TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

# TIMSS



# TIMSS 2019

# INTERNATIONAL RESULTS IN MATHEMATICS AND SCIENCE


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TIMSS & PIRLS International Study Center
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TIMSS 2019 International Results in Mathematics and Science
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Publishers: TIMSS & PIRLS International Study Center,
Lynch School of Education and Human Development,
Boston College and
International Association for the Evaluation of Educational Achievement (IEA)

Library of Congress Catalog Card Number: 2020922702
ISBN-978-1-889938-54-7

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# Contents


About TIMSS 2019 . . . . . 1

COUNTRIES' MATHEMATICS & SCIENCE ACHIEVEMENT . . . . . 6

1
Mathematics Grade 4 . . . . . 7

**Average Mathematics Achievement** . . . . . 7

Average Achievement and Scale Score Distributions . . . . . 7

**Exhibit 1.1** Average Mathematics Achievement and Scale Score Distributions . . . . . 9

**Exhibit 1.2** Significance of Differences Between Countries' Average Mathematics Achievement . . 10

Trends in Average Achievement. . . . . 12

**Exhibit 1.3** Trend Plots of Average Mathematics Achievement Across Assessment Years . . . . 13

**Exhibit 1.4** Differences in Average Mathematics Achievement Across Assessment Years . . . . 20

Average Achievement by Gender . . . . . 25

**Exhibit 1.5** Average Mathematics Achievement by Gender . . . . . 26

Trends in Average Achievement by Gender . . . . . 27

**Exhibit 1.6** Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender . . . . . 28

**Performance at TIMSS International Benchmarks in Mathematics** . . . . . 35

TIMSS 2019 International Benchmarks . . . . . 35

**Exhibit 1.7** Summary of TIMSS 2019 International Benchmarks of Mathematics Achievement. . . 36

Percentages of Students Reaching International Benchmarks . . . . . 37

**Exhibit 1.8** Percentages of Students Reaching International Benchmarks of Mathematics Achievement . . . . . 38

Trends in Percentages of Students Reaching International Benchmarks . . . . . 39

**Exhibit 1.9** Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years . . . . . 40

Low Benchmark: Full Description and Example Items . . . . . 42

**Exhibit 1.10** Description of the TIMSS 2019 Low International Benchmark (400) of Mathematics Achievement . . . . . 43

**Exhibit 1.10.1** Low International Benchmark of Mathematics Achievement – Example Item 1 . . . . 44

Intermediate Benchmark: Full Description and Example Items . . . . . 45
Exhibit 1.11 Description of the TIMSS 2019 Intermediate International Benchmark (475) of Mathematics Achievement . . . . . 46
Exhibit 1.11.1 Intermediate International Benchmark of Mathematics Achievement – Example Item 1 . . . . . 47
Exhibit 1.11.2 Intermediate International Benchmark of Mathematics Achievement – Example Item 2 . . . . . 48
High Benchmark: Full Description and Example Items . . . . . 49
Exhibit 1.12 Description of the TIMSS 2019 High International Benchmark (550) of Mathematics Achievement . . . . . 50
Exhibit 1.12.1 High International Benchmark of Mathematics Achievement – Example Item 1 . . . . 51
Exhibit 1.12.2 High International Benchmark of Mathematics Achievement – Example Item 2 . . . . 52
Exhibit 1.12.3 High International Benchmark of Mathematics Achievement – Example Item 3 . . . . 53
Advanced Benchmark: Full Description and Example Items . . . . . 54
Exhibit 1.13 Description of the TIMSS 2019 Advanced International Benchmark (625) of Mathematics Achievement . . . . . 55
Exhibit 1.13.1 Advanced International Benchmark of Mathematics Achievement – Example Item 1 . . 56
Exhibit 1.13.2 Advanced International Benchmark of Mathematics Achievement – Example Item 2 . . 57
Exhibit 1.13.3 Advanced International Benchmark of Mathematics Achievement – Example Item 3 . . 58
Exhibit 1.13.4 Advanced International Benchmark of Mathematics Achievement – Example Item 4 . . 59
**Average Achievement in Mathematics Content and Cognitive Domains . . . . . 60**
TIMSS 2019 Mathematics Content and Cognitive Domains . . . . . 60
Average Achievement in Content Domains . . . . . 60
Exhibit 1.14 Average Achievement in Mathematics Content Domains . . . . . 62
Trends in Average Achievement in Content Domains . . . . . 63
Exhibit 1.15 Differences in Achievement for Mathematics Content Domains Across Assessment Years . . . . . 64
Average Achievement in Content Domains by Gender . . . . . 68
Exhibit 1.16 Average Achievement in Mathematics Content Domains by Gender . . . . . 69
Average Achievement in Cognitive Domains . . . . . 70
Exhibit 1.17 Average Achievement in Mathematics Cognitive Domains . . . . . 71
Trends in Average Achievement in Cognitive Domains . . . . . 72
Exhibit 1.18 Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years . . . . . 73
Average Achievement in Cognitive Domains by Gender . . . . . 77
Exhibit 1.19 Average Achievement in Mathematics Cognitive Domains by Gender . . . . . 78

## 2
## Science Grade 4 . . . . . 79

**Average Science Achievement** . . . . . 79
Average Achievement and Scale Score Distributions . . . . . 79
**Exhibit 2.1** Average Science Achievement and Scale Score Distributions . . . . . 80
**Exhibit 2.2** Significance of Differences Between Countries' Average Science Achievement. . . . 81
Trends in Average Achievement. . . . . 83
**Exhibit 2.3** Trend Plots of Average Science Achievement Across Assessment Years . . . . . 84
**Exhibit 2.4** Differences in Average Science Achievement Across Assessment Years . . . . . 91
Average Achievement by Gender . . . . . 96
**Exhibit 2.5** Average Science Achievement by Gender. . . . . 97
Trends in Average Achievement by Gender . . . . . 98
**Exhibit 2.6** Trend Plots of Average Science Achievement Across Assessment Years by Gender. . 99
**Performance at TIMSS International Benchmarks in Science** . . . . . 106
TIMSS 2019 International Benchmarks . . . . . 106
**Exhibit 2.7** Summary of TIMSS 2019 International Benchmarks of Science Achievement . . . . 107
Percentages of Students Reaching International Benchmarks . . . . . 108
**Exhibit 2.8** Percentages of Students Reaching International Benchmarks of Science Achievement . . . . . 109
Trends in Percentages of Students Reaching International Benchmarks . . . . . 110
**Exhibit 2.9** Percentages of Students Reaching International Benchmarks of Science Achievement Across Assessment Years . . . . . 111
Low Benchmark: Full Description and Example Items . . . . . 113
**Exhibit 2.10** Description of the TIMSS 2019 Low International Benchmark (400) of Science Achievement . . . . . 114
**Exhibit 2.10.1** Low International Benchmark of Science Achievement – Example Item 1 . . . . . 115
Intermediate Benchmark: Full Description and Example Items . . . . . 116
**Exhibit 2.11** Description of the TIMSS 2019 Intermediate International Benchmark (475) of Science Achievement . . . . . 117
**Exhibit 2.11.1** Intermediate International Benchmark of Science Achievement – Example Item 1 . . . 118
**Exhibit 2.11.2** Intermediate International Benchmark of Science Achievement – Example Item 2 . . . 119
High Benchmark: Full Description and Example Items . . . . . 120
**Exhibit 2.12** Description of the TIMSS 2019 High International Benchmark (550) of Science Achievement . . . . . 121
**Exhibit 2.12.1** High International Benchmark of Science Achievement – Example Item 1 . . . . . 122
**Exhibit 2.12.2** High International Benchmark of Science Achievement – Example Item 2 . . . . . 123
**Exhibit 2.12.3** High International Benchmark of Science Achievement – Example Item 3 . . . . . 124

Advanced Benchmark: Full Description and Example Items . . . . . 125
Exhibit 2.13 Description of the TIMSS 2019 Advanced International Benchmark (625) of Science Achievement . . . . . 126
Exhibit 2.13.1 Advanced International Benchmark of Science Achievement – Example Item 1 . . . . 127
Exhibit 2.13.2 Advanced International Benchmark of Science Achievement – Example Item 2 . . . . 128
Exhibit 2.13.3 Advanced International Benchmark of Science Achievement – Example Item 3 . . . . 129
Exhibit 2.13.4 Advanced International Benchmark of Science Achievement – Example Item 4 . . . . 130
**Average Achievement in Science Content and Cognitive Domains . . . . . 131**
TIMSS 2019 Science Content and Cognitive Domains. . . . . 131
Average Achievement in Content Domains . . . . . 132
Exhibit 2.14 Average Achievement in Science Content Domains . . . . . 133
Trends in Average Achievement in Content Domains . . . . . 134
Exhibit 2.15 Differences in Achievement for Science Content Domains Across Assessment Years . . . . . 135
Average Achievement in Content Domains by Gender . . . . . 139
Exhibit 2.16 Average Achievement in Science Content Domains by Gender . . . . . 140
Average Achievement in Cognitive Domains . . . . . 141
Exhibit 2.17 Average Achievement in Science Cognitive Domains . . . . . 142
Trends in Average Achievement in Cognitive Domains . . . . . 143
Exhibit 2.18 Differences in Achievement for Science Cognitive Domains Across Assessment Years . . . . . 144
Average Achievement in Cognitive Domains by Gender . . . . . 148
Exhibit 2.19 Average Achievement in Science Cognitive Domains by Gender. . . . . 149

**3**
**Mathematics Grade 8 . . . . . 150**
**Average Mathematics Achievement . . . . . 150**
Average Achievement and Scale Score Distributions . . . . . 150
Exhibit 3.1 Average Mathematics Achievement and Scale Score Distributions . . . . . 151
Exhibit 3.2 Significance of Differences Between Countries' Average Mathematics Achievement . . 152
Trends in Average Achievement. . . . . 154
Exhibit 3.3 Trend Plots of Average Mathematics Achievement Across Assessment Years . . . . 155
Exhibit 3.4 Differences in Average Mathematics Achievement Across Assessment Years . . . . 160
Average Achievement by Gender . . . . . 164
Exhibit 3.5 Average Mathematics Achievement by Gender. . . . . 165
Trends in Average Achievement by Gender . . . . . 166
Exhibit 3.6 Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender . . . . . 167

**Performance at TIMSS International Benchmarks in Mathematics . . . . . 172**

TIMSS 2019 International Benchmarks . . . . . 172

**Exhibit 3.7** Summary of TIMSS 2019 International Benchmarks of Mathematics Achievement . . . . . 173

Percentages of Students Reaching International Benchmarks . . . . . 174

**Exhibit 3.8** Percentages of Students Reaching International Benchmarks of Mathematics Achievement . . . . . 175

Trends in Percentages of Students Reaching International Benchmarks . . . . . 176

**Exhibit 3.9** Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years . . . . . 177

Low Benchmark: Full Description . . . . . 179

**Exhibit 3.10** Description of the TIMSS 2019 Low International Benchmark (400) of Mathematics Achievement . . . . . 180

Intermediate Benchmark: Full Description and Example Items . . . . . 181

**Exhibit 3.11** Description of the TIMSS 2019 Intermediate International Benchmark (475) of Mathematics Achievement . . . . . 182

**Exhibit 3.11.1** Intermediate International Benchmark of Mathematics Achievement – Example Item 1 . . . . . 183

**Exhibit 3.11.2** Intermediate International Benchmark of Mathematics Achievement – Example Item 2 . . . . . 184

**Exhibit 3.11.3** Intermediate International Benchmark of Mathematics Achievement – Example Item 3 . . . . . 185

High Benchmark: Full Description and Example Items . . . . . 186

**Exhibit 3.12** Description of the TIMSS 2019 High International Benchmark (550) of Mathematics Achievement . . . . . 187

**Exhibit 3.12.1** High International Benchmark of Mathematics Achievement – Example Item 1 . . . . 188

**Exhibit 3.12.2** High International Benchmark of Mathematics Achievement – Example Item 2 . . . . 189

**Exhibit 3.12.3** High International Benchmark of Mathematics Achievement – Example Item 3 . . . . 190

**Exhibit 3.12.4** High International Benchmark of Mathematics Achievement – Example Item 4 . . . . 191

**Exhibit 3.12.5** High International Benchmark of Mathematics Achievement – Example Item 5 . . . . 192

Advanced Benchmark: Full Description and Example Items . . . . . 193

**Exhibit 3.13** Description of the TIMSS 2019 Advanced International Benchmark (625) of Mathematics Achievement . . . . . 194

**Exhibit 3.13.1** Advanced International Benchmark of Mathematics Achievement – Example Item 1 . . 195

**Exhibit 3.13.2** Advanced International Benchmark of Mathematics Achievement – Example Item 2 . . 196

**Exhibit 3.13.3** Advanced International Benchmark of Mathematics Achievement – Example Item 3 . . 197

**Exhibit 3.13.4** Advanced International Benchmark of Mathematics Achievement – Example Item 4 . . 198

**Average Achievement in Mathematics Content and Cognitive Domains . . . . . 199**

TIMSS 2019 Mathematics Content and Cognitive Domains . . . . . 199

Average Achievement in Content Domains . . . . . 200

**Exhibit 3.14** Average Achievement in Mathematics Content Domains . . . . . 201

Trends in Average Achievement in Content Domains . . . . . 202
Exhibit 3.15 Differences in Achievement for Mathematics Content Domains Across Assessment Years . . . . . 203
Average Achievement in Content Domains by Gender . . . . . 206
Exhibit 3.16 Average Achievement in Mathematics Content Domains by Gender . . . . . 207
Average Achievement in Cognitive Domains . . . . . 208
Exhibit 3.17 Average Achievement in Mathematics Cognitive Domains . . . . . 209
Trends in Average Achievement in Cognitive Domains . . . . . 210
Exhibit 3.18 Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years . . . . . 211
Average Achievement in Cognitive Domains by Gender . . . . . 214
Exhibit 3.19 Average Achievement in Mathematics Cognitive Domains by Gender . . . . . 215

4
Science Grade 8 . . . . . 216
Average Science Achievement . . . . . 216
Average Achievement and Scale Score Distributions . . . . . 216
Exhibit 4.1 Average Science Achievement and Scale Score Distributions . . . . . 217
Exhibit 4.2 Significance of Differences Between Countries' Average Science Achievement. . . . 218
Trends in Average Achievement. . . . . 220
Exhibit 4.3 Trend Plots of Average Science Achievement Across Assessment Years . . . . . 221
Exhibit 4.4 Differences in Average Science Achievement Across Assessment Years . . . . . 226
Average Achievement by Gender . . . . . 230
Exhibit 4.5 Average Science Achievement by Gender. . . . . 231
Trends in Average Achievement by Gender . . . . . 232
Exhibit 4.6 Trend Plots of Average Science Achievement Across Assessment Years by Gender. . 233
Performance at TIMSS International Benchmarks in Science . . . . . 238
TIMSS 2019 International Benchmarks . . . . . 238
Exhibit 4.7 Summary of TIMSS 2019 International Benchmarks of Science Achievement . . . . 239
Percentages of Students Reaching International Benchmarks . . . . . 240
Exhibit 4.8 Percentages of Students Reaching International Benchmarks of Science Achievement . . . . . 241
Trends in Percentages of Students Reaching International Benchmarks . . . . . 242
Exhibit 4.9: Percentages of Students Reaching International Benchmarks of Science Achievement Across Assessment Years . . . . . 243
Low Benchmark: Full Description . . . . . 245
Exhibit 4.10 Description of the TIMSS 2019 Low International Benchmark (400) of Science Achievement . . . . . 246

Intermediate Benchmark: Full Description and Example Items . . . . . 247
Exhibit 4.11 Description of the TIMSS 2019 Intermediate International Benchmark (475) of Science Achievement . . . . . 248
Exhibit 4.11.1 Intermediate International Benchmark of Science Achievement – Example Item 1 . . . 249
Exhibit 4.11.2 Intermediate International Benchmark of Science Achievement – Example Item 2 . . . 250
Exhibit 4.11.3 Intermediate International Benchmark of Science Achievement – Example Item 3 . . . 251
High Benchmark: Full Description and Example Items . . . . . 252
Exhibit 4.12 Description of the TIMSS 2019 High International Benchmark (550) of Science Achievement . . . . . 253
Exhibit 4.12.1 High International Benchmark of Science Achievement – Example Item 1 . . . . . 254
Exhibit 4.12.2 High International Benchmark of Science Achievement – Example Item 2 . . . . . 255
Exhibit 4.12.3 High International Benchmark of Science Achievement – Example Item 3 . . . . . 256
Exhibit 4.12.4 High International Benchmark of Science Achievement – Example Item 4 . . . . . 257
Advanced Benchmark: Full Description and Example Items . . . . . 258
Exhibit 4.13 Description of the TIMSS 2019 Advanced International Benchmark (625) of Science Achievement . . . . . 259
Exhibit 4.13.1 Advanced International Benchmark of Science Achievement – Example Item 1 . . . . 260
Exhibit 4.13.2 Advanced International Benchmark of Science Achievement – Example Item 2 . . . . 261
Exhibit 4.13.3 Advanced International Benchmark of Science Achievement – Example Item 3 . . . . 262
Exhibit 4.13.4 Advanced International Benchmark of Science Achievement – Example Item 4 . . . . 263
**Average Achievement in Science Cognitive Domains . . . . . 264**
TIMSS 2019 Science Content and Cognitive Domains. . . . . 264
Average Achievement in Content Domains . . . . . 265
Exhibit 4.14 Average Achievement in Science Content Domains . . . . . 266
Trends in Average Achievement in Content Domains . . . . . 267
Exhibit 4.15 Differences in Achievement for Science Content Domains Across Assessment Years . . . . . 268
Average Achievement in Content Domains by Gender . . . . . 271
Exhibit 4.16 Average Achievement in Science Content Domains by Gender . . . . . 272
Average Achievement in Cognitive Domains . . . . . 273
Exhibit 4.17 Average Achievement in Science Cognitive Domains . . . . . 274
Trends in Average Achievement in Cognitive Domains . . . . . 275
Exhibit 4.18 Differences in Achievement for Science Cognitive Domains Across Assessment Years . . . . . 276
Average Achievement in Cognitive Domains by Gender . . . . . 279
Exhibit 4.19 Average Achievement in Science Cognitive Domains by Gender. . . . . 280

## Home & School Contexts . . . . . .281

5
## Home Environment Support . . . . . 282

**Home Resources** . . . . . 282

Home Resources for Learning . . . . . 282

**Exhibit 5.1** Home Resources for Learning – About the Scale – Grade 4 . . . . . 283
**Exhibit 5.2** Home Resources for Learning – Mathematics Grade 4 . . . . . 284
**Exhibit 5.3** Home Resources for Learning – Science Grade 4 . . . . . 286

Home Educational Resources . . . . . 288

**Exhibit 5.4** Home Educational Resources – About the Scale – Grade 8 . . . . . 289
**Exhibit 5.5** Home Educational Resources – Mathematics Grade 8 . . . . . 290
**Exhibit 5.6** Home Educational Resources – Science Grade 8 . . . . . 292

**Students Speak the Language of Test** . . . . . 294

**Exhibit 5.7** Students Speak the Language of the Test at Home – Mathematics Grade 4 . . . . . 295
**Exhibit 5.8** Students Speak the Language of the Test at Home – Science Grade 4 . . . . . 296
**Exhibit 5.9** Students Speak the Language of the Test at Home – Mathematics Grade 8 . . . . . 297
**Exhibit 5.10** Students Speak the Language of the Test at Home – Science Grade 8 . . . . . 298

**Emphasis on Early Literacy and Numeracy Development** . . . . . 299

Early Literacy and Numeracy Activities Before Primary School . . . . . 299

**Exhibit 5.11** Home Early Literacy and Numeracy Activities Before Primary School – About the Scale – Grade 4 . . . . . 300
**Exhibit 5.12** Home Early Literacy and Numeracy Activities Before Primary School – Mathematics Grade 4 . . . . . 301
**Exhibit 5.13** Home Early Literacy and Numeracy Activities Before Primary School – Science Grade 4 . . . . . 302

Students Attended Preprimary Education . . . . . 303

**Exhibit 5.14** Students Attended Preprimary Education – Mathematics Grade 4 . . . . . 304
**Exhibit 5.15** Students Attended Preprimary Education – Science Grade 4 . . . . . 305

**Literacy and Numeracy Readiness for School.** . . . . . 306

Early Preparation for School . . . . . 306

**Exhibit 5.16** Early Preparation for School – Mathematics Grade 4 . . . . . 307
**Exhibit 5.17** Early Preparation for School – Science Grade 4 . . . . . 308

Could Do Literacy and Numeracy Tasks When Beginning Primary School . . . . . 309

**Exhibit 5.18** Could Do Literacy and Numeracy Tasks When Beginning Primary School – About the Scale – Grade 4 . . . . . 310
**Exhibit 5.19** Could Do Literacy and Numeracy Tasks When Beginning Primary School – Mathematics Grade 4 . . . . . 311
**Exhibit 5.20** Could Do Literacy and Numeracy Tasks When Beginning Primary School – Science Grade 4 . . . . . 312

# 6
# School Composition and Resources . . . . . 313


## Socioeconomic Background of the Student Body . . . . . 313

**Exhibit 6.1** School Composition by Socioeconomic Background of the Student Body – About the Scale – Grades 4 & 8 . . . . . 314

**Exhibit 6.2** School Composition by Socioeconomic Background of the Student Body – Mathematics Grade 4 . . . . . 315

**Exhibit 6.3** School Composition by Socioeconomic Background of the Student Body – Science Grade 4 . . . . . 316

**Exhibit 6.4** School Composition by Socioeconomic Background of the Student Body – Mathematics Grade 8 . . . . . 317

**Exhibit 6.5** School Composition by Socioeconomic Background of the Student Body – Science Grade 8 . . . . . 318

## Students' Native Language is the Language of the Test . . . . . 319

**Exhibit 6.6** Schools with Students Having the Language of the Test as Their Native Language – Mathematics Grade 4 . . . . . 320

**Exhibit 6.7** Schools with Students Having the Language of the Test as Their Native Language – Science Grade 4 . . . . . 321

**Exhibit 6.8** Schools with Students Having the Language of the Test as Their Native Language – Mathematics Grade 8 . . . . . 322

**Exhibit 6.9** Schools with Students Having the Language of the Test as Their Native Language – Science Grade 8 . . . . . 323

## Students Enter Primary School with Literacy and Numeracy Skills . . . . . 324

**Exhibit 6.10** Schools Where Students Enter the Primary Grades with Literacy and Numeracy Skills – About the Scale – Grade 4. . . . . 325

**Exhibit 6.11** Schools Where Students Enter the Primary Grades with Literacy and Numeracy Skills – Mathematics Grade 4. . . . . 326

**Exhibit 6.12** Schools Where Students Enter the Primary Grades with Literacy and Numeracy Skills – Science Grade 4 . . . . . 327

## Instruction Affected by Resource Shortages . . . . . 328

### Instruction Affected by Mathematics Resource Shortages . . . . . 328

**Exhibit 6.13** Instruction Affected by Mathematics Resource Shortages – About the Scale – Grades 4 & 8 . . . . . 329

**Exhibit 6.14** Instruction Affected by Mathematics Resource Shortages – Principals' Reports – Grade 4 . . . . . 330

**Exhibit 6.15** Instruction Affected by Mathematics Resource Shortages – Principals' Reports – Grade 8 . . . . . 331

### Instruction Affected by Science Resource Shortages . . . . . 332

**Exhibit 6.16** Instruction Affected by Science Resource Shortages – About the Scale – Grades 4 & 8 . . . . . 333

**Exhibit 6.17** Instruction Affected by Science Resource Shortages – Principals' Reports – Grade 4 . . . . . 334

**Exhibit 6.18** Instruction Affected by Science Resource Shortages – Principals' Reports – Grade 8 . . . . . 335

**Principals' Education and Years of Experience** . . . . . 336
Principals' Formal Education . . . . . 336
Exhibit 6.19 Principals' Formal Education – Grade 4 . . . . . 337
Exhibit 6.20 Principals' Formal Education – Grade 8 . . . . . 338
Principals' Years of Experience . . . . . 339
Exhibit 6.21 Principals' Years of Experience – Grade 4 . . . . . 340
Exhibit 6.22 Principals' Years of Experience – Grade 8 . . . . . 341

7
**School Climate** . . . . . 342
**School Emphasis on Academic Success** . . . . . 342
Exhibit 7.1 School Emphasis on Academic Success – About the Scale – Grades 4 & 8 . . . . . 343
Exhibit 7.2 School Emphasis on Academic Success – Principals' Reports – Mathematics Grade 4 . . . . . 344
Exhibit 7.3 School Emphasis on Academic Success – Principals' Reports – Science Grade 4 . . . . . 345
Exhibit 7.4 School Emphasis on Academic Success – Principals' Reports – Mathematics Grade 8 . . . . . 346
Exhibit 7.5 School Emphasis on Academic Success – Principals' Reports – Science Grade 8 . . . . . 347
**Parents' Perceptions of the School** . . . . . 348
Exhibit 7.6 Parents' Perceptions of Their Child's School – About the Scale – Grade 4 . . . . . 349
Exhibit 7.7 Parents' Perceptions of Their Child's School – Mathematics Grade 4 . . . . . 350
Exhibit 7.8 Parents' Perceptions of Their Child's School – Science Grade 4 . . . . . 351
**Students' Sense of School Belonging** . . . . . 352
Exhibit 7.9 Students' Sense of School Belonging – About the Scale – Grades 4 & 8. . . . . 353
Exhibit 7.10 Students' Sense of School Belonging – Mathematics Grade 4 . . . . . 354
Exhibit 7.11 Students' Sense of School Belonging – Science Grade 4. . . . . 355
Exhibit 7.12 Students' Sense of School Belonging – Mathematics Grade 8 . . . . . 356
Exhibit 7.13 Students' Sense of School Belonging – Science Grade 8. . . . . 357

8
**School Discipline and Safety** . . . . . 358
**School Discipline** . . . . . 358
Exhibit 8.1 School Discipline – About the Scale – Grades 4 & 8 . . . . . 359
Exhibit 8.2 School Discipline – Principals' Reports – Mathematics Grade 4 . . . . . 360
Exhibit 8.3 School Discipline – Principals' Reports – Science Grade 4 . . . . . 361
Exhibit 8.4 School Discipline – Principals' Reports – Mathematics Grade 8 . . . . . 362
Exhibit 8.5 School Discipline – Principals' Reports – Science Grade 8 . . . . . 363

**Safe and Orderly School** . . . . . 364
Exhibit 8.6 Safe and Orderly School – About the Scale – Grades 4 & 8 . . . . . 365
Exhibit 8.7 Safe and Orderly School – Teachers' Reports – Mathematics Grade 4 . . . . . 366
Exhibit 8.8 Safe and Orderly School – Teachers' Reports – Science Grade 4 . . . . . 367
Exhibit 8.9 Safe and Orderly School – Teachers' Reports – Mathematics Grade 8 . . . . . 368
Exhibit 8.10 Safe and Orderly School – Teachers' Reports – Science Grade 8 . . . . . 369
**Student Bullying** . . . . . 370
Exhibit 8.11 Student Bullying – About the Scale – Grade 4 . . . . . 371
Exhibit 8.12 Student Bullying – Mathematics Grade 4 . . . . . 372
Exhibit 8.13 Student Bullying – Science Grade 4 . . . . . 373
Exhibit 8.14 Student Bullying – About the Scale – Grade 8 . . . . . 374
Exhibit 8.15 Student Bullying – Mathematics Grade 8 . . . . . 375
Exhibit 8.16 Student Bullying – Science Grade 8 . . . . . 376

**CLASSROOM CONTEXTS** . . . . . 377

**9**
**Teacher Preparation, Professional Development, and Job Satisfaction** . . . . . 378

**Teachers' Formal Education** . . . . . 378
Exhibit 9.1 Teachers' Formal Education – Mathematics Grade 4 . . . . . 379
Exhibit 9.2 Teachers' Formal Education – Science Grade 4 . . . . . 380
Exhibit 9.3 Teachers' Formal Education – Mathematics Grade 8 . . . . . 381
Exhibit 9.4 Teachers' Formal Education – Science Grade 8 . . . . . 382
**Teachers' Major** . . . . . 383
Exhibit 9.5 Teachers Majored in Education and Mathematics – Grade 4 . . . . . 385
Exhibit 9.6 Teachers Majored in Education and Science – Grade 4 . . . . . 386
Exhibit 9.7 Teachers Majored in Education and Mathematics – Grade 8 . . . . . 387
Exhibit 9.8 Teachers Majored in Education and Science – Grade 8 . . . . . 388
**Teachers' Years of Experience** . . . . . 389
Exhibit 9.9 Teachers' Years of Experience – Mathematics Grade 4 . . . . . 390
Exhibit 9.10 Teachers' Years of Experience – Science Grade 4 . . . . . 391
Exhibit 9.11 Teachers' Years of Experience – Mathematics Grade 8 . . . . . 392
Exhibit 9.12 Teachers' Years of Experience – Science Grade 8 . . . . . 393
**Teachers' Participation in Professional Development** . . . . . 394
Exhibit 9.13 Teachers' Participation in Professional Development in Mathematics in the Past Two Years – Grade 4 . . . . . 395
Exhibit 9.14 Teachers' Participation in Professional Development in Science in the Past Two Years – Grade 4 . . . . . 396

**Exhibit 9.15** Teachers' Participation in Professional Development in Mathematics in the Past Two Years – Grade 8 . . . 397
**Exhibit 9.16** Teachers' Participation in Professional Development in Science in the Past Two Years – Grade 8 . . . 398

**Teachers' Professional Development Needs** . . . 399

**Exhibit 9.17** Teachers' Needs for Future Professional Development in Mathematics – Grade 4 . . . 400
**Exhibit 9.18** Teachers' Needs for Future Professional Development in Science – Grade 4 . . . 401
**Exhibit 9.19** Teachers' Needs for Future Professional Development in Mathematics – Grade 8 . . . 402
**Exhibit 9.20** Teachers' Needs for Future Professional Development in Science – Grade 8 . . . 403

**Teachers' Job Satisfaction** . . . 404

**Exhibit 9.21** Teachers' Job Satisfaction – About the Scale – Grades 4 & 8 . . . 405
**Exhibit 9.22** Teachers' Job Satisfaction – Mathematics Grade 4 . . . 406
**Exhibit 9.23** Teachers' Job Satisfaction – Science Grade 4 . . . 407
**Exhibit 9.24** Teachers' Job Satisfaction – Mathematics Grade 8 . . . 408
**Exhibit 9.25** Teachers' Job Satisfaction – Science Grade 8 . . . 409

**10**
**Challenges to Teaching and Learning . . . 410**

**Student Absenteeism** . . . 410

**Exhibit 10.1** Frequency of Student Absences – Mathematics Grade 4 . . . 411
**Exhibit 10.2** Frequency of Student Absences – Science Grade 4 . . . 412
**Exhibit 10.3** Frequency of Student Absences – Mathematics Grade 8 . . . 413
**Exhibit 10.4** Frequency of Student Absences – Science Grade 8 . . . 414

**Students Feel Tired or Hungry** . . . 415

**Exhibit 10.5** Students Report Arriving at School Feeling Tired or Hungry – Mathematics Grade 4 . . . 416
**Exhibit 10.6** Students Report Arriving at School Feeling Tired or Hungry – Science Grade 4 . . . 417
**Exhibit 10.7** Students Report Arriving at School Feeling Tired or Hungry – Mathematics Grade 8 . . . 418
**Exhibit 10.8** Students Report Arriving at School Feeling Tired or Hungry – Science Grade 8 . . . 419

**Classroom Teaching Limited by Students Not Ready for Instruction.** . . . 420

**Exhibit 10.9** Classroom Teaching Limited by Students Not Ready for Instruction – About the Scale – Grades 4 & 8 . . . 421
**Exhibit 10.10** Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports – Mathematics Grade 4 . . . 422
**Exhibit 10.11** Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports – Science Grade 4 . . . 423
**Exhibit 10.12** Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports – Mathematics Grade 8 . . . 424
**Exhibit 10.13** Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports – Science Grade 8 . . . 425

## 11
## Students' Attitudes . . . . . 426


**Students Like Learning Mathematics and Science** . . . . . 426

Exhibit 11.1 Students Like Learning Mathematics – About the Scale – Grades 4 & 8 . . . . . 428
Exhibit 11.2 Students Like Learning Mathematics – Grade 4. . . . . 429
Exhibit 11.3 Students Like Learning Mathematics – Grade 8. . . . . 430
Exhibit 11.4 Students Like Learning Science – About the Scale – Grades 4 & 8 . . . . . 431
Exhibit 11.5 Students Like Learning Science – Grade 4 . . . . . 432
Exhibit 11.6 Students Like Learning Science – Grade 8 . . . . . 433

**Students Confident in Mathematics and Science** . . . . . 435

Exhibit 11.7 Students Confident in Mathematics – About the Scale – Grades 4 & 8 . . . . . 436
Exhibit 11.8 Students Confident in Mathematics – Grade 4 . . . . . 437
Exhibit 11.9 Students Confident in Mathematics – Grade 8 . . . . . 438
Exhibit 11.10 Students Confident in Science – About the Scale – Grades 4 & 8 . . . . . 439
Exhibit 11.11 Students Confident in Science – Grade 4 . . . . . 440
Exhibit 11.12 Students Confident in Science – Grade 8 . . . . . 441

**Students Value Mathematics and Science** . . . . . 443

Exhibit 11.13 Students Value Mathematics – About the Scale – Grade 8 . . . . . 444
Exhibit 11.14 Students Value Mathematics – Grade 8 . . . . . 445
Exhibit 11.15 Students Value Science – About the Scale – Grade 8 . . . . . 446
Exhibit 11.16 Students Value Science – Grade 8 . . . . . 447


## 12
## Mathematics Curriculum and Instruction . . . . . 448


**Instructional Time in Mathematics** . . . . . 448

Exhibit 12.1 Instructional Time Spent on Mathematics – About the Scale – Grades 4 & 8 . . . . . 449
Exhibit 12.2 Instructional Time Spent on Mathematics – Grade 4 . . . . . 450
Exhibit 12.3 Instructional Time Spent on Mathematics – Grade 8 . . . . . 451

**Students Taught the TIMSS Mathematics Topics** . . . . . 452

Exhibit 12.4 Percentages of Students Taught the TIMSS Mathematics Topics – About the Scale – Grade 4 . . . . . 454
Exhibit 12.5 Percentages of Students Taught the TIMSS Mathematics Topics – Grade 4 . . . . . 455
Exhibit 12.6 Percentages of Students Taught the TIMSS Mathematics Topics – About the Scale – Grade 8 . . . . . 456
Exhibit 12.7 Percentages of Students Taught the TIMSS Mathematics Topics – Grade 8 . . . . . 457

**Instructional Clarity in Mathematics Lessons** . . . . . 458

Exhibit 12.8 Instructional Clarity in Mathematics Lessons – About the Scale – Grades 4 & 8 . . . . . 459
Exhibit 12.9 Instructional Clarity in Mathematics Lessons – Students' Reports – Grade 4 . . . . . 460
Exhibit 12.10 Instructional Clarity in Mathematics Lessons – Students' Reports – Grade 8 . . . . . 461

Disorderly Behavior During Mathematics Lessons . . . . . 462
Exhibit 12.11 Disorderly Behavior During Mathematics Lessons – About the Scale – Grades 4 & 8 . . 463
Exhibit 12.12 Disorderly Behavior During Mathematics Lessons – Grade 4 . . . . . 464
Exhibit 12.13 Disorderly Behavior During Mathematics Lessons – Grade 8 . . . . . 465

13
Science Curriculum and Instruction . . . . . 466

Instructional Time in Science . . . . . 466
Exhibit 13.1 Instructional Time Spent on Science – About the Scale – Grades 4 & 8 . . . . . 467
Exhibit 13.2 Instructional Time Spent on Science – Grade 4 . . . . . 468
Exhibit 13.3 Instructional Time Spent on Science – Grade 8 . . . . . 469
Students Taught the TIMSS Science Topics . . . . . 471
Exhibit 13.4 Percentages of Students Taught the TIMSS Science Topics – About the Scale – Grade 4 . . . . . 472
Exhibit 13.5 Percentages of Students Taught the TIMSS Science Topics – Grade 4 . . . . . 473
Exhibit 13.6 Percentages of Students Taught the TIMSS Science Topics – About the Scale – Grade 8 . . . . . 474
Exhibit 13.7 Percentages of Students Taught the TIMSS Science Topics – Grade 8 . . . . . 475
Instructional Clarity in Science Lessons. . . . . 476
Exhibit 13.8 Instructional Clarity in Science Lessons – About the Scale – Grades 4 & 8 . . . . . 477
Exhibit 13.9 Instructional Clarity in Science Lessons – Students' Reports – Grade 4 . . . . . 478
Exhibit 13.10 Instructional Clarity in Science Lessons – Students' Reports – Grade 8 . . . . . 479
Teachers' Emphasis on Science Investigation . . . . . 481
Exhibit 13.11 Teachers' Emphasis on Science Investigation – About the Scale – Grades 4 & 8 . . . 482
Exhibit 13.12 Teachers' Emphasis on Science Investigation – Grade 4 . . . . . 483
Exhibit 13.13 Teachers' Emphasis on Science Investigation – Grade 8 . . . . . 484
School Resources for Science Experiments . . . . . 485
Exhibit 13.14 School Resources for Conducting Science Experiments – Grade 4 . . . . . 486
Exhibit 13.15 School Resources for Conducting Science Experiments – Grade 8 . . . . . 487
Experiments in Science Lessons . . . . . 488
Exhibit 13.16 Frequency Students Conduct Experiments in Science Lessons – Grade 4 . . . . . 489
Exhibit 13.17 Frequency Students Conduct Experiments in Science Lessons – Grade 8 . . . . . 490

14
Technology in Instruction . . . . . 492

Computer Access for Instruction . . . . . 492
Exhibit 14.1 Access to Computers for Mathematics Lessons – Grade 4 . . . . . 493
Exhibit 14.2 Access to Computers for Science Lessons – Grade 4 . . . . . 494
Exhibit 14.3 Access to Computers for Mathematics Lessons – Grade 8 . . . . . 495
Exhibit 14.4 Access to Computers for Science Lessons – Grade 8 . . . . . 496

**Technology to Support Learning** . . . . . 497

**Exhibit 14.5:** Teachers Do Computer Activities to Support Learning in Mathematics Lessons – Grade 4 . . . . . 498

**Exhibit 14.6** Teachers Do Computer Activities to Support Learning in Science Lessons – Grade 4 . . . . . 499

**Exhibit 14.7** Teachers Do Computer Activities to Support Learning in Mathematics Lessons – Grade 8 . . . . . 500

**Exhibit 14.8** Teachers Do Computer Activities to Support Learning in Science Lessons – Grade 8 . . . . . 501

**Tests Delivered on Digital Devices** . . . . . 502

**Exhibit 14.9** Students Take Mathematics Tests on Computers or Tablets – Grade 4 . . . . . 503

**Exhibit 14.10** Students Take Science Tests on Computers or Tablets – Grade 4 . . . . . 504

**Exhibit 14.11** Students Take Mathematics Tests on Computers or Tablets – Grade 8 . . . . . 505

**Exhibit 14.12** Students Take Science Tests on Computers or Tablets – Grade 8 . . . . . 506

## Appendix A
## Country Participation in TIMSS 2019 and in Earlier TIMSS Assessments . . . . . 507

**Exhibit A.1** Country Participation in TIMSS 2019 and in Earlier TIMSS Assessments . . . . . 508

## Appendix B
## Population Coverage and Sample Participation Rates. . . 510

**Exhibit B.1** Information About the Students Assessed in TIMSS 2019 . . . . . 511

**Exhibit B.2** Coverage of TIMSS 2019 Target Population – Grade 4. . . . . 513

**Exhibit B.3** School Sample Sizes – Grade 4 . . . . . 514

**Exhibit B.4** Student Sample Sizes – Grade 4 . . . . . 515

**Exhibit B.5** Participation Rates (Weighted) – Grade 4 . . . . . 516

**Exhibit B.6** Trends in Student Populations – Grade 4 . . . . . 517

**Exhibit B.7** Coverage of TIMSS 2019 Target Population – Grade 8. . . . . 522

**Exhibit B.8** School Sample Sizes – Grade 8 . . . . . 523

**Exhibit B.9** Student Sample Sizes – Grade 8 . . . . . 524

**Exhibit B.10** Participation Rates (Weighted) – Grade 8 . . . . . 525

**Exhibit B.11** Trends in Student Populations – Grade 8 . . . . . 526

## Appendix C
## The Test-Curriculum Matching Analysis. . . . . 530

**Exhibit C.1** Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis – Grade 4 . . . . . 534

**Exhibit C.2** Average Scale Scores for the Science Test-Curriculum Matching Analysis – Grade 4 . . . . . 541

**Exhibit C.3** Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis – Grade 8 . . . . . 548

**Exhibit C.4** Average Scale Scores for the Science Test-Curriculum Matching Analysis – Grade 8 . . . . . 553

## Appendix D
## Percentiles of Achievement . . . . . 558

Exhibit D.1 Percentiles of Mathematics Achievement – Grade 4 . . . . . 559
Exhibit D.2 Percentiles of Science Achievement – Grade 4 . . . . . 560
Exhibit D.3 Percentiles of Mathematics Achievement – Grade 8 . . . . . 561
Exhibit D.4 Percentiles of Science Achievement – Grade 8 . . . . . 562

## Appendix E
## Standard Deviations of Achievement . . . . . 563

Exhibit E.1 Average Mathematics Achievement and Standard Deviations by Gender – Grade 4 . . 564
Exhibit E.2 Average Science Achievement and Standard Deviations by Gender – Grade 4 . . . . 565
Exhibit E.3 Average Mathematics Achievement and Standard Deviations by Gender – Grade 8 . . 566
Exhibit E.4 Average Science Achievement and Standard Deviations by Gender – Grade 8 . . . . 567

## Appendix F
## Average Percent Correct in the Content and Cognitive Domains . . . . . 568

Exhibit F.1 Average Percent Correct in the Mathematics Content and Cognitive Domains – Grade 4 . . . . . 569
Exhibit F.2 Average Percent Correct in the Science Content and Cognitive Domains – Grade 4 . . . . . 571
Exhibit F.3 Average Percent Correct in the Mathematics Content and Cognitive Domains – Grade 8 . . . . . 573
Exhibit F.4 Average Percent Correct in the Science Content and Cognitive Domains – Grade 8 . . . . . 574

## Appendix G
## Percentages of Students with Achievement Too Low for Estimation . . . . . 575

Exhibit G.1 Percentages of Students with Mathematics Achievement Too Low for Estimation – Grade 4 . . . . . 576
Exhibit G.2 Percentages of Students with Science Achievement Too Low for Estimation – Grade 4 . . . . . 577
Exhibit G.3 Percentages of Students with Mathematics Achievement Too Low for Estimation – Grade 8 . . . . . 578
Exhibit G.4 Percentages of Students with Science Achievement Too Low for Estimation – Grade 8 . . . . . 579

## Appendix H
## Organizations and Individuals Responsible for TIMSS 2019 . . . . . 580

IEA TIMSS 2019

# About TIMSS 2019

## Overview

IEA's TIMSS 2019 is the seventh assessment cycle of TIMSS, the Trends in International Mathematics and Science Study. TIMSS 2019 was conducted at the fourth and eighth grades in 64 countries and 8 benchmarking systems. Inaugurated in 1995, TIMSS has been conducted every four years since, providing 24 years of trends in mathematics and science achievement.

The TIMSS assessments of student achievement are updated with each cycle in collaboration with the participating countries, who review the frameworks describing the mathematics and science content to be assessed and participate in item development. TIMSS also provides important policy relevant data about students' contexts for learning mathematics and science based on questionnaires completed by students and their parents or caregivers, teachers, and school principals. Taken together, TIMSS provides comparative data about countries' student achievement over time and in relation to key home, school, and classroom variables.

TIMSS 2019 continues the long history of international assessments in mathematics and science conducted by IEA—the International Association for the Evaluation of Educational Achievement. An independent international cooperative of national research institutions and government agencies, IEA pioneered international comparative assessments of educational achievement in the 1960s to gain a deeper understanding of the effects of policies across countries' different systems of education. IEA has been conducting international assessments of mathematics and science and collecting data about the factors associated with achievement in countries around the world for more than 50 years. TIMSS at the fourth grade is complemented by IEA's PIRLS—the Progress in International Reading Literacy Study—conducted every five years since 2001.

TIMSS and PIRLS are directed by IEA's TIMSS & PIRLS International Study Center at Boston College, in close cooperation with IEA Amsterdam, IEA Hamburg, and Statistics Canada. Each participating country has a National Research Coordinator who is responsible for implementing TIMSS in accordance with international procedures and to TIMSS' standards of technical excellence.

## Transition to Computer-Based Assessment

In 2019, TIMSS began the transition to computer-based assessment by introducing a computerized version—eTIMSS. Half the participating countries in 2019 chose to administer the new eTIMSS version, while the other half continued to administer the paper-based version.

Every effort was made to have the eTIMSS and paperTIMSS assessments be as similar as possible, while capitalizing on new item types, such as drag-and-drop and drop-down menus, and automated scoring through keypad entry. The goal of item development was to ensure that eTIMSS and paperTIMSS measured the same mathematics and science constructs using the same assessment items, as much as possible.

To provide a bridge between eTIMSS and paperTIMSS, eTIMSS countries also administered the paperTIMSS trend items to a separate sample of students, typically in the same schools. The bridge data form an intermediate link (or bridge) between eTIMSS countries' computer-based data in 2019 and their paper-based data in 2015 as well as to the paperTIMSS countries in 2019.

## Participating Countries

As shown below, 64 countries participated in TIMSS 2019, including some distinct education systems within countries that have always participated separately throughout IEA's long history (e.g., the Dutch-speaking part of Belgium and Hong Kong Special Administrative Region (SAR) of the People's Republic of China). In addition, TIMSS 2019 had 8 benchmarking participants, (e.g., regional entities, such as provinces and municipalities).

Countries and benchmarking participants could choose to participate in the fourth grade assessment, the eighth grade assessment, or both. In 2019, 58 countries and 6 benchmarking entities participated in the TIMSS fourth grade assessment, and 39 countries and 7 benchmarking participants participated in the eighth grade assessment.

**Countries Participating in TIMSS 2019**

Albania
Armenia
Australia
Austria *
Azerbaijan
Bahrain
Belgium (Flemish)
Bosnia and Herzegovina
Bulgaria
Canada *
Chile *
Chinese Taipei *
Croatia *
Cyprus
Czech Republic *
Denmark *
Egypt
England *
Finland *
France *
Georgia *
Germany *
Hong Kong SAR *
Hungary *
Iran, Islamic Rep. of
Ireland
Israel *
Italy *
Japan
Jordan
Kazakhstan
Korea, Rep. of *
Kosovo
Kuwait
Latvia
Lebanon
Lithuania *
Malaysia *
Malta *
Montenegro
Morocco
Netherlands *
New Zealand
North Macedonia
Northern Ireland
Norway *
Oman
Pakistan
Philippines
Poland
Portugal *
Qatar *
Romania
Russian Federation *
Saudi Arabia
Serbia
Singapore *
Slovak Republic *
South Africa
Spain *
Sweden *
Turkey *
United Arab Emirates *
United States *

**Benchmarking Participants**

Ontario, Canada *
Quebec, Canada *
Moscow, Russian Fed. *
Madrid, Spain *
Gauteng, RSA
Western Cape, RSA
Abu Dhabi, UAE *
Dubai, UAE *

* Transitioned to eTIMSS

## TIMSS 2019 Assessment Frameworks

The TIMSS 2019 mathematics and science assessments are based on comprehensive frameworks developed collaboratively with the participating countries. The TIMSS 2019 Mathematics Framework and the TIMSS 2019 Science Framework are each organized around two dimensions: a content dimension specifying the content to be assessed and a cognitive dimension specifying the thinking processes to be assessed.

In mathematics, TIMSS 2019 at the fourth grade assessed three content domains: number, measurement and geometry, and data. The eighth grade assessment had four content domains: number, algebra, geometry, and data and probability. In science, the TIMSS 2019 fourth grade assessment included three content domains: life science, physical science, and Earth science. The eighth grade included four content domains: biology, chemistry, physics, and Earth science. The proportion of each assessment devoted to the content domains differed to reflect curricular emphases in each grade. In both grades and both subjects, TIMSS 2019 assessed three cognitive domains: knowing, applying, and reasoning.

The TIMSS assessments include a substantial number of items to cover the breadth of mathematics and science content addressed in the frameworks. The fourth grade mathematics and science assessments each include approximately 175 items and the eighth grade mathematics and science assessments each include approximately 220 items.

## Achievement Data

The *TIMSS 2019 International Mathematics and Science Results* report presents TIMSS 2019 average mathematics and science scale scores and score distributions at the fourth and eighth grades for each participating country and benchmarking system. Scaling the TIMSS 2019 achievement data proceeded in two phases: calibrating the paperTIMSS and bridge data on the TIMSS 2019 achievement scales, and linking the eTIMSS data to these scales via the bridge data. This process enabled the eTIMSS and paperTIMSS achievement results to be reported on the same achievement scale in each grade and subject.

Trends are reported across the seven TIMSS assessment cycles for countries that have comparable data from previous TIMSS assessments. Average scale scores also are provided by gender and for each of the content and cognitive domains. To provide an interpretation for the average scale scores, TIMSS relates performance on the assessment items to four international benchmarks on the achievement scales: Low, Intermediate, High, and Advanced. Students' performance at each of the benchmarks is described in terms of the items that students reaching the benchmark answered correctly.

## Contextual Data

The goal of TIMSS is to provide the best policy-relevant information to help improve mathematics and science teaching and learning. TIMSS 2019 included student, teacher, and school questionnaires

and the Early Learning Survey (also called the "home questionnaire") completed by students' parents or caregivers. Many of the questionnaire items were developed and analyzed as item response theory (IRT) scales to provide robust indicators of important aspects of schooling (e.g., school safety, students' attitudes toward learning mathematics and science, the impact of an early start). Together, the questionnaire results provide a wealth of information about the home, school, and classroom contexts in which students learn mathematics and science. The results from the questionnaires are reported in the Home & School Contexts and Classroom Contexts parts of this report.

The *TIMSS 2019 Encyclopedia: Education Policy and Curriculum in Mathematics and Science report* is a qualitative companion to the quantitative results summarized in this report. The *TIMSS 2019 Encyclopedia* comprises chapters written by each country and benchmarking participant that describe the structure of these countries' education systems and their mathematics and science curricula and initiatives. It also includes the results from the TIMSS 2019 Curriculum Questionnaire, completed by each TIMSS National Research Coordinator.

## Students Assessed

TIMSS assesses students in participating countries in their fourth year of formal schooling, provided the mean age at the time of testing is at least 9.5 years, and in their eighth year of formal schooling, provided the mean age at the time of testing is 13.5 years. Because education systems vary in structure and in policies and practices with regard to age of starting school and promotion and retention, there are differences across countries in how the target grades are labeled and in the average age of students. Moreover, some countries choose to administer TIMSS to a different grade than the fourth or eighth years of formal schooling. Norway chose to assess fifth and ninth grade students to obtain better comparisons with Sweden and Finland. South Africa and its benchmarking systems assessed fifth and ninth grade students to better match their curricula and to maintain trend measurement. Turkey also chose to assess students in the fifth grade.

In each grade, nationally representative samples of approximately 4,000 students from 150 to 200 schools participated in TIMSS 2019. Including the mathematics and science assessments and context questionnaires, more than 330,000 students, 310,000 parents, 11,000 schools, and 22,000 teachers participated in the fourth grade assessment, and a further 250,000 students from 8,000 schools, and 30,000 teachers participated in the eighth grade assessment.

Appendix B of this report provides information about the grades assessed in each country, including the country's name of that grade or grades, as well as the mean age of students in each grade assessed in TIMSS 2019.

## Quality Assurance

TIMSS 2019 made every effort to attend to the quality and comparability of the data through careful planning and documentation, cooperation among participating countries, standardized procedures,

and rigorous attention to quality control throughout. The assessments were administered to nationally representative and well-documented probability samples of students in each country. Staff from Statistics Canada and IEA Hamburg worked with National Research Coordinators on all phases of sampling activities to ensure compliance with sampling and participation requirements, with the few exceptions from compliance annotated in the data exhibits. IEA Amsterdam worked with the TIMSS & PIRLS International Study Center to manage an extensive series of verification checks to ensure the comparability of translations of the assessment items and questionnaires, and to conduct an international quality assurance program of school visits to monitor and report on the administration of the assessment. IEA Hamburg staff worked closely with National Research Coordinators during the project to organize data collection operations and to check all data for accuracy and consistency within and across countries.

Finally, full documentation of the many technical activities required to conduct TIMSS 2019 is provided in *Methods and Procedures: TIMSS 2019 Technical Report*. This volume includes detailed information about the processes used to develop and implement the TIMSS 2019 assessments, including sampling, translation verification, data collection, scaling, linking, and data analysis.

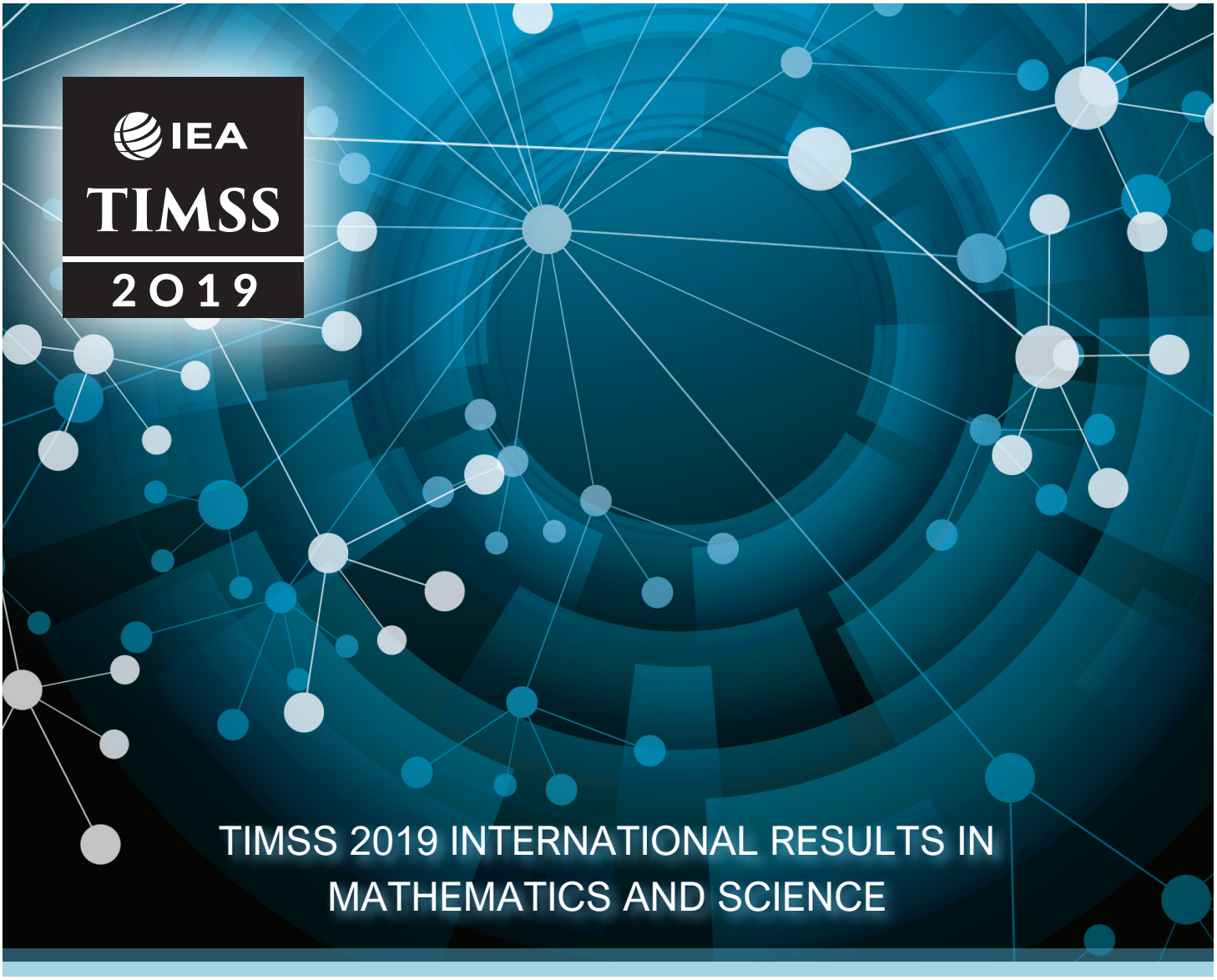
## About this Report

The *TIMSS 2019 International Mathematics and Science Results* report presents results from TIMSS 2019 in 14 chapters. Report readers can view the TIMSS 2019 results using the navigation buttons across the top of the report website, or access each chapter using the side menu. Exhibits and report text can be downloaded and printed from the Download Center in the side menu and on pages throughout the website.

The report is organized in three parts:

- **Countries' Mathematics & Science Achievement** presents achievement results in four chapters, one for each grade and subject assessed in TIMSS: Mathematics Grade 4, Science Grade 4, Mathematics Grade 8, and Science Grade 8.
- **Home & School Contexts** presents results pertaining to the home and school contexts in which students learn, in four chapters: Home Environment Support; School Composition and Resources; School Climate; and School Discipline and Safety.
- **Classroom Contexts** presents results pertaining to students' classrooms contexts for learning mathematics and science: Teacher Preparation, Professional Development and Job Satisfaction; Challenges to Teaching and Learning; Students' Attitudes; Mathematics Curriculum and Instruction; Science Curriculum and Instruction; and Technology in Instruction.

Appendices A through H provide information about country participation in TIMSS 2019 and earlier TIMSS assessments; population coverage, sample sizes, and participation rates; additional achievement results, including the Test-Curriculum Matching Analysis (TCMA); and information about the organizations and individuals responsible for TIMSS 2019.




# COUNTRIES' MATHEMATICS & SCIENCE ACHIEVEMENT

IEA
TIMSS & PIRLS
International Study Center
Lynch School of Education
BOSTON COLLEGE

# Mathematics Grade 4

## Average Mathematics Achievement

### Average Achievement and Scale Score Distributions

The TIMSS 2019 fourth grade mathematics assessment was based on a comprehensive assessment framework developed collaboratively with the participating countries to reflect their curricular goals. The fourth grade mathematics assessment included three content areas—number, which included prealgebra (50%); measurement and geometry (30%); and data (20%). In accordance with the framework, the majority of TIMSS 2019 mathematics items assessed fourth grade students' applying and reasoning skills. To cover the framework at the fourth grade, the TIMSS 2019 mathematics assessment comprised 175 assessment items. This cycle marked the beginning of the transition to a computer-based assessment system. More than half of the TIMSS 2019 countries administered the assessment in an "e" (electronic) format and almost half administered the assessment in a paper format, as in TIMSS 2015. The "e" countries also administered the trend items in the paper format to provide a bridge to the TIMSS 2015 and TIMSS 2019 paper-based assessments. At the fourth grade, the paper-based assessment also was available in a less difficult version, with some items being less difficult, and the rest of the items in common with the regular version. Some countries opted to administer the less difficult TIMSS mathematics assessment at fourth grade in order to better measure student achievement of their student populations. The assessment was carefully designed and analyzed, so that the TIMSS 2019 mathematics achievement results for all 58 countries are reported on the same TIMSS fourth grade mathematics scale.

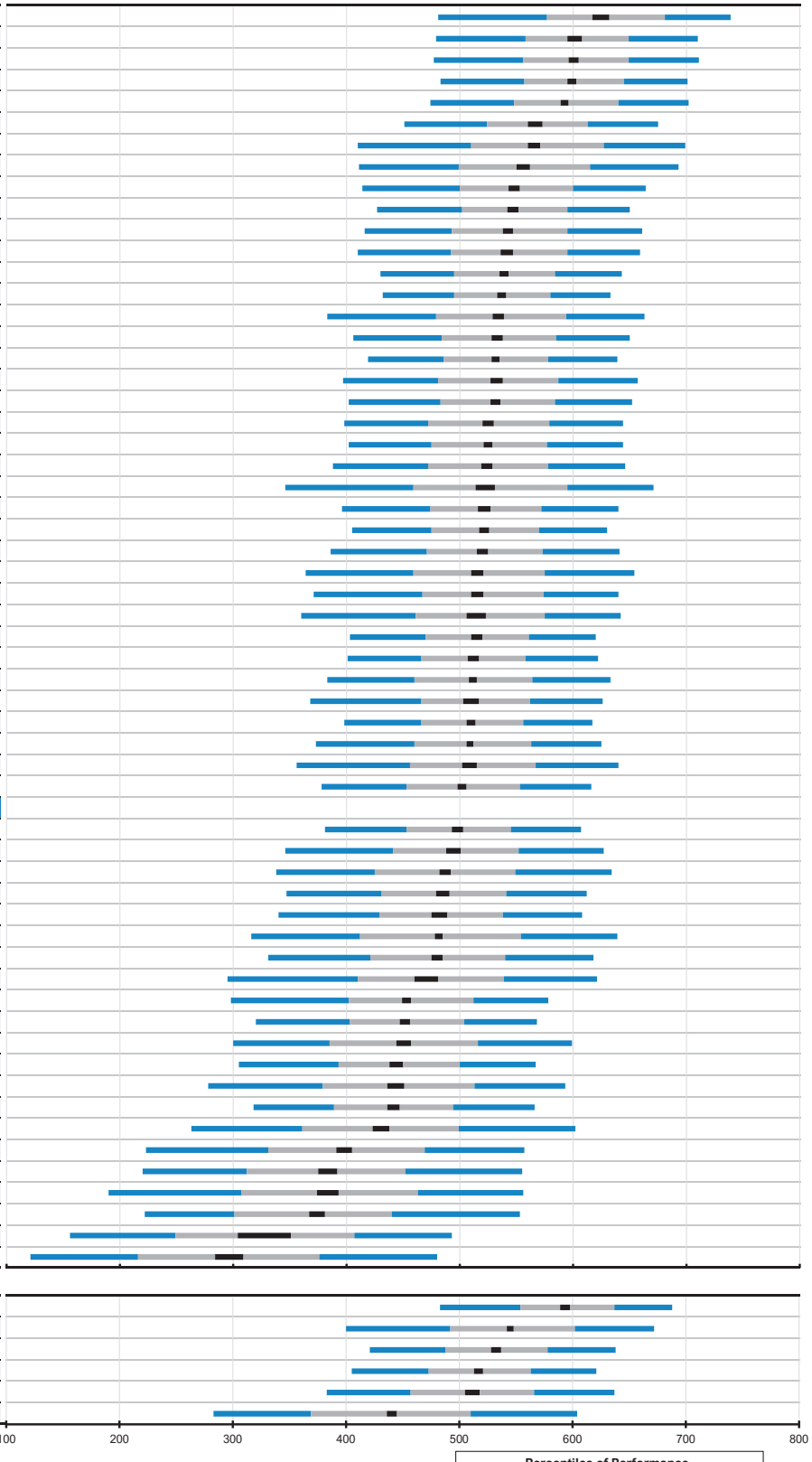
Exhibit 1.1 presents the average achievement at the fourth grade for each participating country (from highest to lowest) together with the scale score distribution underlying the average scale score. Exhibit 1.2 shows whether relatively small differences in average achievement between one country and the next are statistically significant.

The five East Asian countries had the highest average achievement, with Singapore having higher average achievement than all of the other TIMSS 2019 countries. Singapore was followed by Hong Kong SAR, Korea, and Chinese Taipei, whose students had similar average achievement that was higher than all the rest of the countries except Singapore. Fourth grade students in Japan had higher achievement than students in all of the other countries except the other four East Asian countries. In turn, the Russian Federation and Northern Ireland, which performed similarly, had higher achievement than all of the other remaining countries. England and Ireland, and then Latvia, Norway (fifth grade), and Lithuania also performed very well. Essentially, Exhibit 1.2 shows clusters of several similarly performing countries, followed by the next highest achieving clusters of similarly performing countries, and so on.

A number of fourth grade TIMSS 2019 participating countries performed well. Thirty-six countries (including those discussed above) had higher average achievement than the centerpoint of 500 (Exhibit 1.1), which is a point of reference on the TIMSS fourth grade mathematics scale that remains constant from TIMSS assessment to TIMSS assessment. However, there was a considerable difference between the highest average achievement and the lowest. Also, the scale score distributions show that there is wide variation in achievement in every country. Every TIMSS 2019 country has some higher achieving and some lower achieving students.

# Exhibit 1.1: Average Mathematics Achievement and Scale Score Distributions

| Country | Average Scale Score | |
|---|---|---|
| [3] Singapore | 625 (3.9) | ▲ |
| † Hong Kong SAR | 602 (3.3) | ▲ |
| Korea, Rep. of | 600 (2.2) | ▲ |
| Chinese Taipei | 599 (1.9) | ▲ |
| Japan | 593 (1.8) | ▲ |
| [2] Russian Federation | 567 (3.3) | ▲ |
| † Northern Ireland | 566 (2.7) | ▲ |
| [2] England | 556 (3.0) | ▲ |
| Ireland | 548 (2.5) | ▲ |
| [2] Latvia | 546 (2.6) | ▲ |
| † Norway (5) | 543 (2.2) | ▲ |
| [2] Lithuania | 542 (2.8) | ▲ |
| Austria | 539 (2.0) | ▲ |
| ≡ Netherlands | 538 (2.2) | ▲ |
| [2] † United States | 535 (2.5) | ▲ |
| Czech Republic | 533 (2.5) | ▲ |
| † Belgium (Flemish) | 532 (1.9) | ▲ |
| Cyprus | 532 (2.9) | ▲ |
| Finland | 532 (2.3) | ▲ |
| [2] Portugal | 525 (2.6) | ▲ |
| † Denmark | 525 (1.9) | ▲ |
| Hungary | 523 (2.6) | ▲ |
| [2] Turkey (5) | 523 (4.4) | ▲ |
| Sweden | 521 (2.8) | ▲ |
| Germany | 521 (2.3) | ▲ |
| Poland | 520 (2.7) | ▲ |
| Australia | 516 (2.8) | ▲ |
| Azerbaijan | 515 (2.7) | ▲ |
| Bulgaria | 515 (4.3) | ▲ |
| Italy | 515 (2.4) | ▲ |
| [2] Kazakhstan | 512 (2.5) | ▲ |
| [1 2] Canada | 512 (1.9) | ▲ |
| [2] Slovak Republic | 510 (3.5) | ▲ |
| Croatia | 509 (2.2) | ▲ |
| Malta | 509 (1.4) | ▲ |
| [2] Serbia | 508 (3.2) | ▲ |
| Spain | 502 (2.1) | |
| **TIMSS Scale Centerpoint** | **500** | |
| Armenia | 498 (2.5) | |
| Albania | 494 (3.4) | |
| [2] New Zealand | 487 (2.6) | ▽ |
| France | 485 (3.0) | ▽ |
| [1] Georgia | 482 (3.7) | ▽ |
| United Arab Emirates | 481 (1.7) | ▽ |
| Bahrain | 480 (2.6) | ▽ |
| North Macedonia | 472 (5.3) | ▽ |
| Montenegro | 453 (2.0) | ▽ |
| Bosnia and Herzegovina | 452 (2.4) | ▽ |
| Qatar | 449 (3.4) | ▽ |
| [2] Kosovo | 444 (3.0) | ▽ |
| Iran, Islamic Rep. of | 443 (3.9) | ▽ |
| Chile | 441 (2.7) | ▽ |
| Oman | 431 (3.7) | ▽ |
| [2] Saudi Arabia | 398 (3.6) | ▽ |
| Morocco | 383 (4.3) | ▽ |
| Kuwait | 383 (4.7) | ▽ |
| South Africa (5) | 374 (3.6) | ▽ |
| [2 Ψ] Pakistan | 328 (12.0) | ▽ |
| [2 Ψ] Philippines | 297 (6.4) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 593 (2.2) | ▲ |
| [2] Dubai, UAE | 544 (1.6) | ▲ |
| Quebec, Canada | 532 (2.3) | ▲ |
| Madrid, Spain | 518 (2.2) | ▲ |
| [2] Ontario, Canada | 512 (3.3) | ▲ |
| Abu Dhabi, UAE | 441 (2.2) | ▽ |




The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the distribution.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 1.2: Significance of Differences Between Countries' Average Mathematics Achievement

Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly higher (▲) than that of the comparison country, significantly lower (▽), or if there is no statistically significant difference.

| Country | Average Scale Score | Singapore | Hong Kong SAR | Korea, Rep. of | Chinese Taipei | Japan | Russian Federation | Northern Ireland | England | Ireland | Latvia | Norway (5) | Lithuania | Austria | Netherlands | United States | Czech Republic | Belgium (Flemish) | Cyprus | Finland | Portugal | Denmark | Hungary | Turkey (5) | Sweden | Germany | Poland | Australia | Azerbaijan | Bulgaria | Italy | Kazakhstan | Canada | Slovak Republic | Croatia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 602 (3.3) | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 600 (2.2) | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 599 (1.9) | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 593 (1.8) | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 567 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Northern Ireland | 566 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | 556 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | 548 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Latvia | 546 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Norway (5) | 543 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 542 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Austria | 539 (2.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Netherlands | 538 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United States | 535 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Czech Republic | 533 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Belgium (Flemish) | 532 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Cyprus | 532 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | 532 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Portugal | 525 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Denmark | 525 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hungary | 523 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Turkey (5) | 523 (4.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Sweden | 521 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Germany | 521 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Poland | 520 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Australia | 516 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | |
| Azerbaijan | 515 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | |
| Bulgaria | 515 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | |
| Italy | 515 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | |
| Kazakhstan | 512 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | |
| Canada | 512 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | |
| Slovak Republic | 510 (3.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | |
| Croatia | 509 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | |
| Malta | 509 (1.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ | | | |
| Serbia | 508 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | |
| Spain | 502 (2.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ |
| Armenia | 498 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Albania | 494 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| New Zealand | 487 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| France | 485 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Georgia | 482 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| United Arab Emirates | 481 (1.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Bahrain | 480 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| North Macedonia | 472 (5.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Montenegro | 453 (2.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Bosnia and Herzegovina | 452 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Qatar | 449 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kosovo | 444 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Iran, Islamic Rep. of | 443 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Chile | 441 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Oman | 431 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Saudi Arabia | 398 (3.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | 383 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kuwait | 383 (4.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (5) | 374 (3.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Pakistan | 328 (12.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Philippines | 297 (6.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 544 (1.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 532 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Madrid, Spain | 518 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | ▲ | ▲ | ▲ |
| Ontario, Canada | 512 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | |
| Abu Dhabi, UAE | 441 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.2: Significance of Differences Between Countries' Average Mathematics Achievement

(Continued)

| Country | Average Scale Score | Malta | Serbia | Spain | Armenia | Albania | New Zealand | France | Georgia | United Arab Emirates | Bahrain | North Macedonia | Montenegro | Bosnia and Herzegovina | Qatar | Kosovo | Iran, Islamic Rep. of | Chile | Oman | Saudi Arabia | Morocco | Kuwait | South Africa (5) | Pakistan | Philippines |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 602 (3.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 600 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 599 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 593 (1.8) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 567 (3.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Northern Ireland | 566 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | 556 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | 548 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Latvia | 546 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Norway (5) | 543 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 542 (2.8) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Austria | 539 (2.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Netherlands | 538 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United States | 535 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Czech Republic | 533 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Belgium (Flemish) | 532 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Cyprus | 532 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | 532 (2.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Portugal | 525 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Denmark | 525 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hungary | 523 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Turkey (5) | 523 (4.4) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Sweden | 521 (2.8) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Germany | 521 (2.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Poland | 520 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Australia | 516 (2.8) | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Azerbaijan | 515 (2.7) | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bulgaria | 515 (4.3) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Italy | 515 (2.4) | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Kazakhstan | 512 (2.5) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Canada | 512 (1.9) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Slovak Republic | 510 (3.5) | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Croatia | 509 (2.2) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Malta | 509 (1.4) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Serbia | 508 (3.2) | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Spain | 502 (2.1) | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Armenia | 498 (2.5) | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Albania | 494 (3.4) | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| New Zealand | 487 (2.6) | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| France | 485 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Georgia | 482 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United Arab Emirates | 481 (1.7) | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bahrain | 480 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| North Macedonia | 472 (5.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Montenegro | 453 (2.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bosnia and Herzegovina | 452 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Qatar | 449 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Kosovo | 444 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Iran, Islamic Rep. of | 443 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chile | 441 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Oman | 431 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Saudi Arabia | 398 (3.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Morocco | 383 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ |
| Kuwait | 383 (4.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ |
| South Africa (5) | 374 (3.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ |
| Pakistan | 328 (12.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Philippines | 297 (6.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 544 (1.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 532 (2.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Madrid, Spain | 518 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | 512 (3.3) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Abu Dhabi, UAE | 441 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |

| Country | Benchmarking Participants | Moscow City, Russian Fed. | Dubai, UAE | Quebec, Canada | Madrid, Spain | Ontario, Canada | Abu Dhabi, UAE |
|---|---|---|---|---|---|---|---|
| Singapore | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Northern Ireland | | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Latvia | | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Norway (5) | | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Lithuania | | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Austria | | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Netherlands | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| United States | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Czech Republic | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Belgium (Flemish) | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Cyprus | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Finland | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Portugal | | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Denmark | | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Hungary | | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Turkey (5) | | ▽ | ▽ | | | ▲ | ▲ |
| Sweden | | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Germany | | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Poland | | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Australia | | ▽ | ▽ | ▽ | | | ▲ |
| Azerbaijan | | ▽ | ▽ | ▽ | | | ▲ |
| Bulgaria | | ▽ | ▽ | ▽ | | | ▲ |
| Italy | | ▽ | ▽ | ▽ | | | ▲ |
| Kazakhstan | | ▽ | ▽ | ▽ | | | ▲ |
| Canada | | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Slovak Republic | | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Croatia | | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Malta | | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Serbia | | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Spain | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Armenia | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Albania | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| New Zealand | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| France | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Georgia | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| United Arab Emirates | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Bahrain | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| North Macedonia | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Montenegro | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Bosnia and Herzegovina | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Qatar | | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Kosovo | | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Iran, Islamic Rep. of | | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Chile | | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Oman | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Saudi Arabia | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kuwait | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (5) | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Pakistan | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Philippines | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Madrid, Spain | | ▽ | ▽ | ▽ | | | ▲ |
| Ontario, Canada | | ▽ | ▽ | ▽ | | | ▲ |
| Abu Dhabi, UAE | | ▽ | ▽ | ▽ | ▽ | ▽ | |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

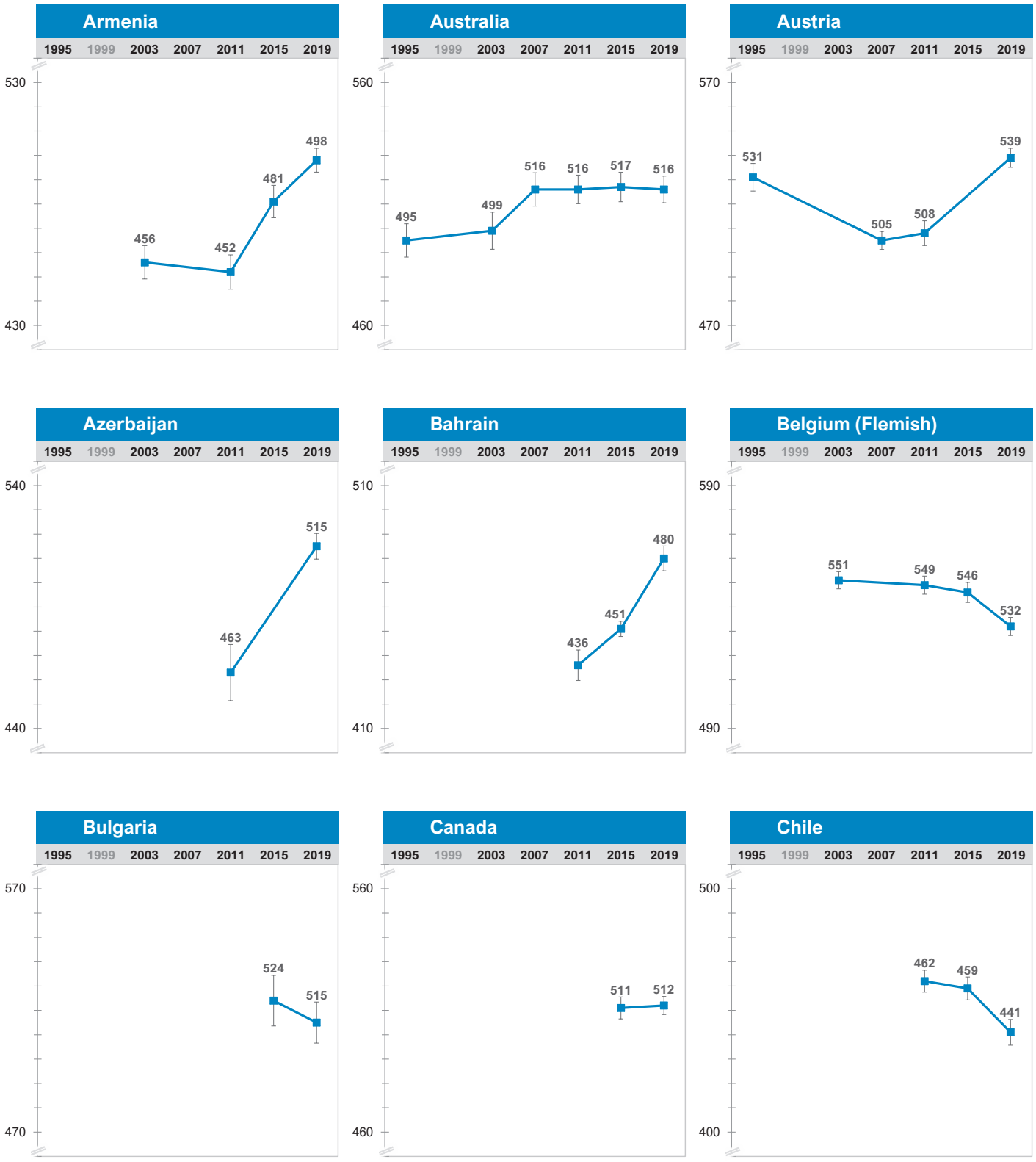
## Trends in Average Achievement

Exhibit 1.3 graphs the differences in average mathematics achievement between assessment cycles for TIMSS 2019 countries that have comparable data from previous assessments, while Exhibit 1.4 provides more detail. The countries are presented in alphabetical order in both exhibits. The trends in mathematics achievement at the fourth grade signal more improvements than downturns across the assessment cycles internationally. However, since 1995, most countries have had some periods of increases and decreases in average achievement as well as periods of stability.

Most recently, for the 45 countries that participated in both TIMSS 2015 and 2019, 14 had increases in average achievement, and 8 had declines. The trends in average achievement between 2007 and 2019, as well as between 1995 and 2019, show considerably more progress than declines in average mathematics achievement at the fourth grade over the long term. In 2019, compared with 2007, the 21 countries in both assessments had 14 increases and no decreases. In 2019, compared with 1995, the 16 countries in both assessments had 13 increases and 1 decrease.

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



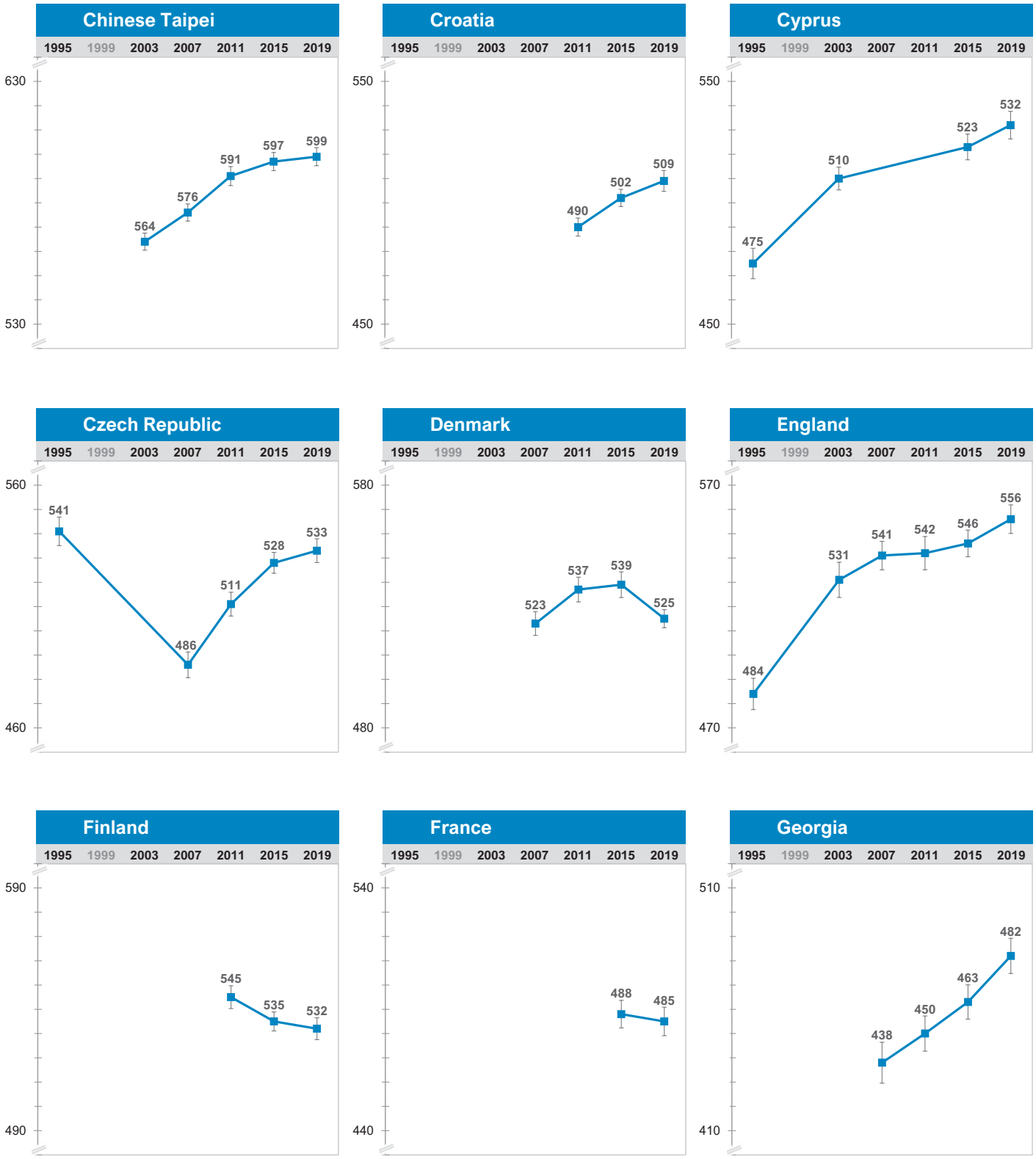

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



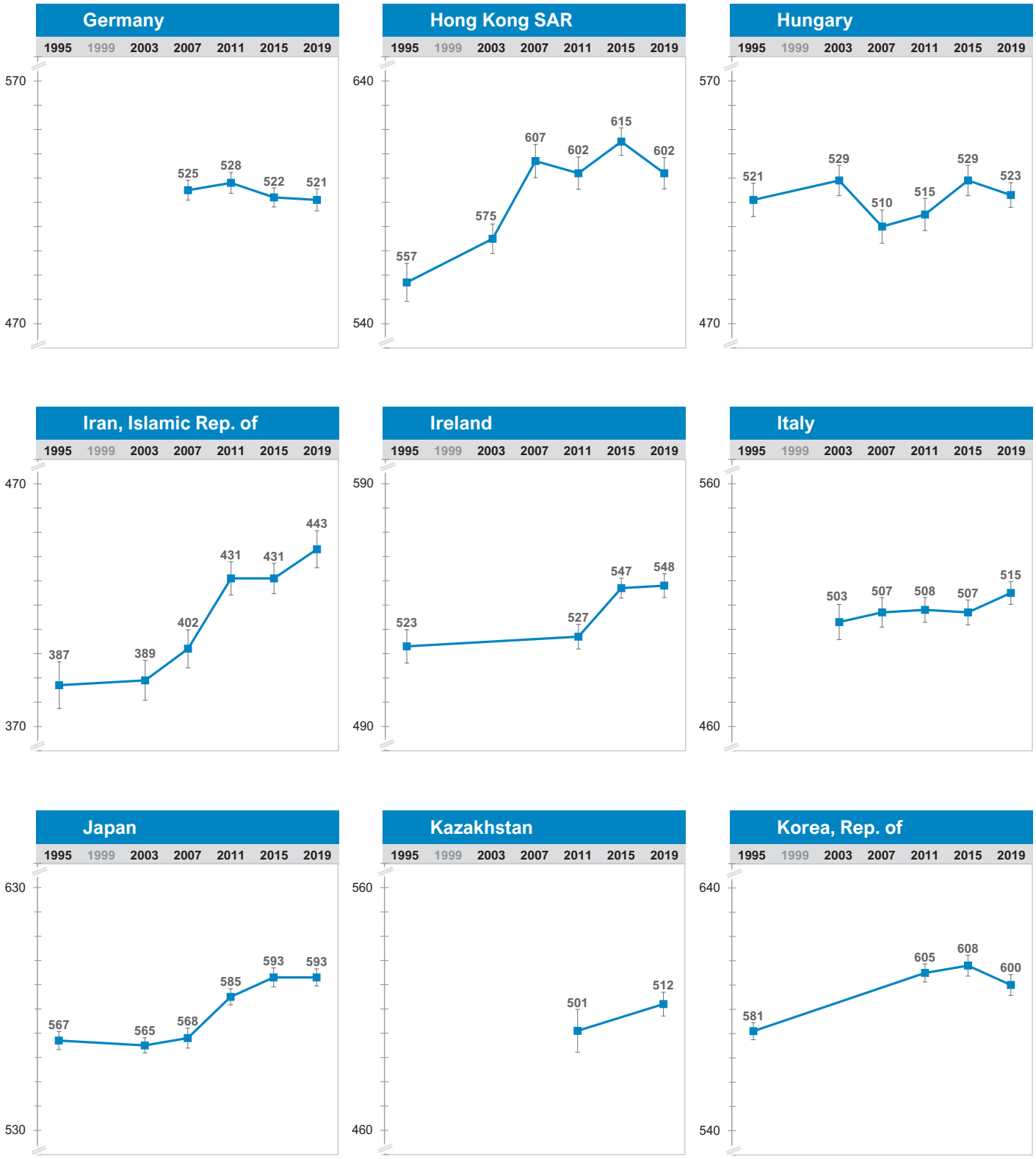

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



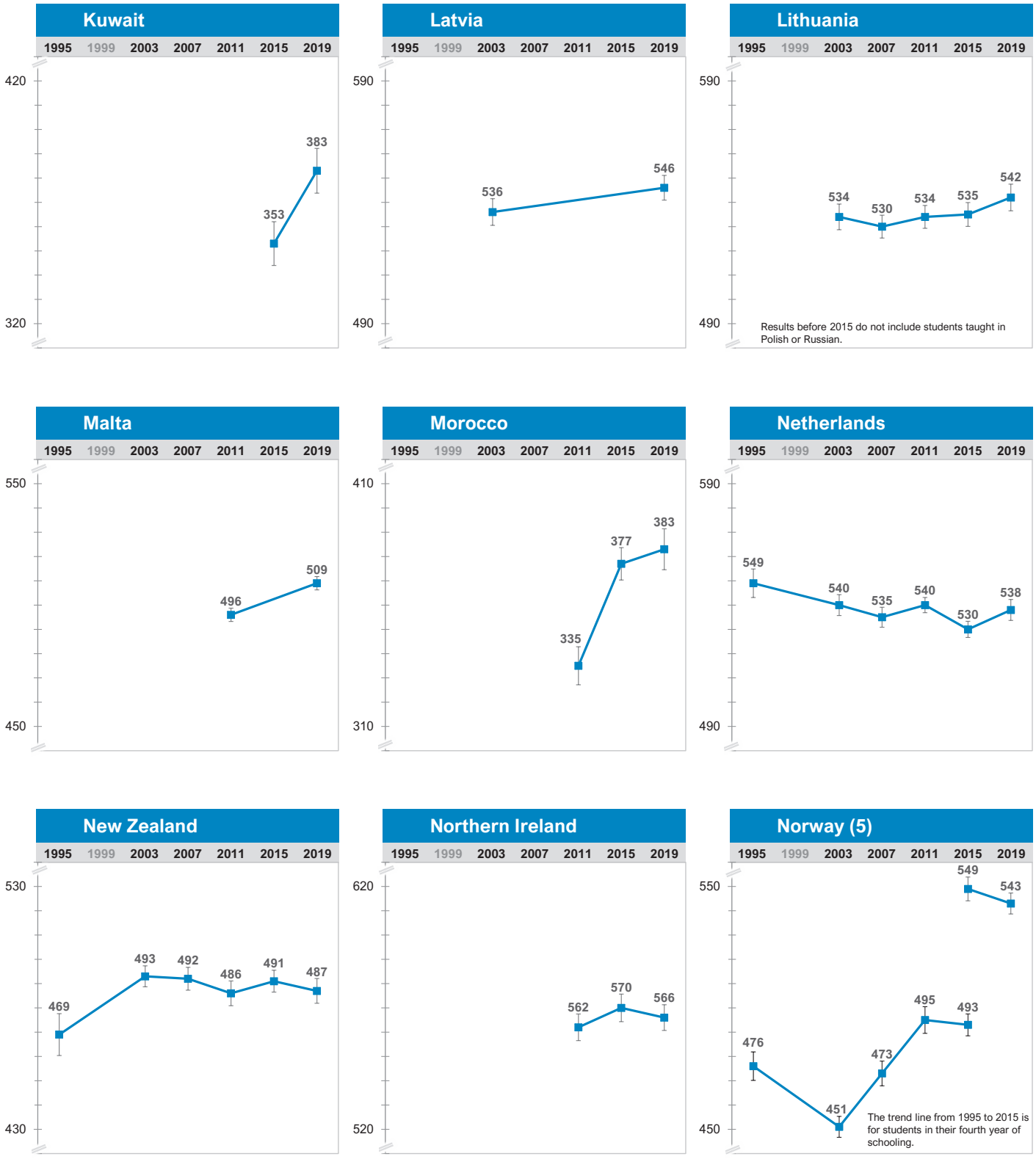

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



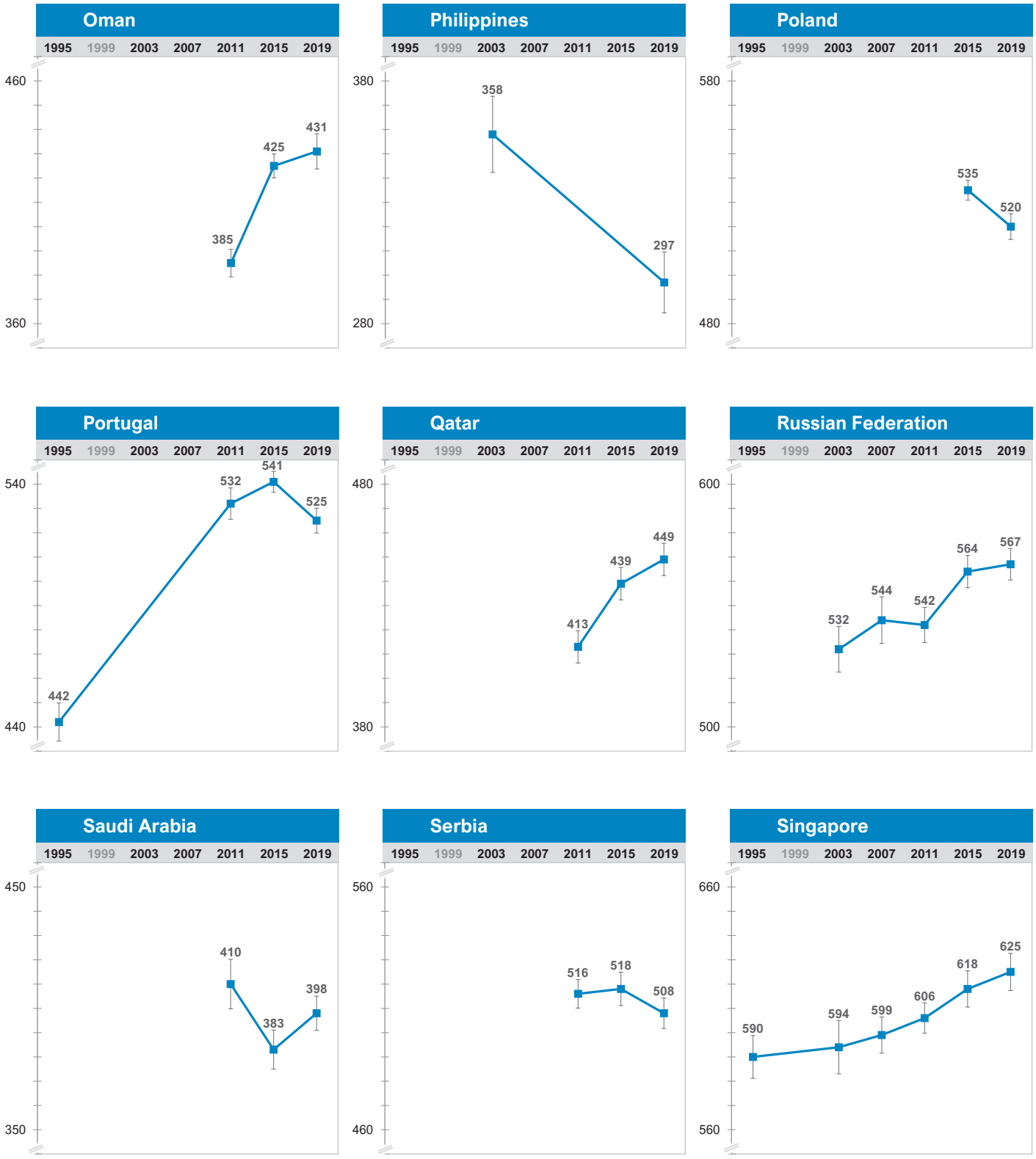

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



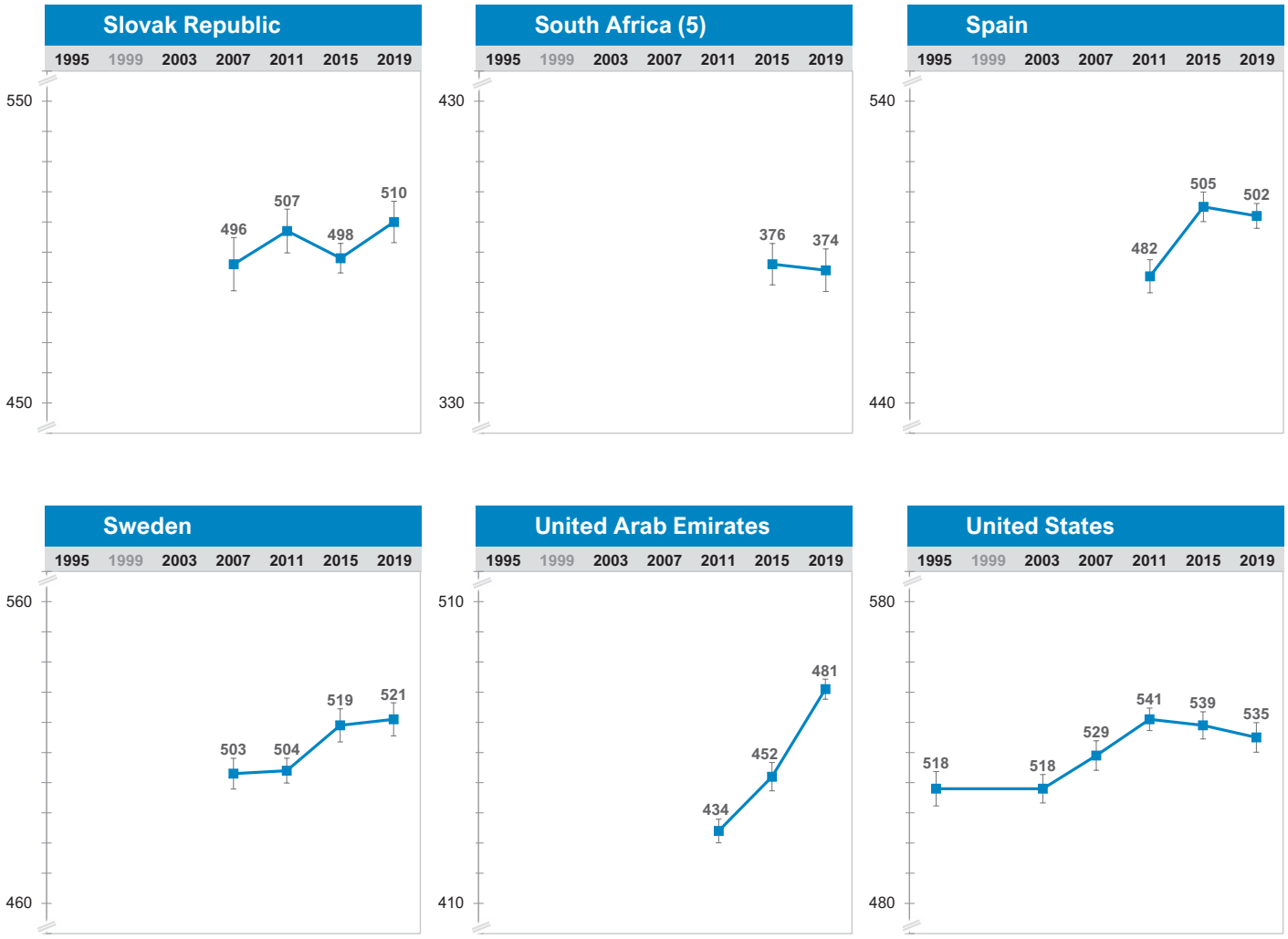

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

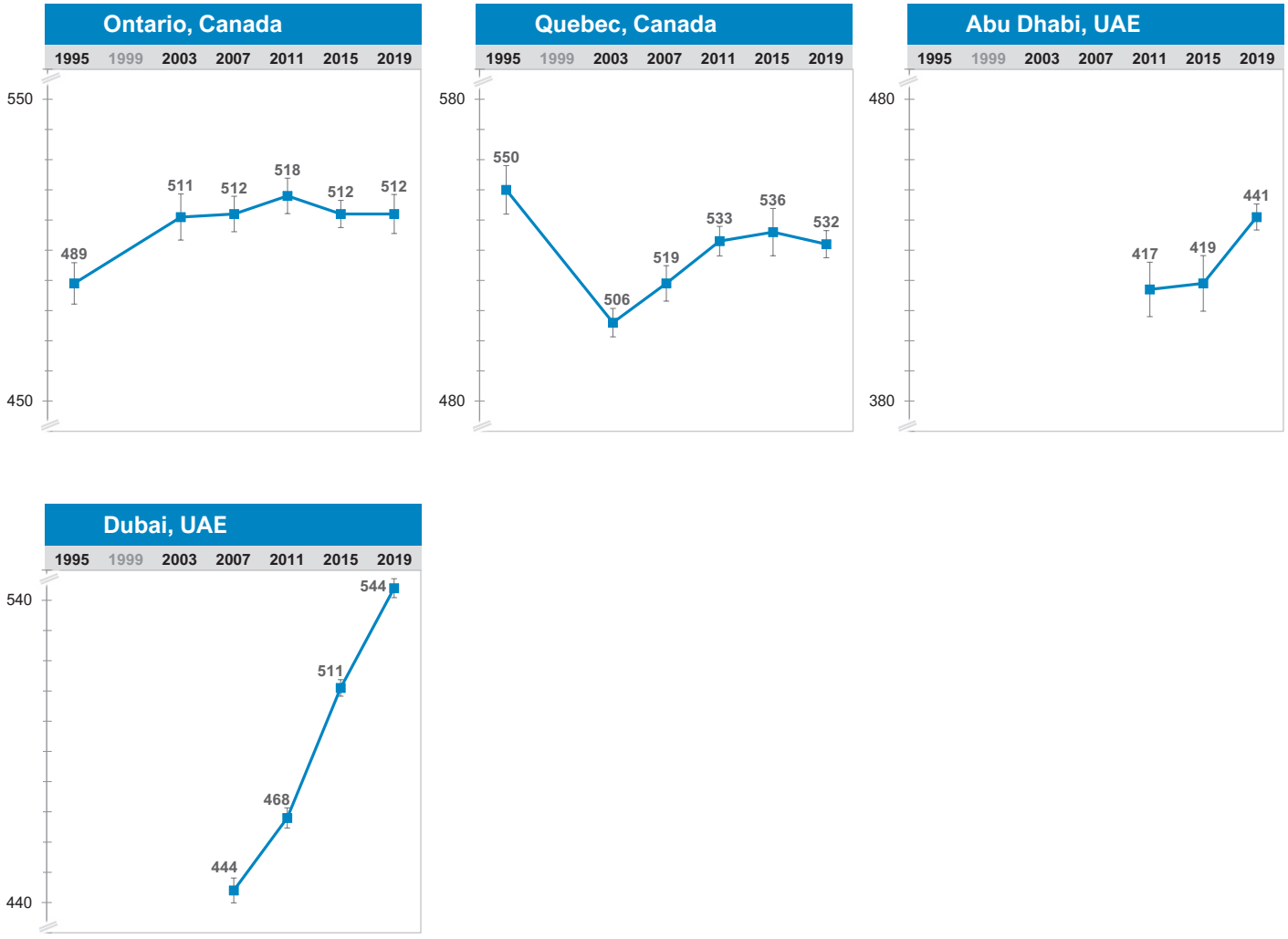
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 1.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.

### Benchmarking Participants



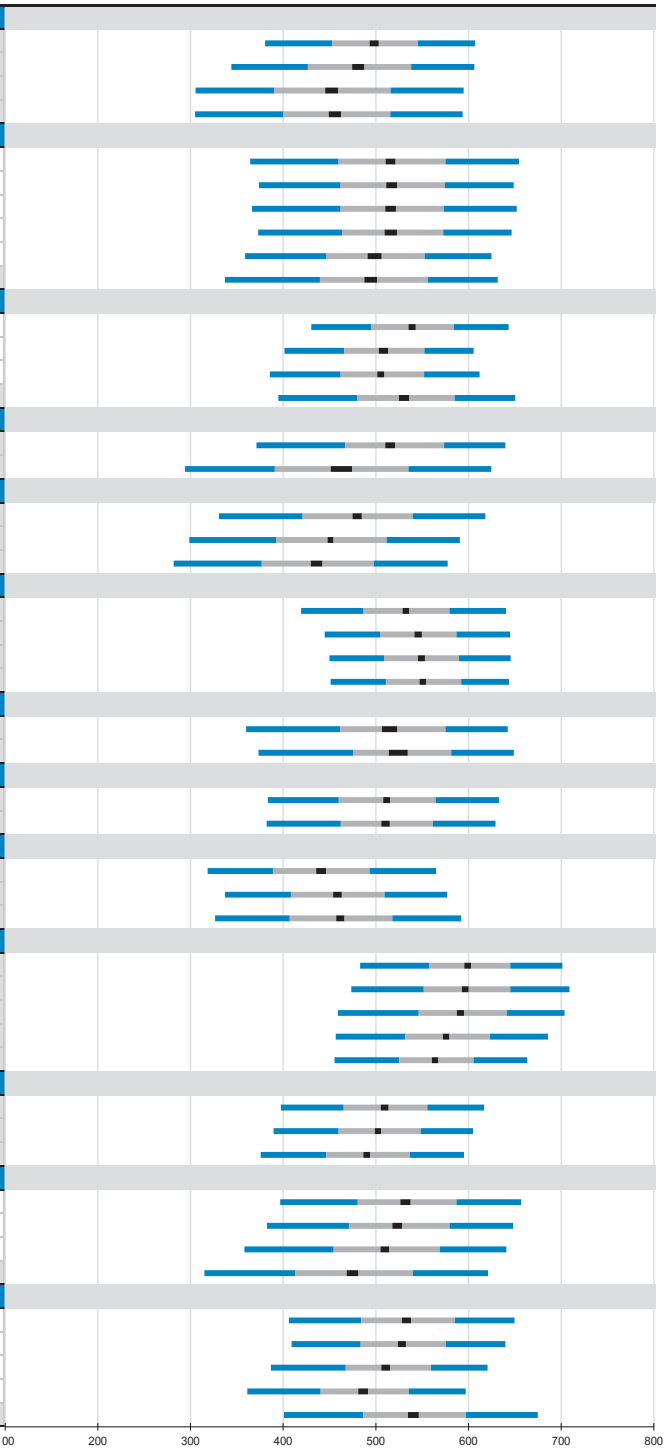

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.4: Differences in Average Mathematics Achievement Across Assessment Years

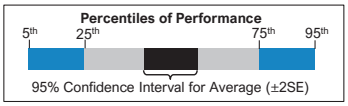
Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Average Scale Score | Differences Between Years | | | | |
|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1995 |
| **Armenia** | | | | | | |
| 2019 | 498 (2.5) | 17 ▲ | 46 ▲ | | 42 ▲ | |
| 2015 | 481 (3.4) | | 29 ▲ | | 25 ▲ | |
| 2011 | 452 (3.6) | | | | -4 | |
| 2003 | 456 (3.5) | | | | | |
| **Australia** | | | | | | |
| 2019 | 516 (2.8) | -1 | 0 | 0 | 17 ▲ | 21 ▲ |
| 2015 | 517 (3.1) | | 1 | 1 | 19 ▲ | 23 ▲ |
| 2011 | 516 (3.0) | | | 0 | 17 ▲ | 21 ▲ |
| 2007 | 516 (3.5) | | | | 17 ▲ | 22 ▲ |
| † 2003 | 499 (3.9) | | | | | 4 |
| ≡ 1995 | 495 (3.5) | | | | | |
| **Austria** | | | | | | |
| 2019 | 539 (2.0) | | 31 ▲ | 34 ▲ | | 9 ▲ |
| 2011 | 508 (2.6) | | | 3 | | -22 ▽ |
| 2007 | 505 (1.9) | | | | | -25 ▽ |
| ≡ 1995 | 531 (2.9) | | | | | |
| **Azerbaijan** | | | | | | |
| 2019 | 515 (2.7) | | 53 ▲ | | | |
| 2 2011 | 463 (5.9) | | | | | |
| **Bahrain** | | | | | | |
| 2019 | 480 (2.6) | 29 ▲ | 44 ▲ | | | |
| 2 2015 | 451 (1.6) | | 15 ▲ | | | |
| 2011 | 436 (3.2) | | | | | |
| **Belgium (Flemish)** | | | | | | |
| † 2019 | 532 (1.9) | -13 ▽ | -17 ▽ | | -18 ▽ | |
| † 2015 | 546 (2.1) | | -4 | | -5 | |
| 2011 | 549 (1.9) | | | | -1 | |
| 2 2003 | 551 (1.8) | | | | | |
| **Bulgaria** | | | | | | |
| 2019 | 515 (4.3) | -9 | | | | |
| 2015 | 524 (5.3) | | | | | |
| **Canada** | | | | | | |
| 1 2 2019 | 512 (1.9) | 1 | | | | |
| 1 2 † 2015 | 511 (2.3) | | | | | |
| **Chile** | | | | | | |
| 2019 | 441 (2.7) | -18 ▽ | -21 ▽ | | | |
| 2015 | 459 (2.4) | | -3 | | | |
| 2011 | 462 (2.3) | | | | | |
| **Chinese Taipei** | | | | | | |
| 2019 | 599 (1.9) | 3 | 8 ▲ | 23 ▲ | 35 ▲ | |
| 2015 | 597 (1.9) | | 5 ▲ | 21 ▲ | 33 ▲ | |
| 2011 | 591 (2.0) | | | 15 ▲ | 27 ▲ | |
| 2007 | 576 (1.8) | | | | 12 ▲ | |
| 2003 | 564 (1.8) | | | | | |
| **Croatia** | | | | | | |
| 2019 | 509 (2.2) | 7 ▲ | 19 ▲ | | | |
| 2015 | 502 (1.8) | | 12 ▲ | | | |
| 2 2011 | 490 (1.9) | | | | | |
| **Cyprus** | | | | | | |
| 2019 | 532 (2.9) | 9 ▲ | | | 22 ▲ | 57 ▲ |
| 2015 | 523 (2.7) | | | | 13 ▲ | 48 ▲ |
| 2003 | 510 (2.4) | | | | | 35 ▲ |
| 1995 | 475 (3.2) | | | | | |
| **Czech Republic** | | | | | | |
| 2019 | 533 (2.5) | 5 | 22 ▲ | 47 ▲ | | -8 |
| 2015 | 528 (2.2) | | 17 ▲ | 42 ▲ | | -12 ▽ |
| 2011 | 511 (2.5) | | | 24 ▲ | | -30 ▽ |
| 2007 | 486 (2.7) | | | | | -54 ▽ |
| 1995 | 541 (3.0) | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower




See Appendix A for country participation in previous TIMSS assessments.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.4: Differences in Average Mathematics Achievement Across Assessment Years

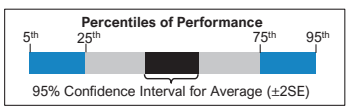
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | Mathematics Achievement Distribution |
|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1995 | |
| **Denmark** | | | | | | | |
| † 2019 | 525 (1.9) | -14 ▽ | -12 ▽ | 1 | | | |
| 2 † 2015 | 539 (2.7) | | 2 | 16 ▲ | | | |
| 2 2011 | 537 (2.6) | | | 14 ▲ | | | |
| † 2007 | 523 (2.5) | | | | | | |
| **England** | | | | | | | |
| 2 2019 | 556 (3.0) | 10 ▲ | 13 ▲ | 14 ▲ | 25 ▲ | 72 ▲ | |
| 2015 | 546 (2.8) | | 4 | 5 | 15 ▲ | 62 ▲ | |
| 2011 | 542 (3.5) | | | 1 | 11 ▲ | 58 ▲ | |
| 2007 | 541 (3.0) | | | | 10 ▲ | 57 ▲ | |
| † 2003 | 531 (3.7) | | | | | 47 ▲ | |
| 3 † 1995 | 484 (3.3) | | | | | | |
| **Finland** | | | | | | | |
| 2019 | 532 (2.3) | -3 | -13 ▽ | | | | |
| 2015 | 535 (2.0) | | -10 ▽ | | | | |
| 2011 | 545 (2.4) | | | | | | |
| **France** | | | | | | | |
| 2019 | 485 (3.0) | -3 | | | | | |
| 2015 | 488 (2.9) | | | | | | |
| **Georgia** | | | | | | | |
| 1 2019 | 482 (3.7) | 19 ▲ | 32 ▲ | 43 ▲ | | | |
| 1 2015 | 463 (3.6) | | 13 ▲ | 25 ▲ | | | |
| 1 2011 | 450 (3.7) | | | 12 ▲ | | | |
| 1 2007 | 438 (4.3) | | | | | | |
| **Germany** | | | | | | | |
| 2019 | 521 (2.3) | -1 | -7 ▽ | -4 | | | |
| 2015 | 522 (2.0) | | -6 ▽ | -4 | | | |
| 2011 | 528 (2.2) | | | 3 | | | |
| 2007 | 525 (2.1) | | | | | | |
| **Hong Kong SAR** | | | | | | | |
| † 2019 | 602 (3.3) | -13 ▽ | 0 | -5 | 27 ▲ | 45 ▲ | |
| † 2015 | 615 (2.9) | | 13 ▲ | 8 | 40 ▲ | 58 ▲ | |
| 2 2011 | 602 (3.4) | | | -5 | 27 ▲ | 45 ▲ | |
| 2007 | 607 (3.5) | | | | 32 ▲ | 50 ▲ | |
| † 2003 | 575 (3.1) | | | | | 18 ▲ | |
| 1995 | 557 (4.0) | | | | | | |
| **Hungary** | | | | | | | |
| 2019 | 523 (2.6) | -6 | 8 | 14 ▲ | -5 | 2 | |
| 2015 | 529 (3.2) | | 14 ▲ | 19 ▲ | 1 | 8 | |
| 2011 | 515 (3.4) | | | 6 | -13 ▽ | -6 | |
| 2007 | 510 (3.5) | | | | -19 ▽ | -12 ▽ | |
| 2 2003 | 529 (3.2) | | | | | 7 | |
| 1995 | 521 (3.5) | | | | | | |
| **Iran, Islamic Rep. of** | | | | | | | |
| 2019 | 443 (3.9) | 12 ▲ | 12 ▲ | 41 ▲ | 54 ▲ | 56 ▲ | |
| 2015 | 431 (3.2) | | 1 | 29 ▲ | 42 ▲ | 45 ▲ | |
| 2011 | 431 (3.5) | | | 28 ▲ | 42 ▲ | 44 ▲ | |
| 2007 | 402 (4.0) | | | | 13 ▲ | 15 ▲ | |
| 2 2003 | 389 (4.2) | | | | | 2 | |
| 1995 | 387 (4.9) | | | | | | |
| **Ireland** | | | | | | | |
| 2019 | 548 (2.5) | 1 | 21 ▲ | | | 26 ▲ | |
| 2015 | 547 (2.1) | | 20 ▲ | | | 24 ▲ | |
| 2011 | 527 (2.6) | | | | | 5 | |
| 2 1995 | 523 (3.5) | | | | | | |
| **Italy** | | | | | | | |
| 2019 | 515 (2.4) | 8 ▲ | 7 ▲ | 8 ▲ | 12 ▲ | | |
| 2 2015 | 507 (2.6) | | -1 | 0 | 4 | | |
| 2011 | 508 (2.6) | | | 1 | 5 | | |
| 2007 | 507 (3.1) | | | | 4 | | |
| 2003 | 503 (3.7) | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



## Exhibit 1.4: Differences in Average Mathematics Achievement Across Assessment Years

(Continued)

| Country | Average Scale Score | Differences Between Years | | | | |
|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1995 |
| **Japan** | | | | | | |
| 2019 | 593 (1.8) | 0 | 8 ▲ | 25 ▲ | 28 ▲ | 26 ▲ |
| 2015 | 593 (2.0) | | 7 ▲ | 25 ▲ | 28 ▲ | 26 ▲ |
| 2011 | 585 (1.7) | | | 17 ▲ | 21 ▲ | 18 ▲ |
| 2007 | 568 (2.1) | | | | 4 | 1 |
| 2003 | 565 (1.6) | | | | | -3 |
| 1995 | 567 (1.9) | | | | | |
| **Kazakhstan** | | | | | | |
| [2] 2019 | 512 (2.5) | | 11 ▲ | | | |
| [2] 2011 | 501 (4.5) | | | | | |
| **Korea, Rep. of** | | | | | | |
| 2019 | 600 (2.2) | -8 ▽ | -5 | | | 19 ▲ |
| 2015 | 608 (2.2) | | 3 | | | 27 ▲ |
| 2011 | 605 (1.9) | | | | | 24 ▲ |
| [2] 1995 | 581 (1.8) | | | | | |
| **Kuwait** | | | | | | |
| 2019 | 383 (4.7) | 30 ▲ | | | | |
| Ψ 2015 | 353 (4.6) | | | | | |
| **Latvia** | | | | | | |
| [2] 2019 | 546 (2.6) | | | | 10 ▲ | |
| 2003 | 536 (2.8) | | | | | |
| **Lithuania** | | | | | | |
| [2] 2019 | 542 (2.8) | 7 | 8 ▲ | 12 ▲ | 8 ▲ | |
| [2] 2015 | 535 (2.5) | | 2 | 6 | 1 | |
| [1 2] 2011 | 534 (2.4) | | | 4 | 0 | |
| [1] 2007 | 530 (2.4) | | | | -4 | |
| [1] 2003 | 534 (2.7) | | | | | |
| **Malta** | | | | | | |
| 2019 | 509 (1.4) | | 13 ▲ | | | |
| 2011 | 496 (1.4) | | | | | |
| **Morocco** | | | | | | |
| 2019 | 383 (4.3) | 6 | 49 ▲ | | | |
| 2015 | 377 (3.4) | | 43 ▲ | | | |
| Ж 2011 | 335 (4.0) | | | | | |
| **Netherlands** | | | | | | |
| ≡ 2019 | 538 (2.2) | 8 ▲ | -3 | 3 | -3 | -12 ▽ |
| † 2015 | 530 (1.7) | | -10 ▽ | -5 | -11 ▽ | -19 ▽ |
| † 2011 | 540 (1.6) | | | 5 | 0 | -9 ▽ |
| ‡ 2007 | 535 (2.1) | | | | -5 | -14 ▽ |
| † 2003 | 540 (2.2) | | | | | -9 ▽ |
| ≡ 1995 | 549 (3.0) | | | | | |
| **New Zealand** | | | | | | |
| [2] 2019 | 487 (2.6) | -3 | 1 | -5 | -6 | 18 ▲ |
| 2015 | 491 (2.3) | | 4 | -2 | -3 | 21 ▲ |
| 2011 | 486 (2.6) | | | -6 | -7 ▽ | 17 ▲ |
| 2007 | 492 (2.4) | | | | -1 | 23 ▲ |
| 2003 | 493 (2.2) | | | | | 24 ▲ |
| 1995 | 469 (4.4) | | | | | |
| **Northern Ireland** | | | | | | |
| † 2019 | 566 (2.7) | -4 | 3 | | | |
| ‡ 2015 | 570 (2.9) | | 8 | | | |
| † 2011 | 562 (2.8) | | | | | |
| **Norway (5)** | | | | | | |
| † 2019 | 543 (2.2) | -6 | | | | |
| 2015 | 549 (2.5) | | | | | |
| **Oman** | | | | | | |
| 2019 | 431 (3.7) | 5 | 46 ▲ | | | |
| 2015 | 425 (2.5) | | 41 ▲ | | | |
| Ψ 2011 | 385 (2.9) | | | | | |
| **Philippines** | | | | | | |
| [2] Ψ 2019 | 297 (6.4) | | | | -62 ▽ | |
| 2003 | 358 (8.0) | | | | | |
| **Poland** | | | | | | |
| 2019 | 520 (2.7) | -15 ▽ | | | | |
| 2015 | 535 (2.1) | | | | | |

Mathematics Achievement Distribution

100 200 300 400 500 600 700 800

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.4: Differences in Average Mathematics Achievement Across Assessment Years

(Continued)

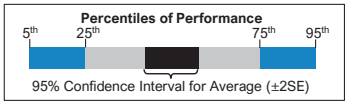
| Country | Average Scale Score | Differences Between Years 2015 | 2011 | 2007 | 2003 | 1995 |
|---|---|---|---|---|---|---|
| **Portugal** | | | | | | |
| [2] 2019 | 525 (2.6) | -16 ▽ | -7 | | | 83 ▲ |
| [2] 2015 | 541 (2.2) | | 9 ▲ | | | 99 ▲ |
| 2011 | 532 (3.3) | | | | | 90 ▲ |
| [2] 1995 | 442 (4.0) | | | | | |
| **Qatar** | | | | | | |
| 2019 | 449 (3.4) | 10 ▲ | 36 ▲ | | | |
| 2015 | 439 (3.4) | | 26 ▲ | | | |
| [2] 2011 | 413 (3.4) | | | | | |
| **Russian Federation** | | | | | | |
| [2] 2019 | 567 (3.3) | 3 | 25 ▲ | 23 ▲ | 35 ▲ | |
| 2015 | 564 (3.4) | | 22 ▲ | 20 ▲ | 32 ▲ | |
| 2011 | 542 (3.7) | | | -2 | 10 | |
| 2007 | 544 (4.9) | | | | 12 | |
| [2] 2003 | 532 (4.8) | | | | | |
| **Saudi Arabia** | | | | | | |
| [2] 2019 | 398 (3.6) | 15 ▲ | -12 | | | |
| Ψ 2015 | 383 (4.1) | | -27 ▽ | | | |
| 2011 | 410 (5.2) | | | | | |
| **Serbia** | | | | | | |
| [2] 2019 | 508 (3.2) | -10 ▽ | -8 | | | |
| [3] 2015 | 518 (3.5) | | 2 | | | |
| [2] 2011 | 516 (3.0) | | | | | |
| **Singapore** | | | | | | |
| [3] 2019 | 625 (3.9) | 8 | 20 ▲ | 26 ▲ | 31 ▲ | 35 ▲ |
| [2] 2015 | 618 (3.8) | | 12 ▲ | 18 ▲ | 23 ▲ | 27 ▲ |
| [2] 2011 | 606 (3.2) | | | 6 | 11 | 16 ▲ |
| 2007 | 599 (3.8) | | | | 5 | 9 |
| 2003 | 594 (5.6) | | | | | 4 |
| 1995 | 590 (4.5) | | | | | |
| **Slovak Republic** | | | | | | |
| [2] 2019 | 510 (3.5) | 12 ▲ | 3 | 14 ▲ | | |
| 2015 | 498 (2.5) | | -9 | 2 | | |
| 2011 | 507 (3.7) | | | 11 | | |
| 2007 | 496 (4.5) | | | | | |
| **South Africa (5)** | | | | | | |
| 2019 | 374 (3.6) | -2 | | | | |
| 2015 | 376 (3.5) | | | | | |
| **Spain** | | | | | | |
| 2019 | 502 (2.1) | -3 | 20 ▲ | | | |
| [2] 2015 | 505 (2.5) | | 23 ▲ | | | |
| 2011 | 482 (2.8) | | | | | |
| **Sweden** | | | | | | |
| 2019 | 521 (2.8) | 3 | 17 ▲ | 19 ▲ | | |
| [2] 2015 | 519 (2.8) | | 15 ▲ | 16 ▲ | | |
| 2011 | 504 (2.1) | | | 1 | | |
| 2007 | 503 (2.6) | | | | | |
| **United Arab Emirates** | | | | | | |
| 2019 | 481 (1.7) | 30 ▲ | 47 ▲ | | | |
| 2015 | 452 (2.4) | | 17 ▲ | | | |
| 2011 | 434 (2.0) | | | | | |
| **United States** | | | | | | |
| [2†] 2019 | 535 (2.5) | -4 | -6 | 6 | 16 ▲ | 17 ▲ |
| [2†] 2015 | 539 (2.3) | | -1 | 10 ▲ | 21 ▲ | 21 ▲ |
| [2] 2011 | 541 (1.9) | | | 12 ▲ | 22 ▲ | 23 ▲ |
| [2†] 2007 | 529 (2.5) | | | | 11 ▲ | 11 ▲ |
| † 2003 | 518 (2.4) | | | | | 0 |
| 1995 | 518 (2.9) | | | | | |

Mathematics Achievement Distribution




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



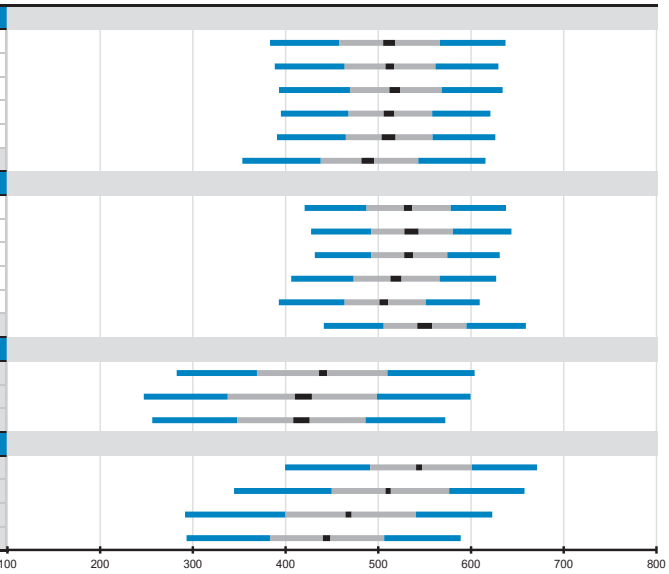

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.4: Differences in Average Mathematics Achievement Across Assessment Years

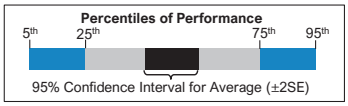
(Continued)

| Country | Average Scale Score | Differences Between Years 2015 | 2011 | 2007 | 2003 | 1995 | Mathematics Achievement Distribution |
|---|---|---|---|---|---|---|---|
| **Benchmarking Participants** | | | | | | | |
| **Ontario, Canada** | | | | | | | |
| [2] 2019 | 512 (3.3) | -1 | -6 | 0 | 1 | 23 ▲ | |
| 2015 | 512 (2.3) | | -5 | 1 | 1 | 24 ▲ | |
| 2011 | 518 (3.0) | | | 6 | 7 | 29 ▲ | |
| [2] 2007 | 512 (3.0) | | | | 0 | 23 ▲ | |
| 2003 | 511 (3.9) | | | | | 23 ▲ | |
| [2] 1995 | 489 (3.5) | | | | | | |
| **Quebec, Canada** | | | | | | | |
| 2019 | 532 (2.3) | -4 | -1 | 13 ▲ | 26 ▲ | -18 ▽ | |
| [≡] 2015 | 536 (4.0) | | 3 | 17 ▲ | 30 ▲ | -14 ▽ | |
| 2011 | 533 (2.5) | | | 14 ▲ | 27 ▲ | -17 ▽ | |
| [2] 2007 | 519 (3.0) | | | | 13 ▲ | -31 ▽ | |
| 2003 | 506 (2.4) | | | | | -44 ▽ | |
| 1995 | 550 (4.1) | | | | | | |
| **Abu Dhabi, UAE** | | | | | | | |
| 2019 | 441 (2.2) | 21 ▲ | 23 ▲ | | | | |
| [2 Ψ] 2015 | 419 (4.7) | | 2 | | | | |
| 2011 | 417 (4.6) | | | | | | |
| **Dubai, UAE** | | | | | | | |
| [2] 2019 | 544 (1.6) | 33 ▲ | 76 ▲ | 100 ▲ | | | |
| 2015 | 511 (1.4) | | 43 ▲ | 66 ▲ | | | |
| 2011 | 468 (1.7) | | | 24 ▲ | | | |
| [‡] 2007 | 444 (2.1) | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower




Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

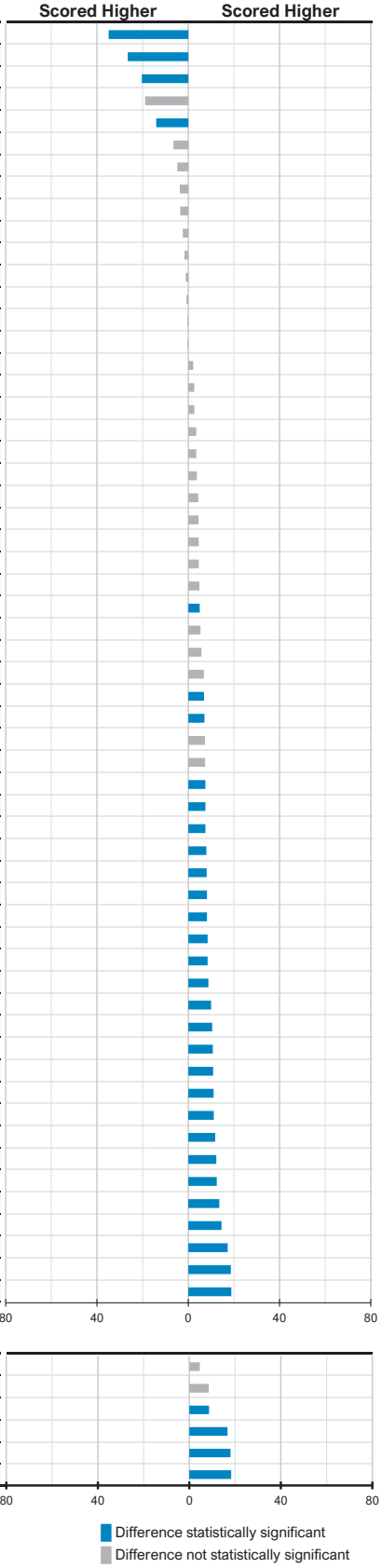
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement by Gender

Exhibit 1.5 shows the differences in average mathematics achievement between girls and boys. In TIMSS 2019, fourth grade boys had higher average achievement than girls in close to half of the 58 participating countries. More specifically, girls had higher average achievement than boys in 4 countries, there was gender equity in average mathematics achievement in 27 countries, and boys had higher average achievement than girls in 27 countries (although the differences were small).

## Exhibit 1.5: Average Mathematics Achievement by Gender

| Country | Girls | | Boys | | Difference (Absolute Value) | Gender Difference |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Scale Score | Percent of Students | Average Scale Score | | Girls Scored Higher / Boys Scored Higher |
| 2 Ψ Philippines | 48 (0.7) | 315 (6.6) | 52 (0.7) | 280 (6.4) | 35 (3.7) | |
| 2 Saudi Arabia | 48 (0.8) | 412 (4.9) | 52 (0.8) | 385 (5.8) | 26 (8.1) | |
| South Africa (5) | 50 (0.6) | 384 (4.0) | 50 (0.6) | 364 (3.7) | 20 (2.9) | |
| 2 Ψ Pakistan | 45 (4.7) | 338 (16.4) | 55 (4.7) | 319 (11.8) | 19 (16.0) | |
| Oman | 50 (0.7) | 438 (3.6) | 50 (0.7) | 424 (4.4) | 14 (2.9) | |
| Kuwait | 47 (2.6) | 387 (6.0) | 53 (2.6) | 380 (6.9) | 7 (8.9) | |
| Bahrain | 49 (1.2) | 482 (3.2) | 51 (1.2) | 477 (3.5) | 5 (4.3) | |
| Azerbaijan | 47 (0.9) | 517 (3.1) | 53 (0.9) | 514 (3.1) | 4 (3.0) | |
| Morocco | 49 (0.7) | 385 (4.8) | 51 (0.7) | 382 (4.3) | 3 (2.9) | |
| Armenia | 48 (0.8) | 499 (2.6) | 52 (0.8) | 497 (3.2) | 2 (2.8) | |
| 2 Serbia | 50 (0.9) | 509 (3.4) | 50 (0.9) | 507 (4.0) | 2 (3.9) | |
| Qatar | 50 (1.5) | 450 (5.1) | 50 (1.5) | 449 (3.2) | 1 (5.2) | |
| Japan | 48 (0.5) | 593 (2.2) | 52 (0.5) | 593 (1.9) | 1 (2.2) | |
| 2 Kazakhstan | 49 (0.7) | 512 (3.0) | 51 (0.7) | 512 (2.6) | 0 (2.4) | |
| North Macedonia | 48 (0.6) | 472 (5.9) | 52 (0.6) | 472 (5.4) | 0 (4.0) | |
| Bulgaria | 48 (0.9) | 514 (4.7) | 52 (0.9) | 516 (4.6) | 2 (3.6) | |
| Finland | 49 (0.9) | 531 (2.9) | 51 (0.9) | 533 (2.8) | 3 (3.2) | |
| Albania | 49 (0.9) | 493 (3.8) | 51 (0.9) | 495 (3.9) | 3 (3.6) | |
| † Northern Ireland | 50 (1.0) | 564 (3.2) | 50 (1.0) | 568 (3.7) | 3 (4.2) | |
| 2 Turkey (5) | 52 (1.4) | 521 (4.5) | 48 (1.4) | 525 (5.6) | 3 (4.9) | |
| Chinese Taipei | 48 (0.6) | 597 (2.4) | 52 (0.6) | 601 (2.3) | 4 (2.7) | |
| † Norway (5) | 48 (0.9) | 540 (2.7) | 52 (0.9) | 545 (2.9) | 4 (3.5) | |
| 2 Kosovo | 49 (1.0) | 442 (3.1) | 51 (1.0) | 447 (3.7) | 5 (3.3) | |
| 2 Lithuania | 49 (0.9) | 540 (2.9) | 51 (0.9) | 544 (3.7) | 5 (3.8) | |
| 2 Latvia | 50 (0.9) | 544 (2.9) | 50 (0.9) | 548 (3.0) | 5 (2.7) | |
| Montenegro | 47 (0.6) | 450 (2.6) | 53 (0.6) | 455 (2.4) | 5 (3.0) | |
| Korea, Rep. of | 47 (0.7) | 597 (2.3) | 53 (0.7) | 602 (2.8) | 5 (2.5) | |
| 2 New Zealand | 48 (1.3) | 484 (3.7) | 52 (1.3) | 490 (3.3) | 5 (4.6) | |
| † Hong Kong SAR | 46 (1.3) | 599 (3.5) | 54 (1.3) | 604 (3.9) | 6 (3.3) | |
| Ireland | 50 (1.1) | 545 (3.2) | 50 (1.1) | 552 (2.9) | 7 (3.7) | |
| † Denmark | 50 (0.8) | 521 (2.2) | 50 (0.8) | 528 (2.6) | 7 (2.9) | |
| Sweden | 50 (1.1) | 518 (3.2) | 50 (1.1) | 525 (3.1) | 7 (2.8) | |
| 2 England | 50 (1.0) | 552 (4.0) | 50 (1.0) | 560 (3.0) | 7 (3.8) | |
| Iran, Islamic Rep. of | 49 (2.1) | 439 (6.4) | 51 (2.1) | 447 (5.3) | 7 (8.8) | |
| Malta | 49 (0.7) | 505 (2.1) | 51 (0.7) | 513 (1.9) | 7 (2.7) | |
| 1 Georgia | 49 (0.9) | 478 (3.9) | 51 (0.9) | 486 (4.1) | 7 (3.3) | |
| Austria | 49 (1.0) | 535 (2.8) | 51 (1.0) | 543 (2.1) | 8 (2.9) | |
| 3 Singapore | 49 (0.5) | 621 (4.0) | 51 (0.5) | 629 (4.2) | 8 (2.8) | |
| Poland | 49 (0.8) | 516 (3.0) | 51 (0.8) | 524 (3.0) | 8 (2.8) | |
| United Arab Emirates | 50 (1.1) | 477 (2.5) | 50 (1.1) | 486 (2.3) | 8 (3.4) | |
| 2 Russian Federation | 51 (1.1) | 563 (3.6) | 49 (1.1) | 571 (3.5) | 8 (2.5) | |
| ≡ Netherlands | 49 (1.0) | 533 (2.2) | 51 (1.0) | 542 (3.0) | 9 (3.0) | |
| Chile | 50 (1.3) | 437 (3.4) | 50 (1.3) | 445 (3.1) | 9 (3.7) | |
| Bosnia and Herzegovina | 49 (0.7) | 447 (2.7) | 51 (0.7) | 456 (2.8) | 9 (2.6) | |
| Australia | 49 (0.8) | 511 (2.9) | 51 (0.8) | 521 (3.3) | 10 (2.9) | |
| Germany | 50 (0.8) | 516 (2.8) | 50 (0.8) | 526 (2.4) | 10 (2.5) | |
| † Belgium (Flemish) | 51 (0.8) | 527 (2.1) | 49 (0.8) | 538 (2.8) | 11 (3.2) | |
| Czech Republic | 49 (0.9) | 527 (2.7) | 51 (0.9) | 538 (3.1) | 11 (2.9) | |
| 2 † United States | 49 (0.8) | 529 (3.0) | 51 (0.8) | 540 (2.9) | 11 (2.9) | |
| Hungary | 48 (1.0) | 518 (3.0) | 52 (1.0) | 529 (3.1) | 11 (3.0) | |
| Croatia | 50 (1.2) | 504 (2.6) | 50 (1.2) | 515 (2.7) | 12 (3.1) | |
| Italy | 50 (0.8) | 509 (2.7) | 50 (0.8) | 521 (3.2) | 12 (3.4) | |
| 2 Slovak Republic | 49 (1.0) | 503 (3.5) | 51 (1.0) | 516 (4.2) | 12 (3.6) | |
| France | 49 (1.0) | 478 (3.3) | 51 (1.0) | 491 (3.5) | 14 (3.0) | |
| Spain | 47 (0.8) | 495 (2.5) | 53 (0.8) | 509 (2.6) | 15 (2.8) | |
| 2 Portugal | 48 (0.9) | 516 (2.9) | 52 (0.9) | 533 (2.9) | 17 (2.6) | |
| Cyprus | 52 (0.7) | 523 (3.0) | 48 (0.7) | 542 (3.5) | 19 (3.2) | |
| 1 2 Canada | 49 (0.8) | 502 (2.5) | 51 (0.8) | 521 (2.0) | 19 (2.4) | |
| **International Average** | **49 (0.2)** | **499 (0.5)** | **51 (0.2)** | **503 (0.5)** | | |
| **Benchmarking Participants** | | | | | | |
| Abu Dhabi, UAE | 50 (1.5) | 438 (2.8) | 50 (1.5) | 443 (3.2) | 5 (4.0) | |
| 2 Dubai, UAE | 49 (2.4) | 540 (3.2) | 51 (2.4) | 548 (2.3) | 9 (4.4) | |
| Moscow City, Russian Fed. | 49 (1.0) | 588 (2.5) | 51 (1.0) | 597 (2.5) | 9 (2.2) | |
| Madrid, Spain | 49 (1.0) | 510 (2.6) | 51 (1.0) | 526 (2.4) | 17 (2.7) | |
| Quebec, Canada | 48 (0.8) | 523 (3.0) | 52 (0.8) | 541 (2.4) | 18 (3.0) | |
| 2 Ontario, Canada | 49 (1.6) | 502 (4.9) | 51 (1.6) | 521 (3.2) | 18 (4.4) | |




Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

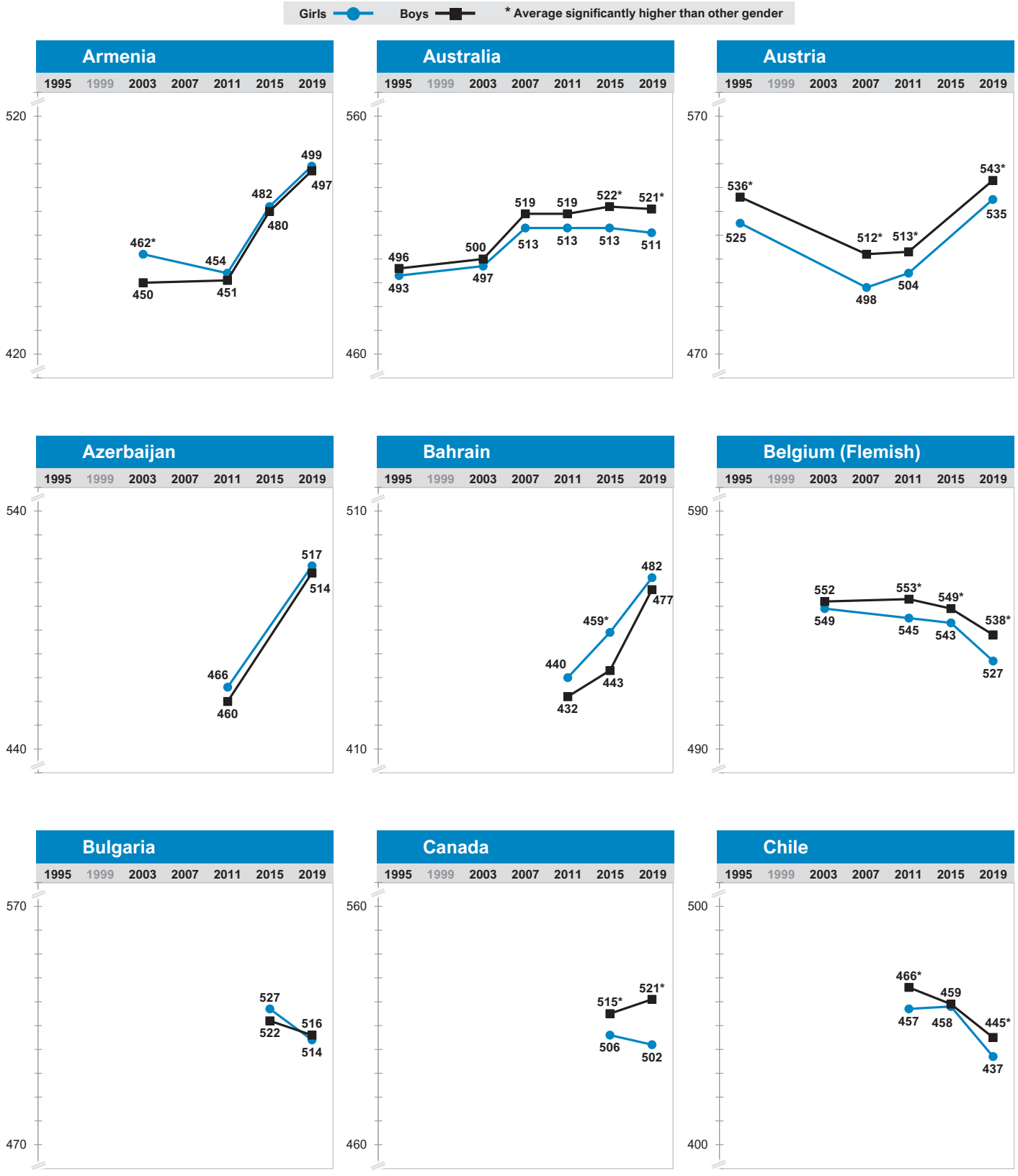
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Trends in Average Achievement by Gender

For the TIMSS 2019 countries with comparable data from previous TIMSS assessments, Exhibit 1.6 contains graphs of average mathematics achievement across assessments by gender. The countries are presented in alphabetical order. The difference in average mathematics achievement between boys and girls has remained relatively stable in most countries, with any overall increases or decreases in achievement from assessment to assessment occurring similarly for both girls and boys. However, a number of countries with no gender gap in TIMSS 2015 had a gap favoring boys in TIMSS 2019, including Chile, Georgia, Germany, Hungary, Poland, the Russian Federation, Singapore, Sweden, and the United Arab Emirates. On a more positive note, the gender gap in average achievement favoring boys in TIMSS 2015 was closed in Chinese Taipei, England, and Hong Kong SAR, while the gap favoring girls was closed in Bahrain, Finland, and Kuwait.

## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

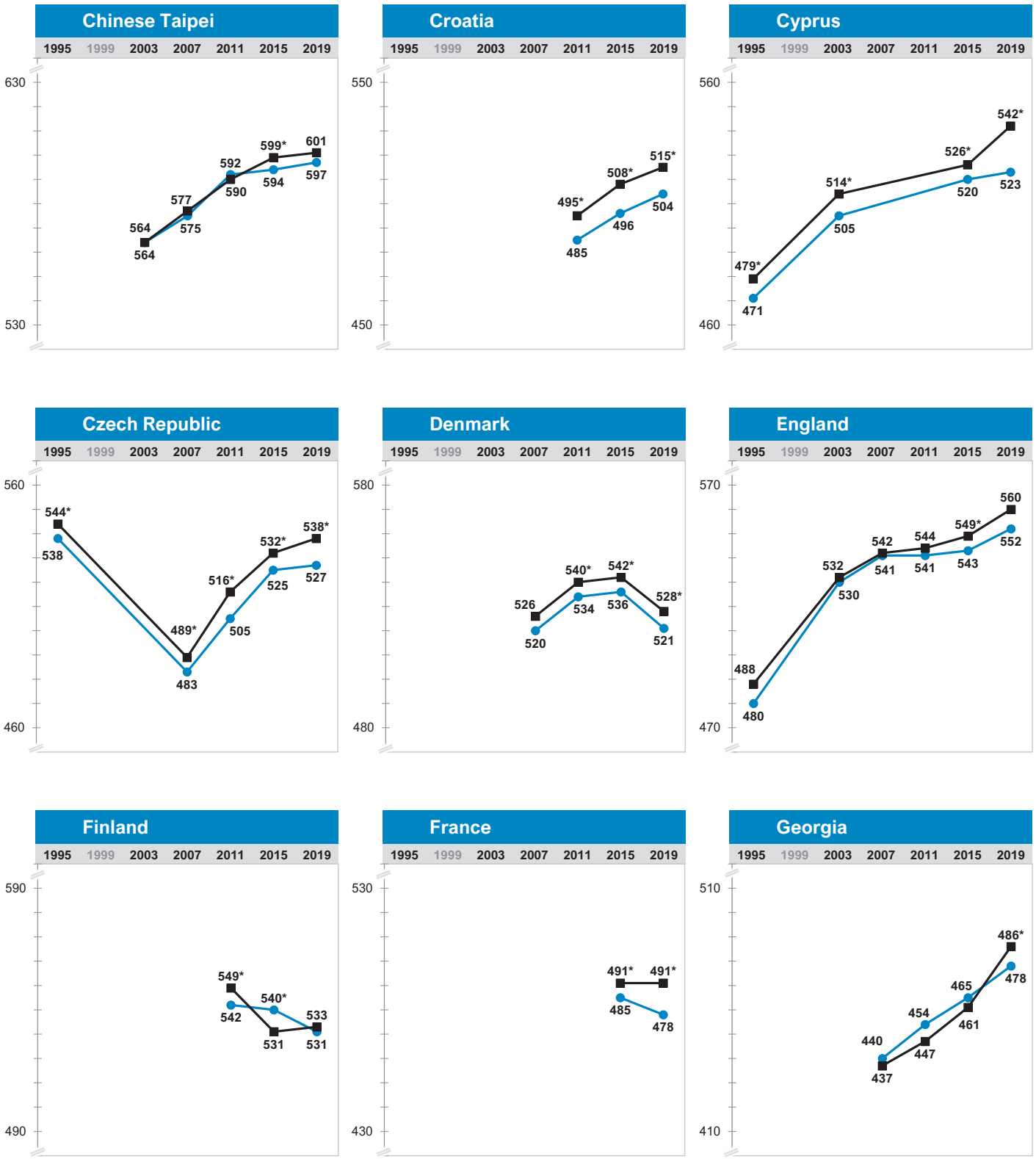
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.

Girls — Boys — * Average significantly higher than other gender



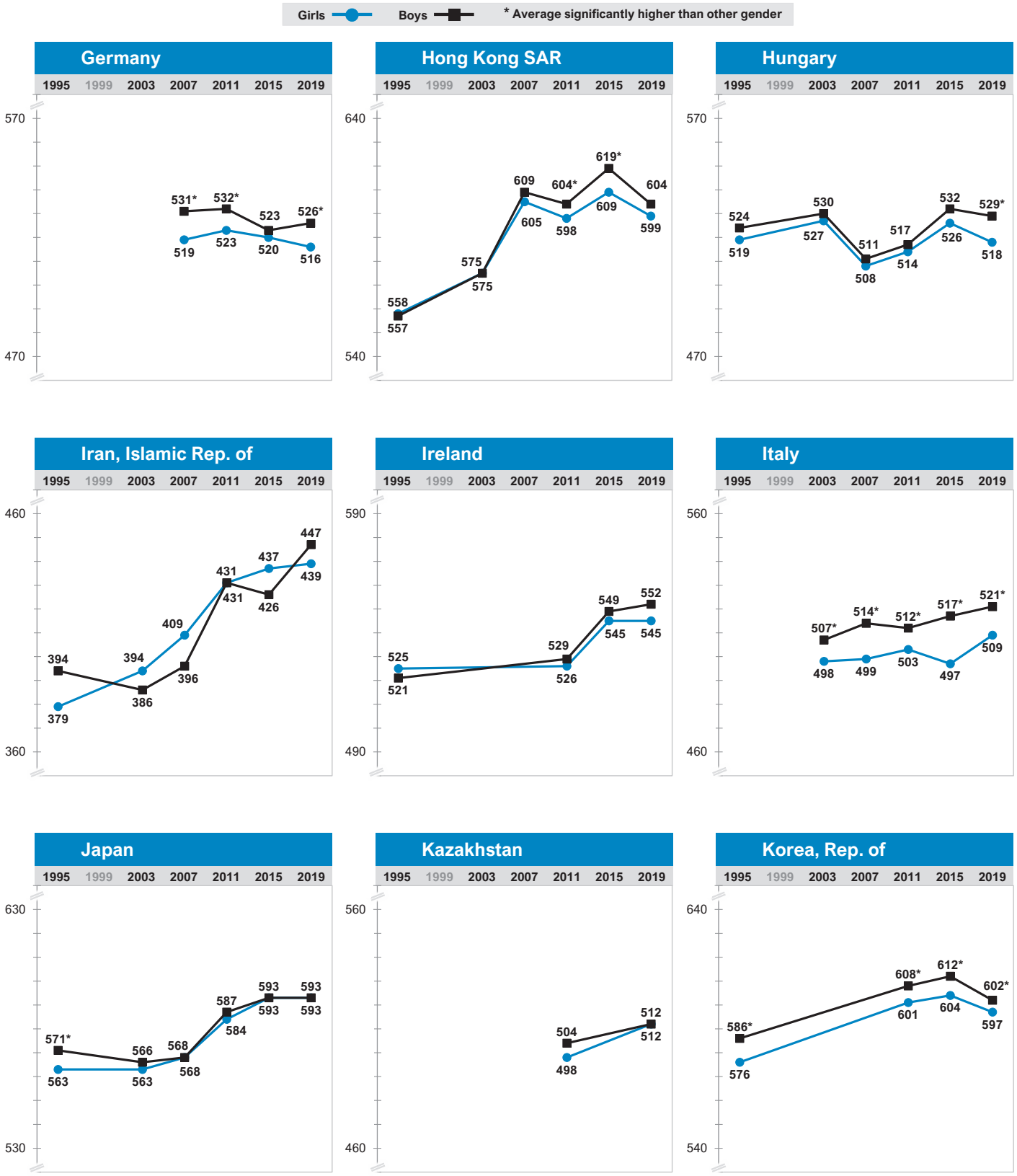

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



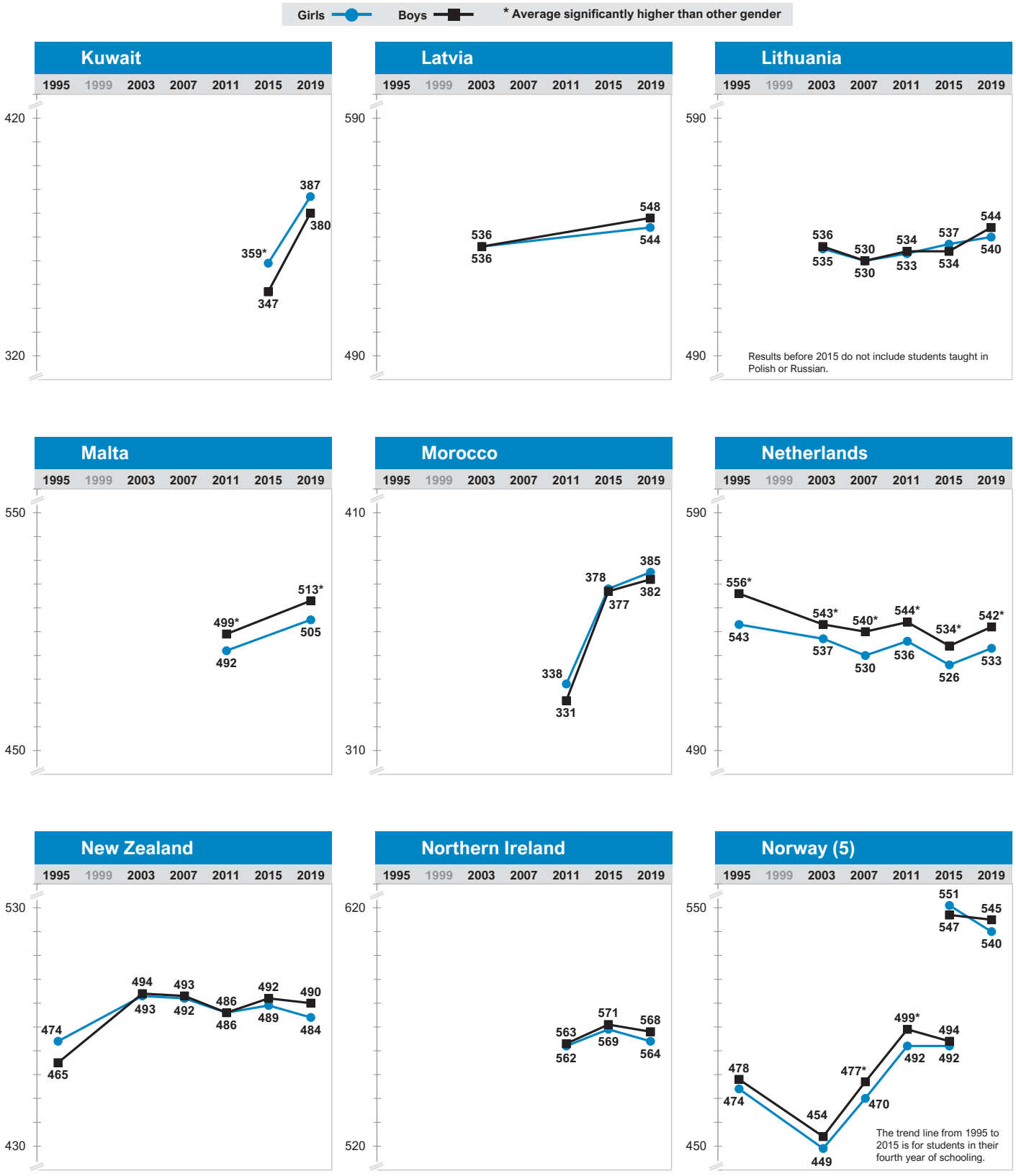

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



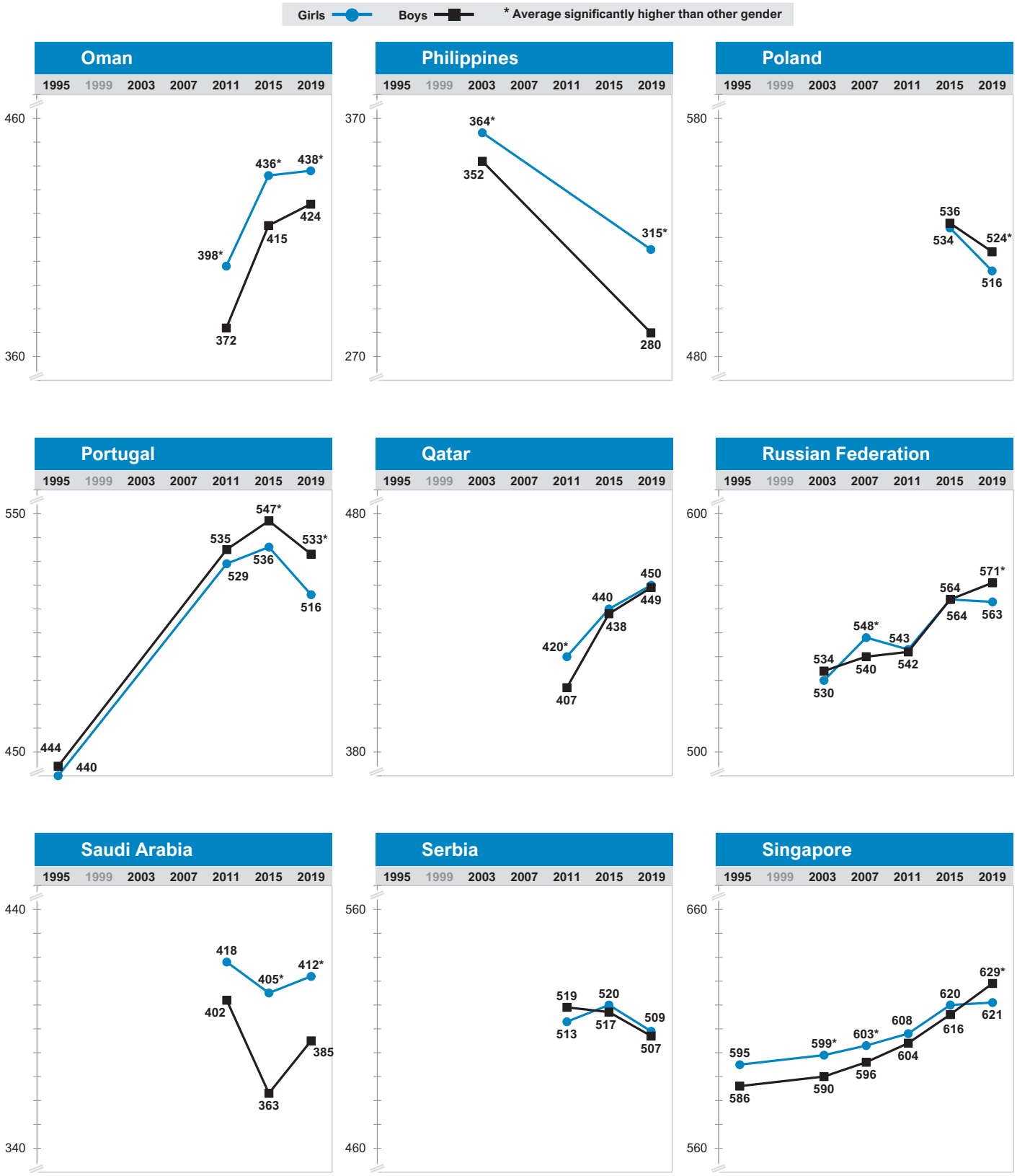

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



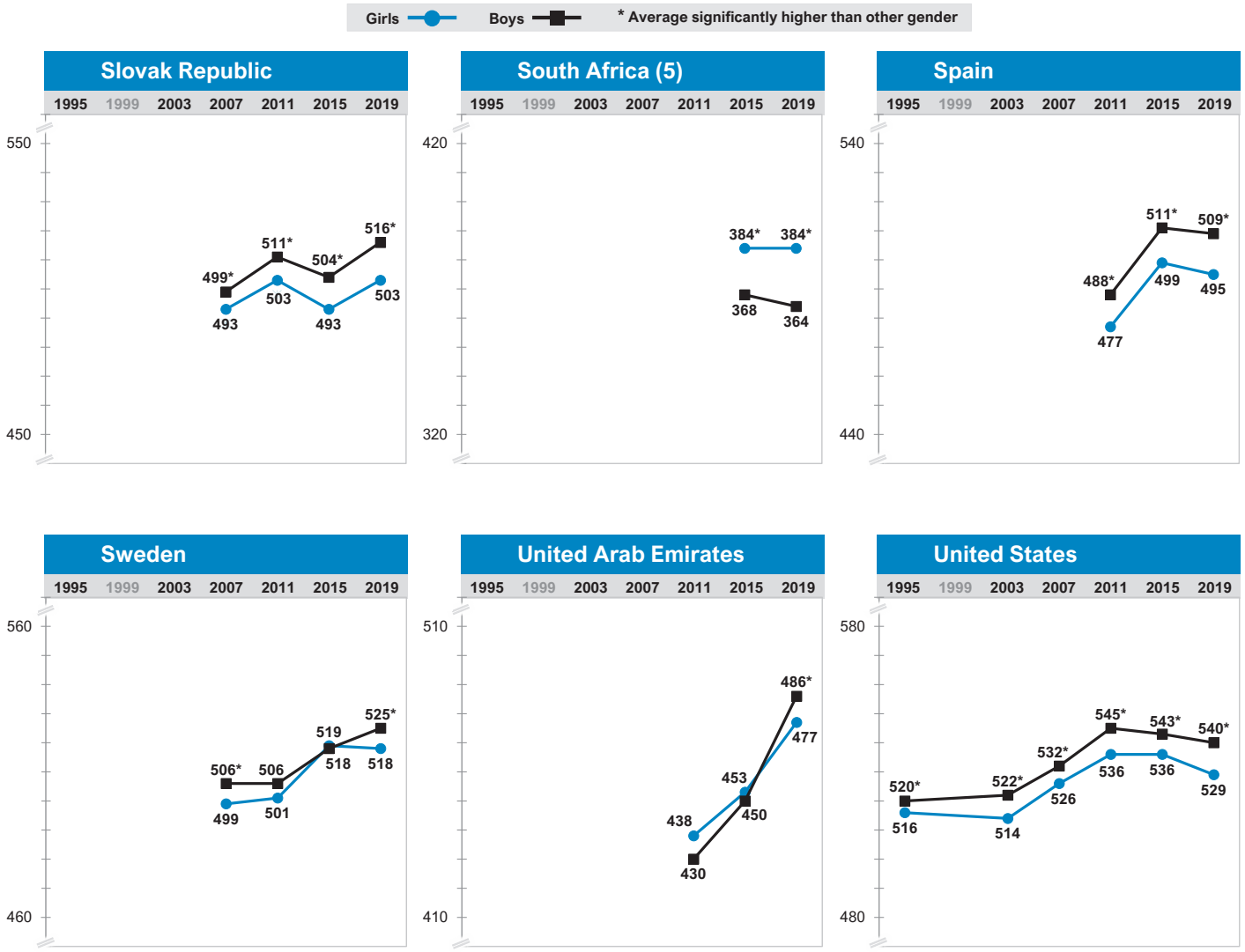

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

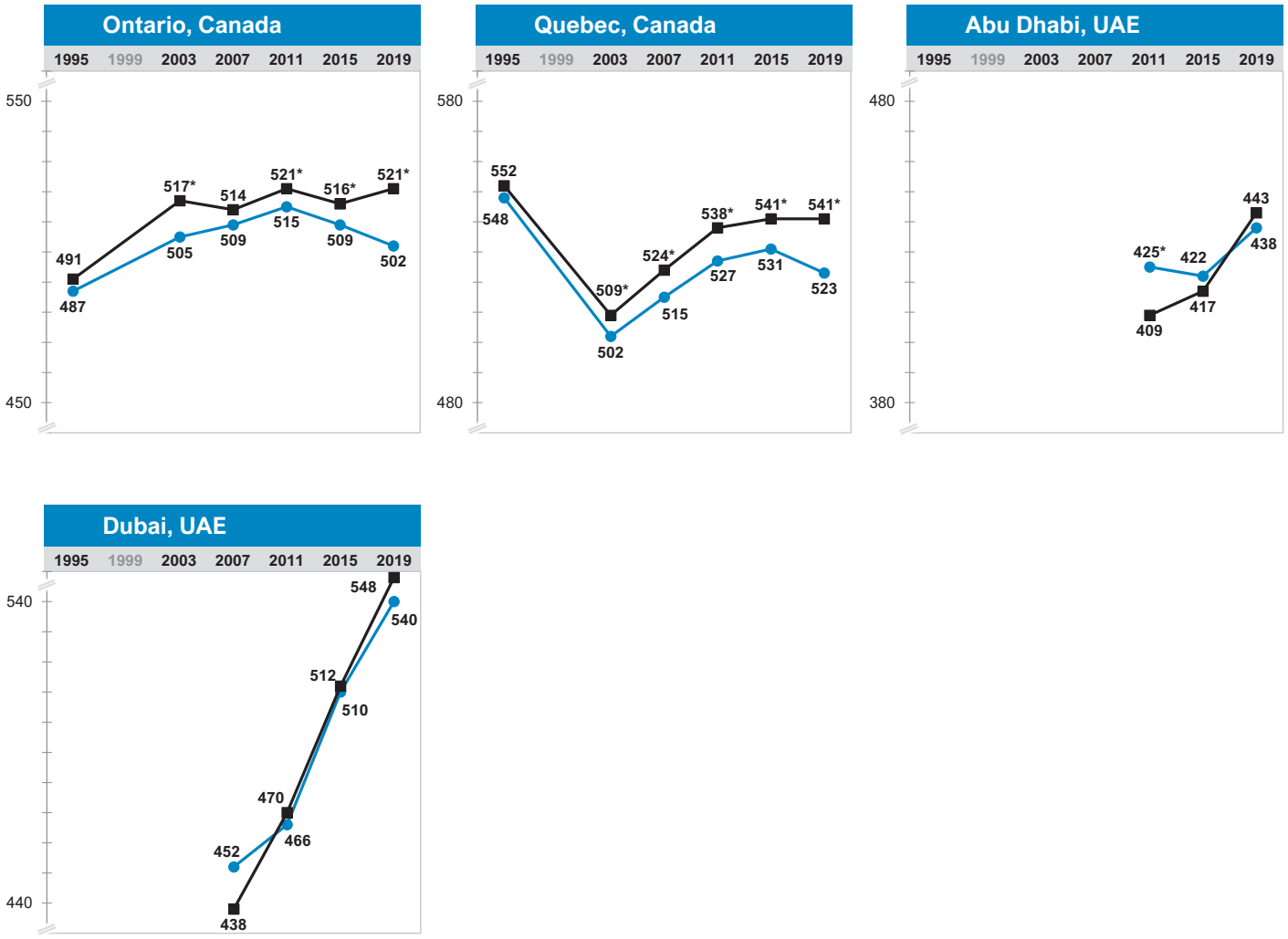
## Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.

Girls — Boys — * Average significantly higher than other gender

### Benchmarking Participants




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Performance at TIMSS International Benchmarks in Mathematics

## TIMSS 2019 International Benchmarks

To provide an interpretation of the results on the TIMSS fourth grade mathematics achievement scale in relation to the students' performance on the assessment items, TIMSS describes achievement at four points along the scale as International Benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400). The descriptions of mathematics achievement at the International Benchmarks were updated from TIMSS 2015 based on an analysis of the items that students with average achievement at each of the benchmarks answered successfully in TIMSS 2019.

Exhibit 1.7 summarizes what fourth grade students who reached each of the TIMSS International Benchmarks in 2019 could do in mathematics. The progression in mathematics achievement is evident from benchmark to benchmark, from demonstrating basic mathematics knowledge at the Low International Benchmark to applying and justifying their mathematical understanding at the Advanced International Benchmark. As much as possible, each description references achievement in the three content areas covered in the assessment at the fourth grade: number, measurement and geometry, and data. The following tables show the target percentages for the content and cognitive domains.

**Target Percentages of Assessment Devoted to Content and Cognitive Domains – TIMSS 2019 Fourth Grade Mathematics**

| Content Domain | Percentage |
|---|---|
| Number | 50% |
| Measurement and Geometry | 30% |
| Data | 20% |

| Cognitive Domain | Percentage |
|---|---|
| Knowing | 40% |
| Applying | 40% |
| Reasoning | 20% |

The interactive map of the benchmark descriptions links to example items. It provides an overview of the mathematics understanding demonstrated by the fourth grade students who performed at the four different levels on the achievement scale. The following sections provide more information about students' achievement in TIMSS 2019 at each International Benchmark as well as more detailed descriptions of each level together with example items.

## Exhibit 1.7: Summary of TIMSS 2019 International Benchmarks of Mathematics Achievement

| | |
|---|---|
| ● **Advanced** International Benchmark | |
| **625** | *Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.* Students can solve a variety of multistep word problems involving whole numbers and show an understanding of fractions and decimals. They can apply knowledge of two- and three-dimensional shapes in a variety of situations. Students can interpret and represent data to solve multistep problems. |
| ○ **High** International Benchmark | |
| **550** | *Students apply conceptual understanding to solve problems.* They can apply conceptual understanding of whole numbers to solve two-step word problems. They show understanding of the number line, multiples, factors, and rounding numbers, and operations with fractions and decimals. Students can solve simple measurement problems. They demonstrate understanding of geometric properties of shapes and angles. Students can interpret and use data in tables and a variety of graphs to solve problems. |
| ● **Intermediate** International Benchmark | |
| **475** | *Students can apply basic mathematical knowledge in simple situations.* They can compute with three- and four-digit whole numbers in a variety of situations. They have some understanding of decimals and fractions. Students can identify and draw shapes with simple properties. They can read, label, and interpret information in graphs and tables. |
| ○ **Low** International Benchmark | |
| **400** | *Students have some basic mathematical knowledge.* They can add, subtract, multiply, and divide one- and two-digit whole numbers. They can solve simple word problems. They have some knowledge of simple fractions and common geometric shapes. Students can read and complete simple bar graphs and tables. |

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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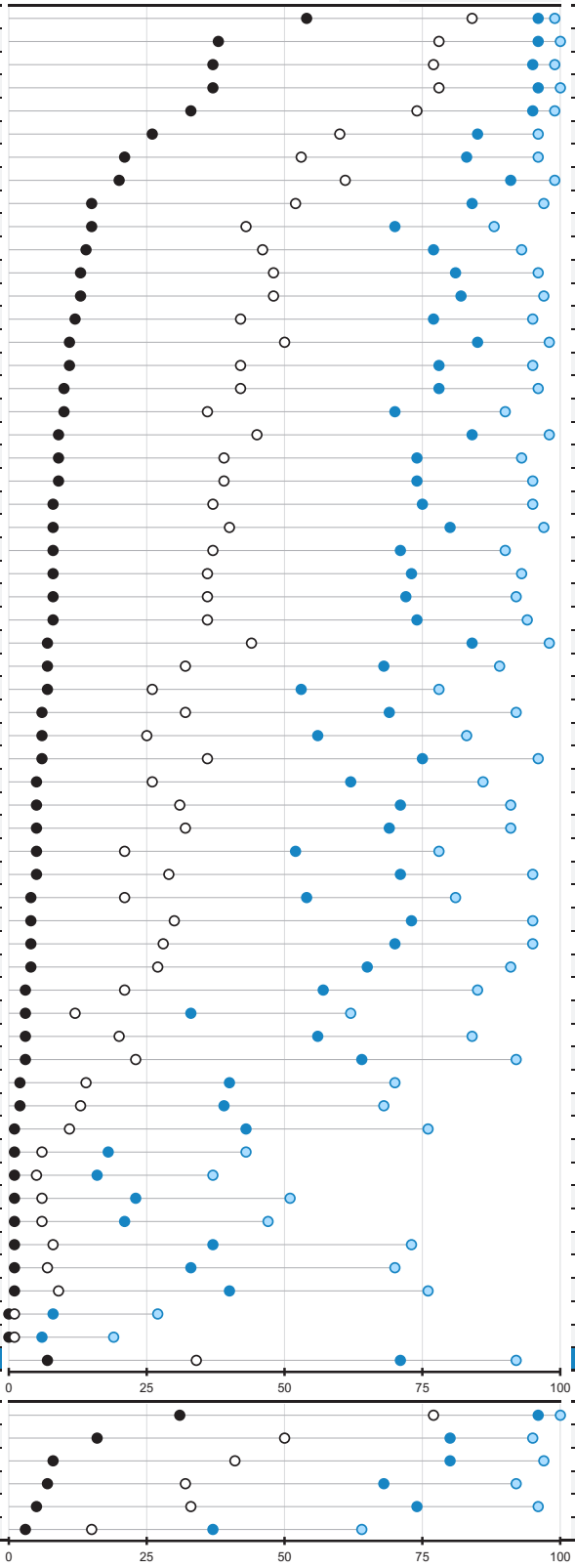
## Percentages of Students Reaching International Benchmarks

Exhibit 1.8 presents the percentages of students reaching each TIMSS 2019 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark, which is indicated on the graph with black dots. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages illustrated in the exhibit and shown in the columns to the right are cumulative. The five highest-performing East Asian countries had the highest percentages of students reaching the Advanced International Benchmark. More than half of the fourth grade students reached the Advanced International Benchmark in Singapore (54%), and one-third or more did so in Hong Kong SAR (38%), Korea (37%), Chinese Taipei (37%), and Japan (33%). Northern Ireland had about one-fourth (26%) of its students reaching the Advanced International Benchmark, and England and the Russian Federation had about one-fifth (21% and 20%, respectively).

Most countries had fewer than 10 percent of their fourth grade students performing at the Advanced level. As a point of reference, Exhibit 1.8 provides the international median percentage of students reaching each benchmark at the bottom of the four right-hand columns. By definition, half the countries have a percentage in that column above the median and half below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced—7 percent, High—34 percent, Intermediate—71 percent, and Low—92 percent. Many TIMSS 2019 countries had more than 90 percent of their fourth grade students reaching the Low Benchmark, which can be considered a level of minimum proficiency internationally. In 6 countries, essentially all the students reached this benchmark—100 percent in Hong Kong SAR and Chinese Taipei, and 99 percent in Singapore, Korea, Japan, and the Russian Federation.

Not only are the East Asian countries and the Russian Federation educating high percentages of their students to an advanced level, they are educating all of their students to a level of minimal proficiency.

## Exhibit 1.8: Percentages of Students Reaching International Benchmarks of Mathematics Achievement




| Country | Advanced Benchmark (625) | High Benchmark (550) | Intermediate Benchmark (475) | Low Benchmark (400) |
|---|---|---|---|---|
| [3] Singapore | 54 (2.2) | 84 (1.5) | 96 (0.7) | 99 (0.3) |
| † Hong Kong SAR | 38 (1.9) | 78 (1.6) | 96 (0.7) | 100 (0.2) |
| Korea, Rep. of | 37 (1.4) | 77 (1.2) | 95 (0.5) | 99 (0.2) |
| Chinese Taipei | 37 (1.3) | 78 (1.1) | 96 (0.5) | 100 (0.2) |
| Japan | 33 (1.3) | 74 (0.9) | 95 (0.4) | 99 (0.2) |
| † Northern Ireland | 26 (1.4) | 60 (1.4) | 85 (1.1) | 96 (0.6) |
| [2] England | 21 (1.4) | 53 (1.5) | 83 (1.2) | 96 (0.5) |
| [2] Russian Federation | 20 (1.6) | 61 (1.9) | 91 (1.0) | 99 (0.3) |
| Ireland | 15 (1.0) | 52 (1.4) | 84 (1.0) | 97 (0.5) |
| [2] Turkey (5) | 15 (1.3) | 43 (1.8) | 70 (1.7) | 88 (1.3) |
| [2] † United States | 14 (0.8) | 46 (1.3) | 77 (1.1) | 93 (0.6) |
| [2] Lithuania | 13 (1.1) | 48 (1.6) | 81 (1.1) | 96 (0.6) |
| † Norway (5) | 13 (0.9) | 48 (1.3) | 82 (1.2) | 97 (0.6) |
| Cyprus | 12 (0.9) | 42 (1.6) | 77 (1.3) | 95 (0.6) |
| [2] Latvia | 11 (0.9) | 50 (1.7) | 85 (1.2) | 98 (0.6) |
| Finland | 11 (0.8) | 42 (1.3) | 78 (1.2) | 95 (0.6) |
| Czech Republic | 10 (1.0) | 42 (1.5) | 78 (1.3) | 96 (0.6) |
| Australia | 10 (0.9) | 36 (1.2) | 70 (1.3) | 90 (1.0) |
| Austria | 9 (0.7) | 45 (1.4) | 84 (1.1) | 98 (0.4) |
| Hungary | 9 (0.8) | 39 (1.4) | 74 (1.3) | 93 (0.8) |
| [2] Portugal | 9 (0.7) | 39 (1.6) | 74 (1.2) | 95 (0.7) |
| † Denmark | 8 (0.9) | 37 (1.3) | 75 (1.0) | 95 (0.5) |
| † Belgium (Flemish) | 8 (0.5) | 40 (1.2) | 80 (1.2) | 97 (0.4) |
| Bulgaria | 8 (0.6) | 37 (1.7) | 71 (1.9) | 90 (1.5) |
| Poland | 8 (0.8) | 36 (1.4) | 73 (1.4) | 93 (0.6) |
| Azerbaijan | 8 (0.6) | 36 (1.3) | 72 (1.5) | 92 (0.8) |
| Sweden | 8 (0.8) | 36 (1.7) | 74 (1.4) | 94 (0.7) |
| ≡ Netherlands | 7 (0.9) | 44 (1.7) | 84 (1.1) | 98 (0.4) |
| [2] Serbia | 7 (0.7) | 32 (1.4) | 68 (1.5) | 89 (1.1) |
| United Arab Emirates | 7 (0.3) | 26 (0.6) | 53 (0.8) | 78 (0.7) |
| [1 2] Canada | 6 (0.6) | 32 (1.0) | 69 (0.9) | 92 (0.6) |
| [2] New Zealand | 6 (0.5) | 25 (1.2) | 56 (1.3) | 83 (0.9) |
| Germany | 6 (0.6) | 36 (1.5) | 75 (1.2) | 96 (0.6) |
| Albania | 5 (0.6) | 26 (1.4) | 62 (1.8) | 86 (1.3) |
| [2] Slovak Republic | 5 (0.7) | 31 (1.7) | 71 (1.7) | 91 (1.2) |
| Malta | 5 (0.5) | 32 (0.9) | 69 (0.8) | 91 (0.6) |
| North Macedonia | 5 (0.8) | 21 (1.8) | 52 (2.4) | 78 (1.7) |
| [2] Kazakhstan | 5 (0.6) | 29 (1.5) | 71 (1.4) | 95 (0.6) |
| Bahrain | 4 (0.4) | 21 (1.0) | 54 (1.2) | 81 (1.0) |
| Italy | 4 (0.5) | 30 (1.5) | 73 (1.3) | 95 (0.5) |
| Croatia | 4 (0.6) | 28 (1.3) | 70 (1.5) | 95 (0.7) |
| Spain | 4 (0.4) | 27 (0.9) | 65 (1.3) | 91 (1.0) |
| France | 3 (0.5) | 21 (1.2) | 57 (1.6) | 85 (1.2) |
| Oman | 3 (0.8) | 12 (1.3) | 33 (1.5) | 62 (1.3) |
| [1] Georgia | 3 (0.4) | 20 (1.4) | 56 (2.0) | 84 (1.4) |
| Armenia | 3 (0.5) | 23 (1.4) | 64 (1.6) | 92 (0.7) |
| Qatar | 2 (0.4) | 14 (1.2) | 40 (1.6) | 70 (1.4) |
| Iran, Islamic Rep. of | 2 (0.3) | 13 (1.0) | 39 (1.6) | 68 (1.5) |
| Montenegro | 1 (0.2) | 11 (0.7) | 43 (0.9) | 76 (0.9) |
| Morocco | 1 (0.8) | 6 (1.1) | 18 (1.4) | 43 (1.7) |
| South Africa (5) | 1 (0.2) | 5 (0.5) | 16 (1.1) | 37 (1.5) |
| [2] Saudi Arabia | 1 (0.2) | 6 (0.6) | 23 (1.2) | 51 (1.4) |
| Kuwait | 1 (0.2) | 6 (0.9) | 21 (1.6) | 47 (1.8) |
| [2] Kosovo | 1 (0.2) | 8 (0.8) | 37 (1.5) | 73 (1.4) |
| Chile | 1 (0.1) | 7 (0.6) | 33 (1.4) | 70 (1.5) |
| Bosnia and Herzegovina | 1 (0.2) | 9 (0.7) | 40 (1.5) | 76 (1.1) |
| [2] Ψ Pakistan | 0 (0.1) | 1 (0.3) | 8 (1.5) | 27 (4.7) |
| [2] Ψ Philippines | 0 (0.1) | 1 (0.2) | 6 (0.8) | 19 (1.8) |
| **International Median** | **7** | **34** | **71** | **92** |
| **Benchmarking Participants** | | | | |
| Moscow City, Russian Fed. | 31 (1.5) | 77 (1.4) | 96 (0.5) | 100 (0.2) |
| [2] Dubai, UAE | 16 (0.9) | 50 (0.9) | 80 (0.8) | 95 (0.5) |
| Quebec, Canada | 8 (0.8) | 41 (1.4) | 80 (1.3) | 97 (0.5) |
| [2] Ontario, Canada | 7 (1.0) | 32 (1.8) | 68 (1.6) | 92 (0.9) |
| Madrid, Spain | 5 (0.5) | 33 (1.2) | 74 (1.5) | 96 (0.6) |
| Abu Dhabi, UAE | 3 (0.2) | 15 (0.6) | 37 (1.0) | 64 (1.1) |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Trends in Percentages of Students Reaching International Benchmarks

Exhibit 1.9 shows the changes in percentages of students reaching the benchmarks for countries that have comparable data from previous assessments. The short-term trends show about the same numbers of increases and decreases, with a few more decreases in the midrange of the scale. Of the 45 countries that participated in both 2015 and 2019, 8 increased and 7 decreased at the Advanced International Benchmark, 9 increased and 9 decreased at the High Benchmark, 8 increased and 9 decreased at the Intermediate Benchmark, and 9 increased and 6 decreased at the Low Benchmark.

In contrast, the longer-term trends show considerable improvement across the percentages of students reaching all four of the benchmarks. Between 2007 and 2019, the 21 countries participating in those two assessments had 11 increases and no decreases at the Advanced level, 13 increases and no decreases at the High level, 14 increases and 2 decreases at the Intermediate level, and 12 increases and 1 decrease at the Low level. Between 1995 and 2019, the 16 countries participating in those two assessments had 12 increases and 2 decreases at the Advanced level, 12 increases and 1 decrease at the High level, and 11 increases with no decreases at both the Intermediate and Low levels.

## Exhibit 1.9: Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years

| Country | Advanced International Benchmark (625) | | | | | | High International Benchmark (550) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | | | | | | Percent of Students | | | | | |
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 |
| Singapore | 54 | 50 | 43 ▲ | 41 ▲ | 38 ▲ | 38 ▲ | 84 | 80 | 78 ▲ | 74 ▲ | 73 ▲ | 70 ▲ |
| Hong Kong SAR | 38 | 45 ▽ | 37 | 40 | 22 ▲ | 17 ▲ | 78 | 84 ▽ | 80 | 81 | 67 ▲ | 56 ▲ |
| Korea, Rep. of | 37 | 41 ▽ | 39 | | | 25 ▲ | 77 | 81 ▽ | 80 | | | 70 ▲ |
| Chinese Taipei | 37 | 35 | 34 | 24 ▲ | 16 ▲ | | 78 | 76 | 74 ▲ | 66 ▲ | 61 ▲ | |
| Japan | 33 | 32 | 30 ▲ | 23 ▲ | 21 ▲ | 22 ▲ | 74 | 74 | 70 ▲ | 61 ▲ | 60 ▲ | 61 ▲ |
| Northern Ireland | 26 | 27 | 24 | | | | 60 | 61 | 59 | | | |
| England | 21 | 17 ▲ | 18 | 16 ▲ | 14 ▲ | 7 ▲ | 53 | 49 ▲ | 49 | 48 ▲ | 43 ▲ | 24 ▲ |
| Russian Federation | 20 | 20 | 13 ▲ | 16 | 11 ▲ | | 61 | 59 | 47 ▲ | 48 ▲ | 41 ▲ | |
| Ireland | 15 | 14 | 9 ▲ | | | 10 ▲ | 52 | 51 | 41 ▲ | | | 40 ▲ |
| United States | 14 | 14 | 13 | 10 ▲ | 7 ▲ | 9 ▲ | 46 | 47 | 47 | 40 ▲ | 35 ▲ | 37 ▲ |
| Lithuania | 13 | 10 ▲ | 10 ▲ | 10 ▲ | 10 ▲ | | 48 | 44 | 43 ▲ | 42 ▲ | 44 | |
| Norway (5) | 13 | 14 | | | | | 48 | 50 | | | | |
| Cyprus | 12 | 10 | | | 8 ▲ | 5 ▲ | 42 | 39 | | | 34 ▲ | 21 ▲ |
| Latvia | 11 | | | | 10 | | 50 | | | | 44 ▲ | |
| Finland | 11 | 8 ▲ | 12 | | | | 42 | 43 | 49 ▽ | | | |
| Czech Republic | 10 | 8 ▲ | 4 ▲ | 2 ▲ | | 16 ▽ | 42 | 38 | 30 ▲ | 19 ▲ | | 46 |
| Australia | 10 | 9 | 10 | 9 | 5 ▲ | 6 ▲ | 36 | 36 | 35 | 35 | 26 ▲ | 27 ▲ |
| Austria | 9 | | 2 ▲ | 3 ▲ | | 10 | 45 | | 26 ▲ | 26 ▲ | | 42 |
| Hungary | 9 | 13 ▽ | 10 | 9 | 10 | 11 | 39 | 44 ▽ | 37 | 35 | 41 | 38 |
| Portugal | 9 | 12 ▽ | 8 | | | 1 ▲ | 39 | 46 ▽ | 40 | | | 11 ▲ |
| Denmark | 8 | 12 ▽ | 10 | 7 | | | 37 | 46 ▽ | 44 ▽ | 36 | | |
| Belgium (Flemish) | 8 | 10 | 10 | | 10 ▽ | | 40 | 47 ▽ | 50 ▽ | | 51 ▽ | |
| Bulgaria | 8 | 10 | | | | | 37 | 40 | | | | |
| Poland | 8 | 10 | | | | | 36 | 44 ▽ | | | | |
| Azerbaijan | 8 | | 5 ▲ | | | | 36 | | 21 ▲ | | | |
| Sweden | 8 | 5 ▲ | 3 ▲ | 3 ▲ | | | 36 | 34 | 25 ▲ | 24 ▲ | | |
| Netherlands | 7 | 4 ▲ | 5 ▲ | 7 | 5 | 12 ▽ | 44 | 37 ▲ | 44 | 42 | 44 | 50 ▽ |
| Serbia | 7 | 10 ▽ | 9 ▽ | | | | 32 | 37 ▽ | 36 | | | |
| United Arab Emirates | 7 | 5 ▲ | 2 ▲ | | | | 26 | 18 ▲ | 12 ▲ | | | |
| Canada | 6 | 6 | | | | | 32 | 31 | | | | |
| New Zealand | 6 | 6 | 4 ▲ | 5 | 5 ▲ | 4 ▲ | 25 | 26 | 23 | 26 | 26 | 19 ▲ |
| Germany | 6 | 5 | 5 | 6 | | | 36 | 34 | 37 | 37 | | |
| Slovak Republic | 5 | 4 | 5 | 5 | | | 31 | 26 ▲ | 30 | 26 ▲ | | |
| Malta | 5 | | 4 ▲ | | | | 32 | | 25 ▲ | | | |
| Kazakhstan | 5 | | 7 | | | | 29 | | 29 | | | |
| Bahrain | 4 | 2 ▲ | 1 ▲ | | | | 21 | 13 ▲ | 10 ▲ | | | |
| Italy | 4 | 4 | 5 | 6 | 6 | | 30 | 28 | 28 | 29 | 29 | |
| Croatia | 4 | 3 | 2 ▲ | | | | 28 | 24 ▲ | 19 ▲ | | | |
| Spain | 4 | 3 | 1 ▲ | | | | 27 | 27 | 17 ▲ | | | |
| France | 3 | 2 | | | | | 21 | 21 | | | | |
| Oman | 3 | 2 | 1 ▲ | | | | 12 | 11 | 5 ▲ | | | |
| Georgia | 3 | 2 | 2 | 1 ▲ | | | 20 | 15 ▲ | 12 ▲ | 10 ▲ | | |
| Armenia | 3 | 3 | 2 | | 2 | | 23 | 20 | 14 ▲ | | 13 ▲ | |
| Qatar | 2 | 3 | 2 | | | | 14 | 13 | 10 ▲ | | | |
| Iran, Islamic Rep. of | 2 | 1 | 1 ▲ | 0 ▲ | 0 ▲ | 0 ▲ | 13 | 11 | 9 ▲ | 3 ▲ | 2 ▲ | 3 ▲ |
| Morocco | 1 | 0 | 0 | | | | 6 | 3 | 2 ▲ | | | |
| South Africa (5) | 1 | 1 | | | | | 5 | 5 | | | | |
| Saudi Arabia | 1 | 0 | 2 | | | | 6 | 3 ▲ | 7 | | | |
| Kuwait | 1 | 0 | | | | | 6 | 3 ▲ | | | | |
| Chile | 1 | 1 ▽ | 2 ▽ | | | | 7 | 10 ▽ | 14 ▽ | | | |
| Philippines | 0 | | | | 1 | | 1 | | | | 5 ▽ | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Dubai, UAE | 16 | 11 ▲ | 5 ▲ | 2 ▲ | | | 50 | 35 ▲ | 22 ▲ | 12 ▲ | | |
| Quebec, Canada | 8 | 9 | 6 | 5 ▲ | 3 ▲ | 13 ▽ | 41 | 42 | 40 | 34 ▲ | 25 ▲ | 50 ▽ |
| Ontario, Canada | 7 | 6 | 7 | 4 ▲ | 5 | 4 ▲ | 32 | 31 | 34 | 29 | 29 | 22 ▲ |
| Abu Dhabi, UAE | 3 | 3 | 1 ▲ | | | | 15 | 12 | 8 ▲ | | | |

▲ 2019 percent significantly higher
▽ 2019 percent significantly lower

An empty cell indicates a country did not participate in that year's assessment or did not have comparable data.
See Appendix A for country participation in previous TIMSS assessments.
Results for Lithuania before 2015 do not include students taught in Polish or Russian.

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## Exhibit 1.9: Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years

(Continued)

| Country | Intermediate International Benchmark (475) Percent of Students | | | | | | Low International Benchmark (400) Percent of Students | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 |
| Singapore | 96 | 93 | 94 | 92 ▲ | 91 ▲ | 89 ▲ | 99 | 99 | 99 | 98 ▲ | 97 ▲ | 96 ▲ |
| Hong Kong SAR | 96 | 98 ▽ | 96 | 97 | 94 ▲ | 87 ▲ | 100 | 100 | 99 | 100 | 99 | 97 ▲ |
| Korea, Rep. of | 95 | 97 ▽ | 97 ▽ | | | 94 | 99 | 100 | 100 | | | 99 |
| Chinese Taipei | 96 | 95 | 93 ▲ | 92 ▲ | 92 ▲ | | 100 | 100 | 99 ▲ | 99 ▲ | 99 ▲ | |
| Japan | 95 | 95 | 93 ▲ | 89 ▲ | 89 ▲ | 89 ▲ | 99 | 99 | 99 | 98 ▲ | 98 ▲ | 98 ▲ |
| Northern Ireland | 85 | 86 | 85 | | | | 96 | 97 | 96 | | | |
| England | 83 | 80 | 78 ▲ | 79 ▲ | 75 ▲ | 54 ▲ | 96 | 96 | 93 ▲ | 94 ▲ | 93 ▲ | 82 ▲ |
| Russian Federation | 91 | 89 | 82 ▲ | 81 ▲ | 76 ▲ | | 99 | 98 | 97 ▲ | 95 ▲ | 95 ▲ | |
| Ireland | 84 | 84 | 77 ▲ | | | 73 ▲ | 97 | 97 | 94 ▲ | | | 91 ▲ |
| United States | 77 | 79 | 81 ▽ | 77 | 72 ▲ | 71 ▲ | 93 | 95 ▽ | 96 ▽ | 95 ▽ | 93 | 92 |
| Lithuania | 81 | 81 | 79 | 77 ▲ | 79 | | 96 | 96 | 96 | 94 ▲ | 96 | |
| Norway (5) | 82 | 86 ▽ | | | | | 97 | 98 | | | | |
| Cyprus | 77 | 74 | | | 68 ▲ | 52 ▲ | 95 | 93 ▲ | | | 89 ▲ | 79 ▲ |
| Latvia | 85 | | | | 81 ▲ | | 98 | | | | 96 ▲ | |
| Finland | 78 | 82 ▽ | 85 ▽ | | | | 95 | 97 ▽ | 98 ▽ | | | |
| Czech Republic | 78 | 78 | 72 ▲ | 59 ▲ | | 79 | 96 | 96 | 93 ▲ | 88 ▲ | | 95 |
| Australia | 70 | 70 | 70 | 71 | 64 ▲ | 61 ▲ | 90 | 91 | 90 | 91 | 88 | 86 ▲ |
| Austria | 84 | | 70 ▲ | 69 ▲ | | 77 ▲ | 98 | | 95 ▲ | 93 ▲ | | 94 ▲ |
| Hungary | 74 | 75 | 70 | 67 ▲ | 76 | 72 | 93 | 92 | 90 ▲ | 88 ▲ | 94 | 91 |
| Portugal | 74 | 82 ▽ | 80 ▽ | | | 37 ▲ | 95 | 97 ▽ | 97 ▽ | | | 70 ▲ |
| Denmark | 75 | 80 ▽ | 82 ▽ | 76 | | | 95 | 96 | 97 | 95 | | |
| Belgium (Flemish) | 80 | 88 ▽ | 89 ▽ | | 90 ▽ | | 97 | 99 ▽ | 99 ▽ | | 99 ▽ | |
| Bulgaria | 71 | 75 | | | | | 90 | 92 | | | | |
| Poland | 73 | 80 ▽ | | | | | 93 | 96 ▽ | | | | |
| Azerbaijan | 72 | | 46 ▲ | | | | 92 | | 72 ▲ | | | |
| Sweden | 74 | 75 | 69 ▲ | 68 ▲ | | | 94 | 95 | 93 | 93 | | |
| Netherlands | 84 | 83 | 88 ▽ | 84 | 89 ▽ | 87 | 98 | 99 | 99 ▽ | 98 | 99 | 99 |
| Serbia | 68 | 72 | 70 | | | | 89 | 91 | 90 | | | |
| United Arab Emirates | 53 | 42 ▲ | 35 ▲ | | | | 78 | 68 ▲ | 64 ▲ | | | |
| Canada | 69 | 69 | | | | | 92 | 92 | | | | |
| New Zealand | 56 | 59 | 58 | 61 ▽ | 61 ▽ | 51 | 83 | 84 | 85 | 85 | 86 ▽ | 78 ▲ |
| Germany | 75 | 77 | 81 ▽ | 78 ▽ | | | 96 | 96 | 97 ▽ | 96 | | |
| Slovak Republic | 71 | 65 ▲ | 69 | 63 ▲ | | | 91 | 88 | 90 | 88 | | |
| Malta | 69 | | 63 ▲ | | | | 91 | | 88 ▲ | | | |
| Kazakhstan | 71 | | 62 ▲ | | | | 95 | | 88 ▲ | | | |
| Bahrain | 54 | 41 ▲ | 34 ▲ | | | | 81 | 72 ▲ | 67 ▲ | | | |
| Italy | 73 | 69 ▲ | 69 ▲ | 67 ▲ | 65 ▲ | | 95 | 93 ▲ | 93 ▲ | 91 ▲ | 89 ▲ | |
| Croatia | 70 | 67 | 60 ▲ | | | | 95 | 93 | 90 ▲ | | | |
| Spain | 65 | 67 | 56 ▲ | | | | 91 | 93 | 87 ▲ | | | |
| France | 57 | 58 | | | | | 85 | 87 | | | | |
| Oman | 33 | 32 | 20 ▲ | | | | 62 | 60 | 46 ▲ | | | |
| Georgia | 56 | 47 ▲ | 41 ▲ | 35 ▲ | | | 84 | 78 ▲ | 72 ▲ | 67 ▲ | | |
| Armenia | 64 | 55 ▲ | 41 ▲ | | 43 ▲ | | 92 | 84 ▲ | 72 ▲ | | 75 ▲ | |
| Qatar | 40 | 36 | 29 ▲ | | | | 70 | 65 ▲ | 55 ▲ | | | |
| Iran, Islamic Rep. of | 39 | 36 | 33 ▲ | 20 ▲ | 17 ▲ | 15 ▲ | 68 | 65 | 64 | 53 ▲ | 45 ▲ | 44 ▲ |
| Morocco | 18 | 17 | 10 ▲ | | | | 43 | 41 | 26 ▲ | | | |
| South Africa (5) | 16 | 17 | | | | | 37 | 39 | | | | |
| Saudi Arabia | 23 | 16 ▲ | 24 | | | | 51 | 43 ▲ | 55 | | | |
| Kuwait | 21 | 12 ▲ | | | | | 47 | 33 ▲ | | | | |
| Chile | 33 | 42 ▽ | 44 ▽ | | | | 70 | 78 ▽ | 77 ▽ | | | |
| Philippines | 6 | | | | 15 ▽ | | 19 | | | | 34 ▽ | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Dubai, UAE | 80 | 66 ▲ | 50 ▲ | 37 ▲ | | | 95 | 87 ▲ | 75 ▲ | 69 ▲ | | |
| Quebec, Canada | 80 | 82 | 83 | 74 ▲ | 69 ▲ | 87 ▽ | 97 | 98 | 99 ▽ | 96 | 94 ▲ | 98 |
| Ontario, Canada | 68 | 70 | 73 ▽ | 71 | 70 | 59 ▲ | 92 | 93 | 94 | 94 | 94 | 86 ▲ |
| Abu Dhabi, UAE | 37 | 32 ▲ | 29 ▲ | | | | 64 | 56 ▲ | 58 ▲ | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

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## Low Benchmark: Full Description and Example Items

Exhibit 1.10 presents the description of fourth grade students' achievement at the Low International Benchmark. Essentially, students demonstrated some basic understanding in each of the content domains: number, measurement and geometry, and data.

Exhibit 1.10.1 shows an example item from the data content domain. Students could read the numbers in the table and use the data to draw two bars on the graph. Nearly all the students in a number of countries completed this task successfully. The international average across countries was 81 percent.

## Exhibit 1.10: Description of the TIMSS 2019 Low International Benchmark (400) of Mathematics Achievement

### Low International Benchmark

**400**

**Summary**

*Students have some basic mathematical knowledge.* They can add, subtract, multiply, and divide one- and two-digit whole numbers. They can solve simple word problems. They have some knowledge of simple fractions and common geometric shapes. Students can read and complete simple bar graphs and tables.

Students at this level are familiar with numbers into the thousands. They can order, add, and subtract whole numbers. They have some knowledge of multiplication and division involving two-digit numbers. They can solve one-step word problems and number sentences. They can recognize pictorial representations of simple fractions.

Students can recognize basic measurement ideas. They can recognize and visualize common two- and three-dimensional geometric shapes.

Students can read and complete simple bar graphs and tables.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 1.10.1: Low International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| † Hong Kong SAR | 98 (0.6) | ▲ |
| Korea, Rep. of | 96 (0.9) | ▲ |
| Japan | 95 (0.9) | ▲ |
| 3 Singapore | 94 (1.0) | ▲ |
| 2 Lithuania | 93 (1.3) | ▲ |
| 2 Latvia | 93 (1.3) | ▲ |
| † Northern Ireland | 92 (1.3) | ▲ |
| Ireland | 90 (1.3) | ▲ |
| † Belgium (Flemish) | 89 (1.2) | ▲ |
| Poland | 88 (1.6) | ▲ |
| 2 Russian Federation | 88 (1.5) | ▲ |
| Chinese Taipei | 88 (1.7) | ▲ |
| Czech Republic | 87 (1.5) | ▲ |
| Australia | 87 (1.5) | ▲ |
| Austria | 86 (1.4) | ▲ |
| Finland | 86 (2.0) | ▲ |
| † Norway (5) | 86 (1.7) | ▲ |
| 2 England | 84 (1.8) | ▲ |
| 2 Portugal | 84 (1.5) | ▲ |
| ≡ Netherlands | 84 (1.9) | |
| Cyprus | 84 (1.7) | ▲ |
| Sweden | 83 (1.8) | |
| Spain | 82 (1.9) | |
| Hungary | 82 (2.3) | |
| 2† United States | 82 (1.3) | |
| Germany | 82 (1.9) | |
| † Denmark | 82 (1.7) | |
| 2 Turkey (5) | 81 (2.3) | |
| Azerbaijan | 81 (1.7) | |
| **International Average** | **81 (0.3)** | |
| Malta | 80 (1.7) | |
| 2 Slovak Republic | 80 (1.9) | |
| Croatia | 80 (2.1) | |
| Italy | 79 (2.1) | |
| 2 New Zealand | 79 (1.8) | |
| 1 2 Canada | 77 (1.5) | ▽ |
| 2 Serbia | 75 (3.3) | |
| Bulgaria | 74 (2.6) | ▽ |
| France | 71 (2.1) | ▽ |
| United Arab Emirates | 69 (0.7) | ▽ |
| Iran, Islamic Rep. of | 69 (1.9) | ▽ |
| Bahrain | 64 (2.5) | ▽ |
| Qatar | 63 (2.6) | ▽ |
| Oman | 61 (1.8) | ▽ |
| 1 Georgia | 61 (2.9) | ▽ |
| 2 Kazakhstan | 60 (2.3) | ▽ |
| Chile | 59 (2.2) | ▽ |
| Armenia | 57 (2.9) | ▽ |
| Albania | - - | |
| Bosnia and Herzegovina | - - | |
| 2 Kosovo | - - | |
| Kuwait | - - | |
| Montenegro | - - | |
| Morocco | - - | |
| North Macedonia | - - | |
| 2 Pakistan | - - | |
| 2 Philippines | - - | |
| 2 Saudi Arabia | - - | |
| South Africa (5) | - - | |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 96 (0.8) | ▲ |
| Quebec, Canada | 90 (1.3) | ▲ |
| Madrid, Spain | 86 (1.6) | ▲ |
| 2 Dubai, UAE | 83 (1.1) | ▲ |
| 2 Ontario, Canada | 75 (2.4) | ▽ |
| Abu Dhabi, UAE | 60 (1.6) | ▽ |

**Content Domain:** Data

**Cognitive Domain:** Applying

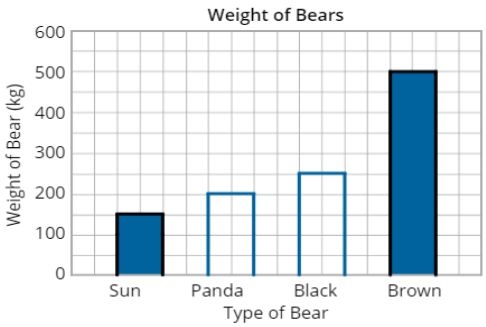
**Description:** Represents data from a table in a bar graph

The table shows the weights of 4 bears.

| Type of Bear | Weight (kg) |
|---|---|
| Sun | 150 |
| Panda | 200 |
| Black | 250 |
| Brown | 500 |

Use the data to complete the graph.






The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. Item not included in TIMSS 2019 less difficult mathematics assessment.

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## Intermediate Benchmark: Full Description and Example Items

Exhibit 1.11 provides the description of student achievement at the Intermediate International Benchmark. At this level, students could apply their mathematics understanding in a variety of simple situations.

Example 1.11.1 presents an item from the measurement and geometry domain. Students reaching the Intermediate level could complete the symmetrical figure. Ninety-seven percent of the Singaporean fourth grade students could do this task, and the international average was 70 percent.

Example 1.11.2 presents an item from the data domain. High percentages of fourth grade students in a number of countries were able to read data from the line graph. The international average was 68 percent.

## Exhibit 1.11: Description of the TIMSS 2019 Intermediate International Benchmark (475) of Mathematics Achievement

### **Intermediate** International Benchmark

**475**

**Summary**

*Students can apply basic mathematical knowledge in simple situations.* They can compute with three- and four-digit whole numbers in a variety of situations. They have some understanding of decimals and fractions. Students can identify and draw shapes with simple properties. They can read, label, and interpret information in graphs and tables.

Students at this level demonstrate an understanding of four-digit whole numbers. They can add and subtract four-digit numbers in a variety of situations, including problems involving two steps. Students can multiply and divide three-digit numbers by a one-digit number. They can identify expressions representing simple situations. Students at this level can add and order decimals and work with non-unit fractions.

Students can solve simple measurement problems such as identifying the appropriate metric unit for linear objects and volume. Students can solve addition and subtraction problems involving hours and minutes. They can identify and draw shapes with simple properties and relate two- and three-dimensional shapes.

Students can read, label, and interpret information in graphs and tables.

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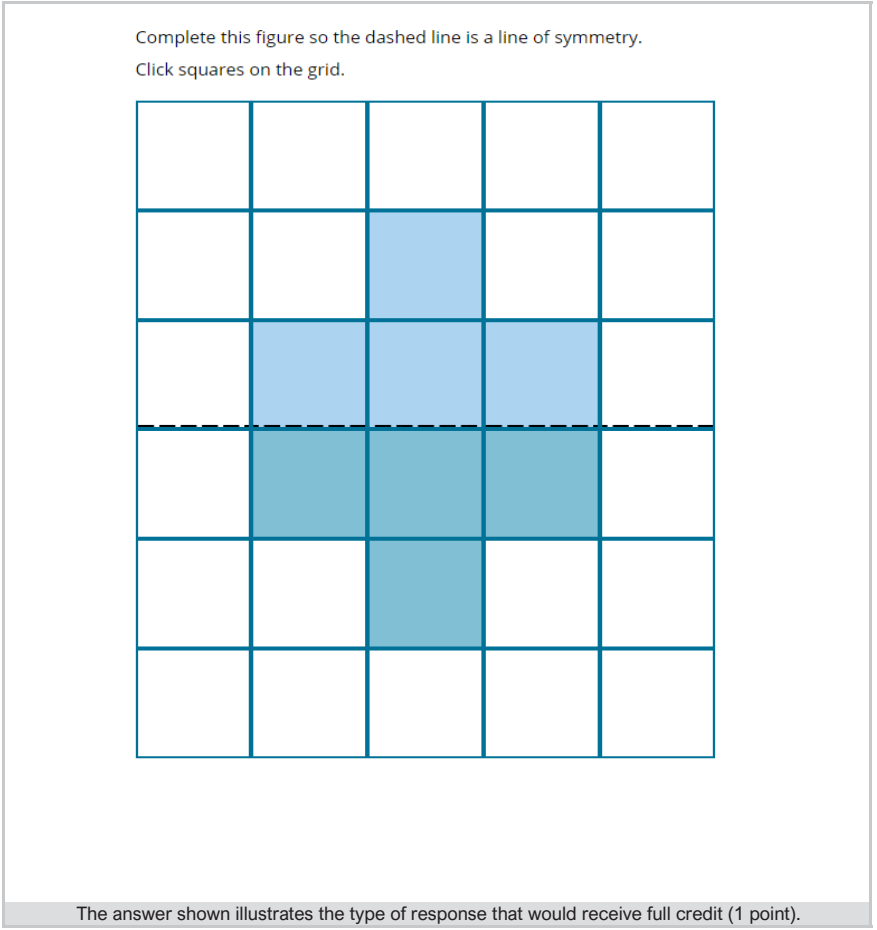
## Exhibit 1.11.1: Intermediate International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| [3] Singapore | 97 (0.7) | ▲ |
| Cyprus | 93 (1.2) | ▲ |
| Ireland | 92 (1.4) | ▲ |
| † Northern Ireland | 91 (1.6) | ▲ |
| † Denmark | 91 (1.5) | ▲ |
| † Hong Kong SAR | 90 (1.9) | ▲ |
| ≡ Netherlands | 90 (1.3) | ▲ |
| Malta | 90 (1.4) | ▲ |
| Albania | 90 (1.8) | ▲ |
| Poland | 90 (1.2) | ▲ |
| † Belgium (Flemish) | 89 (1.5) | ▲ |
| [2] Latvia | 89 (1.6) | ▲ |
| [2] England | 88 (1.8) | ▲ |
| † Norway (5) | 88 (1.9) | ▲ |
| Australia | 86 (1.8) | ▲ |
| [2] Lithuania | 86 (1.7) | ▲ |
| [2] Kosovo | 86 (1.9) | ▲ |
| Germany | 85 (1.8) | ▲ |
| [2] Kazakhstan | 84 (1.7) | ▲ |
| [2] Portugal | 84 (2.0) | ▲ |
| Finland | 82 (1.8) | ▲ |
| Hungary | 81 (1.7) | ▲ |
| Morocco | 81 (1.9) | ▲ |
| Azerbaijan | 79 (2.0) | ▲ |
| [2] New Zealand | 79 (1.9) | ▲ |
| Bulgaria | 78 (2.4) | ▲ |
| North Macedonia | 77 (2.4) | ▲ |
| [2] Russian Federation | 77 (2.3) | ▲ |
| Austria | 77 (1.9) | ▲ |
| Sweden | 76 (2.2) | ▲ |
| Italy | 73 (2.5) | |
| [1 2] Canada | 72 (1.8) | |
| France | 72 (2.4) | |
| **International Average** | **70 (0.3)** | |
| Oman | 70 (2.0) | |
| Korea, Rep. of | 69 (2.3) | |
| Iran, Islamic Rep. of | 68 (2.2) | |
| [2] Turkey (5) | 67 (2.7) | |
| Czech Republic | 66 (2.6) | |
| Spain | 65 (2.5) | ▽ |
| [2] Slovak Republic | 62 (2.8) | ▽ |
| [2†] United States | 60 (1.5) | ▽ |
| Chinese Taipei | 59 (2.4) | ▽ |
| [2] Serbia | 58 (2.5) | ▽ |
| Bahrain | 57 (2.4) | ▽ |
| Japan | 56 (2.5) | ▽ |
| United Arab Emirates | 55 (1.2) | ▽ |
| Croatia | 54 (2.9) | ▽ |
| South Africa (5) | 54 (1.9) | ▽ |
| Kuwait | 52 (2.6) | ▽ |
| Montenegro | 52 (2.0) | ▽ |
| Chile | 51 (2.6) | ▽ |
| Armenia | 49 (2.5) | ▽ |
| Qatar | 41 (2.6) | ▽ |
| [2] Saudi Arabia | 40 (1.9) | ▽ |
| [1] Georgia | 31 (2.7) | ▽ |
| Bosnia and Herzegovina | 30 (2.0) | ▽ |
| [2] Pakistan | 18 (4.7) | ▽ |
| [2] Philippines | 13 (1.9) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 90 (1.6) | ▲ |
| Quebec, Canada | 83 (2.2) | ▲ |
| [2] Ontario, Canada | 74 (3.1) | |
| [2] Dubai, UAE | 73 (1.5) | |
| Madrid, Spain | 65 (3.1) | |
| Abu Dhabi, UAE | 45 (2.1) | ▽ |

**Content Domain:** Measurement and Geometry

**Cognitive Domain:** Applying

**Description:** Completes a symmetric figure on a square grid given half the shape and the line of symmetry




The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 1.11.2: Intermediate International Benchmark of Mathematics Achievement – Example Item 2

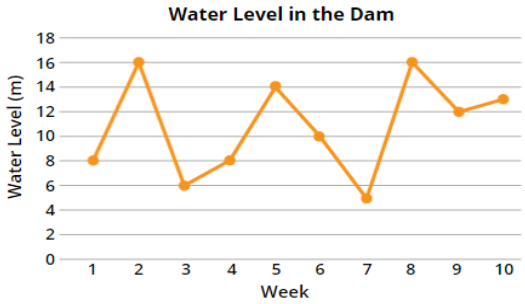
| Country | Percent Full Credit | |
|---|---|---|
| Japan | 95 (0.9) | ▲ |
| 3 Singapore | 92 (0.9) | ▲ |
| Chinese Taipei | 92 (1.3) | ▲ |
| Korea, Rep. of | 91 (1.3) | ▲ |
| 2 England | 91 (1.5) | ▲ |
| ≡ Netherlands | 91 (1.4) | ▲ |
| † Hong Kong SAR | 91 (1.5) | ▲ |
| † Norway (5) | 88 (1.7) | ▲ |
| † Northern Ireland | 87 (1.8) | ▲ |
| 2 Russian Federation | 87 (1.5) | ▲ |
| Sweden | 86 (1.9) | ▲ |
| Finland | 86 (1.6) | ▲ |
| † Belgium (Flemish) | 86 (1.6) | ▲ |
| 2 Lithuania | 84 (1.7) | ▲ |
| † Denmark | 84 (1.7) | ▲ |
| Australia | 84 (1.6) | ▲ |
| 2 Portugal | 82 (1.6) | ▲ |
| 2 Latvia | 81 (2.0) | ▲ |
| Ireland | 80 (1.6) | ▲ |
| Azerbaijan | 79 (2.0) | ▲ |
| 2† United States | 79 (1.4) | ▲ |
| Spain | 78 (2.5) | ▲ |
| 2 New Zealand | 77 (1.7) | ▲ |
| Hungary | 76 (1.9) | ▲ |
| 1 2 Canada | 76 (1.3) | ▲ |
| Cyprus | 75 (1.7) | ▲ |
| Malta | 74 (2.0) | ▲ |
| Czech Republic | 73 (2.2) | ▲ |
| Germany | 71 (2.0) | |
| Austria | 70 (2.4) | |
| 2 Slovak Republic | 70 (2.2) | |
| Italy | 69 (2.5) | |
| 2 Turkey (5) | 69 (2.4) | |
| France | 68 (2.6) | |
| **International Average** | **68 (0.3)** | |
| Albania | 68 (2.2) | |
| 2 Serbia | 66 (2.7) | |
| Poland | 65 (2.2) | |
| 2 Kazakhstan | 64 (2.2) | |
| Bahrain | 63 (1.8) | ▽ |
| United Arab Emirates | 62 (0.8) | ▽ |
| Bulgaria | 62 (2.8) | ▽ |
| Chile | 61 (2.2) | ▽ |
| Qatar | 60 (2.3) | ▽ |
| Croatia | 59 (3.2) | ▽ |
| North Macedonia | 52 (2.8) | ▽ |
| South Africa (5) | 52 (1.8) | ▽ |
| Iran, Islamic Rep. of | 50 (2.4) | ▽ |
| 1 Georgia | 48 (2.9) | ▽ |
| Oman | 45 (2.0) | ▽ |
| 2 Kosovo | 43 (2.8) | ▽ |
| Armenia | 42 (2.1) | ▽ |
| Montenegro | 41 (1.8) | ▽ |
| Kuwait | 40 (2.6) | ▽ |
| 2 Saudi Arabia | 34 (1.8) | ▽ |
| Morocco | 32 (2.5) | ▽ |
| Bosnia and Herzegovina | 32 (1.8) | ▽ |
| 2 Philippines | 28 (2.1) | ▽ |
| 2 Pakistan | 21 (4.2) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 95 (1.1) | ▲ |
| Quebec, Canada | 84 (1.9) | ▲ |
| 2 Dubai, UAE | 81 (1.2) | ▲ |
| Madrid, Spain | 80 (2.1) | ▲ |
| 2 Ontario, Canada | 75 (2.1) | ▲ |
| Abu Dhabi, UAE | 52 (1.2) | ▽ |

**Content Domain:** Data

**Cognitive Domain:** Knowing

**Description:** Reads data from a line graph

The graph shows the water level in a dam for 10 weeks.




What was the water level for week 8?

Answer: 16 m

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## High Benchmark: Full Description and Example Items

Exhibit 1.12 presents the description of achievement at the High International Benchmark. Fourth grade students reaching this level demonstrated proficiency with a variety of topics in the framework.

Exhibit 1.12.1 provides an example from the number domain. Fifty-three percent of the fourth grade students, on average, were able to identify the expression that represented how to calculate the amount of water in the tank. With 79 percent correct, Japan and Singapore had the highest percentages of students answering this item correctly.

Exhibit 1.12.2 provides another example from the number domain. In this item, students were asked to solve a word problem involving fractions. Students in the five high-performing East Asian countries and students in Finland were the most successful—more than 75 percent correct. The international average was 47 percent.

Exhibit 1.12.3 shows an example from the data domain. Two-thirds or more of the fourth grade students in a number of countries were able to complete a pictograph, with 61 percent correct, on average.

## Exhibit 1.12: Description of the TIMSS 2019 High International Benchmark (550) of Mathematics Achievement

### High International Benchmark

**550**

**Summary**

*Students apply conceptual understanding to solve problems.* They can apply conceptual understanding of whole numbers to solve two-step word problems. They show understanding of the number line, multiples, factors, and rounding numbers, and operations with fractions and decimals. Students can solve simple measurement problems. They demonstrate understanding of geometric properties of shapes and angles. Students can interpret and use data in tables and a variety of graphs to solve problems.

Students at this level apply conceptual understanding of whole numbers to solve two-step word problems. They can multiply two-digit numbers and solve problems based on the number line, fractions, and decimals. They can find multiples of one-digit numbers and factors of numbers up to 30 and can round numbers. Students can identify an expression that represents a situation and can identify and use relationships in a well-defined pattern.

Students can solve a variety of one-step measurement problems. They can classify and compare a variety of shapes and angles based on their properties. They demonstrate understanding of line symmetry and can recognize relationships between two- and three-dimensional shapes.

Students can solve problems by interpreting data presented in tables, pie charts, pictographs, and line and bar graphs. They can compare data from two representations to draw conclusions.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 1.12.1: High International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Correct | |
|---|---|---|
| Japan | 79 (1.6) | ▲ |
| [3] Singapore | 79 (1.6) | ▲ |
| Korea, Rep. of | 71 (2.2) | ▲ |
| [2] Latvia | 70 (2.2) | ▲ |
| Finland | 67 (1.9) | ▲ |
| Czech Republic | 66 (2.8) | ▲ |
| [2] Russian Federation | 65 (2.0) | ▲ |
| Poland | 65 (1.9) | ▲ |
| Chinese Taipei | 65 (2.3) | ▲ |
| [2] Lithuania | 64 (2.5) | ▲ |
| Bulgaria | 63 (2.9) | ▲ |
| † Northern Ireland | 63 (2.8) | ▲ |
| Ireland | 61 (2.4) | ▲ |
| [2] Slovak Republic | 61 (2.3) | ▲ |
| [2] Serbia | 59 (2.3) | ▲ |
| † Hong Kong SAR | 59 (2.7) | ▲ |
| Cyprus | 57 (2.4) | |
| † Belgium (Flemish) | 56 (2.1) | |
| Hungary | 56 (2.1) | |
| Croatia | 56 (2.8) | |
| [2] England | 55 (2.7) | |
| [2†] United States | 55 (1.6) | |
| Azerbaijan | 54 (2.5) | |
| Austria | 54 (2.2) | |
| † Norway (5) | 54 (2.9) | |
| Sweden | 53 (2.4) | |
| **International Average** | **53 (0.3)** | |
| [2] Kazakhstan | 53 (2.2) | |
| Australia | 52 (2.5) | |
| ≡ Netherlands | 51 (2.5) | |
| [2] Portugal | 51 (2.3) | |
| Germany | 50 (2.6) | |
| [2] New Zealand | 50 (1.9) | |
| [1] Georgia | 49 (3.0) | |
| † Denmark | 48 (2.4) | ▽ |
| France | 48 (2.5) | ▽ |
| Armenia | 47 (2.0) | ▽ |
| [2] Turkey (5) | 47 (2.4) | ▽ |
| Spain | 45 (2.4) | ▽ |
| [1 2] Canada | 42 (1.8) | ▽ |
| Malta | 40 (1.8) | ▽ |
| Italy | 40 (2.4) | ▽ |
| Bahrain | 38 (1.8) | ▽ |
| United Arab Emirates | 37 (0.9) | ▽ |
| Iran, Islamic Rep. of | 33 (2.0) | ▽ |
| Qatar | 30 (2.2) | ▽ |
| Oman | 29 (2.0) | ▽ |
| Chile | 23 (1.8) | ▽ |
| Albania | - - | |
| Bosnia and Herzegovina | - - | |
| [2] Kosovo | - - | |
| Kuwait | - - | |
| Montenegro | - - | |
| Morocco | - - | |
| North Macedonia | - - | |
| [2] Pakistan | - - | |
| [2] Philippines | - - | |
| [2] Saudi Arabia | - - | |
| South Africa (5) | - - | |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 75 (1.9) | ▲ |
| Quebec, Canada | 58 (2.4) | |
| [2] Dubai, UAE | 52 (1.8) | |
| Madrid, Spain | 46 (2.3) | ▽ |
| [2] Ontario, Canada | 39 (3.2) | ▽ |
| Abu Dhabi, UAE | 28 (1.5) | ▽ |

**Content Domain:** Number

**Cognitive Domain:** Applying

**Description:** Identifies an expression that represents a situation

There were 12 liters of water in the tank.

Ravi then poured 3 liters of water into the tank and Indira poured another 3 liters of water into the tank.



How can the amount of water in the tank be calculated?

A. 12 + (2 + 3)

B. (12 + 3) + (12 + 3)

C. (12 + 2) × 3

D. 12 + (2 × 3)

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. Item not included in TIMSS 2019 less difficult mathematics assessment.

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# Exhibit 1.12.2: High International Benchmark of Mathematics Achievement – Example Item 2

| Country | Percent Full Credit | |
|---|---|---|
| [3] Singapore | 86 (1.4) | ▲ |
| Chinese Taipei | 82 (1.9) | ▲ |
| Finland | 80 (1.8) | ▲ |
| Korea, Rep. of | 79 (1.8) | ▲ |
| † Hong Kong SAR | 77 (2.9) | ▲ |
| Japan | 76 (1.9) | ▲ |
| † Belgium (Flemish) | 67 (2.2) | ▲ |
| Ireland | 67 (2.1) | ▲ |
| [2†] United States | 66 (1.5) | ▲ |
| † Northern Ireland | 64 (2.7) | ▲ |
| [2] England | 63 (1.8) | ▲ |
| Cyprus | 62 (2.4) | ▲ |
| † Norway (5) | 61 (3.1) | ▲ |
| Austria | 59 (3.0) | ▲ |
| ≡ Netherlands | 58 (3.0) | ▲ |
| Poland | 57 (2.6) | ▲ |
| † Denmark | 54 (2.8) | ▲ |
| Australia | 53 (1.8) | ▲ |
| Italy | 52 (2.8) | |
| [2] Portugal | 50 (2.3) | |
| [1 2] Canada | 48 (1.9) | |
| Bahrain | 48 (2.2) | |
| **International Average** | **47 (0.3)** | |
| Spain | 45 (1.9) | |
| Sweden | 44 (2.9) | |
| [2] Turkey (5) | 44 (2.5) | |
| Armenia | 43 (2.3) | |
| [2] New Zealand | 42 (2.1) | ▽ |
| Iran, Islamic Rep. of | 41 (2.2) | ▽ |
| Malta | 40 (1.7) | ▽ |
| [2] Russian Federation | 39 (2.5) | ▽ |
| Czech Republic | 38 (2.3) | ▽ |
| France | 38 (2.4) | ▽ |
| United Arab Emirates | 37 (1.1) | ▽ |
| Qatar | 36 (3.1) | ▽ |
| [2] Latvia | 33 (2.5) | ▽ |
| Hungary | 30 (2.3) | ▽ |
| Chile | 29 (2.0) | ▽ |
| [2] Lithuania | 29 (2.4) | ▽ |
| Azerbaijan | 28 (2.1) | ▽ |
| [2] Kazakhstan | 25 (2.0) | ▽ |
| Oman | 23 (1.8) | ▽ |
| [2] Slovak Republic | 23 (2.0) | ▽ |
| [1] Georgia | 20 (2.2) | ▽ |
| [2] Serbia | 16 (2.0) | ▽ |
| Bulgaria | 13 (1.8) | ▽ |
| Germany | 12 (1.7) | ▽ |
| Croatia | 11 (1.5) | ▽ |
| Albania | - - | |
| Bosnia and Herzegovina | - - | |
| [2] Kosovo | - - | |
| Kuwait | - - | |
| Montenegro | - - | |
| Morocco | - - | |
| North Macedonia | - - | |
| [2] Pakistan | - - | |
| [2] Philippines | - - | |
| [2] Saudi Arabia | - - | |
| South Africa (5) | - - | |
| **Benchmarking Participants** | | |
| [2] Dubai, UAE | 57 (1.6) | ▲ |
| Madrid, Spain | 53 (2.4) | ▲ |
| Quebec, Canada | 52 (2.7) | ▲ |
| [2] Ontario, Canada | 48 (3.1) | |
| Moscow City, Russian Fed. | 44 (2.8) | |
| Abu Dhabi, UAE | 25 (1.5) | ▽ |

**Content Domain:** Number

**Cognitive Domain:** Applying

**Description:** Solves a word problem involving subtraction of a non-unit fraction from 1

Anna is cycling to her grandmother's house. She has cycled $\frac{3}{8}$ of the way.

What fraction of the distance does Anna have left to cycle?

Answer: $\frac{5}{8}$

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. Item not included in TIMSS 2019 less difficult mathematics assessment.

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# Exhibit 1.12.3: High International Benchmark of Mathematics Achievement – Example Item 3

| Country | Percent Full Credit | |
|---|---|---|
| † Hong Kong SAR | 88 (2.0) | ▲ |
| 3 Singapore | 86 (1.4) | ▲ |
| Japan | 84 (1.5) | ▲ |
| Korea, Rep. of | 83 (1.7) | ▲ |
| Chinese Taipei | 81 (1.8) | ▲ |
| 2 England | 81 (2.1) | ▲ |
| † Northern Ireland | 80 (2.1) | ▲ |
| 2 Latvia | 80 (2.4) | ▲ |
| † Belgium (Flemish) | 78 (1.6) | ▲ |
| ≡ Netherlands | 78 (2.1) | ▲ |
| Ireland | 77 (2.0) | ▲ |
| 2 Lithuania | 77 (1.9) | ▲ |
| † Norway (5) | 77 (2.4) | ▲ |
| Poland | 77 (1.6) | ▲ |
| Finland | 74 (2.0) | ▲ |
| 2 Russian Federation | 74 (2.5) | ▲ |
| 2 Kazakhstan | 74 (2.2) | ▲ |
| † Denmark | 72 (2.4) | ▲ |
| Cyprus | 72 (1.9) | ▲ |
| Sweden | 71 (2.2) | ▲ |
| Malta | 71 (2.0) | ▲ |
| Australia | 70 (1.9) | ▲ |
| Hungary | 69 (1.9) | ▲ |
| Austria | 68 (2.5) | ▲ |
| Germany | 68 (1.9) | ▲ |
| 2 Portugal | 67 (1.7) | ▲ |
| Azerbaijan | 67 (2.1) | ▲ |
| 2 Turkey (5) | 67 (2.7) | ▲ |
| 2 New Zealand | 65 (2.0) | ▲ |
| Czech Republic | 65 (2.1) | |
| 2† United States | 65 (1.5) | ▲ |
| 1 2 Canada | 65 (1.6) | ▲ |
| 2 Serbia | 62 (2.5) | |
| **International Average** | **61 (0.3)** | |
| Bulgaria | 61 (2.5) | |
| Croatia | 61 (2.8) | |
| Albania | 59 (2.5) | |
| 2 Slovak Republic | 58 (2.4) | |
| Spain | 56 (2.2) | ▽ |
| Bahrain | 56 (1.7) | ▽ |
| Italy | 56 (2.6) | ▽ |
| 1 Georgia | 53 (2.9) | ▽ |
| North Macedonia | 52 (3.0) | ▽ |
| France | 50 (2.3) | ▽ |
| United Arab Emirates | 50 (1.0) | ▽ |
| Montenegro | 48 (2.1) | ▽ |
| Iran, Islamic Rep. of | 48 (2.7) | ▽ |
| 2 Kosovo | 48 (2.8) | ▽ |
| Armenia | 46 (2.4) | ▽ |
| Qatar | 45 (2.4) | ▽ |
| Bosnia and Herzegovina | 43 (1.9) | ▽ |
| Oman | 41 (2.0) | ▽ |
| Chile | 38 (2.3) | ▽ |
| 2 Saudi Arabia | 38 (2.1) | ▽ |
| Morocco | 34 (2.2) | ▽ |
| Kuwait | 30 (2.1) | ▽ |
| South Africa (5) | 29 (1.4) | ▽ |
| 2 Philippines | 17 (1.9) | ▽ |
| 2 Pakistan | 10 (2.1) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 91 (1.4) | ▲ |
| 2 Dubai, UAE | 72 (1.4) | ▲ |
| 2 Ontario, Canada | 68 (2.7) | ▲ |
| Quebec, Canada | 65 (2.4) | |
| Madrid, Spain | 58 (3.0) | |
| Abu Dhabi, UAE | 37 (1.5) | ▽ |

**Content Domain:** Data

**Cognitive Domain:** Reasoning

**Description:** Represents data from a table in a pictograph

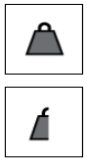
**Animal Weights**

| Animal | Weight (kg) |
|---|---|
| Cheetah | 50 |
| Lion | 100 |
| Leopard | 75 |

Make a pictograph of the weight of each animal.

Drag symbols to complete the pictograph. The cheetah has been done for you.

| Animal | Weight (kg) |
|---|---|
| Cheetah |  |
| Lion |  |
| Leopard |  |



Key:  = 50 kg

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Advanced Benchmark: Full Description and Example Items

Exhibit 1.13 presents the description of fourth grade performance at the Advanced International Benchmark. Students reaching the Advanced level demonstrated a solid conceptual understanding of many of the topics in the framework.

Exhibit 1.13.1 shows a multi-part item from the number content domain that required reasoning with odd numbers and multiples. To receive full credit (2 points), students needed to provide two different correct answers. This item was very difficult, with an international average of 24 percent of students receiving full credit. More than half of the Singaporean fourth grade students (55%) received full credit.

Exhibit 1.13.2 shows a multi-part item from the measurement and geometry domain. Students were required to cover the area of a square with three different two-dimensional shapes to receive full credit (2 points). On average, only 21 percent of students received full credit. More than half the fourth grade students received full credit in Korea and Hong Kong SAR (53–54%).

Exhibit 1.13.3 shows another multi-part item from the measurement and geometry domain. Students were asked to visualize the number of faces making up three different three-dimensional shapes. On average, 27 percent of students received full credit.

The last example item illustrating the Advanced benchmark asked students to label the *y*-axis of a bar graph based on tabular data. Internationally, on average, about one-third of the fourth grade students (34%) were able to accomplish this task. Eighty percent or more answered correctly in Japan, Korea, and Hong Kong SAR.

## Exhibit 1.13: Description of the TIMSS 2019 Advanced International Benchmark (625) of Mathematics Achievement

**Advanced** International Benchmark

**625**

**Summary**

*Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.* Students can solve a variety of multistep word problems involving whole numbers and show an understanding of fractions and decimals. They can apply knowledge of two- and three-dimensional shapes in a variety of situations. Students can interpret and represent data to solve multistep problems.

Students at this level can solve a variety of multistep word problems involving whole numbers. They can find more than one solution to a problem. Students can solve problems that show an understanding of fractions, including those with different denominators. They can order, add, and subtract one- and two-place decimals.

Students can apply knowledge of two- and three-dimensional shapes in a variety of situations. They can draw parallel lines and solve problems involving area and perimeter of shapes. They can use a ruler to measure lengths of objects beginning or ending at a half-unit and read other measurement scales.

Students can interpret and represent data to solve multistep problems. They can give a mathematical argument to support their solutions.

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# Exhibit 1.13.1: Advanced International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| [3] Singapore | 55 (2.4) | ▲ |
| † Northern Ireland | 42 (2.7) | ▲ |
| Korea, Rep. of | 39 (2.5) | ▲ |
| Chinese Taipei | 38 (2.4) | ▲ |
| † Hong Kong SAR | 35 (2.9) | ▲ |
| [2] Latvia | 35 (2.1) | ▲ |
| [2] England | 34 (2.6) | ▲ |
| Poland | 32 (2.1) | ▲ |
| [2] Russian Federation | 31 (1.9) | ▲ |
| Czech Republic | 29 (2.1) | ▲ |
| † Denmark | 29 (2.5) | |
| Cyprus | 27 (2.3) | |
| † Norway (5) | 27 (2.3) | |
| [2†] United States | 27 (1.4) | |
| † Belgium (Flemish) | 26 (2.1) | |
| Ireland | 26 (2.5) | |
| [2] Slovak Republic | 26 (2.3) | |
| [2] Portugal | 26 (2.4) | |
| ≡ Netherlands | 25 (2.2) | |
| Germany | 25 (2.1) | |
| Sweden | 25 (1.5) | |
| Japan | 25 (2.0) | |
| Australia | 25 (2.0) | |
| **International Average** | **24 (0.3)** | |
| [2] Serbia | 24 (2.1) | |
| Finland | 23 (1.7) | |
| Hungary | 23 (2.1) | |
| [1 2] Canada | 23 (1.4) | |
| Bahrain | 22 (1.7) | |
| [2] New Zealand | 21 (1.7) | |
| [2] Kazakhstan | 21 (2.0) | |
| Malta | 21 (1.7) | ▽ |
| Austria | 21 (1.9) | |
| United Arab Emirates | 20 (0.8) | ▽ |
| Azerbaijan | 20 (1.9) | ▽ |
| Croatia | 20 (2.0) | ▽ |
| Bulgaria | 19 (2.2) | ▽ |
| Armenia | 19 (2.0) | ▽ |
| Italy | 18 (2.1) | ▽ |
| [2] Lithuania | 17 (1.9) | ▽ |
| [2] Turkey (5) | 16 (1.8) | ▽ |
| Spain | 15 (1.7) | ▽ |
| [1] Georgia | 12 (2.0) | ▽ |
| Iran, Islamic Rep. of | 12 (1.6) | ▽ |
| France | 12 (1.7) | ▽ |
| Oman | 11 (1.6) | ▽ |
| Qatar | 11 (1.5) | ▽ |
| Chile | 6 (1.0) | ▽ |
| Albania | - - | |
| Bosnia and Herzegovina | - - | |
| [2] Kosovo | - - | |
| Kuwait | - - | |
| Montenegro | - - | |
| Morocco | - - | |
| North Macedonia | - - | |
| [2] Pakistan | - - | |
| [2] Philippines | - - | |
| [2] Saudi Arabia | - - | |
| South Africa (5) | - - | |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 38 (2.2) | ▲ |
| [2] Dubai, UAE | 31 (2.0) | ▲ |
| [2] Ontario, Canada | 25 (2.3) | |
| Quebec, Canada | 24 (2.3) | |
| Madrid, Spain | 22 (2.1) | |
| Abu Dhabi, UAE | 11 (0.9) | ▽ |

**Content Domain:** Number

**Cognitive Domain:** Reasoning

**Description:** Devises two ways of grouping objects that satisfy two conditions (2 of 2 points)

A teacher wants to put 30 students in groups so that

- each group has the same number of students, **and**
- each group has an odd number of students.

Show two different ways the teacher could make the groups.

**Way 1**

Number of groups: 6

Number of students in each group: 5

**Way 2**

Number of groups: 10

Number of students in each group: 3

The answer shown illustrates the type of response that would receive full credit (2 points).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. Item not included in TIMSS 2019 less difficult mathematics assessment.

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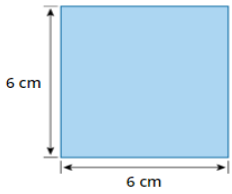
# Exhibit 1.13.2: Advanced International Benchmark of Mathematics Achievement – Example Item 2

| Country | Percent Full Credit | |
|---|---|---|
| Korea, Rep. of | 54 (2.0) | ▲ |
| † Hong Kong SAR | 53 (3.2) | ▲ |
| 2 Russian Federation | 47 (2.3) | ▲ |
| 3 Singapore | 45 (2.1) | ▲ |
| Japan | 41 (2.3) | ▲ |
| Chinese Taipei | 40 (2.6) | ▲ |
| ≡ Netherlands | 36 (2.3) | ▲ |
| Czech Republic | 35 (2.2) | ▲ |
| Finland | 34 (2.1) | ▲ |
| Poland | 34 (1.9) | ▲ |
| Hungary | 31 (2.4) | ▲ |
| 2 Lithuania | 31 (2.2) | ▲ |
| 2 Latvia | 31 (2.1) | ▲ |
| Azerbaijan | 30 (1.6) | ▲ |
| Armenia | 28 (2.3) | ▲ |
| † Norway (5) | 27 (2.7) | ▲ |
| Bulgaria | 27 (2.7) | ▲ |
| † Denmark | 26 (2.0) | ▲ |
| Sweden | 26 (2.1) | ▲ |
| † Northern Ireland | 26 (2.2) | ▲ |
| Albania | 25 (2.6) | |
| Ireland | 24 (2.1) | |
| 2 England | 24 (2.1) | |
| † Belgium (Flemish) | 24 (1.9) | |
| Austria | 24 (1.8) | |
| Australia | 23 (1.7) | |
| Italy | 22 (1.9) | |
| 2 Portugal | 21 (1.8) | |
| Germany | 21 (2.2) | |
| **International Average** | **21 (0.2)** | |
| Cyprus | 21 (2.3) | |
| 2 Serbia | 20 (2.3) | |
| 1 2 Canada | 19 (1.9) | |
| 2 Kazakhstan | 19 (2.2) | |
| 2† United States | 17 (1.4) | ▽ |
| 2 New Zealand | 16 (1.5) | ▽ |
| 2 Turkey (5) | 16 (1.6) | ▽ |
| 2 Slovak Republic | 16 (1.8) | ▽ |
| France | 15 (1.5) | ▽ |
| United Arab Emirates | 14 (0.7) | ▽ |
| North Macedonia | 14 (2.0) | ▽ |
| Malta | 12 (1.4) | ▽ |
| 1 Georgia | 12 (1.5) | ▽ |
| Montenegro | 12 (1.3) | ▽ |
| Spain | 11 (1.3) | ▽ |
| Bahrain | 11 (1.3) | ▽ |
| Iran, Islamic Rep. of | 11 (1.5) | ▽ |
| Oman | 10 (1.8) | ▽ |
| Croatia | 10 (1.5) | ▽ |
| Bosnia and Herzegovina | 9 (1.4) | ▽ |
| 2 Saudi Arabia | 8 (1.0) | ▽ |
| Morocco | 6 (1.4) | ▽ |
| Chile | 6 (1.0) | ▽ |
| Qatar | 6 (1.1) | ▽ |
| 2 Kosovo | 3 (0.8) | ▽ |
| Kuwait | 3 (0.9) | ▽ |
| South Africa (5) | 2 (0.5) | ▽ |
| 2 Pakistan | 1 (0.3) | ▽ |
| 2 Philippines | 1 (0.3) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 53 (2.9) | ▲ |
| 2 Dubai, UAE | 23 (1.5) | |
| Quebec, Canada | 21 (2.0) | |
| 2 Ontario, Canada | 19 (3.6) | |
| Madrid, Spain | 13 (1.6) | ▽ |
| Abu Dhabi, UAE | 8 (0.8) | ▽ |

**Content Domain:** Measurement and Geometry

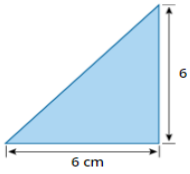
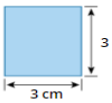
**Cognitive Domain:** Applying

**Description:** Determines the number of three different shapes that cover the area of a square (2 of 2 points)




The square above can be made by putting together smaller shapes.

Complete the table with the number of each shape that are needed to cover the whole square.

| Shape | Number Needed to Cover the Square Above |
|---|---|
|   | 3 |
|   | 2 |
|   | 4 |

The answer shown illustrates the type of response that would receive full credit (2 points).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 1.13.3: Advanced International Benchmark of Mathematics Achievement – Example Item 3

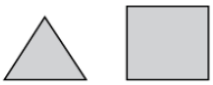
| Country | Percent Full Credit | |
|---|---|---|
| † Hong Kong SAR | 49 (2.4) | ▲ |
| Japan | 47 (2.0) | ▲ |
| † Northern Ireland | 46 (2.4) | ▲ |
| 1 2 Canada | 43 (1.6) | ▲ |
| 2 Lithuania | 42 (2.6) | ▲ |
| Ireland | 40 (2.5) | ▲ |
| Korea, Rep. of | 38 (2.5) | ▲ |
| Cyprus | 38 (2.4) | ▲ |
| Australia | 37 (2.6) | ▲ |
| Chinese Taipei | 36 (2.2) | ▲ |
| 2 Portugal | 34 (1.9) | ▲ |
| 3 Singapore | 34 (1.9) | ▲ |
| 2 England | 33 (2.5) | ▲ |
| 2 Russian Federation | 33 (1.9) | ▲ |
| † Norway (5) | 32 (2.8) | |
| Czech Republic | 32 (2.2) | ▲ |
| Finland | 30 (2.1) | |
| Austria | 30 (2.2) | |
| Malta | 29 (2.3) | |
| Germany | 29 (1.9) | |
| Sweden | 28 (2.1) | |
| Hungary | 27 (2.1) | |
| **International Average** | **27 (0.3)** | |
| 2 Serbia | 25 (2.3) | |
| 2 New Zealand | 25 (1.8) | |
| 2† United States | 25 (1.6) | |
| Chile | 25 (1.8) | |
| Bahrain | 23 (1.7) | ▽ |
| † Denmark | 23 (2.6) | |
| 2 Latvia | 22 (2.0) | ▽ |
| Poland | 22 (2.0) | ▽ |
| Azerbaijan | 22 (1.6) | ▽ |
| 2 Slovak Republic | 21 (1.8) | ▽ |
| 2 Turkey (5) | 21 (1.8) | ▽ |
| United Arab Emirates | 21 (0.7) | ▽ |
| Spain | 20 (1.8) | ▽ |
| Italy | 20 (1.9) | ▽ |
| 2 Kazakhstan | 19 (1.9) | ▽ |
| Oman | 18 (1.8) | ▽ |
| Croatia | 17 (1.9) | ▽ |
| ≡ Netherlands | 17 (1.7) | ▽ |
| France | 17 (1.6) | ▽ |
| Bulgaria | 17 (2.0) | ▽ |
| 1 Georgia | 16 (2.2) | ▽ |
| Armenia | 16 (1.7) | ▽ |
| † Belgium (Flemish) | 12 (1.2) | ▽ |
| Qatar | 11 (1.4) | ▽ |
| Iran, Islamic Rep. of | 4 (0.9) | ▽ |
| Albania | - - | |
| Bosnia and Herzegovina | - - | |
| 2 Kosovo | - - | |
| Kuwait | - - | |
| Montenegro | - - | |
| Morocco | - - | |
| North Macedonia | - - | |
| 2 Pakistan | - - | |
| 2 Philippines | - - | |
| 2 Saudi Arabia | - - | |
| South Africa (5) | - - | |
| **Benchmarking Participants** | | |
| Quebec, Canada | 57 (2.9) | ▲ |
| 2 Ontario, Canada | 43 (2.7) | ▲ |
| 2 Dubai, UAE | 34 (1.7) | ▲ |
| Moscow City, Russian Fed. | 33 (2.0) | ▲ |
| Madrid, Spain | 21 (2.2) | ▽ |
| Abu Dhabi, UAE | 14 (0.9) | ▽ |

**Content Domain:** Measurement and Geometry

**Cognitive Domain:** Applying

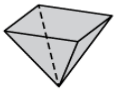
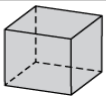
**Description:** Determines the number of square and triangular faces of three-dimensional shapes (2 of 2 points)

Justin has many of these triangle and square panels that fit together to make three-dimensional shapes.



Justin makes each of the shapes shown below.

Fill in the table. The first one has been done for you.

| Three-dimensional shape | Number of triangles | Number of squares |
|---|---|---|
|  | 4 | 1 |
|  | 4 | 0 |
|  | 0 | 6 |
|  | 2 | 3 |

The answer shown illustrates the type of response that would receive full credit (2 points).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. Item not included in TIMSS 2019 less difficult mathematics assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 1.13.4: Advanced International Benchmark of Mathematics Achievement – Example Item 4

| Country | Percent Full Credit | |
|---|---|---|
| Japan | 88 (1.6) | ▲ |
| Korea, Rep. of | 87 (1.6) | ▲ |
| † Hong Kong SAR | 80 (2.3) | ▲ |
| 3 Singapore | 77 (1.9) | ▲ |
| Chinese Taipei | 67 (2.2) | ▲ |
| † Norway (5) | 54 (2.1) | ▲ |
| 2 England | 52 (2.6) | ▲ |
| † Belgium (Flemish) | 51 (2.5) | ▲ |
| ≡ Netherlands | 49 (2.2) | ▲ |
| 2 Latvia | 48 (2.3) | ▲ |
| † Northern Ireland | 47 (2.4) | ▲ |
| Cyprus | 47 (2.6) | ▲ |
| Australia | 47 (2.0) | ▲ |
| Ireland | 47 (2.2) | ▲ |
| Sweden | 45 (2.4) | ▲ |
| 1 2 Canada | 43 (1.7) | ▲ |
| 2 Russian Federation | 41 (2.7) | ▲ |
| 2 Lithuania | 40 (2.3) | ▲ |
| † Denmark | 40 (2.6) | ▲ |
| 2† United States | 40 (1.8) | ▲ |
| Finland | 39 (2.1) | ▲ |
| 2 Portugal | 38 (2.0) | ▲ |
| Czech Republic | 38 (2.3) | |
| Austria | 38 (2.4) | |
| Malta | 36 (1.9) | |
| Germany | 35 (2.5) | |
| **International Average** | **34 (0.3)** | |
| Hungary | 34 (2.6) | |
| 2 Slovak Republic | 33 (2.5) | |
| United Arab Emirates | 33 (1.0) | |
| 2 New Zealand | 32 (1.8) | |
| Poland | 31 (2.1) | |
| Italy | 30 (2.6) | |
| Albania | 30 (2.7) | |
| North Macedonia | 29 (3.2) | |
| 2 Turkey (5) | 28 (2.0) | ▽ |
| Bahrain | 27 (1.8) | ▽ |
| 2 Kazakhstan | 27 (2.5) | ▽ |
| Spain | 27 (1.9) | ▽ |
| 2 Serbia | 25 (2.4) | ▽ |
| Bulgaria | 24 (2.5) | ▽ |
| France | 24 (2.0) | ▽ |
| Qatar | 20 (2.0) | ▽ |
| Chile | 19 (1.6) | ▽ |
| Oman | 18 (1.8) | ▽ |
| Azerbaijan | 17 (1.5) | ▽ |
| Croatia | 16 (2.7) | ▽ |
| Morocco | 15 (2.0) | ▽ |
| Montenegro | 14 (1.7) | ▽ |
| 2 Kosovo | 14 (1.6) | ▽ |
| 2 Saudi Arabia | 13 (1.4) | ▽ |
| South Africa (5) | 11 (1.3) | ▽ |
| Kuwait | 11 (1.9) | ▽ |
| Iran, Islamic Rep. of | 11 (1.8) | ▽ |
| 1 Georgia | 8 (1.5) | ▽ |
| Bosnia and Herzegovina | 8 (1.7) | ▽ |
| Armenia | 7 (1.4) | ▽ |
| 2 Philippines | 6 (1.0) | ▽ |
| 2 Pakistan | 4 (1.8) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 70 (2.2) | ▲ |
| 2 Dubai, UAE | 51 (2.0) | ▲ |
| 2 Ontario, Canada | 48 (2.7) | ▲ |
| Quebec, Canada | 46 (2.4) | ▲ |
| Madrid, Spain | 27 (2.4) | ▽ |
| Abu Dhabi, UAE | 21 (1.5) | ▽ |

**Content Domain:** Data

**Cognitive Domain:** Applying

**Description:** Determines the y-axis scale for a bar graph given the data in a table

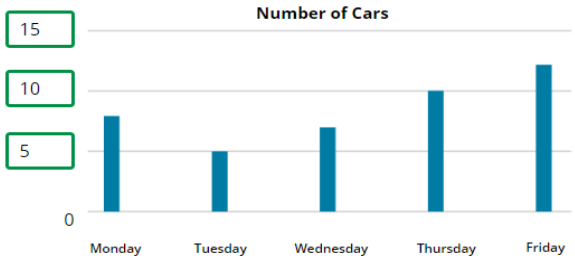
Skylar recorded the number of cars that traveled along her street each morning.

| Day | Number of Cars |
|---|---|
| Monday | 8 |
| Tuesday | 5 |
| Wednesday | 7 |
| Thursday | 10 |
| Friday | 12 |

She started making a graph of her data.

What numbers should Skylar use to label the horizontal lines on her graph?

Put the numbers in the boxes on Skylar's graph.




The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Average Achievement in Mathematics Content and Cognitive Domains

## TIMSS 2019 Mathematics Content and Cognitive Domains

TIMSS 2019 assessed three content areas in mathematics at the fourth grade: number, measurement and geometry, and data.

Fifty percent of the fourth grade assessment was devoted to the number content domain apportioned as follows: whole numbers (25%); expressions, simple equations, and relationships (15%); and fractions and decimals (10%). The predominant component of the number domain involved computation of whole numbers. The prealgebra concepts included the concept of variables (unknowns) in simple equations, and initial understandings of relationships between quantities. Students were asked to compare, add, and subtract familiar fractions and decimals to solve problems.

Thirty percent of the assessment was devoted to measurement and geometry (15% each). Measurement included using a ruler to measure length, calculating areas and perimeters of simple polygons, and using cubes to determine volumes as well as identifying the properties and characteristics of lines, angles, and a variety of two- and three-dimensional shapes. Geometry included describing and drawing a variety of geometric figures as well as using geometric relationships to solve problems.

The remaining 20 percent of the assessment was devoted to the data content domain, which consisted of two topic areas: reading, interpreting, and representing data (15%) and using data to solve problems (5%). Students were asked to read and recognize various forms of data displays; to collect, organize, and represent the data in graphs and charts to address a simple question; and to use data from one or more sources to solve problems.

Fourth grade students also needed to draw on a range of cognitive skills across the content domains described above. The cognitive skills were categorized into three broad domains—knowing, applying, and reasoning. Forty percent of the fourth grade assessment was devoted to the knowing cognitive domain, 40 percent to applying, and 20 percent to reasoning. The knowing domain covers the facts, concepts, and procedures students need to know, while the applying domain focuses on students' ability to apply knowledge and conceptual understanding to solve problems or answer questions. The reasoning domain goes beyond the solution of familiar problems that may have been routinely practiced in mathematics lessons to encompass unfamiliar situations, complex contexts, and multistep problems.

## Average Achievement in Content Domains

Exhibit 1.14 shows countries' average mathematics achievement in each of the three content domains relative to their overall average achievement (presented from highest to lowest overall average achievement). Based on countries' relative strengths and weaknesses, the TIMSS 2019 countries appear to be placing relatively more instructional emphasis on the number content domain and much less

on the data content domain. Of the 55 participating countries for which content domain scores were estimated, 27 had a relative strength in number and 17 had a relative weakness; 19 had a relative strength in measurement and geometry and 23 had a relative weakness, and 11 had a relative strength in data and 33 had a relative weakness. Almost all countries had at least one relative strength or relative weakness compared with their overall achievement, except Albania.

## Exhibit 1.14: Average Achievement in Mathematics Content Domains

| Country | Overall Mathematics Average Scale Score | Number (83 Items) | | Measurement and Geometry (52 Items) | | Data (36 Items) | |
|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score |
| [3] Singapore | 625 (3.9) | 635 (4.0) | 10 (1.0) ▲ | 620 (3.9) | -5 (1.2) ▽ | 613 (3.8) | -12 (1.5) ▽ |
| † Hong Kong SAR | 602 (3.3) | 598 (3.6) | -4 (2.1) | 608 (3.1) | 6 (1.6) ▲ | 607 (3.6) | 5 (3.0) |
| Korea, Rep. of | 600 (2.2) | 593 (2.4) | -6 (0.8) ▽ | 608 (2.6) | 8 (1.7) ▲ | 602 (2.5) | 3 (1.5) |
| Chinese Taipei | 599 (1.9) | 599 (1.7) | 0 (1.2) | 607 (1.8) | 8 (1.9) ▲ | 590 (2.4) | -9 (1.5) ▽ |
| Japan | 593 (1.8) | 586 (1.8) | -7 (1.0) ▽ | 601 (2.7) | 8 (1.9) ▲ | 606 (2.1) | 13 (1.2) ▲ |
| [2] Russian Federation | 567 (3.3) | 567 (3.4) | 0 (1.6) | 571 (3.7) | 4 (1.3) ▲ | 560 (3.9) | -7 (2.2) ▽ |
| † Northern Ireland | 566 (2.7) | 572 (3.1) | 7 (1.9) ▲ | 556 (3.0) | -10 (2.0) ▽ | 564 (2.5) | -2 (1.3) |
| [2] England | 556 (3.0) | 559 (3.3) | 3 (1.0) ▲ | 545 (3.3) | -11 (1.6) ▽ | 565 (3.1) | 9 (1.7) ▲ |
| Ireland | 548 (2.5) | 555 (2.7) | 6 (1.4) ▲ | 540 (2.7) | -8 (1.2) ▽ | 543 (3.0) | -6 (1.6) ▽ |
| [2] Latvia | 546 (2.6) | 547 (2.6) | 1 (0.8) | 548 (2.8) | 2 (0.8) | 542 (3.2) | -4 (1.9) ▽ |
| † Norway (5) | 543 (2.2) | 540 (2.0) | -3 (1.0) ▽ | 546 (2.8) | 4 (1.5) ▲ | 547 (3.2) | 4 (2.4) |
| [2] Lithuania | 542 (2.8) | 538 (2.8) | -4 (1.1) ▽ | 543 (3.0) | 1 (1.6) | 545 (3.0) | 3 (1.8) |
| Austria | 539 (2.0) | 542 (1.9) | 3 (1.1) ▲ | 542 (2.4) | 2 (1.6) | 528 (2.7) | -11 (1.5) ▽ |
| ≡ Netherlands | 538 (2.2) | 533 (2.2) | -5 (1.2) ▽ | 537 (2.2) | 0 (1.5) | 549 (3.0) | 12 (1.5) ▲ |
| [2] † United States | 535 (2.5) | 542 (2.6) | 8 (0.7) ▲ | 520 (2.6) | -15 (0.7) ▽ | 533 (3.0) | -2 (1.5) |
| Czech Republic | 533 (2.5) | 536 (2.4) | 3 (1.1) ▲ | 540 (2.9) | 7 (1.8) ▲ | 518 (2.9) | -15 (1.7) ▽ |
| † Belgium (Flemish) | 532 (1.9) | 526 (2.0) | -6 (1.1) ▽ | 551 (2.0) | 18 (0.9) ▲ | 527 (2.2) | -6 (1.4) ▽ |
| Cyprus | 532 (2.9) | 538 (2.8) | 6 (0.9) ▲ | 526 (3.1) | -6 (1.9) ▽ | 524 (3.4) | -9 (1.2) ▽ |
| Finland | 532 (2.3) | 528 (2.3) | -4 (1.0) ▽ | 538 (3.0) | 6 (2.2) ▲ | 534 (2.8) | 2 (1.8) |
| [2] Portugal | 525 (2.6) | 524 (2.9) | -1 (1.5) | 520 (2.9) | -5 (1.6) ▽ | 528 (2.6) | 3 (1.0) ▲ |
| † Denmark | 525 (1.9) | 518 (2.1) | -7 (1.1) ▽ | 536 (2.4) | 12 (1.8) ▲ | 525 (2.3) | 1 (1.5) |
| Hungary | 523 (2.6) | 531 (2.6) | 7 (1.0) ▲ | 519 (3.3) | -4 (2.0) ▽ | 508 (3.2) | -15 (1.7) ▽ |
| [2] Turkey (5) | 523 (4.4) | 525 (4.7) | 3 (1.1) ▲ | 527 (4.4) | 4 (1.8) ▲ | 510 (4.5) | -13 (1.4) ▽ |
| Sweden | 521 (2.8) | 517 (2.9) | -4 (1.4) ▽ | 521 (3.4) | 0 (1.7) | 527 (3.5) | 6 (1.8) ▲ |
| Germany | 521 (2.3) | 517 (2.1) | -4 (1.3) ▽ | 531 (2.6) | 10 (1.0) ▲ | 515 (3.1) | -6 (1.4) ▽ |
| Poland | 520 (2.7) | 513 (2.8) | -7 (1.0) ▽ | 529 (2.7) | 9 (1.0) ▲ | 524 (2.9) | 4 (1.5) ▲ |
| Australia | 516 (2.8) | 506 (3.1) | -10 (0.9) ▽ | 516 (3.3) | 0 (1.4) | 534 (3.4) | 18 (2.1) ▲ |
| Azerbaijan | 515 (2.7) | 526 (2.7) | 10 (1.3) ▲ | 503 (3.2) | -13 (1.6) ▽ | 504 (3.0) | -11 (1.0) ▽ |
| Bulgaria | 515 (4.3) | 521 (4.0) | 6 (1.0) ▲ | 522 (4.9) | 7 (2.1) ▲ | 490 (5.6) | -25 (2.5) ▽ |
| Italy | 515 (2.4) | 522 (2.5) | 7 (1.2) ▲ | 510 (3.2) | -5 (2.0) ▽ | 498 (3.0) | -17 (1.5) ▽ |
| [2] Kazakhstan | 512 (2.5) | 523 (2.4) | 11 (1.5) ▲ | 513 (2.8) | 1 (1.9) | 481 (3.0) | -31 (1.7) ▽ |
| [1 2] Canada | 512 (1.9) | 505 (2.1) | -6 (0.8) ▽ | 511 (1.8) | -1 (0.7) | 523 (2.4) | 11 (1.4) ▲ |
| [2] Slovak Republic | 510 (3.5) | 512 (3.6) | 2 (1.6) | 506 (3.7) | -4 (2.0) ▽ | 506 (4.1) | -4 (1.9) ▽ |
| Croatia | 509 (2.2) | 512 (1.9) | 2 (1.0) ▲ | 518 (2.7) | 8 (2.0) ▲ | 494 (2.7) | -15 (2.0) ▽ |
| Malta | 509 (1.4) | 512 (1.5) | 3 (1.0) ▲ | 497 (1.8) | -12 (1.2) ▽ | 512 (1.8) | 3 (2.1) |
| [2] Serbia | 508 (3.2) | 518 (2.9) | 10 (1.5) ▲ | 499 (3.7) | -9 (1.7) ▽ | 489 (4.2) | -19 (2.0) ▽ |
| Spain | 502 (2.1) | 506 (1.9) | 4 (0.8) ▲ | 494 (2.2) | -9 (0.8) ▽ | 499 (2.6) | -3 (1.2) ▽ |
| Armenia | 498 (2.5) | 518 (2.3) | 20 (1.1) ▲ | 490 (3.0) | -8 (1.3) ▽ | 446 (4.2) | -52 (2.1) ▽ |
| Albania | 494 (3.4) | 495 (3.6) | 1 (1.5) | 496 (3.4) | 2 (1.4) | 490 (4.0) | -4 (2.5) |
| [2] New Zealand | 487 (2.6) | 478 (2.9) | -9 (1.1) ▽ | 481 (2.7) | -6 (2.4) ▽ | 504 (3.1) | 17 (1.8) ▲ |
| France | 485 (3.0) | 480 (3.2) | -5 (1.0) ▽ | 498 (3.3) | 13 (1.4) ▲ | 476 (3.4) | -9 (1.6) ▽ |
| [1] Georgia | 482 (3.7) | 501 (3.6) | 19 (1.8) ▲ | 470 (4.1) | -12 (2.3) ▽ | 444 (4.6) | -38 (2.2) ▽ |
| United Arab Emirates | 481 (1.7) | 485 (1.7) | 4 (0.7) ▲ | 472 (1.8) | -10 (0.8) ▽ | 476 (1.8) | -5 (0.6) ▽ |
| Bahrain | 480 (2.6) | 478 (2.6) | -2 (1.0) | 474 (2.6) | -6 (1.3) ▽ | 483 (3.3) | 3 (1.7) ▲ |
| North Macedonia | 472 (5.3) | 472 (5.2) | 1 (1.5) | 475 (5.8) | 3 (2.5) | 464 (6.1) | -7 (2.4) ▽ |
| Montenegro | 453 (2.0) | 454 (2.2) | 1 (1.4) | 459 (2.1) | 7 (1.3) ▲ | 439 (2.7) | -14 (1.7) ▽ |
| Bosnia and Herzegovina | 452 (2.4) | 459 (2.3) | 7 (1.1) ▲ | 458 (2.9) | 6 (1.6) ▲ | 413 (3.8) | -39 (2.9) ▽ |
| Qatar | 449 (3.4) | 455 (3.4) | 5 (1.3) ▲ | 434 (3.4) | -15 (1.3) ▽ | 445 (3.8) | -4 (1.7) ▽ |
| [2] Kosovo | 444 (3.0) | 447 (2.8) | 3 (0.9) ▲ | 450 (3.3) | 6 (1.4) ▲ | 423 (3.7) | -21 (1.9) ▽ |
| Iran, Islamic Rep. of | 443 (3.9) | 446 (4.0) | 3 (1.3) ▲ | 445 (3.6) | 2 (1.5) | 424 (3.8) | -19 (1.6) ▽ |
| Chile | 441 (2.7) | - - | - - | - - | - - | - - | - - |
| Oman | 431 (3.7) | 424 (4.0) | -7 (0.8) ▽ | 429 (4.2) | -2 (1.2) | 433 (3.8) | 2 (1.9) |
| [2] Saudi Arabia | 398 (3.6) | - - | - - | - - | - - | - - | - - |
| Morocco | 383 (4.3) | 383 (4.4) | 0 (1.2) | 386 (4.5) | 2 (1.5) | 374 (5.3) | -9 (2.1) ▽ |
| Kuwait | 383 (4.7) | - - | - - | - - | - - | - - | - - |
| South Africa (5) | 374 (3.6) | 370 (3.6) | -3 (1.1) ▽ | 362 (3.7) | -11 (1.7) ▽ | 390 (3.8) | 16 (1.5) ▲ |
| [2 Ψ] Pakistan | 328 (12.0) | 351 (10.9) | 24 (2.2) ▲ | 286 (14.1) | -42 (4.4) ▽ | 278 (14.5) | -50 (4.3) ▽ |
| [2 Ψ] Philippines | 297 (6.4) | 308 (6.1) | 11 (2.0) ▲ | 259 (7.1) | -37 (3.0) ▽ | 291 (7.1) | -6 (1.8) ▽ |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 591 (2.2) | -2 (0.7) ▽ | 590 (2.4) | -2 (1.2) | 603 (2.5) | 10 (0.8) ▲ |
| [2] Dubai, UAE | 544 (1.6) | 548 (1.7) | 4 (1.2) ▲ | 535 (2.1) | -9 (1.1) ▽ | 546 (2.0) | 2 (1.2) |
| Quebec, Canada | 532 (2.3) | 530 (2.4) | -3 (1.4) | 532 (2.6) | 0 (1.6) | 535 (3.1) | 3 (2.5) |
| Madrid, Spain | 518 (2.2) | 524 (2.2) | 6 (1.1) ▲ | 508 (3.4) | -10 (2.4) ▽ | 513 (2.9) | -5 (2.2) ▽ |
| [2] Ontario, Canada | 512 (3.3) | 501 (3.6) | -10 (1.8) ▽ | 516 (3.2) | 5 (1.0) ▲ | 527 (4.0) | 15 (2.0) ▲ |
| Abu Dhabi, UAE | 441 (2.2) | 443 (2.0) | 2 (1.2) | 429 (2.1) | -11 (1.9) ▽ | 435 (2.3) | -6 (1.6) ▽ |

▲ Subscale score significantly higher than overall mathematics score
▽ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2019 fourth grade mathematics eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Trends in Average Achievement in Content Domains

Exhibit 1.15 presents trends in average achievement for the three mathematics content domains assessed by TIMSS 2019 at the fourth grade—number, measurement and geometry, and data. Of the 55 TIMSS 2019 countries with mathematics content domain scores, 42 also participated in TIMSS 2015 and have comparable data for the two assessment cycles. In each of the three content areas, about just over half the countries showed no or little change in average achievement. For the countries that did have changes, there were similar numbers of increases and decreases: in the number content area, 11 showed improvement and 7 declined; in measurement and geometry, 13 showed improvement and 9 declined; and in data, 10 showed improvement and 7 declined.

In comparison, the longer term trends showed many more improvements than declines. TIMSS began providing scaled results in the content domains in 2007, with 21 countries having trends between 2007 and 2019. Compared with 2007, these countries showed considerable improvement in TIMSS 2019 across the content domains—14 had higher average achievement in number, 12 in measurement and geometry, and 12 in data. One country had lower achievement in number compared with 2007, 3 countries had lower average achievement in measurement and geometry and 2 had lower achievement in data.

## Exhibit 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Number | | | | Measurement and Geometry | | | | Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Armenia** | | | | | | | | | | | | |
| 2019 | 518 (2.3) | 8 ▲ | 34 ▲ | | 490 (3.0) | 46 ▲ | 66 ▲ | | 446 (4.2) | 39 ▲ | 61 ▲ | |
| 2015 | 510 (3.0) | | 26 ▲ | | 444 (4.6) | | 20 ▲ | | 407 (5.1) | | 21 ▲ | |
| 2011 | 484 (3.1) | | | | 424 (4.3) | | | | 386 (5.0) | | | |
| **Australia** | | | | | | | | | | | | |
| 2019 | 506 (3.1) | -3 | -2 | 3 | 516 (3.3) | -11 ▽ | -18 ▽ | -20 ▽ | 534 (3.4) | 2 | 19 ▲ | 2 |
| 2015 | 509 (3.1) | | 1 | 6 | 527 (3.3) | | -7 | -9 | 533 (3.6) | | 17 ▲ | 0 |
| 2011 | 508 (3.2) | | | 5 | 534 (3.0) | | | -3 | 515 (3.1) | | | -17 ▽ |
| 2007 | 503 (3.6) | | | | 536 (3.6) | | | | 532 (4.3) | | | |
| **Austria** | | | | | | | | | | | | |
| 2019 | 542 (1.9) | | 36 ▲ | 36 ▲ | 542 (2.4) | | 30 ▲ | 36 ▲ | 528 (2.7) | | 13 ▲ | 27 ▲ |
| 2011 | 506 (2.4) | | | 0 | 512 (3.4) | | | 6 | 515 (3.2) | | | 13 ▲ |
| 2007 | 506 (2.1) | | | | 506 (2.6) | | | | 502 (3.4) | | | |
| **Azerbaijan** | | | | | | | | | | | | |
| 2019 | 526 (2.7) | | 35 ▲ | | 503 (3.2) | | 66 ▲ | | 504 (3.0) | | 96 ▲ | |
| 2 2011 | 491 (5.2) | | | | 437 (7.2) | | | | 407 (6.3) | | | |
| **Bahrain** | | | | | | | | | | | | |
| 2019 | 478 (2.6) | 26 ▲ | 39 ▲ | | 474 (2.6) | 27 ▲ | 52 ▲ | | 483 (3.3) | 29 ▲ | 41 ▲ | |
| 2 2015 | 453 (1.7) | | 14 ▲ | | 447 (1.9) | | 25 ▲ | | 454 (2.3) | | 12 ▲ | |
| 2011 | 439 (3.1) | | | | 422 (3.8) | | | | 442 (4.0) | | | |
| **Belgium (Flemish)** | | | | | | | | | | | | |
| † 2019 | 526 (2.0) | -17 ▽ | -25 ▽ | | 551 (2.0) | -13 ▽ | -1 | | 527 (2.2) | 3 | -10 ▽ | |
| † 2015 | 543 (2.1) | | -8 ▽ | | 564 (2.3) | | 11 ▲ | | 523 (3.0) | | -13 ▽ | |
| 2011 | 552 (2.1) | | | | 552 (1.9) | | | | 536 (2.8) | | | |
| **Bulgaria** | | | | | | | | | | | | |
| 2019 | 521 (4.0) | -8 | | | 522 (4.9) | -3 | | | 490 (5.6) | -15 | | |
| 2015 | 529 (4.6) | | | | 525 (5.9) | | | | 504 (7.6) | | | |
| **Canada** | | | | | | | | | | | | |
| 1 2 2019 | 505 (2.1) | 2 | | | 511 (1.8) | -6 ▽ | | | 523 (2.4) | -6 | | |
| 1 2 † 2015 | 503 (2.4) | | | | 517 (2.5) | | | | 528 (2.7) | | | |
| **Chinese Taipei** | | | | | | | | | | | | |
| 2019 | 599 (1.7) | 0 | 0 | 17 ▲ | 607 (1.8) | 11 ▲ | 35 ▲ | 42 ▲ | 590 (2.4) | -1 | -10 ▽ | 14 ▲ |
| 2015 | 599 (1.8) | | 0 | 17 ▲ | 597 (3.0) | | 24 ▲ | 31 ▲ | 591 (2.2) | | -9 ▽ | 15 ▲ |
| 2011 | 599 (2.0) | | | 17 ▲ | 573 (2.1) | | | 7 ▲ | 600 (2.6) | | | 24 ▲ |
| 2007 | 583 (1.8) | | | | 566 (2.7) | | | | 576 (2.4) | | | |
| **Croatia** | | | | | | | | | | | | |
| 2019 | 512 (1.9) | 14 ▲ | 21 ▲ | | 518 (2.7) | 5 | 28 ▲ | | 494 (2.7) | -4 | 6 | |
| 2015 | 498 (1.8) | | 7 ▲ | | 512 (2.3) | | 22 ▲ | | 498 (3.0) | | 10 ▲ | |
| 2 2011 | 491 (1.9) | | | | 490 (2.5) | | | | 488 (2.9) | | | |
| **Cyprus** | | | | | | | | | | | | |
| 2019 | 538 (2.8) | 10 ▲ | | | 526 (3.1) | 2 | | | 524 (3.4) | 16 ▲ | | |
| 2015 | 528 (2.5) | | | | 524 (2.8) | | | | 507 (3.8) | | | |
| **Czech Republic** | | | | | | | | | | | | |
| 2019 | 536 (2.4) | 8 ▲ | 27 ▲ | 49 ▲ | 540 (2.9) | 9 ▲ | 27 ▲ | 53 ▲ | 518 (2.9) | -7 | -1 | 36 ▲ |
| 2015 | 528 (2.4) | | 19 ▲ | 42 ▲ | 531 (2.5) | | 18 ▲ | 44 ▲ | 525 (3.0) | | 6 | 43 ▲ |
| 2011 | 509 (2.5) | | | 23 ▲ | 513 (3.0) | | | 26 ▲ | 519 (2.9) | | | 37 ▲ |
| 2007 | 486 (2.7) | | | | 487 (3.2) | | | | 482 (4.1) | | | |
| **Denmark** | | | | | | | | | | | | |
| † 2019 | 518 (2.1) | -17 ▽ | -16 ▽ | 4 | 536 (2.4) | -19 ▽ | -12 ▽ | -9 ▽ | 525 (2.3) | -1 | -6 | -1 |
| 2 † 2015 | 535 (2.7) | | 1 | 21 ▲ | 555 (3.2) | | 7 | 10 ▲ | 526 (3.5) | | -6 | -1 |
| 2 2011 | 534 (2.5) | | | 21 ▲ | 548 (3.1) | | | 2 | 532 (2.9) | | | 5 |
| † 2007 | 513 (2.7) | | | | 546 (3.1) | | | | 527 (4.0) | | | |
| **England** | | | | | | | | | | | | |
| 2 2019 | 559 (3.3) | 12 ▲ | 20 ▲ | 24 ▲ | 545 (3.3) | 3 | 0 | -6 | 565 (3.1) | 13 ▲ | 15 ▲ | 14 ▲ |
| 2015 | 547 (3.2) | | 8 | 11 ▲ | 542 (3.3) | | -3 | -9 ▽ | 552 (3.2) | | 3 | 2 |
| 2011 | 539 (3.7) | | | 4 | 545 (3.8) | | | -6 | 549 (4.6) | | | -1 |
| 2007 | 535 (3.2) | | | | 552 (3.3) | | | | 551 (3.3) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in content domains using current methodology began with TIMSS 2007.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

| Country | Number | | | | Measurement and Geometry | | | | Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Finland** | | | | | | | | | | | | |
| 2019 | 528 (2.3) | -4 | -17 ▽ | | 538 (3.0) | -1 | -5 | | 534 (2.8) | -8 | -17 ▽ | |
| 2015 | 532 (2.1) | | -14 ▽ | | 539 (2.5) | | -4 | | 542 (3.3) | | -9 | |
| 2011 | 545 (2.4) | | | | 543 (3.0) | | | | 551 (3.7) | | | |
| **France** | | | | | | | | | | | | |
| 2019 | 480 (3.2) | -3 | | | 498 (3.3) | -6 | | | 476 (3.4) | 0 | | |
| 2015 | 483 (3.0) | | | | 503 (3.0) | | | | 476 (3.1) | | | |
| **Georgia** | | | | | | | | | | | | |
| 1 2019 | 501 (3.6) | 18 ▲ | 28 ▲ | 30 ▲ | 470 (4.1) | 41 ▲ | 58 ▲ | 74 ▲ | 444 (4.6) | 10 | 12 | 54 ▲ |
| 1 2015 | 483 (3.5) | | 10 ▲ | 12 ▲ | 429 (4.6) | | 17 ▲ | 33 ▲ | 435 (4.4) | | 2 | 45 ▲ |
| 1 2011 | 473 (3.2) | | | 2 | 411 (4.2) | | | 16 ▲ | 433 (4.2) | | | 43 ▲ |
| 1 2007 | 470 (3.7) | | | | 395 (5.9) | | | | 390 (5.4) | | | |
| **Germany** | | | | | | | | | | | | |
| 2019 | 517 (2.1) | 2 | -3 | -7 ▽ | 531 (2.6) | 0 | -5 | 4 | 515 (3.1) | -20 ▽ | -31 ▽ | -17 ▽ |
| 2015 | 515 (2.1) | | -5 | -9 ▽ | 531 (2.5) | | -5 | 4 | 535 (2.6) | | -11 ▽ | 3 |
| 2011 | 520 (2.3) | | | -4 | 536 (2.7) | | | 9 ▲ | 546 (2.8) | | | 14 ▲ |
| 2007 | 524 (2.2) | | | | 527 (2.4) | | | | 532 (3.7) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | |
| † 2019 | 598 (3.6) | -18 ▽ | -6 | -10 | 608 (3.1) | -9 | 3 | -5 | 607 (3.6) | -4 | 13 ▲ | 6 |
| † 2015 | 616 (3.1) | | 12 ▲ | 9 | 617 (3.4) | | 12 ▲ | 3 | 611 (3.8) | | 18 ▲ | 10 ▲ |
| 2 2011 | 604 (3.3) | | | -4 | 605 (3.4) | | | -9 | 593 (3.7) | | | -7 |
| 2007 | 608 (3.7) | | | | 613 (3.8) | | | | 600 (3.3) | | | |
| **Hungary** | | | | | | | | | | | | |
| 2019 | 531 (2.6) | -1 | 16 ▲ | 16 ▲ | 519 (3.3) | -17 ▽ | -1 | 13 ▲ | 508 (3.2) | -5 | -2 | 11 ▲ |
| 2015 | 531 (3.0) | | 16 ▲ | 16 ▲ | 536 (3.6) | | 16 ▲ | 29 ▲ | 513 (3.6) | | 3 | 16 ▲ |
| 2011 | 515 (3.3) | | | 0 | 520 (3.7) | | | 14 ▲ | 510 (4.1) | | | 13 ▲ |
| 2007 | 515 (3.4) | | | | 507 (3.9) | | | | 497 (4.3) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | |
| 2019 | 446 (4.0) | 11 ▲ | 6 | 39 ▲ | 445 (3.6) | 17 ▲ | 11 ▲ | 37 ▲ | 424 (3.8) | 9 | 27 ▲ | 51 ▲ |
| 2015 | 435 (3.2) | | -5 | 28 ▲ | 428 (3.5) | | -7 | 19 ▲ | 416 (3.2) | | 18 ▲ | 42 ▲ |
| 2011 | 440 (3.3) | | | 32 ▲ | 435 (3.7) | | | 26 ▲ | 397 (4.2) | | | 24 ▲ |
| 2007 | 407 (3.5) | | | | 408 (4.0) | | | | 374 (5.1) | | | |
| **Ireland** | | | | | | | | | | | | |
| 2019 | 555 (2.7) | 4 | 22 ▲ | | 540 (2.7) | -2 | 20 ▲ | | 543 (3.0) | -5 | 20 ▲ | |
| 2015 | 551 (2.2) | | 18 ▲ | | 542 (2.9) | | 22 ▲ | | 548 (3.8) | | 25 ▲ | |
| 2011 | 533 (2.6) | | | | 520 (3.1) | | | | 523 (3.0) | | | |
| **Italy** | | | | | | | | | | | | |
| 2019 | 522 (2.5) | 12 ▲ | 12 ▲ | 12 ▲ | 510 (3.2) | 7 | -2 | 4 | 498 (3.0) | 0 | 4 | 0 |
| 2 2015 | 510 (2.4) | | 0 | 0 | 503 (2.8) | | -9 ▽ | -3 | 498 (2.9) | | 3 | -1 |
| 2011 | 510 (2.7) | | | 0 | 513 (3.2) | | | 6 | 495 (3.2) | | | -4 |
| 2007 | 510 (2.9) | | | | 507 (3.6) | | | | 499 (4.0) | | | |
| **Japan** | | | | | | | | | | | | |
| 2019 | 586 (1.8) | -6 ▽ | 2 | 22 ▲ | 601 (2.7) | 0 | 12 ▲ | 26 ▲ | 606 (2.1) | 12 ▲ | 16 ▲ | 18 ▲ |
| 2015 | 592 (1.9) | | 8 ▲ | 28 ▲ | 601 (2.5) | | 12 ▲ | 26 ▲ | 593 (2.6) | | 4 | 6 |
| 2011 | 584 (1.7) | | | 20 ▲ | 589 (1.9) | | | 14 ▲ | 590 (3.0) | | | 2 |
| 2007 | 564 (2.1) | | | | 575 (2.7) | | | | 588 (3.5) | | | |
| **Kazakhstan** | | | | | | | | | | | | |
| 2 2019 | 523 (2.4) | | 8 | | 513 (2.8) | | 22 ▲ | | 481 (3.0) | | 5 | |
| 2 2011 | 515 (4.1) | | | | 491 (5.4) | | | | 476 (5.5) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | |
| 2019 | 593 (2.4) | -16 ▽ | -12 ▽ | | 608 (2.6) | -3 | 0 | | 602 (2.5) | -4 | -1 | |
| 2015 | 610 (2.6) | | 4 | | 610 (2.3) | | 3 | | 607 (2.6) | | 4 | |
| 2011 | 606 (2.0) | | | | 607 (2.0) | | | | 603 (1.8) | | | |
| **Lithuania** | | | | | | | | | | | | |
| 2 2019 | 538 (2.8) | 0 | 1 | 2 | 543 (3.0) | 18 ▲ | 12 ▲ | 25 ▲ | 545 (3.0) | 5 | 18 ▲ | 16 ▲ |
| 2 2015 | 538 (2.6) | | 1 | 2 | 526 (3.0) | | -5 | 7 | 540 (3.6) | | 14 ▲ | 11 ▲ |
| 1 2 2011 | 537 (2.4) | | | 1 | 531 (2.9) | | | 12 ▲ | 526 (2.8) | | | -3 |
| 1 2007 | 536 (2.2) | | | | 518 (3.1) | | | | 529 (3.7) | | | |
| **Malta** | | | | | | | | | | | | |
| 2019 | 512 (1.5) | | 14 ▲ | | 497 (1.8) | | 10 ▲ | | 512 (1.8) | | 14 ▲ | |
| 2011 | 498 (1.9) | | | | 487 (1.5) | | | | 498 (1.7) | | | |
| **Morocco** | | | | | | | | | | | | |
| 2019 | 383 (4.4) | 2 | 43 ▲ | | 386 (4.5) | 1 | 36 ▲ | | 374 (5.3) | 24 ▲ | 104 ▲ | |
| 2015 | 381 (3.3) | | 41 ▲ | | 385 (3.8) | | 35 ▲ | | 351 (4.2) | | 80 ▲ | |
| ✕ 2011 | 340 (4.0) | | | | 350 (3.8) | | | | 271 (4.7) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

✕ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

| Country | Number | | | | Measurement and Geometry | | | | Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Netherlands** | | | | | | | | | | | | |
| ≡ 2019 | 533 (2.2) | 2 | -10 ▽ | -6 | 537 (2.2) | 15 ▲ | 13 ▲ | 15 ▲ | 549 (3.0) | 11 ▲ | -10 ▽ | 4 |
| † 2015 | 531 (2.2) | | -12 ▽ | -8 ▽ | 522 (1.9) | | -2 | 0 | 539 (3.4) | | -20 ▽ | -6 |
| † 2011 | 543 (1.7) | | | 4 | 524 (2.9) | | | 2 | 559 (2.8) | | | 14 ▲ |
| ‡ 2007 | 539 (2.2) | | | | 522 (2.6) | | | | 545 (2.8) | | | |
| **New Zealand** | | | | | | | | | | | | |
| 2 2019 | 478 (2.9) | -7 | -4 | -7 | 481 (2.7) | -7 | -2 | -14 ▽ | 504 (3.1) | -2 | 13 ▲ | -3 |
| 2015 | 485 (2.7) | | 3 | 0 | 489 (2.8) | | 6 | -7 | 506 (2.9) | | 15 ▲ | 0 |
| 2011 | 483 (2.7) | | | -3 | 483 (2.6) | | | -12 ▽ | 491 (2.8) | | | -15 ▽ |
| 2007 | 485 (2.6) | | | | 495 (2.5) | | | | 506 (3.0) | | | |
| **Northern Ireland** | | | | | | | | | | | | |
| † 2019 | 572 (3.1) | -2 | 6 | | 556 (3.0) | -10 ▽ | -4 | | 564 (2.5) | -3 | 9 ▲ | |
| ‡ 2015 | 574 (3.1) | | 8 | | 566 (3.3) | | 6 | | 567 (3.8) | | 12 ▲ | |
| † 2011 | 566 (2.9) | | | | 560 (3.2) | | | | 555 (2.9) | | | |
| **Norway (5)** | | | | | | | | | | | | |
| † 2019 | 540 (2.0) | -2 | | | 546 (2.8) | -12 ▽ | | | 547 (3.2) | -19 ▽ | | |
| 2015 | 542 (2.4) | | | | 559 (3.5) | | | | 566 (3.0) | | | |
| **Oman** | | | | | | | | | | | | |
| 2019 | 424 (4.0) | 1 | 40 ▲ | | 429 (4.2) | -2 | 52 ▲ | | 433 (3.8) | 19 ▲ | 52 ▲ | |
| 2015 | 423 (2.6) | | 39 ▲ | | 430 (2.9) | | 54 ▲ | | 414 (2.6) | | 33 ▲ | |
| Ψ 2011 | 384 (3.1) | | | | 376 (3.2) | | | | 381 (3.0) | | | |
| **Poland** | | | | | | | | | | | | |
| 2019 | 513 (2.8) | -22 ▽ | | | 529 (2.7) | -4 | | | 524 (2.9) | -14 ▽ | | |
| 2015 | 534 (2.3) | | | | 534 (2.5) | | | | 538 (2.8) | | | |
| **Portugal** | | | | | | | | | | | | |
| 2 2019 | 524 (2.9) | -16 ▽ | 2 | | 520 (2.9) | -19 ▽ | -28 ▽ | | 528 (2.6) | -18 ▽ | -20 ▽ | |
| 2 2015 | 541 (2.1) | | 18 ▲ | | 539 (2.6) | | -9 | | 546 (2.8) | | -2 | |
| 2011 | 522 (3.6) | | | | 548 (4.0) | | | | 548 (2.9) | | | |
| **Qatar** | | | | | | | | | | | | |
| 2019 | 455 (3.4) | 9 | 38 ▲ | | 434 (3.4) | 11 ▲ | 36 ▲ | | 445 (3.8) | 10 | 29 ▲ | |
| 2015 | 446 (3.4) | | 29 ▲ | | 423 (4.4) | | 24 ▲ | | 435 (3.9) | | 19 ▲ | |
| 2 2011 | 417 (3.4) | | | | 399 (4.0) | | | | 416 (4.7) | | | |
| **Russian Federation** | | | | | | | | | | | | |
| 2 2019 | 567 (3.4) | 1 | 23 ▲ | 18 ▲ | 571 (3.7) | 14 ▲ | 29 ▲ | 28 ▲ | 560 (3.9) | -13 ▽ | 27 ▲ | 31 ▲ |
| 2015 | 567 (3.3) | | 22 ▲ | 18 ▲ | 557 (4.4) | | 15 ▲ | 14 | 573 (3.6) | | 40 ▲ | 44 ▲ |
| 2011 | 545 (3.3) | | | -4 | 542 (4.2) | | | -1 | 533 (4.0) | | | 4 |
| 2007 | 549 (4.4) | | | | 543 (6.2) | | | | 529 (6.2) | | | |
| **Serbia** | | | | | | | | | | | | |
| 2 2019 | 518 (2.9) | -6 | -11 ▽ | | 499 (3.7) | -4 | 2 | | 489 (4.2) | -28 ▽ | -13 ▽ | |
| 3 2015 | 524 (3.4) | | -5 | | 503 (3.8) | | 6 | | 517 (3.8) | | 14 ▲ | |
| 2 2011 | 529 (3.0) | | | | 497 (3.7) | | | | 503 (3.7) | | | |
| **Singapore** | | | | | | | | | | | | |
| 3 2019 | 635 (4.0) | 5 | 16 ▲ | 24 ▲ | 620 (3.9) | 13 ▲ | 31 ▲ | 36 ▲ | 613 (3.8) | 14 ▲ | 26 ▲ | 16 ▲ |
| 2 2015 | 630 (4.2) | | 11 ▲ | 18 ▲ | 607 (4.2) | | 18 ▲ | 24 ▲ | 600 (4.1) | | 12 ▲ | 3 |
| 2 2011 | 619 (3.4) | | | 8 | 589 (3.6) | | | 5 | 588 (3.3) | | | -9 |
| 2007 | 611 (4.0) | | | | 584 (4.2) | | | | 597 (3.7) | | | |
| **Slovak Republic** | | | | | | | | | | | | |
| 2 2019 | 512 (3.6) | 10 ▲ | 1 | 12 ▲ | 506 (3.7) | 15 ▲ | 6 | 11 | 506 (4.1) | 10 | 2 | 23 ▲ |
| 2015 | 502 (2.4) | | -9 ▽ | 2 | 491 (2.6) | | -9 | -3 | 496 (3.8) | | -8 | 14 ▲ |
| 2011 | 511 (3.7) | | | 11 ▲ | 500 (4.2) | | | 6 | 504 (4.6) | | | 22 ▲ |
| 2007 | 500 (4.0) | | | | 494 (5.3) | | | | 482 (5.6) | | | |
| **South Africa (5)** | | | | | | | | | | | | |
| 2019 | 370 (3.6) | -8 | | | 362 (3.7) | 3 | | | 390 (3.8) | 9 | | |
| 2015 | 379 (3.4) | | | | 359 (3.7) | | | | 381 (4.0) | | | |
| **Spain** | | | | | | | | | | | | |
| 2019 | 506 (1.9) | 2 | 20 ▲ | | 494 (2.2) | -9 ▽ | 17 ▲ | | 499 (2.6) | -9 ▽ | 20 ▲ | |
| 2 2015 | 504 (2.5) | | 18 ▲ | | 503 (2.8) | | 26 ▲ | | 509 (3.1) | | 30 ▲ | |
| 2011 | 487 (2.9) | | | | 476 (2.9) | | | | 479 (3.6) | | | |
| **Sweden** | | | | | | | | | | | | |
| 2019 | 517 (2.9) | 3 | 17 ▲ | 22 ▲ | 521 (3.4) | -1 | 22 ▲ | 18 ▲ | 527 (3.5) | -2 | 4 | 0 |
| 2 2015 | 514 (2.7) | | 14 ▲ | 19 ▲ | 523 (3.3) | | 23 ▲ | 19 ▲ | 529 (3.9) | | 6 | 2 |
| 2011 | 500 (2.2) | | | 5 | 500 (2.4) | | | -4 | 523 (3.0) | | | -4 |
| 2007 | 495 (2.5) | | | | 503 (2.9) | | | | 527 (3.4) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

| Country | Number | | | | Measurement and Geometry | | | | Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **United Arab Emirates** | | | | | | | | | | | | |
| 2019 | 485 (1.7) | 30 ▲ | 47 ▲ | | 472 (1.8) | 30 ▲ | 54 ▲ | | 476 (1.8) | 23 ▲ | 39 ▲ | |
| 2015 | 455 (2.4) | | 17 ▲ | | 442 (2.7) | | 24 ▲ | | 453 (2.4) | | 16 ▲ | |
| 2011 | 438 (2.1) | | | | 418 (2.2) | | | | 437 (1.9) | | | |
| **United States** | | | | | | | | | | | | |
| 2† 2019 | 542 (2.6) | -3 | -1 | 13 ▲ | 520 (2.6) | -6 | -15 ▽ | -2 | 533 (3.0) | -7 | -12 ▽ | -13 ▽ |
| 2† 2015 | 546 (2.2) | | 3 | 16 ▲ | 525 (2.6) | | -9 ▽ | 3 | 540 (2.8) | | -4 | -5 |
| 2 2011 | 543 (2.0) | | | 13 ▲ | 535 (2.2) | | | 13 ▲ | 545 (1.8) | | | -1 |
| 2† 2007 | 529 (2.6) | | | | 522 (3.0) | | | | 546 (2.8) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | |
| 2 2019 | 501 (3.6) | 2 | -2 | 6 | 516 (3.2) | -10 ▽ | -19 ▽ | -14 ▽ | 527 (4.0) | -9 | -9 | -18 ▽ |
| 2015 | 500 (2.6) | | -4 | 4 | 526 (2.9) | | -9 | -3 | 536 (2.6) | | -1 | -9 |
| 2011 | 504 (3.4) | | | 9 | 535 (3.5) | | | 5 | 536 (3.6) | | | -9 |
| 2 2007 | 495 (3.5) | | | | 530 (3.7) | | | | 545 (4.0) | | | |
| **Quebec, Canada** | | | | | | | | | | | | |
| 2019 | 530 (2.4) | -3 | -2 | 14 ▲ | 532 (2.6) | -11 ▽ | -4 | 8 | 535 (3.1) | -6 | -3 | 12 ▲ |
| ≡ 2015 | 533 (4.2) | | 1 | 17 ▲ | 542 (4.6) | | 6 | 18 ▲ | 541 (5.0) | | 4 | 18 ▲ |
| 2011 | 531 (2.6) | | | 16 ▲ | 536 (3.2) | | | 12 ▲ | 538 (3.7) | | | 15 ▲ |
| 2 2007 | 515 (3.0) | | | | 524 (3.8) | | | | 523 (4.4) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | |
| 2019 | 443 (2.0) | 21 ▲ | 23 ▲ | | 429 (2.1) | 18 ▲ | 28 ▲ | | 435 (2.3) | 12 ▲ | 17 ▲ | |
| 2 Ψ 2015 | 422 (4.7) | | 2 | | 412 (5.1) | | 10 | | 423 (4.8) | | 5 | |
| 2011 | 420 (4.7) | | | | 401 (5.3) | | | | 418 (4.4) | | | |
| **Dubai, UAE** | | | | | | | | | | | | |
| 2 2019 | 548 (1.7) | 34 ▲ | 74 ▲ | 95 ▲ | 535 (2.1) | 33 ▲ | 86 ▲ | 112 ▲ | 546 (2.0) | 30 ▲ | 75 ▲ | 102 ▲ |
| 2015 | 514 (1.5) | | 40 ▲ | 61 ▲ | 503 (1.9) | | 54 ▲ | 79 ▲ | 517 (1.7) | | 45 ▲ | 73 ▲ |
| 2011 | 474 (1.7) | | | 21 ▲ | 449 (2.3) | | | 26 ▲ | 471 (3.1) | | | 27 ▲ |
| ‡ 2007 | 452 (2.1) | | | | 424 (3.4) | | | | 444 (3.0) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Content Domains by Gender

Exhibit 1.16 shows the differences in average achievement between boys and girls in the three mathematics content domains. The differences in average achievement between girls and boys in all three content areas largely reflected the overall TIMSS 2019 results, where boys had higher achievement than girls in close to half the countries (27 out of 55). In the number content domain, girls had higher average achievement than boys in 3 countries, and boys had higher average achievement in 25 countries. In measurement and geometry, girls had higher average achievement than boys in 3 countries, and boys had higher average achievement in 26 countries. In data, girls had higher average achievement than boys in 8 countries, and boys had higher average achievement in 11. countries.

## Exhibit 1.16: Average Achievement in Mathematics Content Domains by Gender

| Country | Number (83 Items) | | Measurement and Geometry (52 Items) | | Data (36 Items) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Albania | 493 (3.8) | 497 (4.3) | 492 (3.9) | 499 (4.0) | 494 (4.7) ▲ | 485 (4.4) |
| Armenia | 520 (2.6) | 516 (2.9) | 489 (3.1) | 491 (3.9) | 450 (4.3) | 444 (5.0) |
| Australia | 501 (3.0) | 511 (3.8) ▲ | 509 (3.2) | 523 (3.9) ▲ | 531 (4.0) | 537 (3.6) |
| Austria | 539 (2.6) | 544 (2.2) | 534 (3.0) | 549 (2.7) ▲ | 524 (4.2) | 532 (2.7) |
| Azerbaijan | 528 (3.2) | 524 (3.0) | 501 (4.0) | 504 (3.4) | 508 (3.5) ▲ | 500 (3.3) |
| Bahrain | 482 (3.5) | 475 (3.6) | 473 (3.5) | 475 (3.4) | 487 (3.7) | 479 (4.2) |
| † Belgium (Flemish) | 520 (2.1) | 533 (2.6) ▲ | 545 (2.5) | 557 (2.7) ▲ | 523 (2.6) | 530 (3.2) |
| Bosnia and Herzegovina | 454 (2.7) | 463 (2.6) ▲ | 452 (3.7) | 464 (3.0) ▲ | 412 (4.0) | 414 (4.5) |
| Bulgaria | 520 (4.3) | 523 (4.4) | 518 (5.5) | 525 (5.2) | 491 (6.2) | 488 (6.1) |
| 1 2 Canada | 495 (2.7) | 515 (2.4) ▲ | 500 (2.7) | 520 (2.1) ▲ | 514 (3.0) | 531 (2.4) ▲ |
| Chile | - - | - - | - - | - - | - - | - - |
| Chinese Taipei | 597 (2.4) | 602 (2.2) | 606 (1.9) | 609 (2.4) | 588 (3.6) | 592 (2.7) |
| Croatia | 506 (2.5) | 518 (2.5) ▲ | 514 (3.9) | 522 (3.4) | 491 (2.9) | 497 (3.9) |
| Cyprus | 528 (3.1) | 549 (3.5) ▲ | 515 (3.3) | 538 (4.2) ▲ | 518 (3.7) | 529 (4.2) ▲ |
| Czech Republic | 531 (2.5) | 540 (3.1) ▲ | 533 (3.5) | 547 (3.9) ▲ | 512 (3.2) | 524 (3.5) ▲ |
| † Denmark | 513 (2.4) | 523 (2.8) ▲ | 533 (3.4) | 540 (2.4) ▲ | 524 (3.2) | 526 (3.4) |
| 2 England | 556 (4.4) | 562 (3.4) | 540 (4.5) | 550 (3.2) ▲ | 561 (4.2) | 568 (3.5) |
| Finland | 525 (2.9) | 530 (2.8) | 537 (3.4) | 540 (3.3) | 534 (3.6) | 534 (3.1) |
| France | 474 (3.6) | 487 (3.7) ▲ | 490 (3.9) | 505 (3.9) ▲ | 470 (4.1) | 481 (3.7) ▲ |
| 1 Georgia | 498 (3.9) | 504 (4.0) | 466 (4.1) | 473 (5.0) | 439 (5.4) | 449 (5.9) |
| Germany | 512 (2.5) | 523 (2.3) ▲ | 524 (3.2) | 538 (2.8) ▲ | 511 (4.0) | 518 (4.2) |
| † Hong Kong SAR | 595 (4.5) | 600 (3.8) | 600 (3.6) | 615 (3.7) ▲ | 607 (4.4) | 607 (4.1) |
| Hungary | 525 (3.0) | 535 (3.1) ▲ | 510 (3.7) | 528 (4.1) ▲ | 503 (4.0) | 512 (4.2) |
| Iran, Islamic Rep. of | 443 (6.6) | 449 (5.8) | 440 (6.0) | 450 (5.3) | 423 (6.0) | 426 (5.4) |
| Ireland | 551 (3.2) | 558 (3.2) | 538 (3.7) | 543 (3.2) | 540 (3.8) | 545 (3.4) |
| Italy | 515 (2.5) | 529 (3.2) ▲ | 504 (3.5) | 516 (3.7) ▲ | 490 (3.6) | 507 (3.8) ▲ |
| Japan | 585 (2.2) | 587 (2.2) | 602 (3.4) | 601 (2.6) | 608 (2.5) ▲ | 603 (2.2) |
| 2 Kazakhstan | 522 (2.9) | 523 (2.8) | 512 (3.2) | 515 (2.9) | 484 (3.6) | 479 (3.2) |
| Korea, Rep. of | 589 (2.6) | 597 (3.1) ▲ | 605 (3.0) | 610 (3.1) | 605 (3.2) | 600 (3.5) |
| 2 Kosovo | 444 (3.1) | 451 (3.5) | 448 (3.7) | 452 (3.7) | 423 (4.3) | 423 (5.1) |
| Kuwait | - - | - - | - - | - - | - - | - - |
| 2 Latvia | 543 (2.9) | 550 (3.2) ▲ | 545 (3.1) | 550 (3.4) | 542 (4.0) | 542 (3.3) |
| 2 Lithuania | 535 (3.1) | 541 (3.6) | 542 (3.5) | 545 (3.7) | 543 (3.9) | 547 (4.7) |
| Malta | 510 (2.7) | 514 (2.0) | 492 (2.4) | 502 (2.8) ▲ | 506 (2.4) | 517 (2.7) ▲ |
| Montenegro | 450 (2.9) | 457 (2.4) ▲ | 460 (4.0) | 459 (3.3) | 442 (4.0) | 436 (3.3) |
| Morocco | 385 (4.9) | 382 (4.5) | 386 (5.7) | 385 (4.8) | 379 (5.8) ▲ | 369 (5.5) |
| ≡ Netherlands | 528 (2.8) | 538 (2.8) ▲ | 530 (2.3) | 544 (3.0) ▲ | 549 (4.0) | 550 (3.9) |
| 2 New Zealand | 476 (4.3) | 481 (3.6) | 476 (3.7) | 486 (3.4) ▲ | 503 (4.8) | 504 (3.8) |
| North Macedonia | 472 (5.9) | 473 (5.3) | 476 (6.5) | 474 (5.8) | 465 (7.5) | 464 (6.2) |
| † Northern Ireland | 571 (3.6) | 574 (3.8) | 551 (3.8) | 560 (3.7) | 564 (3.1) | 564 (4.0) |
| † Norway (5) | 538 (2.6) | 542 (2.8) | 543 (3.3) | 549 (3.6) | 548 (3.9) | 546 (4.1) |
| Oman | 431 (4.0) ▲ | 416 (5.1) | 433 (4.0) ▲ | 424 (5.1) | 442 (4.3) ▲ | 423 (4.6) |
| 2 Ψ Pakistan | 358 (14.1) | 346 (11.9) | 296 (19.7) | 278 (14.3) | 303 (20.3) ▲ | 257 (12.5) |
| 2 Ψ Philippines | 324 (6.5) ▲ | 293 (6.0) | 276 (7.7) ▲ | 243 (7.4) | 315 (7.6) ▲ | 269 (7.8) |
| Poland | 508 (3.3) | 517 (3.1) ▲ | 524 (3.1) | 535 (3.5) ▲ | 523 (3.7) | 525 (3.2) |
| 2 Portugal | 516 (3.3) | 532 (3.2) ▲ | 512 (3.5) | 528 (3.1) ▲ | 518 (2.9) | 537 (3.3) ▲ |
| Qatar | 455 (5.1) | 454 (3.2) | 432 (5.5) | 437 (2.9) | 448 (5.7) | 443 (3.7) |
| 2 Russian Federation | 563 (3.6) | 572 (3.6) ▲ | 566 (4.2) | 576 (3.8) ▲ | 556 (4.2) | 564 (4.3) ▲ |
| 2 Saudi Arabia | - - | - - | - - | - - | - - | - - |
| 2 Serbia | 519 (3.2) | 516 (3.9) | 496 (4.0) | 502 (5.2) | 493 (4.1) | 486 (5.7) |
| 3 Singapore | 631 (4.3) | 639 (4.3) ▲ | 615 (4.0) | 625 (4.5) ▲ | 611 (4.1) | 616 (4.3) |
| 2 Slovak Republic | 507 (3.6) | 518 (4.4) ▲ | 497 (4.1) | 514 (4.4) ▲ | 501 (4.6) | 510 (5.4) |
| South Africa (5) | 381 (4.0) ▲ | 360 (3.8) | 371 (4.3) ▲ | 354 (3.9) | 403 (3.9) ▲ | 377 (4.4) |
| Spain | 498 (2.7) | 513 (2.4) ▲ | 484 (3.1) | 502 (2.9) ▲ | 491 (3.0) | 507 (3.2) ▲ |
| Sweden | 513 (3.2) | 521 (3.4) ▲ | 515 (4.1) | 528 (3.5) ▲ | 525 (4.4) | 529 (3.8) |
| 2 Turkey (5) | 524 (4.8) | 527 (6.1) | 524 (4.8) | 531 (5.5) | 510 (4.7) | 511 (5.8) |
| United Arab Emirates | 481 (2.5) | 489 (2.2) ▲ | 467 (2.6) | 476 (2.5) ▲ | 472 (2.6) | 480 (2.4) ▲ |
| 2 † United States | 537 (2.9) | 547 (3.1) ▲ | 513 (3.0) | 526 (3.0) ▲ | 527 (3.2) | 539 (3.8) ▲ |
| **International Average** | **506 (0.5)** | **510 (0.5)** ▲ | **501 (0.6)** | **508 (0.6)** ▲ | **499 (0.7)** | **500 (0.6)** |
| **Benchmarking Participants** | | | | | | |
| 2 Ontario, Canada | 491 (5.2) | 512 (3.8) ▲ | 506 (4.8) | 526 (3.3) ▲ | 520 (5.2) | 534 (4.0) ▲ |
| Quebec, Canada | 520 (2.9) | 538 (2.6) ▲ | 523 (3.0) | 540 (3.0) ▲ | 526 (3.7) | 543 (3.2) ▲ |
| Moscow City, Russian Fed. | 586 (2.4) | 595 (2.5) ▲ | 586 (2.8) | 595 (2.8) ▲ | 598 (3.3) | 608 (3.4) ▲ |
| Madrid, Spain | 516 (2.7) | 533 (2.5) ▲ | 498 (3.9) | 517 (3.3) ▲ | 505 (3.8) | 521 (3.2) ▲ |
| Abu Dhabi, UAE | 441 (3.1) | 445 (2.9) | 427 (2.9) | 432 (3.2) | 434 (3.0) | 436 (3.3) |
| 2 Dubai, UAE | 544 (3.4) | 552 (2.4) | 531 (3.8) | 540 (2.7) | 541 (3.8) | 551 (2.8) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 fourth grade mathematics eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Average Achievement in Cognitive Domains

Exhibit 1.17 shows countries' average achievement in the knowing, applying, and reasoning cognitive domains relative to their overall average achievement (from highest to lowest overall average achievement). Interestingly, few countries had a relative strength in the knowing cognitive domain, especially compared with the applying domain. Nine countries had a relative strength in the knowing cognitive domain, and 25 had a relative weakness. Twenty-four countries had a relative strength in the applying cognitive domain, and 10 had a relative weakness. Seventeen countries had a relative strength in the reasoning cognitive domain, and 28 had a relative weakness. Hungary, Croatia, and Malta were the only countries with no relative strengths or weaknesses in the cognitive domains.

## Exhibit 1.17: Average Achievement in Mathematics Cognitive Domains

| Country | Overall Mathematics Average Scale Score | Knowing (59 Items) | | Applying (74 Items) | | Reasoning (38 Items) | |
|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score |
| [3] Singapore | 625 (3.9) | 640 (3.9) | 15 (1.7) ▲ | 626 (3.9) | 0 (1.2) | 614 (4.0) | -11 (1.5) ▽ |
| † Hong Kong SAR | 602 (3.3) | 600 (3.0) | -2 (1.8) | 606 (3.3) | 5 (2.0) ▲ | 596 (4.2) | -6 (3.1) |
| Korea, Rep. of | 600 (2.2) | 612 (3.6) | 13 (2.4) ▲ | 594 (2.5) | -5 (1.2) ▽ | 596 (2.9) | -3 (2.0) |
| Chinese Taipei | 599 (1.9) | 622 (1.9) | 22 (1.3) ▲ | 600 (1.5) | 1 (1.5) | 576 (1.8) | -23 (1.5) ▽ |
| Japan | 593 (1.8) | 597 (2.0) | 4 (0.9) ▲ | 593 (2.0) | 0 (1.5) | 589 (2.2) | -4 (1.5) ▽ |
| [2] Russian Federation | 567 (3.3) | 555 (3.0) | -12 (1.3) ▽ | 571 (3.6) | 4 (0.9) ▲ | 573 (3.6) | 6 (1.1) ▲ |
| † Northern Ireland | 566 (2.7) | 574 (3.3) | 9 (1.5) ▲ | 565 (2.8) | -1 (1.4) | 558 (2.9) | -7 (1.7) ▽ |
| [2] England | 556 (3.0) | 563 (3.3) | 7 (1.2) ▲ | 553 (3.3) | -3 (1.5) | 554 (3.4) | -2 (2.0) |
| Ireland | 548 (2.5) | 550 (3.0) | 2 (1.7) | 551 (2.7) | 3 (1.4) ▲ | 542 (2.5) | -7 (1.4) ▽ |
| [2] Latvia | 546 (2.6) | 537 (2.6) | -9 (1.0) ▽ | 547 (2.7) | 0 (0.8) | 554 (3.0) | 8 (1.3) ▲ |
| † Norway (5) | 543 (2.2) | 541 (2.3) | -2 (1.2) | 540 (2.3) | -3 (0.8) ▽ | 551 (2.9) | 8 (2.6) ▲ |
| [2] Lithuania | 542 (2.8) | 535 (2.8) | -7 (1.9) ▽ | 547 (2.7) | 5 (1.0) ▲ | 534 (3.3) | -9 (2.4) ▽ |
| Austria | 539 (2.0) | 540 (2.0) | 1 (1.4) | 538 (2.1) | -2 (0.7) ▽ | 537 (2.4) | -2 (1.6) |
| ≡ Netherlands | 538 (2.2) | 534 (2.1) | -3 (1.0) ▽ | 536 (2.2) | -2 (1.3) | 546 (2.9) | 8 (2.5) ▲ |
| [2] † United States | 535 (2.5) | 536 (2.6) | 2 (0.8) ▲ | 537 (2.6) | 3 (0.8) ▲ | 524 (2.5) | -11 (0.7) ▽ |
| Czech Republic | 533 (2.5) | 528 (3.0) | -5 (1.7) ▽ | 531 (2.6) | -1 (1.0) | 541 (2.8) | 8 (1.1) ▲ |
| † Belgium (Flemish) | 532 (1.9) | 546 (2.4) | 14 (1.1) ▲ | 526 (2.0) | -6 (0.9) ▽ | 530 (2.0) | -2 (0.8) ▽ |
| Cyprus | 532 (2.9) | 530 (3.3) | -2 (1.8) | 536 (3.0) | 4 (1.1) ▲ | 526 (2.9) | -6 (1.0) ▽ |
| Finland | 532 (2.3) | 531 (2.4) | -1 (1.1) | 531 (2.4) | -1 (0.9) | 535 (2.5) | 3 (0.9) ▲ |
| [2] Portugal | 525 (2.6) | 523 (2.8) | -2 (1.6) | 528 (2.6) | 3 (0.7) ▲ | 519 (2.9) | -6 (1.9) ▽ |
| † Denmark | 525 (1.9) | 524 (2.2) | -1 (1.7) | 520 (2.3) | -5 (1.8) ▽ | 535 (2.2) | 10 (1.6) ▲ |
| Hungary | 523 (2.6) | 525 (2.6) | 1 (1.5) | 521 (2.8) | -2 (1.5) | 522 (3.0) | -1 (1.2) |
| [2] Turkey (5) | 523 (4.4) | 514 (4.4) | -8 (1.3) ▽ | 531 (4.4) | 8 (0.9) ▲ | 509 (5.1) | -14 (2.2) ▽ |
| Sweden | 521 (2.8) | 515 (3.1) | -6 (1.7) ▽ | 518 (2.8) | -3 (1.1) ▽ | 536 (2.9) | 15 (1.4) ▲ |
| Germany | 521 (2.3) | 523 (2.3) | 2 (1.3) | 514 (2.5) | -7 (1.2) ▽ | 531 (2.8) | 10 (1.3) ▲ |
| Poland | 520 (2.7) | 509 (2.7) | -11 (1.1) ▽ | 521 (2.8) | 1 (1.0) | 527 (2.8) | 7 (1.0) ▲ |
| Australia | 516 (2.8) | 509 (3.3) | -7 (1.5) ▽ | 516 (2.9) | 0 (1.1) | 522 (3.0) | 6 (1.6) ▲ |
| Azerbaijan | 515 (2.7) | 513 (2.3) | -2 (1.1) ▽ | 519 (3.1) | 4 (1.1) ▲ | 506 (3.1) | -9 (1.2) ▽ |
| Bulgaria | 515 (4.3) | 511 (4.1) | -4 (1.0) ▽ | 518 (4.5) | 3 (1.0) ▲ | 509 (5.0) | -6 (1.4) ▽ |
| Italy | 515 (2.4) | 515 (3.0) | 0 (2.0) | 517 (2.6) | 2 (1.2) ▲ | 504 (2.9) | -11 (2.0) ▽ |
| [2] Kazakhstan | 512 (2.5) | 510 (2.3) | -2 (0.9) ▽ | 514 (2.7) | 2 (0.9) ▲ | 507 (2.7) | -5 (1.2) ▽ |
| [1 2] Canada | 512 (1.9) | 506 (2.1) | -5 (0.7) ▽ | 513 (1.9) | 1 (0.7) ▲ | 513 (2.0) | 2 (1.1) |
| [2] Slovak Republic | 510 (3.5) | 502 (3.3) | -8 (1.2) ▽ | 508 (3.4) | -2 (1.9) | 522 (3.5) | 12 (1.3) ▲ |
| Croatia | 509 (2.2) | 508 (2.2) | -2 (1.1) | 509 (2.3) | 0 (1.6) | 510 (2.8) | 0 (1.5) |
| Malta | 509 (1.4) | 510 (1.4) | 0 (1.5) | 508 (1.2) | -2 (1.4) | 508 (1.4) | -1 (1.6) |
| [2] Serbia | 508 (3.2) | 504 (3.3) | -4 (2.1) | 509 (3.5) | 1 (1.3) | 503 (3.7) | -5 (1.6) ▽ |
| Spain | 502 (2.1) | 499 (2.4) | -3 (0.8) ▽ | 506 (1.9) | 3 (1.4) ▲ | 497 (2.0) | -6 (1.5) ▽ |
| Armenia | 498 (2.5) | 497 (2.7) | -1 (1.4) | 501 (2.9) | 3 (1.2) ▲ | 483 (2.9) | -15 (1.7) ▽ |
| Albania | 494 (3.4) | 492 (3.7) | -2 (1.9) | 498 (3.3) | 4 (1.0) ▲ | 490 (3.7) | -4 (2.0) ▽ |
| [2] New Zealand | 487 (2.6) | 476 (2.7) | -11 (1.7) ▽ | 487 (2.4) | 0 (1.0) | 501 (2.7) | 14 (1.7) ▲ |
| France | 485 (3.0) | 488 (3.3) | 3 (1.6) | 482 (3.1) | -3 (0.9) ▽ | 480 (3.3) | -5 (1.6) ▽ |
| [1] Georgia | 482 (3.7) | 473 (3.9) | -8 (2.1) ▽ | 490 (3.6) | 8 (1.2) ▲ | 469 (4.5) | -13 (2.2) ▽ |
| United Arab Emirates | 481 (1.7) | 479 (1.6) | -2 (0.7) ▽ | 484 (1.7) | 3 (0.5) ▲ | 474 (1.7) | -7 (0.7) ▽ |
| Bahrain | 480 (2.6) | 478 (2.7) | -2 (0.9) ▽ | 479 (2.6) | 0 (1.0) | 479 (2.5) | -1 (1.4) |
| North Macedonia | 472 (5.3) | 470 (5.6) | -2 (2.1) | 477 (5.2) | 5 (1.9) ▲ | 470 (5.7) | -2 (3.6) |
| Montenegro | 453 (2.0) | 445 (2.1) | -8 (1.1) ▽ | 454 (2.1) | 1 (1.1) | 463 (2.7) | 10 (1.9) ▲ |
| Bosnia and Herzegovina | 452 (2.4) | 444 (2.7) | -8 (1.7) ▽ | 452 (2.9) | 0 (1.9) | 461 (3.0) | 10 (1.9) ▲ |
| Qatar | 449 (3.4) | 447 (3.6) | -2 (1.2) | 453 (3.4) | 4 (1.2) ▲ | 440 (3.5) | -10 (1.5) ▽ |
| [2] Kosovo | 444 (3.0) | 445 (3.2) | 0 (1.0) | 445 (3.0) | 1 (1.3) | 441 (3.2) | -3 (1.5) ▽ |
| Iran, Islamic Rep. of | 443 (3.9) | 436 (3.9) | -7 (1.1) ▽ | 450 (4.0) | 7 (1.0) ▲ | 426 (4.3) | -17 (2.0) ▽ |
| Chile | 441 (2.7) | 427 (2.6) | -14 (1.0) ▽ | 446 (3.0) | 5 (1.9) ▲ | 448 (4.0) | 7 (2.6) ▲ |
| Oman | 431 (3.7) | 424 (4.4) | -7 (1.7) ▽ | 434 (3.5) | 3 (1.1) ▲ | 424 (3.7) | -6 (1.0) ▽ |
| [2] Saudi Arabia | 398 (3.6) | - - | - - | - - | - - | - - | - - |
| Morocco | 383 (4.3) | 379 (4.4) | -4 (1.0) ▽ | 387 (4.5) | 4 (1.5) ▲ | 380 (5.2) | -4 (2.1) |
| Kuwait | 383 (4.7) | - - | - - | - - | - - | - - | - - |
| South Africa (5) | 374 (3.6) | 372 (3.7) | -1 (0.8) | 375 (3.6) | 2 (1.0) | 370 (3.8) | -3 (1.0) ▽ |
| [2 Ψ] Pakistan | 328 (12.0) | 327 (12.6) | -1 (2.4) | 306 (13.1) | -21 (2.6) ▽ | 354 (9.3) | 27 (3.9) ▲ |
| [2 Ψ] Philippines | 297 (6.4) | 302 (6.3) | 5 (1.5) ▲ | 286 (6.9) | -10 (1.7) ▽ | 272 (6.6) | -25 (2.9) ▽ |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 577 (2.1) | -16 (1.2) ▽ | 599 (2.5) | 6 (1.4) ▲ | 602 (2.8) | 9 (1.3) ▲ |
| [2] Dubai, UAE | 544 (1.6) | 542 (1.8) | -2 (1.2) | 547 (1.6) | 3 (0.7) ▲ | 538 (1.8) | -6 (0.8) ▽ |
| Quebec, Canada | 532 (2.3) | 535 (2.7) | 3 (1.3) ▲ | 533 (2.3) | 1 (1.2) | 524 (2.8) | -8 (2.2) ▽ |
| Madrid, Spain | 518 (2.2) | 515 (4.0) | -4 (3.3) | 520 (2.4) | 2 (1.2) | 514 (2.7) | -4 (2.1) |
| [2] Ontario, Canada | 512 (3.3) | 504 (3.7) | -8 (1.6) ▽ | 514 (3.4) | 2 (1.1) | 516 (3.5) | 4 (1.8) ▲ |
| Abu Dhabi, UAE | 441 (2.2) | 439 (2.0) | -1 (1.2) | 442 (2.0) | 1 (0.9) | 435 (2.4) | -6 (0.8) ▽ |

▲ Subscale score significantly higher than overall mathematics score
▽ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2019 fourth grade mathematics eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Trends in Average Achievement in Cognitive Domains

Exhibit 1.18 presents differences in average achievement for the three cognitive domains across four assessment cycles back to 2007, when TIMSS first began providing scaled results in the cognitive domains. Forty-three countries participated in both the TIMSS 2015 and TIMSS 2019 assessments and have comparable cognitive domain scores for the two assessment cycles. The recent trends in the knowing cognitive domain showed increases in 7 countries and decreases in 9 countries. In the applying domain, 12 countries showed increases and 10 decreases. In the reasoning domain, 6 showed increases and 8 decreases.

Between 2007 and 2019 there were more differences in average achievement in the cognitive domains than there were in short-term—almost all of them positive. In the knowing and applying domains, 14 countries had higher average achievement in 2019 than 2007 and 13 had higher average achievement in the reasoning domain. Two countries had lower average achievement in the knowing domain, only 1 country had lower average achievement in the applying domain, and none had lower average achievement in the reasoning domain.

## Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Armenia** | | | | | | | | | | | | |
| 2019 | 497 (2.7) | 3 | 36 ▲ | | 501 (2.9) | 26 ▲ | 55 ▲ | | 483 (2.9) | 25 ▲ | 41 ▲ | |
| 2015 | 494 (3.5) | | 33 ▲ | | 475 (3.8) | | 29 ▲ | | 458 (4.4) | | 16 ▲ | |
| 2011 | 461 (4.0) | | | | 446 (4.0) | | | | 442 (3.7) | | | |
| **Australia** | | | | | | | | | | | | |
| 2019 | 509 (3.3) | 0 | -7 | -2 | 516 (2.9) | -5 | -3 | -6 | 522 (3.0) | -1 | 9 ▲ | 6 |
| 2015 | 509 (3.5) | | -7 | -2 | 521 (3.0) | | 2 | -1 | 523 (3.0) | | 10 ▲ | 7 |
| 2011 | 516 (3.4) | | | 5 | 519 (3.0) | | | -3 | 513 (2.7) | | | -3 |
| 2007 | 511 (4.1) | | | | 522 (3.6) | | | | 516 (3.7) | | | |
| **Austria** | | | | | | | | | | | | |
| 2019 | 540 (2.0) | | 33 ▲ | 36 ▲ | 538 (2.1) | | 32 ▲ | 32 ▲ | 537 (2.4) | | 24 ▲ | 31 ▲ |
| 2011 | 507 (2.7) | | | 4 | 506 (2.8) | | | 0 | 513 (3.3) | | | 7 |
| 2007 | 504 (2.2) | | | | 505 (2.0) | | | | 506 (2.4) | | | |
| **Azerbaijan** | | | | | | | | | | | | |
| 2019 | 513 (2.3) | | 40 ▲ | | 519 (3.1) | | 62 ▲ | | 506 (3.1) | | 62 ▲ | |
| [2] 2011 | 473 (6.5) | | | | 457 (6.1) | | | | 445 (6.2) | | | |
| **Bahrain** | | | | | | | | | | | | |
| 2019 | 478 (2.7) | 25 ▲ | 39 ▲ | | 479 (2.6) | 29 ▲ | 48 ▲ | | 479 (2.5) | 32 ▲ | 40 ▲ | |
| [2] 2015 | 453 (1.8) | | 15 ▲ | | 450 (1.6) | | 19 ▲ | | 447 (2.0) | | 8 ▲ | |
| 2011 | 438 (3.8) | | | | 431 (3.3) | | | | 439 (3.2) | | | |
| **Belgium (Flemish)** | | | | | | | | | | | | |
| † 2019 | 546 (2.4) | -8 ▽ | -18 ▽ | | 526 (2.0) | -18 ▽ | -19 ▽ | | 530 (2.0) | -6 | -1 | |
| † 2015 | 554 (2.3) | | -10 ▽ | | 544 (2.2) | | -2 | | 536 (2.7) | | 4 | |
| 2011 | 564 (2.0) | | | | 546 (2.2) | | | | 532 (2.7) | | | |
| **Bulgaria** | | | | | | | | | | | | |
| 2019 | 511 (4.1) | -16 ▽ | | | 518 (4.5) | -4 | | | 509 (5.0) | -11 | | |
| 2015 | 527 (5.1) | | | | 523 (5.6) | | | | 521 (5.8) | | | |
| **Canada** | | | | | | | | | | | | |
| [1 2] 2019 | 506 (2.1) | 1 | | | 513 (1.9) | 3 | | | 513 (2.0) | -8 ▽ | | |
| [1 2] † 2015 | 505 (2.4) | | | | 510 (2.3) | | | | 521 (2.4) | | | |
| **Chile** | | | | | | | | | | | | |
| 2019 | 427 (2.6) | -21 ▽ | -28 ▽ | | 446 (3.0) | -17 ▽ | -17 ▽ | | 448 (4.0) | -18 ▽ | -21 ▽ | |
| 2015 | 449 (2.8) | | -7 | | 462 (2.4) | | 0 | | 466 (2.3) | | -3 | |
| 2011 | 455 (2.4) | | | | 463 (2.4) | | | | 469 (2.5) | | | |
| **Chinese Taipei** | | | | | | | | | | | | |
| 2019 | 622 (1.9) | 1 | 23 ▲ | 36 ▲ | 600 (1.5) | 7 ▲ | 7 ▲ | 26 ▲ | 576 (1.8) | 1 | -1 | 5 |
| 2015 | 620 (2.3) | | 21 ▲ | 35 ▲ | 593 (2.1) | | 0 | 19 ▲ | 576 (3.1) | | -2 | 5 |
| 2011 | 599 (2.0) | | | 13 ▲ | 593 (2.1) | | | 19 ▲ | 577 (2.5) | | | 6 |
| 2007 | 586 (1.9) | | | | 574 (1.9) | | | | 571 (2.0) | | | |
| **Croatia** | | | | | | | | | | | | |
| 2019 | 508 (2.2) | 5 | 13 ▲ | | 509 (2.3) | 11 ▲ | 26 ▲ | | 510 (2.8) | 2 | 17 ▲ | |
| 2015 | 502 (1.9) | | 8 ▲ | | 499 (1.9) | | 15 ▲ | | 507 (2.1) | | 15 ▲ | |
| [2] 2011 | 495 (1.9) | | | | 484 (2.0) | | | | 492 (2.9) | | | |
| **Cyprus** | | | | | | | | | | | | |
| 2019 | 530 (3.3) | 11 ▲ | | | 536 (3.0) | 8 | | | 526 (2.9) | 8 | | |
| 2015 | 519 (2.8) | | | | 529 (2.8) | | | | 519 (3.1) | | | |
| **Czech Republic** | | | | | | | | | | | | |
| 2019 | 528 (3.0) | 9 ▲ | 26 ▲ | 57 ▲ | 531 (2.6) | 3 | 20 ▲ | 38 ▲ | 541 (2.8) | -2 | 19 ▲ | 50 ▲ |
| 2015 | 519 (2.5) | | 17 ▲ | 48 ▲ | 528 (2.4) | | 16 ▲ | 35 ▲ | 544 (3.0) | | 21 ▲ | 52 ▲ |
| 2011 | 502 (2.4) | | | 30 ▲ | 512 (2.8) | | | 19 ▲ | 523 (2.5) | | | 31 ▲ |
| 2007 | 472 (2.5) | | | | 493 (2.9) | | | | 491 (3.6) | | | |
| **Denmark** | | | | | | | | | | | | |
| † 2019 | 524 (2.2) | -12 ▽ | -8 ▽ | 10 ▲ | 520 (2.3) | -18 ▽ | -19 ▽ | -7 | 535 (2.2) | -13 ▽ | -8 ▽ | 10 ▲ |
| [2] † 2015 | 536 (3.3) | | 5 | 22 ▲ | 538 (2.8) | | -1 | 11 ▲ | 548 (3.2) | | 5 | 22 ▲ |
| [2] 2011 | 531 (2.7) | | | 18 ▲ | 539 (2.9) | | | 12 ▲ | 543 (2.7) | | | 17 ▲ |
| † 2007 | 514 (2.7) | | | | 527 (2.8) | | | | 525 (2.5) | | | |
| **England** | | | | | | | | | | | | |
| [2] 2019 | 563 (3.3) | 9 | 11 ▲ | 17 ▲ | 553 (3.3) | 9 | 11 ▲ | 11 ▲ | 554 (3.4) | 14 ▲ | 23 ▲ | 15 ▲ |
| 2015 | 554 (3.3) | | 2 | 8 | 544 (3.2) | | 2 | 3 | 540 (3.2) | | 9 | 1 |
| 2011 | 552 (4.3) | | | 6 | 542 (3.7) | | | 0 | 531 (3.8) | | | -8 |
| 2007 | 546 (3.6) | | | | 542 (3.3) | | | | 539 (3.4) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in cognitive domains using current methodology began with TIMSS 2007.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Finland** | | | | | | | | | | | | |
| 2019 | 531 (2.4) | 1 | -17 ▽ | | 531 (2.4) | -5 | -13 ▽ | | 535 (2.5) | -5 | -10 ▽ | |
| 2015 | 530 (2.2) | | -18 ▽ | | 536 (2.1) | | -8 ▽ | | 540 (3.1) | | -5 | |
| 2011 | 548 (2.6) | | | | 544 (2.6) | | | | 546 (2.3) | | | |
| **France** | | | | | | | | | | | | |
| 2019 | 488 (3.3) | 3 | | | 482 (3.1) | -7 | | | 480 (3.3) | -11 ▽ | | |
| 2015 | 484 (2.8) | | | | 488 (3.1) | | | | 491 (3.4) | | | |
| **Georgia** | | | | | | | | | | | | |
| 1 2019 | 473 (3.9) | 8 | 24 ▲ | 28 ▲ | 490 (3.6) | 29 ▲ | 42 ▲ | 59 ▲ | 469 (4.5) | 17 ▲ | 19 ▲ | 36 ▲ |
| 1 2015 | 466 (4.0) | | 16 ▲ | 21 ▲ | 461 (4.1) | | 14 ▲ | 31 ▲ | 452 (4.4) | | 1 | 19 ▲ |
| 1 2011 | 449 (3.7) | | | 4 | 447 (3.4) | | | 17 ▲ | 450 (3.3) | | | 18 ▲ |
| 1 2007 | 445 (4.4) | | | | 430 (4.7) | | | | 433 (4.7) | | | |
| **Germany** | | | | | | | | | | | | |
| 2019 | 523 (2.3) | 0 | 0 | 9 ▲ | 514 (2.5) | -1 | -14 ▽ | -16 ▽ | 531 (2.8) | -4 | -1 | 2 |
| 2015 | 524 (2.3) | | 0 | 9 ▲ | 515 (2.2) | | -13 ▽ | -15 ▽ | 535 (2.4) | | 3 | 5 |
| 2011 | 524 (2.4) | | | 9 ▲ | 528 (2.3) | | | -2 | 532 (3.0) | | | 2 |
| 2007 | 515 (2.1) | | | | 530 (2.3) | | | | 530 (2.9) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | |
| † 2019 | 600 (3.0) | -18 ▽ | -19 ▽ | -22 ▽ | 606 (3.3) | -14 ▽ | 9 | 0 | 596 (4.2) | -4 | 7 | 0 |
| † 2015 | 618 (3.1) | | -1 | -4 | 621 (3.1) | | 23 ▲ | 14 ▲ | 600 (3.2) | | 11 ▲ | 4 |
| 2 2011 | 619 (3.4) | | | -3 | 597 (3.4) | | | -9 | 589 (3.3) | | | -7 |
| 2007 | 622 (3.8) | | | | 606 (3.8) | | | | 596 (3.8) | | | |
| **Hungary** | | | | | | | | | | | | |
| 2019 | 525 (2.6) | -8 | 5 | 14 ▲ | 521 (2.8) | -5 | 8 | 15 ▲ | 522 (3.0) | -7 | 8 | 12 ▲ |
| 2015 | 532 (3.1) | | 13 ▲ | 21 ▲ | 526 (3.3) | | 13 ▲ | 20 ▲ | 529 (3.6) | | 15 ▲ | 20 ▲ |
| 2011 | 519 (3.8) | | | 8 | 513 (3.3) | | | 7 | 514 (3.7) | | | 5 |
| 2007 | 511 (3.8) | | | | 506 (3.8) | | | | 510 (4.3) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | |
| 2019 | 436 (3.9) | 7 | 1 | 32 ▲ | 450 (4.0) | 15 ▲ | 22 ▲ | 52 ▲ | 426 (4.3) | 0 | 4 | 26 ▲ |
| 2015 | 429 (3.2) | | -6 | 25 ▲ | 435 (2.9) | | 7 | 38 ▲ | 426 (3.3) | | 4 | 26 ▲ |
| 2011 | 435 (4.0) | | | 31 ▲ | 427 (3.7) | | | 30 ▲ | 423 (3.2) | | | 22 ▲ |
| 2007 | 404 (3.9) | | | | 397 (4.0) | | | | 401 (4.3) | | | |
| **Ireland** | | | | | | | | | | | | |
| 2019 | 550 (3.0) | -4 | 11 ▲ | | 551 (2.7) | 3 | 23 ▲ | | 542 (2.5) | 7 | 32 ▲ | |
| 2015 | 554 (2.9) | | 15 ▲ | | 549 (2.2) | | 20 ▲ | | 535 (2.7) | | 26 ▲ | |
| 2011 | 539 (3.1) | | | | 529 (2.7) | | | | 510 (3.1) | | | |
| **Italy** | | | | | | | | | | | | |
| 2019 | 515 (3.0) | 4 | 5 | 3 | 517 (2.6) | 13 ▲ | 11 ▲ | 18 ▲ | 504 (2.9) | 1 | -1 | -7 |
| 2 2015 | 511 (2.9) | | 1 | -1 | 504 (2.5) | | -2 | 5 | 503 (3.3) | | -3 | -8 |
| 2011 | 510 (2.8) | | | -3 | 506 (2.8) | | | 7 | 505 (3.2) | | | -5 |
| 2007 | 512 (3.5) | | | | 499 (3.1) | | | | 511 (3.4) | | | |
| **Japan** | | | | | | | | | | | | |
| 2019 | 597 (2.0) | -4 | 7 ▲ | 31 ▲ | 593 (2.0) | 4 | 14 ▲ | 23 ▲ | 589 (2.2) | -6 | -3 | 19 ▲ |
| 2015 | 601 (2.4) | | 11 ▲ | 35 ▲ | 589 (2.1) | | 10 ▲ | 19 ▲ | 595 (2.7) | | 3 | 26 ▲ |
| 2011 | 590 (1.7) | | | 24 ▲ | 579 (1.6) | | | 9 ▲ | 592 (1.9) | | | 22 ▲ |
| 2007 | 567 (2.4) | | | | 570 (2.2) | | | | 569 (2.3) | | | |
| **Kazakhstan** | | | | | | | | | | | | |
| 2 2019 | 510 (2.3) | | 7 | | 514 (2.7) | | 15 ▲ | | 507 (2.7) | | 6 | |
| 2 2011 | 503 (4.7) | | | | 499 (5.0) | | | | 501 (4.7) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | |
| 2019 | 612 (3.6) | -15 ▽ | -2 | | 594 (2.5) | -1 | -6 | | 596 (2.9) | -22 ▽ | -6 | |
| 2015 | 627 (2.9) | | 13 ▲ | | 595 (2.1) | | -5 | | 619 (2.5) | | 16 ▲ | |
| 2011 | 614 (2.0) | | | | 600 (2.2) | | | | 603 (2.3) | | | |
| **Lithuania** | | | | | | | | | | | | |
| 2 2019 | 535 (2.8) | 3 | 10 ▲ | 16 ▲ | 547 (2.7) | 10 ▲ | 7 | 7 | 534 (3.3) | -1 | -3 | 5 |
| 2 2015 | 532 (2.5) | | 7 | 13 ▲ | 537 (2.7) | | -4 | -4 | 534 (2.8) | | -2 | 6 |
| 1 2 2011 | 525 (2.9) | | | 5 | 540 (2.4) | | | 0 | 536 (2.5) | | | 8 ▲ |
| 1 2007 | 520 (2.8) | | | | 540 (2.7) | | | | 529 (2.8) | | | |
| **Malta** | | | | | | | | | | | | |
| 2019 | 510 (1.4) | | 6 ▲ | | 508 (1.2) | | 10 ▲ | | 508 (1.4) | | 33 ▲ | |
| 2011 | 504 (1.5) | | | | 497 (1.9) | | | | 475 (1.7) | | | |
| **Morocco** | | | | | | | | | | | | |
| 2019 | 379 (4.4) | 3 | 59 ▲ | | 387 (4.5) | 12 ▲ | 55 ▲ | | 380 (5.2) | 1 | 33 ▲ | |
| 2015 | 377 (3.7) | | 57 ▲ | | 375 (3.6) | | 43 ▲ | | 379 (3.6) | | 32 ▲ | |
| ✕ 2011 | 320 (4.3) | | | | 332 (3.9) | | | | 347 (4.2) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

✕ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Netherlands** | | | | | | | | | | | | |
| ≡ 2019 | 534 (2.1) | 14 ▲ | -3 | 6 | 536 (2.2) | 5 | -4 | -4 | 546 (2.9) | 3 | 2 | 9 ▲ |
| † 2015 | 521 (1.8) | | -17 ▽ | -8 ▽ | 531 (1.7) | | -10 ▽ | -10 ▽ | 543 (2.6) | | 0 | 6 |
| † 2011 | 537 (2.0) | | | 9 ▲ | 540 (1.7) | | | 0 | 543 (2.7) | | | 7 |
| ‡ 2007 | 528 (2.3) | | | | 540 (2.2) | | | | 537 (2.5) | | | |
| **New Zealand** | | | | | | | | | | | | |
| 2 2019 | 476 (2.7) | 1 | 0 | -8 ▽ | 487 (2.4) | -10 ▽ | -2 | -5 | 501 (2.7) | -2 | 11 ▲ | 0 |
| 2015 | 475 (2.6) | | -1 | -8 ▽ | 497 (2.5) | | 7 ▲ | 4 | 504 (2.7) | | 13 ▲ | 2 |
| 2011 | 476 (3.2) | | | -7 | 490 (2.4) | | | -3 | 490 (2.5) | | | -12 ▽ |
| 2007 | 484 (2.7) | | | | 493 (2.5) | | | | 502 (2.7) | | | |
| **Northern Ireland** | | | | | | | | | | | | |
| † 2019 | 574 (3.3) | -7 | -5 | | 565 (2.8) | -11 ▽ | 0 | | 558 (2.9) | 9 ▲ | 20 ▲ | |
| ‡ 2015 | 582 (3.9) | | 2 | | 575 (3.2) | | 11 ▲ | | 550 (3.3) | | 12 ▲ | |
| † 2011 | 580 (3.4) | | | | 565 (2.9) | | | | 538 (3.4) | | | |
| **Norway (5)** | | | | | | | | | | | | |
| † 2019 | 541 (2.3) | -4 | | | 540 (2.3) | -10 ▽ | | | 551 (2.9) | -5 | | |
| 2015 | 544 (3.1) | | | | 550 (2.6) | | | | 556 (2.9) | | | |
| **Oman** | | | | | | | | | | | | |
| 2019 | 424 (4.4) | 2 | 44 ▲ | | 434 (3.5) | 6 | 52 ▲ | | 424 (3.7) | 5 | 34 ▲ | |
| 2015 | 422 (2.7) | | 43 ▲ | | 428 (2.4) | | 46 ▲ | | 420 (2.4) | | 29 ▲ | |
| Ψ 2011 | 380 (3.2) | | | | 382 (2.9) | | | | 391 (2.7) | | | |
| **Poland** | | | | | | | | | | | | |
| 2019 | 509 (2.7) | -8 ▽ | | | 521 (2.8) | -20 ▽ | | | 527 (2.8) | -19 ▽ | | |
| 2015 | 517 (2.4) | | | | 541 (2.1) | | | | 546 (2.3) | | | |
| **Portugal** | | | | | | | | | | | | |
| 2 2019 | 523 (2.8) | -24 ▽ | -8 | | 528 (2.6) | -12 ▽ | -6 | | 519 (2.9) | -12 ▽ | -11 ▽ | |
| 2 2015 | 548 (2.6) | | 17 ▲ | | 540 (2.4) | | 6 | | 532 (2.3) | | 1 | |
| 2011 | 531 (3.3) | | | | 534 (3.7) | | | | 531 (3.7) | | | |
| **Qatar** | | | | | | | | | | | | |
| 2019 | 447 (3.6) | 3 | 36 ▲ | | 453 (3.4) | 19 ▲ | 42 ▲ | | 440 (3.5) | 9 | 24 ▲ | |
| 2015 | 444 (3.4) | | 33 ▲ | | 434 (3.5) | | 23 ▲ | | 431 (4.4) | | 15 ▲ | |
| 2 2011 | 411 (3.7) | | | | 411 (3.4) | | | | 416 (4.4) | | | |
| **Russian Federation** | | | | | | | | | | | | |
| 2 2019 | 555 (3.0) | -2 | 14 ▲ | 16 ▲ | 571 (3.6) | 4 | 31 ▲ | 22 ▲ | 573 (3.6) | 3 | 25 ▲ | 29 ▲ |
| 2015 | 556 (3.4) | | 16 ▲ | 18 ▲ | 566 (3.7) | | 27 ▲ | 18 ▲ | 570 (4.0) | | 22 ▲ | 26 ▲ |
| 2011 | 541 (3.4) | | | 2 | 539 (3.9) | | | -9 | 548 (3.4) | | | 4 |
| 2007 | 539 (5.0) | | | | 549 (5.2) | | | | 544 (5.1) | | | |
| **Serbia** | | | | | | | | | | | | |
| 2 2019 | 504 (3.3) | -9 | -16 ▽ | | 509 (3.5) | -12 ▽ | -2 | | 503 (3.7) | -14 ▽ | -11 ▽ | |
| 3 2015 | 513 (3.5) | | -7 | | 521 (3.4) | | 10 ▲ | | 517 (3.8) | | 2 | |
| 2 2011 | 520 (3.0) | | | | 511 (3.2) | | | | 514 (3.9) | | | |
| **Singapore** | | | | | | | | | | | | |
| 3 2019 | 640 (3.9) | 10 | 11 ▲ | 15 ▲ | 626 (3.9) | 6 | 24 ▲ | 29 ▲ | 614 (4.0) | 11 | 26 ▲ | 30 ▲ |
| 2 2015 | 631 (4.0) | | 2 | 5 | 619 (4.0) | | 17 ▲ | 23 ▲ | 603 (4.5) | | 15 ▲ | 19 ▲ |
| 2 2011 | 629 (3.6) | | | 4 | 602 (3.4) | | | 5 | 588 (3.7) | | | 4 |
| 2007 | 625 (4.2) | | | | 597 (4.1) | | | | 584 (4.0) | | | |
| **Slovak Republic** | | | | | | | | | | | | |
| 2 2019 | 502 (3.3) | 11 ▲ | -5 | 10 | 508 (3.4) | 11 ▲ | 3 | 12 ▲ | 522 (3.5) | 6 | 11 ▲ | 23 ▲ |
| 2015 | 491 (2.4) | | -16 ▽ | -1 | 497 (2.5) | | -9 | 1 | 515 (2.9) | | 5 | 17 ▲ |
| 2011 | 506 (3.7) | | | 15 ▲ | 505 (3.9) | | | 9 | 511 (3.8) | | | 12 ▲ |
| 2007 | 491 (4.4) | | | | 496 (4.4) | | | | 499 (4.8) | | | |
| **South Africa (5)** | | | | | | | | | | | | |
| 2019 | 372 (3.7) | -5 | | | 375 (3.6) | -1 | | | 370 (3.8) | 1 | | |
| 2015 | 378 (3.6) | | | | 377 (3.4) | | | | 369 (3.5) | | | |
| **Spain** | | | | | | | | | | | | |
| 2019 | 499 (2.4) | -6 | 17 ▲ | | 506 (1.9) | 1 | 22 ▲ | | 497 (2.0) | -5 | 14 ▲ | |
| 2 2015 | 505 (2.4) | | 23 ▲ | | 505 (2.4) | | 22 ▲ | | 502 (2.5) | | 19 ▲ | |
| 2011 | 482 (3.4) | | | | 483 (3.1) | | | | 483 (2.9) | | | |
| **Sweden** | | | | | | | | | | | | |
| 2019 | 515 (3.1) | 15 ▲ | 26 ▲ | 32 ▲ | 518 (2.8) | -3 | 10 ▲ | 12 ▲ | 536 (2.9) | -6 | 16 ▲ | 16 ▲ |
| 2 2015 | 501 (3.4) | | 12 ▲ | 18 ▲ | 521 (2.7) | | 14 ▲ | 16 ▲ | 542 (3.3) | | 22 ▲ | 22 ▲ |
| 2011 | 489 (2.2) | | | 6 | 507 (2.2) | | | 2 | 520 (2.9) | | | 0 |
| 2007 | 483 (2.6) | | | | 506 (2.4) | | | | 519 (2.8) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **United Arab Emirates** | | | | | | | | | | | | |
| 2019 | 479 (1.6) | 26 ▲ | 42 ▲ | | 484 (1.7) | 32 ▲ | 54 ▲ | | 474 (1.7) | 29 ▲ | 41 ▲ | |
| 2015 | 453 (2.7) | | 16 ▲ | | 452 (2.5) | | 22 ▲ | | 445 (2.4) | | 11 ▲ | |
| 2011 | 437 (2.2) | | | | 430 (2.0) | | | | 434 (2.3) | | | |
| **United States** | | | | | | | | | | | | |
| 2† 2019 | 536 (2.6) | -11 ▽ | -19 ▽ | -5 | 537 (2.6) | 0 | -1 | 13 ▲ | 524 (2.5) | -7 | -2 | -1 |
| 2† 2015 | 547 (2.3) | | -8 ▽ | 6 | 537 (2.4) | | -2 | 13 ▲ | 531 (2.5) | | 5 | 6 |
| 2 2011 | 556 (2.1) | | | 14 ▲ | 539 (2.1) | | | 15 ▲ | 525 (2.1) | | | 1 |
| 2† 2007 | 541 (2.8) | | | | 524 (2.8) | | | | 525 (2.4) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | |
| 2 2019 | 504 (3.7) | -1 | -6 | 6 | 514 (3.4) | 1 | -7 | 0 | 516 (3.5) | -9 ▽ | -6 | -11 ▽ |
| 2015 | 505 (2.5) | | -5 | 7 | 513 (2.3) | | -8 | 0 | 524 (2.6) | | 3 | -2 |
| 2011 | 510 (3.4) | | | 11 ▲ | 521 (3.4) | | | 8 | 522 (3.1) | | | -5 |
| 2 2007 | 498 (3.5) | | | | 513 (3.3) | | | | 526 (3.1) | | | |
| **Quebec, Canada** | | | | | | | | | | | | |
| 2019 | 535 (2.7) | -7 | -1 | 16 ▲ | 533 (2.3) | 1 | 4 | 17 ▲ | 524 (2.8) | -13 ▽ | -10 ▽ | 1 |
| ≡ 2015 | 542 (4.3) | | 6 | 23 ▲ | 533 (4.1) | | 3 | 17 ▲ | 536 (4.9) | | 2 | 14 ▲ |
| 2011 | 536 (2.4) | | | 18 ▲ | 529 (2.4) | | | 13 ▲ | 534 (2.5) | | | 12 ▲ |
| 2 2007 | 519 (3.3) | | | | 516 (3.1) | | | | 523 (3.2) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | |
| 2019 | 439 (2.0) | 21 ▲ | 21 ▲ | | 442 (2.0) | 20 ▲ | 29 ▲ | | 435 (2.4) | 21 ▲ | 16 ▲ | |
| 2 Ψ 2015 | 418 (5.1) | | 0 | | 422 (4.8) | | 9 | | 414 (4.4) | | -5 | |
| 2011 | 418 (4.9) | | | | 413 (4.7) | | | | 418 (4.5) | | | |
| **Dubai, UAE** | | | | | | | | | | | | |
| 2 2019 | 542 (1.8) | 29 ▲ | 71 ▲ | 88 ▲ | 547 (1.6) | 37 ▲ | 82 ▲ | 111 ▲ | 538 (1.8) | 31 ▲ | 74 ▲ | 97 ▲ |
| 2015 | 514 (2.0) | | 42 ▲ | 60 ▲ | 510 (1.8) | | 45 ▲ | 74 ▲ | 507 (1.7) | | 44 ▲ | 66 ▲ |
| 2011 | 472 (2.4) | | | 18 ▲ | 465 (2.3) | | | 29 ▲ | 464 (2.2) | | | 23 ▲ |
| ‡ 2007 | 454 (2.5) | | | | 436 (2.2) | | | | 441 (3.0) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Cognitive Domains by Gender

Exhibit 1.19 shows the differences between girls' and boys' average achievement in the cognitive domains of knowing, applying, and reasoning. Reflecting the higher average achievement overall for boys in 27 of the 56 TIMSS 2019 countries for which cognitive domain scores were estimated, boys also had higher average achievement than girls in many countries in the cognitive domains—31 countries in the knowing domain, 15 in the applying domain, and 28 in the reasoning domain. Girls had higher average achievement than boys in all three domains in the same 3 countries—Oman, the Philippines and South Africa (fifth grade).

## Exhibit 1.19: Average Achievement in Mathematics Cognitive Domains by Gender

| Country | Knowing (59 Items) | | Applying (74 Items) | | Reasoning (38 Items) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Albania | 491 (4.2) | 493 (4.3) | 497 (3.6) | 498 (3.8) | 487 (3.9) | 493 (4.6) |
| Armenia | 497 (3.1) | 497 (3.1) | 504 (3.0) | 499 (3.6) | 483 (3.8) | 483 (3.4) |
| Australia | 499 (3.4) | 519 (4.0) ▲ | 513 (2.9) | 519 (3.5) | 517 (3.2) | 528 (3.8) ▲ |
| Austria | 534 (2.7) | 546 (2.3) ▲ | 536 (2.9) | 540 (2.2) | 531 (2.9) | 543 (3.2) ▲ |
| Azerbaijan | 513 (2.9) | 513 (3.0) | 523 (3.8) | 516 (3.6) | 507 (3.4) | 505 (3.7) |
| Bahrain | 481 (3.3) | 474 (3.6) | 482 (3.3) | 477 (3.6) | 482 (3.7) | 476 (3.3) |
| † Belgium (Flemish) | 539 (2.7) | 554 (2.9) ▲ | 523 (2.2) | 530 (2.6) ▲ | 524 (2.2) | 537 (2.6) ▲ |
| Bosnia and Herzegovina | 441 (2.8) | 447 (3.5) | 447 (3.2) | 457 (3.1) ▲ | 457 (3.9) | 466 (3.2) ▲ |
| Bulgaria | 509 (4.8) | 513 (4.2) | 518 (5.2) | 519 (4.6) | 505 (5.7) | 514 (5.3) |
| 1 2 Canada | 495 (2.8) | 517 (2.3) ▲ | 505 (2.6) | 520 (2.0) ▲ | 503 (3.0) | 523 (2.1) ▲ |
| Chile | 420 (3.2) | 434 (3.3) ▲ | 444 (3.6) | 447 (3.3) | 442 (5.0) | 453 (4.3) ▲ |
| Chinese Taipei | 619 (2.1) | 624 (2.6) | 599 (1.9) | 601 (2.0) | 570 (2.4) | 581 (2.9) ▲ |
| Croatia | 501 (3.1) | 514 (2.5) ▲ | 504 (2.8) | 514 (2.9) ▲ | 503 (3.6) | 516 (3.9) ▲ |
| Cyprus | 518 (3.8) | 542 (4.2) ▲ | 530 (3.4) | 544 (3.9) ▲ | 515 (3.0) | 539 (3.8) ▲ |
| Czech Republic | 520 (3.0) | 536 (3.9) ▲ | 528 (2.8) | 535 (3.2) ▲ | 535 (3.0) | 548 (3.6) ▲ |
| † Denmark | 517 (3.0) | 531 (2.8) ▲ | 518 (2.9) | 522 (2.8) | 532 (2.5) | 538 (3.0) |
| 2 England | 555 (4.4) | 570 (3.6) ▲ | 552 (4.1) | 555 (3.4) | 550 (5.0) | 558 (3.3) |
| Finland | 528 (3.1) | 534 (3.0) | 532 (3.1) | 530 (2.8) | 533 (3.1) | 538 (3.2) |
| France | 477 (3.7) | 497 (3.9) ▲ | 478 (3.6) | 485 (3.5) | 472 (3.3) | 489 (4.2) ▲ |
| 1 Georgia | 468 (4.5) | 479 (4.4) ▲ | 488 (4.0) | 491 (4.1) | 463 (4.5) | 475 (5.2) ▲ |
| Germany | 515 (3.4) | 531 (2.8) ▲ | 510 (3.0) | 518 (2.7) ▲ | 526 (3.8) | 537 (2.7) ▲ |
| † Hong Kong SAR | 594 (3.7) | 605 (3.6) ▲ | 604 (4.1) | 608 (3.8) | 590 (4.3) | 601 (5.3) ▲ |
| Hungary | 519 (3.1) | 530 (2.9) ▲ | 516 (3.4) | 526 (3.2) ▲ | 513 (3.5) | 530 (3.7) ▲ |
| Iran, Islamic Rep. of | 433 (6.6) | 440 (5.4) | 447 (6.7) | 452 (5.5) | 421 (6.5) | 432 (5.8) |
| Ireland | 546 (4.1) | 554 (3.4) | 548 (3.4) | 554 (3.0) | 538 (3.4) | 546 (3.3) |
| Italy | 508 (3.3) | 522 (3.7) ▲ | 511 (2.9) | 523 (3.3) ▲ | 494 (3.5) | 514 (3.5) ▲ |
| Japan | 597 (2.4) | 598 (2.6) | 594 (2.8) | 591 (2.0) | 588 (3.0) | 590 (2.5) |
| 2 Kazakhstan | 508 (3.1) | 511 (3.0) | 515 (3.5) | 513 (3.1) | 507 (3.1) | 508 (3.4) |
| Korea, Rep. of | 608 (4.8) | 616 (4.3) | 594 (2.7) | 595 (2.9) | 591 (3.1) | 601 (3.5) ▲ |
| 2 Kosovo | 440 (3.8) | 449 (3.8) ▲ | 443 (3.6) | 448 (3.6) | 441 (4.2) | 441 (3.5) |
| Kuwait | - - | - - | - - | - - | - - | - - |
| 2 Latvia | 533 (2.9) | 541 (3.1) ▲ | 546 (3.0) | 547 (3.2) | 550 (3.8) | 559 (3.4) ▲ |
| 2 Lithuania | 532 (3.2) | 538 (3.6) | 546 (3.0) | 547 (3.7) | 529 (3.5) | 538 (4.7) |
| Malta | 504 (2.0) | 515 (3.0) ▲ | 504 (1.8) | 511 (2.0) ▲ | 507 (2.5) | 509 (2.4) |
| Montenegro | 443 (3.7) | 446 (2.4) | 453 (2.7) | 455 (2.5) | 461 (3.4) | 465 (3.0) |
| Morocco | 381 (4.9) | 377 (4.6) | 387 (4.8) | 387 (4.7) | 382 (5.3) | 378 (5.7) |
| ≡ Netherlands | 527 (3.3) | 541 (3.7) ▲ | 533 (2.2) | 539 (3.1) | 541 (3.6) | 550 (3.5) ▲ |
| 2 New Zealand | 469 (4.3) | 482 (3.6) ▲ | 487 (3.7) | 488 (3.1) | 499 (3.5) | 503 (3.5) |
| North Macedonia | 468 (6.5) | 472 (5.8) | 479 (6.5) | 475 (5.2) | 470 (6.3) | 470 (5.9) |
| † Northern Ireland | 570 (4.0) | 579 (4.2) | 565 (3.4) | 564 (3.7) | 556 (3.2) | 561 (3.9) |
| † Norway (5) | 535 (2.7) | 546 (3.4) ▲ | 539 (2.8) | 540 (3.1) | 551 (4.0) | 551 (3.9) |
| Oman | 431 (4.4) ▲ | 417 (5.3) | 442 (3.7) ▲ | 426 (4.2) | 431 (3.6) ▲ | 418 (4.7) |
| 2 Ψ Pakistan | 338 (17.0) | 318 (12.5) | 318 (18.0) | 297 (13.2) | 354 (13.5) | 354 (10.6) |
| 2 Ψ Philippines | 320 (6.6) ▲ | 285 (6.4) | 303 (7.7) ▲ | 271 (6.6) | 289 (7.6) ▲ | 256 (6.3) |
| Poland | 500 (3.3) | 518 (2.9) ▲ | 521 (3.3) | 522 (3.0) | 523 (3.5) | 531 (3.4) |
| 2 Portugal | 512 (3.2) | 533 (3.7) ▲ | 520 (3.3) | 535 (2.9) ▲ | 513 (3.3) | 525 (3.5) ▲ |
| Qatar | 445 (5.7) | 450 (3.7) | 456 (4.7) | 451 (3.8) | 438 (5.2) | 442 (3.4) |
| 2 Russian Federation | 550 (3.2) | 559 (3.3) ▲ | 567 (3.7) | 574 (3.9) ▲ | 568 (4.3) | 578 (4.1) ▲ |
| 2 Saudi Arabia | - - | - - | - - | - - | - - | - - |
| 2 Serbia | 504 (3.5) | 505 (4.4) | 510 (3.8) | 508 (4.3) | 501 (5.0) | 505 (4.9) |
| 3 Singapore | 634 (4.2) | 646 (4.4) ▲ | 623 (4.0) | 628 (4.2) | 609 (4.2) | 619 (4.4) ▲ |
| 2 Slovak Republic | 493 (3.4) | 510 (4.0) ▲ | 504 (3.7) | 512 (4.1) ▲ | 512 (4.3) | 531 (4.2) ▲ |
| South Africa (5) | 384 (4.0) ▲ | 361 (3.9) | 385 (3.9) ▲ | 366 (4.1) | 380 (4.8) ▲ | 361 (3.6) |
| Spain | 490 (3.3) | 508 (2.8) ▲ | 498 (2.3) | 512 (2.5) ▲ | 485 (2.5) | 507 (2.9) ▲ |
| Sweden | 510 (3.3) | 521 (3.8) ▲ | 515 (3.5) | 521 (3.2) | 532 (3.5) | 539 (3.2) ▲ |
| 2 Turkey (5) | 512 (4.5) | 517 (5.6) | 532 (4.6) | 530 (5.9) | 503 (4.8) | 516 (6.9) ▲ |
| United Arab Emirates | 475 (2.5) | 484 (2.2) ▲ | 482 (2.6) | 487 (2.3) | 469 (2.7) | 480 (2.2) ▲ |
| 2 † United States | 528 (3.0) | 544 (3.0) ▲ | 534 (3.0) | 541 (2.9) ▲ | 516 (3.3) | 531 (2.8) ▲ |
| **International Average** | **500 (0.6)** | **507 (0.5)** ▲ | **505 (0.6)** | **506 (0.5)** ▲ | **500 (0.6)** | **507 (0.6)** ▲ |
| **Benchmarking Participants** | | | | | | |
| 2 Ontario, Canada | 493 (5.6) | 514 (3.4) ▲ | 506 (4.9) | 521 (3.3) ▲ | 505 (5.4) | 526 (3.5) ▲ |
| Quebec, Canada | 525 (3.1) | 545 (3.0) ▲ | 526 (2.9) | 540 (2.7) ▲ | 514 (3.8) | 533 (2.7) ▲ |
| Moscow City, Russian Fed. | 572 (2.2) | 581 (3.2) ▲ | 595 (2.8) | 602 (2.8) ▲ | 596 (3.2) | 607 (3.9) ▲ |
| Madrid, Spain | 505 (4.1) | 524 (4.2) ▲ | 513 (2.6) | 528 (3.0) ▲ | 503 (3.3) | 525 (3.4) ▲ |
| Abu Dhabi, UAE | 436 (2.9) | 442 (3.0) | 441 (2.7) | 443 (3.1) | 431 (3.1) | 438 (3.3) |
| 2 Dubai, UAE | 537 (3.6) | 547 (2.1) ▲ | 544 (3.4) | 550 (2.2) | 533 (3.5) | 543 (2.3) ▲ |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 fourth grade mathematics eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Science Grade 4

## Average Science Achievement

### Average Achievement and Scale Score Distributions

The TIMSS 2019 fourth grade science assessment was based on a comprehensive assessment framework developed collaboratively with the participating countries to reflect their curricular goals. The fourth grade science assessment included three content areas—life science, physical science, and Earth science. In accordance with the framework, the majority of the TIMSS 2019 science items assessed students' applying and reasoning skills. To cover the framework at the fourth grade, the TIMSS 2019 science assessment comprised 175 assessment items. This cycle marked the beginning of the transition to a computer-based assessment system. More than half of the TIMSS 2019 countries administered the assessment in an "e" (electronic) format and almost half administered the assessment in a paper format, as in TIMSS 2015. The "e" countries also administered the trend items in the paper format to provide a bridge to the TIMSS 2015 and TIMSS 2019 paper-based assessments. The assessment was carefully designed and analyzed, so that the TIMSS 2019 science achievement results for all 58 countries are reported on the same TIMSS fourth grade science scale.

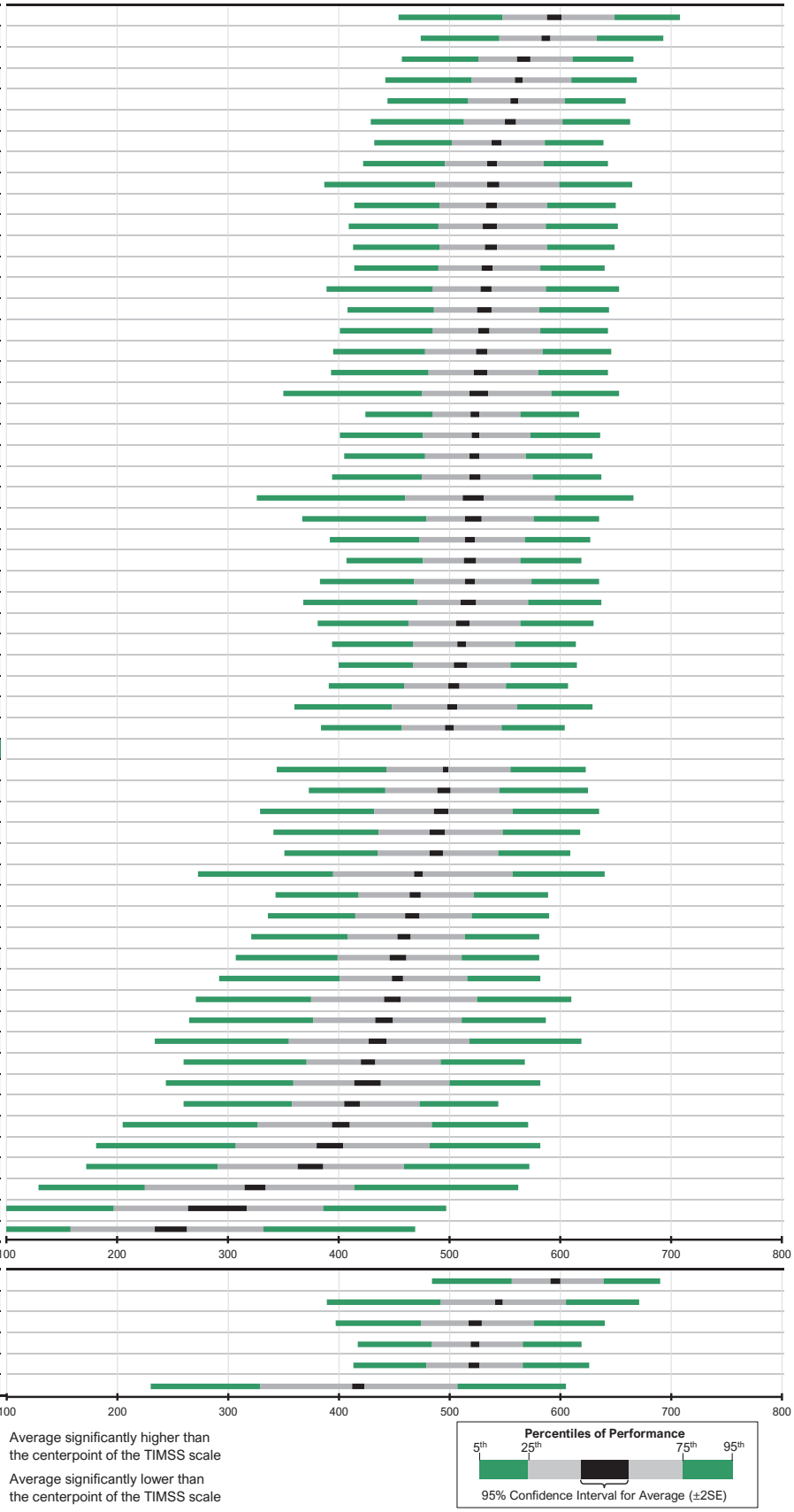
Exhibit 2.1 presents the average achievement at the fourth grade for each participating country (from highest to lowest) together with the scale score distribution underlying the scale score average. Exhibit 2.2 shows whether relatively small differences in average achievement between one country and the next are statistically significant.

Singapore and Korea performed similarly and had higher average achievement than all of the other countries, followed by the Russian Federation and Japan, whose students had similar achievement. However, the Russian Federation's performance was higher than all the remaining countries, while Japan performed higher than all the remaining countries except Chinese Taipei. Next, fourth grade students in Chinese Taipei performed similarly to students in Japan and Finland and had higher achievement than students in all of the other countries except the four top performing countries and Finland. In turn, Finland performed similarly to Chinese Taipei and had higher achievement than all of the other remaining countries. Latvia, Norway (fifth grade), the United States, Lithuania, Sweden, and England also performed very well. Essentially, Exhibit 2.2 shows clusters of several similarly performing countries, followed by the next highest achieving clusters of similarly performing countries, and so on.

A number of fourth grade TIMSS 2019 participants performed well. Thirty-two countries (including those discussed above) had higher average achievement than the centerpoint of 500 (Exhibit 2.1), which is a point of reference on the TIMSS fourth grade science scale that remains constant from TIMSS assessment to TIMSS assessment. However, although there was little difference between countries from one to the next, there was a considerable difference between the highest

# Exhibit 2.1: Average Science Achievement and Scale Score Distributions

| Country | Average Scale Score | |
|---|---|---|
| [3] Singapore | 595 (3.4) | ▲ |
| Korea, Rep. of | 588 (2.1) | ▲ |
| [2] Russian Federation | 567 (3.0) | ▲ |
| Japan | 562 (1.8) | ▲ |
| Chinese Taipei | 558 (1.8) | ▲ |
| Finland | 555 (2.6) | ▲ |
| [2] Latvia | 542 (2.4) | ▲ |
| † Norway (5) | 539 (2.2) | ▲ |
| [2] † United States | 539 (2.7) | ▲ |
| [2] Lithuania | 538 (2.5) | ▲ |
| Sweden | 537 (3.3) | ▲ |
| [2] England | 537 (2.7) | ▲ |
| Czech Republic | 534 (2.6) | ▲ |
| Australia | 533 (2.4) | ▲ |
| † Hong Kong SAR | 531 (3.3) | ▲ |
| Poland | 531 (2.6) | ▲ |
| Hungary | 529 (2.7) | ▲ |
| Ireland | 528 (3.2) | ▲ |
| [2] Turkey (5) | 526 (4.2) | ▲ |
| Croatia | 524 (2.2) | ▲ |
| [1 2] Canada | 523 (1.9) | ▲ |
| † Denmark | 522 (2.4) | ▲ |
| Austria | 522 (2.6) | ▲ |
| Bulgaria | 521 (4.9) | ▲ |
| [2] Slovak Republic | 521 (3.7) | ▲ |
| † Northern Ireland | 518 (2.3) | ▲ |
| ≡ Netherlands | 518 (2.9) | ▲ |
| Germany | 518 (2.2) | ▲ |
| [2] Serbia | 517 (3.5) | ▲ |
| Cyprus | 511 (3.0) | ▲ |
| Spain | 511 (2.0) | ▲ |
| Italy | 510 (3.0) | ▲ |
| [2] Portugal | 504 (2.6) | |
| [2] New Zealand | 503 (2.3) | |
| † Belgium (Flemish) | 501 (2.1) | |
| **TIMSS Scale Centerpoint** | **500** | |
| Malta | 496 (1.3) | ▽ |
| [2] Kazakhstan | 494 (3.1) | |
| Bahrain | 493 (3.4) | ▽ |
| Albania | 489 (3.5) | ▽ |
| France | 488 (3.0) | ▽ |
| United Arab Emirates | 473 (2.1) | ▽ |
| Chile | 469 (2.6) | ▽ |
| Armenia | 466 (3.4) | ▽ |
| Bosnia and Herzegovina | 459 (2.9) | ▽ |
| [1] Georgia | 454 (3.9) | ▽ |
| Montenegro | 453 (2.5) | ▽ |
| Qatar | 449 (3.9) | ▽ |
| Iran, Islamic Rep. of | 441 (4.1) | ▽ |
| Oman | 435 (4.1) | ▽ |
| Azerbaijan | 427 (3.3) | ▽ |
| North Macedonia | 426 (6.2) | ▽ |
| [2] Kosovo | 413 (3.7) | ▽ |
| [2] Saudi Arabia | 402 (4.1) | ▽ |
| Kuwait | 392 (6.1) | ▽ |
| Ψ Morocco | 374 (5.8) | ▽ |
| Ж South Africa (5) | 324 (4.9) | ▽ |
| [2 Ж] Pakistan | 290 (13.4) | ▽ |
| [2 Ж] Philippines | 249 (7.5) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 595 (2.2) | ▲ |
| [2] Dubai, UAE | 545 (1.7) | ▲ |
| [2] Ontario, Canada | 524 (3.2) | ▲ |
| Madrid, Spain | 523 (2.0) | ▲ |
| Quebec, Canada | 522 (2.5) | ▲ |
| Abu Dhabi, UAE | 418 (2.8) | ▽ |




The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the distribution.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 2.2: Significance of Differences Between Countries' Average Science Achievement

Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly higher (▲) than that of the comparison country, significantly lower (▽), or if there is no statistically significant difference.

| Country | Average Scale Score | Singapore | Korea, Rep. of | Russian Federation | Japan | Chinese Taipei | Finland | Latvia | Norway (5) | United States | Lithuania | Sweden | England | Czech Republic | Australia | Hong Kong SAR | Poland | Hungary | Ireland | Turkey (5) | Croatia | Canada | Denmark | Austria | Bulgaria | Slovak Republic | Northern Ireland | Netherlands | Germany | Serbia | Cyprus | Spain | Italy | Portugal | New Zealand |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 588 (2.1) | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 567 (3.0) | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 562 (1.8) | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 558 (1.8) | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | 555 (2.6) | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Latvia | 542 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Norway (5) | 539 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United States | 539 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 538 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Sweden | 537 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | 537 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Czech Republic | 534 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Australia | 533 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 531 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Poland | 531 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hungary | 529 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ | | | | | | | | | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | 528 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Turkey (5) | 526 (4.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Croatia | 524 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ | | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Canada | 523 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Denmark | 522 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Austria | 522 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Bulgaria | 521 (4.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | | | | | ▲ | ▲ | ▲ |
| Slovak Republic | 521 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Northern Ireland | 518 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Netherlands | 518 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Germany | 518 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Serbia | 517 (3.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | | ▲ | ▲ |
| Cyprus | 511 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | ▲ |
| Spain | 511 (2.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ |
| Italy | 510 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | |
| Portugal | 504 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▽ | | | |
| New Zealand | 503 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | |
| Belgium (Flemish) | 501 (2.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | |
| Malta | 496 (1.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kazakhstan | 494 (3.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Bahrain | 493 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Albania | 489 (3.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| France | 488 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| United Arab Emirates | 473 (2.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Chile | 469 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Armenia | 466 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Bosnia and Herzegovina | 459 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Georgia | 454 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Montenegro | 453 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Qatar | 449 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Iran, Islamic Rep. of | 441 (4.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Oman | 435 (4.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Azerbaijan | 427 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| North Macedonia | 426 (6.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kosovo | 413 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Saudi Arabia | 402 (4.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kuwait | 392 (6.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | 374 (5.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (5) | 324 (4.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Pakistan | 290 (13.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Philippines | 249 (7.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 545 (1.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | 524 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Madrid, Spain | 523 (2.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 522 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Abu Dhabi, UAE | 418 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.2: Significance of Differences Between Countries' Average Science Achievement

(Continued)

| Country | Average Scale Score | Belgium (Flemish) | Malta | Kazakhstan | Bahrain | Albania | France | United Arab Emirates | Chile | Armenia | Bosnia and Herzegovina | Georgia | Montenegro | Qatar | Iran, Islamic Rep. of | Oman | Azerbaijan | North Macedonia | Kosovo | Saudi Arabia | Kuwait | Morocco | South Africa (5) | Pakistan | Philippines |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 588 (2.1) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 567 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 562 (1.8) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 558 (1.8) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | 555 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Latvia | 542 (2.4) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Norway (5) | 539 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United States | 539 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 538 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Sweden | 537 (3.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | 537 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Czech Republic | 534 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Australia | 533 (2.4) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 531 (3.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Poland | 531 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hungary | 529 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | 528 (3.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Turkey (5) | 526 (4.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Croatia | 524 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Canada | 523 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Denmark | 522 (2.4) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Austria | 522 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bulgaria | 521 (4.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Slovak Republic | 521 (3.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Northern Ireland | 518 (2.3) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Netherlands | 518 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Germany | 518 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Serbia | 517 (3.5) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Cyprus | 511 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Spain | 511 (2.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Italy | 510 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Portugal | 504 (2.6) | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| New Zealand | 503 (2.3) | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Belgium (Flemish) | 501 (2.1) | | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Malta | 496 (1.3) | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Kazakhstan | 494 (3.1) | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bahrain | 493 (3.4) | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Albania | 489 (3.5) | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| France | 488 (3.0) | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United Arab Emirates | 473 (2.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chile | 469 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Armenia | 466 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bosnia and Herzegovina | 459 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Georgia | 454 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Montenegro | 453 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Qatar | 449 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Iran, Islamic Rep. of | 441 (4.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Oman | 435 (4.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Azerbaijan | 427 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| North Macedonia | 426 (6.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | |
| Kosovo | 413 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Saudi Arabia | 402 (4.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ |
| Kuwait | 392 (6.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ |
| Morocco | 374 (5.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| South Africa (5) | 324 (4.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Pakistan | 290 (13.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Philippines | 249 (7.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 545 (1.7) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | 524 (3.2) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Madrid, Spain | 523 (2.0) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 522 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Abu Dhabi, UAE | 418 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |

| Benchmarking Participants | Moscow City, Russian Fed. | Dubai, UAE | Ontario, Canada | Madrid, Spain | Quebec, Canada | Abu Dhabi, UAE |
|---|---|---|---|---|---|---|
| Singapore | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | ▽ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Latvia | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Norway (5) | ▽ | | ▲ | ▲ | ▲ | ▲ |
| United States | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Lithuania | ▽ | ▽ | ▲ | ▲ | ▲ | ▲ |
| Sweden | ▽ | | ▲ | ▲ | ▲ | ▲ |
| England | ▽ | ▽ | ▲ | ▲ | ▲ | ▲ |
| Czech Republic | ▽ | ▽ | ▲ | ▲ | ▲ | ▲ |
| Australia | ▽ | ▽ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Poland | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Hungary | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Ireland | ▽ | ▽ | | | | ▲ |
| Turkey (5) | ▽ | ▽ | | | | ▲ |
| Croatia | ▽ | ▽ | | | | ▲ |
| Canada | ▽ | ▽ | | | | ▲ |
| Denmark | ▽ | ▽ | | | | ▲ |
| Austria | ▽ | ▽ | | | | ▲ |
| Bulgaria | ▽ | ▽ | | | | ▲ |
| Slovak Republic | ▽ | ▽ | | | | ▲ |
| Northern Ireland | ▽ | ▽ | | | | ▲ |
| Netherlands | ▽ | ▽ | | | | ▲ |
| Germany | ▽ | ▽ | | | | ▲ |
| Serbia | ▽ | ▽ | | | | ▲ |
| Cyprus | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Spain | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Italy | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Portugal | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| New Zealand | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Belgium (Flemish) | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Malta | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Kazakhstan | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Bahrain | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Albania | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| France | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| United Arab Emirates | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Chile | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Armenia | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Bosnia and Herzegovina | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Georgia | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Montenegro | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Qatar | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Iran, Islamic Rep. of | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Oman | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| Azerbaijan | ▽ | ▽ | ▽ | ▽ | ▽ | ▲ |
| North Macedonia | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Kosovo | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Saudi Arabia | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kuwait | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Pakistan | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Philippines | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | |
| Moscow City, Russian Fed. | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | ▽ | ▽ | | | | ▲ |
| Madrid, Spain | ▽ | ▽ | | | | ▲ |
| Quebec, Canada | ▽ | ▽ | | | | ▲ |
| Abu Dhabi, UAE | ▽ | ▽ | ▽ | ▽ | ▽ | |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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average achievement and the lowest. Also, the scale score distributions show that there is wide variation in achievement in every country. Every country has some higher achieving and some lower achieving students.

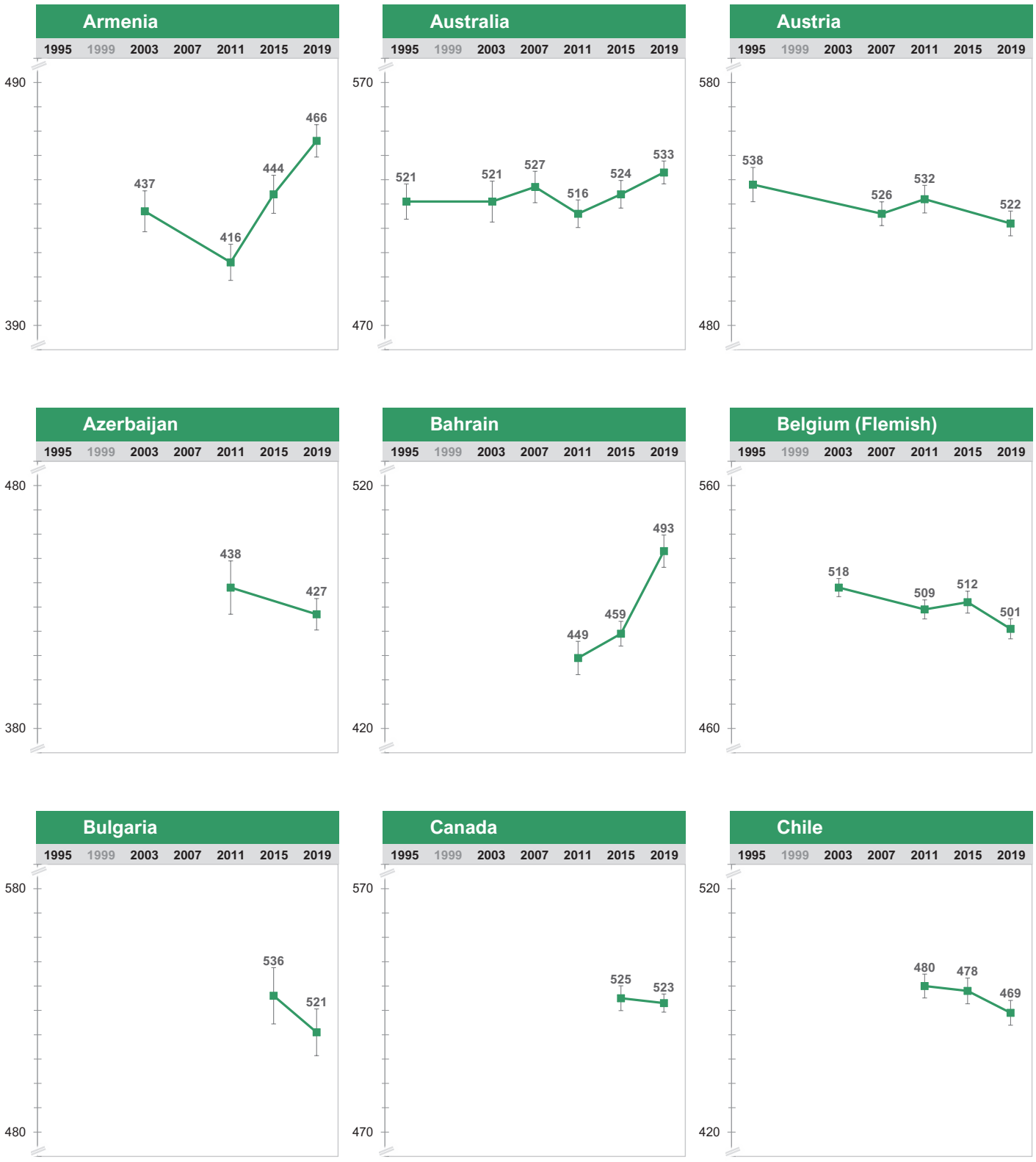
## Trends in Average Achievement

Exhibit 2.3 graphs the differences in average science achievement between the assessments for TIMSS 2019 countries that have comparable data from previous assessments, while Exhibit 2.4 provides more detailed results. The countries are presented in alphabetical order in both exhibits. The trends in science achievement at the fourth grade signal more improvements than downturns across the assessment cycles internationally. However, since the inception of TIMSS in 1995, most countries have had some periods of increases and some of decreases in average achievement, as well as periods of stability.

Most recently, for the 44 countries that participated in both TIMSS 2015 and 2019, 10 had increases in average achievement and 10 had declines, but the majority stayed the same. As a midway point, 21 countries participated in both TIMSS 2007 and 2019, with 6 showing increases and 3 declines. For the 16 countries that participated in both 1995 and 2019, most showed improvement—11 with higher average achievement in 2019 and only 2 with lower average achievement.

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



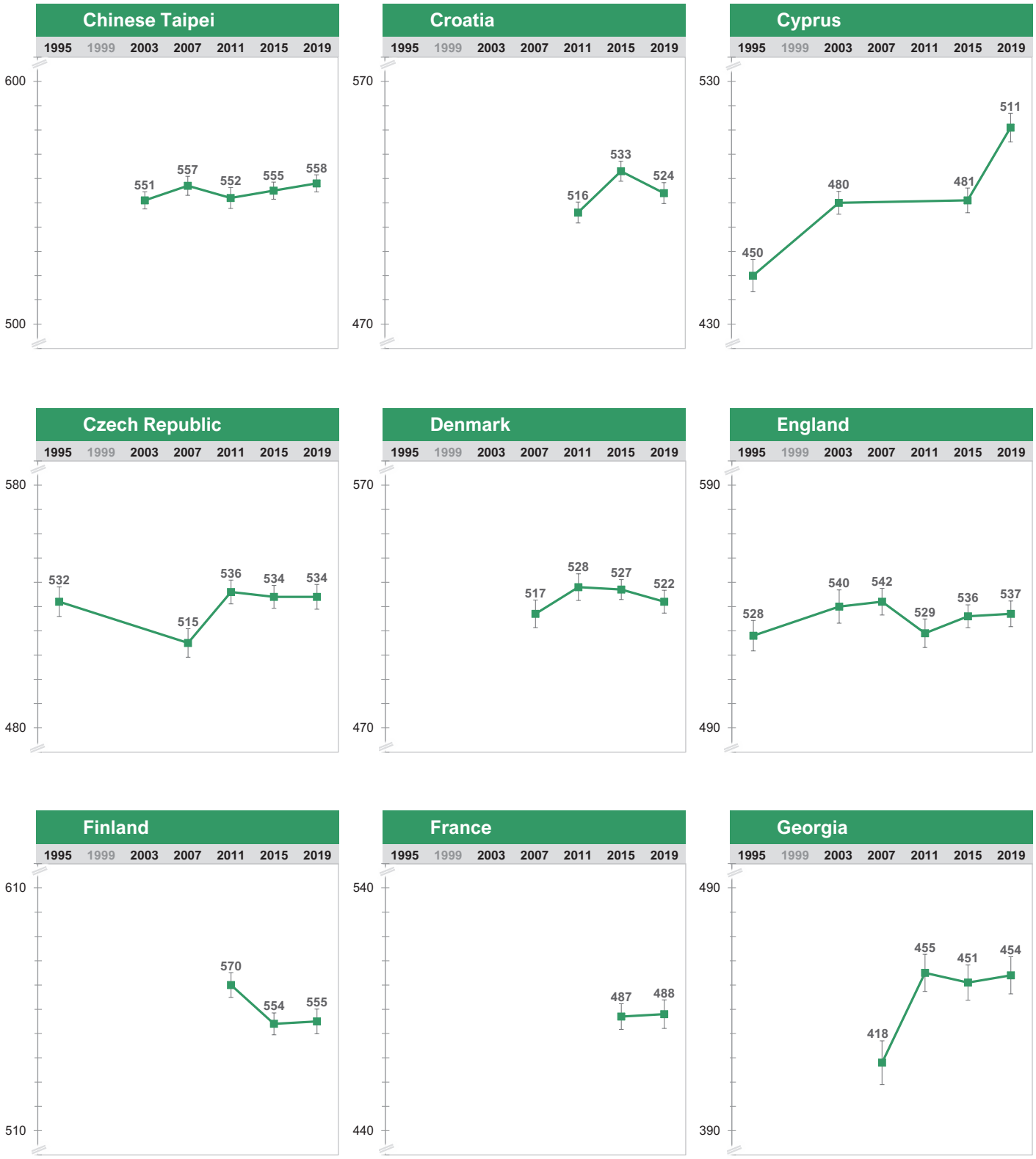

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



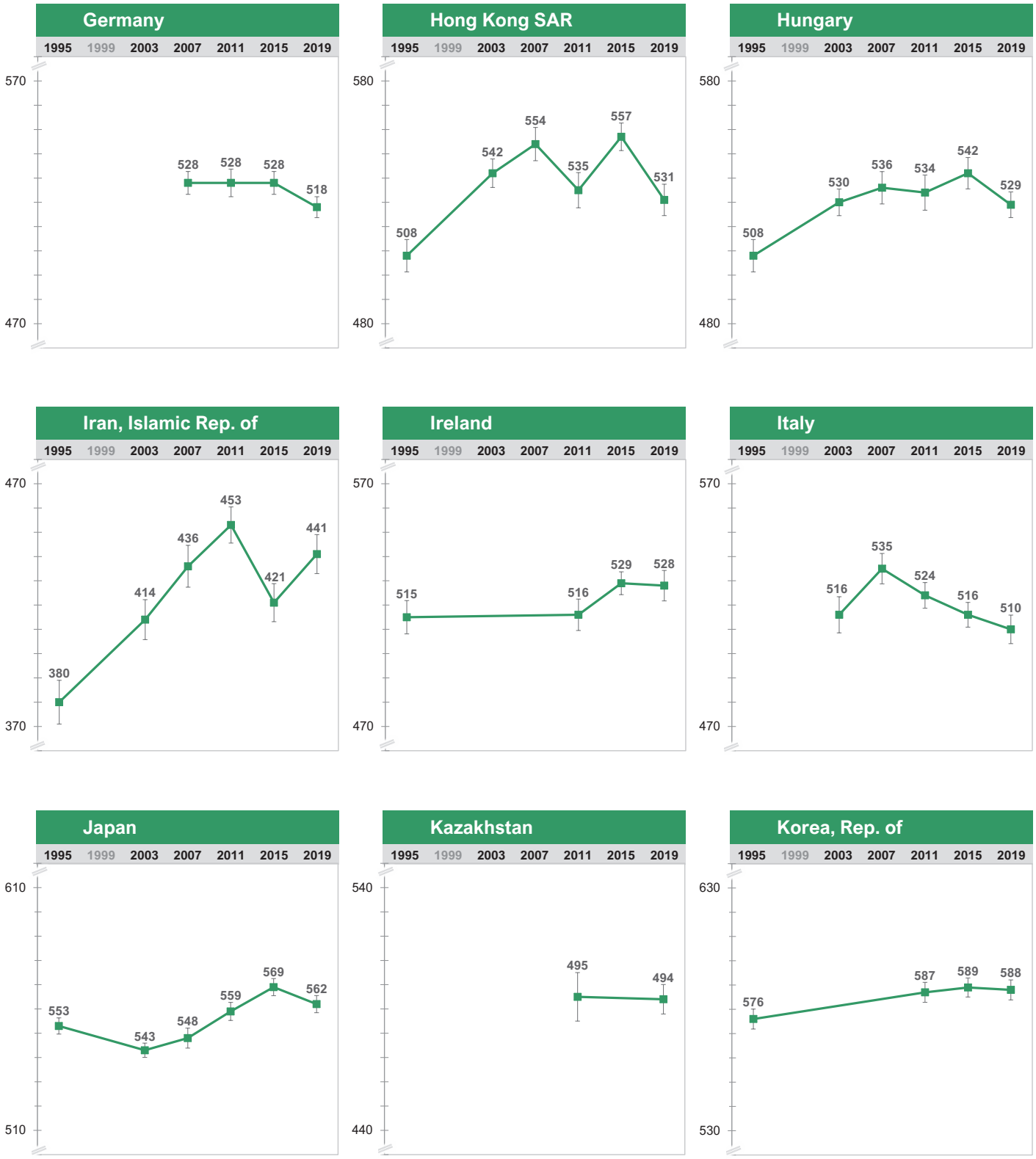

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



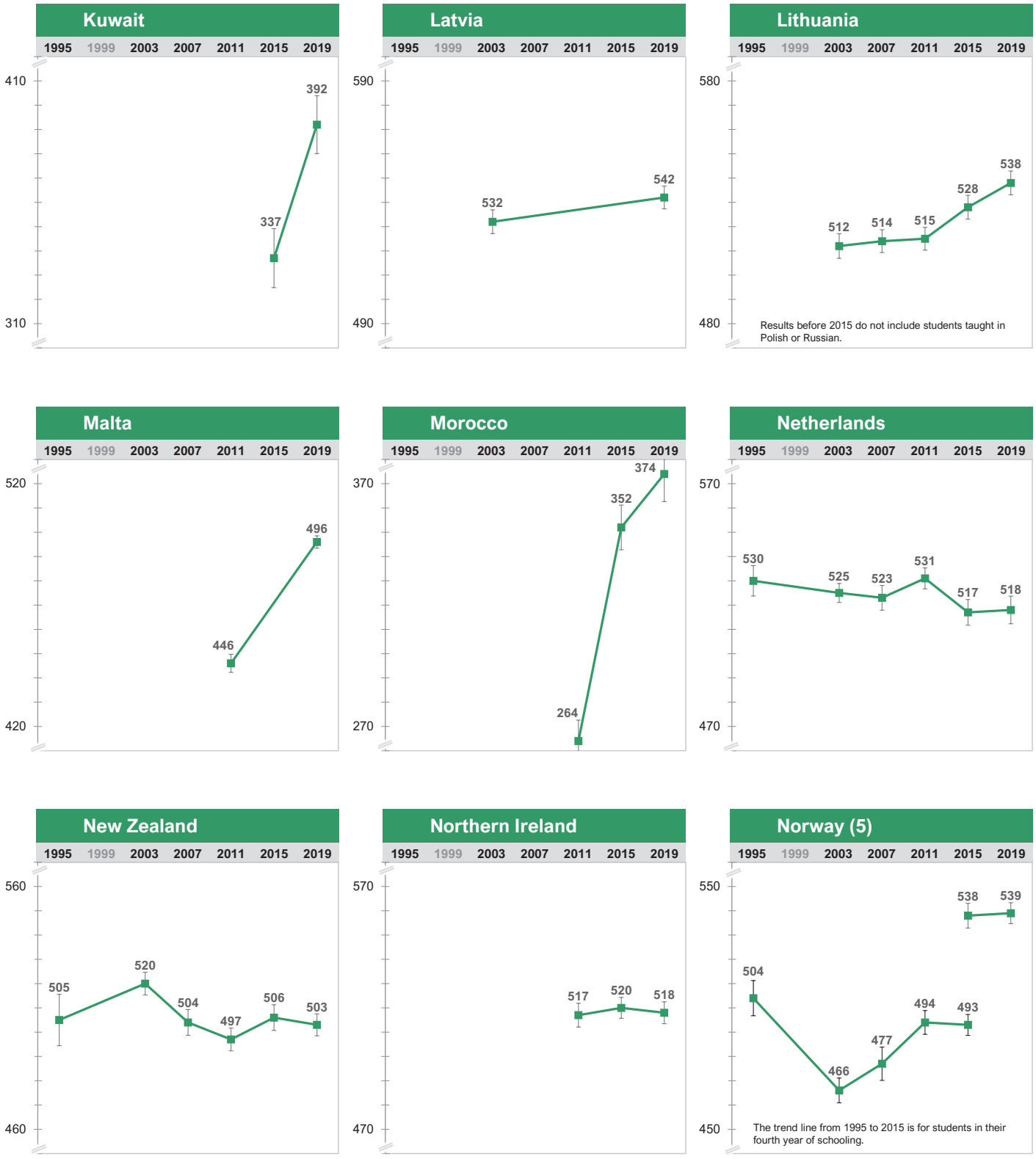

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



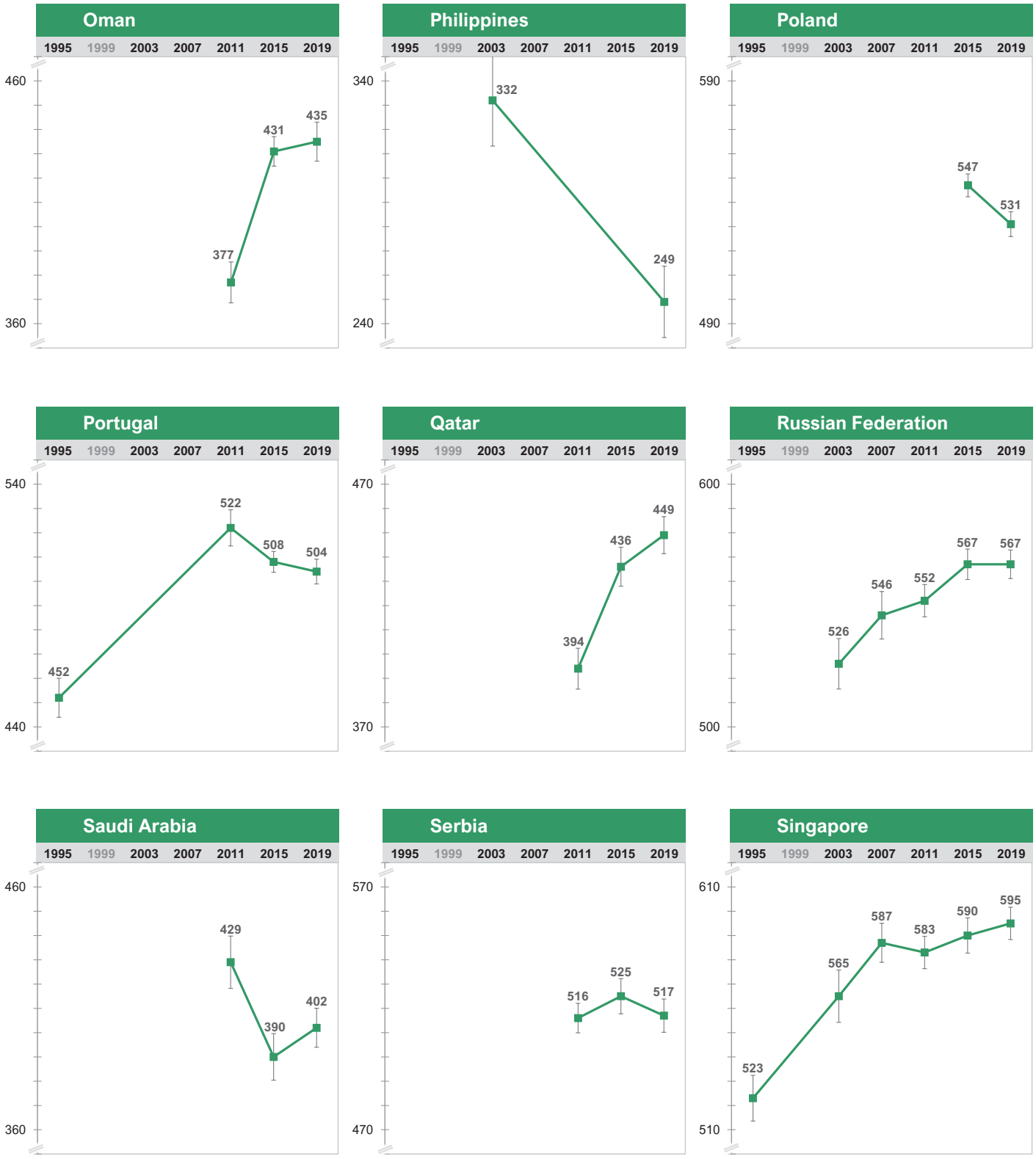

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



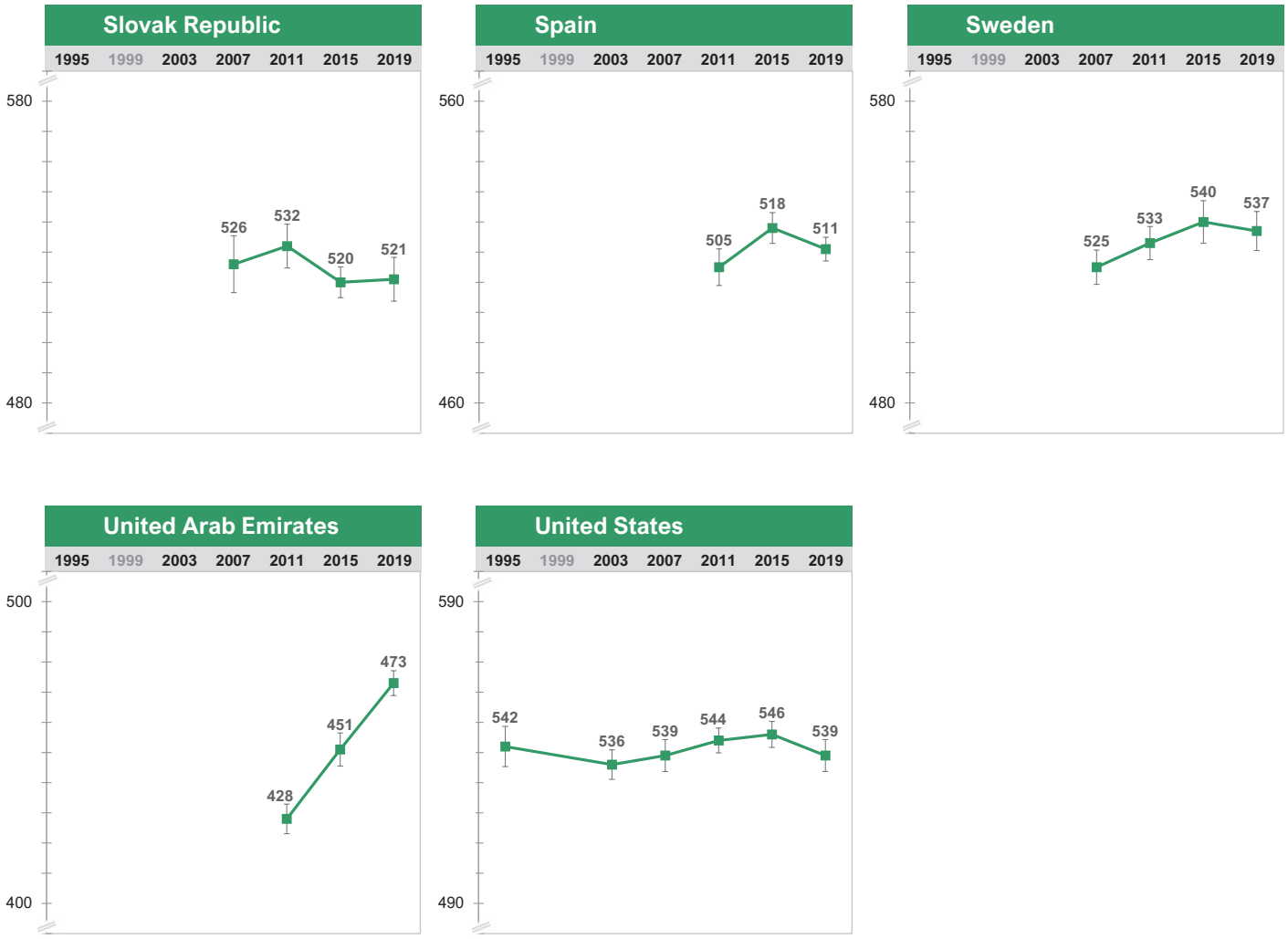

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

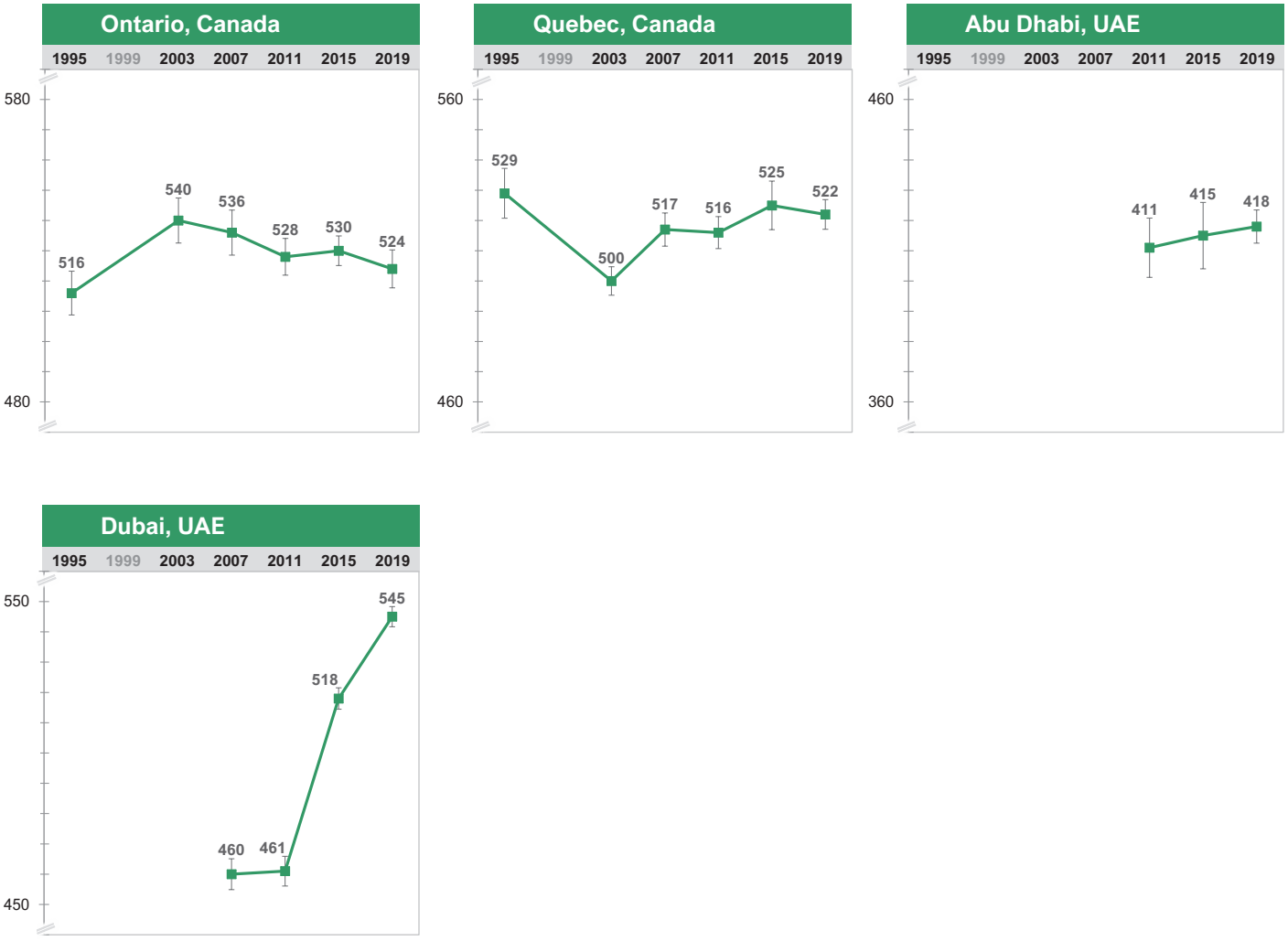
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.3: Trend Plots of Average Science Achievement Across Assessment Years◊

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 2.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.

### Benchmarking Participants



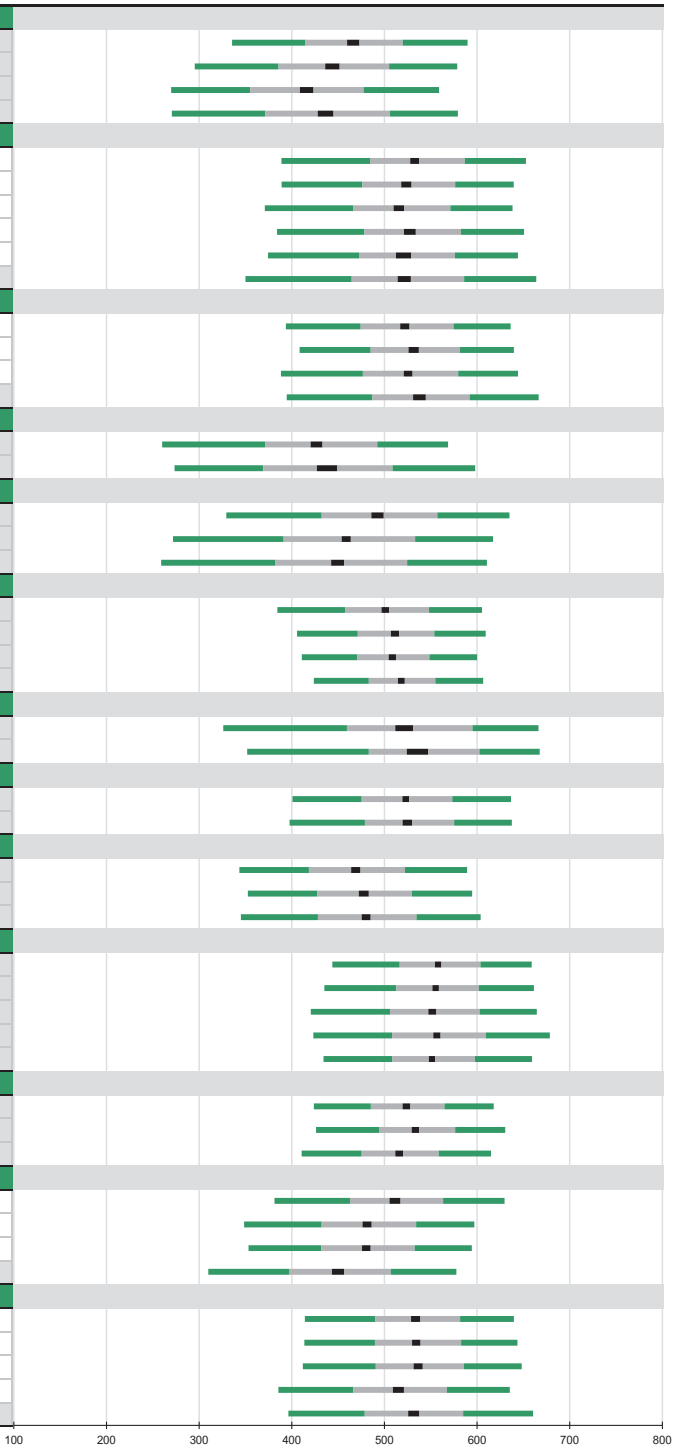

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.4: Differences in Average Science Achievement Across Assessment Years

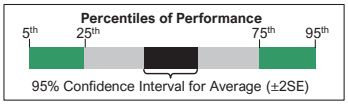
Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Average Scale Score | Differences Between Years | | | | | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1995 | |
| **Armenia** | | | | | | | |
| 2019 | 466 (3.4) | 23 ▲ | 50 ▲ | | 30 ▲ | | |
| 2015 | 444 (4.0) | | 28 ▲ | | 7 | | |
| 2011 | 416 (3.8) | | | | -20 ▽ | | |
| 2003 | 437 (4.3) | | | | | | |
| **Australia** | | | | | | | |
| 2019 | 533 (2.4) | 9 ▲ | 17 ▲ | 5 | 12 ▲ | 11 ▲ | |
| 2015 | 524 (2.9) | | 8 ▲ | -4 | 3 | 2 | |
| 2011 | 516 (2.9) | | | -12 ▽ | -5 | -6 | |
| 2007 | 527 (3.3) | | | | 7 | 6 | |
| † 2003 | 521 (4.3) | | | | | -1 | |
| ≡ 1995 | 521 (3.7) | | | | | | |
| **Austria** | | | | | | | |
| 2019 | 522 (2.6) | | -9 ▽ | -4 | | -16 ▽ | |
| 2011 | 532 (2.9) | | | 6 | | -6 | |
| 2007 | 526 (2.5) | | | | | -12 ▽ | |
| ≡ 1995 | 538 (3.6) | | | | | | |
| **Azerbaijan** | | | | | | | |
| 2019 | 427 (3.3) | | -11 | | | | |
| 2 2011 | 438 (5.6) | | | | | | |
| **Bahrain** | | | | | | | |
| 2019 | 493 (3.4) | 34 ▲ | 43 ▲ | | | | |
| 2 2015 | 459 (2.6) | | 9 ▲ | | | | |
| 2011 | 449 (3.5) | | | | | | |
| **Belgium (Flemish)** | | | | | | | |
| † 2019 | 501 (2.1) | -10 ▽ | -8 ▽ | | -17 ▽ | | |
| † 2015 | 512 (2.3) | | 3 | | -7 ▽ | | |
| 2011 | 509 (2.0) | | | | -10 ▽ | | |
| 2 2003 | 518 (1.9) | | | | | | |
| **Bulgaria** | | | | | | | |
| 2019 | 521 (4.9) | -14 | | | | | |
| 2015 | 536 (5.9) | | | | | | |
| **Canada** | | | | | | | |
| 1 2 2019 | 523 (1.9) | -2 | | | | | |
| 1 2 † 2015 | 525 (2.6) | | | | | | |
| **Chile** | | | | | | | |
| 2019 | 469 (2.6) | -9 ▽ | -11 ▽ | | | | |
| 2015 | 478 (2.7) | | -3 | | | | |
| 2011 | 480 (2.5) | | | | | | |
| **Chinese Taipei** | | | | | | | |
| 2019 | 558 (1.8) | 3 | 6 ▲ | 1 | 7 ▲ | | |
| 2015 | 555 (1.8) | | 4 | -1 | 4 | | |
| 2011 | 552 (2.2) | | | -5 | 0 | | |
| 2007 | 557 (2.0) | | | | 5 ▲ | | |
| 2003 | 551 (1.8) | | | | | | |
| **Croatia** | | | | | | | |
| 2019 | 524 (2.2) | -10 ▽ | 8 ▲ | | | | |
| 2015 | 533 (2.1) | | 17 ▲ | | | | |
| 2 2011 | 516 (2.2) | | | | | | |
| **Cyprus** | | | | | | | |
| 2019 | 511 (3.0) | 30 ▲ | | | 31 ▲ | 61 ▲ | |
| 2015 | 481 (2.6) | | | | 1 | 31 ▲ | |
| 2003 | 480 (2.4) | | | | | 30 ▲ | |
| 1995 | 450 (3.4) | | | | | | |
| **Czech Republic** | | | | | | | |
| 2019 | 534 (2.6) | -1 | -3 | 19 ▲ | | 2 | |
| 2015 | 534 (2.4) | | -2 | 19 ▲ | | 3 | |
| 2011 | 536 (2.5) | | | 21 ▲ | | 5 | |
| 2007 | 515 (3.0) | | | | | -17 ▽ | |
| 1995 | 532 (3.1) | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower




See Appendix A for country participation in previous TIMSS assessments.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.4: Differences in Average Science Achievement Across Assessment Years

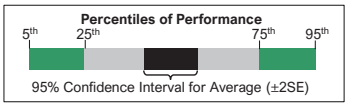
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1995 | |
| **Denmark** | | | | | | | |
| † 2019 | 522 (2.4) | -5 | -6 | 5 | | | |
| 2 † 2015 | 527 (2.1) | | -1 | 10 ▲ | | | |
| 2 2011 | 528 (2.8) | | | 11 ▲ | | | |
| † 2007 | 517 (2.9) | | | | | | |
| **England** | | | | | | | |
| 2 2019 | 537 (2.7) | 1 | 8 ▲ | -5 | -3 | 9 ▲ | |
| 2015 | 536 (2.4) | | 7 | -6 | -4 | 8 ▲ | |
| 2011 | 529 (3.0) | | | -13 ▽ | -11 ▽ | 1 | |
| 2007 | 542 (2.8) | | | | 1 | 14 ▲ | |
| † 2003 | 540 (3.5) | | | | | 13 ▲ | |
| 3 † 1995 | 528 (3.2) | | | | | | |
| **Finland** | | | | | | | |
| 2019 | 555 (2.6) | 1 | -16 ▽ | | | | |
| 2015 | 554 (2.3) | | -16 ▽ | | | | |
| 2011 | 570 (2.6) | | | | | | |
| **France** | | | | | | | |
| 2019 | 488 (3.0) | 0 | | | | | |
| 2015 | 487 (2.7) | | | | | | |
| **Georgia** | | | | | | | |
| 1 2019 | 454 (3.9) | 3 | -1 | 37 ▲ | | | |
| 1 2015 | 451 (3.7) | | -4 | 34 ▲ | | | |
| 1 2011 | 455 (3.9) | | | 37 ▲ | | | |
| 1 2007 | 418 (4.6) | | | | | | |
| **Germany** | | | | | | | |
| 2019 | 518 (2.2) | -10 ▽ | -9 ▽ | -9 ▽ | | | |
| 2015 | 528 (2.4) | | 1 | 1 | | | |
| 2011 | 528 (2.9) | | | 0 | | | |
| 2007 | 528 (2.4) | | | | | | |
| **Hong Kong SAR** | | | | | | | |
| † 2019 | 531 (3.3) | -25 ▽ | -4 | -23 ▽ | -11 ▽ | 23 ▲ | |
| † 2015 | 557 (2.9) | | 22 ▲ | 2 | 14 ▲ | 49 ▲ | |
| 2 2011 | 535 (3.7) | | | -19 ▽ | -8 | 27 ▲ | |
| 2007 | 554 (3.5) | | | | 12 ▲ | 46 ▲ | |
| † 2003 | 542 (3.0) | | | | | 35 ▲ | |
| 1995 | 508 (3.4) | | | | | | |
| **Hungary** | | | | | | | |
| 2019 | 529 (2.7) | -13 ▽ | -5 | -7 | 0 | 22 ▲ | |
| 2015 | 542 (3.3) | | 8 | 6 | 12 ▲ | 34 ▲ | |
| 2011 | 534 (3.7) | | | -2 | 5 | 27 ▲ | |
| 2007 | 536 (3.4) | | | | 6 | 28 ▲ | |
| 2 2003 | 530 (2.8) | | | | | 22 ▲ | |
| 1995 | 508 (3.4) | | | | | | |
| **Iran, Islamic Rep. of** | | | | | | | |
| 2019 | 441 (4.1) | 20 ▲ | -12 ▽ | 5 | 27 ▲ | 61 ▲ | |
| 2015 | 421 (4.0) | | -32 ▽ | -15 ▽ | 7 | 41 ▲ | |
| 2011 | 453 (3.8) | | | 17 ▲ | 39 ▲ | 73 ▲ | |
| 2007 | 436 (4.4) | | | | 22 ▲ | 55 ▲ | |
| 2 2003 | 414 (4.2) | | | | | 34 ▲ | |
| 1995 | 380 (4.6) | | | | | | |
| **Ireland** | | | | | | | |
| 2019 | 528 (3.2) | -1 | 12 ▲ | | | 13 ▲ | |
| 2015 | 529 (2.4) | | 13 ▲ | | | 14 ▲ | |
| 2011 | 516 (3.3) | | | | | 1 | |
| 2 1995 | 515 (3.5) | | | | | | |
| **Italy** | | | | | | | |
| 2019 | 510 (3.0) | -7 | -14 ▽ | -25 ▽ | -6 | | |
| 2 2015 | 516 (2.6) | | -7 ▽ | -19 ▽ | 1 | | |
| 2011 | 524 (2.7) | | | -11 ▽ | 8 | | |
| 2007 | 535 (3.2) | | | | 20 ▲ | | |
| 2003 | 516 (3.8) | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.4: Differences in Average Science Achievement Across Assessment Years

(Continued)

| Country | Average Scale Score | Differences Between Years 2015 | 2011 | 2007 | 2003 | 1995 |
|---|---|---|---|---|---|---|
| **Japan** | | | | | | |
| 2019 | 562 (1.8) | -7 ▽ | 3 | 14 ▲ | 18 ▲ | 8 ▲ |
| 2015 | 569 (1.8) | | 10 ▲ | 21 ▲ | 26 ▲ | 16 ▲ |
| 2011 | 559 (1.9) | | | 11 ▲ | 15 ▲ | 5 ▲ |
| 2007 | 548 (2.1) | | | | 4 | -5 |
| 2003 | 543 (1.5) | | | | | -10 ▽ |
| 1995 | 553 (1.7) | | | | | |
| **Kazakhstan** | | | | | | |
| [2] 2019 | 494 (3.1) | | 0 | | | |
| [2] 2011 | 495 (5.1) | | | | | |
| **Korea, Rep. of** | | | | | | |
| 2019 | 588 (2.1) | -2 | 1 | | | 12 ▲ |
| 2015 | 589 (2.0) | | 3 | | | 14 ▲ |
| 2011 | 587 (2.1) | | | | | 11 ▲ |
| [2] 1995 | 576 (2.1) | | | | | |
| **Kuwait** | | | | | | |
| 2019 | 392 (6.1) | 55 ▲ | | | | |
| Ψ 2015 | 337 (6.2) | | | | | |
| **Latvia** | | | | | | |
| [2] 2019 | 542 (2.4) | | | | 10 ▲ | |
| 2003 | 532 (2.5) | | | | | |
| **Lithuania** | | | | | | |
| [2] 2019 | 538 (2.5) | 10 ▲ | 23 ▲ | 24 ▲ | 26 ▲ | |
| [2] 2015 | 528 (2.5) | | 13 ▲ | 13 ▲ | 16 ▲ | |
| [1 2] 2011 | 515 (2.4) | | | 0 | 3 | |
| [1] 2007 | 514 (2.4) | | | | 2 | |
| [1] 2003 | 512 (2.6) | | | | | |
| **Malta** | | | | | | |
| 2019 | 496 (1.3) | | 50 ▲ | | | |
| 2011 | 446 (1.9) | | | | | |
| **Morocco** | | | | | | |
| Ψ 2019 | 374 (5.8) | 22 ▲ | 110 ▲ | | | |
| Ψ 2015 | 352 (4.7) | | 89 ▲ | | | |
| Ж 2011 | 264 (4.4) | | | | | |
| **Netherlands** | | | | | | |
| ≡ 2019 | 518 (2.9) | 1 | -13 ▽ | -5 | -7 | -12 ▽ |
| † 2015 | 517 (2.7) | | -14 ▽ | -6 | -8 ▽ | -13 ▽ |
| † 2011 | 531 (2.2) | | | 8 ▲ | 6 ▲ | 1 |
| ‡ 2007 | 523 (2.6) | | | | -2 | -7 |
| † 2003 | 525 (2.0) | | | | | -5 |
| ≡ 1995 | 530 (3.2) | | | | | |
| **New Zealand** | | | | | | |
| [2] 2019 | 503 (2.3) | -3 | 6 | -2 | -17 ▽ | -3 |
| 2015 | 506 (2.7) | | 9 ▲ | 1 | -14 ▽ | 0 |
| 2011 | 497 (2.4) | | | -7 ▽ | -23 ▽ | -8 |
| 2007 | 504 (2.7) | | | | -16 ▽ | -1 |
| 2003 | 520 (2.4) | | | | | 15 ▲ |
| 1995 | 505 (5.4) | | | | | |
| **Northern Ireland** | | | | | | |
| † 2019 | 518 (2.3) | -1 | 2 | | | |
| ‡ 2015 | 520 (2.2) | | 3 | | | |
| † 2011 | 517 (2.5) | | | | | |
| **Norway (5)** | | | | | | |
| † 2019 | 539 (2.2) | 2 | | | | |
| 2015 | 538 (2.6) | | | | | |
| **Oman** | | | | | | |
| 2019 | 435 (4.1) | 4 | 58 ▲ | | | |
| 2015 | 431 (3.1) | | 54 ▲ | | | |
| 2011 | 377 (4.3) | | | | | |
| **Philippines** | | | | | | |
| [2] Ж 2019 | 249 (7.5) | | | | -83 ▽ | |
| 2003 | 332 (9.6) | | | | | |
| **Poland** | | | | | | |
| 2019 | 531 (2.6) | -16 ▽ | | | | |
| 2015 | 547 (2.4) | | | | | |

Science Achievement Distribution

100 200 300 400 500 600 700 800

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.4: Differences in Average Science Achievement Across Assessment Years

(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1995 | |
| **Portugal** | | | | | | | |
| [2] 2019 | 504 (2.6) | -4 | -18 ▽ | | | 52 ▲ | |
| [2] 2015 | 508 (2.2) | | -14 ▽ | | | 56 ▲ | |
| 2011 | 522 (3.8) | | | | | 70 ▲ | |
| [2] 1995 | 452 (4.1) | | | | | | |
| **Qatar** | | | | | | | |
| 2019 | 449 (3.9) | 13 ▲ | 55 ▲ | | | | |
| 2015 | 436 (4.1) | | 42 ▲ | | | | |
| [2] 2011 | 394 (4.3) | | | | | | |
| **Russian Federation** | | | | | | | |
| [2] 2019 | 567 (3.0) | 0 | 15 ▲ | 21 ▲ | 41 ▲ | | |
| 2015 | 567 (3.2) | | 15 ▲ | 21 ▲ | 41 ▲ | | |
| 2011 | 552 (3.4) | | | 6 | 26 ▲ | | |
| 2007 | 546 (5.0) | | | | 20 ▲ | | |
| [2] 2003 | 526 (5.3) | | | | | | |
| **Saudi Arabia** | | | | | | | |
| [2] 2019 | 402 (4.1) | 12 | -27 ▽ | | | | |
| 2015 | 390 (4.9) | | -39 ▽ | | | | |
| 2011 | 429 (5.5) | | | | | | |
| **Serbia** | | | | | | | |
| [2] 2019 | 517 (3.5) | -8 | 1 | | | | |
| [3] 2015 | 525 (3.7) | | 9 | | | | |
| [2] 2011 | 516 (3.1) | | | | | | |
| **Singapore** | | | | | | | |
| [3] 2019 | 595 (3.4) | 4 | 11 ▲ | 8 | 29 ▲ | 71 ▲ | |
| [2] 2015 | 590 (3.7) | | 7 | 4 | 25 ▲ | 67 ▲ | |
| [2] 2011 | 583 (3.4) | | | -3 | 18 ▲ | 60 ▲ | |
| 2007 | 587 (4.1) | | | | 22 ▲ | 63 ▲ | |
| 2003 | 565 (5.5) | | | | | 42 ▲ | |
| 1995 | 523 (4.8) | | | | | | |
| **Slovak Republic** | | | | | | | |
| [2] 2019 | 521 (3.7) | 0 | -11 ▽ | -5 | | | |
| 2015 | 520 (2.6) | | -11 ▽ | -5 | | | |
| 2011 | 532 (3.7) | | | 6 | | | |
| 2007 | 526 (4.8) | | | | | | |
| **Spain** | | | | | | | |
| 2019 | 511 (2.0) | -7 ▽ | 6 | | | | |
| [2] 2015 | 518 (2.6) | | 13 ▲ | | | | |
| 2011 | 505 (3.1) | | | | | | |
| **Sweden** | | | | | | | |
| 2019 | 537 (3.3) | -3 | 4 | 12 ▲ | | | |
| [2] 2015 | 540 (3.6) | | 7 | 15 ▲ | | | |
| 2011 | 533 (2.8) | | | 9 ▲ | | | |
| 2007 | 525 (2.9) | | | | | | |
| **United Arab Emirates** | | | | | | | |
| 2019 | 473 (2.1) | 21 ▲ | 45 ▲ | | | | |
| 2015 | 451 (2.8) | | 23 ▲ | | | | |
| 2011 | 428 (2.5) | | | | | | |
| **United States** | | | | | | | |
| [2†] 2019 | 539 (2.7) | -7 ▽ | -5 | 0 | 3 | -3 | |
| [2†] 2015 | 546 (2.2) | | 2 | 7 ▲ | 10 ▲ | 4 | |
| [2] 2011 | 544 (2.1) | | | 5 | 8 ▲ | 2 | |
| [2†] 2007 | 539 (2.7) | | | | 3 | -3 | |
| [†] 2003 | 536 (2.5) | | | | | -6 | |
| 1995 | 542 (3.4) | | | | | | |




▲ Average from more recent year significantly higher

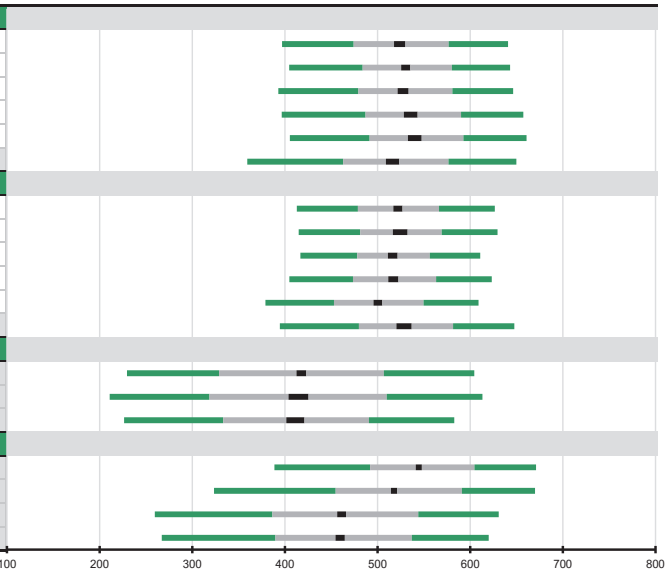
▽ Average from more recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.4: Differences in Average Science Achievement Across Assessment Years

(Continued)

| Country | Average Scale Score | Differences Between Years 2015 | 2011 | 2007 | 2003 | 1995 | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|
| **Benchmarking Participants** | | | | | | | |
| **Ontario, Canada** | | | | | | | |
| [2] 2019 | 524 (3.2) | -6 | -4 | -12 ▽ | -16 ▽ | 8 | |
| 2015 | 530 (2.5) | | 3 | -5 | -10 ▽ | 14 ▲ | |
| 2011 | 528 (3.1) | | | -8 | -13 ▽ | 11 ▲ | |
| [2] 2007 | 536 (3.8) | | | | -4 | 20 ▲ | |
| 2003 | 540 (3.8) | | | | | 24 ▲ | |
| [2] 1995 | 516 (3.7) | | | | | | |
| **Quebec, Canada** | | | | | | | |
| 2019 | 522 (2.5) | -3 | 6 | 5 | 22 ▲ | -7 | |
| [≡] 2015 | 525 (4.1) | | 8 | 7 | 24 ▲ | -4 | |
| 2011 | 516 (2.7) | | | -1 | 16 ▲ | -12 ▽ | |
| [2] 2007 | 517 (2.8) | | | | 17 ▲ | -11 ▽ | |
| 2003 | 500 (2.4) | | | | | -28 ▽ | |
| 1995 | 529 (4.2) | | | | | | |
| **Abu Dhabi, UAE** | | | | | | | |
| 2019 | 418 (2.8) | 3 | 6 | | | | |
| [2] 2015 | 415 (5.6) | | 3 | | | | |
| 2011 | 411 (5.0) | | | | | | |
| **Dubai, UAE** | | | | | | | |
| [2] 2019 | 545 (1.7) | 27 ▲ | 83 ▲ | 85 ▲ | | | |
| 2015 | 518 (1.8) | | 57 ▲ | 58 ▲ | | | |
| 2011 | 461 (2.5) | | | 2 | | | |
| [‡] 2007 | 460 (2.6) | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

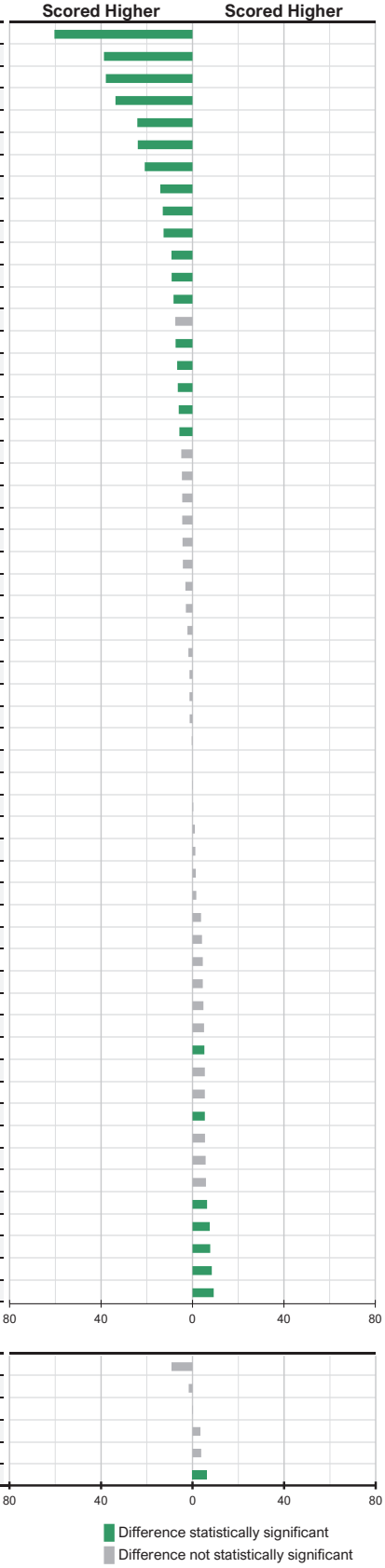
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement by Gender

Exhibit 2.5 shows the differences in average science achievement between girls and boys. In TIMSS 2019, fourth grade girls had higher average achievement than boys in 18 countries, there was gender equity in average science achievement in 33 countries, and boys had higher average achievement than girls in 7 countries.

## Exhibit 2.5: Average Science Achievement by Gender

| Country | Girls | | Boys | | Difference (Absolute Value) | Gender Difference |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Scale Score | Percent of Students | Average Scale Score | | Girls Scored Higher / Boys Scored Higher |
| 2 Saudi Arabia | 48 (0.8) | 434 (4.8) | 52 (0.8) | 373 (6.5) | 60 (8.3) | |
| Kuwait | 47 (2.6) | 413 (6.9) | 53 (2.6) | 374 (8.7) | 39 (10.3) | |
| 2 Ж Pakistan | 45 (4.7) | 311 (15.4) | 55 (4.7) | 273 (14.5) | 38 (15.8) | |
| Bahrain | 49 (1.2) | 510 (3.8) | 51 (1.2) | 476 (5.1) | 34 (6.1) | |
| Oman | 50 (0.7) | 447 (3.8) | 50 (0.7) | 423 (5.0) | 24 (3.6) | |
| 2 Ж Philippines | 48 (0.7) | 261 (7.8) | 52 (0.7) | 238 (7.8) | 24 (4.9) | |
| Ж South Africa (5) | 50 (0.6) | 335 (5.4) | 50 (0.6) | 314 (5.2) | 21 (3.9) | |
| North Macedonia | 48 (0.6) | 433 (6.5) | 52 (0.6) | 419 (6.7) | 14 (4.3) | |
| 2 Kosovo | 49 (1.0) | 420 (4.2) | 51 (1.0) | 407 (4.0) | 13 (3.6) | |
| Qatar | 50 (1.5) | 456 (6.0) | 50 (1.5) | 443 (3.7) | 13 (6.1) | |
| Armenia | 48 (0.8) | 471 (3.5) | 52 (0.8) | 462 (4.0) | 9 (3.1) | |
| Ψ Morocco | 49 (0.7) | 379 (6.4) | 51 (0.7) | 370 (5.8) | 9 (3.7) | |
| Albania | 49 (0.9) | 494 (3.9) | 51 (0.9) | 485 (3.9) | 8 (3.4) | |
| Bulgaria | 48 (0.9) | 525 (5.3) | 52 (0.9) | 518 (5.4) | 7 (4.3) | |
| 2 Serbia | 50 (0.9) | 521 (3.5) | 50 (0.9) | 513 (4.3) | 7 (3.5) | |
| Bosnia and Herzegovina | 49 (0.7) | 462 (3.1) | 51 (0.7) | 455 (3.5) | 7 (2.9) | |
| 2 Kazakhstan | 49 (0.7) | 497 (3.6) | 51 (0.7) | 491 (3.1) | 6 (2.8) | |
| Montenegro | 47 (0.6) | 457 (2.9) | 53 (0.6) | 451 (2.8) | 6 (2.8) | |
| Japan | 48 (0.5) | 565 (2.0) | 52 (0.5) | 559 (2.1) | 6 (2.0) | |
| Finland | 49 (0.9) | 557 (3.5) | 51 (0.9) | 552 (2.4) | 5 (3.1) | |
| 2 Latvia | 50 (0.9) | 544 (2.6) | 50 (0.9) | 540 (3.0) | 5 (2.9) | |
| 2 New Zealand | 48 (1.3) | 505 (3.2) | 52 (1.3) | 500 (2.8) | 5 (3.9) | |
| 2 Lithuania | 49 (0.9) | 540 (2.8) | 51 (0.9) | 536 (3.3) | 4 (3.4) | |
| United Arab Emirates | 50 (1.1) | 475 (3.1) | 50 (1.1) | 471 (2.6) | 4 (4.0) | |
| Azerbaijan | 47 (0.9) | 429 (3.9) | 53 (0.9) | 425 (3.5) | 4 (3.2) | |
| † Norway (5) | 48 (0.9) | 541 (2.4) | 52 (0.9) | 538 (3.1) | 3 (3.5) | |
| Poland | 49 (0.8) | 532 (2.8) | 51 (0.8) | 529 (3.2) | 3 (3.0) | |
| Sweden | 50 (1.1) | 538 (3.6) | 50 (1.1) | 536 (3.8) | 2 (3.3) | |
| France | 49 (1.0) | 489 (3.2) | 51 (1.0) | 487 (3.4) | 2 (2.8) | |
| † Northern Ireland | 50 (1.0) | 519 (2.9) | 50 (1.0) | 518 (2.8) | 1 (3.4) | |
| † Denmark | 50 (0.8) | 523 (2.7) | 50 (0.8) | 522 (2.8) | 1 (2.8) | |
| Australia | 49 (0.8) | 533 (2.9) | 51 (0.8) | 532 (2.7) | 1 (2.9) | |
| ≡ Netherlands | 49 (1.0) | 519 (3.1) | 51 (1.0) | 518 (3.3) | 0 (2.8) | |
| Croatia | 50 (1.2) | 524 (2.6) | 50 (1.2) | 524 (2.7) | 0 (3.1) | |
| † Hong Kong SAR | 46 (1.3) | 531 (3.1) | 54 (1.3) | 531 (4.3) | 0 (3.6) | |
| 2 England | 50 (1.0) | 537 (3.6) | 50 (1.0) | 537 (2.7) | 0 (3.5) | |
| 2 Russian Federation | 51 (1.1) | 567 (3.5) | 49 (1.1) | 568 (3.3) | 1 (3.0) | |
| Spain | 47 (0.8) | 511 (2.4) | 53 (0.8) | 512 (2.5) | 1 (2.9) | |
| Iran, Islamic Rep. of | 49 (2.1) | 440 (6.6) | 51 (2.1) | 442 (5.4) | 2 (8.7) | |
| Chinese Taipei | 48 (0.6) | 557 (2.0) | 52 (0.6) | 559 (2.2) | 2 (2.3) | |
| † Belgium (Flemish) | 51 (0.8) | 499 (2.3) | 49 (0.8) | 503 (2.8) | 4 (2.9) | |
| Cyprus | 52 (0.7) | 509 (2.8) | 48 (0.7) | 514 (4.1) | 4 (3.3) | |
| Ireland | 50 (1.1) | 526 (3.8) | 50 (1.1) | 530 (3.4) | 4 (3.5) | |
| Germany | 50 (0.8) | 516 (2.8) | 50 (0.8) | 520 (2.4) | 4 (2.8) | |
| Malta | 49 (0.7) | 493 (2.1) | 51 (0.7) | 498 (2.4) | 5 (3.7) | |
| 1 Georgia | 49 (0.9) | 452 (4.7) | 51 (0.9) | 457 (4.2) | 5 (4.1) | |
| 1 2 Canada | 49 (0.8) | 520 (2.1) | 51 (0.8) | 526 (2.2) | 5 (2.1) | |
| 2 Turkey (5) | 52 (1.4) | 524 (4.4) | 48 (1.4) | 529 (5.2) | 5 (4.6) | |
| 2 Slovak Republic | 49 (1.0) | 518 (3.8) | 51 (1.0) | 523 (4.4) | 5 (3.8) | |
| 2 † United States | 49 (0.8) | 536 (3.0) | 51 (0.8) | 541 (3.2) | 5 (2.7) | |
| 2 Portugal | 48 (0.9) | 501 (3.1) | 52 (0.9) | 506 (2.7) | 6 (2.9) | |
| Austria | 49 (1.0) | 519 (3.1) | 51 (1.0) | 525 (3.0) | 6 (3.3) | |
| Chile | 50 (1.3) | 466 (3.1) | 50 (1.3) | 472 (3.3) | 6 (3.7) | |
| Hungary | 48 (1.0) | 526 (3.2) | 52 (1.0) | 533 (3.1) | 6 (3.3) | |
| Italy | 50 (0.8) | 506 (3.3) | 50 (0.8) | 514 (3.3) | 8 (2.8) | |
| 3 Singapore | 49 (0.5) | 591 (3.6) | 51 (0.5) | 598 (3.8) | 8 (2.8) | |
| Czech Republic | 49 (0.9) | 529 (3.0) | 51 (0.9) | 538 (3.0) | 8 (3.1) | |
| Korea, Rep. of | 47 (0.7) | 583 (2.4) | 53 (0.7) | 592 (2.5) | 9 (2.5) | |
| **International Average** | **49 (0.2)** | **493 (0.6)** | **51 (0.2)** | **489 (0.6)** | | |
| **Benchmarking Participants** | | | | | | |
| Abu Dhabi, UAE | 50 (1.5) | 422 (3.8) | 50 (1.5) | 413 (3.9) | 9 (5.3) | |
| 2 Dubai, UAE | 49 (2.4) | 545 (3.6) | 51 (2.4) | 544 (2.4) | 2 (5.0) | |
| Moscow City, Russian Fed. | 49 (1.0) | 595 (2.5) | 51 (1.0) | 595 (2.6) | 0 (2.5) | |
| Madrid, Spain | 49 (1.0) | 521 (2.5) | 51 (1.0) | 524 (2.3) | 3 (2.6) | |
| 2 Ontario, Canada | 49 (1.6) | 522 (4.0) | 51 (1.6) | 526 (3.3) | 4 (3.7) | |
| Quebec, Canada | 48 (0.8) | 519 (2.7) | 52 (0.8) | 525 (3.0) | 6 (2.5) | |




Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

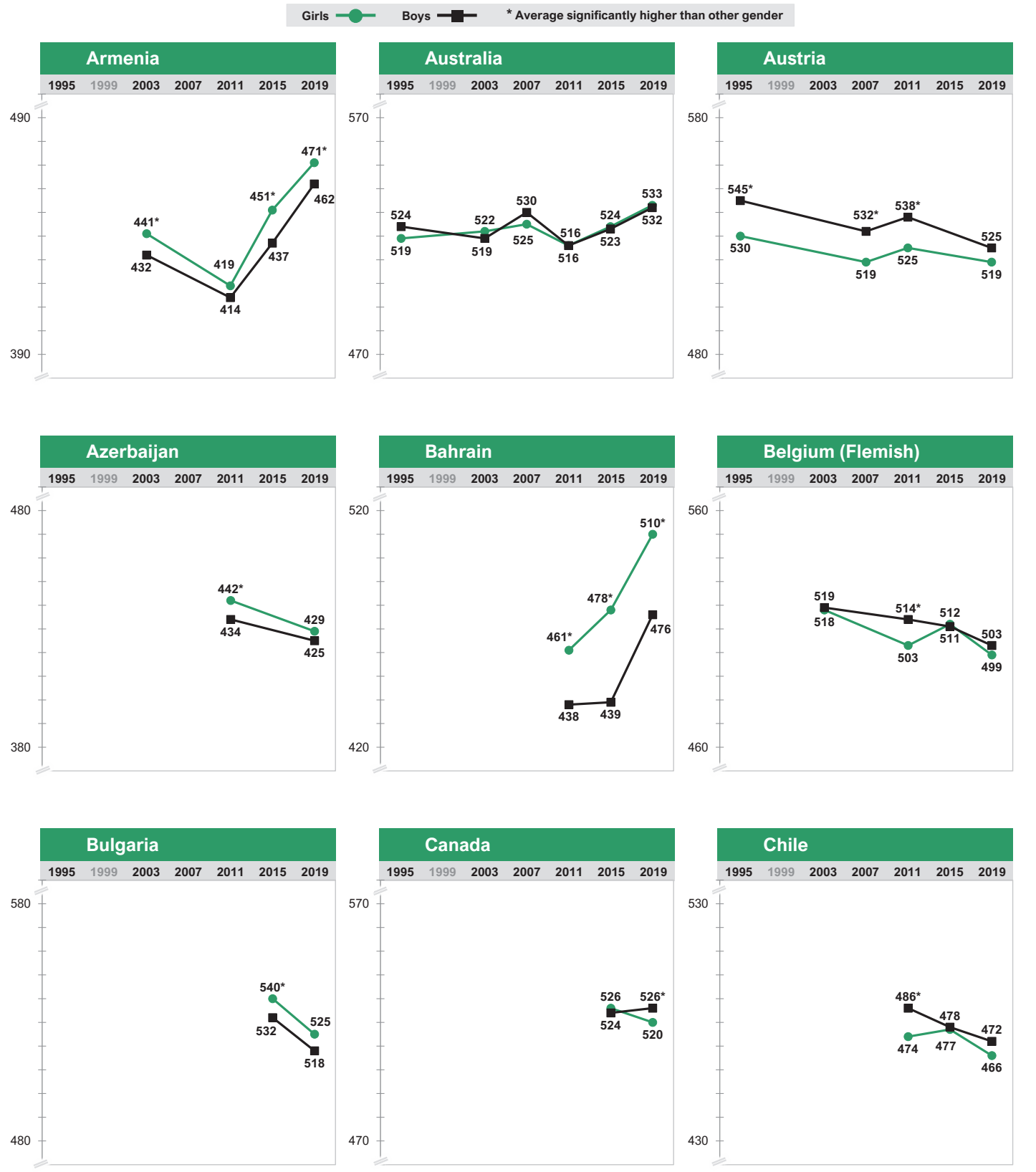
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement by Gender

For the TIMSS 2019 countries with comparable data from previous TIMSS assessments, Exhibit 2.6 contains graphs of average science achievement across assessments by gender. The countries are presented in alphabetical order. Most recently between 2015 and 2019, there were not a lot of changes, and the changes that did occur were varied. In Chinese Taipei, Hong Kong SAR, Portugal, Slovak Republic, and Spain, the gender gap favoring boys in 2015 closed in 2019. In Bulgaria, Finland, Sweden, and the United Arab Emirates, the gender gap favoring girls in 2015 closed in 2019. In Canada and Singapore, boys had higher average achievement than girls in 2019, whereas there was no gender gap in 2015. In Japan and Serbia, girls had higher achievement than boys in 2019, whereas that was not the situation in 2015.

## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



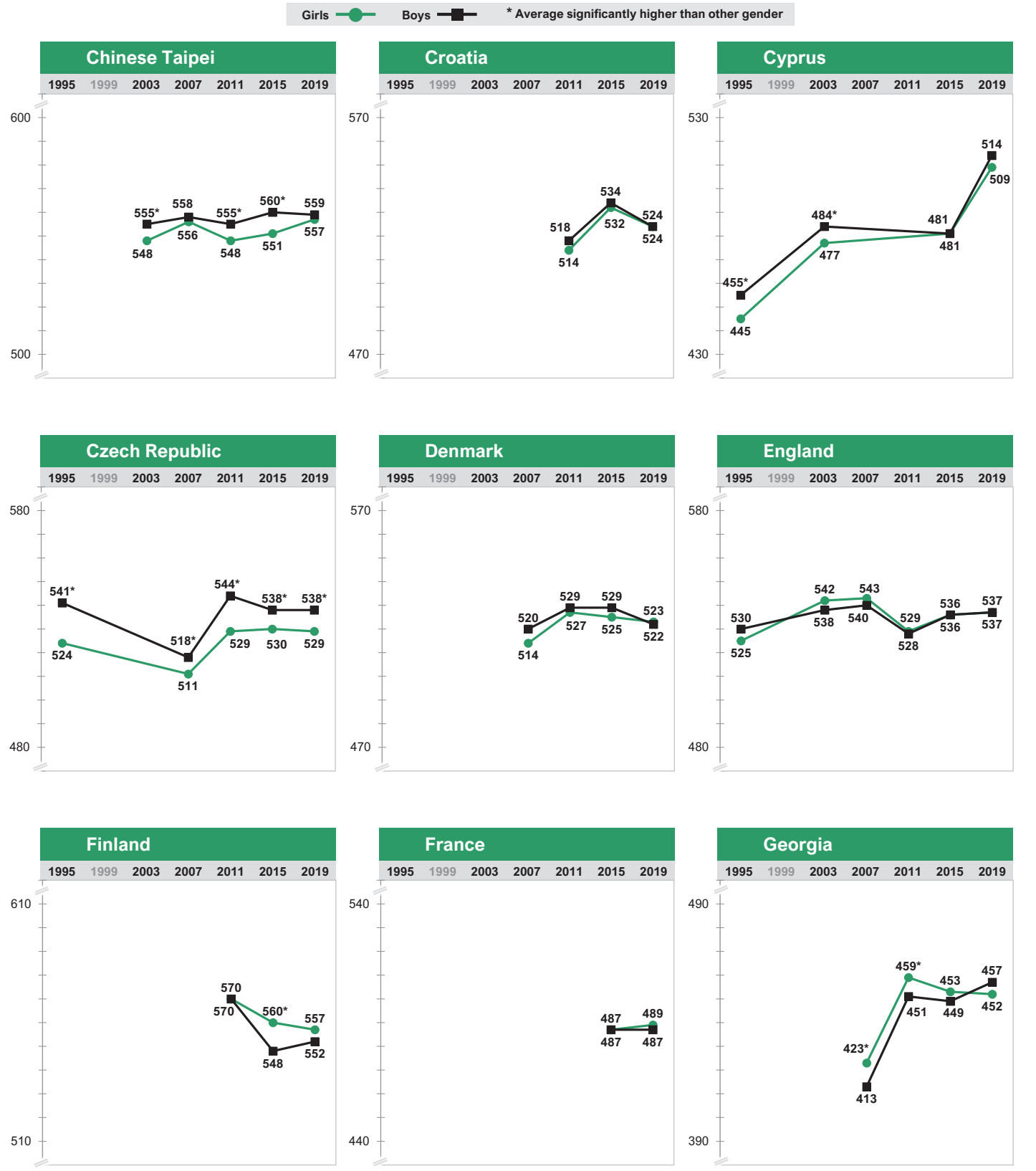

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



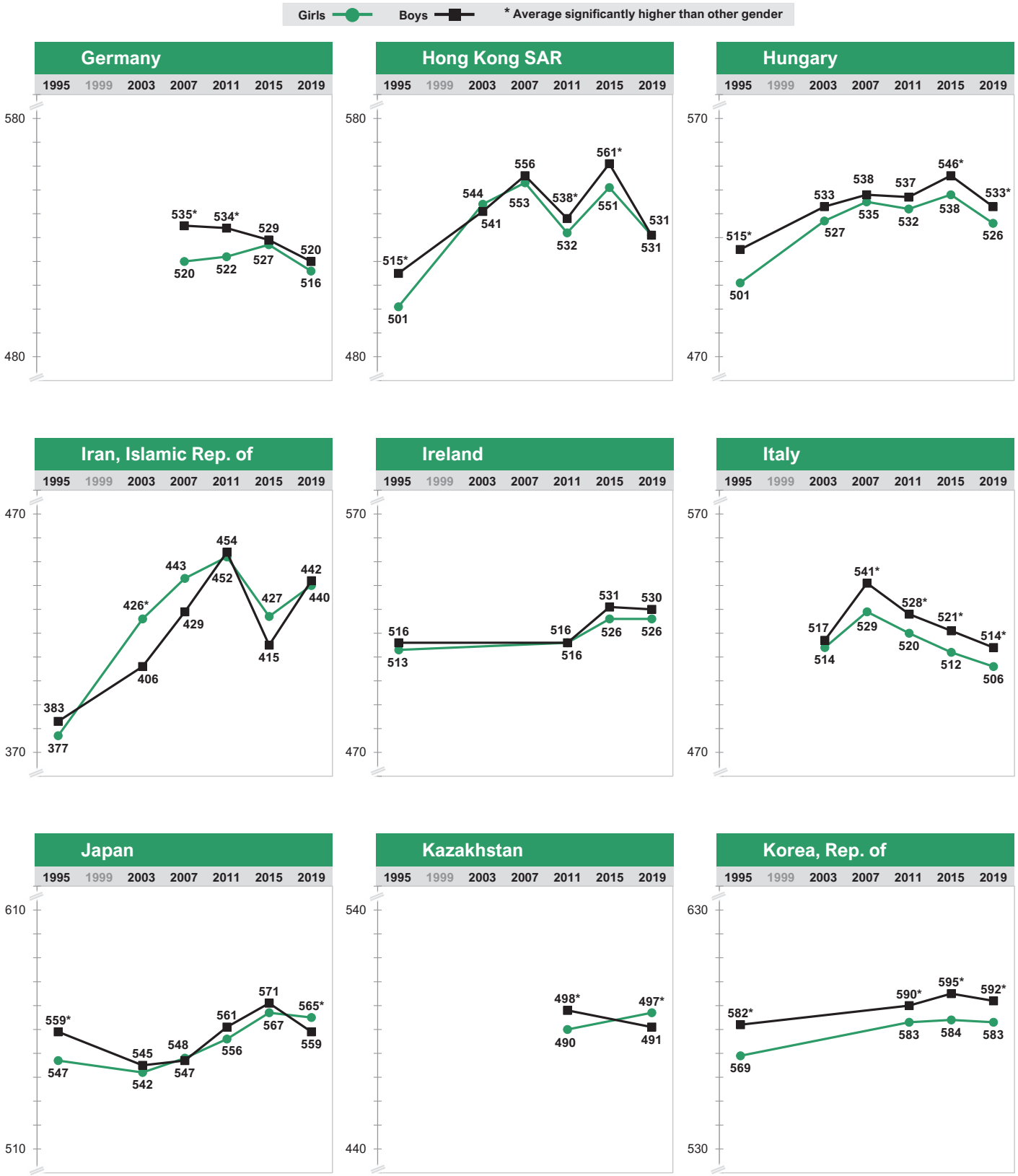

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

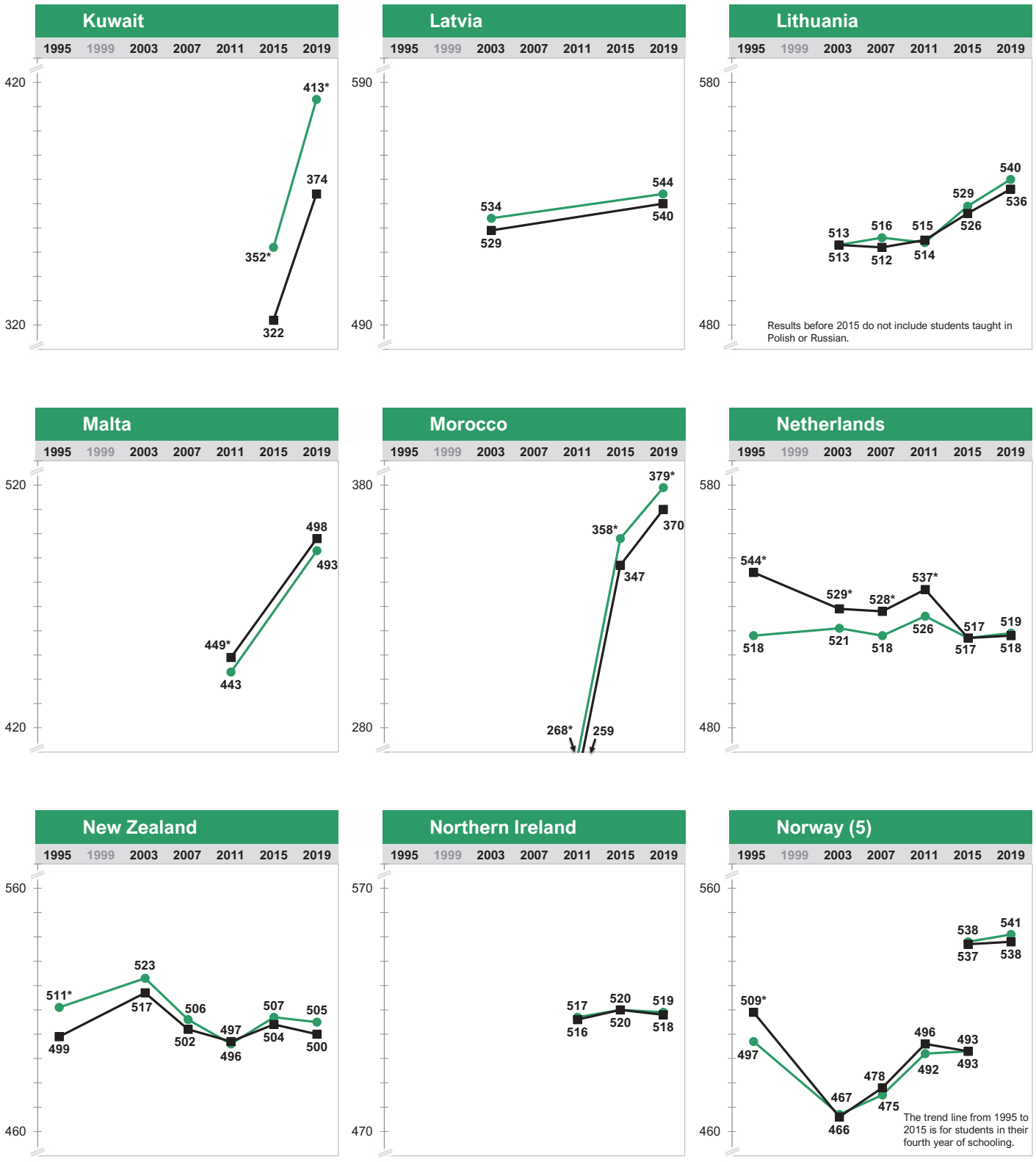
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.

Girls — Boys — * Average significantly higher than other gender



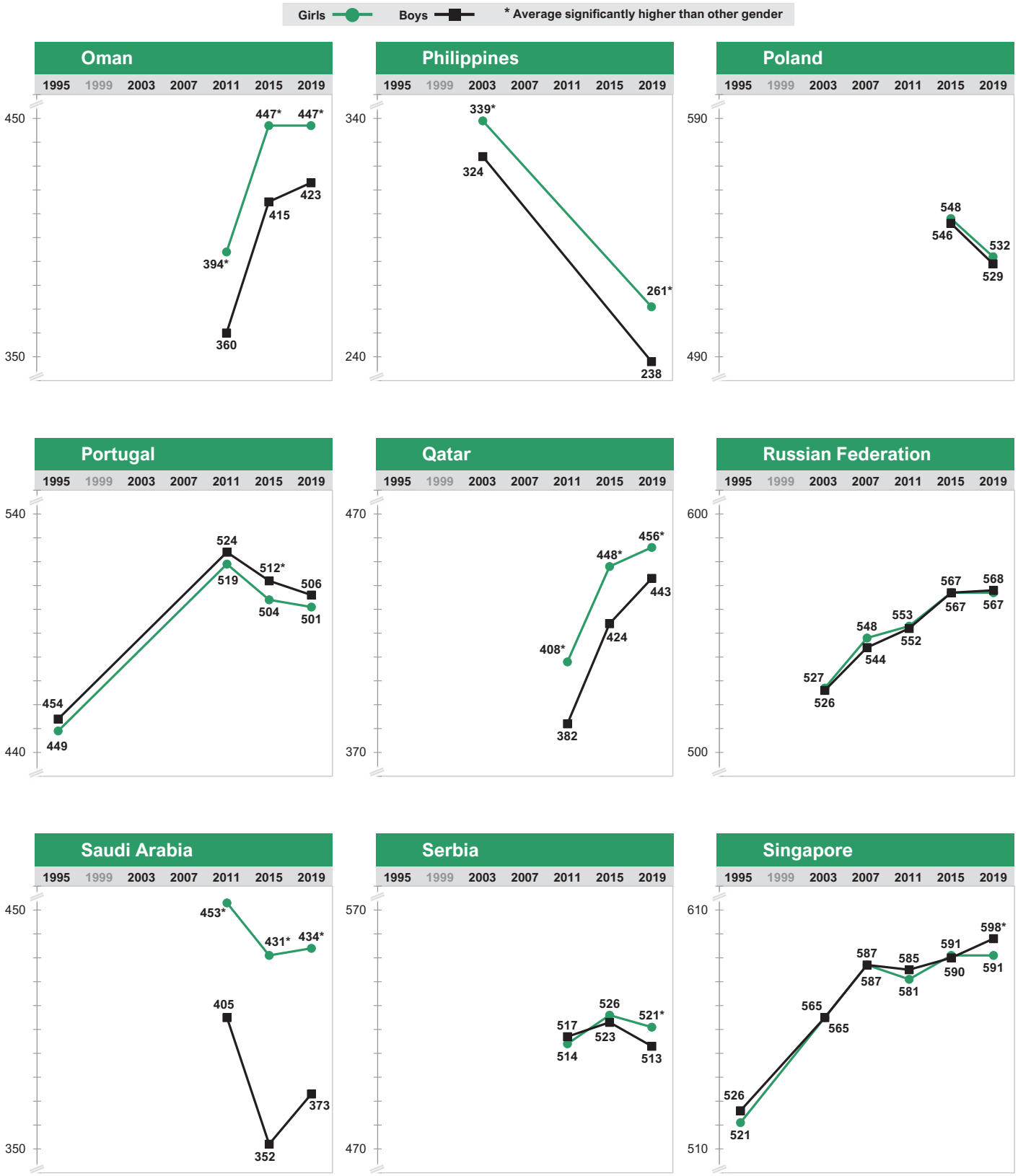

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



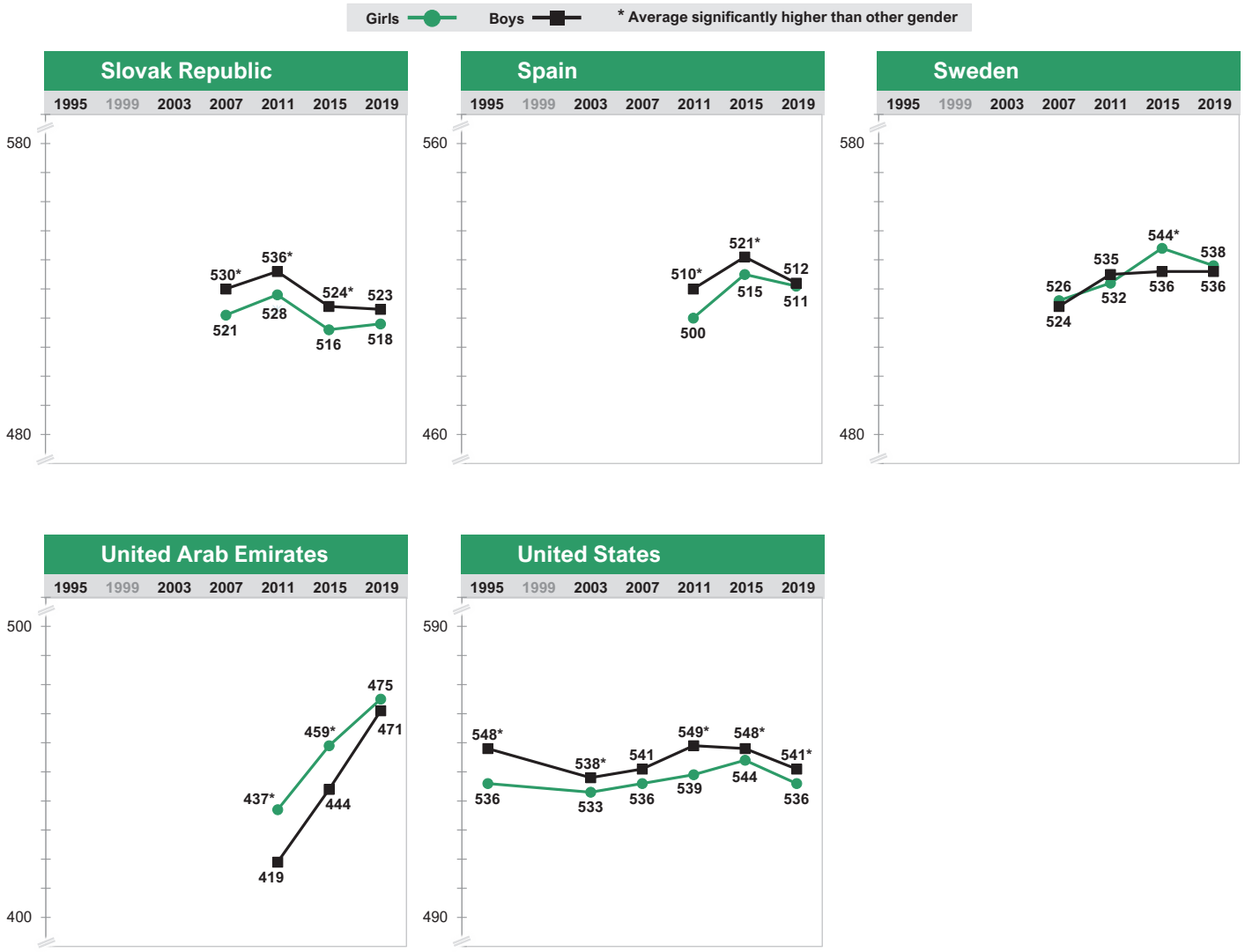

◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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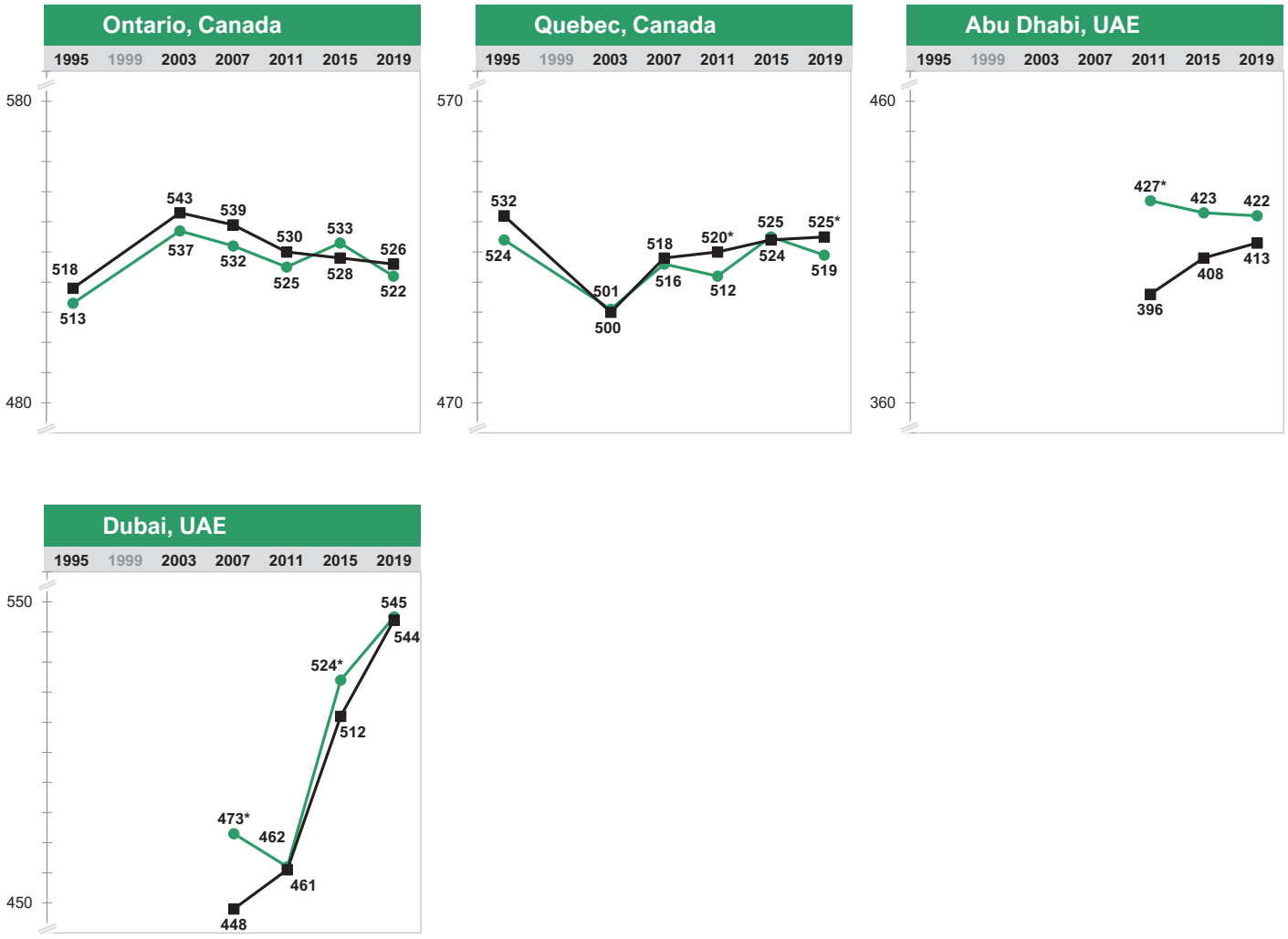
## Exhibit 2.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender◊

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.

Girls — Boys — * Average significantly higher than other gender

### Benchmarking Participants




◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Performance at TIMSS International Benchmarks in Science

## TIMSS 2019 International Benchmarks

To provide an interpretation of the results on the TIMSS fourth grade science achievement scale in relation to the students' performance on the assessment items, TIMSS describes achievement at four points along the scale as International Benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400). The descriptions of science achievement at the International Benchmarks were updated from TIMSS 2015 based on an analysis of the items that students with average achievement at each of the benchmarks answered successfully in TIMSS 2019.

Exhibit 2.7 summarizes what fourth grade students who reached each of the TIMSS International Benchmarks in 2019 could do in science. The progression in science achievement is evident from benchmark to benchmark, from showing limited knowledge of science facts at the Low International Benchmark to communicating their science understanding about a variety of topics in life science, physical science, and Earth science at the Advanced International Benchmark. As much as possible, each description references achievement in the three content areas covered in the assessment at the fourth grade, as well as science practices assessed by TIMSS. Science practices include skills from daily life and school studies that students use systematically to conduct scientific inquiry and investigation. The following tables show the target percentages for the content and cognitive domains.

**Target Percentages of Assessment Devoted to Content and Cognitive Domains – TIMSS 2019 Fourth Grade Science**

| Content Domain | Percentage |
|---|---|
| Life Science | 45% |
| Physical Science | 35% |
| Earth Science | 20% |

| Cognitive Domain | Percentage |
|---|---|
| Knowing | 40% |
| Applying | 40% |
| Reasoning | 20% |

The interactive map of the benchmark descriptions links to example items. It provides an overview of the science understanding demonstrated by the fourth grade students who performed at the four different levels on the achievement scale. The following sections provide more information about students' achievement in TIMSS 2019 at each International Benchmark as well as more detailed descriptions of each level together with example items.

## Exhibit 2.7: Summary of TIMSS 2019 International Benchmarks of Science Achievement

| | |
|---|---|
| **Advanced** International Benchmark | |
| **625** | *Students communicate their understanding of life, physical, and Earth sciences and demonstrate some knowledge of the process of scientific inquiry.* Students demonstrate knowledge of characteristics and life processes of a variety of organisms. They can communicate understanding of relationships in ecosystems and interactions between organisms and their environment. They communicate understanding of properties and states of matter and physical and chemical changes. Students communicate understanding of Earth's physical characteristics, processes, and history and show knowledge of Earth's revolution and rotation. |
| **High** International Benchmark | |
| **550** | *Students communicate and apply knowledge of life, physical, and Earth sciences.* Students communicate knowledge of characteristics of plants, animals, and their life cycles, and apply knowledge of ecosystems and of humans' and organisms' interactions with their environment. Students demonstrate knowledge of states and properties of matter and of energy transfer in practical contexts, and show some understanding of forces and motion. Students know various facts about the Earth's physical characteristics and show basic understanding of the Earth-Moon-Sun system. |
| **Intermediate** International Benchmark | |
| **475** | *Students show knowledge and understanding of some aspects of science.* Students demonstrate some basic knowledge of plants and animals. They demonstrate knowledge about some properties of matter and some facts related to electricity, and can apply elementary knowledge of forces and motion. They show some understanding of Earth's physical characteristics. |
| **Low** International Benchmark | |
| **400** | *Students show limited understanding of scientific concepts and limited knowledge of foundational science facts.* |

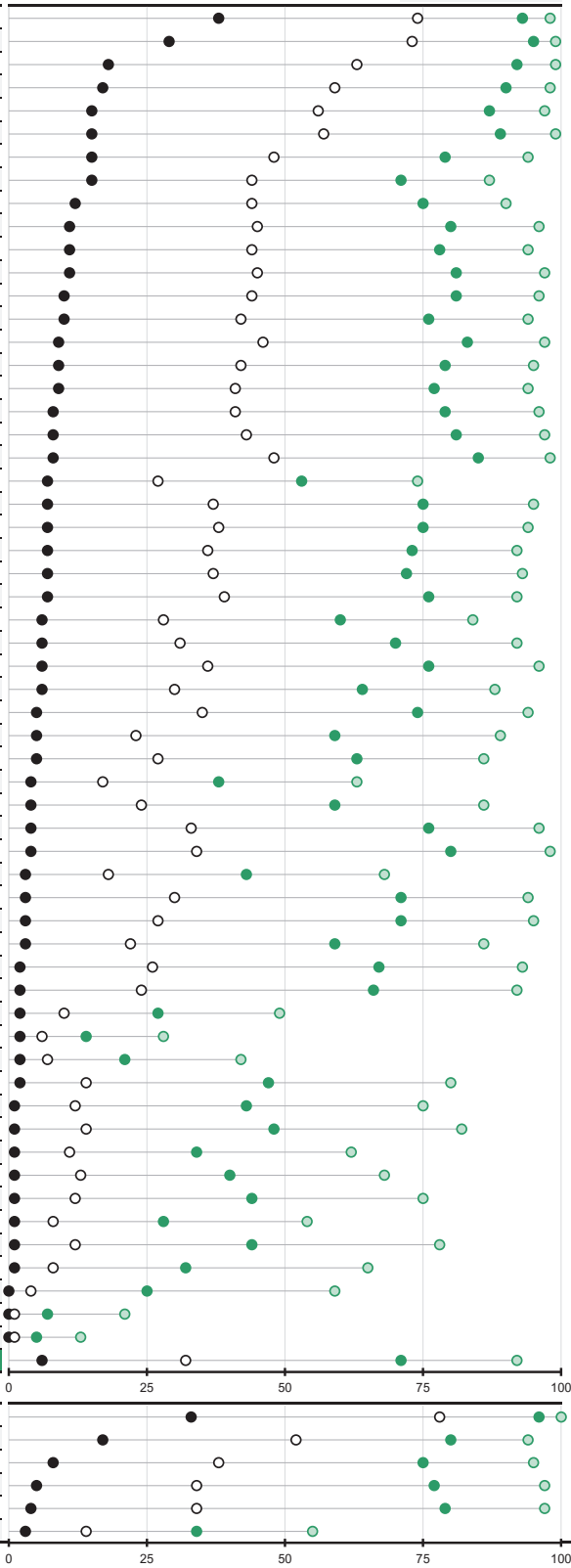
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Percentages of Students Reaching International Benchmarks

Exhibit 2.8 presents the percentage of students reaching each TIMSS 2019 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark, which is indicated in the graph with black dots. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages illustrated in the exhibit and shown in the columns to the right are cumulative. The two highest-performing countries had the highest percentages of students reaching the Advanced International Benchmark—38 percent in Singapore and 29 percent in Korea. The Russian Federation and Japan were next with 17–18 percent.

Most countries had fewer than 10 percent of their fourth grade students performing at the Advanced Benchmark. In general, more countries are having success in educating their fourth grade students to a minimal level of proficiency in science than to an advanced level. As a point of reference, Exhibit 2.8 provides the international median percentage of students reaching each benchmark at the bottom of the four right-hand columns. By definition, half the countries have a percentage in that column above the median and half below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced—6 percent, High—32 percent, Intermediate—71 percent, and Low—92 percent. Many TIMSS 2019 countries had more than 90 percent of their fourth grade students reaching the Low Benchmark, and in three countries—Korea, the Russian Federation, and Chinese Taipei—essentially all the students (99%) reached this benchmark.

# Exhibit 2.8: Percentages of Students Reaching International Benchmarks of Science Achievement




| Country | Advanced Benchmark (625) | High Benchmark (550) | Intermediate Benchmark (475) | Low Benchmark (400) |
|---|---|---|---|---|
| [3] Singapore | 38 (1.9) | 74 (1.7) | 93 (0.9) | 98 (0.4) |
| Korea, Rep. of | 29 (1.2) | 73 (1.3) | 95 (0.6) | 99 (0.2) |
| [2] Russian Federation | 18 (1.3) | 63 (1.9) | 92 (1.0) | 99 (0.3) |
| Japan | 17 (0.8) | 59 (1.2) | 90 (0.7) | 98 (0.4) |
| Finland | 15 (1.1) | 56 (1.4) | 87 (1.0) | 97 (0.5) |
| Chinese Taipei | 15 (0.9) | 57 (1.1) | 89 (0.9) | 99 (0.3) |
| [2] † United States | 15 (0.8) | 48 (1.3) | 79 (1.1) | 94 (0.6) |
| Bulgaria | 15 (1.0) | 44 (2.0) | 71 (2.1) | 87 (1.4) |
| [2] Turkey (5) | 12 (1.0) | 44 (1.9) | 75 (1.7) | 90 (1.1) |
| Sweden | 11 (1.0) | 45 (1.8) | 80 (1.5) | 96 (0.6) |
| Australia | 11 (0.9) | 44 (1.5) | 78 (1.2) | 94 (0.7) |
| [2] Lithuania | 11 (0.9) | 45 (1.5) | 81 (1.4) | 97 (0.4) |
| [2] England | 10 (1.1) | 44 (1.7) | 81 (1.2) | 96 (0.6) |
| Hungary | 10 (0.6) | 42 (1.3) | 76 (1.4) | 94 (0.7) |
| † Norway (5) | 9 (0.7) | 46 (1.6) | 83 (1.2) | 97 (0.5) |
| Poland | 9 (0.8) | 42 (1.6) | 79 (1.3) | 95 (0.5) |
| Ireland | 9 (0.6) | 41 (1.6) | 77 (1.7) | 94 (0.8) |
| † Hong Kong SAR | 8 (0.9) | 41 (1.8) | 79 (1.6) | 96 (0.6) |
| Czech Republic | 8 (0.9) | 43 (2.2) | 81 (1.2) | 97 (0.5) |
| [2] Latvia | 8 (0.9) | 48 (1.6) | 85 (1.2) | 98 (0.5) |
| United Arab Emirates | 7 (0.4) | 27 (0.7) | 53 (0.9) | 74 (0.7) |
| [1 2] Canada | 7 (0.6) | 37 (1.1) | 75 (1.0) | 95 (0.4) |
| Austria | 7 (0.7) | 38 (1.4) | 75 (1.4) | 94 (0.8) |
| [2] Serbia | 7 (0.7) | 36 (1.7) | 73 (1.5) | 92 (1.0) |
| Germany | 7 (0.9) | 37 (1.3) | 72 (1.2) | 93 (0.7) |
| [2] Slovak Republic | 7 (0.8) | 39 (1.5) | 76 (1.6) | 92 (1.2) |
| Bahrain | 6 (0.7) | 28 (1.3) | 60 (1.5) | 84 (1.1) |
| Cyprus | 6 (0.8) | 31 (1.6) | 70 (1.5) | 92 (0.8) |
| † Denmark | 6 (0.7) | 36 (1.3) | 76 (1.3) | 96 (0.5) |
| [2] New Zealand | 6 (0.5) | 30 (1.3) | 64 (1.2) | 88 (0.8) |
| † Northern Ireland | 5 (0.7) | 35 (1.4) | 74 (1.5) | 94 (0.7) |
| [2] Kazakhstan | 5 (0.8) | 23 (1.5) | 59 (1.7) | 89 (1.0) |
| Malta | 5 (0.4) | 27 (0.8) | 63 (0.8) | 86 (0.7) |
| Oman | 4 (0.8) | 17 (1.3) | 38 (1.4) | 63 (1.2) |
| Albania | 4 (0.5) | 24 (1.5) | 59 (1.8) | 86 (1.4) |
| ≡ Netherlands | 4 (0.9) | 33 (1.7) | 76 (1.7) | 96 (0.6) |
| Croatia | 4 (0.5) | 34 (1.4) | 80 (1.3) | 98 (0.4) |
| Qatar | 3 (0.6) | 18 (1.2) | 43 (1.7) | 68 (1.5) |
| Spain | 3 (0.5) | 30 (1.1) | 71 (1.3) | 94 (0.7) |
| Italy | 3 (0.7) | 27 (1.8) | 71 (1.6) | 95 (0.8) |
| France | 3 (0.4) | 22 (1.3) | 59 (1.6) | 86 (1.0) |
| [2] Portugal | 2 (0.4) | 26 (1.4) | 67 (1.5) | 93 (0.6) |
| † Belgium (Flemish) | 2 (0.3) | 24 (1.1) | 66 (1.5) | 92 (0.6) |
| Kuwait | 2 (0.4) | 10 (1.3) | 27 (2.0) | 49 (2.1) |
| Ж South Africa (5) | 2 (0.3) | 6 (0.6) | 14 (1.2) | 28 (1.5) |
| Ψ Morocco | 2 (0.7) | 7 (1.1) | 21 (1.6) | 42 (2.0) |
| Armenia | 2 (0.4) | 14 (1.2) | 47 (1.7) | 80 (1.5) |
| [1] Georgia | 1 (0.4) | 12 (1.1) | 43 (2.1) | 75 (1.8) |
| Chile | 1 (0.2) | 14 (0.9) | 48 (1.8) | 82 (1.3) |
| North Macedonia | 1 (0.4) | 11 (1.3) | 34 (2.5) | 62 (2.6) |
| Iran, Islamic Rep. of | 1 (0.3) | 13 (1.0) | 40 (1.7) | 68 (1.8) |
| Montenegro | 1 (0.2) | 12 (0.9) | 44 (1.6) | 75 (0.9) |
| [2] Saudi Arabia | 1 (0.2) | 8 (0.6) | 28 (1.1) | 54 (1.5) |
| Bosnia and Herzegovina | 1 (0.2) | 12 (0.9) | 44 (1.5) | 78 (1.4) |
| Azerbaijan | 1 (0.2) | 8 (0.6) | 32 (1.3) | 65 (1.5) |
| [2] Kosovo | 0 (0.1) | 4 (0.6) | 25 (1.6) | 59 (1.7) |
| [2] Ж Pakistan | 0 (0.1) | 1 (0.4) | 7 (1.4) | 21 (3.2) |
| [2] Ж Philippines | 0 (0.0) | 1 (0.3) | 5 (0.7) | 13 (1.4) |
| **International Median** | **6** | **32** | **71** | **92** |
| **Benchmarking Participants** | | | | |
| Moscow City, Russian Fed. | 33 (1.4) | 78 (1.2) | 96 (0.5) | 100 (0.1) |
| [2] Dubai, UAE | 17 (0.8) | 52 (0.8) | 80 (0.7) | 94 (0.5) |
| [2] Ontario, Canada | 8 (1.0) | 38 (1.8) | 75 (1.7) | 95 (0.8) |
| Quebec, Canada | 5 (0.7) | 34 (1.5) | 77 (1.7) | 97 (0.5) |
| Madrid, Spain | 4 (0.7) | 34 (1.2) | 79 (1.3) | 97 (0.4) |
| Abu Dhabi, UAE | 3 (0.3) | 14 (0.8) | 34 (0.9) | 55 (1.0) |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Percentages of Students Reaching International Benchmarks

Exhibit 2.9 shows the changes in percentages of students reaching the benchmarks for countries that have comparable data from previous assessments. Most recently, there were about as many decreases as increases at each level across the distribution. Of the 44 countries participating in both 2015 and 2019, 5 increased and 5 decreased at the Advanced International Benchmark, 8 increased and 7 decreased at the High Benchmark, 7 increased and 9 decreased at the Intermediate Benchmark, and 9 increased and 6 decreased at the Low Benchmark.

The recent trends from 2015 differ from previous assessments, when the countries made progress at all but the Advanced Benchmark. The pattern across the benchmarks between 2007 and 2019 shows decreases at the Advanced Benchmark but increases at the other three levels. Of the 21 countries that also participated in TIMSS 2007, 4 increased and 8 decreased at the Advanced International Benchmark, 7 increased and 4 decreased at the High Benchmark, 9 increased and 3 decreased at the Intermediate Benchmark, and 6 increased and only 1 decreased at the Low Benchmark. For the 16 countries with data for 1995 and 2019, although the Advanced International Benchmark had 7 increases and 5 decreases, there were substantial gains at the other three levels—High International Benchmark with 9 increases and 2 decreases, Intermediate International Benchmark with 11 increases and 2 decreases, and Low International Benchmark with 10 increases and 1 decrease.

# Exhibit 2.9: Percentages of Students Reaching International Benchmarks of Science Achievement Across Assessment Years

| Country | Advanced International Benchmark (625) Percent of Students | | | | | | High International Benchmark (550) Percent of Students | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 |
| Singapore | 38 | 37 | 33 | 36 | 25 ▲ | 14 ▲ | 74 | 71 | 68 ▲ | 68 ▲ | 61 ▲ | 42 ▲ |
| Korea, Rep. of | 29 | 29 | 29 | | | 22 ▲ | 73 | 75 | 73 | | | 67 ▲ |
| Russian Federation | 18 | 20 | 16 | 16 | 11 ▲ | | 63 | 62 | 52 ▲ | 49 ▲ | 39 ▲ | |
| Japan | 17 | 19 | 14 ▲ | 12 ▲ | 12 ▲ | 15 ▲ | 59 | 63 ▽ | 58 | 51 ▲ | 49 ▲ | 54 ▲ |
| Finland | 15 | 13 | 20 ▽ | | | | 56 | 54 | 65 ▽ | | | |
| Chinese Taipei | 15 | 14 | 15 | 19 ▽ | 14 | | 57 | 56 | 53 ▲ | 55 | 52 ▲ | |
| United States | 15 | 16 | 15 | 15 | 13 | 19 ▽ | 48 | 51 | 49 | 47 | 45 | 50 |
| Bulgaria | 15 | 16 | | | | | 44 | 50 | | | | |
| Sweden | 11 | 11 | 10 | 8 ▲ | | | 45 | 47 | 44 | 37 ▲ | | |
| Australia | 11 | 8 ▲ | 7 ▲ | 10 | 9 | 13 | 44 | 39 ▲ | 35 ▲ | 41 | 38 ▲ | 40 |
| Lithuania | 11 | 7 ▲ | 4 ▲ | 3 ▲ | 3 ▲ | | 45 | 39 ▲ | 31 ▲ | 30 ▲ | 30 ▲ | |
| England | 10 | 10 | 11 | 14 ▽ | 15 ▽ | 15 ▽ | 44 | 43 | 42 | 48 | 47 | 42 |
| Hungary | 10 | 14 ▽ | 13 ▽ | 13 ▽ | 10 | 7 ▲ | 42 | 50 ▽ | 46 | 47 ▽ | 42 | 32 ▲ |
| Norway (5) | 9 | 7 | | | | | 46 | 44 | | | | |
| Poland | 9 | 12 ▽ | | | | | 42 | 51 ▽ | | | | |
| Ireland | 9 | 7 | 7 | | | 8 | 41 | 40 | 35 ▲ | | | 36 ▲ |
| Hong Kong SAR | 8 | 16 ▽ | 9 | 14 ▽ | 7 | 5 ▲ | 41 | 55 ▽ | 45 | 55 ▽ | 47 ▽ | 30 ▲ |
| Czech Republic | 8 | 9 | 10 | 7 | | 12 ▽ | 43 | 43 | 44 | 33 ▲ | | 42 |
| Latvia | 8 | | | | 8 | | 48 | | | | 41 ▲ | |
| United Arab Emirates | 7 | 6 | 3 ▲ | | | | 27 | 22 ▲ | 14 ▲ | | | |
| Canada | 7 | 7 | | | | | 37 | 38 | | | | |
| Austria | 7 | | 8 | 9 | | 13 ▽ | 38 | | 42 ▽ | 39 | | 45 ▽ |
| Serbia | 7 | 8 | 8 | | | | 36 | 40 ▽ | 35 | | | |
| Germany | 7 | 8 | 7 | 10 ▽ | | | 37 | 40 | 39 | 41 ▽ | | |
| Slovak Republic | 7 | 9 | 10 ▽ | 11 ▽ | | | 39 | 40 | 44 ▽ | 42 | | |
| Bahrain | 6 | 4 ▲ | 4 ▲ | | | | 28 | 19 ▲ | 17 ▲ | | | |
| Cyprus | 6 | 2 ▲ | | | 2 ▲ | 1 ▲ | 31 | 18 ▲ | | | 17 ▲ | 11 ▲ |
| Denmark | 6 | 7 | 8 ▽ | 7 | | | 36 | 39 | 39 | 35 | | |
| New Zealand | 6 | 6 | 5 | 8 ▽ | 9 ▽ | 11 ▽ | 30 | 32 | 28 | 32 | 38 ▽ | 35 ▽ |
| Northern Ireland | 5 | 5 | 5 | | | | 35 | 34 | 33 | | | |
| Kazakhstan | 5 | | 7 | | | | 23 | | 28 ▽ | | | |
| Malta | 5 | | 2 ▲ | | | | 27 | | 14 ▲ | | | |
| Oman | 4 | 4 | 1 ▲ | | | | 17 | 16 | 7 ▲ | | | |
| Netherlands | 4 | 3 | 3 | 4 | 3 | 6 | 33 | 30 | 37 | 34 | 32 | 38 |
| Croatia | 4 | 6 ▽ | 3 | | | | 34 | 41 ▽ | 30 ▲ | | | |
| Qatar | 3 | 3 | 2 | | | | 18 | 15 | 11 ▲ | | | |
| Spain | 3 | 5 ▽ | 4 | | | | 30 | 34 ▽ | 28 | | | |
| Italy | 3 | 4 | 8 ▽ | 13 ▽ | 9 ▽ | | 27 | 32 | 37 ▽ | 44 ▽ | 35 ▽ | |
| France | 3 | 2 | | | | | 22 | 20 | | | | |
| Portugal | 2 | 2 | 7 ▽ | | | 2 | 26 | 25 | 35 ▽ | | | 13 ▲ |
| Belgium (Flemish) | 2 | 3 | 2 | | 2 | | 24 | 27 | 24 | | 28 ▽ | |
| Kuwait | 2 | 1 ▲ | | | | | 10 | 4 ▲ | | | | |
| Morocco | 2 | 1 | 0 ▲ | | | | 7 | 5 | 1 ▲ | | | |
| Armenia | 2 | 1 | 1 ▲ | | 2 | | 14 | 10 ▲ | 6 ▲ | | 10 ▲ | |
| Georgia | 1 | 1 | 1 | 1 ▲ | | | 12 | 12 | 13 | 5 ▲ | | |
| Chile | 1 | 2 | 2 ▽ | | | | 14 | 16 | 19 ▽ | | | |
| Iran, Islamic Rep. of | 1 | 1 | 3 ▽ | 2 | 1 ▲ | 0 ▲ | 13 | 9 ▲ | 16 ▽ | 12 | 7 ▲ | 3 ▲ |
| Saudi Arabia | 1 | 1 | 3 ▽ | | | | 8 | 8 | 12 ▽ | | | |
| Azerbaijan | 1 | | 2 ▽ | | | | 8 | | 13 ▽ | | | |
| Philippines | 0 | | | | 2 | | 1 | | | | 6 ▽ | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Dubai, UAE | 17 | 14 ▲ | 6 ▲ | 4 ▲ | | | 52 | 42 ▲ | 23 ▲ | 21 ▲ | | |
| Ontario, Canada | 8 | 9 | 9 | 12 ▽ | 13 ▽ | 10 | 38 | 41 | 40 | 45 ▽ | 47 ▽ | 37 |
| Quebec, Canada | 5 | 6 | 3 ▲ | 5 | 3 ▲ | 9 ▽ | 34 | 35 | 29 ▲ | 32 | 25 ▲ | 40 |
| Abu Dhabi, UAE | 3 | 4 | 2 ▲ | | | | 14 | 15 | 10 ▲ | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

An empty cell indicates a country did not participate in that year's assessment or did not have comparable data.
See Appendix A for country participation in previous TIMSS assessments.
Results for Lithuania before 2015 do not include students taught in Polish or Russian.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.9: Percentages of Students Reaching International Benchmarks of Science Achievement Across Assessment Years

(Continued)

| Country | Intermediate International Benchmark (475) Percent of Students | | | | | | Low International Benchmark (400) Percent of Students | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 |
| Singapore | 93 | 90 | 89 ▲ | 88 ▲ | 86 ▲ | 71 ▲ | 98 | 97 | 97 ▲ | 96 ▲ | 95 ▲ | 89 ▲ |
| Korea, Rep. of | 95 | 96 | 95 | | | 93 | 99 | 100 | 99 | | | 99 |
| Russian Federation | 92 | 91 | 86 ▲ | 82 ▲ | 74 ▲ | | 99 | 99 | 98 ▲ | 96 ▲ | 93 ▲ | |
| Japan | 90 | 93 ▽ | 90 | 86 ▲ | 84 ▲ | 87 ▲ | 98 | 99 | 99 | 97 | 96 ▲ | 97 |
| Finland | 87 | 89 | 92 ▽ | | | | 97 | 99 | 99 ▽ | | | |
| Chinese Taipei | 89 | 88 | 85 ▲ | 86 ▲ | 87 | | 99 | 98 | 97 ▲ | 97 ▲ | 98 | |
| United States | 79 | 81 ▽ | 81 ▽ | 78 | 78 | 78 | 94 | 95 ▽ | 96 ▽ | 94 | 94 | 92 |
| Bulgaria | 71 | 77 ▽ | | | | | 87 | 90 | | | | |
| Sweden | 80 | 82 | 79 | 76 ▲ | | | 96 | 96 | 95 | 95 | | |
| Australia | 78 | 75 | 72 ▲ | 76 | 74 | 72 ▲ | 94 | 94 | 91 ▲ | 93 | 92 | 89 ▲ |
| Lithuania | 81 | 78 | 73 ▲ | 74 ▲ | 73 ▲ | | 97 | 96 | 95 ▲ | 95 | 95 ▲ | |
| England | 81 | 81 | 76 ▲ | 81 | 79 | 72 ▲ | 96 | 97 | 93 ▲ | 95 | 94 ▲ | 90 ▲ |
| Hungary | 76 | 81 | 78 | 78 | 76 | 67 ▲ | 94 | 94 | 93 | 93 | 94 | 90 ▲ |
| Norway (5) | 83 | 85 | | | | | 97 | 98 | | | | |
| Poland | 79 | 85 ▽ | | | | | 95 | 97 ▽ | | | | |
| Ireland | 77 | 79 | 72 ▲ | | | 70 ▲ | 94 | 96 | 92 | | | 91 ▲ |
| Hong Kong SAR | 79 | 88 ▽ | 82 | 88 ▽ | 87 ▽ | 69 ▲ | 96 | 98 ▽ | 96 | 98 ▽ | 98 ▽ | 91 ▲ |
| Czech Republic | 81 | 81 | 81 | 72 ▲ | | 77 ▲ | 97 | 96 | 97 | 93 ▲ | | 95 ▲ |
| Latvia | 85 | | | | 80 ▲ | | 98 | | | | 96 ▲ | |
| United Arab Emirates | 53 | 46 ▲ | 36 ▲ | | | | 74 | 67 ▲ | 61 ▲ | | | |
| Canada | 75 | 77 | | | | | 95 | 95 | | | | |
| Austria | 75 | | 79 ▽ | 76 | | 79 ▽ | 94 | | 96 | 93 | | 94 |
| Serbia | 73 | 77 | 72 | | | | 92 | 93 | 91 | | | |
| Germany | 72 | 78 ▽ | 78 ▽ | 76 ▽ | | | 93 | 96 ▽ | 96 ▽ | 94 | | |
| Slovak Republic | 76 | 74 | 79 | 75 | | | 92 | 91 | 94 | 92 | | |
| Bahrain | 60 | 47 ▲ | 43 ▲ | | | | 84 | 72 ▲ | 70 ▲ | | | |
| Cyprus | 70 | 56 ▲ | | | 55 ▲ | 39 ▲ | 92 | 86 ▲ | | | 86 ▲ | 74 ▲ |
| Denmark | 76 | 78 | 78 | 72 ▲ | | | 96 | 96 | 95 | 93 ▲ | | |
| New Zealand | 64 | 67 | 63 | 65 | 73 ▽ | 66 | 88 | 88 | 86 | 87 | 91 ▽ | 85 |
| Northern Ireland | 74 | 76 | 74 | | | | 94 | 95 | 94 | | | |
| Kazakhstan | 59 | | 58 | | | | 89 | | 84 ▲ | | | |
| Malta | 63 | | 41 ▲ | | | | 86 | | 70 ▲ | | | |
| Oman | 38 | 38 | 23 ▲ | | | | 63 | 61 | 45 ▲ | | | |
| Netherlands | 76 | 76 | 86 ▽ | 79 | 83 ▽ | 82 ▽ | 96 | 97 | 99 ▽ | 97 | 99 ▽ | 98 ▽ |
| Croatia | 80 | 83 | 75 ▲ | | | | 98 | 98 | 96 ▲ | | | |
| Qatar | 43 | 39 | 29 ▲ | | | | 68 | 64 ▲ | 50 ▲ | | | |
| Spain | 71 | 74 | 67 | | | | 94 | 95 | 92 | | | |
| Italy | 71 | 75 | 76 ▽ | 78 ▽ | 70 | | 95 | 95 | 95 | 94 | 91 ▲ | |
| France | 59 | 58 | | | | | 86 | 88 | | | | |
| Portugal | 67 | 72 ▽ | 75 ▽ | | | 43 ▲ | 93 | 96 ▽ | 95 | | | 73 ▲ |
| Belgium (Flemish) | 66 | 73 ▽ | 73 ▽ | | 79 ▽ | | 92 | 96 ▽ | 96 ▽ | | 98 ▽ | |
| Kuwait | 27 | 15 ▲ | | | | | 49 | 33 ▲ | | | | |
| Morocco | 21 | 17 | 6 ▲ | | | | 42 | 35 ▲ | 16 ▲ | | | |
| Armenia | 47 | 38 ▲ | 26 ▲ | | 38 ▲ | | 80 | 70 ▲ | 58 ▲ | | 66 ▲ | |
| Georgia | 43 | 41 | 44 | 26 ▲ | | | 75 | 74 | 75 | 59 ▲ | | |
| Chile | 48 | 53 ▽ | 54 ▽ | | | | 82 | 85 | 85 | | | |
| Iran, Islamic Rep. of | 40 | 33 ▲ | 44 ▽ | 36 | 28 ▲ | 15 ▲ | 68 | 61 ▲ | 72 | 65 | 58 ▲ | 42 ▲ |
| Saudi Arabia | 28 | 25 ▲ | 35 ▽ | | | | 54 | 48 ▲ | 63 ▽ | | | |
| Azerbaijan | 32 | | 37 | | | | 65 | | 65 | | | |
| Philippines | 5 | | | | 19 ▽ | | 13 | | | | 34 ▽ | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Dubai, UAE | 80 | 70 ▲ | 48 ▲ | 48 ▲ | | | 94 | 86 ▲ | 72 ▲ | 72 ▲ | | |
| Ontario, Canada | 75 | 79 | 77 | 79 | 81 ▽ | 71 | 95 | 96 | 94 | 95 | 96 | 90 ▲ |
| Quebec, Canada | 77 | 78 | 76 | 74 | 66 ▲ | 77 | 97 | 97 | 97 | 96 | 91 ▲ | 94 ▲ |
| Abu Dhabi, UAE | 34 | 35 | 30 | | | | 55 | 55 | 55 | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Low Benchmark: Full Description and Example Items

Exhibit 2.10 provides the description of fourth grade students' achievement at the Low International Benchmark. Students demonstrated limited understanding of scientific concepts and limited knowledge of foundational science facts in life science, physical science, and Earth science.

Exhibit 2.10.1 shows an example item from the life science domain. On average, 74 percent of the students were able to recognize that the frog was the animal with a backbone. The top performing students on this item were in Hungary and Latvia with 88–89 percent correct.

## Exhibit 2.10: Description of the TIMSS 2019 Low International Benchmark (400) of Science Achievement

### Low International Benchmark

**400**

**Summary**

*Students show limited understanding of scientific concepts and limited knowledge of foundational science facts.*

Students at this level can recognize that some animals have backbones, that some materials conduct heat better than others, and that water and soil are natural resources.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

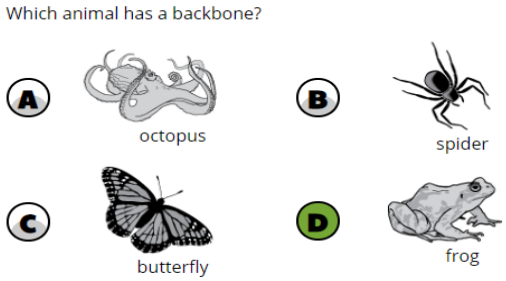
# Exhibit 2.10.1: Low International Benchmark of Science Achievement – Example Item 1

| Country | Percent Correct | |
|---|---|---|
| Hungary | 89 (1.6) | ▲ |
| 2 Latvia | 88 (1.6) | ▲ |
| Croatia | 87 (1.6) | ▲ |
| Korea, Rep. of | 87 (1.6) | ▲ |
| Albania | 86 (2.5) | ▲ |
| Armenia | 85 (1.7) | ▲ |
| Chinese Taipei | 85 (1.4) | ▲ |
| 2 Slovak Republic | 84 (1.7) | ▲ |
| † Norway (5) | 83 (2.0) | ▲ |
| 1 Georgia | 83 (1.8) | ▲ |
| Bulgaria | 83 (2.1) | ▲ |
| 2† United States | 82 (1.2) | ▲ |
| 2 Serbia | 82 (1.9) | ▲ |
| Poland | 81 (1.6) | ▲ |
| Bosnia and Herzegovina | 81 (1.7) | ▲ |
| 2 Turkey (5) | 81 (1.8) | ▲ |
| Czech Republic | 81 (1.9) | ▲ |
| North Macedonia | 81 (2.1) | ▲ |
| 2 Russian Federation | 80 (1.9) | ▲ |
| Japan | 80 (1.5) | ▲ |
| † Denmark | 79 (2.0) | ▲ |
| Malta | 79 (1.7) | ▲ |
| Finland | 79 (1.7) | ▲ |
| Sweden | 79 (1.9) | ▲ |
| Australia | 78 (1.7) | ▲ |
| 2 New Zealand | 78 (1.8) | ▲ |
| 1 2 Canada | 78 (1.5) | ▲ |
| 2 Kazakhstan | 77 (1.8) | |
| 2 England | 77 (2.4) | |
| France | 76 (2.0) | |
| Azerbaijan | 76 (2.0) | |
| † Northern Ireland | 76 (2.0) | |
| Ireland | 76 (2.1) | |
| Montenegro | 75 (1.7) | |
| Cyprus | 75 (1.8) | |
| 2 Lithuania | 74 (2.0) | |
| **International Average** | **74 (0.3)** | |
| Morocco | 74 (1.7) | |
| 2 Kosovo | 74 (1.8) | |
| † Hong Kong SAR | 74 (2.3) | |
| Germany | 73 (2.0) | |
| Italy | 73 (2.2) | |
| Oman | 73 (2.0) | |
| Austria | 72 (2.2) | |
| United Arab Emirates | 72 (1.0) | ▽ |
| 3 Singapore | 72 (1.5) | |
| Spain | 71 (2.7) | |
| Qatar | 70 (2.2) | ▽ |
| Chile | 67 (2.1) | ▽ |
| Bahrain | 67 (1.8) | ▽ |
| Iran, Islamic Rep. of | 64 (2.1) | ▽ |
| Kuwait | 61 (2.6) | ▽ |
| 2 Pakistan | 61 (3.2) | ▽ |
| 2 Saudi Arabia | 61 (1.8) | ▽ |
| 2 Portugal | 60 (2.3) | ▽ |
| South Africa (5) | 58 (1.6) | ▽ |
| 2 Philippines | 56 (2.5) | ▽ |
| † Belgium (Flemish) | 35 (2.1) | ▽ |
| ≡ Netherlands | 27 (2.4) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 79 (1.7) | ▲ |
| 2 Ontario, Canada | 79 (2.1) | ▲ |
| 2 Dubai, UAE | 78 (1.9) | ▲ |
| Quebec, Canada | 73 (2.6) | |
| Madrid, Spain | 69 (2.4) | ▽ |
| Abu Dhabi, UAE | 66 (1.6) | ▽ |

**Content Domain:** Life Science

**Cognitive Domain:** Knowing

**Description:** Recognizes an animal that has a backbone




▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Intermediate Benchmark: Full Description and Example Items

Exhibit 2.11 provides the description of student achievement at the Intermediate International Benchmark. At this level, students showed knowledge and understanding of some aspects of science across the three content domains.

Exhibit 2.11.1 presents an item from the life science domain. It illustrates that students reaching the Intermediate Benchmark understood why plastic objects in the ocean are dangerous for sea animals. Sweden, Finland, and Norway (fifth grade) had best achievement on this item, 85–86 percent correct. The international average was 57 percent.

Exhibit 2.11.2 shows an item from the physical science domain. On average, internationally, 66 percent of fourth grade students recognized why wheels on a wagon make it easier to pull. Finland and Korea had the highest percentage correct—87–88 percent.

## Exhibit 2.11: Description of the TIMSS 2019 Intermediate International Benchmark (475) of Science Achievement

**Intermediate** International Benchmark

**475**

**Summary**

*Students show knowledge and understanding of some aspects of science.* Students demonstrate some basic knowledge of plants and animals. They demonstrate knowledge about some properties of matter and some facts related to electricity, and can apply elementary knowledge of forces and motion. They show some understanding of Earth's physical characteristics.

Students show basic knowledge of what plants and animals need to survive as well as some knowledge of the characteristics of animals.

Students can recognize different properties of matter, demonstrate understanding of simple electrical circuits, and apply elementary knowledge of forces and motion, such as the force between a magnet and different materials.

Students show some understanding of Earth's physical characteristics.

Students can relate information in diagrams to some basic science concepts.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Exhibit 2.11.1: Intermediate International Benchmark of Science Achievement – Example Item 1

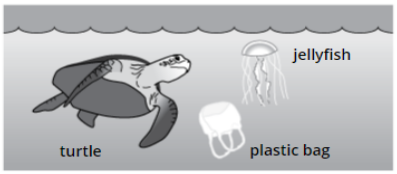
| Country | Percent Full Credit | |
|---|---|---|
| Sweden | 86 (1.8) | ▲ |
| Finland | 85 (1.4) | ▲ |
| † Norway (5) | 85 (1.9) | ▲ |
| Australia | 84 (1.6) | ▲ |
| Japan | 83 (1.6) | ▲ |
| ≡ Netherlands | 83 (1.8) | ▲ |
| 3 Singapore | 83 (1.2) | ▲ |
| Cyprus | 83 (1.7) | ▲ |
| 2 England | 81 (2.1) | ▲ |
| Ireland | 81 (1.9) | ▲ |
| 2† United States | 79 (1.2) | ▲ |
| † Denmark | 78 (2.2) | ▲ |
| † Belgium (Flemish) | 78 (2.1) | ▲ |
| † Northern Ireland | 76 (2.5) | ▲ |
| Malta | 76 (1.8) | ▲ |
| Chinese Taipei | 75 (2.2) | ▲ |
| 1 2 Canada | 75 (1.6) | ▲ |
| 2 Russian Federation | 74 (2.3) | ▲ |
| Czech Republic | 73 (1.9) | ▲ |
| Germany | 73 (2.1) | ▲ |
| Korea, Rep. of | 73 (2.1) | ▲ |
| 2 Lithuania | 71 (1.9) | ▲ |
| Spain | 70 (2.0) | ▲ |
| 2 New Zealand | 70 (1.7) | ▲ |
| 2 Portugal | 70 (2.2) | ▲ |
| Austria | 70 (2.2) | ▲ |
| Hungary | 68 (2.0) | ▲ |
| Poland | 67 (1.9) | ▲ |
| Italy | 65 (2.1) | ▲ |
| 2 Slovak Republic | 63 (2.4) | ▲ |
| France | 62 (2.6) | ▲ |
| † Hong Kong SAR | 62 (3.0) | |
| Chile | 61 (2.1) | |
| 2 Latvia | 60 (2.2) | |
| 2 Turkey (5) | 58 (2.4) | |
| **International Average** | **57 (0.3)** | |
| 2 Serbia | 54 (2.7) | |
| Croatia | 51 (2.3) | ▽ |
| Bahrain | 48 (2.2) | ▽ |
| Armenia | 45 (2.4) | ▽ |
| Qatar | 45 (2.6) | ▽ |
| United Arab Emirates | 44 (1.0) | ▽ |
| Bulgaria | 42 (3.1) | ▽ |
| Albania | 40 (2.9) | ▽ |
| Bosnia and Herzegovina | 39 (2.5) | ▽ |
| 1 Georgia | 36 (2.8) | ▽ |
| Montenegro | 35 (2.1) | ▽ |
| Oman | 34 (2.1) | ▽ |
| 2 Kazakhstan | 33 (2.0) | ▽ |
| South Africa (5) | 28 (1.5) | ▽ |
| Kuwait | 28 (2.0) | ▽ |
| Iran, Islamic Rep. of | 21 (1.8) | ▽ |
| Morocco | 21 (1.9) | ▽ |
| Azerbaijan | 20 (1.9) | ▽ |
| North Macedonia | 19 (2.3) | ▽ |
| 2 Kosovo | 17 (1.9) | ▽ |
| 2 Saudi Arabia | 14 (1.4) | ▽ |
| 2 Philippines | 11 (1.5) | ▽ |
| 2 Pakistan | 7 (1.9) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 78 (2.0) | ▲ |
| Madrid, Spain | 76 (2.6) | ▲ |
| 2 Ontario, Canada | 76 (2.7) | ▲ |
| Quebec, Canada | 73 (2.4) | ▲ |
| 2 Dubai, UAE | 60 (2.1) | |
| Abu Dhabi, UAE | 34 (1.4) | ▽ |

**Content Domain:** Life Science

**Cognitive Domain:** Knowing

**Description:** States one reason why plastic objects in the ocean are dangerous for sea animals

The picture shows a turtle and jellyfish swimming in the ocean. A plastic bag is floating nearby.




Write down one reason why plastic objects in the ocean are dangerous for animals such as turtles.

The turtle's flippers could get tangled up in the bag and make it hard for it to swim.

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 2.11.2: Intermediate International Benchmark of Science Achievement – Example Item 2

| Country | Percent Correct | |
|---|---|---|
| Finland | 88 (1.4) | ▲ |
| Korea, Rep. of | 87 (1.6) | ▲ |
| 3 Singapore | 85 (1.2) | ▲ |
| Chinese Taipei | 85 (1.5) | ▲ |
| † Hong Kong SAR | 83 (2.1) | ▲ |
| 2 Russian Federation | 82 (2.1) | ▲ |
| 2 Lithuania | 82 (1.9) | ▲ |
| Sweden | 81 (1.7) | ▲ |
| Ireland | 80 (1.9) | ▲ |
| 2 Latvia | 80 (2.0) | ▲ |
| 2 England | 77 (2.1) | ▲ |
| † Northern Ireland | 76 (2.0) | ▲ |
| 2 Serbia | 76 (2.3) | ▲ |
| Australia | 76 (2.1) | ▲ |
| Hungary | 75 (1.9) | ▲ |
| † Belgium (Flemish) | 74 (2.2) | ▲ |
| † Denmark | 73 (2.0) | ▲ |
| Poland | 72 (1.8) | ▲ |
| Italy | 72 (2.6) | ▲ |
| Germany | 72 (2.2) | ▲ |
| 2 New Zealand | 72 (2.0) | ▲ |
| 1 2 Canada | 72 (2.1) | ▲ |
| 2† United States | 71 (1.4) | ▲ |
| † Norway (5) | 71 (2.2) | ▲ |
| 2 Slovak Republic | 70 (2.1) | ▲ |
| Croatia | 70 (2.8) | |
| ≡ Netherlands | 70 (2.4) | |
| Czech Republic | 69 (2.2) | |
| 2 Kazakhstan | 68 (1.9) | |
| Cyprus | 68 (1.8) | |
| Austria | 67 (2.2) | |
| Spain | 67 (2.1) | |
| **International Average** | **66 (0.3)** | |
| Malta | 66 (2.2) | |
| Japan | 66 (2.2) | |
| Bulgaria | 65 (2.8) | |
| Albania | 64 (2.3) | |
| Bahrain | 63 (1.8) | |
| 2 Portugal | 62 (1.9) | ▽ |
| Iran, Islamic Rep. of | 61 (2.3) | ▽ |
| United Arab Emirates | 61 (0.8) | ▽ |
| 2 Turkey (5) | 60 (2.6) | ▽ |
| Azerbaijan | 60 (2.2) | ▽ |
| Bosnia and Herzegovina | 58 (2.1) | ▽ |
| France | 58 (2.1) | ▽ |
| 1 Georgia | 55 (2.7) | ▽ |
| Qatar | 54 (2.2) | ▽ |
| 2 Kosovo | 54 (2.2) | ▽ |
| Montenegro | 53 (2.1) | ▽ |
| Oman | 53 (1.8) | ▽ |
| North Macedonia | 51 (3.0) | ▽ |
| Chile | 50 (2.1) | ▽ |
| 2 Saudi Arabia | 49 (2.3) | ▽ |
| Armenia | 48 (2.4) | ▽ |
| South Africa (5) | 47 (1.5) | ▽ |
| Kuwait | 45 (2.1) | ▽ |
| Morocco | 41 (2.0) | ▽ |
| 2 Pakistan | 39 (4.7) | ▽ |
| 2 Philippines | 36 (2.0) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 88 (1.7) | ▲ |
| 2 Dubai, UAE | 77 (1.6) | ▲ |
| Madrid, Spain | 73 (2.6) | ▲ |
| 2 Ontario, Canada | 72 (3.7) | |
| Quebec, Canada | 68 (2.4) | |
| Abu Dhabi, UAE | 52 (1.4) | ▽ |

**Content Domain:** Physical Science

**Cognitive Domain:** Applying

**Description:** Recognizes the best explanation for why a box on a cart is easier to pull than a box resting directly on the floor

Tina and Mary need to move identical heavy boxes. Tina has to pull harder on her box to move it than Mary does.




Why is it easier for Mary to move her box?

A. Gravity acting on Tina's box is much stronger.

B. Air resistance acting on Tina's box is much greater.

C. The cart increases the magnetic force acting on Mary's box.

D. The cart's wheels decrease the force needed to move Mary's box.

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## High Benchmark: Full Description and Example Items

Exhibit 2.12 presents the description of achievement at the High International Benchmark. Fourth grade students reaching this level could communicate and apply knowledge about various topics in life science, physical science, and Earth science.

Exhibit 2.12.1 provides an example from the life science domain. When shown a picture of a desert, 45 percent of students, on average, identified two living things and two non-living things. Eighty-four percent of the Singaporean fourth grade students successfully completed this task.

Exhibit 2.12.2 shows an example from the physical science domain. On average, internationally, 64 percent of the fourth grade students recognized that a flashlight changed electrical energy into light energy. The highest achievement was posted by Chinese Taipei, Korea, and Hong Kong SAR—80–82 percent.

Exhibit 2.12.3 shows an example from the Earth science domain. Sixty-one percent of Finnish students could explain that the shape of the Moon changes during the month. The average across countries was 37 percent.

## Exhibit 2.12: Description of the TIMSS 2019 High International Benchmark (550) of Science Achievement

### High International Benchmark

**550**

**Summary**

*Students communicate and apply knowledge of life, physical, and Earth sciences.* Students communicate knowledge of characteristics of plants, animals, and their life cycles, and apply knowledge of ecosystems and of humans' and organisms' interactions with their environment. Students demonstrate knowledge of states and properties of matter and of energy transfer in practical contexts, and show some understanding of forces and motion. Students know various facts about the Earth's physical characteristics and show basic understanding of the Earth-Moon-Sun system.

Students communicate knowledge of characteristics of plants and animals. For example, they can distinguish living things from nonliving things and demonstrate some knowledge of life cycles of plants and animals. Students can apply knowledge of ecosystems and of organisms' interactions with their environment. They can complete food chains and recognize some plant and animal features that provide advantages in a given environment. Students demonstrate an understanding of how germs spread.

Students demonstrate knowledge of states and properties of matter. They understand basic properties of magnets, including the forces between two magnets. Students show some elementary knowledge about how shadows are formed. They apply knowledge of energy transfer in practical contexts and show some understanding of forces and motion, including gravity and air resistance.

Students know various facts about the Earth's physical characteristics and climates, and show basic understanding of the Earth-Moon-Sun system.

Students can make simple inferences using models, tables, and diagrams.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 2.12.1: High International Benchmark of Science Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| [3] Singapore | 84 (1.4) | ▲ |
| Armenia | 79 (1.8) | ▲ |
| [2] Kazakhstan | 71 (2.6) | ▲ |
| Cyprus | 67 (2.4) | ▲ |
| [2] Russian Federation | 67 (2.2) | ▲ |
| [2] Turkey (5) | 67 (2.6) | ▲ |
| [2] Serbia | 66 (2.7) | ▲ |
| Czech Republic | 64 (1.7) | ▲ |
| Italy | 63 (2.6) | ▲ |
| [2] Slovak Republic | 62 (2.3) | ▲ |
| Hungary | 62 (2.3) | ▲ |
| Croatia | 62 (2.6) | ▲ |
| Bahrain | 60 (1.5) | ▲ |
| United Arab Emirates | 58 (1.1) | ▲ |
| Bulgaria | 57 (2.6) | ▲ |
| Oman | 56 (2.1) | ▲ |
| Montenegro | 55 (1.9) | ▲ |
| † Norway (5) | 55 (3.0) | ▲ |
| [2] Kosovo | 55 (2.6) | ▲ |
| Malta | 52 (2.2) | ▲ |
| [2†] United States | 52 (1.6) | ▲ |
| Australia | 51 (2.2) | ▲ |
| Qatar | 51 (3.0) | ▲ |
| Sweden | 50 (2.4) | |
| Poland | 50 (2.6) | |
| Finland | 49 (2.0) | ▲ |
| [2] Portugal | 48 (2.3) | |
| [2] Latvia | 47 (2.3) | |
| [2] Lithuania | 47 (2.7) | |
| [2] Saudi Arabia | 46 (2.0) | |
| [1 2] Canada | 46 (1.3) | |
| Kuwait | 46 (2.3) | |
| **International Average** | **45 (0.3)** | |
| Albania | 39 (2.8) | ▽ |
| [2] England | 38 (2.6) | ▽ |
| North Macedonia | 38 (3.3) | ▽ |
| Bosnia and Herzegovina | 38 (2.4) | ▽ |
| France | 37 (2.2) | ▽ |
| Japan | 37 (2.3) | ▽ |
| Korea, Rep. of | 37 (2.4) | ▽ |
| Iran, Islamic Rep. of | 35 (2.5) | ▽ |
| Ireland | 34 (2.1) | ▽ |
| † Denmark | 34 (2.4) | ▽ |
| [2] Pakistan | 34 (3.6) | ▽ |
| Azerbaijan | 33 (2.0) | ▽ |
| [2] New Zealand | 32 (2.0) | ▽ |
| Spain | 32 (2.2) | ▽ |
| [1] Georgia | 31 (2.7) | ▽ |
| ≡ Netherlands | 30 (2.3) | ▽ |
| † Northern Ireland | 29 (2.4) | ▽ |
| Austria | 27 (2.4) | ▽ |
| South Africa (5) | 27 (1.6) | ▽ |
| Morocco | 27 (2.0) | ▽ |
| Germany | 23 (1.9) | ▽ |
| † Hong Kong SAR | 23 (2.3) | ▽ |
| Chile | 20 (2.0) | ▽ |
| † Belgium (Flemish) | 18 (1.7) | ▽ |
| [2] Philippines | 15 (1.5) | ▽ |
| Chinese Taipei | 10 (1.2) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 76 (1.9) | ▲ |
| [2] Dubai, UAE | 72 (1.5) | ▲ |
| [2] Ontario, Canada | 52 (2.1) | ▲ |
| Abu Dhabi, UAE | 42 (1.3) | ▽ |
| Quebec, Canada | 31 (2.0) | ▽ |
| Madrid, Spain | 23 (1.9) | ▽ |

**Content Domain:** Life Science

**Cognitive Domain:** Knowing

**Description:** Lists two living things and two nonliving things shown in a picture of a desert ecosystem

The picture below shows a desert.



What are two **living things** shown in the picture?

1. Camel
2. Cactus

What are two **non-living things** shown in the picture?

1. Rock
2. Sand

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 2.12.2: High International Benchmark of Science Achievement – Example Item 2

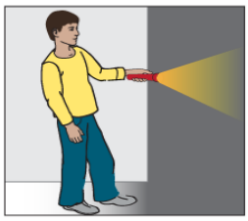
| Country | Percent Correct | |
|---|---|---|
| Chinese Taipei | 82 (1.8) | ▲ |
| Korea, Rep. of | 81 (2.0) | ▲ |
| † Hong Kong SAR | 80 (1.9) | ▲ |
| Sweden | 77 (2.1) | ▲ |
| Croatia | 75 (2.8) | ▲ |
| Finland | 74 (2.0) | ▲ |
| Japan | 74 (1.9) | ▲ |
| 2 Lithuania | 74 (2.1) | ▲ |
| Iran, Islamic Rep. of | 73 (1.8) | ▲ |
| Poland | 73 (2.0) | ▲ |
| Bulgaria | 72 (2.5) | ▲ |
| 3 Singapore | 72 (1.6) | ▲ |
| † Belgium (Flemish) | 71 (1.7) | ▲ |
| 2 Slovak Republic | 70 (2.3) | ▲ |
| 2 Serbia | 69 (2.1) | ▲ |
| † Norway (5) | 69 (2.4) | ▲ |
| 2 Russian Federation | 69 (2.0) | ▲ |
| Spain | 68 (2.0) | ▲ |
| Czech Republic | 68 (2.2) | ▲ |
| † Denmark | 67 (2.2) | |
| Australia | 67 (2.0) | |
| 2 Latvia | 67 (2.6) | |
| France | 66 (2.3) | |
| Bahrain | 66 (1.8) | |
| Germany | 66 (2.0) | |
| 2 England | 66 (2.3) | |
| Bosnia and Herzegovina | 66 (1.8) | |
| Italy | 65 (2.5) | |
| 1 2 Canada | 65 (1.4) | |
| 2† United States | 65 (1.6) | |
| Austria | 64 (2.1) | |
| 2 New Zealand | 64 (2.1) | |
| **International Average** | **64 (0.3)** | |
| Hungary | 64 (2.0) | |
| † Northern Ireland | 63 (2.6) | |
| Ireland | 62 (2.5) | |
| ≡ Netherlands | 62 (2.3) | |
| United Arab Emirates | 62 (1.1) | |
| 1 Georgia | 62 (2.8) | |
| Qatar | 61 (2.4) | |
| 2 Turkey (5) | 60 (2.4) | |
| 2 Portugal | 60 (2.1) | ▽ |
| Cyprus | 59 (1.8) | ▽ |
| North Macedonia | 59 (2.9) | |
| Malta | 59 (2.0) | ▽ |
| 2 Saudi Arabia | 58 (2.1) | ▽ |
| Oman | 57 (2.0) | ▽ |
| Kuwait | 57 (2.2) | ▽ |
| Albania | 56 (2.8) | ▽ |
| 2 Kazakhstan | 56 (2.1) | ▽ |
| Montenegro | 56 (1.6) | ▽ |
| 2 Kosovo | 54 (2.5) | ▽ |
| Chile | 52 (2.3) | ▽ |
| Azerbaijan | 51 (2.4) | ▽ |
| Morocco | 50 (1.9) | ▽ |
| South Africa (5) | 50 (1.6) | ▽ |
| Armenia | 49 (2.3) | ▽ |
| 2 Philippines | 42 (2.1) | ▽ |
| 2 Pakistan | 32 (3.3) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 88 (1.4) | ▲ |
| 2 Dubai, UAE | 73 (1.5) | ▲ |
| Quebec, Canada | 72 (2.2) | ▲ |
| Madrid, Spain | 66 (2.5) | |
| 2 Ontario, Canada | 61 (2.3) | |
| Abu Dhabi, UAE | 51 (1.7) | ▽ |

**Content Domain:** Physical Science

**Cognitive Domain:** Knowing

**Description:** Recognizes the energy change that occurs when a flashlight is turned on

Jake switches on a flashlight.



One kind of energy changes into another kind of energy in the flashlight.

Which statement describes this change?

A. Electrical energy changes into light energy.

B. Motion energy changes into light energy.

C. Light energy changes into electrical energy.

D. Light energy changes into motion energy.

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 2.12.3: High International Benchmark of Science Achievement – Example Item 3

| Country | Percent Full Credit | |
|---|---|---|
| Finland | 61 (2.0) | ▲ |
| † Norway (5) | 58 (2.5) | ▲ |
| Australia | 58 (2.0) | ▲ |
| 2 Lithuania | 56 (2.4) | ▲ |
| 2† United States | 55 (1.7) | ▲ |
| Korea, Rep. of | 54 (2.1) | ▲ |
| 2 Turkey (5) | 53 (2.4) | ▲ |
| 2 Russian Federation | 53 (2.4) | ▲ |
| 2 Portugal | 52 (2.3) | ▲ |
| Sweden | 52 (2.5) | ▲ |
| Japan | 51 (2.1) | ▲ |
| 3 Singapore | 51 (1.8) | ▲ |
| Austria | 50 (2.3) | ▲ |
| Germany | 50 (2.3) | ▲ |
| Hungary | 49 (2.4) | ▲ |
| Malta | 49 (2.3) | ▲ |
| † Belgium (Flemish) | 48 (2.1) | ▲ |
| Croatia | 46 (3.3) | ▲ |
| Spain | 46 (2.2) | ▲ |
| Chinese Taipei | 44 (2.3) | ▲ |
| 2 New Zealand | 44 (2.5) | ▲ |
| 2 Latvia | 43 (2.2) | ▲ |
| 2 Kazakhstan | 43 (2.5) | ▲ |
| 1 2 Canada | 43 (1.6) | ▲ |
| 2 Slovak Republic | 42 (2.3) | ▲ |
| ≡ Netherlands | 41 (2.6) | |
| 2 Serbia | 41 (2.2) | |
| Bahrain | 40 (1.7) | |
| Ireland | 40 (2.4) | |
| Cyprus | 40 (2.2) | |
| † Northern Ireland | 39 (2.2) | |
| France | 37 (2.4) | |
| Italy | 37 (2.4) | |
| Czech Republic | 37 (2.5) | |
| **International Average** | **37 (0.3)** | |
| 2 England | 36 (2.6) | |
| Poland | 34 (2.2) | |
| † Denmark | 34 (2.4) | |
| Armenia | 33 (2.2) | |
| United Arab Emirates | 30 (1.0) | ▽ |
| Bulgaria | 30 (2.4) | ▽ |
| Chile | 30 (1.8) | ▽ |
| Montenegro | 28 (1.8) | ▽ |
| Albania | 28 (2.3) | ▽ |
| 1 Georgia | 27 (2.1) | ▽ |
| Bosnia and Herzegovina | 26 (1.8) | ▽ |
| Qatar | 25 (2.0) | ▽ |
| † Hong Kong SAR | 24 (2.0) | ▽ |
| 2 Saudi Arabia | 20 (1.7) | ▽ |
| Oman | 19 (1.5) | ▽ |
| Azerbaijan | 18 (1.6) | ▽ |
| South Africa (5) | 17 (1.3) | ▽ |
| North Macedonia | 17 (2.4) | ▽ |
| 2 Kosovo | 15 (1.4) | ▽ |
| Morocco | 15 (1.8) | ▽ |
| Kuwait | 15 (1.6) | ▽ |
| Iran, Islamic Rep. of | 15 (1.6) | ▽ |
| 2 Pakistan | 8 (1.7) | ▽ |
| 2 Philippines | 4 (1.1) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 58 (2.1) | ▲ |
| Madrid, Spain | 53 (2.5) | ▲ |
| Quebec, Canada | 48 (2.5) | ▲ |
| 2 Dubai, UAE | 46 (1.8) | ▲ |
| 2 Ontario, Canada | 40 (3.0) | |
| Abu Dhabi, UAE | 23 (1.5) | ▽ |

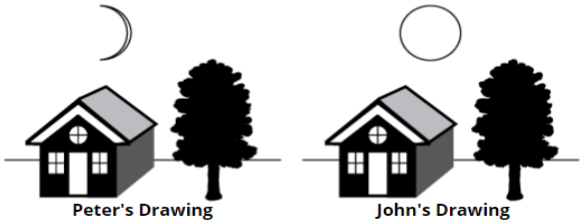
**Content Domain:** Earth Science

**Cognitive Domain:** Applying

**Description:** Using two pictures of the same location, explains that the Moon can look different at different times

One evening Peter went outside and made a drawing of a house, a tree, and the Moon. About 2 weeks later, Peter's brother, John, went outside and made a drawing of the same house, the same tree, and the Moon.

When they compared their drawings, they saw that they drew the Moon differently.



Peter's Drawing | John's Drawing

Whose drawing of the moon is correct?

(Click one box.)

- ☐ Only Peter's drawing of the moon can be correct.
- ☐ Only John's drawing of the moon can be correct.
- ☑ Both drawings of the moon can be correct.

Explain your answer.

The shape of the moon in the sky changes during the month. It looks different on different days.

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Advanced Benchmark: Full Description and Example Items

Exhibit 2.13 presents the description of fourth grade performance at the Advanced International Benchmark. Students reaching the Advanced level could communicate their understanding of science concepts in the three content areas and demonstrate familiarity with the process of scientific inquiry.

Exhibit 2.13.1 shows an item from the life science domain that asks students to identify two competitors in a food web. Bulgaria was by far the highest achieving country, with 69 percent correct. The international average was 30 percent.

Exhibits 2.13.2 and 2.13.3 present a two-part item from the physical science domain about an experiment involving dissolving sugar in water. Part A asked students to recognize three situations that would dissolve the sugar faster—higher water temperature, stirring the water, and smaller sugar cubes. Latvia had the highest percentage correct—74 percent. The international average was 37 percent. Part B asked why the amount of water in each beaker had to be same. The international average was only 21 percent. However, 66 percent of the Singaporean fourth grade students provided the correct explanation.

Exhibit 2.13.4 shows the example from the Earth science domain. Students at the Advanced level demonstrated they understood that Earth's seasons are related to the tilt of its axis and its orbit around the Sun. Chinese Taipei had the highest percentage correct (59%), and the international average was 36 percent.

## Exhibit 2.13: Description of the TIMSS 2019 Advanced International Benchmark (625) of Science Achievement

**Advanced** International Benchmark

**625**

**Summary**

*Students communicate their understanding of life, physical, and Earth sciences and demonstrate some knowledge of the process of scientific inquiry.* Students demonstrate knowledge of characteristics and life processes of a variety of organisms. They can communicate understanding of relationships in ecosystems and interactions between organisms and their environment. They communicate understanding of properties and states of matter and physical and chemical changes. Students communicate understanding of Earth's physical characteristics, processes, and history and show knowledge of Earth's revolution and rotation.

Students demonstrate knowledge of characteristics and life processes of a variety of organisms. Students communicate understanding of relationships in ecosystems and interactions between organisms and their environment, such as explaining adaptations and identifying animals that compete for food. They can evaluate experimental designs to test how light and water affect the growth of plants.

Students communicate understanding of properties and states of matter and of physical and chemical changes. In the context of investigations, students can explain what makes a solid dissolve faster in water, can evaluate methods for separating mixtures of solids, and understand what is important when designing a fair test.

Students communicate understanding of Earth's physical characteristics, processes, and history. For example, they can relate two different environments to the weathering of rocks and recognize how fish fossils are formed. Students show knowledge of Earth's revolution and can describe how the Earth's rotation causes day and night.

Students demonstrate basic knowledge and skills related to scientific inquiry and can recognize how to set up a simple experiment. They can draw conclusions from descriptions and diagrams and from results of experiments.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 2.13.1: Advanced International Benchmark of Science Achievement – Example Item 1

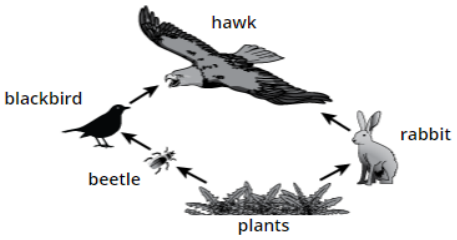
| Country | Percent Full Credit | |
|---|---|---|
| Bulgaria | 69 (2.3) | ▲ |
| Korea, Rep. of | 56 (2.3) | ▲ |
| 3 Singapore | 54 (2.0) | ▲ |
| Chinese Taipei | 45 (2.2) | ▲ |
| Sweden | 45 (2.6) | ▲ |
| † Norway (5) | 44 (2.2) | ▲ |
| Finland | 43 (1.7) | ▲ |
| 2 Slovak Republic | 42 (2.3) | ▲ |
| 2 Serbia | 40 (2.7) | ▲ |
| 2† United States | 40 (1.8) | ▲ |
| † Hong Kong SAR | 40 (2.6) | ▲ |
| † Denmark | 40 (2.4) | ▲ |
| † Northern Ireland | 39 (2.8) | ▲ |
| Austria | 38 (2.9) | ▲ |
| Germany | 38 (2.3) | ▲ |
| Australia | 37 (2.3) | ▲ |
| 2 England | 37 (2.7) | ▲ |
| Japan | 37 (1.9) | ▲ |
| 2 Russian Federation | 37 (2.4) | ▲ |
| Poland | 37 (2.2) | ▲ |
| France | 36 (2.8) | ▲ |
| Bahrain | 35 (1.8) | ▲ |
| Ireland | 35 (2.1) | ▲ |
| Czech Republic | 34 (2.2) | |
| Spain | 34 (1.7) | ▲ |
| Malta | 33 (2.1) | |
| Italy | 31 (2.6) | |
| Hungary | 31 (2.0) | |
| 2 New Zealand | 31 (1.6) | |
| 2 Portugal | 31 (2.2) | |
| 1 2 Canada | 31 (1.9) | |
| **International Average** | **30 (0.3)** | |
| Cyprus | 30 (2.5) | |
| † Belgium (Flemish) | 29 (2.2) | |
| United Arab Emirates | 28 (1.1) | ▽ |
| ≡ Netherlands | 27 (2.1) | |
| 2 Latvia | 27 (2.1) | |
| Montenegro | 26 (2.1) | ▽ |
| Croatia | 26 (2.0) | ▽ |
| 2 Lithuania | 26 (2.3) | ▽ |
| Chile | 24 (2.0) | ▽ |
| Albania | 22 (2.4) | ▽ |
| Armenia | 22 (1.8) | ▽ |
| Oman | 22 (2.0) | ▽ |
| Iran, Islamic Rep. of | 22 (1.8) | ▽ |
| 2 Turkey (5) | 20 (1.7) | ▽ |
| 2 Saudi Arabia | 20 (1.4) | ▽ |
| Qatar | 19 (2.1) | ▽ |
| Morocco | 16 (2.0) | ▽ |
| 1 Georgia | 16 (2.2) | ▽ |
| Bosnia and Herzegovina | 15 (1.5) | ▽ |
| Kuwait | 15 (1.9) | ▽ |
| South Africa (5) | 15 (1.1) | ▽ |
| Azerbaijan | 14 (1.4) | ▽ |
| 2 Kazakhstan | 13 (1.6) | ▽ |
| North Macedonia | 13 (1.8) | ▽ |
| 2 Pakistan | 10 (2.3) | ▽ |
| 2 Philippines | 6 (0.9) | ▽ |
| 2 Kosovo | 5 (1.3) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 52 (2.7) | ▲ |
| 2 Dubai, UAE | 41 (2.0) | ▲ |
| Madrid, Spain | 36 (2.3) | ▲ |
| 2 Ontario, Canada | 32 (3.6) | |
| Quebec, Canada | 30 (2.2) | |
| Abu Dhabi, UAE | 19 (1.3) | ▽ |

**Content Domain:** Life Science

**Cognitive Domain:** Applying

**Description:** Uses a food web to determine which animals are competitors

The picture below shows a food web in a forest ecosystem.




Based on what you see in the food web above, which two animals compete with each other for food?

1. beetle
2. rabbit

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 2.13.2: Advanced International Benchmark of Science Achievement – Example Item 2

| Country | Percent Full Credit | |
|---|---|---|
| [2] Latvia | 74 (2.0) | ▲ |
| Chinese Taipei | 69 (2.0) | ▲ |
| Poland | 61 (2.1) | ▲ |
| Japan | 59 (1.9) | ▲ |
| Korea, Rep. of | 57 (2.1) | ▲ |
| [2] Serbia | 55 (2.6) | ▲ |
| Finland | 54 (2.2) | ▲ |
| [2] Russian Federation | 52 (2.0) | ▲ |
| [2] Lithuania | 52 (2.5) | ▲ |
| † Belgium (Flemish) | 50 (2.0) | ▲ |
| [2] Slovak Republic | 49 (2.7) | ▲ |
| [3] Singapore | 48 (1.8) | ▲ |
| Sweden | 46 (2.6) | ▲ |
| † Hong Kong SAR | 45 (2.6) | ▲ |
| Czech Republic | 44 (2.3) | ▲ |
| Ireland | 44 (2.5) | ▲ |
| Hungary | 44 (2.3) | ▲ |
| ≡ Netherlands | 43 (2.6) | ▲ |
| Bulgaria | 43 (2.4) | ▲ |
| † Norway (5) | 43 (2.6) | ▲ |
| † Denmark | 42 (2.4) | ▲ |
| [1 2] Canada | 42 (1.6) | ▲ |
| Croatia | 41 (2.2) | |
| Germany | 41 (2.0) | ▲ |
| Australia | 41 (1.8) | ▲ |
| † Northern Ireland | 41 (2.6) | |
| Italy | 40 (2.3) | |
| Cyprus | 40 (2.3) | |
| [2] Portugal | 38 (2.2) | |
| [2] New Zealand | 37 (1.9) | |
| **International Average** | **37 (0.3)** | |
| Austria | 37 (2.1) | |
| Albania | 36 (2.6) | |
| [2] England | 36 (2.6) | |
| Malta | 34 (2.2) | |
| France | 32 (2.5) | ▽ |
| Spain | 32 (2.4) | ▽ |
| Armenia | 32 (2.0) | ▽ |
| [2†] United States | 31 (1.6) | ▽ |
| [2] Turkey (5) | 30 (1.8) | ▽ |
| Bahrain | 30 (2.1) | ▽ |
| Chile | 29 (2.0) | ▽ |
| Azerbaijan | 28 (2.1) | ▽ |
| North Macedonia | 28 (2.9) | ▽ |
| [2] Kazakhstan | 28 (2.0) | ▽ |
| United Arab Emirates | 27 (0.8) | ▽ |
| Bosnia and Herzegovina | 27 (1.8) | ▽ |
| Montenegro | 26 (1.9) | ▽ |
| [1] Georgia | 25 (2.5) | ▽ |
| Qatar | 24 (1.7) | ▽ |
| Oman | 22 (1.8) | ▽ |
| Kuwait | 21 (1.7) | ▽ |
| [2] Philippines | 19 (1.6) | ▽ |
| [2] Saudi Arabia | 18 (1.4) | ▽ |
| [2] Kosovo | 17 (1.7) | ▽ |
| Morocco | 15 (2.2) | ▽ |
| South Africa (5) | 14 (1.2) | ▽ |
| Iran, Islamic Rep. of | 13 (1.5) | ▽ |
| [2] Pakistan | 9 (1.9) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 58 (2.2) | ▲ |
| Quebec, Canada | 43 (2.5) | ▲ |
| Madrid, Spain | 43 (2.8) | ▲ |
| [2] Ontario, Canada | 42 (2.9) | |
| [2] Dubai, UAE | 36 (1.8) | |
| Abu Dhabi, UAE | 21 (1.4) | ▽ |

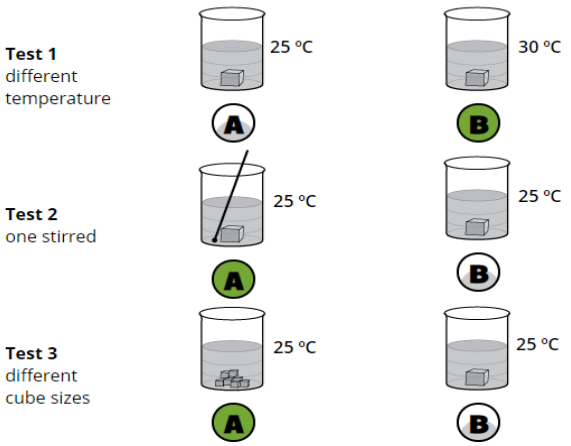
**Content Domain:** Physical Science

**Cognitive Domain:** Reasoning

**Description:** Part A - Recognizes set-ups that will more quickly dissolve a solid in water

Karl is investigating ways to make the same amount of sugar dissolve quickly in water. He sets up three tests.

**A.** For each of the tests, click the circle under the set-up that will dissolve the sugar faster.




**B.** Why is it important that the amount of water in each beaker is the same?

To make sure the amount of water did not change the test. Different amounts of water would not make the test fair.

The answer shown for part A illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 2.13.3: Advanced International Benchmark of Science Achievement – Example Item 3

| Country | Percent Full Credit | |
|---|---|---|
| [3] Singapore | 66 (1.7) | ▲ |
| [2] England | 53 (3.3) | ▲ |
| Japan | 49 (2.0) | ▲ |
| Korea, Rep. of | 48 (2.3) | ▲ |
| [2] Russian Federation | 40 (2.5) | ▲ |
| Australia | 38 (1.5) | ▲ |
| Ireland | 35 (2.5) | ▲ |
| Finland | 34 (2.1) | ▲ |
| † Northern Ireland | 32 (2.3) | ▲ |
| Chinese Taipei | 30 (2.5) | ▲ |
| Cyprus | 30 (1.9) | ▲ |
| Armenia | 29 (2.3) | ▲ |
| ≡ Netherlands | 28 (2.4) | ▲ |
| Oman | 28 (2.0) | ▲ |
| [2] Serbia | 27 (2.4) | ▲ |
| [2] Turkey (5) | 27 (1.8) | ▲ |
| Poland | 25 (1.7) | ▲ |
| Albania | 25 (2.2) | |
| † Belgium (Flemish) | 24 (1.7) | |
| [1 2] Canada | 24 (1.5) | |
| Czech Republic | 23 (1.7) | |
| Malta | 23 (1.7) | |
| [2] Lithuania | 23 (1.9) | |
| Germany | 22 (1.9) | |
| Bahrain | 22 (1.8) | |
| Spain | 21 (2.2) | |
| Croatia | 21 (1.9) | |
| **International Average** | **21 (0.2)** | |
| Hungary | 21 (1.7) | |
| † Hong Kong SAR | 20 (2.6) | |
| [2] Latvia | 20 (1.8) | |
| France | 20 (1.7) | |
| [2] Kazakhstan | 20 (1.9) | |
| [2] Slovak Republic | 19 (1.6) | |
| [2†] United States | 19 (1.2) | |
| † Denmark | 18 (1.9) | |
| Bulgaria | 18 (1.6) | |
| Austria | 18 (1.9) | |
| [2] New Zealand | 16 (1.5) | ▽ |
| United Arab Emirates | 16 (0.6) | ▽ |
| [2] Portugal | 14 (1.6) | ▽ |
| Sweden | 14 (1.8) | ▽ |
| Iran, Islamic Rep. of | 13 (1.7) | ▽ |
| Qatar | 12 (1.6) | ▽ |
| † Norway (5) | 11 (1.6) | ▽ |
| Italy | 10 (1.5) | ▽ |
| Bosnia and Herzegovina | 10 (1.3) | ▽ |
| Azerbaijan | 9 (1.1) | ▽ |
| North Macedonia | 8 (1.4) | ▽ |
| Chile | 8 (1.0) | ▽ |
| Kuwait | 6 (1.1) | ▽ |
| Montenegro | 6 (0.9) | ▽ |
| [2] Pakistan | 5 (1.6) | ▽ |
| [1] Georgia | 5 (1.2) | ▽ |
| South Africa (5) | 5 (1.0) | ▽ |
| [2] Saudi Arabia | 4 (0.8) | ▽ |
| [2] Kosovo | 4 (0.9) | ▽ |
| Morocco | 4 (0.8) | ▽ |
| [2] Philippines | 1 (0.3) | ▽ |
| **Benchmarking Participants** | | |
| [2] Dubai, UAE | 35 (1.9) | ▲ |
| Madrid, Spain | 27 (2.1) | ▲ |
| [2] Ontario, Canada | 24 (2.5) | |
| Moscow City, Russian Fed. | 20 (2.2) | |
| Quebec, Canada | 19 (2.0) | |
| Abu Dhabi, UAE | 7 (0.7) | ▽ |

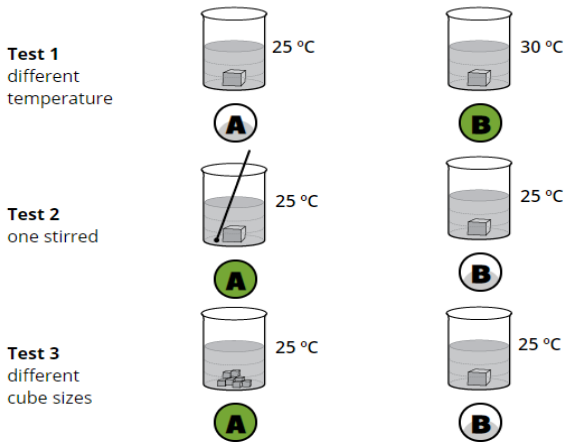
**Content Domain:** Physical Science

**Cognitive Domain:** Reasoning

**Description:** Part B - Explains the importance of controlling a variable in an experiment

Karl is investigating ways to make the same amount of sugar dissolve quickly in water. He sets up three tests.

**A.** For each of the tests, click the circle under the set-up that will dissolve the sugar faster.




**B.** Why is it important that the amount of water in each beaker is the same?

To make sure the amount of water did not change the test. Different amounts of water would not make the test fair.

The answer shown for part B illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 2.13.4: Advanced International Benchmark of Science Achievement – Example Item 4

| Country | Percent Full Credit | |
|---|---|---|
| Chinese Taipei | 59 (2.6) | ▲ |
| Sweden | 55 (2.7) | ▲ |
| 2 Russian Federation | 54 (2.4) | ▲ |
| 3 Singapore | 53 (2.3) | ▲ |
| † Norway (5) | 52 (2.4) | ▲ |
| 2 England | 48 (2.4) | ▲ |
| 2 Latvia | 47 (2.2) | ▲ |
| Finland | 47 (2.5) | ▲ |
| 2 Lithuania | 47 (2.1) | ▲ |
| Korea, Rep. of | 46 (2.4) | ▲ |
| 2 Slovak Republic | 45 (2.4) | ▲ |
| Ireland | 44 (2.5) | ▲ |
| 2† United States | 44 (1.5) | ▲ |
| Germany | 43 (2.2) | ▲ |
| Australia | 43 (2.7) | ▲ |
| † Denmark | 42 (2.6) | ▲ |
| Poland | 41 (2.4) | ▲ |
| Croatia | 41 (3.2) | |
| United Arab Emirates | 41 (1.1) | ▲ |
| Hungary | 40 (2.5) | |
| † Hong Kong SAR | 40 (2.1) | |
| Czech Republic | 40 (2.6) | |
| 2 Turkey (5) | 40 (2.4) | |
| Bulgaria | 40 (2.3) | |
| France | 39 (2.2) | |
| 1 2 Canada | 39 (1.4) | |
| Austria | 39 (2.4) | |
| † Belgium (Flemish) | 38 (2.5) | |
| 2 New Zealand | 38 (1.8) | |
| † Northern Ireland | 37 (2.6) | |
| ≡ Netherlands | 37 (2.5) | |
| Japan | 37 (2.0) | |
| 2 Portugal | 36 (2.2) | |
| **International Average** | **36 (0.3)** | |
| 2 Kazakhstan | 36 (2.3) | |
| 2 Serbia | 35 (2.3) | |
| 1 Georgia | 35 (2.6) | |
| Italy | 33 (2.3) | |
| Qatar | 32 (2.3) | |
| Malta | 31 (2.2) | ▽ |
| Spain | 30 (2.0) | ▽ |
| Chile | 28 (2.0) | ▽ |
| Albania | 27 (2.7) | ▽ |
| Armenia | 27 (2.1) | ▽ |
| Oman | 27 (1.8) | ▽ |
| 2 Saudi Arabia | 27 (1.7) | ▽ |
| Bahrain | 27 (1.7) | ▽ |
| Kuwait | 26 (2.1) | ▽ |
| Bosnia and Herzegovina | 26 (1.6) | ▽ |
| Azerbaijan | 26 (1.8) | ▽ |
| Cyprus | 26 (2.2) | ▽ |
| South Africa (5) | 26 (1.3) | ▽ |
| Morocco | 24 (2.0) | ▽ |
| 2 Kosovo | 23 (2.3) | ▽ |
| 2 Pakistan | 22 (2.4) | ▽ |
| North Macedonia | 21 (2.2) | ▽ |
| 2 Philippines | 21 (1.9) | ▽ |
| Montenegro | 18 (1.6) | ▽ |
| Iran, Islamic Rep. of | 15 (1.7) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 69 (2.6) | ▲ |
| 2 Dubai, UAE | 53 (1.8) | ▲ |
| Quebec, Canada | 42 (2.5) | ▲ |
| 2 Ontario, Canada | 36 (2.6) | |
| Madrid, Spain | 35 (2.3) | |
| Abu Dhabi, UAE | 33 (2.0) | |

**Content Domain:** Earth Science

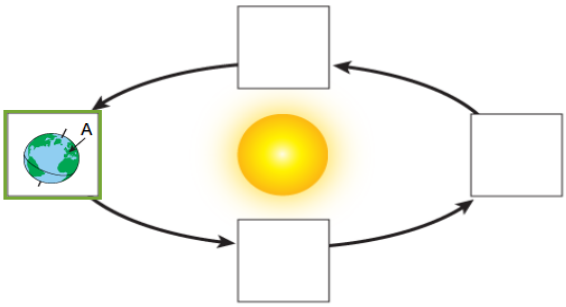
**Cognitive Domain:** Applying

**Description:** Places the Earth in a model to show its position relative to the Sun when a labeled city is experiencing summer

Earth's seasons are caused by the tilt of its axis.

It is summer in City A. In what position is the Earth when it is summer in City A?

Drag the Earth to the position that shows it is summer in City A.




The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Average Achievement in Science Content and Cognitive Domains

## TIMSS 2019 Science Content and Cognitive Domains

TIMSS 2019 assessed three content areas in science at the fourth grade: life science, physical science, and Earth science.

Forty-five percent of the fourth grade science assessment was devoted to life science topics, including characteristics and life processes of organisms; life cycles, reproduction, and heredity; organisms, environment, and their interactions; ecosystems; and human health. Students were expected to have some knowledge about general characteristics of organisms, how they function, and how they interact with other organisms and with their environment, as well as to be familiar with fundamental science concepts related to life cycles, heredity, and human health.

The topic areas for the physical science content domain made up 35 percent of the assessment, including classification and properties of matter and changes in matter; forms of energy and energy transfer; and forces and motion. Students were asked about physical states of matter (solid, liquid, and gas), as well as common changes in the state and form of matter; common forms and sources of energy and their practical uses; and basic concepts about light, sound, electricity, and magnetism, as well as forces and motion.

The Earth science domain (20% of the assessment) included three topic areas: Earth's physical characteristics, resources, and history; Earth's weather and climates; and Earth in the Solar System. Students were asked about the structure and physical characteristics of Earth's surface and about the use of Earth's most important resources, and were asked to describe some of Earth's processes in terms of observable changes and recognize the time frame over which such changes have occurred. They also were asked about Earth's place in the Solar System based on observations of patterns of change on Earth and in the sky.

Fourth grade students also needed to draw on a range of cognitive skills across the content domains described above. The cognitive skills were categorized into three broad domains—knowing, applying, and reasoning. Forty percent of the fourth grade assessment was devoted to the knowing domain, 40 percent to applying, and 20 percent to reasoning. The knowing domain covers the facts, concepts, and procedures students need to know, while the applying domain focuses on students' ability to apply knowledge and conceptual understanding to solve practical problems or answer questions. The reasoning domain goes beyond the solution of familiar problems to encompass unfamiliar situations, complex contexts, and multistep problems. Also, five science practices fundamental to scientific inquiry were assessed within the content areas and cognitive domains.

## Average Achievement in Content Domains

Exhibit 2.14 shows countries' average science achievement in each of the three content domains relative to their overall average achievement (presented from highest to lowest overall average achievement). Based on countries' relative strengths and weaknesses, the TIMSS 2019 countries appear to be placing relatively less instructional emphasis on the Earth science content domain than the other two science content domains. Of the 53 participating countries with scores in the science content domains, 21 had a relative strength in life science and 13 had a relative weakness; 17 had a relative strength in physical science and 21 had a relative weakness, and 10 had a relative strength in Earth science, and 26 had a relative weakness. All countries except Austria had at least one relative strength or relative weakness compared with their overall achievement.

## Exhibit 2.14: Average Achievement in Science Content Domains

| Country | Overall Science Average Scale Score | Life Science (73 Items) | | Physical Science (61 Items) | | Earth Science (35 Items) | |
|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score |
| [3] Singapore | 595 (3.4) | 603 (3.6) | 8 (0.9) ▲ | 613 (3.7) | 19 (1.1) ▲ | 557 (3.9) | -38 (2.0) ▽ |
| Korea, Rep. of | 588 (2.1) | 574 (2.5) | -13 (1.4) ▽ | 607 (2.7) | 19 (2.7) ▲ | 587 (2.9) | -1 (1.9) |
| [2] Russian Federation | 567 (3.0) | 570 (3.1) | 3 (1.2) ▲ | 572 (2.9) | 5 (1.7) ▲ | 554 (4.4) | -13 (2.5) ▽ |
| Japan | 562 (1.8) | 550 (2.0) | -11 (1.1) ▽ | 579 (1.9) | 17 (1.1) ▲ | 559 (1.9) | -2 (1.3) |
| Chinese Taipei | 558 (1.8) | 540 (2.0) | -18 (1.5) ▽ | 573 (1.9) | 15 (1.0) ▲ | 568 (1.8) | 10 (1.6) ▲ |
| Finland | 555 (2.6) | 558 (2.9) | 4 (1.5) ▲ | 544 (3.2) | -10 (2.1) ▽ | 563 (3.5) | 9 (2.2) ▲ |
| [2] Latvia | 542 (2.4) | 535 (2.7) | -7 (1.5) ▽ | 553 (3.6) | 12 (2.7) ▲ | 535 (3.7) | -7 (2.8) ▽ |
| † Norway (5) | 539 (2.2) | 547 (3.0) | 8 (2.2) ▲ | 525 (3.0) | -14 (2.2) ▽ | 547 (2.9) | 7 (1.7) ▲ |
| [2] † United States | 539 (2.7) | 546 (2.5) | 8 (0.8) ▲ | 527 (2.8) | -12 (0.7) ▽ | 539 (3.2) | 0 (1.6) |
| [2] Lithuania | 538 (2.5) | 537 (2.8) | -1 (1.2) | 547 (3.0) | 9 (1.7) ▲ | 525 (3.0) | -13 (1.6) ▽ |
| Sweden | 537 (3.3) | 541 (3.3) | 4 (2.4) | 525 (3.3) | -12 (1.2) ▽ | 547 (3.8) | 9 (3.2) ▲ |
| [2] England | 537 (2.7) | 537 (2.6) | 0 (1.5) | 537 (3.2) | 0 (1.9) | 533 (2.9) | -4 (1.4) ▽ |
| Czech Republic | 534 (2.6) | 535 (2.2) | 2 (1.6) | 528 (2.5) | -6 (1.5) ▽ | 536 (3.0) | 2 (2.6) |
| Australia | 533 (2.4) | 539 (2.8) | 7 (1.1) ▲ | 526 (2.7) | -7 (1.2) ▽ | 527 (2.8) | -6 (1.2) ▽ |
| † Hong Kong SAR | 531 (3.3) | 523 (3.6) | -8 (1.5) ▽ | 529 (3.5) | -2 (2.0) | 549 (4.5) | 18 (2.7) ▲ |
| Poland | 531 (2.6) | 534 (3.1) | 3 (1.7) | 526 (2.9) | -5 (1.8) ▽ | 529 (3.3) | -2 (2.4) |
| Hungary | 529 (2.7) | 533 (3.4) | 4 (2.1) | 524 (2.8) | -6 (1.5) ▽ | 531 (3.2) | 2 (2.0) |
| Ireland | 528 (3.2) | 528 (3.5) | 0 (1.2) | 523 (3.2) | -5 (1.3) ▽ | 536 (3.8) | 8 (2.9) ▲ |
| [2] Turkey (5) | 526 (4.2) | 519 (4.6) | -8 (1.5) ▽ | 538 (4.6) | 12 (2.2) ▲ | 524 (4.0) | -2 (1.8) |
| Croatia | 524 (2.2) | 520 (2.3) | -4 (1.6) ▽ | 528 (2.4) | 4 (2.3) | 523 (3.0) | -1 (2.6) |
| [1 2] Canada | 523 (1.9) | 532 (1.9) | 9 (0.8) ▲ | 513 (1.8) | -10 (0.9) ▽ | 519 (2.2) | -4 (0.9) ▽ |
| † Denmark | 522 (2.4) | 526 (2.2) | 4 (1.9) ▲ | 507 (2.3) | -15 (2.1) ▽ | 535 (2.7) | 13 (2.4) ▲ |
| Austria | 522 (2.6) | 523 (2.3) | 1 (1.5) | 519 (2.6) | -3 (1.5) | 524 (3.5) | 2 (2.7) |
| Bulgaria | 521 (4.9) | 525 (5.2) | 4 (1.7) ▲ | 518 (6.4) | -3 (2.5) | 514 (4.8) | -7 (1.9) ▽ |
| [2] Slovak Republic | 521 (3.7) | 520 (3.9) | -1 (1.3) | 525 (3.9) | 5 (1.8) ▲ | 513 (4.4) | -8 (2.5) ▽ |
| † Northern Ireland | 518 (2.3) | 520 (2.8) | 2 (2.1) | 511 (2.2) | -8 (1.4) ▽ | 525 (2.6) | 6 (2.5) ▲ |
| ≡ Netherlands | 518 (2.9) | 518 (3.3) | -1 (2.5) | 516 (2.8) | -3 (2.0) | 521 (3.5) | 2 (1.2) ▲ |
| Germany | 518 (2.2) | 521 (2.3) | 3 (1.2) ▲ | 518 (3.0) | 0 (2.1) | 509 (4.0) | -9 (3.6) ▽ |
| [2] Serbia | 517 (3.5) | 521 (3.8) | 4 (1.7) ▲ | 524 (4.2) | 7 (2.2) ▲ | 494 (4.5) | -23 (2.1) ▽ |
| Cyprus | 511 (3.0) | 515 (3.3) | 3 (2.1) | 511 (3.2) | 0 (1.7) | 500 (2.7) | -12 (1.9) ▽ |
| Spain | 511 (2.0) | 514 (2.2) | 3 (0.9) ▲ | 503 (2.3) | -8 (1.4) ▽ | 518 (2.4) | 7 (1.5) ▲ |
| Italy | 510 (3.0) | 514 (3.3) | 4 (1.2) ▲ | 502 (3.4) | -8 (1.8) ▽ | 507 (3.7) | -3 (1.5) |
| [2] Portugal | 504 (2.6) | 509 (1.9) | 5 (1.7) ▲ | 496 (2.4) | -7 (1.7) ▽ | 501 (3.0) | -3 (2.5) |
| [2] New Zealand | 503 (2.3) | 510 (2.3) | 8 (1.6) ▲ | 492 (2.1) | -10 (1.4) ▽ | 503 (3.1) | 1 (2.1) |
| † Belgium (Flemish) | 501 (2.1) | 500 (2.5) | -1 (1.4) | 502 (2.3) | 1 (1.4) | 496 (2.2) | -5 (1.6) ▽ |
| Malta | 496 (1.3) | 499 (2.5) | 4 (1.9) | 492 (2.9) | -4 (2.4) | 491 (2.1) | -4 (1.7) ▽ |
| [2] Kazakhstan | 494 (3.1) | 486 (3.5) | -8 (1.4) ▽ | 506 (3.3) | 12 (1.4) ▲ | 488 (3.2) | -7 (1.5) ▽ |
| Bahrain | 493 (3.4) | 492 (3.6) | -1 (1.4) | 496 (3.8) | 4 (1.4) ▲ | 478 (4.0) | -15 (1.7) ▽ |
| Albania | 489 (3.5) | 488 (3.7) | -1 (1.6) | 493 (4.1) | 4 (1.5) ▲ | 475 (4.2) | -15 (1.8) ▽ |
| France | 488 (3.0) | 494 (3.1) | 6 (1.2) ▲ | 477 (3.1) | -10 (1.5) ▽ | 488 (3.2) | 1 (1.5) |
| United Arab Emirates | 473 (2.1) | 467 (2.0) | -6 (0.5) ▽ | 477 (2.2) | 5 (0.9) ▲ | 474 (1.6) | 1 (1.0) |
| Chile | 469 (2.6) | 478 (2.5) | 9 (1.1) ▲ | 458 (3.8) | -11 (2.3) ▽ | 460 (4.3) | -9 (3.4) ▽ |
| Armenia | 466 (3.4) | 476 (3.2) | 9 (1.7) ▲ | 454 (3.4) | -13 (1.2) ▽ | 451 (3.8) | -15 (2.3) ▽ |
| Bosnia and Herzegovina | 459 (2.9) | 471 (3.3) | 13 (1.3) ▲ | 450 (3.3) | -8 (1.3) ▽ | 437 (3.2) | -22 (1.6) ▽ |
| [1] Georgia | 454 (3.9) | 457 (4.0) | 3 (1.2) ▲ | 452 (4.6) | -2 (2.4) | 435 (4.2) | -20 (3.2) ▽ |
| Montenegro | 453 (2.5) | 464 (2.2) | 11 (1.4) ▲ | 446 (2.8) | -7 (2.0) ▽ | 434 (3.1) | -20 (1.9) ▽ |
| Qatar | 449 (3.9) | 448 (4.6) | -1 (1.7) | 451 (4.0) | 2 (1.3) | 442 (5.7) | -7 (3.2) ▽ |
| Iran, Islamic Rep. of | 441 (4.1) | 430 (4.5) | -11 (2.1) ▽ | 453 (4.7) | 12 (1.9) ▲ | 438 (4.2) | -3 (1.7) |
| Oman | 435 (4.1) | 434 (4.6) | 0 (1.8) | 437 (4.7) | 2 (1.4) | 416 (4.5) | -19 (1.9) ▽ |
| Azerbaijan | 427 (3.3) | 423 (3.4) | -4 (1.3) ▽ | 427 (3.3) | 0 (1.5) | 424 (4.7) | -3 (3.3) |
| North Macedonia | 426 (6.2) | 422 (5.9) | -4 (2.5) | 432 (7.2) | 6 (2.8) ▲ | 409 (7.2) | -17 (2.6) ▽ |
| [2] Kosovo | 413 (3.7) | 408 (4.3) | -5 (2.5) ▽ | 415 (4.2) | 2 (2.0) | 410 (3.9) | -3 (2.0) |
| [2] Saudi Arabia | 402 (4.1) | - - | - - | - - | - - | - - | - - |
| Kuwait | 392 (6.1) | - - | - - | - - | - - | - - | - - |
| Ψ Morocco | 374 (5.8) | 364 (5.9) | -10 (1.6) ▽ | 379 (6.2) | 4 (1.9) ▲ | 350 (6.6) | -24 (2.1) ▽ |
| Ж South Africa (5) | 324 (4.9) | - - | - - | - - | - - | - - | - - |
| [2 Ж] Pakistan | 290 (13.4) | - - | - - | - - | - - | - - | - - |
| [2 Ж] Philippines | 249 (7.5) | - - | - - | - - | - - | - - | - - |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (2.7) | 0 (1.9) | 598 (2.7) | 4 (2.3) | 589 (3.0) | -6 (1.8) ▽ |
| [2] Dubai, UAE | 545 (1.7) | 537 (1.9) | -7 (1.1) ▽ | 556 (2.1) | 11 (1.1) ▲ | 542 (2.3) | -3 (1.3) ▽ |
| [2] Ontario, Canada | 524 (3.2) | 535 (2.9) | 11 (1.3) ▲ | 512 (2.9) | -12 (1.4) ▽ | 518 (3.4) | -6 (1.2) ▽ |
| Madrid, Spain | 523 (2.0) | 525 (3.4) | 2 (2.5) | 514 (2.5) | -9 (2.2) ▽ | 533 (2.0) | 10 (0.8) ▲ |
| Quebec, Canada | 522 (2.5) | 530 (2.4) | 8 (1.3) ▲ | 514 (2.8) | -8 (1.6) ▽ | 519 (3.2) | -3 (1.7) |
| Abu Dhabi, UAE | 418 (2.8) | 413 (2.5) | -5 (1.1) ▽ | 418 (2.6) | 0 (1.2) | 422 (2.1) | 4 (2.4) |

▲ Subscale score significantly higher than overall science score
▽ Subscale score significantly lower than overall science score

Numbers of items are based on the TIMSS 2019 fourth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement in Content Domains

Exhibit 2.15 presents trends in average achievement for the three science content domains assessed by TIMSS 2019—life science, physical science, and Earth science. Of the 53 TIMSS 2019 countries for which science content domain scores were estimated, 42 had comparable data from TIMSS 2015, with each of three content areas showing no recent changes in average achievement for about half the countries. However, in the life science content area, 6 showed improvement and 12 declined; in physical science, 12 showed improvement and 9 declined; and in Earth science, 9 showed improvement and 6 declined.

TIMSS began providing scaled results in the content domains in 2007, with 21 countries having trends between 2007 and 2019. Compared with 2007, in TIMSS 2019 across the content domains in these countries, 7 had higher average achievement in life science and 6 had lower average achievement, 11 had higher average achievement in physical science and 2 had lower average achievement, and in Earth science, 7 had higher average achievement and 7 had lower average achievement.

# Exhibit 2.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Life Science | | | | Physical Science | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Armenia** | | | | | | | | | | | | |
| 2019 | 476 (3.2) | 31 ▲ | 51 ▲ | | 454 (3.4) | 18 ▲ | 55 ▲ | | 451 (3.8) | 16 ▲ | 53 ▲ | |
| 2015 | 444 (3.9) | | 20 ▲ | | 436 (4.3) | | 37 ▲ | | 435 (4.1) | | 37 ▲ | |
| 2011 | 424 (3.9) | | | | 399 (3.9) | | | | 398 (4.1) | | | |
| **Australia** | | | | | | | | | | | | |
| 2019 | 539 (2.8) | 8 | 23 ▲ | 10 ▲ | 526 (2.7) | 10 ▲ | 12 ▲ | 5 | 527 (2.8) | 7 | 7 | -9 |
| 2015 | 531 (3.0) | | 15 ▲ | 2 | 516 (2.7) | | 2 | -5 | 520 (3.3) | | 0 | -16 ▽ |
| 2011 | 516 (3.1) | | | -14 ▽ | 514 (3.1) | | | -7 | 520 (3.6) | | | -17 ▽ |
| 2007 | 529 (3.6) | | | | 521 (3.8) | | | | 536 (4.2) | | | |
| **Austria** | | | | | | | | | | | | |
| 2019 | 523 (2.3) | | -3 | -4 | 519 (2.6) | | -16 ▽ | 3 | 524 (3.5) | | -15 ▽ | -11 ▽ |
| 2011 | 526 (2.8) | | | -2 | 535 (2.8) | | | 18 ▲ | 539 (3.5) | | | 4 |
| 2007 | 528 (2.4) | | | | 517 (3.0) | | | | 535 (2.6) | | | |
| **Azerbaijan** | | | | | | | | | | | | |
| 2019 | 423 (3.4) | | -17 ▽ | | 427 (3.3) | | -9 | | 424 (4.7) | | 16 | |
| [2] 2011 | 440 (5.3) | | | | 436 (6.0) | | | | 408 (7.3) | | | |
| **Bahrain** | | | | | | | | | | | | |
| 2019 | 492 (3.6) | 37 ▲ | 48 ▲ | | 496 (3.8) | 31 ▲ | 44 ▲ | | 478 (4.0) | 30 ▲ | 33 ▲ | |
| [2] 2015 | 455 (2.9) | | 11 ▲ | | 465 (3.2) | | 12 ▲ | | 448 (3.2) | | 3 | |
| 2011 | 444 (4.2) | | | | 453 (4.6) | | | | 445 (3.7) | | | |
| **Belgium (Flemish)** | | | | | | | | | | | | |
| † 2019 | 500 (2.5) | -13 ▽ | -10 ▽ | | 502 (2.3) | -4 | -5 | | 496 (2.2) | -16 ▽ | -8 ▽ | |
| † 2015 | 513 (2.4) | | 3 | | 506 (3.2) | | -1 | | 513 (2.8) | | 8 | |
| 2011 | 510 (2.5) | | | | 507 (2.1) | | | | 505 (2.9) | | | |
| **Bulgaria** | | | | | | | | | | | | |
| 2019 | 525 (5.2) | -17 ▽ | | | 518 (6.4) | -11 | | | 514 (4.8) | -18 ▽ | | |
| 2015 | 542 (6.3) | | | | 529 (6.5) | | | | 532 (6.9) | | | |
| **Canada** | | | | | | | | | | | | |
| [1 2] 2019 | 532 (1.9) | -4 | | | 513 (1.8) | -5 | | | 519 (2.2) | 6 | | |
| [1 2] † 2015 | 536 (2.8) | | | | 518 (2.7) | | | | 513 (3.1) | | | |
| **Chile** | | | | | | | | | | | | |
| 2019 | 478 (2.5) | -9 ▽ | -12 ▽ | | 458 (3.8) | -8 | -13 ▽ | | 460 (4.3) | -5 | -15 ▽ | |
| 2015 | 487 (2.6) | | -2 | | 466 (2.9) | | -5 | | 465 (3.4) | | -10 ▽ | |
| 2011 | 490 (2.2) | | | | 471 (2.5) | | | | 475 (2.8) | | | |
| **Chinese Taipei** | | | | | | | | | | | | |
| 2019 | 540 (2.0) | -4 | 2 | -7 | 573 (1.9) | 5 | 5 | 9 ▲ | 568 (1.8) | 13 ▲ | 15 ▲ | 5 |
| 2015 | 545 (2.0) | | 7 ▲ | -2 | 568 (2.0) | | 0 | 5 | 555 (2.5) | | 3 | -8 ▽ |
| 2011 | 538 (2.5) | | | -9 ▽ | 569 (2.1) | | | 5 | 553 (2.6) | | | -10 ▽ |
| 2007 | 547 (2.7) | | | | 564 (2.4) | | | | 563 (2.9) | | | |
| **Croatia** | | | | | | | | | | | | |
| 2019 | 520 (2.3) | -11 ▽ | -5 | | 528 (2.4) | -8 ▽ | 26 ▲ | | 523 (3.0) | -12 ▽ | 2 | |
| 2015 | 531 (2.6) | | 6 | | 535 (2.9) | | 33 ▲ | | 535 (3.4) | | 14 ▲ | |
| [2] 2011 | 525 (2.0) | | | | 502 (2.7) | | | | 521 (2.7) | | | |
| **Cyprus** | | | | | | | | | | | | |
| 2019 | 515 (3.3) | 34 ▲ | | | 511 (3.2) | 25 ▲ | | | 500 (2.7) | 37 ▲ | | |
| 2015 | 481 (2.8) | | | | 486 (2.7) | | | | 463 (3.5) | | | |
| **Czech Republic** | | | | | | | | | | | | |
| 2019 | 535 (2.2) | -3 | -14 ▽ | 13 ▲ | 528 (2.5) | -3 | 9 ▲ | 19 ▲ | 536 (3.0) | 4 | -2 | 22 ▲ |
| 2015 | 538 (2.0) | | -12 ▽ | 16 ▲ | 531 (2.4) | | 11 ▲ | 22 ▲ | 531 (3.0) | | -6 | 18 ▲ |
| 2011 | 550 (3.0) | | | 27 ▲ | 519 (3.1) | | | 10 ▲ | 537 (3.2) | | | 24 ▲ |
| 2007 | 522 (3.4) | | | | 509 (3.5) | | | | 514 (3.6) | | | |
| **Denmark** | | | | | | | | | | | | |
| † 2019 | 526 (2.2) | -8 ▽ | -4 | 0 | 507 (2.3) | -9 ▽ | -19 ▽ | 5 | 535 (2.7) | 4 | 8 ▲ | 16 ▲ |
| [2] † 2015 | 534 (2.4) | | 4 | 7 | 516 (2.7) | | -10 ▽ | 14 ▲ | 531 (3.0) | | 4 | 12 ▲ |
| [2] 2011 | 530 (2.7) | | | 3 | 526 (2.4) | | | 24 ▲ | 527 (3.0) | | | 8 |
| † 2007 | 527 (3.4) | | | | 502 (3.1) | | | | 519 (3.3) | | | |
| **England** | | | | | | | | | | | | |
| [2] 2019 | 537 (2.6) | 1 | 7 | 2 | 537 (3.2) | -3 | 2 | -9 | 533 (2.9) | 5 | 11 ▲ | -9 ▽ |
| 2015 | 536 (2.5) | | 6 | 0 | 540 (2.7) | | 5 | -6 | 527 (3.3) | | 5 | -14 ▽ |
| 2011 | 530 (3.0) | | | -6 | 535 (3.4) | | | -10 ▽ | 522 (3.8) | | | -19 ▽ |
| 2007 | 536 (3.1) | | | | 546 (3.2) | | | | 542 (3.4) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in content domains using current methodology began with TIMSS 2007.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

(Continued)

| Country | Life Science | | | | Physical Science | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Finland** | | | | | | | | | | | | |
| 2019 | 558 (2.9) | 2 | -16 ▽ | | 544 (3.2) | -3 | -24 ▽ | | 563 (3.5) | 3 | -2 | |
| 2015 | 556 (2.6) | | -18 ▽ | | 547 (2.3) | | -21 ▽ | | 560 (2.6) | | -5 | |
| 2011 | 574 (2.8) | | | | 568 (2.9) | | | | 566 (2.8) | | | |
| **France** | | | | | | | | | | | | |
| 2019 | 494 (3.1) | 4 | | | 477 (3.1) | -4 | | | 488 (3.2) | 4 | | |
| 2015 | 490 (3.1) | | | | 482 (2.7) | | | | 485 (4.7) | | | |
| **Georgia** | | | | | | | | | | | | |
| 1 2019 | 457 (4.0) | -2 | -4 | 36 ▲ | 452 (4.6) | 15 ▲ | 12 ▲ | 50 ▲ | 435 (4.2) | -6 | -23 ▽ | 18 ▲ |
| 1 2015 | 459 (4.1) | | -2 | 37 ▲ | 438 (4.7) | | -2 | 35 ▲ | 441 (4.3) | | -17 ▽ | 25 ▲ |
| 1 2011 | 461 (3.7) | | | 39 ▲ | 440 (4.2) | | | 37 ▲ | 458 (4.2) | | | 42 ▲ |
| 1 2007 | 421 (4.2) | | | | 403 (4.9) | | | | 416 (5.6) | | | |
| **Germany** | | | | | | | | | | | | |
| 2019 | 521 (2.3) | -7 ▽ | -4 | -9 ▽ | 518 (3.0) | -14 ▽ | -17 ▽ | -8 | 509 (4.0) | -10 | -11 ▽ | -15 ▽ |
| 2015 | 528 (2.0) | | 3 | -3 | 532 (2.5) | | -3 | 6 | 519 (4.0) | | -1 | -5 |
| 2011 | 525 (2.7) | | | -6 | 535 (3.1) | | | 8 | 520 (3.8) | | | -4 |
| 2007 | 531 (2.2) | | | | 527 (3.2) | | | | 524 (2.8) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | |
| † 2019 | 523 (3.6) | -27 ▽ | -1 | -17 ▽ | 529 (3.5) | -26 ▽ | -10 | -33 ▽ | 549 (4.5) | -25 ▽ | 1 | -19 ▽ |
| † 2015 | 550 (3.7) | | 26 ▲ | 10 | 555 (3.5) | | 16 ▲ | -7 | 574 (3.1) | | 26 ▲ | 6 |
| 2 2011 | 524 (3.9) | | | -16 ▽ | 539 (4.5) | | | -23 ▽ | 548 (3.4) | | | -20 ▽ |
| 2007 | 540 (3.8) | | | | 562 (3.9) | | | | 568 (4.2) | | | |
| **Hungary** | | | | | | | | | | | | |
| 2019 | 533 (3.4) | -17 ▽ | -18 ▽ | -19 ▽ | 524 (2.8) | -10 ▽ | 3 | -5 | 531 (3.2) | -4 | 8 | 14 ▲ |
| 2015 | 550 (3.4) | | -1 | -2 | 534 (3.5) | | 13 ▲ | 5 | 535 (4.0) | | 11 | 18 ▲ |
| 2011 | 552 (3.4) | | | -1 | 520 (3.7) | | | -8 | 524 (4.4) | | | 7 |
| 2007 | 553 (3.3) | | | | 529 (3.7) | | | | 517 (4.4) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | |
| 2019 | 430 (4.5) | 13 ▲ | -19 ▽ | -7 | 453 (4.7) | 29 ▲ | 0 | 13 ▲ | 438 (4.2) | 30 ▲ | -19 ▽ | 22 ▲ |
| 2015 | 417 (4.5) | | -31 ▽ | -20 ▽ | 423 (5.0) | | -30 ▽ | -16 ▽ | 408 (4.8) | | -49 ▽ | -8 |
| 2011 | 449 (4.0) | | | 11 | 453 (3.9) | | | 13 ▲ | 457 (3.6) | | | 40 ▲ |
| 2007 | 437 (5.1) | | | | 440 (4.8) | | | | 416 (5.0) | | | |
| **Ireland** | | | | | | | | | | | | |
| 2019 | 528 (3.5) | -3 | 15 ▲ | | 523 (3.2) | -1 | 6 | | 536 (3.8) | 2 | 16 ▲ | |
| 2015 | 531 (2.4) | | 18 ▲ | | 524 (2.8) | | 7 | | 535 (3.0) | | 15 ▲ | |
| 2011 | 513 (3.5) | | | | 517 (3.0) | | | | 520 (3.8) | | | |
| **Italy** | | | | | | | | | | | | |
| 2019 | 514 (3.3) | -5 | -21 ▽ | -41 ▽ | 502 (3.4) | -11 ▽ | -7 | -18 ▽ | 507 (3.7) | -3 | -16 ▽ | -20 ▽ |
| 2 2015 | 519 (2.7) | | -16 ▽ | -36 ▽ | 513 (2.9) | | 4 | -7 | 510 (3.5) | | -13 ▽ | -16 ▽ |
| 2011 | 535 (2.8) | | | -20 ▽ | 509 (3.1) | | | -11 ▽ | 523 (3.7) | | | -3 |
| 2007 | 555 (3.7) | | | | 520 (3.6) | | | | 527 (4.2) | | | |
| **Japan** | | | | | | | | | | | | |
| 2019 | 550 (2.0) | -6 | 10 ▲ | 14 ▲ | 579 (1.9) | -8 ▽ | -11 ▽ | 7 ▲ | 559 (1.9) | -4 | 8 ▲ | 28 ▲ |
| 2015 | 556 (2.2) | | 16 ▲ | 20 ▲ | 587 (2.6) | | -2 | 16 ▲ | 563 (2.5) | | 12 ▲ | 31 ▲ |
| 2011 | 540 (1.9) | | | 4 | 589 (2.0) | | | 18 ▲ | 551 (1.8) | | | 20 ▲ |
| 2007 | 536 (2.3) | | | | 571 (2.8) | | | | 532 (3.5) | | | |
| **Kazakhstan** | | | | | | | | | | | | |
| 2 2019 | 486 (3.5) | | -14 ▽ | | 506 (3.3) | | 20 ▲ | | 488 (3.2) | | -3 | |
| 2 2011 | 500 (5.2) | | | | 486 (5.3) | | | | 491 (5.9) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | |
| 2019 | 574 (2.5) | -7 ▽ | 3 | | 607 (2.7) | 9 ▲ | 10 ▲ | | 587 (2.9) | -4 | -16 ▽ | |
| 2015 | 581 (1.9) | | 11 ▲ | | 597 (2.0) | | 1 | | 591 (4.1) | | -12 ▽ | |
| 2011 | 571 (2.2) | | | | 597 (2.6) | | | | 603 (2.0) | | | |
| **Lithuania** | | | | | | | | | | | | |
| 2 2019 | 537 (2.8) | 10 ▲ | 16 ▲ | 18 ▲ | 547 (3.0) | 12 ▲ | 33 ▲ | 36 ▲ | 525 (3.0) | 9 ▲ | 24 ▲ | 16 ▲ |
| 2 2015 | 527 (3.0) | | 7 | 9 ▲ | 535 (2.5) | | 21 ▲ | 24 ▲ | 515 (3.7) | | 15 ▲ | 7 |
| 1 2 2011 | 520 (3.0) | | | 2 | 514 (3.1) | | | 3 | 501 (3.0) | | | -8 |
| 1 2007 | 518 (2.2) | | | | 511 (2.1) | | | | 508 (2.8) | | | |
| **Malta** | | | | | | | | | | | | |
| 2019 | 499 (2.5) | | 61 ▲ | | 492 (2.9) | | 39 ▲ | | 491 (2.1) | | 45 ▲ | |
| 2011 | 439 (2.4) | | | | 453 (2.4) | | | | 447 (2.3) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

(Continued)

| Country | Life Science | | | | Physical Science | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Morocco** | | | | | | | | | | | | |
| Ψ 2019 | 364 (5.9) | 13 | 119 ▲ | | 379 (6.2) | 22 ▲ | 122 ▲ | | 350 (6.6) | 60 ▲ | 141 ▲ | |
| Ψ 2015 | 350 (4.3) | | 106 ▲ | | 357 (5.9) | | 101 ▲ | | 289 (6.6) | | 81 ▲ | |
| Ж 2011 | 245 (4.6) | | | | 256 (5.4) | | | | 208 (4.9) | | | |
| **Netherlands** | | | | | | | | | | | | |
| ≡ 2019 | 518 (3.3) | -7 | -19 ▽ | -21 ▽ | 516 (2.8) | 12 ▲ | -10 ▽ | 12 ▲ | 521 (3.5) | 1 | -4 | -3 |
| † 2015 | 525 (2.7) | | -11 ▽ | -14 ▽ | 504 (2.6) | | -22 ▽ | 0 | 520 (3.0) | | -5 | -4 |
| † 2011 | 537 (1.9) | | | -3 | 526 (2.0) | | | 22 ▲ | 525 (2.8) | | | 1 |
| ‡ 2007 | 539 (2.6) | | | | 503 (3.2) | | | | 524 (3.5) | | | |
| **New Zealand** | | | | | | | | | | | | |
| 2 2019 | 510 (2.3) | -1 | 13 ▲ | 4 | 492 (2.1) | -5 | -1 | -2 | 503 (3.1) | -2 | 5 | -9 ▽ |
| 2015 | 511 (2.7) | | 14 ▲ | 5 | 497 (2.5) | | 4 | 3 | 506 (3.4) | | 7 | -7 |
| 2011 | 497 (2.5) | | | -8 ▽ | 493 (2.7) | | | -1 | 499 (3.1) | | | -14 ▽ |
| 2007 | 506 (2.7) | | | | 494 (3.3) | | | | 513 (3.5) | | | |
| **Northern Ireland** | | | | | | | | | | | | |
| † 2019 | 520 (2.8) | -1 | 1 | | 511 (2.2) | -3 | -9 ▽ | | 525 (2.6) | 3 | 17 ▲ | |
| ‡ 2015 | 521 (2.7) | | 3 | | 514 (2.6) | | -6 | | 522 (3.0) | | 15 ▲ | |
| † 2011 | 519 (2.9) | | | | 520 (3.2) | | | | 507 (2.7) | | | |
| **Norway (5)** | | | | | | | | | | | | |
| † 2019 | 547 (3.0) | 1 | | | 525 (3.0) | 3 | | | 547 (2.9) | -2 | | |
| 2015 | 546 (2.6) | | | | 522 (2.8) | | | | 549 (3.8) | | | |
| **Oman** | | | | | | | | | | | | |
| 2019 | 434 (4.6) | 8 | 65 ▲ | | 437 (4.7) | 2 | 67 ▲ | | 416 (4.5) | -7 | 45 ▲ | |
| 2015 | 426 (3.2) | | 56 ▲ | | 435 (3.4) | | 65 ▲ | | 423 (3.5) | | 53 ▲ | |
| 2011 | 370 (3.9) | | | | 370 (4.8) | | | | 371 (4.7) | | | |
| **Poland** | | | | | | | | | | | | |
| 2019 | 534 (3.1) | -23 ▽ | | | 526 (2.9) | -14 ▽ | | | 529 (3.3) | -11 ▽ | | |
| 2015 | 557 (2.5) | | | | 540 (2.1) | | | | 540 (2.6) | | | |
| **Portugal** | | | | | | | | | | | | |
| 2 2019 | 509 (1.9) | 1 | -12 ▽ | | 496 (2.4) | -5 | -20 ▽ | | 501 (3.0) | -12 ▽ | -30 ▽ | |
| 2 2015 | 508 (2.1) | | -13 ▽ | | 502 (2.9) | | -15 ▽ | | 513 (2.5) | | -18 ▽ | |
| 2011 | 520 (4.2) | | | | 517 (4.1) | | | | 531 (4.3) | | | |
| **Qatar** | | | | | | | | | | | | |
| 2019 | 448 (4.6) | 12 | 65 ▲ | | 451 (4.0) | 16 ▲ | 54 ▲ | | 442 (5.7) | 15 ▲ | 42 ▲ | |
| 2015 | 436 (4.4) | | 53 ▲ | | 435 (4.7) | | 39 ▲ | | 427 (5.0) | | 26 ▲ | |
| 2 2011 | 383 (5.1) | | | | 397 (5.0) | | | | 401 (4.7) | | | |
| **Russian Federation** | | | | | | | | | | | | |
| 2 2019 | 570 (3.1) | 2 | 14 ▲ | 26 ▲ | 572 (2.9) | 5 | 24 ▲ | 20 ▲ | 554 (4.4) | -8 | 2 | 13 |
| 2015 | 569 (3.1) | | 13 ▲ | 24 ▲ | 567 (3.6) | | 19 ▲ | 15 ▲ | 562 (4.7) | | 10 | 21 ▲ |
| 2011 | 556 (3.7) | | | 12 | 548 (4.0) | | | -4 | 552 (4.0) | | | 11 |
| 2007 | 545 (4.7) | | | | 552 (5.6) | | | | 541 (5.6) | | | |
| **Serbia** | | | | | | | | | | | | |
| 2 2019 | 521 (3.8) | -10 | 3 | | 524 (4.2) | -5 | 2 | | 494 (4.5) | -1 | -3 | |
| 3 2015 | 531 (3.8) | | 13 ▲ | | 529 (3.8) | | 6 | | 496 (4.8) | | -1 | |
| 2 2011 | 518 (3.0) | | | | 523 (3.8) | | | | 497 (3.6) | | | |
| **Singapore** | | | | | | | | | | | | |
| 3 2019 | 603 (3.6) | -4 | 6 | 8 | 613 (3.7) | 10 | 15 ▲ | 16 ▲ | 557 (3.9) | 10 | 16 ▲ | -8 |
| 2 2015 | 607 (4.4) | | 9 | 12 | 603 (3.7) | | 5 | 6 | 546 (3.7) | | 5 | -18 ▽ |
| 2 2011 | 597 (4.4) | | | 3 | 598 (3.6) | | | 2 | 541 (3.1) | | | -24 ▽ |
| 2007 | 595 (4.8) | | | | 597 (4.3) | | | | 565 (4.1) | | | |
| **Slovak Republic** | | | | | | | | | | | | |
| 2 2019 | 520 (3.9) | 3 | -14 ▽ | -15 ▽ | 525 (3.9) | 0 | -2 | 13 ▲ | 513 (4.4) | -1 | -22 ▽ | -19 ▽ |
| 2015 | 517 (2.9) | | -16 ▽ | -18 ▽ | 526 (3.4) | | -2 | 14 ▲ | 514 (3.0) | | -22 ▽ | -18 ▽ |
| 2011 | 534 (3.7) | | | -1 | 527 (4.1) | | | 15 ▲ | 535 (4.0) | | | 3 |
| 2007 | 535 (4.7) | | | | 512 (4.9) | | | | 532 (6.5) | | | |
| **Spain** | | | | | | | | | | | | |
| 2019 | 514 (2.2) | -9 ▽ | 1 | | 503 (2.3) | -3 | 7 | | 518 (2.4) | -2 | 19 ▲ | |
| 2 2015 | 523 (2.6) | | 10 ▲ | | 507 (2.9) | | 10 ▲ | | 520 (3.0) | | 21 ▲ | |
| 2011 | 513 (3.0) | | | | 497 (2.9) | | | | 499 (3.7) | | | |
| **Sweden** | | | | | | | | | | | | |
| 2019 | 541 (3.3) | 2 | 8 | 9 ▲ | 525 (3.3) | -9 | -3 | 17 ▲ | 547 (3.8) | -5 | 8 | 7 |
| 2 2015 | 540 (3.3) | | 6 | 8 | 534 (3.6) | | 6 | 26 ▲ | 552 (4.1) | | 13 ▲ | 13 ▲ |
| 2011 | 534 (2.8) | | | 2 | 528 (2.5) | | | 19 ▲ | 538 (3.2) | | | -1 |
| 2007 | 532 (2.7) | | | | 509 (3.2) | | | | 539 (3.9) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 2.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

(Continued)

| Country | Life Science | | | | Physical Science | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **United Arab Emirates** | | | | | | | | | | | | |
| 2019 | 467 (2.0) | 18 ▲ | 47 ▲ | | 477 (2.2) | 24 ▲ | 49 ▲ | | 474 (1.6) | 26 ▲ | 39 ▲ | |
| 2015 | 449 (3.3) | | 29 ▲ | | 453 (3.0) | | 25 ▲ | | 448 (3.5) | | 13 ▲ | |
| 2011 | 420 (2.7) | | | | 429 (2.7) | | | | 435 (2.4) | | | |
| **United States** | | | | | | | | | | | | |
| 2† 2019 | 546 (2.5) | -9 ▽ | -1 | 3 | 527 (2.8) | -10 ▽ | -17 ▽ | -8 | 539 (3.2) | -1 | 0 | 2 |
| 2† 2015 | 555 (2.3) | | 8 ▲ | 12 ▲ | 537 (2.6) | | -6 | 3 | 539 (2.4) | | 0 | 2 |
| 2 2011 | 547 (2.0) | | | 3 | 544 (2.0) | | | 9 ▲ | 539 (2.2) | | | 2 |
| 2† 2007 | 544 (2.8) | | | | 535 (3.1) | | | | 537 (3.2) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | |
| 2 2019 | 535 (2.9) | -9 ▽ | 0 | -4 | 512 (2.9) | -10 ▽ | -15 ▽ | -23 ▽ | 518 (3.4) | 3 | 4 | -15 ▽ |
| 2015 | 544 (2.6) | | 9 ▲ | 5 | 522 (2.5) | | -6 | -13 ▽ | 515 (3.7) | | 1 | -18 ▽ |
| 2011 | 535 (3.4) | | | -4 | 528 (3.2) | | | -7 | 514 (3.7) | | | -19 ▽ |
| 2 2007 | 539 (3.9) | | | | 535 (3.4) | | | | 533 (4.2) | | | |
| **Quebec, Canada** | | | | | | | | | | | | |
| 2019 | 530 (2.4) | -3 | 5 | 5 | 514 (2.8) | -6 | 7 | 4 | 519 (3.2) | 4 | 3 | -3 |
| ≡ 2015 | 533 (4.3) | | 9 | 9 | 519 (4.9) | | 12 ▲ | 10 | 515 (4.4) | | -1 | -7 |
| 2011 | 524 (2.6) | | | 0 | 507 (3.3) | | | -2 | 516 (3.4) | | | -6 |
| 2 2007 | 524 (3.0) | | | | 509 (3.3) | | | | 522 (2.9) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | |
| 2019 | 413 (2.5) | 0 | 10 | | 418 (2.6) | 5 | 3 | | 422 (2.1) | 14 | 4 | |
| 2 2015 | 413 (6.0) | | 10 | | 413 (5.9) | | -2 | | 408 (6.9) | | -10 | |
| 2011 | 403 (5.6) | | | | 415 (5.2) | | | | 418 (5.1) | | | |
| **Dubai, UAE** | | | | | | | | | | | | |
| 2 2019 | 537 (1.9) | 20 ▲ | 82 ▲ | 81 ▲ | 556 (2.1) | 35 ▲ | 96 ▲ | 100 ▲ | 542 (2.3) | 31 ▲ | 73 ▲ | 81 ▲ |
| 2015 | 518 (2.6) | | 62 ▲ | 62 ▲ | 521 (2.2) | | 61 ▲ | 64 ▲ | 510 (2.9) | | 41 ▲ | 49 ▲ |
| 2011 | 455 (3.0) | | | -1 | 460 (3.1) | | | 4 | 469 (3.0) | | | 8 |
| ‡ 2007 | 456 (2.7) | | | | 456 (3.5) | | | | 461 (3.7) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Content Domains by Gender

Exhibit 2.16 shows differences in average achievement between girls and boys in the three science content domains. The differences in average achievement between girls and boys are very different from content domain to content domain across the TIMSS 2019 countries, with girls having higher achievement in life science than boys in many countries, and boys having higher achievement in physical and Earth science. In the life science content domain, girls had higher average achievement than boys in 26 countries, and boys did not have higher average achievement in any country. In physical science, girls had higher average achievement than boys in 4 countries, and boys had higher average achievement in 13 countries. In Earth science, girls had higher average achievement than boys in 4 countries, and boys had higher average achievement in 16 countries.

## Exhibit 2.16: Average Achievement in Science Content Domains by Gender

| Country | Life Science (73 Items) | | Physical Science (61 Items) | | Earth Science (35 Items) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Albania | 495 (4.2) ▲ | 482 (4.1) | 497 (4.6) | 490 (5.3) | 476 (5.0) | 473 (4.5) |
| Armenia | 482 (3.7) ▲ | 471 (3.5) | 459 (4.0) ▲ | 449 (3.9) | 458 (4.3) ▲ | 445 (4.9) |
| Australia | 543 (2.9) ▲ | 535 (3.4) | 524 (3.4) | 528 (3.3) | 524 (3.0) | 530 (3.5) |
| Austria | 523 (3.2) | 523 (3.5) | 514 (3.3) | 524 (3.0) ▲ | 518 (3.8) | 529 (4.0) ▲ |
| Azerbaijan | 427 (4.1) | 420 (3.9) | 429 (4.0) | 425 (3.9) | 425 (6.1) | 422 (4.8) |
| Bahrain | 512 (4.5) ▲ | 473 (5.0) | 515 (4.3) ▲ | 479 (5.7) | 494 (4.2) ▲ | 462 (5.9) |
| † Belgium (Flemish) | 500 (2.4) | 500 (3.4) | 500 (2.7) | 504 (2.5) | 489 (2.9) | 504 (3.3) ▲ |
| Bosnia and Herzegovina | 478 (3.6) ▲ | 465 (3.7) | 452 (4.0) | 449 (3.5) | 434 (3.6) | 439 (4.0) |
| Bulgaria | 533 (5.6) ▲ | 518 (5.9) | 518 (6.7) | 518 (7.4) | 518 (5.5) | 510 (5.8) |
| 1 2 Canada | 533 (2.4) | 531 (2.0) | 508 (2.2) | 518 (2.2) ▲ | 513 (2.5) | 524 (2.9) ▲ |
| Chile | 477 (2.9) | 478 (3.0) | 452 (4.7) | 463 (4.0) ▲ | 454 (5.1) | 466 (5.0) ▲ |
| Chinese Taipei | 542 (3.6) | 539 (2.3) | 570 (1.9) | 576 (2.8) | 565 (2.7) | 571 (2.0) |
| Croatia | 524 (2.8) ▲ | 517 (2.5) | 526 (3.8) | 529 (2.6) | 520 (3.7) | 527 (3.6) |
| Cyprus | 515 (3.6) | 514 (4.0) | 507 (3.3) | 515 (4.1) ▲ | 495 (3.1) | 505 (3.7) ▲ |
| Czech Republic | 536 (2.5) | 535 (2.8) | 520 (3.2) | 536 (2.9) ▲ | 529 (4.4) | 542 (3.5) ▲ |
| † Denmark | 533 (2.7) ▲ | 520 (2.9) | 504 (3.4) | 510 (3.6) | 531 (4.0) | 539 (2.8) |
| 2 England | 540 (3.7) | 535 (3.7) | 534 (4.2) | 540 (3.6) | 532 (3.3) | 534 (3.8) |
| Finland | 565 (3.7) ▲ | 552 (3.3) | 544 (3.8) | 544 (4.3) | 564 (3.7) | 562 (5.1) |
| France | 499 (3.5) ▲ | 489 (3.8) | 475 (3.3) | 480 (3.9) | 488 (4.2) | 489 (3.7) |
| † Georgia | 459 (4.5) | 455 (4.6) | 446 (5.5) | 458 (4.8) ▲ | 432 (4.9) | 438 (6.0) |
| Germany | 525 (3.0) ▲ | 518 (2.7) | 513 (4.4) | 524 (4.1) | 502 (4.9) | 515 (4.3) ▲ |
| † Hong Kong SAR | 529 (3.7) ▲ | 518 (4.4) | 525 (3.7) | 532 (4.4) | 544 (3.9) | 554 (5.8) ▲ |
| Hungary | 532 (3.7) | 534 (4.0) | 517 (3.2) | 530 (3.6) ▲ | 527 (4.3) | 535 (4.0) |
| Iran, Islamic Rep. of | 432 (6.7) | 428 (6.0) | 449 (7.6) | 457 (6.1) | 435 (6.4) | 441 (6.0) |
| Ireland | 530 (4.3) | 526 (3.6) | 520 (4.1) | 526 (3.3) | 529 (4.8) | 543 (3.9) ▲ |
| Italy | 514 (4.1) | 514 (3.3) | 495 (3.5) | 508 (4.3) ▲ | 501 (4.5) | 513 (3.7) ▲ |
| Japan | 554 (2.4) ▲ | 547 (2.4) | 580 (2.2) | 577 (2.2) | 558 (2.9) | 560 (3.2) |
| 2 Kazakhstan | 492 (3.7) ▲ | 481 (3.7) | 509 (3.7) | 504 (3.9) | 490 (4.8) | 485 (4.2) |
| Korea, Rep. of | 572 (3.2) | 576 (2.5) | 600 (3.3) | 613 (2.8) ▲ | 579 (3.5) | 594 (3.7) ▲ |
| 2 Kosovo | 416 (4.8) ▲ | 400 (4.8) | 423 (4.7) ▲ | 408 (4.8) | 414 (4.3) | 406 (5.6) |
| Kuwait | - - | - - | - - | - - | - - | - - |
| 2 Latvia | 540 (2.9) ▲ | 529 (3.2) | 551 (4.0) | 556 (4.8) | 537 (4.3) | 534 (3.9) |
| 2 Lithuania | 543 (3.1) ▲ | 530 (3.7) | 545 (3.8) | 549 (4.2) | 524 (3.7) | 526 (3.8) |
| Malta | 501 (3.8) | 498 (2.3) | 486 (4.8) | 497 (3.1) | 482 (2.8) | 500 (2.8) ▲ |
| Montenegro | 469 (3.0) ▲ | 460 (2.8) | 447 (3.1) | 445 (3.6) | 434 (4.2) | 433 (3.8) |
| Ψ Morocco | 371 (6.5) ▲ | 356 (6.0) | 383 (7.0) | 374 (6.4) | 353 (7.2) | 346 (7.7) |
| ≡ Netherlands | 520 (3.3) | 516 (3.9) | 515 (2.8) | 516 (4.2) | 518 (4.3) | 524 (4.6) |
| 2 New Zealand | 516 (3.9) ▲ | 504 (2.8) | 493 (2.9) | 492 (2.9) | 501 (5.4) | 505 (3.6) |
| North Macedonia | 431 (7.0) ▲ | 414 (6.0) | 435 (7.5) | 429 (7.9) | 418 (8.0) ▲ | 401 (7.7) |
| † Northern Ireland | 523 (3.9) | 517 (4.2) | 510 (2.7) | 512 (2.9) | 521 (3.2) | 528 (3.9) |
| † Norway (5) | 550 (3.7) | 544 (3.6) | 525 (3.4) | 526 (4.1) | 546 (4.5) | 548 (3.0) |
| Oman | 447 (5.1) ▲ | 422 (4.9) | 450 (4.6) ▲ | 424 (5.8) | 426 (4.7) ▲ | 406 (5.8) |
| 2 ж Pakistan | - - | - - | - - | - - | - - | - - |
| 2 ж Philippines | - - | - - | - - | - - | - - | - - |
| Poland | 539 (3.2) ▲ | 529 (3.6) | 525 (3.2) | 527 (3.5) | 524 (3.7) | 534 (3.7) ▲ |
| 2 Portugal | 508 (2.5) | 509 (2.9) | 493 (3.3) | 499 (2.4) ▲ | 497 (3.4) | 504 (4.1) |
| Qatar | 456 (6.0) ▲ | 440 (5.2) | 456 (6.5) | 446 (3.9) | 444 (8.0) | 440 (5.1) |
| 2 Russian Federation | 572 (3.6) | 569 (3.3) | 570 (3.1) | 574 (3.3) | 552 (4.9) | 557 (4.6) |
| 2 Saudi Arabia | - - | - - | - - | - - | - - | - - |
| 2 Serbia | 526 (4.4) ▲ | 515 (4.4) | 526 (4.4) | 522 (4.9) | 494 (5.6) | 494 (4.9) |
| 3 Singapore | 601 (3.9) | 605 (4.2) | 607 (3.9) | 619 (4.0) ▲ | 548 (3.9) | 565 (4.5) ▲ |
| 2 Slovak Republic | 520 (4.0) | 520 (4.6) | 520 (4.2) | 530 (4.7) ▲ | 507 (5.0) | 519 (5.2) ▲ |
| ж South Africa (5) | - - | - - | - - | - - | - - | - - |
| Spain | 515 (2.5) | 513 (2.9) | 499 (3.2) | 507 (2.4) ▲ | 517 (3.0) | 519 (3.3) |
| Sweden | 546 (3.6) ▲ | 537 (4.0) | 523 (4.0) | 527 (3.7) | 546 (3.6) | 547 (4.9) |
| 2 Turkey (5) | 518 (4.8) | 520 (5.7) | 534 (4.9) | 543 (5.9) | 521 (5.0) | 528 (5.0) |
| United Arab Emirates | 471 (3.0) | 463 (2.6) | 479 (3.3) | 476 (2.9) | 475 (2.7) | 474 (2.3) |
| 2 † United States | 547 (2.6) | 546 (3.4) | 523 (3.7) | 531 (3.1) | 533 (3.7) | 543 (3.4) ▲ |
| **International Average** | **510 (0.5) ▲** | **503 (0.5)** | **504 (0.6)** | **506 (0.6) ▲** | **499 (0.6)** | **503 (0.6) ▲** |
| **Benchmarking Participants** | | | | | | |
| 2 Ontario, Canada | 537 (4.0) | 533 (3.0) | 508 (4.0) | 516 (3.0) ▲ | 514 (4.6) | 522 (3.6) ▲ |
| Quebec, Canada | 530 (2.9) | 529 (2.9) | 508 (3.0) | 519 (3.5) ▲ | 513 (3.3) | 524 (3.9) ▲ |
| Moscow City, Russian Fed. | 599 (2.7) ▲ | 592 (3.3) | 594 (3.0) | 603 (2.9) ▲ | 586 (4.1) | 593 (4.1) |
| Madrid, Spain | 525 (3.1) | 524 (4.4) | 510 (3.4) | 518 (2.4) ▲ | 531 (2.9) | 535 (2.8) |
| Abu Dhabi, UAE | 418 (3.5) ▲ | 408 (3.6) | 422 (3.9) | 414 (3.9) | 424 (3.0) | 419 (3.4) |
| 2 Dubai, UAE | 540 (3.6) | 535 (2.8) | 556 (4.1) | 555 (3.0) | 541 (3.6) | 542 (3.7) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 fourth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Cognitive Domains

Exhibit 2.17 shows countries' average achievement in the knowing, applying, and reasoning cognitive domains relative to their overall average achievement (from highest to lowest overall average achievement). Eighteen countries had a relative strength in the knowing cognitive domain and 11 had a relative weakness, only 9 countries had a relative strength in the applying cognitive domain and 22 had a relative weakness, and 17 had a relative strength in the reasoning cognitive domain, and 15 had a relative weakness. Five countries had no relative strengths or weaknesses in the cognitive domains: Croatia, Germany, Portugal, Malta, and Montenegro.

## Exhibit 2.17: Average Achievement in Science Cognitive Domains

| Country | Overall Science Average Scale Score | Knowing (69 Items) | | Applying (64 Items) | | Reasoning (36 Items) | |
|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score |
| [3] Singapore | 595 (3.4) | 588 (3.7) | -7 (0.9) ▽ | 595 (3.7) | 1 (1.6) | 604 (3.5) | 9 (1.2) ▲ |
| Korea, Rep. of | 588 (2.1) | 584 (2.5) | -3 (1.8) | 596 (2.6) | 8 (1.5) ▲ | 581 (2.4) | -6 (1.4) ▽ |
| [2] Russian Federation | 567 (3.0) | 562 (3.3) | -5 (1.7) ▽ | 572 (3.4) | 5 (1.3) ▲ | 569 (2.8) | 2 (1.7) |
| Japan | 562 (1.8) | 535 (2.6) | -27 (1.6) ▽ | 576 (2.2) | 15 (1.3) ▲ | 580 (2.4) | 18 (2.2) ▲ |
| Chinese Taipei | 558 (1.8) | 560 (1.9) | 2 (1.3) | 561 (2.0) | 2 (0.9) ▲ | 552 (2.7) | -6 (2.0) ▽ |
| Finland | 555 (2.6) | 553 (2.5) | -1 (1.4) | 551 (2.5) | -4 (1.5) ▽ | 563 (2.4) | 8 (1.6) ▲ |
| [2] Latvia | 542 (2.4) | 539 (3.2) | -3 (2.0) | 540 (2.6) | -2 (0.9) ▽ | 547 (2.5) | 5 (1.2) ▲ |
| † Norway (5) | 539 (2.2) | 540 (2.5) | 1 (1.6) | 537 (2.4) | -3 (1.1) ▽ | 540 (2.5) | 0 (1.3) |
| [2] † United States | 539 (2.7) | 542 (2.7) | 3 (1.7) ▲ | 535 (3.1) | -4 (0.9) ▽ | 538 (2.7) | 0 (1.2) |
| [2] Lithuania | 538 (2.5) | 539 (3.1) | 1 (1.7) | 531 (2.3) | -7 (1.3) ▽ | 548 (2.9) | 10 (2.6) ▲ |
| Sweden | 537 (3.3) | 540 (3.4) | 3 (2.2) | 532 (3.1) | -5 (1.2) ▽ | 541 (3.2) | 4 (1.1) ▲ |
| [2] England | 537 (2.7) | 544 (3.3) | 7 (1.5) ▲ | 526 (3.0) | -11 (1.4) ▽ | 544 (3.7) | 6 (2.8) ▲ |
| Czech Republic | 534 (2.6) | 538 (2.9) | 5 (1.6) ▲ | 526 (2.5) | -7 (1.8) ▽ | 539 (3.2) | 5 (3.2) |
| Australia | 533 (2.4) | 538 (3.0) | 5 (1.9) ▲ | 524 (3.2) | -9 (1.9) ▽ | 538 (3.0) | 5 (1.7) ▲ |
| † Hong Kong SAR | 531 (3.3) | 537 (3.2) | 6 (1.6) ▲ | 526 (3.1) | -5 (1.8) ▽ | 531 (3.6) | -1 (2.2) |
| Poland | 531 (2.6) | 524 (2.6) | -6 (0.9) ▽ | 538 (2.5) | 7 (1.1) ▲ | 525 (2.6) | -5 (1.9) ▽ |
| Hungary | 529 (2.7) | 533 (2.7) | 4 (1.4) ▲ | 526 (3.1) | -4 (2.1) | 532 (2.6) | 2 (1.2) ▲ |
| Ireland | 528 (3.2) | 532 (3.4) | 4 (1.6) ▲ | 525 (3.0) | -3 (1.4) | 525 (3.8) | -3 (2.1) |
| [2] Turkey (5) | 526 (4.2) | 531 (4.5) | 4 (1.5) ▲ | 528 (4.3) | 2 (1.1) | 521 (4.1) | -6 (1.7) ▽ |
| Croatia | 524 (2.2) | 526 (2.4) | 3 (1.6) | 521 (2.3) | -3 (1.6) | 522 (2.5) | -2 (2.0) |
| [1 2] Canada | 523 (1.9) | 524 (1.9) | 1 (1.5) | 520 (2.0) | -3 (1.0) ▽ | 526 (1.8) | 2 (1.8) |
| † Denmark | 522 (2.4) | 521 (2.0) | -1 (2.3) | 519 (2.5) | -3 (1.1) ▽ | 527 (2.7) | 5 (1.7) ▲ |
| Austria | 522 (2.6) | 523 (3.1) | 1 (1.4) | 523 (2.4) | 1 (1.4) | 518 (3.3) | -4 (1.9) ▽ |
| Bulgaria | 521 (4.9) | 526 (5.4) | 5 (1.9) ▲ | 523 (5.4) | 1 (1.6) | 508 (5.5) | -14 (1.7) ▽ |
| [2] Slovak Republic | 521 (3.7) | 527 (3.9) | 6 (1.4) ▲ | 515 (4.3) | -5 (1.9) ▽ | 516 (4.2) | -5 (2.1) ▽ |
| † Northern Ireland | 518 (2.3) | 523 (2.9) | 4 (2.7) | 514 (2.3) | -4 (1.2) ▽ | 519 (3.2) | 1 (2.1) |
| ≡ Netherlands | 518 (2.9) | 515 (2.8) | -4 (1.9) ▽ | 517 (3.1) | -1 (2.2) | 523 (3.2) | 5 (2.0) ▲ |
| Germany | 518 (2.2) | 520 (2.3) | 1 (0.9) | 516 (2.5) | -2 (1.7) | 519 (2.9) | 0 (1.8) |
| [2] Serbia | 517 (3.5) | 506 (3.3) | -11 (1.9) ▽ | 526 (3.9) | 9 (1.4) ▲ | 518 (3.9) | 1 (2.4) |
| Cyprus | 511 (3.0) | 503 (3.3) | -9 (1.1) ▽ | 519 (3.0) | 8 (1.4) ▲ | 511 (3.2) | -1 (2.3) |
| Spain | 511 (2.0) | 514 (2.2) | 3 (1.0) ▲ | 511 (2.0) | -1 (0.9) | 507 (1.8) | -5 (1.5) ▽ |
| Italy | 510 (3.0) | 515 (3.0) | 5 (1.5) ▲ | 504 (2.7) | -6 (1.0) ▽ | 508 (2.7) | -2 (1.8) |
| [2] Portugal | 504 (2.6) | 502 (2.8) | -1 (2.5) | 502 (3.1) | -2 (2.1) | 504 (2.0) | 0 (1.5) |
| [2] New Zealand | 503 (2.3) | 505 (2.7) | 2 (1.2) ▲ | 497 (2.6) | -5 (1.0) ▽ | 505 (2.6) | 2 (2.1) |
| † Belgium (Flemish) | 501 (2.1) | 493 (2.7) | -8 (1.7) ▽ | 501 (2.2) | 0 (1.2) | 511 (2.4) | 10 (1.9) ▲ |
| Malta | 496 (1.3) | 496 (1.6) | 1 (1.4) | 496 (2.7) | 0 (2.2) | 490 (3.8) | -6 (3.5) |
| [2] Kazakhstan | 494 (3.1) | 489 (2.9) | -6 (1.7) ▽ | 494 (3.4) | 0 (1.6) | 502 (3.4) | 8 (2.7) ▲ |
| Bahrain | 493 (3.4) | 496 (3.7) | 4 (1.6) ▲ | 494 (3.4) | 2 (1.6) | 482 (3.6) | -11 (2.5) ▽ |
| Albania | 489 (3.5) | 494 (3.9) | 4 (1.5) ▲ | 485 (3.8) | -4 (2.3) | 487 (3.6) | -2 (1.8) |
| France | 488 (3.0) | 485 (3.6) | -2 (1.9) | 495 (3.0) | 7 (1.1) ▲ | 475 (4.7) | -13 (4.0) ▽ |
| United Arab Emirates | 473 (2.1) | 482 (2.2) | 9 (0.7) ▲ | 470 (2.1) | -3 (0.9) ▽ | 462 (1.9) | -11 (1.2) ▽ |
| Chile | 469 (2.6) | 473 (3.7) | 4 (2.3) | 461 (3.4) | -8 (1.7) ▽ | 472 (2.7) | 3 (1.6) |
| Armenia | 466 (3.4) | 463 (3.4) | -3 (1.6) | 453 (3.3) | -13 (1.4) ▽ | 486 (3.6) | 19 (3.5) ▲ |
| Bosnia and Herzegovina | 459 (2.9) | 451 (3.2) | -7 (1.3) ▽ | 459 (3.0) | 0 (1.1) | 469 (3.0) | 10 (1.8) ▲ |
| [1] Georgia | 454 (3.9) | 452 (3.9) | -3 (2.2) | 445 (3.7) | -9 (2.1) ▽ | 465 (4.4) | 11 (2.2) ▲ |
| Montenegro | 453 (2.5) | 451 (3.2) | -2 (1.4) | 454 (2.7) | 0 (1.9) | 451 (3.3) | -2 (1.7) |
| Qatar | 449 (3.9) | 455 (4.4) | 5 (1.4) ▲ | 451 (4.2) | 1 (1.5) | 434 (4.3) | -16 (2.4) ▽ |
| Iran, Islamic Rep. of | 441 (4.1) | 444 (4.6) | 3 (1.7) | 440 (4.3) | 0 (2.1) | 433 (4.9) | -8 (3.1) ▽ |
| Oman | 435 (4.1) | - - | - - | - - | - - | - - | - - |
| Azerbaijan | 427 (3.3) | 425 (4.0) | -2 (2.1) | 419 (4.5) | -8 (2.7) ▽ | 430 (3.5) | 3 (1.4) ▲ |
| North Macedonia | 426 (6.2) | - - | - - | - - | - - | - - | - - |
| [2] Kosovo | 413 (3.7) | 419 (4.5) | 6 (2.2) ▲ | 406 (3.7) | -7 (1.3) ▽ | 402 (4.2) | -11 (2.3) ▽ |
| [2] Saudi Arabia | 402 (4.1) | - - | - - | - - | - - | - - | - - |
| Kuwait | 392 (6.1) | - - | - - | - - | - - | - - | - - |
| Ψ Morocco | 374 (5.8) | 362 (6.1) | -12 (1.5) ▽ | 378 (6.2) | 4 (1.7) ▲ | 366 (5.5) | -9 (2.0) ▽ |
| Ж South Africa (5) | 324 (4.9) | - - | - - | - - | - - | - - | - - |
| [2] Ж Pakistan | 290 (13.4) | - - | - - | - - | - - | - - | - - |
| [2] Ж Philippines | 249 (7.5) | - - | - - | - - | - - | - - | - - |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 592 (2.1) | -3 (1.2) ▽ | 603 (2.4) | 8 (1.0) ▲ | 592 (2.9) | -3 (2.1) |
| [2] Dubai, UAE | 545 (1.7) | 560 (2.1) | 15 (0.8) ▲ | 541 (2.3) | -4 (1.5) ▽ | 531 (2.1) | -13 (1.5) ▽ |
| [2] Ontario, Canada | 524 (3.2) | 525 (3.1) | 1 (2.3) | 520 (3.1) | -4 (1.2) ▽ | 528 (3.0) | 4 (2.3) |
| Madrid, Spain | 523 (2.0) | 523 (3.7) | 0 (3.3) | 521 (3.8) | -1 (3.5) | 520 (3.7) | -3 (3.2) |
| Quebec, Canada | 522 (2.5) | 523 (2.8) | 1 (1.9) | 520 (3.6) | -2 (2.6) | 525 (3.0) | 3 (3.2) |
| Abu Dhabi, UAE | 418 (2.8) | 422 (2.9) | 4 (1.7) ▲ | 415 (3.0) | -3 (1.9) | 411 (2.7) | -7 (2.6) ▽ |

▲ Subscale score significantly higher than overall science score
▽ Subscale score significantly lower than overall science score

Numbers of items are based on the TIMSS 2019 fourth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Trends in Average Achievement in Cognitive Domains

Exhibit 2.18 presents differences in average achievement for the three cognitive domains across four assessment cycles back to 2007, when TIMSS first began providing scaled results in the cognitive domains. Forty-one countries for which cognitive domain scores were estimated participated in both the TIMSS 2015 and TIMSS 2019 assessments. The recent trends compared with 2015 in the knowing cognitive domain showed increases in 12 countries and decreases in 9 countries. In the applying domain, 8 countries showed increases and 12 showed decreases. In the reasoning domain, 9 showed increases, and 9 showed decreases. These recent increases in average achievement in the knowing cognitive domain together with the decreases in the applying domain may have contributed to more countries having a relative strength in knowing compared with applying in 2019.

Between 2007 and 2019, 6 countries had higher average achievement and 5 had lower average achievement in knowing; 6 had higher average achievement and 4 had lower average achievement in applying; and 7 had higher average achievement and 3 had lower average achievement in reasoning.

# Exhibit 2.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Armenia** | | | | | | | | | | | | |
| 2019 | 463 (3.4) | 18 ▲ | 51 ▲ | | 453 (3.3) | 13 ▲ | 35 ▲ | | 486 (3.6) | 50 ▲ | 83 ▲ | |
| 2015 | 445 (4.1) | | 33 ▲ | | 440 (4.8) | | 22 ▲ | | 435 (4.2) | | 33 ▲ | |
| 2011 | 412 (4.3) | | | | 418 (3.9) | | | | 402 (5.1) | | | |
| **Australia** | | | | | | | | | | | | |
| 2019 | 538 (3.0) | 15 ▲ | 20 ▲ | 6 | 524 (3.2) | 1 | 10 ▲ | 2 | 538 (3.0) | 10 ▲ | 20 ▲ | 9 |
| 2015 | 523 (3.3) | | 5 | -9 | 522 (2.7) | | 9 ▲ | 0 | 527 (3.0) | | 10 ▲ | -1 |
| 2011 | 517 (2.8) | | | -14 ▽ | 513 (3.0) | | | -9 | 518 (3.4) | | | -11 ▽ |
| 2007 | 532 (3.5) | | | | 522 (3.8) | | | | 528 (4.2) | | | |
| **Austria** | | | | | | | | | | | | |
| 2019 | 523 (3.1) | | -9 ▽ | -8 ▽ | 523 (2.4) | | -10 ▽ | -3 | 518 (3.3) | | -7 | 4 |
| 2011 | 532 (3.0) | | | 1 | 533 (2.9) | | | 7 | 525 (3.1) | | | 11 ▲ |
| 2007 | 531 (2.4) | | | | 527 (2.7) | | | | 514 (2.8) | | | |
| **Azerbaijan** | | | | | | | | | | | | |
| 2019 | 425 (4.0) | | -20 ▽ | | 419 (4.5) | | -20 ▽ | | 430 (3.5) | | 28 ▲ | |
| [2] 2011 | 445 (6.4) | | | | 439 (5.3) | | | | 402 (5.9) | | | |
| **Bahrain** | | | | | | | | | | | | |
| 2019 | 496 (3.7) | 41 ▲ | 43 ▲ | | 494 (3.4) | 33 ▲ | 51 ▲ | | 481 (3.6) | 26 ▲ | 39 ▲ | |
| [2] 2015 | 456 (2.5) | | 2 | | 462 (3.0) | | 18 ▲ | | 455 (3.0) | | 13 ▲ | |
| 2011 | 454 (3.8) | | | | 443 (3.8) | | | | 442 (4.8) | | | |
| **Belgium (Flemish)** | | | | | | | | | | | | |
| † 2019 | 493 (2.7) | -5 | -14 ▽ | | 501 (2.2) | -12 ▽ | -10 ▽ | | 511 (2.4) | -15 ▽ | 3 | |
| † 2015 | 498 (2.7) | | -9 ▽ | | 513 (2.5) | | 2 | | 526 (2.9) | | 17 ▲ | |
| 2011 | 507 (2.2) | | | | 511 (1.9) | | | | 508 (2.6) | | | |
| **Bulgaria** | | | | | | | | | | | | |
| 2019 | 526 (5.4) | -25 ▽ | | | 523 (5.4) | -14 | | | 507 (5.5) | 1 | | |
| 2015 | 551 (6.5) | | | | 536 (6.2) | | | | 507 (6.4) | | | |
| **Canada** | | | | | | | | | | | | |
| [1 2] 2019 | 524 (1.9) | 2 | | | 520 (2.0) | -8 ▽ | | | 525 (1.8) | 1 | | |
| [1 2] † 2015 | 523 (3.1) | | | | 528 (2.6) | | | | 524 (2.6) | | | |
| **Chile** | | | | | | | | | | | | |
| 2019 | 473 (3.7) | -5 | -10 ▽ | | 461 (3.4) | -15 ▽ | -19 ▽ | | 472 (2.7) | -5 | -5 | |
| 2015 | 477 (3.2) | | -5 | | 476 (3.0) | | -4 | | 477 (2.5) | | 0 | |
| 2011 | 483 (2.8) | | | | 479 (2.3) | | | | 477 (2.8) | | | |
| **Chinese Taipei** | | | | | | | | | | | | |
| 2019 | 560 (1.9) | 4 | 18 ▲ | 17 ▲ | 561 (2.0) | 7 ▲ | 8 ▲ | 1 | 552 (2.7) | -6 | -15 ▽ | -21 ▽ |
| 2015 | 557 (2.5) | | 15 ▲ | 13 ▲ | 553 (2.6) | | 1 | -6 | 558 (3.1) | | -10 ▽ | -16 ▽ |
| 2011 | 542 (2.6) | | | -1 | 552 (3.2) | | | -7 | 568 (3.1) | | | -6 |
| 2007 | 544 (2.7) | | | | 560 (2.1) | | | | 574 (3.3) | | | |
| **Croatia** | | | | | | | | | | | | |
| 2019 | 526 (2.4) | -8 ▽ | 1 | | 521 (2.3) | -9 ▽ | 11 ▲ | | 522 (2.5) | -14 ▽ | 10 ▲ | |
| 2015 | 534 (2.9) | | 9 ▲ | | 530 (2.2) | | 20 ▲ | | 536 (2.4) | | 23 ▲ | |
| [2] 2011 | 526 (2.0) | | | | 510 (2.4) | | | | 512 (3.5) | | | |
| **Cyprus** | | | | | | | | | | | | |
| 2019 | 503 (3.3) | 35 ▲ | | | 519 (3.0) | 30 ▲ | | | 511 (3.2) | 21 ▲ | | |
| 2015 | 467 (3.2) | | | | 489 (3.4) | | | | 490 (3.6) | | | |
| **Czech Republic** | | | | | | | | | | | | |
| 2019 | 538 (2.9) | -6 | -12 ▽ | 18 ▲ | 526 (2.5) | -2 | -8 ▽ | 11 ▲ | 539 (3.2) | 10 ▲ | 22 ▲ | 31 ▲ |
| 2015 | 545 (3.0) | | -6 | 24 ▲ | 528 (2.1) | | -6 | 13 ▲ | 529 (2.4) | | 12 ▲ | 21 ▲ |
| 2011 | 551 (3.2) | | | 30 ▲ | 534 (2.7) | | | 19 ▲ | 516 (3.9) | | | 9 |
| 2007 | 521 (3.0) | | | | 515 (3.3) | | | | 507 (3.6) | | | |
| **Denmark** | | | | | | | | | | | | |
| † 2019 | 521 (2.0) | -3 | -4 | 4 | 519 (2.5) | -10 ▽ | -12 ▽ | 6 | 527 (2.7) | 2 | 0 | 3 |
| [2] † 2015 | 524 (2.6) | | 0 | 7 | 529 (2.4) | | -2 | 16 ▲ | 526 (2.9) | | -2 | 1 |
| [2] 2011 | 524 (2.6) | | | 7 | 532 (2.5) | | | 19 ▲ | 527 (2.9) | | | 3 |
| † 2007 | 517 (3.3) | | | | 513 (3.4) | | | | 524 (4.4) | | | |
| **England** | | | | | | | | | | | | |
| [2] 2019 | 544 (3.3) | 10 ▲ | 15 ▲ | -4 | 526 (3.0) | -12 ▽ | -7 | -11 ▽ | 544 (3.7) | 5 | 17 ▲ | 3 |
| 2015 | 533 (2.6) | | 5 | -14 ▽ | 538 (2.7) | | 5 | 1 | 539 (2.7) | | 12 ▲ | -1 |
| 2011 | 529 (3.4) | | | -19 ▽ | 532 (3.2) | | | -4 | 526 (4.5) | | | -14 ▽ |
| 2007 | 547 (3.3) | | | | 537 (3.4) | | | | 540 (2.8) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in cognitive domains using current methodology began with TIMSS 2007.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Finland** | | | | | | | | | | | | |
| 2019 | 553 (2.5) | -3 | -26 ▽ | | 551 (2.5) | -2 | -17 ▽ | | 563 (2.4) | 11 ▲ | 3 | |
| 2015 | 556 (3.1) | | -23 ▽ | | 553 (2.4) | | -15 ▽ | | 552 (2.3) | | -8 ▽ | |
| 2011 | 579 (2.5) | | | | 568 (2.4) | | | | 560 (3.0) | | | |
| **France** | | | | | | | | | | | | |
| 2019 | 485 (3.6) | 4 | | | 495 (3.0) | 1 | | | 475 (4.7) | -6 | | |
| 2015 | 482 (3.8) | | | | 494 (3.1) | | | | 481 (2.8) | | | |
| **Georgia** | | | | | | | | | | | | |
| [1] 2019 | 452 (3.9) | -8 | -14 ▽ | 23 ▲ | 445 (3.7) | -4 | -7 | 31 ▲ | 465 (4.4) | 40 ▲ | 43 ▲ | 86 ▲ |
| [1] 2015 | 460 (4.2) | | -6 | 31 ▲ | 449 (4.8) | | -3 | 35 ▲ | 426 (4.0) | | 3 | 46 ▲ |
| [1] 2011 | 466 (3.8) | | | 37 ▲ | 452 (4.3) | | | 38 ▲ | 422 (4.8) | | | 43 ▲ |
| [1] 2007 | 429 (4.3) | | | | 415 (4.7) | | | | 379 (6.1) | | | |
| **Germany** | | | | | | | | | | | | |
| 2019 | 520 (2.3) | -8 ▽ | -5 | -9 ▽ | 516 (2.5) | -13 ▽ | -17 ▽ | -10 ▽ | 518 (2.9) | -13 ▽ | -8 | -7 |
| 2015 | 527 (2.8) | | 3 | -1 | 529 (2.4) | | -4 | 3 | 532 (2.3) | | 6 | 6 |
| 2011 | 524 (4.0) | | | -4 | 533 (2.5) | | | 7 ▲ | 526 (3.7) | | | 1 |
| 2007 | 529 (2.4) | | | | 526 (2.5) | | | | 525 (2.8) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | |
| [†] 2019 | 537 (3.2) | -25 ▽ | 0 | -15 ▽ | 526 (3.1) | -28 ▽ | -3 | -26 ▽ | 531 (3.6) | -22 ▽ | -11 | -32 ▽ |
| [†] 2015 | 562 (3.0) | | 25 ▲ | 9 | 554 (3.3) | | 25 ▲ | 1 | 552 (4.1) | | 11 | -10 |
| [2] 2011 | 537 (3.7) | | | -16 ▽ | 529 (3.5) | | | -24 ▽ | 541 (4.2) | | | -21 ▽ |
| 2007 | 553 (4.0) | | | | 552 (3.5) | | | | 563 (4.9) | | | |
| **Hungary** | | | | | | | | | | | | |
| 2019 | 533 (2.7) | -17 ▽ | -13 ▽ | -11 ▽ | 526 (3.1) | -13 ▽ | -4 | -6 | 532 (2.6) | -1 | 7 | 4 |
| 2015 | 550 (3.8) | | 4 | 6 | 539 (3.4) | | 9 | 7 | 533 (3.9) | | 8 | 5 |
| 2011 | 547 (3.7) | | | 2 | 530 (3.5) | | | -2 | 525 (4.7) | | | -3 |
| 2007 | 544 (3.5) | | | | 532 (3.9) | | | | 528 (4.1) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | |
| 2019 | 444 (4.6) | 28 ▲ | -4 | 13 | 440 (4.3) | 23 ▲ | -11 | -2 | 432 (4.9) | 10 | -27 ▽ | 6 |
| 2015 | 416 (4.1) | | -32 ▽ | -15 ▽ | 417 (4.5) | | -34 ▽ | -25 ▽ | 422 (4.9) | | -37 ▽ | -5 |
| 2011 | 448 (4.2) | | | 17 ▲ | 452 (3.8) | | | 9 | 459 (3.8) | | | 32 ▲ |
| 2007 | 431 (5.0) | | | | 443 (4.9) | | | | 427 (4.6) | | | |
| **Ireland** | | | | | | | | | | | | |
| 2019 | 532 (3.4) | 3 | 14 ▲ | | 525 (3.0) | -5 | 8 | | 525 (3.8) | 0 | 16 ▲ | |
| 2015 | 529 (2.5) | | 11 ▲ | | 530 (2.5) | | 13 ▲ | | 526 (2.9) | | 17 ▲ | |
| 2011 | 518 (3.8) | | | | 517 (3.6) | | | | 509 (3.3) | | | |
| **Italy** | | | | | | | | | | | | |
| 2019 | 515 (3.0) | -6 | -17 ▽ | -20 ▽ | 504 (2.7) | -10 ▽ | -19 ▽ | -37 ▽ | 508 (2.7) | -3 | -2 | -15 ▽ |
| [2] 2015 | 521 (3.1) | | -11 ▽ | -14 ▽ | 513 (3.1) | | -10 ▽ | -28 ▽ | 511 (3.5) | | 2 | -12 ▽ |
| 2011 | 532 (3.1) | | | -3 | 523 (2.8) | | | -18 ▽ | 510 (2.9) | | | -14 ▽ |
| 2007 | 535 (4.1) | | | | 541 (3.3) | | | | 523 (3.5) | | | |
| **Japan** | | | | | | | | | | | | |
| 2019 | 535 (2.6) | -9 ▽ | -3 | 1 | 576 (2.2) | 0 | 14 ▲ | 30 ▲ | 579 (2.4) | -15 ▽ | -12 ▽ | 6 ▲ |
| 2015 | 544 (2.3) | | 6 ▲ | 9 ▲ | 576 (1.8) | | 14 ▲ | 31 ▲ | 594 (1.8) | | 3 | 21 ▲ |
| 2011 | 538 (1.8) | | | 3 | 562 (1.6) | | | 16 ▲ | 591 (1.9) | | | 18 ▲ |
| 2007 | 534 (2.6) | | | | 546 (3.1) | | | | 573 (2.1) | | | |
| **Kazakhstan** | | | | | | | | | | | | |
| [2] 2019 | 489 (2.9) | | 2 | | 494 (3.4) | | -5 | | 502 (3.4) | | 6 | |
| [2] 2011 | 486 (5.4) | | | | 499 (5.2) | | | | 496 (5.8) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | |
| 2019 | 584 (2.5) | 3 | 15 ▲ | | 596 (2.6) | 2 | 3 | | 581 (2.4) | -13 ▽ | -23 ▽ | |
| 2015 | 582 (2.2) | | 12 ▲ | | 594 (1.9) | | 0 | | 594 (2.2) | | -11 ▽ | |
| 2011 | 570 (2.1) | | | | 593 (2.0) | | | | 605 (3.0) | | | |
| **Lithuania** | | | | | | | | | | | | |
| [2] 2019 | 539 (3.1) | 16 ▲ | 32 ▲ | 28 ▲ | 531 (2.3) | 5 | 10 ▲ | 18 ▲ | 548 (2.9) | 10 ▲ | 32 ▲ | 27 ▲ |
| [2] 2015 | 524 (3.0) | | 16 ▲ | 12 ▲ | 526 (2.4) | | 6 | 13 ▲ | 538 (3.0) | | 22 ▲ | 17 ▲ |
| [12] 2011 | 508 (2.8) | | | -4 | 521 (2.5) | | | 7 | 515 (2.7) | | | -5 |
| [1] 2007 | 511 (2.3) | | | | 513 (3.3) | | | | 521 (2.9) | | | |
| **Malta** | | | | | | | | | | | | |
| 2019 | 496 (1.6) | | 60 ▲ | | 496 (2.7) | | 47 ▲ | | 490 (3.8) | | 31 ▲ | |
| 2011 | 437 (3.1) | | | | 449 (1.7) | | | | 459 (4.2) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Morocco** | | | | | | | | | | | | |
| Ψ 2019 | 362 (6.1) | 31 ▲ | 125 ▲ | | 378 (6.2) | 21 ▲ | 122 ▲ | | 365 (5.5) | 12 | 125 ▲ | |
| Ψ 2015 | 331 (5.6) | | 94 ▲ | | 357 (4.7) | | 101 ▲ | | 354 (4.7) | | 114 ▲ | |
| Ж 2011 | 237 (6.0) | | | | 256 (4.9) | | | | 240 (5.1) | | | |
| **Netherlands** | | | | | | | | | | | | |
| ≡ 2019 | 515 (2.8) | 6 | -13 ▽ | -6 | 517 (3.1) | -2 | -17 ▽ | -7 | 523 (3.2) | -2 | -9 ▽ | -2 |
| † 2015 | 508 (2.4) | | -19 ▽ | -12 ▽ | 519 (2.4) | | -15 ▽ | -6 | 526 (2.9) | | -6 | 0 |
| † 2011 | 528 (2.2) | | | 7 ▲ | 534 (2.0) | | | 10 ▲ | 532 (3.0) | | | 6 |
| ‡ 2007 | 521 (2.7) | | | | 525 (2.4) | | | | 526 (2.7) | | | |
| **New Zealand** | | | | | | | | | | | | |
| 2 2019 | 505 (2.7) | 1 | 9 ▲ | -6 | 497 (2.6) | -5 | 0 | 1 | 505 (2.6) | -9 ▽ | 8 ▲ | 2 |
| 2015 | 504 (2.8) | | 8 ▲ | -7 | 502 (3.1) | | 5 | 6 | 514 (2.4) | | 17 ▲ | 11 ▲ |
| 2011 | 496 (2.7) | | | -15 ▽ | 497 (2.8) | | | 1 | 497 (3.0) | | | -6 |
| 2007 | 511 (3.4) | | | | 496 (2.8) | | | | 503 (4.2) | | | |
| **Northern Ireland** | | | | | | | | | | | | |
| † 2019 | 523 (2.9) | 5 | 6 | | 514 (2.3) | -5 | -7 ▽ | | 519 (3.2) | -1 | 16 ▲ | |
| ‡ 2015 | 518 (2.9) | | 1 | | 519 (2.9) | | -3 | | 520 (2.6) | | 17 ▲ | |
| † 2011 | 517 (3.1) | | | | 521 (2.8) | | | | 503 (3.2) | | | |
| **Norway (5)** | | | | | | | | | | | | |
| † 2019 | 540 (2.5) | 8 ▲ | | | 537 (2.4) | -5 | | | 540 (2.5) | 3 | | |
| 2015 | 533 (3.0) | | | | 542 (2.9) | | | | 537 (3.8) | | | |
| **Poland** | | | | | | | | | | | | |
| 2019 | 524 (2.6) | -19 ▽ | | | 538 (2.5) | -16 ▽ | | | 525 (2.6) | -17 ▽ | | |
| 2015 | 544 (2.5) | | | | 554 (2.8) | | | | 542 (3.2) | | | |
| **Portugal** | | | | | | | | | | | | |
| 2 2019 | 502 (2.8) | -4 | -25 ▽ | | 502 (3.1) | -6 | -13 ▽ | | 504 (2.0) | -2 | -21 ▽ | |
| 2 2015 | 507 (2.9) | | -21 ▽ | | 508 (1.9) | | -7 | | 506 (1.9) | | -19 ▽ | |
| 2011 | 528 (4.4) | | | | 515 (4.2) | | | | 524 (4.3) | | | |
| **Qatar** | | | | | | | | | | | | |
| 2019 | 455 (4.4) | 18 ▲ | 67 ▲ | | 451 (4.2) | 20 ▲ | 62 ▲ | | 434 (4.3) | 0 | 29 ▲ | |
| 2015 | 437 (4.5) | | 49 ▲ | | 430 (4.7) | | 41 ▲ | | 433 (4.4) | | 29 ▲ | |
| 2 2011 | 388 (5.2) | | | | 389 (5.4) | | | | 404 (4.7) | | | |
| **Russian Federation** | | | | | | | | | | | | |
| 2 2019 | 562 (3.3) | -7 | 9 | 16 ▲ | 572 (3.4) | 3 | 16 ▲ | 22 ▲ | 569 (2.8) | 9 | 27 ▲ | 27 ▲ |
| 2015 | 569 (3.9) | | 15 ▲ | 23 ▲ | 568 (3.3) | | 12 ▲ | 19 ▲ | 561 (3.8) | | 19 ▲ | 18 ▲ |
| 2011 | 553 (3.8) | | | 7 | 556 (3.5) | | | 6 | 542 (4.3) | | | 0 |
| 2007 | 546 (5.5) | | | | 550 (5.3) | | | | 542 (5.3) | | | |
| **Serbia** | | | | | | | | | | | | |
| 2 2019 | 506 (3.3) | -20 ▽ | -18 ▽ | | 526 (3.9) | 4 | 20 ▲ | | 518 (3.9) | -3 | -2 | |
| 3 2015 | 527 (3.9) | | 3 | | 522 (4.5) | | 16 ▲ | | 521 (3.9) | | 1 | |
| 2 2011 | 524 (2.9) | | | | 506 (3.1) | | | | 519 (3.0) | | | |
| **Singapore** | | | | | | | | | | | | |
| 3 2019 | 588 (3.7) | 13 ▲ | 18 ▲ | -11 | 595 (3.7) | -4 | 6 | 8 | 604 (3.5) | -1 | 7 | 27 ▲ |
| 2 2015 | 574 (4.1) | | 4 | -24 ▽ | 599 (4.0) | | 10 | 12 ▲ | 605 (3.6) | | 8 | 29 ▲ |
| 2 2011 | 570 (3.4) | | | -29 ▽ | 590 (4.0) | | | 2 | 597 (3.8) | | | 20 ▲ |
| 2007 | 599 (4.5) | | | | 587 (4.2) | | | | 576 (4.1) | | | |
| **Slovak Republic** | | | | | | | | | | | | |
| 2 2019 | 527 (3.9) | -2 | -20 ▽ | -4 | 515 (4.3) | -1 | -12 ▽ | -11 | 516 (4.2) | 9 | 2 | 4 |
| 2015 | 530 (3.3) | | -17 ▽ | -2 | 517 (2.8) | | -11 ▽ | -10 | 507 (3.4) | | -7 | -4 |
| 2011 | 547 (3.9) | | | 15 ▲ | 528 (3.9) | | | 1 | 514 (4.0) | | | 2 |
| 2007 | 531 (4.9) | | | | 527 (5.0) | | | | 512 (5.4) | | | |
| **Spain** | | | | | | | | | | | | |
| 2019 | 514 (2.2) | -8 ▽ | -2 | | 511 (2.0) | -3 | 12 ▲ | | 507 (1.8) | -10 ▽ | 11 ▲ | |
| 2 2015 | 522 (3.3) | | 6 | | 514 (3.3) | | 15 ▲ | | 517 (2.6) | | 21 ▲ | |
| 2011 | 516 (3.2) | | | | 499 (3.1) | | | | 496 (3.0) | | | |
| **Sweden** | | | | | | | | | | | | |
| 2019 | 540 (3.4) | 2 | 4 | 12 ▲ | 532 (3.1) | -8 | 2 | 12 ▲ | 541 (3.2) | -1 | 4 | 13 ▲ |
| 2 2015 | 538 (3.8) | | 3 | 10 ▲ | 540 (3.4) | | 9 ▲ | 20 ▲ | 542 (3.8) | | 5 | 14 ▲ |
| 2011 | 536 (2.8) | | | 8 | 531 (3.0) | | | 11 ▲ | 537 (3.0) | | | 9 |
| 2007 | 528 (3.1) | | | | 520 (3.2) | | | | 528 (4.3) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 2.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **United Arab Emirates** | | | | | | | | | | | | |
| 2019 | 482 (2.2) | 28 ▲ | 49 ▲ | | 470 (2.1) | 18 ▲ | 49 ▲ | | 461 (1.9) | 17 ▲ | 36 ▲ | |
| 2015 | 453 (3.3) | | 21 ▲ | | 452 (3.2) | | 31 ▲ | | 444 (3.0) | | 19 ▲ | |
| 2011 | 433 (2.8) | | | | 421 (2.6) | | | | 426 (2.6) | | | |
| **United States** | | | | | | | | | | | | |
| 2† 2019 | 542 (2.7) | -6 | -4 | -4 | 535 (3.1) | -11 ▽ | -9 ▽ | 1 | 538 (2.7) | -3 | 1 | 3 |
| 2† 2015 | 548 (2.5) | | 2 | 3 | 546 (2.2) | | 2 | 12 ▲ | 542 (2.7) | | 4 | 6 |
| 2 2011 | 546 (1.9) | | | 1 | 544 (2.2) | | | 10 ▲ | 537 (2.4) | | | 2 |
| 2† 2007 | 546 (2.7) | | | | 534 (3.1) | | | | 535 (3.0) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | |
| 2 2019 | 525 (3.1) | -3 | -4 | -18 ▽ | 520 (3.1) | -15 ▽ | -6 | -9 | 528 (3.0) | -1 | -1 | -13 ▽ |
| 2015 | 527 (2.8) | | -1 | -15 ▽ | 534 (2.5) | | 9 ▲ | 6 | 529 (2.8) | | 0 | -11 ▽ |
| 2011 | 529 (3.0) | | | -14 ▽ | 526 (3.3) | | | -3 | 529 (3.6) | | | -11 ▽ |
| 2 2007 | 542 (3.6) | | | | 529 (3.7) | | | | 540 (3.4) | | | |
| **Quebec, Canada** | | | | | | | | | | | | |
| 2019 | 523 (2.8) | -1 | 4 | 6 | 520 (3.6) | -6 | 6 | 5 | 525 (3.0) | -1 | 5 | -1 |
| ≡ 2015 | 524 (4.3) | | 5 | 7 | 525 (4.5) | | 12 ▲ | 11 ▲ | 526 (4.6) | | 7 | 0 |
| 2011 | 519 (2.7) | | | 2 | 514 (2.5) | | | -1 | 520 (3.8) | | | -6 |
| 2 2007 | 517 (2.8) | | | | 515 (3.0) | | | | 526 (3.6) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | |
| 2019 | 422 (2.9) | 12 | 7 | | 415 (3.0) | -2 | 10 | | 411 (2.7) | -1 | -5 | |
| 2 2015 | 410 (6.6) | | -4 | | 417 (5.9) | | 11 | | 412 (5.3) | | -5 | |
| 2011 | 415 (5.7) | | | | 405 (5.3) | | | | 416 (5.2) | | | |
| **Dubai, UAE** | | | | | | | | | | | | |
| 2 2019 | 560 (2.1) | 37 ▲ | 92 ▲ | 99 ▲ | 541 (2.3) | 24 ▲ | 88 ▲ | 83 ▲ | 531 (2.1) | 21 ▲ | 76 ▲ | 76 ▲ |
| 2015 | 523 (2.3) | | 55 ▲ | 62 ▲ | 517 (2.8) | | 64 ▲ | 59 ▲ | 510 (2.9) | | 55 ▲ | 54 ▲ |
| 2011 | 467 (2.5) | | | 7 | 453 (2.2) | | | -5 | 455 (3.7) | | | -1 |
| ‡ 2007 | 461 (2.8) | | | | 458 (3.7) | | | | 456 (3.1) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

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## Average Achievement in Cognitive Domains by Gender

Exhibit 2.19 shows the differences between girls' and boys' average achievement in the cognitive domains of knowing, applying, and reasoning. Interestingly, boys had higher average achievement in more countries than girls in the knowing cognitive domain, but the situation was reversed in the applying and reasoning domains. In the knowing domain, girls had higher average achievement than boys in 3 countries, and boys had higher average achievement than girls in 16 countries. However, in the applying domain, girls had higher average achievement than boys in 12 countries compared with only 3 countries where boys had higher achievement than girls, and in the reasoning domain, girls had higher average achievement than boys in 16 countries compared with no countries with higher average achievement for boys.

## Exhibit 2.19: Average Achievement in Science Cognitive Domains by Gender

| Country | Knowing (69 Items) | | Applying (64 Items) | | Reasoning (36 Items) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Albania | 496 (5.0) | 491 (4.7) | 493 (4.8) ▲ | 477 (4.4) | 492 (3.9) ▲ | 482 (4.5) |
| Armenia | 469 (3.4) ▲ | 458 (4.5) | 458 (3.8) ▲ | 449 (3.9) | 492 (4.9) ▲ | 480 (3.7) |
| Australia | 535 (3.0) | 540 (3.7) | 526 (4.0) | 521 (3.5) | 541 (3.2) ▲ | 534 (3.3) |
| Austria | 517 (3.1) | 528 (4.1) ▲ | 520 (3.4) | 526 (2.9) | 520 (4.3) | 517 (3.1) |
| Azerbaijan | 426 (4.5) | 424 (4.4) | 422 (4.3) | 416 (6.5) | 434 (5.4) | 426 (3.9) |
| Bahrain | 515 (4.5) ▲ | 479 (5.3) | 513 (4.0) ▲ | 477 (5.0) | 498 (4.0) ▲ | 465 (5.2) |
| † Belgium (Flemish) | 490 (2.9) | 497 (3.4) ▲ | 500 (2.4) | 502 (2.6) | 511 (2.3) | 511 (4.1) |
| Bosnia and Herzegovina | 450 (4.1) | 453 (3.2) | 463 (3.0) ▲ | 454 (4.0) | 474 (3.5) ▲ | 464 (3.8) |
| Bulgaria | 529 (5.8) | 524 (6.0) | 529 (6.5) ▲ | 517 (5.7) | 512 (6.8) | 503 (5.9) |
| 1 2 Canada | 519 (2.4) | 529 (2.0) ▲ | 517 (2.3) | 522 (2.2) ▲ | 527 (2.2) | 524 (2.4) |
| Chile | 468 (4.4) | 477 (3.9) ▲ | 458 (4.1) | 463 (3.5) | 473 (3.1) | 471 (3.8) |
| Chinese Taipei | 556 (2.3) | 565 (2.6) ▲ | 559 (2.5) | 562 (2.4) | 556 (4.1) | 548 (3.0) |
| Croatia | 525 (3.5) | 528 (2.3) | 521 (2.5) | 521 (3.0) | 524 (2.8) | 519 (3.1) |
| Cyprus | 498 (3.6) | 508 (4.0) ▲ | 519 (3.3) | 520 (3.6) | 509 (3.9) | 512 (4.7) |
| Czech Republic | 532 (4.0) | 545 (3.0) ▲ | 524 (3.0) | 529 (3.4) | 536 (3.9) | 541 (3.2) |
| † Denmark | 518 (2.8) | 523 (2.9) | 520 (3.0) | 518 (2.9) | 532 (4.0) | 523 (3.1) |
| 2 England | 542 (3.9) | 545 (4.0) | 526 (4.1) | 525 (3.4) | 548 (3.9) ▲ | 539 (4.5) |
| Finland | 553 (3.1) | 553 (2.7) | 554 (3.3) | 548 (2.7) | 568 (3.1) ▲ | 557 (3.2) |
| France | 485 (4.0) | 486 (4.2) | 497 (3.6) | 492 (4.0) | 478 (4.8) | 471 (5.3) |
| † Georgia | 448 (4.1) | 455 (4.6) | 445 (4.0) | 446 (4.3) | 463 (4.6) | 467 (5.1) |
| Germany | 517 (3.0) | 522 (3.2) | 515 (3.2) | 517 (2.8) | 519 (3.8) | 518 (3.5) |
| † Hong Kong SAR | 531 (3.7) | 542 (4.1) ▲ | 528 (3.4) | 525 (4.0) | 534 (4.0) | 528 (4.5) |
| Hungary | 528 (3.5) | 538 (3.1) ▲ | 522 (3.6) | 529 (3.7) | 531 (3.8) | 532 (3.2) |
| Iran, Islamic Rep. of | 441 (7.2) | 447 (6.2) | 441 (6.7) | 440 (5.4) | 434 (6.9) | 431 (5.9) |
| Ireland | 528 (4.8) | 535 (3.5) | 524 (4.0) | 527 (3.1) | 527 (4.7) | 524 (4.1) |
| Italy | 507 (3.6) | 522 (3.7) ▲ | 501 (3.2) | 506 (3.1) | 507 (3.0) | 508 (4.2) |
| Japan | 533 (2.5) | 537 (3.3) | 581 (2.3) ▲ | 572 (2.9) | 585 (3.1) | 574 (4.3) |
| 2 Kazakhstan | 488 (3.8) | 489 (3.4) | 499 (3.9) ▲ | 489 (3.5) | 509 (3.5) ▲ | 495 (4.4) |
| Korea, Rep. of | 573 (2.3) | 595 (3.2) ▲ | 594 (2.9) | 598 (2.8) | 580 (2.9) | 583 (3.7) |
| 2 Kosovo | 426 (5.0) ▲ | 413 (4.8) | 415 (4.6) ▲ | 398 (3.9) | 407 (5.6) | 398 (5.8) |
| Kuwait | - - | - - | - - | - - | - - | - - |
| 2 Latvia | 538 (3.7) | 541 (3.6) | 543 (2.8) ▲ | 537 (3.0) | 553 (3.5) ▲ | 540 (3.4) |
| 2 Lithuania | 539 (4.2) | 540 (3.8) | 534 (2.7) | 528 (3.2) | 551 (3.6) | 545 (3.5) |
| Malta | 491 (2.1) | 501 (2.8) ▲ | 493 (2.8) | 499 (3.9) | 491 (3.4) | 489 (4.7) |
| Montenegro | 451 (3.9) | 451 (3.5) | 459 (3.3) ▲ | 449 (2.9) | 453 (3.8) | 449 (4.0) |
| Ψ Morocco | 365 (6.9) | 359 (6.1) | 386 (7.0) ▲ | 370 (6.2) | 372 (6.1) ▲ | 359 (6.1) |
| ≡ Netherlands | 512 (3.1) | 517 (3.3) | 519 (3.6) | 515 (3.6) | 526 (4.3) | 520 (4.1) |
| 2 New Zealand | 504 (3.8) | 505 (3.6) | 500 (3.6) | 495 (3.5) | 512 (3.5) ▲ | 498 (3.3) |
| North Macedonia | - - | - - | - - | - - | - - | - - |
| † Northern Ireland | 521 (3.7) | 525 (3.7) | 514 (3.6) | 514 (3.3) | 525 (3.9) ▲ | 514 (4.0) |
| † Norway (5) | 539 (2.5) | 542 (3.6) | 538 (2.8) | 536 (3.2) | 546 (3.5) ▲ | 535 (3.6) |
| Oman | - - | - - | - - | - - | - - | - - |
| 2 Ж Pakistan | - - | - - | - - | - - | - - | - - |
| 2 Ж Philippines | - - | - - | - - | - - | - - | - - |
| Poland | 522 (3.3) | 526 (3.0) | 540 (2.9) | 536 (2.9) | 531 (3.4) ▲ | 520 (3.6) |
| 2 Portugal | 499 (3.5) | 505 (3.2) | 500 (3.9) | 504 (3.2) | 502 (2.9) | 505 (2.5) |
| Qatar | 459 (6.6) | 450 (4.2) | 457 (6.1) | 444 (4.5) | 442 (6.8) ▲ | 425 (4.2) |
| 2 Russian Federation | 559 (3.9) | 566 (3.5) ▲ | 570 (4.4) | 573 (3.2) | 571 (4.8) | 567 (3.6) |
| 2 Saudi Arabia | - - | - - | - - | - - | - - | - - |
| 2 Serbia | 507 (3.7) | 506 (4.3) | 533 (4.4) ▲ | 518 (4.8) | 522 (3.9) | 514 (5.2) |
| 3 Singapore | 580 (3.9) | 595 (4.2) ▲ | 591 (4.1) | 599 (3.9) ▲ | 605 (4.0) | 603 (3.8) |
| 2 Slovak Republic | 522 (3.9) | 532 (4.7) ▲ | 511 (4.1) | 519 (5.3) ▲ | 517 (5.5) | 516 (4.8) |
| Ж South Africa (5) | - - | - - | - - | - - | - - | - - |
| Spain | 511 (2.9) | 517 (2.5) | 511 (2.4) | 511 (2.6) | 506 (2.8) | 507 (2.5) |
| Sweden | 538 (3.6) | 543 (4.3) | 534 (3.2) | 530 (4.5) | 547 (3.2) ▲ | 535 (4.4) |
| 2 Turkey (5) | 527 (5.0) | 536 (5.6) | 526 (4.4) | 530 (5.3) | 519 (4.0) | 523 (5.3) |
| United Arab Emirates | 482 (3.3) | 482 (3.0) | 473 (3.2) | 467 (2.6) | 465 (3.2) | 458 (2.3) |
| 2 † United States | 537 (3.4) | 547 (3.1) ▲ | 534 (3.1) | 536 (3.7) | 538 (3.1) | 539 (3.2) |
| **International Average** | **507 (0.6)** | **510 (0.5)** ▲ | **509 (0.5)** ▲ | **506 (0.5)** | **512 (0.6)** ▲ | **506 (0.6)** |
| **Benchmarking Participants** | | | | | | |
| 2 Ontario, Canada | 521 (4.1) | 528 (3.2) | 519 (3.9) | 521 (3.2) | 530 (3.9) | 526 (3.5) |
| Quebec, Canada | 517 (3.1) | 529 (3.4) ▲ | 516 (4.1) | 523 (3.7) ▲ | 526 (3.6) | 524 (3.3) |
| Moscow City, Russian Fed. | 588 (2.8) | 595 (2.8) | 601 (3.6) | 604 (3.4) | 593 (2.6) | 590 (3.8) |
| Madrid, Spain | 520 (4.5) | 527 (3.4) ▲ | 520 (4.2) | 522 (4.0) | 519 (3.4) | 520 (5.1) |
| Abu Dhabi, UAE | 424 (4.1) | 419 (4.3) | 420 (4.2) | 410 (3.8) | 417 (4.1) ▲ | 405 (3.4) |
| 2 Dubai, UAE | 559 (4.2) | 560 (3.1) | 542 (3.9) | 540 (2.7) | 534 (4.0) | 529 (2.5) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 fourth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

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# Mathematics Grade 8

## Average Mathematics Achievement

### Average Achievement and Scale Score Distributions

The TIMSS 2019 eighth grade mathematics assessment was based on a comprehensive assessment framework developed collaboratively with the participating countries to reflect their curricular goals. The eighth grade mathematics assessment included four content areas—number (30%), algebra (30%), geometry (20%), and data and probability (20%). In accordance with the framework, the majority of TIMSS 2019 mathematics items assess students' applying and reasoning skills. To cover the framework at the eighth grade, the TIMSS 2019 mathematics assessment comprised 211 assessment items. This cycle marked the beginning of the transition to a computer-based assessment system. More than half of the TIMSS 2019 countries administered the assessment in an "e" (electronic) format and almost half administered the assessment in a paper format, as in TIMSS 2015. The "e" countries also administered the trend items in the paper format to provide a bridge to the TIMSS 2015 and TIMSS 2019 paper-based assessments. The assessment was carefully designed and analyzed, so that the TIMSS 2019 mathematics achievement results for all 39 countries are reported on the same TIMSS eighth grade mathematics scale.

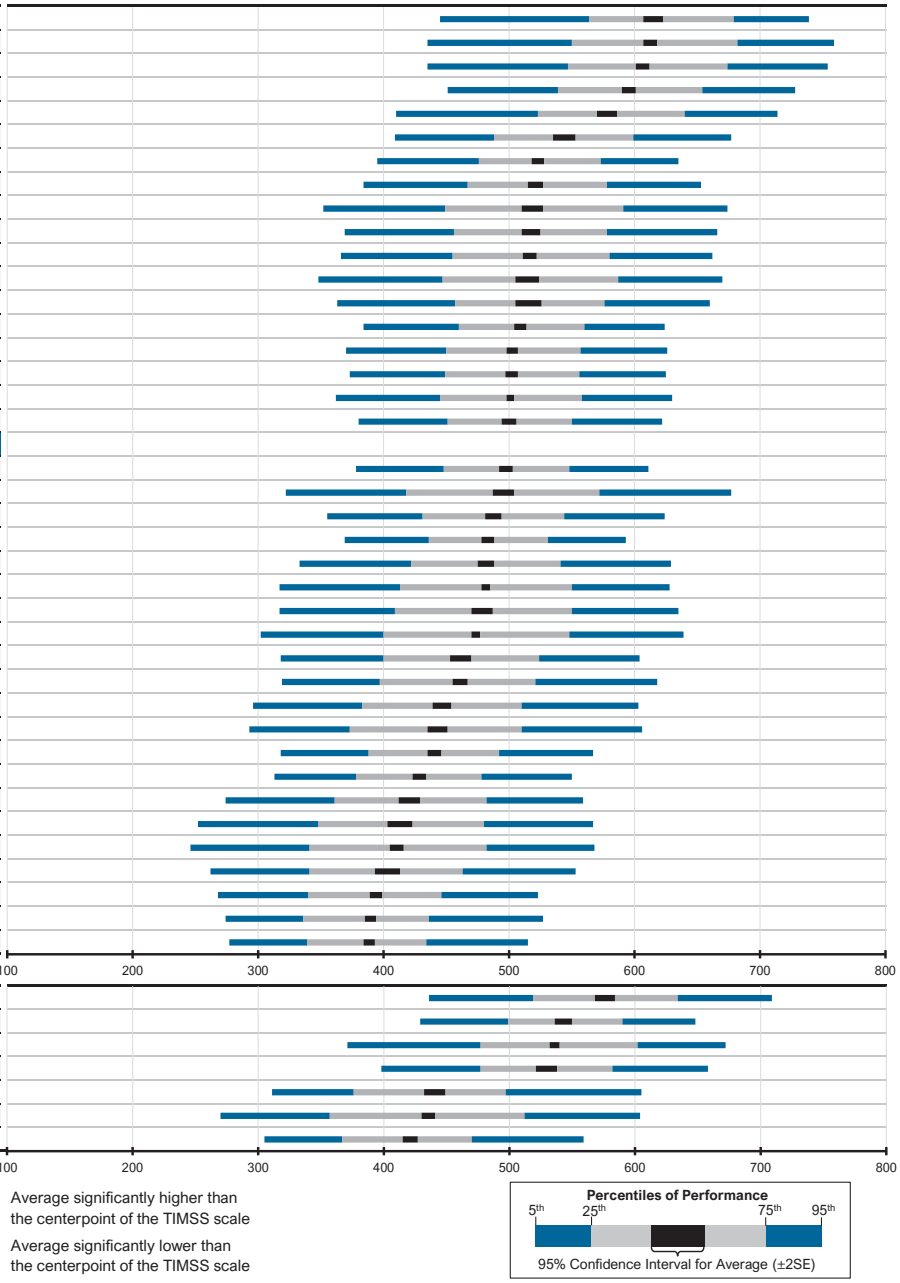
Exhibit 3.1 presents the average achievement at the eighth grade for each participating country from highest to lowest together with the scale score distribution. Exhibit 3.2 shows whether relatively small differences in average achievement between one country and the next are statistically significant.

The five East Asian countries had the highest average achievement, with Singapore, Chinese Taipei, and Korea performing similarly and having higher average achievement than all of the other TIMSS 2019 countries. These three countries were followed by Japan, whose eighth grade students had higher average achievement than students in all of the other countries except those three countries, and then by Hong Kong SAR, whose students had higher average achievement than students in all of the other countries except those four countries. In turn, the Russian Federation had higher achievement than all of the other remaining countries. Next, Ireland, Lithuania, Israel, Australia, Hungary, the United States, and England also performed well. Essentially, Exhibit 3.2 shows clusters of several similarly performing countries, followed by the next highest achieving clusters of similarly performing countries, and so on.

A number of eighth grade TIMSS 2019 participants performed well. Fourteen countries (including those discussed above) had higher average achievement than the centerpoint of 500 (Exhibit 3.1), which is a point of reference on the TIMSS eighth grade mathematics scale that remains constant from TIMSS assessment to TIMSS assessment. However, there was a considerable difference between the highest average achievement and the lowest. Also, the scale score distributions in Exhibit 3.1 show that there is wide variation in achievement in every country. Every country has some higher achieving and some lower achieving students.

## Exhibit 3.1: Average Mathematics Achievement and Scale Score Distributions

| Country | Average Scale Score | |
|---|---|---|
| [2] Singapore | 616 (4.0) | ▲ |
| Chinese Taipei | 612 (2.7) | ▲ |
| Korea, Rep. of | 607 (2.8) | ▲ |
| Japan | 594 (2.7) | ▲ |
| † Hong Kong SAR | 578 (4.1) | ▲ |
| [2] Russian Federation | 543 (4.5) | ▲ |
| Ireland | 524 (2.6) | ▲ |
| Lithuania | 520 (2.9) | ▲ |
| [3] Israel | 519 (4.3) | ▲ |
| Australia | 517 (3.8) | ▲ |
| Hungary | 517 (2.9) | ▲ |
| † United States | 515 (4.8) | ▲ |
| England | 515 (5.3) | ▲ |
| Finland | 509 (2.6) | ▲ |
| † Norway (9) | 503 (2.4) | |
| [2] Sweden | 503 (2.5) | |
| Cyprus | 501 (1.6) | |
| Portugal | 500 (3.2) | |
| **TIMSS Scale Centerpoint** | **500** | |
| Italy | 497 (2.7) | |
| Turkey | 496 (4.3) | |
| [2] Kazakhstan | 488 (3.3) | ▽ |
| France | 483 (2.5) | ▽ |
| † New Zealand | 482 (3.4) | ▽ |
| Bahrain | 481 (1.7) | ▽ |
| Romania | 479 (4.3) | ▽ |
| United Arab Emirates | 473 (1.9) | ▽ |
| [1] Georgia | 461 (4.3) | ▽ |
| Malaysia | 461 (3.2) | ▽ |
| Iran, Islamic Rep. of | 446 (3.7) | ▽ |
| Ψ Qatar | 443 (4.0) | ▽ |
| Ψ Chile | 441 (2.8) | ▽ |
| Lebanon | 429 (2.9) | ▽ |
| Ψ Jordan | 420 (4.3) | ▽ |
| [2] Ψ Egypt | 413 (5.2) | ▽ |
| Ψ Oman | 411 (2.8) | ▽ |
| Ψ Kuwait | 403 (5.0) | ▽ |
| [2] Ψ Saudi Arabia | 394 (2.5) | ▽ |
| Ж South Africa (9) | 389 (2.3) | ▽ |
| Ψ Morocco | 388 (2.3) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 575 (4.2) | ▲ |
| ‡ Quebec, Canada | 543 (3.7) | ▲ |
| [2] Dubai, UAE | 537 (2.0) | ▲ |
| Ontario, Canada | 530 (4.3) | ▲ |
| Ψ Western Cape, RSA (9) | 441 (4.4) | ▽ |
| Ψ Abu Dhabi, UAE | 436 (2.9) | ▽ |
| Ψ Gauteng, RSA (9) | 421 (3.0) | ▽ |




The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the distribution.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.2: Significance of Differences Between Countries' Average Mathematics Achievement

Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly higher (▲) than that of the comparison country, significantly lower (▽), or if there is no statistically significant difference.

| Country | Average Scale Score | Singapore | Chinese Taipei | Korea, Rep. of | Japan | Hong Kong SAR | Russian Federation | Ireland | Lithuania | Israel | Australia | Hungary | United States | England | Finland | Norway (9) | Sweden | Cyprus | Portugal | Italy | Turkey | Kazakhstan | France | New Zealand | Bahrain | Romania | United Arab Emirates | Georgia | Malaysia | Iran, Islamic Rep. of | Qatar | Chile | Lebanon | Jordan | Egypt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 612 (2.7) | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 607 (2.8) | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 594 (2.7) | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 578 (4.1) | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 543 (4.5) | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | 524 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 520 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Israel | 519 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Australia | 517 (3.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hungary | 517 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United States | 515 (4.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | 515 (5.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | 509 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Norway (9) | 503 (2.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Sweden | 503 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Cyprus | 501 (1.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Portugal | 500 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Italy | 497 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Turkey | 496 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Kazakhstan | 488 (3.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| France | 483 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| New Zealand | 482 (3.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bahrain | 481 (1.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Romania | 479 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United Arab Emirates | 473 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Georgia | 461 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Malaysia | 461 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Iran, Islamic Rep. of | 446 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ |
| Qatar | 443 (4.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ |
| Chile | 441 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ |
| Lebanon | 429 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | ▲ |
| Jordan | 420 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | |
| Egypt | 413 (5.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Oman | 411 (2.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Kuwait | 403 (5.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Saudi Arabia | 394 (2.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (9) | 389 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | 388 (2.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 543 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 537 (2.0) | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | 530 (4.3) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Western Cape, RSA (9) | 441 (4.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ |
| Abu Dhabi, UAE | 436 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ |
| Gauteng, RSA (9) | 421 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.2: Significance of Differences Between Countries' Average Mathematics Achievement

(Continued)

| Country | Average Scale Score | Oman | Kuwait | Saudi Arabia | South Africa (9) | Morocco | **Benchmarking Participants** | Moscow City, Russian Fed. | Quebec, Canada | Dubai, UAE | Ontario, Canada | Western Cape, RSA (9) | Abu Dhabi, UAE | Gauteng, RSA (9) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 612 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 607 (2.8) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 594 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 578 (4.1) | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 543 (4.5) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | | | ▲ | ▲ | ▲ | ▲ |
| Ireland | 524 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Lithuania | 520 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Israel | 519 (4.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Australia | 517 (3.8) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Hungary | 517 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| United States | 515 (4.8) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| England | 515 (5.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Finland | 509 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Norway (9) | 503 (2.4) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Sweden | 503 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Cyprus | 501 (1.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Portugal | 500 (3.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Italy | 497 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Turkey | 496 (4.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Kazakhstan | 488 (3.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| France | 483 (2.5) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| New Zealand | 482 (3.4) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Bahrain | 481 (1.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Romania | 479 (4.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| United Arab Emirates | 473 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Georgia | 461 (4.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Malaysia | 461 (3.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Iran, Islamic Rep. of | 446 (3.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Qatar | 443 (4.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | | ▲ |
| Chile | 441 (2.8) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | | ▲ |
| Lebanon | 429 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | | ▲ |
| Jordan | 420 (4.3) | | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Egypt | 413 (5.2) | | | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |
| Oman | 411 (2.8) | | | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Kuwait | 403 (5.0) | | | | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Saudi Arabia | 394 (2.5) | ▽ | | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (9) | 389 (2.3) | ▽ | ▽ | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | 388 (2.3) | ▽ | ▽ | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 543 (3.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | | | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 537 (2.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | | | | ▲ | ▲ | ▲ |
| Ontario, Canada | 530 (4.3) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | | | ▲ | ▲ | ▲ |
| Western Cape, RSA (9) | 441 (4.4) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | | ▲ |
| Abu Dhabi, UAE | 436 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | | ▲ |
| Gauteng, RSA (9) | 421 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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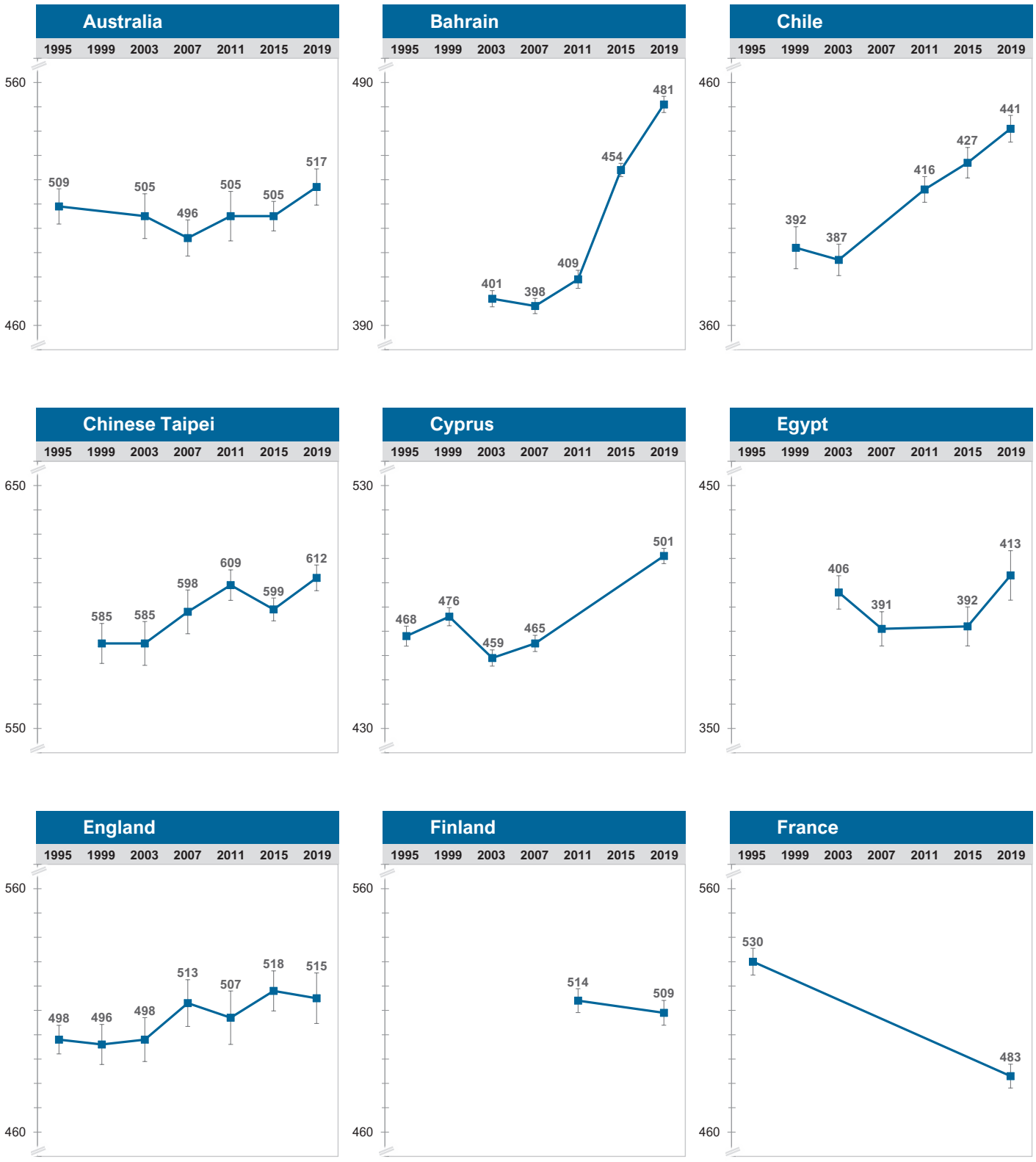
## Trends in Average Achievement

Exhibit 3.3 graphs the differences in average mathematics achievement between the assessment cycles for TIMSS 2019 countries that have comparable data from previous assessments, while Exhibit 3.4 provides more details. The countries are presented in alphabetical order in both exhibits. The trends in mathematics achievement at the eighth grade signal more improvements than downturns across the assessment cycles internationally.

Most recently, for the 33 countries that participated in both TIMSS 2015 and 2019, 13 had increases in average achievement and 4 had decreases. The trends between 2007 and 2019, as well as between 1995 and 2019, also show more increases than decreases in average mathematics achievement over the long term. In 2019, compared with 2007, for the 23 countries in both assessments, there were 16 increases and only 2 decreases. In 2019, compared with 1995, for the 18 countries in both assessments, there were 9 increases and 4 decreases.

## Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



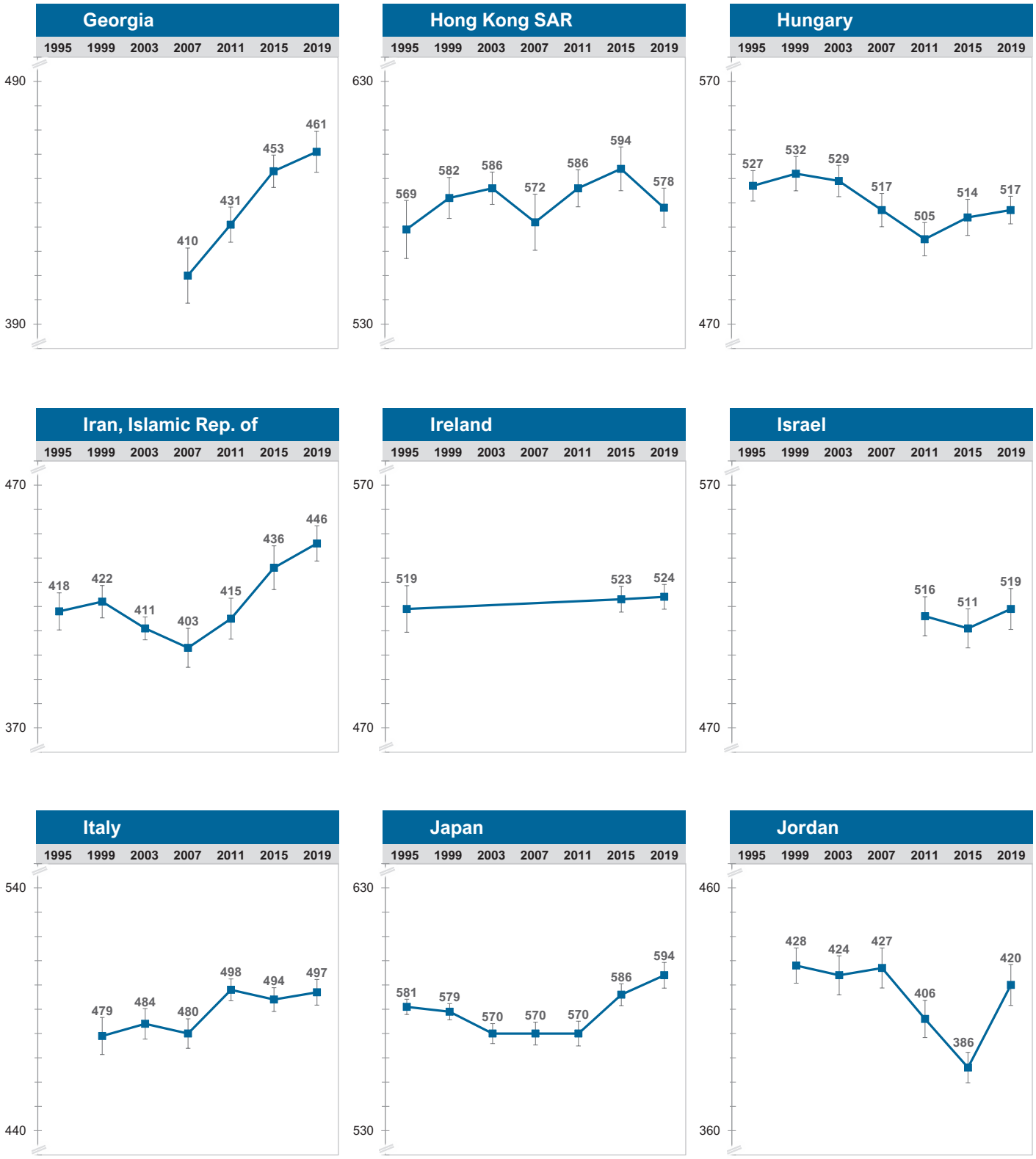

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



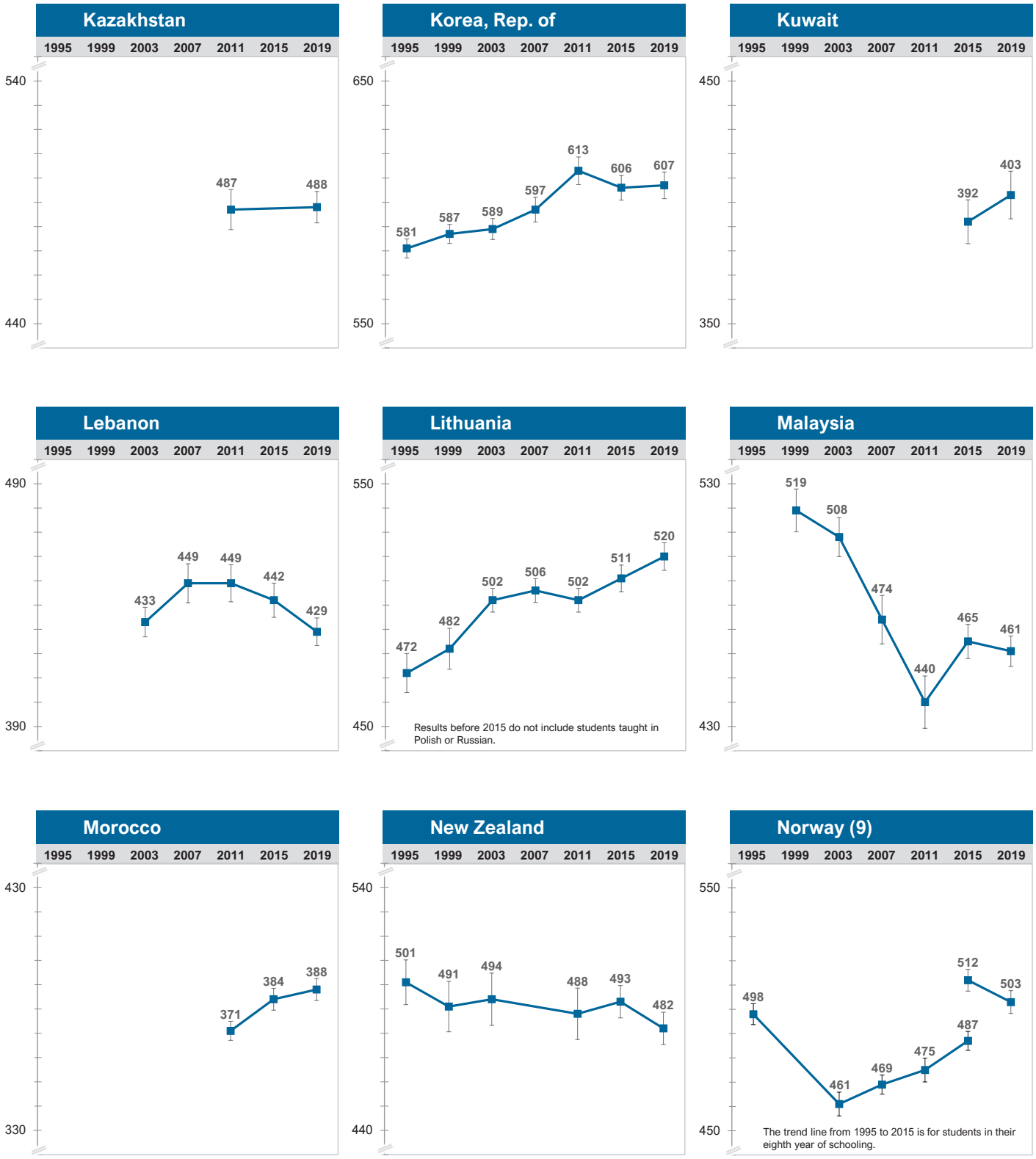

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



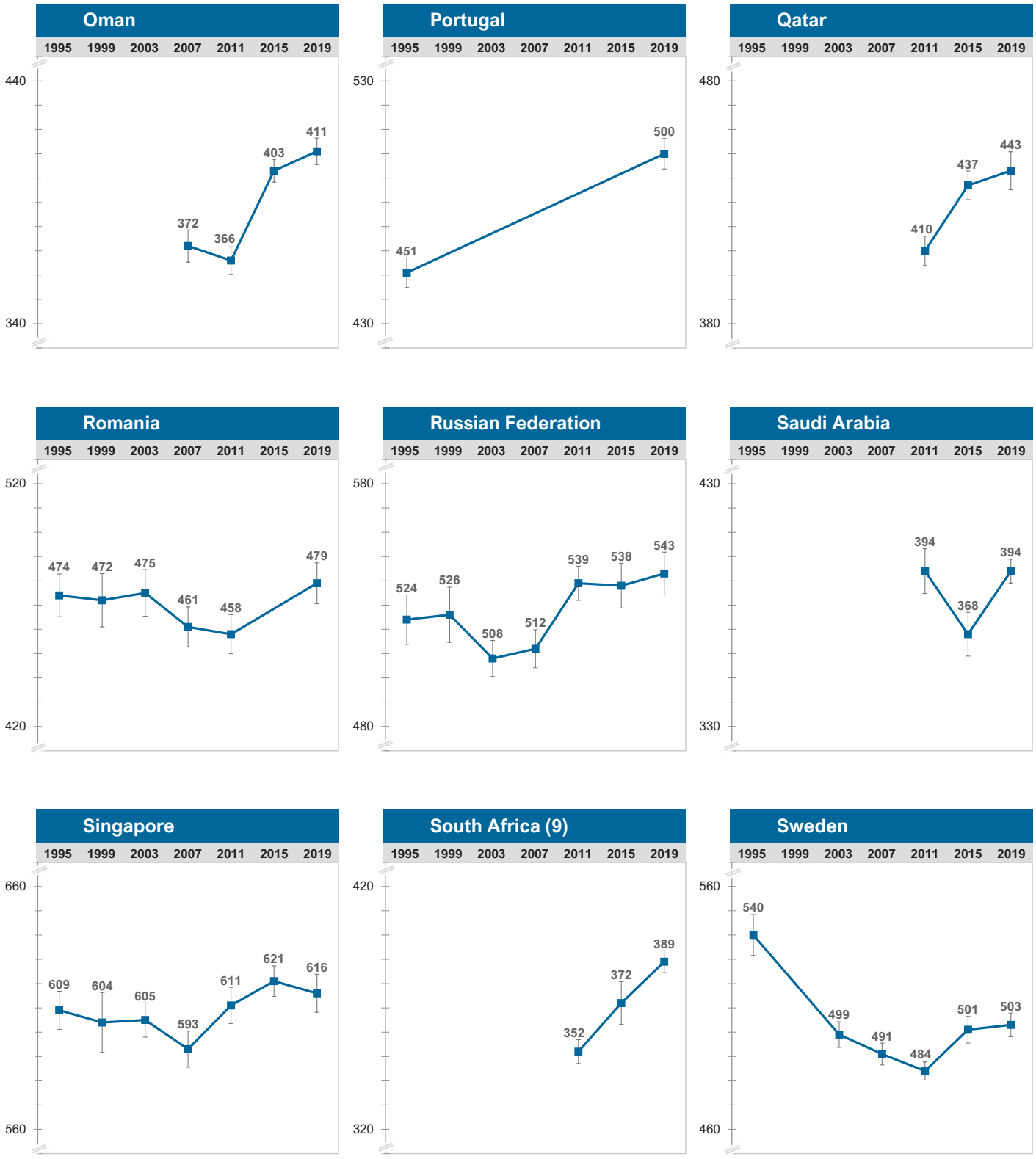

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



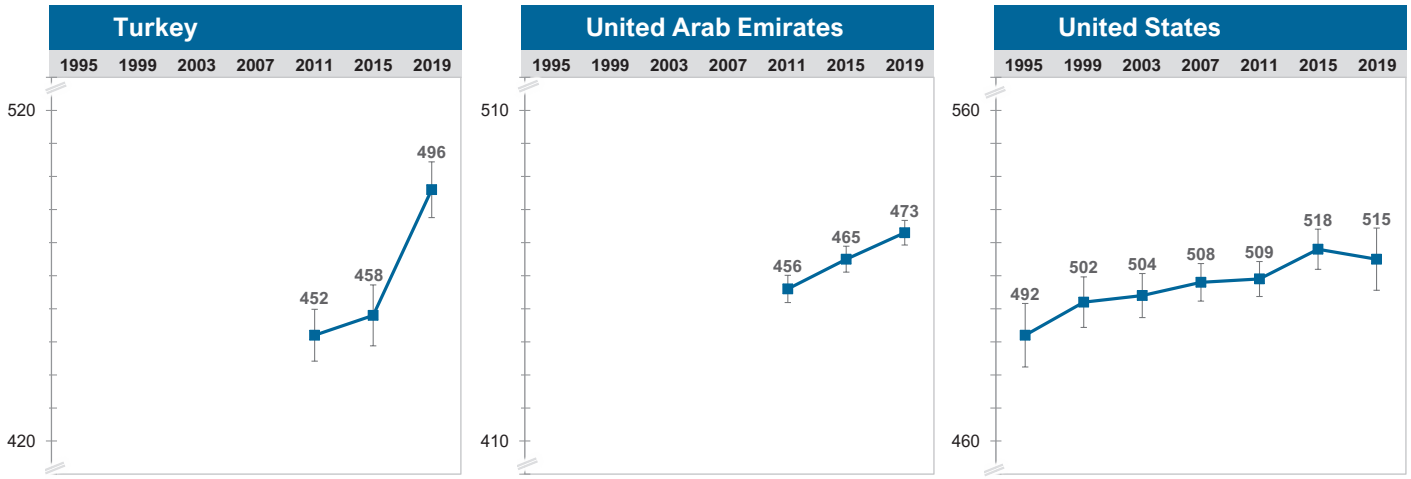

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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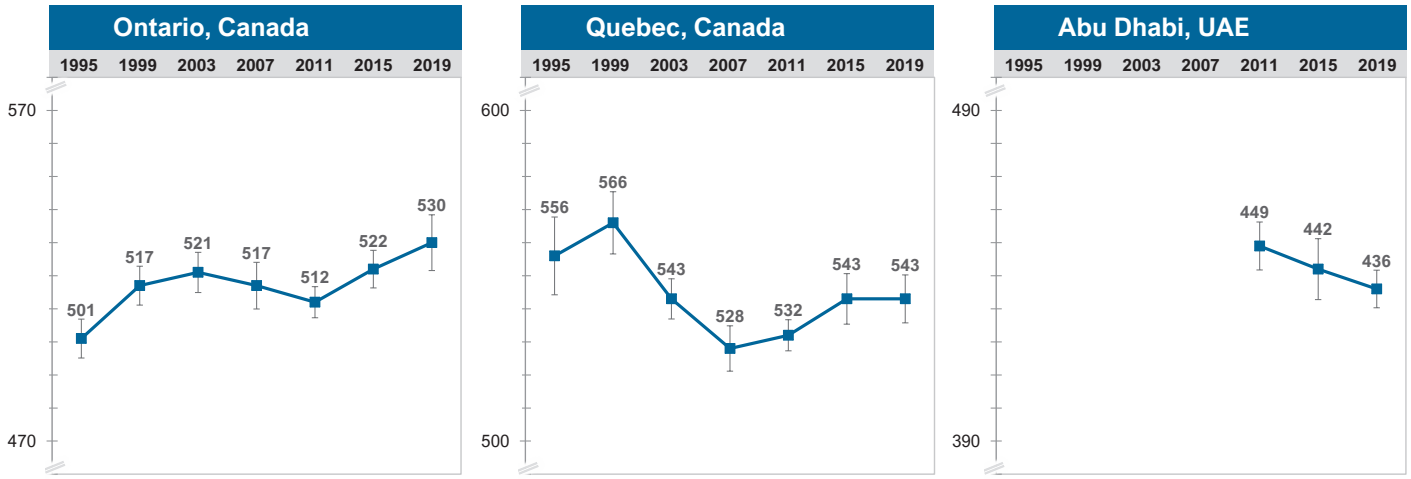
## Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

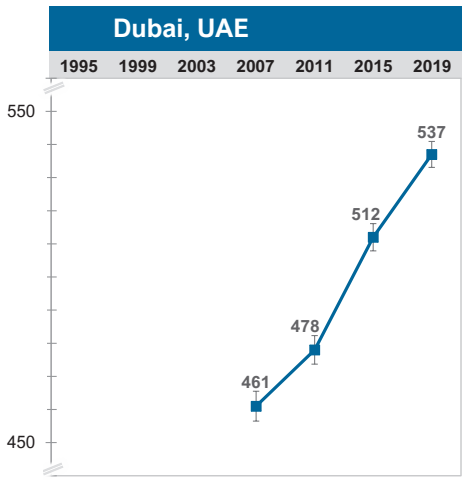
(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.




### Benchmarking Participants



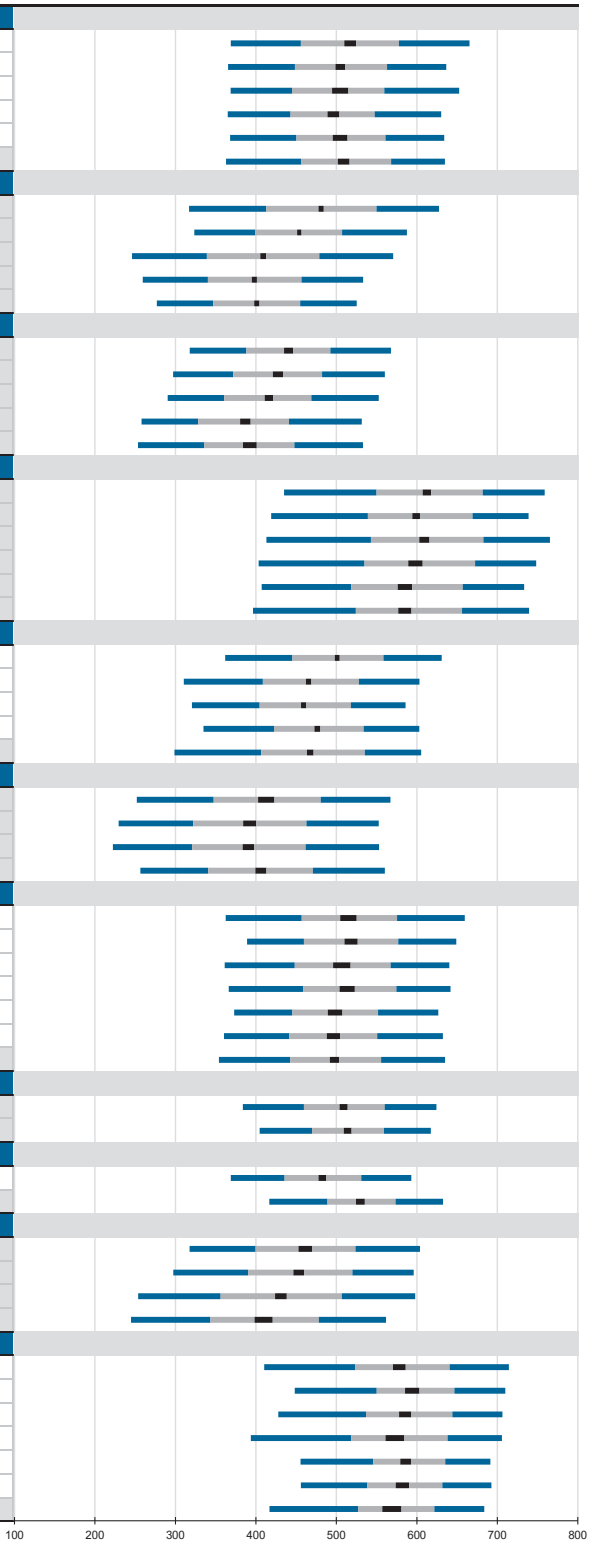

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

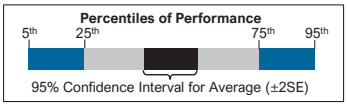
Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Average Scale Score | Differences Between Years | | | | | | Mathematics Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Australia** | | | | | | | | |
| 2019 | 517 (3.8) | 12 ▲ | 12 | 21 ▲ | 13 ▲ | | 8 | |
| 2015 | 505 (3.1) | | 0 | 9 | 0 | | -4 | |
| 2011 | 505 (5.2) | | | 9 | 0 | | -4 | |
| 2007 | 496 (3.8) | | | | -8 | | -13 ▽ | |
| 2003 | 505 (4.7) | | | | | | -4 | |
| ‡ 1995 | 509 (3.7) | | | | | | | |
| **Bahrain** | | | | | | | | |
| 2019 | 481 (1.7) | 27 ▲ | 72 ▲ | 83 ▲ | 80 ▲ | | | |
| 2015 | 454 (1.4) | | 45 ▲ | 56 ▲ | 53 ▲ | | | |
| Ψ 2011 | 409 (1.9) | | | 11 ▲ | 8 ▲ | | | |
| 2007 | 398 (1.6) | | | | -3 | | | |
| 2003 | 401 (1.7) | | | | | | | |
| **Chile** | | | | | | | | |
| Ψ 2019 | 441 (2.8) | 13 ▲ | 24 ▲ | | 54 ▲ | 48 ▲ | | |
| Ψ 2015 | 427 (3.2) | | 11 ▲ | | 41 ▲ | 35 ▲ | | |
| 2011 | 416 (2.7) | | | | 29 ▲ | 24 ▲ | | |
| 2003 | 387 (3.3) | | | | | -6 | | |
| 1999 | 392 (4.4) | | | | | | | |
| **Chinese Taipei** | | | | | | | | |
| 2019 | 612 (2.7) | 13 ▲ | 3 | 14 ▲ | 27 ▲ | 27 ▲ | | |
| 2015 | 599 (2.4) | | -10 ▽ | 1 | 14 ▲ | 14 ▲ | | |
| 2011 | 609 (3.2) | | | 11 | 24 ▲ | 24 ▲ | | |
| 2007 | 598 (4.6) | | | | 13 ▲ | 13 ▲ | | |
| 2003 | 585 (4.6) | | | | | 0 | | |
| 1999 | 585 (4.2) | | | | | | | |
| **Cyprus** | | | | | | | | |
| 2019 | 501 (1.6) | | | 36 ▲ | 42 ▲ | 25 ▲ | 34 ▲ | |
| 2007 | 465 (1.7) | | | | 6 ▲ | -11 ▽ | -2 | |
| 2003 | 459 (1.7) | | | | | -17 ▽ | -8 ▽ | |
| 1999 | 476 (1.9) | | | | | | 9 ▲ | |
| 1995 | 468 (2.1) | | | | | | | |
| **Egypt** | | | | | | | | |
| 2 Ψ 2019 | 413 (5.2) | 21 ▲ | | 22 ▲ | 7 | | | |
| Ψ 2015 | 392 (4.1) | | | 2 | -14 ▽ | | | |
| 2007 | 391 (3.6) | | | | -16 ▽ | | | |
| 2003 | 406 (3.5) | | | | | | | |
| **England** | | | | | | | | |
| 2019 | 515 (5.3) | -3 | 8 | 2 | 16 ▲ | 19 ▲ | 17 ▲ | |
| 2015 | 518 (4.2) | | 11 | 5 | 20 ▲ | 22 ▲ | 21 ▲ | |
| ‡ 2011 | 507 (5.6) | | | -7 | 8 | 10 | 9 | |
| † 2007 | 513 (4.9) | | | | 15 ▲ | 17 ▲ | 16 ▲ | |
| ≡ 2003 | 498 (4.6) | | | | | 2 | 1 | |
| † 1999 | 496 (4.2) | | | | | | -1 | |
| 3 † 1995 | 498 (3.0) | | | | | | | |
| **Finland** | | | | | | | | |
| 2019 | 509 (2.6) | | -5 | | | | | |
| 2011 | 514 (2.5) | | | | | | | |
| **France** | | | | | | | | |
| 2019 | 483 (2.5) | | | | | | -47 ▽ | |
| 1995 | 530 (2.8) | | | | | | | |
| **Georgia** | | | | | | | | |
| 1 2019 | 461 (4.3) | 8 | 30 ▲ | 52 ▲ | | | | |
| 1 2 2015 | 453 (3.4) | | 22 ▲ | 44 ▲ | | | | |
| 1 2011 | 431 (3.7) | | | 22 ▲ | | | | |
| 1 2007 | 410 (5.8) | | | | | | | |
| **Hong Kong SAR** | | | | | | | | |
| † 2019 | 578 (4.1) | -16 ▽ | -7 | 6 | -8 | -4 | 9 | |
| 2015 | 594 (4.6) | | 9 | 22 ▲ | 8 | 12 | 25 ▲ | |
| 2011 | 586 (3.9) | | | 13 | 0 | 4 | 17 ▲ | |
| † 2007 | 572 (5.9) | | | | -14 ▽ | -10 | 4 | |
| † 2003 | 586 (3.4) | | | | | 4 | 17 ▲ | |
| † 1999 | 582 (4.3) | | | | | | 13 | |
| 1995 | 569 (6.1) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



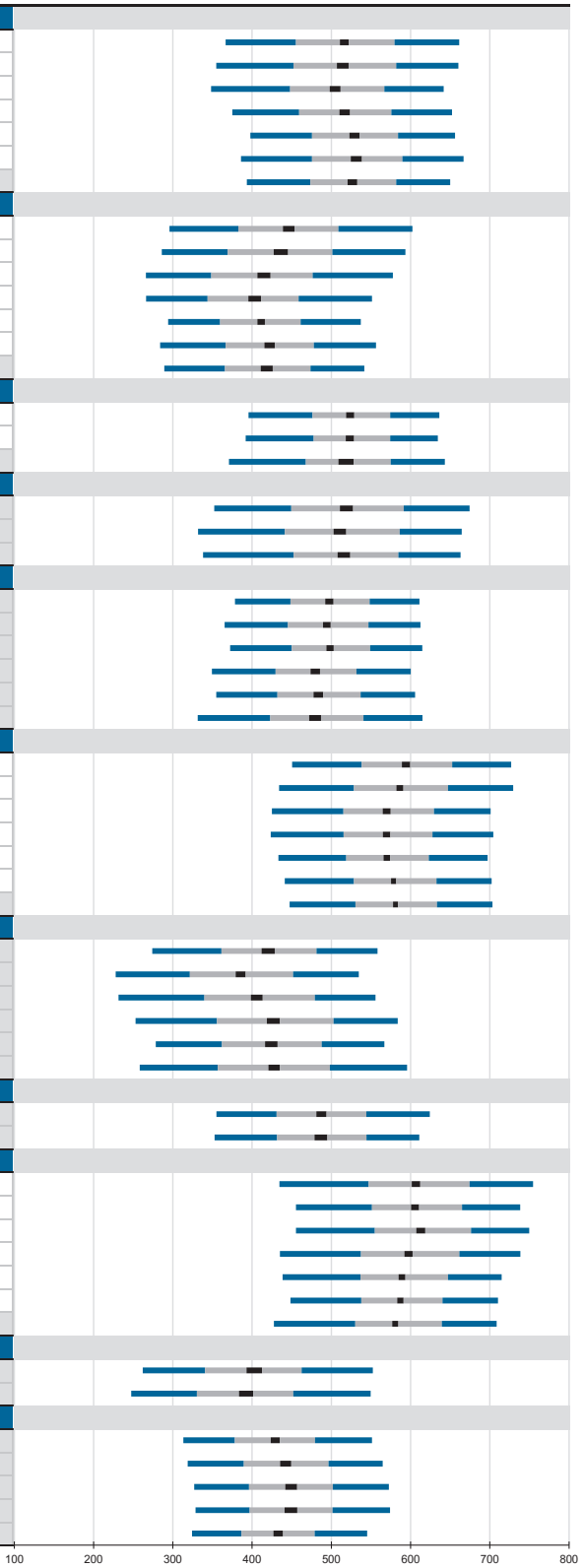

See Appendix A for country participation in previous TIMSS assessments.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

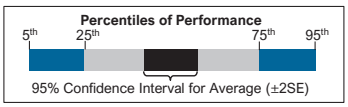
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | | Mathematics Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Hungary** | | | | | | | | |
| 2019 | 517 (2.9) | 2 | 12 ▲ | 0 | -13 ▽ | -15 ▽ | -10 ▽ | |
| 2015 | 514 (3.8) | | 10 | -2 | -15 ▽ | -17 ▽ | -12 ▽ | |
| 2011 | 505 (3.5) | | | -12 ▽ | -24 ▽ | -27 ▽ | -22 ▽ | |
| 2007 | 517 (3.5) | | | | -12 ▽ | -15 ▽ | -10 ▽ | |
| [2] 2003 | 529 (3.3) | | | | | -2 | 3 | |
| 1999 | 532 (3.6) | | | | | | 5 | |
| 1995 | 527 (3.2) | | | | | | | |
| **Iran, Islamic Rep. of** | | | | | | | | |
| 2019 | 446 (3.7) | 10 | 31 ▲ | 43 ▲ | 35 ▲ | 24 ▲ | 28 ▲ | |
| Ψ 2015 | 436 (4.6) | | 21 ▲ | 33 ▲ | 25 ▲ | 14 ▲ | 18 ▲ | |
| Ψ 2011 | 415 (4.3) | | | 12 | 4 | -7 | -3 | |
| 2007 | 403 (4.1) | | | | -8 | -19 ▽ | -15 ▽ | |
| [2] 2003 | 411 (2.4) | | | | | -11 ▽ | -7 | |
| 1999 | 422 (3.4) | | | | | | 4 | |
| 1995 | 418 (3.9) | | | | | | | |
| **Ireland** | | | | | | | | |
| 2019 | 524 (2.6) | 0 | | | | | 5 | |
| 2015 | 523 (2.7) | | | | | | 5 | |
| 1995 | 519 (4.9) | | | | | | | |
| **Israel** | | | | | | | | |
| [3] 2019 | 519 (4.3) | 8 | 3 | | | | | |
| [3] 2015 | 511 (4.1) | | -5 | | | | | |
| [3] 2011 | 516 (4.1) | | | | | | | |
| **Italy** | | | | | | | | |
| 2019 | 497 (2.7) | 3 | -1 | 18 ▲ | 14 ▲ | 18 ▲ | | |
| [2] 2015 | 494 (2.5) | | -4 | 15 ▲ | 11 ▲ | 15 ▲ | | |
| 2011 | 498 (2.3) | | | 19 ▲ | 15 ▲ | 19 ▲ | | |
| 2007 | 480 (3.1) | | | | -4 | 0 | | |
| 2003 | 484 (3.2) | | | | | 4 | | |
| [2] 1999 | 479 (3.9) | | | | | | | |
| **Japan** | | | | | | | | |
| 2019 | 594 (2.7) | 8 ▲ | 24 ▲ | 24 ▲ | 24 ▲ | 16 ▲ | 13 ▲ | |
| 2015 | 586 (2.3) | | 17 ▲ | 17 ▲ | 17 ▲ | 8 ▲ | 5 | |
| 2011 | 570 (2.6) | | | 0 | 0 | -9 ▽ | -11 ▽ | |
| 2007 | 570 (2.4) | | | | 0 | -9 ▽ | -11 ▽ | |
| 2003 | 570 (2.1) | | | | | -9 ▽ | -11 ▽ | |
| 1999 | 579 (1.7) | | | | | | -2 | |
| 1995 | 581 (1.6) | | | | | | | |
| **Jordan** | | | | | | | | |
| Ψ 2019 | 420 (4.3) | 35 ▲ | 14 ▲ | -7 | -4 | -7 | | |
| Ж 2015 | 386 (3.2) | | -20 ▽ | -41 ▽ | -39 ▽ | -42 ▽ | | |
| Ψ 2011 | 406 (3.9) | | | -21 ▽ | -18 ▽ | -22 ▽ | | |
| 2007 | 427 (4.2) | | | | 3 | -1 | | |
| 2003 | 424 (4.1) | | | | | -3 | | |
| 1999 | 428 (3.7) | | | | | | | |
| **Kazakhstan** | | | | | | | | |
| [2] 2019 | 488 (3.3) | | 1 | | | | | |
| 2011 | 487 (4.2) | | | | | | | |
| **Korea, Rep. of** | | | | | | | | |
| 2019 | 607 (2.8) | 1 | -6 | 10 ▲ | 18 ▲ | 20 ▲ | 26 ▲ | |
| 2015 | 606 (2.6) | | -7 | 8 ▲ | 17 ▲ | 19 ▲ | 25 ▲ | |
| 2011 | 613 (2.9) | | | 16 ▲ | 24 ▲ | 26 ▲ | 32 ▲ | |
| 2007 | 597 (2.6) | | | | 8 ▲ | 10 ▲ | 17 ▲ | |
| 2003 | 589 (2.2) | | | | | 2 | 8 ▲ | |
| 1999 | 587 (2.0) | | | | | | 6 ▲ | |
| 1995 | 581 (2.0) | | | | | | | |
| **Kuwait** | | | | | | | | |
| Ψ 2019 | 403 (5.0) | 10 | | | | | | |
| Ψ 2015 | 392 (4.6) | | | | | | | |
| **Lebanon** | | | | | | | | |
| 2019 | 429 (2.9) | -13 ▽ | -20 ▽ | -20 ▽ | -4 | | | |
| 2015 | 442 (3.6) | | -7 | -7 | 9 | | | |
| 2011 | 449 (3.9) | | | 0 | 16 ▲ | | | |
| 2007 | 449 (4.1) | | | | 16 ▲ | | | |
| 2003 | 433 (3.1) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



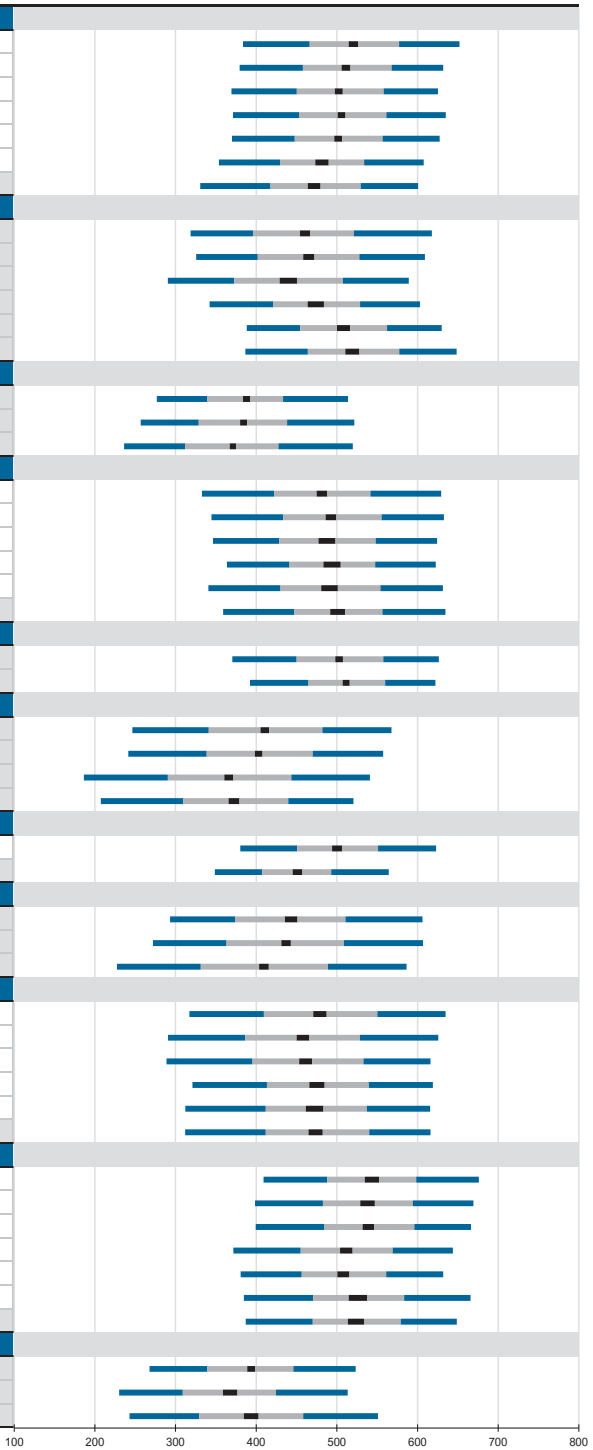

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

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## Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

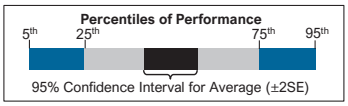
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | | Mathematics Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Lithuania** | | | | | | | | |
| 2019 | 520 (2.9) | 9 ▲ | 18 ▲ | 15 ▲ | 19 ▲ | 39 ▲ | 49 ▲ | |
| [2] 2015 | 511 (2.8) | | 9 ▲ | 5 | 10 ▲ | 30 ▲ | 39 ▲ | |
| [1] 2011 | 502 (2.5) | | | -3 | 1 | 21 ▲ | 31 ▲ | |
| [1] 2007 | 506 (2.5) | | | | 4 | 24 ▲ | 34 ▲ | |
| [1] 2003 | 502 (2.5) | | | | | 20 ▲ | 30 ▲ | |
| [1] 1999 | 482 (4.3) | | | | | | 10 | |
| [1 2] 1995 | 472 (4.1) | | | | | | | |
| **Malaysia** | | | | | | | | |
| 2019 | 461 (3.2) | -5 | 21 ▲ | -13 ▽ | -48 ▽ | -59 ▽ | | |
| 2015 | 465 (3.6) | | 25 ▲ | -9 | -43 ▽ | -54 ▽ | | |
| 2011 | 440 (5.5) | | | -34 ▽ | -69 ▽ | -79 ▽ | | |
| 2007 | 474 (5.1) | | | | -34 ▽ | -45 ▽ | | |
| 2003 | 508 (4.1) | | | | | -11 | | |
| 1999 | 519 (4.5) | | | | | | | |
| **Morocco** | | | | | | | | |
| Ψ 2019 | 388 (2.3) | 4 | 17 ▲ | | | | | |
| Ж 2015 | 384 (2.3) | | 13 ▲ | | | | | |
| Ж 2011 | 371 (2.0) | | | | | | | |
| **New Zealand** | | | | | | | | |
| † 2019 | 482 (3.4) | -11 ▽ | -6 | | -12 | -9 | -19 ▽ | |
| † 2015 | 493 (3.4) | | 5 | | -1 | 2 | -8 | |
| 2011 | 488 (5.4) | | | | -6 | -3 | -13 | |
| 2003 | 494 (5.5) | | | | | 3 | -7 | |
| 1999 | 491 (5.3) | | | | | | -10 | |
| 1995 | 501 (4.7) | | | | | | | |
| **Norway (9)** | | | | | | | | |
| † 2019 | 503 (2.4) | -9 ▽ | | | | | | |
| 2015 | 512 (2.3) | | | | | | | |
| **Oman** | | | | | | | | |
| Ψ 2019 | 411 (2.8) | 8 ▲ | 45 ▲ | 38 ▲ | | | | |
| Ψ 2015 | 403 (2.4) | | 37 ▲ | 31 ▲ | | | | |
| Ψ 2011 | 366 (2.9) | | | -6 | | | | |
| 2007 | 372 (3.4) | | | | | | | |
| **Portugal** | | | | | | | | |
| 2019 | 500 (3.2) | | | | | | 49 ▲ | |
| 1995 | 451 (3.1) | | | | | | | |
| **Qatar** | | | | | | | | |
| Ψ 2019 | 443 (4.0) | 6 | 34 ▲ | | | | | |
| Ψ 2015 | 437 (3.0) | | 28 ▲ | | | | | |
| Ψ 2011 | 410 (3.1) | | | | | | | |
| **Romania** | | | | | | | | |
| 2019 | 479 (4.3) | | 21 ▲ | 18 ▲ | 4 | 7 | 5 | |
| 2011 | 458 (4.1) | | | -3 | -17 ▽ | -14 ▽ | -16 ▽ | |
| 2007 | 461 (4.2) | | | | -14 ▽ | -11 | -12 ▽ | |
| 2003 | 475 (4.9) | | | | | 3 | 2 | |
| 1999 | 472 (5.6) | | | | | | -1 | |
| 1995 | 474 (4.5) | | | | | | | |
| **Russian Federation** | | | | | | | | |
| [2] 2019 | 543 (4.5) | 5 | 5 | 32 ▲ | 35 ▲ | 17 ▲ | 20 ▲ | |
| 2015 | 538 (4.7) | | -1 | 26 ▲ | 30 ▲ | 12 | 14 ▲ | |
| [2] 2011 | 539 (3.6) | | | 27 ▲ | 31 ▲ | 13 | 15 ▲ | |
| 2007 | 512 (4.0) | | | | 4 | -14 ▽ | -12 | |
| 2003 | 508 (3.8) | | | | | -18 ▽ | -16 ▽ | |
| 1999 | 526 (5.8) | | | | | | 2 | |
| [2] 1995 | 524 (5.2) | | | | | | | |
| **Saudi Arabia** | | | | | | | | |
| [2] Ψ 2019 | 394 (2.5) | 26 ▲ | 0 | | | | | |
| Ж 2015 | 368 (4.6) | | -26 ▽ | | | | | |
| Ψ 2011 | 394 (4.7) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



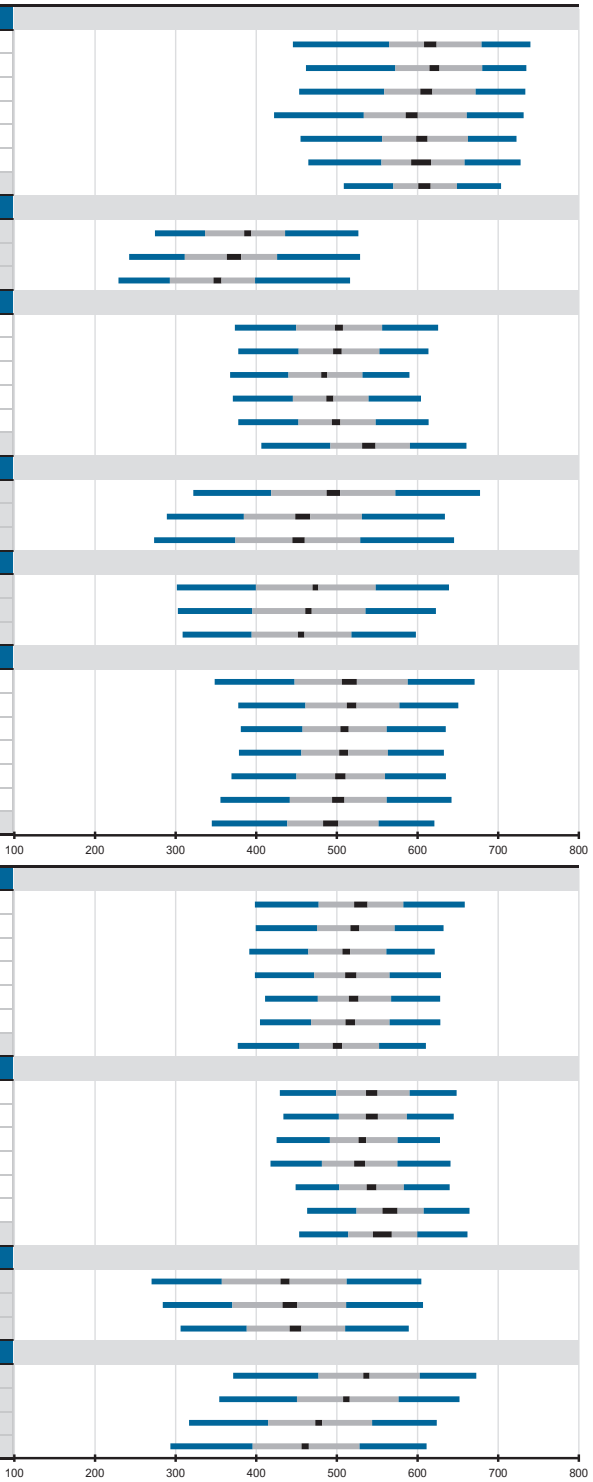

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

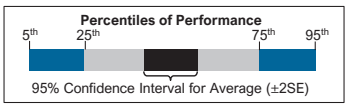
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | | Mathematics Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Singapore** | | | | | | | | |
| [2] 2019 | 616 (4.0) | -5 | 5 | 23 ▲ | 10 | 11 | 7 | |
| [2] 2015 | 621 (3.2) | | 10 ▲ | 28 ▲ | 16 ▲ | 17 ▲ | 12 ▲ | |
| [2] 2011 | 611 (3.8) | | | 18 ▲ | 6 | 7 | 2 | |
| 2007 | 593 (3.8) | | | | -13 ▽ | -12 | -16 ▽ | |
| 2003 | 605 (3.6) | | | | | 1 | -3 | |
| 1999 | 604 (6.3) | | | | | | -4 | |
| 1995 | 609 (4.0) | | | | | | | |
| **South Africa (9)** | | | | | | | | |
| Ж 2019 | 389 (2.3) | 17 ▲ | 38 ▲ | | | | | |
| Ж 2015 | 372 (4.5) | | 20 ▲ | | | | | |
| Ж 2011 | 352 (2.5) | | | | | | | |
| **Sweden** | | | | | | | | |
| [2] 2019 | 503 (2.5) | 2 | 18 ▲ | 11 ▲ | 3 | | -37 ▽ | |
| 2015 | 501 (2.8) | | 16 ▲ | 9 ▲ | 2 | | -39 ▽ | |
| 2011 | 484 (1.9) | | | -7 ▽ | -15 ▽ | | -55 ▽ | |
| 2007 | 491 (2.3) | | | | -8 ▽ | | -48 ▽ | |
| 2003 | 499 (2.7) | | | | | | -41 ▽ | |
| 1995 | 540 (4.3) | | | | | | | |
| **Turkey** | | | | | | | | |
| 2019 | 496 (4.3) | 38 ▲ | 43 ▲ | | | | | |
| 2015 | 458 (4.7) | | 5 | | | | | |
| 2011 | 452 (4.0) | | | | | | | |
| **United Arab Emirates** | | | | | | | | |
| 2019 | 473 (1.9) | 9 ▲ | 18 ▲ | | | | | |
| 2015 | 465 (2.0) | | 9 ▲ | | | | | |
| 2011 | 456 (2.1) | | | | | | | |
| **United States** | | | | | | | | |
| † 2019 | 515 (4.8) | -3 | 6 | 7 | 11 | 14 ▲ | 23 ▲ | |
| † 2015 | 518 (3.1) | | 9 ▲ | 10 ▲ | 14 ▲ | 17 ▲ | 26 ▲ | |
| [2] 2011 | 509 (2.7) | | | 1 | 5 | 8 | 17 ▲ | |
| [2] † 2007 | 508 (2.9) | | | | 4 | 7 | 16 ▲ | |
| ‡ 2003 | 504 (3.4) | | | | | 3 | 12 ▲ | |
| 1999 | 502 (3.9) | | | | | | 9 | |
| † 1995 | 492 (4.9) | | | | | | | |
| **Benchmarking Participants** | | | | | | | | |
| **Ontario, Canada** | | | | | | | | |
| 2019 | 530 (4.3) | 7 | 18 ▲ | 13 ▲ | 9 | 13 ▲ | 29 ▲ | |
| 2015 | 522 (2.9) | | 11 ▲ | 5 | 1 | 6 | 22 ▲ | |
| [2] 2011 | 512 (2.4) | | | -6 | -9 ▽ | -5 | 11 ▲ | |
| [2] 2007 | 517 (3.6) | | | | -4 | 1 | 17 ▲ | |
| [2] 2003 | 521 (3.1) | | | | | 4 | 20 ▲ | |
| 1999 | 517 (3.0) | | | | | | 16 ▲ | |
| 1995 | 501 (3.0) | | | | | | | |
| **Quebec, Canada** | | | | | | | | |
| ‡ 2019 | 543 (3.7) | 0 | 12 ▲ | 15 ▲ | 0 | -23 ▽ | -13 | |
| ≡ 2015 | 543 (3.9) | | 12 ▲ | 15 ▲ | 0 | -22 ▽ | -13 | |
| 2011 | 532 (2.4) | | | 3 | -12 ▽ | -34 ▽ | -25 ▽ | |
| [3] 2007 | 528 (3.5) | | | | -15 ▽ | -38 ▽ | -28 ▽ | |
| 2003 | 543 (3.1) | | | | | -23 ▽ | -13 ▽ | |
| 1999 | 566 (4.8) | | | | | | 9 | |
| 1995 | 556 (6.0) | | | | | | | |
| **Abu Dhabi, UAE** | | | | | | | | |
| Ψ 2019 | 436 (2.9) | -6 | -13 ▽ | | | | | |
| 2015 | 442 (4.7) | | -7 | | | | | |
| 2011 | 449 (3.7) | | | | | | | |
| **Dubai, UAE** | | | | | | | | |
| [2] 2019 | 537 (2.0) | 25 ▲ | 59 ▲ | 76 ▲ | | | | |
| 2015 | 512 (2.1) | | 34 ▲ | 51 ▲ | | | | |
| 2011 | 478 (2.2) | | | 17 ▲ | | | | |
| ‡ 2007 | 461 (2.3) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower




Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

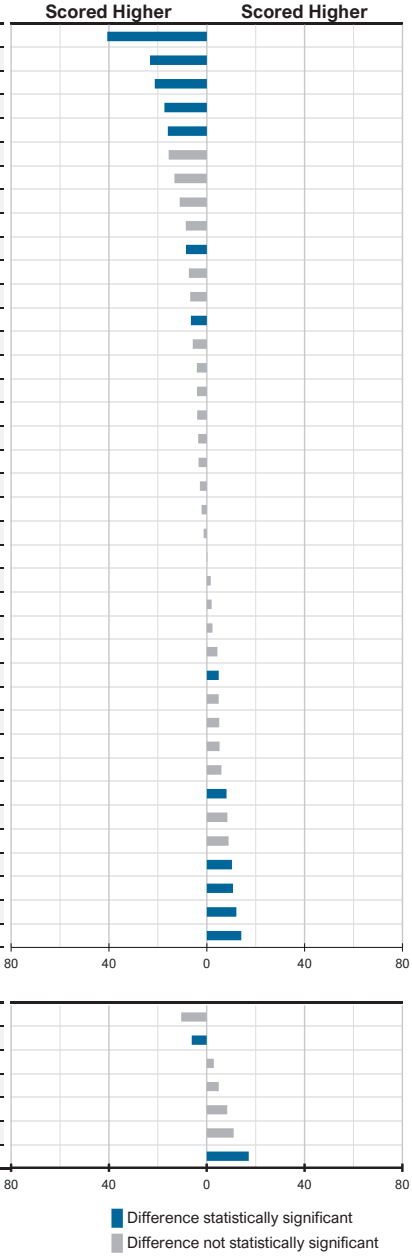
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Average Achievement by Gender

Exhibit 3.5 shows the differences in average mathematics achievement between girls and boys. In TIMSS 2019, there was considerable gender equity in average achievement. Girls had higher average achievement than boys in 7 countries, there was gender equity in average mathematics achievement in 26 countries, and boys had higher average achievement than girls in 6 countries.

## Exhibit 3.5: Average Mathematics Achievement by Gender

| Country | Girls | | Boys | | Difference (Absolute Value) | Gender Difference |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Scale Score | Percent of Students | Average Scale Score | | Girls Scored Higher / Boys Scored Higher |
| Ψ Oman | 48 (1.1) | 432 (3.3) | 52 (1.1) | 391 (4.0) | 41 (4.8) | |
| Ψ Jordan | 48 (3.4) | 432 (3.8) | 52 (3.4) | 409 (6.4) | 23 (6.7) | |
| Bahrain | 49 (0.9) | 492 (2.4) | 51 (0.9) | 471 (2.2) | 21 (3.0) | |
| 2 Ψ Saudi Arabia | 49 (0.9) | 403 (3.4) | 51 (0.9) | 385 (3.4) | 17 (4.5) | |
| Romania | 51 (0.9) | 487 (4.6) | 49 (0.9) | 471 (4.7) | 16 (3.8) | |
| 2 Ψ Egypt | 55 (2.0) | 420 (5.3) | 45 (2.0) | 404 (7.9) | 16 (8.1) | |
| Iran, Islamic Rep. of | 47 (1.3) | 453 (5.0) | 53 (1.3) | 440 (5.6) | 13 (7.6) | |
| Turkey | 50 (1.3) | 501 (4.4) | 50 (1.3) | 490 (5.8) | 11 (5.7) | |
| Ψ Kuwait | 53 (2.2) | 407 (5.4) | 47 (2.2) | 398 (7.9) | 9 (8.8) | |
| Malaysia | 51 (1.1) | 465 (3.0) | 49 (1.1) | 456 (4.1) | 9 (3.4) | |
| † Hong Kong SAR | 46 (2.1) | 582 (4.9) | 54 (2.1) | 575 (5.4) | 7 (6.5) | |
| Ψ Qatar | 50 (2.4) | 447 (5.0) | 50 (2.4) | 440 (5.4) | 7 (6.6) | |
| Ж South Africa (9) | 52 (0.6) | 393 (2.4) | 48 (0.6) | 386 (2.5) | 6 (2.1) | |
| United Arab Emirates | 48 (1.8) | 476 (3.4) | 52 (1.8) | 471 (3.4) | 6 (5.6) | |
| Finland | 48 (0.8) | 511 (2.6) | 52 (0.8) | 507 (3.2) | 4 (2.8) | |
| Cyprus | 49 (0.6) | 503 (2.1) | 51 (0.6) | 499 (2.3) | 4 (3.0) | |
| 2 Kazakhstan | 49 (1.1) | 490 (3.9) | 51 (1.1) | 486 (3.7) | 4 (3.8) | |
| † United States | 49 (0.9) | 517 (4.0) | 51 (0.9) | 514 (6.1) | 4 (3.9) | |
| 2 Singapore | 49 (0.7) | 617 (4.6) | 51 (0.7) | 614 (4.4) | 3 (4.2) | |
| 2 Sweden | 49 (0.9) | 504 (3.0) | 51 (0.9) | 501 (2.9) | 3 (3.1) | |
| Chinese Taipei | 50 (0.9) | 614 (3.1) | 50 (0.9) | 611 (3.2) | 2 (3.3) | |
| Ireland | 49 (1.1) | 524 (2.9) | 51 (1.1) | 523 (3.4) | 1 (3.5) | |
| † Norway (9) | 49 (0.7) | 503 (2.7) | 51 (0.7) | 503 (3.0) | 0 (3.2) | |
| England | 53 (1.9) | 514 (5.6) | 47 (1.9) | 516 (7.2) | 2 (7.3) | |
| Lithuania | 50 (1.0) | 519 (2.8) | 50 (1.0) | 521 (3.7) | 2 (2.9) | |
| Japan | 52 (1.0) | 593 (2.9) | 48 (1.0) | 595 (3.2) | 2 (2.8) | |
| Australia | 49 (1.5) | 515 (3.6) | 51 (1.5) | 519 (5.5) | 4 (5.4) | |
| Ψ Morocco | 50 (0.7) | 386 (2.5) | 50 (0.7) | 391 (2.6) | 5 (2.2) | |
| 2 Russian Federation | 48 (1.0) | 541 (4.8) | 52 (1.0) | 546 (4.9) | 5 (3.4) | |
| Korea, Rep. of | 48 (1.4) | 604 (3.4) | 52 (1.4) | 609 (3.1) | 5 (3.4) | |
| Lebanon | 49 (1.4) | 427 (3.5) | 51 (1.4) | 432 (3.3) | 5 (3.5) | |
| † New Zealand | 48 (2.1) | 478 (3.6) | 52 (2.1) | 484 (4.7) | 6 (5.2) | |
| France | 49 (0.8) | 478 (2.5) | 51 (0.8) | 487 (3.1) | 8 (2.7) | |
| 1 Georgia | 48 (1.2) | 457 (4.5) | 52 (1.2) | 465 (5.2) | 8 (4.5) | |
| Ψ Chile | 49 (1.6) | 436 (3.5) | 51 (1.6) | 445 (3.8) | 9 (4.6) | |
| Portugal | 50 (1.1) | 495 (3.3) | 50 (1.1) | 505 (3.9) | 10 (3.4) | |
| 3 Israel | 52 (1.7) | 514 (4.3) | 48 (1.7) | 525 (5.3) | 11 (4.6) | |
| Italy | 50 (1.0) | 491 (3.0) | 50 (1.0) | 504 (3.3) | 12 (3.0) | |
| Hungary | 50 (0.9) | 510 (3.2) | 50 (0.9) | 524 (3.6) | 14 (3.5) | |
| **International Average** | **50 (0.2)** | **491 (0.6)** | **50 (0.2)** | **488 (0.7)** | | |
| **Benchmarking Participants** | | | | | | |
| Ψ Abu Dhabi, UAE | 47 (2.1) | 441 (5.4) | 53 (2.1) | 431 (4.4) | 10 (7.9) | |
| Ψ Gauteng, RSA (9) | 55 (0.9) | 423 (3.1) | 45 (0.9) | 417 (3.5) | 6 (2.8) | |
| Ontario, Canada | 50 (0.9) | 528 (4.4) | 50 (0.9) | 531 (4.8) | 3 (3.3) | |
| ‡ Quebec, Canada | 51 (2.0) | 541 (4.3) | 49 (2.0) | 546 (4.0) | 5 (3.8) | |
| 2 Dubai, UAE | 50 (3.6) | 532 (4.8) | 50 (3.6) | 541 (5.9) | 8 (10.0) | |
| Ψ Western Cape, RSA (9) | 55 (1.2) | 436 (5.1) | 45 (1.2) | 447 (5.4) | 11 (5.7) | |
| Moscow City, Russian Fed. | 48 (1.1) | 566 (4.2) | 52 (1.1) | 584 (4.8) | 17 (3.5) | |




Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

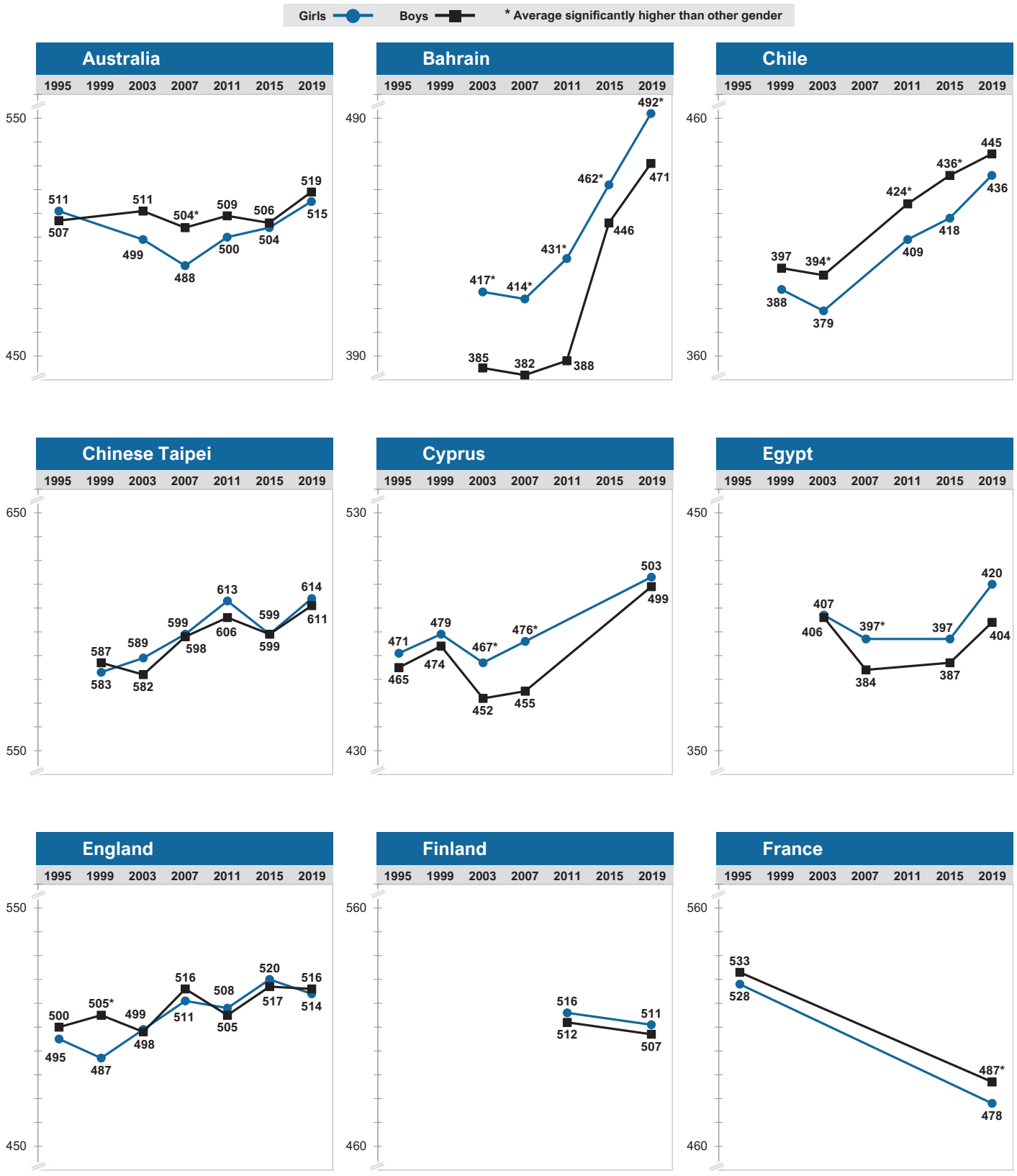
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement by Gender

For the TIMSS 2019 countries with comparable data from previous TIMSS assessments, Exhibit 3.6 contains graphs of average mathematics achievement across assessments by gender. The countries are presented in alphabetical order. The difference in average mathematics achievement between boys and girls has remained relatively stable in most countries, with any overall increases or decreases in achievement from assessment to assessment occurring similarly for both girls and boys. However, several countries with no gender gap in TIMSS 2015 had a gap favoring boys in TIMSS 2019, including Israel and Morocco, while Saudi Arabia and South Africa (ninth grade) had a gap favoring girls in 2019. Gender gaps in average achievement favoring boys in TIMSS 2015 were closed in Chile, the Russian Federation, and Sweden, and a gap favoring girls was closed in Singapore.

## Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



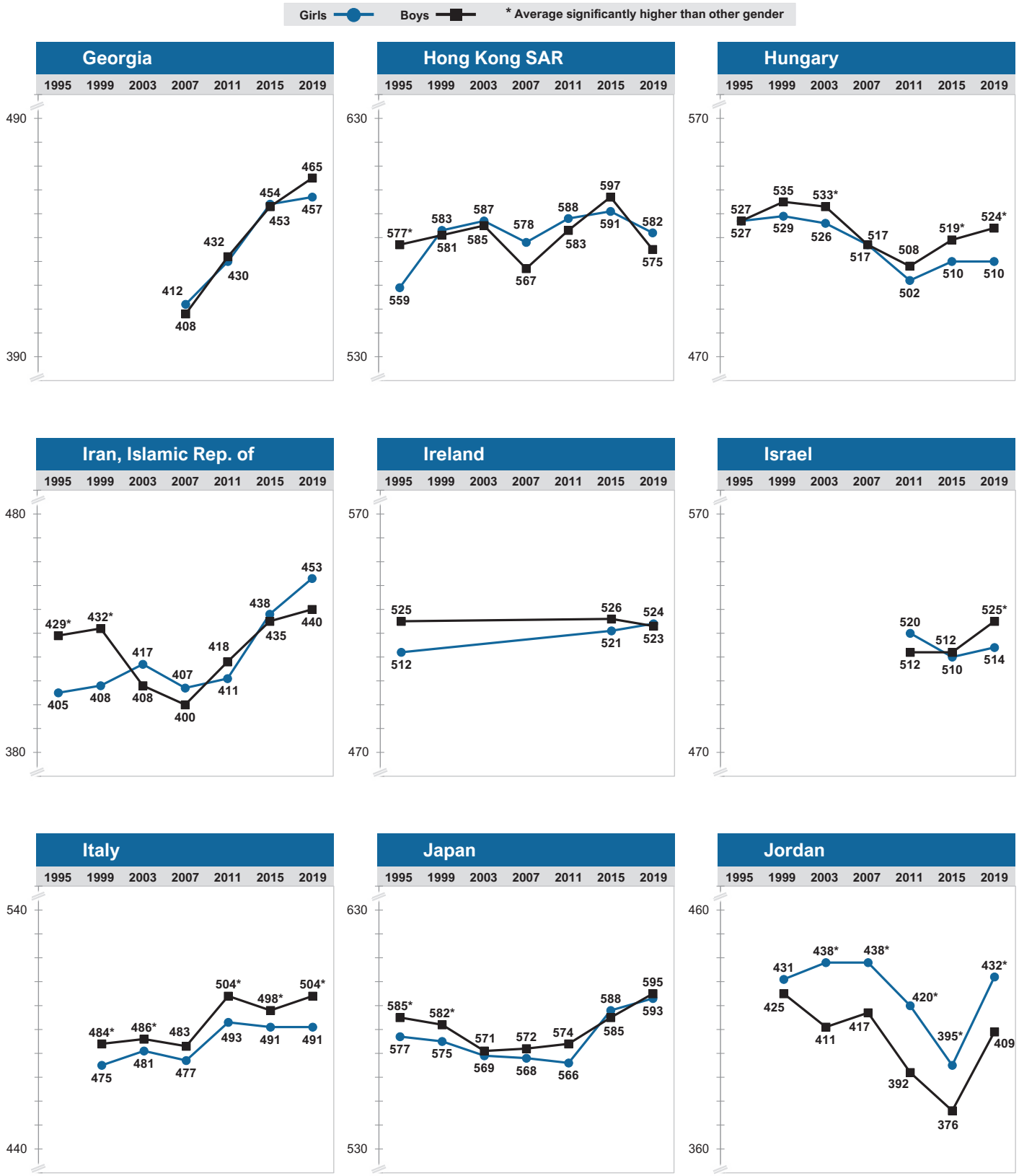

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



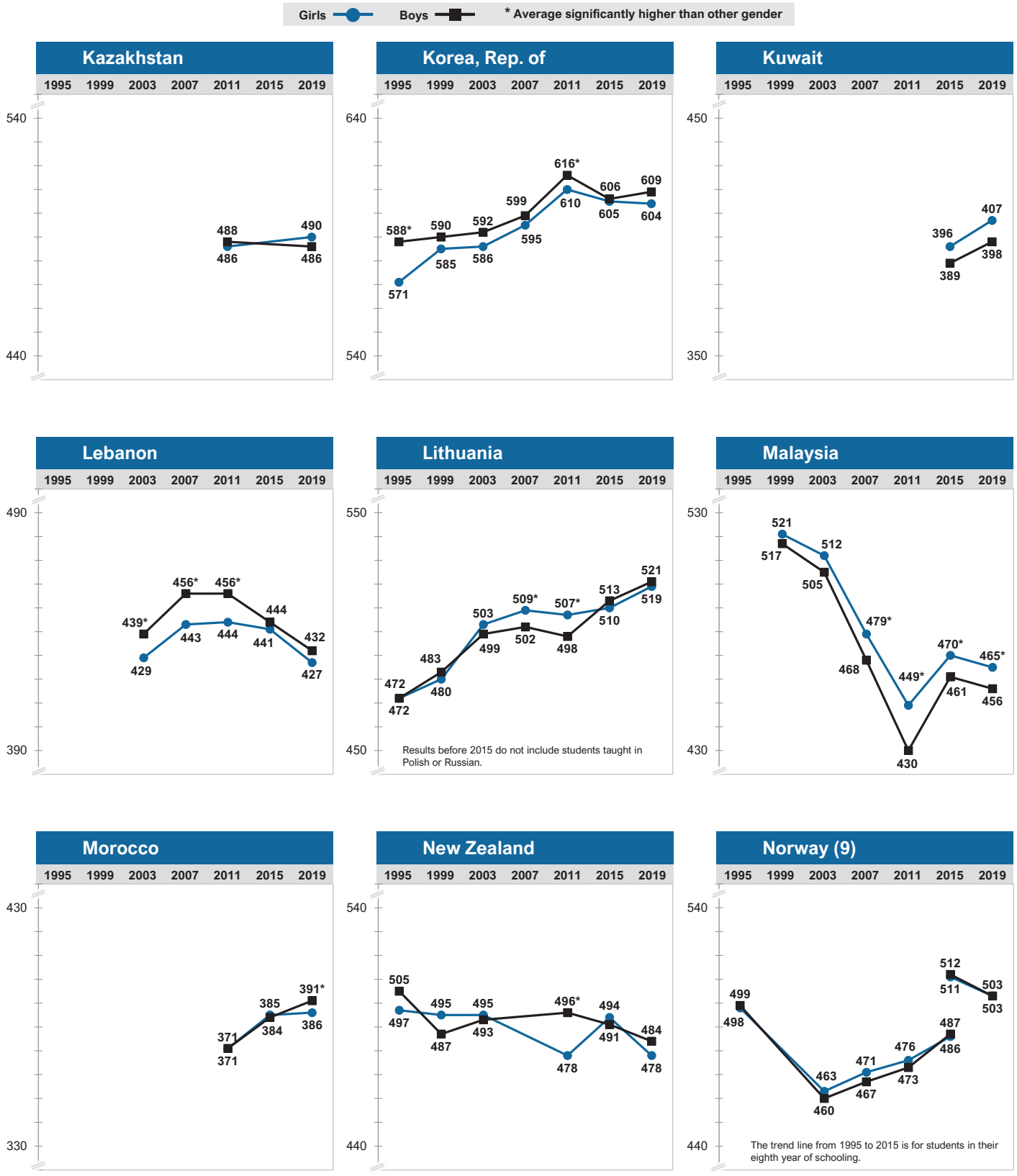

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



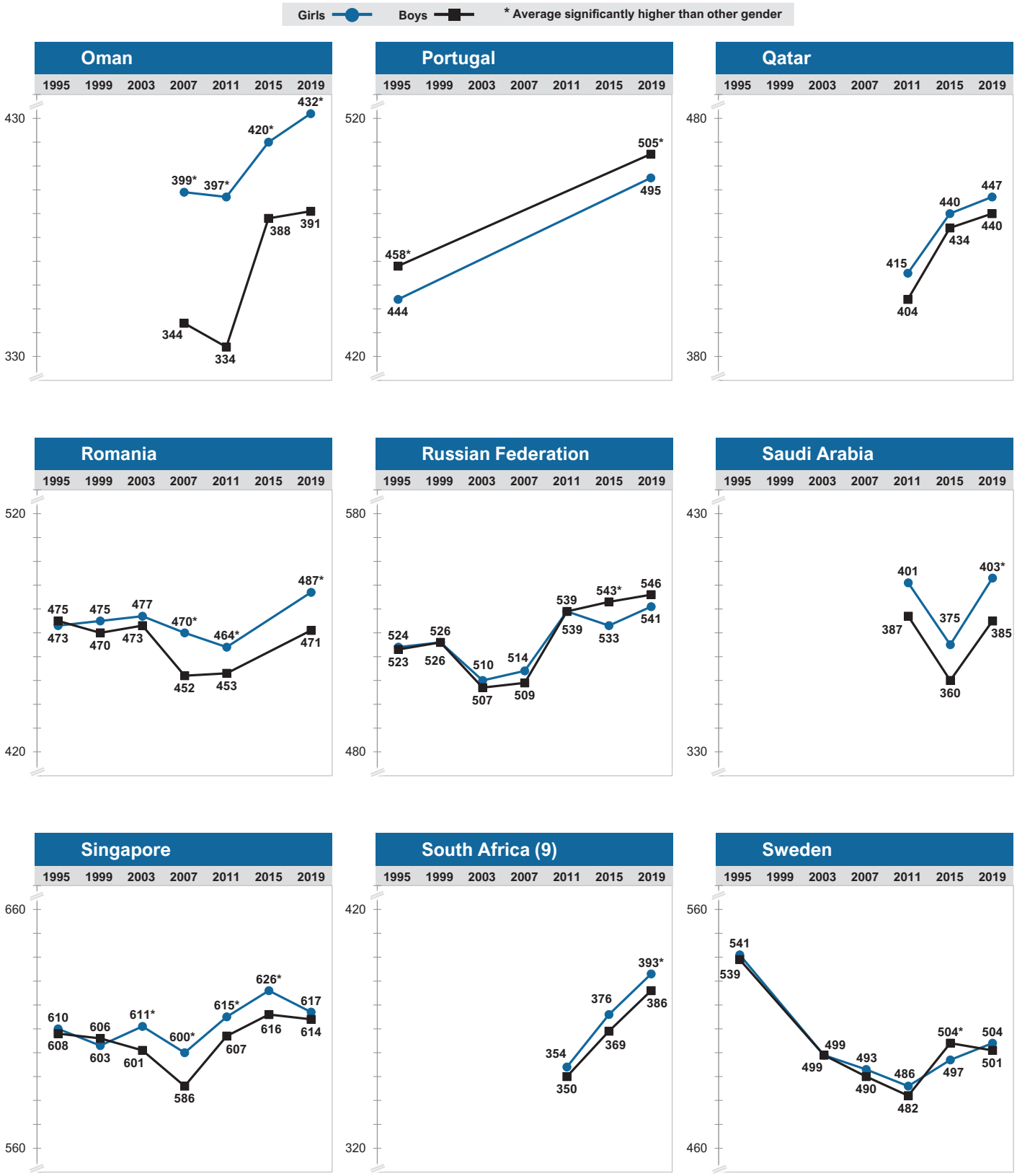

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



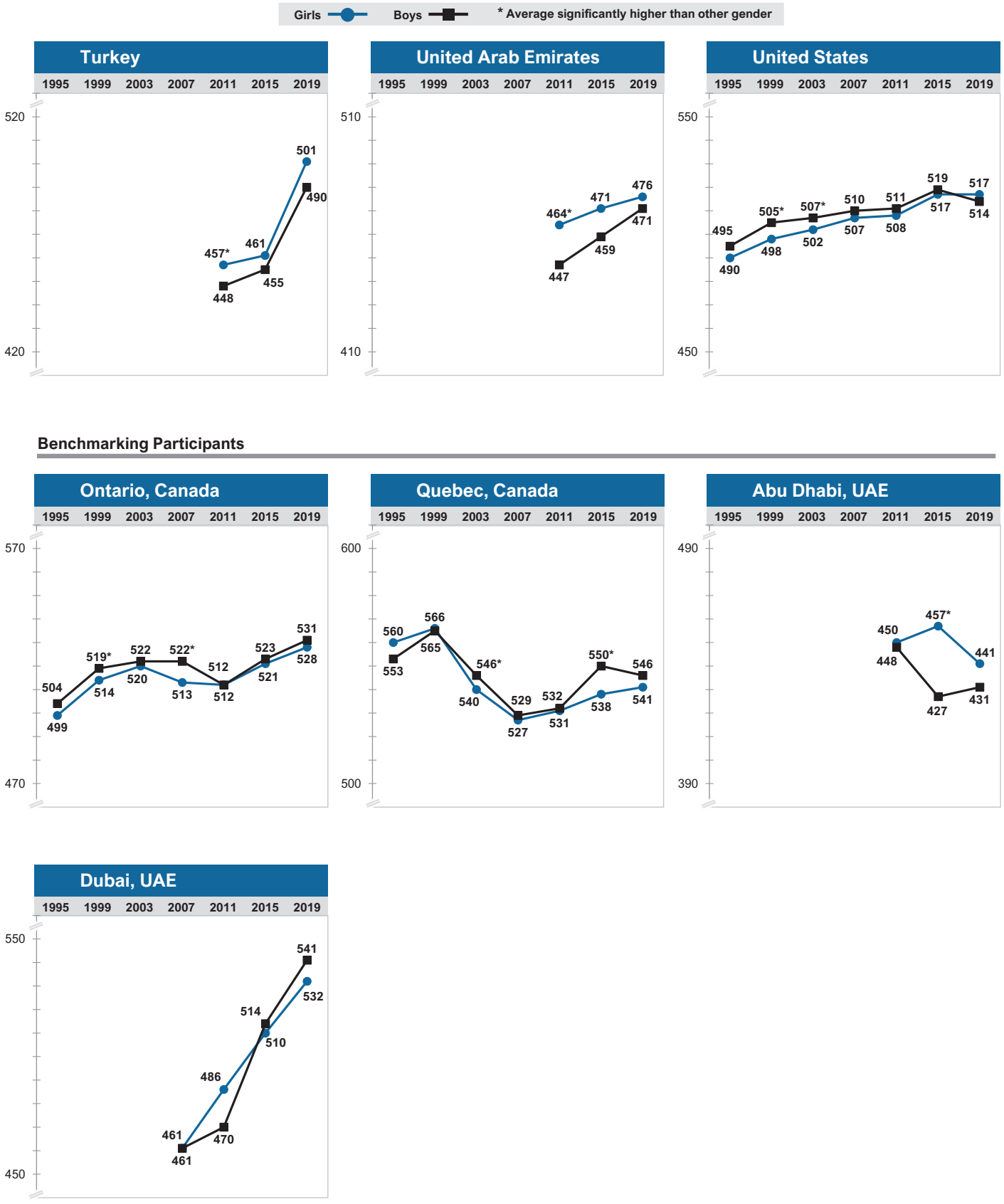

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.




See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Performance at TIMSS International Benchmarks in Mathematics

## TIMSS 2019 International Benchmarks

To provide an interpretation of the results on the TIMSS eighth grade mathematics achievement scale in relation to the students' performance on the assessment items, TIMSS describes achievement at four points along the scale as International Benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400). The descriptions of mathematics achievement at the International Benchmarks were updated from TIMSS 2015 based on an analysis of the items that students with average achievement at each of the benchmarks answered successfully in TIMSS 2019.

Exhibit 3.7 summarizes what eighth grade students who reached each of the TIMSS International Benchmarks in 2019 could do in mathematics. The progression in mathematics achievement is evident from benchmark to benchmark, from demonstrating some knowledge of whole numbers and basic graphs at the Low International Benchmark to applying and reasoning in a variety of complex situations at the Advanced International Benchmark. As much as possible, each description references achievement in the four content areas covered in the assessment at the eighth grade: number, algebra, geometry, and data and probability. The following tables show the target percentages for the content and cognitive domains.

**Target Percentages of Assessment Devoted to Content and Cognitive Domains – TIMSS 2019 Eighth Grade Mathematics**

| Content Domain | Percentage |
|---|---|
| Number | 30% |
| Algebra | 30% |
| Geometry | 20% |
| Data and Probability | 20% |

| Cognitive Domain | Percentage |
|---|---|
| Knowing | 35% |
| Applying | 40% |
| Reasoning | 25% |

The interactive map of the benchmark descriptions links to example items. It provides an overview of the mathematics understanding demonstrated by the eighth grade students who performed at the four levels of the achievement scale. The following sections provide more information about students' achievement in TIMSS 2019 at each International Benchmark as well as more detailed descriptions of each level together with example items.

## Exhibit 3.7: Summary of TIMSS 2019 International Benchmarks of Mathematics Achievement

| | |
|---|---|
| **Advanced** International Benchmark | |
| **625** | *Students can apply and reason in a variety of problem situations, solve linear equations, and make generalizations.* They can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can understand linear functions and algebraic expressions. Students can use their knowledge of geometric figures to solve a wide range of problems involving angles, area, and surface area. They can calculate means and medians, and understand how changing data points can impact the mean. Students can interpret a wide variety of data displays to draw and justify conclusions, and solve multistep problems. They can solve problems involving expected values. |
| **High** International Benchmark | |
| **550** | *Students can apply their understanding and knowledge in a variety of relatively complex situations.* They can solve problems with fractions, decimals, ratios, and proportions. Students at this level show basic procedural knowledge related to algebraic expressions and equations. They can solve a variety of problems with angles, including problems involving triangles, parallel lines, rectangles, and congruent and similar figures. Students can interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities. |
| **Intermediate** International Benchmark | |
| **475** | *Students can apply basic mathematical knowledge in a variety of situations.* They can solve problems involving whole numbers, negative numbers, fractions, decimals, and ratios. Students have some basic knowledge about properties of two-dimensional shapes. They can read and interpret data in graphs and have some rudimentary knowledge of probability. |
| **Low** International Benchmark | |
| **400** | *Students have some knowledge of whole numbers and basic graphs.* |

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Percentages of Students Reaching International Benchmarks

Exhibit 3.8 presents the percentage of students reaching each TIMSS 2019 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark, which is indicated in the bar graph with black dots. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages illustrated in the exhibit and shown in the columns to the right are cumulative.

The five high-performing East Asian countries had the highest percentages of students reaching the Advanced International Benchmark. Half the eighth grade students reached the Advanced International Benchmark in Singapore (51%) and Chinese Taipei (49%), as well as 45 percent in Korea, 37 percent in Japan, and 32 percent in Hong Kong SAR. Eight countries had 10 to 16 percent, but most countries had fewer than 10 percent of their eighth grade students reaching the Advanced International Benchmark.

As a point of reference, Exhibit 3.8 provides the international median percentage of students reaching each benchmark at the bottom of the four right-hand columns. By definition, half the countries have a percentage in that column above the median and half below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced—5 percent, High—25 percent, Intermediate—56 percent, and Low—87 percent. Japan had 99 percent of its students reach the Low Benchmark, Singapore and Chinese Taipei had 98 percent, and Korea had 97 percent.

Not only are Singapore, Chinese Taipei, Korea, and Japan educating high percentages of their students to an advanced level, they are educating almost all of their students to a level of minimal proficiency.

# Exhibit 3.8: Percentages of Students Reaching International Benchmarks of Mathematics Achievement

| Country | Percentages of Students Reaching International Benchmarks (● Advanced ○ High ● Intermediate ○ Low) | Advanced Benchmark (625) | High Benchmark (550) | Intermediate Benchmark (475) | Low Benchmark (400) |
|---|---|---|---|---|---|
| [2] Singapore | | 51 (2.2) | 79 (2.0) | 92 (1.1) | 98 (0.4) |
| Chinese Taipei | | 49 (1.3) | 75 (0.9) | 90 (0.6) | 98 (0.3) |
| Korea, Rep. of | | 45 (1.3) | 74 (0.9) | 90 (0.8) | 97 (0.4) |
| Japan | | 37 (1.4) | 71 (1.1) | 92 (0.6) | 99 (0.2) |
| † Hong Kong SAR | | 32 (1.9) | 66 (1.8) | 87 (1.4) | 96 (0.9) |
| [2] Russian Federation | | 16 (1.5) | 48 (2.4) | 80 (2.0) | 96 (0.7) |
| [3] Israel | | 15 (1.7) | 40 (2.2) | 67 (1.8) | 87 (1.0) |
| † United States | | 14 (1.2) | 38 (1.9) | 66 (1.9) | 87 (1.4) |
| Turkey | | 12 (0.9) | 32 (1.6) | 56 (1.6) | 80 (1.4) |
| Australia | | 11 (1.4) | 36 (1.8) | 68 (1.5) | 90 (0.8) |
| Hungary | | 11 (1.1) | 36 (1.4) | 68 (1.4) | 90 (0.9) |
| England | | 11 (1.5) | 35 (2.3) | 69 (2.2) | 90 (1.6) |
| Lithuania | | 10 (1.1) | 37 (1.7) | 71 (1.2) | 93 (0.7) |
| Ireland | | 7 (0.8) | 38 (1.6) | 76 (1.3) | 94 (0.8) |
| United Arab Emirates | | 7 (0.4) | 24 (0.7) | 50 (0.9) | 75 (0.7) |
| Romania | | 6 (0.9) | 25 (1.6) | 52 (1.9) | 78 (1.5) |
| Cyprus | | 6 (0.5) | 29 (1.1) | 63 (1.1) | 88 (0.8) |
| † New Zealand | | 6 (0.5) | 22 (1.1) | 53 (1.6) | 82 (1.4) |
| Bahrain | | 5 (0.4) | 25 (0.8) | 55 (0.9) | 79 (0.8) |
| † Norway (9) | | 5 (0.6) | 29 (1.2) | 65 (1.5) | 90 (0.8) |
| [2] Sweden | | 5 (0.6) | 28 (1.3) | 64 (1.3) | 90 (0.9) |
| Finland | | 5 (0.5) | 29 (1.2) | 69 (1.4) | 93 (0.9) |
| [2] Kazakhstan | | 5 (0.7) | 23 (1.6) | 55 (1.8) | 85 (1.2) |
| Portugal | | 5 (0.6) | 25 (1.5) | 63 (1.7) | 91 (1.1) |
| Malaysia | | 4 (0.3) | 17 (0.7) | 42 (1.6) | 74 (1.7) |
| Ψ Qatar | | 3 (0.7) | 14 (1.5) | 37 (1.9) | 65 (1.5) |
| Italy | | 3 (0.5) | 24 (1.4) | 62 (1.7) | 91 (0.9) |
| Iran, Islamic Rep. of | | 3 (0.7) | 14 (1.4) | 37 (1.6) | 68 (1.4) |
| [1] Georgia | | 3 (0.8) | 17 (1.6) | 44 (2.0) | 75 (1.8) |
| France | | 2 (0.3) | 17 (1.2) | 55 (1.5) | 88 (0.8) |
| Ψ Oman | | 1 (0.2) | 7 (0.6) | 27 (1.0) | 54 (1.2) |
| [2] Ψ Egypt | | 1 (0.3) | 7 (1.1) | 27 (2.0) | 55 (2.3) |
| Ψ Chile | | 1 (0.2) | 7 (0.8) | 33 (1.5) | 70 (1.7) |
| Ж South Africa (9) | | 1 (0.1) | 3 (0.3) | 13 (0.7) | 41 (1.3) |
| Ψ Jordan | | 0 (0.2) | 6 (0.7) | 28 (1.7) | 60 (2.1) |
| Ψ Kuwait | | 0 (0.1) | 5 (0.9) | 21 (1.9) | 50 (2.3) |
| Lebanon | | 0 (0.2) | 5 (0.6) | 27 (1.7) | 64 (1.7) |
| [2] Ψ Saudi Arabia | | 0 (0.1) | 2 (0.3) | 15 (0.8) | 47 (1.6) |
| Ψ Morocco | | 0 (0.1) | 2 (0.4) | 12 (0.9) | 41 (1.2) |
| **International Median** | 0 25 50 75 100 | **5** | **25** | **56** | **87** |
| **Benchmarking Participants** | | | | | |
| Moscow City, Russian Fed. | | 28 (2.0) | 62 (2.0) | 88 (1.2) | 98 (0.3) |
| [2] Dubai, UAE | | 17 (1.0) | 48 (1.1) | 76 (0.9) | 92 (0.6) |
| Ontario, Canada | | 11 (1.7) | 41 (2.2) | 76 (1.6) | 95 (0.8) |
| ‡ Quebec, Canada | | 11 (1.5) | 47 (2.3) | 85 (1.6) | 98 (0.6) |
| Ψ Western Cape, RSA (9) | | 3 (0.7) | 13 (1.7) | 32 (2.1) | 64 (1.8) |
| Ψ Abu Dhabi, UAE | | 3 (0.3) | 15 (0.7) | 37 (1.3) | 61 (1.5) |
| Ψ Gauteng, RSA (9) | 0 25 50 75 100 | 1 (0.2) | 6 (0.7) | 23 (1.5) | 58 (1.6) |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Percentages of Students Reaching International Benchmarks

Exhibit 3.9 shows the changes in percentages of students reaching the benchmarks for countries that have comparable data from previous assessments. The trends paint a positive picture of improvement across all four benchmarks. Of the 33 countries participating in both 2015 and 2019, 9 increased and none decreased at the Advanced International Benchmark, 7 increased and 3 decreased at the High Benchmark, 10 increased and 6 decreased at the Intermediate Benchmark, and 10 increased and 4 decreased at the Low Benchmark.

The longer-term trends also show considerable improvement across the percentages of students reaching all four of the benchmarks. Between 2007 and 2019, the 23 countries participating in those two assessments had 15 increases and only 1 decrease at the Advanced level, 16 increases and 2 decreases at the High level, 15 increases and 3 decreases at the Intermediate level, and 12 increases and 3 decreases at the Low level. Between 1995 and 2019, the 18 countries participating in both assessments had 13 increases and 2 decreases at the Advanced level, 9 increases and 4 decreases at the High level, 6 increases and 5 decreases at the Intermediate level, and 5 increases and 5 decreases at the Low level.

# Exhibit 3.9: Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years

| Country | Advanced International Benchmark (625) | | | | | | | High International Benchmark (550) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | | | | | | | Percent of Students | | | | | | |
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 |
| Singapore | 51 | 54 | 48 | 40 ▲ | 44 ▲ | 42 ▲ | 40 ▲ | 79 | 81 | 78 | 70 ▲ | 77 | 77 | 84 ▽ |
| Chinese Taipei | 49 | 44 ▲ | 49 | 45 | 38 ▲ | 37 ▲ | | 75 | 72 ▲ | 73 | 71 ▲ | 66 ▲ | 67 ▲ | |
| Korea, Rep. of | 45 | 43 | 47 | 40 ▲ | 35 ▲ | 32 ▲ | 31 ▲ | 74 | 75 | 77 ▽ | 71 ▲ | 70 ▲ | 70 ▲ | 67 ▲ |
| Japan | 37 | 34 | 27 ▲ | 26 ▲ | 24 ▲ | 29 ▲ | 29 ▲ | 71 | 67 ▲ | 61 ▲ | 61 ▲ | 62 ▲ | 66 ▲ | 67 ▲ |
| Hong Kong SAR | 32 | 37 | 34 | 31 | 31 | 28 | 23 ▲ | 66 | 75 ▽ | 71 | 64 | 73 ▽ | 70 | 65 |
| Russian Federation | 16 | 14 | 14 | 8 ▲ | 6 ▲ | 12 | 9 ▲ | 48 | 46 | 47 | 33 ▲ | 30 ▲ | 39 ▲ | 38 ▲ |
| Israel | 15 | 13 | 12 | | | | | 40 | 38 | 40 | | | | |
| United States | 14 | 10 ▲ | 7 ▲ | 6 ▲ | 7 ▲ | 7 ▲ | 4 ▲ | 38 | 37 | 30 ▲ | 31 ▲ | 29 ▲ | 30 ▲ | 26 ▲ |
| Turkey | 12 | 6 ▲ | 7 ▲ | | | | | 32 | 20 ▲ | 20 ▲ | | | | |
| Australia | 11 | 7 ▲ | 9 | 6 ▲ | 7 ▲ | | 7 ▲ | 36 | 30 ▲ | 29 ▲ | 24 ▲ | 29 ▲ | | 33 |
| Hungary | 11 | 12 | 8 ▲ | 10 | 11 | 13 | 10 | 36 | 37 | 32 ▲ | 36 | 41 | 43 ▽ | 40 |
| England | 11 | 10 | 8 | 8 | 5 ▲ | 6 ▲ | 6 ▲ | 35 | 36 | 32 | 35 | 26 ▲ | 25 ▲ | 27 ▲ |
| Lithuania | 10 | 6 ▲ | 5 ▲ | 6 ▲ | 5 ▲ | 3 ▲ | 2 ▲ | 37 | 33 | 29 ▲ | 30 ▲ | 28 ▲ | 18 ▲ | 17 ▲ |
| Ireland | 7 | 7 | | | | | 8 | 38 | 38 | | | | | 37 |
| United Arab Emirates | 7 | 5 ▲ | 2 ▲ | | | | | 24 | 20 ▲ | 14 ▲ | | | | |
| Romania | 6 | | 5 | 4 ▲ | 4 ▲ | 4 | 4 ▲ | 25 | | 19 ▲ | 20 ▲ | 21 | 20 | 21 |
| Cyprus | 6 | | | 2 ▲ | 1 ▲ | 2 ▲ | 3 ▲ | 29 | | | 17 ▲ | 13 ▲ | 19 ▲ | 19 ▲ |
| New Zealand | 6 | 6 | 5 | | 5 | 6 | 6 | 22 | 27 ▽ | 24 | | 24 | 26 | 28 ▽ |
| Bahrain | 5 | 2 ▲ | 1 ▲ | 0 ▲ | 0 ▲ | | | 25 | 12 ▲ | 8 ▲ | 3 ▲ | 2 ▲ | | |
| Norway (9) | 5 | 5 | | | | | | 29 | 30 | | | | | |
| Sweden | 5 | 3 ▲ | 1 ▲ | 2 ▲ | 3 ▲ | | 12 ▽ | 28 | 26 | 16 ▲ | 20 ▲ | 24 | | 46 ▽ |
| Finland | 5 | | 4 | | | | | 29 | | 30 | | | | |
| Kazakhstan | 5 | | 3 | | | | | 23 | | 23 | | | | |
| Portugal | 5 | | | | | | 1 ▲ | 25 | | | | | | 7 ▲ |
| Malaysia | 4 | 3 ▲ | 2 ▲ | 2 ▲ | 6 | 10 ▽ | | 17 | 18 | 12 ▲ | 18 | 30 ▽ | 36 ▽ | |
| Qatar | 3 | 3 | 2 | | | | | 14 | 14 | 10 ▲ | | | | |
| Italy | 3 | 3 | 3 | 3 | 3 | 4 | | 24 | 24 | 24 | 17 ▲ | 19 ▲ | 21 | |
| Iran, Islamic Rep. of | 3 | 2 | 2 | 1 ▲ | 0 ▲ | 1 ▲ | 0 ▲ | 14 | 12 | 8 ▲ | 5 ▲ | 3 ▲ | 6 ▲ | 4 ▲ |
| Georgia | 3 | 2 | 3 | 1 ▲ | | | | 17 | 15 | 13 | 7 ▲ | | | |
| France | 2 | | | | | | 6 ▽ | 17 | | | | | | 38 ▽ |
| Oman | 1 | 1 | 0 ▲ | 0 ▲ | | | | 7 | 6 | 4 ▲ | 2 ▲ | | | |
| Egypt | 1 | 0 | | 1 | 1 | | | 7 | 5 | | 5 | 6 | | |
| Chile | 1 | 1 | 1 | | 0 | 1 | | 7 | 7 | 5 ▲ | | 3 ▲ | 4 ▲ | |
| South Africa (9) | 1 | 1 | 1 | | | | | 3 | 3 | 3 | | | | |
| Jordan | 0 | 0 | 0 | 1 ▽ | 1 | 3 ▽ | | 6 | 3 ▲ | 6 | 11 ▽ | 8 | 12 ▽ | |
| Kuwait | 0 | 1 | | | | | | 5 | 5 | | | | | |
| Lebanon | 0 | 0 | 1 | 1 | 0 | | | 5 | 8 ▽ | 9 ▽ | 10 ▽ | 4 | | |
| Saudi Arabia | 0 | 0 | 1 | | | | | 2 | 2 | 5 ▽ | | | | |
| Morocco | 0 | 0 | 0 | | | | | 2 | 2 | 2 | | | | |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Dubai, UAE | 17 | 10 ▲ | 5 ▲ | 3 ▲ | | | | 48 | 36 ▲ | 23 ▲ | 17 ▲ | | | |
| Ontario, Canada | 11 | 6 ▲ | 4 ▲ | 6 ▲ | 6 ▲ | 6 ▲ | 3 ▲ | 41 | 37 | 31 ▲ | 33 ▲ | 34 ▲ | 32 ▲ | 26 ▲ |
| Quebec, Canada | 11 | 9 | 6 ▲ | 8 | 8 | 18 ▽ | 14 | 47 | 47 | 40 ▲ | 37 ▲ | 45 | 60 ▽ | 54 |
| Abu Dhabi, UAE | 3 | 3 | 2 ▲ | | | | | 15 | 14 | 12 | | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

An empty cell indicates a country did not participate in that year's assessment or did not have comparable data.
See Appendix A for country participation in previous TIMSS assessments.
Results for Lithuania before 2015 do not include students taught in Polish or Russian.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.9: Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years

(Continued)

| Country | Intermediate International Benchmark (475) Percent of Students | | | | | | | Low International Benchmark (400) Percent of Students | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 |
| Singapore | 92 | 94 | 92 | 88 ▲ | 93 | 94 | 98 ▽ | 98 | 99 | 99 | 97 | 99 | 99 | 100 ▽ |
| Chinese Taipei | 90 | 88 ▲ | 88 ▲ | 86 ▲ | 85 ▲ | 85 ▲ | | 98 | 97 ▲ | 96 ▲ | 95 ▲ | 96 ▲ | 95 ▲ | |
| Korea, Rep. of | 90 | 93 ▽ | 93 ▽ | 90 | 90 | 91 | 89 | 97 | 99 ▽ | 99 ▽ | 98 | 98 | 99 ▽ | 97 |
| Japan | 92 | 89 ▲ | 87 ▲ | 87 ▲ | 88 ▲ | 90 ▲ | 91 | 99 | 98 ▲ | 97 ▲ | 97 ▲ | 98 ▲ | 98 | 98 |
| Hong Kong SAR | 87 | 92 ▽ | 89 | 85 | 93 ▽ | 92 ▽ | 88 | 96 | 98 | 97 | 94 | 98 ▽ | 98 ▽ | 96 |
| Russian Federation | 80 | 78 | 78 | 68 ▲ | 66 ▲ | 73 ▲ | 73 ▲ | 96 | 95 | 95 | 91 ▲ | 92 ▲ | 93 ▲ | 93 ▲ |
| Israel | 67 | 65 | 68 | | | | | 87 | 84 | 87 | | | | |
| United States | 66 | 70 | 68 | 67 | 64 | 62 | 61 | 87 | 91 ▽ | 92 ▽ | 92 ▽ | 90 | 87 | 86 |
| Turkey | 56 | 42 ▲ | 40 ▲ | | | | | 80 | 70 ▲ | 67 ▲ | | | | |
| Australia | 68 | 64 | 63 | 61 ▲ | 65 | | 68 | 90 | 89 | 89 | 89 | 90 | | 90 |
| Hungary | 68 | 67 | 65 | 69 | 75 ▽ | 75 ▽ | 74 ▽ | 90 | 88 | 88 | 91 | 95 ▽ | 93 ▽ | 94 ▽ |
| England | 69 | 69 | 65 | 69 | 61 ▲ | 60 ▲ | 61 ▲ | 90 | 93 | 88 | 90 | 90 | 88 | 87 |
| Lithuania | 71 | 68 | 64 ▲ | 65 ▲ | 63 ▲ | 53 ▲ | 50 ▲ | 93 | 92 | 90 ▲ | 90 ▲ | 90 ▲ | 85 ▲ | 81 ▲ |
| Ireland | 76 | 76 | | | | | 73 | 94 | 94 | | | | | 91 |
| United Arab Emirates | 50 | 46 ▲ | 42 ▲ | | | | | 75 | 73 | 73 | | | | |
| Romania | 52 | | 44 ▲ | 46 ▲ | 52 | 51 | 52 | 78 | | 71 ▲ | 73 ▲ | 79 | 79 | 79 |
| Cyprus | 63 | | | 48 ▲ | 45 ▲ | 53 ▲ | 51 ▲ | 88 | | | 78 ▲ | 77 ▲ | 82 ▲ | 77 ▲ |
| New Zealand | 53 | 58 ▽ | 57 | | 59 ▽ | 57 | 64 ▽ | 82 | 85 | 84 | | 88 ▽ | 84 | 89 ▽ |
| Bahrain | 55 | 39 ▲ | 26 ▲ | 19 ▲ | 17 ▲ | | | 79 | 75 ▲ | 53 ▲ | 49 ▲ | 51 ▲ | | |
| Norway (9) | 65 | 70 ▽ | | | | | | 90 | 94 ▽ | | | | | |
| Sweden | 64 | 65 | 57 ▲ | 60 ▲ | 64 | | 81 ▽ | 90 | 91 | 89 | 90 | 91 | | 96 ▽ |
| Finland | 69 | | 73 | | | | | 93 | | 96 ▽ | | | | |
| Kazakhstan | 55 | | 57 | | | | | 85 | | 85 | | | | |
| Portugal | 63 | | | | | | 35 ▲ | 91 | | | | | | 79 ▲ |
| Malaysia | 42 | 45 | 36 | 50 ▽ | 66 ▽ | 70 ▽ | | 74 | 76 | 65 ▲ | 82 ▽ | 93 ▽ | 93 ▽ | |
| Qatar | 37 | 36 | 29 ▲ | | | | | 65 | 63 | 54 ▲ | | | | |
| Italy | 62 | 62 | 64 | 54 ▲ | 56 ▲ | 53 ▲ | | 91 | 89 | 90 | 85 ▲ | 86 ▲ | 82 ▲ | |
| Iran, Islamic Rep. of | 37 | 34 | 26 ▲ | 20 ▲ | 20 ▲ | 26 ▲ | 24 ▲ | 68 | 63 ▲ | 55 ▲ | 51 ▲ | 55 ▲ | 61 ▲ | 59 ▲ |
| Georgia | 44 | 42 | 36 ▲ | 26 ▲ | | | | 75 | 72 | 62 ▲ | 56 ▲ | | | |
| France | 55 | | | | | | 81 ▽ | 88 | | | | | | 97 ▽ |
| Oman | 27 | 23 ▲ | 16 ▲ | 14 ▲ | | | | 54 | 52 | 39 ▲ | 41 ▲ | | | |
| Egypt | 27 | 21 ▲ | | 21 ▲ | 24 | | | 55 | 47 ▲ | | 47 ▲ | 52 | | |
| Chile | 33 | 28 ▲ | 23 ▲ | | 15 ▲ | 16 ▲ | | 70 | 63 ▲ | 57 ▲ | | 41 ▲ | 46 ▲ | |
| South Africa (9) | 13 | 13 | 9 ▲ | | | | | 41 | 34 ▲ | 24 ▲ | | | | |
| Jordan | 28 | 18 ▲ | 26 | 35 ▽ | 30 | 33 ▽ | | 60 | 45 ▲ | 55 ▲ | 61 | 60 | 61 | |
| Kuwait | 21 | 18 | | | | | | 50 | 45 | | | | | |
| Lebanon | 27 | 35 ▽ | 38 ▽ | 36 ▽ | 27 | | | 64 | 71 ▽ | 73 ▽ | 74 ▽ | 68 | | |
| Saudi Arabia | 15 | 11 ▲ | 20 ▽ | | | | | 47 | 34 ▲ | 47 | | | | |
| Morocco | 12 | 14 ▽ | 12 | | | | | 41 | 41 | 36 ▲ | | | | |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Dubai, UAE | 76 | 67 ▲ | 53 ▲ | 47 ▲ | | | | 92 | 88 ▲ | 79 ▲ | 74 ▲ | | | |
| Ontario, Canada | 76 | 75 | 71 ▲ | 74 | 75 | 72 | 65 ▲ | 95 | 95 | 94 | 95 | 97 | 96 | 91 ▲ |
| Quebec, Canada | 85 | 86 | 82 | 78 ▲ | 88 | 93 ▽ | 90 | 98 | 98 | 98 | 97 | 99 ▽ | 99 | 99 |
| Abu Dhabi, UAE | 37 | 37 | 39 | | | | | 61 | 65 | 71 ▽ | | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Low Benchmark: Full Description

Exhibit 3.10 presents the description of eighth grade students' achievement at the Low International Benchmark. The few eighth grade items in TIMSS 2019 at the Low level indicated that students had some understanding of whole numbers and basic graphs.

## Exhibit 3.10: Description of the TIMSS 2019 Low International Benchmark (400) of Mathematics Achievement

### Low International Benchmark

**400**

**Summary**

*Students have some knowledge of whole numbers and basic graphs.*

No items at the eighth grade anchored at the Low level in TIMSS 2019. However, TIMSS 2015 indicated that students at this level have an elementary understanding of whole numbers. They could match tables to bar graphs and pictographs.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Intermediate Benchmark: Full Description and Example Items

Exhibit 3.11 provides the description of student achievement at the Intermediate International Benchmark. At this level, students could apply basic mathematical knowledge in a variety of situations.

Exhibit 3.11.1 presents an item from the number domain. As shown in this item, students reaching the Intermediate Benchmark demonstrated familiarity with negative numbers. The international average was 59 percent. The highest performance on the item was in Finland—85 percent of the students responded correctly.

Exhibit 3.11.2 presents a geometry item. Fifty-six percent of the eighth grade students, on average, were able to use the properties of angles to determine the size of a fourth angle in a quadrilateral when given the values of the other three angles. The Singaporean students had the highest achievement, with 90 percent correct.

Exhibit 3.11.3 shows a multi-part item from the data and probability domain. Eighty-three percent of the students in Singapore were able to compute and compare three unit prices based on advertisements. The international average was 56 percent.

## Exhibit 3.11: Description of the TIMSS 2019 Intermediate International Benchmark (475) of Mathematics Achievement

### Intermediate International Benchmark

**475**

**Summary**

*Students can apply basic mathematical knowledge in a variety of situations.* They can solve problems involving whole numbers, negative numbers, fractions, decimals, and ratios. Students have some basic knowledge about properties of two-dimensional shapes. They can read and interpret data in graphs and have some rudimentary knowledge of probability.

Students at this level can solve problems involving whole numbers, negative numbers, fractions, decimals, and ratios.

Students have some basic knowledge about properties of two-dimensional shapes.

Students can read and interpret data presented in tables, bar graphs, and line graphs. They have some rudimentary knowledge of probability.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.11.1: Intermediate International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| Finland | 85 (1.5) | ▲ |
| † Norway (9) | 82 (2.0) | ▲ |
| Chinese Taipei | 82 (1.5) | ▲ |
| England | 82 (1.6) | ▲ |
| Japan | 81 (1.6) | ▲ |
| 2 Singapore | 80 (2.0) | ▲ |
| Ireland | 80 (1.7) | ▲ |
| † Hong Kong SAR | 80 (2.0) | ▲ |
| 2 Sweden | 80 (2.1) | ▲ |
| Korea, Rep. of | 80 (1.9) | ▲ |
| Australia | 79 (1.8) | ▲ |
| Hungary | 76 (2.4) | ▲ |
| † United States | 70 (1.7) | ▲ |
| † New Zealand | 69 (2.5) | ▲ |
| Lithuania | 68 (2.3) | ▲ |
| 3 Israel | 67 (1.9) | ▲ |
| Cyprus | 65 (1.9) | ▲ |
| France | 63 (2.3) | ▲ |
| 2 Russian Federation | 61 (3.1) | |
| Portugal | 61 (2.8) | |
| **International Average** | **59 (0.3)** | |
| Italy | 57 (2.5) | |
| Romania | 55 (2.4) | |
| United Arab Emirates | 53 (1.2) | ▽ |
| Turkey | 52 (1.9) | ▽ |
| Bahrain | 51 (2.2) | ▽ |
| Qatar | 47 (2.4) | ▽ |
| Chile | 46 (2.4) | ▽ |
| 2 Kazakhstan | 45 (2.7) | ▽ |
| 1 Georgia | 44 (2.6) | ▽ |
| Malaysia | 43 (1.6) | ▽ |
| 2 Egypt | 41 (2.3) | ▽ |
| Kuwait | 39 (2.2) | ▽ |
| Jordan | 37 (2.2) | ▽ |
| Oman | 36 (2.0) | ▽ |
| Lebanon | 36 (2.2) | ▽ |
| Iran, Islamic Rep. of | 35 (2.3) | ▽ |
| 2 Saudi Arabia | 33 (2.0) | ▽ |
| South Africa (9) | 25 (1.1) | ▽ |
| Morocco | 22 (1.4) | ▽ |
| **Benchmarking Participants** | | |
| ‡ Quebec, Canada | 82 (2.6) | ▲ |
| Moscow City, Russian Fed. | 75 (1.9) | ▲ |
| Ontario, Canada | 71 (2.0) | ▲ |
| 2 Dubai, UAE | 70 (1.8) | ▲ |
| Abu Dhabi, UAE | 44 (2.0) | ▽ |
| Western Cape, RSA (9) | 40 (2.4) | ▽ |
| Gauteng, RSA (9) | 30 (1.7) | ▽ |

**Content Domain:** Number

**Cognitive Domain:** Knowing

**Description:** Solves a word problem involving subtraction of negative numbers

On Thursday, the lowest temperature in City X was 6 °C and the lowest temperature in City Y was −3 °C. What was the difference between the lowest temperatures in the cities?

Answer: 9 °C

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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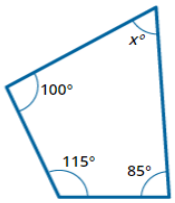
## Exhibit 3.11.2: Intermediate International Benchmark of Mathematics Achievement – Example Item 2

| Country | Percent Full Credit | |
|---|---|---|
| [2] Singapore | 90 (1.0) | ▲ |
| Japan | 89 (1.1) | ▲ |
| Korea, Rep. of | 86 (2.0) | ▲ |
| Chinese Taipei | 83 (1.5) | ▲ |
| † Hong Kong SAR | 81 (2.2) | ▲ |
| Ireland | 78 (1.9) | ▲ |
| Hungary | 71 (3.0) | ▲ |
| England | 70 (2.5) | ▲ |
| Lithuania | 69 (2.2) | ▲ |
| [2] Russian Federation | 65 (2.8) | ▲ |
| Cyprus | 63 (2.0) | ▲ |
| † Norway (9) | 62 (2.1) | ▲ |
| Australia | 61 (2.0) | ▲ |
| Turkey | 61 (2.5) | ▲ |
| [2] Kazakhstan | 60 (2.7) | |
| Romania | 59 (2.3) | |
| Finland | 58 (2.2) | |
| Portugal | 57 (3.0) | |
| **International Average** | **56 (0.4)** | |
| Italy | 55 (2.6) | |
| [1] Georgia | 54 (2.7) | |
| Bahrain | 54 (2.5) | |
| [2] Sweden | 52 (2.1) | |
| Malaysia | 52 (2.1) | |
| Lebanon | 51 (2.9) | |
| Iran, Islamic Rep. of | 51 (2.0) | ▽ |
| [2] Egypt | 49 (2.7) | ▽ |
| Qatar | 48 (2.3) | ▽ |
| † New Zealand | 47 (2.4) | ▽ |
| United Arab Emirates | 46 (1.2) | ▽ |
| [3] Israel | 46 (2.5) | ▽ |
| Oman | 42 (2.1) | ▽ |
| Jordan | 41 (2.5) | ▽ |
| † United States | 39 (1.9) | ▽ |
| France | 36 (2.4) | ▽ |
| Kuwait | 32 (3.3) | ▽ |
| [2] Saudi Arabia | 30 (2.2) | ▽ |
| South Africa (9) | 27 (1.2) | ▽ |
| Chile | 26 (1.9) | ▽ |
| Morocco | 26 (1.7) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 75 (2.2) | ▲ |
| ‡ Quebec, Canada | 74 (2.5) | ▲ |
| [2] Dubai, UAE | 63 (2.3) | ▲ |
| Ontario, Canada | 58 (3.2) | |
| Western Cape, RSA (9) | 44 (2.5) | ▽ |
| Abu Dhabi, UAE | 38 (2.1) | ▽ |
| Gauteng, RSA (9) | 37 (2.0) | ▽ |

**Content Domain:** Geometry

**Cognitive Domain:** Applying

**Description:** Determines the value of an angle in an irregular quadrilateral given the values of the other angles




What is the value of $x$?

$x =$ 60

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.11.3: Intermediate International Benchmark of Mathematics Achievement – Example Item 3

| Country | Percent Full Credit | |
|---|---|---|
| [2] Singapore | 83 (1.3) | ▲ |
| Chinese Taipei | 81 (1.4) | ▲ |
| Japan | 81 (1.5) | ▲ |
| Korea, Rep. of | 80 (2.0) | ▲ |
| Ireland | 77 (2.5) | ▲ |
| † Hong Kong SAR | 74 (2.7) | ▲ |
| Lithuania | 70 (2.5) | ▲ |
| Australia | 69 (1.8) | ▲ |
| [2] Russian Federation | 66 (2.7) | ▲ |
| Cyprus | 66 (2.5) | ▲ |
| [2] Kazakhstan | 66 (2.7) | ▲ |
| Finland | 65 (2.2) | ▲ |
| France | 65 (2.2) | ▲ |
| Portugal | 65 (2.7) | ▲ |
| Italy | 64 (2.2) | ▲ |
| † United States | 63 (1.9) | ▲ |
| † New Zealand | 61 (2.1) | ▲ |
| Hungary | 61 (2.4) | |
| Romania | 61 (2.9) | |
| [3] Israel | 59 (2.4) | |
| England | 59 (2.8) | |
| Malaysia | 57 (1.4) | |
| **International Average** | **56 (0.4)** | |
| † Norway (9) | 56 (2.6) | |
| [2] Sweden | 55 (2.5) | |
| Turkey | 53 (2.4) | |
| Lebanon | 48 (2.4) | ▽ |
| [1] Georgia | 44 (2.6) | ▽ |
| United Arab Emirates | 43 (1.0) | ▽ |
| Bahrain | 43 (1.9) | ▽ |
| Iran, Islamic Rep. of | 42 (2.2) | ▽ |
| Oman | 37 (1.7) | ▽ |
| Chile | 37 (2.3) | ▽ |
| [2] Egypt | 35 (1.7) | ▽ |
| Jordan | 35 (1.8) | ▽ |
| Qatar | 33 (2.2) | ▽ |
| South Africa (9) | 32 (1.5) | ▽ |
| Morocco | 29 (1.7) | ▽ |
| Kuwait | 21 (1.8) | ▽ |
| [2] Saudi Arabia | - - | |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 77 (1.9) | ▲ |
| ‡ Quebec, Canada | 72 (2.6) | ▲ |
| Ontario, Canada | 66 (2.4) | ▲ |
| [2] Dubai, UAE | 63 (2.2) | ▲ |
| Western Cape, RSA (9) | 53 (2.1) | |
| Gauteng, RSA (9) | 40 (2.1) | ▽ |
| Abu Dhabi, UAE | 36 (1.9) | ▽ |

**Content Domain:** Data and Probability

**Cognitive Domain:** Applying

**Description:** Finds and compares the unit prices of four objects

**Socks on Sale!**
Advertisements

| | |
|---|---|
| **SALE** Store Q 6 pairs of socks 24.30 zeds | **SALE** Store R 2 pairs of socks 8.40 zeds |
| **SALE** Store S 4 pairs of socks 16.40 zeds | **SALE** Store T 3 pairs of socks 12 zeds |

Chen has seen these advertisements for socks and wants to pay the lowest price per pair of socks. Complete the table below to show Chen the price per pair of socks in each store. Store Q has been done for you.

| Store | Price Per Pair |
|---|---|
| Q | 4.05 zeds |
| R | 4.2 zeds |
| S | 4.1 zeds |
| T | 4.0 zeds |

From which store should Chen buy her socks in order to pay the lowest price per pair?

Store: T

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## High Benchmark: Full Description and Example Items

Exhibit 3.12 presents the description of achievement at the High International Benchmark. Eighth grade students reaching this benchmark could apply their mathematics understanding in a variety of relatively complex situations.

Exhibit 3.12.1 provides an example from the number domain. Fifty-four percent of the eighth grade students, on average, were able to use a ratio to solve a problem. With 87 percent correct, Singapore had the highest percentage correct.

Exhibit 3.12.2 provides an example from the algebra domain. In this item, students were asked to solve a problem by evaluating a formula with exponents. The international average was 35 percent. Seventy-three percent of the Singaporean eighth grade students answered correctly.

Exhibit 3.12.3 shows a reasoning item from the geometry domain. On average, 41 percent of eighth grade students were able to visualize two different cylinders. The highest achievement was in Japan, with 79 percent of the students answering this item correctly.

Exhibit 3.12.4 shows a data interpretation item from the data and probability domain. Eighty-three percent of the Japanese eighth grade students were able to match different types of data to the appropriate graphic displays. The international average was 47 percent.

Exhibit 3.12.5 shows another example item from the data and probability domain, involving outcomes and probabilities. Eighth grade students in Korea posted the highest percentage correct—70 percent. The international average was 43 percent.

## Exhibit 3.12: Description of the TIMSS 2019 High International Benchmark (550) of Mathematics Achievement

### **High** International Benchmark

**550**

**Summary**

*Students can apply their understanding and knowledge in a variety of relatively complex situations.* They can solve problems with fractions, decimals, ratios, and proportions. Students at this level show basic procedural knowledge related to algebraic expressions and equations. They can solve a variety of problems with angles, including problems involving triangles, parallel lines, rectangles, and congruent and similar figures. Students can interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities.

Students can solve problems with fractions, decimals, ratios, and proportions.

Students at this level show basic procedural knowledge related to algebraic expressions. They can simplify expressions with integers. They can evaluate a variety of expressions and formulas, including those with exponents. They can identify algebraic expressions that represent real world situations. Students can identify the solutions of linear equations, a pair of simultaneous linear equations in two variables, and identify the values that satisfy two inequalities. They can determine a specific term of a numerical or geometric pattern.

Students can solve a variety of problems with angles, including problems involving triangles, parallel lines, rectangles, and congruent and similar figures. They can identify points in the Cartesian plane to draw lines and shapes. They can visualize rectangular solids.

Students can interpret data from pie charts, line graphs, and bar graphs to solve problems and provide explanations. They can calculate means. They can solve simple problems involving outcomes and probabilities.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 3.12.1: High International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Correct | |
|---|---|---|
| [2] Singapore | 87 (1.4) | ▲ |
| Japan | 82 (1.6) | ▲ |
| Korea, Rep. of | 81 (1.9) | ▲ |
| Chinese Taipei | 80 (1.7) | ▲ |
| † Hong Kong SAR | 72 (2.1) | ▲ |
| [3] Israel | 70 (2.0) | ▲ |
| Ireland | 68 (2.3) | ▲ |
| England | 67 (2.4) | ▲ |
| Australia | 67 (2.0) | ▲ |
| Hungary | 66 (2.1) | ▲ |
| Lithuania | 61 (2.1) | ▲ |
| † United States | 61 (1.7) | ▲ |
| [2] Russian Federation | 60 (2.5) | ▲ |
| † New Zealand | 57 (2.2) | |
| **International Average** | **54 (0.3)** | |
| [2] Kazakhstan | 54 (2.5) | |
| Qatar | 53 (2.2) | |
| Finland | 52 (2.0) | |
| † Norway (9) | 52 (2.3) | |
| Cyprus | 52 (2.4) | |
| United Arab Emirates | 52 (1.1) | |
| Romania | 52 (2.3) | |
| Iran, Islamic Rep. of | 51 (2.1) | |
| [1] Georgia | 51 (2.8) | |
| [2] Sweden | 50 (2.6) | |
| Malaysia | 49 (1.9) | ▽ |
| France | 49 (2.3) | ▽ |
| Chile | 47 (3.3) | ▽ |
| Bahrain | 46 (2.1) | ▽ |
| Italy | 46 (2.5) | ▽ |
| Jordan | 43 (2.1) | ▽ |
| [2] Egypt | 43 (1.9) | ▽ |
| Portugal | 43 (2.3) | ▽ |
| Kuwait | 40 (2.3) | ▽ |
| [2] Saudi Arabia | 40 (1.9) | ▽ |
| South Africa (9) | 38 (1.3) | ▽ |
| Turkey | 35 (1.9) | ▽ |
| Morocco | 33 (1.4) | ▽ |
| Oman | 33 (1.8) | ▽ |
| Lebanon | 29 (2.1) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 67 (2.3) | ▲ |
| [2] Dubai, UAE | 66 (2.1) | ▲ |
| Ontario, Canada | 63 (2.3) | ▲ |
| Western Cape, RSA (9) | 49 (2.2) | ▽ |
| Abu Dhabi, UAE | 46 (1.8) | ▽ |
| ‡ Quebec, Canada | 43 (2.4) | ▽ |
| Gauteng, RSA (9) | 41 (1.7) | ▽ |

**Content Domain:** Number

**Cognitive Domain:** Applying

**Description:** In a word problem dividing a quantity by a given ratio, determines the quantity of one of the parts

A piece of string was 45 cm long. Then, it was divided into two pieces in a ratio of 4:5.

What is the length of the shorter piece of string in cm?

A) 5

B) 20

C) 25

D) 36

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.12.2: High International Benchmark of Mathematics Achievement – Example Item 2

| Country | Percent Full Credit | |
|---|---|---|
| [2] Singapore | 73 (2.1) | ▲ |
| Chinese Taipei | 66 (2.0) | ▲ |
| † Hong Kong SAR | 66 (2.3) | ▲ |
| [2] Russian Federation | 60 (2.6) | ▲ |
| Korea, Rep. of | 55 (2.3) | ▲ |
| Ireland | 48 (2.4) | ▲ |
| Lithuania | 48 (2.4) | ▲ |
| [2] Kazakhstan | 47 (2.7) | ▲ |
| [3] Israel | 46 (2.4) | ▲ |
| Japan | 44 (1.9) | ▲ |
| † United States | 43 (2.3) | ▲ |
| Hungary | 43 (2.5) | ▲ |
| Romania | 41 (2.3) | ▲ |
| England | 40 (2.9) | |
| Cyprus | 39 (1.9) | ▲ |
| Australia | 37 (2.1) | |
| United Arab Emirates | 36 (1.2) | |
| **International Average** | **35 (0.3)** | |
| Italy | 35 (2.7) | |
| [1] Georgia | 34 (2.6) | |
| Portugal | 34 (2.3) | |
| Turkey | 32 (2.2) | |
| Bahrain | 31 (1.7) | |
| Oman | 28 (1.7) | ▽ |
| Qatar | 28 (2.1) | ▽ |
| Lebanon | 27 (2.0) | ▽ |
| [2] Egypt | 27 (2.0) | ▽ |
| Finland | 25 (1.8) | ▽ |
| France | 23 (2.0) | ▽ |
| † Norway (9) | 23 (1.9) | ▽ |
| Iran, Islamic Rep. of | 22 (1.5) | ▽ |
| [2] Sweden | 22 (2.0) | ▽ |
| Malaysia | 22 (1.5) | ▽ |
| Jordan | 21 (1.8) | ▽ |
| † New Zealand | 19 (1.5) | ▽ |
| South Africa (9) | 17 (1.1) | ▽ |
| [2] Saudi Arabia | 15 (1.6) | ▽ |
| Chile | 14 (1.5) | ▽ |
| Kuwait | 12 (1.8) | ▽ |
| Morocco | 6 (1.0) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 73 (2.1) | ▲ |
| [2] Dubai, UAE | 52 (2.5) | ▲ |
| ‡ Quebec, Canada | 44 (3.1) | ▲ |
| Ontario, Canada | 44 (3.2) | ▲ |
| Western Cape, RSA (9) | 28 (2.5) | ▽ |
| Abu Dhabi, UAE | 28 (1.3) | ▽ |
| Gauteng, RSA (9) | 20 (2.0) | ▽ |

**Content Domain:** Algebra

**Cognitive Domain:** Applying

**Description:** Solves a word problem involving evaluating a formula with exponents

The stopping distance ($d$) meters depends on the speed ($v$) meters per second of the car when the brakes are applied. A formula for calculating this distance is:

$$d = \frac{2v + v^2}{20}$$

What is the stopping distance when $v = 20$?

$d =$ 22 m

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Exhibit 3.12.3: High International Benchmark of Mathematics Achievement – Example Item 3

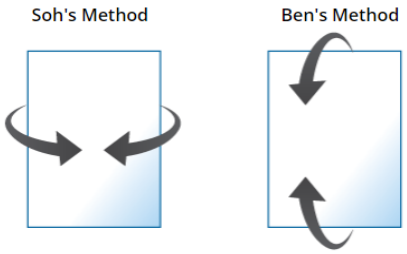
| Country | Percent Full Credit | |
|---|---|---|
| Japan | 79 (1.7) | ▲ |
| [2] Singapore | 70 (1.7) | ▲ |
| † Hong Kong SAR | 66 (2.5) | ▲ |
| Korea, Rep. of | 64 (2.5) | ▲ |
| Italy | 59 (2.7) | ▲ |
| Lithuania | 58 (2.6) | ▲ |
| Hungary | 57 (2.4) | ▲ |
| Chinese Taipei | 53 (2.2) | ▲ |
| [2] Russian Federation | 52 (2.5) | ▲ |
| † United States | 51 (2.3) | ▲ |
| [3] Israel | 49 (2.2) | ▲ |
| England | 48 (2.5) | ▲ |
| Portugal | 48 (2.7) | ▲ |
| Turkey | 47 (2.0) | ▲ |
| Finland | 44 (2.0) | |
| Malaysia | 42 (1.9) | |
| France | 42 (2.0) | |
| **International Average** | **41 (0.3)** | |
| † Norway (9) | 41 (2.5) | |
| Bahrain | 40 (2.0) | |
| Cyprus | 40 (2.2) | |
| [2] Kazakhstan | 39 (2.3) | |
| Chile | 39 (2.2) | |
| Romania | 39 (2.4) | |
| United Arab Emirates | 38 (1.1) | ▽ |
| [2] Sweden | 38 (2.5) | |
| Ireland | 35 (2.2) | ▽ |
| Qatar | 33 (2.1) | ▽ |
| Iran, Islamic Rep. of | 32 (2.0) | ▽ |
| Oman | 28 (1.8) | ▽ |
| Australia | 28 (1.7) | ▽ |
| [1] Georgia | 27 (2.3) | ▽ |
| Jordan | 27 (2.1) | ▽ |
| Kuwait | 26 (2.1) | ▽ |
| [2] Egypt | 23 (1.8) | ▽ |
| Morocco | 22 (1.4) | ▽ |
| † New Zealand | 21 (1.4) | ▽ |
| South Africa (9) | 21 (0.9) | ▽ |
| Lebanon | 20 (2.1) | ▽ |
| [2] Saudi Arabia | 10 (1.2) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 64 (1.9) | ▲ |
| Ontario, Canada | 60 (2.9) | ▲ |
| [2] Dubai, UAE | 49 (2.9) | ▲ |
| ‡ Quebec, Canada | 46 (3.0) | |
| Abu Dhabi, UAE | 35 (1.5) | ▽ |
| Western Cape, RSA (9) | 27 (1.9) | ▽ |
| Gauteng, RSA (9) | 27 (1.7) | ▽ |

**Content Domain:** Geometry

**Cognitive Domain:** Reasoning

**Description:** Compares properties of two open cylinders made by rolling the same rectangle in different directions

Soh and Ben have identical rectangular pieces of paper. They use different ways to roll their papers into cylinders so that the opposite sides of the paper touch as shown below.




Compare the properties of the two cylinders.

Use the drop-down menus.

**Height**

Soh's cylinder [ > ] Ben's cylinder

**Diameter**

Soh's cylinder [ < ] Ben's cylinder

**Surface Area (with open ends)**

Soh's cylinder [ = ] Ben's cylinder

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 3.12.4: High International Benchmark of Mathematics Achievement – Example Item 4

| Country | Percent Full Credit | |
|---|---|---|
| Japan | 83 (1.2) | ▲ |
| [2] Singapore | 76 (1.8) | ▲ |
| Chinese Taipei | 68 (1.8) | ▲ |
| Korea, Rep. of | 67 (2.2) | ▲ |
| Ireland | 64 (2.2) | ▲ |
| Australia | 64 (2.1) | ▲ |
| Portugal | 63 (2.8) | ▲ |
| England | 61 (2.7) | ▲ |
| † Hong Kong SAR | 61 (2.5) | ▲ |
| Hungary | 58 (2.6) | ▲ |
| Lithuania | 58 (2.2) | ▲ |
| † Norway (9) | 58 (2.8) | ▲ |
| Turkey | 58 (1.9) | ▲ |
| France | 54 (2.3) | ▲ |
| Finland | 54 (2.0) | ▲ |
| [2] Russian Federation | 54 (2.9) | ▲ |
| † New Zealand | 53 (2.4) | ▲ |
| † United States | 53 (2.2) | ▲ |
| [3] Israel | 52 (2.0) | ▲ |
| Italy | 51 (2.5) | |
| Cyprus | 50 (2.6) | |
| **International Average** | **47 (0.3)** | |
| Bahrain | 45 (1.8) | |
| [2] Sweden | 45 (2.3) | |
| Malaysia | 43 (1.8) | ▽ |
| United Arab Emirates | 40 (0.9) | ▽ |
| Romania | 38 (2.5) | ▽ |
| Chile | 37 (2.2) | ▽ |
| Oman | 37 (2.0) | ▽ |
| Qatar | 34 (2.5) | ▽ |
| Kuwait | 33 (2.8) | ▽ |
| [2] Kazakhstan | 31 (2.0) | ▽ |
| [2] Saudi Arabia | 29 (2.0) | ▽ |
| Jordan | 26 (2.2) | ▽ |
| South Africa (9) | 25 (1.1) | ▽ |
| Iran, Islamic Rep. of | 25 (1.9) | ▽ |
| Lebanon | 22 (2.1) | ▽ |
| Morocco | 21 (1.3) | ▽ |
| [1] Georgia | 20 (1.8) | ▽ |
| [2] Egypt | 18 (1.4) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 69 (2.5) | ▲ |
| Ontario, Canada | 66 (2.3) | ▲ |
| ‡ Quebec, Canada | 65 (2.5) | ▲ |
| [2] Dubai, UAE | 59 (1.8) | ▲ |
| Western Cape, RSA (9) | 39 (2.0) | ▽ |
| Gauteng, RSA (9) | 33 (1.6) | ▽ |
| Abu Dhabi, UAE | 31 (1.4) | ▽ |

**Content Domain:** Data and Probability

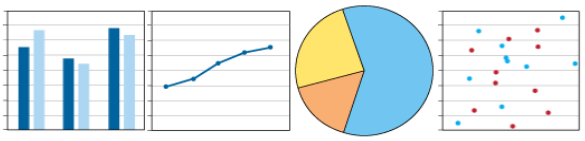
**Cognitive Domain:** Applying

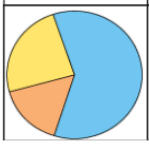
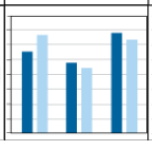
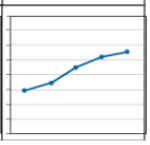
**Description:** Identifies an appropriate graph for three different types of data

Lee wants to make three graphs to show information about his town.
The titles of his graphs are shown in the table below.

Which type of graph is best for each?

Drag one type of graph to each title.



| Job Types of Workers in Town | The Number of Girls and Boys Born Each Year | Town Population Over Time |
|---|---|---|
|  |  |  |

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Exhibit 3.12.5: High International Benchmark of Mathematics Achievement – Example Item 5

| Country | Percent Correct | |
|---|---|---|
| Korea, Rep. of | 70 (2.0) | ▲ |
| [2] Singapore | 69 (1.9) | ▲ |
| Japan | 65 (1.8) | ▲ |
| Chinese Taipei | 63 (2.1) | ▲ |
| Ireland | 57 (2.4) | ▲ |
| Australia | 56 (2.0) | ▲ |
| Turkey | 55 (2.2) | ▲ |
| Bahrain | 52 (2.1) | ▲ |
| † United States | 52 (2.2) | ▲ |
| England | 50 (2.2) | ▲ |
| † Hong Kong SAR | 49 (2.9) | ▲ |
| Finland | 49 (2.1) | ▲ |
| Italy | 48 (2.5) | ▲ |
| † New Zealand | 48 (2.3) | ▲ |
| † Norway (9) | 48 (2.8) | |
| Lithuania | 46 (2.7) | |
| [3] Israel | 46 (2.7) | |
| Iran, Islamic Rep. of | 45 (2.8) | |
| **International Average** | **43 (0.4)** | |
| Hungary | 43 (2.3) | |
| [2] Russian Federation | 42 (2.6) | |
| [2] Sweden | 42 (2.7) | |
| Cyprus | 41 (2.4) | |
| Portugal | 41 (2.6) | |
| [2] Kazakhstan | 39 (2.7) | |
| France | 38 (2.4) | ▽ |
| United Arab Emirates | 38 (1.0) | ▽ |
| Chile | 36 (1.9) | ▽ |
| Malaysia | 35 (1.4) | ▽ |
| Jordan | 34 (2.0) | ▽ |
| Oman | 34 (1.6) | ▽ |
| Qatar | 32 (2.3) | ▽ |
| Romania | 30 (2.4) | ▽ |
| Kuwait | 30 (2.0) | ▽ |
| [2] Egypt | 27 (1.8) | ▽ |
| [2] Saudi Arabia | 27 (1.9) | ▽ |
| [1] Georgia | 27 (2.2) | ▽ |
| Morocco | 26 (1.8) | ▽ |
| South Africa (9) | 25 (1.2) | ▽ |
| Lebanon | 22 (1.8) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 53 (2.3) | ▲ |
| Ontario, Canada | 50 (3.0) | ▲ |
| ‡ Quebec, Canada | 50 (2.4) | ▲ |
| [2] Dubai, UAE | 48 (2.1) | ▲ |
| Western Cape, RSA (9) | 35 (1.9) | ▽ |
| Abu Dhabi, UAE | 34 (1.5) | ▽ |
| Gauteng, RSA (9) | 28 (1.5) | ▽ |

**Content Domain:** Data and Probability

**Cognitive Domain:** Applying

**Description:** Estimates the number of objects in a given probability sample

A bag contains 24 marbles, some white and some black.

A marble is chosen at random, its color is noted, and the marble is placed back into the bag. This is done 120 times, and a white marble appears 70 times.

How many white marbles are likely to be in the bag?

A) 7

B) 10

C) 12

D) 14

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Advanced Benchmark: Full Description and Example Items

Exhibit 3.13 presents the description of eighth grade performance at the Advanced International Benchmark. Students could apply and reason to solve a variety of problems as well as solve linear equations and make generalizations.

Exhibit 3.13.1 shows a multistep problem involving fractions from the number domain. This problem was relatively difficult for eighth grade students, with an international average of 18 percent. The top performances were in Chinese Taipei and Korea, where just over half the students answered correctly (52–53%).

Exhibit 3.13.2 involved students constructing a linear equation to solve a problem about perimeter. The international average was 26 percent. Almost three-fourths (74%) of the Singaporean students successfully completed this task.

Exhibit 3.13.3 shows a reasoning item from the geometry domain, which was based on properties of supplementary angles. Seventy-seven percent of eighth grade students answered correctly in both Japan and Korea. The international average was 26 percent.

Exhibit 3.13.4 presents an item from the data and probability domain that required students to interpret the change in a mean, using decimals and rounding. The international average was 36 percent. The highest percentage correct—71 percent—was in Korea.

## Exhibit 3.13: Description of the TIMSS 2019 Advanced International Benchmark (625) of Mathematics Achievement

### Advanced International Benchmark

**625**

**Summary**

*Students can apply and reason in a variety of problem situations, solve linear equations, and make generalizations.* They can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can understand linear functions and algebraic expressions. Students can use their knowledge of geometric figures to solve a wide range of problems involving angles, area, and surface area. They can calculate means and medians, and understand how changing data points can impact the mean. Students can interpret a wide variety of data displays to draw and justify conclusions, and solve multistep problems. They can solve problems involving expected values.

Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can reason with different representations of numbers in abstract and multistep problems.

Students can construct and solve linear equations in one or two variables. They can identify properties of linear functions from tables, graphs, and equations, including slopes and $y$-intercepts. Students can express generalizations either algebraically or in words, such as expressing the $n^{th}$ term in number patterns. They can simplify algebraic expressions.

Students can use their knowledge of geometric figures to solve a wide range of problems. They can solve a variety of problems about area and surface area, and use the Pythagorean theorem to find the side length of a triangle. Students can use their knowledge of the relationships between geometric figures, parallel lines, and angles to solve problems on the coordinate plane.

Students can calculate means and medians, and understand how changing data points can impact the mean. Students can interpret a wide variety of data displays to draw and justify conclusions, and solve multi-step problems. They can solve problems involving expected values.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.13.1: Advanced International Benchmark of Mathematics Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| Chinese Taipei | 53 (2.0) | ▲ |
| Korea, Rep. of | 52 (2.3) | ▲ |
| Japan | 47 (2.1) | ▲ |
| [2] Singapore | 46 (2.1) | ▲ |
| Bahrain | 30 (1.6) | ▲ |
| Cyprus | 28 (2.3) | ▲ |
| [2] Russian Federation | 26 (2.5) | ▲ |
| † Hong Kong SAR | 24 (2.8) | ▲ |
| Ireland | 23 (2.1) | ▲ |
| Hungary | 22 (1.9) | ▲ |
| [3] Israel | 22 (2.2) | |
| England | 22 (2.8) | |
| Australia | 21 (1.8) | |
| [2] Kazakhstan | 19 (1.9) | |
| **International Average** | **18 (0.3)** | |
| Turkey | 18 (1.8) | |
| Iran, Islamic Rep. of | 17 (1.9) | |
| † United States | 17 (1.4) | |
| Romania | 17 (1.8) | |
| † New Zealand | 16 (1.1) | |
| Lithuania | 16 (1.8) | |
| United Arab Emirates | 14 (1.0) | ▽ |
| Portugal | 14 (1.8) | ▽ |
| [2] Sweden | 13 (1.8) | ▽ |
| Finland | 13 (1.4) | ▽ |
| † Norway (9) | 10 (1.4) | ▽ |
| France | 10 (1.4) | ▽ |
| [2] Egypt | 10 (1.3) | ▽ |
| Qatar | 8 (1.4) | ▽ |
| Malaysia | 8 (0.9) | ▽ |
| Italy | 7 (1.2) | ▽ |
| Chile | 6 (1.0) | ▽ |
| Jordan | 6 (1.1) | ▽ |
| Kuwait | 6 (1.3) | ▽ |
| Oman | 6 (0.8) | ▽ |
| South Africa (9) | 5 (0.5) | ▽ |
| Lebanon | 5 (1.2) | ▽ |
| Morocco | 4 (0.7) | ▽ |
| [2] Saudi Arabia | 4 (0.9) | ▽ |
| [1] Georgia | - - | |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 37 (2.9) | ▲ |
| [2] Dubai, UAE | 25 (2.2) | ▲ |
| Ontario, Canada | 20 (2.4) | |
| ‡ Quebec, Canada | 18 (1.9) | |
| Western Cape, RSA (9) | 12 (1.7) | ▽ |
| Abu Dhabi, UAE | 10 (1.1) | ▽ |
| Gauteng, RSA (9) | 7 (1.1) | ▽ |

**Content Domain:** Number

**Cognitive Domain:** Reasoning

**Description:** Solves a multistep problem involving addition and subtraction of fractions

In the square below:

- The numbers in each row add to 1,
- The numbers in each column add to 1, and
- The numbers in both diagonals add to 1.

| | | |
|---|---|---|
| $\frac{8}{15}$ | | $\frac{2}{5}$ |
| $\frac{1}{5}$ | $X$ | |
| | | |

What is the value of $X$?

$X = \frac{5}{15}$

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

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## Exhibit 3.13.2: Advanced International Benchmark of Mathematics Achievement – Example Item 2

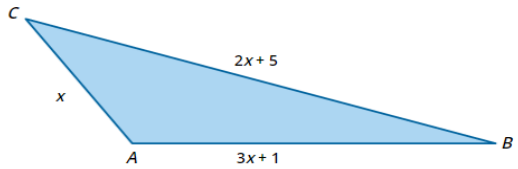
| Country | Percent Full Credit | |
|---|---|---|
| [2] Singapore | 74 (2.1) | ▲ |
| Chinese Taipei | 66 (1.8) | ▲ |
| † Hong Kong SAR | 61 (2.4) | ▲ |
| Korea, Rep. of | 59 (2.8) | ▲ |
| [3] Israel | 46 (2.7) | ▲ |
| Japan | 42 (2.1) | ▲ |
| Cyprus | 41 (2.3) | ▲ |
| [2] Russian Federation | 40 (3.0) | ▲ |
| Romania | 36 (2.8) | ▲ |
| Lithuania | 34 (2.4) | ▲ |
| [2] Sweden | 34 (2.2) | ▲ |
| Hungary | 33 (2.6) | ▲ |
| [2] Kazakhstan | 30 (2.2) | |
| Australia | 29 (1.8) | |
| **International Average** | **26 (0.3)** | |
| [1] Georgia | 26 (2.7) | |
| United Arab Emirates | 25 (0.9) | |
| Bahrain | 25 (1.7) | |
| † United States | 24 (1.8) | |
| Turkey | 23 (2.1) | |
| Ireland | 23 (1.7) | |
| England | 22 (2.5) | |
| Finland | 21 (1.7) | ▽ |
| † Norway (9) | 18 (1.7) | ▽ |
| Portugal | 18 (1.8) | ▽ |
| † New Zealand | 17 (1.4) | ▽ |
| [2] Egypt | 17 (1.9) | ▽ |
| Iran, Islamic Rep. of | 16 (1.9) | ▽ |
| Oman | 15 (1.2) | ▽ |
| Italy | 15 (1.9) | ▽ |
| France | 14 (1.8) | ▽ |
| Lebanon | 14 (1.9) | ▽ |
| Jordan | 13 (1.3) | ▽ |
| Malaysia | 12 (0.9) | ▽ |
| Qatar | 12 (1.5) | ▽ |
| Kuwait | 8 (1.7) | ▽ |
| Morocco | 6 (1.1) | ▽ |
| Chile | 5 (1.0) | ▽ |
| South Africa (9) | 5 (0.5) | ▽ |
| [2] Saudi Arabia | 3 (0.6) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 51 (2.5) | ▲ |
| ‡ Quebec, Canada | 46 (3.2) | ▲ |
| [2] Dubai, UAE | 40 (1.9) | ▲ |
| Ontario, Canada | 26 (2.4) | |
| Abu Dhabi, UAE | 15 (1.2) | ▽ |
| Western Cape, RSA (9) | 13 (1.9) | ▽ |
| Gauteng, RSA (9) | 7 (1.2) | ▽ |

**Content Domain:** Algebra

**Cognitive Domain:** Applying

**Description:** Constructs a linear equation for the perimeter of a triangle and solves for the length of one side

The perimeter of triangle *ABC* is 21 cm.




What is the value of $x$?

$x =$ 2.5 cm

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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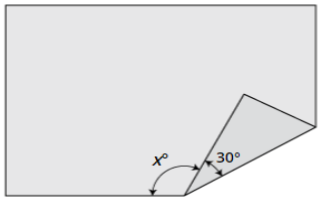
## Exhibit 3.13.3: Advanced International Benchmark of Mathematics Achievement – Example Item 3

| Country | Percent Correct | |
|---|---|---|
| Japan | 77 (1.7) | ▲ |
| Korea, Rep. of | 77 (1.8) | ▲ |
| [2] Singapore | 76 (1.9) | ▲ |
| Chinese Taipei | 64 (2.1) | ▲ |
| † Hong Kong SAR | 56 (2.7) | ▲ |
| [2] Russian Federation | 34 (2.4) | ▲ |
| Hungary | 32 (2.1) | ▲ |
| [2] Kazakhstan | 32 (2.6) | ▲ |
| Romania | 29 (2.5) | |
| Lithuania | 28 (2.1) | |
| † Norway (9) | 28 (2.3) | |
| Australia | 28 (1.6) | |
| England | 26 (2.3) | |
| **International Average** | **26 (0.3)** | |
| Cyprus | 26 (2.0) | |
| Portugal | 26 (2.4) | |
| Bahrain | 25 (1.3) | |
| Italy | 25 (2.1) | |
| Finland | 23 (1.7) | ▽ |
| Ireland | 22 (2.0) | ▽ |
| [3] Israel | 21 (1.9) | ▽ |
| † New Zealand | 20 (1.9) | ▽ |
| Iran, Islamic Rep. of | 20 (2.0) | ▽ |
| [2] Sweden | 20 (2.0) | ▽ |
| Turkey | 19 (1.7) | ▽ |
| United Arab Emirates | 17 (0.8) | ▽ |
| Morocco | 17 (1.4) | ▽ |
| Malaysia | 16 (1.4) | ▽ |
| Lebanon | 16 (1.6) | ▽ |
| France | 16 (1.6) | ▽ |
| † United States | 15 (1.4) | ▽ |
| Chile | 14 (1.0) | ▽ |
| [1] Georgia | 13 (2.2) | ▽ |
| [2] Egypt | 13 (1.4) | ▽ |
| Qatar | 13 (1.5) | ▽ |
| Oman | 12 (1.0) | ▽ |
| [2] Saudi Arabia | 11 (1.4) | ▽ |
| Jordan | 11 (1.3) | ▽ |
| Kuwait | 7 (1.5) | ▽ |
| South Africa (9) | 6 (0.5) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 41 (2.0) | ▲ |
| ‡ Quebec, Canada | 39 (2.8) | ▲ |
| [2] Dubai, UAE | 27 (2.0) | |
| Ontario, Canada | 25 (2.9) | |
| Abu Dhabi, UAE | 13 (1.0) | ▽ |
| Western Cape, RSA (9) | 9 (1.2) | ▽ |
| Gauteng, RSA (9) | 8 (1.1) | ▽ |

**Content Domain:** Geometry

**Cognitive Domain:** Reasoning

**Description:** Uses properties of supplementary angles to solve for an angle




A rectangular piece of paper is folded at one corner, as shown above.
What is the value of $x$?

Answer: 120

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.13.4: Advanced International Benchmark of Mathematics Achievement – Example Item 4

| Country | Percent Correct | |
|---|---|---|
| Korea, Rep. of | 71 (1.9) | ▲ |
| Japan | 70 (1.9) | ▲ |
| Chinese Taipei | 69 (1.8) | ▲ |
| 2 Singapore | 66 (2.1) | ▲ |
| † Hong Kong SAR | 64 (2.4) | ▲ |
| † Norway (9) | 52 (2.6) | ▲ |
| 3 Israel | 47 (2.3) | ▲ |
| Finland | 47 (2.0) | ▲ |
| 2 Sweden | 47 (2.4) | ▲ |
| Lithuania | 46 (2.7) | ▲ |
| 2 Russian Federation | 44 (3.1) | ▲ |
| Australia | 43 (1.9) | ▲ |
| Ireland | 42 (2.4) | ▲ |
| † United States | 41 (1.6) | ▲ |
| Hungary | 38 (2.7) | |
| France | 38 (2.1) | |
| Portugal | 37 (2.4) | |
| Turkey | 37 (2.1) | |
| Italy | 37 (2.1) | |
| **International Average** | **36 (0.3)** | |
| Cyprus | 36 (2.1) | |
| † New Zealand | 35 (1.8) | |
| England | 35 (2.6) | |
| 2 Kazakhstan | 32 (2.1) | ▽ |
| United Arab Emirates | 30 (1.0) | ▽ |
| Bahrain | 28 (2.0) | ▽ |
| Chile | 27 (2.6) | ▽ |
| Malaysia | 26 (1.4) | ▽ |
| Qatar | 25 (2.1) | ▽ |
| Iran, Islamic Rep. of | 24 (2.0) | ▽ |
| 1 Georgia | 24 (2.3) | ▽ |
| Romania | 23 (2.1) | ▽ |
| Morocco | 21 (1.3) | ▽ |
| 2 Egypt | 20 (1.6) | ▽ |
| Oman | 20 (1.3) | ▽ |
| Kuwait | 19 (1.9) | ▽ |
| 2 Saudi Arabia | 18 (1.2) | ▽ |
| Jordan | 17 (1.8) | ▽ |
| Lebanon | 11 (1.5) | ▽ |
| South Africa (9) | 10 (0.7) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 53 (2.3) | ▲ |
| ‡ Quebec, Canada | 51 (2.6) | ▲ |
| 2 Dubai, UAE | 40 (2.3) | |
| Ontario, Canada | 39 (2.6) | |
| Abu Dhabi, UAE | 25 (1.5) | ▽ |
| Western Cape, RSA (9) | 18 (1.6) | ▽ |
| Gauteng, RSA (9) | 13 (1.2) | ▽ |

**Content Domain:** Data and Probability

**Cognitive Domain:** Applying

**Description:** Determines the change in a mean given changes in individual scores

A relay team for a 400 m race has 4 runners. They took 12 seconds, 13 seconds, 11 seconds, and 13 seconds, respectively, to complete their legs of the race.

In the next race, 2 of the runners each improved their times by 2 seconds, and the other 2 had the same times as before. By how many seconds did the team's mean running time improve?

A 0 sec.

B 1 sec.

C 2 sec.

D 4 sec.

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Average Achievement in Mathematics Content and Cognitive Domains

## TIMSS 2019 Mathematics Content and Cognitive Domains

TIMSS 2019 assessed four content areas in mathematics at the eighth grade: number, algebra, geometry, and data and probability.

The 30 percent of the eighth grade assessment devoted to number consisted of integers (10%); fractions and decimals (10%); and ratio, proportion, and percent (10%). Building on the number content domain at the fourth grade, eighth grade students were asked to compute and solve problems involving more advanced whole number concepts and procedures as well as integers, fractions, and decimals.

Thirty percent of the assessment also was devoted to algebra, which included expressions, operations, and equations (20%) and relationships and functions (10%). Students were asked to solve real world problems using algebraic models and explain relationships involving algebraic concepts. For example, when given one quantity in a formula involving two quantities, they were asked to find the other quantity. They also were given problems involving linear equations and functions.

Twenty percent of the assessment was devoted to geometry. Extending the understanding of shapes and measures assessed at the fourth grade, eighth grade students were asked to analyze the properties of a variety of two- and three-dimensional figures and calculate perimeters, areas, and volumes. They were asked to solve problems and provide explanations based on geometric relationships, such as congruence, similarity, and the Pythagorean theorem.

The remaining 20 percent of the assessment was devoted to the data and probability content domain, which consisted of two topic areas: data (15%) and probability (5%). Students were asked to read and extract the important meaning from a variety of visual displays, demonstrate familiarity with the statistics underlying data distributions, and organize and represent data. There also were some questions related to basic probability concepts.

Eighth grade students also needed to draw on a range of cognitive skills across the content domains described above. These skills were categorized into three broad cognitive domains—knowing, applying, and reasoning. Thirty-five percent of the eighth grade assessment was devoted to the knowing cognitive domain, 40 percent to applying, and 25 percent to reasoning. The knowing domain covers the facts, concepts, and procedures students need to know, while the second domain, applying, focuses on students' ability to apply knowledge and conceptual understanding to solve problems or answer questions. The reasoning domain goes beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multistep problems.

## Average Achievement in Content Domains

Exhibit 3.14 shows countries' average mathematics achievement in each of the four content domains relative to their overall average achievement (presented from highest to lowest overall average achievement). Based on students' relative strengths and weaknesses at the eighth grade, the TIMSS 2019 countries appear to be placing relatively more instructional emphasis on the algebra content domain and less on the number and data and probability domains. Of the 36 participating countries for which content domain scores were estimated, 7 had a relative strength in number and 14 had a relative weakness; 19 had a relative strength in algebra and 14 had a relative weakness; 14 had a relative strength in geometry, and 17 had relative weakness; and 10 had a relative strength in data and probability, and 21 had a relative weakness. All countries had at least one relative strength or relative weakness compared with their overall achievement.

## Exhibit 3.14: Average Achievement in Mathematics Content Domains

| Country | Overall Mathematics Average Scale Score | Number (63 Items) Average Scale Score | Number (63 Items) Difference from Overall Mathematics Score | Algebra (61 Items) Average Scale Score | Algebra (61 Items) Difference from Overall Mathematics Score | Geometry (43 Items) Average Scale Score | Geometry (43 Items) Difference from Overall Mathematics Score | Data and Probability (39 Items) Average Scale Score | Data and Probability (39 Items) Difference from Overall Mathematics Score |
|---|---|---|---|---|---|---|---|---|---|
| [2] Singapore | 616 (4.0) | 611 (4.1) | -5 (1.0) ▽ | 619 (4.6) | 3 (1.3) ▲ | 619 (3.9) | 3 (0.8) ▲ | 620 (4.9) | 4 (2.1) ▲ |
| Chinese Taipei | 612 (2.7) | 613 (2.7) | 1 (1.0) | 618 (2.6) | 6 (1.4) ▲ | 623 (2.7) | 11 (1.3) ▲ | 593 (2.5) | -19 (1.6) ▽ |
| Korea, Rep. of | 607 (2.8) | 605 (2.6) | -2 (1.5) | 609 (3.5) | 2 (1.1) ▲ | 617 (2.9) | 10 (1.0) ▲ | 598 (2.6) | -9 (1.7) ▽ |
| Japan | 594 (2.7) | 578 (3.5) | -16 (1.4) ▽ | 602 (3.2) | 8 (1.3) ▲ | 610 (3.4) | 16 (1.9) ▲ | 594 (2.5) | 0 (0.7) |
| † Hong Kong SAR | 578 (4.1) | 570 (4.2) | -9 (1.5) ▽ | 584 (3.9) | 5 (1.5) ▲ | 596 (4.6) | 18 (1.6) ▲ | 563 (5.6) | -16 (3.5) ▽ |
| [2] Russian Federation | 543 (4.5) | 541 (4.6) | -2 (1.0) ▽ | 560 (5.0) | 16 (1.1) ▲ | 540 (5.2) | -3 (1.2) ▽ | 517 (4.7) | -26 (2.1) ▽ |
| Ireland | 524 (2.6) | 541 (3.0) | 17 (2.1) ▲ | 505 (2.8) | -18 (1.1) ▽ | 506 (2.8) | -18 (0.9) ▽ | 541 (3.4) | 17 (2.0) ▲ |
| Lithuania | 520 (2.9) | 514 (3.0) | -6 (1.4) ▽ | 518 (2.9) | -2 (1.1) ▽ | 529 (3.0) | 9 (1.2) ▲ | 522 (3.1) | 2 (1.5) |
| [3] Israel | 519 (4.3) | 519 (4.2) | 0 (1.3) | 528 (5.0) | 9 (1.2) ▲ | 506 (4.8) | -13 (1.8) ▽ | 511 (4.9) | -8 (2.3) ▽ |
| Australia | 517 (3.8) | 522 (3.9) | 4 (0.7) ▲ | 501 (4.1) | -16 (1.1) ▽ | 513 (4.0) | -4 (1.0) ▽ | 533 (3.9) | 15 (1.4) ▲ |
| Hungary | 517 (2.9) | 515 (3.1) | -1 (1.4) | 509 (3.0) | -8 (1.0) ▽ | 521 (3.3) | 5 (1.9) ▲ | 521 (3.2) | 4 (2.2) |
| † United States | 515 (4.8) | 520 (4.5) | 4 (0.7) ▲ | 520 (5.4) | 4 (0.9) ▲ | 499 (4.8) | -16 (1.1) ▽ | 509 (5.4) | -6 (1.8) ▽ |
| England | 515 (5.3) | 519 (5.4) | 4 (2.1) ▲ | 504 (5.8) | -11 (1.6) ▽ | 509 (5.3) | -6 (1.5) ▽ | 523 (6.2) | 9 (1.9) ▲ |
| Finland | 509 (2.6) | 515 (2.6) | 6 (0.9) ▲ | 489 (2.9) | -20 (1.2) ▽ | 511 (3.2) | 2 (2.0) | 514 (3.6) | 5 (1.7) ▲ |
| † Norway (9) | 503 (2.4) | 507 (2.3) | 5 (1.0) ▲ | 477 (3.0) | -26 (1.7) ▽ | 502 (2.3) | -1 (1.0) | 518 (3.0) | 15 (1.3) ▲ |
| [2] Sweden | 503 (2.5) | 502 (2.4) | -1 (1.3) | 496 (2.9) | -7 (1.9) ▽ | 495 (3.1) | -7 (1.4) ▽ | 513 (3.7) | 11 (2.2) ▲ |
| Cyprus | 501 (1.6) | 499 (2.2) | -2 (1.8) | 515 (2.6) | 14 (1.7) ▲ | 490 (2.3) | -11 (1.5) ▽ | 493 (2.7) | -8 (2.0) ▽ |
| Portugal | 500 (3.2) | 492 (3.3) | -8 (1.7) ▽ | 499 (3.3) | -2 (1.2) | 509 (3.3) | 9 (1.2) ▲ | 498 (3.2) | -3 (1.6) |
| Italy | 497 (2.7) | 495 (2.4) | -3 (1.4) | 491 (2.7) | -7 (2.3) ▽ | 510 (3.7) | 12 (2.4) ▲ | 494 (3.3) | -4 (2.0) |
| Turkey | 496 (4.3) | 493 (4.3) | -2 (1.7) | 493 (4.6) | -3 (1.2) ▽ | 490 (4.2) | -6 (1.4) ▽ | 502 (4.3) | 7 (1.1) ▲ |
| [2] Kazakhstan | 488 (3.3) | 482 (3.4) | -5 (1.4) ▽ | 504 (3.7) | 16 (1.2) ▲ | 486 (3.8) | -2 (1.6) | 463 (3.3) | -25 (1.5) ▽ |
| France | 483 (2.5) | 477 (2.6) | -6 (1.2) ▽ | 468 (2.8) | -15 (1.5) ▽ | 493 (2.7) | 11 (1.6) ▲ | 496 (2.6) | 13 (1.4) ▲ |
| † New Zealand | 482 (3.4) | 483 (3.6) | 2 (1.7) | 464 (3.5) | -17 (1.8) ▽ | 477 (3.4) | -5 (1.6) ▽ | 496 (3.7) | 14 (1.6) ▲ |
| Bahrain | 481 (1.7) | 473 (2.2) | -8 (1.7) ▽ | 485 (2.1) | 4 (1.5) ▲ | 493 (2.3) | 12 (1.9) ▲ | 465 (2.0) | -16 (1.3) ▽ |
| Romania | 479 (4.3) | 478 (4.5) | -1 (1.3) | 490 (4.6) | 11 (1.7) ▲ | 472 (4.7) | -7 (1.6) ▽ | 458 (4.5) | -21 (1.8) ▽ |
| United Arab Emirates | 473 (1.9) | 474 (1.9) | 1 (0.7) | 486 (2.1) | 12 (0.8) ▲ | 462 (2.1) | -12 (1.0) ▽ | 451 (2.1) | -22 (1.0) ▽ |
| [1] Georgia | 461 (4.3) | 466 (4.7) | 5 (1.7) ▲ | 473 (4.3) | 12 (2.2) ▲ | 449 (4.4) | -12 (2.8) ▽ | 429 (5.1) | -32 (3.9) ▽ |
| Malaysia | 461 (3.2) | 458 (3.1) | -3 (1.1) ▽ | 456 (3.3) | -4 (1.6) ▽ | 466 (3.7) | 6 (2.6) ▲ | 457 (3.5) | -4 (1.2) ▽ |
| Iran, Islamic Rep. of | 446 (3.7) | 442 (4.2) | -4 (1.6) ▽ | 450 (3.8) | 4 (1.2) ▲ | 442 (4.4) | -5 (1.7) ▽ | 435 (4.0) | -11 (1.5) ▽ |
| Ψ Qatar | 443 (4.0) | 441 (4.0) | -2 (1.0) | 454 (4.0) | 10 (1.5) ▲ | 435 (4.0) | -8 (1.2) ▽ | 423 (4.7) | -20 (1.9) ▽ |
| Ψ Chile | 441 (2.8) | 442 (3.2) | 1 (1.4) | 439 (3.1) | -2 (1.8) | 434 (4.3) | -6 (3.2) | 434 (3.2) | -6 (1.3) ▽ |
| Lebanon | 429 (2.9) | 432 (2.7) | 2 (1.3) | 452 (3.0) | 23 (1.3) ▲ | 422 (3.2) | -7 (2.1) ▽ | 383 (3.5) | -46 (2.4) ▽ |
| Ψ Jordan | 420 (4.3) | 408 (4.5) | -12 (1.3) ▽ | 442 (4.8) | 22 (1.2) ▲ | 413 (4.6) | -7 (3.0) ▽ | 396 (4.2) | -24 (1.8) ▽ |
| [2] Ψ Egypt | 413 (5.2) | 414 (5.4) | 1 (2.2) | 413 (6.0) | 0 (2.0) | 417 (5.3) | 4 (1.3) ▲ | 380 (5.4) | -33 (1.4) ▽ |
| Ψ Oman | 411 (2.8) | 392 (3.0) | -19 (1.5) ▽ | 427 (3.0) | 16 (1.4) ▲ | 418 (3.2) | 7 (1.1) ▲ | 393 (2.9) | -17 (1.4) ▽ |
| Ψ Kuwait | 403 (5.0) | - - | - - | - - | - - | - - | - - | - - | - - |
| [2] Ψ Saudi Arabia | 394 (2.5) | - - | - - | - - | - - | - - | - - | - - | - - |
| Ж South Africa (9) | 389 (2.3) | - - | - - | - - | - - | - - | - - | - - | - - |
| Ψ Morocco | 388 (2.3) | 377 (2.7) | -11 (1.3) ▽ | 370 (3.1) | -18 (1.6) ▽ | 413 (2.2) | 25 (1.4) ▲ | 372 (2.4) | -16 (1.3) ▽ |
| **Benchmarking Participants** | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | 574 (4.5) | -1 (1.5) | 592 (4.2) | 17 (1.1) ▲ | 565 (4.4) | -10 (1.1) ▽ | 564 (4.2) | -11 (1.6) ▽ |
| ‡ Quebec, Canada | 543 (3.7) | 544 (3.9) | 1 (1.3) | 531 (4.0) | -12 (1.7) ▽ | 549 (4.4) | 6 (2.3) ▲ | 554 (4.5) | 11 (2.8) ▲ |
| [2] Dubai, UAE | 537 (2.0) | 537 (2.1) | 0 (0.8) | 547 (2.4) | 10 (1.5) ▲ | 527 (2.6) | -10 (1.7) ▽ | 525 (2.7) | -11 (1.6) ▽ |
| Ontario, Canada | 530 (4.3) | 530 (4.3) | 1 (1.8) | 515 (4.4) | -15 (1.2) ▽ | 536 (4.8) | 6 (2.2) ▲ | 542 (5.2) | 12 (2.5) ▲ |
| Ψ Western Cape, RSA (9) | 441 (4.4) | 445 (5.2) | 3 (3.2) | 451 (4.9) | 10 (2.3) ▲ | 427 (5.3) | -14 (3.4) ▽ | 426 (5.1) | -16 (2.5) ▽ |
| Ψ Abu Dhabi, UAE | 436 (2.9) | 439 (3.0) | 3 (1.8) | 448 (3.2) | 12 (1.0) ▲ | 420 (3.4) | -16 (1.5) ▽ | 411 (3.1) | -25 (1.2) ▽ |
| Ψ Gauteng, RSA (9) | 421 (3.0) | 421 (3.2) | 0 (1.4) | 431 (3.7) | 11 (1.7) ▲ | 407 (3.6) | -14 (2.2) ▽ | 406 (3.5) | -15 (1.9) ▽ |

▲ Subscale score significantly higher than overall mathematics score
▽ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2019 eighth grade mathematics items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement in Content Domains

Exhibit 3.15 presents trends in average achievement for the four mathematics content domains. The results are very positive, showing more increases than decreases in all four content areas, especially geometry. Thirty TIMSS 2019 countries also participated in TIMSS 2015 and had comparable data for the content domains. In the number content area, 8 showed improvement and 6 showed declines; in algebra, 8 showed improvement and 3 showed declines; in geometry, 12 showed improvement and 2 showed declines; and in data and probability, 8 showed improvement and 5 showed declines.

TIMSS began providing scaled results in the content domains in 2007, with 23 countries having trends between 2007 and 2019. Compared with 2007, there was considerable improvement in TIMSS 2019 across the content domains in these countries—13 had higher average achievement in number, 13 in algebra, 18 in geometry, and 10 in data and probability. Only several of the countries had lower average achievement—2 in number, 1 in algebra, 2 in geometry, and 3 in data and probability.

## Exhibit 3.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Number | | | | Algebra | | | | Geometry | | | | Data and Probability | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Australia** | | | | | | | | | | | | | | | | |
| 2019 | 522 (3.9) | 10 ▲ | 9 | 18 ▲ | 501 (4.1) | 11 ▲ | 12 | 27 ▲ | 513 (4.0) | 13 ▲ | 14 ▲ | 25 ▲ | 533 (3.9) | 14 ▲ | -2 | 7 |
| 2015 | 511 (3.2) | | -1 | 8 | 491 (3.4) | | 2 | 16 ▲ | 500 (3.1) | | 1 | 12 ▲ | 519 (3.1) | | -16 ▽ | -7 |
| 2011 | 513 (5.5) | | | 9 | 489 (5.3) | | | 15 ▲ | 499 (5.3) | | | 11 | 534 (6.0) | | | 8 |
| 2007 | 504 (4.0) | | | | 474 (4.2) | | | | 488 (4.0) | | | | 526 (4.4) | | | |
| **Bahrain** | | | | | | | | | | | | | | | | |
| 2019 | 473 (2.2) | 37 ▲ | 76 ▲ | 91 ▲ | 485 (2.1) | 2 | 61 ▲ | 88 ▲ | 493 (2.3) | 44 ▲ | 95 ▲ | 90 ▲ | 465 (2.0) | 12 ▲ | 58 ▲ | 66 ▲ |
| 2015 | 436 (2.0) | | 39 ▲ | 54 ▲ | 483 (2.1) | | 58 ▲ | 86 ▲ | 449 (2.5) | | 51 ▲ | 46 ▲ | 453 (2.2) | | 46 ▲ | 53 ▲ |
| Ψ 2011 | 397 (1.7) | | | 15 ▲ | 424 (1.7) | | | 28 ▲ | 398 (2.5) | | | -5 | 407 (2.5) | | | 8 ▲ |
| 2007 | 381 (2.5) | | | | 397 (1.7) | | | | 403 (2.9) | | | | 400 (2.6) | | | |
| **Chile** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 442 (3.2) | 15 ▲ | 29 ▲ | | 439 (3.1) | 25 ▲ | 36 ▲ | | 434 (4.3) | 7 | 15 ▲ | | 434 (3.2) | 5 | 9 ▲ | |
| Ψ 2015 | 427 (3.3) | | 15 ▲ | | 413 (3.4) | | 11 ▲ | | 428 (3.4) | | 9 | | 429 (3.8) | | 4 | |
| 2011 | 413 (2.9) | | | | 403 (3.6) | | | | 419 (3.0) | | | | 426 (3.0) | | | |
| **Chinese Taipei** | | | | | | | | | | | | | | | | |
| 2019 | 613 (2.7) | 23 ▲ | 16 ▲ | 27 ▲ | 618 (2.6) | 5 | -10 ▽ | -11 | 623 (2.7) | 16 ▲ | -2 | 18 ▲ | 593 (2.5) | 5 | 9 ▲ | 15 ▲ |
| 2015 | 590 (2.4) | | -8 | 4 | 613 (2.8) | | -15 ▽ | -16 ▽ | 607 (2.6) | | -18 ▽ | 2 | 588 (2.5) | | 4 | 9 |
| 2011 | 598 (3.2) | | | 12 ▲ | 628 (3.8) | | | -1 | 625 (3.7) | | | 20 ▲ | 584 (2.9) | | | 5 |
| 2007 | 586 (4.3) | | | | 629 (5.9) | | | | 605 (5.7) | | | | 579 (4.6) | | | |
| **Cyprus** | | | | | | | | | | | | | | | | |
| 2019 | 499 (2.2) | | | 36 ▲ | 515 (2.6) | | | 44 ▲ | 490 (2.3) | | | 35 ▲ | 493 (2.7) | | | 38 ▲ |
| 2007 | 464 (2.2) | | | | 471 (2.3) | | | | 455 (3.1) | | | | 456 (2.1) | | | |
| **Egypt** | | | | | | | | | | | | | | | | |
| 2 Ψ 2019 | 414 (5.4) | 20 ▲ | | 28 ▲ | 413 (6.0) | -7 | | 8 | 417 (5.3) | 24 ▲ | | 20 ▲ | 380 (5.4) | 42 ▲ | | 22 ▲ |
| Ψ 2015 | 393 (3.7) | | | 8 | 420 (4.3) | | | 15 ▲ | 393 (4.1) | | | -4 | 338 (4.4) | | | -20 ▽ |
| 2007 | 386 (3.6) | | | | 405 (3.5) | | | | 397 (3.7) | | | | 358 (3.9) | | | |
| **England** | | | | | | | | | | | | | | | | |
| 2019 | 519 (5.4) | -8 | 7 | 8 | 504 (5.8) | 11 | 14 | 7 | 509 (5.3) | -6 | 11 | -5 | 523 (6.2) | -18 ▽ | -20 ▽ | -29 ▽ |
| 2015 | 528 (4.5) | | 15 ▲ | 17 ▲ | 492 (4.7) | | 3 | -4 | 514 (4.1) | | 16 ▲ | 1 | 541 (4.7) | | -2 | -11 |
| ‡ 2011 | 512 (5.9) | | | 1 | 489 (5.8) | | | -7 | 498 (5.9) | | | -15 ▽ | 543 (7.0) | | | -9 |
| † 2007 | 511 (5.4) | | | | 496 (5.1) | | | | 513 (5.2) | | | | 552 (6.2) | | | |
| **Finland** | | | | | | | | | | | | | | | | |
| 2019 | 515 (2.6) | | -12 ▽ | | 489 (2.9) | | -3 | | 511 (3.2) | | 9 ▲ | | 514 (3.6) | | -28 ▽ | |
| 2011 | 527 (2.4) | | | | 492 (2.9) | | | | 502 (2.9) | | | | 542 (3.1) | | | |
| **Georgia** | | | | | | | | | | | | | | | | |
| 1 2019 | 466 (4.7) | 9 | 31 ▲ | 50 ▲ | 473 (4.3) | 5 | 23 ▲ | 57 ▲ | 449 (4.4) | 8 | 43 ▲ | 47 ▲ | 429 (5.1) | 8 | 38 ▲ | 79 ▲ |
| 1 2 2015 | 457 (3.4) | | 22 ▲ | 40 ▲ | 469 (3.8) | | 18 ▲ | 52 ▲ | 441 (3.9) | | 34 ▲ | 39 ▲ | 421 (3.7) | | 30 ▲ | 71 ▲ |
| 1 2011 | 435 (3.5) | | | 19 ▲ | 450 (3.9) | | | 34 ▲ | 406 (4.3) | | | 5 | 392 (4.5) | | | 42 ▲ |
| 1 2007 | 416 (5.9) | | | | 416 (7.6) | | | | 402 (7.1) | | | | 350 (5.1) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | | | | | |
| † 2019 | 570 (4.2) | -25 ▽ | -18 ▽ | -5 | 584 (3.9) | -9 | 1 | 9 | 596 (4.6) | -6 | -1 | 16 ▲ | 563 (5.6) | -34 ▽ | -19 ▽ | 2 |
| 2015 | 594 (4.9) | | 6 | 19 ▲ | 593 (4.7) | | 10 | 18 ▲ | 602 (5.1) | | 4 | 22 ▲ | 597 (5.9) | | 16 ▲ | 37 ▲ |
| 2011 | 588 (3.7) | | | 13 | 583 (4.0) | | | 8 | 597 (4.4) | | | 18 ▲ | 581 (4.1) | | | 21 ▲ |
| † 2007 | 575 (6.0) | | | | 575 (6.1) | | | | 580 (6.1) | | | | 560 (5.9) | | | |
| **Hungary** | | | | | | | | | | | | | | | | |
| 2019 | 515 (3.1) | -2 | 6 | -5 | 509 (3.0) | 6 | 12 ▲ | 1 | 521 (3.3) | 3 | 20 ▲ | 11 ▲ | 521 (3.2) | 2 | 4 | -6 |
| 2015 | 518 (4.0) | | 8 | -3 | 503 (4.1) | | 6 | -5 | 518 (4.2) | | 17 ▲ | 8 | 519 (3.9) | | 2 | -8 |
| 2011 | 510 (3.8) | | | -11 | 496 (4.0) | | | -11 ▽ | 501 (4.1) | | | -9 | 517 (4.2) | | | -10 |
| 2007 | 520 (3.8) | | | | 508 (3.8) | | | | 510 (4.0) | | | | 527 (3.9) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | | | | | |
| 2019 | 442 (4.2) | 10 | 40 ▲ | 54 ▲ | 450 (3.8) | 13 ▲ | 28 ▲ | 46 ▲ | 442 (4.4) | -6 | 4 | 27 ▲ | 435 (4.0) | 18 ▲ | 42 ▲ | 39 ▲ |
| Ψ 2015 | 432 (4.7) | | 30 ▲ | 44 ▲ | 437 (5.1) | | 15 ▲ | 33 ▲ | 448 (4.7) | | 10 | 33 ▲ | 417 (5.0) | | 24 ▲ | 21 ▲ |
| Ψ 2011 | 402 (5.0) | | | 14 ▲ | 422 (4.4) | | | 18 ▲ | 437 (4.7) | | | 23 ▲ | 393 (4.9) | | | -3 |
| 2007 | 388 (4.4) | | | | 405 (4.2) | | | | 414 (4.7) | | | | 396 (3.8) | | | |
| **Ireland** | | | | | | | | | | | | | | | | |
| 2019 | 541 (3.0) | -4 | | | 505 (2.8) | 4 | | | 506 (2.8) | 3 | | | 541 (3.4) | 7 | | |
| 2015 | 544 (3.3) | | | | 501 (2.8) | | | | 503 (3.1) | | | | 534 (3.8) | | | |
| **Israel** | | | | | | | | | | | | | | | | |
| 3 2019 | 519 (4.2) | 1 | 1 | | 528 (5.0) | 11 | 7 | | 506 (4.8) | 19 ▲ | 10 | | 511 (4.9) | 8 | -4 | |
| 3 2015 | 518 (4.0) | | 0 | | 517 (4.7) | | -4 | | 487 (4.6) | | -9 | | 503 (4.9) | | -12 | |
| 3 2011 | 518 (4.1) | | | | 521 (4.7) | | | | 496 (4.4) | | | | 515 (4.7) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in content domains using current methodology began with TIMSS 2007.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

| Country | Number | | | | Algebra | | | | Geometry | | | | Data and Probability | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Italy** | | | | | | | | | | | | | | | | |
| 2019 | 495 (2.4) | 1 | -1 | 14 ▲ | 491 (2.7) | 10 ▲ | 0 | 31 ▲ | 510 (3.7) | 6 | -2 | 19 ▲ | 494 (3.3) | -2 | -5 | 9 |
| 2 2015 | 494 (2.7) | | -2 | 14 ▲ | 481 (3.0) | | -10 ▽ | 21 ▲ | 504 (3.5) | | -8 | 13 ▲ | 496 (2.7) | | -3 | 12 ▲ |
| 2011 | 496 (2.8) | | | 16 ▲ | 491 (2.6) | | | 30 ▲ | 512 (3.5) | | | 21 ▲ | 499 (3.1) | | | 15 ▲ |
| 2007 | 480 (3.1) | | | | 460 (3.7) | | | | 491 (3.6) | | | | 485 (3.6) | | | |
| **Japan** | | | | | | | | | | | | | | | | |
| 2019 | 578 (3.5) | 6 | 21 ▲ | 20 ▲ | 602 (3.2) | 6 | 32 ▲ | 35 ▲ | 610 (3.4) | 12 ▲ | 24 ▲ | 26 ▲ | 594 (2.5) | 5 | 15 ▲ | 3 |
| 2015 | 572 (2.4) | | 15 ▲ | 14 ▲ | 596 (2.8) | | 26 ▲ | 29 ▲ | 598 (2.6) | | 12 ▲ | 14 ▲ | 589 (2.3) | | 10 ▲ | -2 |
| 2011 | 557 (3.0) | | | -2 | 570 (3.1) | | | 3 | 586 (3.6) | | | 2 | 579 (3.1) | | | -11 ▽ |
| 2007 | 558 (2.4) | | | | 567 (2.9) | | | | 584 (2.5) | | | | 591 (2.7) | | | |
| **Jordan** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 408 (4.5) | 28 ▲ | 18 ▲ | -4 | 442 (4.8) | 24 ▲ | 10 | -3 | 413 (4.6) | 32 ▲ | 6 | -16 ▽ | 396 (4.2) | 50 ▲ | 17 ▲ | -10 |
| Ж 2015 | 380 (3.2) | | -10 ▽ | -32 ▽ | 418 (3.5) | | -14 ▽ | -28 ▽ | 381 (3.4) | | -26 ▽ | -48 ▽ | 346 (4.0) | | -33 ▽ | -60 ▽ |
| Ψ 2011 | 390 (3.8) | | | -22 ▽ | 432 (3.9) | | | -14 ▽ | 407 (3.7) | | | -22 ▽ | 379 (3.9) | | | -27 ▽ |
| 2007 | 412 (4.8) | | | | 445 (4.3) | | | | 429 (4.2) | | | | 406 (4.3) | | | |
| **Kazakhstan** | | | | | | | | | | | | | | | | |
| 2 2019 | 482 (3.4) | | 3 | | 504 (3.7) | | -2 | | 486 (3.8) | | -5 | | 463 (3.3) | | 18 ▲ | |
| 2011 | 479 (4.1) | | | | 506 (4.5) | | | | 491 (4.5) | | | | 444 (4.4) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | | | | | |
| 2019 | 605 (2.6) | 4 | -13 ▽ | 13 ▲ | 609 (3.5) | -3 | -7 | 1 | 617 (2.9) | 5 | 5 | 17 ▲ | 598 (2.6) | -3 | -18 ▽ | -4 |
| 2015 | 601 (2.4) | | -17 ▽ | 9 ▲ | 612 (2.9) | | -4 | 4 | 612 (3.4) | | 0 | 12 ▲ | 600 (2.4) | | -15 ▽ | -1 |
| 2011 | 618 (2.7) | | | 25 ▲ | 617 (3.3) | | | 9 | 612 (2.8) | | | 12 ▲ | 616 (2.6) | | | 14 ▲ |
| 2007 | 592 (2.5) | | | | 608 (3.3) | | | | 600 (2.7) | | | | 602 (2.6) | | | |
| **Lebanon** | | | | | | | | | | | | | | | | |
| 2019 | 432 (2.7) | -8 | -20 ▽ | -21 ▽ | 452 (3.0) | -14 ▽ | -19 ▽ | -16 ▽ | 422 (3.2) | -21 ▽ | -25 ▽ | -33 ▽ | 383 (3.5) | -12 ▽ | -10 | -5 |
| 2015 | 440 (4.1) | | -11 ▽ | -13 ▽ | 466 (4.0) | | -5 | -2 | 444 (4.0) | | -4 | -12 ▽ | 395 (4.6) | | 2 | 7 |
| 2011 | 451 (3.8) | | | -1 | 471 (3.8) | | | 3 | 447 (3.8) | | | -8 | 393 (5.2) | | | 5 |
| 2007 | 453 (3.9) | | | | 468 (3.6) | | | | 455 (4.2) | | | | 388 (5.3) | | | |
| **Lithuania** | | | | | | | | | | | | | | | | |
| 2019 | 514 (3.0) | 3 | 13 ▲ | 7 | 518 (2.9) | 21 ▲ | 26 ▲ | 31 ▲ | 529 (3.0) | 15 ▲ | 30 ▲ | 20 ▲ | 522 (3.1) | 1 | 7 | -3 |
| 2 2015 | 511 (2.8) | | 10 ▲ | 4 | 497 (3.3) | | 5 | 10 ▲ | 515 (3.1) | | 15 ▲ | 6 | 521 (2.7) | | 6 | -4 |
| 1 2011 | 501 (2.5) | | | -6 | 492 (2.8) | | | 5 | 500 (3.2) | | | -9 ▽ | 515 (2.8) | | | -10 ▽ |
| 1 2007 | 507 (2.8) | | | | 487 (2.9) | | | | 509 (3.1) | | | | 526 (2.9) | | | |
| **Malaysia** | | | | | | | | | | | | | | | | |
| 2019 | 458 (3.1) | -14 ▽ | 7 | -36 ▽ | 456 (3.3) | -11 ▽ | 26 ▲ | 1 | 466 (3.7) | 11 ▲ | 34 ▲ | -8 | 457 (3.5) | 5 | 27 ▲ | -2 |
| 2015 | 472 (3.6) | | 21 ▲ | -22 ▽ | 467 (3.4) | | 37 ▲ | 11 | 455 (3.9) | | 23 ▲ | -19 ▽ | 451 (3.8) | | 22 ▲ | -7 |
| 2011 | 451 (5.8) | | | -43 ▽ | 430 (5.2) | | | -26 ▽ | 432 (6.4) | | | -42 ▽ | 429 (5.4) | | | -30 ▽ |
| 2007 | 494 (5.5) | | | | 455 (4.9) | | | | 474 (6.3) | | | | 459 (5.0) | | | |
| **Morocco** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 377 (2.7) | -5 | -2 | | 370 (3.1) | -2 | 14 ▲ | | 413 (2.2) | 3 | 23 ▲ | | 372 (2.4) | 19 ▲ | 40 ▲ | |
| Ж 2015 | 382 (2.1) | | 3 | | 372 (2.3) | | 16 ▲ | | 410 (3.0) | | 20 ▲ | | 353 (2.9) | | 21 ▲ | |
| Ж 2011 | 379 (2.5) | | | | 357 (2.6) | | | | 390 (2.5) | | | | 332 (1.9) | | | |
| **New Zealand** | | | | | | | | | | | | | | | | |
| † 2019 | 483 (3.6) | -16 ▽ | -9 | | 464 (3.5) | -11 ▽ | -8 | | 477 (3.4) | -11 ▽ | -6 | | 496 (3.7) | -13 ▽ | -18 ▽ | |
| † 2015 | 500 (3.5) | | 7 | | 475 (3.5) | | 3 | | 488 (3.2) | | 5 | | 509 (3.7) | | -5 | |
| 2011 | 492 (6.0) | | | | 472 (5.6) | | | | 483 (5.6) | | | | 513 (6.9) | | | |
| **Norway (9)** | | | | | | | | | | | | | | | | |
| † 2019 | 507 (2.3) | -21 ▽ | | | 477 (3.0) | 6 | | | 502 (2.3) | 4 | | | 518 (3.0) | -24 ▽ | | |
| 2015 | 529 (2.6) | | | | 471 (2.7) | | | | 498 (2.5) | | | | 542 (3.2) | | | |
| **Oman** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 392 (3.0) | 3 | 42 ▲ | 38 ▲ | 427 (3.0) | 0 | 43 ▲ | 43 ▲ | 418 (3.2) | 3 | 41 ▲ | 41 ▲ | 393 (2.9) | 17 ▲ | 51 ▲ | 29 ▲ |
| Ψ 2015 | 389 (2.6) | | 38 ▲ | 35 ▲ | 426 (2.7) | | 43 ▲ | 43 ▲ | 415 (2.8) | | 38 ▲ | 38 ▲ | 376 (3.0) | | 34 ▲ | 11 ▲ |
| Ψ 2011 | 351 (2.9) | | | -4 | 383 (2.7) | | | 0 | 377 (2.6) | | | 0 | 342 (3.0) | | | -23 ▽ |
| 2007 | 354 (3.1) | | | | 384 (3.5) | | | | 377 (3.5) | | | | 365 (4.0) | | | |
| **Qatar** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 441 (4.0) | 6 | 33 ▲ | | 454 (4.0) | 1 | 29 ▲ | | 435 (4.0) | 2 | 48 ▲ | | 423 (4.7) | 6 | 34 ▲ | |
| Ψ 2015 | 435 (2.9) | | 27 ▲ | | 452 (2.6) | | 27 ▲ | | 433 (3.0) | | 45 ▲ | | 417 (3.9) | | 27 ▲ | |
| Ψ 2011 | 408 (3.6) | | | | 425 (2.8) | | | | 387 (3.4) | | | | 390 (3.6) | | | |
| **Romania** | | | | | | | | | | | | | | | | |
| 2019 | 478 (4.5) | | 30 ▲ | 23 ▲ | 490 (4.6) | | 13 ▲ | 10 | 472 (4.7) | | 19 ▲ | 9 | 458 (4.5) | | 29 ▲ | 42 ▲ |
| 2011 | 448 (4.2) | | | -7 | 477 (4.3) | | | -3 | 453 (4.5) | | | -10 | 429 (4.0) | | | 13 ▲ |
| 2007 | 455 (3.9) | | | | 480 (5.0) | | | | 463 (4.4) | | | | 415 (4.6) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 3.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

| Country | Number | | | | Algebra | | | | Geometry | | | | Data and Probability | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Russian Federation** | | | | | | | | | | | | | | | | |
| 2 2019 | 541 (4.6) | 8 | 7 | 32 ▲ | 560 (5.0) | 2 | 4 | 35 ▲ | 540 (5.2) | 5 | 7 | 30 ▲ | 517 (4.7) | 10 | 6 | 34 ▲ |
| 2015 | 533 (4.5) | | -1 | 23 ▲ | 558 (5.2) | | 2 | 33 ▲ | 536 (5.6) | | 3 | 25 ▲ | 507 (5.0) | | -4 | 24 ▲ |
| 2 2011 | 534 (3.4) | | | 25 ▲ | 556 (3.8) | | | 31 ▲ | 533 (4.0) | | | 23 ▲ | 511 (4.0) | | | 28 ▲ |
| 2007 | 510 (4.1) | | | | 525 (4.6) | | | | 510 (4.8) | | | | 483 (4.5) | | | |
| **Singapore** | | | | | | | | | | | | | | | | |
| 2 2019 | 611 (4.1) | -18 ▽ | 0 | 6 | 619 (4.6) | -4 | 4 | 28 ▲ | 619 (3.9) | 2 | 10 | 29 ▲ | 620 (4.9) | 3 | 13 ▲ | 31 ▲ |
| 2 2015 | 629 (3.2) | | 18 ▲ | 24 ▲ | 623 (3.4) | | 8 | 31 ▲ | 617 (3.5) | | 8 | 27 ▲ | 617 (3.4) | | 10 | 28 ▲ |
| 2 2011 | 611 (3.7) | | | 6 | 614 (4.1) | | | 23 ▲ | 609 (4.0) | | | 19 ▲ | 607 (4.4) | | | 18 ▲ |
| 2007 | 605 (3.8) | | | | 591 (4.0) | | | | 590 (4.1) | | | | 589 (5.2) | | | |
| **Sweden** | | | | | | | | | | | | | | | | |
| 2 2019 | 502 (2.4) | -11 ▽ | -2 | -3 | 496 (2.9) | 14 ▲ | 37 ▲ | 37 ▲ | 495 (3.1) | 17 ▲ | 39 ▲ | 23 ▲ | 513 (3.7) | 1 | 9 | -13 ▽ |
| 2015 | 513 (2.9) | | 9 ▲ | 7 ▲ | 482 (3.2) | | 23 ▲ | 23 ▲ | 478 (3.4) | | 22 ▲ | 5 | 512 (3.7) | | 8 | -14 ▽ |
| 2011 | 504 (1.8) | | | -2 | 459 (2.2) | | | 0 | 456 (2.3) | | | -17 ▽ | 504 (2.8) | | | -22 ▽ |
| 2007 | 505 (1.9) | | | | 459 (2.7) | | | | 472 (2.8) | | | | 526 (3.9) | | | |
| **Turkey** | | | | | | | | | | | | | | | | |
| 2019 | 493 (4.3) | 46 ▲ | 58 ▲ | | 493 (4.6) | 34 ▲ | 38 ▲ | | 490 (4.2) | 27 ▲ | 35 ▲ | | 502 (4.3) | 36 ▲ | 35 ▲ | |
| 2015 | 447 (4.6) | | 13 ▲ | | 459 (4.6) | | 4 | | 463 (4.9) | | 8 | | 467 (5.2) | | -1 | |
| 2011 | 435 (4.0) | | | | 455 (4.3) | | | | 454 (4.4) | | | | 467 (4.0) | | | |
| **United Arab Emirates** | | | | | | | | | | | | | | | | |
| 2019 | 474 (1.9) | 11 ▲ | 15 ▲ | | 486 (2.1) | 1 | 18 ▲ | | 462 (2.1) | 14 ▲ | 31 ▲ | | 451 (2.1) | 2 | 11 ▲ | |
| 2015 | 464 (1.9) | | 5 | | 485 (2.0) | | 17 ▲ | | 447 (2.4) | | 17 ▲ | | 449 (2.5) | | 9 ▲ | |
| 2011 | 459 (2.3) | | | | 468 (2.2) | | | | 431 (2.4) | | | | 440 (2.4) | | | |
| **United States** | | | | | | | | | | | | | | | | |
| † 2019 | 520 (4.5) | 0 | 6 | 6 | 520 (5.4) | -5 | 8 | 13 ▲ | 499 (4.8) | -1 | 14 ▲ | 19 ▲ | 509 (5.4) | -13 | -18 ▽ | -23 ▽ |
| † 2015 | 520 (3.1) | | 6 | 6 | 525 (3.1) | | 13 ▲ | 18 ▲ | 500 (3.2) | | 15 ▲ | 20 ▲ | 522 (3.5) | | -5 | -11 ▽ |
| 2 2011 | 514 (3.0) | | | 0 | 512 (2.6) | | | 5 | 485 (2.7) | | | 5 | 527 (3.3) | | | -5 |
| 2 † 2007 | 514 (2.9) | | | | 507 (3.1) | | | | 480 (2.9) | | | | 533 (3.4) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | | | | | |
| 2019 | 530 (4.3) | 1 | 12 ▲ | 2 | 515 (4.4) | 7 | 18 ▲ | 19 ▲ | 536 (4.8) | 12 ▲ | 24 ▲ | 25 ▲ | 542 (5.2) | 10 | 11 | -6 |
| 2015 | 530 (3.0) | | 11 ▲ | 2 | 507 (3.0) | | 11 ▲ | 11 ▲ | 524 (3.5) | | 12 ▲ | 13 ▲ | 531 (3.9) | | 0 | -16 ▽ |
| 2 2011 | 519 (2.8) | | | -9 | 497 (2.4) | | | 1 | 512 (2.8) | | | 1 | 531 (4.2) | | | -17 ▽ |
| 2 2007 | 528 (4.2) | | | | 496 (3.9) | | | | 510 (4.5) | | | | 547 (5.1) | | | |
| **Quebec, Canada** | | | | | | | | | | | | | | | | |
| ‡ 2019 | 544 (3.9) | -13 ▽ | 1 | 6 | 531 (4.0) | 0 | 15 ▲ | 19 ▲ | 549 (4.4) | 9 | 21 ▲ | 22 ▲ | 554 (4.5) | 8 | 6 | 14 ▲ |
| ≡ 2015 | 557 (4.3) | | 14 ▲ | 19 ▲ | 530 (4.4) | | 15 ▲ | 18 ▲ | 540 (4.3) | | 12 ▲ | 13 ▲ | 546 (5.0) | | -2 | 6 |
| 2011 | 543 (2.4) | | | 5 | 516 (2.9) | | | 4 | 529 (2.6) | | | 1 | 549 (3.0) | | | 8 |
| 3 2007 | 537 (3.7) | | | | 512 (3.6) | | | | 527 (3.5) | | | | 540 (3.8) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 439 (3.0) | -3 | -13 ▽ | | 448 (3.2) | -14 ▽ | -11 ▽ | | 420 (3.4) | -6 | -5 | | 411 (3.1) | -15 ▽ | -24 ▽ | |
| 2015 | 443 (4.4) | | -10 | | 462 (4.5) | | 3 | | 425 (5.4) | | 1 | | 426 (5.5) | | -8 | |
| 2011 | 452 (4.0) | | | | 459 (3.9) | | | | 424 (4.5) | | | | 434 (4.3) | | | |
| **Dubai, UAE** | | | | | | | | | | | | | | | | |
| 2 2019 | 537 (2.1) | 28 ▲ | 57 ▲ | 78 ▲ | 547 (2.4) | 19 ▲ | 58 ▲ | 71 ▲ | 527 (2.6) | 31 ▲ | 74 ▲ | 82 ▲ | 525 (2.7) | 22 ▲ | 58 ▲ | 81 ▲ |
| 2015 | 509 (2.5) | | 29 ▲ | 50 ▲ | 528 (2.7) | | 40 ▲ | 53 ▲ | 496 (2.6) | | 44 ▲ | 51 ▲ | 504 (3.0) | | 36 ▲ | 59 ▲ |
| 2011 | 479 (2.4) | | | 21 ▲ | 489 (2.4) | | | 13 ▲ | 453 (3.1) | | | 7 | 468 (2.9) | | | 23 ▲ |
| ‡ 2007 | 458 (3.3) | | | | 476 (2.6) | | | | 445 (3.6) | | | | 444 (3.5) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Content Domains by Gender

Exhibit 3.16 shows the differences in average achievement between girls and boys in the four mathematics content domains. Boys had a substantial advantage in number (as they did at fourth grade) and girls did in algebra. In the number content domain, girls had higher average achievement than boys in only 4 countries, and boys had higher average achievement in 14 countries. In algebra, girls had higher average achievement than boys in 16 countries, and in no country did boys have higher average achievement. In geometry, girls had higher average achievement than boys in 7 countries, and boys had higher average achievement in 3 countries. In data and probability, girls had higher average achievement than boys in 7 countries, and boys had higher average achievement in 9 countries.

## Exhibit 3.16: Average Achievement in Mathematics Content Domains by Gender

| Country | Number (63 Items) | | Algebra (61 Items) | | Geometry (43 Items) | | Data and Probability (39 Items) | |
|---|---|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys | Girls | Boys |
| Australia | 515 (3.7) | 528 (5.7) ▲ | 502 (4.1) | 501 (5.9) | 510 (3.9) | 517 (5.8) | 532 (3.8) | 534 (5.7) |
| Bahrain | 482 (3.1) ▲ | 464 (2.9) | 497 (3.0) ▲ | 473 (2.8) | 503 (3.2) ▲ | 484 (2.7) | 482 (3.1) ▲ | 449 (3.0) |
| Ψ Chile | 435 (4.2) | 448 (3.9) ▲ | 436 (3.8) | 441 (4.3) | 431 (5.5) | 438 (5.0) | 426 (4.4) | 442 (4.8) ▲ |
| Chinese Taipei | 612 (3.3) | 614 (3.5) | 623 (3.0) ▲ | 613 (3.4) | 623 (3.2) | 623 (3.7) | 593 (3.7) | 594 (3.4) |
| Cyprus | 495 (3.1) | 504 (3.1) | 523 (3.7) ▲ | 507 (2.7) | 494 (4.3) | 486 (2.8) | 494 (3.9) | 493 (3.3) |
| 2 Ψ Egypt | 419 (5.7) | 407 (8.0) | 422 (6.3) ▲ | 401 (8.7) | 422 (5.4) | 411 (8.2) | 390 (5.8) ▲ | 368 (8.2) |
| England | 513 (5.6) | 526 (7.4) | 507 (6.5) | 500 (7.8) | 510 (5.8) | 507 (7.2) | 523 (6.6) | 523 (8.3) |
| Finland | 512 (2.8) | 517 (3.1) | 495 (3.2) ▲ | 483 (3.6) | 517 (3.7) ▲ | 504 (3.8) | 517 (3.6) | 511 (4.4) |
| France | 468 (2.7) | 485 (3.3) ▲ | 468 (3.3) | 468 (3.0) | 490 (3.4) | 496 (3.7) | 490 (2.9) | 500 (3.5) ▲ |
| 1 Georgia | 459 (4.5) | 473 (6.1) ▲ | 472 (5.2) | 474 (5.5) | 447 (4.6) | 450 (5.7) | 424 (5.7) | 435 (6.2) |
| † Hong Kong SAR | 570 (5.0) | 569 (5.5) | 588 (4.8) | 580 (5.3) | 602 (5.6) | 591 (6.0) | 571 (6.4) ▲ | 555 (7.0) |
| Hungary | 506 (3.8) | 525 (3.9) ▲ | 506 (3.4) | 512 (3.8) | 514 (3.8) | 529 (3.8) ▲ | 511 (3.4) | 531 (4.0) ▲ |
| Iran, Islamic Rep. of | 444 (5.5) | 440 (6.2) | 465 (5.1) ▲ | 437 (5.8) | 450 (5.5) ▲ | 434 (6.3) | 438 (5.1) | 433 (6.6) |
| Ireland | 538 (3.4) | 544 (4.0) | 510 (3.1) ▲ | 501 (3.7) | 504 (3.5) | 508 (3.6) | 541 (3.6) | 540 (4.6) |
| 3 Israel | 511 (4.3) | 527 (5.2) ▲ | 526 (5.0) | 530 (6.5) | 500 (5.1) | 513 (5.9) ▲ | 503 (4.9) | 520 (5.9) ▲ |
| Italy | 485 (2.7) | 505 (3.0) ▲ | 488 (2.9) | 494 (3.6) | 506 (4.0) | 513 (4.7) | 487 (4.0) | 501 (4.5) ▲ |
| Japan | 573 (3.7) | 583 (4.0) ▲ | 605 (2.9) | 600 (4.1) | 609 (3.4) | 611 (4.0) | 592 (2.7) | 597 (3.0) |
| Ψ Jordan | 416 (4.0) ▲ | 401 (6.8) | 460 (4.2) ▲ | 425 (7.1) | 425 (5.3) ▲ | 402 (6.6) | 408 (4.0) ▲ | 385 (6.3) |
| 2 Kazakhstan | 483 (4.2) | 481 (3.8) | 508 (4.2) ▲ | 499 (4.2) | 489 (4.9) | 483 (4.1) | 462 (4.1) | 463 (4.0) |
| Korea, Rep. of | 602 (3.3) | 608 (3.2) | 611 (4.2) | 608 (4.0) | 613 (3.9) | 621 (3.3) | 594 (3.5) | 601 (3.0) |
| Ψ Kuwait | - - | - - | - - | - - | - - | - - | - - | - - |
| Lebanon | 427 (3.2) | 436 (3.2) ▲ | 453 (3.7) | 451 (3.6) | 420 (3.7) | 424 (3.7) | 378 (4.5) | 388 (4.1) ▲ |
| Lithuania | 512 (3.0) | 517 (3.7) | 520 (3.2) | 516 (3.5) | 530 (3.8) | 529 (4.0) | 518 (3.3) | 526 (3.9) ▲ |
| Malaysia | 460 (3.0) | 455 (4.0) | 461 (3.0) ▲ | 451 (4.5) | 470 (3.6) | 462 (4.8) | 464 (3.7) ▲ | 449 (4.6) |
| Ψ Morocco | 374 (2.8) | 381 (3.1) ▲ | 373 (3.3) | 367 (4.5) | 407 (2.6) | 419 (2.8) ▲ | 370 (3.7) | 375 (2.9) |
| † New Zealand | 477 (3.8) | 489 (5.1) ▲ | 464 (4.1) | 464 (5.2) | 474 (4.1) | 479 (5.1) | 492 (3.9) | 499 (5.5) |
| † Norway (9) | 503 (2.9) | 512 (3.1) ▲ | 481 (3.5) | 474 (3.6) | 505 (2.7) | 499 (3.2) | 518 (3.4) | 518 (3.6) |
| Ψ Oman | 411 (3.3) ▲ | 375 (4.7) | 452 (3.3) ▲ | 403 (4.8) | 435 (3.9) ▲ | 402 (5.1) | 418 (3.4) ▲ | 370 (4.5) |
| Portugal | 483 (3.6) | 502 (4.2) ▲ | 500 (3.8) | 498 (4.5) | 506 (3.6) | 512 (4.2) | 487 (3.3) | 508 (3.9) ▲ |
| Ψ Qatar | 442 (5.1) | 440 (5.4) | 462 (4.9) ▲ | 446 (5.4) | 440 (5.7) | 430 (5.7) | 425 (5.9) | 422 (6.0) |
| Romania | 484 (4.7) ▲ | 472 (5.0) | 503 (5.2) ▲ | 477 (5.0) | 480 (5.4) ▲ | 464 (5.5) | 464 (5.0) ▲ | 451 (4.8) |
| 2 Russian Federation | 535 (5.0) | 547 (5.1) ▲ | 563 (5.4) | 557 (5.3) | 538 (5.5) | 543 (5.7) | 509 (5.2) | 525 (5.2) ▲ |
| 2 Ψ Saudi Arabia | - - | - - | - - | - - | - - | - - | - - | - - |
| 2 Singapore | 611 (4.5) | 611 (4.8) | 623 (5.1) | 615 (5.3) | 620 (4.7) | 618 (4.4) | 623 (5.4) | 618 (5.3) |
| Ж South Africa (9) | - - | - - | - - | - - | - - | - - | - - | - - |
| 2 Sweden | 500 (2.8) | 504 (3.2) | 499 (3.7) | 492 (3.2) | 500 (4.0) | 491 (3.6) | 514 (4.8) | 512 (4.0) |
| Turkey | 496 (4.7) | 490 (5.8) | 503 (5.0) ▲ | 482 (6.3) | 496 (4.6) ▲ | 483 (5.7) | 506 (4.7) | 498 (5.8) |
| United Arab Emirates | 473 (3.4) | 475 (3.3) | 493 (3.6) ▲ | 480 (3.5) | 465 (3.7) | 459 (3.8) | 455 (3.8) | 447 (3.6) |
| † United States | 518 (3.7) | 522 (5.7) | 528 (4.5) ▲ | 512 (6.8) | 500 (4.1) | 499 (6.1) | 510 (4.4) | 509 (7.0) |
| **International Average** | **493 (0.7)** | **497 (0.8) ▲** | **503 (0.7) ▲** | **493 (0.8)** | **499 (0.7) ▲** | **495 (0.8)** | **490 (0.7)** | **489 (0.8)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 527 (4.3) | 533 (4.9) | 515 (4.7) | 515 (4.7) | 535 (5.0) | 537 (5.8) | 540 (5.2) | 543 (6.0) |
| ‡ Quebec, Canada | 540 (4.4) | 548 (4.7) | 529 (4.9) | 532 (4.5) | 548 (5.0) | 550 (4.8) | 553 (4.7) | 556 (5.7) |
| Moscow City, Russian Fed. | 562 (4.8) | 585 (5.1) ▲ | 588 (4.3) | 597 (4.8) ▲ | 558 (5.3) | 572 (5.2) ▲ | 551 (4.7) | 577 (4.8) ▲ |
| Ψ Gauteng, RSA (9) | 422 (3.6) | 419 (3.6) | 437 (4.3) ▲ | 424 (3.7) | 407 (4.0) | 406 (3.9) | 408 (3.9) | 403 (3.7) |
| Ψ Western Cape, RSA (9) | 438 (6.1) | 453 (6.0) ▲ | 449 (5.7) | 454 (5.9) | 420 (6.0) | 435 (6.1) ▲ | 421 (5.7) | 431 (6.0) |
| Ψ Abu Dhabi, UAE | 441 (5.3) | 438 (4.6) | 457 (5.6) ▲ | 440 (4.6) | 426 (5.8) | 414 (5.1) | 418 (5.9) | 404 (4.9) |
| 2 Dubai, UAE | 529 (4.9) | 544 (5.9) | 546 (5.2) | 548 (6.0) | 522 (5.3) | 532 (6.4) | 521 (5.4) | 530 (6.5) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 eighth grade mathematics items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Cognitive Domains

Exhibit 3.17 shows countries' average achievement in the knowing, applying, and reasoning cognitive domains relative to their overall average achievement (from highest to lowest overall average achievement). Interestingly, fewer countries had a relative strength in the knowing and applying cognitive domains than they did in the reasoning domain. More countries had a weakness in the knowing domain than in the applying and reasoning domains. Eight countries had a relative strength in the knowing cognitive domain, and 17 had a relative weakness. Six countries had a relative strength in the applying cognitive domain, and 14 had a relative weakness. Sixteen countries had a relative strength in the reasoning cognitive domain, and 9 had a relative weakness. Kazakhstan was the only country with no relative strengths or weaknesses in the cognitive domains.

## Exhibit 3.17: Average Achievement in Mathematics Cognitive Domains

| Country | Overall Mathematics Average Scale Score | Knowing (64 Items) | | Applying (96 Items) | | Reasoning (46 Items) | |
|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score |
| [2] Singapore | 616 (4.0) | 614 (4.3) | -1 (1.4) | 614 (3.8) | -2 (0.7) ▽ | 620 (4.5) | 4 (1.0) ▲ |
| Chinese Taipei | 612 (2.7) | 616 (3.0) | 3 (1.5) ▲ | 610 (2.6) | -3 (1.8) | 616 (2.7) | 4 (1.9) |
| Korea, Rep. of | 607 (2.8) | 614 (3.2) | 7 (1.2) ▲ | 604 (2.7) | -3 (1.2) ▽ | 609 (3.0) | 2 (2.4) |
| Japan | 594 (2.7) | 589 (3.1) | -5 (1.2) ▽ | 596 (2.8) | 2 (1.2) | 599 (3.2) | 5 (1.7) ▲ |
| † Hong Kong SAR | 578 (4.1) | 580 (4.0) | 2 (1.6) | 575 (4.0) | -3 (1.1) ▽ | 582 (4.4) | 4 (1.9) |
| [2] Russian Federation | 543 (4.5) | 550 (5.2) | 6 (2.0) ▲ | 543 (4.5) | -1 (1.0) | 536 (4.8) | -7 (1.7) ▽ |
| Ireland | 524 (2.6) | 530 (2.8) | 7 (1.5) ▲ | 526 (2.7) | 3 (0.9) ▲ | 508 (3.4) | -16 (1.8) ▽ |
| Lithuania | 520 (2.9) | 518 (2.8) | -2 (1.1) | 524 (3.1) | 3 (1.2) ▲ | 514 (3.6) | -7 (1.5) ▽ |
| [3] Israel | 519 (4.3) | 516 (4.8) | -3 (1.2) ▽ | 519 (4.2) | 0 (0.8) | 525 (4.7) | 6 (1.9) ▲ |
| Australia | 517 (3.8) | 511 (4.0) | -7 (1.2) ▽ | 521 (3.8) | 4 (0.7) ▲ | 515 (3.9) | -3 (0.8) ▽ |
| Hungary | 517 (2.9) | 516 (3.1) | -1 (1.0) | 517 (3.0) | 0 (1.1) | 512 (3.0) | -4 (1.3) ▽ |
| † United States | 515 (4.8) | 522 (5.2) | 6 (1.4) ▲ | 515 (4.9) | 0 (0.8) | 507 (4.6) | -8 (1.0) ▽ |
| England | 515 (5.3) | 510 (5.5) | -5 (2.1) ▽ | 518 (5.3) | 3 (1.1) ▲ | 512 (5.7) | -3 (1.8) |
| Finland | 509 (2.6) | 505 (2.5) | -4 (1.1) ▽ | 510 (2.7) | 2 (0.9) | 506 (2.9) | -3 (1.5) |
| † Norway (9) | 503 (2.4) | 499 (2.3) | -4 (1.6) ▽ | 504 (2.7) | 1 (1.3) | 496 (2.8) | -7 (1.9) ▽ |
| [2] Sweden | 503 (2.5) | 496 (2.6) | -7 (1.6) ▽ | 501 (2.6) | -1 (1.0) | 514 (2.9) | 11 (1.3) ▲ |
| Cyprus | 501 (1.6) | 509 (2.0) | 8 (1.6) ▲ | 496 (1.7) | -5 (1.3) ▽ | 505 (2.1) | 4 (1.3) ▲ |
| Portugal | 500 (3.2) | 498 (3.5) | -2 (2.0) | 497 (3.3) | -4 (1.2) ▽ | 508 (3.3) | 7 (2.2) ▲ |
| Italy | 497 (2.7) | 492 (2.8) | -5 (2.1) ▽ | 497 (2.4) | -1 (1.5) | 505 (3.6) | 7 (1.8) ▲ |
| Turkey | 496 (4.3) | 494 (5.0) | -1 (1.8) | 491 (4.0) | -4 (1.6) ▽ | 504 (4.1) | 8 (1.8) ▲ |
| [2] Kazakhstan | 488 (3.3) | 488 (3.7) | 1 (1.4) | 486 (3.2) | -1 (0.8) | 487 (3.4) | 0 (1.0) |
| France | 483 (2.5) | 473 (2.8) | -9 (1.6) ▽ | 485 (2.6) | 2 (1.6) | 489 (2.7) | 6 (1.5) ▲ |
| † New Zealand | 482 (3.4) | 468 (3.5) | -14 (2.0) ▽ | 486 (3.1) | 5 (1.1) ▲ | 486 (3.4) | 5 (0.9) ▲ |
| Bahrain | 481 (1.7) | 471 (1.7) | -10 (0.8) ▽ | 479 (1.7) | -2 (0.9) ▽ | 489 (2.1) | 8 (1.3) ▲ |
| Romania | 479 (4.3) | 482 (5.0) | 3 (2.0) | 475 (4.1) | -4 (1.1) ▽ | 481 (4.5) | 2 (1.4) |
| United Arab Emirates | 473 (1.9) | 478 (1.9) | 5 (0.8) ▲ | 466 (1.8) | -8 (0.7) ▽ | 479 (1.9) | 6 (0.9) ▲ |
| [1] Georgia | 461 (4.3) | - - | - - | - - | - - | - - | - - |
| Malaysia | 461 (3.2) | 451 (3.8) | -9 (1.5) ▽ | 464 (3.1) | 3 (0.9) ▲ | 462 (3.1) | 1 (1.1) |
| Iran, Islamic Rep. of | 446 (3.7) | 441 (4.2) | -6 (1.1) ▽ | 443 (3.5) | -4 (1.1) ▽ | 457 (4.0) | 11 (1.6) ▲ |
| Ψ Qatar | 443 (4.0) | 443 (4.6) | -1 (1.8) | 438 (4.1) | -6 (0.9) ▽ | 448 (3.8) | 4 (1.3) ▲ |
| Ψ Chile | 441 (2.8) | 434 (3.0) | -7 (1.3) ▽ | 438 (2.9) | -3 (1.5) | 451 (3.2) | 10 (2.0) ▲ |
| Lebanon | 429 (2.9) | 456 (2.9) | 26 (1.5) ▲ | 412 (3.5) | -18 (1.7) ▽ | 407 (3.7) | -22 (2.4) ▽ |
| Ψ Jordan | 420 (4.3) | 414 (5.0) | -7 (1.8) ▽ | 415 (4.0) | -5 (1.1) ▽ | 431 (4.4) | 11 (1.5) ▲ |
| [2] Ψ Egypt | 413 (5.2) | 416 (5.8) | 3 (1.6) | 405 (5.3) | -7 (1.6) ▽ | 411 (5.6) | -2 (1.4) |
| Ψ Oman | 411 (2.8) | 406 (2.8) | -4 (1.1) ▽ | 409 (2.5) | -2 (1.0) | 412 (2.8) | 1 (1.0) |
| Ψ Kuwait | 403 (5.0) | - - | - - | - - | - - | - - | - - |
| [2] Ψ Saudi Arabia | 394 (2.5) | - - | - - | - - | - - | - - | - - |
| Ж South Africa (9) | 389 (2.3) | - - | - - | - - | - - | - - | - - |
| Ψ Morocco | 388 (2.3) | 382 (2.9) | -6 (1.6) ▽ | 389 (2.4) | 0 (1.3) | 381 (2.9) | -7 (2.2) ▽ |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | 589 (4.2) | 14 (1.6) ▲ | 574 (4.3) | -1 (1.4) | 568 (4.2) | -8 (1.4) ▽ |
| ‡ Quebec, Canada | 543 (3.7) | 546 (3.8) | 2 (1.9) | 544 (4.1) | 1 (1.5) | 538 (3.8) | -5 (1.0) ▽ |
| [2] Dubai, UAE | 537 (2.0) | 540 (2.2) | 3 (1.1) ▲ | 532 (2.2) | -4 (1.0) ▽ | 541 (2.1) | 5 (1.1) ▲ |
| Ontario, Canada | 530 (4.3) | 518 (4.2) | -12 (1.9) ▽ | 531 (4.5) | 1 (1.3) | 540 (4.6) | 11 (2.3) ▲ |
| Ψ Western Cape, RSA (9) | 441 (4.4) | 432 (5.9) | -9 (2.3) ▽ | 442 (4.1) | 1 (1.7) | 444 (4.8) | 3 (2.4) |
| Ψ Abu Dhabi, UAE | 436 (2.9) | 440 (3.2) | 5 (1.5) ▲ | 428 (2.9) | -8 (1.3) ▽ | 441 (2.8) | 6 (0.8) ▲ |
| Ψ Gauteng, RSA (9) | 421 (3.0) | 411 (3.6) | -9 (1.2) ▽ | 423 (3.3) | 2 (2.1) | 427 (3.4) | 6 (2.5) ▲ |

▲ Subscale score significantly higher than overall mathematics score
▽ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2019 eighth grade mathematics items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.2 for target population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Trends in Average Achievement in Cognitive Domains

Exhibit 3.18 presents differences in average achievement for the three cognitive domains across four assessment cycles back to 2007, when TIMSS first began providing scaled results in the cognitive domains. Trends for countries with comparable data between assessment cycles show more countries have had increases than decreases in average achievement in each of the cognitive domains. Twenty-nine countries had comparable data in the TIMSS 2015 and TIMSS 2019 assessments for the cognitive domains. The recent trends in the knowing cognitive domain showed increases in 9 countries and decreases in 4 countries. In the applying domain, 9 countries showed increases and 3 showed decreases. In the reasoning domain, 13 showed increases and 3 showed decreases.

Between 2007 and 2019, in the knowing, applying, and reasoning domains, there were increases in average achievement in 14 countries, 14 countries, and 16 countries, respectively. There were decreases in average achievement in only 1 country in knowing and reasoning, and 2 countries in applying.

# Exhibit 3.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Australia** | | | | | | | | | | | | |
| 2019 | 511 (4.0) | 6 | 7 | 21 ▲ | 521 (3.8) | 19 ▲ | 15 ▲ | 23 ▲ | 515 (3.9) | 3 | 9 | 12 ▲ |
| 2015 | 504 (3.1) | | 0 | 15 ▲ | 502 (3.0) | | -4 | 4 | 512 (3.1) | | 6 | 9 |
| 2011 | 504 (5.2) | | | 14 ▲ | 506 (4.9) | | | 8 | 506 (5.2) | | | 3 |
| 2007 | 490 (3.9) | | | | 498 (3.8) | | | | 503 (4.0) | | | |
| **Bahrain** | | | | | | | | | | | | |
| 2019 | 471 (1.7) | 8 ▲ | 60 ▲ | 82 ▲ | 479 (1.7) | 34 ▲ | 79 ▲ | 79 ▲ | 489 (2.1) | 38 ▲ | 75 ▲ | 83 ▲ |
| 2015 | 463 (2.3) | | 52 ▲ | 74 ▲ | 445 (1.7) | | 45 ▲ | 45 ▲ | 452 (2.2) | | 37 ▲ | 46 ▲ |
| Ψ 2011 | 411 (2.4) | | | 23 ▲ | 400 (2.4) | | | 0 | 415 (2.1) | | | 9 ▲ |
| 2007 | 389 (1.8) | | | | 400 (2.4) | | | | 406 (2.4) | | | |
| **Chile** | | | | | | | | | | | | |
| Ψ 2019 | 434 (3.0) | 11 ▲ | 28 ▲ | | 438 (2.9) | 11 ▲ | 13 ▲ | | 451 (3.2) | 19 ▲ | 29 ▲ | |
| Ψ 2015 | 423 (3.4) | | 17 ▲ | | 427 (3.3) | | 2 | | 432 (3.3) | | 10 ▲ | |
| 2011 | 405 (2.9) | | | | 425 (2.6) | | | | 422 (2.9) | | | |
| **Chinese Taipei** | | | | | | | | | | | | |
| 2019 | 616 (3.0) | 18 ▲ | 5 | 12 ▲ | 610 (2.6) | 8 ▲ | -5 | 13 ▲ | 616 (2.7) | 14 ▲ | 7 | 14 ▲ |
| 2015 | 598 (2.9) | | -13 ▽ | -6 | 602 (2.5) | | -12 ▽ | 5 | 602 (2.5) | | -7 | 0 |
| 2011 | 611 (3.6) | | | 7 | 614 (3.4) | | | 17 ▲ | 609 (3.4) | | | 7 |
| 2007 | 604 (5.0) | | | | 597 (4.8) | | | | 602 (4.4) | | | |
| **Cyprus** | | | | | | | | | | | | |
| 2019 | 509 (2.0) | | | 45 ▲ | 496 (1.7) | | | 31 ▲ | 505 (2.1) | | | 47 ▲ |
| 2007 | 464 (1.8) | | | | 465 (2.0) | | | | 458 (2.6) | | | |
| **Egypt** | | | | | | | | | | | | |
| 2 Ψ 2019 | 416 (5.8) | 17 ▲ | | 31 ▲ | 405 (5.3) | 21 ▲ | | 14 ▲ | 411 (5.6) | 32 ▲ | | 25 ▲ |
| Ψ 2015 | 399 (4.3) | | | 14 ▲ | 385 (3.9) | | | -6 | 379 (4.3) | | | -7 |
| 2007 | 385 (3.7) | | | | 391 (3.9) | | | | 386 (3.7) | | | |
| **England** | | | | | | | | | | | | |
| 2019 | 510 (5.5) | -3 | 9 | 3 | 518 (5.3) | -1 | 10 | 4 | 512 (5.7) | -10 | 2 | -6 |
| 2015 | 513 (4.1) | | 12 | 5 | 519 (4.1) | | 11 | 6 | 522 (4.4) | | 12 | 4 |
| ‡ 2011 | 501 (5.5) | | | -6 | 508 (5.6) | | | -5 | 510 (5.6) | | | -8 |
| † 2007 | 508 (4.7) | | | | 514 (5.1) | | | | 518 (5.1) | | | |
| **Finland** | | | | | | | | | | | | |
| 2019 | 505 (2.5) | | -3 | | 510 (2.7) | | -10 ▽ | | 506 (2.9) | | -5 | |
| 2011 | 508 (2.4) | | | | 520 (2.5) | | | | 512 (2.7) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | |
| † 2019 | 580 (4.0) | -20 ▽ | -11 | -3 | 575 (4.0) | -20 ▽ | -12 ▽ | 3 | 582 (4.4) | -9 | 2 | 15 ▲ |
| 2015 | 600 (5.1) | | 9 | 17 ▲ | 595 (4.5) | | 8 | 23 ▲ | 591 (5.1) | | 11 | 24 ▲ |
| 2011 | 591 (4.1) | | | 8 | 587 (3.8) | | | 15 ▲ | 580 (4.0) | | | 13 |
| † 2007 | 583 (6.0) | | | | 572 (6.2) | | | | 567 (6.1) | | | |
| **Hungary** | | | | | | | | | | | | |
| 2019 | 516 (3.1) | 5 | 9 | -6 | 517 (3.0) | 1 | 12 ▲ | 3 | 512 (3.0) | -3 | 10 ▲ | -2 |
| 2015 | 511 (3.9) | | 4 | -10 | 516 (3.8) | | 11 ▲ | 3 | 515 (3.9) | | 13 ▲ | 0 |
| 2011 | 507 (3.9) | | | -15 ▽ | 505 (3.6) | | | -9 | 502 (3.8) | | | -13 ▽ |
| 2007 | 522 (3.7) | | | | 513 (3.5) | | | | 515 (3.7) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | |
| 2019 | 441 (4.2) | 5 | 30 ▲ | 43 ▲ | 443 (3.5) | 8 | 31 ▲ | 43 ▲ | 457 (4.0) | 21 ▲ | 29 ▲ | 40 ▲ |
| Ψ 2015 | 435 (4.9) | | 25 ▲ | 38 ▲ | 434 (4.4) | | 23 ▲ | 35 ▲ | 436 (4.7) | | 8 | 19 ▲ |
| Ψ 2011 | 410 (4.4) | | | 13 ▲ | 411 (4.6) | | | 12 | 428 (4.3) | | | 11 |
| 2007 | 397 (4.3) | | | | 399 (4.4) | | | | 417 (3.9) | | | |
| **Ireland** | | | | | | | | | | | | |
| 2019 | 530 (2.8) | 3 | | | 526 (2.7) | 6 | | | 508 (3.4) | -13 ▽ | | |
| 2015 | 527 (3.0) | | | | 520 (3.0) | | | | 521 (3.1) | | | |
| **Israel** | | | | | | | | | | | | |
| 3 2019 | 516 (4.8) | 5 | 0 | | 519 (4.2) | 7 | 6 | | 525 (4.7) | 15 ▲ | 5 | |
| 3 2015 | 511 (4.2) | | -5 | | 512 (4.0) | | -1 | | 510 (4.4) | | -10 | |
| 3 2011 | 516 (4.2) | | | | 513 (4.4) | | | | 520 (4.2) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in cognitive domains using current methodology began with TIMSS 2007.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Italy** | | | | | | | | | | | | |
| 2019 | 492 (2.8) | 4 | -2 | 19 ▲ | 497 (2.4) | 2 | -6 | 14 ▲ | 505 (3.6) | 5 | 8 | 22 ▲ |
| 2 2015 | 489 (2.7) | | -5 | 15 ▲ | 495 (2.6) | | -8 ▽ | 13 ▲ | 500 (2.8) | | 4 | 18 ▲ |
| 2011 | 494 (2.7) | | | 20 ▲ | 503 (2.3) | | | 20 ▲ | 496 (2.6) | | | 14 ▲ |
| 2007 | 474 (3.4) | | | | 482 (3.0) | | | | 482 (3.4) | | | |
| **Japan** | | | | | | | | | | | | |
| 2019 | 589 (3.1) | 11 ▲ | 31 ▲ | 20 ▲ | 596 (2.8) | 5 | 22 ▲ | 28 ▲ | 599 (3.2) | 8 ▲ | 20 ▲ | 22 ▲ |
| 2015 | 578 (2.6) | | 20 ▲ | 9 ▲ | 592 (2.3) | | 17 ▲ | 23 ▲ | 591 (2.6) | | 12 ▲ | 14 ▲ |
| 2011 | 558 (2.8) | | | -11 ▽ | 574 (2.5) | | | 6 | 579 (3.0) | | | 2 |
| 2007 | 569 (2.9) | | | | 568 (2.3) | | | | 577 (2.6) | | | |
| **Jordan** | | | | | | | | | | | | |
| Ψ 2019 | 414 (5.0) | 23 ▲ | 9 | -12 | 415 (4.0) | 37 ▲ | 18 ▲ | -6 | 431 (4.4) | 51 ▲ | 16 ▲ | -3 |
| Ж 2015 | 391 (3.2) | | -14 ▽ | -35 ▽ | 378 (3.2) | | -19 ▽ | -43 ▽ | 380 (3.3) | | -36 ▽ | -55 ▽ |
| Ψ 2011 | 405 (4.2) | | | -20 ▽ | 397 (3.7) | | | -24 ▽ | 416 (4.0) | | | -19 ▽ |
| 2007 | 425 (4.5) | | | | 421 (4.5) | | | | 434 (4.1) | | | |
| **Kazakhstan** | | | | | | | | | | | | |
| 2 2019 | 488 (3.7) | | -1 | | 486 (3.2) | | 2 | | 487 (3.4) | | 5 | |
| 2011 | 489 (4.4) | | | | 484 (4.3) | | | | 482 (4.9) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | |
| 2019 | 614 (3.2) | 7 | -2 | 6 | 604 (2.7) | -2 | -12 ▽ | 4 | 609 (3.0) | 1 | -3 | 17 ▲ |
| 2015 | 607 (2.8) | | -9 ▽ | -1 | 606 (2.8) | | -10 ▽ | 6 | 608 (2.7) | | -5 | 15 ▲ |
| 2011 | 616 (3.1) | | | 8 | 617 (2.8) | | | 16 ▲ | 612 (2.6) | | | 20 ▲ |
| 2007 | 608 (3.1) | | | | 600 (2.8) | | | | 592 (2.5) | | | |
| **Lebanon** | | | | | | | | | | | | |
| 2019 | 456 (2.9) | 0 | -8 | -1 | 412 (3.5) | -27 ▽ | -24 ▽ | -35 ▽ | 407 (3.7) | 1 | -19 ▽ | -16 ▽ |
| 2015 | 456 (3.8) | | -8 | -1 | 439 (3.9) | | 3 | -8 | 406 (4.5) | | -20 ▽ | -17 ▽ |
| 2011 | 464 (3.9) | | | 7 | 436 (4.1) | | | -11 | 426 (4.6) | | | 3 |
| 2007 | 457 (4.2) | | | | 447 (4.5) | | | | 423 (4.7) | | | |
| **Lithuania** | | | | | | | | | | | | |
| 2019 | 518 (2.8) | 16 ▲ | 17 ▲ | 9 ▲ | 524 (3.1) | 4 | 16 ▲ | 13 ▲ | 514 (3.6) | 13 ▲ | 21 ▲ | 27 ▲ |
| 2 2015 | 502 (3.1) | | 0 | -7 | 520 (2.6) | | 12 ▲ | 9 ▲ | 501 (3.0) | | 9 ▲ | 14 ▲ |
| 1 2011 | 502 (2.6) | | | -8 ▽ | 508 (2.4) | | | -3 | 493 (2.6) | | | 6 |
| 1 2007 | 509 (2.7) | | | | 511 (2.5) | | | | 487 (2.8) | | | |
| **Malaysia** | | | | | | | | | | | | |
| 2019 | 451 (3.8) | -21 ▽ | 7 | -22 ▽ | 464 (3.1) | 0 | 25 ▲ | -13 ▽ | 462 (3.1) | 9 | 35 ▲ | -4 |
| 2015 | 472 (3.8) | | 28 ▲ | -1 | 463 (3.6) | | 24 ▲ | -14 ▽ | 453 (3.7) | | 27 ▲ | -13 ▽ |
| 2011 | 444 (5.8) | | | -29 ▽ | 439 (5.3) | | | -38 ▽ | 426 (5.6) | | | -40 ▽ |
| 2007 | 473 (5.4) | | | | 477 (5.2) | | | | 466 (4.6) | | | |
| **Morocco** | | | | | | | | | | | | |
| Ψ 2019 | 382 (2.9) | 0 | 19 ▲ | | 389 (2.4) | 3 | 11 ▲ | | 381 (2.9) | 7 | 24 ▲ | |
| Ж 2015 | 382 (2.4) | | 19 ▲ | | 385 (2.2) | | 7 ▲ | | 374 (2.8) | | 17 ▲ | |
| Ж 2011 | 363 (2.3) | | | | 378 (2.0) | | | | 357 (2.8) | | | |
| **New Zealand** | | | | | | | | | | | | |
| † 2019 | 468 (3.5) | -20 ▽ | -13 ▽ | | 486 (3.1) | -7 | -5 | | 486 (3.4) | -12 ▽ | -7 | |
| † 2015 | 488 (3.4) | | 7 | | 493 (3.3) | | 2 | | 499 (3.5) | | 5 | |
| 2011 | 481 (5.7) | | | | 491 (5.2) | | | | 494 (5.5) | | | |
| **Norway (9)** | | | | | | | | | | | | |
| † 2019 | 499 (2.3) | -1 | | | 504 (2.7) | -13 ▽ | | | 496 (2.8) | -20 ▽ | | |
| 2015 | 500 (2.3) | | | | 516 (2.3) | | | | 516 (2.5) | | | |
| **Oman** | | | | | | | | | | | | |
| Ψ 2019 | 406 (2.8) | 5 | 42 ▲ | 41 ▲ | 409 (2.5) | 8 ▲ | 49 ▲ | 44 ▲ | 412 (2.8) | 10 ▲ | 43 ▲ | 23 ▲ |
| Ψ 2015 | 401 (3.1) | | 37 ▲ | 36 ▲ | 401 (2.5) | | 41 ▲ | 36 ▲ | 402 (3.1) | | 33 ▲ | 14 ▲ |
| Ψ 2011 | 365 (3.0) | | | -1 | 360 (3.0) | | | -5 | 369 (3.0) | | | -20 ▽ |
| 2007 | 366 (3.6) | | | | 365 (3.1) | | | | 389 (3.1) | | | |
| **Qatar** | | | | | | | | | | | | |
| Ψ 2019 | 443 (4.6) | 3 | 25 ▲ | | 438 (4.1) | 3 | 41 ▲ | | 448 (3.8) | 16 ▲ | 41 ▲ | |
| Ψ 2015 | 440 (3.1) | | 22 ▲ | | 435 (2.9) | | 39 ▲ | | 431 (2.8) | | 25 ▲ | |
| Ψ 2011 | 418 (3.0) | | | | 396 (3.4) | | | | 406 (3.6) | | | |
| **Romania** | | | | | | | | | | | | |
| 2019 | 482 (5.0) | | 22 ▲ | 18 ▲ | 475 (4.1) | | 22 ▲ | 14 ▲ | 481 (4.5) | | 25 ▲ | 36 ▲ |
| 2011 | 460 (4.5) | | | -4 | 454 (4.0) | | | -7 | 455 (4.2) | | | 11 |
| 2007 | 464 (4.5) | | | | 461 (4.2) | | | | 445 (4.9) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 3.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Russian Federation** | | | | | | | | | | | | |
| 2 2019 | 550 (5.2) | 7 | 1 | 29 ▲ | 543 (4.5) | 2 | 5 | 33 ▲ | 536 (4.8) | 9 | 5 | 37 ▲ |
| 2015 | 543 (5.6) | | -5 | 22 ▲ | 541 (4.6) | | 3 | 31 ▲ | 528 (5.0) | | -4 | 28 ▲ |
| 2 2011 | 548 (3.8) | | | 28 ▲ | 538 (3.6) | | | 28 ▲ | 531 (3.8) | | | 32 ▲ |
| 2007 | 521 (4.5) | | | | 510 (3.9) | | | | 499 (4.0) | | | |
| **Singapore** | | | | | | | | | | | | |
| 2 2019 | 614 (4.3) | -19 ▽ | -3 | 22 ▲ | 614 (3.8) | -5 | 1 | 17 ▲ | 620 (4.5) | 4 | 16 ▲ | 31 ▲ |
| 2 2015 | 633 (3.4) | | 16 ▲ | 41 ▲ | 619 (3.2) | | 7 | 22 ▲ | 616 (3.7) | | 12 ▲ | 27 ▲ |
| 2 2011 | 617 (3.9) | | | 25 ▲ | 613 (4.0) | | | 16 ▲ | 604 (4.3) | | | 15 ▲ |
| 2007 | 592 (3.7) | | | | 597 (3.9) | | | | 589 (4.5) | | | |
| **Sweden** | | | | | | | | | | | | |
| 2 2019 | 496 (2.6) | 12 ▲ | 18 ▲ | 16 ▲ | 501 (2.6) | -6 | 12 ▲ | 6 | 514 (2.9) | 4 | 36 ▲ | 21 ▲ |
| 2015 | 484 (2.8) | | 7 | 4 | 507 (2.8) | | 17 ▲ | 12 ▲ | 509 (3.5) | | 32 ▲ | 17 ▲ |
| 2011 | 478 (2.0) | | | -2 | 489 (2.2) | | | -6 | 478 (2.4) | | | -15 ▽ |
| 2007 | 480 (2.2) | | | | 495 (2.2) | | | | 493 (2.8) | | | |
| **Turkey** | | | | | | | | | | | | |
| 2019 | 494 (5.0) | 47 ▲ | 54 ▲ | | 491 (4.0) | 32 ▲ | 33 ▲ | | 504 (4.1) | 32 ▲ | 39 ▲ | |
| 2015 | 447 (4.9) | | 7 | | 460 (4.3) | | 1 | | 472 (4.8) | | 7 | |
| 2011 | 441 (4.2) | | | | 459 (4.0) | | | | 465 (3.7) | | | |
| **United Arab Emirates** | | | | | | | | | | | | |
| 2019 | 478 (1.9) | 3 | 11 ▲ | | 466 (1.8) | 8 ▲ | 24 ▲ | | 479 (1.9) | 18 ▲ | 30 ▲ | |
| 2015 | 476 (2.2) | | 9 ▲ | | 457 (2.1) | | 16 ▲ | | 461 (2.2) | | 12 ▲ | |
| 2011 | 467 (2.2) | | | | 442 (2.3) | | | | 449 (2.2) | | | |
| **United States** | | | | | | | | | | | | |
| † 2019 | 522 (5.2) | -6 | 3 | 5 | 515 (4.9) | 0 | 12 ▲ | 13 ▲ | 507 (4.6) | -7 | 4 | 1 |
| † 2015 | 528 (3.5) | | 9 ▲ | 11 ▲ | 515 (3.2) | | 12 ▲ | 13 ▲ | 514 (3.1) | | 11 ▲ | 8 |
| 2 2011 | 519 (2.7) | | | 2 | 503 (2.9) | | | 1 | 503 (2.7) | | | -3 |
| 2 † 2007 | 517 (2.9) | | | | 502 (3.1) | | | | 506 (2.8) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | |
| 2019 | 518 (4.2) | 5 | 15 ▲ | 9 | 531 (4.5) | 8 | 21 ▲ | 13 ▲ | 540 (4.6) | 6 | 16 ▲ | 15 ▲ |
| 2015 | 513 (3.0) | | 10 ▲ | 4 | 522 (2.8) | | 12 ▲ | 4 | 534 (3.1) | | 10 ▲ | 9 |
| 2 2011 | 503 (2.6) | | | -6 | 510 (2.3) | | | -8 | 524 (2.7) | | | -1 |
| 2 2007 | 509 (3.6) | | | | 518 (4.0) | | | | 526 (3.8) | | | |
| **Quebec, Canada** | | | | | | | | | | | | |
| ‡ 2019 | 546 (3.8) | 5 | 18 ▲ | 21 ▲ | 544 (4.1) | -2 | 9 | 15 ▲ | 538 (3.8) | 0 | 9 | 9 |
| ≡ 2015 | 541 (4.2) | | 13 ▲ | 16 ▲ | 546 (4.0) | | 11 ▲ | 17 ▲ | 538 (4.2) | | 9 | 10 |
| 2011 | 528 (2.9) | | | 4 | 536 (2.7) | | | 6 | 529 (2.7) | | | 1 |
| 3 2007 | 524 (3.1) | | | | 529 (3.3) | | | | 528 (3.5) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | |
| Ψ 2019 | 440 (3.2) | -13 ▽ | -19 ▽ | | 428 (2.9) | -6 | -6 | | 441 (2.8) | 1 | -1 | |
| 2015 | 453 (4.8) | | -6 | | 434 (4.7) | | -1 | | 440 (4.7) | | -2 | |
| 2011 | 459 (3.8) | | | | 434 (4.3) | | | | 442 (4.2) | | | |
| **Dubai, UAE** | | | | | | | | | | | | |
| 2 2019 | 540 (2.2) | 19 ▲ | 52 ▲ | 75 ▲ | 532 (2.2) | 27 ▲ | 67 ▲ | 78 ▲ | 541 (2.1) | 32 ▲ | 72 ▲ | 82 ▲ |
| 2015 | 521 (2.3) | | 33 ▲ | 56 ▲ | 505 (2.5) | | 40 ▲ | 51 ▲ | 509 (2.8) | | 40 ▲ | 50 ▲ |
| 2011 | 488 (2.4) | | | 23 ▲ | 465 (2.5) | | | 11 ▲ | 470 (2.7) | | | 10 ▲ |
| ‡ 2007 | 465 (2.6) | | | | 454 (3.2) | | | | 460 (3.0) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Cognitive Domains by Gender

Exhibit 3.19 shows the differences between girls' and boys' average achievement in the cognitive domains of knowing, applying, and reasoning. In the knowing domain, girls had higher average achievement than boys in 8 countries, and boys had higher achievement than girls in 5 countries. In the applying domain, girls had higher average achievement than boys in 5 countries, and boys had higher average achievement than girls in 8 countries. In reasoning, girls had higher average achievement than boys in 8 countries compared with 3 countries where boys had higher average achievement.

## Exhibit 3.19: Average Achievement in Mathematics Cognitive Domains by Gender

| Country | Knowing (64 Items) | | Applying (96 Items) | | Reasoning (46 Items) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Australia | 509 (3.7) | 513 (5.8) | 519 (3.6) | 524 (5.6) | 512 (4.0) | 517 (5.7) |
| Bahrain | 484 (2.8) ▲ | 459 (2.2) | 489 (2.7) ▲ | 469 (2.2) | 501 (2.9) ▲ | 478 (2.5) |
| Ψ Chile | 428 (3.8) | 439 (4.1) ▲ | 433 (3.9) | 442 (3.9) | 447 (3.9) | 454 (4.4) |
| Chinese Taipei | 619 (3.4) | 613 (3.7) | 611 (3.0) | 609 (3.2) | 616 (3.0) | 616 (3.2) |
| Cyprus | 510 (3.5) | 507 (2.9) | 497 (2.3) | 495 (2.3) | 509 (3.4) ▲ | 501 (2.5) |
| 2 Ψ Egypt | 426 (5.8) ▲ | 404 (8.9) | 411 (5.6) | 399 (7.7) | 421 (6.0) ▲ | 399 (8.6) |
| England | 507 (6.1) | 514 (7.3) | 519 (5.7) | 517 (7.2) | 512 (6.1) | 512 (7.8) |
| Finland | 506 (2.8) | 504 (3.0) | 513 (2.9) | 508 (3.3) | 509 (3.2) | 504 (3.5) |
| France | 470 (2.7) | 476 (3.6) | 480 (2.7) | 490 (3.6) ▲ | 487 (2.5) | 491 (3.3) |
| 1 Georgia | - - | - - | - - | - - | - - | - - |
| † Hong Kong SAR | 584 (5.0) | 577 (5.3) | 580 (5.1) | 572 (5.4) | 584 (5.7) | 580 (5.8) |
| Hungary | 509 (3.5) | 523 (3.8) ▲ | 509 (3.4) | 524 (3.6) ▲ | 504 (3.5) | 521 (3.6) ▲ |
| Iran, Islamic Rep. of | 452 (5.7) ▲ | 431 (6.5) | 446 (4.7) | 440 (5.1) | 466 (5.2) ▲ | 450 (6.0) |
| Ireland | 533 (3.4) | 528 (3.6) | 527 (2.9) | 526 (3.6) | 507 (3.5) | 509 (4.3) |
| 3 Israel | 511 (5.3) | 521 (5.6) ▲ | 513 (4.2) | 525 (5.2) ▲ | 520 (4.6) | 530 (6.4) |
| Italy | 487 (2.9) | 497 (3.9) ▲ | 490 (2.9) | 504 (3.0) ▲ | 500 (4.4) | 510 (4.1) ▲ |
| Japan | 589 (3.6) | 589 (3.5) | 594 (3.0) | 598 (3.2) | 598 (3.3) | 600 (3.6) |
| Ψ Jordan | 428 (4.5) ▲ | 400 (7.6) | 425 (3.7) ▲ | 406 (6.1) | 446 (4.0) ▲ | 418 (6.8) |
| 2 Kazakhstan | 492 (4.4) | 485 (4.3) | 488 (3.6) | 485 (3.7) | 490 (4.1) | 484 (4.1) |
| Korea, Rep. of | 612 (4.2) | 616 (3.5) | 602 (3.5) | 606 (2.9) | 606 (3.3) | 612 (3.7) |
| Ψ Kuwait | - - | - - | - - | - - | - - | - - |
| Lebanon | 453 (3.7) | 458 (3.1) | 407 (4.5) | 417 (3.6) ▲ | 408 (4.1) | 406 (4.8) |
| Lithuania | 518 (2.9) | 519 (3.8) | 523 (3.3) | 525 (3.6) | 513 (3.9) | 514 (4.2) |
| Malaysia | 457 (4.2) ▲ | 446 (4.8) | 468 (3.1) ▲ | 459 (4.2) | 462 (3.7) | 461 (3.7) |
| Ψ Morocco | 382 (2.9) | 382 (3.5) | 384 (2.5) | 394 (2.9) ▲ | 381 (3.6) | 382 (3.1) |
| † New Zealand | 462 (3.7) | 473 (5.2) | 483 (3.5) | 489 (4.6) | 483 (3.4) | 489 (5.0) |
| † Norway (9) | 500 (2.8) | 499 (2.9) | 504 (2.8) | 503 (3.4) | 496 (3.2) | 497 (3.3) |
| Ψ Oman | 432 (3.5) ▲ | 382 (4.8) | 427 (3.1) ▲ | 392 (3.8) | 436 (3.4) ▲ | 390 (4.2) |
| Portugal | 493 (3.7) | 504 (4.3) ▲ | 492 (3.6) | 501 (4.3) ▲ | 501 (3.8) | 514 (3.8) ▲ |
| Ψ Qatar | 444 (5.5) | 442 (6.1) | 442 (5.4) | 433 (5.7) | 453 (4.8) | 442 (5.1) |
| Romania | 490 (5.5) ▲ | 474 (6.2) | 482 (4.6) ▲ | 468 (4.6) | 490 (5.2) ▲ | 470 (4.8) |
| 2 Russian Federation | 549 (5.6) | 550 (5.6) | 538 (4.8) | 547 (4.8) ▲ | 533 (5.4) | 540 (5.1) |
| 2 Ψ Saudi Arabia | - - | - - | - - | - - | - - | - - |
| 2 Singapore | 618 (5.0) | 611 (4.8) | 616 (4.4) | 613 (4.2) | 622 (5.0) | 619 (5.1) |
| Ж South Africa (9) | - - | - - | - - | - - | - - | - - |
| 2 Sweden | 497 (3.6) | 495 (2.9) | 501 (3.3) | 501 (3.1) | 516 (3.7) | 511 (3.3) |
| Turkey | 503 (5.2) ▲ | 485 (6.7) | 494 (4.4) | 488 (5.4) | 511 (4.6) ▲ | 497 (5.4) |
| United Arab Emirates | 483 (3.6) | 474 (3.5) | 468 (3.4) | 464 (3.4) | 482 (3.4) | 476 (3.4) |
| † United States | 525 (4.4) | 519 (6.6) | 517 (4.1) | 513 (6.3) | 508 (3.9) | 507 (5.8) |
| **International Average** | **499 (0.7) ▲** | **494 (0.8)** | **497 (0.6)** | **496 (0.8)** | **501 (0.7) ▲** | **497 (0.8)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 518 (4.1) | 518 (5.0) | 529 (4.5) | 532 (4.9) | 538 (4.9) | 543 (4.9) |
| ‡ Quebec, Canada | 543 (4.3) | 548 (4.2) | 543 (4.6) | 546 (4.5) | 533 (4.5) | 543 (4.3) ▲ |
| Moscow City, Russian Fed. | 582 (4.3) | 596 (5.0) ▲ | 564 (4.4) | 583 (5.0) ▲ | 558 (4.2) | 576 (5.2) ▲ |
| Ψ Gauteng, RSA (9) | 417 (4.1) ▲ | 405 (3.9) | 424 (3.6) | 420 (3.7) | 429 (3.7) | 424 (3.7) |
| Ψ Western Cape, RSA (9) | 429 (6.3) | 437 (7.2) | 436 (4.8) | 449 (5.1) ▲ | 439 (5.2) | 451 (5.9) ▲ |
| Ψ Abu Dhabi, UAE | 448 (5.8) | 434 (4.4) | 433 (5.5) | 424 (4.4) | 447 (5.2) | 436 (4.2) |
| 2 Dubai, UAE | 537 (5.0) | 543 (6.3) | 527 (5.0) | 538 (6.1) | 537 (4.9) | 546 (5.9) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 eighth grade mathematics items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Science Grade 8

## Average Science Achievement

### Average Achievement and Scale Score Distributions

The TIMSS 2019 eighth grade science assessment was based on a comprehensive assessment framework developed collaboratively with the participating countries to reflect their curricular goals. The eighth grade science assessment included four content areas—biology (35%), chemistry (20%), physics (25%), and Earth science (20%). In accordance with the framework, the majority of TIMSS 2019 science items assessed eighth grade students' applying and reasoning skills, and there is a cross-cutting inquiry strand. To cover the framework at the eighth grade, the TIMSS 2019 science assessment comprised 220 assessment items. This cycle marked the beginning of the transition to a computer-based assessment system. More than half of the TIMSS 2019 countries administered the assessment in an "e" (electronic) format and almost half administered the assessment in a paper format, as in TIMSS 2015. The "e" countries also administered the trend items in the paper format to provide a bridge to the TIMSS 2015 and TIMSS 2019 paper-based assessments. The assessment was carefully designed and analyzed, so that the TIMSS 2019 science achievement results for all 39 countries are reported on the same TIMSS eighth grade science scale.

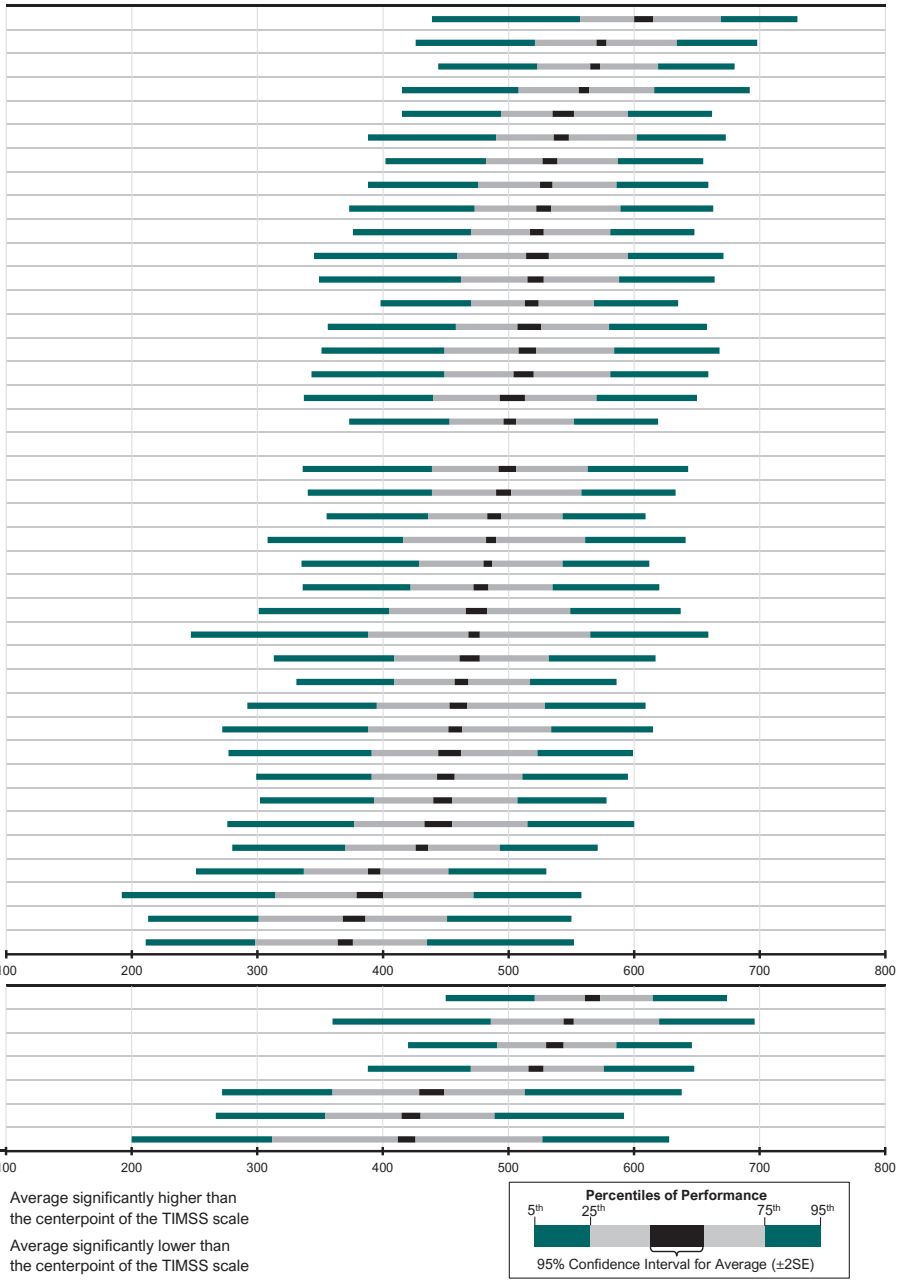
Exhibit 4.1 presents the average achievement at the eighth grade for each participating country (from highest to lowest) together with the scale score distribution underlying the average scale score. Exhibit 4.2 shows whether relatively small differences in average achievement between one country and the next are statistically significant.

Singapore had the highest average achievement, followed by Chinese Taipei and Japan, whose students performed similarly and had higher average achievement than all of the other countries. These three countries were followed by Korea, whose eighth grade students had higher average achievement than students in all of the other countries except the three top-performing countries. Next, the Russian Federation and Finland, followed by Lithuania, and then by Hungary and Australia, and then Ireland and the United States, all performed very well. Essentially, Exhibit 4.2 shows clusters of several similarly performing countries, followed by the next highest achieving clusters of similarly performing countries, and so on.

A number of eighth grade TIMSS 2019 participants performed well. Sixteen countries (including those discussed above) had higher average achievement than the centerpoint of 500 (Exhibit 4.1), which is a point of reference on the TIMSS eighth grade science scale that remains constant from TIMSS assessment to TIMSS assessment. However, there was a considerable difference between the highest average achievement and the lowest. Also, the scale score distributions in Exhibit 4.1 show that there is wide variation in achievement in every country. Every country has some higher achieving and some lower achieving students.

## Exhibit 4.1: Average Science Achievement and Scale Score Distributions

| Country | Average Scale Score | |
|---|---|---|
| [2] Singapore | 608 (3.9) | ▲ |
| Chinese Taipei | 574 (1.9) | ▲ |
| Japan | 570 (2.1) | ▲ |
| Korea, Rep. of | 561 (2.1) | ▲ |
| [2] Russian Federation | 543 (4.2) | ▲ |
| Finland | 543 (3.1) | ▲ |
| Lithuania | 534 (3.0) | ▲ |
| Hungary | 530 (2.6) | ▲ |
| Australia | 528 (3.2) | ▲ |
| Ireland | 523 (2.9) | ▲ |
| † United States | 522 (4.7) | ▲ |
| [2] Sweden | 521 (3.2) | ▲ |
| Portugal | 519 (2.9) | ▲ |
| England | 517 (4.8) | ▲ |
| Turkey | 515 (3.7) | ▲ |
| [3] Israel | 513 (4.2) | ▲ |
| † Hong Kong SAR | 504 (5.2) | |
| Italy | 500 (2.6) | |
| **TIMSS Scale Centerpoint** | **500** | |
| † New Zealand | 499 (3.5) | |
| † Norway (9) | 495 (3.1) | |
| France | 489 (2.7) | ▽ |
| Bahrain | 486 (1.9) | ▽ |
| Cyprus | 484 (1.9) | ▽ |
| [2] Kazakhstan | 478 (3.1) | ▽ |
| Qatar | 475 (4.4) | ▽ |
| United Arab Emirates | 473 (2.2) | ▽ |
| Romania | 470 (4.2) | ▽ |
| Chile | 462 (2.9) | ▽ |
| Malaysia | 460 (3.5) | ▽ |
| Oman | 457 (2.9) | ▽ |
| Jordan | 452 (4.7) | ▽ |
| Iran, Islamic Rep. of | 449 (3.6) | ▽ |
| [1] Georgia | 447 (3.9) | ▽ |
| Kuwait | 444 (5.7) | ▽ |
| [2] Saudi Arabia | 431 (2.6) | ▽ |
| Morocco | 394 (2.7) | ▽ |
| [2] Egypt | 389 (5.4) | ▽ |
| Lebanon | 377 (4.6) | ▽ |
| Ψ South Africa (9) | 370 (3.1) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 567 (2.9) | ▲ |
| [2] Dubai, UAE | 548 (2.0) | ▲ |
| ‡ Quebec, Canada | 537 (3.6) | ▲ |
| Ontario, Canada | 522 (3.0) | ▲ |
| Western Cape, RSA (9) | 439 (5.1) | ▽ |
| Gauteng, RSA (9) | 422 (3.9) | ▽ |
| Abu Dhabi, UAE | 420 (3.6) | ▽ |




The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the distribution.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 4.2: Significance of Differences Between Countries' Average Science Achievement

Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly higher (▲) than that of the comparison country, significantly lower (▽), or if there is no statistically significant difference.

| Country | Average Scale Score | Singapore | Chinese Taipei | Japan | Korea, Rep. of | Russian Federation | Finland | Lithuania | Hungary | Australia | Ireland | United States | Sweden | Portugal | England | Turkey | Israel | Hong Kong SAR | Italy | New Zealand | Norway (9) | France | Bahrain | Cyprus | Kazakhstan | Qatar | United Arab Emirates | Romania | Chile | Malaysia | Oman | Jordan | Iran, Islamic Rep. of | Georgia | Kuwait |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 574 (1.9) | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 570 (2.1) | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 561 (2.1) | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 543 (4.2) | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Finland | 543 (3.1) | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 534 (3.0) | ▽ | ▽ | ▽ | ▽ | | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hungary | 530 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Australia | 528 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ireland | 523 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United States | 522 (4.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Sweden | 521 (3.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Portugal | 519 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| England | 517 (4.8) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Turkey | 515 (3.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Israel | 513 (4.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Hong Kong SAR | 504 (5.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Italy | 500 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| New Zealand | 499 (3.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Norway (9) | 495 (3.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| France | 489 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Bahrain | 486 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Cyprus | 484 (1.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Kazakhstan | 478 (3.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Qatar | 475 (4.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| United Arab Emirates | 473 (2.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Romania | 470 (4.2) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | ▲ | ▲ | ▲ | ▲ |
| Chile | 462 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ |
| Malaysia | 460 (3.5) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ | ▲ |
| Oman | 457 (2.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | ▲ | ▲ |
| Jordan | 452 (4.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | |
| Iran, Islamic Rep. of | 449 (3.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | |
| Georgia | 447 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | |
| Kuwait | 444 (5.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | |
| Saudi Arabia | 431 (2.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Morocco | 394 (2.7) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Egypt | 389 (5.4) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Lebanon | 377 (4.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (9) | 370 (3.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 548 (2.0) | ▽ | ▽ | ▽ | ▽ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 537 (3.6) | ▽ | ▽ | ▽ | ▽ | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | 522 (3.0) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Western Cape, RSA (9) | 439 (5.1) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | | | | |
| Gauteng, RSA (9) | 422 (3.9) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Abu Dhabi, UAE | 420 (3.6) | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.2: Significance of Differences Between Countries' Average Science Achievement

(Continued)

| Country | Average Scale Score | Saudi Arabia | Morocco | Egypt | Lebanon | South Africa (9) | Benchmarking Participants | Moscow City, Russian Fed. | Dubai, UAE | Quebec, Canada | Ontario, Canada | Western Cape, RSA (9) | Gauteng, RSA (9) | Abu Dhabi, UAE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Chinese Taipei | 574 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Japan | 570 (2.1) | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Korea, Rep. of | 561 (2.1) | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Russian Federation | 543 (4.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | | | ▲ | ▲ | ▲ | ▲ |
| Finland | 543 (3.1) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | | | ▲ | ▲ | ▲ | ▲ |
| Lithuania | 534 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Hungary | 530 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Australia | 528 (3.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | | | ▲ | ▲ | ▲ |
| Ireland | 523 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| United States | 522 (4.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Sweden | 521 (3.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Portugal | 519 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| England | 517 (4.8) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Turkey | 515 (3.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Israel | 513 (4.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Hong Kong SAR | 504 (5.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Italy | 500 (2.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| New Zealand | 499 (3.5) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Norway (9) | 495 (3.1) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| France | 489 (2.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Bahrain | 486 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Cyprus | 484 (1.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Kazakhstan | 478 (3.1) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Qatar | 475 (4.4) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| United Arab Emirates | 473 (2.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Romania | 470 (4.2) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Chile | 462 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Malaysia | 460 (3.5) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Oman | 457 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▲ | ▲ | ▲ |
| Jordan | 452 (4.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Iran, Islamic Rep. of | 449 (3.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Georgia | 447 (3.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Kuwait | 444 (5.7) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Saudi Arabia | 431 (2.6) | | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Morocco | 394 (2.7) | ▽ | | | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Egypt | 389 (5.4) | ▽ | | | | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| Lebanon | 377 (4.6) | ▽ | ▽ | | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| South Africa (9) | 370 (3.1) | ▽ | ▽ | ▽ | | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Dubai, UAE | 548 (2.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | | ▲ | ▲ | ▲ | ▲ | ▲ |
| Quebec, Canada | 537 (3.6) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | | ▲ | ▲ | ▲ | ▲ |
| Ontario, Canada | 522 (3.0) | ▲ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | | ▲ | ▲ | ▲ |
| Western Cape, RSA (9) | 439 (5.1) | | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | | ▲ | ▲ |
| Gauteng, RSA (9) | 422 (3.9) | ▽ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | | |
| Abu Dhabi, UAE | 420 (3.6) | ▽ | ▲ | ▲ | ▲ | ▲ | | ▽ | ▽ | ▽ | ▽ | ▽ | | |

▲ Average achievement significantly higher than comparison country
▽ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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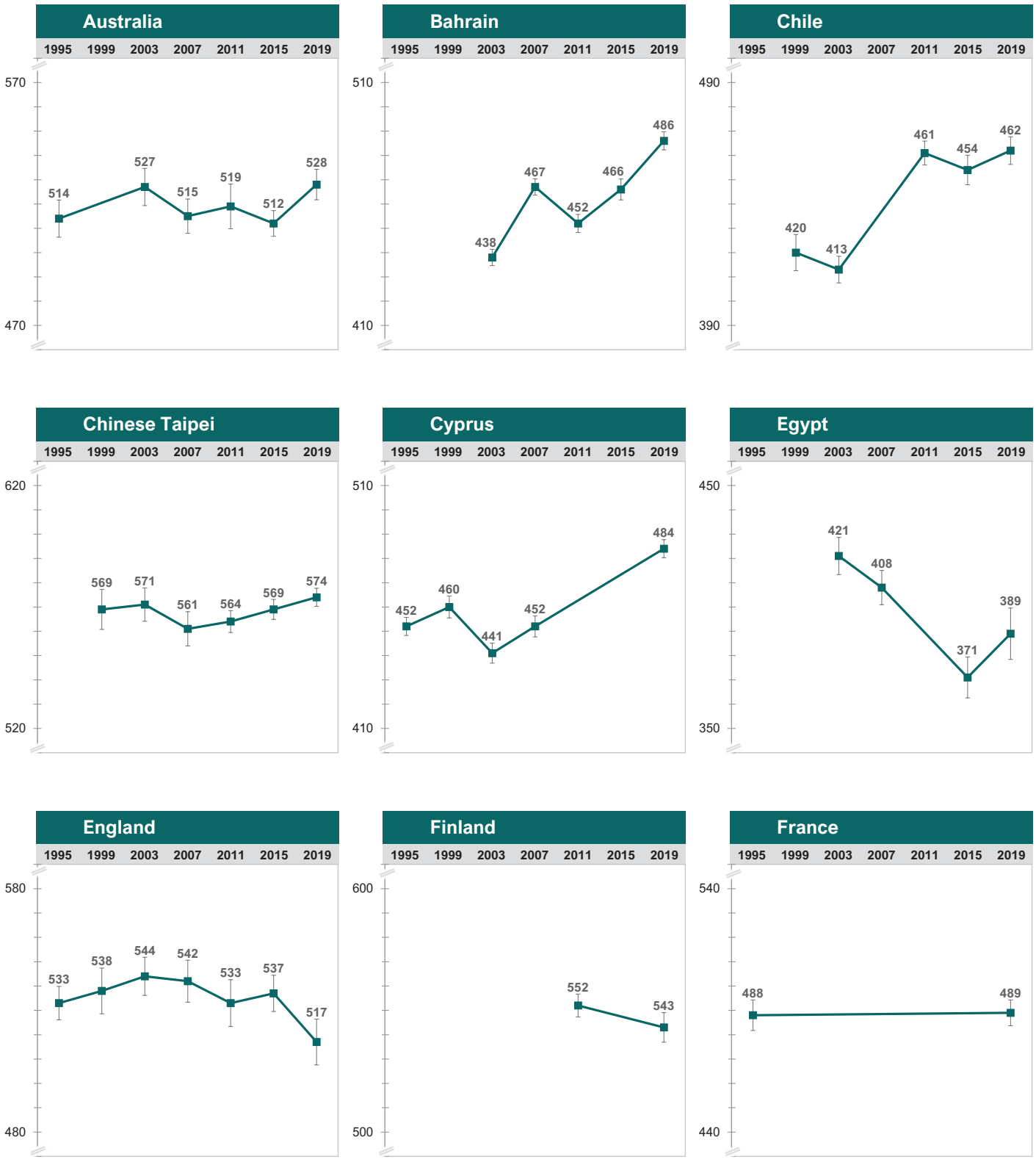
## Trends in Average Achievement

Exhibit 4.3 graphs the differences in average science achievement between the assessments for TIMSS 2019 countries that have comparable data from previous assessments, while Exhibit 4.4 provides more details. The countries are presented in alphabetical order in both exhibits. The trends in science achievement at the eighth grade signal more improvements than downturns across the assessment cycles internationally. However, across the seven assessment cycles since 1995, most countries have had some periods of increases and decreases in average achievement as well as periods of stability.

Most recently, for the 33 countries that participated in both TIMSS 2015 and 2019, 11 had increases in average achievement and 5 had declines. Looking at trends between 2007 and 2019 as well as between 1995 and 2019 also shows moderate progress in average science achievement at the eighth grade over the long term, with more countries having increases than decreases. In 2019 compared with 2007, for the 23 countries in both assessments, there were 12 increases and 6 decreases. In 2019 compared with 1995, for the 18 countries in both assessments, there were 8 increases and 4 decreases.

## Exhibit 4.3: Trend Plots of Average Science Achievement Across Assessment Years

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 4.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



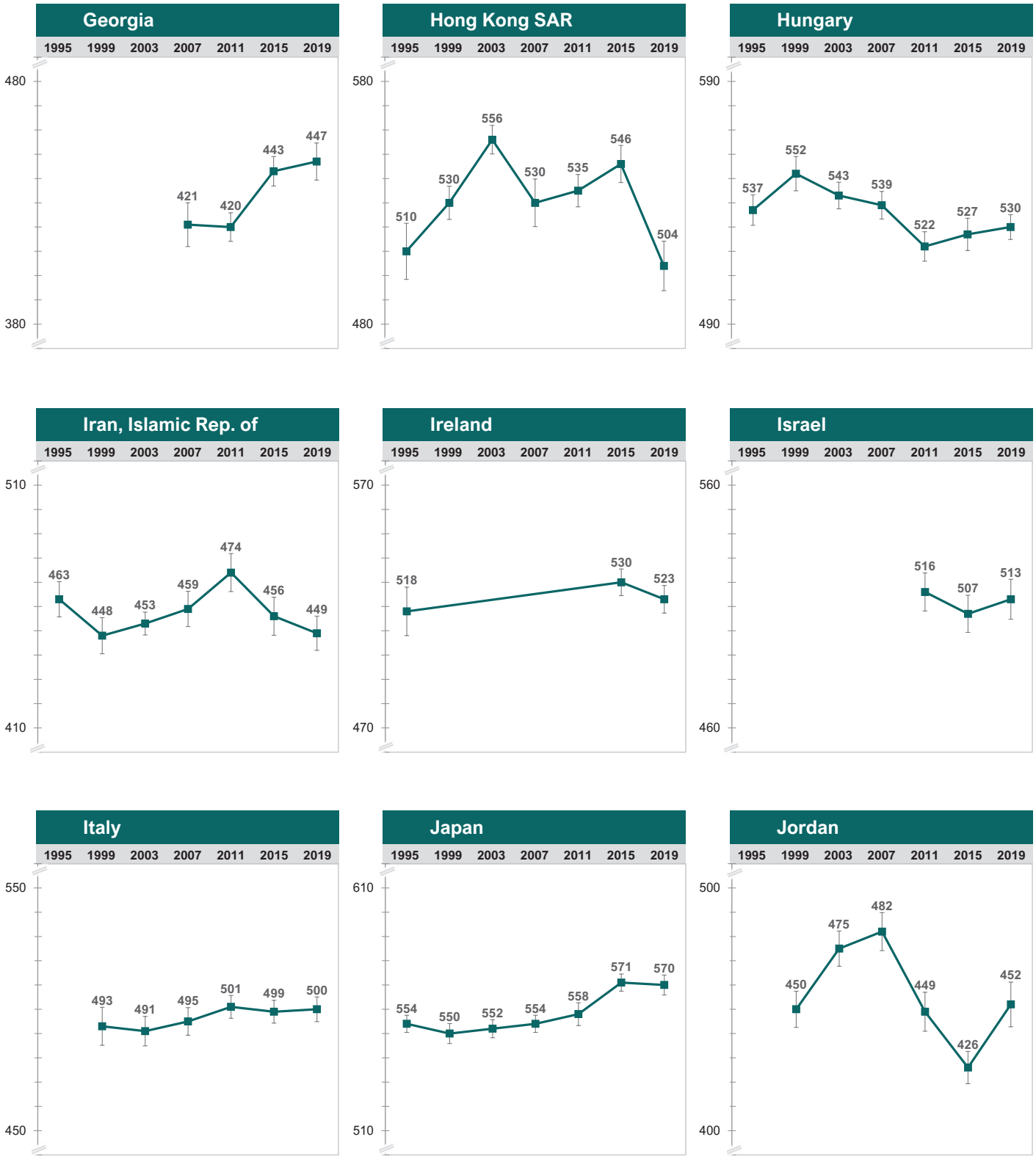

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.3: Trend Plots of Average Science Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 4.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



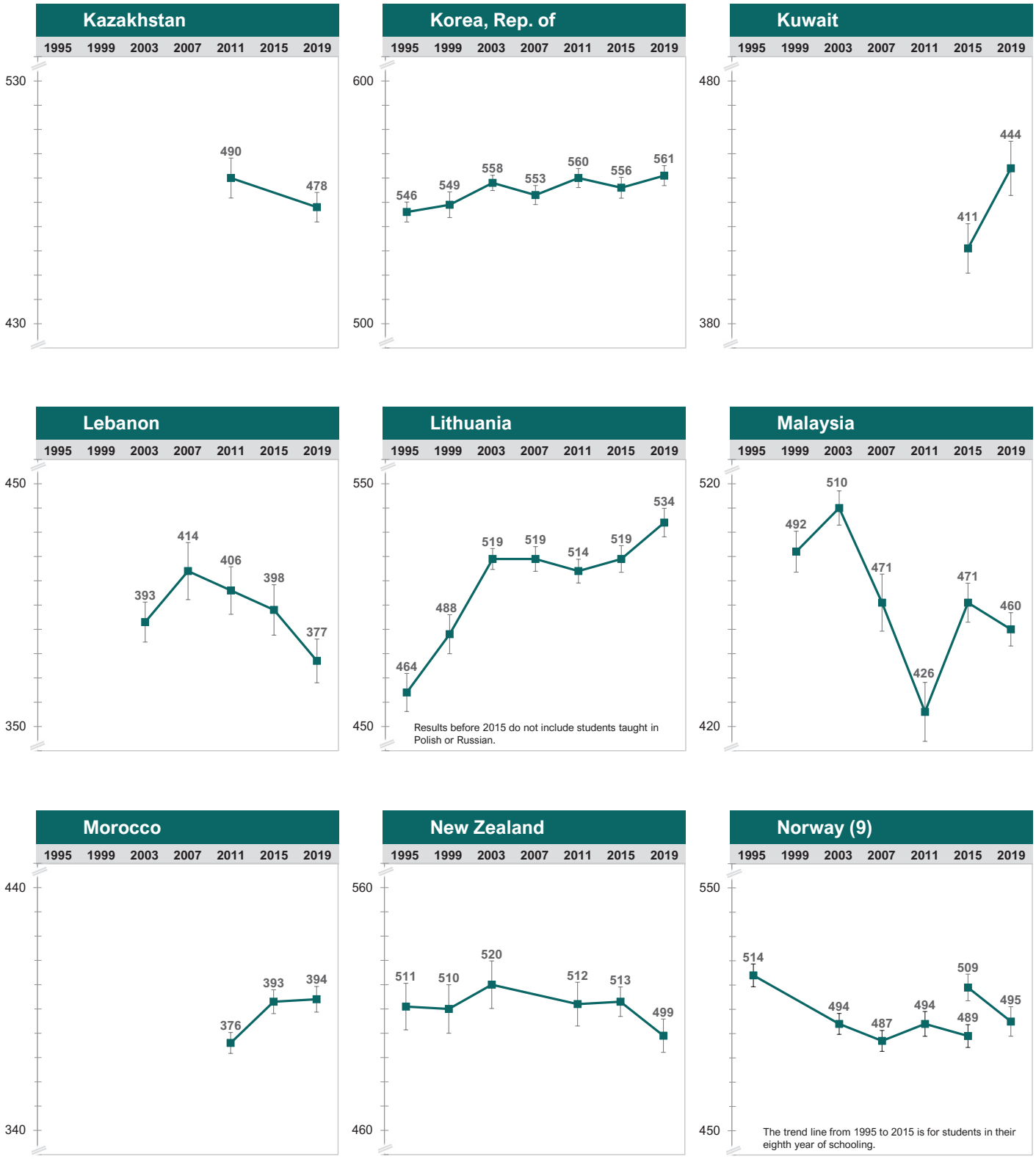

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.3: Trend Plots of Average Science Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 4.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



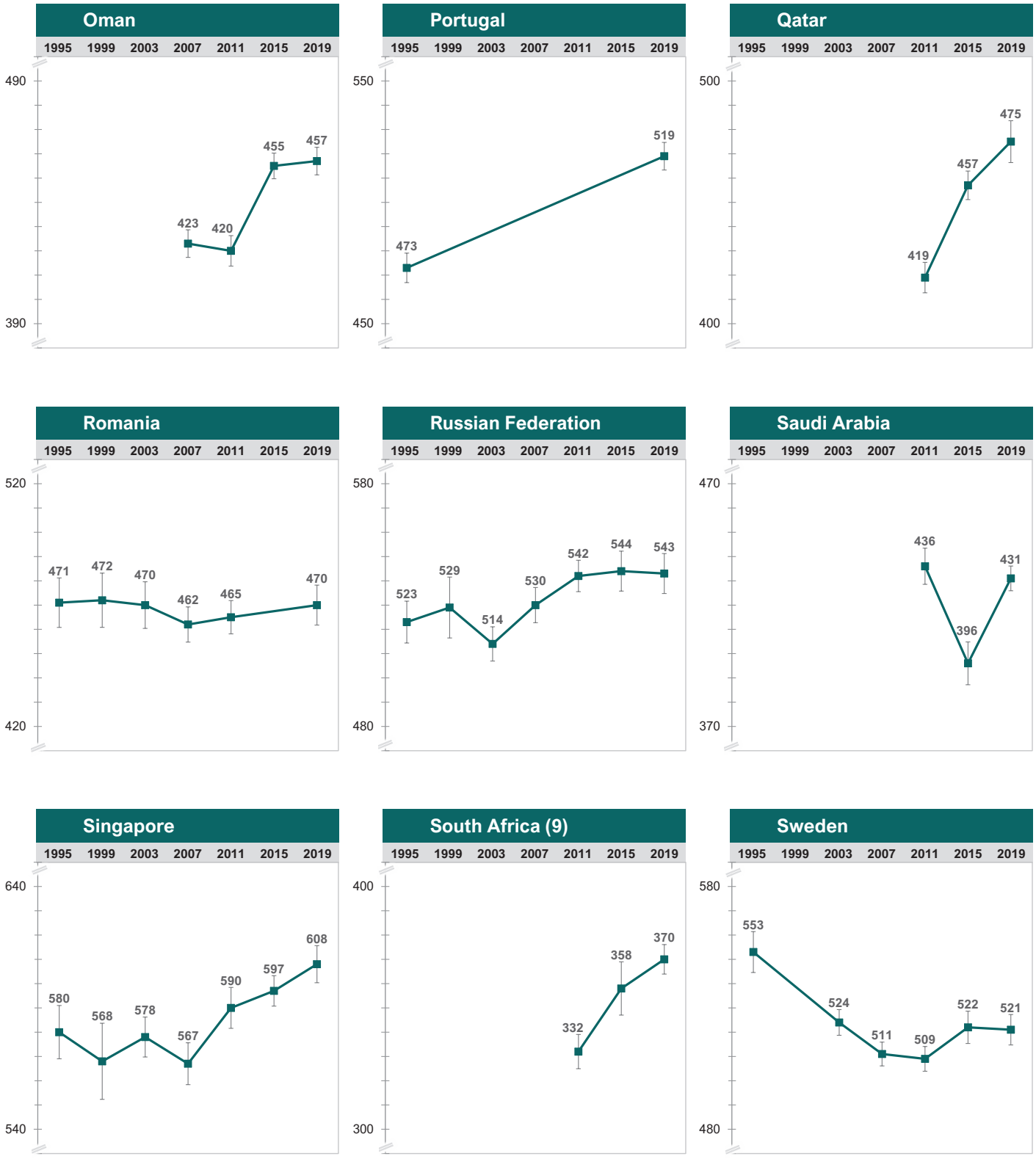

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.3: Trend Plots of Average Science Achievement Across Assessment Years

**(Continued)**

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 4.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



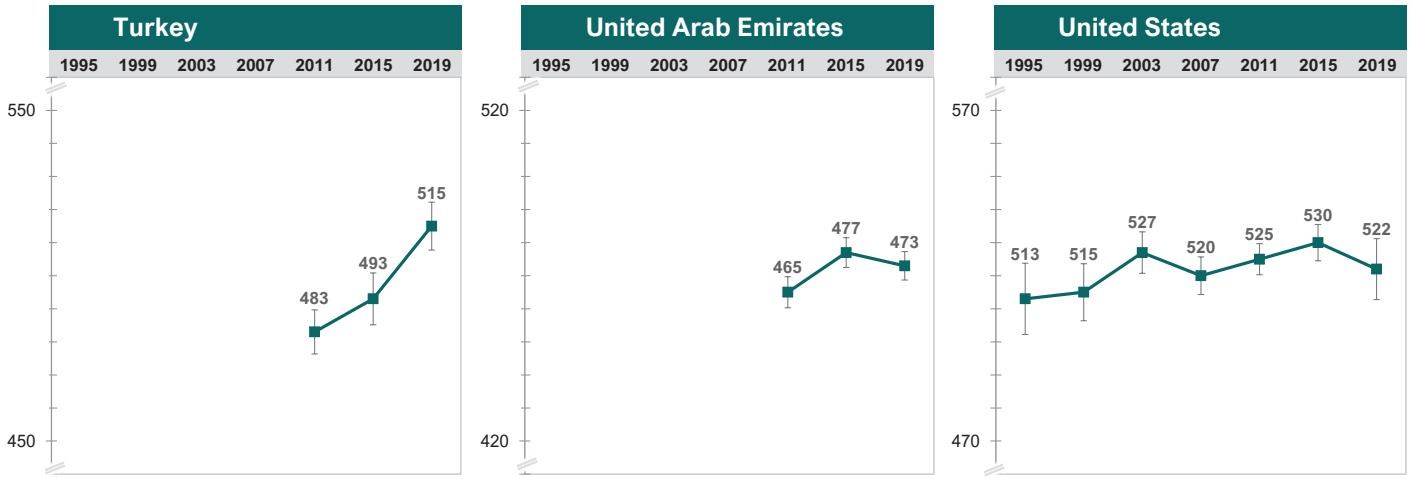

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

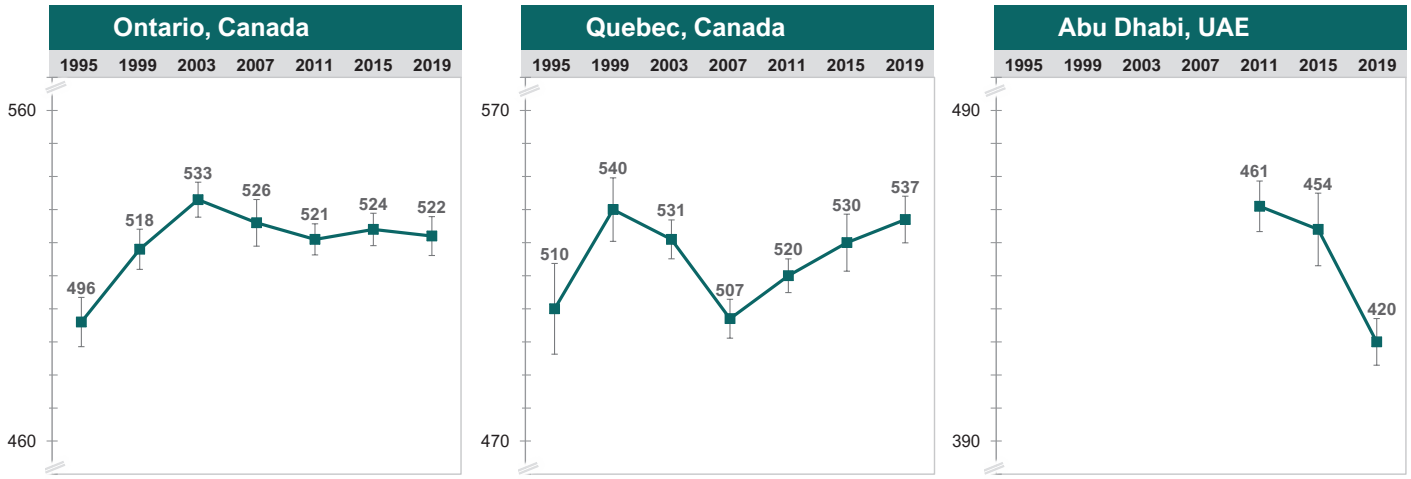
## Exhibit 4.3: Trend Plots of Average Science Achievement Across Assessment Years

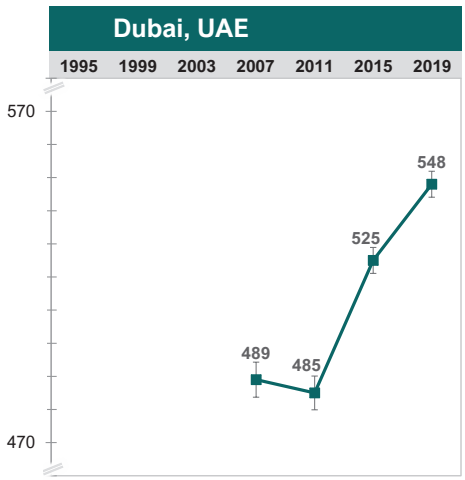
(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 4.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.




### Benchmarking Participants




See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 4.4: Differences in Average Science Achievement Across Assessment Years

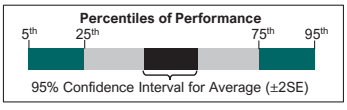
Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Average Scale Score | Differences Between Years | | | | | | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Australia** | | | | | | | | |
| 2019 | 528 (3.2) | 16 ▲ | 9 | 14 ▲ | 1 | | 15 ▲ | |
| 2015 | 512 (2.7) | | -7 | -3 | -15 ▽ | | -2 | |
| 2011 | 519 (4.7) | | | 4 | -8 | | 6 | |
| 2007 | 515 (3.6) | | | | -12 ▽ | | 1 | |
| 2003 | 527 (3.9) | | | | | | 13 ▲ | |
| ‡ 1995 | 514 (3.9) | | | | | | | |
| **Bahrain** | | | | | | | | |
| 2019 | 486 (1.9) | 20 ▲ | 34 ▲ | 19 ▲ | 48 ▲ | | | |
| 2015 | 466 (2.2) | | 13 ▲ | -2 | 28 ▲ | | | |
| 2011 | 452 (1.9) | | | -15 ▽ | 14 ▲ | | | |
| 2007 | 467 (1.7) | | | | 29 ▲ | | | |
| 2003 | 438 (1.7) | | | | | | | |
| **Chile** | | | | | | | | |
| 2019 | 462 (2.9) | 8 ▲ | 1 | | 49 ▲ | 42 ▲ | | |
| 2015 | 454 (3.1) | | -7 | | 41 ▲ | 34 ▲ | | |
| 2011 | 461 (2.5) | | | | 49 ▲ | 41 ▲ | | |
| 2003 | 413 (2.8) | | | | | -8 | | |
| 1999 | 420 (3.8) | | | | | | | |
| **Chinese Taipei** | | | | | | | | |
| 2019 | 574 (1.9) | 5 | 11 ▲ | 13 ▲ | 3 | 5 | | |
| 2015 | 569 (2.1) | | 6 | 8 ▲ | -2 | 0 | | |
| 2011 | 564 (2.3) | | | 3 | -7 | -5 | | |
| 2007 | 561 (3.6) | | | | -10 ▽ | -8 | | |
| 2003 | 571 (3.5) | | | | | 2 | | |
| 1999 | 569 (4.2) | | | | | | | |
| **Cyprus** | | | | | | | | |
| 2019 | 484 (1.9) | | | 32 ▲ | 42 ▲ | 23 ▲ | 32 ▲ | |
| 2007 | 452 (2.2) | | | | 10 ▲ | -9 ▽ | 0 | |
| 2003 | 441 (2.1) | | | | | -19 ▽ | -11 ▽ | |
| 1999 | 460 (2.3) | | | | | | 8 ▲ | |
| 1995 | 452 (1.9) | | | | | | | |
| **Egypt** | | | | | | | | |
| [2] 2019 | 389 (5.4) | 19 ▲ | | -19 ▽ | -32 ▽ | | | |
| 2015 | 371 (4.3) | | | -37 ▽ | -50 ▽ | | | |
| 2007 | 408 (3.6) | | | | -13 ▽ | | | |
| 2003 | 421 (3.9) | | | | | | | |
| **England** | | | | | | | | |
| 2019 | 517 (4.8) | -20 ▽ | -16 ▽ | -25 ▽ | -27 ▽ | -22 ▽ | -17 ▽ | |
| 2015 | 537 (3.8) | | 4 | -5 | -7 | -2 | 3 | |
| ‡ 2011 | 533 (4.9) | | | -9 | -11 | -5 | 0 | |
| † 2007 | 542 (4.4) | | | | -2 | 3 | 8 | |
| ≡ 2003 | 544 (4.0) | | | | | 5 | 11 ▲ | |
| † 1999 | 538 (4.8) | | | | | | 5 | |
| [3] † 1995 | 533 (3.5) | | | | | | | |
| **Finland** | | | | | | | | |
| 2019 | 543 (3.1) | | -10 ▽ | | | | | |
| 2011 | 552 (2.4) | | | | | | | |
| **France** | | | | | | | | |
| 2019 | 489 (2.7) | | | | | | 1 | |
| 1995 | 488 (3.2) | | | | | | | |
| **Georgia** | | | | | | | | |
| [1] 2019 | 447 (3.9) | 4 | 27 ▲ | 26 ▲ | | | | |
| [1] [2] 2015 | 443 (3.1) | | 23 ▲ | 22 ▲ | | | | |
| [1] 2011 | 420 (3.0) | | | -1 | | | | |
| [1] 2007 | 421 (4.6) | | | | | | | |
| **Hong Kong SAR** | | | | | | | | |
| † 2019 | 504 (5.2) | -42 ▽ | -32 ▽ | -27 ▽ | -53 ▽ | -26 ▽ | -6 | |
| 2015 | 546 (3.9) | | 11 ▲ | 16 ▲ | -10 ▽ | 16 ▲ | 36 ▲ | |
| 2011 | 535 (3.4) | | | 5 | -21 ▽ | 6 | 25 ▲ | |
| † 2007 | 530 (5.0) | | | | -26 ▽ | 1 | 20 ▲ | |
| † 2003 | 556 (3.0) | | | | | 27 ▲ | 46 ▲ | |
| † 1999 | 530 (3.5) | | | | | | 20 ▲ | |
| 1995 | 510 (5.9) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



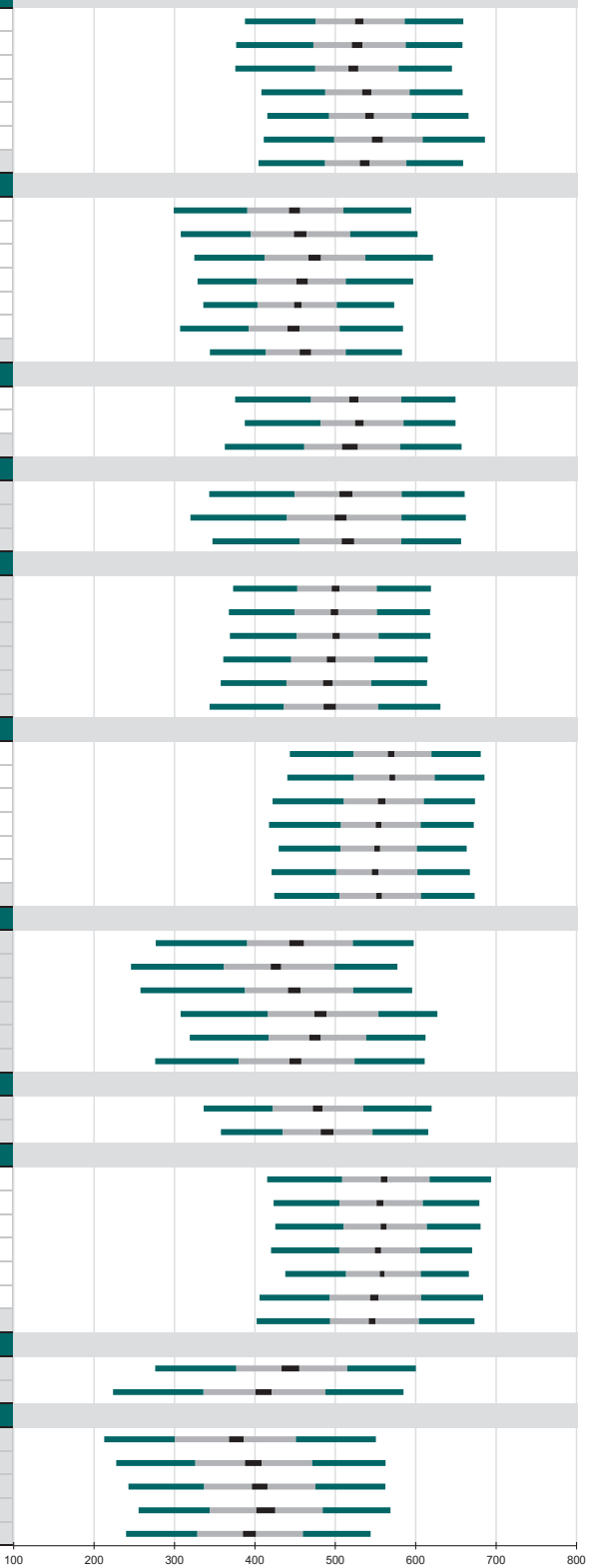

See Appendix A for country participation in previous TIMSS assessments.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.4: Differences in Average Science Achievement Across Assessment Years

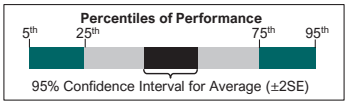
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Hungary** | | | | | | | | |
| 2019 | 530 (2.6) | 2 | 7 | -9 ▽ | -13 ▽ | -23 ▽ | -7 | |
| 2015 | 527 (3.4) | | 5 | -12 ▽ | -16 ▽ | -25 ▽ | -9 ▽ | |
| 2011 | 522 (3.1) | | | -17 ▽ | -20 ▽ | -30 ▽ | -14 ▽ | |
| 2007 | 539 (2.9) | | | | -4 | -13 ▽ | 2 | |
| [2] 2003 | 543 (2.8) | | | | | -10 ▽ | 6 | |
| 1999 | 552 (3.6) | | | | | | 16 ▲ | |
| 1995 | 537 (3.2) | | | | | | | |
| **Iran, Islamic Rep. of** | | | | | | | | |
| 2019 | 449 (3.6) | -7 | -25 ▽ | -10 | -4 | 1 | -13 ▽ | |
| 2015 | 456 (4.0) | | -18 ▽ | -3 | 3 | 8 | -6 | |
| 2011 | 474 (4.0) | | | 15 ▲ | 21 ▲ | 26 ▲ | 12 ▲ | |
| 2007 | 459 (3.7) | | | | 6 | 11 ▲ | -4 | |
| [2] 2003 | 453 (2.4) | | | | | 5 | -9 ▽ | |
| 1999 | 448 (3.8) | | | | | | -15 ▽ | |
| 1995 | 463 (3.7) | | | | | | | |
| **Ireland** | | | | | | | | |
| 2019 | 523 (2.9) | -7 | | | | | 5 | |
| 2015 | 530 (2.8) | | | | | | 12 ▲ | |
| 1995 | 518 (5.1) | | | | | | | |
| **Israel** | | | | | | | | |
| [3] 2019 | 513 (4.2) | 7 | -2 | | | | | |
| [3] 2015 | 507 (3.9) | | -9 | | | | | |
| [3] 2011 | 516 (4.0) | | | | | | | |
| **Italy** | | | | | | | | |
| 2019 | 500 (2.6) | 2 | -1 | 5 | 10 ▲ | 7 | | |
| [2] 2015 | 499 (2.4) | | -2 | 4 | 8 ▲ | 6 | | |
| 2011 | 501 (2.4) | | | 6 | 10 ▲ | 8 | | |
| 2007 | 495 (2.9) | | | | 4 | 2 | | |
| 2003 | 491 (3.1) | | | | | -2 | | |
| [2] 1999 | 493 (4.0) | | | | | | | |
| **Japan** | | | | | | | | |
| 2019 | 570 (2.1) | -1 | 12 ▲ | 16 ▲ | 17 ▲ | 20 ▲ | 15 ▲ | |
| 2015 | 571 (1.8) | | 13 ▲ | 17 ▲ | 19 ▲ | 21 ▲ | 16 ▲ | |
| 2011 | 558 (2.4) | | | 4 | 6 | 8 ▲ | 3 | |
| 2007 | 554 (1.8) | | | | 2 | 4 | -1 | |
| 2003 | 552 (1.9) | | | | | 3 | -2 | |
| 1999 | 550 (2.1) | | | | | | -5 | |
| 1995 | 554 (1.8) | | | | | | | |
| **Jordan** | | | | | | | | |
| 2019 | 452 (4.7) | 26 ▲ | 3 | -30 ▽ | -23 ▽ | 2 | | |
| 2015 | 426 (3.4) | | -23 ▽ | -56 ▽ | -49 ▽ | -24 ▽ | | |
| 2011 | 449 (4.1) | | | -33 ▽ | -26 ▽ | -1 | | |
| 2007 | 482 (4.0) | | | | 7 | 31 ▲ | | |
| 2003 | 475 (3.7) | | | | | 25 ▲ | | |
| 1999 | 450 (3.8) | | | | | | | |
| **Kazakhstan** | | | | | | | | |
| [2] 2019 | 478 (3.1) | | -12 ▽ | | | | | |
| 2011 | 490 (4.2) | | | | | | | |
| **Korea, Rep. of** | | | | | | | | |
| 2019 | 561 (2.1) | 5 | 1 | 8 ▲ | 2 | 12 ▲ | 15 ▲ | |
| 2015 | 556 (2.2) | | -5 | 2 | -3 | 7 ▲ | 10 ▲ | |
| 2011 | 560 (2.0) | | | 7 ▲ | 2 | 12 ▲ | 14 ▲ | |
| 2007 | 553 (2.0) | | | | -5 ▽ | 4 | 7 ▲ | |
| 2003 | 558 (1.6) | | | | | 10 ▲ | 13 ▲ | |
| 1999 | 549 (2.7) | | | | | | 3 | |
| 1995 | 546 (2.1) | | | | | | | |
| **Kuwait** | | | | | | | | |
| 2019 | 444 (5.7) | 33 ▲ | | | | | | |
| 2015 | 411 (5.2) | | | | | | | |
| **Lebanon** | | | | | | | | |
| 2019 | 377 (4.6) | -21 ▽ | -29 ▽ | -37 ▽ | -17 ▽ | | | |
| 2015 | 398 (5.3) | | -8 | -15 | 5 | | | |
| 2011 | 406 (5.0) | | | -8 | 13 | | | |
| 2007 | 414 (6.0) | | | | 20 ▲ | | | |
| 2003 | 393 (4.2) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

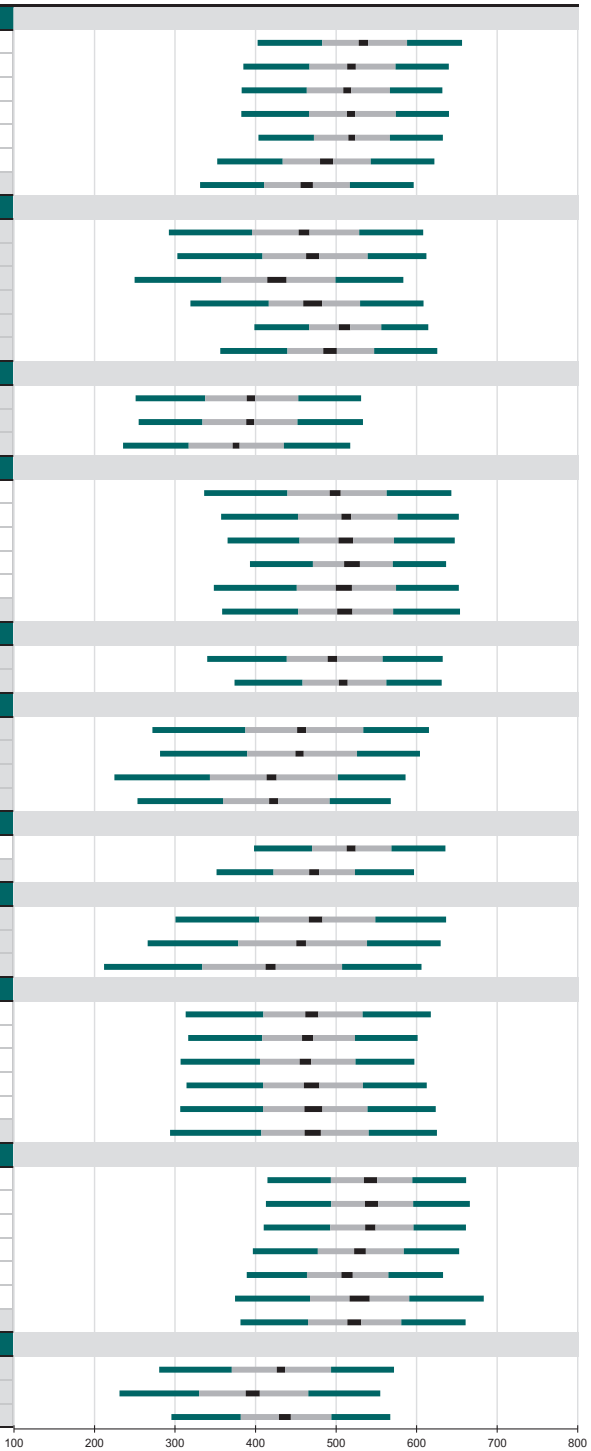



SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.4: Differences in Average Science Achievement Across Assessment Years

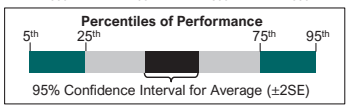
(Continued)

| Country | Average Scale Score | Differences Between Years | | | | | | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| | | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | |
| **Lithuania** | | | | | | | | |
| 2019 | 534 (3.0) | 15 ▲ | 20 ▲ | 15 ▲ | 14 ▲ | 46 ▲ | 70 ▲ | |
| [2] 2015 | 519 (2.8) | | 5 | 1 | 0 | 31 ▲ | 56 ▲ | |
| [1] 2011 | 514 (2.5) | | | -5 | -6 | 26 ▲ | 50 ▲ | |
| [1] 2007 | 519 (2.6) | | | | -1 | 30 ▲ | 55 ▲ | |
| [1] 2003 | 519 (2.2) | | | | | 31 ▲ | 56 ▲ | |
| [1] 1999 | 488 (4.1) | | | | | | 25 ▲ | |
| [1 2] 1995 | 464 (4.0) | | | | | | | |
| **Malaysia** | | | | | | | | |
| 2019 | 460 (3.5) | -11 | 34 ▲ | -11 | -50 ▽ | -32 ▽ | | |
| 2015 | 471 (4.1) | | 44 ▲ | 0 | -40 ▽ | -22 ▽ | | |
| 2011 | 426 (6.2) | | | -44 ▽ | -84 ▽ | -66 ▽ | | |
| 2007 | 471 (6.0) | | | | -40 ▽ | -22 ▽ | | |
| 2003 | 510 (3.6) | | | | | 18 ▲ | | |
| 1999 | 492 (4.3) | | | | | | | |
| **Morocco** | | | | | | | | |
| 2019 | 394 (2.7) | 1 | 18 ▲ | | | | | |
| 2015 | 393 (2.5) | | 17 ▲ | | | | | |
| 2011 | 376 (2.2) | | | | | | | |
| **New Zealand** | | | | | | | | |
| † 2019 | 499 (3.5) | -14 ▽ | -13 ▽ | | -21 ▽ | -11 | -12 ▽ | |
| † 2015 | 513 (3.1) | | 1 | | -7 | 3 | 2 | |
| 2011 | 512 (4.6) | | | | -8 | 2 | 1 | |
| 2003 | 520 (5.0) | | | | | 10 | 9 | |
| 1999 | 510 (5.1) | | | | | | -1 | |
| 1995 | 511 (4.9) | | | | | | | |
| **Norway (9)** | | | | | | | | |
| † 2019 | 495 (3.1) | -13 ▽ | | | | | | |
| 2015 | 509 (2.8) | | | | | | | |
| **Oman** | | | | | | | | |
| 2019 | 457 (2.9) | 3 | 37 ▲ | 35 ▲ | | | | |
| 2015 | 455 (2.7) | | 35 ▲ | 32 ▲ | | | | |
| 2011 | 420 (3.2) | | | -3 | | | | |
| 2007 | 423 (2.9) | | | | | | | |
| **Portugal** | | | | | | | | |
| 2019 | 519 (2.9) | | | | | | 46 ▲ | |
| 1995 | 473 (3.1) | | | | | | | |
| **Qatar** | | | | | | | | |
| 2019 | 475 (4.4) | 18 ▲ | 56 ▲ | | | | | |
| 2015 | 457 (3.0) | | 38 ▲ | | | | | |
| 2011 | 419 (3.2) | | | | | | | |
| **Romania** | | | | | | | | |
| 2019 | 470 (4.2) | | 5 | 8 | 0 | -2 | -1 | |
| 2011 | 465 (3.5) | | | 3 | -5 | -7 | -6 | |
| 2007 | 462 (3.7) | | | | -8 | -10 | -9 | |
| 2003 | 470 (4.9) | | | | | -2 | -1 | |
| 1999 | 472 (5.7) | | | | | | 1 | |
| 1995 | 471 (5.2) | | | | | | | |
| **Russian Federation** | | | | | | | | |
| [2] 2019 | 543 (4.2) | -1 | 0 | 13 ▲ | 29 ▲ | 14 | 20 ▲ | |
| 2015 | 544 (4.2) | | 2 | 15 ▲ | 30 ▲ | 15 | 22 ▲ | |
| [2] 2011 | 542 (3.3) | | | 13 ▲ | 29 ▲ | 13 | 20 ▲ | |
| 2007 | 530 (3.7) | | | | 16 ▲ | 0 | 7 | |
| 2003 | 514 (3.6) | | | | | -16 ▽ | -9 | |
| 1999 | 529 (6.4) | | | | | | 7 | |
| [2] 1995 | 523 (4.4) | | | | | | | |
| **Saudi Arabia** | | | | | | | | |
| [2] 2019 | 431 (2.6) | 35 ▲ | -5 | | | | | |
| 2015 | 396 (4.5) | | -40 ▽ | | | | | |
| 2011 | 436 (3.8) | | | | | | | |




▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.4: Differences in Average Science Achievement Across Assessment Years

(Continued)

| Country | Average Scale Score | Differences Between Years 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | Science Achievement Distribution |
|---|---|---|---|---|---|---|---|---|
| **Singapore** | | | | | | | | |
| [2] 2019 | 608 (3.9) | 11 ▲ | 18 ▲ | 40 ▲ | 30 ▲ | 40 ▲ | 27 ▲ | |
| [2] 2015 | 597 (3.2) | | 7 | 29 ▲ | 19 ▲ | 29 ▲ | 16 ▲ | |
| [2] 2011 | 590 (4.3) | | | 23 ▲ | 12 ▲ | 22 ▲ | 10 | |
| 2007 | 567 (4.4) | | | | -11 | -1 | -13 | |
| 2003 | 578 (4.2) | | | | | 10 | -3 | |
| 1999 | 568 (8.0) | | | | | | -12 | |
| 1995 | 580 (5.6) | | | | | | | |
| **South Africa (9)** | | | | | | | | |
| Ψ 2019 | 370 (3.1) | 12 | 38 ▲ | | | | | |
| 2015 | 358 (5.6) | | 26 ▲ | | | | | |
| Ψ 2011 | 332 (3.6) | | | | | | | |
| **Sweden** | | | | | | | | |
| [2] 2019 | 521 (3.2) | -1 | 12 ▲ | 11 ▲ | -3 | | -31 ▽ | |
| 2015 | 522 (3.4) | | 13 ▲ | 12 ▲ | -2 | | -30 ▽ | |
| 2011 | 509 (2.6) | | | -1 | -15 ▽ | | -43 ▽ | |
| 2007 | 511 (2.5) | | | | -14 ▽ | | -42 ▽ | |
| 2003 | 524 (2.7) | | | | | | -28 ▽ | |
| 1995 | 553 (4.3) | | | | | | | |
| **Turkey** | | | | | | | | |
| 2019 | 515 (3.7) | 22 ▲ | 32 ▲ | | | | | |
| 2015 | 493 (4.0) | | 10 ▲ | | | | | |
| 2011 | 483 (3.4) | | | | | | | |
| **United Arab Emirates** | | | | | | | | |
| 2019 | 473 (2.2) | -4 | 8 ▲ | | | | | |
| 2015 | 477 (2.3) | | 12 ▲ | | | | | |
| 2011 | 465 (2.4) | | | | | | | |
| **United States** | | | | | | | | |
| † 2019 | 522 (4.7) | -8 | -2 | 2 | -5 | 7 | 10 | |
| † 2015 | 530 (2.8) | | 5 | 10 ▲ | 3 | 15 ▲ | 17 ▲ | |
| [2] 2011 | 525 (2.4) | | | 5 | -3 | 10 | 12 ▲ | |
| [2] † 2007 | 520 (2.9) | | | | -7 | 5 | 7 | |
| ‡ 2003 | 527 (3.2) | | | | | 12 ▲ | 15 ▲ | |
| 1999 | 515 (4.4) | | | | | | 2 | |
| † 1995 | 513 (5.5) | | | | | | | |
| **Benchmarking Participants** | | | | | | | | |
| **Ontario, Canada** | | | | | | | | |
| 2019 | 522 (3.0) | -2 | 0 | -5 | -11 ▽ | 3 | 25 ▲ | |
| 2015 | 524 (2.5) | | 3 | -2 | -9 ▽ | 6 | 28 ▲ | |
| [2] 2011 | 521 (2.4) | | | -5 | -12 ▽ | 3 | 25 ▲ | |
| [2] 2007 | 526 (3.6) | | | | -7 | 8 | 30 ▲ | |
| [2] 2003 | 533 (2.7) | | | | | 15 ▲ | 37 ▲ | |
| 1999 | 518 (3.1) | | | | | | 22 ▲ | |
| 1995 | 496 (3.8) | | | | | | | |
| **Quebec, Canada** | | | | | | | | |
| ‡ 2019 | 537 (3.6) | 7 | 17 ▲ | 30 ▲ | 6 | -4 | 27 ▲ | |
| ≡ 2015 | 530 (4.4) | | 10 | 23 ▲ | -1 | -11 | 20 ▲ | |
| 2011 | 520 (2.6) | | | 13 ▲ | -11 ▽ | -21 ▽ | 10 | |
| [3] 2007 | 507 (3.0) | | | | -24 ▽ | -34 ▽ | -3 | |
| 2003 | 531 (3.0) | | | | | -9 | 21 ▲ | |
| 1999 | 540 (4.9) | | | | | | 30 ▲ | |
| 1995 | 510 (7.0) | | | | | | | |
| **Abu Dhabi, UAE** | | | | | | | | |
| 2019 | 420 (3.6) | -34 ▽ | -41 ▽ | | | | | |
| 2015 | 454 (5.6) | | -7 | | | | | |
| 2011 | 461 (3.9) | | | | | | | |
| **Dubai, UAE** | | | | | | | | |
| [2] 2019 | 548 (2.0) | 23 ▲ | 63 ▲ | 59 ▲ | | | | |
| 2015 | 525 (2.0) | | 40 ▲ | 36 ▲ | | | | |
| 2011 | 485 (2.6) | | | -4 | | | | |
| ‡ 2007 | 489 (2.7) | | | | | | | |

100 200 300 400 500 600 700 800

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

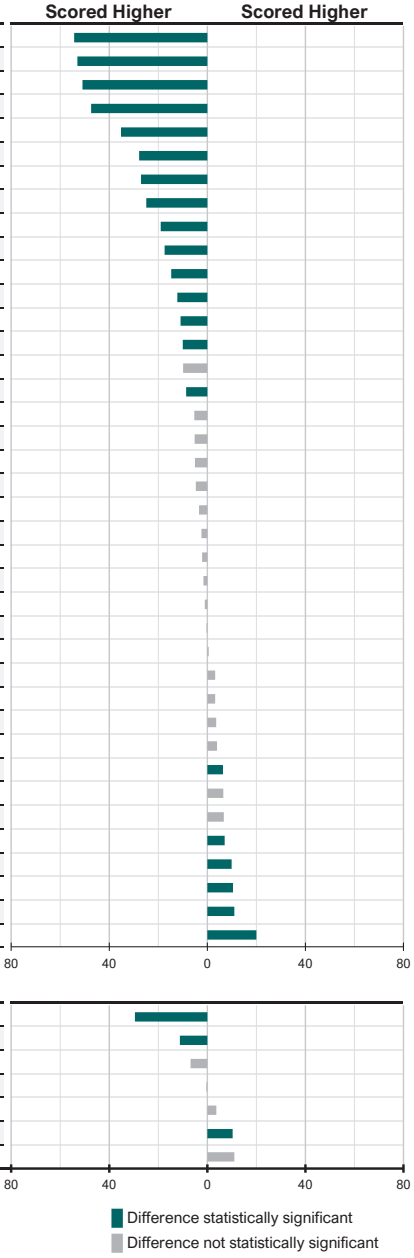
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Average Achievement by Gender

Exhibit 4.5 shows the differences in average science achievement between girls and boys. In TIMSS 2019, girls had higher average achievement than boys in 15 countries, there was gender equity in average science achievement in 18 countries, and boys had higher average achievement than girls in 6 countries.

## Exhibit 4.5: Average Science Achievement by Gender

| Country | Girls | | Boys | | Difference (Absolute Value) | Gender Difference |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Scale Score | Percent of Students | Average Scale Score | | Girls Scored Higher / Boys Scored Higher |
| Oman | 48 (1.1) | 485 (3.1) | 52 (1.1) | 431 (4.5) | 54 (5.1) | |
| Jordan | 48 (3.4) | 480 (4.0) | 52 (3.4) | 427 (6.6) | 53 (7.6) | |
| Bahrain | 49 (0.9) | 512 (2.6) | 51 (0.9) | 461 (2.8) | 51 (3.7) | |
| [2] Saudi Arabia | 49 (0.9) | 455 (3.3) | 51 (0.9) | 408 (3.9) | 47 (5.0) | |
| Kuwait | 53 (2.2) | 461 (5.7) | 47 (2.2) | 426 (9.4) | 35 (10.3) | |
| Qatar | 50 (2.4) | 488 (5.2) | 50 (2.4) | 461 (6.0) | 28 (7.4) | |
| [2] Egypt | 55 (2.0) | 402 (6.1) | 45 (2.0) | 374 (8.2) | 27 (9.2) | |
| United Arab Emirates | 48 (1.8) | 486 (3.9) | 52 (1.8) | 461 (4.0) | 25 (6.5) | |
| Finland | 48 (0.8) | 552 (3.1) | 52 (0.8) | 533 (3.9) | 19 (3.5) | |
| Iran, Islamic Rep. of | 47 (1.3) | 459 (4.6) | 53 (1.3) | 441 (5.4) | 17 (7.2) | |
| Cyprus | 49 (0.6) | 491 (2.4) | 51 (0.6) | 476 (2.5) | 15 (3.1) | |
| Ψ South Africa (9) | 52 (0.6) | 376 (3.2) | 48 (0.6) | 364 (3.6) | 12 (2.8) | |
| [2] Sweden | 49 (0.9) | 527 (3.7) | 51 (0.9) | 516 (3.8) | 11 (4.0) | |
| Romania | 51 (0.9) | 475 (4.3) | 49 (0.9) | 465 (4.9) | 10 (3.9) | |
| Turkey | 50 (1.3) | 520 (3.8) | 50 (1.3) | 510 (5.1) | 10 (5.1) | |
| [2] Kazakhstan | 49 (1.1) | 483 (3.4) | 51 (1.1) | 474 (3.6) | 9 (3.4) | |
| Malaysia | 51 (1.1) | 463 (3.5) | 49 (1.1) | 458 (4.3) | 5 (3.7) | |
| Ireland | 49 (1.1) | 526 (3.0) | 51 (1.1) | 521 (3.9) | 5 (3.8) | |
| Lebanon | 49 (1.4) | 379 (5.3) | 51 (1.4) | 374 (5.2) | 5 (5.0) | |
| † United States | 49 (0.9) | 525 (3.9) | 51 (0.9) | 520 (6.1) | 5 (4.3) | |
| England | 53 (1.9) | 518 (5.5) | 47 (1.9) | 515 (6.6) | 3 (7.2) | |
| Lithuania | 50 (1.0) | 535 (3.0) | 50 (1.0) | 533 (3.6) | 2 (2.9) | |
| † Hong Kong SAR | 46 (2.1) | 505 (5.9) | 54 (2.1) | 503 (6.3) | 2 (6.5) | |
| Morocco | 50 (0.7) | 395 (2.9) | 50 (0.7) | 393 (2.9) | 2 (2.4) | |
| [1] Georgia | 48 (1.2) | 447 (4.4) | 52 (1.2) | 446 (4.5) | 1 (4.3) | |
| Australia | 49 (1.5) | 529 (3.1) | 51 (1.5) | 528 (4.6) | 0 (4.7) | |
| † Norway (9) | 49 (0.7) | 495 (3.5) | 51 (0.7) | 496 (3.8) | 1 (3.9) | |
| † New Zealand | 48 (2.1) | 497 (3.6) | 52 (2.1) | 500 (4.9) | 3 (5.0) | |
| [3] Israel | 52 (1.7) | 512 (4.5) | 48 (1.7) | 515 (5.0) | 3 (4.6) | |
| France | 49 (0.8) | 487 (2.6) | 51 (0.8) | 490 (3.6) | 4 (3.4) | |
| Chinese Taipei | 50 (0.9) | 572 (2.4) | 50 (0.9) | 576 (2.5) | 4 (2.9) | |
| Portugal | 50 (1.1) | 516 (3.2) | 50 (1.1) | 522 (3.4) | 6 (3.1) | |
| [2] Singapore | 49 (0.7) | 604 (4.5) | 51 (0.7) | 611 (4.5) | 7 (4.4) | |
| [2] Russian Federation | 48 (1.0) | 539 (4.5) | 52 (1.0) | 546 (4.6) | 7 (3.5) | |
| Italy | 50 (1.0) | 497 (2.8) | 50 (1.0) | 504 (3.0) | 7 (2.7) | |
| Japan | 52 (1.0) | 565 (2.4) | 48 (1.0) | 575 (2.5) | 10 (2.5) | |
| Korea, Rep. of | 48 (1.4) | 555 (2.9) | 52 (1.4) | 566 (2.6) | 10 (3.5) | |
| Chile | 49 (1.6) | 457 (3.6) | 51 (1.6) | 468 (3.9) | 11 (4.7) | |
| Hungary | 50 (0.9) | 520 (2.9) | 50 (0.9) | 540 (3.2) | 20 (3.1) | |
| **International Average** | **50 (0.2)** | **495 (0.6)** | **50 (0.2)** | **485 (0.8)** | | |
| **Benchmarking Participants** | | | | | | |
| Abu Dhabi, UAE | 47 (2.1) | 436 (6.9) | 53 (2.1) | 406 (5.8) | 30 (10.6) | |
| Gauteng, RSA (9) | 55 (0.9) | 427 (4.1) | 45 (0.9) | 416 (4.3) | 11 (3.4) | |
| [2] Dubai, UAE | 50 (3.6) | 551 (5.5) | 50 (3.6) | 544 (6.6) | 7 (11.4) | |
| ‡ Quebec, Canada | 51 (2.0) | 537 (4.1) | 49 (2.0) | 536 (4.0) | 0 (3.7) | |
| Ontario, Canada | 50 (0.9) | 520 (3.4) | 50 (0.9) | 523 (3.5) | 4 (3.3) | |
| Moscow City, Russian Fed. | 48 (1.1) | 561 (3.2) | 52 (1.1) | 572 (3.3) | 10 (2.8) | |
| Western Cape, RSA (9) | 55 (1.2) | 434 (6.1) | 45 (1.2) | 445 (6.2) | 11 (6.8) | |




Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

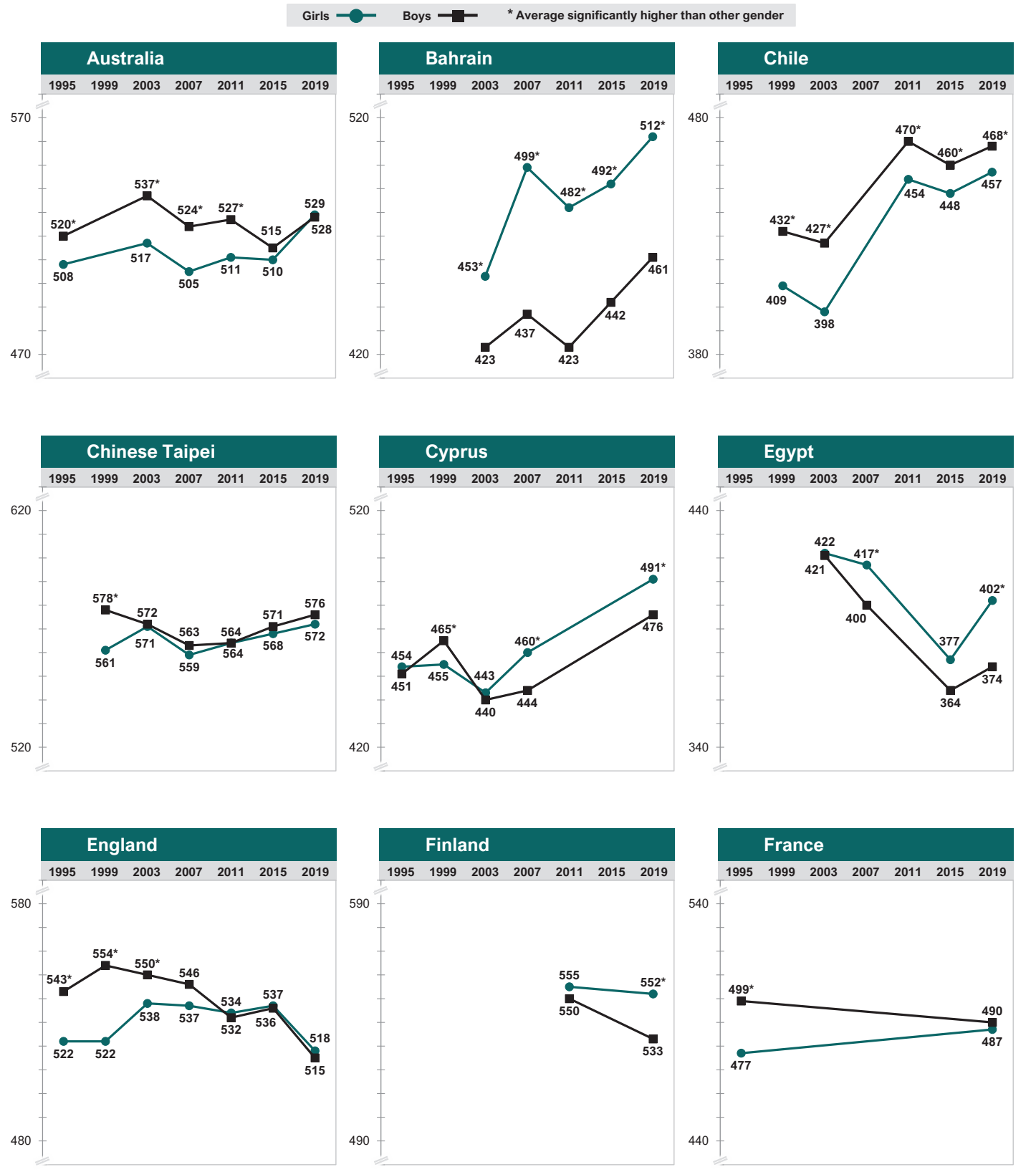
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement by Gender

For the TIMSS 2019 countries with comparable data from previous TIMSS assessments, Exhibit 4.6 contains graphs of average science achievement across assessments by gender. The countries are presented in alphabetical order. The difference in average science achievement between boys and girls has remained relatively stable in most countries, with any overall increases or decreases in achievement from assessment to assessment occurring similarly for both girls and boys. However, consistent with girls having average higher achievement than boys in more countries than the other way around, a number of countries with no gender gap in TIMSS 2015 had a gap favoring girls in TIMSS 2019, including Egypt, Iran, South Africa (ninth grade), and Sweden. (Finland, Kazakhstan, and Romania did not have comparable data from 2015, but had a gap favoring girls in TIMSS 2019 that did not exist in 2011.) The gender gap in average achievement favoring girls in TIMSS 2015 was closed in Lebanon, Malaysia, Morocco, and Turkey. Japan and Korea had no gender gap in 2015, but had a gap favoring boys in 2019. The gender gap in average achievement favoring boys in TIMSS 2015 was closed in Hong Kong SAR and the United States.

## Exhibit 4.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



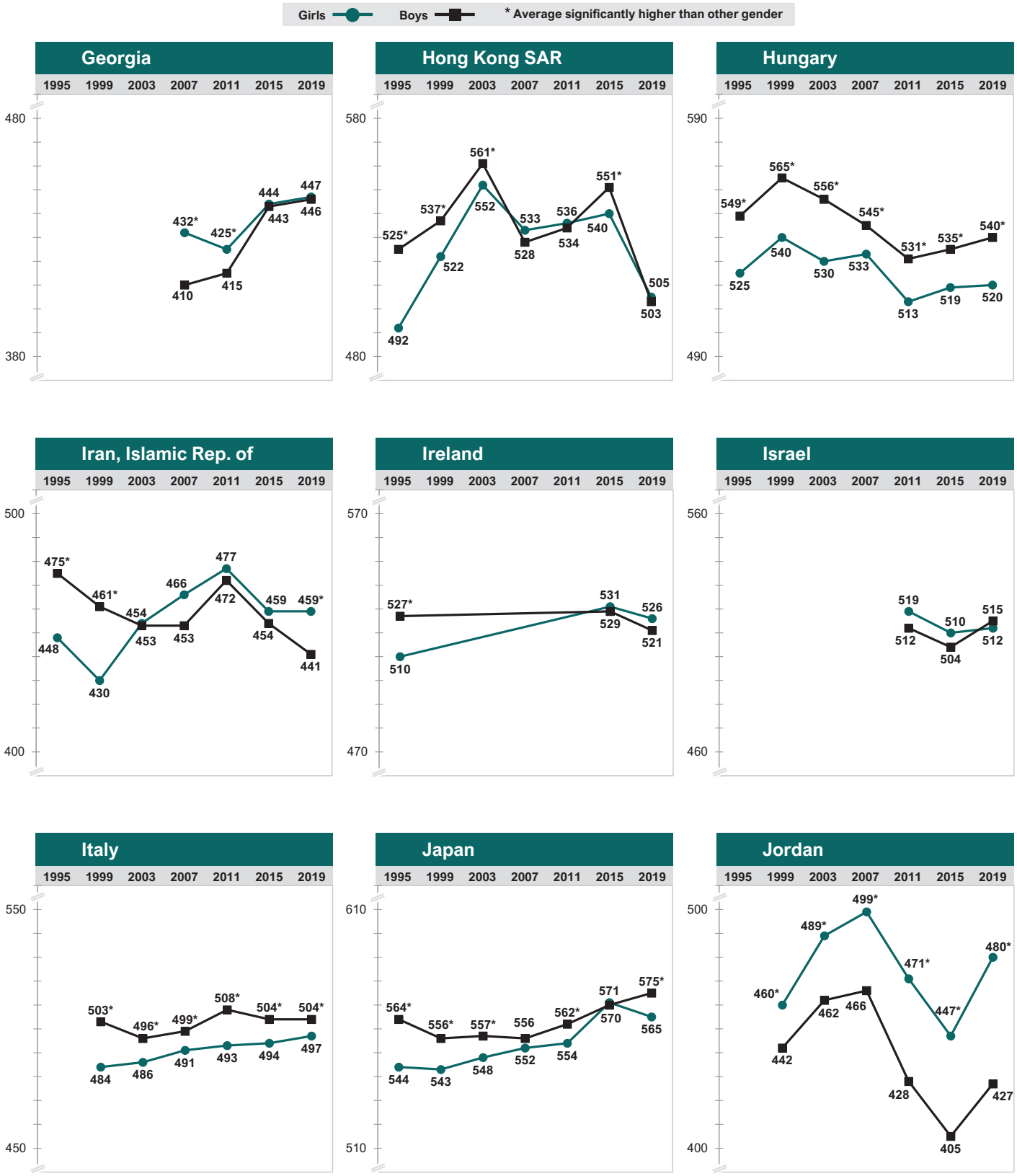

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



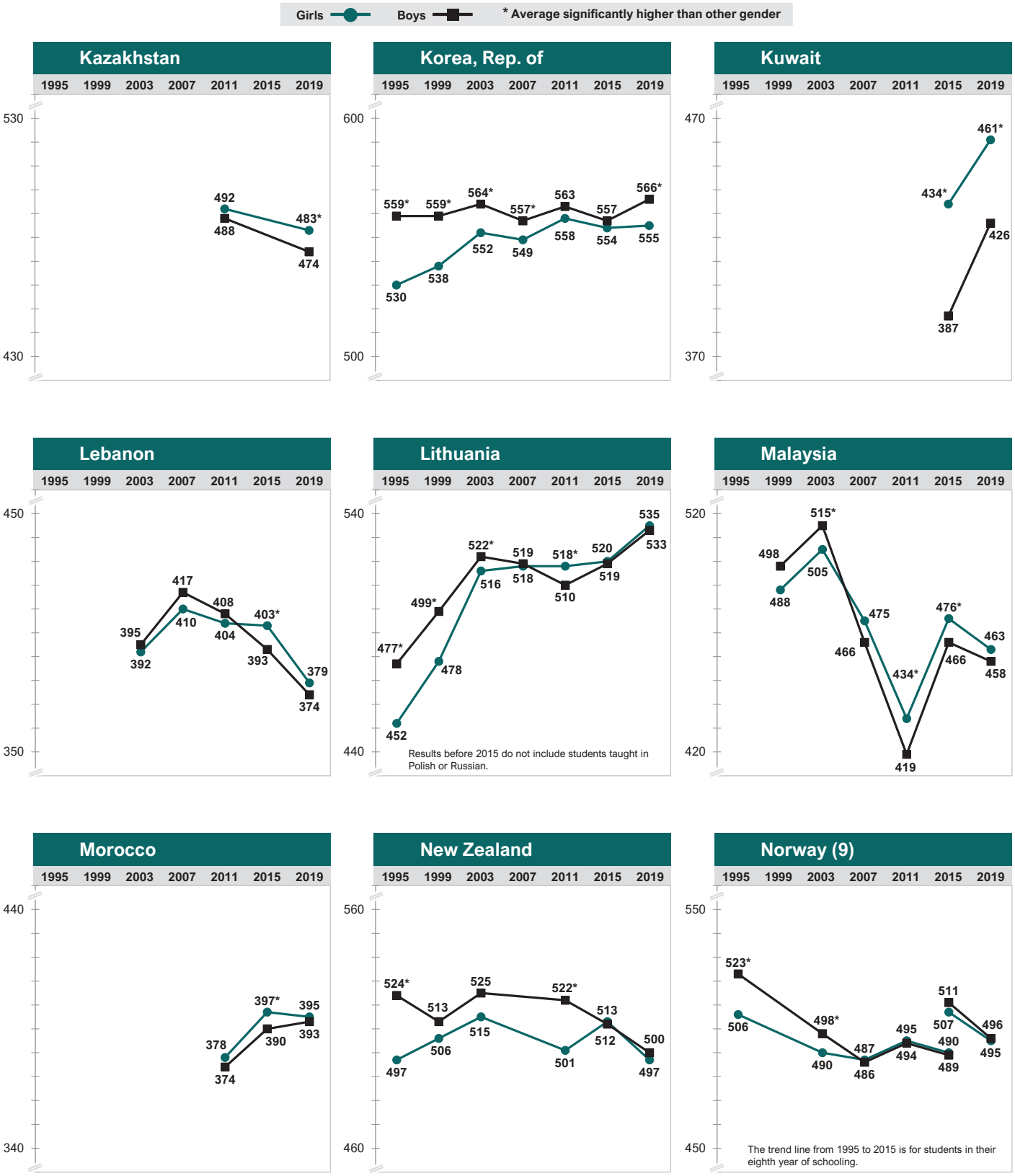

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



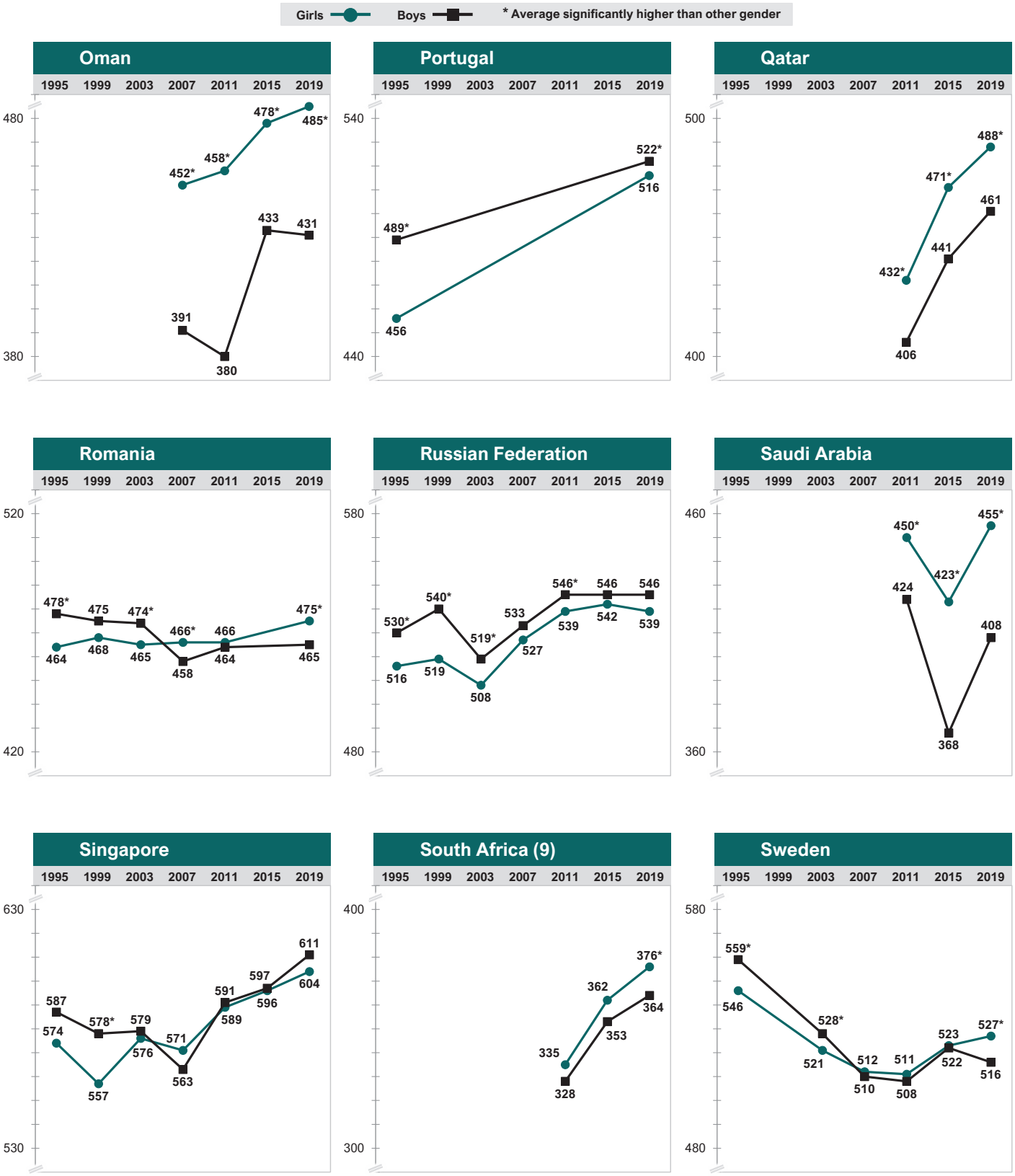

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.



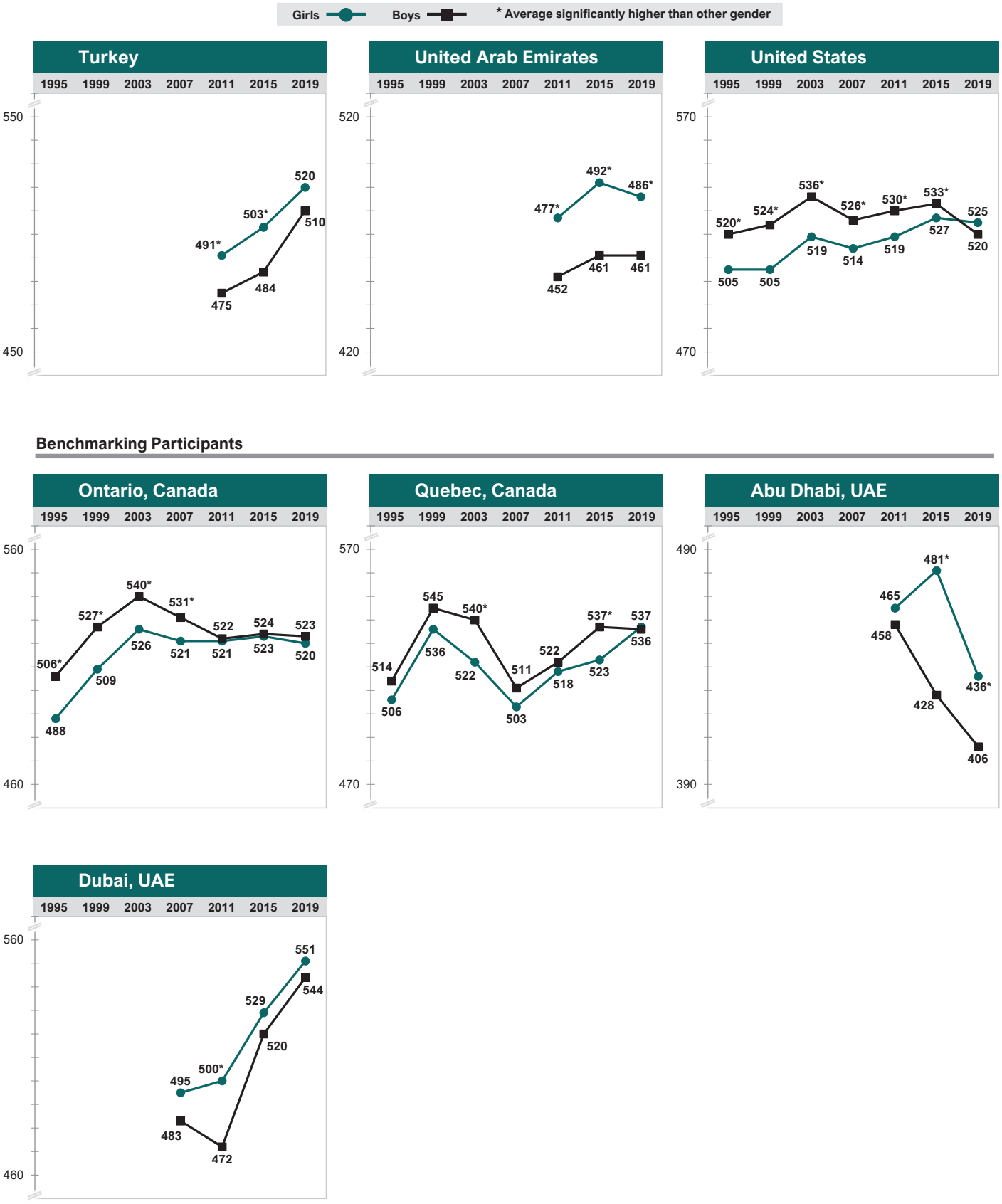

See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.6: Trend Plots of Average Science Achievement Across Assessment Years by Gender

(Continued)

This exhibit displays changes in achievement for girls and boys in each country and benchmarking participant that have comparable data from previous assessments. See Appendix A for country participation in previous assessments.




See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Performance at TIMSS International Benchmarks in Science

## TIMSS 2019 International Benchmarks

To provide an interpretation of the results on the TIMSS eighth grade science achievement scale in relation to the students' performance on the assessment items, TIMSS describes achievement at four points along the scale as International Benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400). The descriptions of science achievement at the International Benchmarks were updated from TIMSS 2015 based on an analysis of the items that students with average achievement at each of the benchmarks answered successfully in TIMSS 2019.

Exhibit 4.7 summarizes what eighth grade students who reached each of the TIMSS International Benchmarks in 2019 could do in science. The progression in science achievement is evident from benchmark to benchmark, from limited knowledge of science facts at the Low International Benchmark to communicating conceptual understanding in a variety of science contexts at the Advanced International Benchmark. As much as possible, each description references achievement in the four content areas covered in the assessment at the eighth grade— biology, chemistry, physics, and Earth science—as well as science practices assessed by TIMSS. Science practices include skills from daily life and school studies that students use systematically to conduct scientific inquiry and investigation. The following tables show the target percentages for the content and cognitive domains.

**Target Percentages of Assessment Devoted to Content and Cognitive Domains – TIMSS 2019 Eighth Grade Science**

| Content Domain | Percentage |
|---|---|
| Biology | 35% |
| Chemistry | 20% |
| Physics | 25% |
| Earth Science | 20% |

| Cognitive Domain | Percentage |
|---|---|
| Knowing | 35% |
| Applying | 35% |
| Reasoning | 30% |

The interactive map of the benchmark descriptions links to example items. It provides an overview of the science understanding demonstrated by the eighth grade students who performed at the four different levels on the achievement scale. The following sections provide more information about students' achievement in TIMSS 2019 at each International Benchmark as well as more detailed descriptions of each level together with example items.

## Exhibit 4.7: Summary of TIMSS 2019 International Benchmarks of Science Achievement

| | |
|---|---|
| **Advanced** International Benchmark | |
| **625** | *Students communicate understanding of concepts related to biology, chemistry, physics, and Earth science in a variety of contexts.* Students can classify animals into taxonomic groups. They can apply knowledge of cell structures and their functions. Students show some understanding of diversity, adaptation, and natural selection. They also recognize the interdependence of populations of organisms in an ecosystem. Students demonstrate knowledge of the composition of matter and the periodic table of the elements. Students use physical properties of matter to sort, classify, and compare substances and materials. They also recognize evidence that a chemical reaction has occurred. Students communicate understanding of particle spacing and motion in different physical states. Students apply knowledge of energy transfer and electrical circuits, can relate the properties of light and sound to common phenomena, and demonstrate understanding of forces in everyday contexts. Students communicate understanding of Earth's structure, physical features, and processes. They demonstrate knowledge of the Earth's resources and their conservation. |
| **High** International Benchmark | |
| **550** | *Students apply understanding of concepts from biology, chemistry, physics, and Earth science.* Students can apply knowledge of the characteristics of groups of animals, life processes in humans, cells and their functions, genetic inheritance, ecosystems, and nutrition. Students show some knowledge and understanding of the composition and properties of matter and chemical reactions. They can apply basic knowledge of energy transformation and transfer, electrical circuits, properties of magnets, light, sound, and forces. They can apply knowledge of Earth's physical features, processes, cycles, and history, and show some understanding of Earth's resources and their use. |
| **Intermediate** International Benchmark | |
| **475** | *Students show and apply some knowledge of biology and the physical sciences.* Students demonstrate some knowledge of characteristics of animals and apply knowledge of ecosystems. They show some knowledge of the properties of matter, chemical changes, and a few physics concepts. |
| **Low** International Benchmark | |
| **400** | *Students show limited understanding of scientific principles and concepts and limited knowledge of science facts.* |

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

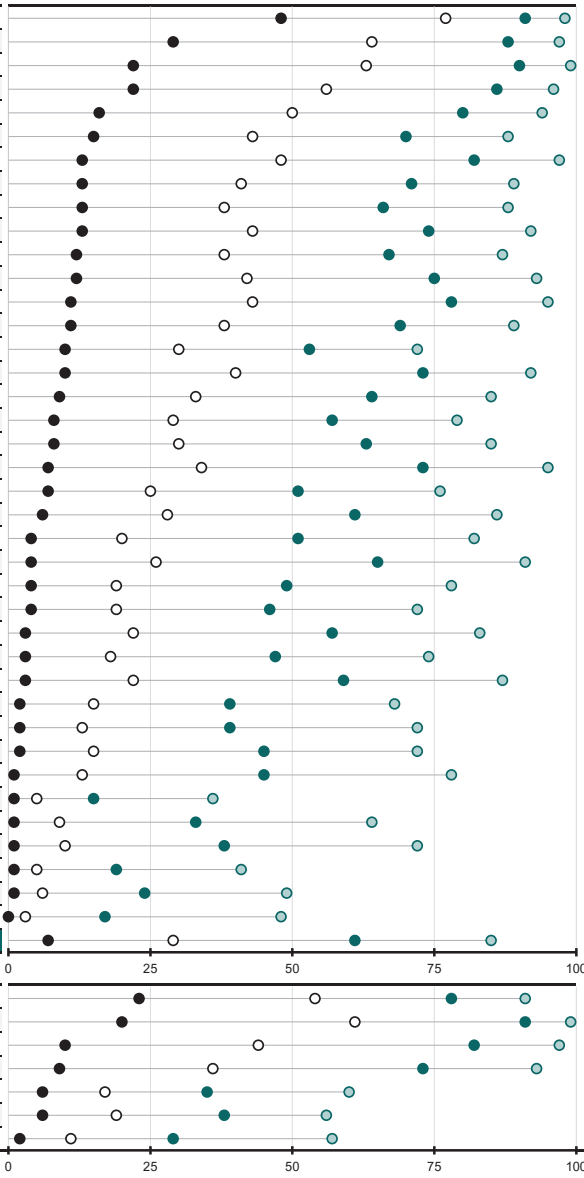
## Percentages of Students Reaching International Benchmarks

Exhibit 4.8 presents the percentage of students reaching each TIMSS 2019 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark and are indicated in the graph with black dots. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages illustrated in the exhibit and shown in the columns to the right are cumulative.

Consistent with Singapore being the highest performing country, nearly half of their eighth grade students (48%) reached the Advanced International Benchmark. The next highest percentages reaching the Advanced level were in Chinese Taipei (29%), Japan (22%), and Korea (22%). Twelve countries had 10 to 16 percent, and the rest of the countries had fewer than 10 percent of their eighth grade students reaching the Advanced International Benchmark.

As a point of reference, Exhibit 4.8 provides the international median percentage of students reaching each benchmark at the bottom of the four right-hand columns. By definition, half the countries have a percentage in that column above the median and half below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced—7 percent, High—29 percent, Intermediate—61 percent, and Low—85 percent. The Low International Benchmark can be considered a level of minimum proficiency, with Japan (99%) and Singapore (98%) having nearly all of their students reaching this level.

# Exhibit 4.8: Percentages of Students Reaching International Benchmarks of Science Achievement




| Country | Advanced Benchmark (625) | High Benchmark (550) | Intermediate Benchmark (475) | Low Benchmark (400) |
|---|---|---|---|---|
| [2] Singapore | 48 (1.9) | 77 (2.0) | 91 (1.2) | 98 (0.5) |
| Chinese Taipei | 29 (1.0) | 64 (1.0) | 88 (0.7) | 97 (0.3) |
| Japan | 22 (1.4) | 63 (1.1) | 90 (0.6) | 99 (0.3) |
| Korea, Rep. of | 22 (0.9) | 56 (1.1) | 86 (0.8) | 96 (0.4) |
| Finland | 16 (1.0) | 50 (1.5) | 80 (1.4) | 94 (0.7) |
| † United States | 15 (1.1) | 43 (1.8) | 70 (1.8) | 88 (1.4) |
| [2] Russian Federation | 13 (1.4) | 48 (2.3) | 82 (1.7) | 97 (0.8) |
| [2] Sweden | 13 (1.1) | 41 (1.5) | 71 (1.5) | 89 (0.9) |
| Turkey | 13 (0.9) | 38 (1.8) | 66 (1.6) | 88 (1.0) |
| Australia | 13 (1.2) | 43 (1.6) | 74 (1.2) | 92 (0.7) |
| [3] Israel | 12 (1.3) | 38 (1.9) | 67 (1.9) | 87 (1.2) |
| Hungary | 12 (1.1) | 42 (1.5) | 75 (1.3) | 93 (0.7) |
| Lithuania | 11 (1.0) | 43 (1.6) | 78 (1.2) | 95 (0.6) |
| England | 11 (1.3) | 38 (2.1) | 69 (2.1) | 89 (1.4) |
| United Arab Emirates | 10 (0.4) | 30 (0.8) | 53 (0.9) | 72 (0.7) |
| Ireland | 10 (0.8) | 40 (1.4) | 73 (1.5) | 92 (0.9) |
| † Hong Kong SAR | 9 (1.2) | 33 (2.1) | 64 (2.3) | 85 (1.9) |
| Bahrain | 8 (0.5) | 29 (0.8) | 57 (0.9) | 79 (0.9) |
| † New Zealand | 8 (0.6) | 30 (1.4) | 63 (1.6) | 85 (1.2) |
| Portugal | 7 (0.7) | 34 (1.5) | 73 (1.7) | 95 (1.0) |
| Qatar | 7 (0.9) | 25 (1.8) | 51 (1.8) | 76 (1.4) |
| † Norway (9) | 6 (0.6) | 28 (1.4) | 61 (1.5) | 86 (1.0) |
| [2] Kazakhstan | 4 (0.6) | 20 (1.3) | 51 (1.7) | 82 (1.3) |
| Italy | 4 (0.5) | 26 (1.2) | 65 (1.5) | 91 (0.9) |
| Romania | 4 (0.6) | 19 (1.6) | 49 (2.1) | 78 (1.5) |
| Oman | 4 (0.5) | 19 (0.9) | 46 (1.1) | 72 (1.1) |
| Cyprus | 3 (0.4) | 22 (1.1) | 57 (1.2) | 83 (0.9) |
| Malaysia | 3 (0.4) | 18 (0.8) | 47 (1.6) | 74 (1.7) |
| France | 3 (0.5) | 22 (1.4) | 59 (1.4) | 87 (0.9) |
| Kuwait | 2 (0.5) | 15 (1.5) | 39 (2.2) | 68 (2.2) |
| Iran, Islamic Rep. of | 2 (0.5) | 13 (1.4) | 39 (1.7) | 72 (1.3) |
| Jordan | 2 (0.3) | 15 (1.1) | 45 (2.0) | 72 (1.9) |
| Chile | 1 (0.2) | 13 (1.2) | 45 (1.5) | 78 (1.4) |
| Ψ South Africa (9) | 1 (0.1) | 5 (0.4) | 15 (0.8) | 36 (1.2) |
| [2] Saudi Arabia | 1 (0.2) | 9 (0.6) | 33 (1.2) | 64 (1.2) |
| [1] Georgia | 1 (0.3) | 10 (1.4) | 38 (1.8) | 72 (2.1) |
| Lebanon | 1 (0.2) | 5 (0.7) | 19 (1.3) | 41 (1.9) |
| [2] Egypt | 1 (0.2) | 6 (0.7) | 24 (1.6) | 49 (2.1) |
| Morocco | 0 (0.1) | 3 (0.4) | 17 (0.9) | 48 (1.4) |
| **International Median** | **7** | **29** | **61** | **85** |
| **Benchmarking Participants** | | | | |
| [2] Dubai, UAE | 23 (0.9) | 54 (1.0) | 78 (0.7) | 91 (0.6) |
| Moscow City, Russian Fed. | 20 (1.5) | 61 (1.9) | 91 (0.8) | 99 (0.3) |
| ‡ Quebec, Canada | 10 (1.2) | 44 (2.2) | 82 (1.5) | 97 (0.7) |
| Ontario, Canada | 9 (1.0) | 36 (1.5) | 73 (1.4) | 93 (0.7) |
| Western Cape, RSA (9) | 6 (1.0) | 17 (1.9) | 35 (1.9) | 60 (1.7) |
| Abu Dhabi, UAE | 6 (0.5) | 19 (0.9) | 38 (1.3) | 56 (1.4) |
| Gauteng, RSA (9) | 2 (0.4) | 11 (1.0) | 29 (1.6) | 57 (1.5) |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Trends in Percentages of Students Reaching International Benchmarks

Exhibit 4.9 shows the changes in percentages of students reaching the benchmarks for countries that have comparable data from previous assessments. The trends indicate more improvement at the two higher benchmarks than declines, in contrast to similar improvements but more declines at lower benchmarks. Of the 33 countries participating in both 2015 and 2019, 10 increased and only 1 decreased at the Advanced International Benchmark, 9 increased and 4 decreased at the High Benchmark, 10 increased and 8 decreased at the Intermediate Benchmark, and 8 increased and 8 decreased at the Low Benchmark.

The longer-term trends also show a similar pattern. Between 2007 and 2019, the 23 countries participating in those two assessments had 13 increases and 2 decreases at the Advanced level, 12 increases and 4 decreases at the High level, 10 increases and 5 decreases at the Intermediate level, and 8 increases and 9 decreases at the Low level. Between 1995 and 2019, the 18 countries participating in both assessments had 7 increases and 2 decreases at the Advanced level, 8 increases and 2 decreases at the High level, and 7 increases and 3 decreases at the Intermediate level, as well as 5 increases and 6 decreases at the Low level.

# Exhibit 4.9: Percentages of Students Reaching International Benchmarks of Science Achievement Across Assessment Years

| Country | Advanced International Benchmark (625) — Percent of Students | | | | | | | High International Benchmark (550) — Percent of Students | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 |
| Singapore | 48 | 42 ▲ | 40 ▲ | 32 ▲ | 33 ▲ | 29 ▲ | 29 ▲ | 77 | 74 | 69 ▲ | 61 ▲ | 66 ▲ | 60 ▲ | 64 ▲ |
| Chinese Taipei | 29 | 27 | 24 ▲ | 25 ▲ | 26 | 27 | | 64 | 63 | 60 ▲ | 60 ▲ | 63 | 61 | |
| Japan | 22 | 24 | 18 ▲ | 17 ▲ | 15 ▲ | 16 ▲ | 18 ▲ | 63 | 63 | 57 ▲ | 55 ▲ | 53 ▲ | 52 ▲ | 54 ▲ |
| Korea, Rep. of | 22 | 19 ▲ | 20 | 17 ▲ | 17 ▲ | 19 ▲ | 17 ▲ | 56 | 54 | 57 | 54 | 57 | 50 ▲ | 50 ▲ |
| Finland | 16 | | 13 ▲ | | | | | 50 | | 53 | | | | |
| United States | 15 | 12 ▲ | 10 ▲ | 10 ▲ | 11 ▲ | 12 | 11 ▲ | 43 | 43 | 40 | 38 ▲ | 41 | 37 ▲ | 38 |
| Russian Federation | 13 | 14 | 14 | 11 | 6 ▲ | 15 | 11 | 48 | 49 | 48 | 41 ▲ | 32 ▲ | 41 | 38 ▲ |
| Sweden | 13 | 10 ▲ | 6 ▲ | 6 ▲ | 8 ▲ | | 19 ▽ | 41 | 40 | 33 ▲ | 32 ▲ | 38 | | 52 ▽ |
| Turkey | 13 | 8 ▲ | 8 ▲ | | | | | 38 | 29 ▲ | 26 ▲ | | | | |
| Australia | 13 | 7 ▲ | 11 | 8 ▲ | 9 ▲ | | 10 | 43 | 34 ▲ | 35 ▲ | 33 ▲ | 40 | | 36 ▲ |
| Israel | 12 | 12 | 11 | | | | | 38 | 37 | 39 | | | | |
| Hungary | 12 | 12 | 9 ▲ | 13 | 14 | 19 ▽ | 12 | 42 | 42 | 39 | 46 | 46 | 53 ▽ | 44 |
| Lithuania | 11 | 8 ▲ | 6 ▲ | 8 ▲ | 6 ▲ | 5 ▲ | 2 ▲ | 43 | 36 ▲ | 33 ▲ | 36 ▲ | 34 ▲ | 22 ▲ | 14 ▲ |
| England | 11 | 14 | 14 | 17 ▽ | 15 | 17 ▽ | 15 ▽ | 38 | 45 ▽ | 44 | 48 ▽ | 48 ▽ | 45 ▽ | 43 ▽ |
| United Arab Emirates | 10 | 7 ▲ | 4 ▲ | | | | | 30 | 26 ▲ | 19 ▲ | | | | |
| Ireland | 10 | 10 | | | | | 11 | 40 | 43 | | | | | 38 |
| Hong Kong SAR | 9 | 12 | 9 | 10 | 13 ▽ | 7 | 7 | 33 | 51 ▽ | 47 ▽ | 45 ▽ | 58 ▽ | 40 ▽ | 33 |
| Bahrain | 8 | 6 ▲ | 3 ▲ | 2 ▲ | 0 ▲ | | | 29 | 22 ▲ | 17 ▲ | 17 ▲ | 6 ▲ | | |
| New Zealand | 8 | 10 ▽ | 9 | | 7 | 10 | 9 | 30 | 36 ▽ | 34 | | 35 | 35 | 34 |
| Portugal | 7 | | | | | | 2 ▲ | 34 | | | | | | 15 ▲ |
| Qatar | 7 | 6 | 3 ▲ | | | | | 25 | 21 | 14 ▲ | | | | |
| Norway (9) | 6 | 6 | | | | | | 28 | 31 | | | | | |
| Kazakhstan | 4 | | 4 | | | | | 20 | | 23 | | | | |
| Italy | 4 | 4 | 4 | 4 | 4 | 6 | | 26 | 26 | 27 | 24 | 23 | 26 | |
| Romania | 4 | | 3 ▲ | 2 ▲ | 4 | 5 | 5 | 19 | | 16 | 16 | 20 | 21 | 22 |
| Oman | 4 | 3 ▲ | 2 ▲ | 1 ▲ | | | | 19 | 17 ▲ | 11 ▲ | 8 ▲ | | | |
| Cyprus | 3 | | | 1 ▲ | 0 ▲ | 2 ▲ | 2 ▲ | 22 | | | 12 ▲ | 8 ▲ | 14 ▲ | 15 ▲ |
| Malaysia | 3 | 3 | 1 ▲ | 3 | 4 | 5 ▽ | | 18 | 21 ▽ | 11 ▲ | 18 | 28 ▽ | 24 ▽ | |
| France | 3 | | | | | | 2 | 22 | | | | | | 19 |
| Kuwait | 2 | 2 | | | | | | 15 | 10 ▲ | | | | | |
| Iran, Islamic Rep. of | 2 | 3 | 5 ▽ | 2 | 1 ▲ | 1 | 1 | 13 | 15 | 21 ▽ | 14 | 9 ▲ | 11 | 11 |
| Jordan | 2 | 1 | 2 | 5 ▽ | 3 ▽ | 4 ▽ | | 15 | 9 ▲ | 15 | 26 ▽ | 21 ▽ | 17 | |
| Chile | 1 | 1 | 1 | | 1 ▲ | 1 | | 13 | 12 | 12 | | 5 ▲ | 7 ▲ | |
| South Africa (9) | 1 | 1 | 1 | | | | | 5 | 5 | 4 | | | | |
| Saudi Arabia | 1 | 1 | 1 | | | | | 9 | 6 ▲ | 8 | | | | |
| Georgia | 1 | 1 | 0 | 0 ▲ | | | | 10 | 10 | 6 ▲ | 5 ▲ | | | |
| Lebanon | 1 | 1 | 1 | 1 | 0 | | | 5 | 7 | 7 | 8 ▽ | 4 | | |
| Egypt | 1 | 0 | | 1 | 1 ▽ | | | 6 | 5 | | 7 | 10 ▽ | | |
| Morocco | 0 | 0 | 0 | | | | | 3 | 3 | 2 ▲ | | | | |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Dubai, UAE | 23 | 14 ▲ | 7 ▲ | 6 ▲ | | | | 54 | 43 ▲ | 28 ▲ | 27 ▲ | | | |
| Quebec, Canada | 10 | 7 | 5 ▲ | 4 ▲ | 6 ▲ | 10 | 7 | 44 | 39 | 34 ▲ | 27 ▲ | 39 | 43 | 30 ▲ |
| Ontario, Canada | 9 | 7 | 6 ▲ | 7 | 7 | 7 | 5 ▲ | 36 | 37 | 35 | 37 | 41 | 34 | 26 ▲ |
| Abu Dhabi, UAE | 6 | 5 | 4 ▲ | | | | | 19 | 20 | 17 | | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

An empty cell indicates a country did not participate in that year's assessment or did not have comparable data.
See Appendix A for country participation in previous TIMSS assessments.
Results for Lithuania before 2015 do not include students taught in Polish or Russian.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.9: Percentages of Students Reaching International Benchmarks of Science Achievement Across Assessment Years

(Continued)

| Country | Intermediate International Benchmark (475) — Percent of Students | | | | | | | Low International Benchmark (400) — Percent of Students | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 |
| Singapore | 91 | 90 | 87 ▲ | 80 ▲ | 85 ▲ | 84 ▲ | 91 | 98 | 97 | 96 ▲ | 93 ▲ | 95 ▲ | 95 ▲ | 99 ▽ |
| Chinese Taipei | 88 | 86 | 85 ▲ | 83 ▲ | 88 | 86 | | 97 | 96 | 96 | 95 ▲ | 98 | 96 | |
| Japan | 90 | 89 | 86 ▲ | 85 ▲ | 86 ▲ | 84 ▲ | 85 ▲ | 99 | 98 | 97 ▲ | 96 ▲ | 98 ▲ | 97 ▲ | 97 ▲ |
| Korea, Rep. of | 86 | 85 | 86 | 85 | 88 ▽ | 81 ▲ | 81 ▲ | 96 | 97 | 97 | 97 | 98 ▽ | 96 | 95 |
| Finland | 80 | | 88 ▽ | | | | | 94 | | 99 ▽ | | | | |
| United States | 70 | 75 ▽ | 73 | 71 | 75 | 67 | 68 | 88 | 93 ▽ | 93 ▽ | 92 ▽ | 93 ▽ | 87 | 87 |
| Russian Federation | 82 | 81 | 81 | 76 ▲ | 70 ▲ | 73 ▲ | 71 ▲ | 97 | 96 | 96 | 95 ▲ | 93 ▲ | 92 ▲ | 92 ▲ |
| Sweden | 71 | 73 | 68 | 69 | 75 ▽ | | 83 ▽ | 89 | 92 ▽ | 91 | 91 | 95 ▽ | | 97 ▽ |
| Turkey | 66 | 59 ▲ | 54 ▲ | | | | | 88 | 83 ▲ | 79 ▲ | | | | |
| Australia | 74 | 69 ▲ | 70 | 70 ▲ | 76 | | 69 ▲ | 92 | 91 | 92 | 92 | 95 ▽ | | 89 |
| Israel | 67 | 64 | 69 | | | | | 87 | 84 | 88 | | | | |
| Hungary | 75 | 74 | 75 | 80 ▽ | 82 ▽ | 83 ▽ | 80 ▽ | 93 | 92 | 92 | 96 ▽ | 97 ▽ | 96 ▽ | 95 ▽ |
| Lithuania | 78 | 72 ▲ | 71 ▲ | 72 ▲ | 74 ▲ | 57 ▲ | 45 ▲ | 95 | 93 ▲ | 92 ▲ | 93 ▲ | 95 | 86 ▲ | 79 ▲ |
| England | 69 | 77 ▽ | 76 ▽ | 79 ▽ | 81 ▽ | 76 ▽ | 75 ▽ | 89 | 95 ▽ | 93 ▽ | 94 ▽ | 96 ▽ | 94 ▽ | 93 ▽ |
| United Arab Emirates | 53 | 53 | 47 ▲ | | | | | 72 | 76 ▽ | 75 | | | | |
| Ireland | 73 | 77 ▽ | | | | | 70 | 92 | 94 | | | | | 90 |
| Hong Kong SAR | 64 | 85 ▽ | 80 ▽ | 77 ▽ | 89 ▽ | 80 ▽ | 70 | 85 | 96 ▽ | 95 ▽ | 92 ▽ | 98 ▽ | 96 ▽ | 90 |
| Bahrain | 57 | 49 ▲ | 44 ▲ | 49 ▲ | 33 ▲ | | | 79 | 73 ▲ | 70 ▲ | 78 | 70 ▲ | | |
| New Zealand | 63 | 67 ▽ | 67 | | 73 ▽ | 66 | 67 | 85 | 88 ▽ | 90 ▽ | | 94 ▽ | 88 | 89 ▽ |
| Portugal | 73 | | | | | | 49 ▲ | 95 | | | | | | 84 ▲ |
| Qatar | 51 | 46 ▲ | 34 ▲ | | | | | 76 | 70 ▲ | 58 ▲ | | | | |
| Norway (9) | 61 | 68 ▽ | | | | | | 86 | 91 ▽ | | | | | |
| Kazakhstan | 51 | | 58 ▽ | | | | | 82 | | 86 ▽ | | | | |
| Italy | 65 | 64 | 65 | 62 | 59 ▲ | 59 ▲ | | 91 | 89 | 90 | 88 | 87 ▲ | 86 ▲ | |
| Romania | 49 | | 47 | 46 | 49 | 50 | 51 | 78 | | 78 | 77 | 78 | 78 | 77 |
| Oman | 46 | 45 | 34 ▲ | 32 ▲ | | | | 72 | 72 | 59 ▲ | 61 ▲ | | | |
| Cyprus | 57 | | | 42 ▲ | 35 ▲ | 45 ▲ | 43 ▲ | 83 | | | 74 ▲ | 71 ▲ | 77 ▲ | 72 ▲ |
| Malaysia | 47 | 52 ▽ | 34 ▲ | 50 | 71 ▽ | 59 ▽ | | 74 | 77 | 62 ▲ | 80 ▽ | 95 ▽ | 87 ▽ | |
| France | 59 | | | | | | 58 | 87 | | | | | | 89 |
| Kuwait | 39 | 29 ▲ | | | | | | 68 | 55 ▲ | | | | | |
| Iran, Islamic Rep. of | 39 | 42 | 50 ▽ | 41 | 38 | 38 | 43 | 72 | 73 | 79 ▽ | 76 ▽ | 77 ▽ | 72 | 81 ▽ |
| Jordan | 45 | 34 ▲ | 45 | 56 ▽ | 53 ▽ | 42 | | 72 | 63 ▲ | 72 | 79 ▽ | 80 ▽ | 69 | |
| Chile | 45 | 40 ▲ | 43 | | 24 ▲ | 27 ▲ | | 78 | 75 | 79 | | 56 ▲ | 60 ▲ | |
| South Africa (9) | 15 | 14 | 11 ▲ | | | | | 36 | 32 | 25 ▲ | | | | |
| Saudi Arabia | 33 | 22 ▲ | 33 | | | | | 64 | 49 ▲ | 68 | | | | |
| Georgia | 38 | 38 | 28 ▲ | 27 ▲ | | | | 72 | 70 | 62 ▲ | 61 ▲ | | | |
| Lebanon | 19 | 24 ▽ | 25 ▽ | 28 ▽ | 20 | | | 41 | 50 ▽ | 54 ▽ | 55 ▽ | 48 ▽ | | |
| Egypt | 24 | 20 ▲ | | 27 | 33 ▽ | | | 49 | 42 ▲ | | 55 ▽ | 59 ▽ | | |
| Morocco | 17 | 17 | 13 ▲ | | | | | 48 | 47 | 39 ▲ | | | | |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Dubai, UAE | 78 | 72 ▲ | 57 ▲ | 58 ▲ | | | | 91 | 89 ▲ | 79 ▲ | 82 ▲ | | | |
| Quebec, Canada | 82 | 79 | 76 ▲ | 68 ▲ | 82 | 83 | 69 ▲ | 97 | 97 | 96 | 94 ▲ | 98 | 98 | 92 |
| Ontario, Canada | 73 | 77 | 76 | 77 | 81 ▽ | 72 | 61 ▲ | 93 | 95 | 96 ▽ | 96 ▽ | 97 ▽ | 95 | 88 ▲ |
| Abu Dhabi, UAE | 38 | 44 ▽ | 45 ▽ | | | | | 56 | 69 ▽ | 74 ▽ | | | | |

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Low Benchmark: Full Description

Exhibit 4.10 presents the description of eighth grade students' achievement at the Low International Benchmark. The very few items that anchored at the Low level indicated students had limited understanding of scientific principles and concepts and limited knowledge of science facts.

## Exhibit 4.10: Description of the TIMSS 2019 Low International Benchmark (400) of Science Achievement

### Low International Benchmark

**400**

**Summary**

*Students show limited understanding of scientific principles and concepts and limited knowledge of science facts.*

Students at this level can read a food web, identify some materials that are attracted to magnets, and know that salt must be removed from clean ocean water to make it safe to drink.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Intermediate Benchmark: Full Description and Example Items

Exhibit 4.11 provides the description of students' achievement at the Intermediate International Benchmark. At this level, the eighth grade students showed and applied some knowledge of biology and physical science.

Exhibit 4.11.1 presents an item from the biology content domain about the advantages of a crocodile's field of vision. On average, 55 percent of the eighth grade students could provide an explanation. The highest achievement was in Japan and Singapore with 84–85 percent correct.

Exhibit 4.11.2 presents an item from the chemistry content domain asking students to distinguish between elements and compounds. Finland and Lithuania had the highest performance—88–89 percent correct. The international average was 61 percent.

Exhibit 4.11.3 shows an example item from physics. Students were able to identify the difference in gravitational attraction as the reason why a rover weighs a different amount on Mars than it does on Earth. With 90 percent correct, the Singaporean eighth graders had the highest achievement. The international average was 69 percent.

## Exhibit 4.11: Description of the TIMSS 2019 Intermediate International Benchmark (475) of Science Achievement

### Intermediate International Benchmark

**475**

**Summary**

*Students show and apply some knowledge of biology and the physical sciences.* Students demonstrate some knowledge of characteristics of animals and apply knowledge of ecosystems. They show some knowledge of the properties of matter, chemical changes, and a few physics concepts.

Students demonstrate limited knowledge of characteristics of animals and of animals' adaptations to their environment. They can apply knowledge of ecosystems and the interaction of living things with their environment.

Students show some knowledge of the structure and properties of matter and chemical changes.

Students can separate conductors from insulators based on differences in electric current, recognize energy change in an everyday object moving downhill, and recognize that the gravity on Earth is different than on another planet.

Students can interpret information from graphs and pictorial diagrams.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 4.11.1: Intermediate International Benchmark of Science Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| Japan | 85 (1.6) | ▲ |
| [2] Singapore | 84 (1.5) | ▲ |
| Portugal | 79 (1.9) | ▲ |
| Ireland | 76 (2.2) | ▲ |
| Korea, Rep. of | 75 (2.1) | ▲ |
| Turkey | 75 (2.0) | ▲ |
| [3] Israel | 72 (1.9) | ▲ |
| Finland | 72 (1.8) | ▲ |
| France | 69 (2.2) | ▲ |
| Australia | 68 (1.9) | ▲ |
| Lithuania | 68 (2.4) | ▲ |
| [2] Sweden | 68 (2.2) | ▲ |
| England | 67 (2.7) | ▲ |
| † United States | 66 (1.5) | ▲ |
| [2] Russian Federation | 65 (2.3) | ▲ |
| Hungary | 63 (2.4) | ▲ |
| Chinese Taipei | 63 (1.8) | ▲ |
| † New Zealand | 62 (2.5) | ▲ |
| Italy | 62 (2.1) | ▲ |
| † Norway (9) | 62 (2.7) | ▲ |
| Cyprus | 56 (2.3) | |
| **International Average** | **55 (0.3)** | |
| [2] Kazakhstan | 54 (2.9) | |
| Bahrain | 54 (1.6) | |
| Romania | 49 (2.8) | ▽ |
| Chile | 48 (2.5) | ▽ |
| Qatar | 44 (1.8) | ▽ |
| Jordan | 44 (2.3) | ▽ |
| United Arab Emirates | 44 (1.0) | ▽ |
| Iran, Islamic Rep. of | 44 (2.1) | ▽ |
| † Hong Kong SAR | 40 (2.7) | ▽ |
| Oman | 38 (2.0) | ▽ |
| Kuwait | 36 (2.0) | ▽ |
| [1] Georgia | 35 (3.1) | ▽ |
| [2] Saudi Arabia | 35 (1.9) | ▽ |
| Malaysia | 27 (1.5) | ▽ |
| Morocco | 24 (1.5) | ▽ |
| Lebanon | 22 (2.2) | ▽ |
| [2] Egypt | 18 (1.5) | ▽ |
| South Africa (9) | 14 (0.8) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 80 (2.2) | ▲ |
| Ontario, Canada | 73 (2.0) | ▲ |
| ‡ Quebec, Canada | 73 (2.6) | ▲ |
| [2] Dubai, UAE | 65 (1.6) | ▲ |
| Western Cape, RSA (9) | 36 (2.3) | ▽ |
| Abu Dhabi, UAE | 34 (1.8) | ▽ |
| Gauteng, RSA (9) | 24 (1.8) | ▽ |

**Content Domain:** Biology

**Cognitive Domain:** Reasoning

**Description:** Reasons how a crocodile's angle of vision helps it to survive in the environment

Dixon read a fact sheet about crocodiles.

**Crocodile Facts**

1. Crocodiles have a lifespan of up to 75 years.

2. Crocodiles today look like ancient crocodiles found in fossils.

3. Crocodiles have an angle of vision of 290° as shown in the diagram.




How can a crocodile's angle of vision help it to survive in its environment?

Give one reason.

The crocodile can see predators and prey almost all of the way around its body without moving its head.

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.11.2: Intermediate International Benchmark of Science Achievement – Example Item 2

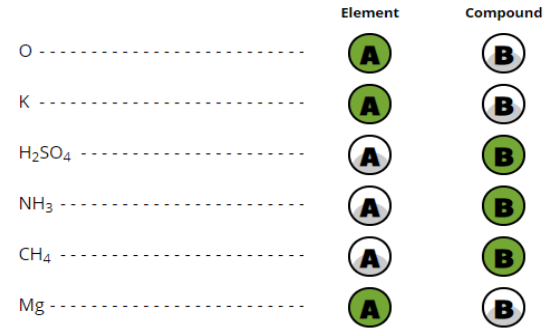
| Country | Percent Full Credit | |
|---|---|---|
| Finland | 89 (1.6) | ▲ |
| Lithuania | 88 (1.7) | ▲ |
| [2] Russian Federation | 83 (1.9) | ▲ |
| [2] Singapore | 78 (1.8) | ▲ |
| Chinese Taipei | 78 (1.5) | ▲ |
| Japan | 77 (1.9) | ▲ |
| [2] Kazakhstan | 75 (2.1) | ▲ |
| [1] Georgia | 74 (2.9) | ▲ |
| England | 74 (2.5) | ▲ |
| Korea, Rep. of | 73 (2.2) | ▲ |
| [3] Israel | 73 (2.2) | ▲ |
| Hungary | 72 (1.8) | ▲ |
| Portugal | 71 (2.2) | ▲ |
| † Norway (9) | 71 (2.9) | ▲ |
| Cyprus | 70 (2.3) | ▲ |
| Romania | 67 (2.3) | ▲ |
| Turkey | 65 (2.1) | |
| Italy | 64 (3.0) | |
| Qatar | 64 (2.6) | |
| † United States | 63 (2.0) | |
| **International Average** | **61 (0.4)** | |
| Australia | 61 (2.3) | |
| Lebanon | 61 (2.8) | |
| Jordan | 60 (2.5) | |
| [2] Sweden | 59 (2.1) | |
| Ireland | 58 (2.6) | |
| United Arab Emirates | 58 (1.0) | ▽ |
| Bahrain | 56 (2.0) | ▽ |
| Oman | 54 (1.8) | ▽ |
| Chile | 49 (2.5) | ▽ |
| † New Zealand | 48 (3.0) | ▽ |
| Kuwait | 47 (2.4) | ▽ |
| Morocco | 45 (1.9) | ▽ |
| France | 45 (2.6) | ▽ |
| [2] Egypt | 42 (2.3) | ▽ |
| South Africa (9) | 41 (1.2) | ▽ |
| Malaysia | 40 (1.7) | ▽ |
| † Hong Kong SAR | 39 (2.9) | ▽ |
| [2] Saudi Arabia | 31 (1.6) | ▽ |
| Iran, Islamic Rep. of | 29 (1.8) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 90 (1.5) | ▲ |
| ‡ Quebec, Canada | 79 (2.1) | ▲ |
| [2] Dubai, UAE | 73 (1.7) | ▲ |
| Western Cape, RSA (9) | 56 (2.5) | ▽ |
| Gauteng, RSA (9) | 50 (1.8) | ▽ |
| Abu Dhabi, UAE | 47 (1.7) | ▽ |
| Ontario, Canada | 32 (2.6) | ▽ |

**Content Domain:** Chemistry

**Cognitive Domain:** Applying

**Description:** From a list of symbols and formulas, recognizes which are elements and which are compounds

Click the circle to show whether each symbol or formula represents an element or compound.




The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 4.11.3: Intermediate International Benchmark of Science Achievement – Example Item 3

| Country | Percent Correct | |
|---|---|---|
| [2] Singapore | 90 (1.2) | ▲ |
| Korea, Rep. of | 86 (1.5) | ▲ |
| Hungary | 84 (1.4) | ▲ |
| Ireland | 84 (1.7) | ▲ |
| [2] Russian Federation | 81 (2.1) | ▲ |
| Australia | 80 (1.6) | ▲ |
| Italy | 80 (2.0) | ▲ |
| England | 80 (2.0) | ▲ |
| † Norway (9) | 79 (1.9) | ▲ |
| Cyprus | 77 (1.9) | ▲ |
| Lithuania | 77 (2.1) | ▲ |
| † New Zealand | 76 (1.8) | ▲ |
| † United States | 74 (2.4) | ▲ |
| Chinese Taipei | 74 (1.7) | ▲ |
| Finland | 73 (1.8) | ▲ |
| Portugal | 73 (2.6) | |
| [2] Sweden | 72 (2.1) | |
| Malaysia | 72 (1.9) | |
| [3] Israel | 71 (2.1) | |
| Oman | 71 (1.9) | |
| Bahrain | 70 (1.9) | |
| Romania | 69 (2.2) | |
| **International Average** | **69 (0.3)** | |
| Japan | 68 (1.7) | |
| Iran, Islamic Rep. of | 67 (1.9) | |
| Chile | 67 (2.6) | |
| France | 67 (2.3) | |
| Turkey | 67 (2.1) | |
| Qatar | 66 (2.2) | |
| Jordan | 65 (2.1) | |
| Kuwait | 65 (2.5) | |
| United Arab Emirates | 65 (1.1) | ▽ |
| † Hong Kong SAR | 61 (2.7) | ▽ |
| [2] Saudi Arabia | 59 (1.8) | ▽ |
| [2] Egypt | 54 (1.8) | ▽ |
| South Africa (9) | 53 (1.5) | ▽ |
| [2] Kazakhstan | 48 (2.2) | ▽ |
| Morocco | 47 (1.9) | ▽ |
| [1] Georgia | 46 (2.7) | ▽ |
| Lebanon | 39 (2.6) | ▽ |
| **Benchmarking Participants** | | |
| ‡ Quebec, Canada | 85 (2.1) | ▲ |
| Moscow City, Russian Fed. | 84 (2.0) | ▲ |
| Ontario, Canada | 84 (1.8) | ▲ |
| [2] Dubai, UAE | 81 (1.7) | ▲ |
| Western Cape, RSA (9) | 69 (1.6) | |
| Gauteng, RSA (9) | 68 (1.5) | |
| Abu Dhabi, UAE | 53 (1.8) | ▽ |

**Content Domain:** Physics

**Cognitive Domain:** Knowing

**Description:** Recognizes why a vehicle has a different weight on Mars than it does on Earth

Scientists sent a special vehicle to Mars to make a map of the surface of the planet. A diagram of the vehicle is shown.



The vehicle has a different weight on Mars than it has on the Earth.

Why does the vehicle have different weights on the two planets?

A. The vehicle lost mass when it was transported from Earth to Mars.

B. The vehicle gained mass when it began moving on Mars.

C. The magnetic attraction on Earth is different from Mars.

D. The gravitational attraction on Earth is different from Mars.

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## High Benchmark: Full Description and Example Items

Exhibit 4.12 presents the description of science achievement at the High International Benchmark. Eighth grade students reaching this level demonstrated conceptual understanding of topics related to biology, chemistry, physics, and Earth science.

Exhibit 4.12.1 provides an example from the biology domain. Forty-eight percent of the eighth grade students, on average, were able to explain why increasing the number of gardens reduces the amount of carbon dioxide in the air. With 85 percent success, Singapore had the highest percentage correct.

Exhibit 4.12.2 provides an example from the chemistry domain. In this item, students were asked to interpret the results of a science experiment shown in a diagram and provide evidence. Students in the Russian Federation were the most successful—69 percent correct. The international average was 39 percent.

A physics example is shown in Exhibit 4.12.3. Seventy-eight percent of the students in Chinese Taipei—by far the highest percentage correct—explained that you cannot hear a phone ring in a vacuum because there is no air. The international average was 38 percent.

Exhibit 4.12.4 provides an example from Earth science asking students to identify the shrinking size of polar ice caps as evidence that the Earth is becoming warmer. Chinese Taipei had the highest achievement with 87 percent correct, and 57 percent of eighth grade students internationally answered correctly, on average.

## Exhibit 4.12: Description of the TIMSS 2019 High International Benchmark (550) of Science Achievement

### High International Benchmark

**550**

**Summary**

*Students apply understanding of concepts from biology, chemistry, physics, and Earth science.* Students can apply knowledge of the characteristics of groups of animals, life processes in humans, cells and their functions, genetic inheritance, ecosystems, and nutrition. Students show some knowledge and understanding of the composition and properties of matter and chemical reactions. They can apply basic knowledge of energy transformation and transfer, electrical circuits, properties of magnets, light, sound, and forces. They can apply knowledge of Earth's physical features, processes, cycles, and history, and show some understanding of Earth's resources and their use.

Students apply knowledge of the characteristics of groups of animals and life processes in humans. They apply knowledge of cells and their functions, recognizing, for example, what happens to an animal's cells as it grows, and distinguishing between plant and animal cells. Students have a basic understanding of genetic inheritance in plants and animals. They can communicate understanding of ecosystems and the interaction of organisms with their environment. Students can apply some knowledge of human health related to nutrition.

Students show some knowledge and understanding of the composition and properties of matter, including identifying structural models of simple substances. Students show some knowledge of chemical reactions.

Students apply basic knowledge of energy transformation and transfer. They demonstrate understanding of parallel electrical circuits as well as properties of magnets. Students demonstrate understanding of light and sound in practical situations. They can identify the forces acting on objects at rest, predict whether an object will float or sink, and analyze force diagrams.

Students apply knowledge of Earth's physical features, processes, cycles, and history. They can interpret weather pattern data to identify climate types and have some understanding of Earth's resources and their use. They can recognize that the planets are visible because they reflect the Sun's light.

Students can combine and interpret information from various types of diagrams, graphs, and tables to draw conclusions.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.12.1: High International Benchmark of Science Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| [2] Singapore | 85 (1.5) | ▲ |
| Chinese Taipei | 69 (2.0) | ▲ |
| [2] Kazakhstan | 68 (2.3) | ▲ |
| Turkey | 67 (2.4) | ▲ |
| [2] Russian Federation | 65 (2.5) | ▲ |
| [2] Sweden | 63 (2.6) | ▲ |
| † Hong Kong SAR | 60 (2.9) | ▲ |
| Korea, Rep. of | 58 (2.5) | ▲ |
| Australia | 57 (2.0) | ▲ |
| Qatar | 57 (2.0) | ▲ |
| [3] Israel | 57 (2.2) | ▲ |
| Ireland | 56 (2.3) | ▲ |
| Lithuania | 53 (2.7) | |
| Cyprus | 52 (2.3) | |
| † United States | 51 (2.5) | |
| Bahrain | 50 (2.1) | |
| Romania | 49 (2.5) | |
| United Arab Emirates | 49 (1.2) | |
| Finland | 49 (1.8) | |
| Kuwait | 49 (2.8) | |
| **International Average** | **48 (0.4)** | |
| Jordan | 48 (2.6) | |
| Portugal | 47 (3.0) | |
| Italy | 44 (2.4) | |
| England | 44 (2.7) | |
| Hungary | 43 (3.0) | |
| Oman | 42 (2.2) | ▽ |
| Japan | 42 (1.9) | ▽ |
| [2] Saudi Arabia | 40 (2.0) | ▽ |
| Iran, Islamic Rep. of | 40 (2.1) | ▽ |
| France | 39 (2.2) | ▽ |
| [2] Egypt | 37 (1.9) | ▽ |
| † Norway (9) | 37 (2.3) | ▽ |
| [1] Georgia | 36 (2.7) | ▽ |
| Morocco | 34 (1.6) | ▽ |
| Malaysia | 33 (1.7) | ▽ |
| † New Zealand | 30 (1.9) | ▽ |
| Lebanon | 29 (2.0) | ▽ |
| Chile | 24 (1.8) | ▽ |
| South Africa (9) | 20 (1.1) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 79 (1.7) | ▲ |
| [2] Dubai, UAE | 66 (2.0) | ▲ |
| Ontario, Canada | 49 (2.5) | |
| ‡ Quebec, Canada | 42 (2.7) | ▽ |
| Abu Dhabi, UAE | 37 (1.5) | ▽ |
| Western Cape, RSA (9) | 33 (1.8) | ▽ |
| Gauteng, RSA (9) | 32 (1.7) | ▽ |

**Content Domain:** Biology

**Cognitive Domain:** Reasoning

**Description:** Explains how roof gardens in cities help reduce the amount of carbon dioxide in the air

In some large cities, owners of large buildings and houses have installed gardens on the roofs. Having more gardens helps reduce the amount of carbon dioxide in the air.

How does increasing the number of gardens help reduce the amount of carbon dioxide in the air?

The trees and plants in the gardens take carbon dioxide out of the air during photosynthesis and give off oxygen.

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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# Exhibit 4.12.2: High International Benchmark of Science Achievement – Example Item 2

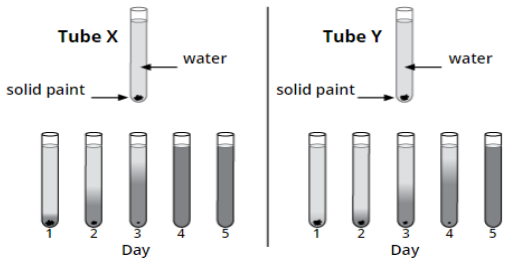
| Country | Percent Full Credit | |
|---|---|---|
| [2] Russian Federation | 69 (1.8) | ▲ |
| Japan | 67 (2.0) | ▲ |
| [2] Singapore | 64 (1.9) | ▲ |
| Korea, Rep. of | 63 (2.4) | ▲ |
| Lithuania | 59 (2.4) | ▲ |
| † United States | 55 (1.9) | ▲ |
| † New Zealand | 52 (1.8) | ▲ |
| Chinese Taipei | 52 (2.0) | ▲ |
| Portugal | 51 (2.8) | ▲ |
| Hungary | 51 (2.2) | ▲ |
| Australia | 49 (2.0) | ▲ |
| Turkey | 49 (2.4) | ▲ |
| Ireland | 49 (2.4) | ▲ |
| [3] Israel | 48 (2.5) | ▲ |
| Finland | 48 (1.7) | ▲ |
| [2] Sweden | 45 (2.6) | ▲ |
| † Hong Kong SAR | 40 (2.4) | |
| [2] Kazakhstan | 40 (2.8) | |
| Bahrain | 39 (1.9) | |
| **International Average** | **39 (0.3)** | |
| France | 38 (2.3) | |
| Chile | 35 (2.3) | |
| Qatar | 35 (2.6) | |
| Cyprus | 34 (2.4) | |
| Italy | 33 (2.4) | ▽ |
| Romania | 32 (2.4) | ▽ |
| † Norway (9) | 32 (2.1) | ▽ |
| England | 31 (2.5) | ▽ |
| Morocco | 29 (1.6) | ▽ |
| Malaysia | 27 (1.5) | ▽ |
| Iran, Islamic Rep. of | 27 (2.1) | ▽ |
| [1] Georgia | 27 (2.9) | ▽ |
| Oman | 26 (1.7) | ▽ |
| Kuwait | 23 (1.7) | ▽ |
| United Arab Emirates | 21 (0.9) | ▽ |
| [2] Saudi Arabia | 20 (1.4) | ▽ |
| South Africa (9) | 20 (0.9) | ▽ |
| Jordan | 15 (1.4) | ▽ |
| Lebanon | 13 (1.5) | ▽ |
| [2] Egypt | 5 (0.7) | ▽ |
| **Benchmarking Participants** | | |
| ‡ Quebec, Canada | 63 (2.5) | ▲ |
| Moscow City, Russian Fed. | 59 (2.3) | ▲ |
| Ontario, Canada | 56 (2.5) | ▲ |
| Western Cape, RSA (9) | 37 (1.8) | |
| Gauteng, RSA (9) | 36 (1.7) | |
| [2] Dubai, UAE | 35 (2.0) | |
| Abu Dhabi, UAE | 15 (1.1) | ▽ |

**Content Domain:** Chemistry

**Cognitive Domain:** Reasoning

**Description:** Explains the effect of temperature on diffusion in the context of an investigation

Maria placed two identical pieces of solid paint at the bottom of two identical tubes, X and Y, filled with water. On Day 1 she put one tube in a refrigerator and left the other in the warm room. Maria took a picture of each tube at the same time for five days. The diagram shows Maria's pictures from each day.




Which tube was in the refrigerator?

(Click one box.)

☐ Tube X

☑ Tube Y

Explain your answer.

The paint in Tube X spread through the water faster. The test tube is fully dark on day 4 for Tube X. The test tube is not fully dark until day 5 for Tube Y. The cold water made the mixing go more slowly in Tube Y.

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.12.3: High International Benchmark of Science Achievement – Example Item 3

| Country | Percent Full Credit | |
|---|---|---|
| Chinese Taipei | 78 (1.8) | ▲ |
| Turkey | 61 (2.1) | ▲ |
| [2] Singapore | 59 (2.5) | ▲ |
| Japan | 56 (2.2) | ▲ |
| Lithuania | 56 (2.8) | ▲ |
| Korea, Rep. of | 53 (2.6) | ▲ |
| Malaysia | 52 (2.0) | ▲ |
| † Hong Kong SAR | 51 (3.3) | ▲ |
| Qatar | 50 (2.8) | ▲ |
| Jordan | 46 (2.3) | ▲ |
| [2] Sweden | 46 (2.3) | ▲ |
| France | 44 (2.5) | ▲ |
| Finland | 44 (2.1) | ▲ |
| Hungary | 43 (2.2) | ▲ |
| [2] Russian Federation | 42 (2.8) | |
| [2] Kazakhstan | 42 (2.0) | |
| [2] Saudi Arabia | 41 (2.2) | |
| [1] Georgia | 40 (2.8) | |
| United Arab Emirates | 39 (1.1) | |
| **International Average** | **38 (0.4)** | |
| Portugal | 38 (2.7) | |
| † United States | 37 (2.3) | |
| Cyprus | 36 (2.4) | |
| England | 35 (2.8) | |
| Oman | 33 (1.9) | ▽ |
| Australia | 33 (2.1) | ▽ |
| Kuwait | 33 (2.8) | ▽ |
| Ireland | 33 (2.3) | ▽ |
| [2] Egypt | 32 (2.0) | ▽ |
| † New Zealand | 31 (2.1) | ▽ |
| Romania | 30 (2.3) | ▽ |
| Morocco | 29 (1.7) | ▽ |
| Bahrain | 29 (1.8) | ▽ |
| [3] Israel | 26 (2.1) | ▽ |
| † Norway (9) | 26 (2.0) | ▽ |
| Italy | 22 (2.3) | ▽ |
| Lebanon | 19 (1.7) | ▽ |
| Iran, Islamic Rep. of | 15 (1.4) | ▽ |
| South Africa (9) | 11 (0.7) | ▽ |
| Chile | 7 (1.3) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 73 (2.2) | ▲ |
| [2] Dubai, UAE | 52 (2.0) | ▲ |
| Abu Dhabi, UAE | 32 (1.7) | ▽ |
| ‡ Quebec, Canada | 28 (2.7) | ▽ |
| Ontario, Canada | 23 (2.0) | ▽ |
| Western Cape, RSA (9) | 22 (1.6) | ▽ |
| Gauteng, RSA (9) | 17 (1.9) | ▽ |

**Content Domain:** Physics

**Cognitive Domain:** Applying

**Description:** Applies knowledge of sound transmission to explain whether a ringing cell phone in a vacuum can be heard outside the vacuum chamber

Nada hangs her cell phone under a glass bowl as shown. The ringer on the phone is turned on. She removes the air from under the bowl so that her phone is in a vacuum.



Nada asks her friend to call her phone. Will they hear it ring?

(Click one box.)

☐ Yes

☑ No

Explain your answer.

There is no air under the bowl for the sound waves to travel through.

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Exhibit 4.12.4: High International Benchmark of Science Achievement – Example Item 4

| Country | Percent Correct | |
|---|---|---|
| Chinese Taipei | 87 (1.3) | ▲ |
| Finland | 82 (1.8) | ▲ |
| Ireland | 79 (1.9) | ▲ |
| Hungary | 77 (2.1) | ▲ |
| Lithuania | 76 (2.1) | ▲ |
| [2] Singapore | 76 (1.9) | ▲ |
| Japan | 75 (1.8) | ▲ |
| Turkey | 74 (2.0) | ▲ |
| † Norway (9) | 70 (2.0) | ▲ |
| [2] Sweden | 70 (2.0) | ▲ |
| England | 69 (2.8) | ▲ |
| † New Zealand | 68 (2.0) | ▲ |
| Korea, Rep. of | 67 (2.6) | ▲ |
| Australia | 67 (1.5) | ▲ |
| Italy | 65 (2.4) | ▲ |
| † United States | 65 (2.4) | ▲ |
| [2] Russian Federation | 63 (2.7) | ▲ |
| † Hong Kong SAR | 63 (2.8) | ▲ |
| Cyprus | 63 (2.3) | ▲ |
| Chile | 60 (2.2) | |
| [3] Israel | 58 (2.8) | |
| France | 57 (2.5) | |
| **International Average** | **57 (0.4)** | |
| Portugal | 54 (2.8) | |
| [2] Kazakhstan | 52 (2.5) | ▽ |
| Romania | 52 (2.7) | |
| Qatar | 48 (2.5) | ▽ |
| United Arab Emirates | 47 (1.1) | ▽ |
| Kuwait | 45 (2.5) | ▽ |
| Bahrain | 44 (2.6) | ▽ |
| [1] Georgia | 44 (2.9) | ▽ |
| Oman | 43 (2.0) | ▽ |
| Malaysia | 43 (1.7) | ▽ |
| [2] Egypt | 40 (1.9) | ▽ |
| [2] Saudi Arabia | 39 (2.3) | ▽ |
| Jordan | 36 (1.8) | ▽ |
| Iran, Islamic Rep. of | 28 (1.5) | ▽ |
| Morocco | 28 (1.6) | ▽ |
| South Africa (9) | 24 (1.1) | ▽ |
| Lebanon | 24 (2.1) | ▽ |
| **Benchmarking Participants** | | |
| ‡ Quebec, Canada | 78 (2.1) | ▲ |
| Ontario, Canada | 75 (2.4) | ▲ |
| Moscow City, Russian Fed. | 72 (2.1) | ▲ |
| [2] Dubai, UAE | 65 (2.1) | ▲ |
| Abu Dhabi, UAE | 39 (1.6) | ▽ |
| Western Cape, RSA (9) | 35 (2.1) | ▽ |
| Gauteng, RSA (9) | 25 (1.6) | ▽ |

**Content Domain:** Earth Science

**Cognitive Domain:** Reasoning

**Description:** Identifies evidence that the Earth is becoming warmer over time

Scientists have evidence of changes in Earth's climate over the last 650,000 years.

Which of the following statements would be evidence that the Earth is becoming warmer?

A. a decrease in the size of Earth's polar ice caps

B. a decrease in the average depth of Earth's oceans

C. an increase in the number of volcanoes erupting

D. an increase in the number of sunspots

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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## Advanced Benchmark: Full Description and Example Items

Exhibit 4.13 presents the description of eighth grade performance at the Advanced International Benchmark. Students reaching the Advanced level communicated conceptual understanding of concepts related to biology, chemistry, physics, and Earth science in a variety of contexts.

Exhibit 4.13.1 shows an item from the biology domain asking students to correctly classify seven animals as mammals or non-mammals. On average, 30 percent of the eighth grade students were successful. Japan was the highest achieving country with 75 percent correct.

Exhibit 4.13.2 presents an item from the chemistry domain about the periodic table of elements. The international average was 29 percent correct, and top-achieving Singapore had 60 percent on this item.

Exhibit 4.13.3 shows a physics item that asked what happens to gas molecules inside a balloon when the balloon is heated. Singapore and Israel had the highest performance on this item with 68–69 percent correct. The international average was 41 percent.

The last example item is shown in Exhibit 4.13.4. From the Earth science content domain, the item asked students to recognize what causes a weather balloon to expand as it rises above the ground. On average, 42 percent of the eighth grade students correctly answered that the atmospheric pressure decreases. The highest percentage correct, 68 percent, was posted by Japan.

## Exhibit 4.13: Description of the TIMSS 2019 Advanced International Benchmark (625) of Science Achievement

### Advanced International Benchmark

**625**

**Summary**

*Students communicate understanding of concepts related to biology, chemistry, physics, and Earth science in a variety of contexts.* Students can classify animals into taxonomic groups. They can apply knowledge of cell structures and their functions. Students show some understanding of diversity, adaptation, and natural selection. They also recognize the interdependence of populations of organisms in an ecosystem. Students demonstrate knowledge of the composition of matter and the periodic table of the elements. Students use physical properties of matter to sort, classify, and compare substances and materials. They also recognize evidence that a chemical reaction has occurred. Students communicate understanding of particle spacing and motion in different physical states. Students apply knowledge of energy transfer and electrical circuits, can relate the properties of light and sound to common phenomena, and demonstrate understanding of forces in everyday contexts. Students communicate understanding of Earth's structure, physical features, and processes. They demonstrate knowledge of the Earth's resources and their conservation.

Students can classify animals into taxonomic groups. They can apply knowledge of cell structures and their functions. Students show some understanding of diversity, adaptation, and natural selection among organisms. They also recognize the interdependence of populations of organisms in an ecosystem.

Students demonstrate knowledge of the composition of matter. They demonstrate understanding of how the elements are arranged in the periodic table. Students use physical properties of matter to sort, classify, and compare substances and materials. They also recognize evidence that a chemical reaction has occurred.

Students communicate understanding of particle spacing and motion in different physical states. They can apply knowledge of energy transfer in practical and abstract contexts. Students can relate the properties of light and sound to common phenomena. They can apply knowledge of electricity. For example, they can recognize components in a circuit, indicate whether parts of a lightbulb are electrical conductors or insulators, and evaluate statements about battery life and bulb brightness in two circuits. Students demonstrate understanding of forces and motion and pressure in everyday contexts.

Students communicate understanding of Earth's structure, physical features, and processes. They also demonstrate knowledge of the Earth's resources and their conservation.

Students can combine and compare information from several sources to draw conclusions. They can interpret information in diagrams, graphs, and tables to identify and explain science concepts.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.13.1: Advanced International Benchmark of Science Achievement – Example Item 1

| Country | Percent Full Credit | |
|---|---|---|
| Japan | 75 (1.9) | ▲ |
| Chinese Taipei | 63 (1.9) | ▲ |
| [2] Singapore | 62 (2.0) | ▲ |
| Hungary | 53 (2.8) | ▲ |
| † Hong Kong SAR | 46 (2.6) | ▲ |
| [2] Russian Federation | 44 (2.5) | ▲ |
| [1] Georgia | 42 (3.2) | ▲ |
| Italy | 41 (2.6) | ▲ |
| Romania | 40 (2.4) | ▲ |
| Finland | 37 (1.7) | ▲ |
| Lithuania | 37 (2.7) | ▲ |
| [2] Kazakhstan | 35 (2.6) | ▲ |
| Australia | 35 (1.6) | ▲ |
| Portugal | 35 (2.6) | ▲ |
| [3] Israel | 33 (2.5) | |
| Korea, Rep. of | 31 (2.1) | |
| † New Zealand | 30 (2.0) | |
| † United States | 30 (1.9) | |
| **International Average** | **30 (0.3)** | |
| England | 27 (2.5) | |
| Cyprus | 27 (2.0) | |
| United Arab Emirates | 27 (1.2) | ▽ |
| Lebanon | 26 (2.3) | |
| Bahrain | 24 (2.3) | ▽ |
| Qatar | 22 (1.7) | ▽ |
| Malaysia | 21 (1.5) | ▽ |
| France | 21 (1.8) | ▽ |
| Turkey | 20 (2.0) | ▽ |
| Ireland | 20 (1.9) | ▽ |
| Oman | 20 (1.5) | ▽ |
| Jordan | 18 (1.8) | ▽ |
| [2] Sweden | 17 (1.7) | ▽ |
| † Norway (9) | 16 (2.0) | ▽ |
| Chile | 16 (1.7) | ▽ |
| Kuwait | 16 (2.3) | ▽ |
| Morocco | 16 (1.5) | ▽ |
| Iran, Islamic Rep. of | 12 (1.4) | ▽ |
| [2] Saudi Arabia | 10 (1.3) | ▽ |
| [2] Egypt | 7 (1.2) | ▽ |
| South Africa (9) | 5 (0.4) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 55 (2.5) | ▲ |
| [2] Dubai, UAE | 37 (2.0) | ▲ |
| Ontario, Canada | 37 (3.0) | ▲ |
| ‡ Quebec, Canada | 27 (2.2) | |
| Abu Dhabi, UAE | 23 (1.5) | ▽ |
| Western Cape, RSA (9) | 14 (1.4) | ▽ |
| Gauteng, RSA (9) | 10 (1.6) | ▽ |

**Content Domain:** Biology

**Cognitive Domain:** Applying

**Description:** Classifies 7 of 7 animals as mammals or non-mammals

Here is a list of animals.

| | | | |
|---|---|---|---|
| **ant** | **cat** | **dolphin** | **earthworm** |
| **fish** | **frog** | **jellyfish** | |

Classify the animals into two groups based on whether or not the animal is a mammal. List the animals in each group in the table.

| Mammal | Not a mammal |
|---|---|
| cat<br>dolphin | ant<br>earthworm<br>fish<br>frog<br>jellyfish |

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.13.2: Advanced International Benchmark of Science Achievement – Example Item 2

| Country | Percent Full Credit | |
|---|---|---|
| [2] Singapore | 60 (2.1) | ▲ |
| Korea, Rep. of | 56 (2.0) | ▲ |
| Turkey | 49 (2.2) | ▲ |
| [2] Russian Federation | 46 (2.4) | ▲ |
| Japan | 44 (2.3) | ▲ |
| † Norway (9) | 44 (2.5) | ▲ |
| Chinese Taipei | 43 (2.2) | ▲ |
| Lithuania | 42 (2.8) | ▲ |
| Hungary | 41 (2.7) | ▲ |
| [2] Kazakhstan | 40 (2.7) | ▲ |
| Australia | 40 (2.1) | ▲ |
| † New Zealand | 38 (2.2) | ▲ |
| Finland | 36 (2.0) | ▲ |
| † United States | 35 (1.8) | ▲ |
| Ireland | 35 (2.3) | ▲ |
| [1] Georgia | 32 (3.2) | |
| England | 31 (2.7) | |
| [3] Israel | 31 (2.4) | |
| [2] Sweden | 29 (2.6) | |
| **International Average** | **29 (0.3)** | |
| United Arab Emirates | 27 (1.1) | |
| Romania | 26 (2.7) | |
| Bahrain | 23 (2.0) | ▽ |
| Kuwait | 23 (2.3) | ▽ |
| Lebanon | 23 (2.2) | ▽ |
| Italy | 21 (2.1) | ▽ |
| South Africa (9) | 21 (1.1) | ▽ |
| Chile | 21 (1.9) | ▽ |
| † Hong Kong SAR | 21 (2.1) | ▽ |
| Iran, Islamic Rep. of | 19 (2.3) | ▽ |
| Jordan | 19 (2.1) | ▽ |
| [2] Egypt | 18 (1.9) | ▽ |
| Portugal | 17 (1.6) | ▽ |
| Qatar | 15 (2.3) | ▽ |
| Cyprus | 15 (1.8) | ▽ |
| France | 15 (1.5) | ▽ |
| Malaysia | 11 (1.1) | ▽ |
| Oman | 8 (1.0) | ▽ |
| [2] Saudi Arabia | 7 (1.3) | ▽ |
| Morocco | 6 (1.1) | ▽ |
| **Benchmarking Participants** | | |
| ‡ Quebec, Canada | 56 (2.7) | ▲ |
| Moscow City, Russian Fed. | 55 (2.3) | ▲ |
| [2] Dubai, UAE | 41 (2.0) | ▲ |
| Western Cape, RSA (9) | 32 (2.1) | |
| Gauteng, RSA (9) | 31 (2.3) | |
| Abu Dhabi, UAE | 23 (1.4) | ▽ |
| Ontario, Canada | 23 (2.4) | ▽ |

**Content Domain:** Chemistry

**Cognitive Domain:** Applying

**Description:** Uses a portion of the periodic table to order four elements from the smallest atomic number to the largest atomic number

This is a portion of the periodic table of elements.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [1]H | | | | | | | He |
| Li | Be | B | C | N | O | F | Ne |
| Na | Mg | Al | Si | P | S | Cl | Ar |

Hydrogen (H) is the first element of the periodic table. The nucleus of a hydrogen atom contains one proton. The atomic number of hydrogen is 1.

Four elements from the periodic table are shown below. The elements are not ordered by their atomic numbers.

Drag the four elements below to sort them by atomic number from smallest to largest.

**Smallest** **Largest**

Helium (He) | Carbon (C) | Fluorine (F) | Sodium (Na)

The answer shown illustrates the type of response that would receive full credit (1 point).

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.13.3: Advanced International Benchmark of Science Achievement – Example Item 3

| Country | Percent Correct | |
|---|---|---|
| [2] Singapore | 69 (2.2) | ▲ |
| [3] Israel | 68 (2.1) | ▲ |
| Portugal | 56 (2.6) | ▲ |
| Korea, Rep. of | 56 (2.3) | ▲ |
| Bahrain | 50 (2.1) | ▲ |
| Australia | 50 (2.5) | ▲ |
| United Arab Emirates | 50 (1.0) | ▲ |
| [2] Russian Federation | 49 (2.5) | ▲ |
| England | 49 (2.5) | ▲ |
| Turkey | 49 (2.3) | ▲ |
| Chile | 47 (2.6) | ▲ |
| Qatar | 47 (2.4) | ▲ |
| † United States | 47 (1.7) | ▲ |
| Japan | 46 (2.6) | ▲ |
| Oman | 45 (1.8) | ▲ |
| Lithuania | 43 (2.4) | |
| [2] Sweden | 41 (2.4) | |
| **International Average** | **41 (0.4)** | |
| Italy | 40 (2.5) | |
| † New Zealand | 40 (2.6) | |
| Chinese Taipei | 38 (2.0) | |
| Kuwait | 37 (2.3) | |
| Jordan | 37 (2.5) | |
| France | 36 (2.2) | ▽ |
| Malaysia | 36 (2.1) | ▽ |
| [2] Saudi Arabia | 36 (1.6) | ▽ |
| [1] Georgia | 36 (3.0) | |
| † Hong Kong SAR | 35 (3.1) | |
| [2] Kazakhstan | 35 (2.1) | ▽ |
| Ireland | 34 (2.4) | ▽ |
| Finland | 34 (2.0) | ▽ |
| † Norway (9) | 34 (2.1) | ▽ |
| Iran, Islamic Rep. of | 31 (2.0) | ▽ |
| Cyprus | 31 (2.2) | ▽ |
| Hungary | 31 (2.0) | ▽ |
| Morocco | 28 (1.8) | ▽ |
| Romania | 27 (2.4) | ▽ |
| Lebanon | 23 (2.4) | ▽ |
| [2] Egypt | 22 (2.0) | ▽ |
| South Africa (9) | 20 (0.9) | ▽ |
| **Benchmarking Participants** | | |
| [2] Dubai, UAE | 63 (1.9) | ▲ |
| Ontario, Canada | 60 (2.6) | ▲ |
| Moscow City, Russian Fed. | 59 (2.5) | ▲ |
| ‡ Quebec, Canada | 48 (2.8) | ▲ |
| Abu Dhabi, UAE | 43 (1.9) | |
| Western Cape, RSA (9) | 28 (2.0) | ▽ |
| Gauteng, RSA (9) | 28 (2.0) | ▽ |

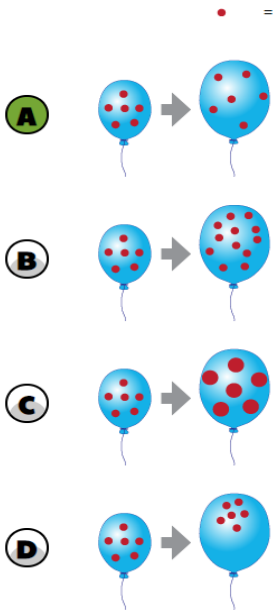
**Content Domain:** Physics

**Cognitive Domain:** Applying

**Description:** Recognizes a diagram of what happens to gas molecules inside a balloon when the balloon expands

Gas inside of a balloon expands when heated.

What happens to the gas molecules when the balloon expands?




▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 4.13.4: Advanced International Benchmark of Science Achievement – Example Item 4

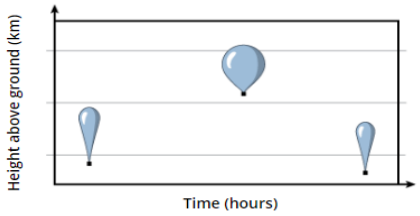
| Country | Percent Correct | |
|---|---|---|
| Japan | 68 (1.9) | ▲ |
| [2] Russian Federation | 66 (2.6) | ▲ |
| Lithuania | 65 (2.0) | ▲ |
| Korea, Rep. of | 63 (2.2) | ▲ |
| Chinese Taipei | 63 (2.0) | ▲ |
| Turkey | 62 (2.4) | ▲ |
| [2] Kazakhstan | 57 (2.4) | ▲ |
| Finland | 55 (2.0) | ▲ |
| Hungary | 52 (2.3) | ▲ |
| Bahrain | 51 (2.0) | ▲ |
| † Hong Kong SAR | 50 (2.5) | ▲ |
| France | 49 (2.1) | ▲ |
| Italy | 45 (2.8) | |
| [2] Singapore | 45 (2.1) | |
| Romania | 43 (2.3) | |
| England | 42 (2.6) | |
| **International Average** | **42 (0.3)** | |
| [1] Georgia | 42 (3.0) | |
| [2] Saudi Arabia | 42 (2.0) | |
| Australia | 41 (1.9) | |
| † United States | 40 (1.8) | |
| Portugal | 40 (2.1) | |
| United Arab Emirates | 39 (1.0) | ▽ |
| † Norway (9) | 39 (2.4) | |
| Qatar | 37 (2.0) | ▽ |
| Ireland | 36 (2.0) | ▽ |
| [2] Sweden | 35 (2.2) | ▽ |
| [3] Israel | 35 (2.7) | ▽ |
| † New Zealand | 34 (2.5) | ▽ |
| Oman | 34 (1.8) | ▽ |
| Cyprus | 34 (2.2) | ▽ |
| Kuwait | 33 (1.8) | ▽ |
| Chile | 33 (2.2) | ▽ |
| Malaysia | 32 (1.7) | ▽ |
| Morocco | 30 (1.7) | ▽ |
| Jordan | 29 (2.1) | ▽ |
| [2] Egypt | 28 (1.8) | ▽ |
| Lebanon | 25 (2.0) | ▽ |
| Iran, Islamic Rep. of | 18 (1.5) | ▽ |
| South Africa (9) | 12 (0.7) | ▽ |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. | 74 (2.3) | ▲ |
| ‡ Quebec, Canada | 51 (3.3) | ▲ |
| [2] Dubai, UAE | 47 (1.9) | ▲ |
| Ontario, Canada | 37 (2.9) | |
| Abu Dhabi, UAE | 37 (1.5) | ▽ |
| Gauteng, RSA (9) | 18 (1.4) | ▽ |
| Western Cape, RSA (9) | 18 (1.5) | ▽ |

**Content Domain:** Earth Science

**Cognitive Domain:** Knowing

**Description:** Recognizes why a balloon gets bigger as its height above the ground increases

The diagram shows the height above the ground of a helium-filled weather balloon during a period of several hours.




What causes the balloon to become bigger as its height above the ground increases?

A. Gravity decreases.

B. Atmospheric pressure decreases.

C. The balloon is heated by the Sun.

D. The balloon absorbs air.

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Average Achievement in Science Content and Cognitive Domains

## TIMSS 2019 Science Content and Cognitive Domains

TIMSS 2019 assessed four content areas in science at the eighth grade: biology, chemistry, physics, and Earth science.

Thirty-five percent of the eighth grade science assessment was devoted to biology, including characteristics and life processes of organisms; cells and their functions; life cycles, reproduction, and heredity; diversity, adaptation, and natural selection; ecosystems; and human health. Eighth grade students were asked about how structure relates to function in organisms, cell structure and function, and the processes of photosynthesis and cellular respiration. Other areas assessed included reproduction and heredity, molecular biology and molecular genetics, adaptation and natural selection, and processes and interactions in ecosystems.

Twenty percent of the assessment covered three chemistry topics—composition of matter, properties of matter, and chemical change. Students were asked about elements, compounds, and mixtures; the use of the periodic table; physical and chemical properties of matter; as well as the properties of mixtures and solutions and the properties of acids and bases. The chemical change topic focused on the characteristics of chemical changes and the conservation of matter during chemical changes.

Twenty-five percent of the assessment was devoted to physics, which consisted of five topics: physical states and changes in matter, energy transformation and transfer, light and sound, electricity and magnetism, and motion and forces. For example, eighth grade students were asked to describe processes involved in changes in the state of matter, to identify different forms of energy and describe simple energy transformations, to apply the principle of conservation of total energy in practical situations, and to understand the difference between thermal energy (heat) and temperature.

The remaining 20 percent of the assessment was devoted to Earth science topics. Students were asked about the structure and physical features of Earth, including Earth's structural layers, and the atmosphere, as well as processes, cycles, and patterns, including geological processes that have occurred over Earth's history, the water cycle, and patterns of weather and climate. Earth's resources and their use and conservation also were covered. The area of Earth in the Solar System included identifying how observable phenomena relate to the movements of Earth and the Moon, and describing the features of Earth, the Moon, and other planets.

Eighth grade students also needed to draw on a range of cognitive skills across the content domains already described above. There are three cognitive domains. Thirty-five percent of the eighth grade assessment was devoted to the knowing cognitive domain, 35 percent to applying, and 30 percent to reasoning. The knowing domain covers the facts, concepts, and procedures students need to know, while the applying domain focuses on students' ability to apply knowledge and conceptual understanding to solve practical problems or answer questions. The reasoning domain goes beyond

the solution of familiar problems to encompass unfamiliar situations, complex contexts, and multistep problems. Also, five science practices fundamental to scientific inquiry were assessed within the content areas and cognitive domains.

## Average Achievement in Content Domains

Exhibit 4.14 shows countries' average science achievement in each of the four content domains relative to their overall average achievement (presented from highest to lowest overall average achievement). Based on countries' strengths and weaknesses, the TIMSS 2019 countries appear to be placing relatively less instructional emphasis on the chemistry and physics domains. Of the 37 participating countries for which cognitive domain scores were estimated, 11 had a relative strength in biology and 8 had a relative weakness. In chemistry, 10 had a relative strength and 16 had a relative weakness; in physics, 9 had a relative strength and 14 had a relative weakness. In most countries, Earth science tended to be either a relative strength (12 countries) or a relative weakness (19 countries). England and Hungary were the only two countries without at least one relative strength or relative weakness compared with its overall achievement.

## Exhibit 4.14: Average Achievement in Science Content Domains

| Country | Overall Science Average Scale Score | Biology (75 Items) | | Chemistry (42 Items) | | Physics (52 Items) | | Earth Science (42 Items) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score |
| [2] Singapore | 608 (3.9) | 622 (4.2) | 14 (1.9) ▲ | 616 (5.0) | 8 (1.8) ▲ | 619 (4.1) | 12 (1.0) ▲ | 562 (4.1) | -46 (1.8) ▽ |
| Chinese Taipei | 574 (1.9) | 576 (2.2) | 2 (1.2) | 594 (2.4) | 20 (1.2) ▲ | 555 (2.7) | -19 (2.3) ▽ | 579 (2.5) | 5 (2.0) ▲ |
| Japan | 570 (2.1) | 574 (2.3) | 4 (1.5) ▲ | 560 (2.7) | -9 (2.1) ▽ | 570 (2.5) | 1 (1.7) | 572 (3.2) | 2 (2.1) |
| Korea, Rep. of | 561 (2.1) | 560 (2.2) | -1 (1.3) | 551 (2.5) | -10 (1.6) ▽ | 569 (2.7) | 9 (1.7) ▲ | 562 (3.2) | 1 (2.3) |
| [2] Russian Federation | 543 (4.2) | 543 (4.5) | 0 (1.4) | 551 (4.2) | 8 (1.5) ▲ | 540 (4.7) | -2 (2.6) | 533 (4.4) | -10 (1.8) ▽ |
| Finland | 543 (3.1) | 534 (3.3) | -9 (1.6) ▽ | 545 (3.8) | 3 (2.0) | 539 (3.9) | -3 (1.9) | 558 (3.5) | 16 (2.8) ▲ |
| Lithuania | 534 (3.0) | 535 (3.0) | 1 (1.4) | 530 (3.2) | -4 (2.3) | 529 (3.5) | -5 (2.0) ▽ | 534 (3.3) | 0 (2.8) |
| Hungary | 530 (2.6) | 530 (2.7) | 0 (1.2) | 527 (3.5) | -2 (2.4) | 528 (2.9) | -2 (1.5) | 535 (3.9) | 5 (2.7) |
| Australia | 528 (3.2) | 531 (3.3) | 3 (1.4) | 515 (3.8) | -14 (1.2) ▽ | 529 (3.6) | 0 (1.1) | 533 (3.3) | 5 (1.9) ▲ |
| Ireland | 523 (2.9) | 521 (3.2) | -2 (1.6) | 512 (3.9) | -11 (2.4) ▽ | 519 (3.8) | -4 (1.9) ▽ | 536 (3.8) | 13 (3.1) ▲ |
| † United States | 522 (4.7) | 530 (4.8) | 7 (0.9) ▲ | 509 (5.2) | -13 (1.8) ▽ | 515 (5.0) | -8 (1.1) ▽ | 530 (5.1) | 7 (1.2) ▲ |
| [2] Sweden | 521 (3.2) | 519 (3.4) | -3 (1.8) | 509 (3.7) | -13 (1.5) ▽ | 520 (3.8) | -1 (2.1) | 530 (3.2) | 9 (1.4) ▲ |
| Portugal | 519 (2.9) | 527 (3.0) | 8 (1.6) ▲ | 512 (3.5) | -6 (1.8) ▽ | 497 (3.5) | -22 (1.9) ▽ | 531 (3.4) | 12 (1.8) ▲ |
| England | 517 (4.8) | 516 (5.2) | -1 (2.0) | 512 (6.0) | -5 (3.1) | 516 (5.1) | 0 (1.2) | 517 (5.5) | 1 (2.6) |
| Turkey | 515 (3.7) | 513 (3.4) | -2 (1.2) ▽ | 516 (4.8) | 0 (2.6) | 518 (4.0) | 3 (1.9) | 509 (3.8) | -6 (1.8) ▽ |
| [3] Israel | 513 (4.2) | 512 (4.2) | -1 (1.1) | 518 (4.6) | 5 (1.7) ▲ | 520 (4.9) | 7 (1.6) ▲ | 495 (4.7) | -18 (2.4) ▽ |
| † Hong Kong SAR | 504 (5.2) | 501 (5.7) | -3 (1.3) ▽ | 485 (5.5) | -19 (2.6) ▽ | 510 (5.6) | 6 (2.7) ▲ | 512 (5.6) | 8 (2.7) ▲ |
| Italy | 500 (2.6) | 508 (2.7) | 8 (1.0) ▲ | 484 (3.0) | -17 (1.9) ▽ | 487 (4.5) | -14 (3.6) ▽ | 512 (3.5) | 11 (2.1) ▲ |
| † New Zealand | 499 (3.5) | 498 (3.7) | -1 (1.5) | 482 (3.8) | -17 (1.5) ▽ | 502 (3.8) | 3 (1.3) ▲ | 510 (3.7) | 11 (1.3) ▲ |
| † Norway (9) | 495 (3.1) | 486 (2.8) | -10 (1.6) ▽ | 492 (3.7) | -3 (2.6) | 493 (3.6) | -3 (2.1) | 519 (3.9) | 23 (2.9) ▲ |
| France | 489 (2.7) | 488 (2.9) | 0 (1.8) | 465 (3.2) | -24 (2.0) ▽ | 491 (3.6) | 2 (3.0) | 502 (4.3) | 14 (3.1) ▲ |
| Bahrain | 486 (1.9) | 492 (1.9) | 6 (1.4) ▲ | 480 (2.4) | -6 (1.7) ▽ | 480 (2.6) | -6 (2.1) ▽ | 475 (2.8) | -11 (2.1) ▽ |
| Cyprus | 484 (1.9) | 489 (2.4) | 5 (1.7) ▲ | 478 (2.1) | -5 (1.4) ▽ | 480 (3.6) | -4 (3.3) | 473 (2.6) | -11 (2.3) ▽ |
| [2] Kazakhstan | 478 (3.1) | 476 (3.2) | -2 (1.4) | 494 (3.6) | 16 (1.9) ▲ | 476 (3.9) | -3 (2.4) | 448 (4.1) | -30 (2.6) ▽ |
| Qatar | 475 (4.4) | 476 (4.4) | 2 (1.2) | 474 (4.4) | 0 (1.5) | 469 (4.4) | -5 (1.7) ▽ | 465 (5.0) | -10 (2.6) ▽ |
| United Arab Emirates | 473 (2.2) | 474 (2.5) | 1 (0.8) | 475 (2.4) | 2 (0.7) ▲ | 469 (2.3) | -4 (0.7) ▽ | 465 (2.4) | -8 (0.9) ▽ |
| Romania | 470 (4.2) | 479 (4.4) | 9 (1.4) ▲ | 466 (5.0) | -3 (2.6) | 458 (4.3) | -12 (1.5) ▽ | 453 (4.7) | -16 (3.7) ▽ |
| Chile | 462 (2.9) | 471 (3.0) | 9 (1.2) ▲ | 442 (2.9) | -20 (1.6) ▽ | 450 (3.7) | -12 (1.8) ▽ | 464 (3.3) | 2 (1.4) |
| Malaysia | 460 (3.5) | 463 (3.7) | 2 (1.4) | 434 (4.2) | -26 (1.5) ▽ | 475 (3.4) | 15 (1.3) ▲ | 452 (4.3) | -9 (1.7) ▽ |
| Oman | 457 (2.9) | 466 (3.3) | 9 (1.1) ▲ | 443 (3.1) | -14 (1.2) ▽ | 449 (3.1) | -8 (1.1) ▽ | 449 (3.0) | -9 (1.8) ▽ |
| Jordan | 452 (4.7) | 457 (5.2) | 5 (1.3) ▲ | 454 (5.3) | 2 (1.6) | 449 (4.6) | -3 (1.4) ▽ | 428 (4.7) | -24 (2.5) ▽ |
| Iran, Islamic Rep. of | 449 (3.6) | 448 (3.7) | -2 (1.2) | 450 (4.5) | 1 (2.0) | 453 (4.2) | 4 (2.5) | 437 (4.0) | -13 (2.3) ▽ |
| [1] Georgia | 447 (3.9) | 447 (3.5) | 0 (2.1) | 456 (4.3) | 9 (2.1) ▲ | 436 (5.0) | -11 (3.3) ▽ | 431 (3.6) | -16 (2.0) ▽ |
| Kuwait | 444 (5.7) | - - | - - | - - | - - | - - | - - | - - | - - |
| [2] Saudi Arabia | 431 (2.6) | - - | - - | - - | - - | - - | - - | - - | - - |
| Morocco | 394 (2.7) | 387 (3.0) | -7 (1.1) ▽ | 402 (3.0) | 8 (1.7) ▲ | 402 (2.9) | 8 (1.9) ▲ | 357 (3.3) | -37 (1.6) ▽ |
| [2] Egypt | 389 (5.4) | 381 (5.6) | -8 (1.0) ▽ | 397 (5.9) | 8 (1.6) ▲ | 394 (5.0) | 5 (1.9) ▲ | 367 (5.5) | -22 (1.3) ▽ |
| Lebanon | 377 (4.6) | 355 (5.1) | -22 (1.9) ▽ | 412 (4.6) | 36 (2.4) ▲ | 378 (4.9) | 1 (2.2) | 337 (5.1) | -40 (3.4) ▽ |
| Ψ South Africa (9) | 370 (3.1) | 359 (3.0) | -11 (1.4) ▽ | 372 (4.2) | 2 (2.4) | 381 (3.0) | 11 (1.3) ▲ | 366 (3.2) | -4 (1.6) ▽ |
| **Benchmarking Participants** | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | 565 (3.1) | -1 (1.2) | 561 (2.9) | -5 (1.1) ▽ | 576 (3.6) | 10 (2.1) ▲ | 565 (3.6) | -2 (1.9) |
| [2] Dubai, UAE | 548 (2.0) | 554 (2.2) | 6 (0.9) ▲ | 554 (2.2) | 6 (1.4) ▲ | 539 (2.6) | -8 (1.9) ▽ | 538 (2.3) | -9 (1.7) ▽ |
| ‡ Quebec, Canada | 537 (3.6) | 531 (3.8) | -6 (1.5) ▽ | 548 (4.1) | 12 (1.8) ▲ | 521 (4.2) | -16 (2.5) ▽ | 553 (4.5) | 16 (2.7) ▲ |
| Ontario, Canada | 522 (3.0) | 534 (3.2) | 13 (1.9) ▲ | 492 (3.9) | -30 (3.1) ▽ | 520 (3.5) | -2 (2.5) | 520 (3.0) | -2 (1.7) |
| Western Cape, RSA (9) | 439 (5.1) | 432 (5.2) | -7 (2.6) ▽ | 442 (7.2) | 2 (5.6) | 442 (6.2) | 3 (4.2) | 442 (6.7) | 3 (5.6) |
| Gauteng, RSA (9) | 422 (3.9) | 416 (3.9) | -6 (2.1) ▽ | 423 (4.2) | 0 (1.8) | 428 (4.5) | 6 (2.6) ▲ | 419 (4.1) | -3 (2.5) |
| Abu Dhabi, UAE | 420 (3.6) | 417 (3.9) | -3 (1.2) ▽ | 421 (4.1) | 1 (1.3) | 420 (3.8) | 0 (1.0) | 413 (4.1) | -7 (2.0) ▽ |

▲ Subscale score significantly higher than overall science score
▽ Subscale score significantly lower than overall science score

Numbers of items are based on the TIMSS 2019 eighth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement in Content Domains

Exhibit 4.15 presents trends in average achievement for the four science content domains assessed by TIMSS 2019—biology, chemistry, physics, and Earth science. The results are moderately positive, showing more increases than decreases in all four content areas, especially most recently in biology. Thirty-one TIMSS 2019 countries also participated in TIMSS 2015 and have comparable data in the content domains. In the biology content area, 13 showed improvement and 5 showed declines; in chemistry, 8 showed improvement and 8 showed declines; in physics, 9 showed improvement and 5 showed declines; and in Earth science, 10 showed improvement and 5 showed declines.

TIMSS began providing scaled results in the content domains in 2007, with 23 countries having trends between 2007 and 2019. Compared with 2007, in TIMSS 2019, 11 countries showed improvement and 5 showed declines in biology, 8 countries showed improvement and 6 showed declines in chemistry, 11 showed improvement and 6 showed declines in physics, and 12 showed improvement and 6 showed declines in Earth science.

# Exhibit 4.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Biology | | | | Chemistry | | | | Physics | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Australia** | | | | | | | | | | | | | | | | |
| 2019 | 531 (3.3) | 9 ▲ | 4 | 12 ▲ | 515 (3.8) | 22 ▲ | 13 ▲ | 10 | 529 (3.6) | 24 ▲ | 18 ▲ | 20 ▲ | 533 (3.3) | 11 ▲ | 0 | 13 ▲ |
| 2015 | 522 (2.8) | | -5 | 3 | 493 (3.3) | | -8 | -12 ▽ | 505 (2.7) | | -6 | -4 | 522 (2.9) | | -11 | 1 |
| 2011 | 527 (4.8) | | | 8 | 501 (5.0) | | | -3 | 511 (5.1) | | | 2 | 533 (5.5) | | | 13 |
| 2007 | 519 (3.8) | | | | 504 (4.0) | | | | 509 (4.3) | | | | 521 (4.4) | | | |
| **Bahrain** | | | | | | | | | | | | | | | | |
| 2019 | 492 (1.9) | 24 ▲ | 44 ▲ | 22 ▲ | 480 (2.4) | 18 ▲ | 33 ▲ | 14 ▲ | 480 (2.6) | 19 ▲ | 23 ▲ | 17 ▲ | 475 (2.8) | 15 ▲ | 24 ▲ | 15 ▲ |
| 2015 | 469 (2.6) | | 20 ▲ | -1 | 462 (2.8) | | 15 ▲ | -4 | 461 (2.6) | | 5 | -2 | 461 (3.5) | | 9 ▲ | 0 |
| 2011 | 449 (2.0) | | | -22 ▽ | 448 (2.6) | | | -19 ▽ | 457 (1.7) | | | -7 ▽ | 451 (1.8) | | | -9 ▽ |
| 2007 | 470 (2.1) | | | | 467 (2.9) | | | | 463 (1.6) | | | | 460 (2.8) | | | |
| **Chile** | | | | | | | | | | | | | | | | |
| 2019 | 471 (3.0) | 12 ▲ | 10 ▲ | | 442 (2.9) | 4 | -5 | | 450 (3.7) | 11 ▲ | -3 | | 464 (3.3) | 0 | -12 ▽ | |
| 2015 | 459 (3.6) | | -3 | | 438 (3.6) | | -9 | | 439 (3.8) | | -14 ▽ | | 464 (3.2) | | -12 ▽ | |
| 2011 | 462 (2.6) | | | | 447 (3.0) | | | | 453 (2.6) | | | | 476 (2.8) | | | |
| **Chinese Taipei** | | | | | | | | | | | | | | | | |
| 2019 | 576 (2.2) | 11 ▲ | 19 ▲ | 22 ▲ | 594 (2.4) | 16 ▲ | 9 ▲ | 10 | 555 (2.7) | -5 | 3 | -4 | 579 (2.5) | -2 | 11 ▲ | 27 ▲ |
| 2015 | 565 (2.2) | | 8 ▲ | 11 ▲ | 579 (2.7) | | -7 | -6 | 560 (3.0) | | 8 | 1 | 581 (2.7) | | 12 ▲ | 29 ▲ |
| 2011 | 557 (2.5) | | | 3 | 585 (3.8) | | | 1 | 552 (3.3) | | | -6 | 568 (2.8) | | | 16 ▲ |
| 2007 | 554 (3.7) | | | | 585 (4.7) | | | | 559 (4.2) | | | | 552 (3.4) | | | |
| **Cyprus** | | | | | | | | | | | | | | | | |
| 2019 | 489 (2.4) | | | 45 ▲ | 478 (2.1) | | | 30 ▲ | 480 (3.6) | | | 25 ▲ | 473 (2.6) | | | 20 ▲ |
| 2007 | 444 (2.3) | | | | 448 (3.1) | | | | 454 (3.6) | | | | 453 (2.6) | | | |
| **Egypt** | | | | | | | | | | | | | | | | |
| [2] 2019 | 381 (5.6) | 33 ▲ | | -19 ▽ | 397 (5.9) | 2 | | -7 | 394 (5.0) | 16 ▲ | | -12 | 367 (5.5) | 16 ▲ | | -50 ▽ |
| 2015 | 348 (5.0) | | | -52 ▽ | 395 (5.0) | | | -9 | 378 (4.7) | | | -28 ▽ | 351 (4.6) | | | -65 ▽ |
| 2007 | 400 (3.7) | | | | 404 (4.7) | | | | 406 (3.8) | | | | 417 (4.4) | | | |
| **England** | | | | | | | | | | | | | | | | |
| 2019 | 516 (5.2) | -26 ▽ | -17 ▽ | -28 ▽ | 512 (6.0) | -17 ▽ | -17 ▽ | -27 ▽ | 516 (5.1) | -19 ▽ | -17 ▽ | -32 ▽ | 517 (5.5) | -18 ▽ | -19 ▽ | -14 |
| 2015 | 542 (4.0) | | 9 | -2 | 529 (4.5) | | 0 | -11 | 535 (3.9) | | 2 | -14 ▽ | 536 (4.0) | | -1 | 4 |
| ‡ 2011 | 533 (4.8) | | | -11 | 529 (5.2) | | | -11 | 533 (4.7) | | | -15 ▽ | 536 (5.3) | | | 5 |
| † 2007 | 544 (4.7) | | | | 539 (4.7) | | | | 549 (4.5) | | | | 531 (5.2) | | | |
| **Finland** | | | | | | | | | | | | | | | | |
| 2019 | 534 (3.3) | | -14 ▽ | | 545 (3.8) | | -8 | | 539 (3.9) | | -1 | | 558 (3.5) | | -16 ▽ | |
| 2011 | 548 (2.8) | | | | 554 (2.6) | | | | 540 (2.9) | | | | 574 (3.0) | | | |
| **Georgia** | | | | | | | | | | | | | | | | |
| [1] 2019 | 447 (3.5) | 0 | 12 ▲ | 28 ▲ | 456 (4.3) | 0 | 61 ▲ | 48 ▲ | 436 (5.0) | 6 | 35 ▲ | 25 ▲ | 431 (3.6) | 11 ▲ | 13 ▲ | 15 ▲ |
| [1 2] 2015 | 447 (3.1) | | 12 ▲ | 28 ▲ | 456 (3.7) | | 61 ▲ | 48 ▲ | 429 (4.6) | | 28 ▲ | 19 ▲ | 420 (3.6) | | 2 | 4 |
| [1] 2011 | 435 (3.2) | | | 16 ▲ | 395 (3.2) | | | -13 ▽ | 401 (4.2) | | | -9 | 417 (3.5) | | | 2 |
| [1] 2007 | 419 (4.1) | | | | 408 (5.4) | | | | 411 (5.9) | | | | 416 (4.5) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | | | | | |
| † 2019 | 501 (5.7) | -48 ▽ | -35 ▽ | -29 ▽ | 485 (5.5) | -51 ▽ | -41 ▽ | -36 ▽ | 510 (5.6) | -30 ▽ | -29 ▽ | -20 ▽ | 512 (5.6) | -46 ▽ | -28 ▽ | -24 ▽ |
| 2015 | 549 (4.7) | | 13 ▲ | 19 ▲ | 536 (4.1) | | 10 | 15 ▲ | 540 (4.1) | | 2 | 10 | 558 (4.3) | | 19 ▲ | 23 ▲ |
| 2011 | 535 (3.6) | | | 6 | 526 (3.6) | | | 5 | 539 (3.6) | | | 9 | 539 (3.6) | | | 4 |
| † 2007 | 529 (5.0) | | | | 521 (5.3) | | | | 530 (5.4) | | | | 535 (5.1) | | | |
| **Hungary** | | | | | | | | | | | | | | | | |
| 2019 | 530 (2.7) | 9 ▲ | 11 ▲ | -5 | 527 (3.5) | -7 | -7 | -13 ▽ | 528 (2.9) | -3 | 3 | -16 ▽ | 535 (3.9) | 13 ▲ | 24 ▲ | 0 |
| 2015 | 521 (3.3) | | 1 | -14 ▽ | 534 (3.6) | | 0 | -6 | 531 (4.0) | | 6 | -13 ▽ | 521 (3.9) | | 10 ▲ | -13 ▽ |
| 2011 | 520 (3.0) | | | -15 ▽ | 534 (3.3) | | | -6 | 525 (3.7) | | | -19 ▽ | 511 (3.3) | | | -24 ▽ |
| 2007 | 535 (2.9) | | | | 540 (4.0) | | | | 544 (3.7) | | | | 535 (3.3) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | | | | | |
| 2019 | 448 (3.7) | -1 | -18 ▽ | 3 | 450 (4.5) | -8 | -19 ▽ | -7 | 453 (4.2) | -22 ▽ | -30 ▽ | -14 ▽ | 437 (4.0) | -2 | -40 ▽ | -35 ▽ |
| 2015 | 448 (3.8) | | -18 ▽ | 3 | 458 (4.6) | | -12 | 1 | 475 (4.4) | | -8 | 8 | 439 (4.5) | | -38 ▽ | -33 ▽ |
| 2011 | 466 (3.9) | | | 21 ▲ | 469 (4.4) | | | 12 ▲ | 483 (4.1) | | | 16 ▲ | 477 (4.0) | | | 5 |
| 2007 | 445 (3.7) | | | | 457 (4.1) | | | | 467 (4.1) | | | | 472 (4.3) | | | |
| **Ireland** | | | | | | | | | | | | | | | | |
| 2019 | 521 (3.2) | -13 ▽ | | | 512 (3.9) | -5 | | | 519 (3.8) | -6 | | | 536 (3.8) | -6 | | |
| 2015 | 534 (2.9) | | | | 517 (3.6) | | | | 525 (3.2) | | | | 542 (3.1) | | | |
| **Israel** | | | | | | | | | | | | | | | | |
| [3] 2019 | 512 (4.2) | 8 | -11 | | 518 (4.6) | 3 | 5 | | 520 (4.9) | 11 | 6 | | 495 (4.7) | 2 | -9 | |
| [3] 2015 | 504 (4.2) | | -19 ▽ | | 516 (4.6) | | 2 | | 508 (4.0) | | -5 | | 493 (4.0) | | -12 ▽ | |
| [3] 2011 | 523 (4.2) | | | | 514 (5.0) | | | | 514 (4.1) | | | | 504 (4.3) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in content domains using current methodology began with TIMSS 2007.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

(Continued)

| Country | Biology | | | | Chemistry | | | | Physics | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Italy** | | | | | | | | | | | | | | | | |
| 2019 | 508 (2.7) | 13 ▲ | 5 | 6 | 484 (3.0) | -4 | -8 | 6 | 487 (4.5) | -10 | -4 | -2 | 512 (3.5) | -2 | -1 | 10 ▲ |
| [2] 2015 | 496 (2.6) | | -8 ▽ | -6 | 487 (2.4) | | -4 | 9 ▲ | 496 (2.5) | | 6 | 8 | 514 (2.8) | | 1 | 12 ▲ |
| 2011 | 503 (3.0) | | | 1 | 491 (3.0) | | | 13 ▲ | 490 (2.8) | | | 2 | 513 (3.8) | | | 11 ▲ |
| 2007 | 502 (3.2) | | | | 478 (3.5) | | | | 489 (3.5) | | | | 502 (3.5) | | | |
| **Japan** | | | | | | | | | | | | | | | | |
| 2019 | 574 (2.3) | 3 | 13 ▲ | 19 ▲ | 560 (2.7) | -10 ▽ | 0 | 2 | 570 (2.5) | 1 | 12 ▲ | 7 ▲ | 572 (3.2) | -2 | 23 ▲ | 36 ▲ |
| 2015 | 570 (2.9) | | 10 ▲ | 16 ▲ | 570 (2.4) | | 10 ▲ | 11 ▲ | 570 (2.3) | | 12 ▲ | 6 ▲ | 574 (2.0) | | 26 ▲ | 38 ▲ |
| 2011 | 561 (2.3) | | | 6 ▲ | 560 (2.7) | | | 1 | 558 (2.8) | | | -5 | 548 (2.8) | | | 12 ▲ |
| 2007 | 554 (2.0) | | | | 559 (2.4) | | | | 563 (2.2) | | | | 536 (3.4) | | | |
| **Jordan** | | | | | | | | | | | | | | | | |
| 2019 | 457 (5.2) | 38 ▲ | 10 | -19 ▽ | 454 (5.3) | 17 ▲ | -8 | -38 ▽ | 449 (4.6) | 25 ▲ | 3 | -28 ▽ | 428 (4.7) | 12 ▲ | -8 | -54 ▽ |
| 2015 | 420 (3.9) | | -28 ▽ | -57 ▽ | 438 (3.8) | | -25 ▽ | -55 ▽ | 424 (3.6) | | -22 ▽ | -53 ▽ | 416 (3.0) | | -20 ▽ | -66 ▽ |
| 2011 | 447 (4.4) | | | -29 ▽ | 463 (4.4) | | | -30 ▽ | 446 (4.2) | | | -31 ▽ | 436 (4.3) | | | -46 ▽ |
| 2007 | 476 (4.2) | | | | 493 (4.7) | | | | 478 (4.3) | | | | 481 (4.2) | | | |
| **Kazakhstan** | | | | | | | | | | | | | | | | |
| [2] 2019 | 476 (3.2) | | -7 | | 494 (3.6) | | -15 ▽ | | 476 (3.9) | | -13 ▽ | | 448 (4.1) | | -24 ▽ | |
| 2011 | 483 (4.4) | | | | 508 (4.7) | | | | 489 (4.3) | | | | 472 (4.8) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | | | | | |
| 2019 | 560 (2.2) | 6 | -1 | 8 ▲ | 551 (2.5) | 0 | 0 | 12 ▲ | 569 (2.7) | 5 | -7 | -7 | 562 (3.2) | 7 | 14 ▲ | 19 ▲ |
| 2015 | 554 (2.2) | | -7 ▽ | 2 | 550 (2.5) | | -1 | 11 ▲ | 564 (2.8) | | -12 ▽ | -12 ▽ | 554 (2.7) | | 7 | 12 ▲ |
| 2011 | 561 (2.3) | | | 9 ▲ | 551 (2.1) | | | 12 ▲ | 577 (2.7) | | | 0 | 548 (3.2) | | | 5 |
| 2007 | 552 (2.0) | | | | 539 (3.0) | | | | 576 (2.6) | | | | 543 (2.4) | | | |
| **Lebanon** | | | | | | | | | | | | | | | | |
| 2019 | 355 (5.1) | -11 | -40 ▽ | -44 ▽ | 412 (4.6) | -25 ▽ | -22 ▽ | -27 ▽ | 378 (4.9) | -34 ▽ | -27 ▽ | -46 ▽ | 337 (5.1) | -28 ▽ | -28 ▽ | -41 ▽ |
| 2015 | 366 (6.2) | | -29 ▽ | -33 ▽ | 438 (6.2) | | 3 | -2 | 412 (6.6) | | 7 | -12 | 365 (6.4) | | 1 | -13 |
| 2011 | 395 (5.2) | | | -4 | 435 (5.2) | | | -5 | 405 (5.4) | | | -19 ▽ | 365 (6.4) | | | -14 |
| 2007 | 399 (6.7) | | | | 440 (6.5) | | | | 424 (5.7) | | | | 378 (6.8) | | | |
| **Lithuania** | | | | | | | | | | | | | | | | |
| 2019 | 535 (3.0) | 14 ▲ | 18 ▲ | 5 | 530 (3.2) | 13 ▲ | 13 ▲ | 23 ▲ | 529 (3.5) | 16 ▲ | 26 ▲ | 22 ▲ | 534 (3.3) | 16 ▲ | 18 ▲ | 17 ▲ |
| [2] 2015 | 521 (3.1) | | 4 | -9 ▽ | 517 (3.2) | | 0 | 11 ▲ | 513 (3.6) | | 10 ▲ | 6 | 518 (3.3) | | 2 | 1 |
| [1] 2011 | 517 (2.7) | | | -13 ▽ | 517 (2.3) | | | 11 ▲ | 503 (3.2) | | | -4 | 517 (3.5) | | | 0 |
| [1] 2007 | 530 (2.7) | | | | 506 (2.6) | | | | 507 (3.1) | | | | 517 (3.0) | | | |
| **Malaysia** | | | | | | | | | | | | | | | | |
| 2019 | 463 (3.7) | -4 | 36 ▲ | -3 | 434 (4.2) | -39 ▽ | 8 | -41 ▽ | 475 (3.4) | -5 | 40 ▲ | -7 | 452 (4.3) | -9 | 50 ▲ | -5 |
| 2015 | 466 (4.4) | | 39 ▲ | 1 | 473 (4.0) | | 47 ▲ | -2 | 480 (3.9) | | 45 ▲ | -2 | 460 (4.5) | | 59 ▲ | 4 |
| 2011 | 427 (6.2) | | | -39 ▽ | 426 (6.5) | | | -49 ▽ | 435 (6.6) | | | -47 ▽ | 401 (6.5) | | | -56 ▽ |
| 2007 | 466 (6.2) | | | | 475 (5.9) | | | | 482 (6.4) | | | | 457 (6.1) | | | |
| **Morocco** | | | | | | | | | | | | | | | | |
| 2019 | 387 (3.0) | 7 | 9 ▲ | | 402 (3.0) | 3 | 28 ▲ | | 402 (2.9) | 7 | 53 ▲ | | 357 (3.3) | -38 ▽ | -20 ▽ | |
| 2015 | 380 (2.5) | | 2 | | 400 (3.0) | | 25 ▲ | | 395 (2.9) | | 47 ▲ | | 395 (2.2) | | 18 ▲ | |
| 2011 | 378 (3.1) | | | | 374 (2.3) | | | | 349 (2.6) | | | | 377 (3.3) | | | |
| **New Zealand** | | | | | | | | | | | | | | | | |
| † 2019 | 498 (3.7) | -22 ▽ | -16 ▽ | | 482 (3.8) | -16 ▽ | -19 ▽ | | 502 (3.8) | -7 | -7 | | 510 (3.7) | -7 | -13 ▽ | |
| † 2015 | 520 (3.5) | | 5 | | 498 (3.5) | | -3 | | 508 (3.2) | | 0 | | 517 (3.6) | | -6 | |
| 2011 | 514 (4.8) | | | | 501 (5.3) | | | | 509 (4.6) | | | | 523 (4.8) | | | |
| **Norway (9)** | | | | | | | | | | | | | | | | |
| † 2019 | 486 (2.8) | -16 ▽ | | | 492 (3.7) | -10 ▽ | | | 493 (3.6) | -19 ▽ | | | 519 (3.9) | -4 | | |
| 2015 | 502 (2.6) | | | | 503 (2.9) | | | | 512 (3.1) | | | | 523 (3.3) | | | |
| **Oman** | | | | | | | | | | | | | | | | |
| 2019 | 466 (3.3) | 12 ▲ | 59 ▲ | 59 ▲ | 443 (3.1) | -9 ▽ | 35 ▲ | 35 ▲ | 449 (3.1) | 1 | 23 ▲ | 11 ▲ | 449 (3.0) | -8 | 17 ▲ | 17 ▲ |
| 2015 | 454 (2.7) | | 47 ▲ | 47 ▲ | 452 (2.7) | | 44 ▲ | 44 ▲ | 449 (3.0) | | 22 ▲ | 10 ▲ | 456 (2.4) | | 25 ▲ | 24 ▲ |
| 2011 | 407 (3.5) | | | 0 | 408 (3.5) | | | 0 | 427 (3.3) | | | -12 ▽ | 431 (3.0) | | | -1 |
| 2007 | 408 (3.2) | | | | 408 (4.4) | | | | 439 (3.1) | | | | 432 (2.9) | | | |
| **Qatar** | | | | | | | | | | | | | | | | |
| 2019 | 476 (4.4) | 22 ▲ | 65 ▲ | | 474 (4.4) | 19 ▲ | 59 ▲ | | 469 (4.4) | 10 | 43 ▲ | | 465 (5.0) | 19 ▲ | 57 ▲ | |
| 2015 | 454 (3.0) | | 43 ▲ | | 455 (3.6) | | 39 ▲ | | 459 (3.4) | | 33 ▲ | | 446 (3.7) | | 38 ▲ | |
| 2011 | 411 (4.2) | | | | 416 (4.0) | | | | 426 (3.8) | | | | 408 (3.8) | | | |
| **Romania** | | | | | | | | | | | | | | | | |
| 2019 | 479 (4.4) | | 21 ▲ | 22 ▲ | 466 (5.0) | | -2 | 9 | 458 (4.3) | | 2 | 3 | 453 (4.7) | | -17 ▽ | -13 ▽ |
| 2011 | 458 (3.7) | | | 2 | 469 (4.3) | | | 11 | 456 (3.9) | | | 2 | 470 (3.6) | | | 4 |
| 2007 | 457 (3.8) | | | | 458 (5.2) | | | | 454 (3.8) | | | | 466 (4.0) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.15: Differences in Achievement for Science Content Domains Across Assessment Years◊

(Continued)

| Country | Biology | | | | Chemistry | | | | Physics | | | | Earth Science | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Russian Federation** | | | | | | | | | | | | | | | | |
| 2 2019 | 543 (4.5) | 4 | 6 | 16 ▲ | 551 (4.2) | -7 | -3 | 11 | 540 (4.7) | -7 | -7 | 20 ▲ | 533 (4.4) | 1 | -2 | 5 |
| 2015 | 539 (4.4) | | 2 | 12 ▲ | 558 (4.9) | | 4 | 18 ▲ | 548 (4.2) | | 1 | 27 ▲ | 532 (4.7) | | -3 | 4 |
| 2 2011 | 537 (3.3) | | | 10 | 554 (3.5) | | | 13 ▲ | 547 (3.6) | | | 26 ▲ | 535 (3.6) | | | 7 |
| 2007 | 527 (3.9) | | | | 540 (4.2) | | | | 521 (4.3) | | | | 528 (4.2) | | | |
| **Singapore** | | | | | | | | | | | | | | | | |
| 2 2019 | 622 (4.2) | 13 ▲ | 27 ▲ | 55 ▲ | 616 (5.0) | 22 ▲ | 25 ▲ | 49 ▲ | 619 (4.1) | 11 ▲ | 17 ▲ | 37 ▲ | 562 (4.1) | -3 | -4 | 15 ▲ |
| 2 2015 | 609 (3.5) | | 15 ▲ | 42 ▲ | 593 (3.6) | | 3 | 27 ▲ | 608 (3.1) | | 7 | 26 ▲ | 565 (3.6) | | -1 | 17 ▲ |
| 2 2011 | 594 (4.8) | | | 27 ▲ | 590 (4.7) | | | 24 ▲ | 602 (4.2) | | | 19 ▲ | 566 (4.5) | | | 19 ▲ |
| 2007 | 567 (4.5) | | | | 566 (4.8) | | | | 582 (4.3) | | | | 547 (4.9) | | | |
| **South Africa (9)** | | | | | | | | | | | | | | | | |
| Ψ 2019 | 359 (3.0) | 3 | 41 ▲ | | 372 (4.2) | 3 | 36 ▲ | | 381 (3.0) | 22 ▲ | 30 ▲ | | 366 (3.2) | 36 ▲ | 72 ▲ | |
| 2015 | 356 (5.9) | | 38 ▲ | | 369 (6.1) | | 33 ▲ | | 359 (5.5) | | 8 | | 330 (6.4) | | 36 ▲ | |
| Ψ 2011 | 318 (3.5) | | | | 336 (3.8) | | | | 351 (3.6) | | | | 294 (3.7) | | | |
| **Sweden** | | | | | | | | | | | | | | | | |
| 2 2019 | 519 (3.4) | -1 | 6 | 3 | 509 (3.7) | -4 | 7 | 10 ▲ | 520 (3.8) | -4 | 22 ▲ | 13 ▲ | 530 (3.2) | -2 | 10 ▲ | 19 ▲ |
| 2015 | 520 (3.6) | | 7 | 5 | 512 (3.6) | | 10 ▲ | 13 ▲ | 524 (3.7) | | 26 ▲ | 17 ▲ | 532 (4.5) | | 12 ▲ | 20 ▲ |
| 2011 | 513 (2.9) | | | -3 | 502 (2.6) | | | 3 | 498 (3.2) | | | -9 ▽ | 520 (2.7) | | | 8 |
| 2007 | 515 (2.6) | | | | 499 (2.8) | | | | 507 (3.0) | | | | 511 (3.3) | | | |
| **Turkey** | | | | | | | | | | | | | | | | |
| 2019 | 513 (3.4) | 22 ▲ | 29 ▲ | | 516 (4.8) | 22 ▲ | 39 ▲ | | 518 (4.0) | 13 ▲ | 24 ▲ | | 509 (3.8) | 32 ▲ | 41 ▲ | |
| 2015 | 491 (4.1) | | 7 | | 493 (4.7) | | 16 ▲ | | 506 (4.2) | | 12 ▲ | | 477 (3.9) | | 9 | |
| 2011 | 484 (3.7) | | | | 477 (4.0) | | | | 494 (3.6) | | | | 468 (3.4) | | | |
| **United Arab Emirates** | | | | | | | | | | | | | | | | |
| 2019 | 474 (2.5) | 0 | 11 ▲ | | 475 (2.4) | -6 | 12 ▲ | | 469 (2.3) | -5 | 8 ▲ | | 465 (2.4) | -10 ▽ | -1 | |
| 2015 | 475 (2.4) | | 12 ▲ | | 481 (3.2) | | 17 ▲ | | 475 (2.5) | | 13 ▲ | | 475 (2.4) | | 8 ▲ | |
| 2011 | 463 (2.4) | | | | 464 (2.3) | | | | 461 (2.3) | | | | 466 (2.5) | | | |
| **United States** | | | | | | | | | | | | | | | | |
| † 2019 | 530 (4.8) | -11 | 0 | -1 | 509 (5.2) | -10 | -11 | -1 | 515 (5.0) | -1 | 1 | 11 ▲ | 530 (5.1) | -5 | -4 | 3 |
| † 2015 | 540 (2.9) | | 10 ▲ | 10 ▲ | 519 (3.2) | | -1 | 9 ▲ | 516 (2.9) | | 3 | 13 ▲ | 535 (3.1) | | 2 | 9 |
| 2 2011 | 530 (2.5) | | | 0 | 520 (2.6) | | | 10 ▲ | 513 (2.5) | | | 10 ▲ | 533 (2.7) | | | 7 |
| 2 † 2007 | 531 (3.0) | | | | 510 (3.1) | | | | 503 (3.0) | | | | 526 (3.7) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | | | | | |
| 2019 | 534 (3.2) | -3 | 3 | -3 | 492 (3.9) | -11 ▽ | -3 | -12 ▽ | 520 (3.5) | -2 | -2 | -3 | 520 (3.0) | -6 | -8 | -13 ▽ |
| 2015 | 538 (2.9) | | 7 | 0 | 503 (2.7) | | 8 ▲ | -1 | 521 (2.9) | | 0 | -1 | 526 (3.2) | | -2 | -7 |
| 2 2011 | 531 (2.6) | | | -6 | 495 (2.4) | | | -9 ▽ | 521 (2.8) | | | -1 | 528 (3.4) | | | -5 |
| 2 2007 | 537 (4.1) | | | | 504 (4.1) | | | | 523 (4.6) | | | | 533 (4.8) | | | |
| **Quebec, Canada** | | | | | | | | | | | | | | | | |
| ‡ 2019 | 531 (3.8) | 4 | 6 | 18 ▲ | 548 (4.1) | 18 ▲ | 33 ▲ | 53 ▲ | 521 (4.2) | 1 | 19 ▲ | 29 ▲ | 553 (4.5) | 10 | 17 ▲ | 38 ▲ |
| ≡ 2015 | 527 (4.3) | | 2 | 15 ▲ | 531 (4.6) | | 15 ▲ | 35 ▲ | 520 (4.7) | | 18 ▲ | 28 ▲ | 542 (4.2) | | 7 | 28 ▲ |
| 2011 | 525 (2.8) | | | 12 ▲ | 515 (3.0) | | | 20 ▲ | 502 (3.1) | | | 10 ▲ | 536 (2.9) | | | 21 ▲ |
| 3 2007 | 512 (3.2) | | | | 495 (3.4) | | | | 492 (3.5) | | | | 514 (4.3) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | | | | | |
| 2019 | 417 (3.9) | -35 ▽ | -43 ▽ | | 421 (4.1) | -38 ▽ | -40 ▽ | | 420 (3.8) | -34 ▽ | -39 ▽ | | 413 (4.1) | -41 ▽ | -48 ▽ | |
| 2015 | 452 (6.1) | | -7 | | 459 (6.7) | | -2 | | 454 (5.4) | | -5 | | 453 (5.8) | | -8 | |
| 2011 | 459 (4.2) | | | | 461 (4.1) | | | | 459 (3.9) | | | | 461 (4.6) | | | |
| **Dubai, UAE** | | | | | | | | | | | | | | | | |
| 2 2019 | 554 (2.2) | 29 ▲ | 69 ▲ | 71 ▲ | 554 (2.2) | 26 ▲ | 67 ▲ | 62 ▲ | 539 (2.6) | 15 ▲ | 58 ▲ | 50 ▲ | 538 (2.3) | 20 ▲ | 52 ▲ | 50 ▲ |
| 2015 | 525 (2.4) | | 40 ▲ | 42 ▲ | 528 (2.5) | | 41 ▲ | 36 ▲ | 525 (2.4) | | 43 ▲ | 36 ▲ | 518 (2.3) | | 31 ▲ | 30 ▲ |
| 2011 | 485 (2.7) | | | 2 | 487 (2.4) | | | -5 | 482 (2.1) | | | -7 | 487 (3.1) | | | -1 |
| ‡ 2007 | 483 (3.3) | | | | 492 (3.9) | | | | 489 (3.5) | | | | 488 (3.7) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Content Domains by Gender

Exhibit 4.16 shows the differences in average achievement between girls and boys in the four science content domains. Across the TIMSS 2019 countries, girls had a substantial advantage in biology and chemistry whereas boys had the edge in physics and Earth science. In the biology content domain, girls had higher average achievement than boys in 17 countries, and boys had higher average achievement in 3 countries. In chemistry, girls had higher average achievement than boys in 21 countries, and boys had higher average achievement in only 1 country. In physics, girls had higher average achievement than boys in 6 countries, and boys had higher average achievement in 13 countries. In Earth science, girls had higher average achievement than boys in 4 countries, and boys had higher average achievement in 15 countries.

## Exhibit 4.16: Average Achievement in Science Content Domains by Gender

| Country | Biology (75 Items) | | Chemistry (42 Items) | | Physics (52 Items) | | Earth Science (42 Items) | |
|---|---|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys | Girls | Boys |
| Australia | 533 (3.2) | 529 (4.8) | 519 (3.5) | 510 (5.3) | 524 (3.6) | 533 (5.0) | 531 (3.3) | 536 (4.6) |
| Bahrain | 522 (2.8) ▲ | 464 (2.7) | 514 (3.0) ▲ | 448 (3.5) | 500 (3.8) ▲ | 461 (2.8) | 499 (3.2) ▲ | 453 (3.7) |
| Chile | 468 (3.6) | 475 (4.0) | 440 (3.7) | 443 (3.8) | 442 (3.6) | 458 (5.3) ▲ | 451 (4.6) | 476 (4.8) ▲ |
| Chinese Taipei | 577 (3.1) | 575 (2.7) | 598 (3.3) | 591 (3.1) | 550 (3.3) | 560 (3.3) ▲ | 572 (3.4) | 586 (2.8) ▲ |
| Cyprus | 500 (3.3) ▲ | 479 (2.8) | 491 (2.7) ▲ | 466 (3.3) | 482 (4.9) | 477 (3.7) | 473 (3.4) | 473 (3.1) |
| [2] Egypt | 393 (6.3) ▲ | 366 (8.7) | 415 (6.2) ▲ | 376 (9.1) | 405 (5.8) ▲ | 380 (7.8) | 375 (6.4) | 357 (8.6) |
| England | 518 (5.9) | 513 (6.7) | 521 (7.5) | 502 (7.9) | 517 (5.9) | 515 (7.2) | 513 (6.8) | 523 (7.0) |
| Finland | 549 (3.4) ▲ | 520 (4.1) | 561 (4.0) ▲ | 530 (4.7) | 542 (4.0) | 537 (5.1) | 562 (4.4) | 555 (4.0) |
| France | 488 (2.8) | 488 (3.8) | 467 (3.7) | 463 (4.8) | 486 (3.5) | 495 (4.6) ▲ | 495 (5.9) | 510 (4.5) ▲ |
| [1] Georgia | 451 (3.8) | 444 (4.2) | 462 (4.7) | 451 (5.8) | 431 (6.0) | 441 (5.4) | 425 (4.0) | 436 (4.7) ▲ |
| † Hong Kong SAR | 502 (6.3) | 499 (6.8) | 492 (6.1) | 479 (7.5) | 511 (6.1) | 509 (7.1) | 506 (6.8) | 516 (6.7) |
| Hungary | 523 (3.3) | 537 (3.2) ▲ | 521 (3.9) | 534 (4.4) ▲ | 514 (3.4) | 542 (3.5) ▲ | 517 (4.2) | 552 (4.6) ▲ |
| Iran, Islamic Rep. of | 459 (4.4) ▲ | 438 (5.8) | 467 (5.5) ▲ | 435 (6.8) | 460 (5.2) | 448 (6.0) | 438 (5.7) | 436 (6.0) |
| Ireland | 523 (3.2) | 520 (4.4) | 525 (4.6) ▲ | 500 (5.0) | 517 (4.1) | 520 (4.7) | 536 (4.5) | 536 (4.2) |
| [3] Israel | 511 (4.5) | 513 (5.4) | 527 (5.0) ▲ | 510 (5.6) | 514 (5.3) | 526 (5.9) ▲ | 487 (6.1) | 503 (5.4) ▲ |
| Italy | 506 (3.2) | 510 (3.2) | 484 (3.4) | 483 (3.4) | 483 (4.8) | 491 (4.8) ▲ | 503 (4.1) | 521 (4.8) ▲ |
| Japan | 571 (2.2) | 577 (3.2) ▲ | 560 (2.5) | 560 (3.6) | 563 (2.8) | 578 (3.4) ▲ | 563 (3.5) | 581 (4.9) ▲ |
| Jordan | 488 (4.4) ▲ | 429 (7.1) | 488 (4.4) ▲ | 423 (7.5) | 471 (4.3) ▲ | 429 (6.8) | 450 (4.6) ▲ | 407 (6.7) |
| [2] Kazakhstan | 482 (3.7) ▲ | 471 (3.7) | 501 (4.0) ▲ | 487 (4.3) | 479 (4.4) | 472 (4.4) | 449 (5.6) | 447 (4.7) |
| Korea, Rep. of | 554 (3.0) | 565 (2.8) ▲ | 553 (4.0) | 549 (3.7) | 563 (3.7) | 575 (3.2) ▲ | 549 (4.3) | 574 (3.7) ▲ |
| Kuwait | - - | - - | - - | - - | - - | - - | - - | - - |
| Lebanon | 362 (6.2) ▲ | 348 (5.3) | 420 (4.9) ▲ | 405 (5.9) | 375 (6.0) | 380 (5.4) | 337 (6.2) | 337 (5.9) |
| Lithuania | 540 (3.1) ▲ | 529 (3.7) | 536 (3.2) ▲ | 524 (3.9) | 523 (2.9) | 534 (4.6) ▲ | 530 (3.2) | 539 (4.2) ▲ |
| Malaysia | 468 (3.9) ▲ | 457 (4.4) | 440 (4.6) ▲ | 428 (5.1) | 475 (4.1) | 475 (4.4) | 449 (4.7) | 454 (4.9) |
| Morocco | 387 (3.5) | 386 (3.8) | 408 (3.4) ▲ | 396 (3.6) | 403 (3.0) | 401 (3.3) | 352 (4.1) | 362 (4.1) |
| † New Zealand | 500 (3.7) | 496 (5.0) | 483 (3.8) | 481 (6.1) | 496 (3.9) | 507 (5.4) ▲ | 502 (3.5) | 517 (5.4) ▲ |
| † Norway (9) | 489 (3.1) | 482 (3.8) | 499 (4.8) ▲ | 486 (4.7) | 486 (3.5) | 500 (4.6) ▲ | 513 (5.1) | 525 (4.1) ▲ |
| Oman | 497 (3.6) ▲ | 437 (4.8) | 480 (3.3) ▲ | 409 (4.9) | 473 (3.6) ▲ | 427 (5.3) | 472 (4.2) ▲ | 427 (5.4) |
| Portugal | 524 (3.7) | 530 (3.7) | 514 (3.5) | 511 (4.9) | 493 (4.0) | 500 (4.2) | 523 (5.1) | 539 (4.0) ▲ |
| Qatar | 491 (5.3) ▲ | 462 (6.4) | 497 (5.8) ▲ | 452 (6.5) | 480 (5.6) ▲ | 459 (5.7) | 472 (5.7) | 458 (7.2) |
| Romania | 486 (5.0) ▲ | 472 (4.8) | 476 (5.3) ▲ | 457 (5.8) | 460 (4.6) | 455 (4.9) | 452 (4.6) | 455 (5.8) |
| [2] Russian Federation | 545 (4.7) | 542 (4.9) | 550 (4.6) | 552 (4.6) | 532 (5.0) | 549 (5.1) ▲ | 522 (5.0) | 543 (5.0) ▲ |
| [2] Saudi Arabia | - - | - - | - - | - - | - - | - - | - - | - - |
| [2] Singapore | 621 (4.7) | 623 (5.2) | 617 (5.8) | 614 (5.7) | 614 (5.0) | 624 (4.8) ▲ | 551 (5.4) | 572 (4.3) ▲ |
| Ψ South Africa (9) | 366 (3.2) ▲ | 352 (3.4) | 383 (4.2) ▲ | 359 (4.9) | 383 (3.3) | 379 (3.6) | 370 (3.6) | 362 (4.2) |
| [2] Sweden | 523 (3.9) | 515 (4.1) | 521 (4.4) ▲ | 497 (4.4) | 524 (4.5) | 516 (4.5) | 533 (4.3) | 528 (4.1) |
| Turkey | 519 (3.9) ▲ | 507 (4.8) | 530 (4.7) ▲ | 501 (6.7) | 519 (4.3) | 517 (5.7) | 508 (4.3) | 510 (5.4) |
| United Arab Emirates | 489 (4.1) ▲ | 461 (4.3) | 494 (4.1) ▲ | 458 (4.4) | 479 (3.8) ▲ | 460 (3.9) | 474 (4.0) ▲ | 458 (4.1) |
| † United States | 536 (4.0) ▲ | 524 (6.2) | 515 (4.6) | 503 (7.0) | 514 (4.2) | 515 (6.6) | 527 (4.5) | 532 (6.8) |
| **International Average** | **499 (0.7) ▲** | **487 (0.8)** | **499 (0.7) ▲** | **480 (0.9)** | **491 (0.7)** | **490 (0.8)** | **486 (0.8)** | **489 (0.8) ▲** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 536 (3.4) | 533 (3.8) | 493 (4.3) | 490 (4.4) | 516 (4.4) | 523 (3.7) | 513 (4.7) | 527 (4.3) ▲ |
| ‡ Quebec, Canada | 533 (4.6) | 528 (4.1) | 553 (4.6) | 544 (4.7) | 517 (5.1) | 525 (4.7) | 549 (5.0) | 556 (5.1) |
| Moscow City, Russian Fed. | 564 (3.8) | 567 (3.5) | 561 (3.7) | 562 (4.2) | 565 (4.3) | 586 (4.7) ▲ | 550 (4.3) | 578 (4.4) ▲ |
| Gauteng, RSA (9) | 421 (4.4) ▲ | 409 (4.4) | 433 (4.8) ▲ | 410 (4.7) | 429 (4.8) | 426 (4.9) | 422 (4.7) | 414 (5.2) |
| Western Cape, RSA (9) | 427 (6.1) | 438 (6.6) | 441 (7.2) | 443 (9.4) | 434 (7.0) | 451 (7.2) ▲ | 435 (7.3) | 450 (8.1) ▲ |
| Abu Dhabi, UAE | 434 (7.5) ▲ | 401 (6.0) | 443 (7.0) ▲ | 401 (6.2) | 433 (6.6) ▲ | 409 (5.6) | 423 (7.1) | 403 (6.3) |
| [2] Dubai, UAE | 558 (5.5) | 549 (7.0) | 563 (5.8) | 545 (7.2) | 541 (5.6) | 538 (6.7) | 537 (5.4) | 540 (6.7) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 eighth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Average Achievement in Cognitive Domains

Exhibit 4.17 shows countries' average achievement in the knowing, applying, and reasoning cognitive domains relative to their overall average achievement (from highest to lowest overall average achievement). Interestingly, in the knowing and reasoning domains, about the same number of countries had relative strengths as had relative weaknesses, but in the applying domain, fewer countries had strengths than weaknesses. Eleven countries had a relative strength in the knowing cognitive domain, and 12 had a relative weakness. Only 6 countries had a relative strength in the applying domain, although 14 had a relative weakness. Thirteen countries had a relative strength in the reasoning cognitive domain, and 16 had a relative weakness. The Russian Federation and Hong Kong SAR were well balanced, with no relative strengths or weaknesses in the cognitive domains.

## Exhibit 4.17: Average Achievement in Science Cognitive Domains

| Country | Overall Science Average Scale Score | Knowing (75 Items) | | Applying (80 Items) | | Reasoning (56 Items) | |
|---|---|---|---|---|---|---|---|
| | | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score | Average Scale Score | Difference from Overall Science Score |
| [2] Singapore | 608 (3.9) | 621 (4.2) | 13 (1.7) ▲ | 608 (4.1) | 1 (1.6) | 595 (4.0) | -13 (0.8) ▽ |
| Chinese Taipei | 574 (1.9) | 600 (2.4) | 26 (1.5) ▲ | 567 (2.1) | -8 (1.2) ▽ | 559 (2.1) | -16 (1.0) ▽ |
| Japan | 570 (2.1) | 563 (2.4) | -7 (1.4) ▽ | 576 (2.3) | 6 (0.8) ▲ | 570 (2.5) | 1 (1.2) |
| Korea, Rep. of | 561 (2.1) | 558 (2.6) | -3 (1.5) | 560 (2.4) | -1 (1.9) | 564 (2.3) | 3 (1.7) ▲ |
| [2] Russian Federation | 543 (4.2) | 543 (4.7) | 1 (2.4) | 543 (4.5) | 0 (1.2) | 543 (4.5) | 0 (2.9) |
| Finland | 543 (3.1) | 545 (3.2) | 2 (1.4) | 537 (3.3) | -6 (1.1) ▽ | 548 (3.4) | 5 (1.4) ▲ |
| Lithuania | 534 (3.0) | 527 (3.1) | -6 (1.3) ▽ | 530 (3.0) | -4 (1.3) ▽ | 541 (3.2) | 7 (1.5) ▲ |
| Hungary | 530 (2.6) | 537 (3.0) | 8 (1.4) ▲ | 528 (3.1) | -2 (1.8) | 524 (3.1) | -5 (1.4) ▽ |
| Australia | 528 (3.2) | 515 (3.5) | -14 (1.4) ▽ | 532 (3.4) | 4 (0.9) ▲ | 536 (3.1) | 7 (1.0) ▲ |
| Ireland | 523 (2.9) | 513 (3.0) | -10 (1.7) ▽ | 521 (3.4) | -2 (1.8) | 534 (3.4) | 11 (1.6) ▲ |
| † United States | 522 (4.7) | 515 (4.6) | -8 (1.1) ▽ | 523 (4.8) | 1 (0.9) | 528 (4.7) | 6 (1.4) ▲ |
| [2] Sweden | 521 (3.2) | 521 (3.2) | 0 (1.1) | 518 (3.3) | -3 (1.2) ▽ | 524 (3.8) | 2 (2.3) |
| Portugal | 519 (2.9) | 520 (3.1) | 2 (1.7) | 514 (3.1) | -4 (1.3) ▽ | 519 (3.5) | 1 (2.2) |
| England | 517 (4.8) | 520 (5.0) | 3 (1.5) | 515 (5.1) | -2 (1.8) | 513 (5.0) | -3 (1.1) ▽ |
| Turkey | 515 (3.7) | 506 (4.2) | -9 (1.6) ▽ | 515 (3.9) | -1 (2.5) | 524 (4.0) | 8 (2.1) ▲ |
| [3] Israel | 513 (4.2) | 514 (4.6) | 0 (1.6) | 509 (4.3) | -4 (1.5) ▽ | 518 (4.6) | 5 (1.9) ▲ |
| † Hong Kong SAR | 504 (5.2) | 501 (5.7) | -2 (1.8) | 501 (5.2) | -2 (1.4) | 504 (5.2) | 0 (1.3) |
| Italy | 500 (2.6) | 507 (2.6) | 7 (1.5) ▲ | 499 (3.4) | -2 (1.8) | 495 (4.0) | -5 (2.7) |
| † New Zealand | 499 (3.5) | 480 (3.6) | -19 (1.6) ▽ | 503 (3.8) | 4 (1.4) ▲ | 510 (3.5) | 11 (1.1) ▲ |
| † Norway (9) | 495 (3.1) | 497 (2.5) | 2 (1.6) | 493 (3.5) | -3 (1.3) ▽ | 494 (3.6) | -1 (1.3) |
| France | 489 (2.7) | 480 (2.9) | -8 (1.7) ▽ | 482 (2.8) | -7 (1.6) ▽ | 502 (3.0) | 14 (2.2) ▲ |
| Bahrain | 486 (1.9) | 493 (2.0) | 7 (1.2) ▲ | 481 (2.6) | -5 (2.0) ▽ | 482 (2.4) | -4 (1.5) ▽ |
| Cyprus | 484 (1.9) | 482 (3.0) | -1 (2.9) | 477 (1.9) | -6 (1.1) ▽ | 488 (2.3) | 4 (1.1) ▲ |
| [2] Kazakhstan | 478 (3.1) | 463 (3.7) | -15 (1.6) ▽ | 481 (3.4) | 3 (1.5) | 482 (3.5) | 4 (1.8) ▲ |
| Qatar | 475 (4.4) | 487 (4.2) | 12 (1.6) ▲ | 469 (4.5) | -5 (1.3) ▽ | 464 (4.6) | -11 (1.7) ▽ |
| United Arab Emirates | 473 (2.2) | 482 (2.7) | 9 (0.9) ▲ | 472 (2.2) | -1 (0.6) | 461 (2.2) | -12 (0.8) ▽ |
| Romania | 470 (4.2) | 475 (4.4) | 5 (2.6) | 467 (4.2) | -3 (1.4) ▽ | 464 (4.4) | -6 (1.9) ▽ |
| Chile | 462 (2.9) | 463 (3.3) | 1 (1.7) | 462 (3.0) | 0 (2.1) | 458 (3.1) | -5 (2.0) ▽ |
| Malaysia | 460 (3.5) | 442 (3.9) | -18 (1.1) ▽ | 473 (3.4) | 13 (0.9) ▲ | 459 (3.7) | -2 (1.5) |
| Oman | 457 (2.9) | 461 (3.3) | 4 (2.0) ▲ | 456 (3.4) | -1 (2.2) | 450 (3.0) | -7 (1.1) ▽ |
| Jordan | 452 (4.7) | 455 (5.3) | 3 (1.7) | 453 (4.9) | 1 (1.4) | 443 (4.8) | -9 (1.7) ▽ |
| Iran, Islamic Rep. of | 449 (3.6) | 449 (4.1) | -1 (1.6) | 452 (3.5) | 2 (0.9) ▲ | 444 (4.4) | -5 (2.3) ▽ |
| [1] Georgia | 447 (3.9) | 459 (4.1) | 12 (1.7) ▲ | 440 (3.7) | -7 (2.8) ▽ | 436 (4.2) | -10 (2.8) ▽ |
| Kuwait | 444 (5.7) | - - | - - | - - | - - | - - | - - |
| [2] Saudi Arabia | 431 (2.6) | - - | - - | - - | - - | - - | - - |
| Morocco | 394 (2.7) | 380 (3.1) | -14 (1.1) ▽ | 393 (2.9) | -1 (1.4) | 398 (2.8) | 4 (1.2) ▲ |
| [2] Egypt | 389 (5.4) | 396 (5.9) | 7 (1.5) ▲ | 384 (5.7) | -6 (2.0) ▽ | 378 (5.7) | -11 (1.7) ▽ |
| Lebanon | 377 (4.6) | 388 (4.4) | 11 (2.9) ▲ | 375 (5.2) | -1 (1.9) | 346 (5.2) | -31 (3.1) ▽ |
| Ψ South Africa (9) | 370 (3.1) | 361 (3.2) | -9 (1.1) ▽ | 377 (2.9) | 7 (0.7) ▲ | 362 (3.0) | -8 (0.9) ▽ |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | 570 (3.0) | 4 (0.9) ▲ | 562 (3.7) | -5 (2.4) ▽ | 568 (3.1) | 2 (1.0) |
| [2] Dubai, UAE | 548 (2.0) | 560 (2.3) | 13 (1.0) ▲ | 545 (2.5) | -3 (1.2) ▽ | 538 (2.3) | -10 (1.6) ▽ |
| ‡ Quebec, Canada | 537 (3.6) | 529 (3.6) | -8 (2.0) ▽ | 538 (4.2) | 1 (2.2) | 540 (4.1) | 4 (1.5) ▲ |
| Ontario, Canada | 522 (3.0) | 505 (3.3) | -17 (1.1) ▽ | 523 (3.5) | 1 (2.3) | 533 (3.7) | 11 (3.3) ▲ |
| Western Cape, RSA (9) | 439 (5.1) | 427 (6.0) | -12 (2.6) ▽ | 446 (5.0) | 7 (1.5) ▲ | 438 (5.8) | -1 (4.1) |
| Gauteng, RSA (9) | 422 (3.9) | 413 (4.9) | -9 (2.2) ▽ | 428 (3.7) | 6 (2.3) ▲ | 417 (3.8) | -5 (1.3) ▽ |
| Abu Dhabi, UAE | 420 (3.6) | 422 (4.3) | 1 (1.2) | 421 (3.5) | 0 (1.4) | 412 (3.6) | -8 (1.4) ▽ |

▲ Subscale score significantly higher than overall science score
▽ Subscale score significantly lower than overall science score

Numbers of items are based on the TIMSS 2019 eighth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Trends in Average Achievement in Cognitive Domains

Exhibit 4.18 presents differences in average achievement for the three cognitive domains across four assessment cycles back to 2007, when TIMSS first began providing scaled results in the cognitive domains. Trends show more countries have had increases than decreases in average achievement in each of cognitive domains, particularly in the knowing domain. Thirty-one countries participated in both the TIMSS 2015 and TIMSS 2019 assessments and have comparable data in the cognitive domains. The recent trends in the knowing cognitive domain showed increases in 10 countries and decreases in 8 countries. In the applying and reasoning domains, 7 countries showed increases, and 6 showed decreases.

Between 2007 and 2019, in the knowing domain, there were increases in 13 countries compared with declines in 6 countries. In the applying domain, there were increases in 11 countries and declines in 6 countries. In the reasoning domain, 9 countries had increases and 6 had decreases.

# Exhibit 4.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Australia** | | | | | | | | | | | | |
| 2019 | 515 (3.5) | 4 | 1 | 10 ▲ | 532 (3.4) | 20 ▲ | 15 ▲ | 21 ▲ | 536 (3.1) | 23 ▲ | 9 | 5 |
| 2015 | 510 (2.7) | | -4 | 6 | 512 (2.9) | | -5 | 1 | 513 (2.8) | | -14 ▽ | -18 ▽ |
| 2011 | 514 (5.1) | | | 9 | 517 (4.5) | | | 6 | 526 (5.0) | | | -4 |
| 2007 | 505 (3.7) | | | | 511 (3.7) | | | | 530 (4.1) | | | |
| **Bahrain** | | | | | | | | | | | | |
| 2019 | 493 (2.0) | 31 ▲ | 35 ▲ | 25 ▲ | 481 (2.6) | 17 ▲ | 31 ▲ | 15 ▲ | 482 (2.4) | 16 ▲ | 33 ▲ | 18 ▲ |
| 2015 | 462 (2.5) | | 4 | -6 | 464 (2.4) | | 15 ▲ | -1 | 466 (2.8) | | 18 ▲ | 3 |
| 2011 | 457 (3.7) | | | -10 ▽ | 450 (2.1) | | | -16 ▽ | 449 (2.0) | | | -15 ▽ |
| 2007 | 468 (2.2) | | | | 465 (2.2) | | | | 464 (2.4) | | | |
| **Chile** | | | | | | | | | | | | |
| 2019 | 463 (3.3) | -3 | -12 ▽ | | 462 (3.0) | 16 ▲ | 8 ▲ | | 458 (3.1) | 9 | -2 | |
| 2015 | 466 (3.2) | | -10 ▽ | | 446 (3.0) | | -7 | | 448 (3.6) | | -11 ▽ | |
| 2011 | 476 (3.1) | | | | 454 (2.3) | | | | 459 (2.7) | | | |
| **Chinese Taipei** | | | | | | | | | | | | |
| 2019 | 600 (2.4) | 11 ▲ | 31 ▲ | 26 ▲ | 567 (2.1) | 1 | -3 | 3 | 559 (2.1) | -2 | 8 ▲ | 15 ▲ |
| 2015 | 589 (2.3) | | 20 ▲ | 15 ▲ | 565 (2.0) | | -5 | 2 | 560 (2.0) | | 9 ▲ | 16 ▲ |
| 2011 | 569 (2.6) | | | -5 | 570 (2.6) | | | 6 | 551 (2.9) | | | 7 |
| 2007 | 574 (3.9) | | | | 564 (3.7) | | | | 544 (4.0) | | | |
| **Cyprus** | | | | | | | | | | | | |
| 2019 | 482 (3.0) | | | 44 ▲ | 477 (1.9) | | | 24 ▲ | 488 (2.3) | | | 35 ▲ |
| 2007 | 438 (3.1) | | | | 454 (2.4) | | | | 453 (2.7) | | | |
| **Egypt** | | | | | | | | | | | | |
| [2] 2019 | 396 (5.9) | 24 ▲ | | -33 ▽ | 384 (5.7) | 13 | | -14 ▽ | 378 (5.7) | 19 ▲ | | -7 |
| 2015 | 372 (5.2) | | | -57 ▽ | 371 (4.4) | | | -27 ▽ | 359 (4.8) | | | -26 ▽ |
| 2007 | 429 (4.1) | | | | 398 (3.8) | | | | 385 (3.7) | | | |
| **England** | | | | | | | | | | | | |
| 2019 | 520 (5.0) | -3 | -14 | -17 ▽ | 515 (5.1) | -24 ▽ | -17 ▽ | -25 ▽ | 513 (5.0) | -31 ▽ | -24 ▽ | -35 ▽ |
| 2015 | 523 (4.1) | | -11 | -14 ▽ | 538 (3.9) | | 7 | -1 | 545 (4.0) | | 8 | -4 |
| ‡ 2011 | 533 (5.1) | | | -3 | 531 (4.7) | | | -8 | 537 (4.9) | | | -12 |
| † 2007 | 536 (5.2) | | | | 540 (4.3) | | | | 548 (4.6) | | | |
| **Finland** | | | | | | | | | | | | |
| 2019 | 545 (3.2) | | -20 ▽ | | 537 (3.3) | | -12 ▽ | | 548 (3.4) | | 0 | |
| 2011 | 564 (3.0) | | | | 549 (2.5) | | | | 547 (3.4) | | | |
| **Georgia** | | | | | | | | | | | | |
| [1] 2019 | 459 (4.1) | 6 | 31 ▲ | 21 ▲ | 440 (3.7) | -2 | 22 ▲ | 22 ▲ | 436 (4.2) | 4 | 24 ▲ | 51 ▲ |
| [1 2] 2015 | 452 (3.3) | | 25 ▲ | 15 ▲ | 442 (3.1) | | 24 ▲ | 24 ▲ | 432 (3.5) | | 20 ▲ | 47 ▲ |
| [1] 2011 | 428 (3.9) | | | -10 | 418 (3.8) | | | 0 | 412 (3.7) | | | 27 ▲ |
| [1] 2007 | 438 (5.3) | | | | 418 (4.6) | | | | 385 (5.0) | | | |
| **Hong Kong SAR** | | | | | | | | | | | | |
| † 2019 | 501 (5.7) | -46 ▽ | -43 ▽ | -36 ▽ | 501 (5.2) | -39 ▽ | -27 ▽ | -21 ▽ | 504 (5.2) | -47 ▽ | -34 ▽ | -31 ▽ |
| 2015 | 547 (3.7) | | 3 | 10 | 541 (4.3) | | 12 ▲ | 18 ▲ | 550 (4.4) | | 12 ▲ | 15 ▲ |
| 2011 | 544 (3.2) | | | 7 | 529 (3.4) | | | 6 | 538 (4.0) | | | 3 |
| † 2007 | 537 (4.8) | | | | 522 (5.1) | | | | 535 (5.6) | | | |
| **Hungary** | | | | | | | | | | | | |
| 2019 | 537 (3.0) | 12 ▲ | 27 ▲ | 8 | 528 (3.1) | 0 | -4 | -23 ▽ | 524 (3.1) | 0 | 6 | -6 |
| 2015 | 525 (3.5) | | 14 ▲ | -5 | 528 (3.4) | | -4 | -23 ▽ | 524 (3.8) | | 6 | -6 |
| 2011 | 511 (3.2) | | | -19 ▽ | 532 (3.5) | | | -19 ▽ | 518 (3.3) | | | -12 ▽ |
| 2007 | 530 (3.2) | | | | 551 (3.2) | | | | 530 (3.4) | | | |
| **Iran, Islamic Rep. of** | | | | | | | | | | | | |
| 2019 | 449 (4.1) | -7 | -30 ▽ | -19 ▽ | 452 (3.5) | -6 | -18 ▽ | 0 | 444 (4.4) | -10 | -31 ▽ | -12 ▽ |
| 2015 | 455 (4.8) | | -24 ▽ | -13 ▽ | 457 (4.0) | | -13 ▽ | 6 | 454 (4.0) | | -22 ▽ | -2 |
| 2011 | 479 (4.6) | | | 11 | 470 (3.9) | | | 18 ▲ | 475 (3.8) | | | 19 ▲ |
| 2007 | 468 (4.1) | | | | 452 (4.0) | | | | 456 (4.0) | | | |
| **Ireland** | | | | | | | | | | | | |
| 2019 | 513 (3.0) | -10 ▽ | | | 521 (3.4) | -12 ▽ | | | 534 (3.4) | 2 | | |
| 2015 | 523 (3.2) | | | | 533 (3.0) | | | | 532 (3.0) | | | |
| **Israel** | | | | | | | | | | | | |
| [3] 2019 | 514 (4.6) | 11 | -4 | | 509 (4.3) | 5 | -3 | | 518 (4.6) | 7 | -1 | |
| [3] 2015 | 503 (4.3) | | -15 ▽ | | 504 (3.8) | | -8 | | 511 (4.4) | | -8 | |
| [3] 2011 | 518 (4.2) | | | | 512 (4.0) | | | | 519 (4.4) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in cognitive domains using current methodology began with TIMSS 2007.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 4.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Italy** | | | | | | | | | | | | |
| 2019 | 507 (2.6) | 3 | -5 | 11 ▲ | 499 (3.4) | 2 | -1 | 2 | 495 (4.0) | 2 | 7 | 6 |
| [2] 2015 | 505 (2.6) | | -8 ▽ | 8 | 496 (2.4) | | -4 | -1 | 493 (2.8) | | 4 | 4 |
| 2011 | 512 (2.7) | | | 16 ▲ | 500 (2.3) | | | 3 | 489 (2.6) | | | -1 |
| 2007 | 496 (3.6) | | | | 497 (2.9) | | | | 489 (3.1) | | | |
| **Japan** | | | | | | | | | | | | |
| 2019 | 563 (2.4) | -5 | 22 ▲ | 21 ▲ | 576 (2.3) | 1 | 15 ▲ | 19 ▲ | 570 (2.5) | 0 | 3 | 7 ▲ |
| 2015 | 567 (2.2) | | 27 ▲ | 26 ▲ | 575 (1.9) | | 14 ▲ | 18 ▲ | 570 (2.1) | | 3 | 7 ▲ |
| 2011 | 541 (2.7) | | | -1 | 561 (2.6) | | | 4 | 568 (2.4) | | | 4 |
| 2007 | 542 (2.4) | | | | 556 (2.1) | | | | 564 (2.3) | | | |
| **Jordan** | | | | | | | | | | | | |
| 2019 | 455 (5.3) | 25 ▲ | 2 | -36 ▽ | 453 (4.9) | 28 ▲ | 2 | -31 ▽ | 443 (4.8) | 23 ▲ | 1 | -24 ▽ |
| 2015 | 430 (3.3) | | -23 ▽ | -62 ▽ | 425 (3.3) | | -26 ▽ | -59 ▽ | 419 (3.6) | | -22 ▽ | -47 ▽ |
| 2011 | 453 (4.4) | | | -39 ▽ | 451 (4.0) | | | -33 ▽ | 441 (4.3) | | | -25 ▽ |
| 2007 | 492 (4.8) | | | | 484 (4.3) | | | | 466 (4.2) | | | |
| **Kazakhstan** | | | | | | | | | | | | |
| [2] 2019 | 463 (3.7) | | -19 ▽ | | 481 (3.4) | | -10 | | 482 (3.5) | | -5 | |
| 2011 | 483 (4.9) | | | | 491 (4.1) | | | | 487 (4.4) | | | |
| **Korea, Rep. of** | | | | | | | | | | | | |
| 2019 | 558 (2.6) | 3 | 4 | 8 ▲ | 560 (2.4) | 8 ▲ | -1 | 10 ▲ | 564 (2.3) | 4 | 0 | 3 |
| 2015 | 555 (2.9) | | 2 | 6 | 552 (2.2) | | -9 ▽ | 2 | 560 (2.8) | | -3 | -1 |
| 2011 | 554 (3.0) | | | 4 | 561 (2.1) | | | 11 ▲ | 564 (2.3) | | | 2 |
| 2007 | 550 (2.3) | | | | 550 (2.4) | | | | 561 (2.3) | | | |
| **Lebanon** | | | | | | | | | | | | |
| 2019 | 388 (4.4) | -15 ▽ | 7 | -13 | 375 (5.2) | -23 ▽ | -33 ▽ | -43 ▽ | 346 (5.2) | -36 ▽ | -62 ▽ | -64 ▽ |
| 2015 | 403 (5.9) | | 22 ▲ | 2 | 398 (5.3) | | -10 | -20 ▽ | 381 (6.3) | | -27 ▽ | -29 ▽ |
| 2011 | 381 (5.7) | | | -20 ▽ | 408 (5.2) | | | -10 | 408 (5.7) | | | -2 |
| 2007 | 401 (6.3) | | | | 418 (6.1) | | | | 410 (6.6) | | | |
| **Lithuania** | | | | | | | | | | | | |
| 2019 | 527 (3.1) | 14 ▲ | 12 ▲ | 10 ▲ | 530 (3.0) | 14 ▲ | 18 ▲ | 17 ▲ | 541 (3.2) | 15 ▲ | 28 ▲ | 14 ▲ |
| [2] 2015 | 513 (3.1) | | -2 | -4 | 517 (3.4) | | 4 | 4 | 525 (3.2) | | 13 ▲ | -2 |
| [1] 2011 | 516 (2.4) | | | -1 | 512 (2.3) | | | -1 | 513 (2.8) | | | -14 ▽ |
| [1] 2007 | 517 (2.5) | | | | 513 (2.4) | | | | 527 (2.7) | | | |
| **Malaysia** | | | | | | | | | | | | |
| 2019 | 442 (3.9) | -23 ▽ | 39 ▲ | -16 ▽ | 473 (3.4) | -3 | 49 ▲ | 3 | 459 (3.7) | -8 | 20 ▲ | -24 ▽ |
| 2015 | 466 (5.1) | | 63 ▲ | 8 | 476 (4.2) | | 52 ▲ | 6 | 467 (3.9) | | 28 ▲ | -15 ▽ |
| 2011 | 403 (7.1) | | | -55 ▽ | 424 (6.2) | | | -46 ▽ | 439 (6.0) | | | -44 ▽ |
| 2007 | 458 (6.8) | | | | 470 (6.2) | | | | 483 (5.5) | | | |
| **Morocco** | | | | | | | | | | | | |
| 2019 | 380 (3.1) | -15 ▽ | 17 ▲ | | 393 (2.9) | 2 | 13 ▲ | | 398 (2.8) | 13 ▲ | 31 ▲ | |
| 2015 | 395 (2.3) | | 32 ▲ | | 391 (2.8) | | 11 ▲ | | 385 (2.6) | | 18 ▲ | |
| 2011 | 363 (2.8) | | | | 381 (2.0) | | | | 366 (2.3) | | | |
| **New Zealand** | | | | | | | | | | | | |
| [†] 2019 | 480 (3.6) | -23 ▽ | -32 ▽ | | 503 (3.8) | -11 ▽ | -7 | | 510 (3.5) | -10 ▽ | -6 | |
| [†] 2015 | 503 (3.2) | | -8 | | 513 (3.5) | | 4 | | 520 (3.3) | | 4 | |
| 2011 | 511 (5.0) | | | | 509 (4.4) | | | | 515 (4.7) | | | |
| **Norway (9)** | | | | | | | | | | | | |
| [†] 2019 | 497 (2.5) | -3 | | | 493 (3.5) | -14 ▽ | | | 494 (3.6) | -24 ▽ | | |
| 2015 | 500 (3.1) | | | | 507 (2.9) | | | | 518 (3.0) | | | |
| **Oman** | | | | | | | | | | | | |
| 2019 | 461 (3.3) | 7 | 45 ▲ | 36 ▲ | 456 (3.4) | 3 | 37 ▲ | 37 ▲ | 450 (3.0) | -4 | 33 ▲ | 31 ▲ |
| 2015 | 455 (2.9) | | 38 ▲ | 30 ▲ | 454 (2.9) | | 34 ▲ | 34 ▲ | 454 (2.4) | | 37 ▲ | 36 ▲ |
| 2011 | 416 (3.4) | | | -8 | 419 (3.4) | | | 0 | 417 (3.0) | | | -2 |
| 2007 | 425 (3.5) | | | | 419 (3.6) | | | | 419 (3.8) | | | |
| **Qatar** | | | | | | | | | | | | |
| 2019 | 487 (4.2) | 39 ▲ | 69 ▲ | | 469 (4.5) | 10 | 49 ▲ | | 464 (4.6) | 10 | 55 ▲ | |
| 2015 | 448 (3.6) | | 30 ▲ | | 460 (3.6) | | 40 ▲ | | 454 (3.2) | | 45 ▲ | |
| 2011 | 418 (4.5) | | | | 420 (3.7) | | | | 409 (4.6) | | | |
| **Romania** | | | | | | | | | | | | |
| 2019 | 475 (4.4) | | 18 ▲ | 24 ▲ | 467 (4.2) | | -1 | -1 | 464 (4.4) | | 4 | 11 |
| 2011 | 457 (4.3) | | | 6 | 468 (3.6) | | | 0 | 460 (3.7) | | | 7 |
| 2007 | 451 (4.3) | | | | 468 (3.7) | | | | 453 (3.8) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 4.18: Differences in Achievement for Science Cognitive Domains Across Assessment Years◊

(Continued)

| Country | Knowing | | | | Applying | | | | Reasoning | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | | Average Scale Score | Differences Between Years | | |
| | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 | | 2015 | 2011 | 2007 |
| **Russian Federation** | | | | | | | | | | | | |
| 2 2019 | 543 (4.7) | -14 ▽ | -14 ▽ | 3 | 543 (4.5) | 4 | 4 | 15 ▲ | 543 (4.5) | 5 | 10 | 24 ▲ |
| 2015 | 558 (5.2) | | 1 | 17 ▲ | 538 (4.6) | | 0 | 11 | 538 (3.9) | | 5 | 18 ▲ |
| 2 2011 | 557 (3.8) | | | 16 ▲ | 539 (3.3) | | | 12 ▲ | 533 (3.2) | | | 13 ▲ |
| 2007 | 541 (4.4) | | | | 527 (4.0) | | | | 519 (4.0) | | | |
| **Singapore** | | | | | | | | | | | | |
| 2 2019 | 621 (4.2) | 27 ▲ | 33 ▲ | 59 ▲ | 608 (4.1) | 8 | 19 ▲ | 38 ▲ | 595 (4.0) | 0 | 2 | 26 ▲ |
| 2 2015 | 594 (3.4) | | 6 | 32 ▲ | 600 (3.4) | | 11 ▲ | 30 ▲ | 595 (3.2) | | 2 | 26 ▲ |
| 2 2011 | 588 (4.9) | | | 26 ▲ | 589 (4.4) | | | 19 ▲ | 592 (4.4) | | | 24 ▲ |
| 2007 | 561 (4.9) | | | | 570 (4.5) | | | | 568 (4.5) | | | |
| **South Africa (9)** | | | | | | | | | | | | |
| Ψ 2019 | 361 (3.2) | 24 ▲ | 79 ▲ | | 377 (2.9) | 9 | 42 ▲ | | 362 (3.0) | 11 | 23 ▲ | |
| 2015 | 337 (6.7) | | 55 ▲ | | 368 (5.9) | | 33 ▲ | | 350 (5.6) | | 12 | |
| Ψ 2011 | 282 (4.1) | | | | 335 (3.5) | | | | 338 (5.0) | | | |
| **Sweden** | | | | | | | | | | | | |
| 2 2019 | 521 (3.2) | 2 | 10 ▲ | 14 ▲ | 518 (3.3) | 0 | 10 ▲ | 9 ▲ | 524 (3.8) | -3 | 14 ▲ | 7 |
| 2015 | 519 (3.2) | | 8 | 12 ▲ | 518 (3.5) | | 10 ▲ | 9 ▲ | 526 (4.0) | | 17 ▲ | 10 ▲ |
| 2011 | 512 (2.5) | | | 4 | 508 (2.7) | | | -1 | 510 (3.0) | | | -6 |
| 2007 | 508 (2.6) | | | | 509 (2.8) | | | | 516 (2.9) | | | |
| **Turkey** | | | | | | | | | | | | |
| 2019 | 506 (4.2) | 17 ▲ | 16 ▲ | | 515 (3.9) | 22 ▲ | 37 ▲ | | 524 (4.0) | 29 ▲ | 41 ▲ | |
| 2015 | 489 (4.5) | | -1 | | 492 (3.9) | | 15 ▲ | | 495 (4.2) | | 12 ▲ | |
| 2011 | 490 (3.7) | | | | 478 (3.4) | | | | 483 (3.3) | | | |
| **United Arab Emirates** | | | | | | | | | | | | |
| 2019 | 482 (2.7) | 4 | 11 ▲ | | 472 (2.2) | -6 | 8 ▲ | | 461 (2.2) | -12 ▽ | 5 | |
| 2015 | 478 (2.5) | | 7 | | 478 (2.4) | | 14 ▲ | | 473 (2.4) | | 17 ▲ | |
| 2011 | 471 (2.4) | | | | 464 (2.1) | | | | 456 (2.5) | | | |
| **United States** | | | | | | | | | | | | |
| † 2019 | 515 (4.6) | -17 ▽ | -12 ▽ | -1 | 523 (4.8) | -8 | 1 | 6 | 528 (4.7) | 2 | 5 | 0 |
| † 2015 | 532 (3.4) | | 5 | 16 ▲ | 531 (2.8) | | 9 ▲ | 14 ▲ | 526 (2.8) | | 3 | -2 |
| 2 2011 | 527 (2.8) | | | 11 ▲ | 522 (2.3) | | | 5 | 524 (2.5) | | | -5 |
| 2 † 2007 | 516 (3.2) | | | | 517 (2.9) | | | | 529 (3.0) | | | |
| **Benchmarking Participants** | | | | | | | | | | | | |
| **Ontario, Canada** | | | | | | | | | | | | |
| 2019 | 505 (3.3) | -9 ▽ | -8 | -10 ▽ | 523 (3.5) | -2 | 5 | -1 | 533 (3.7) | 1 | 0 | -10 |
| 2015 | 514 (2.6) | | 1 | -1 | 525 (2.4) | | 7 ▲ | 1 | 532 (2.6) | | 0 | -10 ▽ |
| 2 2011 | 513 (2.8) | | | -2 | 518 (2.4) | | | -6 | 532 (3.0) | | | -10 |
| 2 2007 | 515 (3.6) | | | | 524 (3.8) | | | | 542 (4.2) | | | |
| **Quebec, Canada** | | | | | | | | | | | | |
| ‡ 2019 | 529 (3.6) | 2 | 9 ▲ | 30 ▲ | 538 (4.2) | 13 ▲ | 20 ▲ | 37 ▲ | 540 (4.1) | 5 | 19 ▲ | 18 ▲ |
| ≡ 2015 | 527 (5.1) | | 7 | 28 ▲ | 524 (4.6) | | 7 | 24 ▲ | 535 (4.5) | | 13 ▲ | 13 ▲ |
| 2011 | 519 (2.8) | | | 20 ▲ | 518 (2.9) | | | 17 ▲ | 522 (3.1) | | | -1 |
| 3 2007 | 499 (3.3) | | | | 500 (3.4) | | | | 523 (3.3) | | | |
| **Abu Dhabi, UAE** | | | | | | | | | | | | |
| 2019 | 422 (4.3) | -31 ▽ | -44 ▽ | | 421 (3.5) | -36 ▽ | -40 ▽ | | 412 (3.6) | -42 ▽ | -43 ▽ | |
| 2015 | 453 (6.1) | | -13 | | 457 (5.9) | | -4 | | 454 (5.7) | | -1 | |
| 2011 | 466 (4.2) | | | | 461 (3.9) | | | | 455 (4.3) | | | |
| **Dubai, UAE** | | | | | | | | | | | | |
| 2 2019 | 560 (2.3) | 33 ▲ | 68 ▲ | 65 ▲ | 545 (2.5) | 19 ▲ | 59 ▲ | 57 ▲ | 538 (2.3) | 18 ▲ | 59 ▲ | 60 ▲ |
| 2015 | 527 (2.5) | | 35 ▲ | 32 ▲ | 525 (2.2) | | 39 ▲ | 37 ▲ | 521 (2.0) | | 41 ▲ | 43 ▲ |
| 2011 | 492 (2.9) | | | -4 | 486 (2.8) | | | -2 | 479 (2.6) | | | 1 |
| ‡ 2007 | 496 (3.5) | | | | 488 (3.0) | | | | 478 (3.5) | | | |

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Average Achievement in Cognitive Domains by Gender

Exhibit 4.19 shows the differences between girls' and boys' average achievement in the cognitive domains of knowing, applying, and reasoning. Reflecting the overall results where girls had higher average achievement in more countries than the reverse, girls had higher average achievement than boys in more countries than the reverse in all three cognitive domains, especially applying and reasoning. In the knowing domain, girls had higher average achievement than boys in 10 countries, and boys had higher achievement than girls in 8 countries. In the applying domain, girls had higher average achievement than boys in 13 countries, and boys had higher average achievement than girls in 4 countries. In reasoning, girls had higher average achievement than boys in 13 countries, compared with 2 countries where boys had higher average achievement.

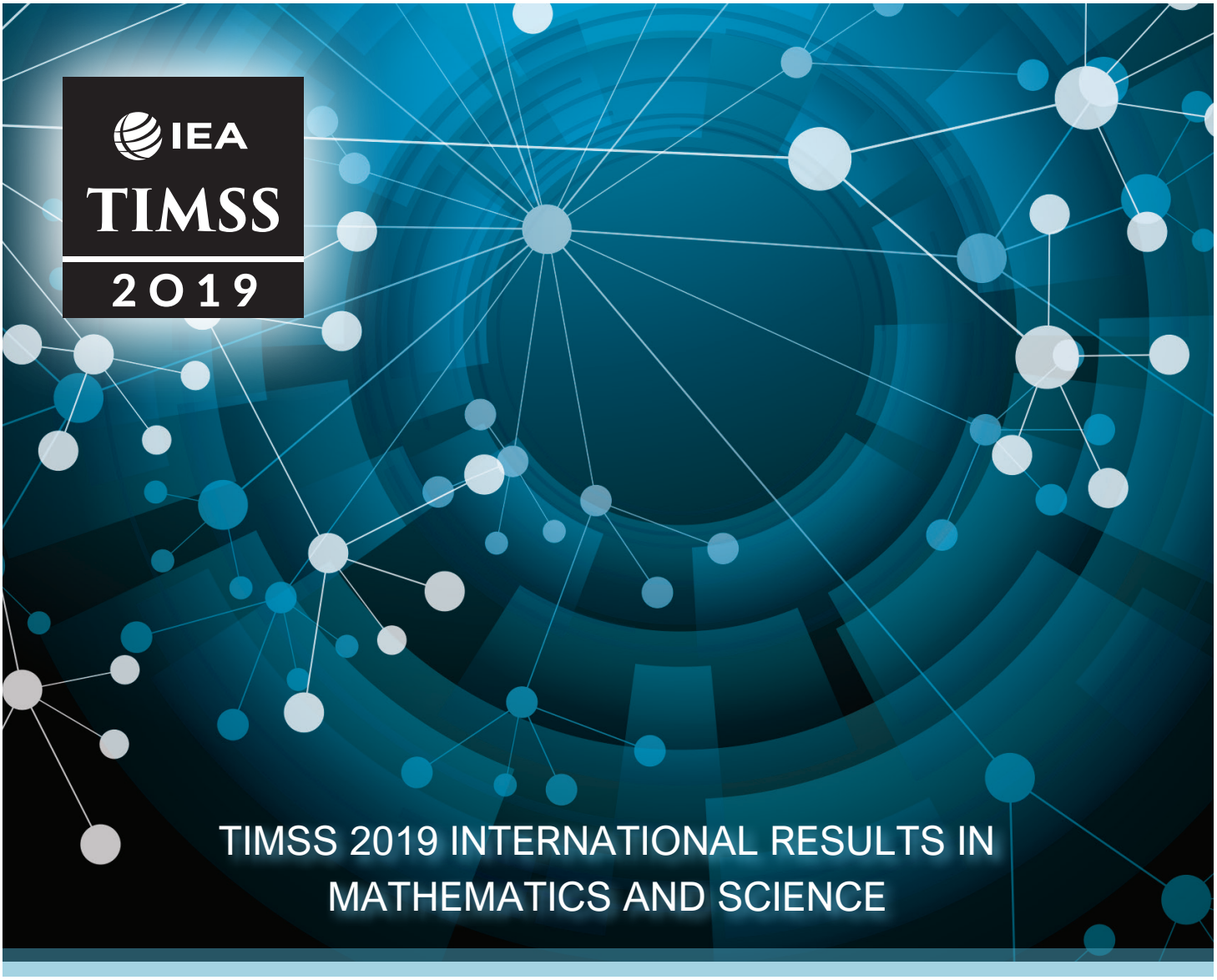
## Exhibit 4.19: Average Achievement in Science Cognitive Domains by Gender

| Country | Knowing (75 Items) | | Applying (80 Items) | | Reasoning (56 Items) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Australia | 511 (3.3) | 518 (5.3) | 534 (3.2) | 530 (4.9) | 538 (3.1) | 533 (4.7) |
| Bahrain | 520 (2.8) ▲ | 466 (3.7) | 508 (2.6) ▲ | 454 (3.9) | 508 (3.6) ▲ | 457 (2.6) |
| Chile | 457 (4.1) | 469 (4.6) ▲ | 458 (3.7) | 466 (3.9) | 450 (4.0) | 465 (3.8) ▲ |
| Chinese Taipei | 592 (2.9) | 608 (2.9) ▲ | 567 (2.5) | 567 (2.9) | 560 (2.7) | 558 (2.6) |
| Cyprus | 487 (4.1) ▲ | 478 (3.1) | 486 (2.5) ▲ | 469 (2.9) | 497 (3.2) ▲ | 479 (2.9) |
| [2] Egypt | 406 (6.3) ▲ | 384 (9.2) | 397 (6.3) ▲ | 367 (8.7) | 392 (6.4) ▲ | 361 (8.4) |
| England | 519 (6.1) | 521 (6.9) | 517 (6.0) | 512 (6.8) | 516 (5.7) | 510 (6.8) |
| Finland | 553 (3.2) ▲ | 537 (4.2) | 547 (3.4) ▲ | 527 (4.0) | 559 (3.9) ▲ | 537 (4.1) |
| France | 473 (2.9) | 487 (4.7) ▲ | 480 (3.1) | 484 (3.8) | 504 (3.2) | 501 (3.7) |
| [1] Georgia | 460 (4.6) | 457 (5.4) | 441 (4.1) | 439 (4.9) | 434 (4.5) | 438 (5.8) |
| † Hong Kong SAR | 493 (6.2) | 508 (6.9) ▲ | 505 (5.7) | 499 (6.7) | 510 (6.0) | 498 (6.4) |
| Hungary | 526 (3.1) | 549 (4.3) ▲ | 516 (3.1) | 540 (3.8) ▲ | 517 (3.4) | 532 (3.9) ▲ |
| Iran, Islamic Rep. of | 457 (5.0) | 442 (6.3) | 462 (4.6) ▲ | 443 (5.3) | 454 (4.9) ▲ | 435 (6.9) |
| Ireland | 512 (3.6) | 514 (4.1) | 525 (4.1) | 518 (4.2) | 538 (3.6) | 531 (4.6) |
| [3] Israel | 513 (5.2) | 514 (5.5) | 507 (4.8) | 511 (5.0) | 516 (4.7) | 520 (5.9) |
| Italy | 502 (3.1) | 512 (4.2) | 495 (3.7) | 503 (3.8) ▲ | 494 (4.5) | 496 (4.6) |
| Japan | 555 (3.3) | 572 (2.7) ▲ | 571 (2.5) | 581 (2.7) ▲ | 569 (2.5) | 571 (3.0) |
| Jordan | 484 (5.0) ▲ | 429 (7.4) | 481 (4.6) ▲ | 428 (6.5) | 470 (4.0) ▲ | 417 (6.7) |
| [2] Kazakhstan | 468 (4.6) ▲ | 459 (4.2) | 486 (4.0) ▲ | 476 (4.1) | 486 (3.9) ▲ | 478 (4.1) |
| Korea, Rep. of | 549 (3.8) | 567 (3.0) ▲ | 554 (3.2) | 566 (2.8) ▲ | 562 (3.4) | 566 (2.5) |
| Kuwait | - - | - - | - - | - - | - - | - - |
| Lebanon | 392 (5.9) | 385 (4.4) | 377 (6.2) | 374 (5.4) | 351 (6.1) | 341 (6.0) |
| Lithuania | 526 (3.1) | 528 (4.0) | 532 (3.0) | 529 (3.6) | 542 (3.2) | 539 (3.8) |
| Malaysia | 447 (4.4) | 437 (5.0) | 475 (3.6) | 471 (4.2) | 460 (3.9) | 457 (4.3) |
| Morocco | 379 (3.5) | 381 (3.6) | 393 (3.2) | 393 (3.3) | 401 (3.3) | 394 (3.5) |
| † New Zealand | 475 (3.7) | 484 (5.3) | 500 (4.2) | 505 (5.2) | 510 (3.6) | 509 (5.0) |
| † Norway (9) | 495 (2.7) | 500 (3.4) | 493 (3.8) | 493 (4.3) | 494 (4.3) | 495 (4.1) |
| Oman | 488 (3.5) ▲ | 436 (5.1) | 485 (4.0) ▲ | 429 (4.8) | 478 (3.4) ▲ | 424 (4.7) |
| Portugal | 515 (3.5) | 526 (3.6) ▲ | 512 (3.8) | 516 (4.0) | 517 (3.9) | 522 (4.1) |
| Qatar | 499 (4.9) ▲ | 474 (5.9) | 485 (5.7) ▲ | 454 (6.2) | 477 (5.8) ▲ | 451 (6.3) |
| Romania | 477 (4.7) | 473 (5.0) | 471 (4.9) | 462 (4.9) | 469 (4.6) ▲ | 458 (5.5) |
| [2] Russian Federation | 539 (5.3) | 547 (5.0) | 539 (4.9) | 546 (4.9) | 541 (5.2) | 545 (4.6) |
| [2] Saudi Arabia | - - | - - | - - | - - | - - | - - |
| [2] Singapore | 617 (4.9) | 624 (4.9) | 604 (4.6) | 613 (5.0) | 591 (4.8) | 598 (4.5) |
| Ψ South Africa (9) | 369 (3.2) ▲ | 352 (3.9) | 383 (3.0) ▲ | 371 (3.5) | 365 (3.3) ▲ | 358 (3.5) |
| [2] Sweden | 522 (4.3) | 521 (4.2) | 526 (4.0) ▲ | 510 (4.3) | 530 (4.6) ▲ | 517 (4.7) |
| Turkey | 510 (4.7) | 502 (5.6) | 521 (4.3) ▲ | 508 (5.3) | 529 (4.1) | 519 (5.5) |
| United Arab Emirates | 495 (4.4) ▲ | 470 (4.7) | 486 (3.6) ▲ | 460 (4.1) | 473 (4.0) ▲ | 450 (3.8) |
| † United States | 515 (4.1) | 514 (5.9) | 525 (4.2) | 521 (6.3) | 530 (3.8) | 526 (6.2) |
| **International Average** | **495 (0.7) ▲** | **490 (0.8)** | **496 (0.7) ▲** | **487 (0.8)** | **496 (0.7) ▲** | **486 (0.8)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 499 (3.4) | 511 (4.1) ▲ | 522 (4.1) | 524 (3.7) | 534 (4.4) | 531 (4.1) |
| ‡ Quebec, Canada | 527 (4.1) | 531 (4.1) | 537 (4.4) | 538 (4.8) | 543 (4.7) | 538 (4.7) |
| Moscow City, Russian Fed. | 564 (3.5) | 576 (3.5) ▲ | 556 (4.2) | 567 (4.0) ▲ | 563 (3.6) | 573 (3.6) ▲ |
| Gauteng, RSA (9) | 421 (5.0) ▲ | 404 (5.4) | 433 (3.9) ▲ | 423 (4.5) | 419 (4.2) | 414 (4.4) |
| Western Cape, RSA (9) | 424 (6.9) | 431 (7.1) | 441 (5.8) | 452 (6.4) | 430 (6.8) | 448 (7.0) ▲ |
| Abu Dhabi, UAE | 437 (7.6) ▲ | 408 (6.4) | 437 (6.7) ▲ | 405 (5.7) | 427 (6.6) ▲ | 398 (5.6) |
| [2] Dubai, UAE | 564 (6.1) | 557 (7.5) | 549 (5.3) | 541 (6.8) | 541 (5.7) | 535 (6.6) |

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 eighth grade science eAssessment items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# HOME & SCHOOL CONTEXTS

IEA
TIMSS & PIRLS
International Study Center
Lynch School of Education
BOSTON COLLEGE

# Home Environment Support

## Home Resources

### Home Resources for Learning

With information from both parents and students, the TIMSS 2019 results add to the already extensive body of research showing a powerful positive relationship between students' socioeconomic environment and their educational achievement.

The *Home Resources for Learning* scale combines data reported by fourth grade students and their parents. The parents' data were collected using the TIMSS 2019 Early Learning Survey (also called the "Home Questionnaire"), which asked parents to provide information about their child's learning experiences before the child began primary school. As explained in Exhibit 5.1, students provided information about the number of books in their homes and other study supports, while parents provided information about the number of children's books, the parents' levels of education, and the parents' occupations (see About the Scale). As also explained, students were assigned a score on the scale according to the availability of these five home resources for learning.

Exhibit 5.2 presents, for each country, the percentage of students in three categories of the scale, together with average student achievement in mathematics. Countries are ordered by the percentage of students in the "many resources" category, with an average percentage across countries of 17 percent. The majority of students (75%, on average) were assigned to the "some resources" category, with just 8 percent in the "few resources" category. There was a 129-point difference in average mathematics achievement of students in the "many resources" category compared with the "few resources" category (562 vs. 433). Average mathematics achievement for the students in the "some resources" category was in between, at 498 points.

The second panel of Exhibit 5.2 presents a scatterplot showing a modest positive association between countries' average *Home Resources for Learning* and average mathematics achievement.

Exhibit 5.3 presents the same *Home Resources for Learning* data, but this time in conjunction with average science achievement. The overall pattern of results is similar to mathematics, with an average science achievement gap of 143 score points between students in the "many resources" and "few resources" categories (557 vs. 414). Average science achievement for the students in the "some resources" category was again in between, at 488 points. Also similar to mathematics, the scatterplot in the second panel of Exhibit 5.3 shows a modest positive relationship between average *Home Resources for Learning* scores and average science achievement across countries.

## Exhibit 5.1: Home Resources for Learning

*Students' Results based on Students' and Parents' Reports*

### About the Scale

Students were scored according to their own and their parents' reports regarding the availability of five resources on the *Home Resources for Learning* scale. Cut scores divide the scale into three categories. Students with **Many Resources** had a score at or above the cut score corresponding to students reporting they had more than 100 books and both home study supports in their home and their parents reporting they had more than 25 children's books in their home, that at least one parent finished university, and that at least one parent had a professional occupation, on average. Students with **Few Resources** had a score at or below the cut score corresponding to students reporting they had 25 or fewer books and neither of the home study supports in their home and their parents reporting they had 10 or fewer children's books in the home, that neither parent had gone beyond upper secondary education, and that neither parent was a small business owner or worked in a clerical or professional occupation, on average. All other students had **Some Resources**.

**Number of books in the home (students):**

1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

**Number of children's books in the home (parents):**

1) 0-10
2) 11-25
3) 26-50
4) 51-100
5) More than 100

**Number of home study supports (students):**

1) None
2) Internet connection or own room
3) Both internet connection and own room

**Highest level of education of either parent (parents):**

1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher

**Highest level of occupation of either parent (parents):**

1) Has never worked outside home for pay, general laborer, or semi-professional (skilled agricultural or fishery worker, craft or trade worker, plant or machine operator)
2) Clerical (clerk or service or sales worker)
3) Small business owner
4) Professional (corporate manager or senior official, professional, or technician or associate professional)




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.2: Home Resources for Learning

*Students' Results based on Students' and Parents' Reports*

| Country | | Many Resources | | Some Resources | | Few Resources | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | | 53 (1.6) | 624 (2.1) | 47 (1.6) | 574 (2.4) | 0 (0.1) | ~ ~ | 11.9 (0.06) |
| Sweden | r | 39 (1.9) | 562 (3.0) | 60 (1.8) | 510 (2.8) | 2 (0.4) | ~ ~ | 11.2 (0.08) |
| Denmark | s | 37 (1.5) | 564 (2.9) | 62 (1.5) | 526 (3.1) | 1 (0.2) | ~ ~ | 11.3 (0.04) |
| Canada | s | 36 (1.7) | 546 (2.1) | 64 (1.7) | 511 (3.8) | 0 (0.1) | ~ ~ | 11.3 (0.05) |
| Northern Ireland | s | 35 (1.8) | 626 (4.5) | 63 (1.7) | 565 (3.6) | 1 (0.3) | ~ ~ | 11.1 (0.07) |
| Finland | | 35 (1.1) | 567 (2.5) | 65 (1.1) | 520 (2.5) | 1 (0.1) | ~ ~ | 11.2 (0.04) |
| Ireland | | 34 (1.4) | 587 (2.6) | 64 (1.5) | 535 (2.7) | 1 (0.3) | ~ ~ | 11.1 (0.05) |
| Norway (5) | s | 33 (1.5) | 583 (3.9) | 66 (1.5) | 540 (3.1) | 1 (0.2) | ~ ~ | 11.5 (0.05) |
| Singapore | | 31 (1.0) | 665 (3.4) | 67 (1.0) | 612 (4.0) | 1 (0.2) | ~ ~ | 11.0 (0.04) |
| Cyprus | | 29 (1.4) | 570 (3.1) | 70 (1.3) | 522 (2.7) | 1 (0.2) | ~ ~ | 10.9 (0.05) |
| France | | 28 (1.5) | 538 (2.8) | 69 (1.4) | 471 (2.9) | 3 (0.3) | 419 (9.3) | 10.8 (0.06) |
| Germany | s | 27 (1.4) | 572 (3.1) | 72 (1.4) | 521 (2.7) | 1 (0.3) | ~ ~ | 10.8 (0.05) |
| Hungary | | 27 (1.4) | 574 (3.0) | 68 (1.4) | 513 (2.5) | 5 (0.8) | 432 (7.6) | 10.6 (0.07) |
| Belgium (Flemish) | | 27 (1.1) | 567 (2.5) | 71 (1.1) | 525 (2.1) | 3 (0.4) | 472 (6.9) | 10.7 (0.04) |
| Hong Kong SAR | | 27 (1.6) | 636 (4.3) | 67 (1.5) | 595 (3.0) | 6 (0.6) | 561 (7.4) | 10.5 (0.08) |
| Malta | r | 27 (0.7) | 553 (2.8) | 72 (0.7) | 504 (1.7) | 1 (0.2) | ~ ~ | 10.8 (0.03) |
| Czech Republic | r | 24 (1.1) | 582 (3.2) | 75 (1.1) | 530 (2.7) | 1 (0.2) | ~ ~ | 10.8 (0.04) |
| Austria | | 22 (1.0) | 584 (2.7) | 75 (1.0) | 531 (2.0) | 2 (0.3) | ~ ~ | 10.6 (0.04) |
| Poland | | 22 (1.1) | 568 (3.9) | 77 (1.0) | 509 (2.6) | 1 (0.2) | ~ ~ | 10.6 (0.05) |
| Spain | | 20 (1.2) | 547 (2.8) | 75 (1.2) | 500 (2.8) | 4 (0.6) | 447 (9.4) | 10.4 (0.06) |
| Chinese Taipei | | 20 (1.1) | 637 (2.5) | 74 (1.1) | 593 (1.9) | 5 (0.5) | 542 (8.2) | 10.4 (0.05) |
| Latvia | | 19 (1.0) | 578 (3.4) | 79 (1.0) | 541 (2.5) | 2 (0.3) | ~ ~ | 10.6 (0.04) |
| Portugal | | 19 (1.1) | 574 (3.3) | 76 (1.1) | 521 (2.7) | 5 (0.5) | 466 (6.3) | 10.2 (0.06) |
| Slovak Republic | | 19 (1.2) | 560 (4.2) | 74 (1.4) | 507 (2.6) | 7 (1.3) | 416 (8.5) | 10.2 (0.08) |
| Lithuania | r | 16 (1.1) | 592 (5.1) | 82 (1.0) | 535 (2.8) | 2 (0.3) | ~ ~ | 10.4 (0.05) |
| Georgia | | 15 (1.0) | 513 (5.5) | 82 (1.1) | 478 (4.1) | 4 (0.6) | 445 (15.7) | 10.3 (0.06) |
| Russian Federation | | 14 (1.1) | 597 (3.8) | 84 (1.1) | 564 (3.4) | 3 (0.5) | 537 (12.2) | 10.3 (0.06) |
| Bulgaria | | 13 (0.8) | 578 (3.1) | 69 (1.9) | 526 (2.7) | 18 (2.1) | 440 (12.5) | 9.6 (0.09) |
| Serbia | | 13 (1.0) | 574 (3.9) | 83 (1.1) | 506 (2.5) | 4 (0.6) | 387 (13.9) | 10.0 (0.05) |
| Japan | | 12 (0.7) | 637 (3.8) | 87 (0.7) | 589 (1.7) | 1 (0.2) | ~ ~ | 10.3 (0.04) |
| Qatar | r | 11 (0.9) | 512 (7.4) | 87 (1.0) | 451 (3.6) | 2 (0.3) | ~ ~ | 10.2 (0.04) |
| Croatia | | 10 (0.7) | 549 (3.6) | 87 (1.0) | 508 (2.2) | 3 (0.9) | 448 (15.2) | 9.9 (0.05) |
| Italy | | 10 (0.8) | 552 (4.4) | 83 (0.9) | 515 (2.5) | 7 (0.8) | 491 (5.3) | 9.8 (0.06) |
| Montenegro | r | 9 (0.5) | 507 (5.2) | 87 (0.6) | 454 (2.1) | 4 (0.3) | 384 (9.8) | 10.0 (0.03) |
| Bahrain | | 8 (0.5) | 520 (5.9) | 88 (0.6) | 480 (2.7) | 4 (0.3) | 461 (6.1) | 9.9 (0.03) |
| North Macedonia | | 7 (0.9) | 550 (7.6) | 78 (1.5) | 485 (4.7) | 15 (1.6) | 406 (9.4) | 9.3 (0.09) |
| Kazakhstan | | 6 (1.0) | 552 (9.5) | 90 (1.0) | 511 (2.4) | 4 (0.5) | 491 (5.8) | 9.8 (0.06) |
| Turkey (5) | | 6 (0.7) | 625 (5.9) | 68 (1.6) | 543 (3.8) | 26 (1.6) | 450 (6.1) | 8.7 (0.08) |
| Armenia | | 5 (0.6) | 534 (5.4) | 86 (0.8) | 500 (2.4) | 9 (0.7) | 469 (6.1) | 9.5 (0.05) |
| Albania | | 5 (0.7) | 577 (6.4) | 65 (1.7) | 505 (3.3) | 30 (1.9) | 467 (6.0) | 8.6 (0.08) |
| Bosnia and Herzegovina | | 5 (0.5) | 517 (6.0) | 89 (0.7) | 453 (2.2) | 6 (0.5) | 410 (6.7) | 9.3 (0.05) |
| Iran, Islamic Rep. of | | 5 (0.7) | 537 (8.7) | 70 (1.5) | 453 (3.4) | 25 (1.4) | 405 (7.2) | 8.7 (0.07) |
| Oman | | 4 (0.4) | 505 (6.8) | 86 (0.6) | 436 (4.0) | 10 (0.6) | 391 (7.4) | 9.4 (0.04) |
| Chile | | 4 (0.4) | 516 (6.4) | 86 (0.7) | 444 (2.9) | 10 (0.6) | 401 (4.6) | 9.3 (0.04) |
| Kuwait | r | 4 (0.5) | 447 (14.3) | 93 (0.5) | 388 (4.9) | 2 (0.4) | ~ ~ | 9.8 (0.04) |
| Kosovo | | 4 (0.6) | 503 (7.4) | 84 (0.8) | 448 (2.7) | 12 (0.8) | 415 (6.1) | 9.1 (0.05) |
| Saudi Arabia | | 3 (0.3) | 466 (8.2) | 88 (0.7) | 403 (3.5) | 9 (0.7) | 383 (7.4) | 9.4 (0.05) |
| Azerbaijan | | 2 (0.3) | ~ ~ | 86 (0.8) | 525 (2.5) | 12 (0.8) | 495 (5.3) | 9.1 (0.04) |
| South Africa (5) | r | 2 (0.3) | ~ ~ | 74 (1.0) | 385 (3.7) | 24 (1.0) | 349 (3.4) | 8.5 (0.05) |
| Morocco | | 1 (0.2) | ~ ~ | 39 (1.4) | 413 (6.5) | 60 (1.4) | 369 (5.8) | 6.9 (0.08) |
| Pakistan | r | 0 (0.2) | ~ ~ | 62 (2.7) | 333 (14.5) | 38 (2.8) | 325 (12.4) | 8.0 (0.14) |
| Philippines | | 0 (0.1) | ~ ~ | 66 (1.8) | 313 (6.8) | 34 (1.8) | 270 (5.8) | 8.1 (0.07) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| New Zealand | x | 42 (1.6) | 549 (3.6) | 57 (1.6) | 486 (4.1) | 1 (0.2) | ~ ~ | 11.4 (0.06) |
| United Arab Emirates | x | 12 (0.4) | 557 (2.5) | 87 (0.4) | 495 (2.3) | 1 (0.1) | ~ ~ | 10.4 (0.02) |
| **International Average** | | **17 (0.1)** | **562 (0.7)** | **75 (0.2)** | **498 (0.5)** | **8 (0.1)** | **433 (1.5)** | |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | | 39 (1.3) | 611 (2.3) | 60 (1.3) | 581 (2.4) | 0 (0.1) | ~ ~ | 11.4 (0.05) |
| Ontario, Canada | s | 36 (3.1) | 548 (3.9) | 64 (3.1) | 512 (7.4) | 0 (0.1) | ~ ~ | 11.3 (0.09) |
| Quebec, Canada | s | 35 (2.0) | 562 (3.1) | 65 (1.9) | 525 (3.2) | 0 (0.2) | ~ ~ | 11.2 (0.07) |
| Madrid, Spain | | 32 (1.3) | 550 (2.4) | 66 (1.3) | 510 (2.4) | 3 (0.4) | 457 (10.1) | 10.9 (0.06) |
| Dubai, UAE | s | 19 (0.7) | 594 (2.9) | 81 (0.7) | 549 (2.2) | 0 (0.1) | ~ ~ | 10.8 (0.02) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

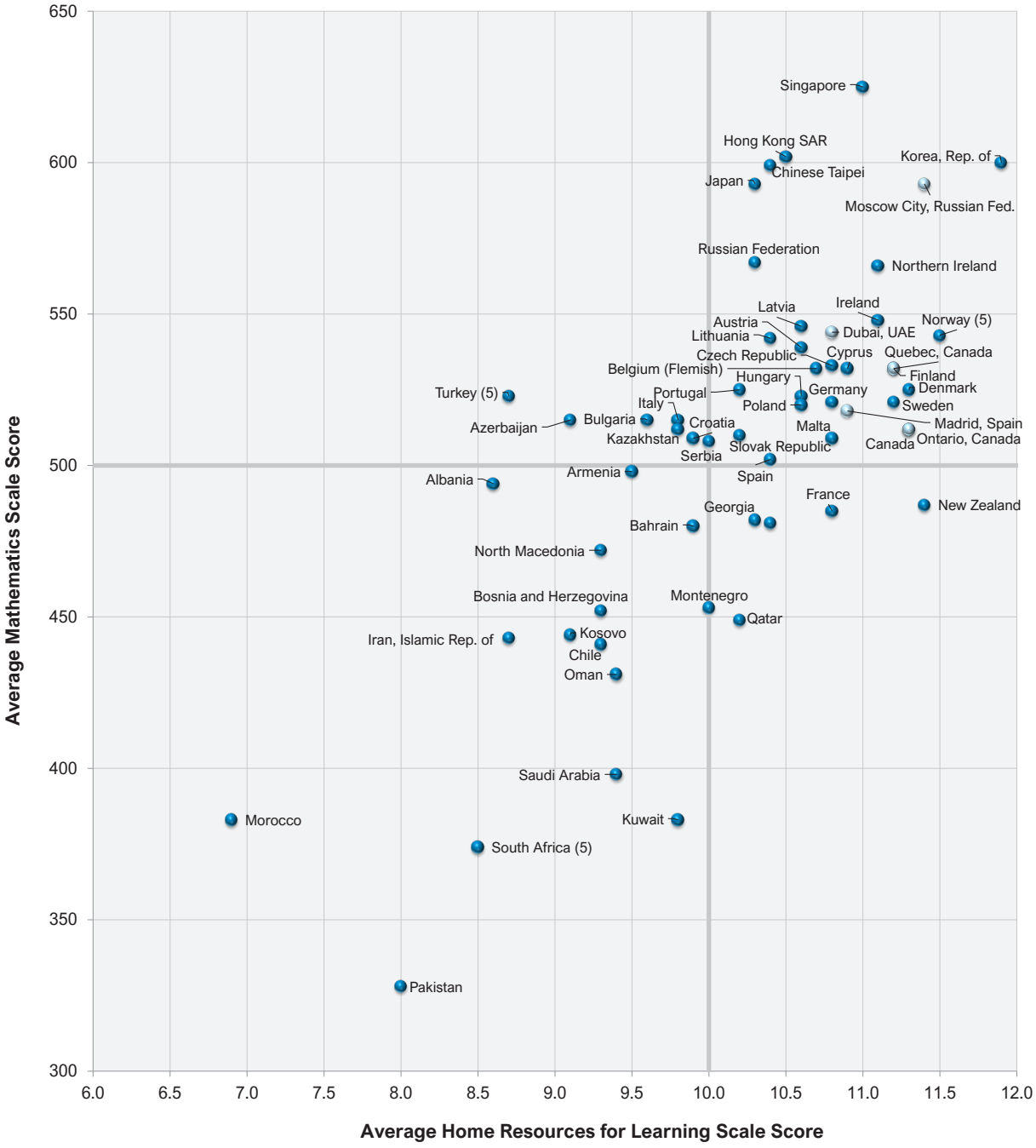
Downloaded from http://timss2019.org/download

## Exhibit 5.2: Home Resources for Learning

*Students' Results based on Students' and Parents' Reports*

**(Continued)**

### Average Mathematics Achievement by Home Resources for Learning




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.3: Home Resources for Learning

*Students' Results based on Students' and Parents' Reports*

| Country | | Many Resources | | Some Resources | | Few Resources | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | | 53 (1.6) | 610 (1.9) | 47 (1.6) | 564 (2.7) | 0 (0.1) | ~ ~ | 11.9 (0.06) |
| Sweden | r | 39 (1.9) | 580 (3.2) | 60 (1.8) | 524 (3.3) | 2 (0.4) | ~ ~ | 11.2 (0.08) |
| Denmark | s | 37 (1.5) | 560 (2.9) | 62 (1.5) | 521 (3.1) | 1 (0.2) | ~ ~ | 11.3 (0.04) |
| Canada | s | 36 (1.7) | 558 (2.2) | 64 (1.7) | 520 (3.1) | 0 (0.1) | ~ ~ | 11.3 (0.05) |
| Northern Ireland | s | 35 (1.8) | 565 (3.3) | 63 (1.7) | 515 (2.6) | 1 (0.3) | ~ ~ | 11.1 (0.07) |
| Finland | | 35 (1.1) | 585 (3.2) | 65 (1.1) | 545 (2.6) | 1 (0.1) | ~ ~ | 11.2 (0.04) |
| Ireland | | 34 (1.4) | 567 (3.4) | 64 (1.5) | 514 (3.3) | 1 (0.3) | ~ ~ | 11.1 (0.05) |
| Norway (5) | s | 33 (1.5) | 579 (3.5) | 66 (1.5) | 534 (3.5) | 1 (0.2) | ~ ~ | 11.5 (0.05) |
| Singapore | | 31 (1.0) | 640 (3.1) | 67 (1.0) | 579 (3.4) | 1 (0.2) | ~ ~ | 11.0 (0.04) |
| Cyprus | | 29 (1.4) | 551 (3.8) | 70 (1.3) | 501 (2.8) | 1 (0.2) | ~ ~ | 10.9 (0.05) |
| France | | 28 (1.5) | 541 (2.8) | 69 (1.4) | 473 (2.9) | 3 (0.3) | 417 (10.2) | 10.8 (0.06) |
| Germany | s | 27 (1.4) | 577 (3.0) | 72 (1.4) | 519 (2.4) | 1 (0.3) | ~ ~ | 10.8 (0.05) |
| Hungary | | 27 (1.4) | 579 (2.5) | 68 (1.4) | 519 (2.4) | 5 (0.8) | 442 (10.3) | 10.6 (0.07) |
| Belgium (Flemish) | | 27 (1.1) | 540 (2.4) | 71 (1.1) | 493 (2.1) | 3 (0.4) | 432 (6.3) | 10.7 (0.04) |
| Hong Kong SAR | | 27 (1.6) | 570 (3.9) | 67 (1.5) | 521 (3.3) | 6 (0.6) | 492 (8.0) | 10.5 (0.08) |
| Malta | r | 27 (0.7) | 547 (2.7) | 72 (0.7) | 488 (1.8) | 1 (0.2) | ~ ~ | 10.8 (0.03) |
| Czech Republic | r | 24 (1.1) | 578 (3.4) | 75 (1.1) | 531 (3.0) | 1 (0.2) | ~ ~ | 10.8 (0.04) |
| Austria | | 22 (1.0) | 578 (3.1) | 75 (1.0) | 514 (2.8) | 2 (0.3) | ~ ~ | 10.6 (0.04) |
| Poland | | 22 (1.1) | 577 (3.6) | 77 (1.0) | 520 (2.5) | 1 (0.2) | ~ ~ | 10.6 (0.05) |
| Spain | | 20 (1.2) | 553 (2.9) | 75 (1.2) | 509 (2.2) | 4 (0.6) | 463 (8.8) | 10.4 (0.06) |
| Chinese Taipei | | 20 (1.1) | 598 (2.7) | 74 (1.1) | 552 (1.6) | 5 (0.5) | 496 (7.0) | 10.4 (0.05) |
| Latvia | | 19 (1.0) | 573 (2.7) | 79 (1.0) | 537 (2.3) | 2 (0.3) | ~ ~ | 10.6 (0.04) |
| Portugal | | 19 (1.1) | 547 (3.3) | 76 (1.1) | 500 (2.6) | 5 (0.5) | 453 (5.3) | 10.2 (0.06) |
| Slovak Republic | | 19 (1.2) | 574 (3.6) | 74 (1.4) | 520 (2.6) | 7 (1.3) | 396 (11.9) | 10.2 (0.08) |
| Lithuania | r | 16 (1.1) | 587 (5.5) | 82 (1.0) | 531 (2.5) | 2 (0.3) | ~ ~ | 10.4 (0.05) |
| Georgia | | 15 (1.0) | 487 (5.1) | 82 (1.1) | 449 (4.5) | 4 (0.6) | 432 (20.7) | 10.3 (0.06) |
| Russian Federation | | 14 (1.1) | 599 (4.0) | 84 (1.1) | 564 (3.0) | 3 (0.5) | 522 (11.1) | 10.3 (0.06) |
| Bulgaria | | 13 (0.8) | 602 (4.0) | 69 (1.9) | 536 (3.5) | 18 (2.1) | 420 (11.7) | 9.6 (0.09) |
| Serbia | | 13 (1.0) | 576 (3.4) | 83 (1.1) | 517 (2.9) | 4 (0.6) | 389 (17.0) | 10.0 (0.05) |
| Japan | | 12 (0.7) | 606 (4.4) | 87 (0.7) | 558 (1.7) | 1 (0.2) | ~ ~ | 10.3 (0.04) |
| Qatar | r | 11 (0.9) | 513 (7.6) | 87 (1.0) | 454 (4.4) | 2 (0.3) | ~ ~ | 10.2 (0.04) |
| Croatia | | 10 (0.7) | 562 (3.5) | 87 (1.0) | 522 (2.2) | 3 (0.9) | 468 (11.6) | 9.9 (0.05) |
| Italy | | 10 (0.8) | 551 (4.0) | 83 (0.9) | 511 (2.9) | 7 (0.8) | 478 (5.8) | 9.8 (0.06) |
| Montenegro | r | 9 (0.5) | 515 (5.2) | 87 (0.6) | 454 (2.7) | 4 (0.3) | 378 (11.6) | 10.0 (0.03) |
| Bahrain | | 8 (0.5) | 552 (6.4) | 88 (0.6) | 495 (3.4) | 4 (0.3) | 451 (8.4) | 9.9 (0.03) |
| North Macedonia | | 7 (0.9) | 511 (7.6) | 78 (1.5) | 439 (5.6) | 15 (1.6) | 352 (10.1) | 9.3 (0.09) |
| Kazakhstan | | 6 (1.0) | 557 (12.0) | 90 (1.0) | 492 (2.9) | 4 (0.5) | 466 (6.2) | 9.8 (0.06) |
| Turkey (5) | | 6 (0.7) | 612 (5.1) | 68 (1.6) | 546 (3.6) | 26 (1.6) | 459 (6.4) | 8.7 (0.08) |
| Armenia | | 5 (0.6) | 511 (6.4) | 86 (0.8) | 467 (3.3) | 9 (0.7) | 434 (7.3) | 9.5 (0.05) |
| Albania | | 5 (0.7) | 570 (6.3) | 65 (1.7) | 499 (3.4) | 30 (1.9) | 464 (5.7) | 8.6 (0.08) |
| Bosnia and Herzegovina | | 5 (0.5) | 518 (6.1) | 89 (0.7) | 459 (2.9) | 6 (0.5) | 420 (8.3) | 9.3 (0.05) |
| Iran, Islamic Rep. of | | 5 (0.7) | 541 (6.4) | 70 (1.5) | 453 (3.6) | 25 (1.4) | 395 (7.1) | 8.7 (0.07) |
| Oman | | 4 (0.4) | 526 (7.9) | 86 (0.6) | 443 (4.2) | 10 (0.6) | 376 (6.5) | 9.4 (0.04) |
| Chile | | 4 (0.4) | 543 (5.9) | 86 (0.7) | 473 (2.6) | 10 (0.6) | 424 (3.9) | 9.3 (0.04) |
| Kuwait | r | 4 (0.5) | 449 (17.7) | 93 (0.5) | 402 (6.0) | 2 (0.4) | ~ ~ | 9.8 (0.04) |
| Kosovo | | 4 (0.6) | 485 (8.3) | 84 (0.8) | 417 (3.2) | 12 (0.8) | 383 (7.7) | 9.1 (0.05) |
| Saudi Arabia | | 3 (0.3) | 477 (9.6) | 88 (0.7) | 409 (3.9) | 9 (0.7) | 382 (8.9) | 9.4 (0.05) |
| Azerbaijan | | 2 (0.3) | ~ ~ | 86 (0.8) | 438 (3.0) | 12 (0.8) | 403 (5.6) | 9.1 (0.04) |
| South Africa (5) | r | 2 (0.3) | ~ ~ | 74 (1.0) | 340 (5.2) | 24 (1.0) | 287 (4.7) | 8.5 (0.05) |
| Morocco | | 1 (0.2) | ~ ~ | 39 (1.4) | 404 (7.3) | 60 (1.4) | 361 (7.4) | 6.9 (0.08) |
| Pakistan | r | 0 (0.2) | ~ ~ | 62 (2.7) | 295 (15.3) | 38 (2.8) | 289 (14.4) | 8.0 (0.14) |
| Philippines | | 0 (0.1) | ~ ~ | 66 (1.8) | 269 (7.8) | 34 (1.8) | 214 (7.2) | 8.1 (0.07) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| New Zealand | x | 42 (1.6) | 563 (3.3) | 57 (1.6) | 501 (3.6) | 1 (0.2) | ~ ~ | 11.4 (0.06) |
| United Arab Emirates | x | 12 (0.4) | 554 (3.2) | 87 (0.4) | 492 (2.9) | 1 (0.1) | ~ ~ | 10.4 (0.02) |
| **International Average** | | **17 (0.1)** | **557 (0.8)** | **75 (0.2)** | **488 (0.5)** | **8 (0.1)** | **414 (1.7)** | |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | | 39 (1.3) | 615 (2.7) | 60 (1.3) | 582 (2.3) | 0 (0.1) | ~ ~ | 11.4 (0.05) |
| Ontario, Canada | s | 36 (3.1) | 560 (3.9) | 64 (3.1) | 523 (5.4) | 0 (0.1) | ~ ~ | 11.3 (0.09) |
| Quebec, Canada | s | 35 (2.0) | 554 (3.1) | 65 (1.9) | 514 (3.3) | 0 (0.2) | ~ ~ | 11.2 (0.07) |
| Madrid, Spain | | 32 (1.3) | 552 (2.3) | 66 (1.3) | 514 (2.2) | 3 (0.4) | 472 (9.7) | 10.9 (0.06) |
| Dubai, UAE | s | 19 (0.7) | 593 (3.8) | 81 (0.7) | 553 (2.4) | 0 (0.1) | ~ ~ | 10.8 (0.02) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

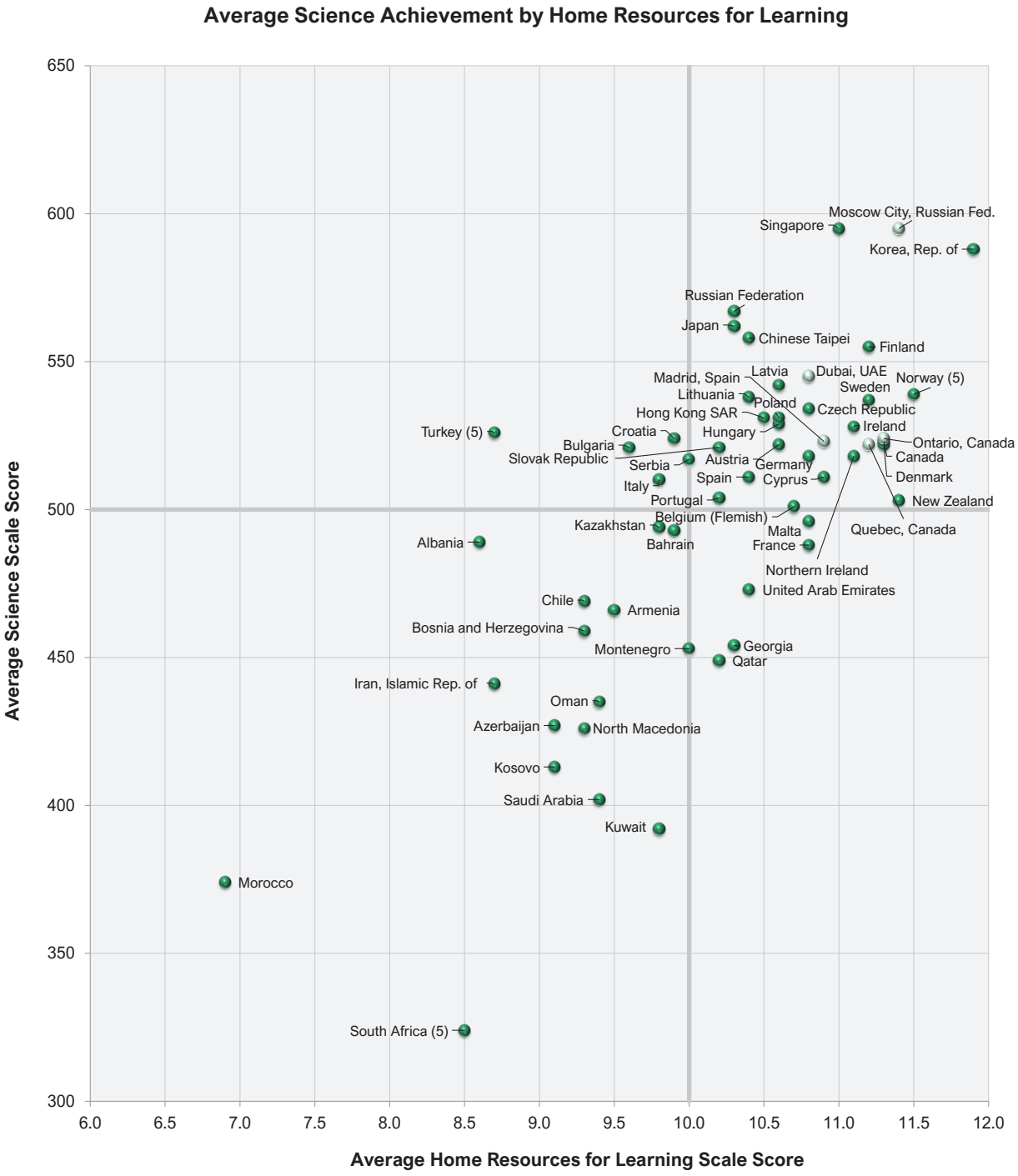
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.3: Home Resources for Learning

*Students' Results based on Students' and Parents' Reports*

**(Continued)**




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Home Educational Resources

The TIMSS 2019 results reinforce the already extensive body of research showing a powerful positive relationship between students' socioeconomic environment and their educational achievement. As shown in Exhibit 5.4, the eighth grade *Home Educational Resources* scale is based on students' reports about the number of books and other study supports in their homes, as well as the highest level of their parents' education (see About the Scale). As also explained, students were assigned a score on the scale according to the availability of these three home educational resources.

Exhibit 5.5 presents for each country the percentage of students in three categories of the scale, together with average student achievement in mathematics. Countries are ordered by the percentage of students in the "many resources" category, with an average percentage across countries of 14 percent. Educational resource availability varied widely across countries, with the percentage of students in the "many resources" category ranging from 2 percent in South Africa and Morocco to 40 percent in the Korea. The majority of students (73%, on average) were assigned to the "some resources" category, with 13 percent in the "few resources" category. There was a 113-point difference in the average mathematics achievement of students in the "many resources" category compared with the "few resources" category (546 vs. 433). Average mathematics achievement for the students in the "some resources" category was in between, at 488 points.

The second panel of Exhibit 5.5 presents a scatterplot showing the relationship between average *Home Educational Resources* and average mathematics achievement across countries. There is a modest positive association between *Home Educational Resources* and average mathematics achievement at the country level.

Exhibit 5.6 presents the same *Home Educational Resources* data, but this time in conjunction with average science achievement. The overall pattern of results is similar to mathematics, with an average science achievement gap of 118 score points between students in the "many resources" and "few resources" categories (549 vs. 431). Average science achievement for the students in the "some resources" category was again in between, at 489 points. Also similar to mathematics, the scatterplot in the second panel of Exhibit 5.6 shows a modest positive relationship between average *Home Educational Resources* scores and average science achievement across countries.

## Exhibit 5.4: Home Educational Resources

*Students' Reports*

### About the Scale

Students were scored according to their reports regarding the availability of three resources on the *Home Educational Resources* scale. Cut scores divide the scale into three categories. Students with **Many Resources** had a score at or above the cut score corresponding to reporting they had more than 100 books and both home study supports in their home and that at least one parent finished university, on average. Students with **Few Resources** had a score at or below the cut score corresponding to reporting they had 25 or fewer books and neither of the home study supports in the home and that neither parent had gone beyond upper secondary education, on average. All other students had **Some Resources**.

**Number of books in the home:**

1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

**Highest level of education of either parent:**

1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher

**Number of home study supports:**

1) None
2) Internet connection or own room
3) Both internet connection and own room




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.5: Home Educational Resources

*Students' Reports*

| Country | Many Resources | | Some Resources | | Few Resources | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | 40 (1.4) | 643 (3.5) | 58 (1.3) | 586 (2.9) | 2 (0.2) | ~ ~ | 11.6 (0.04) |
| Norway (9) | 31 (0.9) | 538 (3.1) | 68 (1.0) | 491 (2.6) | 2 (0.3) | ~ ~ | 11.4 (0.04) |
| Australia | 25 (1.1) | 564 (5.0) | 71 (1.0) | 507 (3.3) | 4 (0.3) | 424 (6.1) | 11.1 (0.04) |
| Hungary | 25 (1.3) | 585 (4.6) | 70 (1.4) | 500 (3.1) | 5 (0.7) | 411 (8.4) | 10.9 (0.04) |
| Finland | 23 (1.0) | 545 (2.9) | 75 (1.0) | 500 (2.5) | 2 (0.3) | ~ ~ | 11.2 (0.04) |
| Sweden | 23 (1.1) | 554 (3.3) | 73 (1.1) | 491 (2.3) | 4 (0.4) | 442 (6.8) | 11.0 (0.05) |
| Cyprus | 22 (0.9) | 549 (3.1) | 74 (0.9) | 492 (1.7) | 4 (0.4) | 425 (8.2) | 10.9 (0.03) |
| Ireland | 20 (1.0) | 572 (3.6) | 74 (1.0) | 517 (2.3) | 6 (0.5) | 451 (9.0) | 10.8 (0.04) |
| United States | 20 (0.9) | 583 (4.5) | 72 (0.9) | 506 (4.4) | 8 (0.5) | 451 (6.9) | 10.7 (0.04) |
| Georgia | 20 (1.2) | 495 (6.1) | 74 (1.3) | 455 (4.3) | 6 (1.1) | 430 (15.4) | 10.8 (0.06) |
| Japan | 18 (0.8) | 637 (4.9) | 79 (0.7) | 587 (2.3) | 3 (0.4) | 526 (10.2) | 10.9 (0.03) |
| New Zealand | 17 (0.9) | 540 (4.0) | 77 (0.8) | 475 (3.4) | 6 (0.4) | 414 (7.2) | 10.8 (0.04) |
| England | 17 (1.3) | 575 (8.6) | 78 (1.2) | 508 (5.1) | 5 (0.5) | 453 (11.3) | 10.7 (0.05) |
| Chinese Taipei | 16 (0.7) | 671 (4.7) | 70 (0.8) | 612 (2.7) | 13 (0.6) | 543 (4.1) | 10.4 (0.03) |
| Lithuania | 16 (0.9) | 580 (5.1) | 81 (0.9) | 513 (3.0) | 3 (0.4) | 437 (8.2) | 10.8 (0.03) |
| Israel r | 16 (1.2) | 583 (6.7) | 82 (1.2) | 523 (4.7) | 2 (0.3) | ~ ~ | 11.1 (0.05) |
| Italy | 15 (0.9) | 536 (4.4) | 72 (1.0) | 498 (2.5) | 13 (1.0) | 452 (5.3) | 10.3 (0.05) |
| France | 15 (0.9) | 534 (4.2) | 78 (0.8) | 478 (2.3) | 7 (0.5) | 432 (4.7) | 10.6 (0.04) |
| Singapore | 14 (0.5) | 661 (3.8) | 78 (0.6) | 616 (3.9) | 8 (0.6) | 536 (8.4) | 10.6 (0.03) |
| Portugal | 14 (1.2) | 553 (4.1) | 70 (1.2) | 499 (3.2) | 16 (1.0) | 460 (4.3) | 10.2 (0.06) |
| Romania | 14 (0.9) | 559 (5.6) | 76 (1.1) | 477 (3.9) | 10 (1.0) | 401 (7.1) | 10.3 (0.06) |
| Hong Kong SAR | 13 (0.7) | 625 (7.8) | 74 (0.9) | 577 (4.1) | 13 (0.7) | 540 (7.0) | 10.3 (0.04) |
| Russian Federation | 13 (0.9) | 583 (6.9) | 81 (0.9) | 540 (4.6) | 6 (0.7) | 503 (8.1) | 10.6 (0.05) |
| United Arab Emirates | 12 (0.3) | 529 (3.3) | 79 (0.3) | 473 (1.9) | 10 (0.3) | 426 (4.2) | 10.4 (0.02) |
| Qatar | 11 (0.7) | 495 (8.5) | 79 (0.8) | 445 (4.1) | 10 (0.7) | 380 (5.5) | 10.3 (0.05) |
| Bahrain | 9 (0.4) | 507 (5.1) | 79 (0.7) | 481 (2.0) | 12 (0.5) | 461 (4.3) | 10.2 (0.02) |
| Turkey | 9 (0.7) | 605 (5.7) | 59 (1.5) | 510 (4.4) | 32 (1.7) | 439 (5.3) | 9.5 (0.07) |
| Iran, Islamic Rep. of | 8 (0.7) | 530 (8.1) | 61 (1.2) | 457 (3.8) | 31 (1.3) | 403 (3.4) | 9.5 (0.05) |
| Kazakhstan | 7 (0.6) | 519 (7.1) | 83 (1.0) | 490 (3.2) | 10 (0.8) | 451 (6.5) | 10.2 (0.04) |
| Oman | 7 (0.4) | 466 (6.5) | 71 (0.8) | 420 (2.8) | 22 (0.8) | 372 (4.2) | 9.7 (0.03) |
| Kuwait | 6 (0.4) | 432 (10.5) | 80 (0.7) | 406 (4.9) | 14 (0.7) | 380 (6.6) | 9.9 (0.03) |
| Lebanon | 6 (0.5) | 473 (6.0) | 73 (1.3) | 436 (3.2) | 22 (1.3) | 396 (3.9) | 9.7 (0.05) |
| Chile | 5 (0.4) | 519 (6.6) | 79 (0.9) | 444 (2.8) | 16 (0.9) | 399 (4.8) | 9.9 (0.04) |
| Saudi Arabia | 4 (0.4) | 432 (7.2) | 69 (1.0) | 402 (2.3) | 27 (1.1) | 369 (3.9) | 9.5 (0.05) |
| Malaysia | 4 (0.3) | 550 (4.9) | 75 (0.8) | 468 (2.9) | 21 (0.8) | 415 (4.9) | 9.6 (0.04) |
| Jordan | 4 (0.4) | 455 (8.9) | 74 (1.1) | 428 (3.7) | 22 (1.2) | 394 (7.1) | 9.6 (0.05) |
| Egypt | 4 (0.4) | 437 (10.2) | 71 (1.1) | 424 (4.8) | 25 (1.3) | 388 (7.0) | 9.4 (0.06) |
| South Africa (9) | 2 (0.2) | ~ ~ | 63 (0.7) | 396 (2.4) | 35 (0.7) | 373 (2.5) | 9.1 (0.03) |
| Morocco | 2 (0.3) | ~ ~ | 43 (1.0) | 400 (3.0) | 55 (1.0) | 376 (2.3) | 8.3 (0.05) |
| **International Average** | **14 (0.1)** | **546 (1.0)** | **73 (0.2)** | **488 (0.5)** | **13 (0.1)** | **433 (1.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 29 (1.4) | 602 (6.0) | 69 (1.3) | 566 (3.7) | 2 (0.3) | ~ ~ | 11.3 (0.04) |
| Ontario, Canada | 25 (1.3) | 567 (5.6) | 73 (1.3) | 520 (4.0) | 1 (0.3) | ~ ~ | 11.2 (0.04) |
| Quebec, Canada | 18 (1.1) | 581 (4.8) | 80 (1.1) | 537 (3.8) | 2 (0.3) | ~ ~ | 10.9 (0.05) |
| Dubai, UAE | 17 (0.5) | 578 (4.2) | 77 (0.6) | 532 (2.0) | 6 (0.3) | 478 (4.6) | 10.8 (0.02) |
| Abu Dhabi, UAE | 10 (0.4) | 497 (5.2) | 79 (0.5) | 438 (3.0) | 12 (0.5) | 388 (7.3) | 10.2 (0.03) |
| Western Cape, RSA (9) | 6 (0.8) | 571 (9.0) | 60 (0.9) | 448 (4.7) | 34 (1.1) | 407 (3.5) | 9.3 (0.06) |
| Gauteng, RSA (9) | 4 (0.5) | 497 (10.3) | 72 (0.9) | 424 (3.2) | 24 (0.9) | 399 (3.1) | 9.5 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

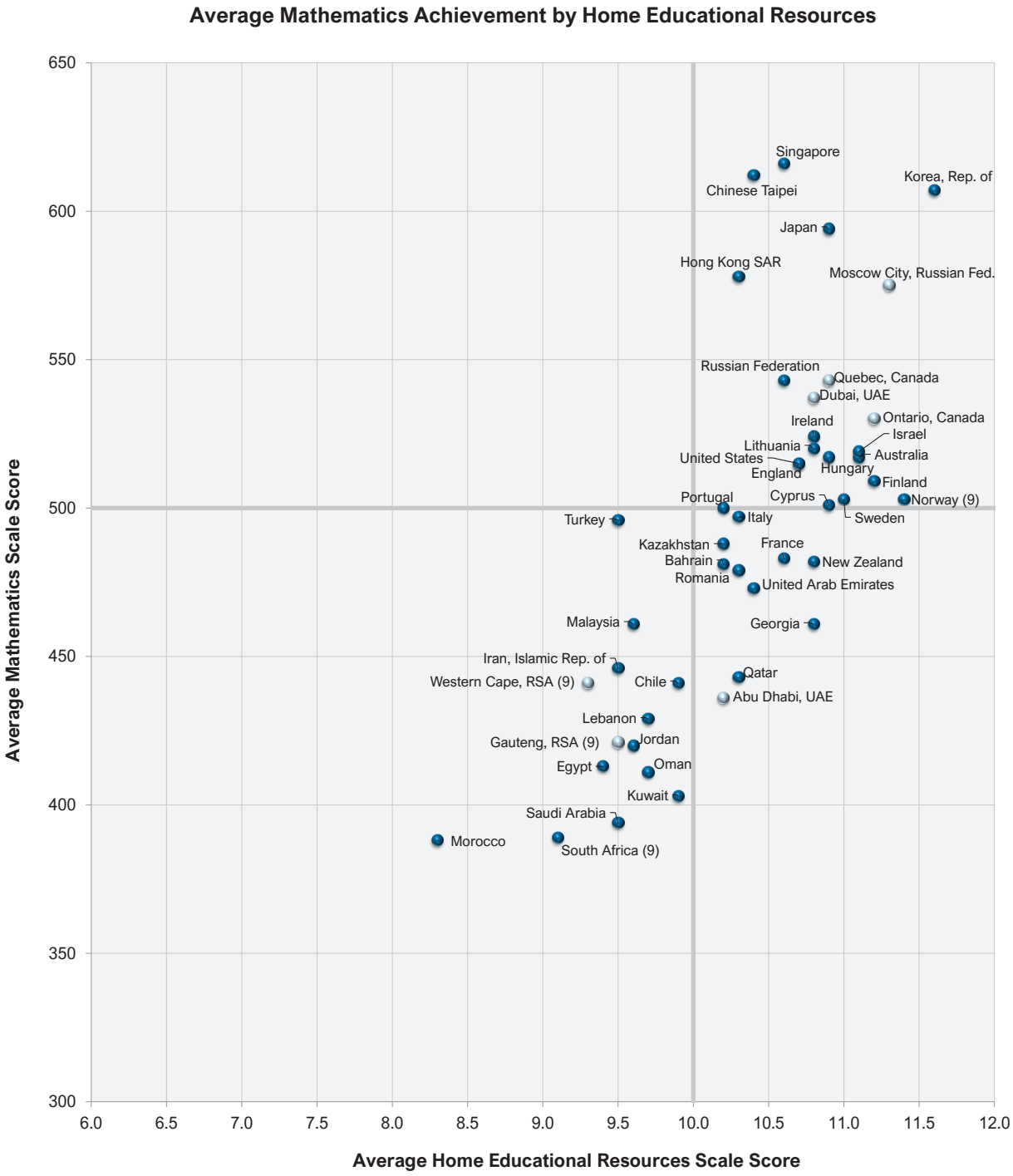
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 5.5: Home Educational Resources

*Students' Reports*

**(Continued)**




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## Exhibit 5.6: Home Educational Resources

*Students' Reports*

| Country | Many Resources | | Some Resources | | Few Resources | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | 40 (1.4) | 588 (2.8) | 58 (1.3) | 545 (2.2) | 2 (0.2) | ~ ~ | 11.6 (0.04) |
| Norway (9) | 31 (0.9) | 536 (2.9) | 68 (1.0) | 480 (3.5) | 2 (0.3) | ~ ~ | 11.4 (0.04) |
| Australia | 25 (1.1) | 580 (3.8) | 71 (1.0) | 517 (2.8) | 4 (0.3) | 430 (6.5) | 11.1 (0.04) |
| Hungary | 25 (1.3) | 589 (4.0) | 70 (1.4) | 516 (2.7) | 5 (0.7) | 431 (8.7) | 10.9 (0.04) |
| Finland | 23 (1.0) | 587 (3.1) | 75 (1.0) | 532 (3.1) | 2 (0.3) | ~ ~ | 11.2 (0.04) |
| Sweden | 23 (1.1) | 587 (4.2) | 73 (1.1) | 509 (3.1) | 4 (0.4) | 423 (10.2) | 11.0 (0.05) |
| Cyprus | 22 (0.9) | 531 (3.0) | 74 (0.9) | 475 (2.2) | 4 (0.4) | 409 (8.5) | 10.9 (0.03) |
| Ireland | 20 (1.0) | 581 (3.6) | 74 (1.0) | 514 (2.6) | 6 (0.5) | 442 (11.6) | 10.8 (0.04) |
| United States | 20 (0.9) | 588 (4.3) | 72 (0.9) | 513 (4.4) | 8 (0.5) | 455 (7.2) | 10.7 (0.04) |
| Georgia | 20 (1.2) | 478 (5.7) | 74 (1.3) | 442 (3.8) | 6 (1.1) | 415 (16.2) | 10.8 (0.06) |
| Japan | 18 (0.8) | 607 (3.8) | 79 (0.7) | 563 (1.8) | 3 (0.4) | 515 (8.4) | 10.9 (0.03) |
| New Zealand | 17 (0.9) | 570 (3.5) | 77 (0.8) | 490 (3.3) | 6 (0.4) | 418 (9.4) | 10.8 (0.04) |
| England | 17 (1.3) | 582 (7.6) | 78 (1.2) | 509 (4.8) | 5 (0.5) | 444 (10.7) | 10.7 (0.05) |
| Chinese Taipei | 16 (0.7) | 623 (3.3) | 70 (0.8) | 574 (1.9) | 13 (0.6) | 515 (3.6) | 10.4 (0.03) |
| Lithuania | 16 (0.9) | 589 (4.2) | 81 (0.9) | 527 (3.2) | 3 (0.4) | 457 (7.9) | 10.8 (0.03) |
| Israel r | 16 (1.2) | 572 (6.3) | 82 (1.2) | 519 (4.3) | 2 (0.3) | ~ ~ | 11.1 (0.05) |
| Italy | 15 (0.9) | 546 (3.4) | 72 (1.0) | 501 (2.4) | 13 (1.0) | 449 (5.5) | 10.3 (0.05) |
| France | 15 (0.9) | 547 (4.0) | 78 (0.8) | 483 (2.5) | 7 (0.5) | 422 (5.6) | 10.6 (0.04) |
| Singapore | 14 (0.5) | 659 (3.5) | 78 (0.6) | 607 (3.7) | 8 (0.6) | 525 (8.4) | 10.6 (0.03) |
| Portugal | 14 (1.2) | 568 (3.7) | 70 (1.2) | 518 (2.9) | 16 (1.0) | 481 (4.6) | 10.2 (0.06) |
| Romania | 14 (0.9) | 537 (5.7) | 76 (1.1) | 468 (4.0) | 10 (1.0) | 404 (6.6) | 10.3 (0.06) |
| Hong Kong SAR | 13 (0.7) | 553 (9.1) | 74 (0.9) | 500 (5.2) | 13 (0.7) | 473 (8.1) | 10.3 (0.04) |
| Russian Federation | 13 (0.9) | 576 (5.3) | 81 (0.9) | 541 (4.3) | 6 (0.7) | 504 (8.6) | 10.6 (0.05) |
| United Arab Emirates | 12 (0.3) | 538 (3.3) | 79 (0.3) | 474 (2.3) | 10 (0.3) | 409 (5.6) | 10.4 (0.02) |
| Qatar | 11 (0.7) | 524 (7.8) | 79 (0.8) | 477 (4.5) | 10 (0.7) | 411 (6.3) | 10.3 (0.05) |
| Bahrain | 9 (0.4) | 531 (5.0) | 79 (0.7) | 490 (2.0) | 12 (0.5) | 433 (5.4) | 10.2 (0.02) |
| Turkey | 9 (0.7) | 612 (5.7) | 59 (1.5) | 527 (3.6) | 32 (1.7) | 467 (5.1) | 9.5 (0.07) |
| Iran, Islamic Rep. of | 8 (0.7) | 535 (7.4) | 61 (1.2) | 459 (3.5) | 31 (1.3) | 409 (3.8) | 9.5 (0.05) |
| Kazakhstan | 7 (0.6) | 512 (6.9) | 83 (1.0) | 480 (3.0) | 10 (0.8) | 441 (5.8) | 10.2 (0.04) |
| Oman | 7 (0.4) | 513 (5.9) | 71 (0.8) | 466 (2.9) | 22 (0.8) | 421 (4.5) | 9.7 (0.03) |
| Kuwait | 6 (0.4) | 474 (9.4) | 80 (0.7) | 448 (5.5) | 14 (0.7) | 420 (7.9) | 9.9 (0.03) |
| Lebanon | 6 (0.5) | 449 (8.9) | 73 (1.3) | 389 (4.8) | 22 (1.3) | 322 (6.4) | 9.7 (0.05) |
| Chile | 5 (0.4) | 537 (6.0) | 79 (0.9) | 466 (2.9) | 16 (0.9) | 420 (4.8) | 9.9 (0.04) |
| Saudi Arabia | 4 (0.4) | 471 (7.9) | 69 (1.0) | 441 (2.7) | 27 (1.1) | 405 (3.6) | 9.5 (0.05) |
| Malaysia | 4 (0.3) | 549 (4.9) | 75 (0.8) | 469 (3.1) | 21 (0.8) | 413 (5.4) | 9.6 (0.04) |
| Jordan | 4 (0.4) | 489 (11.1) | 74 (1.1) | 462 (4.2) | 22 (1.2) | 420 (6.2) | 9.6 (0.05) |
| Egypt | 4 (0.4) | 422 (9.4) | 71 (1.1) | 402 (4.9) | 25 (1.3) | 361 (7.8) | 9.4 (0.06) |
| South Africa (9) | 2 (0.2) | ~ ~ | 63 (0.7) | 381 (3.2) | 35 (0.7) | 345 (3.6) | 9.1 (0.03) |
| Morocco | 2 (0.3) | ~ ~ | 43 (1.0) | 401 (3.2) | 55 (1.0) | 386 (3.1) | 8.3 (0.05) |
| **International Average** | **14 (0.1)** | **549 (1.0)** | **73 (0.2)** | **489 (0.6)** | **13 (0.1)** | **431 (1.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 29 (1.4) | 589 (3.6) | 69 (1.3) | 559 (2.7) | 2 (0.3) | ~ ~ | 11.3 (0.04) |
| Ontario, Canada | 25 (1.3) | 563 (4.4) | 73 (1.3) | 510 (2.7) | 1 (0.3) | ~ ~ | 11.2 (0.04) |
| Quebec, Canada | 18 (1.1) | 581 (5.0) | 80 (1.1) | 528 (3.6) | 2 (0.3) | ~ ~ | 10.9 (0.05) |
| Dubai, UAE | 17 (0.5) | 592 (4.0) | 77 (0.6) | 544 (2.2) | 6 (0.3) | 477 (5.7) | 10.8 (0.02) |
| Abu Dhabi, UAE | 10 (0.4) | 499 (6.2) | 79 (0.5) | 423 (3.7) | 12 (0.5) | 353 (9.7) | 10.2 (0.03) |
| Western Cape, RSA (9) | 6 (0.8) | 598 (10.0) | 60 (0.9) | 450 (5.4) | 34 (1.1) | 393 (4.0) | 9.3 (0.06) |
| Gauteng, RSA (9) | 4 (0.5) | 516 (10.8) | 72 (0.9) | 428 (4.2) | 24 (0.9) | 391 (4.2) | 9.5 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

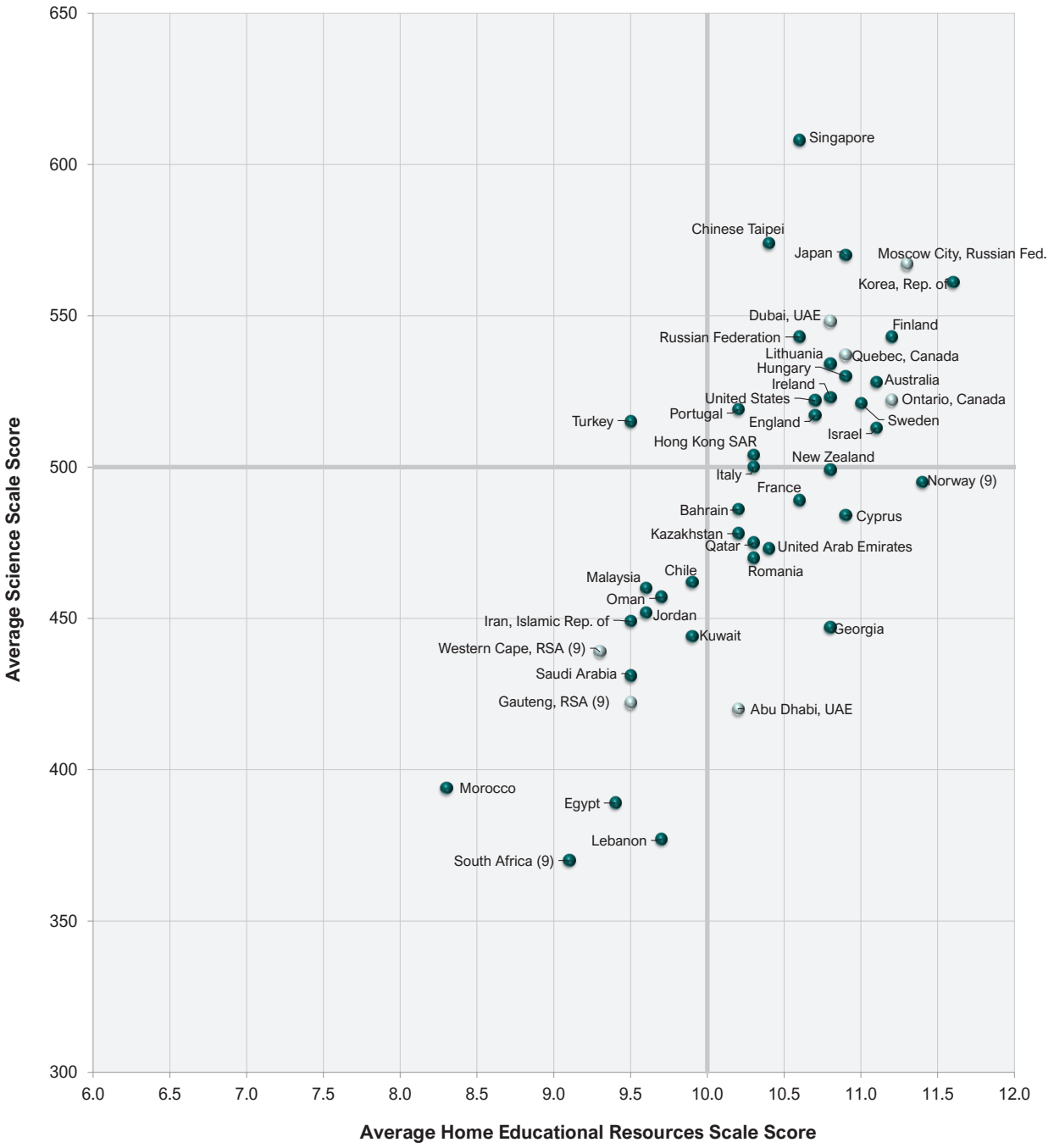
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## Exhibit 5.6: Home Educational Resources

*Students' Reports*

**(Continued)**

### Average Science Achievement by Home Educational Resources




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## Students Speak the Language of Test

Exhibits 5.7 and 5.8 show the percentages of fourth grade students that "always," "almost always," "sometimes," or "never" speak the language of the TIMSS test at home, together with average achievement in mathematics (Exhibit 5.7) and science (Exhibit 5.8). Exhibits 5.9 and 5.10 provide comparable information for eighth grade students.

About two-thirds of students (63% at fourth grade and 66% at eighth grade), on average, reported "always" speaking the language of the test at home, and most of the remaining students (32% at fourth grade and 30% at eighth grade) reported speaking it "almost always" or "sometimes." There was relatively little variation in average achievement across these categories. However, the few students (5% at fourth grade and 4% at eighth grade, on average) who "never" spoke the language of the test at home had much lower average achievement in both mathematics (442 for both fourth and eighth grades) and science (418 and 428, respectively).

## Exhibit 5.7: Students Speak the Language of the Test at Home

*Students' Reports*

| Country | Always | | Almost Always | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 87 (1.0) | 496 (3.7) | 6 (0.6) | 508 (8.4) | 6 (0.5) | 507 (6.7) | 1 (0.7) | ~ ~ |
| Armenia | 74 (1.0) | 497 (2.6) | 26 (1.0) | 502 (4.0) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Australia | 67 (1.5) | 514 (2.8) | 13 (0.7) | 530 (5.0) | 18 (1.2) | 515 (6.8) | 1 (0.2) | ~ ~ |
| Austria | 63 (1.2) | 549 (2.4) | 12 (0.7) | 534 (3.2) | 21 (0.9) | 519 (3.3) | 4 (0.4) | 517 (6.5) |
| Azerbaijan | 69 (1.5) | 520 (2.8) | 14 (0.9) | 524 (4.1) | 16 (1.0) | 527 (4.1) | 1 (0.3) | ~ ~ |
| Bahrain | 52 (1.1) | 481 (3.0) | 12 (0.6) | 484 (5.2) | 31 (0.8) | 482 (3.1) | 5 (0.4) | 468 (7.8) |
| Belgium (Flemish) | 63 (1.1) | 544 (1.8) | 11 (0.6) | 530 (3.2) | 22 (0.9) | 503 (3.4) | 4 (0.3) | 515 (6.4) |
| Bosnia and Herzegovina | 84 (0.9) | 450 (2.3) | 8 (0.5) | 474 (6.0) | 6 (0.5) | 462 (5.5) | 1 (0.2) | ~ ~ |
| Bulgaria | 69 (1.9) | 528 (4.3) | 10 (0.8) | 536 (9.5) | 15 (1.5) | 483 (7.3) | 6 (1.0) | 419 (12.4) |
| Canada | 56 (1.6) | 503 (2.3) | 19 (0.5) | 528 (2.5) | 22 (1.2) | 518 (5.0) | 2 (0.3) | ~ ~ |
| Chile | 82 (0.8) | 441 (2.7) | 9 (0.5) | 469 (4.8) | 8 (0.5) | 440 (6.3) | 1 (0.2) | ~ ~ |
| Chinese Taipei | 51 (1.1) | 601 (2.1) | 17 (0.6) | 611 (3.4) | 31 (1.0) | 595 (2.5) | 1 (0.1) | ~ ~ |
| Croatia | 68 (1.2) | 510 (2.3) | 20 (0.8) | 519 (3.4) | 10 (0.7) | 504 (5.7) | 1 (0.7) | ~ ~ |
| Cyprus | 56 (1.2) | 534 (2.6) | 15 (0.7) | 542 (4.7) | 25 (1.0) | 528 (4.7) | 5 (0.4) | 510 (9.8) |
| Czech Republic | 75 (0.9) | 533 (2.6) | 15 (0.8) | 542 (4.2) | 9 (0.5) | 520 (5.0) | 1 (0.2) | ~ ~ |
| Denmark | 65 (1.1) | 530 (2.2) | 22 (0.9) | 528 (3.4) | 12 (0.8) | 500 (4.4) | 1 (0.2) | ~ ~ |
| England | 70 (1.7) | 553 (3.7) | 13 (0.7) | 568 (5.9) | 15 (1.3) | 560 (5.6) | 2 (0.5) | ~ ~ |
| Finland | 74 (1.2) | 538 (2.2) | 14 (0.7) | 533 (3.9) | 10 (0.8) | 501 (5.7) | 2 (0.3) | ~ ~ |
| France | 68 (1.3) | 490 (3.4) | 13 (0.6) | 500 (4.4) | 18 (1.0) | 461 (5.0) | 1 (0.2) | ~ ~ |
| Georgia | 78 (1.1) | 480 (4.0) | 10 (0.7) | 501 (6.4) | 11 (0.7) | 487 (5.4) | 1 (0.6) | ~ ~ |
| Germany | 62 (1.2) | 532 (2.5) | 17 (0.7) | 531 (4.3) | 18 (0.9) | 497 (4.1) | 2 (0.3) | ~ ~ |
| Hong Kong SAR | 56 (0.9) | 604 (3.2) | 14 (0.6) | 590 (6.0) | 29 (0.8) | 607 (3.6) | 2 (0.3) | ~ ~ |
| Hungary | 75 (1.0) | 522 (2.8) | 16 (0.7) | 544 (4.4) | 8 (0.6) | 509 (5.2) | 0 (0.1) | ~ ~ |
| Iran, Islamic Rep. of | 58 (2.0) | 448 (3.6) | 10 (0.7) | 458 (6.9) | 20 (1.2) | 446 (6.5) | 11 (1.3) | 413 (12.5) |
| Ireland | 68 (1.3) | 556 (2.7) | 14 (0.9) | 539 (5.2) | 15 (0.8) | 540 (3.7) | 4 (0.4) | 500 (7.5) |
| Italy | 74 (1.1) | 519 (2.4) | 13 (0.7) | 514 (5.4) | 11 (0.8) | 496 (4.7) | 2 (0.4) | ~ ~ |
| Japan | 92 (0.5) | 595 (1.8) | 6 (0.4) | 572 (4.8) | 1 (0.2) | ~ ~ | 0 (0.1) | ~ ~ |
| Kazakhstan | 66 (1.0) | 512 (2.8) | 18 (0.8) | 512 (4.1) | 15 (0.9) | 515 (3.7) | 1 (0.1) | ~ ~ |
| Korea, Rep. of | 68 (1.2) | 597 (2.3) | 17 (0.8) | 620 (3.7) | 14 (0.8) | 590 (3.9) | 0 (0.0) | ~ ~ |
| Kosovo | 87 (0.8) | 447 (2.7) | 6 (0.5) | 461 (7.7) | 6 (0.5) | 466 (6.9) | 0 (0.1) | ~ ~ |
| Kuwait | 47 (1.9) | 375 (5.7) | 13 (0.9) | 396 (8.7) | 29 (1.3) | 414 (6.3) | 11 (1.2) | 381 (9.3) |
| Latvia | 64 (1.0) | 545 (3.0) | 22 (0.8) | 560 (3.3) | 13 (0.7) | 535 (4.0) | 2 (0.3) | ~ ~ |
| Lithuania | 68 (1.1) | 540 (3.1) | 21 (0.8) | 556 (3.9) | 11 (0.8) | 528 (4.4) | 0 (0.1) | ~ ~ |
| Malta | 15 (0.6) | 497 (3.4) | 18 (0.7) | 514 (2.9) | 51 (0.7) | 519 (1.9) | 16 (0.6) | 490 (4.3) |
| Montenegro | 71 (0.9) | 454 (2.3) | 12 (0.6) | 469 (4.7) | 11 (0.4) | 457 (4.0) | 6 (0.4) | 465 (6.7) |
| Morocco | 32 (2.3) | 370 (7.0) | 15 (1.0) | 381 (8.4) | 23 (1.5) | 416 (7.3) | 30 (2.4) | 382 (5.7) |
| Netherlands | 64 (1.5) | 542 (2.4) | 17 (0.9) | 544 (3.5) | 16 (1.2) | 518 (4.1) | 3 (0.4) | 535 (10.2) |
| New Zealand | 69 (1.0) | 486 (2.8) | 13 (0.6) | 504 (5.5) | 17 (0.8) | 491 (5.3) | 2 (0.2) | ~ ~ |
| North Macedonia | 79 (1.5) | 478 (5.3) | 8 (0.7) | 501 (8.5) | 10 (0.9) | 460 (10.8) | 3 (0.7) | 433 (23.9) |
| Northern Ireland | 83 (1.1) | 565 (2.9) | 8 (0.6) | 586 (5.0) | 8 (0.8) | 563 (7.1) | 2 (0.3) | ~ ~ |
| Norway (5) | 64 (1.0) | 550 (2.4) | 25 (0.9) | 541 (4.0) | 8 (0.6) | 517 (5.0) | 2 (0.3) | ~ ~ |
| Oman | 58 (1.6) | 436 (4.3) | 15 (0.7) | 422 (5.6) | 20 (1.0) | 439 (4.8) | 8 (1.0) | 429 (12.4) |
| Pakistan | 22 (2.9) | 313 (15.0) | 10 (1.4) | 330 (21.6) | 32 (2.9) | 347 (14.7) | 36 (3.2) | 321 (13.4) |
| Philippines | 9 (0.7) | 253 (7.4) | 16 (0.9) | 263 (7.3) | 41 (1.4) | 337 (6.7) | 33 (1.4) | 284 (6.9) |
| Poland | 77 (0.9) | 515 (2.8) | 19 (0.8) | 546 (3.7) | 5 (0.4) | 524 (7.6) | 0 (0.1) | ~ ~ |
| Portugal | 78 (0.6) | 526 (2.6) | 12 (0.5) | 537 (5.0) | 9 (0.6) | 515 (5.4) | 1 (0.2) | ~ ~ |
| Qatar | 37 (1.8) | 429 (3.6) | 15 (0.8) | 465 (4.6) | 39 (1.4) | 473 (4.7) | 9 (0.6) | 444 (6.4) |
| Russian Federation | 81 (0.9) | 566 (3.7) | 11 (0.6) | 575 (5.0) | 7 (0.5) | 567 (5.1) | 1 (0.2) | ~ ~ |
| Saudi Arabia | 63 (1.2) | 402 (3.6) | 12 (0.6) | 387 (5.9) | 19 (0.9) | 410 (5.9) | 7 (0.6) | 398 (7.6) |
| Serbia | 85 (0.9) | 509 (3.1) | 10 (0.8) | 524 (6.4) | 5 (0.4) | 480 (10.5) | 1 (0.2) | ~ ~ |
| Singapore | 36 (0.6) | 625 (4.1) | 23 (0.5) | 643 (3.7) | 39 (0.7) | 620 (4.5) | 3 (0.2) | 578 (11.4) |
| Slovak Republic | 68 (1.4) | 514 (3.2) | 17 (0.8) | 528 (3.7) | 12 (1.0) | 477 (7.1) | 3 (0.6) | 438 (20.9) |
| South Africa (5) | 22 (1.1) | 406 (6.3) | 13 (0.7) | 409 (8.4) | 53 (1.0) | 369 (3.1) | 12 (0.8) | 315 (4.0) |
| Spain | 62 (1.1) | 505 (2.7) | 13 (0.6) | 521 (3.3) | 17 (0.8) | 498 (3.2) | 9 (0.6) | 478 (4.9) |
| Sweden | 63 (1.8) | 532 (2.9) | 18 (0.8) | 524 (4.2) | 17 (1.3) | 491 (4.9) | 2 (0.4) | ~ ~ |
| Turkey (5) | 74 (1.5) | 538 (3.7) | 12 (0.6) | 540 (6.7) | 11 (1.1) | 445 (9.3) | 3 (0.4) | 401 (11.4) |
| United Arab Emirates | 36 (0.4) | 467 (2.4) | 16 (0.5) | 502 (2.7) | 41 (0.6) | 494 (2.1) | 8 (0.2) | 467 (3.3) |
| United States | 65 (1.1) | 541 (2.9) | 13 (0.5) | 544 (3.7) | 20 (0.8) | 521 (4.0) | 3 (0.2) | 484 (8.0) |
| **International Average** | **63 (0.2)** | **502 (0.5)** | **14 (0.1)** | **511 (0.8)** | **18 (0.1)** | **495 (0.8)** | **5 (0.1)** | **442 (2.1)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 55 (3.0) | 501 (4.2) | 21 (1.1) | 533 (4.3) | 23 (2.1) | 523 (8.6) | 2 (0.4) | ~ ~ |
| Quebec, Canada | 53 (1.8) | 529 (3.0) | 21 (0.9) | 536 (3.4) | 23 (1.8) | 530 (3.7) | 3 (0.4) | 549 (10.8) |
| Moscow City, Russian Fed. | 78 (0.8) | 592 (2.3) | 15 (0.7) | 601 (3.6) | 7 (0.4) | 586 (4.7) | 1 (0.1) | ~ ~ |
| Madrid, Spain | 72 (1.0) | 517 (2.2) | 15 (0.8) | 533 (3.3) | 12 (0.6) | 516 (4.2) | 1 (0.3) | ~ ~ |
| Abu Dhabi, UAE | 39 (0.6) | 415 (3.4) | 14 (0.4) | 455 (3.5) | 39 (0.7) | 467 (2.6) | 9 (0.5) | 437 (5.0) |
| Dubai, UAE | 29 (0.6) | 535 (2.3) | 21 (0.7) | 555 (2.9) | 43 (0.7) | 547 (2.6) | 7 (0.4) | 530 (5.5) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.8: Students Speak the Language of the Test at Home

*Students' Reports*

| Country | Always | | Almost Always | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 87 (1.0) | 491 (3.8) | 6 (0.6) | 504 (8.6) | 6 (0.5) | 503 (6.9) | 1 (0.7) | ~ ~ |
| Armenia | 74 (1.0) | 465 (3.6) | 26 (1.0) | 471 (4.4) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Australia | 67 (1.5) | 536 (2.5) | 13 (0.7) | 540 (4.4) | 18 (1.2) | 519 (5.0) | 1 (0.2) | ~ ~ |
| Austria | 63 (1.2) | 543 (2.5) | 12 (0.7) | 511 (3.9) | 21 (0.9) | 479 (4.1) | 4 (0.4) | 477 (8.0) |
| Azerbaijan | 69 (1.5) | 430 (3.5) | 14 (0.9) | 444 (4.4) | 16 (1.0) | 445 (4.6) | 1 (0.3) | ~ ~ |
| Bahrain | 52 (1.1) | 496 (4.0) | 12 (0.6) | 502 (6.3) | 31 (0.8) | 497 (3.3) | 5 (0.4) | 463 (7.6) |
| Belgium (Flemish) | 63 (1.1) | 515 (1.9) | 11 (0.6) | 501 (4.1) | 22 (0.9) | 464 (3.4) | 4 (0.3) | 469 (6.8) |
| Bosnia and Herzegovina | 84 (0.9) | 457 (2.8) | 8 (0.5) | 483 (7.0) | 6 (0.5) | 474 (6.4) | 1 (0.2) | ~ ~ |
| Bulgaria | 69 (1.9) | 542 (4.8) | 10 (0.8) | 543 (11.4) | 15 (1.5) | 474 (8.8) | 6 (1.0) | 383 (14.6) |
| Canada | 56 (1.6) | 523 (2.3) | 19 (0.5) | 537 (2.4) | 22 (1.2) | 516 (4.5) | 2 (0.3) | ~ ~ |
| Chile | 82 (0.8) | 469 (2.6) | 9 (0.5) | 493 (5.8) | 8 (0.5) | 475 (5.1) | 1 (0.2) | ~ ~ |
| Chinese Taipei | 51 (1.1) | 559 (2.4) | 17 (0.6) | 574 (3.5) | 31 (1.0) | 552 (2.4) | 1 (0.1) | ~ ~ |
| Croatia | 68 (1.2) | 525 (2.0) | 20 (0.8) | 528 (4.6) | 10 (0.7) | 524 (4.7) | 1 (0.7) | ~ ~ |
| Cyprus | 56 (1.2) | 516 (2.6) | 15 (0.7) | 517 (5.0) | 25 (1.0) | 504 (4.6) | 5 (0.4) | 481 (9.7) |
| Czech Republic | 75 (0.9) | 534 (2.6) | 15 (0.8) | 543 (4.3) | 9 (0.5) | 520 (5.5) | 1 (0.2) | ~ ~ |
| Denmark | 65 (1.1) | 529 (2.4) | 22 (0.9) | 522 (3.5) | 12 (0.8) | 495 (5.3) | 1 (0.2) | ~ ~ |
| England | 70 (1.7) | 537 (3.3) | 13 (0.7) | 552 (4.9) | 15 (1.3) | 529 (5.1) | 2 (0.5) | ~ ~ |
| Finland | 74 (1.2) | 563 (2.3) | 14 (0.7) | 556 (4.3) | 10 (0.8) | 507 (6.0) | 2 (0.3) | ~ ~ |
| France | 68 (1.3) | 494 (3.3) | 13 (0.6) | 498 (4.3) | 18 (1.0) | 466 (5.4) | 1 (0.2) | ~ ~ |
| Georgia | 78 (1.1) | 452 (4.3) | 10 (0.7) | 478 (6.4) | 11 (0.7) | 460 (5.8) | 1 (0.6) | ~ ~ |
| Germany | 62 (1.2) | 536 (2.4) | 17 (0.7) | 529 (3.7) | 18 (0.9) | 478 (4.7) | 2 (0.3) | ~ ~ |
| Hong Kong SAR | 56 (0.9) | 531 (3.2) | 14 (0.6) | 519 (6.3) | 29 (0.8) | 542 (4.1) | 2 (0.3) | ~ ~ |
| Hungary | 75 (1.0) | 529 (2.9) | 16 (0.7) | 549 (4.4) | 8 (0.6) | 512 (5.4) | 0 (0.1) | ~ ~ |
| Iran, Islamic Rep. of | 58 (2.0) | 452 (3.5) | 10 (0.7) | 457 (7.9) | 20 (1.2) | 434 (7.1) | 11 (1.3) | 395 (13.5) |
| Ireland | 68 (1.3) | 536 (3.2) | 14 (0.9) | 513 (7.4) | 15 (0.8) | 521 (4.2) | 4 (0.4) | 481 (8.6) |
| Italy | 74 (1.1) | 514 (2.9) | 13 (0.7) | 510 (6.1) | 11 (0.8) | 492 (4.9) | 2 (0.4) | ~ ~ |
| Japan | 92 (0.5) | 564 (1.8) | 6 (0.4) | 547 (5.8) | 1 (0.2) | ~ ~ | 0 (0.1) | ~ ~ |
| Kazakhstan | 66 (1.0) | 497 (3.5) | 18 (0.8) | 489 (4.4) | 15 (0.9) | 493 (4.0) | 1 (0.1) | ~ ~ |
| Korea, Rep. of | 68 (1.2) | 585 (2.4) | 17 (0.8) | 606 (3.3) | 14 (0.8) | 579 (4.0) | 0 (0.0) | ~ ~ |
| Kosovo | 87 (0.8) | 417 (3.4) | 6 (0.5) | 434 (9.8) | 6 (0.5) | 430 (6.1) | 0 (0.1) | ~ ~ |
| Kuwait | 47 (1.9) | 388 (7.0) | 13 (0.9) | 411 (9.1) | 29 (1.3) | 418 (7.9) | 11 (1.2) | 382 (11.5) |
| Latvia | 64 (1.0) | 542 (2.7) | 22 (0.8) | 554 (3.5) | 13 (0.7) | 530 (4.5) | 2 (0.3) | ~ ~ |
| Lithuania | 68 (1.1) | 538 (2.9) | 21 (0.8) | 548 (3.6) | 11 (0.8) | 522 (5.0) | 0 (0.1) | ~ ~ |
| Malta | 15 (0.6) | 498 (4.0) | 18 (0.7) | 505 (3.4) | 51 (0.7) | 504 (2.2) | 16 (0.6) | 463 (4.1) |
| Montenegro | 71 (0.9) | 455 (2.8) | 12 (0.6) | 467 (5.4) | 11 (0.4) | 459 (4.6) | 6 (0.4) | 467 (6.7) |
| Morocco | 32 (2.3) | 362 (9.0) | 15 (1.0) | 375 (9.8) | 23 (1.5) | 416 (7.6) | 30 (2.4) | 365 (7.8) |
| Netherlands | 64 (1.5) | 525 (3.0) | 17 (0.9) | 524 (4.2) | 16 (1.2) | 495 (4.7) | 3 (0.4) | 501 (11.8) |
| New Zealand | 69 (1.0) | 506 (2.4) | 13 (0.6) | 512 (5.3) | 17 (0.8) | 495 (4.7) | 2 (0.2) | ~ ~ |
| North Macedonia | 79 (1.5) | 434 (6.5) | 8 (0.7) | 453 (10.1) | 10 (0.9) | 408 (10.8) | 3 (0.7) | 399 (23.4) |
| Northern Ireland | 83 (1.1) | 518 (2.5) | 8 (0.6) | 534 (4.9) | 8 (0.8) | 519 (5.8) | 2 (0.3) | ~ ~ |
| Norway (5) | 64 (1.0) | 548 (2.5) | 25 (0.9) | 535 (4.0) | 8 (0.6) | 509 (5.2) | 2 (0.3) | ~ ~ |
| Oman | 58 (1.6) | 443 (4.7) | 15 (0.7) | 426 (7.7) | 20 (1.0) | 450 (4.7) | 8 (1.0) | 412 (10.4) |
| Pakistan | 22 (2.9) | 280 (16.6) | 10 (1.4) | 282 (23.7) | 32 (2.9) | 314 (17.3) | 36 (3.2) | 280 (17.6) |
| Philippines | 9 (0.7) | 196 (8.0) | 16 (0.9) | 219 (9.4) | 41 (1.4) | 294 (8.1) | 33 (1.4) | 231 (8.7) |
| Poland | 77 (0.9) | 527 (2.7) | 19 (0.8) | 551 (3.7) | 5 (0.4) | 530 (8.2) | 0 (0.1) | ~ ~ |
| Portugal | 78 (0.6) | 503 (2.5) | 12 (0.5) | 521 (5.0) | 9 (0.6) | 500 (4.2) | 1 (0.2) | ~ ~ |
| Qatar | 37 (1.8) | 431 (4.2) | 15 (0.8) | 468 (5.4) | 39 (1.4) | 475 (4.8) | 9 (0.6) | 433 (7.8) |
| Russian Federation | 81 (0.9) | 568 (3.3) | 11 (0.6) | 571 (5.1) | 7 (0.5) | 559 (4.5) | 1 (0.2) | ~ ~ |
| Saudi Arabia | 63 (1.2) | 409 (4.1) | 12 (0.6) | 391 (6.3) | 19 (0.9) | 411 (7.2) | 7 (0.6) | 391 (9.0) |
| Serbia | 85 (0.9) | 519 (3.3) | 10 (0.8) | 532 (6.5) | 5 (0.4) | 482 (12.4) | 1 (0.2) | ~ ~ |
| Singapore | 36 (0.6) | 598 (3.8) | 23 (0.5) | 611 (3.7) | 39 (0.7) | 586 (4.0) | 3 (0.2) | 542 (11.2) |
| Slovak Republic | 68 (1.4) | 530 (2.9) | 17 (0.8) | 535 (3.9) | 12 (1.0) | 477 (9.4) | 3 (0.6) | 402 (27.1) |
| South Africa (5) | 22 (1.1) | 383 (8.6) | 13 (0.7) | 374 (11.0) | 53 (1.0) | 315 (4.1) | 12 (0.8) | 230 (5.2) |
| Spain | 62 (1.1) | 516 (2.5) | 13 (0.6) | 529 (4.0) | 17 (0.8) | 503 (3.3) | 9 (0.6) | 480 (5.1) |
| Sweden | 63 (1.8) | 552 (2.7) | 18 (0.8) | 536 (4.9) | 17 (1.3) | 496 (5.6) | 2 (0.4) | ~ ~ |
| Turkey (5) | 74 (1.5) | 543 (3.4) | 12 (0.6) | 541 (5.8) | 11 (1.1) | 445 (8.3) | 3 (0.4) | 411 (12.6) |
| United Arab Emirates | 36 (0.4) | 460 (3.1) | 16 (0.5) | 498 (3.3) | 41 (0.6) | 486 (2.6) | 8 (0.2) | 444 (4.0) |
| United States | 65 (1.1) | 547 (3.2) | 13 (0.5) | 547 (3.6) | 20 (0.8) | 518 (3.9) | 3 (0.2) | 477 (7.9) |
| **International Average** | **63 (0.2)** | **494 (0.6)** | **14 (0.1)** | **500 (0.9)** | **18 (0.1)** | **482 (0.8)** | **5 (0.1)** | **418 (2.4)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 55 (3.0) | 522 (3.7) | 21 (1.1) | 541 (4.0) | 23 (2.1) | 520 (7.3) | 2 (0.4) | ~ ~ |
| Quebec, Canada | 53 (1.8) | 522 (3.2) | 21 (0.9) | 529 (3.8) | 23 (1.8) | 513 (3.8) | 3 (0.4) | 531 (10.6) |
| Moscow City, Russian Fed. | 78 (0.8) | 595 (2.2) | 15 (0.7) | 599 (4.0) | 7 (0.4) | 586 (4.9) | 1 (0.1) | ~ ~ |
| Madrid, Spain | 72 (1.0) | 522 (2.2) | 15 (0.8) | 536 (3.0) | 12 (0.6) | 519 (3.9) | 1 (0.3) | ~ ~ |
| Abu Dhabi, UAE | 39 (0.6) | 386 (4.6) | 14 (0.4) | 441 (4.1) | 39 (0.7) | 452 (3.4) | 9 (0.5) | 405 (5.3) |
| Dubai, UAE | 29 (0.6) | 538 (2.5) | 21 (0.7) | 556 (3.2) | 43 (0.7) | 547 (2.7) | 7 (0.4) | 521 (5.6) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 5.9: Students Speak the Language of the Test at Home

*Students' Reports*

| Country | Always | | Almost Always | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 77 (1.6) | 512 (3.2) | 14 (0.9) | 534 (6.8) | 8 (0.7) | 542 (11.3) | 1 (0.2) | ~ ~ |
| Bahrain | 55 (0.8) | 480 (2.2) | 19 (0.5) | 494 (3.4) | 21 (0.6) | 477 (3.6) | 4 (0.4) | 460 (9.2) |
| Chile | 87 (0.5) | 439 (2.9) | 11 (0.5) | 461 (4.8) | 2 (0.3) | ~ ~ | 1 (0.2) | ~ ~ |
| Chinese Taipei | 66 (1.0) | 615 (3.1) | 27 (0.9) | 624 (3.7) | 7 (0.4) | 552 (6.1) | 0 (0.1) | ~ ~ |
| Cyprus | 63 (0.9) | 501 (1.9) | 17 (0.7) | 498 (4.5) | 15 (0.6) | 511 (4.2) | 5 (0.4) | 492 (7.6) |
| Egypt | 66 (1.9) | 408 (5.6) | 13 (1.0) | 437 (9.5) | 16 (1.2) | 429 (6.4) | 5 (0.8) | 398 (9.5) |
| England | 81 (1.6) | 516 (5.8) | 12 (1.1) | 523 (8.4) | 6 (0.6) | 516 (10.8) | 1 (0.2) | ~ ~ |
| Finland | 83 (0.8) | 511 (2.6) | 12 (0.6) | 505 (3.7) | 4 (0.4) | 491 (7.1) | 1 (0.1) | ~ ~ |
| France | 75 (1.2) | 489 (2.5) | 17 (0.9) | 472 (3.5) | 6 (0.6) | 442 (7.4) | 1 (0.2) | ~ ~ |
| Georgia | 83 (1.3) | 461 (4.6) | 12 (0.8) | 478 (6.8) | 5 (0.9) | 436 (15.9) | 1 (0.2) | ~ ~ |
| Hong Kong SAR | 73 (1.4) | 574 (4.1) | 11 (0.8) | 584 (8.0) | 12 (1.0) | 597 (8.9) | 3 (0.5) | 595 (12.5) |
| Hungary | 76 (1.0) | 513 (3.3) | 18 (0.8) | 539 (4.7) | 6 (0.5) | 499 (8.2) | 0 (0.1) | ~ ~ |
| Iran, Islamic Rep. of | 53 (2.0) | 461 (4.4) | 15 (0.7) | 466 (5.7) | 20 (1.5) | 419 (6.6) | 12 (1.2) | 404 (9.0) |
| Ireland | 83 (0.8) | 526 (2.6) | 7 (0.5) | 524 (6.5) | 7 (0.6) | 513 (6.1) | 3 (0.3) | 495 (8.1) |
| Israel | 78 (1.1) | 518 (4.3) | 16 (0.8) | 528 (6.6) | 5 (0.5) | 516 (10.7) | 2 (0.2) | ~ ~ |
| Italy | 76 (1.1) | 505 (2.6) | 16 (0.7) | 482 (4.1) | 7 (0.6) | 464 (7.2) | 1 (0.4) | ~ ~ |
| Japan | 96 (0.3) | 596 (2.7) | 3 (0.2) | 568 (10.4) | 1 (0.2) | ~ ~ | 0 (0.1) | ~ ~ |
| Jordan | 77 (1.4) | 420 (4.4) | 12 (1.0) | 442 (7.0) | 8 (0.6) | 412 (7.7) | 3 (0.5) | 387 (12.9) |
| Kazakhstan | 76 (1.0) | 488 (3.5) | 17 (0.8) | 498 (4.7) | 7 (0.5) | 460 (6.4) | 1 (0.1) | ~ ~ |
| Korea, Rep. of | 88 (0.6) | 606 (2.8) | 12 (0.6) | 616 (5.3) | 0 (0.1) | ~ ~ | 0 (0.1) | ~ ~ |
| Kuwait | 51 (1.4) | 391 (5.8) | 11 (0.7) | 417 (7.4) | 29 (1.0) | 418 (5.6) | 9 (1.0) | 408 (6.7) |
| Lebanon | 7 (0.6) | 436 (5.9) | 12 (0.7) | 454 (4.7) | 58 (1.2) | 432 (3.3) | 23 (1.2) | 408 (4.4) |
| Lithuania | 77 (1.1) | 523 (2.8) | 20 (0.9) | 521 (4.5) | 3 (0.6) | 486 (9.7) | 0 (0.1) | ~ ~ |
| Malaysia | 44 (1.5) | 477 (3.1) | 16 (0.7) | 465 (4.0) | 32 (1.1) | 442 (4.6) | 8 (0.9) | 437 (7.7) |
| Morocco | 17 (1.3) | 382 (4.9) | 15 (0.6) | 388 (3.2) | 48 (1.2) | 390 (2.4) | 20 (1.0) | 389 (3.5) |
| New Zealand | 74 (2.0) | 483 (3.2) | 16 (1.0) | 481 (4.6) | 8 (1.2) | 481 (11.3) | 1 (0.2) | ~ ~ |
| Norway (9) | 76 (1.2) | 508 (2.3) | 14 (0.8) | 496 (5.8) | 8 (0.6) | 487 (5.6) | 3 (0.4) | 483 (14.7) |
| Oman | 50 (1.5) | 409 (3.1) | 19 (0.7) | 424 (4.1) | 25 (1.0) | 414 (4.1) | 7 (0.7) | 389 (8.2) |
| Portugal | 88 (0.6) | 501 (3.1) | 9 (0.6) | 510 (4.8) | 2 (0.3) | ~ ~ | 0 (0.1) | ~ ~ |
| Qatar | 45 (1.2) | 416 (4.8) | 20 (0.8) | 480 (5.1) | 28 (1.3) | 466 (5.7) | 7 (0.5) | 427 (7.7) |
| Romania | 87 (1.0) | 480 (4.4) | 9 (0.7) | 504 (7.3) | 3 (0.5) | 446 (10.9) | 1 (0.4) | ~ ~ |
| Russian Federation | 79 (2.2) | 547 (4.1) | 14 (1.0) | 546 (6.5) | 6 (1.3) | 500 (16.3) | 1 (0.4) | ~ ~ |
| Saudi Arabia | 69 (1.2) | 393 (2.7) | 11 (0.6) | 416 (3.8) | 14 (0.7) | 393 (4.9) | 6 (0.6) | 371 (5.9) |
| Singapore | 44 (0.9) | 627 (3.7) | 31 (0.8) | 617 (4.4) | 22 (0.7) | 593 (5.8) | 3 (0.2) | 603 (10.9) |
| South Africa (9) | 14 (0.7) | 432 (4.4) | 13 (0.4) | 430 (3.2) | 65 (0.8) | 377 (2.5) | 8 (0.4) | 354 (4.0) |
| Sweden | 71 (1.4) | 513 (2.4) | 16 (0.9) | 489 (4.3) | 9 (0.7) | 464 (6.7) | 3 (0.3) | 469 (10.5) |
| Turkey | 77 (1.5) | 508 (4.3) | 11 (0.7) | 499 (7.2) | 10 (1.1) | 411 (10.5) | 2 (0.3) | ~ ~ |
| United Arab Emirates | 35 (0.4) | 466 (2.8) | 24 (0.6) | 510 (3.3) | 34 (0.5) | 468 (2.1) | 7 (0.3) | 431 (5.1) |
| United States | 72 (1.1) | 521 (4.9) | 18 (0.7) | 516 (5.1) | 9 (0.5) | 493 (7.4) | 1 (0.2) | ~ ~ |
| **International Average** | **66 (0.2)** | **491 (0.6)** | **15 (0.1)** | **498 (0.9)** | **15 (0.1)** | **470 (1.4)** | **4 (0.1)** | **442 (2.0)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 64 (1.9) | 522 (4.3) | 21 (1.1) | 547 (5.3) | 12 (0.9) | 546 (5.5) | 2 (0.3) | ~ ~ |
| Quebec, Canada | 64 (2.3) | 540 (3.9) | 22 (1.0) | 547 (4.3) | 11 (1.2) | 554 (6.3) | 4 (0.7) | 566 (11.1) |
| Moscow City, Russian Fed. | 80 (0.8) | 574 (4.3) | 18 (0.7) | 585 (5.4) | 2 (0.2) | ~ ~ | 0 (0.2) | ~ ~ |
| Gauteng, RSA (9) | 17 (1.4) | 470 (7.0) | 22 (0.8) | 444 (3.6) | 55 (1.4) | 400 (3.0) | 6 (0.4) | 391 (4.7) |
| Western Cape, RSA (9) | 47 (2.8) | 454 (6.7) | 18 (0.7) | 473 (5.9) | 32 (2.3) | 409 (3.8) | 3 (0.4) | 397 (8.6) |
| Abu Dhabi, UAE | 20 (0.6) | 457 (5.9) | 23 (0.7) | 465 (3.8) | 46 (0.8) | 426 (3.5) | 11 (0.6) | 391 (6.3) |
| Dubai, UAE | 35 (0.9) | 517 (3.7) | 32 (0.8) | 559 (4.0) | 29 (1.0) | 538 (3.3) | 4 (0.4) | 520 (8.7) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.10: Students Speak the Language of the Test at Home

*Students' Reports*

| Country | Always | | Almost Always | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 77 (1.6) | 530 (2.8) | 14 (0.9) | 534 (5.7) | 8 (0.7) | 522 (10.3) | 1 (0.2) | ~ ~ |
| Bahrain | 55 (0.8) | 478 (2.0) | 19 (0.5) | 517 (3.7) | 21 (0.6) | 491 (4.2) | 4 (0.4) | 445 (10.4) |
| Chile | 87 (0.5) | 460 (2.8) | 11 (0.5) | 489 (4.5) | 2 (0.3) | ~ ~ | 1 (0.2) | ~ ~ |
| Chinese Taipei | 66 (1.0) | 576 (2.4) | 27 (0.9) | 586 (2.9) | 7 (0.4) | 526 (5.0) | 0 (0.1) | ~ ~ |
| Cyprus | 63 (0.9) | 485 (2.3) | 17 (0.7) | 483 (4.4) | 15 (0.6) | 483 (4.6) | 5 (0.4) | 465 (7.6) |
| Egypt | 66 (1.9) | 385 (6.0) | 13 (1.0) | 415 (8.5) | 16 (1.2) | 406 (6.2) | 5 (0.8) | 370 (10.5) |
| England | 81 (1.6) | 520 (5.3) | 12 (1.1) | 519 (7.8) | 6 (0.6) | 504 (12.0) | 1 (0.2) | ~ ~ |
| Finland | 83 (0.8) | 548 (3.0) | 12 (0.6) | 532 (4.6) | 4 (0.4) | 494 (9.1) | 1 (0.1) | ~ ~ |
| France | 75 (1.2) | 496 (2.7) | 17 (0.9) | 473 (3.8) | 6 (0.6) | 439 (8.2) | 1 (0.2) | ~ ~ |
| Georgia | 83 (1.3) | 445 (4.1) | 12 (0.8) | 466 (6.0) | 5 (0.9) | 434 (16.2) | 1 (0.2) | ~ ~ |
| Hong Kong SAR | 73 (1.4) | 496 (5.5) | 11 (0.8) | 525 (9.5) | 12 (1.0) | 526 (9.9) | 3 (0.5) | 507 (12.8) |
| Hungary | 76 (1.0) | 526 (3.0) | 18 (0.8) | 550 (4.4) | 6 (0.5) | 518 (7.5) | 0 (0.1) | ~ ~ |
| Iran, Islamic Rep. of | 53 (2.0) | 465 (4.0) | 15 (0.7) | 473 (5.4) | 20 (1.5) | 417 (6.1) | 12 (1.2) | 403 (9.0) |
| Ireland | 83 (0.8) | 526 (3.0) | 7 (0.5) | 521 (7.6) | 7 (0.6) | 510 (7.0) | 3 (0.3) | 498 (9.8) |
| Israel | 78 (1.1) | 512 (4.2) | 16 (0.8) | 527 (7.1) | 5 (0.5) | 519 (10.4) | 2 (0.2) | ~ ~ |
| Italy | 76 (1.1) | 510 (2.4) | 16 (0.7) | 487 (4.3) | 7 (0.6) | 451 (7.7) | 1 (0.4) | ~ ~ |
| Japan | 96 (0.3) | 571 (2.2) | 3 (0.2) | 552 (8.4) | 1 (0.2) | ~ ~ | 0 (0.1) | ~ ~ |
| Jordan | 77 (1.4) | 452 (4.6) | 12 (1.0) | 480 (7.3) | 8 (0.6) | 438 (9.6) | 3 (0.5) | 414 (15.5) |
| Kazakhstan | 76 (1.0) | 478 (3.3) | 17 (0.8) | 492 (4.4) | 7 (0.5) | 447 (6.8) | 1 (0.1) | ~ ~ |
| Korea, Rep. of | 88 (0.6) | 561 (2.2) | 12 (0.6) | 564 (4.1) | 0 (0.1) | ~ ~ | 0 (0.1) | ~ ~ |
| Kuwait | 51 (1.4) | 433 (6.4) | 11 (0.7) | 465 (7.5) | 29 (1.0) | 462 (6.5) | 9 (1.0) | 438 (9.2) |
| Lebanon | 7 (0.6) | 397 (8.0) | 12 (0.7) | 424 (7.1) | 58 (1.2) | 381 (5.2) | 23 (1.2) | 337 (6.6) |
| Lithuania | 77 (1.1) | 535 (2.9) | 20 (0.9) | 538 (4.8) | 3 (0.6) | 498 (10.3) | 0 (0.1) | ~ ~ |
| Malaysia | 44 (1.5) | 491 (3.3) | 16 (0.7) | 468 (3.9) | 32 (1.1) | 434 (4.2) | 8 (0.9) | 379 (9.2) |
| Morocco | 17 (1.3) | 398 (4.7) | 15 (0.6) | 405 (3.6) | 48 (1.2) | 405 (3.0) | 20 (1.0) | 405 (3.2) |
| New Zealand | 74 (2.0) | 506 (3.1) | 16 (1.0) | 490 (4.4) | 8 (1.2) | 464 (11.5) | 1 (0.2) | ~ ~ |
| Norway (9) | 76 (1.2) | 502 (2.9) | 14 (0.8) | 488 (6.4) | 8 (0.6) | 460 (9.0) | 3 (0.4) | 470 (18.9) |
| Oman | 50 (1.5) | 460 (3.3) | 19 (0.7) | 473 (3.7) | 25 (1.0) | 454 (4.4) | 7 (0.7) | 427 (8.8) |
| Portugal | 88 (0.6) | 518 (2.8) | 9 (0.6) | 536 (4.9) | 2 (0.3) | ~ ~ | 0 (0.1) | ~ ~ |
| Qatar | 45 (1.2) | 459 (4.8) | 20 (0.8) | 511 (5.9) | 28 (1.3) | 482 (6.3) | 7 (0.5) | 448 (9.1) |
| Romania | 87 (1.0) | 471 (4.2) | 9 (0.7) | 494 (7.9) | 3 (0.5) | 428 (15.9) | 1 (0.4) | ~ ~ |
| Russian Federation | 79 (2.2) | 548 (3.5) | 14 (1.0) | 544 (5.8) | 6 (1.3) | 486 (14.3) | 1 (0.4) | ~ ~ |
| Saudi Arabia | 69 (1.2) | 431 (2.7) | 11 (0.6) | 461 (4.4) | 14 (0.7) | 429 (5.3) | 6 (0.6) | 404 (6.9) |
| Singapore | 44 (0.9) | 623 (3.4) | 31 (0.8) | 610 (4.5) | 22 (0.7) | 578 (5.9) | 3 (0.2) | 579 (11.8) |
| South Africa (9) | 14 (0.7) | 436 (5.5) | 13 (0.4) | 431 (3.7) | 65 (0.8) | 351 (3.3) | 8 (0.4) | 311 (5.9) |
| Sweden | 71 (1.4) | 540 (2.8) | 16 (0.9) | 508 (5.7) | 9 (0.7) | 447 (8.7) | 3 (0.3) | 443 (12.6) |
| Turkey | 77 (1.5) | 527 (3.8) | 11 (0.7) | 519 (5.5) | 10 (1.1) | 434 (9.2) | 2 (0.3) | ~ ~ |
| United Arab Emirates | 35 (0.4) | 473 (3.0) | 24 (0.6) | 519 (3.9) | 34 (0.5) | 460 (2.7) | 7 (0.3) | 396 (7.0) |
| United States | 72 (1.1) | 530 (4.8) | 18 (0.7) | 523 (4.6) | 9 (0.5) | 487 (7.1) | 1 (0.2) | ~ ~ |
| **International Average** | **66 (0.2)** | **495 (0.6)** | **15 (0.1)** | **502 (0.9)** | **15 (0.1)** | **465 (1.4)** | **4 (0.1)** | **428 (2.4)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 64 (1.9) | 520 (3.4) | 21 (1.1) | 534 (4.4) | 12 (0.9) | 518 (5.1) | 2 (0.3) | ~ ~ |
| Quebec, Canada | 64 (2.3) | 535 (4.1) | 22 (1.0) | 540 (4.5) | 11 (1.2) | 536 (6.5) | 4 (0.7) | 543 (11.2) |
| Moscow City, Russian Fed. | 80 (0.8) | 566 (3.0) | 18 (0.7) | 571 (4.1) | 2 (0.2) | ~ ~ | 0 (0.2) | ~ ~ |
| Gauteng, RSA (9) | 17 (1.4) | 489 (7.3) | 22 (0.8) | 459 (4.4) | 55 (1.4) | 394 (4.0) | 6 (0.4) | 371 (6.1) |
| Western Cape, RSA (9) | 47 (2.8) | 460 (7.6) | 18 (0.7) | 481 (6.9) | 32 (2.3) | 392 (5.0) | 3 (0.4) | 370 (12.7) |
| Abu Dhabi, UAE | 20 (0.6) | 461 (7.4) | 23 (0.7) | 463 (5.2) | 46 (0.8) | 404 (4.2) | 11 (0.6) | 340 (8.4) |
| Dubai, UAE | 35 (0.9) | 529 (4.0) | 32 (0.8) | 574 (4.3) | 29 (1.0) | 547 (3.8) | 4 (0.4) | 512 (9.9) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Emphasis on Early Literacy and Numeracy Development

## Early Literacy and Numeracy Activities Before Primary School

Considerable research, including results from TIMSS and PIRLS, has documented the importance of early childhood learning activities for fostering student achievement during later school years. The *Early Literacy and Numeracy Activities* scale focuses specifically on literacy and numeracy activities, summarizing parents' reports about how often they engaged with their child in nine literacy activities and nine numeracy activities before their child began primary school (see About the Scale in Exhibit 5.11).

Exhibit 5.12 presents the percentage of students whose parents reported "often," "sometimes," and "never or almost never" engaging them in early literacy and numeracy activities, together with average fourth grade mathematics achievement. Countries are ordered by the percentage of students whose parents "often" engaged them in early literacy and numeracy activities. In general, parents reported a good deal of early interaction with their children, with 42 percent of the students having parents who "often" engaged them in such activities and an additional 55 percent with parents who "sometimes" engaged them, on average. Just 3 percent of students had parents who reported "never or almost never" engaging them in early literacy or numeracy activities.

There was a modest positive relationship between the frequency of engagement reported and later mathematics achievement, with the students in the "often" category having higher average achievement than students in the "sometimes" category (516 vs. 495, respectively). In several countries, a small percentage of students (3%, on average) had parents who "never or almost never" engaged them in early literacy and numeracy activities, and these students typically had lower average mathematics achievement (456).

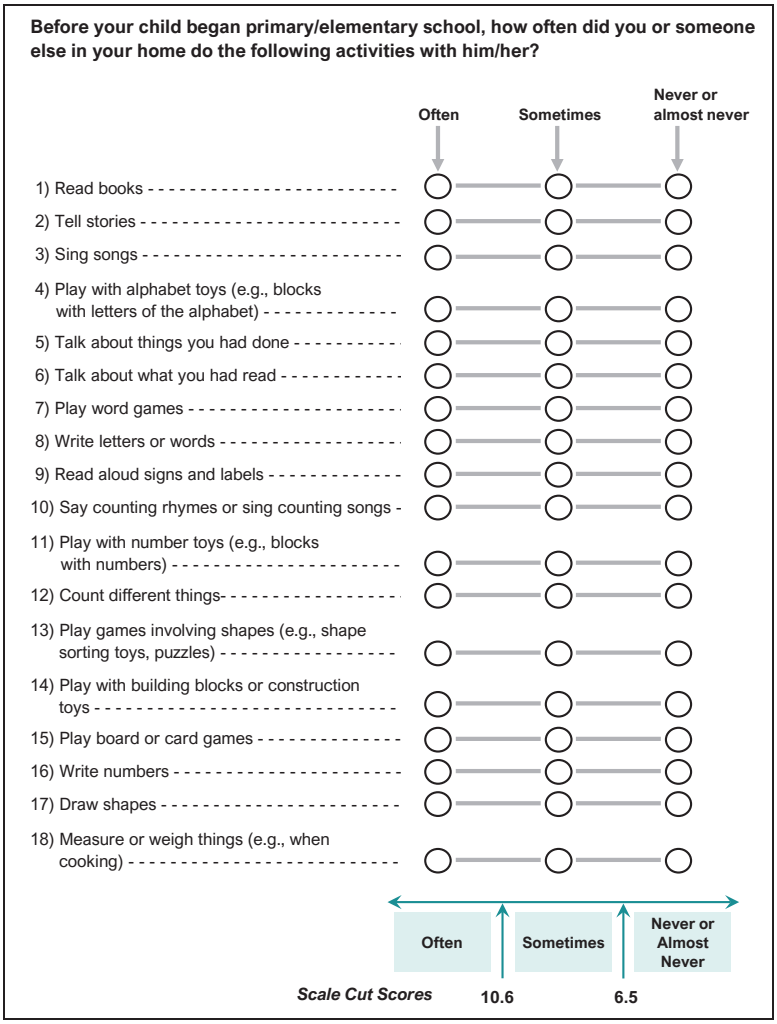
Exhibit 5.13 shows the same student percentages for the *Early Literacy and Numeracy Activities* scale as Exhibit 5.12, but this time together with average fourth grade science achievement. The activities-science achievement relationship was similar to the activities-mathematics achievement relationship, with highest achievement for those whose parents "often" engaged them (507), next for those who were "sometimes" engaged (484), and lowest for those who were "never or almost never" engaged (421).

## Exhibit 5.11: Home Early Literacy and Numeracy Activities Before Primary School

*Students' Results based on Parents' Reports*

### About the Scale

Students were scored according to their parents' reports regarding the frequency they or someone in the home engaged their children in the eighteen activities on the *Early Literacy and Numeracy Activities* scale. Cut scores divide the scale into three categories. Students **Often** engaged in early literacy and numeracy activities before primary school had a score at or above the cut score corresponding to their parents reporting they "often" did nine of the eighteen activities and "sometimes" did the other nine, on average. Students **Never or Almost Never** engaged in early literacy and numeracy activities before primary school had a score at or below the cut score corresponding to their parents reporting they "never or almost never" did nine of the eighteen activities and "sometimes" did the other nine, on average. All other students **Sometimes** engaged in early literacy and numeracy activities.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.12: Home Early Literacy and Numeracy Activities Before Primary School

*Students' Results based on Parents' Reports*

| Country | | Often | | Sometimes | | Never or Almost Never | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Russian Federation | | 67 (1.0) | 571 (3.1) | 32 (1.0) | 561 (4.4) | 1 (0.2) | ~ ~ | 11.4 (0.05) |
| Northern Ireland | s | 65 (1.4) | 592 (4.0) | 34 (1.4) | 572 (5.3) | 1 (0.2) | ~ ~ | 11.6 (0.07) |
| Serbia | | 60 (1.2) | 523 (3.0) | 39 (1.2) | 491 (4.3) | 1 (0.2) | ~ ~ | 11.1 (0.05) |
| Malta | r | 59 (0.9) | 525 (1.9) | 40 (0.9) | 502 (2.3) | 1 (0.2) | ~ ~ | 11.2 (0.04) |
| Montenegro | | 59 (0.9) | 464 (2.3) | 41 (0.9) | 444 (2.8) | 1 (0.1) | ~ ~ | 11.1 (0.04) |
| Poland | | 58 (0.9) | 525 (3.1) | 42 (0.9) | 517 (3.0) | 0 (0.1) | ~ ~ | 11.0 (0.03) |
| Albania | | 58 (1.8) | 508 (3.8) | 40 (1.7) | 481 (4.0) | 2 (0.5) | ~ ~ | 10.9 (0.09) |
| Ireland | | 57 (0.9) | 563 (2.6) | 42 (0.9) | 537 (3.1) | 1 (0.1) | ~ ~ | 11.2 (0.04) |
| Kazakhstan | | 56 (1.7) | 519 (3.1) | 44 (1.7) | 504 (2.8) | 0 (0.1) | ~ ~ | 11.0 (0.07) |
| Canada | s | 56 (0.8) | 530 (2.1) | 43 (0.8) | 515 (2.6) | 1 (0.2) | ~ ~ | 11.1 (0.04) |
| Croatia | | 56 (1.1) | 519 (2.3) | 44 (1.1) | 499 (2.9) | 1 (0.2) | ~ ~ | 11.0 (0.05) |
| Hungary | | 55 (0.9) | 530 (2.9) | 44 (0.8) | 522 (3.0) | 1 (0.5) | ~ ~ | 10.8 (0.05) |
| Slovak Republic | | 55 (1.3) | 519 (3.2) | 44 (1.1) | 504 (3.8) | 2 (0.6) | ~ ~ | 10.9 (0.07) |
| North Macedonia | | 53 (1.4) | 488 (5.8) | 45 (1.3) | 461 (6.1) | 1 (0.4) | ~ ~ | 10.9 (0.07) |
| Bosnia and Herzegovina | | 53 (0.8) | 460 (2.6) | 46 (0.8) | 443 (2.9) | 1 (0.1) | ~ ~ | 10.8 (0.04) |
| Czech Republic | r | 51 (1.1) | 546 (3.0) | 48 (1.1) | 536 (2.8) | 0 (0.1) | ~ ~ | 10.7 (0.04) |
| Cyprus | | 50 (0.9) | 547 (2.6) | 49 (0.9) | 523 (3.7) | 1 (0.2) | ~ ~ | 10.8 (0.05) |
| Kosovo | | 49 (1.2) | 454 (3.2) | 50 (1.2) | 439 (3.7) | 1 (0.2) | ~ ~ | 10.6 (0.05) |
| United Arab Emirates | s | 48 (0.6) | 512 (2.2) | 50 (0.6) | 490 (2.5) | 1 (0.1) | ~ ~ | 10.6 (0.03) |
| Latvia | | 48 (1.1) | 553 (2.8) | 51 (1.0) | 541 (2.9) | 1 (0.2) | ~ ~ | 10.6 (0.04) |
| Korea, Rep. of | | 48 (1.1) | 613 (2.6) | 50 (1.0) | 589 (2.6) | 2 (0.2) | ~ ~ | 10.7 (0.05) |
| Lithuania | r | 46 (1.0) | 550 (3.2) | 53 (1.0) | 537 (3.3) | 1 (0.2) | ~ ~ | 10.5 (0.04) |
| Armenia | | 46 (1.1) | 504 (2.6) | 52 (1.1) | 495 (2.9) | 2 (0.4) | ~ ~ | 10.5 (0.05) |
| Georgia | | 46 (1.1) | 483 (4.2) | 53 (1.0) | 484 (3.8) | 2 (0.4) | ~ ~ | 10.5 (0.05) |
| Italy | | 45 (1.1) | 524 (3.1) | 54 (1.1) | 510 (2.6) | 1 (0.2) | ~ ~ | 10.5 (0.04) |
| France | | 44 (1.0) | 503 (3.5) | 55 (1.0) | 477 (3.4) | 1 (0.2) | ~ ~ | 10.4 (0.03) |
| Spain | | 43 (0.8) | 518 (2.7) | 56 (0.8) | 498 (3.0) | 1 (0.1) | ~ ~ | 10.4 (0.03) |
| Bahrain | | 42 (1.0) | 492 (3.5) | 57 (1.0) | 473 (2.8) | 1 (0.1) | ~ ~ | 10.3 (0.03) |
| Germany | s | 40 (1.4) | 541 (3.1) | 59 (1.3) | 526 (2.9) | 1 (0.2) | ~ ~ | 10.4 (0.05) |
| Portugal | | 40 (0.9) | 541 (3.0) | 59 (0.9) | 519 (2.9) | 1 (0.4) | ~ ~ | 10.3 (0.04) |
| Austria | | 39 (0.9) | 550 (2.7) | 60 (0.9) | 536 (2.3) | 1 (0.2) | ~ ~ | 10.2 (0.03) |
| Bulgaria | | 39 (1.4) | 545 (2.9) | 52 (1.3) | 512 (5.2) | 10 (1.5) | 432 (12.7) | 9.8 (0.11) |
| Chile | | 38 (1.0) | 459 (3.1) | 60 (1.1) | 433 (3.0) | 2 (0.3) | ~ ~ | 10.2 (0.04) |
| Denmark | s | 37 (1.3) | 548 (3.0) | 62 (1.3) | 533 (3.0) | 1 (0.2) | ~ ~ | 10.2 (0.05) |
| Norway (5) | s | 37 (1.0) | 563 (3.6) | 62 (1.1) | 546 (2.8) | 1 (0.3) | ~ ~ | 10.2 (0.04) |
| Singapore | | 34 (0.8) | 641 (4.0) | 62 (0.8) | 620 (4.0) | 4 (0.2) | 605 (8.0) | 9.9 (0.04) |
| Qatar | r | 34 (1.0) | 473 (4.0) | 64 (1.0) | 445 (4.0) | 2 (0.3) | ~ ~ | 10.0 (0.04) |
| Kuwait | r | 33 (1.2) | 405 (6.0) | 64 (1.2) | 379 (4.7) | 2 (0.2) | ~ ~ | 9.9 (0.04) |
| Finland | | 32 (0.8) | 547 (3.0) | 68 (0.9) | 530 (2.7) | 1 (0.1) | ~ ~ | 10.0 (0.03) |
| Azerbaijan | | 29 (1.4) | 535 (3.6) | 66 (1.4) | 519 (2.8) | 4 (0.5) | 483 (7.5) | 9.7 (0.06) |
| Sweden | r | 29 (0.9) | 533 (3.7) | 69 (0.9) | 526 (3.1) | 2 (0.3) | ~ ~ | 9.8 (0.04) |
| Saudi Arabia | | 28 (0.9) | 416 (4.7) | 68 (0.9) | 394 (4.0) | 3 (0.5) | 388 (11.2) | 9.7 (0.05) |
| Philippines | | 28 (1.0) | 327 (7.4) | 70 (1.0) | 287 (6.4) | 2 (0.2) | ~ ~ | 9.8 (0.05) |
| South Africa (5) | r | 28 (0.9) | 405 (5.1) | 68 (0.9) | 366 (3.2) | 4 (0.5) | 344 (8.5) | 9.7 (0.05) |
| Turkey (5) | | 28 (1.4) | 565 (4.5) | 56 (1.6) | 525 (4.8) | 16 (1.8) | 443 (9.9) | 9.0 (0.14) |
| Belgium (Flemish) | | 27 (0.8) | 545 (2.5) | 71 (0.8) | 530 (2.1) | 2 (0.3) | ~ ~ | 9.7 (0.04) |
| Oman | | 26 (0.8) | 460 (6.0) | 71 (0.8) | 424 (3.8) | 2 (0.3) | ~ ~ | 9.8 (0.05) |
| Chinese Taipei | | 25 (0.7) | 619 (3.3) | 71 (0.8) | 595 (1.9) | 5 (0.4) | 572 (5.4) | 9.4 (0.03) |
| Iran, Islamic Rep. of | | 23 (0.9) | 459 (5.1) | 71 (1.0) | 443 (3.7) | 6 (1.1) | 396 (18.9) | 9.3 (0.08) |
| Hong Kong SAR | | 20 (1.2) | 622 (4.5) | 75 (1.2) | 601 (3.7) | 4 (0.4) | 569 (7.2) | 9.3 (0.05) |
| Japan | | 20 (0.7) | 616 (3.1) | 74 (0.7) | 590 (1.9) | 6 (0.4) | 577 (4.5) | 9.2 (0.03) |
| Morocco | | 13 (0.7) | 424 (8.3) | 61 (1.7) | 387 (5.1) | 27 (1.8) | 359 (7.1) | 7.9 (0.12) |
| Pakistan | r | 12 (1.5) | 351 (15.9) | 73 (3.2) | 333 (14.1) | 16 (3.1) | 298 (14.1) | 8.6 (0.16) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| New Zealand | x | 60 (1.6) | 520 (4.1) | 40 (1.6) | 499 (3.9) | 0 (0.1) | ~ ~ | 11.4 (0.07) |
| **International Average** | | **42 (0.1)** | **516 (0.6)** | **55 (0.2)** | **495 (0.5)** | **3 (0.1)** | **456 (3.0)** | |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | | 70 (1.1) | 596 (2.2) | 29 (1.1) | 587 (3.2) | 1 (0.1) | ~ ~ | 11.7 (0.04) |
| Ontario, Canada | s | 60 (1.4) | 530 (3.8) | 39 (1.3) | 514 (5.0) | 1 (0.3) | ~ ~ | 11.3 (0.08) |
| Dubai, UAE | s | 51 (0.9) | 564 (2.4) | 48 (0.9) | 548 (2.7) | 1 (0.2) | ~ ~ | 10.8 (0.04) |
| Madrid, Spain | | 48 (1.1) | 528 (2.9) | 51 (1.1) | 514 (2.6) | 1 (0.2) | ~ ~ | 10.6 (0.05) |
| Quebec, Canada | r | 48 (1.2) | 547 (2.9) | 51 (1.2) | 531 (3.3) | 1 (0.3) | ~ ~ | 10.6 (0.05) |
| Abu Dhabi, UAE | x | 46 (1.2) | 474 (3.7) | 53 (1.1) | 449 (3.2) | 2 (0.2) | ~ ~ | 10.5 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 5.13: Home Early Literacy and Numeracy Activities Before Primary School

*Students' Results based on Parents' Reports*

| Country | Often | | Sometimes | | Never or Almost Never | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Russian Federation | 67 (1.0) | 571 (2.9) | 32 (1.0) | 560 (4.0) | 1 (0.2) | ~ ~ | 11.4 (0.05) |
| Northern Ireland s | 65 (1.4) | 538 (2.9) | 34 (1.4) | 519 (4.3) | 1 (0.2) | ~ ~ | 11.6 (0.07) |
| Serbia | 60 (1.2) | 533 (3.2) | 39 (1.2) | 498 (4.6) | 1 (0.2) | ~ ~ | 11.1 (0.05) |
| Malta r | 59 (0.9) | 511 (1.9) | 40 (0.9) | 490 (2.6) | 1 (0.2) | ~ ~ | 11.2 (0.04) |
| Montenegro | 59 (0.9) | 466 (2.7) | 41 (0.9) | 443 (3.5) | 1 (0.1) | ~ ~ | 11.1 (0.04) |
| Poland | 58 (0.9) | 535 (3.1) | 42 (0.9) | 527 (2.7) | 0 (0.1) | ~ ~ | 11.0 (0.03) |
| Albania | 58 (1.8) | 503 (4.1) | 40 (1.7) | 477 (4.1) | 2 (0.5) | ~ ~ | 10.9 (0.09) |
| Ireland | 57 (0.9) | 542 (3.3) | 42 (0.9) | 516 (3.6) | 1 (0.1) | ~ ~ | 11.2 (0.04) |
| Kazakhstan | 56 (1.7) | 506 (3.8) | 44 (1.7) | 481 (3.5) | 0 (0.1) | ~ ~ | 11.0 (0.07) |
| Canada s | 56 (0.8) | 541 (2.2) | 43 (0.8) | 522 (2.6) | 1 (0.2) | ~ ~ | 11.1 (0.04) |
| Croatia | 56 (1.1) | 533 (2.5) | 44 (1.1) | 514 (2.7) | 1 (0.2) | ~ ~ | 11.0 (0.05) |
| Hungary | 55 (0.9) | 536 (2.8) | 44 (0.8) | 528 (3.1) | 1 (0.5) | ~ ~ | 10.8 (0.05) |
| Slovak Republic | 55 (1.3) | 531 (3.4) | 44 (1.1) | 514 (4.0) | 2 (0.6) | ~ ~ | 10.9 (0.07) |
| North Macedonia | 53 (1.4) | 444 (6.3) | 45 (1.3) | 412 (7.2) | 1 (0.4) | ~ ~ | 10.9 (0.07) |
| Bosnia and Herzegovina | 53 (0.8) | 468 (3.3) | 46 (0.8) | 448 (3.2) | 1 (0.1) | ~ ~ | 10.8 (0.04) |
| Czech Republic r | 51 (1.1) | 544 (3.0) | 48 (1.1) | 537 (2.8) | 0 (0.1) | ~ ~ | 10.7 (0.04) |
| Cyprus | 50 (0.9) | 527 (2.8) | 49 (0.9) | 502 (3.7) | 1 (0.2) | ~ ~ | 10.8 (0.05) |
| Kosovo | 49 (1.2) | 427 (4.1) | 50 (1.2) | 403 (4.4) | 1 (0.2) | ~ ~ | 10.6 (0.05) |
| United Arab Emirates s | 48 (0.6) | 512 (2.7) | 50 (0.6) | 484 (3.0) | 1 (0.1) | ~ ~ | 10.6 (0.03) |
| Latvia | 48 (1.1) | 550 (2.5) | 51 (1.0) | 536 (2.7) | 1 (0.2) | ~ ~ | 10.6 (0.04) |
| Korea, Rep. of | 48 (1.1) | 599 (2.7) | 50 (1.0) | 579 (2.6) | 2 (0.2) | ~ ~ | 10.7 (0.05) |
| Lithuania r | 46 (1.0) | 546 (2.8) | 53 (1.0) | 532 (3.2) | 1 (0.2) | ~ ~ | 10.5 (0.04) |
| Armenia | 46 (1.1) | 474 (3.5) | 52 (1.1) | 461 (3.9) | 2 (0.4) | ~ ~ | 10.5 (0.05) |
| Georgia | 46 (1.1) | 454 (4.1) | 53 (1.0) | 457 (4.5) | 2 (0.4) | ~ ~ | 10.5 (0.05) |
| Italy | 45 (1.1) | 519 (3.4) | 54 (1.1) | 505 (2.9) | 1 (0.2) | ~ ~ | 10.5 (0.04) |
| France | 44 (1.0) | 506 (3.1) | 55 (1.0) | 479 (3.6) | 1 (0.2) | ~ ~ | 10.4 (0.03) |
| Spain | 43 (0.8) | 525 (2.4) | 56 (0.8) | 508 (2.6) | 1 (0.1) | ~ ~ | 10.4 (0.03) |
| Bahrain | 42 (1.0) | 514 (3.9) | 57 (1.0) | 483 (3.5) | 1 (0.1) | ~ ~ | 10.3 (0.03) |
| Germany s | 40 (1.4) | 538 (3.2) | 59 (1.3) | 526 (2.8) | 1 (0.2) | ~ ~ | 10.4 (0.05) |
| Portugal | 40 (0.9) | 518 (2.9) | 59 (0.9) | 498 (2.9) | 1 (0.4) | ~ ~ | 10.3 (0.04) |
| Austria | 39 (0.9) | 535 (3.3) | 60 (0.9) | 520 (3.1) | 1 (0.2) | ~ ~ | 10.2 (0.03) |
| Bulgaria | 39 (1.4) | 560 (3.6) | 52 (1.3) | 518 (5.9) | 10 (1.5) | 407 (12.6) | 9.8 (0.11) |
| Chile | 38 (1.0) | 488 (3.1) | 60 (1.1) | 460 (2.8) | 2 (0.3) | ~ ~ | 10.2 (0.04) |
| Denmark s | 37 (1.3) | 548 (3.2) | 62 (1.3) | 525 (2.9) | 1 (0.2) | ~ ~ | 10.2 (0.05) |
| Norway (5) s | 37 (1.0) | 559 (3.3) | 62 (1.1) | 541 (3.2) | 1 (0.3) | ~ ~ | 10.2 (0.04) |
| Singapore | 34 (0.8) | 613 (3.4) | 62 (0.8) | 587 (3.6) | 4 (0.2) | 577 (7.0) | 9.9 (0.04) |
| Qatar r | 34 (1.0) | 480 (4.8) | 64 (1.0) | 444 (4.6) | 2 (0.3) | ~ ~ | 10.0 (0.04) |
| Kuwait r | 33 (1.2) | 422 (7.1) | 64 (1.2) | 389 (6.0) | 2 (0.2) | ~ ~ | 9.9 (0.04) |
| Finland | 32 (0.8) | 566 (2.9) | 68 (0.9) | 554 (2.9) | 1 (0.1) | ~ ~ | 10.0 (0.03) |
| Azerbaijan | 29 (1.4) | 451 (4.1) | 66 (1.4) | 430 (3.3) | 4 (0.5) | 386 (9.5) | 9.7 (0.06) |
| Sweden r | 29 (0.9) | 545 (4.4) | 69 (0.9) | 542 (3.2) | 2 (0.3) | ~ ~ | 9.8 (0.04) |
| Saudi Arabia | 28 (0.9) | 426 (5.8) | 68 (0.9) | 397 (4.6) | 3 (0.5) | 382 (13.2) | 9.7 (0.05) |
| Philippines | 28 (1.0) | 286 (9.0) | 70 (1.0) | 236 (7.5) | 2 (0.2) | ~ ~ | 9.8 (0.05) |
| South Africa (5) r | 28 (0.9) | 366 (6.9) | 68 (0.9) | 312 (4.4) | 4 (0.5) | 282 (12.1) | 9.7 (0.05) |
| Turkey (5) | 28 (1.4) | 568 (3.9) | 56 (1.6) | 529 (4.5) | 16 (1.8) | 442 (10.4) | 9.0 (0.14) |
| Belgium (Flemish) | 27 (0.8) | 513 (2.6) | 71 (0.8) | 499 (2.4) | 2 (0.3) | ~ ~ | 9.7 (0.04) |
| Oman | 26 (0.8) | 471 (6.3) | 71 (0.8) | 426 (4.2) | 2 (0.3) | ~ ~ | 9.8 (0.05) |
| Chinese Taipei | 25 (0.7) | 577 (2.5) | 71 (0.8) | 553 (2.2) | 5 (0.4) | 532 (5.2) | 9.4 (0.03) |
| Iran, Islamic Rep. of | 23 (0.9) | 462 (5.0) | 71 (1.0) | 442 (4.0) | 6 (1.1) | 374 (14.1) | 9.3 (0.08) |
| Hong Kong SAR | 20 (1.2) | 553 (5.1) | 75 (1.2) | 529 (3.6) | 4 (0.4) | 503 (8.1) | 9.3 (0.05) |
| Japan | 20 (0.7) | 583 (2.8) | 74 (0.7) | 559 (2.0) | 6 (0.4) | 545 (5.3) | 9.2 (0.03) |
| Morocco | 13 (0.7) | 421 (9.4) | 61 (1.7) | 379 (6.4) | 27 (1.8) | 344 (8.8) | 7.9 (0.12) |
| Pakistan r | 12 (1.5) | 329 (20.3) | 73 (3.2) | 289 (15.2) | 16 (3.1) | 274 (17.7) | 8.6 (0.16) |
| Australia | - - | - - | - - | - - | - - | - - | - - |
| England | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | - - | - - | - - | - - | - - | - - | - - |
| United States | - - | - - | - - | - - | - - | - - | - - |
| New Zealand x | 60 (1.6) | 535 (3.6) | 40 (1.6) | 512 (3.7) | 0 (0.1) | ~ ~ | 11.4 (0.07) |
| **International Average** | **42 (0.1)** | **507 (0.7)** | **55 (0.2)** | **484 (0.6)** | **3 (0.1)** | **421 (3.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 70 (1.1) | 598 (2.3) | 29 (1.1) | 590 (3.2) | 1 (0.1) | ~ ~ | 11.7 (0.04) |
| Ontario, Canada s | 60 (1.4) | 541 (3.7) | 39 (1.3) | 525 (4.7) | 1 (0.3) | ~ ~ | 11.3 (0.08) |
| Dubai, UAE s | 51 (0.9) | 569 (2.7) | 48 (0.9) | 549 (2.9) | 1 (0.2) | ~ ~ | 10.8 (0.04) |
| Madrid, Spain | 48 (1.1) | 531 (2.8) | 51 (1.1) | 519 (2.4) | 1 (0.2) | ~ ~ | 10.6 (0.05) |
| Quebec, Canada r | 48 (1.2) | 538 (3.4) | 51 (1.2) | 519 (3.0) | 1 (0.3) | ~ ~ | 10.6 (0.05) |
| Abu Dhabi, UAE x | 46 (1.2) | 461 (4.7) | 53 (1.1) | 431 (4.1) | 2 (0.2) | ~ ~ | 10.5 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Students Attended Preprimary Education

There was a positive relationship for fourth grade students between the number of years they attended preprimary education and their mathematics achievement (Exhibit 5.14) and science achievement (Exhibit 5.15). According to their parents, a majority of fourth grade students across countries had attended three years or more of preprimary school—56 percent. Beyond that, on average, 17 percent had attended two years, 15 percent attended one year or less, and 12 percent did not attend preprimary school.

The students who attended three years or more had the highest average mathematics achievement (509), and those with less preprimary school attendance had successively lower average achievement (495, 483, and 464, respectively). There was a similar pattern with regard to science achievement, with an average of 500 for those who attended three years or more, and successively lower science achievement for those with less preprimary attendance (489, 472, and 452, respectively).

## Exhibit 5.14: Students Attended Preprimary Education

*Students' Results based on Parents' Reports*

| Country | | Attended 3 Years or More | | Attended 2 Years | | Attended 1 Year or Less | | Did Not Attend | |
|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Hungary | | 95 (0.4) | 527 (2.7) | 3 (0.4) | 506 (9.0) | 1 (0.2) | ~ ~ | 0 (0.0) | ~ ~ |
| Denmark | s | 95 (0.5) | 541 (2.6) | 3 (0.4) | 513 (9.6) | 1 (0.2) | ~ ~ | 0 (0.2) | ~ ~ |
| Norway (5) | s | 94 (0.6) | 553 (2.6) | 3 (0.4) | 536 (10.5) | 2 (0.3) | ~ ~ | 1 (0.3) | ~ ~ |
| Korea, Rep. of | | 92 (0.5) | 601 (2.3) | 6 (0.5) | 596 (6.9) | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| Sweden | r | 90 (0.9) | 532 (2.8) | 3 (0.4) | 502 (11.7) | 3 (0.4) | 491 (8.2) | 3 (0.5) | 484 (9.2) |
| Belgium (Flemish) | | 90 (0.6) | 539 (1.9) | 5 (0.4) | 513 (6.0) | 3 (0.4) | 501 (5.5) | 2 (0.2) | ~ ~ |
| Italy | | 89 (0.9) | 519 (2.5) | 8 (0.8) | 499 (4.8) | 2 (0.3) | ~ ~ | 1 (0.2) | ~ ~ |
| France | | 88 (0.8) | 492 (2.9) | 5 (0.5) | 469 (8.5) | 5 (0.5) | 461 (8.2) | 2 (0.3) | ~ ~ |
| Latvia | | 84 (0.7) | 551 (2.5) | 9 (0.5) | 531 (5.2) | 4 (0.4) | 534 (6.7) | 3 (0.4) | 523 (7.7) |
| Czech Republic | r | 84 (0.8) | 543 (2.4) | 11 (0.7) | 537 (4.9) | 4 (0.4) | 518 (9.1) | 1 (0.2) | ~ ~ |
| Singapore | | 83 (0.6) | 633 (3.7) | 10 (0.4) | 601 (5.5) | 4 (0.3) | 598 (7.3) | 3 (0.2) | 585 (8.9) |
| Portugal | | 82 (0.9) | 533 (2.4) | 10 (0.7) | 517 (5.4) | 5 (0.3) | 497 (6.3) | 3 (0.3) | 484 (8.8) |
| Austria | | 80 (1.2) | 546 (2.2) | 13 (1.1) | 537 (5.0) | 4 (0.4) | 512 (6.0) | 2 (0.4) | ~ ~ |
| Slovak Republic | | 77 (1.7) | 523 (2.5) | 11 (0.7) | 500 (7.1) | 7 (0.7) | 478 (9.4) | 6 (0.8) | 418 (10.6) |
| Bulgaria | | 75 (2.2) | 532 (3.0) | 13 (1.7) | 480 (10.4) | 10 (1.0) | 469 (12.3) | 3 (0.6) | 456 (20.3) |
| Finland | | 74 (1.1) | 535 (2.5) | 10 (0.6) | 540 (4.7) | 15 (0.8) | 540 (5.1) | 1 (0.2) | ~ ~ |
| Lithuania | r | 74 (1.2) | 550 (3.0) | 8 (0.7) | 531 (7.0) | 15 (0.9) | 514 (5.2) | 2 (0.4) | ~ ~ |
| Georgia | | 71 (1.3) | 485 (3.9) | 16 (0.8) | 478 (5.0) | 7 (0.7) | 488 (8.1) | 6 (0.8) | 464 (7.8) |
| Poland | | 70 (1.1) | 531 (2.7) | 16 (0.8) | 510 (4.0) | 14 (1.2) | 498 (4.8) | 1 (0.2) | ~ ~ |
| Hong Kong SAR | | 69 (0.9) | 608 (3.7) | 6 (0.6) | 602 (7.6) | 14 (0.8) | 603 (5.0) | 10 (0.8) | 587 (5.3) |
| Spain | | 68 (0.8) | 518 (2.5) | 13 (0.7) | 499 (4.3) | 9 (0.6) | 479 (7.1) | 10 (0.5) | 476 (5.3) |
| Germany | s | 64 (1.2) | 540 (2.6) | 8 (0.6) | 518 (6.0) | 16 (0.8) | 534 (4.3) | 12 (0.8) | 507 (4.8) |
| Albania | | 61 (1.6) | 508 (3.4) | 19 (1.2) | 489 (5.8) | 13 (0.8) | 472 (6.4) | 8 (0.9) | 475 (11.7) |
| Croatia | | 60 (1.8) | 520 (2.4) | 9 (0.7) | 500 (5.6) | 14 (1.3) | 498 (5.0) | 16 (1.4) | 494 (4.6) |
| Chinese Taipei | | 59 (1.1) | 603 (2.1) | 36 (0.9) | 596 (3.0) | 5 (0.5) | 594 (6.4) | 0 (0.1) | ~ ~ |
| Ireland | | 56 (1.2) | 565 (2.6) | 25 (1.1) | 539 (4.3) | 18 (0.9) | 532 (3.6) | 1 (0.2) | ~ ~ |
| Cyprus | | 56 (1.0) | 544 (3.1) | 23 (0.7) | 530 (3.9) | 12 (0.5) | 525 (4.6) | 9 (0.5) | 513 (5.1) |
| Serbia | | 55 (1.4) | 529 (2.9) | 12 (1.3) | 499 (8.9) | 32 (1.8) | 486 (4.5) | 1 (0.2) | ~ ~ |
| Russian Federation | | 55 (1.4) | 573 (3.9) | 10 (0.8) | 570 (4.8) | 16 (0.8) | 564 (3.9) | 19 (1.1) | 557 (4.7) |
| Chile | | 53 (1.2) | 447 (3.1) | 32 (1.0) | 443 (4.0) | 12 (0.7) | 432 (5.4) | 4 (0.3) | 420 (8.1) |
| South Africa (5) | r | 51 (1.1) | 388 (5.1) | 17 (0.8) | 383 (4.7) | 24 (0.9) | 359 (3.8) | 8 (0.5) | 368 (6.7) |
| Armenia | | 51 (1.8) | 503 (3.2) | 19 (1.1) | 492 (3.9) | 13 (0.9) | 493 (4.0) | 17 (1.1) | 498 (3.7) |
| Kazakhstan | | 49 (1.6) | 519 (3.0) | 17 (0.8) | 507 (3.9) | 14 (0.8) | 509 (4.6) | 20 (1.3) | 503 (4.1) |
| Montenegro | | 48 (0.9) | 469 (2.5) | 14 (0.6) | 451 (4.4) | 15 (0.7) | 445 (3.8) | 23 (0.8) | 435 (3.4) |
| Canada | s | 45 (1.4) | 533 (2.5) | 25 (0.8) | 519 (2.7) | 18 (1.0) | 519 (6.0) | 11 (0.7) | 504 (6.9) |
| Bahrain | | 39 (1.0) | 491 (3.2) | 32 (0.8) | 483 (3.6) | 16 (0.8) | 473 (4.9) | 13 (0.6) | 463 (3.9) |
| North Macedonia | | 36 (2.0) | 505 (5.4) | 9 (0.8) | 492 (8.0) | 13 (1.0) | 478 (8.7) | 42 (2.1) | 446 (7.0) |
| Malta | s | 35 (0.9) | 527 (2.3) | 54 (0.9) | 515 (2.5) | 8 (0.5) | 494 (6.1) | 3 (0.4) | 500 (11.5) |
| Philippines | | 33 (1.5) | 305 (7.4) | 29 (1.8) | 300 (8.2) | 36 (1.7) | 293 (6.9) | 2 (0.3) | ~ ~ |
| Morocco | | 31 (0.9) | 413 (6.3) | 24 (1.1) | 391 (5.7) | 15 (0.9) | 378 (8.2) | 30 (1.7) | 358 (5.9) |
| Kuwait | r | 29 (0.9) | 396 (5.0) | 43 (1.0) | 384 (5.8) | 18 (1.2) | 387 (8.1) | 10 (0.9) | 379 (10.3) |
| Qatar | r | 24 (1.1) | 467 (5.3) | 38 (1.0) | 459 (4.8) | 22 (1.0) | 461 (6.0) | 16 (0.9) | 430 (6.2) |
| Pakistan | s | 24 (3.2) | 317 (12.3) | 4 (0.9) | 315 (27.7) | 8 (1.5) | 333 (15.2) | 63 (4.8) | 339 (18.4) |
| Bosnia and Herzegovina | | 23 (1.3) | 473 (3.6) | 8 (0.5) | 464 (4.6) | 50 (1.4) | 447 (2.8) | 19 (1.2) | 445 (4.0) |
| Azerbaijan | | 20 (1.1) | 533 (3.8) | 13 (0.6) | 538 (4.0) | 28 (1.2) | 526 (4.0) | 40 (1.6) | 513 (3.8) |
| Oman | | 17 (0.7) | 448 (5.5) | 36 (0.9) | 448 (5.0) | 28 (0.8) | 426 (4.4) | 19 (0.9) | 404 (7.5) |
| Iran, Islamic Rep. of | | 16 (1.0) | 478 (6.9) | 18 (1.0) | 458 (5.7) | 40 (1.1) | 441 (3.9) | 26 (1.4) | 423 (7.4) |
| Kosovo | | 12 (1.1) | 465 (6.2) | 6 (0.6) | 463 (7.0) | 49 (1.6) | 450 (3.2) | 33 (1.6) | 432 (4.6) |
| Saudi Arabia | | 12 (0.7) | 424 (6.8) | 18 (1.0) | 418 (4.5) | 39 (1.0) | 399 (4.0) | 30 (1.5) | 387 (5.6) |
| Turkey (5) | | 8 (0.9) | 577 (8.4) | 16 (1.0) | 570 (5.0) | 48 (1.6) | 521 (5.1) | 28 (1.7) | 490 (6.4) |
| Australia | | - - | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - | - - |
| Japan | | - - | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - | - - |
| Northern Ireland | | - - | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - | - - |
| New Zealand | x | 57 (1.3) | 510 (3.7) | 33 (1.2) | 517 (5.4) | 7 (0.9) | 515 (11.7) | 3 (0.4) | 470 (16.2) |
| United Arab Emirates | x | 19 (0.5) | 516 (3.4) | 38 (0.6) | 500 (2.2) | 24 (0.7) | 514 (3.5) | 19 (0.5) | 482 (3.4) |
| **International Average** | | **56 (0.2)** | **509 (0.6)** | **17 (0.1)** | **495 (1.0)** | **15 (0.1)** | **483 (1.0)** | **12 (0.2)** | **464 (1.4)** |
| **Benchmarking Participants** | | | | | | | | | |
| Madrid, Spain | r | 74 (1.3) | 530 (2.1) | 11 (0.8) | 517 (4.1) | 8 (0.5) | 492 (6.1) | 8 (0.8) | 487 (6.1) |
| Quebec, Canada | s | 65 (1.3) | 543 (2.9) | 14 (0.8) | 531 (5.5) | 15 (0.9) | 532 (4.8) | 6 (0.5) | 518 (7.2) |
| Moscow City, Russian Fed. | | 55 (1.1) | 597 (2.2) | 14 (0.6) | 593 (3.3) | 18 (0.6) | 588 (3.9) | 13 (0.7) | 581 (4.6) |
| Ontario, Canada | s | 38 (2.6) | 535 (4.1) | 29 (1.3) | 522 (4.3) | 17 (2.0) | 528 (11.8) | 16 (1.3) | 506 (9.6) |
| Dubai, UAE | s | 23 (0.9) | 569 (2.8) | 36 (1.0) | 560 (2.9) | 26 (0.7) | 562 (2.9) | 15 (1.0) | 536 (5.2) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.15: Students Attended Preprimary Education

*Students' Results based on Parents' Reports*

| Country | | Attended 3 Years or More | | Attended 2 Years | | Attended 1 Year or Less | | Did Not Attend | |
|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Hungary | | 95 (0.4) | 533 (2.8) | 3 (0.4) | 525 (10.3) | 1 (0.2) | ~ ~ | 0 (0.0) | ~ ~ |
| Denmark | s | 95 (0.5) | 535 (2.7) | 3 (0.4) | 512 (9.4) | 1 (0.2) | ~ ~ | 0 (0.2) | ~ ~ |
| Norway (5) | s | 94 (0.6) | 550 (2.6) | 3 (0.4) | 525 (13.5) | 2 (0.3) | ~ ~ | 1 (0.3) | ~ ~ |
| Korea, Rep. of | | 92 (0.5) | 588 (2.2) | 6 (0.5) | 597 (5.9) | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| Sweden | r | 90 (0.9) | 549 (3.0) | 3 (0.4) | 511 (12.6) | 3 (0.4) | 504 (8.8) | 3 (0.5) | 473 (9.4) |
| Belgium (Flemish) | | 90 (0.6) | 508 (2.1) | 5 (0.4) | 485 (5.5) | 3 (0.4) | 462 (6.8) | 2 (0.2) | ~ ~ |
| Italy | | 89 (0.9) | 515 (3.0) | 8 (0.8) | 493 (5.3) | 2 (0.3) | ~ ~ | 1 (0.2) | ~ ~ |
| France | | 88 (0.8) | 494 (2.8) | 5 (0.5) | 479 (8.4) | 5 (0.5) | 461 (9.3) | 2 (0.3) | ~ ~ |
| Latvia | | 84 (0.7) | 545 (2.3) | 9 (0.5) | 533 (5.4) | 4 (0.4) | 530 (7.1) | 3 (0.4) | 530 (6.3) |
| Czech Republic | r | 84 (0.8) | 542 (2.7) | 11 (0.7) | 539 (5.2) | 4 (0.4) | 527 (8.9) | 1 (0.2) | ~ ~ |
| Singapore | | 83 (0.6) | 603 (3.2) | 10 (0.4) | 571 (5.2) | 4 (0.3) | 562 (7.3) | 3 (0.2) | 549 (8.7) |
| Portugal | | 82 (0.9) | 509 (2.5) | 10 (0.7) | 507 (4.8) | 5 (0.3) | 484 (5.4) | 3 (0.3) | 478 (8.4) |
| Austria | | 80 (1.2) | 532 (2.9) | 13 (1.1) | 523 (5.1) | 4 (0.4) | 478 (7.7) | 2 (0.4) | ~ ~ |
| Slovak Republic | | 77 (1.7) | 537 (2.4) | 11 (0.7) | 504 (7.3) | 7 (0.7) | 482 (10.5) | 6 (0.8) | 421 (12.0) |
| Bulgaria | | 75 (2.2) | 543 (3.8) | 13 (1.7) | 479 (11.0) | 10 (1.0) | 460 (12.9) | 3 (0.6) | 427 (25.0) |
| Finland | | 74 (1.1) | 557 (2.7) | 10 (0.6) | 561 (4.7) | 15 (0.8) | 562 (4.7) | 1 (0.2) | ~ ~ |
| Lithuania | r | 74 (1.2) | 545 (2.6) | 8 (0.7) | 531 (6.5) | 15 (0.9) | 513 (5.1) | 2 (0.4) | ~ ~ |
| Georgia | | 71 (1.3) | 455 (4.1) | 16 (0.8) | 451 (6.0) | 7 (0.7) | 467 (9.8) | 6 (0.8) | 456 (9.4) |
| Poland | | 70 (1.1) | 540 (2.6) | 16 (0.8) | 523 (3.9) | 14 (1.2) | 511 (4.4) | 1 (0.2) | ~ ~ |
| Hong Kong SAR | | 69 (0.9) | 536 (3.6) | 6 (0.6) | 543 (6.4) | 14 (0.8) | 529 (5.2) | 10 (0.8) | 516 (5.7) |
| Spain | | 68 (0.8) | 525 (2.1) | 13 (0.7) | 510 (4.4) | 9 (0.6) | 493 (7.2) | 10 (0.5) | 488 (5.7) |
| Germany | s | 64 (1.2) | 540 (2.4) | 8 (0.6) | 525 (7.3) | 16 (0.8) | 533 (4.4) | 12 (0.8) | 497 (7.1) |
| Albania | | 61 (1.6) | 503 (3.8) | 19 (1.2) | 490 (5.7) | 13 (0.8) | 470 (6.2) | 8 (0.9) | 464 (11.5) |
| Croatia | | 60 (1.8) | 533 (2.8) | 9 (0.7) | 515 (5.8) | 14 (1.3) | 509 (4.9) | 16 (1.4) | 515 (4.2) |
| Chinese Taipei | | 59 (1.1) | 559 (2.1) | 36 (0.9) | 557 (2.4) | 5 (0.5) | 556 (6.3) | 0 (0.1) | ~ ~ |
| Ireland | | 56 (1.2) | 543 (3.4) | 25 (1.1) | 523 (4.8) | 18 (0.9) | 511 (4.4) | 1 (0.2) | ~ ~ |
| Cyprus | | 56 (1.0) | 523 (3.1) | 23 (0.7) | 511 (4.3) | 12 (0.5) | 504 (4.7) | 9 (0.5) | 493 (5.1) |
| Serbia | | 55 (1.4) | 536 (3.1) | 12 (1.3) | 512 (9.3) | 32 (1.8) | 497 (4.9) | 1 (0.2) | ~ ~ |
| Russian Federation | | 55 (1.4) | 572 (3.4) | 10 (0.8) | 571 (5.2) | 16 (0.8) | 565 (4.3) | 19 (1.1) | 559 (4.5) |
| Chile | | 53 (1.2) | 477 (2.8) | 32 (1.0) | 469 (4.0) | 12 (0.7) | 458 (4.5) | 4 (0.3) | 440 (8.4) |
| South Africa (5) | r | 51 (1.1) | 343 (6.9) | 17 (0.8) | 339 (6.6) | 24 (0.9) | 304 (5.3) | 8 (0.5) | 313 (10.1) |
| Armenia | | 51 (1.8) | 471 (4.1) | 19 (1.1) | 463 (4.6) | 13 (0.9) | 455 (5.4) | 17 (1.1) | 466 (4.6) |
| Kazakhstan | | 49 (1.6) | 503 (3.8) | 17 (0.8) | 490 (4.6) | 14 (0.8) | 491 (5.1) | 20 (1.3) | 480 (4.3) |
| Montenegro | | 48 (0.9) | 469 (2.9) | 14 (0.6) | 457 (6.2) | 15 (0.7) | 443 (4.7) | 23 (0.8) | 439 (4.0) |
| Canada | s | 45 (1.4) | 537 (2.5) | 25 (0.8) | 533 (3.1) | 18 (1.0) | 535 (4.7) | 11 (0.7) | 521 (5.1) |
| Bahrain | | 39 (1.0) | 512 (4.1) | 32 (0.8) | 499 (4.7) | 16 (0.8) | 484 (4.9) | 13 (0.6) | 465 (4.6) |
| North Macedonia | | 36 (2.0) | 461 (6.2) | 9 (0.8) | 445 (8.2) | 13 (1.0) | 428 (9.9) | 42 (2.1) | 400 (8.5) |
| Malta | s | 35 (0.9) | 518 (2.9) | 54 (0.9) | 499 (2.4) | 8 (0.5) | 483 (7.0) | 3 (0.4) | 488 (11.2) |
| Philippines | | 33 (1.5) | 260 (9.0) | 29 (1.8) | 253 (9.2) | 36 (1.7) | 242 (8.0) | 2 (0.3) | ~ ~ |
| Morocco | | 31 (0.9) | 406 (7.8) | 24 (1.1) | 386 (7.3) | 15 (0.9) | 365 (10.5) | 30 (1.7) | 345 (8.1) |
| Kuwait | r | 29 (0.9) | 409 (5.9) | 43 (1.0) | 400 (6.5) | 18 (1.2) | 397 (10.6) | 10 (0.9) | 390 (13.4) |
| Qatar | r | 24 (1.1) | 468 (5.6) | 38 (1.0) | 464 (5.6) | 22 (1.0) | 466 (6.5) | 16 (0.9) | 426 (6.3) |
| Pakistan | s | 24 (3.2) | 281 (15.1) | 4 (0.9) | 312 (31.2) | 8 (1.5) | 300 (17.1) | 63 (4.8) | 300 (18.6) |
| Bosnia and Herzegovina | | 23 (1.3) | 475 (4.4) | 8 (0.5) | 474 (5.2) | 50 (1.4) | 453 (3.1) | 19 (1.2) | 457 (5.2) |
| Azerbaijan | | 20 (1.1) | 445 (5.2) | 13 (0.6) | 452 (4.9) | 28 (1.2) | 442 (4.5) | 40 (1.6) | 425 (4.1) |
| Oman | | 17 (0.7) | 459 (5.8) | 36 (0.9) | 461 (5.5) | 28 (0.8) | 433 (4.6) | 19 (0.9) | 389 (6.7) |
| Iran, Islamic Rep. of | | 16 (1.0) | 475 (6.9) | 18 (1.0) | 462 (5.1) | 40 (1.1) | 440 (4.5) | 26 (1.4) | 418 (7.1) |
| Kosovo | | 12 (1.1) | 433 (7.5) | 6 (0.6) | 436 (8.8) | 49 (1.6) | 419 (4.1) | 33 (1.6) | 399 (5.0) |
| Saudi Arabia | | 12 (0.7) | 423 (7.2) | 18 (1.0) | 429 (5.8) | 39 (1.0) | 406 (4.1) | 30 (1.5) | 389 (7.0) |
| Turkey (5) | | 8 (0.9) | 572 (7.1) | 16 (1.0) | 568 (4.4) | 48 (1.6) | 524 (5.2) | 28 (1.7) | 496 (6.8) |
| Australia | | - - | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - | - - |
| Japan | | - - | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - | - - |
| Northern Ireland | | - - | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - | - - |
| New Zealand | x | 57 (1.3) | 525 (3.4) | 33 (1.2) | 531 (5.1) | 7 (0.9) | 525 (8.3) | 3 (0.4) | 481 (12.7) |
| United Arab Emirates | x | 19 (0.5) | 511 (3.4) | 38 (0.6) | 497 (3.1) | 24 (0.7) | 514 (4.2) | 19 (0.5) | 479 (4.2) |
| **International Average** | | **56 (0.2)** | **500 (0.7)** | **17 (0.1)** | **489 (1.1)** | **15 (0.1)** | **472 (1.0)** | **12 (0.2)** | **452 (1.5)** |
| **Benchmarking Participants** | | | | | | | | | |
| Madrid, Spain | r | 74 (1.3) | 533 (2.1) | 11 (0.8) | 517 (4.3) | 8 (0.5) | 503 (5.5) | 8 (0.8) | 494 (5.4) |
| Quebec, Canada | s | 65 (1.3) | 530 (3.4) | 14 (0.8) | 524 (5.9) | 15 (0.9) | 525 (4.5) | 6 (0.5) | 510 (7.7) |
| Moscow City, Russian Fed. | | 55 (1.1) | 601 (2.5) | 14 (0.6) | 587 (3.3) | 18 (0.6) | 594 (3.6) | 13 (0.7) | 582 (4.9) |
| Ontario, Canada | s | 38 (2.6) | 543 (3.8) | 29 (1.3) | 531 (4.5) | 17 (2.0) | 541 (9.0) | 16 (1.3) | 523 (7.1) |
| Dubai, UAE | s | 23 (0.9) | 566 (4.0) | 36 (1.0) | 563 (3.3) | 26 (0.7) | 565 (3.3) | 15 (1.0) | 545 (6.3) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Literacy and Numeracy Readiness for School

## Early Preparation for School

Exhibits 5.16 and 5.17 provide further insight into the relative effects of formal preprimary education and informal literacy and numeracy activities in the home on later achievement in mathematics and science, respectively. The results suggest that preprimary education cannot completely replace parental involvement in preparing children for later success in school. At each level of preprimary attendance, from three years or more down through one year or less, the students whose parents "often" engaged them in early literacy and numeracy activities had higher average mathematics and higher average science achievement than those engaged only "sometimes" or "never."

For both mathematics and science, average achievement was highest (520 and 513, respectively) among the 26 percent of students that had three years or more of preprimary education and whose parents "often" engaged them in literacy and numeracy activities before beginning primary school. It was lowest (469 and 455, respectively) among the 18 percent that had one year or less of preprimary education and parents reporting only "sometimes" or "never" engaging them in literacy and numeracy activities. See About the Scale in Exhibit 5.11 for information about the *Early Literacy and Numeracy Activities* scale.

# Exhibit 5.16: Early Preparation for School

*Students' Results based on Parents' Reports*

| Country | Attended Preprimary Education Program for 3 Years or More | | | | Attended Preprimary Education Program for 2 Years | | | | Attended Preprimary Education Program for 1 Year or Less Including Did Not Attend | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Often Engaged in Early Literacy and Numeracy Activities | | Sometimes or Never Engaged in Early Literacy and Numeracy Activities | | Often Engaged in Early Literacy and Numeracy Activities | | Sometimes or Never Engaged in Early Literacy and Numeracy Activities | | Often Engaged in Early Literacy and Numeracy Activities | | Sometimes or Never Engaged in Early Literacy and Numeracy Activities | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Hungary | 53 (0.9) | 532 (3.0) | 43 (0.9) | 521 (3.5) | 2 (0.2) | ~ ~ | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| Korea, Rep. of | 45 (1.0) | 614 (2.6) | 47 (1.1) | 590 (2.6) | 3 (0.3) | 608 (8.6) | 3 (0.3) | 586 (8.1) | 1 (0.1) | ~ ~ | 2 (0.2) | ~ ~ |
| Slovak Republic | 44 (1.5) | 528 (2.8) | 33 (1.0) | 517 (3.3) | 5 (0.4) | 513 (7.8) | 6 (0.6) | 489 (9.5) | 5 (0.5) | 461 (9.5) | 7 (1.0) | 444 (11.1) |
| Czech Republic r | 43 (0.9) | 548 (3.2) | 41 (1.1) | 538 (2.6) | 5 (0.4) | 539 (6.5) | 5 (0.5) | 534 (6.3) | 3 (0.3) | 525 (9.0) | 2 (0.3) | ~ ~ |
| Latvia | 41 (1.1) | 556 (2.8) | 43 (0.9) | 547 (2.9) | 4 (0.3) | 547 (7.8) | 5 (0.4) | 517 (7.1) | 3 (0.3) | 539 (8.3) | 4 (0.4) | 520 (7.3) |
| Poland | 41 (1.0) | 533 (3.2) | 28 (0.8) | 528 (3.3) | 9 (0.6) | 512 (5.3) | 7 (0.5) | 507 (5.2) | 8 (0.7) | 503 (6.8) | 7 (0.7) | 494 (5.6) |
| Italy | 41 (1.1) | 526 (3.2) | 48 (1.1) | 513 (2.5) | 3 (0.4) | 505 (7.4) | 5 (0.5) | 495 (6.9) | 1 (0.2) | ~ ~ | 2 (0.3) | ~ ~ |
| Albania | 41 (1.6) | 518 (4.1) | 20 (1.4) | 490 (4.8) | 9 (0.7) | 498 (4.9) | 9 (0.8) | 481 (9.0) | 8 (0.8) | 488 (8.1) | 12 (1.0) | 463 (8.3) |
| France | 40 (1.1) | 505 (3.5) | 48 (0.8) | 482 (3.4) | 2 (0.3) | ~ ~ | 3 (0.3) | 459 (11.3) | 3 (0.3) | 488 (11.1) | 4 (0.5) | 448 (8.0) |
| Russian Federation | 38 (1.2) | 577 (3.8) | 16 (0.8) | 564 (5.0) | 7 (0.6) | 569 (4.3) | 3 (0.3) | 573 (9.2) | 21 (1.1) | 563 (3.8) | 14 (0.9) | 557 (4.9) |
| Croatia | 36 (1.4) | 527 (2.6) | 24 (1.0) | 510 (3.3) | 5 (0.5) | 509 (6.7) | 4 (0.6) | 490 (10.4) | 15 (1.1) | 508 (4.7) | 16 (1.4) | 484 (4.2) |
| Serbia | 36 (1.0) | 537 (3.0) | 19 (0.9) | 515 (4.2) | 7 (0.8) | 519 (8.9) | 5 (0.7) | 469 (9.8) | 18 (1.2) | 498 (5.0) | 15 (1.1) | 466 (6.6) |
| Denmark s | 36 (1.3) | 550 (3.2) | 60 (1.3) | 535 (3.0) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| Lithuania r | 35 (1.0) | 557 (3.3) | 39 (1.0) | 544 (3.7) | 4 (0.5) | 535 (9.1) | 4 (0.4) | 527 (8.2) | 7 (0.5) | 522 (7.7) | 10 (0.8) | 510 (4.7) |
| Norway (5) s | 35 (1.0) | 563 (3.7) | 59 (1.1) | 547 (2.8) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ |
| Georgia | 34 (1.2) | 484 (4.6) | 37 (1.1) | 488 (4.4) | 7 (0.5) | 479 (6.2) | 9 (0.6) | 478 (6.5) | 5 (0.6) | 482 (9.6) | 8 (0.8) | 475 (7.1) |
| Ireland | 34 (0.8) | 576 (2.7) | 22 (0.8) | 550 (3.8) | 14 (0.7) | 546 (5.0) | 11 (0.8) | 530 (5.7) | 10 (0.6) | 542 (4.4) | 9 (0.5) | 518 (5.4) |
| Portugal | 33 (0.8) | 546 (3.0) | 49 (0.9) | 525 (2.7) | 4 (0.4) | 533 (8.7) | 6 (0.5) | 508 (6.3) | 3 (0.3) | 512 (9.5) | 5 (0.4) | 481 (6.1) |
| Bulgaria | 33 (1.4) | 548 (2.9) | 42 (1.7) | 519 (3.7) | 3 (0.3) | 528 (8.1) | 10 (1.6) | 465 (11.7) | 3 (0.3) | 531 (11.0) | 10 (1.2) | 452 (14.9) |
| Austria | 32 (1.1) | 553 (3.1) | 48 (1.1) | 541 (2.5) | 5 (0.5) | 547 (7.1) | 8 (0.8) | 531 (5.9) | 2 (0.3) | ~ ~ | 4 (0.4) | 506 (6.5) |
| Spain | 32 (0.8) | 528 (3.0) | 36 (0.7) | 510 (3.1) | 5 (0.5) | 505 (5.8) | 8 (0.5) | 494 (6.5) | 7 (0.4) | 488 (6.6) | 12 (0.6) | 471 (5.3) |
| Montenegro | 31 (0.9) | 473 (3.1) | 17 (0.6) | 464 (3.8) | 8 (0.5) | 462 (4.7) | 6 (0.4) | 435 (7.1) | 21 (0.7) | 453 (3.3) | 17 (0.6) | 423 (4.0) |
| Cyprus | 30 (0.9) | 556 (3.3) | 25 (0.7) | 530 (4.1) | 11 (0.6) | 540 (4.3) | 12 (0.5) | 520 (5.1) | 8 (0.5) | 532 (5.6) | 13 (0.6) | 513 (5.2) |
| Singapore | 30 (0.8) | 645 (4.2) | 53 (0.7) | 627 (3.7) | 3 (0.2) | 612 (8.3) | 7 (0.3) | 597 (5.7) | 1 (0.1) | ~ ~ | 5 (0.4) | 586 (7.1) |
| Kazakhstan | 30 (1.4) | 524 (3.6) | 19 (1.1) | 513 (3.5) | 9 (0.6) | 515 (4.7) | 7 (0.6) | 498 (5.7) | 16 (0.8) | 515 (4.4) | 18 (1.3) | 496 (4.0) |
| Germany s | 28 (1.4) | 546 (3.8) | 37 (1.1) | 535 (3.1) | 4 (0.4) | 530 (8.8) | 5 (0.5) | 509 (8.2) | 9 (0.6) | 535 (5.4) | 18 (0.9) | 516 (4.1) |
| Canada s | 27 (1.1) | 538 (2.5) | 18 (0.7) | 526 (3.4) | 15 (0.7) | 527 (3.3) | 10 (0.5) | 507 (3.8) | 15 (0.9) | 517 (6.4) | 15 (0.8) | 509 (6.1) |
| Sweden r | 26 (1.0) | 537 (3.6) | 64 (1.1) | 530 (3.1) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ | 2 (0.3) | ~ ~ | 5 (0.6) | 483 (7.8) |
| Belgium (Flemish) | 25 (0.8) | 550 (2.5) | 65 (0.9) | 536 (2.1) | 2 (0.2) | ~ ~ | 4 (0.3) | 514 (6.4) | 1 (0.2) | ~ ~ | 4 (0.4) | 486 (5.3) |
| Armenia | 24 (1.1) | 508 (3.4) | 26 (1.2) | 498 (3.7) | 8 (0.5) | 498 (4.6) | 11 (0.7) | 487 (5.4) | 13 (0.9) | 501 (3.9) | 17 (1.3) | 492 (4.0) |
| Finland | 23 (0.7) | 547 (3.8) | 51 (1.1) | 530 (2.8) | 3 (0.3) | 557 (8.1) | 7 (0.5) | 531 (5.7) | 5 (0.5) | 548 (6.1) | 11 (0.7) | 532 (6.6) |
| North Macedonia r | 23 (1.3) | 511 (5.8) | 13 (1.0) | 497 (6.7) | 6 (0.5) | 494 (9.1) | 4 (0.4) | 489 (11.3) | 25 (1.3) | 470 (7.3) | 30 (1.7) | 440 (7.3) |
| Malta s | 22 (0.7) | 534 (2.8) | 13 (0.7) | 515 (3.8) | 32 (0.9) | 524 (2.9) | 22 (0.9) | 501 (3.6) | 5 (0.5) | 506 (6.7) | 6 (0.5) | 485 (7.6) |
| Chile | 20 (0.8) | 462 (3.6) | 32 (1.0) | 437 (3.5) | 12 (0.7) | 461 (4.8) | 19 (0.9) | 433 (4.4) | 6 (0.5) | 452 (6.9) | 9 (0.7) | 415 (5.0) |
| Bahrain | 19 (0.7) | 503 (4.0) | 20 (0.8) | 480 (4.2) | 14 (0.6) | 489 (4.7) | 18 (0.9) | 479 (4.2) | 9 (0.7) | 479 (6.2) | 19 (0.9) | 463 (3.7) |
| South Africa (5) r | 16 (0.7) | 422 (7.3) | 35 (0.9) | 375 (4.8) | 5 (0.3) | 415 (7.8) | 12 (0.7) | 370 (4.8) | 8 (0.5) | 384 (6.9) | 24 (0.9) | 356 (3.9) |
| Hong Kong SAR | 15 (1.2) | 627 (5.7) | 55 (1.3) | 603 (4.1) | 2 (0.3) | ~ ~ | 4 (0.5) | 598 (8.8) | 4 (0.5) | 608 (6.4) | 20 (0.7) | 594 (4.6) |
| Chinese Taipei | 14 (0.6) | 622 (3.4) | 45 (1.0) | 597 (2.2) | 9 (0.5) | 616 (5.2) | 27 (0.8) | 589 (3.0) | 2 (0.2) | ~ ~ | 4 (0.4) | 581 (7.8) |
| Bosnia and Herzegovina | 13 (0.9) | 475 (4.5) | 10 (0.7) | 470 (4.3) | 4 (0.4) | 471 (5.7) | 3 (0.3) | 454 (6.6) | 36 (1.0) | 457 (2.7) | 33 (1.1) | 436 (3.4) |
| Kuwait r | 12 (0.7) | 407 (7.4) | 18 (0.7) | 388 (5.3) | 15 (0.8) | 402 (7.5) | 29 (0.8) | 375 (6.2) | 8 (0.5) | 407 (9.3) | 20 (1.2) | 376 (8.0) |
| Philippines | 10 (0.7) | 343 (8.6) | 23 (1.3) | 288 (8.6) | 9 (0.7) | 337 (9.3) | 20 (1.4) | 284 (9.0) | 10 (0.8) | 310 (10.3) | 28 (1.4) | 287 (6.5) |
| Qatar r | 10 (0.7) | 481 (6.4) | 14 (0.6) | 457 (5.8) | 13 (0.7) | 474 (5.9) | 25 (1.0) | 452 (5.1) | 12 (0.7) | 471 (6.1) | 26 (1.0) | 438 (6.0) |
| Azerbaijan | 8 (0.6) | 540 (5.5) | 12 (0.8) | 529 (4.8) | 5 (0.4) | 547 (5.7) | 8 (0.6) | 534 (5.4) | 17 (1.0) | 533 (4.6) | 50 (1.5) | 514 (3.4) |
| Kosovo | 8 (0.9) | 478 (7.2) | 4 (0.5) | 448 (8.0) | 4 (0.4) | 471 (8.9) | 3 (0.4) | 455 (9.3) | 39 (1.2) | 449 (3.4) | 43 (1.4) | 438 (3.8) |
| Morocco | 7 (0.5) | 436 (10.6) | 25 (0.8) | 407 (6.0) | 4 (0.4) | 428 (10.0) | 20 (1.0) | 384 (6.5) | 2 (0.3) | ~ ~ | 42 (1.5) | 362 (5.6) |
| Oman | 6 (0.4) | 472 (7.4) | 11 (0.5) | 436 (5.9) | 11 (0.7) | 469 (11.0) | 25 (0.7) | 439 (4.0) | 10 (0.5) | 447 (5.8) | 37 (1.0) | 410 (5.1) |
| Iran, Islamic Rep. of | 6 (0.5) | 480 (10.2) | 11 (0.8) | 476 (7.3) | 5 (0.4) | 470 (11.1) | 13 (0.8) | 454 (5.5) | 12 (0.7) | 449 (5.1) | 53 (1.4) | 431 (4.5) |
| Saudi Arabia r | 5 (0.4) | 443 (7.8) | 8 (0.5) | 412 (9.6) | 7 (0.6) | 430 (6.4) | 11 (0.6) | 412 (5.4) | 17 (0.8) | 406 (6.4) | 53 (1.2) | 391 (4.0) |
| Pakistan s | 4 (1.0) | 356 (22.8) | 20 (2.8) | 310 (11.5) | 1 (0.5) | ~ ~ | 3 (0.6) | 312 (25.1) | 6 (1.0) | 359 (17.4) | 66 (4.0) | 337 (17.3) |
| Turkey (5) | 4 (0.4) | 594 (8.6) | 5 (0.6) | 563 (11.3) | 6 (0.6) | 584 (7.3) | 10 (0.6) | 560 (5.8) | 18 (1.2) | 555 (5.1) | 58 (1.7) | 495 (5.2) |
| Australia | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| England | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Japan | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Northern Ireland | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| United States | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| New Zealand x | 35 (1.3) | 516 (4.1) | 22 (1.2) | 502 (5.6) | 21 (1.1) | 527 (6.5) | 12 (0.8) | 498 (7.2) | 5 (0.5) | 515 (13.5) | 5 (0.9) | 489 (12.9) |
| United Arab Emirates x | 10 (0.3) | 530 (3.7) | 9 (0.3) | 502 (4.4) | 20 (0.4) | 510 (2.7) | 19 (0.5) | 490 (3.0) | 20 (0.5) | 511 (3.6) | 23 (0.5) | 490 (3.7) |
| **International Average** | **26 (0.1)** | **520 (0.8)** | **30 (0.1)** | **501 (0.7)** | **7 (0.1)** | **508 (1.1)** | **9 (0.1)** | **485 (1.1)** | **9 (0.1)** | **488 (1.2)** | **18 (0.1)** | **469 (1.0)** |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 42 (1.2) | 598 (2.5) | 13 (0.7) | 595 (3.7) | 10 (0.5) | 597 (3.6) | 4 (0.4) | 583 (5.7) | 18 (0.8) | 590 (3.6) | 12 (0.7) | 578 (4.6) |
| Madrid, Spain r | 38 (1.4) | 534 (2.6) | 36 (0.9) | 525 (2.7) | 5 (0.5) | 526 (6.6) | 5 (0.5) | 508 (6.6) | 5 (0.4) | 503 (7.8) | 10 (0.8) | 483 (5.8) |
| Quebec, Canada s | 33 (1.4) | 550 (3.3) | 32 (1.1) | 536 (4.3) | 7 (0.7) | 540 (7.0) | 7 (0.6) | 522 (6.8) | 9 (0.7) | 536 (7.0) | 12 (0.8) | 521 (5.0) |
| Ontario, Canada s | 26 (1.8) | 540 (4.3) | 12 (1.1) | 524 (6.3) | 18 (1.3) | 529 (5.0) | 11 (0.8) | 510 (5.8) | 17 (1.8) | 518 (10.9) | 15 (1.6) | 516 (10.8) |
| Dubai, UAE s | 13 (0.6) | 575 (3.6) | 10 (0.5) | 561 (4.8) | 20 (0.7) | 565 (3.3) | 17 (0.8) | 554 (4.8) | 20 (0.7) | 561 (4.2) | 21 (1.0) | 544 (3.9) |
| Abu Dhabi, UAE y | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 5.17: Early Preparation for School

*Students' Results based on Parents' Reports*

| Country | Attended Preprimary Education Program for 3 Years or More | | | | Attended Preprimary Education Program for 2 Years | | | | Attended Preprimary Education Program for 1 Year or Less Including Did Not Attend | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Often Engaged in Early Literacy and Numeracy Activities | | Sometimes or Never Engaged in Early Literacy and Numeracy Activities | | Often Engaged in Early Literacy and Numeracy Activities | | Sometimes or Never Engaged in Early Literacy and Numeracy Activities | | Often Engaged in Early Literacy and Numeracy Activities | | Sometimes or Never Engaged in Early Literacy and Numeracy Activities | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Hungary | 53 (0.9) | 537 (2.8) | 43 (0.9) | 527 (3.6) | 2 (0.2) | ~ ~ | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| Korea, Rep. of | 45 (1.0) | 599 (2.8) | 47 (1.1) | 579 (2.7) | 3 (0.3) | 606 (7.9) | 3 (0.3) | 589 (7.5) | 1 (0.1) | ~ ~ | 2 (0.2) | ~ ~ |
| Slovak Republic | 44 (1.5) | 541 (3.0) | 33 (1.0) | 531 (3.0) | 5 (0.4) | 522 (7.5) | 6 (0.6) | 487 (10.2) | 5 (0.5) | 470 (10.4) | 7 (1.0) | 443 (12.4) |
| Czech Republic r | 43 (0.9) | 545 (3.2) | 41 (1.1) | 539 (2.9) | 5 (0.4) | 541 (7.2) | 5 (0.5) | 537 (7.1) | 3 (0.3) | 530 (9.1) | 2 (0.3) | ~ ~ |
| Latvia | 41 (1.1) | 551 (2.7) | 43 (0.9) | 540 (2.7) | 4 (0.3) | 548 (7.5) | 5 (0.4) | 520 (7.4) | 3 (0.3) | 540 (7.8) | 4 (0.4) | 521 (5.8) |
| Poland | 41 (1.0) | 542 (3.3) | 28 (0.8) | 536 (2.7) | 9 (0.6) | 525 (4.7) | 7 (0.5) | 520 (5.2) | 8 (0.7) | 516 (6.2) | 7 (0.7) | 507 (5.1) |
| Italy | 41 (1.1) | 522 (3.5) | 48 (1.1) | 509 (3.1) | 3 (0.4) | 501 (8.0) | 5 (0.5) | 488 (7.1) | 1 (0.2) | ~ ~ | 2 (0.3) | ~ ~ |
| Albania | 41 (1.6) | 512 (4.7) | 20 (1.4) | 486 (5.2) | 9 (0.7) | 497 (5.5) | 9 (0.8) | 483 (8.4) | 8 (0.8) | 482 (7.9) | 12 (1.0) | 457 (8.2) |
| France | 40 (1.1) | 508 (3.1) | 48 (0.8) | 483 (3.5) | 2 (0.3) | ~ ~ | 3 (0.3) | 468 (11.5) | 3 (0.3) | 496 (11.5) | 4 (0.5) | 448 (9.2) |
| Russian Federation | 38 (1.2) | 577 (3.3) | 16 (0.8) | 563 (4.7) | 7 (0.6) | 571 (5.1) | 3 (0.3) | 571 (8.7) | 21 (1.1) | 565 (3.8) | 14 (0.9) | 556 (4.2) |
| Croatia | 36 (1.4) | 539 (3.1) | 24 (1.0) | 523 (3.5) | 5 (0.5) | 525 (5.8) | 4 (0.6) | 503 (9.7) | 15 (1.1) | 522 (4.2) | 16 (1.4) | 503 (3.8) |
| Serbia | 36 (1.0) | 545 (3.2) | 19 (0.9) | 520 (4.3) | 7 (0.8) | 534 (9.6) | 5 (0.7) | 480 (11.1) | 18 (1.2) | 510 (5.5) | 15 (1.1) | 475 (6.5) |
| Denmark s | 36 (1.3) | 550 (3.5) | 60 (1.3) | 527 (2.9) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| Lithuania r | 35 (1.0) | 552 (2.8) | 39 (1.0) | 538 (3.2) | 4 (0.5) | 535 (8.4) | 4 (0.4) | 528 (7.8) | 7 (0.5) | 523 (7.3) | 10 (0.8) | 508 (5.4) |
| Norway (5) s | 35 (1.0) | 560 (3.4) | 59 (1.1) | 543 (2.9) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ |
| Georgia | 34 (1.2) | 452 (4.5) | 37 (1.1) | 458 (4.9) | 7 (0.5) | 452 (6.9) | 9 (0.6) | 452 (8.2) | 5 (0.6) | 466 (8.4) | 8 (0.8) | 459 (9.6) |
| Ireland | 34 (0.8) | 553 (3.3) | 22 (0.8) | 527 (4.9) | 14 (0.7) | 532 (5.9) | 11 (0.8) | 513 (5.1) | 10 (0.6) | 520 (5.3) | 9 (0.5) | 498 (5.5) |
| Portugal | 33 (0.8) | 520 (3.0) | 49 (0.9) | 502 (3.0) | 4 (0.4) | 519 (8.0) | 6 (0.5) | 499 (5.8) | 3 (0.3) | 502 (7.9) | 5 (0.4) | 471 (5.8) |
| Bulgaria | 33 (1.4) | 564 (3.7) | 42 (1.7) | 527 (4.7) | 3 (0.3) | 537 (8.9) | 10 (1.6) | 461 (12.1) | 3 (0.3) | 539 (12.8) | 10 (1.2) | 436 (15.7) |
| Austria | 32 (1.1) | 539 (3.6) | 48 (1.1) | 528 (3.2) | 5 (0.5) | 534 (7.0) | 8 (0.8) | 517 (7.0) | 2 (0.3) | ~ ~ | 4 (0.4) | 457 (7.9) |
| Spain | 32 (0.8) | 532 (2.8) | 36 (0.7) | 519 (2.6) | 5 (0.5) | 515 (5.2) | 8 (0.5) | 506 (6.0) | 7 (0.4) | 507 (6.2) | 12 (0.6) | 481 (5.4) |
| Montenegro | 31 (0.9) | 474 (3.3) | 17 (0.6) | 460 (4.3) | 8 (0.5) | 468 (6.4) | 6 (0.4) | 440 (8.8) | 21 (0.7) | 457 (3.5) | 17 (0.6) | 423 (4.8) |
| Cyprus | 30 (0.9) | 534 (3.3) | 25 (0.7) | 509 (4.1) | 11 (0.6) | 523 (4.4) | 12 (0.5) | 499 (5.7) | 8 (0.5) | 513 (5.5) | 13 (0.6) | 491 (5.1) |
| Singapore | 30 (0.8) | 617 (3.4) | 53 (0.7) | 595 (3.4) | 3 (0.2) | 586 (7.9) | 7 (0.3) | 565 (5.5) | 1 (0.1) | ~ ~ | 5 (0.4) | 550 (6.5) |
| Kazakhstan | 30 (1.4) | 512 (4.7) | 19 (1.1) | 490 (3.9) | 9 (0.6) | 501 (5.6) | 7 (0.6) | 477 (5.6) | 16 (0.8) | 497 (4.5) | 18 (1.3) | 472 (4.8) |
| Germany s | 28 (1.4) | 543 (3.4) | 37 (1.1) | 537 (3.0) | 4 (0.4) | 534 (10.4) | 5 (0.5) | 517 (8.5) | 9 (0.6) | 530 (6.7) | 18 (0.9) | 512 (4.3) |
| Canada s | 27 (1.1) | 543 (2.9) | 18 (0.7) | 526 (3.0) | 15 (0.7) | 542 (3.1) | 10 (0.5) | 518 (4.8) | 15 (0.9) | 536 (4.3) | 15 (0.8) | 523 (4.9) |
| Sweden r | 26 (1.0) | 550 (4.2) | 64 (1.1) | 548 (2.9) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ | 2 (0.3) | ~ ~ | 5 (0.6) | 484 (8.1) |
| Belgium (Flemish) | 25 (0.8) | 519 (2.5) | 65 (0.9) | 505 (2.4) | 2 (0.2) | ~ ~ | 4 (0.3) | 486 (6.1) | 1 (0.2) | ~ ~ | 4 (0.4) | 450 (7.2) |
| Armenia | 24 (1.1) | 477 (4.2) | 26 (1.2) | 465 (4.9) | 8 (0.5) | 473 (5.5) | 11 (0.7) | 457 (5.9) | 13 (0.9) | 470 (5.0) | 17 (1.3) | 454 (5.0) |
| Finland | 23 (0.7) | 566 (3.4) | 51 (1.1) | 554 (2.9) | 3 (0.3) | 566 (8.1) | 7 (0.5) | 559 (5.9) | 5 (0.5) | 566 (5.5) | 11 (0.7) | 553 (6.8) |
| North Macedonia r | 23 (1.3) | 469 (6.2) | 13 (1.0) | 450 (8.2) | 6 (0.5) | 449 (9.1) | 4 (0.4) | 441 (12.5) | 25 (1.3) | 427 (8.2) | 30 (1.7) | 390 (8.5) |
| Malta s | 22 (0.7) | 524 (3.3) | 13 (0.7) | 506 (4.2) | 32 (0.9) | 506 (2.8) | 22 (0.9) | 489 (3.7) | 5 (0.5) | 499 (7.9) | 6 (0.5) | 470 (8.8) |
| Chile | 20 (0.8) | 492 (3.7) | 32 (1.0) | 468 (3.0) | 12 (0.7) | 488 (4.5) | 19 (0.9) | 458 (4.8) | 6 (0.5) | 476 (6.4) | 9 (0.7) | 440 (4.6) |
| Bahrain | 19 (0.7) | 530 (4.4) | 20 (0.8) | 496 (5.1) | 14 (0.6) | 511 (5.5) | 18 (0.9) | 490 (5.2) | 9 (0.7) | 493 (6.4) | 19 (0.9) | 467 (4.4) |
| South Africa (5) r | 16 (0.7) | 389 (9.8) | 35 (0.9) | 325 (6.7) | 5 (0.3) | 381 (10.2) | 12 (0.7) | 322 (7.2) | 8 (0.5) | 339 (9.4) | 24 (0.9) | 298 (5.5) |
| Hong Kong SAR | 15 (1.2) | 557 (7.3) | 55 (1.3) | 530 (4.0) | 2 (0.3) | ~ ~ | 4 (0.5) | 539 (7.7) | 4 (0.5) | 541 (8.1) | 20 (0.7) | 520 (4.2) |
| Chinese Taipei | 14 (0.6) | 577 (3.4) | 45 (1.0) | 554 (2.5) | 9 (0.5) | 577 (4.1) | 27 (0.8) | 551 (2.9) | 2 (0.2) | ~ ~ | 4 (0.4) | 543 (7.4) |
| Bosnia and Herzegovina | 13 (0.9) | 479 (5.0) | 10 (0.7) | 469 (5.1) | 4 (0.4) | 483 (6.5) | 3 (0.3) | 463 (7.5) | 36 (1.0) | 466 (3.5) | 33 (1.1) | 442 (3.5) |
| Kuwait r | 12 (0.7) | 423 (8.7) | 18 (0.7) | 399 (6.4) | 15 (0.8) | 425 (8.1) | 29 (0.8) | 388 (6.8) | 8 (0.5) | 422 (12.2) | 20 (1.2) | 385 (10.5) |
| Philippines | 10 (0.7) | 307 (11.1) | 23 (1.3) | 239 (9.9) | 9 (0.7) | 298 (11.0) | 20 (1.4) | 234 (9.7) | 10 (0.8) | 264 (11.8) | 28 (1.4) | 235 (7.9) |
| Qatar r | 10 (0.7) | 488 (6.8) | 14 (0.6) | 455 (6.4) | 13 (0.7) | 485 (6.9) | 25 (1.0) | 454 (6.0) | 12 (0.7) | 476 (7.1) | 26 (1.0) | 438 (6.2) |
| Azerbaijan | 8 (0.6) | 455 (7.4) | 12 (0.8) | 439 (6.0) | 5 (0.4) | 466 (6.8) | 8 (0.6) | 445 (6.1) | 17 (1.0) | 450 (4.9) | 50 (1.5) | 426 (3.8) |
| Kosovo | 8 (0.9) | 452 (7.7) | 4 (0.5) | 405 (9.7) | 4 (0.4) | 449 (10.2) | 3 (0.4) | 423 (11.4) | 39 (1.2) | 423 (4.2) | 43 (1.4) | 402 (4.7) |
| Morocco | 7 (0.5) | 434 (11.3) | 25 (0.8) | 399 (7.8) | 4 (0.4) | 426 (12.2) | 20 (1.0) | 380 (8.1) | 2 (0.3) | ~ ~ | 42 (1.5) | 349 (7.9) |
| Oman | 6 (0.4) | 484 (8.3) | 11 (0.5) | 446 (6.6) | 11 (0.7) | 486 (11.6) | 25 (0.7) | 449 (4.6) | 10 (0.5) | 454 (6.4) | 37 (1.0) | 406 (4.9) |
| Iran, Islamic Rep. of | 6 (0.5) | 479 (10.5) | 11 (0.8) | 473 (7.7) | 5 (0.4) | 476 (9.8) | 13 (0.8) | 458 (5.1) | 12 (0.7) | 452 (5.2) | 53 (1.4) | 427 (4.9) |
| Saudi Arabia r | 5 (0.4) | 446 (9.6) | 8 (0.5) | 410 (10.1) | 7 (0.6) | 438 (9.2) | 11 (0.6) | 423 (5.6) | 17 (0.8) | 418 (6.8) | 53 (1.2) | 394 (4.9) |
| Pakistan s | 4 (1.0) | 348 (31.0) | 20 (2.8) | 267 (13.5) | 1 (0.5) | ~ ~ | 3 (0.6) | 300 (27.7) | 6 (1.0) | 325 (21.6) | 66 (4.0) | 298 (17.6) |
| Turkey (5) | 4 (0.4) | 588 (7.4) | 5 (0.6) | 560 (9.6) | 6 (0.6) | 583 (5.7) | 10 (0.6) | 558 (5.6) | 18 (1.2) | 560 (4.7) | 58 (1.7) | 499 (5.5) |
| Australia | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| England | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Japan | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Northern Ireland | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| United States | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| New Zealand x | 35 (1.3) | 533 (3.9) | 22 (1.2) | 512 (5.1) | 21 (1.1) | 540 (6.5) | 12 (0.8) | 516 (6.6) | 5 (0.5) | 524 (10.2) | 5 (0.9) | 502 (10.5) |
| United Arab Emirates x | 10 (0.3) | 527 (3.6) | 9 (0.3) | 494 (5.1) | 20 (0.4) | 511 (3.6) | 19 (0.5) | 482 (3.7) | 20 (0.5) | 513 (4.3) | 23 (0.5) | 486 (4.2) |
| **International Average** | **26 (0.1)** | **513 (0.9)** | **30 (0.1)** | **490 (0.8)** | **7 (0.1)** | **504 (1.1)** | **9 (0.1)** | **477 (1.2)** | **9 (0.1)** | **482 (1.3)** | **18 (0.1)** | **455 (1.1)** |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Moscow City, Russian Fed. | 42 (1.2) | 602 (2.7) | 13 (0.7) | 597 (3.9) | 10 (0.5) | 590 (3.8) | 4 (0.4) | 579 (5.8) | 18 (0.8) | 594 (3.5) | 12 (0.7) | 582 (4.0) |
| Madrid, Spain r | 38 (1.4) | 536 (2.8) | 36 (0.9) | 529 (2.5) | 5 (0.5) | 525 (6.1) | 5 (0.5) | 509 (6.4) | 5 (0.4) | 513 (7.3) | 10 (0.8) | 491 (4.7) |
| Quebec, Canada s | 33 (1.4) | 538 (3.8) | 32 (1.1) | 523 (4.2) | 7 (0.7) | 536 (8.4) | 7 (0.6) | 513 (6.4) | 9 (0.7) | 533 (6.2) | 12 (0.8) | 512 (5.1) |
| Ontario, Canada s | 26 (1.8) | 548 (4.6) | 12 (1.1) | 534 (5.5) | 18 (1.3) | 539 (4.5) | 11 (0.8) | 517 (7.2) | 17 (1.8) | 535 (7.6) | 15 (1.6) | 529 (8.4) |
| Dubai, UAE s | 13 (0.6) | 574 (4.2) | 10 (0.5) | 555 (6.1) | 20 (0.7) | 571 (4.6) | 17 (0.8) | 554 (4.1) | 20 (0.7) | 569 (3.8) | 21 (1.0) | 548 (5.3) |
| Abu Dhabi, UAE y | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Could Do Literacy and Numeracy Tasks When Beginning Primary School

To provide information about the extent to which students enter primary school equipped with some basic literacy and numeracy skills as a foundation for learning, the TIMSS Early Learning Survey (or "Home Questionnaire") included a set of questions asking parents how well their child could do various literacy and numeracy activities when he or she first began primary school. Twelve items formed the *Literacy and Numeracy Tasks* scale in TIMSS 2019 (see About the Scale in Exhibit 5.18).

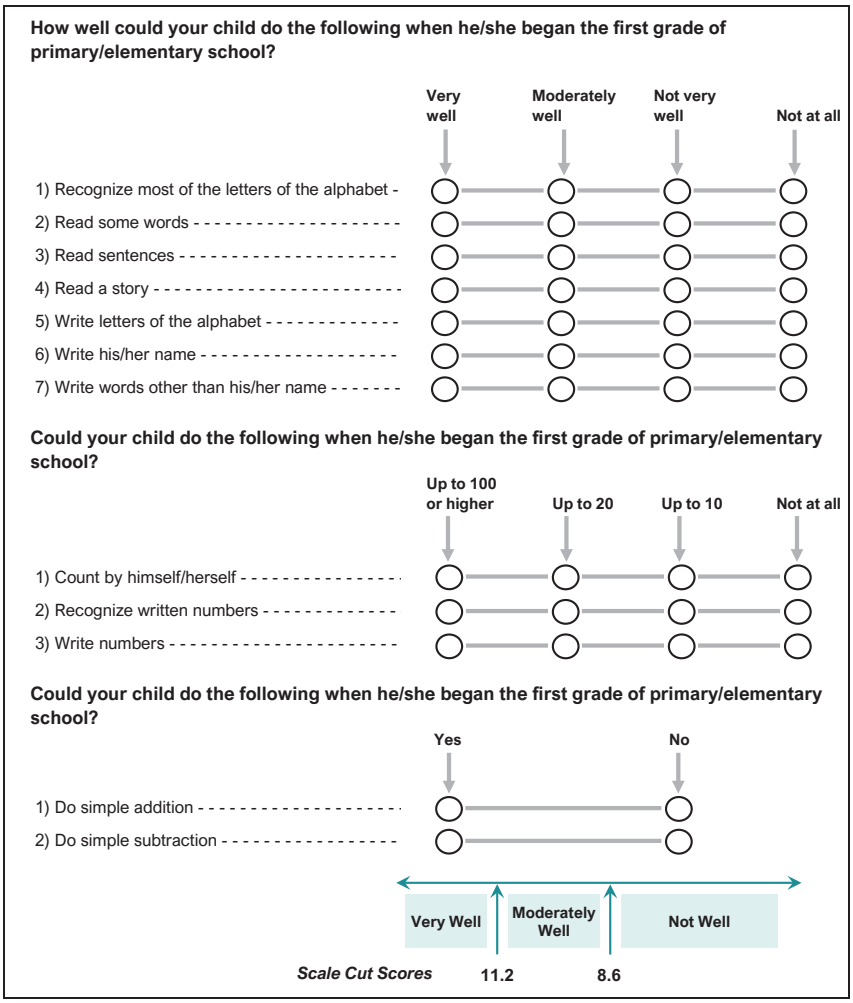
Parents' reports indicate that early preparation appears to have an effect on mathematics and science achievement through the fourth grade. Exhibit 5.19 shows that, on average across countries, 25 percent of students entered school able to perform early literacy and numeracy tasks "very well" according to their parents, and more than half (51%) entered school able to perform the tasks "moderately well." Parents' assessments of their children's early literacy and numeracy skills corresponded well with mathematics achievement at the fourth grade, with the children able to perform "very well" having higher achievement than those performing "moderately well" (532 vs. 498). The 24 percent of the students in the "not well" category had the lowest average achievement (468). Exhibit 5.20 provides a similar picture in relation to science achievement. Students in the "very well" category had the highest average science achievement (518) compared with students in the "moderately well" and "not well" categories (488 and 461, respectively).

## Exhibit 5.18: Could Do Literacy and Numeracy Tasks When Beginning Primary School

*Students' Results based on Parents' Reports*

### About the Scale

Students were scored according to their parents' reports regarding how well their children could do the twelve tasks on the *Early Literacy and Numeracy Tasks* scale when they began primary school. Cut scores divide the scale into three categories. Students who could do the tasks **Very Well** had a score at or above the cut score corresponding to their parents reporting the students could do all twelve tasks (five of the tasks at the highest level, five at the second highest level, and simple addition and simple subtraction), on average. Students who could do the tasks **Not Well** had a score at or below the cut score corresponding to their parents reporting the students could do the twelve tasks at a minimal level (five of the tasks at the second lowest level, five at the second highest level, and not simple addition or simple subtraction), on average. All other students could do the literacy and numeracy tasks **Moderately Well** when they began primary school.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.19: Could Do Literacy and Numeracy Tasks When Beginning Primary School

*Students' Results based on Parents' Reports*

| Country | | Very Well | | Moderately Well | | Not Well | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ireland | | 55 (1.0) | 572 (2.8) | 39 (0.9) | 529 (3.3) | 5 (0.5) | 497 (7.5) | 11.7 (0.04) |
| Korea, Rep. of | | 54 (1.0) | 618 (2.5) | 43 (0.9) | 583 (2.8) | 3 (0.3) | 538 (9.2) | 12.0 (0.04) |
| Bahrain | | 51 (0.9) | 493 (3.3) | 42 (0.8) | 471 (3.0) | 8 (0.4) | 459 (6.2) | 11.3 (0.04) |
| Singapore | | 50 (1.3) | 655 (3.5) | 44 (1.1) | 605 (3.9) | 6 (0.4) | 545 (7.4) | 11.4 (0.06) |
| Albania | | 41 (1.4) | 517 (3.6) | 47 (1.2) | 490 (3.9) | 12 (1.2) | 440 (8.9) | 10.7 (0.07) |
| Oman | | 40 (0.9) | 465 (4.1) | 48 (0.7) | 418 (4.0) | 12 (0.6) | 380 (7.3) | 10.8 (0.04) |
| Spain | | 40 (1.2) | 534 (2.6) | 49 (1.1) | 496 (2.9) | 11 (0.5) | 460 (4.3) | 10.8 (0.04) |
| Latvia | | 38 (1.0) | 576 (2.5) | 54 (1.0) | 534 (2.8) | 8 (0.6) | 492 (6.5) | 10.9 (0.03) |
| Qatar | r | 38 (1.1) | 480 (3.8) | 50 (1.0) | 443 (4.3) | 12 (0.7) | 412 (6.2) | 10.7 (0.05) |
| Kosovo | | 36 (1.0) | 462 (3.5) | 53 (0.9) | 442 (3.5) | 11 (0.8) | 410 (5.7) | 10.6 (0.05) |
| Hong Kong SAR | | 35 (1.1) | 629 (3.6) | 59 (1.0) | 594 (3.2) | 6 (0.6) | 554 (8.0) | 10.9 (0.05) |
| Poland | | 35 (0.8) | 551 (2.9) | 51 (0.9) | 511 (3.1) | 15 (0.6) | 486 (5.0) | 10.5 (0.03) |
| Croatia | | 34 (1.0) | 538 (2.9) | 53 (1.1) | 500 (2.2) | 13 (0.9) | 478 (6.7) | 10.6 (0.05) |
| Japan | | 33 (0.8) | 622 (2.5) | 57 (0.7) | 587 (1.9) | 11 (0.5) | 545 (4.9) | 10.7 (0.04) |
| Philippines | | 32 (1.5) | 347 (6.7) | 58 (1.2) | 282 (6.3) | 10 (0.8) | 230 (8.1) | 10.5 (0.06) |
| Chinese Taipei | | 31 (0.8) | 621 (2.7) | 60 (0.8) | 593 (2.3) | 9 (0.5) | 563 (4.7) | 10.7 (0.03) |
| Kazakhstan | | 31 (1.3) | 530 (3.2) | 57 (1.1) | 506 (2.6) | 12 (0.8) | 496 (4.4) | 10.5 (0.06) |
| Canada | s | 30 (0.8) | 552 (2.9) | 51 (0.8) | 519 (2.4) | 19 (0.8) | 490 (3.0) | 10.3 (0.04) |
| Saudi Arabia | | 29 (0.9) | 431 (3.9) | 52 (0.9) | 392 (4.5) | 19 (1.0) | 373 (6.9) | 10.3 (0.05) |
| Finland | | 29 (0.9) | 579 (2.8) | 47 (0.8) | 531 (2.6) | 24 (0.8) | 493 (3.5) | 10.2 (0.05) |
| Sweden | r | 29 (1.2) | 561 (4.1) | 52 (1.4) | 523 (2.9) | 19 (0.8) | 487 (3.9) | 10.3 (0.05) |
| Azerbaijan | | 27 (0.9) | 543 (3.2) | 50 (0.9) | 521 (2.8) | 23 (1.1) | 497 (3.9) | 10.0 (0.06) |
| Kuwait | r | 27 (0.9) | 429 (5.4) | 55 (0.8) | 385 (5.5) | 18 (0.8) | 330 (6.4) | 10.2 (0.04) |
| North Macedonia | | 25 (1.1) | 501 (6.7) | 53 (1.2) | 474 (5.5) | 22 (1.2) | 441 (7.6) | 10.1 (0.06) |
| Lithuania | r | 25 (1.1) | 590 (3.5) | 58 (1.1) | 535 (2.8) | 17 (0.8) | 497 (5.6) | 10.3 (0.04) |
| South Africa (5) | | 24 (0.7) | 413 (4.1) | 60 (0.8) | 368 (3.6) | 15 (0.5) | 340 (5.3) | 10.2 (0.03) |
| Russian Federation | | 24 (1.1) | 599 (2.9) | 53 (1.0) | 565 (3.4) | 23 (1.4) | 540 (5.8) | 10.0 (0.07) |
| Cyprus | | 24 (0.7) | 566 (3.9) | 54 (0.8) | 531 (2.9) | 22 (0.7) | 509 (3.7) | 10.0 (0.04) |
| Serbia | | 24 (0.9) | 555 (4.0) | 55 (1.1) | 509 (2.9) | 22 (1.0) | 459 (5.9) | 10.0 (0.04) |
| Bosnia and Herzegovina | | 23 (0.7) | 480 (3.1) | 56 (0.8) | 451 (2.6) | 21 (0.8) | 425 (3.7) | 10.0 (0.04) |
| Bulgaria | | 20 (0.9) | 562 (3.6) | 48 (1.5) | 529 (3.5) | 32 (2.0) | 469 (9.1) | 9.5 (0.10) |
| Turkey (5) | | 19 (1.3) | 556 (5.2) | 35 (1.2) | 543 (5.5) | 46 (2.0) | 494 (6.1) | 9.0 (0.12) |
| Morocco | | 19 (0.8) | 443 (4.5) | 45 (1.3) | 385 (4.7) | 36 (1.5) | 352 (6.8) | 9.2 (0.08) |
| Chile | | 19 (0.7) | 486 (3.2) | 54 (1.0) | 445 (3.5) | 27 (1.0) | 408 (3.2) | 9.7 (0.04) |
| Montenegro | | 18 (0.5) | 489 (3.6) | 55 (0.8) | 456 (2.3) | 27 (0.7) | 427 (3.0) | 9.7 (0.03) |
| Armenia | | 18 (0.7) | 514 (3.5) | 48 (1.2) | 498 (2.8) | 34 (1.4) | 491 (3.4) | 9.5 (0.05) |
| Iran, Islamic Rep. of | | 16 (1.0) | 467 (5.8) | 50 (1.2) | 446 (4.4) | 34 (1.2) | 430 (5.7) | 9.4 (0.06) |
| Malta | r | 16 (0.8) | 554 (3.2) | 55 (0.8) | 518 (1.9) | 29 (0.8) | 490 (2.7) | 9.6 (0.04) |
| Pakistan | r | 15 (2.6) | 344 (15.9) | 53 (4.0) | 338 (15.1) | 32 (3.4) | 308 (13.6) | 9.3 (0.16) |
| France | | 14 (0.7) | 526 (4.8) | 59 (0.8) | 491 (3.3) | 26 (0.9) | 459 (4.3) | 9.6 (0.03) |
| Georgia | | 13 (0.7) | 506 (5.1) | 52 (1.1) | 483 (4.2) | 35 (1.1) | 474 (4.8) | 9.3 (0.05) |
| Czech Republic | r | 13 (0.7) | 581 (4.8) | 51 (0.9) | 541 (2.6) | 36 (1.0) | 527 (3.4) | 9.3 (0.04) |
| Portugal | | 12 (0.7) | 553 (5.5) | 55 (0.9) | 534 (2.6) | 33 (0.7) | 508 (3.6) | 9.3 (0.03) |
| Italy | | 11 (0.6) | 547 (4.8) | 50 (0.9) | 516 (2.9) | 39 (1.1) | 508 (2.7) | 9.2 (0.04) |
| Austria | | 10 (0.5) | 556 (5.0) | 49 (1.0) | 544 (2.3) | 41 (1.0) | 534 (2.8) | 9.2 (0.03) |
| Norway (5) | s | 10 (0.6) | 602 (6.0) | 46 (1.2) | 561 (3.3) | 44 (1.2) | 532 (3.4) | 9.0 (0.03) |
| Hungary | | 7 (0.4) | 569 (5.9) | 31 (0.8) | 536 (3.3) | 62 (0.9) | 515 (3.1) | 8.4 (0.04) |
| Germany | s | 7 (0.6) | 558 (6.4) | 48 (1.2) | 536 (3.0) | 45 (1.3) | 525 (3.1) | 9.0 (0.04) |
| Slovak Republic | | 7 (0.6) | 552 (8.8) | 43 (1.1) | 518 (3.8) | 50 (1.2) | 499 (3.9) | 8.7 (0.06) |
| Belgium (Flemish) | | 7 (0.4) | 553 (5.8) | 44 (1.1) | 536 (2.5) | 49 (1.2) | 529 (2.1) | 8.8 (0.04) |
| Denmark | s | 6 (0.6) | 587 (6.4) | 55 (1.1) | 547 (2.9) | 39 (1.0) | 520 (3.2) | 9.1 (0.04) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| Northern Ireland | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| United Arab Emirates | x | 52 (0.6) | 514 (2.3) | 40 (0.5) | 490 (2.8) | 7 (0.3) | 467 (4.4) | 11.4 (0.02) |
| New Zealand | x | 11 (0.9) | 560 (6.9) | 51 (1.3) | 514 (4.3) | 38 (1.2) | 494 (3.9) | 9.2 (0.04) |
| **International Average** | | **25 (0.1)** | **532 (0.7)** | **51 (0.2)** | **498 (0.5)** | **24 (0.1)** | **468 (0.8)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | s | 51 (1.4) | 568 (2.9) | 41 (1.1) | 547 (2.6) | 7 (0.7) | 540 (5.9) | 11.3 (0.04) |
| Madrid, Spain | | 44 (1.5) | 540 (2.6) | 47 (1.3) | 510 (2.6) | 9 (0.6) | 482 (5.5) | 11.0 (0.05) |
| Ontario, Canada | s | 38 (1.3) | 555 (4.3) | 48 (1.1) | 513 (4.6) | 14 (1.1) | 470 (6.1) | 10.8 (0.06) |
| Moscow City, Russian Fed. | | 34 (0.9) | 618 (2.3) | 54 (0.9) | 587 (2.5) | 12 (0.7) | 547 (4.2) | 10.6 (0.04) |
| Quebec, Canada | r | 17 (1.0) | 565 (4.8) | 55 (1.4) | 541 (2.7) | 28 (1.3) | 516 (3.7) | 9.7 (0.04) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 5.20: Could Do Literacy and Numeracy Tasks When Beginning Primary School

*Students' Results based on Parents' Reports*

| Country | | Very Well | | Moderately Well | | Not Well | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ireland | | 55 (1.0) | 550 (3.1) | 39 (0.9) | 510 (4.1) | 5 (0.5) | 486 (7.5) | 11.7 (0.04) |
| Korea, Rep. of | | 54 (1.0) | 603 (2.1) | 43 (0.9) | 572 (2.8) | 3 (0.3) | 546 (8.4) | 12.0 (0.04) |
| Bahrain | | 51 (0.9) | 516 (3.8) | 42 (0.8) | 480 (3.8) | 8 (0.4) | 447 (7.7) | 11.3 (0.04) |
| Singapore | | 50 (1.3) | 622 (3.0) | 44 (1.1) | 575 (3.6) | 6 (0.4) | 521 (7.0) | 11.4 (0.06) |
| Albania | | 41 (1.4) | 507 (4.1) | 47 (1.2) | 488 (3.9) | 12 (1.2) | 440 (9.2) | 10.7 (0.07) |
| Oman | | 40 (0.9) | 481 (4.5) | 48 (0.7) | 419 (4.2) | 12 (0.6) | 359 (6.6) | 10.8 (0.04) |
| Spain | | 40 (1.2) | 538 (2.5) | 49 (1.1) | 505 (2.2) | 11 (0.5) | 478 (3.8) | 10.8 (0.04) |
| Latvia | | 38 (1.0) | 566 (1.9) | 54 (1.0) | 533 (2.7) | 8 (0.6) | 497 (5.5) | 10.9 (0.03) |
| Qatar | r | 38 (1.1) | 488 (4.1) | 50 (1.0) | 442 (4.8) | 12 (0.7) | 408 (6.6) | 10.7 (0.05) |
| Kosovo | | 36 (1.0) | 429 (4.5) | 53 (0.9) | 412 (4.1) | 11 (0.8) | 374 (6.3) | 10.6 (0.05) |
| Hong Kong SAR | | 35 (1.1) | 557 (4.0) | 59 (1.0) | 523 (3.2) | 6 (0.6) | 484 (7.8) | 10.9 (0.05) |
| Poland | | 35 (0.8) | 556 (2.7) | 51 (0.9) | 523 (2.9) | 15 (0.6) | 506 (5.0) | 10.5 (0.03) |
| Croatia | | 34 (1.0) | 543 (3.2) | 53 (1.1) | 519 (2.1) | 13 (0.9) | 497 (6.8) | 10.6 (0.05) |
| Japan | | 33 (0.8) | 585 (2.3) | 57 (0.7) | 557 (2.0) | 11 (0.5) | 521 (4.6) | 10.7 (0.04) |
| Philippines | | 32 (1.5) | 300 (8.2) | 58 (1.2) | 233 (7.3) | 10 (0.8) | 189 (9.2) | 10.5 (0.06) |
| Chinese Taipei | | 31 (0.8) | 580 (2.4) | 60 (0.8) | 550 (2.2) | 9 (0.5) | 532 (5.0) | 10.7 (0.03) |
| Kazakhstan | | 31 (1.3) | 515 (4.3) | 57 (1.1) | 486 (3.4) | 12 (0.8) | 483 (4.6) | 10.5 (0.06) |
| Canada | s | 30 (0.8) | 556 (2.8) | 51 (0.8) | 529 (2.3) | 19 (0.8) | 507 (2.7) | 10.3 (0.04) |
| Saudi Arabia | | 29 (0.9) | 438 (4.7) | 52 (0.9) | 397 (5.2) | 19 (1.0) | 371 (6.8) | 10.3 (0.05) |
| Finland | | 29 (0.9) | 587 (2.6) | 47 (0.8) | 553 (2.9) | 24 (0.8) | 531 (3.5) | 10.2 (0.05) |
| Sweden | r | 29 (1.2) | 566 (4.5) | 52 (1.4) | 539 (3.3) | 19 (0.8) | 516 (4.2) | 10.3 (0.05) |
| Azerbaijan | | 27 (0.9) | 453 (4.0) | 50 (0.9) | 434 (3.2) | 23 (1.1) | 410 (4.3) | 10.0 (0.06) |
| Kuwait | r | 27 (0.9) | 443 (6.8) | 55 (0.8) | 397 (6.4) | 18 (0.8) | 342 (8.3) | 10.2 (0.04) |
| North Macedonia | | 25 (1.1) | 452 (7.8) | 53 (1.2) | 429 (6.7) | 22 (1.2) | 394 (8.0) | 10.1 (0.06) |
| Lithuania | r | 25 (1.1) | 578 (3.1) | 58 (1.1) | 534 (2.9) | 17 (0.8) | 494 (5.0) | 10.3 (0.04) |
| South Africa (5) | | 24 (0.7) | 372 (5.5) | 60 (0.8) | 317 (5.0) | 15 (0.5) | 281 (6.8) | 10.2 (0.03) |
| Russian Federation | | 24 (1.1) | 595 (3.3) | 53 (1.0) | 566 (3.1) | 23 (1.4) | 542 (4.9) | 10.0 (0.07) |
| Cyprus | | 24 (0.7) | 542 (3.9) | 54 (0.8) | 510 (3.1) | 22 (0.7) | 492 (4.1) | 10.0 (0.04) |
| Serbia | | 24 (0.9) | 557 (4.1) | 55 (1.1) | 520 (3.1) | 22 (1.0) | 471 (6.9) | 10.0 (0.04) |
| Bosnia and Herzegovina | | 23 (0.7) | 482 (3.6) | 56 (0.8) | 458 (3.1) | 21 (0.8) | 435 (3.9) | 10.0 (0.04) |
| Bulgaria | | 20 (0.9) | 575 (4.0) | 48 (1.5) | 541 (4.9) | 32 (2.0) | 463 (9.4) | 9.5 (0.10) |
| Turkey (5) | | 19 (1.3) | 558 (4.8) | 35 (1.2) | 546 (5.0) | 46 (2.0) | 497 (6.0) | 9.0 (0.12) |
| Morocco | | 19 (0.8) | 443 (5.7) | 45 (1.3) | 375 (6.0) | 36 (1.5) | 338 (9.4) | 9.2 (0.08) |
| Chile | | 19 (0.7) | 509 (2.9) | 54 (1.0) | 473 (3.0) | 27 (1.0) | 438 (3.5) | 9.7 (0.04) |
| Montenegro | | 18 (0.5) | 485 (3.2) | 55 (0.8) | 459 (2.8) | 27 (0.7) | 429 (3.9) | 9.7 (0.03) |
| Armenia | | 18 (0.7) | 484 (3.9) | 48 (1.2) | 467 (3.6) | 34 (1.4) | 457 (4.2) | 9.5 (0.05) |
| Iran, Islamic Rep. of | | 16 (1.0) | 460 (6.0) | 50 (1.2) | 444 (4.4) | 34 (1.2) | 429 (6.3) | 9.4 (0.06) |
| Malta | r | 16 (0.8) | 535 (3.5) | 55 (0.8) | 504 (2.1) | 29 (0.8) | 480 (3.9) | 9.6 (0.04) |
| Pakistan | r | 15 (2.6) | 311 (20.2) | 53 (4.0) | 299 (16.0) | 32 (3.4) | 270 (14.5) | 9.3 (0.16) |
| France | | 14 (0.7) | 513 (4.7) | 59 (0.8) | 495 (3.1) | 26 (0.9) | 468 (4.5) | 9.6 (0.03) |
| Georgia | | 13 (0.7) | 484 (5.7) | 52 (1.1) | 454 (4.6) | 35 (1.1) | 446 (5.8) | 9.3 (0.05) |
| Czech Republic | r | 13 (0.7) | 569 (4.2) | 51 (0.9) | 541 (2.8) | 36 (1.0) | 531 (3.3) | 9.3 (0.04) |
| Portugal | | 12 (0.7) | 529 (5.3) | 55 (0.9) | 508 (2.5) | 33 (0.7) | 493 (3.2) | 9.3 (0.03) |
| Italy | | 11 (0.6) | 539 (5.6) | 50 (0.9) | 508 (3.3) | 39 (1.1) | 508 (3.3) | 9.2 (0.04) |
| Austria | | 10 (0.5) | 526 (6.0) | 49 (1.0) | 526 (3.2) | 41 (1.0) | 523 (3.4) | 9.2 (0.03) |
| Norway (5) | s | 10 (0.6) | 583 (6.6) | 46 (1.2) | 555 (3.2) | 44 (1.2) | 532 (3.9) | 9.0 (0.03) |
| Hungary | | 7 (0.4) | 562 (6.1) | 31 (0.8) | 538 (3.7) | 62 (0.9) | 524 (2.9) | 8.4 (0.04) |
| Germany | s | 7 (0.6) | 538 (7.9) | 48 (1.2) | 533 (2.9) | 45 (1.3) | 528 (3.2) | 9.0 (0.04) |
| Slovak Republic | | 7 (0.6) | 554 (10.5) | 43 (1.1) | 529 (3.8) | 50 (1.2) | 511 (4.4) | 8.7 (0.06) |
| Belgium (Flemish) | | 7 (0.4) | 513 (5.7) | 44 (1.1) | 501 (2.6) | 49 (1.2) | 503 (2.4) | 8.8 (0.04) |
| Denmark | s | 6 (0.6) | 570 (7.9) | 55 (1.1) | 538 (3.1) | 39 (1.0) | 522 (3.3) | 9.1 (0.04) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| Northern Ireland | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| United Arab Emirates | x | 52 (0.6) | 513 (3.0) | 40 (0.5) | 485 (3.2) | 7 (0.3) | 458 (5.1) | 11.4 (0.02) |
| New Zealand | x | 11 (0.9) | 553 (5.7) | 51 (1.3) | 527 (4.1) | 38 (1.2) | 515 (3.8) | 9.2 (0.04) |
| **International Average** | | **25 (0.1)** | **518 (0.8)** | **51 (0.2)** | **488 (0.6)** | **24 (0.1)** | **461 (0.8)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | s | 51 (1.4) | 570 (2.9) | 41 (1.1) | 550 (2.8) | 7 (0.7) | 545 (6.6) | 11.3 (0.04) |
| Madrid, Spain | | 44 (1.5) | 542 (2.4) | 47 (1.3) | 516 (2.3) | 9 (0.6) | 490 (5.1) | 11.0 (0.05) |
| Ontario, Canada | s | 38 (1.3) | 557 (4.1) | 48 (1.1) | 527 (4.2) | 14 (1.1) | 496 (5.6) | 10.8 (0.06) |
| Moscow City, Russian Fed. | | 34 (0.9) | 616 (2.5) | 54 (0.9) | 590 (2.6) | 12 (0.7) | 555 (4.5) | 10.6 (0.04) |
| Quebec, Canada | r | 17 (1.0) | 548 (4.6) | 55 (1.4) | 528 (3.1) | 28 (1.3) | 514 (3.5) | 9.7 (0.04) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# School Composition and Resources

## Socioeconomic Background of the Student Body

As shown in Exhibit 6.1, TIMSS characterizes schools in terms of socioeconomic composition based on principals' reports of the percentages of economically disadvantaged and economically affluent students in the school (see About the Scale). "More affluent" schools were defined as having more than 25 percent of students from economically affluent homes and not more than 25 percent from economically disadvantaged homes, while "more disadvantaged" schools had more than 25 percent of students from disadvantaged homes and not more than 25 percent from affluent homes. All other combinations were considered to be "neither more affluent nor more disadvantaged."

Exhibits 6.2 and 6.3 present the percentages of fourth grade students in each category in relation to mathematics achievement and science achievement, respectively. At fourth grade, 41 percent of students, on average, were in schools with relatively more affluent students than disadvantaged students, 34 percent were in schools where there was a balance, and 25 percent were in schools with relatively more disadvantaged than affluent students. Average achievement was highest for students in the "more affluent" schools for both mathematics (521) and science (512) and lowest in the "more disadvantaged" schools (479 and 467 for mathematics and science, respectively). Average achievement for students attending "neither more affluent nor more disadvantaged" schools was in the middle (499 for mathematics and 489 for science).

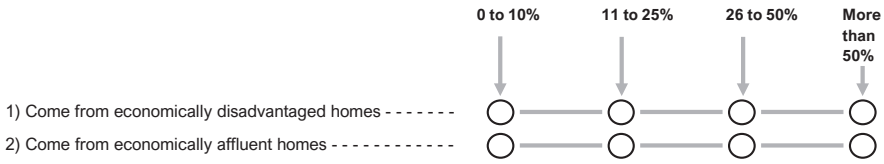
Exhibits 6.4 and 6.5 present the percentages of eighth grade students in each category in relation to mathematics achievement and science achievement, respectively. Compared with the fourth grade, the distribution of eighth grade students was more even across the school composition groups, with 35 percent in schools with relatively more affluent students than disadvantaged students, 33 percent in schools where there was a balance, and 32 percent in schools with relatively more disadvantaged students than affluent students. The relationship with achievement was similar to fourth grade, with average achievement highest for students in "more affluent" schools for both mathematics (518) and science (518) and lowest in the "more disadvantaged" schools (466 and 468 for mathematics and science, respectively). Average achievement for students attending "neither more affluent nor more disadvantaged" schools was in the middle (489 for mathematics and 490 for science).

## Exhibit 6.1: School Composition by Socioeconomic Background of the Student Body

*Students' Results based on Principals' Reports*

### About the Scale

**Approximately what percentage of students in your school have the following backgrounds?**




**More Affluent:** Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes

**More Disadvantaged:** Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes

**Neither More Affluent Nor More Disadvantaged:** All other possible response combinations

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 6.2: School Composition by Socioeconomic Background of the Student Body

*Students' Results based on Principals' Reports*

| Country | More Affluent: Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes | | Neither More Affluent Nor More Disadvantaged | | More Disadvantaged: Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 36 (4.3) | 516 (5.7) | 22 (3.7) | 481 (7.1) | 42 (4.2) | 478 (6.4) |
| Armenia | 49 (4.8) | 502 (4.2) | 28 (3.9) | 491 (4.4) | 23 (4.2) | 499 (5.1) |
| Australia r | 34 (3.5) | 542 (4.4) | 38 (3.8) | 512 (5.0) | 28 (3.4) | 485 (8.0) |
| Austria | 30 (3.4) | 554 (2.6) | 40 (3.5) | 545 (3.4) | 29 (2.8) | 515 (4.1) |
| Azerbaijan | 14 (2.6) | 510 (10.0) | 30 (3.7) | 505 (5.7) | 56 (4.0) | 521 (4.6) |
| Bahrain | 38 (2.4) | 475 (4.0) | 36 (2.7) | 488 (4.9) | 26 (2.5) | 474 (4.3) |
| Belgium (Flemish) | 63 (3.7) | 542 (2.6) | 20 (3.8) | 527 (5.0) | 17 (2.9) | 502 (6.3) |
| Bosnia and Herzegovina | 44 (4.3) | 460 (3.6) | 34 (4.3) | 451 (4.7) | 22 (3.4) | 451 (5.1) |
| Bulgaria | 35 (3.3) | 548 (4.1) | 44 (4.2) | 522 (9.2) | 21 (3.1) | 465 (10.7) |
| Canada | 43 (2.5) | 530 (3.0) | 35 (2.5) | 505 (2.8) | 22 (2.2) | 486 (4.1) |
| Chile | 14 (2.0) | 510 (5.8) | 17 (3.5) | 457 (7.2) | 69 (3.7) | 422 (3.8) |
| Chinese Taipei | 25 (3.9) | 607 (3.6) | 71 (3.9) | 599 (2.1) | 4 (1.6) | 566 (17.6) |
| Croatia | 57 (4.2) | 514 (3.1) | 30 (3.7) | 507 (4.4) | 13 (2.7) | 497 (5.3) |
| Cyprus | 47 (4.6) | 543 (4.5) | 40 (4.7) | 529 (4.8) | 13 (2.9) | 502 (7.3) |
| Czech Republic | 55 (4.4) | 542 (3.3) | 37 (4.4) | 526 (4.5) | 8 (2.3) | 502 (9.0) |
| Denmark r | 56 (4.1) | 530 (3.0) | 33 (3.9) | 522 (4.2) | 10 (2.2) | 508 (6.6) |
| England s | 13 (3.5) | 620 (13.7) | 53 (5.6) | 550 (4.0) | 34 (5.3) | 540 (5.6) |
| Finland | 36 (4.0) | 541 (3.1) | 54 (4.1) | 530 (3.4) | 10 (2.3) | 512 (7.1) |
| France | 43 (3.9) | 511 (3.6) | 25 (3.8) | 485 (6.2) | 32 (3.5) | 453 (5.0) |
| Georgia | 39 (4.6) | 488 (6.6) | 40 (4.4) | 478 (5.8) | 21 (3.5) | 479 (9.5) |
| Germany r | 29 (3.2) | 541 (3.9) | 44 (2.9) | 528 (3.4) | 27 (2.6) | 484 (5.6) |
| Hong Kong SAR | 34 (3.6) | 612 (5.1) | 25 (4.0) | 607 (6.3) | 41 (4.3) | 590 (5.8) |
| Hungary | 35 (3.7) | 557 (4.1) | 38 (4.6) | 517 (5.2) | 27 (3.9) | 484 (6.4) |
| Iran, Islamic Rep. of | 24 (3.3) | 486 (8.2) | 32 (3.2) | 452 (6.0) | 44 (3.2) | 415 (4.6) |
| Ireland | 49 (4.4) | 557 (4.0) | 27 (4.0) | 555 (5.5) | 24 (3.0) | 522 (4.9) |
| Italy | 38 (3.7) | 522 (3.7) | 45 (4.3) | 517 (3.9) | 17 (3.3) | 498 (4.9) |
| Japan | 48 (4.3) | 602 (2.6) | 45 (4.3) | 585 (2.4) | 8 (2.4) | 583 (3.5) |
| Kazakhstan | 81 (3.2) | 514 (3.1) | 17 (3.0) | 503 (5.5) | 2 (1.1) | ~ ~ |
| Korea, Rep. of | 26 (3.3) | 620 (4.1) | 57 (4.1) | 594 (3.0) | 17 (3.1) | 583 (4.4) |
| Kosovo s | 55 (6.0) | 445 (5.2) | 26 (4.7) | 448 (9.1) | 19 (4.4) | 428 (8.7) |
| Kuwait r | 37 (4.5) | 388 (12.4) | 42 (5.3) | 376 (8.7) | 21 (3.9) | 377 (14.3) |
| Latvia r | 54 (4.3) | 552 (3.4) | 41 (4.2) | 538 (5.4) | 5 (1.7) | 539 (12.6) |
| Lithuania | 73 (3.1) | 552 (3.4) | 19 (3.1) | 525 (4.9) | 8 (2.0) | 492 (12.4) |
| Malta | 48 (0.4) | 519 (2.0) | 45 (0.4) | 505 (1.8) | 7 (0.2) | 472 (4.8) |
| Montenegro | 43 (0.6) | 459 (2.4) | 34 (0.5) | 448 (3.7) | 23 (0.3) | 443 (3.8) |
| Morocco r | 4 (1.8) | 451 (14.2) | 26 (3.9) | 393 (9.7) | 70 (4.2) | 372 (7.2) |
| Netherlands s | 57 (5.3) | 545 (3.1) | 32 (5.2) | 533 (3.5) | 11 (3.6) | 515 (6.2) |
| New Zealand | 38 (3.2) | 526 (4.1) | 35 (3.5) | 482 (4.7) | 27 (2.7) | 441 (4.6) |
| North Macedonia | 66 (4.2) | 489 (5.9) | 10 (2.4) | 459 (11.8) | 24 (3.8) | 445 (14.6) |
| Northern Ireland r | 39 (4.3) | 586 (5.9) | 30 (4.9) | 576 (4.6) | 30 (3.9) | 539 (5.1) |
| Norway (5) r | 52 (4.9) | 548 (3.6) | 40 (4.6) | 542 (3.5) | 7 (2.2) | 522 (7.6) |
| Oman | 47 (3.9) | 438 (6.9) | 37 (3.7) | 428 (6.1) | 16 (2.3) | 410 (10.5) |
| Pakistan r | 12 (7.0) | 372 (58.2) | 30 (5.6) | 297 (20.0) | 58 (6.9) | 338 (16.9) |
| Philippines | 18 (2.8) | 359 (14.1) | 32 (4.6) | 287 (10.3) | 50 (4.4) | 284 (8.0) |
| Poland | 25 (4.0) | 534 (5.7) | 64 (4.3) | 521 (3.3) | 11 (3.1) | 493 (7.9) |
| Portugal | 27 (2.9) | 541 (5.1) | 39 (3.8) | 524 (4.1) | 33 (3.8) | 513 (4.1) |
| Qatar | 66 (3.8) | 458 (5.7) | 24 (3.5) | 443 (10.0) | 11 (2.6) | 419 (8.2) |
| Russian Federation | 80 (2.7) | 572 (3.7) | 16 (2.5) | 551 (5.9) | 4 (1.4) | 544 (10.1) |
| Saudi Arabia s | 38 (4.3) | 425 (6.2) | 38 (4.4) | 393 (9.3) | 24 (3.7) | 371 (8.1) |
| Serbia | 31 (4.1) | 522 (5.1) | 41 (4.2) | 507 (4.5) | 28 (3.7) | 497 (6.9) |
| Singapore | 53 (0.0) | 635 (5.2) | 37 (0.0) | 623 (5.7) | 10 (0.0) | 584 (13.4) |
| Slovak Republic | 45 (4.1) | 530 (3.3) | 41 (4.0) | 510 (4.7) | 13 (2.3) | 445 (9.0) |
| South Africa (5) r | 9 (1.9) | 502 (14.5) | 13 (2.6) | 379 (17.5) | 78 (3.0) | 364 (4.7) |
| Spain | 60 (3.7) | 512 (3.9) | 27 (3.5) | 501 (4.5) | 13 (2.7) | 472 (9.8) |
| Sweden r | 75 (3.7) | 533 (3.1) | 11 (2.7) | 511 (8.0) | 14 (2.9) | 473 (8.8) |
| Turkey (5) | 27 (3.7) | 565 (6.2) | 29 (3.6) | 519 (11.0) | 44 (4.2) | 501 (6.9) |
| United Arab Emirates r | 50 (1.8) | 484 (2.4) | 26 (1.6) | 477 (3.3) | 24 (1.2) | 471 (4.6) |
| United States | 23 (2.3) | 574 (5.7) | 19 (2.2) | 550 (3.2) | 58 (2.7) | 516 (3.4) |
| **International Average** | **41 (0.5)** | **521 (1.3)** | **34 (0.5)** | **499 (0.9)** | **25 (0.4)** | **479 (1.1)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 40 (3.8) | 535 (5.6) | 35 (4.2) | 510 (4.4) | 26 (3.9) | 478 (5.1) |
| Quebec, Canada | 55 (4.6) | 541 (2.8) | 29 (4.0) | 520 (4.2) | 16 (3.4) | 523 (6.3) |
| Moscow City, Russian Fed. | 87 (3.1) | 593 (2.5) | 11 (2.9) | 589 (6.0) | 2 (1.2) | ~ ~ |
| Madrid, Spain | 65 (3.9) | 528 (2.1) | 23 (3.3) | 506 (4.9) | 13 (2.9) | 483 (8.0) |
| Abu Dhabi, UAE r | 56 (1.2) | 445 (2.9) | 22 (1.3) | 411 (4.4) | 22 (1.5) | 439 (8.4) |
| Dubai, UAE r | 51 (0.3) | 554 (2.1) | 32 (0.3) | 543 (3.7) | 17 (0.3) | 513 (3.4) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 6.3: School Composition by Socioeconomic Background of the Student Body

*Students' Results based on Principals' Reports*

| Country | More Affluent: Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes | | Neither More Affluent Nor More Disadvantaged | | More Disadvantaged: Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 36 (4.3) | 513 (6.4) | 22 (3.7) | 479 (7.6) | 42 (4.2) | 471 (6.7) |
| Armenia | 49 (4.8) | 469 (4.8) | 28 (3.9) | 459 (4.7) | 23 (4.2) | 470 (6.6) |
| Australia r | 34 (3.5) | 557 (3.8) | 38 (3.8) | 530 (4.1) | 28 (3.4) | 504 (6.6) |
| Austria | 30 (3.4) | 541 (2.8) | 40 (3.5) | 531 (3.9) | 29 (2.8) | 489 (5.6) |
| Azerbaijan | 14 (2.6) | 421 (12.0) | 30 (3.7) | 413 (6.9) | 56 (4.0) | 434 (5.1) |
| Bahrain | 38 (2.4) | 491 (5.9) | 36 (2.7) | 504 (6.4) | 26 (2.5) | 479 (6.9) |
| Belgium (Flemish) | 63 (3.7) | 512 (2.5) | 20 (3.8) | 496 (5.7) | 17 (2.9) | 466 (6.7) |
| Bosnia and Herzegovina | 44 (4.3) | 466 (4.1) | 34 (4.3) | 460 (5.1) | 22 (3.4) | 455 (5.4) |
| Bulgaria | 35 (3.3) | 565 (5.1) | 44 (4.2) | 534 (10.3) | 21 (3.1) | 452 (12.6) |
| Canada | 43 (2.5) | 534 (2.8) | 35 (2.5) | 523 (2.7) | 22 (2.2) | 502 (3.4) |
| Chile | 14 (2.0) | 534 (5.2) | 17 (3.5) | 484 (7.2) | 69 (3.7) | 452 (3.4) |
| Chinese Taipei | 25 (3.9) | 568 (3.4) | 71 (3.9) | 557 (2.0) | 4 (1.6) | 521 (15.5) |
| Croatia | 57 (4.2) | 528 (2.8) | 30 (3.7) | 523 (3.9) | 13 (2.7) | 512 (5.1) |
| Cyprus | 47 (4.6) | 520 (4.4) | 40 (4.7) | 509 (4.5) | 13 (2.9) | 481 (7.2) |
| Czech Republic | 55 (4.4) | 541 (3.3) | 37 (4.4) | 529 (4.0) | 8 (2.3) | 507 (8.2) |
| Denmark r | 56 (4.1) | 528 (3.3) | 33 (3.9) | 521 (3.9) | 10 (2.2) | 501 (5.5) |
| England s | 13 (3.5) | 590 (11.4) | 53 (5.6) | 532 (4.0) | 34 (5.3) | 521 (5.9) |
| Finland | 36 (4.0) | 559 (3.6) | 54 (4.1) | 554 (3.6) | 10 (2.3) | 537 (8.6) |
| France | 43 (3.9) | 513 (3.8) | 25 (3.8) | 489 (5.9) | 32 (3.5) | 456 (4.9) |
| Georgia | 39 (4.6) | 460 (7.1) | 40 (4.4) | 451 (5.9) | 21 (3.5) | 450 (9.6) |
| Germany r | 29 (3.2) | 538 (3.9) | 44 (2.9) | 527 (3.2) | 27 (2.6) | 478 (5.6) |
| Hong Kong SAR | 34 (3.6) | 546 (4.6) | 25 (4.0) | 532 (5.7) | 41 (4.3) | 520 (6.1) |
| Hungary | 35 (3.7) | 561 (3.5) | 38 (4.6) | 523 (4.7) | 27 (3.9) | 493 (6.6) |
| Iran, Islamic Rep. of | 24 (3.3) | 487 (7.4) | 32 (3.2) | 450 (6.1) | 44 (3.2) | 411 (5.0) |
| Ireland | 49 (4.4) | 536 (5.8) | 27 (4.0) | 533 (6.3) | 24 (3.0) | 505 (4.9) |
| Italy | 38 (3.7) | 517 (3.7) | 45 (4.3) | 513 (4.6) | 17 (3.3) | 489 (5.4) |
| Japan | 48 (4.3) | 570 (2.5) | 45 (4.3) | 554 (2.4) | 8 (2.4) | 553 (4.3) |
| Kazakhstan | 81 (3.2) | 498 (3.7) | 17 (3.0) | 476 (7.0) | 2 (1.1) | ~ ~ |
| Korea, Rep. of | 26 (3.3) | 606 (3.7) | 57 (4.1) | 583 (2.6) | 17 (3.1) | 571 (4.1) |
| Kosovo s | 55 (6.0) | 413 (6.4) | 26 (4.7) | 417 (10.0) | 19 (4.4) | 394 (10.7) |
| Kuwait r | 37 (4.5) | 400 (14.0) | 42 (5.3) | 385 (10.2) | 21 (3.9) | 388 (16.9) |
| Latvia r | 54 (4.3) | 547 (3.0) | 41 (4.2) | 535 (5.3) | 5 (1.7) | 531 (13.0) |
| Lithuania | 73 (3.1) | 547 (3.2) | 19 (3.1) | 523 (4.4) | 8 (2.0) | 489 (12.8) |
| Malta | 48 (0.4) | 505 (1.8) | 45 (0.4) | 493 (1.8) | 7 (0.2) | 455 (5.3) |
| Montenegro | 43 (0.6) | 460 (2.9) | 34 (0.5) | 449 (4.2) | 23 (0.3) | 441 (4.3) |
| Morocco r | 4 (1.8) | 447 (23.7) | 26 (3.9) | 384 (11.7) | 70 (4.2) | 362 (8.8) |
| Netherlands s | 57 (5.3) | 529 (3.7) | 32 (5.2) | 512 (4.1) | 11 (3.6) | 488 (9.6) |
| New Zealand | 38 (3.2) | 537 (3.5) | 35 (3.5) | 499 (3.8) | 27 (2.7) | 459 (5.0) |
| North Macedonia | 66 (4.2) | 446 (7.4) | 10 (2.4) | 415 (13.4) | 24 (3.8) | 396 (15.3) |
| Northern Ireland r | 39 (4.3) | 532 (4.3) | 30 (4.9) | 524 (4.1) | 30 (3.9) | 500 (4.2) |
| Norway (5) r | 52 (4.9) | 545 (3.5) | 40 (4.6) | 538 (4.0) | 7 (2.2) | 517 (7.2) |
| Oman | 47 (3.9) | 447 (7.9) | 37 (3.7) | 432 (6.5) | 16 (2.3) | 407 (8.4) |
| Pakistan r | 12 (7.0) | 335 (56.9) | 30 (5.6) | 263 (22.6) | 58 (6.9) | 303 (20.1) |
| Philippines | 18 (2.8) | 327 (17.4) | 32 (4.6) | 234 (11.9) | 50 (4.4) | 235 (9.1) |
| Poland | 25 (4.0) | 545 (5.6) | 64 (4.3) | 531 (3.1) | 11 (3.1) | 504 (7.0) |
| Portugal | 27 (2.9) | 515 (4.6) | 39 (3.8) | 504 (3.8) | 33 (3.8) | 495 (3.6) |
| Qatar | 66 (3.8) | 457 (5.9) | 24 (3.5) | 447 (13.5) | 11 (2.6) | 424 (10.0) |
| Russian Federation | 80 (2.7) | 572 (3.2) | 16 (2.5) | 551 (6.1) | 4 (1.4) | 546 (9.8) |
| Saudi Arabia s | 38 (4.3) | 432 (7.5) | 38 (4.4) | 395 (10.2) | 24 (3.7) | 365 (10.0) |
| Serbia | 31 (4.1) | 532 (4.9) | 41 (4.2) | 516 (4.3) | 28 (3.7) | 504 (7.4) |
| Singapore | 53 (0.0) | 605 (4.6) | 37 (0.0) | 590 (5.1) | 10 (0.0) | 553 (11.9) |
| Slovak Republic | 45 (4.1) | 543 (3.3) | 41 (4.0) | 523 (4.5) | 13 (2.3) | 439 (12.0) |
| South Africa (5) r | 9 (1.9) | 501 (19.2) | 13 (2.6) | 334 (24.2) | 78 (3.0) | 311 (6.7) |
| Spain | 60 (3.7) | 520 (3.1) | 27 (3.5) | 511 (4.5) | 13 (2.7) | 483 (9.7) |
| Sweden r | 75 (3.7) | 551 (3.2) | 11 (2.7) | 526 (7.4) | 14 (2.9) | 480 (10.5) |
| Turkey (5) | 27 (3.7) | 562 (5.1) | 29 (3.6) | 522 (10.6) | 44 (4.2) | 507 (6.9) |
| United Arab Emirates r | 50 (1.8) | 474 (2.5) | 26 (1.6) | 468 (4.3) | 24 (1.2) | 468 (5.4) |
| United States | 23 (2.3) | 580 (6.0) | 19 (2.2) | 556 (3.2) | 58 (2.7) | 518 (3.7) |
| **International Average** | **41 (0.5)** | **512 (1.3)** | **34 (0.5)** | **489 (1.0)** | **25 (0.4)** | **467 (1.1)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 40 (3.8) | 539 (5.3) | 35 (4.2) | 526 (4.2) | 26 (3.9) | 497 (4.6) |
| Quebec, Canada | 55 (4.6) | 530 (2.7) | 29 (4.0) | 514 (3.9) | 16 (3.4) | 510 (5.9) |
| Moscow City, Russian Fed. | 87 (3.1) | 595 (2.4) | 11 (2.9) | 594 (5.6) | 2 (1.2) | ~ ~ |
| Madrid, Spain | 65 (3.9) | 530 (1.9) | 23 (3.3) | 515 (4.8) | 13 (2.9) | 493 (6.6) |
| Abu Dhabi, UAE r | 56 (1.2) | 422 (3.4) | 22 (1.3) | 379 (6.1) | 22 (1.5) | 427 (10.2) |
| Dubai, UAE r | 51 (0.3) | 554 (2.3) | 32 (0.3) | 544 (3.9) | 17 (0.3) | 517 (4.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 6.4: School Composition by Socioeconomic Background of the Student Body

*Students' Results based on Principals' Reports*

| Country | More Affluent: Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes | | Neither More Affluent Nor More Disadvantaged | | More Disadvantaged: Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 39 (3.6) | 558 (7.8) | 34 (3.4) | 511 (5.5) | 27 (3.0) | 474 (5.8) |
| Bahrain | 28 (0.2) | 492 (4.6) | 50 (0.3) | 479 (2.5) | 22 (0.2) | 472 (3.3) |
| Chile | 16 (2.4) | 502 (6.0) | 11 (2.7) | 453 (10.3) | 72 (3.0) | 424 (3.9) |
| Chinese Taipei | 14 (2.7) | 656 (9.2) | 66 (3.5) | 616 (3.4) | 20 (2.4) | 571 (6.6) |
| Cyprus s | 54 (0.5) | 519 (2.7) | 32 (0.4) | 490 (4.1) | 14 (0.3) | 466 (4.9) |
| Egypt | 11 (2.8) | 431 (13.6) | 19 (3.5) | 418 (14.2) | 69 (4.3) | 403 (6.4) |
| England s | 37 (4.7) | 562 (9.4) | 30 (5.1) | 500 (10.5) | 33 (5.0) | 489 (11.3) |
| Finland | 30 (3.9) | 513 (4.3) | 60 (4.2) | 509 (3.4) | 10 (2.5) | 494 (8.0) |
| France r | 32 (4.2) | 510 (4.9) | 30 (3.9) | 486 (4.1) | 38 (4.4) | 463 (4.1) |
| Georgia | 39 (4.6) | 465 (7.1) | 37 (4.5) | 466 (6.9) | 24 (4.1) | 456 (10.1) |
| Hong Kong SAR | 27 (2.8) | 622 (7.0) | 34 (3.9) | 581 (8.3) | 39 (3.6) | 553 (9.0) |
| Hungary | 39 (4.1) | 556 (6.8) | 36 (4.4) | 514 (6.1) | 25 (3.5) | 461 (6.6) |
| Iran, Islamic Rep. of | 18 (2.7) | 503 (11.8) | 27 (3.6) | 454 (5.9) | 55 (3.7) | 425 (5.5) |
| Ireland | 30 (3.8) | 545 (4.0) | 44 (4.2) | 531 (4.2) | 26 (3.4) | 500 (6.6) |
| Israel | 29 (3.1) | 563 (6.6) | 30 (3.6) | 531 (9.7) | 41 (3.5) | 483 (9.3) |
| Italy | 38 (3.9) | 509 (4.0) | 43 (4.1) | 504 (4.2) | 19 (3.5) | 464 (6.0) |
| Japan | 52 (4.3) | 602 (4.7) | 36 (4.0) | 588 (3.1) | 12 (2.7) | 573 (6.5) |
| Jordan r | 16 (2.7) | 450 (8.9) | 27 (3.6) | 413 (6.2) | 57 (3.9) | 413 (6.0) |
| Kazakhstan | 82 (3.4) | 492 (3.8) | 17 (3.2) | 469 (9.0) | 1 (1.0) | ~ ~ |
| Korea, Rep. of | 23 (3.4) | 639 (6.1) | 48 (3.8) | 607 (3.3) | 29 (3.3) | 581 (4.8) |
| Kuwait r | 26 (4.5) | 417 (11.9) | 56 (4.7) | 403 (5.4) | 19 (2.9) | 403 (13.1) |
| Lebanon r | 25 (3.4) | 463 (5.0) | 31 (4.4) | 439 (6.3) | 44 (5.3) | 406 (5.0) |
| Lithuania | 71 (3.3) | 526 (3.6) | 20 (3.5) | 499 (5.1) | 9 (2.4) | 504 (8.3) |
| Malaysia | 10 (1.6) | 539 (10.6) | 25 (3.2) | 489 (8.7) | 65 (3.3) | 438 (4.6) |
| Morocco r | 7 (2.1) | 458 (18.2) | 13 (2.8) | 393 (6.4) | 80 (3.4) | 380 (2.9) |
| New Zealand r | 38 (3.8) | 516 (6.5) | 43 (4.3) | 484 (4.6) | 19 (3.0) | 434 (8.3) |
| Norway (9) r | 56 (5.1) | 511 (4.0) | 34 (4.6) | 500 (3.8) | 10 (3.4) | 487 (8.2) |
| Oman | 35 (3.8) | 428 (6.6) | 42 (3.9) | 406 (4.4) | 23 (3.3) | 389 (7.2) |
| Portugal | 21 (3.0) | 528 (5.8) | 37 (4.1) | 500 (6.0) | 42 (4.1) | 486 (4.3) |
| Qatar | 55 (3.4) | 458 (7.0) | 32 (3.5) | 429 (5.7) | 13 (1.9) | 429 (13.2) |
| Romania | 29 (3.8) | 501 (9.8) | 32 (4.0) | 475 (7.6) | 39 (4.2) | 467 (7.7) |
| Russian Federation | 74 (3.3) | 549 (5.4) | 19 (2.8) | 536 (8.7) | 7 (1.8) | 511 (11.9) |
| Saudi Arabia r | 47 (4.1) | 403 (5.0) | 37 (4.3) | 388 (5.4) | 17 (3.1) | 383 (7.2) |
| Singapore | 43 (0.0) | 640 (6.2) | 46 (0.0) | 611 (6.2) | 10 (0.0) | 539 (12.6) |
| South Africa (9) r | 10 (1.6) | 463 (16.0) | 13 (2.1) | 413 (10.2) | 77 (2.4) | 379 (3.4) |
| Sweden | 69 (4.0) | 511 (3.3) | 22 (3.8) | 490 (5.8) | 8 (2.5) | 479 (5.2) |
| Turkey | 27 (3.0) | 540 (8.2) | 28 (3.6) | 491 (9.1) | 45 (4.0) | 474 (5.7) |
| United Arab Emirates r | 51 (1.3) | 483 (2.3) | 25 (1.3) | 462 (2.7) | 24 (0.9) | 452 (5.3) |
| United States | 22 (2.2) | 581 (7.0) | 23 (2.5) | 530 (8.5) | 55 (2.7) | 488 (5.9) |
| **International Average** | **35 (0.5)** | **518 (1.3)** | **33 (0.6)** | **489 (1.1)** | **32 (0.5)** | **466 (1.2)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada r | 47 (4.7) | 548 (8.3) | 34 (4.4) | 524 (5.4) | 19 (3.4) | 488 (11.1) |
| Quebec, Canada | 57 (3.8) | 553 (5.0) | 29 (4.1) | 541 (7.7) | 15 (3.1) | 532 (13.1) |
| Moscow City, Russian Fed. | 84 (3.2) | 579 (4.7) | 14 (2.8) | 551 (10.7) | 3 (1.5) | 595 (21.9) |
| Gauteng, RSA (9) r | 17 (3.1) | 481 (11.3) | 14 (3.3) | 467 (15.1) | 69 (4.1) | 402 (3.5) |
| Western Cape, RSA (9) r | 17 (3.2) | 558 (7.3) | 6 (2.1) | 497 (23.1) | 77 (3.1) | 418 (5.2) |
| Abu Dhabi, UAE r | 56 (1.2) | 445 (4.6) | 24 (1.7) | 402 (6.5) | 20 (1.4) | 440 (8.5) |
| Dubai, UAE r | 53 (0.5) | 553 (2.8) | 27 (0.5) | 546 (5.2) | 20 (0.4) | 471 (5.4) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 6.5: School Composition by Socioeconomic Background of the Student Body

*Students' Results based on Principals' Reports*

| Country | More Affluent: Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes | | Neither More Affluent Nor More Disadvantaged | | More Disadvantaged: Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 39 (3.6) | 565 (6.0) | 34 (3.4) | 525 (4.3) | 27 (3.0) | 487 (5.6) |
| Bahrain | 28 (0.2) | 521 (3.8) | 50 (0.3) | 479 (2.7) | 22 (0.2) | 463 (3.4) |
| Chile | 16 (2.4) | 518 (5.5) | 11 (2.7) | 473 (9.8) | 72 (3.0) | 447 (3.9) |
| Chinese Taipei | 14 (2.7) | 605 (7.2) | 66 (3.5) | 577 (2.3) | 20 (2.4) | 544 (5.4) |
| Cyprus s | 54 (0.5) | 501 (3.1) | 32 (0.4) | 472 (4.7) | 14 (0.3) | 449 (6.8) |
| Egypt | 11 (2.8) | 404 (12.6) | 19 (3.5) | 396 (15.2) | 69 (4.3) | 380 (7.2) |
| England s | 37 (4.7) | 568 (8.2) | 30 (5.1) | 500 (9.7) | 33 (5.0) | 489 (10.8) |
| Finland | 30 (3.9) | 546 (5.1) | 60 (4.2) | 544 (4.1) | 10 (2.5) | 526 (10.0) |
| France r | 32 (4.2) | 518 (5.2) | 30 (3.9) | 492 (4.4) | 38 (4.4) | 466 (4.6) |
| Georgia | 39 (4.6) | 449 (6.8) | 37 (4.5) | 448 (6.2) | 24 (4.1) | 447 (7.8) |
| Hong Kong SAR | 27 (2.8) | 547 (8.3) | 34 (3.9) | 493 (11.0) | 39 (3.6) | 489 (8.8) |
| Hungary | 39 (4.1) | 563 (5.7) | 36 (4.4) | 530 (5.3) | 25 (3.5) | 480 (6.0) |
| Iran, Islamic Rep. of | 18 (2.7) | 500 (10.6) | 27 (3.6) | 458 (5.7) | 55 (3.7) | 430 (5.4) |
| Ireland | 30 (3.8) | 547 (4.6) | 44 (4.2) | 529 (4.5) | 26 (3.4) | 498 (7.9) |
| Israel | 29 (3.1) | 550 (6.0) | 30 (3.6) | 525 (8.4) | 41 (3.5) | 482 (8.8) |
| Italy | 38 (3.9) | 512 (4.1) | 43 (4.1) | 505 (4.0) | 19 (3.5) | 470 (6.9) |
| Japan | 52 (4.3) | 575 (3.8) | 36 (4.0) | 565 (2.3) | 12 (2.7) | 556 (5.6) |
| Jordan r | 16 (2.7) | 489 (10.8) | 27 (3.6) | 444 (7.8) | 57 (3.9) | 445 (7.4) |
| Kazakhstan | 82 (3.4) | 483 (3.5) | 17 (3.2) | 461 (9.7) | 1 (1.0) | ~ ~ |
| Korea, Rep. of | 23 (3.4) | 585 (4.7) | 48 (3.8) | 559 (2.9) | 29 (3.3) | 544 (3.4) |
| Kuwait r | 26 (4.5) | 451 (11.8) | 56 (4.7) | 446 (7.0) | 19 (2.9) | 443 (12.2) |
| Lebanon r | 25 (3.4) | 429 (9.4) | 31 (4.4) | 394 (10.0) | 44 (5.3) | 342 (8.1) |
| Lithuania | 71 (3.3) | 539 (3.6) | 20 (3.5) | 513 (4.7) | 9 (2.4) | 518 (7.4) |
| Malaysia | 10 (1.6) | 536 (8.5) | 25 (3.2) | 482 (8.8) | 65 (3.3) | 440 (4.9) |
| Morocco r | 7 (2.1) | 447 (22.0) | 13 (2.8) | 393 (9.8) | 80 (3.4) | 389 (3.8) |
| New Zealand r | 38 (3.8) | 535 (5.7) | 43 (4.3) | 502 (4.6) | 19 (3.0) | 449 (9.3) |
| Norway (9) r | 56 (5.1) | 504 (4.5) | 34 (4.6) | 494 (4.7) | 10 (3.4) | 473 (11.6) |
| Oman | 35 (3.8) | 471 (7.2) | 42 (3.9) | 455 (4.8) | 23 (3.3) | 434 (7.6) |
| Portugal | 21 (3.0) | 541 (5.4) | 37 (4.1) | 517 (5.4) | 42 (4.1) | 507 (4.1) |
| Qatar | 55 (3.4) | 486 (6.9) | 32 (3.5) | 464 (6.2) | 13 (1.9) | 463 (12.9) |
| Romania | 29 (3.8) | 492 (8.1) | 32 (4.0) | 468 (7.2) | 39 (4.2) | 461 (7.1) |
| Russian Federation | 74 (3.3) | 546 (5.2) | 19 (2.8) | 541 (7.5) | 7 (1.8) | 518 (12.3) |
| Saudi Arabia r | 47 (4.1) | 437 (5.7) | 37 (4.3) | 429 (6.2) | 17 (3.1) | 423 (7.8) |
| Singapore | 43 (0.0) | 632 (6.0) | 46 (0.0) | 603 (5.9) | 10 (0.0) | 530 (12.4) |
| South Africa (9) r | 10 (1.6) | 469 (21.3) | 13 (2.1) | 401 (14.2) | 77 (2.4) | 356 (4.5) |
| Sweden | 69 (4.0) | 534 (3.8) | 22 (3.8) | 505 (7.2) | 8 (2.5) | 487 (7.7) |
| Turkey | 27 (3.0) | 553 (7.3) | 28 (3.6) | 511 (8.1) | 45 (4.0) | 497 (5.1) |
| United Arab Emirates r | 51 (1.3) | 482 (2.8) | 25 (1.3) | 459 (2.8) | 24 (0.9) | 456 (6.0) |
| United States | 22 (2.2) | 579 (5.6) | 23 (2.5) | 540 (7.4) | 55 (2.7) | 497 (6.4) |
| **International Average** | **35 (0.5)** | **518 (1.3)** | **33 (0.6)** | **490 (1.2)** | **32 (0.5)** | **468 (1.3)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada r | 47 (4.7) | 534 (4.7) | 34 (4.4) | 518 (5.1) | 19 (3.4) | 490 (8.5) |
| Quebec, Canada | 57 (3.8) | 545 (4.8) | 29 (4.1) | 538 (7.2) | 15 (3.1) | 524 (13.6) |
| Moscow City, Russian Fed. | 84 (3.2) | 569 (3.3) | 14 (2.8) | 550 (8.0) | 3 (1.5) | 571 (17.9) |
| Gauteng, RSA (9) r | 17 (3.1) | 501 (13.5) | 14 (3.3) | 480 (18.4) | 69 (4.1) | 398 (4.8) |
| Western Cape, RSA (9) r | 17 (3.2) | 584 (8.5) | 6 (2.1) | 516 (31.0) | 77 (3.1) | 410 (6.0) |
| Abu Dhabi, UAE r | 56 (1.2) | 427 (5.5) | 24 (1.7) | 374 (9.3) | 20 (1.4) | 440 (10.6) |
| Dubai, UAE r | 53 (0.5) | 564 (2.9) | 27 (0.5) | 561 (4.3) | 20 (0.4) | 479 (5.8) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Students' Native Language is the Language of the Test

Principals' categorizations of their schools according to the percentage of fourth grade students who spoke the language of the TIMSS 2019 assessment as their first language are shown in Exhibit 6.6, together with average mathematics achievement, and in Exhibit 6.7 together with science achievement. On average, 63 percent were in schools where most students (more than 90%) spoke the language of the TIMSS assessment as their first language, and another 18 percent were in schools where more than half of students (51–90%) spoke the language of the assessment as their first language. Both groups of students had higher average achievement than the 19 percent of students attending schools where only half of the students (or less) spoke the language of the assessment as their native language (506 and 501 vs. 486 for mathematics, and 498 and 493 vs. 471 for science).

As shown in Exhibit 6.8 for mathematics and in Exhibit 6.9 for science, the distribution of eighth grade students across the language composition groups was similar to fourth grade. Sixty-four percent of students were in schools where most students spoke the assessment language as their first language (more than 90%) and 17 percent and 18 percent were in schools where more than half of the students (51–90%) and only half of the students (or less) did so, respectively. There was little difference in average mathematics or science achievement among the groups, although average science achievement was lower in schools where only half of the students (or less) spoke the language of the assessment as their native language (483 vs. 484 and 487 for mathematics, and 479 vs. 491 and 490 for science).

## Exhibit 6.6: Schools with Students Having the Language of the Test as Their Native Language

*Students' Results based on Principals' Reports*

| Country | School has More than 90% of Students with Language of Test as Their Native Language | | School has 51–90% of Students with Language of Test as Their Native Language | | School has 50% or Less of Students with Language of Test as Their Native Language | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 99 (1.0) | 494 (3.5) | 1 (0.7) | ~ ~ | 1 (0.8) | ~ ~ |
| Armenia | 95 (1.6) | 498 (2.6) | 4 (1.3) | 493 (12.0) | 1 (0.8) | ~ ~ |
| Australia | 48 (3.5) | 516 (4.4) | 34 (3.8) | 514 (5.2) | 17 (3.0) | 513 (13.4) |
| Austria | 21 (2.3) | 551 (4.1) | 46 (3.5) | 547 (3.3) | 34 (3.2) | 521 (3.8) |
| Azerbaijan r | 97 (1.4) | 510 (3.3) | 3 (1.4) | 518 (12.9) | 0 (0.1) | ~ ~ |
| Bahrain | 56 (1.8) | 483 (3.4) | 15 (1.7) | 463 (7.8) | 29 (1.6) | 484 (3.3) |
| Belgium (Flemish) | 37 (3.6) | 545 (2.5) | 39 (4.1) | 535 (2.9) | 24 (3.2) | 510 (6.5) |
| Bosnia and Herzegovina | 95 (1.8) | 450 (2.4) | 4 (1.7) | 481 (5.2) | 1 (0.8) | ~ ~ |
| Bulgaria | 58 (4.0) | 535 (6.4) | 19 (2.9) | 512 (6.7) | 24 (3.1) | 467 (8.7) |
| Canada | 43 (2.3) | 517 (3.0) | 39 (2.8) | 505 (3.2) | 18 (2.1) | 512 (4.6) |
| Chile | 95 (1.8) | 441 (3.1) | 4 (1.8) | 436 (13.1) | 0 (0.2) | ~ ~ |
| Chinese Taipei | 66 (3.3) | 602 (2.0) | 28 (3.5) | 598 (3.1) | 5 (1.7) | 567 (15.2) |
| Croatia | 92 (2.5) | 510 (2.2) | 6 (2.2) | 512 (7.7) | 2 (1.2) | ~ ~ |
| Cyprus | 44 (4.0) | 540 (4.2) | 37 (4.0) | 530 (4.6) | 19 (2.5) | 515 (7.5) |
| Czech Republic | 91 (2.4) | 531 (2.8) | 9 (2.4) | 549 (8.8) | 0 (0.0) | ~ ~ |
| Denmark | 52 (4.4) | 528 (3.0) | 42 (4.7) | 524 (3.7) | 6 (2.0) | 509 (12.5) |
| England s | 43 (5.4) | 561 (5.4) | 45 (5.6) | 554 (6.5) | 13 (3.5) | 559 (16.7) |
| Finland | 69 (3.2) | 538 (2.4) | 28 (3.0) | 522 (4.0) | 3 (1.4) | 490 (16.8) |
| France | 64 (3.6) | 494 (3.7) | 28 (3.9) | 478 (6.1) | 9 (1.8) | 441 (13.8) |
| Georgia | 86 (3.1) | 485 (3.9) | 12 (2.9) | 460 (9.2) | 2 (0.9) | ~ ~ |
| Germany | 25 (2.9) | 535 (3.5) | 53 (3.6) | 525 (3.3) | 22 (2.7) | 495 (6.4) |
| Hong Kong SAR | 74 (3.6) | 601 (3.7) | 11 (4.0) | 593 (19.7) | 15 (3.7) | 612 (11.9) |
| Hungary | 96 (1.8) | 522 (2.9) | 4 (1.8) | 535 (29.1) | 0 (0.0) | ~ ~ |
| Iran, Islamic Rep. of | 57 (3.4) | 455 (4.2) | 12 (2.5) | 457 (10.2) | 31 (3.3) | 417 (8.7) |
| Ireland | 59 (3.6) | 555 (2.9) | 30 (3.6) | 540 (4.8) | 11 (2.7) | 534 (7.7) |
| Italy | 62 (3.9) | 515 (3.4) | 38 (3.9) | 516 (3.4) | 1 (0.7) | ~ ~ |
| Japan | 98 (1.4) | 593 (1.8) | 2 (1.2) | ~ ~ | 1 (0.7) | ~ ~ |
| Kazakhstan | 55 (2.5) | 506 (3.0) | 27 (3.2) | 521 (6.3) | 18 (2.9) | 518 (7.9) |
| Korea, Rep. of | 94 (2.0) | 601 (2.4) | 6 (2.0) | 580 (10.7) | 0 (0.0) | ~ ~ |
| Kosovo | 96 (1.4) | 445 (3.1) | 3 (1.2) | 428 (16.0) | 1 (0.7) | ~ ~ |
| Kuwait | 79 (2.4) | 372 (5.0) | 4 (2.3) | 444 (23.5) | 17 (2.0) | 417 (12.9) |
| Latvia | 51 (3.3) | 544 (3.5) | 21 (3.2) | 540 (6.8) | 28 (1.0) | 556 (4.4) |
| Lithuania | 87 (2.8) | 540 (3.5) | 10 (2.4) | 564 (10.4) | 3 (1.2) | 534 (14.3) |
| Malta | 6 (0.2) | 516 (3.6) | 10 (0.2) | 534 (3.3) | 84 (0.3) | 506 (1.7) |
| Montenegro | 69 (0.5) | 457 (2.1) | 23 (0.5) | 451 (3.5) | 8 (0.3) | 424 (6.6) |
| Morocco | 67 (3.1) | 386 (6.4) | 11 (2.2) | 375 (10.5) | 22 (2.6) | 378 (5.8) |
| Netherlands s | 53 (5.4) | 546 (2.8) | 37 (5.4) | 531 (3.7) | 10 (2.6) | 518 (7.1) |
| New Zealand | 52 (3.6) | 480 (4.5) | 29 (3.5) | 504 (6.8) | 20 (2.7) | 482 (8.9) |
| North Macedonia | 72 (3.2) | 479 (6.6) | 18 (3.3) | 468 (10.4) | 10 (2.7) | 430 (11.4) |
| Northern Ireland r | 66 (4.3) | 566 (4.0) | 24 (4.3) | 573 (9.1) | 10 (2.7) | 558 (12.9) |
| Norway (5) r | 54 (4.9) | 544 (3.8) | 40 (5.1) | 545 (3.8) | 6 (1.9) | 531 (9.2) |
| Oman | 78 (1.7) | 429 (4.3) | 7 (1.5) | 392 (10.8) | 15 (1.1) | 458 (10.0) |
| Pakistan | 5 (1.8) | 334 (18.1) | 4 (1.9) | 266 (32.0) | 91 (2.6) | 333 (13.6) |
| Philippines | 1 (0.7) | ~ ~ | 2 (1.0) | ~ ~ | 97 (1.1) | 296 (6.6) |
| Poland | 99 (1.0) | 520 (2.7) | 1 (1.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Portugal | 86 (2.3) | 527 (3.0) | 11 (2.2) | 519 (6.3) | 4 (1.5) | 505 (12.8) |
| Qatar | 39 (2.8) | 410 (4.6) | 11 (2.2) | 437 (11.9) | 49 (2.3) | 484 (5.5) |
| Russian Federation | 75 (3.1) | 567 (3.8) | 15 (2.6) | 569 (7.3) | 10 (1.6) | 564 (9.1) |
| Saudi Arabia | 88 (2.3) | 396 (3.6) | 6 (1.9) | 394 (14.0) | 5 (1.3) | 424 (17.6) |
| Serbia | 91 (2.2) | 512 (3.1) | 8 (2.1) | 468 (10.2) | 1 (0.5) | ~ ~ |
| Singapore | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ | 100 (0.0) | 625 (3.9) |
| Slovak Republic | 90 (2.1) | 519 (2.9) | 5 (1.4) | 442 (16.3) | 5 (1.8) | 419 (13.9) |
| South Africa (5) | 10 (1.6) | 411 (13.0) | 10 (2.1) | 494 (12.0) | 80 (2.3) | 359 (3.5) |
| Spain | 58 (3.2) | 509 (4.0) | 28 (3.3) | 496 (6.3) | 14 (2.0) | 490 (4.6) |
| Sweden | 43 (4.3) | 535 (3.8) | 34 (4.6) | 523 (4.4) | 23 (4.1) | 490 (7.1) |
| Turkey (5) | 78 (3.1) | 537 (4.9) | 9 (2.0) | 510 (6.8) | 14 (2.4) | 449 (13.6) |
| United Arab Emirates | 26 (0.6) | 475 (3.1) | 5 (0.2) | 555 (4.7) | 69 (0.6) | 475 (1.9) |
| United States | 45 (3.0) | 544 (4.2) | 35 (3.0) | 531 (5.4) | 20 (2.5) | 522 (6.2) |
| **International Average** | **63 (0.4)** | **506 (0.6)** | **18 (0.4)** | **501 (1.5)** | **19 (0.3)** | **486 (1.5)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 34 (3.5) | 522 (6.6) | 46 (4.7) | 505 (4.7) | 21 (3.4) | 510 (5.9) |
| Quebec, Canada | 60 (4.5) | 530 (3.0) | 25 (4.4) | 533 (4.3) | 15 (3.4) | 539 (7.8) |
| Moscow City, Russian Fed. | 75 (3.6) | 595 (2.4) | 24 (3.6) | 587 (4.8) | 1 (0.9) | ~ ~ |
| Madrid, Spain | 74 (3.3) | 526 (1.8) | 24 (3.3) | 495 (5.0) | 2 (1.0) | ~ ~ |
| Abu Dhabi, UAE r | 16 (0.6) | 467 (7.9) | 3 (0.2) | 550 (10.0) | 81 (0.6) | 425 (2.4) |
| Dubai, UAE r | 15 (0.3) | 487 (4.3) | 11 (0.2) | 585 (2.5) | 74 (0.3) | 548 (2.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.7: Schools with Students Having the Language of the Test as Their Native Language

*Students' Results based on Principals' Reports*

| Country | School has More than 90% of Students with Language of Test as Their Native Language | | School has 51–90% of Students with Language of Test as Their Native Language | | School has 50% or Less of Students with Language of Test as Their Native Language | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 99 (1.0) | 489 (3.6) | 1 (0.7) | ~ ~ | 1 (0.8) | ~ ~ |
| Armenia | 95 (1.6) | 467 (3.5) | 4 (1.3) | 458 (9.9) | 1 (0.8) | ~ ~ |
| Australia | 48 (3.5) | 537 (4.1) | 34 (3.8) | 530 (4.5) | 17 (3.0) | 522 (11.0) |
| Austria | 21 (2.3) | 542 (3.5) | 46 (3.5) | 533 (4.1) | 34 (3.2) | 495 (4.9) |
| Azerbaijan r | 97 (1.4) | 419 (4.0) | 3 (1.4) | 428 (16.6) | 0 (0.1) | ~ ~ |
| Bahrain | 56 (1.8) | 495 (4.9) | 15 (1.7) | 462 (11.2) | 29 (1.6) | 505 (4.5) |
| Belgium (Flemish) | 37 (3.6) | 515 (2.4) | 39 (4.1) | 504 (3.2) | 24 (3.2) | 475 (7.6) |
| Bosnia and Herzegovina | 95 (1.8) | 457 (2.9) | 4 (1.7) | 491 (7.4) | 1 (0.8) | ~ ~ |
| Bulgaria | 58 (4.0) | 549 (7.4) | 19 (2.9) | 520 (8.8) | 24 (3.1) | 455 (10.7) |
| Canada | 43 (2.3) | 529 (3.0) | 39 (2.8) | 521 (3.0) | 18 (2.1) | 516 (3.7) |
| Chile | 95 (1.8) | 470 (2.8) | 4 (1.8) | 461 (13.2) | 0 (0.2) | ~ ~ |
| Chinese Taipei | 66 (3.3) | 561 (2.1) | 28 (3.5) | 558 (2.6) | 5 (1.7) | 524 (12.7) |
| Croatia | 92 (2.5) | 525 (2.2) | 6 (2.2) | 528 (7.2) | 2 (1.2) | ~ ~ |
| Cyprus | 44 (4.0) | 517 (4.6) | 37 (4.0) | 511 (3.6) | 19 (2.5) | 498 (7.8) |
| Czech Republic | 91 (2.4) | 532 (2.8) | 9 (2.4) | 547 (8.0) | 0 (0.0) | ~ ~ |
| Denmark | 52 (4.4) | 527 (3.2) | 42 (4.7) | 520 (4.1) | 6 (2.0) | 505 (13.5) |
| England s | 43 (5.4) | 543 (5.2) | 45 (5.6) | 534 (5.5) | 13 (3.5) | 535 (14.6) |
| Finland | 69 (3.2) | 562 (2.6) | 28 (3.0) | 543 (4.1) | 3 (1.4) | 494 (10.8) |
| France | 64 (3.6) | 498 (3.6) | 28 (3.9) | 480 (6.1) | 9 (1.8) | 442 (12.5) |
| Georgia | 86 (3.1) | 457 (4.2) | 12 (2.9) | 432 (8.7) | 2 (0.9) | ~ ~ |
| Germany | 25 (2.9) | 541 (3.2) | 53 (3.6) | 521 (3.1) | 22 (2.7) | 486 (6.6) |
| Hong Kong SAR | 74 (3.6) | 527 (3.7) | 11 (4.0) | 533 (24.5) | 15 (3.7) | 551 (10.9) |
| Hungary | 96 (1.8) | 528 (2.9) | 4 (1.8) | 537 (26.7) | 0 (0.0) | ~ ~ |
| Iran, Islamic Rep. of | 57 (3.4) | 459 (4.2) | 12 (2.5) | 453 (9.8) | 31 (3.3) | 404 (9.2) |
| Ireland | 59 (3.6) | 534 (3.2) | 30 (3.6) | 519 (7.3) | 11 (2.7) | 516 (8.0) |
| Italy | 62 (3.9) | 511 (3.8) | 38 (3.9) | 509 (3.9) | 1 (0.7) | ~ ~ |
| Japan | 98 (1.4) | 561 (1.8) | 2 (1.2) | ~ ~ | 1 (0.7) | ~ ~ |
| Kazakhstan | 55 (2.5) | 480 (3.7) | 27 (3.2) | 515 (7.7) | 18 (2.9) | 507 (9.8) |
| Korea, Rep. of | 94 (2.0) | 589 (2.2) | 6 (2.0) | 569 (9.9) | 0 (0.0) | ~ ~ |
| Kosovo | 96 (1.4) | 414 (3.8) | 3 (1.2) | 390 (16.9) | 1 (0.7) | ~ ~ |
| Kuwait | 79 (2.4) | 389 (6.9) | 4 (2.3) | 465 (20.2) | 17 (2.0) | 394 (14.8) |
| Latvia | 51 (3.3) | 540 (3.2) | 21 (3.2) | 533 (6.4) | 28 (1.0) | 552 (3.9) |
| Lithuania | 87 (2.8) | 536 (3.3) | 10 (2.4) | 554 (10.7) | 3 (1.2) | 532 (15.2) |
| Malta | 6 (0.2) | 504 (4.8) | 10 (0.2) | 530 (3.9) | 84 (0.3) | 491 (1.4) |
| Montenegro | 69 (0.5) | 458 (2.8) | 23 (0.5) | 452 (3.9) | 8 (0.3) | 419 (6.4) |
| Morocco | 67 (3.1) | 376 (7.8) | 11 (2.2) | 371 (12.0) | 22 (2.6) | 368 (9.3) |
| Netherlands s | 53 (5.4) | 532 (3.6) | 37 (5.4) | 509 (4.3) | 10 (2.6) | 484 (9.2) |
| New Zealand | 52 (3.6) | 499 (4.2) | 29 (3.5) | 517 (6.0) | 20 (2.7) | 492 (8.2) |
| North Macedonia | 72 (3.2) | 433 (7.6) | 18 (3.3) | 428 (11.0) | 10 (2.7) | 382 (13.0) |
| Northern Ireland r | 66 (4.3) | 518 (3.4) | 24 (4.3) | 523 (6.6) | 10 (2.7) | 513 (9.7) |
| Norway (5) r | 54 (4.9) | 542 (3.6) | 40 (5.1) | 540 (3.6) | 6 (1.9) | 519 (8.6) |
| Oman | 78 (1.7) | 435 (5.0) | 7 (1.5) | 393 (10.3) | 15 (1.1) | 452 (9.3) |
| Pakistan | 5 (1.8) | 306 (19.8) | 4 (1.9) | 244 (33.1) | 91 (2.6) | 295 (15.3) |
| Philippines | 1 (0.7) | ~ ~ | 2 (1.0) | ~ ~ | 97 (1.1) | 248 (7.7) |
| Poland | 99 (1.0) | 531 (2.6) | 1 (1.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Portugal | 86 (2.3) | 505 (2.8) | 11 (2.2) | 502 (6.3) | 4 (1.5) | 488 (9.5) |
| Qatar | 39 (2.8) | 412 (5.8) | 11 (2.2) | 443 (13.5) | 49 (2.3) | 482 (6.8) |
| Russian Federation | 75 (3.1) | 569 (3.5) | 15 (2.6) | 568 (5.4) | 10 (1.6) | 553 (9.6) |
| Saudi Arabia | 88 (2.3) | 400 (4.3) | 6 (1.9) | 403 (14.9) | 5 (1.3) | 433 (20.1) |
| Serbia | 91 (2.2) | 521 (3.3) | 8 (2.1) | 477 (11.4) | 1 (0.5) | ~ ~ |
| Singapore | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ | 100 (0.0) | 595 (3.4) |
| Slovak Republic | 90 (2.1) | 532 (3.0) | 5 (1.4) | 451 (15.1) | 5 (1.8) | 402 (17.2) |
| South Africa (5) | 10 (1.6) | 387 (16.8) | 10 (2.1) | 492 (15.5) | 80 (2.3) | 303 (4.8) |
| Spain | 58 (3.2) | 518 (3.3) | 28 (3.3) | 506 (6.0) | 14 (2.0) | 494 (5.6) |
| Sweden | 43 (4.3) | 554 (4.0) | 34 (4.6) | 540 (4.2) | 23 (4.1) | 499 (8.2) |
| Turkey (5) | 78 (3.1) | 541 (4.6) | 9 (2.0) | 520 (6.2) | 14 (2.4) | 448 (13.8) |
| United Arab Emirates | 26 (0.6) | 482 (3.7) | 5 (0.2) | 552 (5.3) | 69 (0.6) | 461 (2.4) |
| United States | 45 (3.0) | 551 (4.3) | 35 (3.0) | 532 (5.8) | 20 (2.5) | 523 (6.0) |
| **International Average** | **63 (0.4)** | **498 (0.7)** | **18 (0.4)** | **493 (1.5)** | **19 (0.3)** | **471 (1.5)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 34 (3.5) | 537 (6.0) | 46 (4.7) | 519 (4.2) | 21 (3.4) | 514 (5.1) |
| Quebec, Canada | 60 (4.5) | 523 (3.0) | 25 (4.4) | 522 (4.6) | 15 (3.4) | 520 (6.4) |
| Moscow City, Russian Fed. | 75 (3.6) | 596 (2.4) | 24 (3.6) | 591 (4.6) | 1 (0.9) | ~ ~ |
| Madrid, Spain | 74 (3.3) | 530 (1.8) | 24 (3.3) | 504 (4.2) | 2 (1.0) | ~ ~ |
| Abu Dhabi, UAE r | 16 (0.6) | 468 (9.4) | 3 (0.2) | 541 (9.4) | 81 (0.6) | 397 (2.9) |
| Dubai, UAE r | 15 (0.3) | 492 (5.0) | 11 (0.2) | 583 (2.8) | 74 (0.3) | 549 (2.2) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.8: Schools with Students Having the Language of the Test as Their Native Language

*Students' Results based on Principals' Reports*

| Country | | School has More than 90% of Students with Language of Test as Their Native Language | | School has 51–90% of Students with Language of Test as Their Native Language | | School has 50% or Less of Students with Language of Test as Their Native Language | |
|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | | 56 (3.8) | 506 (4.2) | 31 (3.5) | 530 (8.8) | 13 (2.8) | 548 (16.7) |
| Bahrain | | 64 (0.3) | 480 (1.9) | 14 (0.2) | 480 (7.2) | 21 (0.3) | 485 (3.0) |
| Chile | | 94 (2.0) | 442 (3.1) | 6 (2.0) | 416 (13.9) | 0 (0.0) | ~ ~ |
| Chinese Taipei | | 62 (3.3) | 624 (3.8) | 28 (3.5) | 604 (5.2) | 11 (2.1) | 568 (8.9) |
| Cyprus | r | 36 (0.4) | 500 (3.0) | 43 (0.5) | 487 (2.6) | 21 (0.4) | 538 (4.3) |
| Egypt | | 99 (0.8) | 413 (5.4) | 1 (0.8) | ~ ~ | 0 (0.0) | ~ ~ |
| England | s | 50 (5.3) | 516 (8.8) | 35 (4.5) | 529 (14.7) | 15 (3.5) | 506 (9.5) |
| Finland | | 75 (2.8) | 510 (2.8) | 23 (2.7) | 507 (5.3) | 1 (1.0) | ~ ~ |
| France | r | 71 (3.7) | 494 (3.2) | 24 (3.5) | 469 (6.3) | 4 (1.9) | 431 (10.9) |
| Georgia | | 86 (3.1) | 462 (4.7) | 12 (2.9) | 458 (10.5) | 2 (1.2) | ~ ~ |
| Hong Kong SAR | | 46 (3.5) | 567 (6.5) | 8 (2.6) | 585 (26.5) | 46 (4.1) | 590 (7.8) |
| Hungary | | 98 (1.1) | 516 (3.1) | 2 (1.1) | ~ ~ | 0 (0.0) | ~ ~ |
| Iran, Islamic Rep. of | | 48 (3.1) | 465 (6.3) | 12 (2.4) | 457 (10.5) | 40 (3.4) | 420 (6.9) |
| Ireland | | 70 (4.0) | 533 (2.6) | 28 (4.0) | 510 (5.3) | 2 (1.4) | ~ ~ |
| Israel | | 65 (3.0) | 515 (5.0) | 30 (3.0) | 527 (10.0) | 5 (1.8) | 518 (25.6) |
| Italy | | 59 (4.0) | 500 (3.5) | 37 (4.0) | 499 (4.7) | 4 (1.5) | 472 (19.8) |
| Japan | | 99 (0.9) | 594 (2.7) | 1 (0.6) | ~ ~ | 1 (0.6) | ~ ~ |
| Jordan | | 98 (0.8) | 420 (4.3) | 2 (0.4) | ~ ~ | 1 (0.7) | ~ ~ |
| Kazakhstan | | 57 (2.6) | 486 (5.2) | 27 (3.2) | 486 (5.9) | 16 (2.9) | 496 (10.1) |
| Korea, Rep. of | | 97 (1.3) | 608 (2.7) | 2 (1.2) | ~ ~ | 1 (0.6) | ~ ~ |
| Kuwait | | 83 (3.1) | 394 (5.0) | 3 (1.5) | 395 (27.0) | 14 (2.8) | 453 (13.4) |
| Lebanon | | 6 (2.1) | 424 (6.8) | 6 (2.1) | 462 (17.9) | 87 (2.9) | 427 (3.7) |
| Lithuania | | 91 (2.2) | 518 (2.9) | 7 (2.0) | 535 (16.6) | 2 (0.8) | ~ ~ |
| Malaysia | | 47 (3.4) | 462 (5.1) | 29 (3.4) | 447 (7.7) | 24 (3.7) | 473 (7.8) |
| Morocco | r | 67 (3.7) | 391 (2.9) | 14 (2.6) | 390 (6.7) | 19 (2.9) | 377 (5.3) |
| New Zealand | r | 48 (4.8) | 491 (5.2) | 49 (5.0) | 484 (5.3) | 2 (1.1) | ~ ~ |
| Norway (9) | r | 55 (5.0) | 509 (3.5) | 39 (4.8) | 500 (5.2) | 6 (1.8) | 492 (7.5) |
| Oman | | 85 (1.6) | 403 (3.0) | 4 (1.1) | 384 (5.9) | 12 (1.2) | 472 (9.8) |
| Portugal | | 85 (2.8) | 502 (3.6) | 9 (2.2) | 481 (10.8) | 6 (2.2) | 500 (11.3) |
| Qatar | | 51 (2.6) | 404 (5.7) | 8 (2.2) | 456 (22.7) | 41 (2.5) | 490 (5.4) |
| Romania | | 91 (1.9) | 482 (4.5) | 5 (1.6) | 481 (18.8) | 3 (1.1) | 413 (16.8) |
| Russian Federation | | 75 (3.6) | 552 (4.7) | 14 (2.5) | 536 (8.8) | 11 (2.6) | 500 (16.9) |
| Saudi Arabia | | 92 (1.8) | 392 (2.6) | 5 (1.6) | 393 (13.4) | 3 (0.8) | 463 (27.6) |
| Singapore | | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ | 100 (0.0) | 616 (4.0) |
| South Africa (9) | | 9 (1.3) | 444 (8.7) | 10 (1.5) | 453 (6.8) | 81 (1.8) | 377 (2.7) |
| Sweden | | 31 (3.6) | 514 (6.2) | 54 (3.8) | 504 (3.2) | 15 (3.3) | 478 (6.7) |
| Turkey | | 77 (3.4) | 508 (5.0) | 9 (2.3) | 479 (11.5) | 13 (2.5) | 435 (12.1) |
| United Arab Emirates | | 35 (0.9) | 445 (3.8) | 3 (0.2) | 544 (7.6) | 62 (0.9) | 482 (2.0) |
| United States | | 50 (3.0) | 522 (7.3) | 39 (2.9) | 515 (6.2) | 10 (1.7) | 509 (12.2) |
| **International Average** | | **64 (0.5)** | **487 (0.8)** | **17 (0.4)** | **484 (2.1)** | **18 (0.3)** | **483 (2.3)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | r | 46 (4.3) | 521 (9.4) | 41 (4.8) | 536 (4.7) | 13 (2.8) | 527 (6.9) |
| Quebec, Canada | | 53 (4.6) | 538 (4.6) | 33 (4.9) | 556 (6.6) | 14 (3.3) | 557 (13.2) |
| Moscow City, Russian Fed. | | 75 (3.5) | 583 (4.8) | 24 (3.4) | 551 (7.3) | 1 (0.8) | ~ ~ |
| Gauteng, RSA (9) | | 10 (2.9) | 469 (17.7) | 18 (3.0) | 459 (9.6) | 72 (3.4) | 407 (3.8) |
| Western Cape, RSA (9) | | 32 (4.2) | 446 (9.1) | 27 (3.7) | 479 (11.6) | 40 (4.1) | 413 (6.4) |
| Abu Dhabi, UAE | r | 21 (0.7) | 457 (8.4) | 3 (0.1) | 524 (13.6) | 75 (0.7) | 423 (3.5) |
| Dubai, UAE | r | 20 (0.3) | 453 (5.1) | 6 (0.2) | 585 (5.6) | 74 (0.4) | 553 (2.7) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.9: Schools with Students Having the Language of the Test as Their Native Language

*Students' Results based on Principals' Reports*

| Country | School has More than 90% of Students with Language of Test as Their Native Language | | School has 51–90% of Students with Language of Test as Their Native Language | | School has 50% or Less of Students with Language of Test as Their Native Language | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 56 (3.8) | 525 (3.6) | 31 (3.5) | 536 (7.5) | 13 (2.8) | 540 (14.8) |
| Bahrain | 64 (0.3) | 474 (2.0) | 14 (0.2) | 498 (4.6) | 21 (0.3) | 515 (4.2) |
| Chile | 94 (2.0) | 464 (3.1) | 6 (2.0) | 434 (14.3) | 0 (0.0) | ~ ~ |
| Chinese Taipei | 62 (3.3) | 583 (2.8) | 28 (3.5) | 569 (3.8) | 11 (2.1) | 539 (6.7) |
| Cyprus r | 36 (0.4) | 481 (3.5) | 43 (0.5) | 473 (3.4) | 21 (0.4) | 514 (4.6) |
| Egypt | 99 (0.8) | 389 (5.6) | 1 (0.8) | ~ ~ | 0 (0.0) | ~ ~ |
| England s | 50 (5.3) | 521 (8.4) | 35 (4.5) | 528 (13.5) | 15 (3.5) | 501 (10.9) |
| Finland | 75 (2.8) | 545 (3.2) | 23 (2.7) | 536 (7.0) | 1 (1.0) | ~ ~ |
| France r | 71 (3.7) | 500 (3.6) | 24 (3.5) | 473 (6.6) | 4 (1.9) | 434 (13.0) |
| Georgia | 86 (3.1) | 446 (4.1) | 12 (2.9) | 451 (9.0) | 2 (1.2) | ~ ~ |
| Hong Kong SAR | 46 (3.5) | 494 (7.9) | 8 (2.6) | 540 (31.5) | 46 (4.1) | 507 (9.0) |
| Hungary | 98 (1.1) | 530 (2.8) | 2 (1.1) | ~ ~ | 0 (0.0) | ~ ~ |
| Iran, Islamic Rep. of | 48 (3.1) | 469 (5.8) | 12 (2.4) | 461 (9.7) | 40 (3.4) | 422 (6.7) |
| Ireland | 70 (4.0) | 532 (3.0) | 28 (4.0) | 509 (5.9) | 2 (1.4) | ~ ~ |
| Israel | 65 (3.0) | 512 (5.1) | 30 (3.0) | 516 (9.2) | 5 (1.8) | 505 (25.3) |
| Italy | 59 (4.0) | 502 (3.4) | 37 (4.0) | 503 (4.7) | 4 (1.5) | 474 (24.1) |
| Japan | 99 (0.9) | 570 (2.2) | 1 (0.6) | ~ ~ | 1 (0.6) | ~ ~ |
| Jordan | 98 (0.8) | 451 (4.8) | 2 (0.4) | ~ ~ | 1 (0.7) | ~ ~ |
| Kazakhstan | 57 (2.6) | 467 (4.7) | 27 (3.2) | 491 (5.9) | 16 (2.9) | 495 (9.9) |
| Korea, Rep. of | 97 (1.3) | 561 (2.1) | 2 (1.2) | ~ ~ | 1 (0.6) | ~ ~ |
| Kuwait | 83 (3.1) | 439 (5.6) | 3 (1.5) | 442 (38.8) | 14 (2.8) | 472 (15.1) |
| Lebanon | 6 (2.1) | 362 (12.4) | 6 (2.1) | 424 (26.3) | 87 (2.9) | 376 (5.9) |
| Lithuania | 91 (2.2) | 531 (2.8) | 7 (2.0) | 544 (16.7) | 2 (0.8) | ~ ~ |
| Malaysia | 47 (3.4) | 473 (5.1) | 29 (3.4) | 445 (8.6) | 24 (3.7) | 453 (8.2) |
| Morocco r | 67 (3.7) | 409 (3.0) | 14 (2.6) | 407 (8.5) | 19 (2.9) | 392 (5.3) |
| New Zealand r | 48 (4.8) | 512 (4.7) | 49 (5.0) | 498 (5.7) | 2 (1.1) | ~ ~ |
| Norway (9) r | 55 (5.0) | 504 (4.1) | 39 (4.8) | 491 (5.9) | 6 (1.8) | 468 (8.2) |
| Oman | 85 (1.6) | 453 (3.2) | 4 (1.1) | 432 (9.8) | 12 (1.2) | 496 (9.1) |
| Portugal | 85 (2.8) | 520 (3.2) | 9 (2.2) | 505 (10.1) | 6 (2.2) | 520 (11.3) |
| Qatar | 51 (2.6) | 449 (5.5) | 8 (2.2) | 487 (18.3) | 41 (2.5) | 504 (6.7) |
| Romania | 91 (1.9) | 473 (4.3) | 5 (1.6) | 473 (16.3) | 3 (1.1) | 402 (21.1) |
| Russian Federation | 75 (3.6) | 551 (3.7) | 14 (2.5) | 538 (8.3) | 11 (2.6) | 498 (16.5) |
| Saudi Arabia | 92 (1.8) | 430 (2.7) | 5 (1.6) | 432 (14.7) | 3 (0.8) | 495 (24.4) |
| Singapore | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ | 100 (0.0) | 608 (3.9) |
| South Africa (9) | 9 (1.3) | 448 (11.6) | 10 (1.5) | 463 (8.2) | 81 (1.8) | 352 (3.7) |
| Sweden | 31 (3.6) | 536 (7.1) | 54 (3.8) | 524 (4.2) | 15 (3.3) | 486 (9.7) |
| Turkey | 77 (3.4) | 527 (4.4) | 9 (2.3) | 503 (10.1) | 13 (2.5) | 457 (10.6) |
| United Arab Emirates | 35 (0.9) | 450 (4.1) | 3 (0.2) | 544 (9.0) | 62 (0.9) | 478 (2.5) |
| United States | 50 (3.0) | 530 (7.4) | 39 (2.9) | 520 (5.7) | 10 (1.7) | 516 (12.1) |
| **International Average** | **64 (0.5)** | **490 (0.8)** | **17 (0.4)** | **491 (2.3)** | **18 (0.3)** | **479 (2.4)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada r | 46 (4.3) | 521 (6.0) | 41 (4.8) | 524 (4.2) | 13 (2.8) | 509 (6.4) |
| Quebec, Canada | 53 (4.6) | 534 (4.5) | 33 (4.9) | 550 (6.3) | 14 (3.3) | 542 (11.2) |
| Moscow City, Russian Fed. | 75 (3.5) | 572 (3.2) | 24 (3.4) | 549 (5.4) | 1 (0.8) | ~ ~ |
| Gauteng, RSA (9) | 10 (2.9) | 485 (20.4) | 18 (3.0) | 474 (12.2) | 72 (3.4) | 404 (5.1) |
| Western Cape, RSA (9) | 32 (4.2) | 449 (10.8) | 27 (3.7) | 491 (13.6) | 40 (4.1) | 399 (8.4) |
| Abu Dhabi, UAE r | 21 (0.7) | 465 (10.2) | 3 (0.1) | 523 (16.1) | 75 (0.7) | 399 (4.3) |
| Dubai, UAE r | 20 (0.3) | 458 (5.5) | 6 (0.2) | 586 (5.8) | 74 (0.4) | 567 (2.5) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Students Enter Primary School with Literacy and Numeracy Skills

To collect information about the ability composition of the student intake into the primary grades, TIMSS asked school principals to estimate the percentage of students in the school who possess a range of literacy and numeracy skills when beginning primary school (see About the Scale in Exhibit 6.10).

Exhibits 6.11 and 6.12 present the percentages of students in each of three groups of schools categorized by their principals' reports, together with average mathematics and science achievement, respectively. There was considerable variation across countries in the percentage of students in the highest category—"more than 75% enter with skills"—from 89 percent in Ireland, where many students start preprimary school after their fourth birthday (as described in the *TIMSS 2019 Encyclopedia*), to 0 percent in the Czech Republic and Hungary. On average, 24 percent of students were in schools where "more than 75%" of the students entered school with literacy and numeracy skills, 56 percent were in schools where "25–75%" entered with such skills, and 20 percent in schools where "less than 25%" enter with literacy and numeracy skills.

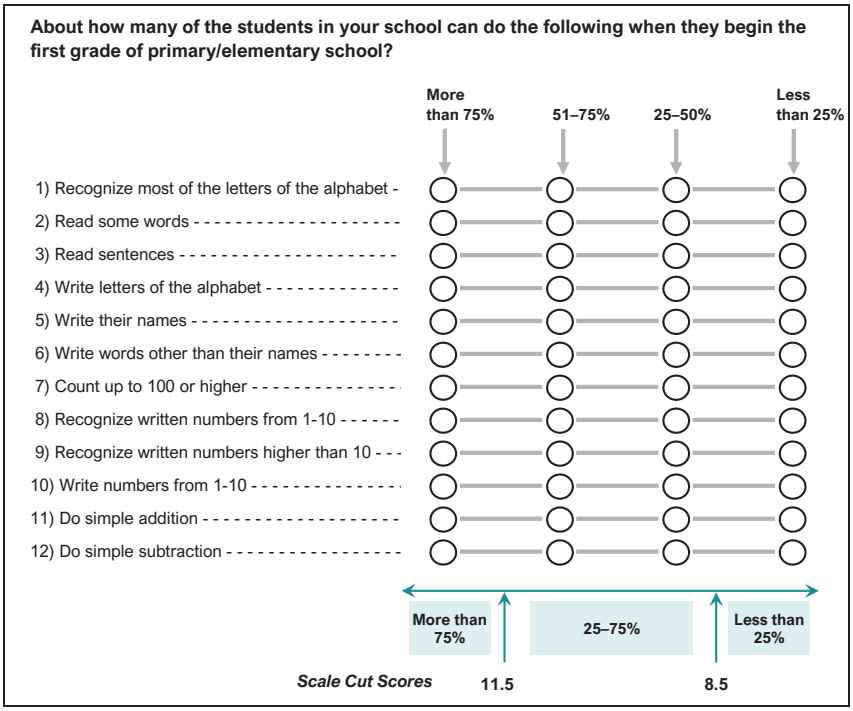
For both mathematics and science, average achievement was higher for students in schools with greater percentages of entering students having literacy and numeracy skills. Students attending schools where "more than 75% enter with skills" had the highest achievement, followed by schools where "25–75% enter with skills," and students in schools with "less than 25%" having the lowest average achievement (508, 499, and 480, respectively, for mathematics and 499, 490, and 471, respectively, for science).

## Exhibit 6.10: Schools Where Students Enter the Primary Grades With Literacy and Numeracy Skills

*Students' Results based on Principals' Reports*

### About the Scale

Students were scored according to their principals' reports regarding the percentage of students in the school who begin primary school with the twelve skills on the *Schools Where Students Enter the Primary Grades with Literacy and Numeracy Skills* scale. Cut scores divide the scale into three categories. Students in **Schools Where More than 75% Enter with Skills** had a score at or above the cut score corresponding to their principals reporting that "more than 75%" of the students have six of the twelve skills and "51–75%" of the students have the other six, on average. Students in **Schools Where Less than 25% Enter with Skills** had a score at or below the cut score corresponding to their principals reporting that "less than 25%" of the students have six of the twelve skills and "25–50%" of the students have the other six, on average. All other students attended **Schools Where 25–75% Enter with Skills**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.11: Schools Where Students Enter the Primary Grades With Literacy and Numeracy Skills

*Students' Results based on Principals' Reports*

| Country | Schools Where More than 75% Enter with Skills | | Schools Where 25–75% Enter with Skills | | Schools Where Less than 25% Enter with Skills | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ireland | 89 (2.6) | 552 (2.6) | 11 (2.6) | 522 (9.8) | 0 (0.4) | ~ ~ | 12.7 (0.08) |
| Singapore | 84 (0.0) | 627 (4.5) | 15 (0.0) | 618 (9.0) | 1 (0.0) | ~ ~ | 12.7 (0.00) |
| Latvia | 65 (4.1) | 545 (3.5) | 35 (4.1) | 549 (3.5) | 0 (0.0) | ~ ~ | 11.8 (0.08) |
| Hong Kong SAR | 65 (4.4) | 607 (4.0) | 35 (4.3) | 593 (6.2) | 1 (0.8) | ~ ~ | 12.2 (0.13) |
| Korea, Rep. of | 62 (4.0) | 604 (2.8) | 34 (4.1) | 592 (4.1) | 4 (1.9) | 592 (18.9) | 11.9 (0.15) |
| Spain | 60 (2.9) | 511 (2.5) | 39 (2.8) | 491 (3.5) | 1 (0.8) | ~ ~ | 11.8 (0.07) |
| United States | 60 (3.1) | 546 (3.4) | 32 (3.1) | 518 (6.0) | 8 (1.6) | 533 (7.2) | 11.6 (0.12) |
| Chinese Taipei | 59 (3.7) | 599 (2.6) | 39 (3.8) | 601 (2.6) | 2 (1.2) | ~ ~ | 11.9 (0.13) |
| United Arab Emirates r | 57 (1.1) | 504 (2.3) | 34 (1.2) | 449 (2.9) | 9 (0.4) | 435 (5.4) | 11.6 (0.04) |
| Qatar | 52 (3.5) | 465 (5.8) | 38 (3.8) | 432 (5.6) | 10 (2.7) | 435 (13.3) | 11.4 (0.15) |
| England s | 47 (5.1) | 567 (8.0) | 49 (5.1) | 548 (4.4) | 4 (1.9) | 536 (21.5) | 11.4 (0.16) |
| Bahrain | 40 (2.6) | 483 (3.9) | 50 (2.9) | 478 (3.8) | 10 (1.8) | 478 (5.3) | 11.0 (0.10) |
| Philippines | 39 (3.8) | 310 (10.6) | 55 (3.9) | 288 (7.2) | 6 (1.9) | 287 (17.5) | 11.1 (0.14) |
| Montenegro | 37 (0.4) | 451 (2.9) | 61 (0.5) | 454 (2.3) | 2 (0.2) | ~ ~ | 11.1 (0.01) |
| Kazakhstan | 32 (3.6) | 520 (4.8) | 65 (3.6) | 509 (3.6) | 3 (1.2) | 493 (17.8) | 10.8 (0.11) |
| Sweden | 31 (4.2) | 531 (4.1) | 62 (4.3) | 516 (4.1) | 6 (2.2) | 504 (8.0) | 11.0 (0.13) |
| Canada | 30 (2.3) | 522 (3.7) | 64 (2.4) | 510 (2.5) | 6 (1.4) | 491 (6.8) | 10.8 (0.09) |
| Japan | 28 (3.9) | 598 (4.0) | 69 (4.0) | 591 (1.9) | 3 (1.4) | 588 (7.1) | 10.9 (0.10) |
| Kuwait | 27 (3.9) | 403 (11.6) | 50 (3.9) | 385 (7.4) | 24 (3.1) | 353 (9.5) | 10.2 (0.17) |
| Kosovo | 25 (4.3) | 449 (6.5) | 64 (4.7) | 443 (3.6) | 11 (2.7) | 438 (8.5) | 10.4 (0.14) |
| Finland | 24 (3.4) | 540 (4.8) | 74 (3.6) | 531 (2.5) | 3 (1.0) | 496 (16.7) | 10.8 (0.08) |
| Albania | 21 (3.8) | 506 (8.7) | 75 (4.1) | 490 (4.4) | 4 (1.6) | 509 (16.7) | 10.6 (0.11) |
| Oman | 21 (2.7) | 447 (7.4) | 68 (3.1) | 430 (4.6) | 12 (2.2) | 406 (9.9) | 10.3 (0.10) |
| Pakistan | 20 (6.3) | 365 (29.0) | 45 (5.6) | 306 (11.4) | 35 (6.7) | 336 (24.1) | 9.4 (0.39) |
| Bulgaria | 20 (3.2) | 556 (4.7) | 54 (4.5) | 521 (6.5) | 26 (3.5) | 471 (9.3) | 9.8 (0.14) |
| Saudi Arabia | 20 (2.8) | 415 (7.2) | 54 (3.4) | 402 (4.7) | 27 (3.3) | 381 (8.4) | 9.8 (0.14) |
| Poland | 18 (3.4) | 523 (6.5) | 77 (3.7) | 520 (3.2) | 5 (1.9) | 505 (9.7) | 10.5 (0.11) |
| Georgia | 18 (3.6) | 494 (7.6) | 48 (4.2) | 483 (5.2) | 34 (4.0) | 474 (7.5) | 9.6 (0.21) |
| Lithuania | 18 (2.6) | 554 (7.6) | 77 (2.8) | 541 (3.3) | 6 (1.4) | 524 (8.8) | 10.4 (0.10) |
| Azerbaijan | 17 (2.7) | 510 (7.2) | 55 (3.5) | 517 (3.8) | 28 (3.4) | 517 (5.3) | 9.8 (0.13) |
| Russian Federation | 15 (2.8) | 576 (6.2) | 68 (3.0) | 570 (3.3) | 17 (2.5) | 549 (9.5) | 10.0 (0.11) |
| Turkey (5) | 14 (3.0) | 540 (9.5) | 36 (3.7) | 536 (7.8) | 49 (4.2) | 507 (7.3) | 9.1 (0.21) |
| Chile | 13 (2.8) | 481 (9.7) | 60 (4.0) | 438 (4.6) | 27 (4.0) | 430 (5.1) | 9.7 (0.15) |
| Malta | 13 (0.3) | 519 (3.4) | 68 (0.4) | 512 (1.6) | 19 (0.3) | 490 (2.8) | 9.8 (0.01) |
| France | 13 (3.1) | 503 (9.0) | 83 (3.6) | 483 (3.5) | 4 (1.7) | 455 (10.5) | 10.3 (0.10) |
| Netherlands s | 12 (3.8) | 543 (7.2) | 80 (5.1) | 537 (2.7) | 8 (3.7) | 531 (11.5) | 10.1 (0.13) |
| South Africa (5) | 11 (1.9) | 413 (18.4) | 75 (3.3) | 363 (4.1) | 14 (2.8) | 404 (12.9) | 9.9 (0.11) |
| Portugal | 10 (2.1) | 536 (8.1) | 68 (3.3) | 526 (3.0) | 22 (2.9) | 521 (6.7) | 9.4 (0.11) |
| Morocco | 9 (2.1) | 412 (15.6) | 42 (3.5) | 396 (8.0) | 49 (3.1) | 368 (6.8) | 8.6 (0.13) |
| Australia | 9 (2.1) | 526 (9.3) | 43 (3.4) | 530 (4.8) | 47 (3.3) | 498 (4.6) | 8.9 (0.13) |
| Armenia | 8 (2.2) | 492 (9.5) | 56 (4.1) | 504 (3.6) | 36 (4.0) | 491 (4.3) | 9.1 (0.13) |
| Croatia | 7 (2.3) | 515 (15.0) | 83 (3.2) | 510 (2.3) | 9 (2.4) | 506 (5.7) | 9.9 (0.10) |
| Iran, Islamic Rep. of | 6 (2.0) | 425 (9.9) | 29 (3.9) | 452 (8.1) | 65 (3.9) | 442 (5.9) | 8.1 (0.15) |
| Cyprus | 6 (2.0) | 558 (9.6) | 61 (4.2) | 535 (3.7) | 33 (3.9) | 522 (5.7) | 9.1 (0.12) |
| Denmark r | 5 (2.1) | 531 (12.5) | 81 (3.7) | 526 (2.5) | 15 (3.2) | 518 (5.0) | 9.6 (0.09) |
| Bosnia and Herzegovina | 5 (1.9) | 469 (12.9) | 67 (4.1) | 451 (3.1) | 28 (3.8) | 450 (4.4) | 9.3 (0.10) |
| Italy | 4 (1.8) | 506 (8.3) | 67 (4.1) | 517 (3.2) | 28 (4.1) | 513 (4.1) | 9.2 (0.12) |
| Norway (5) r | 4 (1.6) | 556 (8.5) | 75 (4.2) | 548 (2.7) | 21 (4.2) | 527 (6.1) | 9.3 (0.12) |
| North Macedonia | 4 (1.3) | 447 (31.3) | 64 (4.5) | 484 (5.5) | 32 (4.4) | 453 (9.5) | 9.1 (0.13) |
| Serbia | 4 (1.7) | 531 (26.3) | 77 (3.9) | 512 (3.3) | 19 (4.1) | 486 (9.5) | 9.5 (0.12) |
| New Zealand | 3 (1.1) | 528 (21.8) | 48 (3.7) | 505 (4.6) | 49 (3.6) | 468 (4.8) | 8.4 (0.11) |
| Austria | 3 (1.3) | 527 (12.8) | 53 (3.4) | 545 (3.3) | 44 (3.6) | 534 (3.2) | 8.8 (0.08) |
| Belgium (Flemish) | 2 (1.3) | ~ ~ | 79 (4.0) | 535 (2.4) | 18 (3.8) | 521 (5.7) | 9.3 (0.09) |
| Slovak Republic | 1 (1.0) | ~ ~ | 70 (3.2) | 518 (2.9) | 29 (3.1) | 485 (8.2) | 9.0 (0.09) |
| Germany | 1 (0.6) | ~ ~ | 68 (3.5) | 527 (2.7) | 31 (3.5) | 508 (5.0) | 8.9 (0.07) |
| Czech Republic | 0 (0.0) | ~ ~ | 60 (4.0) | 539 (3.1) | 40 (4.0) | 525 (4.6) | 8.7 (0.08) |
| Hungary | 0 (0.0) | ~ ~ | 32 (4.0) | 534 (5.6) | 68 (4.0) | 517 (3.8) | 7.8 (0.10) |
| Northern Ireland | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **24 (0.4)** | **508 (1.5)** | **56 (0.5)** | **499 (0.6)** | **20 (0.4)** | **480 (1.4)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 75 (0.3) | 555 (2.0) | 18 (0.2) | 515 (3.2) | 7 (0.3) | 504 (4.8) | 12.2 (0.01) |
| Madrid, Spain | 72 (3.4) | 521 (2.6) | 28 (3.4) | 513 (3.9) | 0 (0.5) | ~ ~ | 12.2 (0.09) |
| Abu Dhabi, UAE r | 44 (1.7) | 470 (3.4) | 42 (1.8) | 413 (3.6) | 14 (0.9) | 394 (11.0) | 11.1 (0.06) |
| Moscow City, Russian Fed. | 40 (4.3) | 594 (3.4) | 57 (4.4) | 591 (2.8) | 2 (1.3) | ~ ~ | 11.2 (0.11) |
| Ontario, Canada | 35 (4.1) | 527 (6.2) | 61 (4.3) | 505 (4.4) | 5 (2.0) | 486 (7.4) | 11.0 (0.16) |
| Quebec, Canada | 21 (3.5) | 538 (5.3) | 72 (4.0) | 531 (2.9) | 7 (2.4) | 527 (5.1) | 10.6 (0.14) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 6.12: Schools Where Students Enter the Primary Grades With Literacy and Numeracy Skills

*Students' Results based on Principals' Reports*

| Country | Schools Where More than 75% Enter with Skills | | Schools Where 25–75% Enter with Skills | | Schools Where Less than 25% Enter with Skills | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Ireland | 89 (2.6) | 531 (3.4) | 11 (2.6) | 505 (9.6) | 0 (0.4) | ~ ~ | 12.7 (0.08) |
| Singapore | 84 (0.0) | 596 (4.0) | 15 (0.0) | 586 (8.1) | 1 (0.0) | ~ ~ | 12.7 (0.00) |
| Latvia | 65 (4.1) | 541 (3.2) | 35 (4.1) | 544 (3.1) | 0 (0.0) | ~ ~ | 11.8 (0.08) |
| Hong Kong SAR | 65 (4.4) | 536 (4.0) | 35 (4.3) | 523 (5.8) | 1 (0.8) | ~ ~ | 12.2 (0.13) |
| Korea, Rep. of | 62 (4.0) | 592 (2.7) | 34 (4.1) | 581 (3.9) | 4 (1.9) | 583 (14.0) | 11.9 (0.15) |
| Spain | 60 (2.9) | 520 (2.5) | 39 (2.8) | 499 (3.6) | 1 (0.8) | ~ ~ | 11.8 (0.07) |
| United States | 60 (3.1) | 549 (3.7) | 32 (3.1) | 521 (6.0) | 8 (1.6) | 539 (8.6) | 11.6 (0.12) |
| Chinese Taipei | 59 (3.7) | 558 (2.5) | 39 (3.8) | 560 (2.4) | 2 (1.2) | ~ ~ | 11.9 (0.13) |
| United Arab Emirates r | 57 (1.1) | 500 (2.7) | 34 (1.2) | 435 (4.0) | 9 (0.4) | 420 (6.9) | 11.6 (0.04) |
| Qatar | 52 (3.5) | 466 (6.4) | 38 (3.8) | 430 (6.6) | 10 (2.7) | 441 (18.2) | 11.4 (0.15) |
| England s | 47 (5.1) | 547 (6.8) | 49 (5.1) | 529 (4.7) | 4 (1.9) | 521 (21.1) | 11.4 (0.16) |
| Bahrain | 40 (2.6) | 502 (5.6) | 50 (2.9) | 490 (5.6) | 10 (1.8) | 477 (7.3) | 11.0 (0.10) |
| Philippines | 39 (3.8) | 267 (12.6) | 55 (3.9) | 238 (8.4) | 6 (1.9) | 236 (17.3) | 11.1 (0.14) |
| Montenegro | 37 (0.4) | 451 (3.6) | 61 (0.5) | 454 (2.8) | 2 (0.2) | ~ ~ | 11.1 (0.01) |
| Kazakhstan | 32 (3.6) | 500 (6.1) | 65 (3.6) | 492 (4.3) | 3 (1.2) | 476 (23.7) | 10.8 (0.11) |
| Sweden | 31 (4.2) | 550 (4.5) | 62 (4.3) | 531 (4.8) | 6 (2.2) | 515 (9.7) | 11.0 (0.13) |
| Canada | 30 (2.3) | 532 (3.4) | 64 (2.4) | 521 (2.2) | 6 (1.4) | 500 (5.0) | 10.8 (0.09) |
| Japan | 28 (3.9) | 566 (4.2) | 69 (4.0) | 560 (1.8) | 3 (1.4) | 559 (7.4) | 10.9 (0.10) |
| Kuwait | 27 (3.9) | 405 (14.6) | 50 (3.9) | 396 (8.4) | 24 (3.1) | 368 (11.0) | 10.2 (0.17) |
| Kosovo | 25 (4.3) | 421 (7.5) | 64 (4.7) | 411 (4.6) | 11 (2.7) | 402 (10.6) | 10.4 (0.14) |
| Finland | 24 (3.4) | 563 (4.6) | 74 (3.6) | 553 (2.8) | 3 (1.0) | 518 (19.2) | 10.8 (0.08) |
| Albania | 21 (3.8) | 501 (7.6) | 75 (4.1) | 486 (4.9) | 4 (1.6) | 497 (16.0) | 10.6 (0.11) |
| Oman | 21 (2.7) | 455 (7.6) | 68 (3.1) | 434 (5.2) | 12 (2.2) | 405 (12.1) | 10.3 (0.10) |
| Pakistan | 20 (6.3) | 341 (25.5) | 45 (5.6) | 271 (13.9) | 35 (6.7) | 287 (27.7) | 9.4 (0.39) |
| Bulgaria | 20 (3.2) | 574 (5.8) | 54 (4.5) | 532 (7.3) | 26 (3.5) | 459 (11.2) | 9.8 (0.14) |
| Saudi Arabia | 20 (2.8) | 420 (7.9) | 54 (3.4) | 409 (5.4) | 27 (3.3) | 377 (9.7) | 9.8 (0.14) |
| Poland | 18 (3.4) | 534 (5.5) | 77 (3.7) | 531 (3.1) | 5 (1.9) | 512 (8.5) | 10.5 (0.11) |
| Georgia | 18 (3.6) | 470 (7.7) | 48 (4.2) | 456 (5.4) | 34 (4.0) | 444 (7.6) | 9.6 (0.21) |
| Lithuania | 18 (2.6) | 549 (7.4) | 77 (2.8) | 537 (3.1) | 6 (1.4) | 518 (8.6) | 10.4 (0.10) |
| Azerbaijan | 17 (2.7) | 420 (8.2) | 55 (3.5) | 429 (4.7) | 28 (3.4) | 426 (6.5) | 9.8 (0.13) |
| Russian Federation | 15 (2.8) | 577 (5.9) | 68 (3.0) | 570 (3.0) | 17 (2.5) | 548 (9.2) | 10.0 (0.11) |
| Turkey (5) | 14 (3.0) | 542 (8.3) | 36 (3.7) | 538 (6.9) | 49 (4.2) | 511 (7.1) | 9.1 (0.21) |
| Chile | 13 (2.8) | 506 (8.8) | 60 (4.0) | 466 (4.3) | 27 (4.0) | 460 (4.7) | 9.7 (0.15) |
| Malta | 13 (0.3) | 509 (3.5) | 68 (0.4) | 499 (1.3) | 19 (0.3) | 475 (2.8) | 9.8 (0.01) |
| France | 13 (3.1) | 505 (9.7) | 83 (3.6) | 486 (3.3) | 4 (1.7) | 467 (16.7) | 10.3 (0.10) |
| Netherlands s | 12 (3.8) | 528 (10.3) | 80 (5.1) | 517 (3.4) | 8 (3.7) | 515 (13.2) | 10.1 (0.13) |
| South Africa (5) | 11 (1.9) | 382 (24.9) | 75 (3.3) | 309 (5.7) | 14 (2.8) | 369 (17.5) | 9.9 (0.11) |
| Portugal | 10 (2.1) | 513 (6.7) | 68 (3.3) | 505 (2.9) | 22 (2.9) | 500 (5.0) | 9.4 (0.11) |
| Morocco | 9 (2.1) | 398 (21.3) | 42 (3.5) | 390 (9.3) | 49 (3.1) | 356 (7.9) | 8.6 (0.13) |
| Australia | 9 (2.1) | 548 (7.0) | 43 (3.4) | 545 (4.3) | 47 (3.3) | 517 (4.0) | 8.9 (0.13) |
| Armenia | 8 (2.2) | 460 (11.4) | 56 (4.1) | 472 (4.3) | 36 (4.0) | 459 (5.6) | 9.1 (0.13) |
| Croatia | 7 (2.3) | 531 (9.8) | 83 (3.2) | 525 (2.3) | 9 (2.4) | 518 (6.4) | 9.9 (0.10) |
| Iran, Islamic Rep. of | 6 (2.0) | 432 (7.8) | 29 (3.9) | 451 (8.1) | 65 (3.9) | 438 (6.0) | 8.1 (0.15) |
| Cyprus | 6 (2.0) | 539 (12.0) | 61 (4.2) | 513 (3.8) | 33 (3.9) | 503 (5.5) | 9.1 (0.12) |
| Denmark r | 5 (2.1) | 523 (11.1) | 81 (3.7) | 523 (2.8) | 15 (3.2) | 515 (4.9) | 9.6 (0.09) |
| Bosnia and Herzegovina | 5 (1.9) | 479 (14.0) | 67 (4.1) | 457 (3.7) | 28 (3.8) | 459 (4.7) | 9.3 (0.10) |
| Italy | 4 (1.8) | 502 (6.6) | 67 (4.1) | 512 (3.7) | 28 (4.1) | 507 (4.6) | 9.2 (0.12) |
| Norway (5) r | 4 (1.6) | 548 (10.2) | 75 (4.2) | 545 (2.5) | 21 (4.2) | 522 (6.3) | 9.3 (0.12) |
| North Macedonia | 4 (1.3) | 388 (35.7) | 64 (4.5) | 438 (6.9) | 32 (4.4) | 409 (10.5) | 9.1 (0.13) |
| Serbia | 4 (1.7) | 541 (26.3) | 77 (3.9) | 522 (3.5) | 19 (4.1) | 494 (9.7) | 9.5 (0.12) |
| New Zealand | 3 (1.1) | 538 (17.6) | 48 (3.7) | 519 (3.6) | 49 (3.6) | 485 (4.5) | 8.4 (0.11) |
| Austria | 3 (1.3) | 513 (18.9) | 53 (3.4) | 531 (3.6) | 44 (3.6) | 512 (4.2) | 8.8 (0.08) |
| Belgium (Flemish) | 2 (1.3) | ~ ~ | 79 (4.0) | 504 (2.6) | 18 (3.8) | 487 (5.7) | 9.3 (0.09) |
| Slovak Republic | 1 (1.0) | ~ ~ | 70 (3.2) | 532 (2.9) | 29 (3.1) | 489 (9.8) | 9.0 (0.09) |
| Germany | 1 (0.6) | ~ ~ | 68 (3.5) | 525 (2.7) | 31 (3.5) | 503 (5.2) | 8.9 (0.07) |
| Czech Republic | 0 (0.0) | ~ ~ | 60 (4.0) | 538 (3.2) | 40 (4.0) | 527 (4.1) | 8.7 (0.08) |
| Hungary | 0 (0.0) | ~ ~ | 32 (4.0) | 537 (5.3) | 68 (4.0) | 525 (3.7) | 7.8 (0.10) |
| Northern Ireland | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **24 (0.4)** | **499 (1.6)** | **56 (0.5)** | **490 (0.7)** | **20 (0.4)** | **471 (1.6)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 75 (0.3) | 556 (2.2) | 18 (0.2) | 513 (3.5) | 7 (0.3) | 515 (6.1) | 12.2 (0.01) |
| Madrid, Spain | 72 (3.4) | 526 (2.4) | 28 (3.4) | 517 (3.5) | 0 (0.5) | ~ ~ | 12.2 (0.09) |
| Abu Dhabi, UAE r | 44 (1.7) | 459 (3.6) | 42 (1.8) | 381 (5.1) | 14 (0.9) | 360 (14.2) | 11.1 (0.06) |
| Moscow City, Russian Fed. | 40 (4.3) | 597 (3.3) | 57 (4.4) | 593 (2.8) | 2 (1.3) | ~ ~ | 11.2 (0.11) |
| Ontario, Canada | 35 (4.1) | 534 (5.9) | 61 (4.3) | 521 (3.8) | 5 (2.0) | 491 (7.6) | 11.0 (0.16) |
| Quebec, Canada | 21 (3.5) | 525 (4.0) | 72 (4.0) | 523 (3.2) | 7 (2.4) | 509 (4.5) | 10.6 (0.14) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Instruction Affected by Resource Shortages

## Instruction Affected by Mathematics Resource Shortages

The *Instruction Affected by Mathematics Resource Shortages* scale, described in Exhibit 6.13, summarizes principals' reports about two kinds of resource shortages affecting instruction: general school resources and resources specific to mathematics instruction (see About the Scale). In Exhibit 6.14, countries are ordered (from most to least) according to the percentage of fourth grade students in schools "not affected" by resource shortages, from a high of 68 percent in Korea to a low of 0 percent in Kosovo. On average, 26 percent of fourth grade students attended schools "not affected" by resource shortages, and they had the highest average mathematics achievement (514). Sixty-eight percent of the students were in schools "somewhat affected" by resource shortages, and 6 percent were in schools "affected a lot." Average mathematics achievement for these two groups was 499 and 473, respectively.

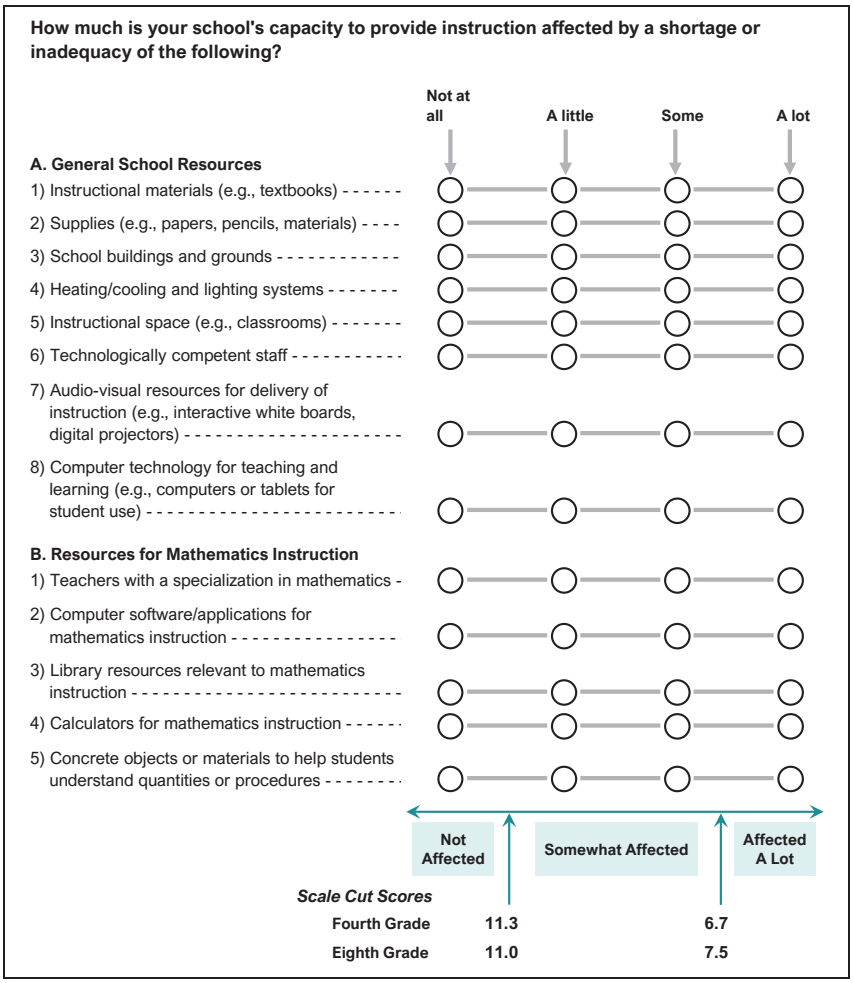
Exhibit 6.15 presents the results of the *Instruction Affected by Mathematics Resource Shortages* scale for eighth grade students. Similar to fourth grade, the percentage of students in schools "not affected" by resource shortages ranged from a high of 73 percent to a low of 2 percent, with an average of 30 percent. Sixty-three percent of the students were in schools "somewhat affected" by resource shortages, and 7 percent were in schools "affected a lot." As in fourth grade, average mathematics achievement was highest for students in schools "not affected" by resource shortages (509), next for students in "somewhat affected" schools (483), and lowest for students in schools that were "affected a lot" (476).

## Exhibit 6.13: Instruction Affected by Mathematics Resource Shortages – Principals' Reports

*Students' Results based on Principals' Reports*

### About the Scale

Students were scored according to their principals' responses regarding thirteen school and classroom resources on the *Instruction Affected by Mathematics Resource Shortages* scale. Cut scores divide the scale into three categories. Students in schools where instruction was **Not Affected** by resource shortages had a score at or above the cut score corresponding to their principals reporting that shortages affected instruction "not at all" for seven of the thirteen resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score at or below the cut score corresponding to their principals reporting that shortages affected instruction "a lot" for seven of the thirteen resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.14: Instruction Affected by Mathematics Resource Shortages – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | Not Affected | | Somewhat Affected | | Affected A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | 68 (4.0) | 601 (2.8) | 30 (3.9) | 594 (4.0) | 2 (0.7) | ~ ~ | 12.3 (0.23) |
| Singapore | 61 (0.0) | 624 (5.2) | 27 (0.0) | 635 (6.8) | 12 (0.0) | 611 (10.0) | 11.5 (0.00) |
| Norway (5) r | 52 (5.3) | 544 (4.0) | 48 (5.3) | 544 (3.5) | 0 (0.0) | ~ ~ | 11.3 (0.15) |
| Bulgaria | 50 (4.1) | 523 (4.4) | 50 (4.1) | 507 (7.1) | 0 (0.0) | ~ ~ | 11.4 (0.17) |
| United States | 49 (2.9) | 538 (4.4) | 49 (2.8) | 532 (4.5) | 1 (0.7) | ~ ~ | 11.4 (0.14) |
| Kazakhstan | 45 (4.1) | 513 (4.5) | 49 (4.0) | 509 (4.0) | 6 (2.0) | 526 (18.3) | 11.2 (0.25) |
| Australia | 44 (4.0) | 523 (5.9) | 53 (3.9) | 509 (4.2) | 3 (1.4) | 485 (20.2) | 11.3 (0.18) |
| Poland | 43 (4.0) | 526 (4.2) | 57 (4.0) | 516 (3.3) | 0 (0.0) | ~ ~ | 11.2 (0.16) |
| Canada | 43 (2.4) | 521 (2.9) | 56 (2.4) | 504 (2.5) | 1 (0.6) | ~ ~ | 11.1 (0.12) |
| Sweden | 43 (4.7) | 522 (4.0) | 57 (4.7) | 521 (3.7) | 1 (0.8) | ~ ~ | 10.8 (0.18) |
| Qatar | 42 (3.7) | 474 (6.3) | 27 (3.5) | 445 (7.1) | 31 (3.2) | 420 (5.6) | 9.7 (0.34) |
| United Arab Emirates | 40 (1.8) | 509 (2.1) | 44 (1.7) | 454 (2.6) | 16 (1.9) | 474 (4.0) | 10.2 (0.19) |
| Belgium (Flemish) | 39 (4.2) | 532 (3.7) | 59 (4.3) | 533 (2.6) | 1 (0.8) | ~ ~ | 11.0 (0.19) |
| Cyprus | 39 (4.5) | 539 (4.5) | 57 (4.3) | 526 (4.4) | 4 (2.1) | 539 (14.3) | 10.7 (0.25) |
| Denmark r | 38 (3.9) | 530 (3.3) | 59 (3.7) | 522 (2.7) | 2 (0.8) | ~ ~ | 10.8 (0.17) |
| New Zealand | 38 (3.9) | 497 (6.4) | 60 (4.1) | 482 (4.2) | 2 (1.1) | ~ ~ | 11.0 (0.19) |
| Finland | 38 (4.3) | 532 (3.6) | 62 (4.3) | 532 (3.1) | 0 (0.0) | ~ ~ | 10.8 (0.13) |
| Armenia | 37 (4.0) | 505 (4.8) | 62 (4.1) | 495 (3.3) | 1 (1.0) | ~ ~ | 10.7 (0.15) |
| Latvia | 35 (3.7) | 536 (6.0) | 65 (3.7) | 551 (2.8) | 0 (0.0) | ~ ~ | 10.8 (0.13) |
| Netherlands s | 35 (6.5) | 541 (4.7) | 65 (6.5) | 536 (2.7) | 0 (0.0) | ~ ~ | 10.7 (0.19) |
| Spain | 35 (3.3) | 515 (3.0) | 65 (3.3) | 496 (3.2) | 0 (0.3) | ~ ~ | 10.8 (0.10) |
| Georgia | 33 (4.1) | 477 (7.3) | 66 (4.2) | 485 (4.5) | 1 (0.7) | ~ ~ | 10.7 (0.16) |
| Chile | 31 (4.1) | 463 (7.0) | 65 (4.3) | 430 (3.5) | 4 (1.7) | 443 (13.5) | 10.4 (0.19) |
| Czech Republic | 30 (4.0) | 534 (4.3) | 69 (4.1) | 532 (3.6) | 1 (0.8) | ~ ~ | 10.8 (0.12) |
| Russian Federation | 28 (3.1) | 576 (6.8) | 69 (3.3) | 562 (3.3) | 2 (1.1) | ~ ~ | 10.3 (0.14) |
| Chinese Taipei | 25 (3.4) | 600 (4.3) | 72 (3.5) | 599 (2.3) | 3 (1.3) | 603 (9.1) | 10.4 (0.15) |
| Bahrain | 25 (2.4) | 495 (4.6) | 48 (2.6) | 480 (2.8) | 27 (2.2) | 467 (6.2) | 9.0 (0.18) |
| Hungary | 25 (3.7) | 520 (6.6) | 73 (3.9) | 523 (3.6) | 2 (1.6) | ~ ~ | 10.0 (0.17) |
| Japan | 25 (3.5) | 598 (4.1) | 75 (3.6) | 591 (2.0) | 1 (0.7) | ~ ~ | 10.4 (0.12) |
| Lithuania | 23 (4.0) | 542 (6.4) | 76 (4.1) | 542 (3.8) | 1 (0.8) | ~ ~ | 10.4 (0.17) |
| England s | 23 (4.1) | 566 (10.7) | 77 (4.1) | 555 (5.0) | 0 (0.0) | ~ ~ | 10.6 (0.16) |
| Malta | 22 (0.4) | 523 (2.4) | 76 (0.4) | 505 (1.6) | 1 (0.1) | ~ ~ | 10.3 (0.02) |
| Hong Kong SAR | 22 (3.0) | 602 (6.1) | 72 (3.9) | 600 (4.4) | 6 (2.5) | 628 (17.8) | 9.8 (0.22) |
| Kuwait | 21 (3.0) | 398 (9.1) | 59 (4.4) | 374 (6.9) | 21 (3.7) | 394 (14.0) | 8.7 (0.22) |
| Serbia | 20 (3.5) | 524 (6.8) | 79 (3.5) | 504 (3.6) | 1 (0.9) | ~ ~ | 9.9 (0.12) |
| Germany | 19 (2.7) | 524 (5.8) | 81 (2.7) | 521 (2.6) | 0 (0.3) | ~ ~ | 10.1 (0.10) |
| Northern Ireland r | 18 (3.7) | 571 (10.7) | 82 (3.7) | 566 (3.5) | 0 (0.0) | ~ ~ | 9.9 (0.14) |
| Austria | 18 (2.8) | 555 (5.7) | 81 (2.9) | 536 (2.1) | 1 (0.7) | ~ ~ | 10.2 (0.09) |
| Portugal | 16 (2.7) | 531 (5.9) | 83 (2.8) | 524 (3.1) | 1 (0.7) | ~ ~ | 9.9 (0.13) |
| Croatia | 16 (2.8) | 518 (6.6) | 84 (2.8) | 509 (2.3) | 0 (0.0) | ~ ~ | 10.1 (0.12) |
| Ireland | 16 (3.4) | 568 (6.8) | 83 (3.5) | 545 (2.7) | 1 (0.7) | ~ ~ | 10.2 (0.11) |
| Slovak Republic | 15 (2.9) | 524 (8.0) | 79 (3.1) | 506 (3.8) | 6 (1.6) | 529 (17.6) | 9.4 (0.13) |
| Italy | 15 (2.8) | 525 (7.3) | 83 (3.0) | 514 (2.6) | 2 (1.3) | ~ ~ | 9.9 (0.12) |
| Oman | 14 (2.0) | 449 (7.9) | 72 (2.8) | 428 (5.0) | 14 (2.2) | 426 (11.8) | 8.9 (0.13) |
| France | 14 (2.8) | 504 (7.9) | 86 (2.8) | 482 (3.4) | 0 (0.0) | ~ ~ | 9.8 (0.12) |
| Bosnia and Herzegovina | 12 (2.7) | 454 (4.9) | 83 (3.3) | 452 (2.8) | 5 (1.7) | 442 (18.1) | 9.5 (0.14) |
| Montenegro | 10 (0.2) | 438 (8.8) | 83 (0.3) | 456 (2.0) | 7 (0.2) | 441 (4.0) | 9.3 (0.02) |
| Saudi Arabia | 9 (1.8) | 409 (11.6) | 72 (3.0) | 393 (4.7) | 19 (2.5) | 416 (8.4) | 8.6 (0.13) |
| Pakistan | 8 (2.7) | 288 (28.7) | 89 (3.1) | 329 (12.9) | 3 (1.3) | 388 (29.6) | 9.1 (0.17) |
| Iran, Islamic Rep. of | 8 (1.9) | 470 (13.1) | 84 (2.6) | 443 (4.0) | 8 (2.0) | 414 (10.5) | 8.6 (0.13) |
| South Africa (5) | 8 (1.7) | 454 (22.6) | 87 (2.4) | 368 (3.5) | 6 (1.6) | 376 (18.9) | 9.1 (0.11) |
| North Macedonia | 8 (2.3) | 469 (20.1) | 79 (3.7) | 475 (6.1) | 14 (3.0) | 461 (15.0) | 8.7 (0.17) |
| Albania | 6 (1.7) | 550 (16.5) | 78 (3.1) | 489 (4.1) | 15 (2.8) | 495 (8.3) | 8.7 (0.15) |
| Morocco | 6 (1.7) | 362 (24.8) | 90 (2.5) | 379 (5.1) | 4 (1.8) | 508 (44.5) | 9.5 (0.11) |
| Turkey (5) | 5 (1.7) | 556 (17.7) | 72 (2.8) | 524 (5.5) | 23 (3.0) | 513 (10.9) | 8.1 (0.16) |
| Azerbaijan | 2 (1.0) | ~ ~ | 89 (2.1) | 516 (2.9) | 9 (1.9) | 509 (8.8) | 8.5 (0.09) |
| Philippines | 1 (0.4) | ~ ~ | 95 (1.4) | 294 (6.7) | 4 (1.4) | 336 (16.6) | 8.7 (0.09) |
| Kosovo | 0 (0.0) | ~ ~ | 72 (4.1) | 445 (3.9) | 28 (4.1) | 443 (4.4) | 7.5 (0.20) |
| **International Average** | **26 (0.4)** | **514 (1.3)** | **68 (0.5)** | **499 (0.6)** | **6 (0.2)** | **473 (3.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 65 (4.1) | 591 (3.1) | 35 (4.1) | 596 (3.0) | 0 (0.0) | ~ ~ | 12.5 (0.25) |
| Dubai, UAE r | 55 (0.3) | 554 (2.5) | 29 (0.3) | 519 (2.3) | 16 (0.2) | 557 (4.6) | 10.9 (0.02) |
| Madrid, Spain | 50 (3.8) | 520 (3.0) | 50 (3.8) | 516 (3.8) | 0 (0.4) | ~ ~ | 11.6 (0.16) |
| Quebec, Canada | 49 (4.2) | 535 (3.3) | 49 (4.2) | 529 (3.5) | 3 (1.6) | 539 (25.6) | 11.2 (0.22) |
| Abu Dhabi, UAE r | 36 (1.5) | 469 (2.7) | 51 (1.8) | 411 (3.7) | 13 (1.4) | 436 (11.0) | 10.2 (0.09) |
| Ontario, Canada | 35 (4.4) | 530 (6.5) | 64 (4.4) | 501 (3.8) | 1 (0.6) | ~ ~ | 10.9 (0.19) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 6.15: Instruction Affected by Mathematics Resource Shortages – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Not Affected | | Somewhat Affected | | Affected A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Singapore | | 73 (0.0) | 617 (4.7) | 21 (0.0) | 610 (9.2) | 6 (0.0) | 625 (20.1) | 12.1 (0.00) |
| Australia | | 62 (3.5) | 535 (5.7) | 37 (3.5) | 493 (4.8) | 2 (1.2) | ~ ~ | 11.4 (0.13) |
| Norway (9) | r | 59 (4.8) | 507 (4.1) | 41 (4.8) | 502 (4.0) | 0 (0.0) | ~ ~ | 11.2 (0.10) |
| France | r | 57 (4.4) | 493 (3.9) | 42 (4.3) | 474 (4.0) | 1 (0.8) | ~ ~ | 11.4 (0.14) |
| Korea, Rep. of | | 52 (4.1) | 611 (4.0) | 44 (4.3) | 602 (4.6) | 4 (1.9) | 601 (6.9) | 11.3 (0.16) |
| New Zealand | | 51 (4.7) | 500 (6.3) | 45 (4.9) | 473 (5.0) | 5 (4.0) | 473 (66.4) | 11.0 (0.30) |
| United States | | 49 (3.0) | 533 (5.3) | 49 (3.0) | 504 (7.4) | 2 (1.0) | ~ ~ | 11.1 (0.12) |
| Qatar | | 44 (3.6) | 476 (8.4) | 29 (3.4) | 430 (6.8) | 27 (3.5) | 404 (7.6) | 9.8 (0.25) |
| Hong Kong SAR | | 44 (4.5) | 593 (7.0) | 50 (3.9) | 562 (7.3) | 7 (2.7) | 610 (26.0) | 10.5 (0.25) |
| Sweden | | 42 (3.8) | 510 (4.5) | 56 (3.7) | 498 (3.3) | 2 (1.1) | ~ ~ | 10.9 (0.09) |
| United Arab Emirates | | 41 (1.8) | 499 (2.7) | 44 (1.8) | 450 (2.8) | 15 (0.7) | 455 (4.9) | 10.3 (0.06) |
| Cyprus | r | 41 (0.5) | 509 (3.2) | 54 (0.5) | 494 (2.3) | 5 (0.2) | 532 (6.5) | 10.8 (0.02) |
| Kazakhstan | | 39 (3.9) | 492 (6.7) | 54 (4.2) | 483 (4.7) | 7 (2.1) | 497 (26.0) | 10.8 (0.16) |
| Japan | | 39 (3.3) | 606 (5.0) | 61 (3.4) | 587 (2.9) | 1 (0.7) | ~ ~ | 10.7 (0.08) |
| Finland | | 38 (4.1) | 508 (4.9) | 62 (4.2) | 509 (2.9) | 1 (0.7) | ~ ~ | 10.8 (0.11) |
| Chile | | 35 (3.3) | 466 (6.7) | 62 (3.4) | 427 (3.7) | 3 (1.4) | 426 (17.7) | 10.4 (0.13) |
| England | s | 34 (5.0) | 530 (12.7) | 64 (4.8) | 515 (7.4) | 1 (1.4) | ~ ~ | 10.6 (0.17) |
| Chinese Taipei | | 32 (3.4) | 619 (5.2) | 68 (3.4) | 610 (3.6) | 0 (0.0) | ~ ~ | 10.7 (0.10) |
| Georgia | | 32 (3.4) | 474 (9.4) | 68 (3.5) | 455 (5.2) | 1 (1.0) | ~ ~ | 10.5 (0.10) |
| Ireland | | 31 (3.5) | 533 (5.2) | 68 (3.6) | 522 (2.9) | 1 (0.6) | ~ ~ | 10.6 (0.11) |
| Hungary | | 28 (4.1) | 510 (8.7) | 71 (4.1) | 519 (4.9) | 1 (1.0) | ~ ~ | 10.3 (0.11) |
| Russian Federation | | 23 (3.4) | 555 (8.7) | 75 (3.5) | 541 (5.0) | 1 (0.7) | ~ ~ | 10.1 (0.12) |
| Lebanon | | 21 (3.0) | 469 (6.5) | 66 (3.5) | 418 (3.7) | 13 (2.6) | 419 (10.0) | 9.5 (0.15) |
| Bahrain | | 21 (0.2) | 499 (3.1) | 52 (0.2) | 472 (2.2) | 27 (0.2) | 485 (4.3) | 9.2 (0.01) |
| Egypt | | 20 (3.3) | 440 (10.9) | 73 (3.6) | 405 (6.2) | 8 (2.4) | 424 (10.8) | 9.8 (0.15) |
| Israel | | 17 (3.5) | 539 (10.8) | 80 (3.7) | 514 (5.3) | 3 (1.1) | 535 (35.2) | 9.9 (0.12) |
| Oman | | 17 (2.7) | 442 (8.6) | 71 (3.4) | 403 (3.5) | 12 (2.5) | 408 (8.4) | 9.5 (0.13) |
| Kuwait | | 17 (3.6) | 419 (12.7) | 59 (4.3) | 393 (5.5) | 23 (3.6) | 412 (9.9) | 9.0 (0.18) |
| Lithuania | | 16 (3.1) | 519 (7.1) | 81 (3.5) | 518 (3.7) | 3 (1.7) | 534 (19.9) | 10.1 (0.10) |
| Portugal | | 15 (2.9) | 520 (8.1) | 82 (3.2) | 496 (3.6) | 3 (1.6) | 506 (21.0) | 10.0 (0.10) |
| Italy | | 14 (3.0) | 507 (7.6) | 86 (3.0) | 497 (2.9) | 0 (0.0) | ~ ~ | 9.9 (0.07) |
| Saudi Arabia | | 11 (2.3) | 401 (7.9) | 67 (3.7) | 388 (3.4) | 22 (3.1) | 410 (6.1) | 8.8 (0.13) |
| Turkey | | 8 (2.3) | 543 (20.7) | 71 (3.4) | 499 (5.4) | 21 (3.0) | 468 (12.1) | 8.6 (0.13) |
| Romania | | 8 (2.1) | 536 (16.4) | 86 (2.7) | 476 (4.6) | 7 (2.0) | 460 (17.2) | 9.5 (0.12) |
| Jordan | | 7 (2.4) | 406 (24.9) | 82 (3.0) | 417 (4.5) | 11 (2.3) | 451 (13.2) | 9.0 (0.10) |
| South Africa (9) | | 6 (1.0) | 477 (15.7) | 88 (1.9) | 383 (2.5) | 6 (1.6) | 386 (8.9) | 9.3 (0.08) |
| Morocco | | 5 (1.7) | 435 (17.9) | 92 (1.6) | 384 (2.2) | 3 (0.9) | 441 (13.4) | 9.6 (0.07) |
| Iran, Islamic Rep. of | | 4 (1.4) | 534 (15.9) | 87 (2.6) | 443 (3.6) | 9 (2.3) | 445 (17.6) | 9.0 (0.10) |
| Malaysia | | 2 (0.7) | ~ ~ | 79 (3.2) | 452 (3.7) | 18 (3.2) | 489 (10.5) | 8.3 (0.09) |
| **International Average** | | **30 (0.5)** | **509 (1.6)** | **63 (0.6)** | **483 (0.7)** | **7 (0.3)** | **476 (4.1)** | |
| **Benchmarking Participants** | | | | | | | | |
| Quebec, Canada | | 68 (4.6) | 545 (3.8) | 31 (4.6) | 549 (8.0) | 1 (1.1) | ~ ~ | 11.7 (0.15) |
| Moscow City, Russian Fed. | | 63 (4.2) | 574 (5.6) | 37 (4.2) | 578 (6.0) | 0 (0.0) | ~ ~ | 11.8 (0.16) |
| Dubai, UAE | r | 58 (0.5) | 551 (3.4) | 28 (0.4) | 504 (3.9) | 13 (0.3) | 538 (3.8) | 11.2 (0.02) |
| Ontario, Canada | r | 44 (4.5) | 539 (8.5) | 55 (4.5) | 518 (5.1) | 1 (1.1) | ~ ~ | 11.0 (0.18) |
| Abu Dhabi, UAE | r | 38 (1.9) | 461 (4.7) | 40 (1.9) | 418 (5.8) | 21 (1.2) | 414 (9.5) | 10.0 (0.10) |
| Western Cape, RSA (9) | | 14 (2.3) | 546 (11.3) | 84 (2.6) | 425 (4.6) | 3 (1.3) | 434 (36.7) | 9.7 (0.10) |
| Gauteng, RSA (9) | | 10 (2.6) | 500 (9.7) | 86 (2.8) | 409 (3.5) | 4 (1.3) | 449 (29.0) | 9.4 (0.11) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Instruction Affected by Science Resource Shortages

The *Instruction Affected by Science Resource Shortages* scale, like its counterpart for mathematics, includes principals' reports about two kinds of resource shortages affecting instruction: general school resources and resources specific to science instruction (see About the Scale in Exhibit 6.16). On average, 24 percent of fourth grade students were in schools "not affected" by science resource shortages, 69 percent were in schools "somewhat affected," and 7 percent were in schools "affected a lot" (see Exhibit 6.17). Average science achievement ranged across the three categories from a high of 508 for students in schools "not affected" by resource shortages, to 488 for students in schools "somewhat affected," to a low of 472 for students in schools "affected a lot."

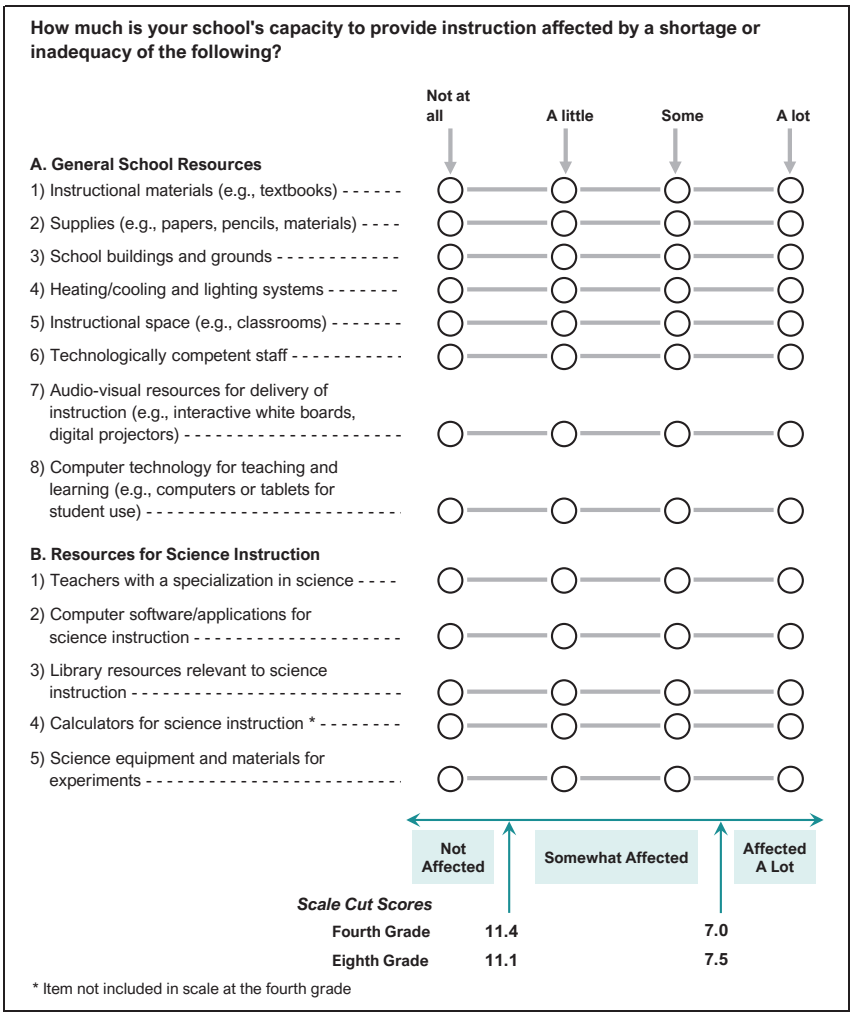
Eighth grade students' results for the *Instruction Affected by Science Resource Shortages* scale are shown in Exhibit 6.18. On average, 30 percent of students were in schools "not affected" by science resource shortages, 62 percent were in schools "somewhat affected," and 8 percent were in schools "affected a lot." Similar to the mathematics scale, there was a modest negative association between the degree students' schools were affected by resource shortages and average science achievement, with achievement highest for students in schools "not affected" by resource shortages (510), next highest in "somewhat affected" schools (484), and lowest in schools that were "affected a lot" (472).

## Exhibit 6.16: Instruction Affected by Science Resource Shortages – Principals' Reports

*Students' Results based on Principals' Reports*

### About the Scale

Students were scored according to their principals' responses regarding thirteen school and classroom resources on the *Instruction Affected by Science Resource Shortages* scale. Cut scores divide the scale into three categories. Students in schools where instruction was **Not Affected** by resource shortages had a score at or above the cut score corresponding to their principals reporting that shortages affected instruction "not at all" for seven of the thirteen resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score at or below the cut score corresponding to their principals reporting that shortages affected instruction "a lot" for seven of the thirteen resources and "some" for the other six, on average. All other students attended schools where instruction was **Somewhat Affected** by resource shortages.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 6.17: Instruction Affected by Science Resource Shortages – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Not Affected | | Somewhat Affected | | Affected A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | | 70 (4.0) | 590 (2.7) | 27 (3.9) | 581 (3.8) | 4 (1.2) | 599 (12.5) | 12.6 (0.24) |
| Singapore | | 63 (0.0) | 595 (4.5) | 25 (0.0) | 601 (5.8) | 12 (0.0) | 582 (8.8) | 11.6 (0.00) |
| Bulgaria | | 48 (4.1) | 533 (5.4) | 52 (4.1) | 510 (8.0) | 0 (0.0) | ~ ~ | 11.4 (0.16) |
| Poland | | 48 (4.2) | 532 (3.6) | 51 (4.2) | 529 (3.5) | 1 (0.8) | ~ ~ | 11.3 (0.16) |
| United States | | 45 (2.9) | 544 (5.1) | 54 (2.9) | 535 (4.3) | 2 (0.8) | ~ ~ | 11.2 (0.14) |
| Qatar | | 43 (3.8) | 473 (7.6) | 24 (3.4) | 444 (7.7) | 33 (3.3) | 423 (6.4) | 9.6 (0.36) |
| Kazakhstan | | 43 (4.3) | 493 (5.9) | 49 (4.1) | 497 (5.3) | 8 (2.1) | 485 (18.0) | 11.3 (0.26) |
| United Arab Emirates | | 40 (1.8) | 502 (2.5) | 42 (1.7) | 444 (3.0) | 18 (1.8) | 464 (4.0) | 10.2 (0.19) |
| Norway (5) | r | 39 (5.3) | 542 (3.6) | 61 (5.3) | 539 (3.5) | 0 (0.0) | ~ ~ | 10.9 (0.13) |
| Georgia | | 38 (4.1) | 455 (6.9) | 61 (4.2) | 455 (5.0) | 1 (0.8) | ~ ~ | 10.9 (0.18) |
| Australia | | 37 (3.7) | 538 (5.6) | 61 (3.8) | 530 (3.7) | 2 (1.4) | ~ ~ | 10.9 (0.16) |
| Belgium (Flemish) | | 35 (4.4) | 502 (3.7) | 64 (4.4) | 500 (3.0) | 1 (0.8) | ~ ~ | 10.9 (0.17) |
| Sweden | | 35 (4.4) | 536 (5.5) | 64 (4.5) | 538 (4.0) | 1 (0.8) | ~ ~ | 10.8 (0.16) |
| Cyprus | | 34 (4.8) | 517 (4.7) | 60 (4.6) | 506 (3.6) | 6 (2.6) | 526 (15.1) | 10.7 (0.25) |
| Canada | | 33 (2.1) | 530 (3.3) | 66 (2.1) | 520 (2.1) | 2 (0.7) | ~ ~ | 10.8 (0.09) |
| Latvia | | 32 (3.3) | 533 (6.2) | 66 (3.5) | 545 (2.6) | 1 (0.9) | ~ ~ | 10.8 (0.14) |
| Spain | | 31 (3.0) | 523 (3.3) | 68 (3.1) | 506 (2.9) | 1 (0.8) | ~ ~ | 10.7 (0.10) |
| Armenia | | 30 (4.1) | 474 (5.7) | 69 (4.1) | 464 (3.9) | 1 (0.6) | ~ ~ | 10.7 (0.16) |
| Denmark | r | 30 (3.6) | 523 (4.0) | 67 (3.4) | 522 (3.0) | 3 (1.1) | 522 (8.4) | 10.7 (0.16) |
| Finland | | 30 (3.7) | 552 (3.9) | 70 (3.7) | 556 (3.3) | 0 (0.0) | ~ ~ | 10.7 (0.13) |
| Chinese Taipei | | 30 (3.4) | 560 (3.4) | 67 (3.3) | 557 (2.2) | 3 (1.3) | 555 (10.2) | 10.6 (0.17) |
| Czech Republic | | 29 (4.2) | 531 (4.3) | 70 (4.3) | 535 (3.3) | 1 (0.8) | ~ ~ | 10.9 (0.13) |
| Chile | | 28 (3.8) | 489 (6.8) | 66 (4.1) | 462 (3.4) | 6 (2.1) | 462 (12.2) | 10.3 (0.18) |
| Russian Federation | | 27 (3.0) | 574 (6.3) | 69 (3.0) | 564 (3.2) | 4 (1.2) | 575 (11.9) | 10.3 (0.15) |
| New Zealand | | 27 (3.5) | 516 (6.3) | 71 (3.6) | 498 (3.3) | 3 (1.3) | 485 (21.8) | 10.5 (0.16) |
| Bahrain | | 24 (2.3) | 521 (5.5) | 43 (2.3) | 488 (4.9) | 33 (2.0) | 478 (7.2) | 9.0 (0.19) |
| Hungary | | 24 (3.6) | 526 (7.0) | 74 (4.0) | 530 (3.5) | 3 (1.8) | 512 (40.0) | 10.1 (0.17) |
| Japan | | 23 (3.6) | 564 (3.9) | 74 (3.6) | 561 (2.0) | 3 (1.0) | 572 (6.4) | 10.5 (0.13) |
| Lithuania | | 23 (3.7) | 535 (6.3) | 76 (3.8) | 539 (3.5) | 1 (0.8) | ~ ~ | 10.4 (0.17) |
| Kuwait | | 22 (3.0) | 408 (10.8) | 51 (4.9) | 382 (8.4) | 27 (4.1) | 401 (15.1) | 8.6 (0.26) |
| England | s | 21 (3.9) | 557 (7.9) | 79 (3.9) | 532 (4.8) | 0 (0.0) | ~ ~ | 10.5 (0.14) |
| Malta | | 21 (0.4) | 513 (2.5) | 76 (0.4) | 491 (1.5) | 3 (0.1) | 501 (5.9) | 10.3 (0.02) |
| Serbia | | 20 (3.5) | 533 (7.0) | 77 (3.6) | 513 (4.0) | 3 (1.2) | 507 (15.5) | 9.9 (0.12) |
| Croatia | | 18 (2.9) | 527 (5.5) | 82 (2.9) | 524 (2.2) | 0 (0.0) | ~ ~ | 10.2 (0.14) |
| Germany | | 17 (2.6) | 520 (7.1) | 82 (2.6) | 518 (2.5) | 0 (0.3) | ~ ~ | 10.2 (0.10) |
| Hong Kong SAR | | 17 (2.7) | 540 (6.3) | 74 (3.8) | 528 (4.5) | 8 (2.6) | 541 (24.6) | 9.7 (0.20) |
| Austria | | 16 (2.8) | 545 (6.5) | 83 (2.8) | 518 (2.7) | 1 (0.6) | ~ ~ | 10.2 (0.09) |
| Bosnia and Herzegovina | | 16 (3.0) | 464 (6.7) | 80 (3.4) | 458 (3.2) | 5 (1.9) | 452 (13.3) | 9.6 (0.14) |
| Oman | | 15 (2.1) | 452 (8.0) | 62 (3.5) | 431 (5.1) | 23 (2.9) | 432 (12.2) | 8.9 (0.16) |
| Slovak Republic | | 15 (3.0) | 537 (6.4) | 78 (3.2) | 519 (4.7) | 7 (1.8) | 514 (11.2) | 9.5 (0.13) |
| Portugal | | 15 (2.9) | 510 (5.6) | 84 (3.0) | 503 (2.8) | 1 (0.7) | ~ ~ | 9.9 (0.13) |
| Ireland | | 13 (2.9) | 545 (8.0) | 86 (3.1) | 526 (3.5) | 1 (0.7) | ~ ~ | 10.0 (0.11) |
| Netherlands | s | 13 (3.8) | 518 (9.1) | 87 (3.8) | 519 (3.5) | 0 (0.0) | ~ ~ | 10.1 (0.16) |
| Northern Ireland | r | 12 (3.1) | 526 (6.8) | 85 (3.4) | 518 (2.9) | 2 (1.5) | ~ ~ | 9.5 (0.13) |
| Montenegro | | 11 (0.2) | 435 (9.3) | 82 (0.3) | 457 (2.5) | 7 (0.2) | 437 (5.1) | 9.4 (0.01) |
| France | | 10 (2.6) | 507 (7.8) | 89 (2.7) | 487 (3.3) | 1 (0.8) | ~ ~ | 9.7 (0.12) |
| Pakistan | | 10 (2.7) | 280 (35.8) | 79 (6.2) | 282 (14.7) | 12 (6.1) | 354 (30.1) | 9.2 (0.21) |
| Saudi Arabia | | 9 (1.8) | 424 (11.2) | 69 (3.0) | 394 (5.7) | 21 (2.7) | 422 (8.7) | 8.6 (0.15) |
| Iran, Islamic Rep. of | | 9 (2.1) | 476 (11.5) | 77 (3.1) | 439 (4.3) | 14 (2.4) | 425 (9.3) | 8.7 (0.15) |
| North Macedonia | | 8 (2.3) | 434 (19.7) | 71 (4.2) | 431 (6.7) | 21 (3.7) | 409 (13.5) | 8.7 (0.17) |
| Albania | | 8 (2.1) | 550 (10.5) | 69 (3.3) | 483 (4.6) | 23 (3.0) | 490 (5.8) | 8.6 (0.16) |
| South Africa (5) | | 8 (1.9) | 423 (32.2) | 84 (3.0) | 318 (5.4) | 8 (2.2) | 323 (25.8) | 9.2 (0.11) |
| Morocco | | 7 (1.8) | 340 (21.9) | 89 (2.5) | 371 (6.4) | 4 (1.8) | 492 (45.1) | 9.6 (0.11) |
| Italy | | 7 (1.9) | 518 (13.5) | 92 (2.2) | 510 (3.1) | 2 (1.3) | ~ ~ | 9.8 (0.11) |
| Turkey (5) | | 5 (1.7) | 568 (10.7) | 62 (3.3) | 527 (5.1) | 33 (3.5) | 519 (9.0) | 8.0 (0.18) |
| Azerbaijan | | 2 (1.0) | ~ ~ | 87 (2.4) | 428 (3.6) | 11 (2.2) | 420 (10.3) | 8.6 (0.09) |
| Philippines | | 1 (0.5) | ~ ~ | 95 (1.6) | 245 (7.6) | 5 (1.5) | 291 (22.0) | 8.8 (0.09) |
| Kosovo | | 0 (0.3) | ~ ~ | 72 (4.2) | 413 (4.6) | 28 (4.2) | 413 (5.6) | 7.6 (0.20) |
| **International Average** | | **24 (0.4)** | **508 (1.4)** | **69 (0.5)** | **488 (0.6)** | **7 (0.3)** | **472 (3.0)** | |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | | 63 (4.3) | 592 (3.1) | 35 (4.3) | 600 (3.2) | 2 (1.1) | ~ ~ | 12.5 (0.26) |
| Dubai, UAE | r | 54 (0.3) | 552 (2.7) | 30 (0.3) | 526 (2.7) | 16 (0.2) | 566 (4.7) | 10.9 (0.02) |
| Madrid, Spain | | 51 (3.8) | 526 (2.2) | 49 (3.8) | 519 (3.5) | 0 (0.4) | ~ ~ | 11.6 (0.16) |
| Abu Dhabi, UAE | r | 36 (1.5) | 454 (3.4) | 48 (1.7) | 384 (4.7) | 16 (1.3) | 405 (12.9) | 10.3 (0.10) |
| Ontario, Canada | | 29 (3.9) | 533 (6.6) | 70 (3.9) | 520 (3.3) | 1 (1.0) | ~ ~ | 10.7 (0.17) |
| Quebec, Canada | | 29 (3.7) | 526 (3.4) | 68 (4.0) | 521 (3.3) | 4 (1.8) | 525 (12.1) | 10.6 (0.16) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.18: Instruction Affected by Science Resource Shortages – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Not Affected | | Somewhat Affected | | Affected A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Singapore | | 75 (0.0) | 607 (4.5) | 18 (0.0) | 607 (8.6) | 7 (0.0) | 612 (20.3) | 12.3 (0.00) |
| Australia | | 63 (3.4) | 542 (4.6) | 35 (3.4) | 510 (4.6) | 2 (1.2) | ~ ~ | 11.7 (0.13) |
| France | r | 56 (4.5) | 501 (4.4) | 43 (4.4) | 478 (4.6) | 1 (0.8) | ~ ~ | 11.5 (0.15) |
| Norway (9) | r | 55 (5.1) | 499 (4.9) | 45 (5.1) | 495 (4.9) | 0 (0.0) | ~ ~ | 11.4 (0.11) |
| New Zealand | | 55 (4.9) | 516 (5.6) | 41 (5.0) | 492 (5.8) | 5 (4.0) | 464 (66.9) | 11.3 (0.33) |
| Korea, Rep. of | | 55 (3.9) | 564 (3.2) | 41 (4.2) | 557 (3.4) | 4 (1.8) | 557 (7.4) | 11.5 (0.17) |
| United States | | 48 (3.0) | 540 (4.5) | 50 (3.0) | 514 (7.7) | 1 (0.7) | ~ ~ | 11.2 (0.12) |
| Hong Kong SAR | | 47 (4.6) | 517 (7.3) | 47 (4.0) | 487 (9.1) | 7 (2.7) | 530 (34.8) | 10.7 (0.27) |
| Qatar | | 46 (3.5) | 499 (7.4) | 25 (3.3) | 462 (6.8) | 28 (3.7) | 445 (9.2) | 9.9 (0.27) |
| Cyprus | r | 44 (0.5) | 489 (3.5) | 51 (0.5) | 478 (2.9) | 5 (0.2) | 497 (7.6) | 10.9 (0.02) |
| Sweden | | 44 (3.7) | 528 (5.5) | 55 (3.8) | 517 (4.6) | 1 (0.8) | ~ ~ | 11.0 (0.09) |
| United Arab Emirates | | 41 (1.8) | 502 (3.2) | 45 (1.8) | 449 (3.3) | 14 (0.7) | 448 (6.2) | 10.4 (0.07) |
| Kazakhstan | | 40 (4.1) | 485 (6.2) | 52 (4.2) | 476 (5.1) | 9 (1.8) | 458 (18.5) | 10.9 (0.17) |
| Finland | | 37 (4.1) | 543 (5.8) | 62 (4.1) | 542 (3.8) | 1 (0.9) | ~ ~ | 10.9 (0.12) |
| England | s | 37 (4.9) | 533 (11.7) | 62 (4.7) | 516 (6.8) | 1 (1.4) | ~ ~ | 10.8 (0.19) |
| Chinese Taipei | | 36 (3.4) | 578 (4.0) | 64 (3.5) | 573 (2.6) | 0 (0.4) | ~ ~ | 10.9 (0.11) |
| Japan | | 36 (3.4) | 578 (4.6) | 64 (3.5) | 565 (2.1) | 1 (0.7) | ~ ~ | 10.8 (0.09) |
| Ireland | | 34 (3.2) | 537 (5.2) | 65 (3.3) | 518 (3.7) | 1 (0.6) | ~ ~ | 10.8 (0.12) |
| Georgia | | 34 (3.3) | 453 (7.5) | 65 (3.4) | 444 (4.9) | 1 (1.0) | ~ ~ | 10.7 (0.12) |
| Chile | | 33 (3.1) | 491 (5.9) | 63 (3.4) | 449 (4.3) | 4 (1.7) | 453 (15.6) | 10.4 (0.14) |
| Hungary | | 25 (3.9) | 527 (7.1) | 73 (3.9) | 531 (4.3) | 2 (1.1) | ~ ~ | 10.3 (0.12) |
| Russian Federation | | 25 (3.5) | 551 (7.4) | 74 (3.6) | 542 (4.0) | 2 (0.9) | ~ ~ | 10.1 (0.11) |
| Lebanon | | 21 (2.9) | 439 (10.5) | 64 (3.7) | 357 (6.3) | 15 (2.7) | 370 (16.0) | 9.5 (0.16) |
| Egypt | | 21 (3.4) | 410 (10.0) | 72 (3.6) | 383 (6.9) | 7 (2.3) | 405 (12.5) | 9.9 (0.16) |
| Bahrain | | 20 (0.2) | 506 (3.0) | 52 (0.2) | 468 (2.1) | 27 (0.2) | 505 (4.3) | 9.2 (0.01) |
| Oman | | 19 (2.9) | 475 (8.7) | 65 (3.9) | 452 (4.1) | 17 (2.9) | 459 (6.2) | 9.5 (0.14) |
| Kuwait | | 17 (3.6) | 456 (12.1) | 58 (4.2) | 432 (6.6) | 25 (3.6) | 459 (9.4) | 9.0 (0.18) |
| Portugal | | 15 (2.7) | 536 (8.0) | 82 (3.0) | 515 (3.2) | 2 (1.3) | ~ ~ | 10.1 (0.11) |
| Lithuania | | 15 (3.1) | 532 (8.0) | 82 (3.6) | 532 (3.6) | 3 (1.8) | 545 (17.8) | 10.1 (0.10) |
| Israel | | 14 (3.2) | 535 (13.5) | 82 (3.6) | 509 (4.7) | 4 (1.7) | 539 (23.5) | 10.0 (0.12) |
| Italy | | 13 (2.7) | 500 (9.3) | 87 (2.7) | 502 (2.6) | 0 (0.0) | ~ ~ | 10.0 (0.09) |
| Saudi Arabia | | 12 (2.4) | 439 (9.7) | 64 (3.7) | 424 (3.9) | 24 (3.2) | 448 (6.0) | 8.8 (0.14) |
| Jordan | | 9 (2.5) | 447 (25.1) | 77 (3.2) | 449 (4.6) | 15 (2.4) | 471 (15.4) | 8.9 (0.12) |
| Romania | | 9 (2.2) | 507 (13.7) | 85 (2.9) | 468 (4.4) | 6 (1.9) | 456 (14.0) | 9.5 (0.12) |
| Turkey | | 8 (2.4) | 550 (18.4) | 68 (3.6) | 519 (4.7) | 23 (3.2) | 493 (9.7) | 8.5 (0.14) |
| South Africa (9) | | 7 (1.1) | 488 (22.0) | 86 (2.1) | 362 (3.4) | 7 (1.8) | 358 (10.7) | 9.3 (0.08) |
| Iran, Islamic Rep. of | | 5 (1.4) | 528 (18.3) | 83 (2.8) | 445 (3.5) | 11 (2.4) | 447 (14.5) | 9.0 (0.11) |
| Morocco | | 4 (1.4) | 457 (16.0) | 93 (1.5) | 390 (2.8) | 3 (1.1) | 438 (21.3) | 9.6 (0.08) |
| Malaysia | | 2 (0.7) | ~ ~ | 77 (3.3) | 454 (3.9) | 20 (3.3) | 479 (8.7) | 8.3 (0.10) |
| **International Average** | | **30 (0.5)** | **510 (1.7)** | **62 (0.6)** | **484 (0.8)** | **8 (0.3)** | **472 (4.1)** | |
| **Benchmarking Participants** | | | | | | | | |
| Quebec, Canada | | 71 (4.3) | 538 (3.6) | 28 (4.3) | 545 (7.9) | 2 (1.2) | ~ ~ | 11.9 (0.16) |
| Moscow City, Russian Fed. | | 65 (4.1) | 566 (4.0) | 34 (4.1) | 568 (4.4) | 1 (0.5) | ~ ~ | 11.9 (0.17) |
| Dubai, UAE | r | 56 (0.6) | 567 (3.4) | 35 (0.6) | 520 (3.4) | 9 (0.3) | 531 (6.8) | 11.3 (0.02) |
| Abu Dhabi, UAE | r | 38 (1.9) | 450 (5.9) | 40 (2.0) | 388 (8.1) | 22 (1.3) | 413 (10.5) | 10.1 (0.10) |
| Ontario, Canada | r | 31 (5.6) | 533 (7.2) | 68 (5.6) | 514 (4.0) | 1 (1.1) | ~ ~ | 10.7 (0.18) |
| Western Cape, RSA (9) | | 14 (2.4) | 575 (11.4) | 84 (2.7) | 418 (5.7) | 3 (1.4) | 435 (37.4) | 9.8 (0.11) |
| Gauteng, RSA (9) | | 11 (2.5) | 528 (11.1) | 85 (2.7) | 406 (4.5) | 4 (1.4) | 458 (32.0) | 9.5 (0.12) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Principals' Education and Years of Experience

## Principals' Formal Education

The main education paths for becoming a school principal can vary across countries (as described in the *TIMSS 2019 Encyclopedia*). Some countries focus on formal education or completion of specialized training and certification, while others focus on years of teaching experience and gradual promotion into school leadership roles.

As shown in Exhibit 6.19, on average, more than half of fourth grade students (54%) had a school principal with a postgraduate university degree, 42 percent had a principal with a bachelor's degree, and 5 percent had a principal who had not completed a bachelor's degree. On average, 68 percent of fourth grade students had a principal with an educational leadership certificate or license, and 36 percent with a postgraduate leadership degree.

At the eighth grade (see Exhibit 6.20), the situation with regard to school principals' formal education was rather similar, with 55 percent of students having a school principal with a postgraduate university degree, 43 percent having a principal with a bachelor's degree, and 2 percent with a principal who had not completed a bachelor's degree. On average, 71 percent of eighth grade students had a principal with an educational leadership certificate or license, and 39 percent had a principal with a postgraduate leadership degree.

## Exhibit 6.19: Principals' Formal Education*

*Students' Results based on Principals' Reports*

| Country | Percent of Students by Principals' Education Level | | | Percent of Students by Principals' Educational Leadership Qualification or Credential*** | |
|---|---|---|---|---|---|
| | Completed Postgraduate University Degree** | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Did Not Complete Bachelor's Degree | Certificate or License | Postgraduate Degree |
| Albania | 57 (4.2) | 37 (3.9) | 6 (2.1) | 51 (4.5) | 48 (3.9) |
| Armenia | 77 (3.9) | 22 (3.8) | 1 (0.7) | 92 (2.2) | 29 (4.1) |
| Australia | r 40 (3.0) | 59 (2.9) | 1 (0.8) | - - | r 31 (2.7) |
| Austria | 18 (2.7) | 45 (3.8) | 37 (3.5) | 91 (2.3) | 17 (2.5) |
| Azerbaijan | 34 (3.0) | 57 (3.1) | 9 (2.1) | 68 (3.7) | 21 (3.3) |
| Bahrain | 39 (2.0) | 61 (2.1) | 1 (0.5) | 89 (1.7) | 25 (2.0) |
| Belgium (Flemish) | 6 (2.2) | 94 (2.2) | 0 (0.0) | 88 (3.6) | 6 (2.7) |
| Bosnia and Herzegovina | 17 (3.2) | 77 (3.3) | 6 (1.6) | 44 (4.0) | 7 (1.9) |
| Bulgaria | 93 (2.6) | 5 (1.7) | 2 (2.0) | 59 (3.7) | 28 (3.9) |
| Canada | 64 (2.1) | 36 (2.1) | 0 (0.0) | 60 (2.9) | 45 (2.6) |
| Chile | 67 (3.5) | 32 (3.5) | 0 (0.3) | 73 (3.7) | 57 (3.8) |
| Chinese Taipei | 91 (2.5) | 9 (2.5) | 0 (0.0) | 60 (3.8) | 77 (3.7) |
| Croatia | 96 (1.8) | 2 (1.2) | 2 (1.3) | 10 (2.8) | 41 (4.5) |
| Cyprus | 72 (4.6) | 26 (4.4) | 2 (1.2) | 42 (5.1) | 42 (4.9) |
| Czech Republic | 99 (0.6) | 1 (0.6) | 0 (0.0) | 90 (2.8) | 21 (3.6) |
| Denmark | r 22 (3.8) | 73 (4.1) | 4 (1.9) | r 93 (2.3) | r 18 (3.3) |
| England | s 22 (4.2) | 78 (4.2) | 0 (0.0) | s 61 (5.5) | s 17 (3.5) |
| Finland | 98 (1.2) | 2 (1.2) | 0 (0.0) | 89 (2.2) | 35 (3.8) |
| France | 32 (3.9) | 49 (4.8) | 20 (3.6) | 23 (3.9) | 3 (1.4) |
| Georgia | 94 (2.0) | 6 (2.0) | 0 (0.0) | r 92 (2.9) | r 77 (4.1) |
| Germany | 91 (2.1) | 3 (1.5) | 6 (1.6) | 49 (3.8) | 25 (3.2) |
| Hong Kong SAR | 66 (4.7) | 33 (4.7) | 1 (0.6) | 82 (4.4) | 57 (4.4) |
| Hungary | 42 (4.7) | 58 (4.7) | 0 (0.0) | 97 (1.5) | - - |
| Iran, Islamic Rep. of | 28 (3.4) | 68 (3.6) | 4 (1.7) | 55 (3.5) | 21 (3.0) |
| Ireland | 53 (4.2) | 45 (4.2) | 2 (1.3) | 31 (4.1) | 25 (3.7) |
| Italy | 87 (3.2) | 12 (3.2) | 1 (0.8) | - - | 36 (4.1) |
| Japan | 13 (2.9) | 87 (2.9) | 0 (0.0) | 24 (3.5) | 19 (3.5) |
| Kazakhstan | 15 (3.1) | 84 (3.2) | 1 (1.1) | 83 (3.0) | 10 (2.4) |
| Korea, Rep. of | 91 (2.4) | 9 (2.4) | 1 (0.6) | 79 (3.4) | 88 (2.8) |
| Kosovo | 42 (4.1) | 42 (4.3) | 16 (3.0) | 93 (3.2) | 48 (4.5) |
| Kuwait | 22 (2.5) | 69 (3.3) | 9 (2.4) | 64 (4.7) | 24 (2.6) |
| Latvia | 91 (2.4) | 9 (2.4) | 0 (0.1) | 54 (3.8) | 38 (3.9) |
| Lithuania | 82 (2.7) | 18 (2.7) | 0 (0.0) | 67 (3.7) | 63 (4.1) |
| Malta | 77 (0.4) | 23 (0.4) | 0 (0.0) | 67 (0.4) | 49 (0.4) |
| Montenegro | 24 (0.5) | 74 (0.5) | 2 (0.1) | 79 (0.6) | 15 (0.3) |
| Morocco | 5 (1.4) | 70 (3.1) | 25 (2.9) | 76 (3.7) | 1 (0.7) |
| Netherlands | s 19 (4.9) | 69 (5.4) | 12 (4.3) | s 85 (4.1) | - - |
| New Zealand | 47 (4.1) | 36 (4.0) | 17 (2.9) | - - | - - |
| North Macedonia | 24 (3.4) | 76 (3.4) | 0 (0.3) | 90 (2.8) | 18 (3.2) |
| Northern Ireland | r 75 (4.7) | 25 (4.7) | 0 (0.0) | r 75 (4.4) | r 59 (4.8) |
| Norway (5) | r 34 (4.3) | 64 (4.4) | 2 (1.1) | r 77 (4.3) | r 28 (3.8) |
| Oman | 27 (2.9) | 58 (3.4) | 14 (2.5) | 67 (3.4) | 22 (3.1) |
| Pakistan | 66 (7.3) | 17 (6.8) | 17 (3.4) | 53 (7.4) | 53 (6.7) |
| Philippines | 79 (3.2) | 20 (3.2) | 1 (0.7) | 78 (3.2) | 80 (3.1) |
| Poland | 99 (0.8) | 0 (0.0) | 1 (0.8) | 46 (4.6) | 63 (4.4) |
| Portugal | 36 (3.9) | 62 (3.9) | 1 (0.9) | - - | 35 (4.1) |
| Qatar | 51 (2.5) | 49 (2.6) | 1 (0.5) | 77 (2.8) | 47 (2.8) |
| Russian Federation | 82 (2.6) | 18 (2.6) | 0 (0.2) | 93 (2.1) | 16 (2.3) |
| Saudi Arabia | 13 (2.5) | 77 (3.2) | 11 (2.2) | 20 (3.5) | 9 (2.4) |
| Serbia | 35 (4.0) | 65 (4.0) | 0 (0.0) | 26 (3.7) | 20 (3.5) |
| Singapore | 63 (0.0) | 36 (0.0) | 1 (0.0) | 97 (0.0) | 44 (0.0) |
| Slovak Republic | 100 (0.0) | 0 (0.0) | 0 (0.0) | 94 (1.8) | 56 (4.2) |
| South Africa (5) | 11 (2.3) | 65 (3.3) | 24 (2.8) | 65 (3.3) | 10 (2.2) |
| Spain | 56 (3.5) | 43 (3.6) | 1 (0.7) | 74 (3.0) | 18 (2.6) |
| Sweden | 41 (4.2) | 55 (4.3) | 4 (1.8) | 73 (4.2) | 49 (4.6) |
| Turkey (5) | 20 (3.2) | 78 (3.3) | 2 (1.1) | 67 (3.9) | 17 (3.1) |
| United Arab Emirates | r 63 (0.7) | 36 (0.7) | 1 (0.3) | r 76 (1.2) | r 54 (1.1) |
| United States | 98 (0.9) | 2 (0.9) | 0 (0.0) | 91 (1.6) | 92 (1.6) |
| **International Average** | **54 (0.4)** | **42 (0.4)** | **5 (0.2)** | **68 (0.5)** | **36 (0.5)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | 58 (4.2) | 42 (4.2) | 0 (0.0) | 69 (5.4) | 38 (5.1) |
| Quebec, Canada | 63 (4.2) | 37 (4.2) | 0 (0.0) | 44 (4.4) | 39 (4.0) |
| Moscow City, Russian Fed. | 95 (1.9) | 5 (1.9) | 0 (0.0) | 97 (1.4) | 39 (4.4) |
| Madrid, Spain | 60 (3.9) | 40 (3.9) | 0 (0.0) | 81 (2.8) | 21 (3.4) |
| Abu Dhabi, UAE | r 65 (1.1) | 35 (1.1) | 0 (0.0) | r 77 (1.2) | r 59 (1.3) |
| Dubai, UAE | r 65 (0.3) | 35 (0.3) | 0 (0.0) | r 73 (0.3) | r 55 (0.3) |

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).
** For example, doctorate, master's, or other postgraduate degree.
*** Principals could indicate holding more than one qualification or credential.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.20: Principals' Formal Education*

*Students' Results based on Principals' Reports*

| Country | Percent of Students by Principals' Education Level | | | Percent of Students by Principals' Educational Leadership Qualification or Credential*** | |
|---|---|---|---|---|---|
| | Completed Postgraduate University Degree** | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Did Not Complete Bachelor's Degree | Certificate or License | Postgraduate Degree |
| Australia | 58 (2.9) | 42 (2.9) | 0 (0.0) | - - | 50 (3.0) |
| Bahrain | 39 (0.3) | 60 (0.2) | 1 (0.0) | 89 (0.2) | 21 (0.2) |
| Chile | 72 (3.6) | 27 (3.6) | 0 (0.4) | 76 (3.5) | 64 (4.1) |
| Chinese Taipei | 90 (2.2) | 10 (2.2) | 0 (0.0) | 60 (3.4) | 64 (3.3) |
| Cyprus | r 78 (0.4) | 22 (0.4) | 0 (0.0) | r 32 (0.5) | r 40 (0.5) |
| Egypt | 3 (1.3) | 90 (2.4) | 7 (2.0) | 86 (2.6) | 4 (1.7) |
| England | s 51 (5.1) | 49 (5.1) | 0 (0.0) | s 65 (4.7) | s 43 (4.9) |
| Finland | 99 (0.6) | 1 (0.6) | 0 (0.0) | 97 (1.2) | 48 (3.9) |
| France | r 72 (4.2) | 27 (4.3) | 1 (0.9) | r 27 (3.9) | r 30 (4.3) |
| Georgia | 96 (1.8) | 4 (1.8) | 0 (0.0) | r 91 (3.0) | r 75 (4.1) |
| Hong Kong SAR | 93 (2.2) | 7 (2.2) | 0 (0.0) | 85 (3.4) | 66 (4.3) |
| Hungary | 50 (4.0) | 49 (4.1) | 1 (0.8) | 98 (1.2) | - - |
| Iran, Islamic Rep. of | 35 (3.1) | 64 (3.3) | 2 (0.8) | 45 (3.3) | 24 (3.3) |
| Ireland | 77 (3.5) | 23 (3.5) | 0 (0.0) | 60 (4.1) | 58 (4.1) |
| Israel | 98 (1.1) | 2 (1.1) | 0 (0.0) | 88 (2.7) | 83 (2.9) |
| Italy | 93 (2.3) | 7 (2.2) | 1 (0.7) | - - | 33 (3.5) |
| Japan | 8 (2.2) | 92 (2.2) | 0 (0.0) | 25 (3.6) | 12 (2.7) |
| Jordan | 53 (4.4) | 45 (4.4) | 2 (0.9) | 89 (2.1) | 37 (4.0) |
| Kazakhstan | 16 (3.3) | 83 (3.4) | 2 (1.1) | 80 (3.3) | 10 (2.7) |
| Korea, Rep. of | 86 (2.9) | 14 (2.9) | 0 (0.0) | 80 (2.9) | 83 (3.1) |
| Kuwait | 19 (3.7) | 70 (4.4) | 11 (2.5) | 63 (3.7) | 14 (2.8) |
| Lebanon | 56 (4.1) | 35 (3.9) | 9 (2.0) | 62 (3.2) | 34 (3.8) |
| Lithuania | 80 (3.2) | 19 (3.1) | 1 (0.9) | 69 (4.3) | 48 (4.3) |
| Malaysia | 37 (3.6) | 62 (3.6) | 0 (0.3) | 67 (3.8) | 43 (3.9) |
| Morocco | 7 (1.9) | 75 (3.0) | 18 (3.1) | 70 (2.9) | 5 (1.5) |
| New Zealand | 79 (4.0) | 20 (4.0) | 1 (1.0) | - - | - - |
| Norway (9) | r 42 (4.7) | 57 (4.8) | 1 (1.2) | r 69 (4.8) | r 34 (4.5) |
| Oman | 29 (3.1) | 62 (3.4) | 9 (2.2) | 64 (3.4) | 23 (3.0) |
| Portugal | 42 (3.9) | 57 (3.9) | 1 (0.9) | - - | 34 (3.5) |
| Qatar | 45 (2.3) | 54 (2.6) | 1 (1.1) | 85 (2.1) | 42 (2.2) |
| Romania | 59 (3.8) | 41 (3.8) | 0 (0.0) | 81 (2.9) | 39 (3.6) |
| Russian Federation | 83 (2.8) | 17 (2.8) | 0 (0.0) | 93 (2.0) | 14 (2.1) |
| Saudi Arabia | 8 (2.1) | 88 (2.7) | 5 (1.6) | 19 (2.9) | r 4 (1.5) |
| Singapore | 67 (0.0) | 33 (0.0) | 0 (0.0) | 95 (0.0) | 44 (0.0) |
| South Africa (9) | 13 (1.6) | 80 (2.3) | 7 (1.6) | 57 (3.2) | 13 (1.7) |
| Sweden | 42 (4.2) | 56 (4.3) | 2 (1.2) | 79 (3.4) | 46 (4.4) |
| Turkey | 22 (3.2) | 76 (3.4) | 2 (1.3) | 67 (4.1) | 18 (2.9) |
| United Arab Emirates | 61 (1.0) | 39 (1.0) | 1 (0.2) | 75 (1.2) | 50 (1.4) |
| United States | 98 (1.3) | 2 (1.3) | 0 (0.0) | 95 (1.4) | 95 (1.6) |
| **International Average** | **55 (0.5)** | **43 (0.5)** | **2 (0.2)** | **71 (0.5)** | **39 (0.5)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | r 52 (6.1) | 48 (6.1) | 0 (0.0) | r 83 (3.5) | r 42 (6.2) |
| Quebec, Canada | 55 (5.0) | 45 (5.0) | 0 (0.2) | 56 (5.4) | 29 (4.8) |
| Moscow City, Russian Fed. | 95 (1.7) | 5 (1.7) | 0 (0.0) | 97 (1.5) | 38 (4.4) |
| Gauteng, RSA (9) | 18 (3.1) | 74 (3.4) | 8 (2.0) | 53 (3.7) | 20 (3.3) |
| Western Cape, RSA (9) | 15 (3.2) | 81 (3.5) | 4 (1.8) | 58 (4.0) | 12 (2.9) |
| Abu Dhabi, UAE | r 63 (1.4) | 36 (1.2) | 1 (0.6) | r 74 (1.6) | r 55 (1.5) |
| Dubai, UAE | r 73 (0.4) | 27 (0.4) | 0 (0.0) | r 68 (0.4) | r 54 (0.5) |

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).
** For example, doctorate, master's, or other postgraduate degree.
*** Principals could indicate holding more than one qualification or credential.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Principals' Years of Experience

Exhibit 6.21 presents fourth grade students' school principals' reports about their years of experience. On average, fourth grade students' principals had 10 years of experience as a principal. Thirteen percent of the students had very experienced principals with 20 years or more of experience, 29 percent had principals with at least 10 years of experience, 27 percent had principals with at least 5 years of experience, and 31 percent had principals with less than 5 years of experience.

Exhibit 6.22 shows eighth grade students' school principals' reports about their years of experience. On average, principals of schools with eighth grade students had 9 years of experience as a principal. Eleven percent of the students had principals with 20 years or more of experience, 28 percent had principals with at least 10 years of experience, 28 percent had principals with at least 5 years of experience, and 34 percent had principals with less than 5 years of experience.

## Exhibit 6.21: Principals' Years of Experience

*Students' Results based on Principals' Reports*

| Country | Percent of Students by Principals' Years of Experience as a Principal | | | | Average Years of Experience as a Principal |
|---|---|---|---|---|---|
| | 20 Years or More | At Least 10 but Less than 20 Years | At Least 5 but Less than 10 Years | Less than 5 Years | |
| Albania | 10 (2.7) | 19 (3.2) | 43 (4.3) | 28 (4.1) | 8 (0.6) |
| Armenia | 25 (4.0) | 24 (4.1) | 27 (3.5) | 24 (3.7) | 12 (0.8) |
| Australia r | 11 (2.2) | 32 (3.0) | 21 (3.9) | 36 (3.9) | 9 (0.5) |
| Austria | 5 (1.5) | 39 (3.3) | 36 (3.7) | 20 (2.9) | 10 (0.4) |
| Azerbaijan | 23 (3.2) | 26 (3.2) | 20 (3.3) | 31 (3.7) | 13 (0.8) |
| Bahrain | 7 (1.3) | 23 (2.1) | 30 (2.6) | 40 (2.7) | 8 (0.4) |
| Belgium (Flemish) | 12 (2.9) | 34 (4.7) | 26 (4.0) | 28 (4.5) | 10 (0.7) |
| Bosnia and Herzegovina | 1 (1.0) | 12 (2.5) | 29 (4.2) | 57 (4.2) | 5 (0.3) |
| Bulgaria | 30 (3.7) | 31 (3.7) | 17 (3.3) | 22 (3.4) | 14 (0.8) |
| Canada | 6 (2.2) | 31 (2.2) | 30 (2.7) | 33 (2.2) | 8 (0.5) |
| Chile | 15 (3.0) | 25 (3.7) | 21 (3.3) | 39 (4.4) | 10 (0.8) |
| Chinese Taipei | 7 (2.1) | 47 (4.3) | 32 (4.0) | 14 (2.9) | 11 (0.5) |
| Croatia | 8 (2.6) | 28 (4.0) | 25 (3.7) | 38 (4.1) | 8 (0.6) |
| Cyprus | 5 (1.9) | 12 (3.1) | 73 (3.9) | 10 (2.6) | 9 (0.6) |
| Czech Republic | 21 (3.4) | 33 (3.8) | 26 (3.9) | 21 (3.8) | 12 (0.7) |
| Denmark r | 13 (3.4) | 23 (3.8) | 27 (4.5) | 38 (4.6) | 9 (0.7) |
| England s | 10 (3.1) | 36 (5.6) | 32 (5.3) | 22 (5.1) | 10 (0.7) |
| Finland | 24 (3.6) | 35 (3.2) | 20 (3.2) | 21 (3.1) | 13 (0.7) |
| France | 25 (4.1) | 31 (3.6) | 23 (3.4) | 22 (3.5) | 12 (0.8) |
| Georgia | 15 (3.2) | 35 (4.1) | 33 (4.1) | 17 (3.4) | 11 (0.7) |
| Germany | 9 (2.0) | 34 (3.7) | 25 (3.1) | 32 (3.8) | 9 (0.6) |
| Hong Kong SAR | 15 (2.9) | 33 (4.6) | 22 (3.3) | 31 (4.3) | 11 (0.7) |
| Hungary | 11 (2.5) | 33 (4.1) | 25 (3.7) | 32 (4.5) | 9 (0.6) |
| Iran, Islamic Rep. of | 16 (2.2) | 37 (3.8) | 27 (3.6) | 20 (3.1) | 11 (0.5) |
| Ireland | 20 (3.6) | 24 (3.9) | 24 (3.8) | 32 (4.2) | 11 (0.8) |
| Italy | 14 (3.1) | 31 (3.8) | 42 (3.8) | 14 (3.3) | 10 (0.6) |
| Japan | 0 (0.0) | 8 (2.3) | 33 (4.0) | 59 (3.9) | 4 (0.2) |
| Kazakhstan | 8 (2.3) | 39 (4.2) | 30 (3.7) | 24 (3.6) | 10 (0.6) |
| Korea, Rep. of | 31 (3.9) | 0 (0.5) | 21 (3.4) | 47 (4.3) | 14 (1.3) |
| Kosovo | 3 (2.1) | 30 (3.8) | 33 (4.3) | 34 (4.6) | 8 (0.6) |
| Kuwait | 9 (1.9) | 20 (3.6) | 27 (3.8) | 43 (4.3) | 8 (0.5) |
| Latvia | 37 (3.5) | 31 (3.5) | 10 (2.4) | 22 (3.4) | 15 (0.7) |
| Lithuania | 33 (3.8) | 31 (3.6) | 13 (2.9) | 24 (3.5) | 14 (0.7) |
| Malta | 7 (0.2) | 35 (0.4) | 30 (0.4) | 29 (0.4) | 9 (0.1) |
| Montenegro | 6 (0.5) | 24 (0.4) | 26 (0.5) | 44 (0.4) | 7 (0.1) |
| Morocco | 8 (2.1) | 44 (4.0) | 18 (2.8) | 29 (3.4) | 10 (0.5) |
| Netherlands s | 18 (4.2) | 34 (5.8) | 19 (5.5) | 28 (6.0) | 11 (1.0) |
| New Zealand | 23 (3.0) | 38 (4.2) | 18 (3.1) | 21 (3.5) | 13 (0.7) |
| North Macedonia | 2 (1.3) | 7 (2.3) | 20 (3.6) | 71 (4.0) | 4 (0.4) |
| Northern Ireland r | 14 (3.3) | 31 (4.0) | 29 (5.0) | 27 (4.4) | 10 (0.8) |
| Norway (5) r | 8 (2.4) | 26 (4.2) | 28 (4.7) | 38 (4.8) | 8 (0.5) |
| Oman | 20 (2.7) | 28 (3.4) | 18 (2.7) | 35 (3.1) | 11 (0.7) |
| Pakistan r | 11 (4.1) | 12 (2.8) | 37 (5.9) | 39 (6.6) | 8 (1.1) |
| Philippines | 7 (2.3) | 35 (3.7) | 30 (3.9) | 27 (3.8) | 9 (0.5) |
| Poland | 18 (3.0) | 37 (4.4) | 20 (3.5) | 25 (4.2) | 12 (0.8) |
| Portugal | 17 (3.0) | 41 (3.9) | 19 (3.2) | 22 (3.0) | 12 (0.6) |
| Qatar | 12 (2.6) | 28 (4.3) | 30 (3.4) | 29 (3.8) | 10 (0.6) |
| Russian Federation | 26 (3.4) | 32 (4.1) | 25 (3.4) | 17 (3.2) | 13 (0.8) |
| Saudi Arabia | 6 (1.6) | 34 (2.8) | 26 (2.8) | 34 (3.5) | 9 (0.5) |
| Serbia | 1 (0.7) | 31 (3.9) | 32 (4.3) | 36 (4.5) | 8 (0.4) |
| Singapore | 4 (0.0) | 43 (0.0) | 36 (0.0) | 18 (0.0) | 10 (0.0) |
| Slovak Republic | 12 (2.5) | 36 (4.2) | 25 (3.9) | 27 (4.1) | 10 (0.6) |
| South Africa (5) | 14 (2.3) | 23 (3.4) | 31 (3.6) | 32 (3.4) | 9 (0.6) |
| Spain | 5 (1.6) | 23 (2.7) | 34 (3.5) | 39 (3.6) | 7 (0.4) |
| Sweden | 5 (2.4) | 31 (4.9) | 25 (4.2) | 38 (4.6) | 8 (0.6) |
| Turkey (5) | 7 (2.1) | 15 (2.3) | 28 (3.5) | 49 (4.1) | 7 (0.5) |
| United Arab Emirates r | 15 (1.1) | 31 (1.6) | 24 (1.6) | 30 (2.0) | 10 (0.3) |
| United States | 5 (1.4) | 28 (2.9) | 32 (2.9) | 35 (3.2) | 8 (0.4) |
| **International Average** | **13 (0.4)** | **29 (0.5)** | **27 (0.5)** | **31 (0.5)** | **10 (0.1)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | 8 (4.2) | 27 (3.8) | 30 (4.9) | 36 (3.9) | 8 (0.9) |
| Quebec, Canada | 4 (1.9) | 36 (4.4) | 32 (4.3) | 27 (4.3) | 9 (0.5) |
| Moscow City, Russian Fed. | 15 (3.1) | 29 (4.1) | 21 (3.1) | 35 (4.1) | 11 (0.8) |
| Madrid, Spain | 5 (1.9) | 31 (3.8) | 31 (4.3) | 33 (4.4) | 8 (0.5) |
| Abu Dhabi, UAE r | 14 (1.7) | 33 (1.5) | 20 (1.2) | 33 (1.6) | 10 (0.3) |
| Dubai, UAE r | 6 (0.2) | 29 (0.3) | 33 (0.4) | 31 (0.2) | 8 (0.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 6.22: Principals' Years of Experience

*Students' Results based on Principals' Reports*

| Country | | Percent of Students by Principals' Years of Experience as a Principal | | | | Average Years of Experience as a Principal |
|---|---|---|---|---|---|---|
| | | 20 Years or More | At Least 10 but Less than 20 Years | At Least 5 but Less than 10 Years | Less than 5 Years | |
| Australia | | 8 (1.9) | 35 (4.5) | 30 (4.1) | 27 (3.2) | 9 (0.5) |
| Bahrain | | 6 (0.2) | 13 (0.2) | 41 (0.2) | 39 (0.2) | 7 (0.0) |
| Chile | | 13 (2.9) | 21 (3.5) | 25 (3.5) | 40 (4.4) | 9 (0.9) |
| Chinese Taipei | | 5 (1.6) | 36 (3.0) | 35 (3.5) | 23 (2.9) | 9 (0.5) |
| Cyprus | r | 11 (0.4) | 9 (0.3) | 37 (0.5) | 43 (0.5) | 8 (0.1) |
| Egypt | | 3 (0.8) | 15 (3.1) | 26 (3.5) | 56 (3.9) | 6 (0.4) |
| England | s | 4 (2.0) | 29 (4.9) | 41 (5.6) | 26 (4.8) | 8 (0.6) |
| Finland | | 21 (3.5) | 35 (3.9) | 23 (3.6) | 21 (3.3) | 12 (0.8) |
| France | r | 6 (2.2) | 23 (3.9) | 34 (4.6) | 37 (4.0) | 7 (0.5) |
| Georgia | | 18 (3.7) | 38 (4.0) | 29 (4.3) | 15 (3.3) | 12 (0.8) |
| Hong Kong SAR | | 6 (1.6) | 28 (4.4) | 32 (4.3) | 35 (4.3) | 8 (0.5) |
| Hungary | | 13 (2.9) | 39 (4.2) | 22 (3.8) | 26 (4.0) | 10 (0.6) |
| Iran, Islamic Rep. of | | 19 (3.0) | 28 (3.1) | 26 (3.0) | 27 (3.4) | 11 (0.6) |
| Ireland | | 4 (1.5) | 37 (3.9) | 31 (4.1) | 29 (3.5) | 8 (0.5) |
| Israel | | 8 (2.2) | 33 (3.8) | 25 (3.8) | 34 (4.0) | 9 (0.7) |
| Italy | | 11 (2.8) | 33 (3.9) | 41 (3.7) | 15 (3.0) | 10 (0.6) |
| Japan | | 0 (0.0) | 7 (2.1) | 39 (4.2) | 54 (4.4) | 5 (0.2) |
| Jordan | | 6 (1.7) | 39 (4.2) | 31 (4.0) | 24 (3.2) | 9 (0.5) |
| Kazakhstan | | 7 (2.1) | 40 (4.2) | 26 (3.5) | 27 (3.7) | 9 (0.6) |
| Korea, Rep. of | | 23 (3.3) | 1 (0.8) | 17 (3.1) | 59 (3.8) | 11 (1.1) |
| Kuwait | | 11 (2.9) | 19 (3.1) | 22 (3.2) | 48 (3.1) | 8 (0.7) |
| Lebanon | | 19 (3.6) | 32 (3.8) | 24 (3.2) | 24 (3.6) | 12 (0.8) |
| Lithuania | | 32 (4.4) | 34 (4.2) | 9 (2.5) | 24 (3.9) | 15 (0.9) |
| Malaysia | | 5 (1.6) | 15 (2.9) | 21 (3.9) | 60 (4.4) | 6 (0.5) |
| Morocco | | 4 (1.2) | 32 (3.1) | 33 (3.3) | 32 (3.4) | 8 (0.4) |
| New Zealand | | 7 (2.6) | 32 (4.8) | 23 (4.0) | 38 (5.0) | 8 (0.6) |
| Norway (9) | r | 5 (2.3) | 19 (3.6) | 35 (4.9) | 40 (5.0) | 7 (0.5) |
| Oman | | 27 (2.9) | 25 (3.5) | 18 (2.7) | 30 (3.2) | 12 (0.6) |
| Portugal | | 16 (3.2) | 38 (3.9) | 19 (3.5) | 27 (4.2) | 11 (0.8) |
| Qatar | | 13 (2.0) | 35 (4.0) | 25 (2.7) | 27 (2.9) | 10 (0.5) |
| Romania | | 14 (2.9) | 27 (3.4) | 32 (3.3) | 26 (3.9) | 10 (0.7) |
| Russian Federation | | 19 (2.6) | 31 (3.5) | 27 (3.0) | 22 (2.5) | 12 (0.6) |
| Saudi Arabia | | 11 (2.7) | 21 (3.0) | 26 (3.5) | 43 (3.3) | 8 (0.6) |
| Singapore | | 5 (0.0) | 39 (0.0) | 31 (0.0) | 24 (0.0) | 9 (0.0) |
| South Africa (9) | | 14 (2.2) | 27 (2.8) | 22 (3.0) | 36 (3.1) | 9 (0.5) |
| Sweden | | 5 (1.7) | 38 (3.8) | 26 (3.9) | 31 (3.5) | 8 (0.4) |
| Turkey | | 7 (2.1) | 15 (2.3) | 29 (3.3) | 48 (3.6) | 7 (0.5) |
| United Arab Emirates | r | 19 (1.5) | 33 (1.1) | 17 (1.6) | 31 (1.7) | 11 (0.4) |
| United States | | 4 (1.4) | 27 (2.7) | 29 (3.4) | 39 (3.4) | 7 (0.4) |
| **International Average** | | **11 (0.4)** | **28 (0.6)** | **28 (0.6)** | **34 (0.6)** | **9 (0.1)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | r | 4 (1.8) | 33 (5.0) | 21 (4.9) | 42 (5.6) | 8 (0.6) |
| Quebec, Canada | | 4 (2.2) | 35 (5.0) | 20 (3.7) | 41 (5.6) | 8 (0.7) |
| Moscow City, Russian Fed. | | 15 (3.0) | 28 (3.8) | 22 (3.4) | 36 (4.2) | 11 (0.7) |
| Gauteng, RSA (9) | | 10 (2.9) | 26 (4.0) | 22 (3.8) | 42 (4.0) | 8 (0.7) |
| Western Cape, RSA (9) | | 14 (2.5) | 32 (4.2) | 18 (3.3) | 36 (4.5) | 9 (0.6) |
| Abu Dhabi, UAE | r | 21 (1.7) | 33 (1.6) | 15 (1.8) | 31 (2.2) | 11 (0.3) |
| Dubai, UAE | r | 8 (0.2) | 37 (0.5) | 25 (0.6) | 30 (0.4) | 9 (0.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# School Climate

## School Emphasis on Academic Success

The *School Emphasis on Academic Success* scale was administered to school principals of fourth and eighth grade students to collect information about the school's expectations toward academic achievement. As described in Exhibit 7.1, students were categorized on the scale according to their principals' responses to 11 items in the TIMSS 2019 School Questionnaire (see About the Scale). Consistent with previous TIMSS results, principals overall had positive attitudes about the degree of emphasis on academics in their schools, so the three regions were described as "very high," "high," and "medium."

Exhibits 7.2 and 7.3 present the results for fourth grade students. The two exhibits include the same results for the *School Emphasis on Academic Success* scale, but Exhibit 7.2 presents results in relation to mathematics achievement and Exhibit 7.3 in relation to science achievement. Countries are ordered according to the percentage of students in the "very high emphasis" category. Across countries, on average, 7 percent of fourth grade students attended schools where the principal reported a "very high emphasis" on academic success, 55 percent attended schools with a "high emphasis," and 37 percent attended schools with a "medium emphasis." Attending schools with a higher emphasis on academic success was related to higher average mathematics achievement. Students in the "very high emphasis" category had the highest average mathematics achievement (515), followed by the "high emphasis" category (508), and then students in the "medium emphasis" category (486). The results were similar in relation to science, with average science achievement for students in the three categories at 508, 499, and 474 points, respectively.

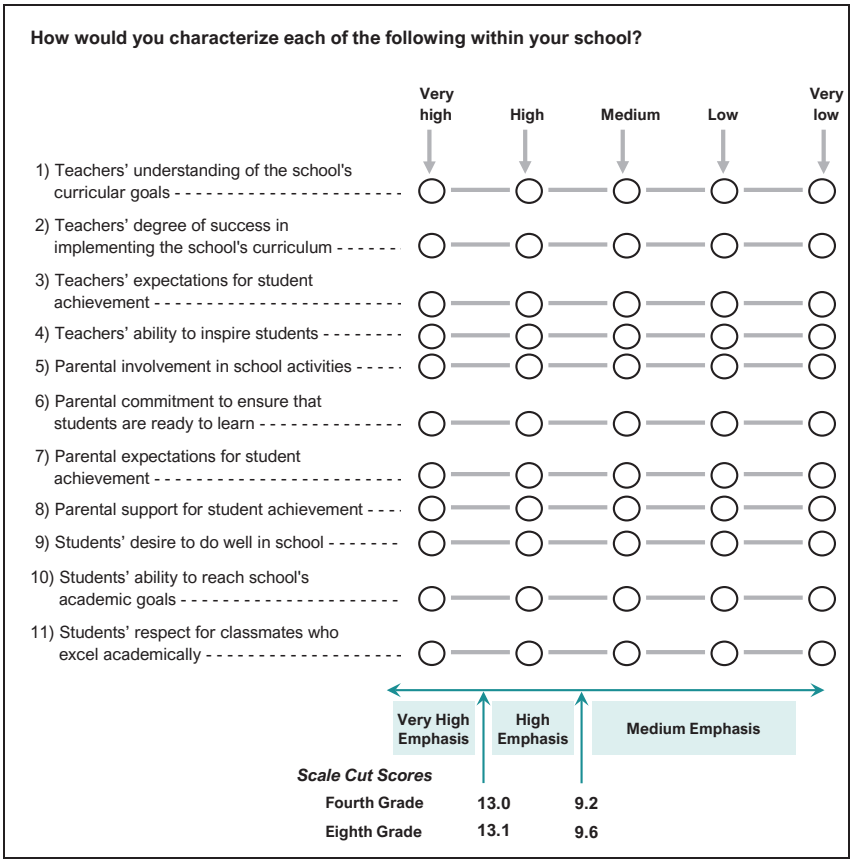
Exhibits 7.4 and 7.5 present the *School Emphasis on Academic Success* results for eighth grade students in relation to their mathematics achievement and science achievement, respectively. On average, the principals of eighth grade students reported a similar degree of emphasis on academic success compared with fourth grade—8 percent of eighth grade students attended schools with a "very high emphasis" on academic success, 49 percent attended schools with a "high emphasis," and 43 percent attended schools with a "medium emphasis." At the eighth grade, there was a greater achievement gap between the "very high emphasis" and "medium emphasis" categories than at the fourth grade (69 points vs. 29 points in mathematics, and 68 points vs. 34 points in science).

## Exhibit 7.1: School Emphasis on Academic Success – Principals' Reports

*Students' Results based on Principals' Reports*

### About the Scale

Students were scored according to their principals' responses characterizing eleven aspects on the *School Emphasis on Academic Success* scale. Cut scores divide the scale into three categories. Students in schools with a **Very High Emphasis** on academic success had a score at or above the cut score corresponding to their principals characterizing six of the eleven aspects as "very high" and the other five as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score at or below the cut score corresponding to their principals characterizing six of the eleven aspects as "medium" and the other five as "high," on average. All other students attended schools with a **High Emphasis** on academic success.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 7.2: School Emphasis on Academic Success – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | Very High Emphasis | | High Emphasis | | Medium Emphasis | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | 33 (4.1) | 613 (4.8) | 54 (4.4) | 596 (2.7) | 13 (3.0) | 580 (5.2) | 12.0 (0.20) |
| Bahrain | 28 (2.3) | 486 (5.0) | 55 (3.0) | 481 (2.6) | 17 (2.3) | 468 (6.3) | 11.7 (0.13) |
| Qatar | 25 (3.9) | 457 (8.5) | 63 (4.2) | 448 (4.3) | 13 (2.4) | 441 (10.7) | 11.8 (0.18) |
| Saudi Arabia | 22 (3.0) | 423 (7.9) | 61 (3.8) | 396 (4.7) | 17 (2.5) | 379 (12.1) | 11.3 (0.15) |
| United Arab Emirates | 22 (1.8) | 522 (3.9) | 54 (2.1) | 488 (2.4) | 25 (1.4) | 422 (3.2) | 11.2 (0.08) |
| Ireland | 21 (3.4) | 562 (5.3) | 63 (3.7) | 552 (3.4) | 16 (3.0) | 520 (6.3) | 11.5 (0.17) |
| Kuwait | 18 (3.6) | 421 (12.0) | 56 (3.9) | 383 (7.0) | 25 (3.6) | 354 (9.9) | 11.0 (0.22) |
| Northern Ireland r | 15 (3.6) | 590 (11.5) | 68 (4.7) | 569 (4.1) | 17 (3.5) | 537 (6.7) | 11.1 (0.17) |
| Oman | 15 (2.5) | 458 (12.3) | 69 (3.3) | 429 (4.6) | 15 (2.5) | 408 (9.7) | 11.1 (0.13) |
| Kazakhstan | 14 (2.7) | 525 (10.9) | 71 (3.3) | 510 (2.9) | 15 (2.4) | 514 (9.5) | 11.2 (0.14) |
| England s | 12 (3.1) | 605 (19.0) | 68 (5.6) | 556 (4.4) | 20 (4.9) | 534 (7.8) | 10.9 (0.19) |
| United States | 11 (2.0) | 574 (6.9) | 51 (3.1) | 544 (4.0) | 38 (2.7) | 511 (4.0) | 10.1 (0.13) |
| Pakistan | 11 (4.0) | 349 (24.7) | 52 (7.1) | 341 (18.6) | 37 (6.4) | 303 (10.9) | 10.2 (0.28) |
| Philippines | 10 (2.4) | 307 (16.3) | 66 (3.7) | 300 (8.5) | 24 (3.4) | 282 (11.3) | 10.8 (0.15) |
| New Zealand | 10 (2.4) | 519 (11.9) | 67 (3.6) | 497 (3.7) | 23 (3.2) | 446 (5.5) | 10.9 (0.13) |
| Malta | 9 (0.2) | 527 (3.9) | 65 (0.4) | 517 (1.6) | 26 (0.4) | 483 (2.8) | 10.5 (0.01) |
| Chinese Taipei | 9 (2.0) | 609 (7.1) | 73 (3.3) | 601 (2.0) | 18 (2.7) | 588 (5.1) | 10.8 (0.13) |
| Canada | 9 (1.9) | 537 (7.7) | 59 (2.6) | 514 (1.8) | 32 (2.9) | 501 (6.8) | 10.2 (0.13) |
| Singapore | 9 (0.0) | 648 (12.8) | 70 (0.0) | 628 (4.5) | 21 (0.0) | 607 (7.6) | 10.6 (0.00) |
| Australia | 9 (1.9) | 556 (8.6) | 53 (3.2) | 521 (4.1) | 38 (3.4) | 496 (5.4) | 10.2 (0.17) |
| Georgia | 9 (2.7) | 499 (15.5) | 51 (4.3) | 483 (5.0) | 40 (4.2) | 476 (5.7) | 10.0 (0.16) |
| Cyprus | 8 (2.9) | 553 (8.4) | 47 (4.7) | 539 (3.7) | 45 (4.4) | 520 (5.1) | 10.0 (0.19) |
| Kosovo | 7 (2.5) | 473 (9.4) | 55 (4.2) | 447 (4.3) | 38 (3.8) | 436 (4.5) | 10.1 (0.13) |
| Sweden | 6 (2.2) | 543 (9.6) | 47 (4.5) | 535 (3.9) | 47 (4.6) | 503 (4.3) | 9.7 (0.19) |
| Albania | 6 (2.0) | 528 (17.2) | 62 (4.3) | 501 (4.2) | 32 (4.1) | 475 (6.4) | 10.2 (0.14) |
| Iran, Islamic Rep. of | 5 (1.6) | 481 (20.0) | 56 (3.3) | 451 (5.6) | 38 (3.3) | 426 (6.4) | 10.0 (0.14) |
| Denmark r | 5 (1.6) | 528 (6.7) | 60 (4.5) | 530 (3.2) | 35 (4.1) | 516 (3.8) | 10.1 (0.16) |
| Hong Kong SAR | 5 (2.4) | 628 (21.1) | 51 (4.5) | 607 (4.3) | 44 (3.9) | 592 (5.5) | 9.8 (0.19) |
| Bosnia and Herzegovina | 5 (1.9) | 447 (15.2) | 51 (4.0) | 458 (3.5) | 44 (3.5) | 444 (3.7) | 9.8 (0.13) |
| Chile | 5 (1.5) | 481 (16.1) | 39 (4.0) | 456 (5.5) | 56 (4.1) | 428 (3.7) | 8.9 (0.19) |
| Montenegro | 5 (0.2) | 464 (5.2) | 73 (0.6) | 454 (2.4) | 22 (0.5) | 448 (3.4) | 10.3 (0.01) |
| Spain | 5 (1.3) | 519 (6.2) | 67 (3.5) | 510 (3.2) | 28 (3.2) | 483 (6.4) | 10.1 (0.11) |
| Bulgaria | 4 (1.7) | 557 (15.7) | 53 (4.3) | 539 (3.7) | 43 (3.9) | 482 (8.9) | 9.7 (0.16) |
| Austria | 4 (1.4) | 546 (10.6) | 65 (3.5) | 547 (2.5) | 31 (3.1) | 521 (3.9) | 10.0 (0.10) |
| France | 4 (1.7) | 519 (13.1) | 56 (4.0) | 495 (3.5) | 40 (3.6) | 468 (5.2) | 9.9 (0.12) |
| South Africa (5) | 4 (1.2) | 464 (29.1) | 34 (3.3) | 395 (8.1) | 62 (3.5) | 359 (3.4) | 8.9 (0.15) |
| Finland | 4 (1.4) | 545 (9.6) | 53 (4.1) | 538 (3.2) | 44 (4.4) | 524 (3.7) | 9.9 (0.14) |
| Poland | 3 (1.7) | 536 (7.1) | 55 (4.0) | 527 (3.7) | 42 (4.3) | 509 (3.8) | 9.8 (0.14) |
| Turkey (5) | 3 (1.3) | 574 (10.7) | 43 (3.9) | 549 (7.7) | 53 (3.8) | 498 (5.4) | 9.2 (0.13) |
| Morocco | 3 (1.4) | 417 (25.5) | 34 (3.3) | 409 (10.2) | 63 (3.5) | 368 (6.0) | 8.9 (0.13) |
| Belgium (Flemish) | 2 (1.4) | ~ ~ | 52 (3.7) | 537 (2.7) | 45 (3.6) | 526 (3.4) | 9.5 (0.11) |
| Hungary | 2 (1.3) | ~ ~ | 32 (4.3) | 541 (6.2) | 66 (4.2) | 512 (4.0) | 8.9 (0.15) |
| Japan | 2 (1.2) | ~ ~ | 40 (3.9) | 600 (2.7) | 58 (4.1) | 587 (2.2) | 9.2 (0.14) |
| Czech Republic | 2 (2.0) | ~ ~ | 39 (4.3) | 550 (4.1) | 59 (4.5) | 521 (3.8) | 9.0 (0.15) |
| Armenia | 2 (1.2) | ~ ~ | 60 (4.3) | 498 (3.2) | 38 (4.0) | 497 (4.3) | 9.8 (0.12) |
| Italy | 2 (1.1) | ~ ~ | 42 (3.5) | 515 (3.9) | 56 (3.4) | 515 (3.3) | 9.3 (0.11) |
| Lithuania | 2 (1.0) | ~ ~ | 79 (3.0) | 545 (3.4) | 19 (2.8) | 527 (7.9) | 10.4 (0.12) |
| Germany | 2 (1.1) | ~ ~ | 57 (3.8) | 534 (2.7) | 42 (3.8) | 503 (4.7) | 9.6 (0.13) |
| North Macedonia | 1 (0.8) | ~ ~ | 54 (4.4) | 486 (6.0) | 45 (4.4) | 456 (9.5) | 9.3 (0.19) |
| Croatia | 1 (0.8) | ~ ~ | 68 (3.5) | 512 (2.8) | 30 (3.5) | 505 (4.1) | 10.0 (0.12) |
| Russian Federation | 1 (0.5) | ~ ~ | 54 (3.3) | 578 (4.8) | 46 (3.3) | 555 (3.5) | 9.5 (0.11) |
| Azerbaijan | 0 (0.5) | ~ ~ | 50 (3.6) | 515 (4.6) | 50 (3.5) | 516 (3.9) | 9.4 (0.12) |
| Portugal | 0 (0.3) | ~ ~ | 45 (3.7) | 537 (3.9) | 55 (3.7) | 516 (3.3) | 9.3 (0.12) |
| Latvia | 0 (0.0) | ~ ~ | 61 (4.0) | 552 (3.0) | 39 (4.0) | 537 (4.6) | 9.6 (0.08) |
| Netherlands s | 0 (0.0) | ~ ~ | 40 (5.7) | 546 (3.7) | 60 (5.7) | 531 (2.9) | 8.9 (0.13) |
| Norway (5) r | 0 (0.0) | ~ ~ | 57 (5.1) | 549 (3.5) | 43 (5.1) | 536 (3.6) | 9.7 (0.14) |
| Serbia | 0 (0.0) | ~ ~ | 59 (3.8) | 518 (3.7) | 41 (3.8) | 492 (5.8) | 9.6 (0.13) |
| Slovak Republic | 0 (0.0) | ~ ~ | 38 (3.6) | 528 (4.5) | 62 (3.6) | 499 (4.4) | 8.9 (0.12) |
| **International Average** | **7 (0.3)** | **515 (2.1)** | **55 (0.5)** | **508 (0.7)** | **37 (0.5)** | **486 (0.8)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 31 (0.3) | 564 (2.6) | 58 (0.3) | 541 (2.3) | 12 (0.1) | 507 (4.1) | 12.2 (0.01) |
| Abu Dhabi, UAE r | 16 (1.5) | 481 (8.1) | 46 (1.8) | 461 (3.2) | 38 (0.9) | 385 (3.7) | 10.3 (0.07) |
| Ontario, Canada | 8 (3.5) | 542 (15.2) | 52 (4.8) | 513 (3.5) | 40 (5.6) | 504 (10.9) | 9.8 (0.26) |
| Quebec, Canada | 8 (2.3) | 549 (9.2) | 68 (4.6) | 536 (2.4) | 24 (4.5) | 517 (5.0) | 10.5 (0.16) |
| Madrid, Spain | 7 (2.6) | 542 (5.6) | 64 (4.2) | 525 (2.6) | 29 (3.5) | 498 (4.7) | 10.4 (0.16) |
| Moscow City, Russian Fed. | 4 (1.8) | 592 (12.2) | 80 (3.9) | 594 (2.6) | 16 (3.5) | 587 (5.1) | 10.6 (0.12) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 7.3: School Emphasis on Academic Success – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Very High Emphasis | | High Emphasis | | Medium Emphasis | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | | 33 (4.1) | 599 (4.2) | 54 (4.4) | 585 (2.5) | 13 (3.0) | 571 (4.9) | 12.0 (0.20) |
| Bahrain | | 28 (2.3) | 507 (6.7) | 55 (3.0) | 494 (3.9) | 17 (2.3) | 461 (8.5) | 11.7 (0.13) |
| Qatar | | 25 (3.9) | 461 (10.3) | 63 (4.2) | 448 (4.7) | 13 (2.4) | 435 (10.3) | 11.8 (0.18) |
| Saudi Arabia | | 22 (3.0) | 434 (8.1) | 61 (3.8) | 399 (5.1) | 17 (2.5) | 375 (13.7) | 11.3 (0.15) |
| United Arab Emirates | | 22 (1.8) | 525 (4.2) | 54 (2.1) | 483 (2.6) | 25 (1.4) | 399 (3.8) | 11.2 (0.08) |
| Ireland | | 21 (3.4) | 539 (5.5) | 63 (3.7) | 532 (4.6) | 16 (3.0) | 501 (6.9) | 11.5 (0.17) |
| Kuwait | | 18 (3.6) | 437 (15.8) | 56 (3.9) | 391 (7.6) | 25 (3.6) | 363 (10.9) | 11.0 (0.22) |
| Northern Ireland | r | 15 (3.6) | 534 (8.3) | 68 (4.7) | 521 (3.1) | 17 (3.5) | 497 (5.6) | 11.1 (0.17) |
| Oman | | 15 (2.5) | 467 (12.6) | 69 (3.3) | 434 (5.4) | 15 (2.5) | 401 (6.7) | 11.1 (0.13) |
| Kazakhstan | | 14 (2.7) | 511 (13.8) | 71 (3.3) | 490 (3.9) | 15 (2.4) | 500 (11.6) | 11.2 (0.14) |
| England | s | 12 (3.1) | 583 (13.7) | 68 (5.6) | 536 (4.2) | 20 (4.9) | 515 (8.1) | 10.9 (0.19) |
| United States | | 11 (2.0) | 577 (6.8) | 51 (3.1) | 549 (4.3) | 38 (2.7) | 514 (4.4) | 10.1 (0.13) |
| Pakistan | | 11 (4.0) | 314 (32.1) | 52 (7.1) | 311 (18.2) | 37 (6.4) | 255 (14.5) | 10.2 (0.28) |
| Philippines | | 10 (2.4) | 259 (18.9) | 66 (3.7) | 255 (9.9) | 24 (3.4) | 229 (13.8) | 10.8 (0.15) |
| New Zealand | | 10 (2.4) | 530 (9.8) | 67 (3.6) | 512 (3.4) | 23 (3.2) | 464 (5.2) | 10.9 (0.13) |
| Malta | | 9 (0.2) | 518 (4.2) | 65 (0.4) | 505 (1.4) | 26 (0.4) | 464 (2.5) | 10.5 (0.01) |
| Chinese Taipei | | 9 (2.0) | 566 (6.7) | 73 (3.3) | 560 (2.0) | 18 (2.7) | 547 (5.1) | 10.8 (0.13) |
| Canada | | 9 (1.9) | 543 (6.0) | 59 (2.6) | 526 (1.8) | 32 (2.9) | 513 (5.2) | 10.2 (0.13) |
| Singapore | | 9 (0.0) | 617 (11.4) | 70 (0.0) | 598 (4.0) | 21 (0.0) | 575 (6.8) | 10.6 (0.00) |
| Australia | | 9 (1.9) | 568 (7.8) | 53 (3.2) | 537 (3.7) | 38 (3.4) | 516 (4.5) | 10.2 (0.17) |
| Georgia | | 9 (2.7) | 471 (15.9) | 51 (4.3) | 455 (5.4) | 40 (4.2) | 448 (5.3) | 10.0 (0.16) |
| Cyprus | | 8 (2.9) | 532 (10.7) | 47 (4.7) | 517 (3.5) | 45 (4.4) | 501 (4.7) | 10.0 (0.19) |
| Kosovo | | 7 (2.5) | 446 (13.7) | 55 (4.2) | 417 (5.2) | 38 (3.8) | 402 (5.0) | 10.1 (0.13) |
| Sweden | | 6 (2.2) | 563 (9.2) | 47 (4.5) | 552 (3.8) | 47 (4.6) | 517 (5.3) | 9.7 (0.19) |
| Albania | | 6 (2.0) | 515 (17.4) | 62 (4.3) | 498 (4.3) | 32 (4.1) | 468 (7.2) | 10.2 (0.14) |
| Iran, Islamic Rep. of | | 5 (1.6) | 476 (18.5) | 56 (3.3) | 451 (5.6) | 38 (3.3) | 420 (6.6) | 10.0 (0.14) |
| Denmark | r | 5 (1.6) | 519 (7.2) | 60 (4.5) | 527 (3.3) | 35 (4.1) | 515 (3.5) | 10.1 (0.16) |
| Hong Kong SAR | | 5 (2.4) | 567 (27.8) | 51 (4.5) | 539 (4.4) | 44 (3.9) | 519 (5.7) | 9.8 (0.19) |
| Bosnia and Herzegovina | | 5 (1.9) | 455 (14.2) | 51 (4.0) | 466 (4.0) | 44 (3.5) | 451 (4.1) | 9.8 (0.13) |
| Chile | | 5 (1.5) | 509 (14.5) | 39 (4.0) | 482 (5.0) | 56 (4.1) | 457 (3.4) | 8.9 (0.19) |
| Montenegro | | 5 (0.2) | 469 (8.5) | 73 (0.6) | 454 (2.9) | 22 (0.5) | 448 (4.0) | 10.3 (0.01) |
| Spain | | 5 (1.3) | 526 (5.4) | 67 (3.5) | 518 (2.8) | 28 (3.2) | 494 (5.8) | 10.1 (0.11) |
| Bulgaria | | 4 (1.7) | 575 (19.3) | 53 (4.3) | 554 (4.7) | 43 (3.9) | 476 (10.1) | 9.7 (0.16) |
| Austria | | 4 (1.4) | 534 (10.1) | 65 (3.5) | 534 (3.2) | 31 (3.1) | 495 (5.1) | 10.0 (0.10) |
| France | | 4 (1.7) | 524 (12.6) | 56 (4.0) | 498 (3.5) | 40 (3.6) | 470 (5.0) | 9.9 (0.12) |
| South Africa (5) | | 4 (1.2) | 443 (41.9) | 34 (3.3) | 352 (11.0) | 62 (3.5) | 305 (5.0) | 8.9 (0.15) |
| Finland | | 4 (1.4) | 570 (9.5) | 53 (4.1) | 561 (3.1) | 44 (4.4) | 546 (4.1) | 9.9 (0.14) |
| Poland | | 3 (1.7) | 546 (8.6) | 55 (4.0) | 538 (3.6) | 42 (4.3) | 521 (3.5) | 9.8 (0.14) |
| Turkey (5) | | 3 (1.3) | 567 (10.5) | 43 (3.9) | 550 (7.4) | 53 (3.8) | 505 (5.2) | 9.2 (0.13) |
| Morocco | | 3 (1.4) | 417 (28.0) | 34 (3.3) | 402 (11.1) | 63 (3.5) | 357 (6.9) | 8.9 (0.13) |
| Belgium (Flemish) | | 2 (1.4) | ~ ~ | 52 (3.7) | 505 (2.6) | 45 (3.6) | 495 (4.1) | 9.5 (0.11) |
| Hungary | | 2 (1.3) | ~ ~ | 32 (4.3) | 546 (5.8) | 66 (4.2) | 519 (4.0) | 8.9 (0.15) |
| Japan | | 2 (1.2) | ~ ~ | 40 (3.9) | 568 (2.7) | 58 (4.1) | 556 (2.2) | 9.2 (0.14) |
| Czech Republic | | 2 (2.0) | ~ ~ | 39 (4.3) | 548 (4.2) | 59 (4.5) | 523 (3.5) | 9.0 (0.15) |
| Armenia | | 2 (1.2) | ~ ~ | 60 (4.3) | 465 (4.2) | 38 (4.0) | 467 (5.0) | 9.8 (0.12) |
| Italy | | 2 (1.1) | ~ ~ | 42 (3.5) | 510 (4.8) | 56 (3.4) | 509 (3.3) | 9.3 (0.11) |
| Lithuania | | 2 (1.0) | ~ ~ | 79 (3.0) | 541 (3.2) | 19 (2.8) | 523 (7.2) | 10.4 (0.12) |
| Germany | | 2 (1.1) | ~ ~ | 57 (3.8) | 532 (2.6) | 42 (3.8) | 498 (4.7) | 9.6 (0.13) |
| North Macedonia | | 1 (0.8) | ~ ~ | 54 (4.4) | 443 (6.7) | 45 (4.4) | 408 (11.1) | 9.3 (0.19) |
| Croatia | | 1 (0.8) | ~ ~ | 68 (3.5) | 526 (2.6) | 30 (3.5) | 519 (3.7) | 10.0 (0.12) |
| Russian Federation | | 1 (0.5) | ~ ~ | 54 (3.3) | 576 (4.4) | 46 (3.3) | 557 (3.4) | 9.5 (0.11) |
| Azerbaijan | | 0 (0.5) | ~ ~ | 50 (3.6) | 428 (5.6) | 50 (3.5) | 426 (4.7) | 9.4 (0.12) |
| Portugal | | 0 (0.3) | ~ ~ | 45 (3.7) | 513 (3.3) | 55 (3.7) | 497 (3.0) | 9.3 (0.12) |
| Latvia | | 0 (0.0) | ~ ~ | 61 (4.0) | 548 (2.8) | 39 (4.0) | 532 (4.2) | 9.6 (0.08) |
| Netherlands | s | 0 (0.0) | ~ ~ | 40 (5.7) | 530 (4.8) | 60 (5.7) | 510 (3.4) | 8.9 (0.13) |
| Norway (5) | r | 0 (0.0) | ~ ~ | 57 (5.1) | 546 (3.7) | 43 (5.1) | 533 (3.5) | 9.7 (0.14) |
| Serbia | | 0 (0.0) | ~ ~ | 59 (3.8) | 527 (3.6) | 41 (3.8) | 501 (6.5) | 9.6 (0.13) |
| Slovak Republic | | 0 (0.0) | ~ ~ | 38 (3.6) | 541 (4.5) | 62 (3.6) | 509 (5.0) | 8.9 (0.12) |
| **International Average** | | **7 (0.3)** | **508 (2.4)** | **55 (0.5)** | **499 (0.7)** | **37 (0.5)** | **474 (0.9)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | r | 31 (0.3) | 567 (2.5) | 58 (0.3) | 542 (2.7) | 12 (0.1) | 508 (3.5) | 12.2 (0.01) |
| Abu Dhabi, UAE | r | 16 (1.5) | 476 (9.2) | 46 (1.8) | 444 (3.9) | 38 (0.9) | 347 (4.2) | 10.3 (0.07) |
| Ontario, Canada | | 8 (3.5) | 542 (11.0) | 52 (4.8) | 527 (3.3) | 40 (5.6) | 517 (7.9) | 9.8 (0.26) |
| Quebec, Canada | | 8 (2.3) | 530 (7.0) | 68 (4.6) | 527 (2.5) | 24 (4.5) | 506 (4.3) | 10.5 (0.16) |
| Madrid, Spain | | 7 (2.6) | 542 (4.9) | 64 (4.2) | 528 (2.3) | 29 (3.5) | 507 (4.3) | 10.4 (0.16) |
| Moscow City, Russian Fed. | | 4 (1.8) | 592 (11.9) | 80 (3.9) | 596 (2.5) | 16 (3.5) | 589 (5.3) | 10.6 (0.12) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 7.4: School Emphasis on Academic Success – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Very High Emphasis | | High Emphasis | | Medium Emphasis | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | | 26 (3.3) | 631 (4.7) | 56 (3.6) | 597 (3.6) | 19 (3.0) | 604 (7.5) | 11.8 (0.18) |
| United Arab Emirates | | 22 (1.8) | 519 (4.4) | 56 (2.0) | 474 (2.9) | 22 (1.3) | 416 (3.5) | 11.4 (0.08) |
| Singapore | | 18 (0.0) | 681 (6.5) | 52 (0.0) | 612 (6.0) | 30 (0.0) | 582 (7.5) | 10.9 (0.00) |
| England | s | 18 (3.6) | 602 (14.8) | 61 (4.9) | 504 (7.7) | 21 (3.8) | 500 (11.5) | 11.3 (0.16) |
| Australia | | 17 (2.8) | 587 (8.8) | 46 (3.5) | 525 (5.4) | 37 (3.0) | 480 (5.6) | 10.8 (0.16) |
| Ireland | | 16 (3.2) | 554 (5.6) | 58 (4.3) | 531 (3.1) | 26 (3.5) | 494 (5.0) | 11.2 (0.16) |
| Qatar | | 15 (2.8) | 502 (17.0) | 66 (3.8) | 438 (4.6) | 19 (2.9) | 414 (9.0) | 11.4 (0.14) |
| Bahrain | | 15 (0.2) | 493 (7.5) | 48 (0.2) | 490 (2.2) | 38 (0.2) | 465 (2.3) | 10.7 (0.01) |
| New Zealand | | 15 (3.4) | 535 (7.4) | 61 (5.0) | 487 (4.7) | 24 (4.1) | 456 (6.9) | 11.1 (0.18) |
| Saudi Arabia | | 15 (2.7) | 417 (5.3) | 61 (4.0) | 394 (3.3) | 24 (3.3) | 379 (6.3) | 11.2 (0.17) |
| Kazakhstan | | 10 (2.6) | 496 (18.3) | 70 (3.7) | 489 (4.4) | 20 (3.2) | 480 (7.0) | 11.1 (0.13) |
| United States | | 10 (2.0) | 559 (10.2) | 53 (3.1) | 539 (5.9) | 38 (3.1) | 482 (7.5) | 10.3 (0.14) |
| Chile | | 9 (1.5) | 482 (9.7) | 31 (3.9) | 472 (6.2) | 60 (4.0) | 418 (3.6) | 9.5 (0.17) |
| Chinese Taipei | | 9 (2.2) | 649 (12.1) | 56 (3.2) | 625 (3.6) | 36 (2.7) | 584 (5.2) | 10.4 (0.12) |
| Kuwait | | 8 (2.2) | 451 (16.6) | 53 (4.8) | 412 (5.8) | 39 (4.1) | 378 (6.4) | 10.3 (0.16) |
| Malaysia | | 8 (2.2) | 500 (16.5) | 52 (3.6) | 476 (5.1) | 39 (3.8) | 432 (5.1) | 10.5 (0.14) |
| Sweden | | 8 (2.4) | 543 (12.2) | 46 (4.0) | 513 (3.8) | 46 (3.9) | 486 (3.5) | 10.2 (0.14) |
| Oman | | 8 (1.8) | 453 (13.2) | 67 (3.4) | 415 (3.5) | 25 (3.1) | 385 (5.7) | 10.9 (0.12) |
| Cyprus | r | 7 (0.3) | 532 (8.4) | 58 (0.5) | 512 (2.5) | 35 (0.5) | 482 (2.8) | 10.4 (0.01) |
| Romania | | 7 (1.8) | 535 (21.4) | 46 (4.0) | 493 (7.1) | 47 (4.1) | 459 (5.4) | 10.1 (0.13) |
| Israel | | 6 (1.9) | 544 (23.0) | 63 (3.8) | 530 (6.1) | 31 (3.8) | 492 (11.1) | 10.5 (0.13) |
| Egypt | | 5 (1.8) | 431 (6.4) | 51 (4.5) | 427 (5.6) | 44 (4.3) | 396 (9.1) | 10.0 (0.14) |
| France | r | 5 (1.6) | 538 (17.9) | 46 (4.6) | 491 (4.4) | 49 (4.5) | 474 (3.9) | 9.8 (0.13) |
| Lebanon | | 5 (1.8) | 467 (14.1) | 51 (3.3) | 445 (3.9) | 44 (3.4) | 404 (4.6) | 10.1 (0.12) |
| Hong Kong SAR | | 5 (2.5) | 674 (19.2) | 46 (4.1) | 605 (6.6) | 50 (3.4) | 546 (7.2) | 9.9 (0.15) |
| Jordan | | 4 (1.6) | 472 (12.1) | 45 (4.3) | 436 (6.4) | 50 (4.3) | 402 (4.8) | 9.8 (0.14) |
| Turkey | | 4 (1.7) | 579 (29.7) | 40 (3.4) | 521 (7.8) | 56 (3.3) | 472 (5.6) | 9.7 (0.13) |
| Japan | | 3 (1.6) | 689 (34.0) | 45 (4.6) | 601 (3.9) | 51 (4.5) | 582 (2.6) | 9.7 (0.16) |
| Iran, Islamic Rep. of | | 3 (1.2) | 562 (29.3) | 44 (3.6) | 467 (5.0) | 53 (3.5) | 422 (4.5) | 9.6 (0.13) |
| Georgia | | 3 (1.3) | 475 (32.1) | 47 (4.1) | 472 (7.3) | 50 (4.0) | 451 (4.2) | 9.9 (0.12) |
| Finland | | 3 (1.3) | 526 (12.2) | 45 (4.1) | 516 (3.4) | 52 (4.3) | 502 (3.7) | 9.8 (0.11) |
| Norway (9) | r | 3 (1.3) | 539 (22.2) | 53 (5.1) | 510 (3.8) | 45 (5.0) | 496 (4.2) | 10.1 (0.13) |
| Hungary | | 2 (1.2) | ~ ~ | 28 (3.5) | 564 (8.0) | 70 (3.4) | 496 (4.0) | 9.3 (0.12) |
| South Africa (9) | | 2 (0.6) | ~ ~ | 29 (2.4) | 403 (5.8) | 69 (2.4) | 380 (2.5) | 8.9 (0.10) |
| Portugal | | 1 (0.8) | ~ ~ | 27 (3.5) | 525 (5.4) | 71 (3.7) | 489 (3.6) | 9.0 (0.13) |
| Morocco | | 1 (0.8) | ~ ~ | 23 (2.9) | 411 (6.4) | 76 (3.1) | 381 (2.8) | 8.5 (0.13) |
| Lithuania | | 1 (0.9) | ~ ~ | 65 (4.1) | 525 (3.8) | 34 (4.1) | 506 (5.6) | 10.3 (0.11) |
| Italy | | 0 (0.0) | ~ ~ | 38 (4.2) | 504 (4.6) | 62 (4.2) | 495 (3.3) | 9.3 (0.11) |
| Russian Federation | | 0 (0.0) | ~ ~ | 36 (3.8) | 562 (6.6) | 64 (3.8) | 533 (5.4) | 9.3 (0.09) |
| **International Average** | | **8 (0.3)** | **538 (3.0)** | **49 (0.6)** | **500 (0.8)** | **43 (0.6)** | **469 (0.9)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | r | 30 (0.5) | 562 (2.6) | 58 (0.5) | 533 (3.5) | 11 (0.2) | 479 (7.7) | 12.2 (0.02) |
| Abu Dhabi, UAE | r | 15 (1.8) | 489 (8.0) | 59 (1.9) | 444 (5.2) | 26 (0.9) | 377 (6.3) | 11.0 (0.09) |
| Quebec, Canada | | 7 (2.6) | 598 (18.1) | 64 (4.6) | 553 (4.3) | 29 (4.4) | 520 (7.0) | 10.6 (0.17) |
| Ontario, Canada | r | 6 (2.2) | 563 (8.3) | 56 (4.6) | 540 (7.1) | 38 (4.5) | 506 (6.6) | 10.2 (0.19) |
| Western Cape, RSA (9) | | 5 (1.9) | 564 (14.8) | 25 (3.0) | 492 (11.6) | 70 (3.1) | 414 (4.8) | 9.0 (0.15) |
| Gauteng, RSA (9) | | 5 (2.0) | 449 (26.9) | 32 (3.6) | 437 (7.2) | 62 (3.7) | 409 (4.4) | 9.2 (0.16) |
| Moscow City, Russian Fed. | | 2 (1.1) | ~ ~ | 59 (4.3) | 579 (5.8) | 39 (4.1) | 571 (5.9) | 10.1 (0.10) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 7.5: School Emphasis on Academic Success – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | Very High Emphasis | | High Emphasis | | Medium Emphasis | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Korea, Rep. of | 26 (3.3) | 578 (4.0) | 56 (3.6) | 553 (2.8) | 19 (3.0) | 561 (5.5) | 11.8 (0.18) |
| United Arab Emirates | 22 (1.8) | 526 (5.0) | 56 (2.0) | 477 (3.5) | 22 (1.3) | 401 (4.5) | 11.4 (0.08) |
| Singapore | 18 (0.0) | 671 (6.7) | 52 (0.0) | 604 (5.7) | 30 (0.0) | 576 (7.5) | 10.9 (0.00) |
| England s | 18 (3.6) | 600 (13.3) | 61 (4.9) | 506 (7.5) | 21 (3.8) | 503 (11.0) | 11.3 (0.16) |
| Australia | 17 (2.8) | 581 (8.7) | 46 (3.5) | 537 (4.5) | 37 (3.0) | 497 (5.0) | 10.8 (0.16) |
| Ireland | 16 (3.2) | 556 (6.5) | 58 (4.3) | 531 (3.4) | 26 (3.5) | 492 (6.3) | 11.2 (0.16) |
| Qatar | 15 (2.8) | 524 (17.5) | 66 (3.8) | 471 (4.7) | 19 (2.9) | 448 (8.0) | 11.4 (0.14) |
| Bahrain | 15 (0.2) | 541 (7.1) | 48 (0.2) | 498 (2.1) | 38 (0.2) | 449 (2.5) | 10.7 (0.01) |
| New Zealand | 15 (3.4) | 549 (6.3) | 61 (5.0) | 504 (4.8) | 24 (4.1) | 474 (7.9) | 11.1 (0.18) |
| Saudi Arabia | 15 (2.7) | 462 (6.3) | 61 (4.0) | 433 (3.9) | 24 (3.3) | 410 (7.2) | 11.2 (0.17) |
| Kazakhstan | 10 (2.6) | 483 (17.8) | 70 (3.7) | 478 (4.2) | 20 (3.2) | 475 (8.3) | 11.1 (0.13) |
| United States | 10 (2.0) | 560 (9.5) | 53 (3.1) | 545 (5.1) | 38 (3.1) | 492 (8.1) | 10.3 (0.14) |
| Chile | 9 (1.5) | 507 (8.5) | 31 (3.9) | 491 (5.8) | 60 (4.0) | 441 (3.5) | 9.5 (0.17) |
| Chinese Taipei | 9 (2.2) | 600 (9.0) | 56 (3.2) | 583 (2.6) | 36 (2.7) | 554 (4.0) | 10.4 (0.12) |
| Kuwait | 8 (2.2) | 506 (10.9) | 53 (4.8) | 455 (6.0) | 39 (4.1) | 414 (7.4) | 10.3 (0.16) |
| Malaysia | 8 (2.2) | 511 (13.6) | 52 (3.6) | 474 (5.4) | 39 (3.8) | 431 (4.9) | 10.5 (0.14) |
| Sweden | 8 (2.4) | 570 (14.1) | 46 (4.0) | 536 (4.7) | 46 (3.9) | 500 (4.5) | 10.2 (0.14) |
| Oman | 8 (1.8) | 494 (13.8) | 67 (3.4) | 462 (3.7) | 25 (3.1) | 432 (6.7) | 10.9 (0.12) |
| Cyprus r | 7 (0.3) | 505 (9.8) | 58 (0.5) | 494 (3.0) | 35 (0.5) | 465 (3.2) | 10.4 (0.01) |
| Romania | 7 (1.8) | 515 (19.7) | 46 (4.0) | 483 (6.4) | 47 (4.1) | 452 (4.9) | 10.1 (0.13) |
| Israel | 6 (1.9) | 542 (19.7) | 63 (3.8) | 525 (5.6) | 31 (3.8) | 484 (10.4) | 10.5 (0.13) |
| Egypt | 5 (1.8) | 417 (12.4) | 51 (4.5) | 407 (5.9) | 44 (4.3) | 367 (10.0) | 10.0 (0.14) |
| France r | 5 (1.6) | 543 (17.2) | 46 (4.6) | 499 (4.9) | 49 (4.5) | 477 (4.4) | 9.8 (0.13) |
| Lebanon | 5 (1.8) | 420 (13.9) | 51 (3.3) | 405 (5.6) | 44 (3.4) | 336 (8.1) | 10.1 (0.12) |
| Hong Kong SAR | 5 (2.5) | 620 (13.1) | 46 (4.1) | 522 (8.3) | 50 (3.4) | 477 (8.0) | 9.9 (0.15) |
| Jordan | 4 (1.6) | 513 (13.5) | 45 (4.3) | 469 (6.9) | 50 (4.3) | 431 (5.9) | 9.8 (0.14) |
| Turkey | 4 (1.7) | 580 (25.8) | 40 (3.4) | 537 (6.8) | 56 (3.3) | 495 (5.0) | 9.7 (0.13) |
| Japan | 3 (1.6) | 642 (23.6) | 45 (4.6) | 574 (2.9) | 51 (4.5) | 561 (2.0) | 9.7 (0.16) |
| Iran, Islamic Rep. of | 3 (1.2) | 558 (25.5) | 44 (3.6) | 470 (4.6) | 53 (3.5) | 426 (4.4) | 9.6 (0.13) |
| Georgia | 3 (1.3) | 453 (25.5) | 47 (4.1) | 451 (6.3) | 50 (4.0) | 442 (4.1) | 9.9 (0.12) |
| Finland | 3 (1.3) | 561 (13.9) | 45 (4.1) | 550 (4.1) | 52 (4.3) | 535 (4.6) | 9.8 (0.11) |
| Norway (9) r | 3 (1.3) | 533 (21.9) | 53 (5.1) | 502 (4.6) | 45 (5.0) | 489 (5.3) | 10.1 (0.13) |
| Hungary | 2 (1.2) | ~ ~ | 28 (3.5) | 570 (6.6) | 70 (3.4) | 513 (3.8) | 9.3 (0.12) |
| South Africa (9) | 2 (0.6) | ~ ~ | 29 (2.4) | 388 (7.9) | 69 (2.4) | 358 (3.4) | 8.9 (0.10) |
| Portugal | 1 (0.8) | ~ ~ | 27 (3.5) | 539 (4.8) | 71 (3.7) | 510 (3.2) | 9.0 (0.13) |
| Morocco | 1 (0.8) | ~ ~ | 23 (2.9) | 417 (7.0) | 76 (3.1) | 388 (3.6) | 8.5 (0.13) |
| Lithuania | 1 (0.9) | ~ ~ | 65 (4.1) | 537 (3.6) | 34 (4.1) | 521 (5.2) | 10.3 (0.11) |
| Italy | 0 (0.0) | ~ ~ | 38 (4.2) | 508 (4.1) | 62 (4.2) | 498 (3.4) | 9.3 (0.11) |
| Russian Federation | 0 (0.0) | ~ ~ | 36 (3.8) | 557 (5.6) | 64 (3.8) | 535 (5.2) | 9.3 (0.09) |
| **International Average** | **8 (0.3)** | **538 (2.6)** | **49 (0.6)** | **501 (0.8)** | **43 (0.6)** | **470 (1.0)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 30 (0.5) | 571 (2.8) | 58 (0.5) | 545 (3.1) | 11 (0.2) | 488 (9.2) | 12.2 (0.02) |
| Abu Dhabi, UAE r | 15 (1.8) | 491 (9.6) | 59 (1.9) | 434 (6.7) | 26 (0.9) | 334 (7.8) | 11.0 (0.09) |
| Quebec, Canada | 7 (2.6) | 580 (17.1) | 64 (4.6) | 548 (4.2) | 29 (4.4) | 514 (6.9) | 10.6 (0.17) |
| Ontario, Canada r | 6 (2.2) | 550 (9.9) | 56 (4.6) | 529 (4.3) | 38 (4.5) | 505 (5.1) | 10.2 (0.19) |
| Western Cape, RSA (9) | 5 (1.9) | 590 (17.0) | 25 (3.0) | 503 (14.2) | 70 (3.1) | 405 (5.6) | 9.0 (0.15) |
| Gauteng, RSA (9) | 5 (2.0) | 460 (33.6) | 32 (3.6) | 444 (9.2) | 62 (3.7) | 407 (5.6) | 9.2 (0.16) |
| Moscow City, Russian Fed. | 2 (1.1) | ~ ~ | 59 (4.3) | 570 (3.9) | 39 (4.1) | 562 (4.4) | 10.1 (0.10) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Parents' Perceptions of the School

The TIMSS 2019 Early Learning Survey (or "Home Questionnaire") asked the parents of fourth grade students about the extent to which they are satisfied that their child's school promotes academic standards and fosters a positive school climate. Students were categorized on the *Parents' Perceptions of Their Child's School* scale according to their parents' responses to eight items listed in Exhibit 7.6 (see About the Scale).

Exhibit 7.7 presents the results for the *Parents' Perceptions of Their Child's School* in relationship to students' mathematics achievement. Overall, parents reported positive perceptions about their child's school. On average across countries, the majority of fourth grade students (64%) had parents who reported being "very satisfied," but these percentages ranged from 90 percent in Albania to 15 percent in Korea and 9 percent in Japan. On average, 31 percent of students attended schools with which their parents were "somewhat satisfied." Only 5 percent of students on average had parents who were "less than satisfied" with their child's school. Average mathematics achievement was similar across the three categories of the scale, with students in the "very satisfied" category having only slightly higher achievement than students in the "somewhat satisfied" and "less than satisfied" categories (504 vs. 497 and 495, respectively).

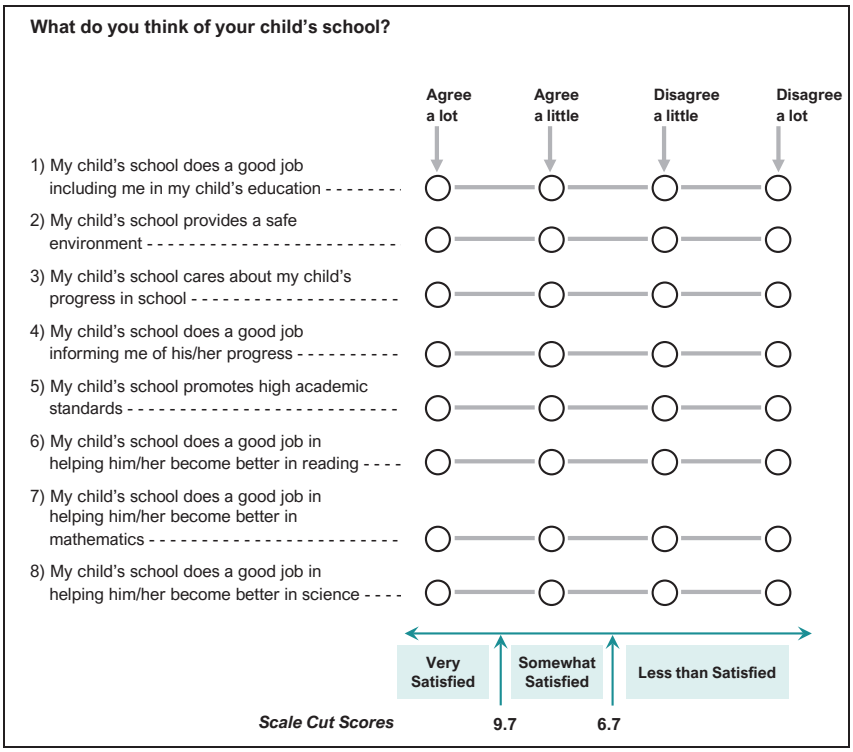
Exhibit 7.8 shows the same results for fourth grade students, but in relationship to science achievement. On average, students had very similar science achievement across the three scale categories (493, 487, and 491, respectively).

## Exhibit 7.6: Parents' Perceptions of Their Child's School

*Students' Results based on Parents' Reports*

### About the Scale

Students were scored according to their parents' responses to eight statements on the *Parents' Perceptions of Their Child's School* scale. Cut scores divide the scale into three categories. Students whose parents are **Very Satisfied** with their child's school had a score at or above the cut score corresponding to their parents "agreeing a lot" with four of the eight statements and "agreeing a little" with the other four, on average. Students whose parents are **Less than Satisfied** had a score at or below the cut score corresponding to their parents "disagreeing a little" with four of the eight statements and "agreeing a little" with the other four, on average. All other students had parents who are **Somewhat Satisfied**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 7.7: Parents' Perceptions of Their Child's School

*Students' Results based on Parents' Reports*

| Country | | Very Satisfied | | Somewhat Satisfied | | Less than Satisfied | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | | 90 (0.8) | 497 (3.4) | 9 (0.7) | 484 (8.6) | 2 (0.4) | ~ ~ | 11.5 (0.05) |
| Armenia | | 88 (1.0) | 500 (2.6) | 11 (0.9) | 486 (5.5) | 1 (0.1) | ~ ~ | 11.5 (0.05) |
| Kazakhstan | | 87 (1.0) | 513 (2.6) | 12 (0.9) | 514 (5.0) | 1 (0.2) | ~ ~ | 11.5 (0.05) |
| Malta | r | 85 (0.7) | 516 (1.7) | 14 (0.7) | 515 (3.5) | 1 (0.2) | ~ ~ | 11.2 (0.03) |
| Kosovo | | 84 (0.8) | 448 (3.0) | 14 (0.6) | 440 (5.2) | 2 (0.3) | ~ ~ | 11.1 (0.04) |
| Saudi Arabia | | 80 (0.9) | 404 (3.7) | 17 (0.7) | 390 (6.1) | 3 (0.3) | 393 (10.8) | 11.0 (0.05) |
| Northern Ireland | s | 79 (1.2) | 590 (3.9) | 19 (1.1) | 566 (5.5) | 2 (0.3) | ~ ~ | 11.0 (0.06) |
| Georgia | | 79 (1.1) | 482 (3.8) | 19 (1.0) | 490 (4.8) | 2 (0.2) | ~ ~ | 10.9 (0.05) |
| North Macedonia | | 79 (1.1) | 473 (5.9) | 18 (0.9) | 482 (7.7) | 3 (0.5) | 473 (10.9) | 10.8 (0.05) |
| Azerbaijan | | 78 (1.1) | 524 (2.8) | 19 (1.0) | 514 (4.3) | 3 (0.3) | 514 (8.0) | 10.9 (0.06) |
| Bulgaria | | 78 (1.4) | 513 (4.0) | 19 (1.1) | 529 (7.0) | 4 (0.4) | 526 (15.3) | 10.9 (0.07) |
| Montenegro | | 77 (0.8) | 455 (2.2) | 20 (0.8) | 454 (3.4) | 3 (0.3) | 455 (10.3) | 10.9 (0.03) |
| Ireland | | 77 (1.1) | 552 (2.4) | 21 (1.0) | 552 (4.4) | 2 (0.4) | ~ ~ | 10.8 (0.05) |
| Turkey (5) | | 77 (1.7) | 522 (4.8) | 20 (1.5) | 523 (7.6) | 3 (0.4) | 551 (14.1) | 10.9 (0.08) |
| Oman | | 76 (1.0) | 442 (4.1) | 21 (0.8) | 407 (4.7) | 3 (0.3) | 370 (8.3) | 10.8 (0.05) |
| South Africa (5) | r | 76 (0.9) | 384 (3.7) | 21 (0.7) | 353 (4.3) | 3 (0.3) | 336 (9.7) | 10.8 (0.04) |
| Bosnia and Herzegovina | | 76 (1.2) | 452 (2.5) | 21 (1.0) | 453 (3.8) | 3 (0.3) | 449 (8.7) | 10.8 (0.06) |
| Pakistan | r | 76 (2.7) | 340 (13.9) | 22 (2.6) | 301 (12.3) | 2 (0.5) | ~ ~ | 10.9 (0.10) |
| Philippines | | 75 (1.3) | 308 (6.5) | 23 (1.2) | 271 (7.1) | 2 (0.2) | ~ ~ | 10.9 (0.06) |
| Serbia | | 75 (1.3) | 506 (3.6) | 22 (1.1) | 520 (3.9) | 3 (0.4) | 521 (8.4) | 10.8 (0.06) |
| Qatar | r | 72 (1.4) | 457 (3.4) | 24 (1.2) | 446 (5.6) | 4 (0.5) | 417 (12.3) | 10.7 (0.07) |
| Morocco | | 72 (1.7) | 392 (4.5) | 25 (1.5) | 367 (6.9) | 4 (0.5) | 351 (14.5) | 10.5 (0.07) |
| Portugal | | 71 (1.1) | 531 (2.8) | 25 (1.0) | 519 (3.0) | 4 (0.4) | 519 (7.0) | 10.5 (0.05) |
| Iran, Islamic Rep. of | | 70 (1.4) | 447 (4.3) | 26 (1.2) | 439 (5.8) | 4 (0.4) | 420 (10.1) | 10.4 (0.06) |
| Italy | | 68 (1.4) | 518 (2.7) | 28 (1.3) | 512 (3.1) | 4 (0.4) | 513 (8.0) | 10.4 (0.06) |
| Spain | | 68 (1.3) | 508 (3.0) | 27 (1.0) | 509 (2.6) | 5 (0.5) | 482 (6.7) | 10.4 (0.06) |
| Lithuania | r | 67 (1.3) | 546 (3.3) | 29 (1.1) | 536 (4.0) | 4 (0.5) | 543 (8.3) | 10.3 (0.06) |
| Cyprus | | 67 (1.4) | 537 (3.1) | 29 (1.1) | 533 (3.0) | 5 (0.5) | 519 (9.2) | 10.3 (0.06) |
| Bahrain | | 64 (1.1) | 486 (3.0) | 31 (0.9) | 474 (3.1) | 5 (0.5) | 462 (6.7) | 10.3 (0.05) |
| Singapore | | 63 (0.8) | 632 (4.1) | 33 (0.7) | 620 (4.0) | 4 (0.3) | 592 (7.1) | 10.3 (0.03) |
| Kuwait | r | 63 (1.2) | 397 (5.2) | 30 (1.0) | 378 (6.0) | 8 (0.5) | 342 (8.7) | 10.2 (0.05) |
| Slovak Republic | | 61 (1.1) | 510 (4.3) | 34 (0.9) | 513 (3.5) | 5 (0.4) | 519 (5.8) | 10.2 (0.05) |
| Austria | | 60 (1.4) | 545 (2.5) | 34 (1.1) | 539 (2.8) | 6 (0.5) | 520 (5.7) | 10.0 (0.06) |
| Hungary | | 58 (1.4) | 525 (3.1) | 35 (1.1) | 528 (3.5) | 6 (0.5) | 519 (5.9) | 10.0 (0.06) |
| Canada | s | 58 (0.9) | 525 (2.7) | 36 (0.8) | 524 (2.3) | 6 (0.4) | 503 (5.7) | 10.1 (0.04) |
| Finland | | 55 (1.3) | 539 (2.8) | 41 (1.2) | 533 (2.7) | 4 (0.4) | 511 (8.3) | 9.9 (0.05) |
| Hong Kong SAR | | 54 (1.2) | 610 (3.7) | 40 (1.2) | 599 (3.7) | 5 (0.6) | 579 (6.4) | 9.9 (0.05) |
| Russian Federation | | 52 (1.4) | 566 (4.1) | 42 (1.2) | 571 (3.2) | 6 (0.6) | 555 (5.3) | 9.7 (0.06) |
| Denmark | s | 51 (1.6) | 544 (2.9) | 37 (1.3) | 538 (3.8) | 12 (1.0) | 522 (5.7) | 9.5 (0.08) |
| Belgium (Flemish) | | 50 (1.1) | 536 (2.6) | 46 (1.0) | 533 (2.2) | 4 (0.4) | 519 (6.4) | 9.7 (0.04) |
| Latvia | | 48 (1.1) | 548 (3.2) | 44 (0.9) | 548 (2.7) | 7 (0.6) | 535 (5.0) | 9.6 (0.05) |
| Chinese Taipei | | 46 (1.2) | 598 (2.2) | 48 (1.1) | 600 (2.5) | 6 (0.5) | 603 (5.3) | 9.6 (0.05) |
| Germany | s | 45 (1.6) | 539 (3.2) | 45 (1.4) | 531 (2.9) | 11 (0.9) | 514 (5.3) | 9.3 (0.07) |
| Sweden | r | 44 (1.7) | 530 (4.0) | 48 (1.5) | 528 (2.8) | 8 (0.8) | 511 (5.2) | 9.4 (0.07) |
| Chile | | 44 (1.5) | 444 (3.3) | 49 (1.2) | 442 (3.2) | 8 (0.7) | 436 (6.7) | 9.4 (0.07) |
| Croatia | | 43 (1.1) | 512 (2.9) | 50 (1.0) | 508 (2.4) | 7 (0.5) | 514 (6.2) | 9.5 (0.05) |
| Poland | | 42 (1.3) | 520 (4.1) | 52 (1.1) | 523 (2.4) | 6 (0.5) | 524 (5.1) | 9.5 (0.06) |
| France | | 37 (1.1) | 493 (4.1) | 55 (1.1) | 487 (3.3) | 8 (0.7) | 472 (6.4) | 9.1 (0.05) |
| Czech Republic | r | 36 (1.9) | 541 (3.9) | 51 (1.5) | 541 (2.8) | 13 (1.0) | 542 (4.0) | 9.0 (0.09) |
| Korea, Rep. of | | 15 (0.9) | 603 (4.3) | 70 (0.9) | 600 (2.4) | 14 (0.7) | 599 (3.3) | 8.2 (0.04) |
| Japan | | 9 (0.8) | 598 (5.2) | 68 (0.9) | 595 (1.7) | 24 (0.9) | 590 (2.8) | 7.8 (0.04) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| Norway (5) | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| United Arab Emirates | x | 71 (0.7) | 507 (2.3) | 25 (0.5) | 491 (3.3) | 5 (0.3) | 472 (5.5) | 10.6 (0.03) |
| New Zealand | x | 64 (1.7) | 513 (3.9) | 31 (1.5) | 511 (4.3) | 5 (0.6) | 490 (10.3) | 10.3 (0.07) |
| **International Average** | | **64 (0.2)** | **504 (0.6)** | **31 (0.2)** | **497 (0.6)** | **5 (0.1)** | **495 (1.2)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | s | 69 (1.2) | 563 (2.2) | 26 (1.2) | 546 (3.6) | 5 (0.3) | 531 (7.0) | 10.5 (0.05) |
| Madrid, Spain | | 66 (1.3) | 523 (2.7) | 28 (1.2) | 519 (3.1) | 6 (0.6) | 505 (7.0) | 10.3 (0.05) |
| Ontario, Canada | s | 57 (1.5) | 528 (5.4) | 35 (1.3) | 523 (3.6) | 8 (0.7) | 499 (8.3) | 9.9 (0.07) |
| Quebec, Canada | r | 51 (1.3) | 540 (3.1) | 45 (1.3) | 537 (3.2) | 4 (0.5) | 528 (5.8) | 9.8 (0.05) |
| Moscow City, Russian Fed. | | 38 (1.3) | 589 (3.0) | 49 (1.1) | 597 (2.3) | 13 (0.8) | 588 (3.5) | 9.1 (0.06) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 7.8: Parents' Perceptions of Their Child's School

*Students' Results based on Parents' Reports*

| Country | | Very Satisfied | | Somewhat Satisfied | | Less than Satisfied | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | | 90 (0.8) | 492 (3.7) | 9 (0.7) | 480 (7.9) | 2 (0.4) | ~ ~ | 11.5 (0.05) |
| Armenia | | 88 (1.0) | 468 (3.6) | 11 (0.9) | 457 (5.7) | 1 (0.1) | ~ ~ | 11.5 (0.05) |
| Kazakhstan | | 87 (1.0) | 494 (3.2) | 12 (0.9) | 503 (5.9) | 1 (0.2) | ~ ~ | 11.5 (0.05) |
| Malta | r | 85 (0.7) | 501 (1.8) | 14 (0.7) | 509 (4.4) | 1 (0.2) | ~ ~ | 11.2 (0.03) |
| Kosovo | | 84 (0.8) | 415 (4.0) | 14 (0.6) | 413 (5.7) | 2 (0.3) | ~ ~ | 11.1 (0.04) |
| Saudi Arabia | | 80 (0.9) | 410 (4.6) | 17 (0.7) | 388 (6.8) | 3 (0.3) | 388 (10.9) | 11.0 (0.05) |
| Northern Ireland | s | 79 (1.2) | 535 (2.9) | 19 (1.1) | 517 (5.1) | 2 (0.3) | ~ ~ | 11.0 (0.06) |
| Georgia | | 79 (1.1) | 454 (4.2) | 19 (1.0) | 465 (5.3) | 2 (0.2) | ~ ~ | 10.9 (0.05) |
| North Macedonia | | 79 (1.1) | 427 (7.0) | 18 (0.9) | 439 (8.6) | 3 (0.5) | 418 (12.6) | 10.8 (0.05) |
| Azerbaijan | | 78 (1.1) | 436 (3.3) | 19 (1.0) | 429 (5.2) | 3 (0.3) | 434 (10.3) | 10.9 (0.06) |
| Bulgaria | | 78 (1.4) | 518 (4.7) | 19 (1.1) | 541 (8.1) | 4 (0.4) | 544 (19.1) | 10.9 (0.07) |
| Montenegro | | 77 (0.8) | 456 (2.9) | 20 (0.8) | 456 (3.5) | 3 (0.3) | 464 (10.3) | 10.9 (0.03) |
| Ireland | | 77 (1.1) | 531 (2.8) | 21 (1.0) | 532 (5.0) | 2 (0.4) | ~ ~ | 10.8 (0.05) |
| Turkey (5) | | 77 (1.7) | 524 (4.7) | 20 (1.5) | 529 (7.0) | 3 (0.4) | 551 (9.7) | 10.9 (0.08) |
| Oman | | 76 (1.0) | 447 (4.4) | 21 (0.8) | 411 (6.0) | 3 (0.3) | 363 (12.0) | 10.8 (0.05) |
| South Africa (5) | r | 76 (0.9) | 336 (5.0) | 21 (0.7) | 297 (6.2) | 3 (0.3) | 284 (12.4) | 10.8 (0.04) |
| Bosnia and Herzegovina | | 76 (1.2) | 458 (3.2) | 21 (1.0) | 461 (3.8) | 3 (0.3) | 460 (8.3) | 10.8 (0.06) |
| Pakistan | r | 76 (2.7) | 304 (14.8) | 22 (2.6) | 260 (12.8) | 2 (0.5) | ~ ~ | 10.9 (0.10) |
| Philippines | | 75 (1.3) | 261 (7.8) | 23 (1.2) | 218 (9.0) | 2 (0.2) | ~ ~ | 10.9 (0.06) |
| Serbia | | 75 (1.3) | 515 (4.0) | 22 (1.1) | 529 (3.9) | 3 (0.4) | 533 (8.6) | 10.8 (0.06) |
| Qatar | r | 72 (1.4) | 462 (4.1) | 24 (1.2) | 441 (6.0) | 4 (0.5) | 413 (12.7) | 10.7 (0.07) |
| Morocco | | 72 (1.7) | 385 (5.9) | 25 (1.5) | 352 (9.4) | 4 (0.5) | 345 (17.9) | 10.5 (0.07) |
| Portugal | | 71 (1.1) | 507 (2.4) | 25 (1.0) | 503 (3.2) | 4 (0.4) | 487 (8.5) | 10.5 (0.05) |
| Iran, Islamic Rep. of | | 70 (1.4) | 443 (4.4) | 26 (1.2) | 439 (5.7) | 4 (0.4) | 426 (10.5) | 10.4 (0.06) |
| Italy | | 68 (1.4) | 514 (3.0) | 28 (1.3) | 507 (3.9) | 4 (0.4) | 506 (7.0) | 10.4 (0.06) |
| Spain | | 68 (1.3) | 516 (2.6) | 27 (1.0) | 516 (2.8) | 5 (0.5) | 497 (6.2) | 10.4 (0.06) |
| Lithuania | r | 67 (1.3) | 541 (3.3) | 29 (1.1) | 533 (4.2) | 4 (0.5) | 535 (8.1) | 10.3 (0.06) |
| Cyprus | | 67 (1.4) | 515 (3.5) | 29 (1.1) | 513 (3.4) | 5 (0.5) | 504 (7.3) | 10.3 (0.06) |
| Bahrain | | 64 (1.1) | 506 (3.4) | 31 (0.9) | 483 (4.3) | 5 (0.5) | 458 (8.4) | 10.3 (0.05) |
| Singapore | | 63 (0.8) | 600 (3.5) | 33 (0.7) | 591 (3.7) | 4 (0.3) | 569 (7.0) | 10.3 (0.03) |
| Kuwait | r | 63 (1.2) | 410 (6.3) | 30 (1.0) | 390 (7.3) | 8 (0.5) | 349 (10.1) | 10.2 (0.05) |
| Slovak Republic | | 61 (1.1) | 516 (4.7) | 34 (0.9) | 530 (3.2) | 5 (0.4) | 543 (7.0) | 10.2 (0.05) |
| Austria | | 60 (1.4) | 526 (3.3) | 34 (1.1) | 527 (3.2) | 6 (0.5) | 513 (5.0) | 10.0 (0.06) |
| Hungary | | 58 (1.4) | 530 (3.3) | 35 (1.1) | 534 (3.0) | 6 (0.5) | 530 (5.8) | 10.0 (0.06) |
| Canada | s | 58 (0.9) | 533 (2.7) | 36 (0.8) | 532 (2.1) | 6 (0.4) | 528 (5.1) | 10.1 (0.04) |
| Finland | | 55 (1.3) | 560 (2.9) | 41 (1.2) | 557 (3.1) | 4 (0.4) | 537 (7.6) | 9.9 (0.05) |
| Hong Kong SAR | | 54 (1.2) | 540 (3.4) | 40 (1.2) | 524 (3.6) | 5 (0.6) | 514 (7.3) | 9.9 (0.05) |
| Russian Federation | | 52 (1.4) | 566 (3.6) | 42 (1.2) | 571 (3.3) | 6 (0.6) | 558 (4.6) | 9.7 (0.06) |
| Denmark | s | 51 (1.6) | 537 (3.2) | 37 (1.3) | 534 (3.7) | 12 (1.0) | 523 (5.9) | 9.5 (0.08) |
| Belgium (Flemish) | | 50 (1.1) | 502 (2.6) | 46 (1.0) | 504 (2.7) | 4 (0.4) | 494 (6.1) | 9.7 (0.04) |
| Latvia | | 48 (1.1) | 543 (3.2) | 44 (0.9) | 544 (2.3) | 7 (0.6) | 531 (4.7) | 9.6 (0.05) |
| Chinese Taipei | | 46 (1.2) | 554 (2.1) | 48 (1.1) | 562 (2.4) | 6 (0.5) | 564 (5.2) | 9.6 (0.05) |
| Germany | s | 45 (1.6) | 535 (3.6) | 45 (1.4) | 530 (2.9) | 11 (0.9) | 526 (5.3) | 9.3 (0.07) |
| Sweden | r | 44 (1.7) | 542 (4.2) | 48 (1.5) | 544 (3.5) | 8 (0.8) | 534 (6.6) | 9.4 (0.07) |
| Chile | | 44 (1.5) | 470 (3.2) | 49 (1.2) | 470 (3.0) | 8 (0.7) | 470 (6.7) | 9.4 (0.07) |
| Croatia | | 43 (1.1) | 525 (2.8) | 50 (1.0) | 524 (2.5) | 7 (0.5) | 528 (5.8) | 9.5 (0.05) |
| Poland | | 42 (1.3) | 528 (4.0) | 52 (1.1) | 535 (2.4) | 6 (0.5) | 539 (5.5) | 9.5 (0.06) |
| France | | 37 (1.1) | 491 (4.1) | 55 (1.1) | 491 (3.6) | 8 (0.7) | 480 (6.4) | 9.1 (0.05) |
| Czech Republic | r | 36 (1.9) | 538 (3.7) | 51 (1.5) | 543 (2.7) | 13 (1.0) | 540 (4.9) | 9.0 (0.09) |
| Korea, Rep. of | | 15 (0.9) | 587 (4.0) | 70 (0.9) | 588 (2.3) | 14 (0.7) | 590 (3.9) | 8.2 (0.04) |
| Japan | | 9 (0.8) | 571 (5.0) | 68 (0.9) | 564 (1.8) | 24 (0.9) | 557 (2.6) | 7.8 (0.04) |
| Australia | | - - | - - | - - | - - | - - | - - | - - |
| England | | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | | - - | - - | - - | - - | - - | - - | - - |
| Norway (5) | | - - | - - | - - | - - | - - | - - | - - |
| United States | | - - | - - | - - | - - | - - | - - | - - |
| United Arab Emirates | x | 71 (0.7) | 505 (2.7) | 25 (0.5) | 485 (3.6) | 5 (0.3) | 465 (6.4) | 10.6 (0.03) |
| New Zealand | x | 64 (1.7) | 527 (3.7) | 31 (1.5) | 525 (4.0) | 5 (0.6) | 516 (8.3) | 10.3 (0.07) |
| **International Average** | | **64 (0.2)** | **493 (0.6)** | **31 (0.2)** | **487 (0.7)** | **5 (0.1)** | **491 (1.3)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | s | 69 (1.2) | 567 (2.5) | 26 (1.2) | 547 (3.8) | 5 (0.3) | 533 (8.0) | 10.5 (0.05) |
| Madrid, Spain | | 66 (1.3) | 526 (2.5) | 28 (1.2) | 521 (3.1) | 6 (0.6) | 518 (6.3) | 10.3 (0.05) |
| Ontario, Canada | s | 57 (1.5) | 534 (4.8) | 35 (1.3) | 536 (3.2) | 8 (0.7) | 529 (7.0) | 9.9 (0.07) |
| Quebec, Canada | r | 51 (1.3) | 528 (3.5) | 45 (1.3) | 528 (3.2) | 4 (0.5) | 525 (5.6) | 9.8 (0.05) |
| Moscow City, Russian Fed. | | 38 (1.3) | 589 (3.0) | 49 (1.1) | 600 (2.4) | 13 (0.8) | 593 (3.7) | 9.1 (0.06) |
| Abu Dhabi, UAE | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Students' Sense of School Belonging

The items forming the *Sense of School Belonging* scale asked students about their attitudes toward school, including the extent to which they like being in school, feel that they belong, and have good relationships with teachers. Both fourth and eighth grade students were asked how much they agreed or disagreed with the five statements listed in Exhibit 7.9 (see About the Scale).

The percentages of fourth grade students assigned to the three categories on the TIMSS 2019 *Sense of School Belonging* scale are shown in Exhibit 7.10 in relation to mathematics achievement and in Exhibit 7.11 in relation to science achievement. Overall, the majority of fourth grade students had positive attitudes toward school, and each successive category of increased school belonging was related to an increase in average achievement. More than half of students (58%) reported having a "high sense of school belonging," and these students had the highest average mathematics achievement (508) and average science achievement (497). On average, 34 percent of students had a "moderate sense of school belonging" with comparatively lower achievement (498 in mathematics and 487 in science). Only 8 percent of fourth grade students had "little sense of school belonging," and these students had the lowest average achievement (484 in mathematics and 476 in science).

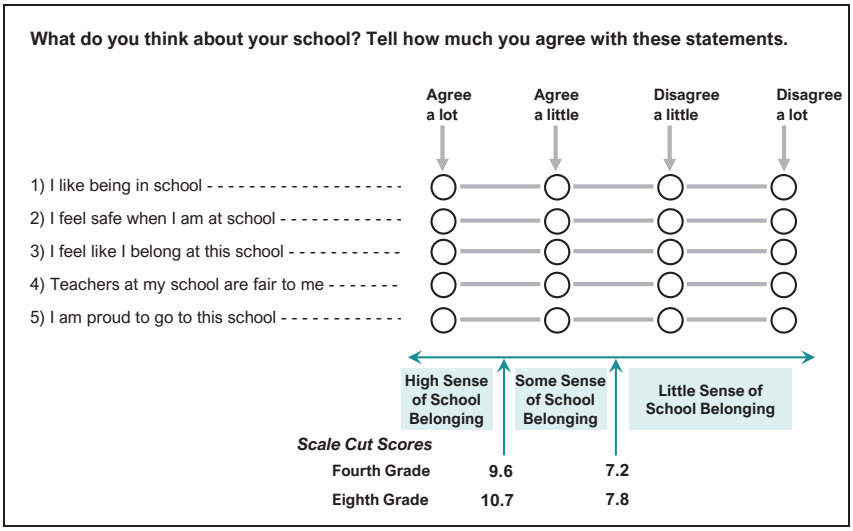
Exhibits 7.12 and 7.13 present the same results for eighth grade students in relation to mathematics achievement and science achievement, respectively. Compared with the fourth grade, smaller percentages of eighth grade students reported having a "high sense of school belonging," and larger percentages reported having a "moderate sense of school belonging." On average, across countries, 37 percent of eighth grade students reported a "high sense of school belonging," and 49 percent had a "moderate sense of school belonging." Like the fourth grade, there was a positive association between eighth grade students' sense of school belonging and their average achievement in mathematics and science. The 14 percent of students with "little sense of school belonging" had the lowest average achievement (470 in both mathematics and science). Students in the "high sense of school belonging" and "moderate sense of school belonging" categories had comparatively higher average achievement (500 and 489, respectively, in mathematics, and 502 and 490, respectively, in science).

## Exhibit 7.9: Students' Sense of School Belonging

*Students' Reports*

### About the Scale

Students were scored according to their responses to five statements on the *Sense of School Belonging* scale. Cut scores divide the scale into three categories. Students with a **High Sense of School Belonging** had a score at or above the cut score corresponding to "agreeing a lot" with three of the five statements and "agreeing a little" with the other two statements, on average. Students with **Little Sense of School Belonging** had a score at or below the cut score corresponding to "disagreeing a little" to three of the five statements and "agreeing a little" with the other two statements, on average. All other students had **Some Sense of School Belonging**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 7.10: Students' Sense of School Belonging

*Students' Reports*

| Country | High Sense of School Belonging | | Some Sense of School Belonging | | Little Sense of School Belonging | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 96 (0.4) | 496 (3.5) | 4 (0.4) | 482 (9.5) | 0 (0.1) | ~ ~ | 12.3 (0.03) |
| Kosovo | 94 (0.5) | 448 (2.8) | 6 (0.5) | 424 (9.4) | 0 (0.1) | ~ ~ | 12.2 (0.03) |
| North Macedonia | 82 (1.1) | 481 (5.1) | 16 (1.1) | 463 (10.3) | 2 (0.2) | ~ ~ | 11.4 (0.05) |
| Montenegro | 81 (0.7) | 456 (2.0) | 16 (0.6) | 449 (4.1) | 3 (0.2) | 443 (11.4) | 11.2 (0.04) |
| Morocco | 80 (1.1) | 391 (4.7) | 18 (0.9) | 362 (6.3) | 3 (0.4) | 331 (13.4) | 11.3 (0.06) |
| Azerbaijan | 78 (1.1) | 526 (2.4) | 19 (0.9) | 514 (4.6) | 3 (0.4) | 497 (8.9) | 11.1 (0.06) |
| Portugal | 76 (1.3) | 526 (2.7) | 21 (1.1) | 522 (3.6) | 3 (0.4) | 518 (8.9) | 10.9 (0.06) |
| Georgia | 74 (1.3) | 481 (4.1) | 24 (1.3) | 484 (5.2) | 2 (0.3) | ~ ~ | 11.0 (0.05) |
| Pakistan | 74 (3.0) | 333 (13.0) | 21 (2.5) | 328 (14.8) | 6 (1.1) | 294 (13.2) | 11.0 (0.16) |
| Bulgaria | 72 (1.4) | 512 (4.0) | 23 (1.1) | 528 (7.1) | 4 (0.5) | 530 (10.1) | 10.7 (0.07) |
| Armenia | 72 (1.2) | 506 (2.6) | 24 (0.9) | 496 (3.8) | 4 (0.6) | 493 (7.3) | 10.8 (0.08) |
| Turkey (5) | 71 (1.1) | 533 (4.4) | 25 (0.9) | 500 (6.0) | 4 (0.4) | 497 (12.7) | 10.7 (0.05) |
| Kazakhstan | 68 (1.3) | 517 (2.8) | 29 (1.1) | 507 (3.1) | 3 (0.4) | 498 (7.7) | 10.6 (0.06) |
| Bosnia and Herzegovina | 68 (1.2) | 455 (2.6) | 26 (1.0) | 452 (3.5) | 6 (0.4) | 436 (5.2) | 10.5 (0.06) |
| Spain | 67 (1.3) | 508 (2.6) | 27 (1.1) | 498 (3.6) | 6 (0.5) | 474 (6.9) | 10.4 (0.06) |
| Saudi Arabia | 65 (1.1) | 409 (3.7) | 27 (1.0) | 393 (4.2) | 8 (0.5) | 383 (6.7) | 10.5 (0.06) |
| Oman | 64 (1.3) | 443 (4.3) | 28 (1.0) | 418 (4.4) | 8 (0.6) | 406 (6.8) | 10.4 (0.07) |
| Norway (5) | 64 (1.4) | 549 (2.5) | 31 (1.2) | 540 (3.6) | 5 (0.7) | 517 (7.8) | 10.2 (0.06) |
| Serbia | 63 (1.4) | 506 (4.0) | 32 (1.1) | 514 (3.5) | 5 (0.7) | 504 (5.9) | 10.1 (0.06) |
| Bahrain | 62 (1.3) | 484 (3.0) | 30 (1.0) | 477 (2.8) | 8 (0.6) | 469 (6.2) | 10.2 (0.07) |
| Ireland | 61 (1.4) | 556 (3.1) | 32 (1.1) | 543 (3.7) | 7 (0.8) | 519 (6.2) | 10.0 (0.06) |
| Finland | 60 (1.0) | 538 (2.3) | 34 (0.8) | 528 (3.7) | 6 (0.6) | 506 (4.9) | 10.0 (0.05) |
| Northern Ireland | 60 (1.7) | 576 (3.4) | 33 (1.3) | 557 (3.9) | 8 (0.7) | 529 (8.2) | 10.0 (0.07) |
| Lithuania | 60 (1.5) | 544 (2.9) | 35 (1.4) | 542 (4.1) | 5 (0.4) | 529 (7.5) | 10.0 (0.06) |
| Netherlands | 59 (1.4) | 542 (2.3) | 33 (1.2) | 535 (3.2) | 7 (0.7) | 515 (7.0) | 10.0 (0.06) |
| United Arab Emirates | 59 (0.6) | 495 (2.0) | 31 (0.5) | 470 (2.0) | 10 (0.3) | 451 (3.6) | 10.1 (0.03) |
| New Zealand | 59 (1.2) | 495 (3.0) | 33 (0.9) | 481 (3.2) | 9 (0.6) | 466 (5.0) | 10.0 (0.06) |
| Austria | 58 (1.2) | 545 (2.4) | 34 (0.9) | 534 (2.5) | 7 (0.6) | 523 (4.8) | 9.9 (0.05) |
| Malta | 57 (0.8) | 513 (1.8) | 33 (0.8) | 508 (2.4) | 10 (0.4) | 493 (4.4) | 10.0 (0.04) |
| Kuwait | 57 (1.5) | 398 (5.6) | 31 (1.2) | 380 (5.3) | 12 (0.7) | 373 (7.9) | 10.0 (0.08) |
| Chile | 57 (1.2) | 450 (2.9) | 36 (1.0) | 437 (3.1) | 7 (0.7) | 407 (6.3) | 10.0 (0.06) |
| Cyprus | 56 (1.5) | 534 (2.7) | 31 (0.9) | 535 (4.1) | 13 (0.9) | 519 (5.0) | 9.8 (0.08) |
| England | 56 (1.7) | 565 (4.6) | 35 (1.4) | 550 (3.3) | 9 (0.8) | 527 (7.5) | 9.8 (0.08) |
| South Africa (5) | 56 (1.2) | 388 (3.9) | 36 (1.0) | 364 (4.1) | 8 (0.5) | 351 (5.6) | 10.0 (0.06) |
| Denmark | 55 (1.1) | 534 (2.4) | 36 (1.1) | 518 (3.1) | 9 (0.7) | 503 (6.0) | 9.8 (0.05) |
| Iran, Islamic Rep. of | 55 (1.6) | 439 (4.0) | 38 (1.4) | 455 (4.5) | 8 (0.6) | 439 (7.3) | 10.0 (0.07) |
| Hungary | 54 (1.4) | 527 (3.1) | 37 (1.2) | 522 (3.5) | 9 (0.8) | 510 (5.4) | 9.8 (0.06) |
| Australia | 54 (1.2) | 526 (3.2) | 36 (0.9) | 509 (3.3) | 10 (0.6) | 490 (6.4) | 9.8 (0.06) |
| Belgium (Flemish) | 54 (1.3) | 539 (2.0) | 38 (1.1) | 529 (2.4) | 8 (0.5) | 506 (4.7) | 9.8 (0.06) |
| Canada | 53 (0.8) | 515 (2.4) | 37 (0.7) | 510 (2.1) | 10 (0.4) | 495 (4.2) | 9.7 (0.03) |
| Italy | 52 (1.1) | 521 (3.0) | 39 (0.9) | 511 (3.2) | 8 (0.6) | 497 (4.8) | 9.6 (0.05) |
| United States | 52 (1.1) | 549 (2.7) | 34 (0.8) | 530 (3.0) | 14 (0.6) | 502 (5.1) | 9.6 (0.05) |
| Sweden | 51 (1.9) | 529 (3.6) | 40 (1.4) | 517 (2.9) | 9 (0.9) | 501 (6.0) | 9.6 (0.08) |
| Qatar | 50 (1.2) | 461 (3.9) | 36 (0.9) | 445 (4.6) | 14 (0.8) | 433 (6.1) | 9.6 (0.06) |
| Slovak Republic | 49 (1.5) | 507 (4.1) | 42 (1.1) | 515 (3.6) | 10 (0.8) | 506 (6.1) | 9.5 (0.07) |
| Germany | 47 (1.4) | 535 (2.8) | 41 (1.1) | 517 (2.7) | 12 (0.8) | 505 (4.5) | 9.4 (0.06) |
| Russian Federation | 47 (1.3) | 570 (4.5) | 43 (1.1) | 567 (3.1) | 10 (0.7) | 556 (4.2) | 9.4 (0.06) |
| Philippines | 46 (2.0) | 320 (7.6) | 44 (1.5) | 289 (6.6) | 10 (0.7) | 257 (7.5) | 9.5 (0.09) |
| Singapore | 45 (0.9) | 633 (4.1) | 44 (0.6) | 624 (4.1) | 11 (0.5) | 602 (4.9) | 9.4 (0.04) |
| Latvia | 42 (1.4) | 552 (3.0) | 47 (1.1) | 546 (3.2) | 11 (0.7) | 531 (4.1) | 9.2 (0.05) |
| France | 40 (1.2) | 491 (3.8) | 52 (1.1) | 485 (3.5) | 8 (0.5) | 458 (6.1) | 9.3 (0.05) |
| Korea, Rep. of | 40 (1.4) | 610 (2.8) | 54 (1.2) | 595 (2.7) | 6 (0.5) | 575 (8.0) | 9.4 (0.06) |
| Czech Republic | 40 (1.7) | 534 (3.8) | 49 (1.4) | 537 (2.6) | 11 (0.8) | 517 (5.0) | 9.2 (0.07) |
| Croatia | 38 (1.3) | 512 (3.3) | 54 (1.3) | 509 (2.7) | 9 (0.6) | 506 (5.6) | 9.2 (0.06) |
| Chinese Taipei | 34 (1.2) | 603 (3.0) | 51 (1.1) | 601 (2.3) | 14 (0.8) | 584 (3.5) | 8.9 (0.05) |
| Poland | 34 (1.1) | 518 (4.1) | 49 (0.9) | 526 (2.7) | 16 (0.9) | 514 (4.1) | 8.9 (0.05) |
| Hong Kong SAR | 34 (1.5) | 612 (5.1) | 45 (1.5) | 602 (3.3) | 21 (1.3) | 586 (4.6) | 8.8 (0.08) |
| Japan | 32 (1.3) | 603 (2.7) | 55 (1.0) | 592 (2.2) | 13 (0.9) | 576 (3.8) | 9.0 (0.06) |
| **International Average** | **58 (0.2)** | **508 (0.5)** | **34 (0.1)** | **498 (0.6)** | **8 (0.1)** | **484 (0.9)** | |
| **Benchmarking Participants** | | | | | | | |
| Madrid, Spain | 68 (1.5) | 519 (2.5) | 26 (1.2) | 520 (3.2) | 6 (0.6) | 508 (6.9) | 10.4 (0.06) |
| Dubai, UAE | 66 (0.6) | 549 (1.6) | 27 (0.6) | 537 (2.7) | 6 (0.3) | 523 (5.4) | 10.4 (0.03) |
| Ontario, Canada | 53 (1.4) | 519 (4.2) | 37 (1.1) | 509 (3.5) | 10 (0.7) | 495 (6.8) | 9.7 (0.06) |
| Abu Dhabi, UAE | 50 (1.0) | 450 (2.5) | 35 (0.7) | 438 (2.8) | 15 (0.7) | 423 (5.1) | 9.6 (0.05) |
| Quebec, Canada | 47 (1.5) | 535 (2.8) | 41 (1.3) | 533 (3.2) | 12 (1.0) | 511 (4.7) | 9.4 (0.07) |
| Moscow City, Russian Fed. | 40 (1.3) | 597 (2.7) | 46 (1.0) | 593 (2.4) | 14 (0.8) | 582 (4.1) | 9.1 (0.06) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 7.11: Students' Sense of School Belonging

*Students' Reports*

| Country | High Sense of School Belonging | | Some Sense of School Belonging | | Little Sense of School Belonging | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 96 (0.4) | 492 (3.7) | 4 (0.4) | 473 (8.8) | 0 (0.1) | ~ ~ | 12.3 (0.03) |
| Kosovo | 94 (0.5) | 418 (3.6) | 6 (0.5) | 382 (11.8) | 0 (0.1) | ~ ~ | 12.2 (0.03) |
| North Macedonia | 82 (1.1) | 435 (6.2) | 16 (1.1) | 416 (10.3) | 2 (0.2) | ~ ~ | 11.4 (0.05) |
| Montenegro | 81 (0.7) | 456 (2.3) | 16 (0.6) | 454 (4.9) | 3 (0.2) | 454 (11.4) | 11.2 (0.04) |
| Morocco | 80 (1.1) | 385 (6.4) | 18 (0.9) | 344 (7.6) | 3 (0.4) | 310 (15.1) | 11.3 (0.06) |
| Azerbaijan | 78 (1.1) | 437 (2.9) | 19 (0.9) | 430 (5.5) | 3 (0.4) | 422 (11.3) | 11.1 (0.06) |
| Portugal | 76 (1.3) | 505 (2.8) | 21 (1.1) | 502 (3.5) | 3 (0.4) | 497 (5.7) | 10.9 (0.06) |
| Georgia | 74 (1.3) | 452 (4.4) | 24 (1.3) | 458 (5.8) | 2 (0.3) | ~ ~ | 11.0 (0.05) |
| Pakistan | 74 (3.0) | 294 (14.9) | 21 (2.5) | 294 (16.3) | 6 (1.1) | 261 (18.7) | 11.0 (0.16) |
| Bulgaria | 72 (1.4) | 518 (4.9) | 23 (1.1) | 539 (7.6) | 4 (0.5) | 529 (12.7) | 10.7 (0.07) |
| Armenia | 72 (1.2) | 476 (3.6) | 24 (0.9) | 462 (4.5) | 4 (0.6) | 447 (8.3) | 10.8 (0.08) |
| Turkey (5) | 71 (1.1) | 536 (4.2) | 25 (0.9) | 507 (5.8) | 4 (0.4) | 509 (12.1) | 10.7 (0.05) |
| Kazakhstan | 68 (1.3) | 501 (3.5) | 29 (1.1) | 484 (4.0) | 3 (0.4) | 479 (10.8) | 10.6 (0.06) |
| Bosnia and Herzegovina | 68 (1.2) | 462 (3.4) | 26 (1.0) | 458 (3.6) | 6 (0.4) | 443 (5.7) | 10.5 (0.06) |
| Spain | 67 (1.3) | 517 (2.0) | 27 (1.1) | 506 (3.5) | 6 (0.5) | 486 (6.7) | 10.4 (0.06) |
| Saudi Arabia | 65 (1.1) | 416 (3.9) | 27 (1.0) | 395 (4.6) | 8 (0.5) | 381 (8.8) | 10.5 (0.06) |
| Oman | 64 (1.3) | 450 (4.4) | 28 (1.0) | 421 (5.1) | 8 (0.6) | 407 (9.1) | 10.4 (0.07) |
| Norway (5) | 64 (1.4) | 543 (2.6) | 31 (1.2) | 536 (3.4) | 5 (0.7) | 526 (6.9) | 10.2 (0.06) |
| Serbia | 63 (1.4) | 514 (4.3) | 32 (1.1) | 525 (3.6) | 5 (0.7) | 513 (6.8) | 10.1 (0.06) |
| Bahrain | 62 (1.3) | 502 (3.5) | 30 (1.0) | 484 (3.8) | 8 (0.6) | 470 (6.7) | 10.2 (0.07) |
| Ireland | 61 (1.4) | 535 (4.0) | 32 (1.1) | 524 (3.7) | 7 (0.8) | 498 (6.7) | 10.0 (0.06) |
| Finland | 60 (1.0) | 559 (2.5) | 34 (0.8) | 551 (3.5) | 6 (0.6) | 540 (5.6) | 10.0 (0.05) |
| Northern Ireland | 60 (1.7) | 527 (2.7) | 33 (1.3) | 510 (3.1) | 8 (0.7) | 497 (6.1) | 10.0 (0.07) |
| Lithuania | 60 (1.5) | 540 (2.8) | 35 (1.4) | 537 (3.5) | 5 (0.4) | 527 (7.6) | 10.0 (0.06) |
| Netherlands | 59 (1.4) | 524 (2.9) | 33 (1.2) | 516 (3.4) | 7 (0.7) | 489 (8.3) | 10.0 (0.06) |
| United Arab Emirates | 59 (0.6) | 490 (2.4) | 31 (0.5) | 459 (2.4) | 10 (0.3) | 431 (3.7) | 10.1 (0.03) |
| New Zealand | 59 (1.2) | 510 (2.9) | 33 (0.9) | 496 (2.7) | 9 (0.6) | 485 (4.9) | 10.0 (0.06) |
| Austria | 58 (1.2) | 528 (2.6) | 34 (0.9) | 517 (3.2) | 7 (0.6) | 507 (6.6) | 9.9 (0.05) |
| Malta | 57 (0.8) | 498 (1.6) | 33 (0.8) | 498 (2.5) | 10 (0.4) | 482 (4.7) | 10.0 (0.04) |
| Kuwait | 57 (1.5) | 412 (6.8) | 31 (1.2) | 388 (6.8) | 12 (0.7) | 367 (8.4) | 10.0 (0.08) |
| Chile | 57 (1.2) | 477 (2.8) | 36 (1.0) | 467 (3.1) | 7 (0.7) | 436 (6.6) | 10.0 (0.06) |
| Cyprus | 56 (1.5) | 514 (3.1) | 31 (0.9) | 512 (4.0) | 13 (0.9) | 498 (4.9) | 9.8 (0.08) |
| England | 56 (1.7) | 544 (3.9) | 35 (1.4) | 533 (3.2) | 9 (0.8) | 517 (5.6) | 9.8 (0.08) |
| South Africa (5) | 56 (1.2) | 343 (5.4) | 36 (1.0) | 313 (5.6) | 8 (0.5) | 293 (8.5) | 10.0 (0.06) |
| Denmark | 55 (1.1) | 530 (2.8) | 36 (1.1) | 515 (3.3) | 9 (0.7) | 504 (5.6) | 9.8 (0.05) |
| Iran, Islamic Rep. of | 55 (1.6) | 436 (4.3) | 38 (1.4) | 454 (4.8) | 8 (0.6) | 440 (7.5) | 10.0 (0.07) |
| Hungary | 54 (1.4) | 532 (3.2) | 37 (1.2) | 529 (3.5) | 9 (0.8) | 518 (5.5) | 9.8 (0.06) |
| Australia | 54 (1.2) | 541 (2.9) | 36 (0.9) | 528 (2.7) | 10 (0.6) | 510 (5.6) | 9.8 (0.06) |
| Belgium (Flemish) | 54 (1.3) | 508 (2.2) | 38 (1.1) | 496 (2.6) | 8 (0.5) | 476 (5.1) | 9.8 (0.06) |
| Canada | 53 (0.8) | 528 (2.3) | 37 (0.7) | 520 (2.2) | 10 (0.4) | 514 (3.4) | 9.7 (0.03) |
| Italy | 52 (1.1) | 515 (3.3) | 39 (0.9) | 506 (3.7) | 8 (0.6) | 495 (5.1) | 9.6 (0.05) |
| United States | 52 (1.1) | 551 (2.6) | 34 (0.8) | 536 (3.3) | 14 (0.6) | 509 (4.5) | 9.6 (0.05) |
| Sweden | 51 (1.9) | 544 (4.1) | 40 (1.4) | 533 (3.6) | 9 (0.9) | 521 (6.3) | 9.6 (0.08) |
| Qatar | 50 (1.2) | 467 (4.1) | 36 (0.9) | 443 (5.9) | 14 (0.8) | 422 (7.0) | 9.6 (0.06) |
| Slovak Republic | 49 (1.5) | 514 (4.8) | 42 (1.1) | 529 (3.7) | 10 (0.8) | 525 (6.6) | 9.5 (0.07) |
| Germany | 47 (1.4) | 533 (2.9) | 41 (1.1) | 514 (2.9) | 12 (0.8) | 507 (5.2) | 9.4 (0.06) |
| Russian Federation | 47 (1.3) | 567 (4.2) | 43 (1.1) | 569 (2.7) | 10 (0.7) | 564 (3.9) | 9.4 (0.06) |
| Philippines | 46 (2.0) | 272 (9.4) | 44 (1.5) | 242 (7.6) | 10 (0.7) | 205 (8.1) | 9.5 (0.09) |
| Singapore | 45 (0.9) | 600 (3.7) | 44 (0.6) | 594 (3.5) | 11 (0.5) | 578 (4.9) | 9.4 (0.04) |
| Latvia | 42 (1.4) | 546 (2.7) | 47 (1.1) | 542 (3.0) | 11 (0.7) | 529 (4.5) | 9.2 (0.05) |
| France | 40 (1.2) | 494 (4.1) | 52 (1.1) | 487 (3.3) | 8 (0.5) | 462 (6.0) | 9.3 (0.05) |
| Korea, Rep. of | 40 (1.4) | 596 (2.9) | 54 (1.2) | 584 (2.5) | 6 (0.5) | 568 (6.8) | 9.4 (0.06) |
| Czech Republic | 40 (1.7) | 534 (3.3) | 49 (1.4) | 538 (3.0) | 11 (0.8) | 521 (4.9) | 9.2 (0.07) |
| Croatia | 38 (1.3) | 529 (2.8) | 54 (1.3) | 522 (2.5) | 9 (0.6) | 514 (4.9) | 9.2 (0.06) |
| Chinese Taipei | 34 (1.2) | 563 (2.4) | 51 (1.1) | 559 (2.1) | 14 (0.8) | 545 (4.2) | 8.9 (0.05) |
| Poland | 34 (1.1) | 529 (3.7) | 49 (0.9) | 537 (2.4) | 16 (0.9) | 525 (4.4) | 8.9 (0.05) |
| Hong Kong SAR | 34 (1.5) | 543 (4.3) | 45 (1.5) | 530 (3.6) | 21 (1.3) | 516 (5.9) | 8.8 (0.08) |
| Japan | 32 (1.3) | 569 (2.5) | 55 (1.0) | 561 (2.4) | 13 (0.9) | 549 (3.5) | 9.0 (0.06) |
| **International Average** | **58 (0.2)** | **497 (0.6)** | **34 (0.1)** | **487 (0.7)** | **8 (0.1)** | **476 (1.0)** | |
| **Benchmarking Participants** | | | | | | | |
| Madrid, Spain | 68 (1.5) | 524 (2.3) | 26 (1.2) | 524 (3.0) | 6 (0.6) | 511 (7.8) | 10.4 (0.06) |
| Dubai, UAE | 66 (0.6) | 550 (1.8) | 27 (0.6) | 537 (2.5) | 6 (0.3) | 522 (5.2) | 10.4 (0.03) |
| Ontario, Canada | 53 (1.4) | 530 (3.8) | 37 (1.1) | 521 (3.6) | 10 (0.7) | 518 (5.2) | 9.7 (0.06) |
| Abu Dhabi, UAE | 50 (1.0) | 431 (3.5) | 35 (0.7) | 415 (3.2) | 15 (0.7) | 390 (5.6) | 9.6 (0.05) |
| Quebec, Canada | 47 (1.5) | 525 (3.3) | 41 (1.3) | 522 (3.1) | 12 (1.0) | 509 (3.9) | 9.4 (0.07) |
| Moscow City, Russian Fed. | 40 (1.3) | 596 (3.2) | 46 (1.0) | 596 (2.3) | 14 (0.8) | 588 (3.7) | 9.1 (0.06) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 7.12: Students' Sense of School Belonging

*Students' Reports*

| Country | High Sense of School Belonging | | Some Sense of School Belonging | | Little Sense of School Belonging | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Egypt | 66 (1.3) | 417 (5.3) | 27 (0.9) | 410 (6.1) | 7 (0.7) | 418 (8.6) | 11.1 (0.06) |
| Jordan | 62 (1.3) | 424 (3.9) | 30 (0.9) | 422 (5.1) | 9 (0.8) | 411 (8.1) | 10.9 (0.07) |
| Morocco | 58 (1.2) | 387 (3.0) | 34 (1.0) | 389 (2.3) | 8 (0.6) | 397 (6.5) | 10.8 (0.05) |
| Romania | 54 (1.3) | 484 (4.8) | 35 (1.0) | 480 (5.7) | 10 (0.8) | 465 (7.5) | 10.5 (0.06) |
| Turkey | 54 (1.3) | 500 (4.1) | 37 (1.0) | 490 (5.4) | 9 (0.7) | 494 (8.9) | 10.5 (0.06) |
| Kazakhstan | 51 (1.4) | 491 (4.0) | 44 (1.2) | 485 (3.5) | 5 (0.5) | 489 (6.2) | 10.6 (0.06) |
| South Africa (9) | 48 (0.7) | 391 (2.4) | 43 (0.5) | 390 (2.4) | 9 (0.4) | 392 (3.5) | 10.3 (0.03) |
| Georgia | 47 (1.4) | 463 (5.2) | 44 (1.2) | 463 (4.6) | 10 (0.7) | 457 (8.3) | 10.2 (0.06) |
| Lebanon | 46 (1.4) | 440 (3.5) | 42 (1.1) | 426 (3.8) | 12 (0.8) | 411 (5.6) | 10.2 (0.06) |
| Saudi Arabia | 45 (1.2) | 398 (3.2) | 43 (0.9) | 394 (2.7) | 12 (0.6) | 387 (4.2) | 10.2 (0.05) |
| Oman | 44 (1.1) | 425 (3.0) | 44 (0.9) | 406 (3.5) | 11 (0.6) | 392 (4.9) | 10.1 (0.05) |
| Finland | 43 (1.1) | 523 (3.2) | 48 (0.9) | 505 (2.5) | 9 (0.6) | 471 (5.5) | 10.2 (0.05) |
| Israel | 42 (1.3) | 520 (5.2) | 43 (1.0) | 527 (4.9) | 14 (0.9) | 504 (7.1) | 10.0 (0.06) |
| Kuwait | 42 (1.2) | 414 (5.4) | 41 (1.0) | 403 (5.0) | 17 (1.1) | 382 (6.2) | 9.9 (0.06) |
| United Arab Emirates | 41 (0.8) | 493 (3.0) | 42 (0.7) | 472 (1.8) | 16 (0.4) | 439 (3.5) | 9.9 (0.04) |
| Norway (9) | 41 (1.4) | 514 (3.1) | 47 (1.2) | 504 (3.1) | 12 (0.8) | 470 (5.7) | 10.0 (0.06) |
| Bahrain | 38 (1.0) | 491 (3.0) | 46 (0.9) | 480 (1.9) | 16 (0.8) | 462 (4.2) | 9.8 (0.05) |
| Malaysia | 37 (1.1) | 461 (3.6) | 58 (1.0) | 461 (3.6) | 5 (0.5) | 462 (8.3) | 10.0 (0.04) |
| Iran, Islamic Rep. of | 36 (1.1) | 455 (4.6) | 50 (0.9) | 440 (3.9) | 14 (0.9) | 448 (6.1) | 9.9 (0.06) |
| New Zealand | 33 (0.9) | 503 (3.8) | 53 (0.7) | 482 (3.7) | 14 (0.8) | 439 (5.6) | 9.7 (0.04) |
| Ireland | 33 (1.2) | 545 (3.1) | 51 (1.1) | 523 (2.9) | 17 (1.0) | 489 (4.5) | 9.6 (0.05) |
| Portugal | 32 (1.4) | 508 (3.9) | 53 (1.0) | 499 (3.5) | 15 (1.0) | 490 (5.1) | 9.6 (0.06) |
| Lithuania | 31 (1.4) | 528 (3.8) | 57 (1.2) | 521 (3.1) | 12 (0.8) | 504 (5.8) | 9.7 (0.06) |
| United States | 31 (0.9) | 547 (5.6) | 48 (0.8) | 518 (4.9) | 22 (0.9) | 476 (4.5) | 9.4 (0.04) |
| Qatar | 31 (1.3) | 456 (6.3) | 48 (0.8) | 450 (4.4) | 22 (1.1) | 414 (4.4) | 9.4 (0.08) |
| Chile | 30 (1.1) | 447 (3.7) | 57 (1.1) | 441 (3.2) | 13 (0.8) | 428 (4.4) | 9.6 (0.04) |
| Australia | 30 (0.9) | 548 (4.6) | 50 (0.8) | 516 (4.1) | 20 (0.9) | 476 (4.1) | 9.4 (0.05) |
| Hungary | 30 (1.2) | 536 (5.4) | 52 (1.0) | 514 (3.3) | 18 (1.1) | 492 (4.7) | 9.5 (0.06) |
| Singapore | 28 (0.8) | 636 (4.4) | 58 (0.8) | 614 (4.2) | 14 (0.5) | 581 (5.6) | 9.5 (0.03) |
| Sweden | 28 (1.2) | 515 (3.8) | 57 (0.9) | 505 (2.7) | 15 (0.9) | 475 (4.6) | 9.5 (0.05) |
| England | 27 (1.3) | 544 (6.0) | 53 (1.0) | 521 (5.4) | 19 (1.0) | 470 (6.9) | 9.3 (0.06) |
| Italy | 27 (1.3) | 500 (4.0) | 58 (0.9) | 500 (2.8) | 15 (0.8) | 485 (4.4) | 9.4 (0.05) |
| Russian Federation | 25 (1.2) | 551 (5.9) | 59 (1.0) | 544 (4.7) | 16 (0.8) | 533 (5.2) | 9.4 (0.05) |
| Chinese Taipei | 23 (1.0) | 624 (5.5) | 60 (0.9) | 613 (2.5) | 17 (0.8) | 596 (4.5) | 9.3 (0.04) |
| Cyprus | 22 (0.9) | 520 (3.6) | 48 (1.0) | 504 (2.2) | 30 (1.2) | 482 (2.7) | 8.9 (0.05) |
| Korea, Rep. of | 22 (0.9) | 627 (4.5) | 65 (0.9) | 606 (2.9) | 14 (0.7) | 577 (5.6) | 9.3 (0.04) |
| Japan | 21 (1.1) | 602 (3.9) | 59 (0.8) | 598 (3.1) | 19 (0.9) | 574 (4.1) | 9.2 (0.05) |
| Hong Kong SAR | 21 (0.9) | 593 (6.8) | 57 (1.0) | 586 (3.7) | 23 (1.1) | 548 (6.3) | 9.1 (0.05) |
| France | 20 (0.9) | 490 (3.9) | 68 (0.8) | 485 (2.7) | 12 (0.7) | 459 (4.4) | 9.3 (0.04) |
| **International Average** | **37 (0.2)** | **500 (0.7)** | **49 (0.2)** | **489 (0.6)** | **14 (0.1)** | **470 (0.9)** | |
| **Benchmarking Participants** | | | | | | | |
| Western Cape, RSA (9) | 46 (1.3) | 442 (5.1) | 44 (0.8) | 443 (4.6) | 10 (0.8) | 439 (5.8) | 10.2 (0.06) |
| Dubai, UAE | 43 (1.1) | 550 (2.8) | 44 (1.1) | 534 (3.3) | 12 (0.5) | 500 (4.6) | 10.1 (0.04) |
| Gauteng, RSA (9) | 41 (1.2) | 420 (3.8) | 47 (0.9) | 422 (3.3) | 13 (0.9) | 428 (4.3) | 10.0 (0.05) |
| Ontario, Canada | 38 (1.5) | 543 (5.1) | 47 (1.3) | 530 (5.0) | 15 (1.1) | 498 (4.6) | 9.9 (0.07) |
| Abu Dhabi, UAE | 33 (1.1) | 463 (3.9) | 46 (0.8) | 434 (3.1) | 21 (0.7) | 410 (5.4) | 9.5 (0.06) |
| Quebec, Canada | 29 (1.4) | 562 (4.0) | 55 (1.1) | 544 (3.6) | 16 (1.1) | 513 (6.3) | 9.5 (0.06) |
| Moscow City, Russian Fed. | 17 (0.9) | 586 (6.5) | 60 (0.9) | 577 (4.3) | 23 (1.0) | 564 (5.1) | 9.0 (0.05) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 7.13: Students' Sense of School Belonging

*Students' Reports*

| Country | High Sense of School Belonging | | Some Sense of School Belonging | | Little Sense of School Belonging | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Egypt | 66 (1.3) | 398 (5.6) | 27 (0.9) | 384 (6.1) | 7 (0.7) | 388 (9.2) | 11.1 (0.06) |
| Jordan | 62 (1.3) | 458 (4.3) | 30 (0.9) | 456 (6.1) | 9 (0.8) | 435 (8.5) | 10.9 (0.07) |
| Morocco | 58 (1.2) | 396 (3.5) | 34 (1.0) | 392 (2.8) | 8 (0.6) | 393 (5.5) | 10.8 (0.05) |
| Romania | 54 (1.3) | 474 (4.8) | 35 (1.0) | 472 (5.2) | 10 (0.8) | 456 (6.0) | 10.5 (0.06) |
| Turkey | 54 (1.3) | 518 (3.6) | 37 (1.0) | 512 (4.8) | 9 (0.7) | 515 (8.0) | 10.5 (0.06) |
| Kazakhstan | 51 (1.4) | 480 (3.7) | 44 (1.2) | 476 (3.5) | 5 (0.5) | 488 (7.4) | 10.6 (0.06) |
| South Africa (9) | 48 (0.7) | 370 (3.4) | 43 (0.5) | 371 (3.2) | 9 (0.4) | 380 (4.4) | 10.3 (0.03) |
| Georgia | 47 (1.4) | 449 (4.7) | 44 (1.2) | 450 (4.2) | 10 (0.7) | 438 (7.8) | 10.2 (0.06) |
| Lebanon | 46 (1.4) | 394 (4.9) | 42 (1.1) | 371 (6.4) | 12 (0.8) | 349 (8.7) | 10.2 (0.06) |
| Saudi Arabia | 45 (1.2) | 436 (3.2) | 43 (0.9) | 434 (2.9) | 12 (0.6) | 421 (4.8) | 10.2 (0.05) |
| Oman | 44 (1.1) | 473 (2.9) | 44 (0.9) | 452 (3.8) | 11 (0.6) | 433 (5.5) | 10.1 (0.05) |
| Finland | 43 (1.1) | 558 (3.9) | 48 (0.9) | 538 (2.8) | 9 (0.6) | 498 (7.1) | 10.2 (0.05) |
| Israel | 42 (1.3) | 517 (4.7) | 43 (1.0) | 519 (5.1) | 14 (0.9) | 499 (6.9) | 10.0 (0.06) |
| Kuwait | 42 (1.2) | 459 (6.1) | 41 (1.0) | 447 (5.2) | 17 (1.1) | 415 (8.3) | 9.9 (0.06) |
| United Arab Emirates | 41 (0.8) | 498 (3.6) | 42 (0.7) | 470 (2.2) | 16 (0.4) | 431 (3.9) | 9.9 (0.04) |
| Norway (9) | 41 (1.4) | 508 (3.5) | 47 (1.2) | 495 (3.9) | 12 (0.8) | 459 (6.5) | 10.0 (0.06) |
| Bahrain | 38 (1.0) | 501 (2.8) | 46 (0.9) | 487 (2.5) | 16 (0.8) | 453 (5.0) | 9.8 (0.05) |
| Malaysia | 37 (1.1) | 465 (3.8) | 58 (1.0) | 460 (3.9) | 5 (0.5) | 436 (9.9) | 10.0 (0.04) |
| Iran, Islamic Rep. of | 36 (1.1) | 456 (4.5) | 50 (0.9) | 444 (4.1) | 14 (0.9) | 453 (5.6) | 9.9 (0.06) |
| New Zealand | 33 (0.9) | 521 (4.3) | 53 (0.7) | 497 (3.9) | 14 (0.8) | 463 (5.5) | 9.7 (0.04) |
| Ireland | 33 (1.2) | 545 (3.2) | 51 (1.1) | 522 (3.1) | 17 (1.0) | 486 (5.0) | 9.6 (0.05) |
| Portugal | 32 (1.4) | 525 (3.8) | 53 (1.0) | 518 (3.2) | 15 (1.0) | 507 (4.8) | 9.6 (0.06) |
| Lithuania | 31 (1.4) | 541 (3.9) | 57 (1.2) | 534 (3.2) | 12 (0.8) | 519 (5.7) | 9.7 (0.06) |
| United States | 31 (0.9) | 548 (5.1) | 48 (0.8) | 527 (4.6) | 22 (0.9) | 488 (4.9) | 9.4 (0.04) |
| Qatar | 31 (1.3) | 489 (6.9) | 48 (0.8) | 481 (4.4) | 22 (1.1) | 445 (5.2) | 9.4 (0.08) |
| Chile | 30 (1.1) | 469 (3.9) | 57 (1.1) | 463 (3.2) | 13 (0.8) | 449 (5.0) | 9.6 (0.04) |
| Australia | 30 (0.9) | 557 (4.2) | 50 (0.8) | 529 (3.5) | 20 (0.9) | 487 (3.1) | 9.4 (0.05) |
| Hungary | 30 (1.2) | 544 (4.8) | 52 (1.0) | 528 (2.9) | 18 (1.1) | 512 (4.2) | 9.5 (0.06) |
| Singapore | 28 (0.8) | 626 (4.3) | 58 (0.8) | 606 (4.2) | 14 (0.5) | 577 (5.4) | 9.5 (0.03) |
| Sweden | 28 (1.2) | 537 (4.5) | 57 (0.9) | 525 (3.5) | 15 (0.9) | 490 (6.0) | 9.5 (0.05) |
| England | 27 (1.3) | 551 (5.4) | 53 (1.0) | 522 (4.8) | 19 (1.0) | 466 (7.4) | 9.3 (0.06) |
| Italy | 27 (1.3) | 501 (4.0) | 58 (0.9) | 503 (2.5) | 15 (0.8) | 492 (5.2) | 9.4 (0.05) |
| Russian Federation | 25 (1.2) | 545 (5.4) | 59 (1.0) | 543 (4.4) | 16 (0.8) | 540 (4.8) | 9.4 (0.05) |
| Chinese Taipei | 23 (1.0) | 582 (4.1) | 60 (0.9) | 574 (1.9) | 17 (0.8) | 563 (3.9) | 9.3 (0.04) |
| Cyprus | 22 (0.9) | 501 (3.8) | 48 (1.0) | 488 (2.7) | 30 (1.2) | 464 (3.0) | 8.9 (0.05) |
| Korea, Rep. of | 22 (0.9) | 577 (3.5) | 65 (0.9) | 560 (2.1) | 14 (0.7) | 537 (4.7) | 9.3 (0.04) |
| Japan | 21 (1.1) | 573 (2.9) | 59 (0.8) | 572 (2.5) | 19 (0.9) | 558 (3.3) | 9.2 (0.05) |
| Hong Kong SAR | 21 (0.9) | 519 (7.5) | 57 (1.0) | 509 (4.9) | 23 (1.1) | 477 (8.0) | 9.1 (0.05) |
| France | 20 (0.9) | 499 (4.4) | 68 (0.8) | 490 (2.7) | 12 (0.7) | 462 (5.6) | 9.3 (0.04) |
| **International Average** | **37 (0.2)** | **502 (0.7)** | **49 (0.2)** | **490 (0.6)** | **14 (0.1)** | **470 (1.0)** | |
| **Benchmarking Participants** | | | | | | | |
| Western Cape, RSA (9) | 46 (1.3) | 437 (6.2) | 44 (0.8) | 442 (5.5) | 10 (0.8) | 447 (6.1) | 10.2 (0.06) |
| Dubai, UAE | 43 (1.1) | 563 (3.2) | 44 (1.1) | 544 (3.1) | 12 (0.5) | 508 (5.0) | 10.1 (0.04) |
| Gauteng, RSA (9) | 41 (1.2) | 418 (5.0) | 47 (0.9) | 424 (4.0) | 13 (0.9) | 437 (5.1) | 10.0 (0.05) |
| Ontario, Canada | 38 (1.5) | 536 (4.1) | 47 (1.3) | 521 (3.5) | 15 (1.1) | 492 (4.5) | 9.9 (0.07) |
| Abu Dhabi, UAE | 33 (1.1) | 454 (4.8) | 46 (0.8) | 416 (4.1) | 21 (0.7) | 390 (6.9) | 9.5 (0.06) |
| Quebec, Canada | 29 (1.4) | 553 (3.7) | 55 (1.1) | 537 (3.8) | 16 (1.1) | 509 (6.0) | 9.5 (0.06) |
| Moscow City, Russian Fed. | 17 (0.9) | 572 (4.9) | 60 (0.9) | 567 (3.1) | 23 (1.0) | 561 (3.5) | 9.0 (0.05) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# School Discipline and Safety

## School Discipline

Continuing from previous TIMSS assessments, TIMSS 2019 asked school principals for their perceptions about the extent that discipline, disorder, and bullying behaviors are problems in their school. As described in Exhibit 8.1, fourth grade students were assigned scores on the *School Discipline* scale according to their principals' characterizations of 10 discipline and safety problems (see About the Scale). The eighth grade scale included one additional problem more suited to older students—"physical injury to teachers or staff." Since TIMSS first reported results on the *School Discipline* scale in 2011, data have shown that attending schools with fewer discipline and safety problems was associated with higher average achievement in mathematics and science.

Exhibit 8.2 presents the results for the *School Discipline* scale at the fourth grade in relation to mathematics achievement. Countries are ordered according to the percentage of students in schools where principals reported "hardly any problems" with discipline and safety. On average, the majority of fourth grade students (60%) attended schools with "hardly any problems," and 32 percent attended schools with "minor problems." Only 8 percent of students, on average, attended schools for which principals reported "moderate to severe problems" with discipline and safety. Consistent with previous TIMSS results, average mathematics achievement was higher for students in schools with "hardly any problems" than for students in schools with "minor problems" (508 vs. 494). At 466 points, on average, mathematics achievement for students in schools with "moderate to severe problems" with school discipline and safety was substantially lower (42 points) than for students in schools with "hardly any problems."

Exhibit 8.3 presents the same percentages of fourth grade students in the three categories of the scale, but in relation to science achievement. Similar to the results for mathematics, fewer discipline problems were related to higher average science achievement. Students in schools with "hardly any problems" with discipline and safety had the highest average science achievement (498), followed by students in schools with "minor problems" (483) and "moderate to severe problems" (457).

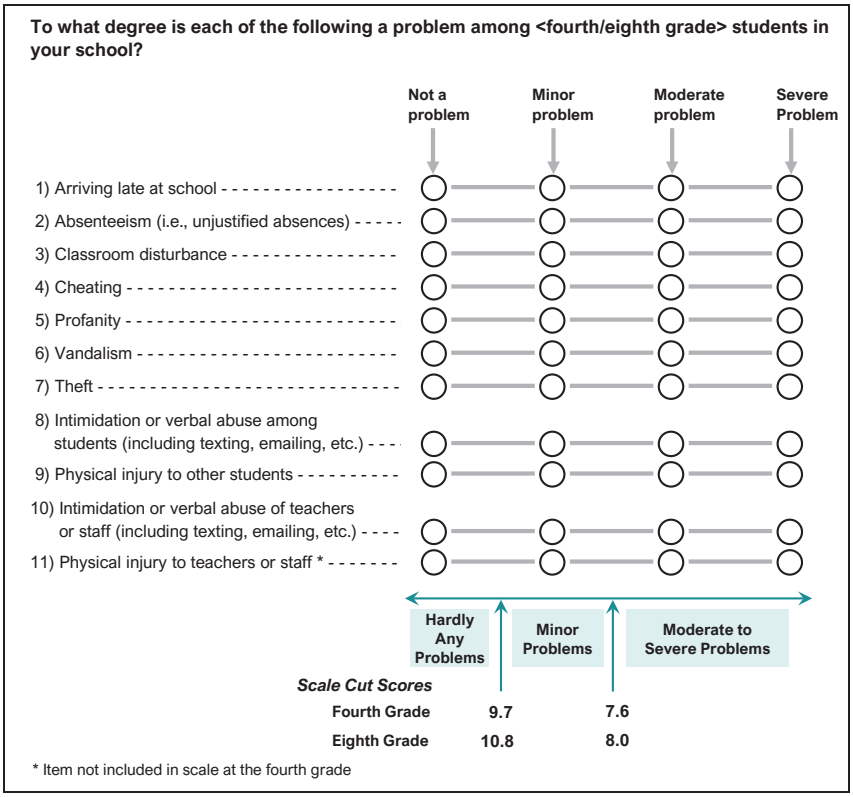
Exhibits 8.4 and 8.5 present the *School Discipline* results for eighth grade students in relation to mathematics achievement and science achievement, respectively. Compared with the fourth grade, fewer eighth grade students attended schools with "hardly any problems" (45% vs. 60%) and more eighth grade students attended schools with "minor problems" (43% vs. 32%). Similar to fourth grade results, the 11 percent of eighth grade students in the "moderate to severe problems" category had the lowest average achievement (448 and 452 in mathematics and science, respectively). However, eighth grade results showed a greater difference in average achievement between students in schools with "hardly any problems" and those in schools with "moderate to severe problems." There was a 55-point gap in average mathematics achievement between the two categories (503 vs. 448) and a 52-point gap in average science achievement (504 vs. 452).

## Exhibit 8.1: School Discipline – Principals' Reports

*Students' Results based on Principals' Reports*

### About the Scale

Students were scored according to their principals' reports regarding eleven potential problems on the *School Discipline* scale. Cut scores divide the scale into three categories. Students in schools with **Hardly Any Problems** had a score at or above the cut score corresponding to their principals reporting that six of the eleven issues are "not a problem" and the other five are a "minor problem," on average. Students in schools with **Moderate to Severe Problems** had a score at or below the cut score corresponding to their principals reporting that six of the eleven issues are a "moderate problem" and the other five are a "minor problem," on average. All other students were in schools with **Minor Problems**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.2: School Discipline – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Hardly Any Problems | | Minor Problems | | Moderate to Severe Problems | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | | 82 (3.4) | 495 (3.8) | 16 (3.2) | 491 (9.3) | 2 (1.1) | ~ ~ | 10.9 (0.14) |
| Ireland | | 82 (3.2) | 552 (3.1) | 16 (3.1) | 540 (5.5) | 2 (1.2) | ~ ~ | 10.8 (0.11) |
| Kazakhstan | | 82 (3.3) | 514 (3.0) | 7 (2.0) | 500 (11.4) | 12 (2.6) | 506 (7.8) | 10.9 (0.19) |
| Netherlands | s | 81 (5.0) | 540 (2.8) | 19 (5.0) | 527 (4.6) | 0 (0.0) | ~ ~ | 10.9 (0.15) |
| Hong Kong SAR | | 77 (4.3) | 607 (3.2) | 23 (4.2) | 583 (7.7) | 1 (0.7) | ~ ~ | 10.7 (0.14) |
| Singapore | | 76 (0.0) | 628 (4.3) | 24 (0.0) | 616 (8.3) | 0 (0.0) | ~ ~ | 10.6 (0.00) |
| Armenia | | 76 (3.4) | 501 (3.2) | 13 (3.2) | 484 (6.1) | 11 (2.3) | 498 (7.6) | 10.4 (0.15) |
| Croatia | | 76 (3.6) | 509 (2.6) | 22 (3.5) | 513 (5.4) | 2 (1.3) | ~ ~ | 10.5 (0.12) |
| Spain | | 75 (3.4) | 508 (2.8) | 22 (3.1) | 486 (8.1) | 3 (1.2) | 493 (14.7) | 10.6 (0.13) |
| Slovak Republic | | 73 (3.6) | 517 (4.1) | 20 (3.5) | 504 (6.9) | 6 (1.7) | 447 (14.5) | 10.3 (0.11) |
| Japan | | 73 (3.6) | 595 (2.1) | 23 (3.6) | 588 (3.5) | 4 (1.8) | 584 (9.1) | 10.4 (0.12) |
| Korea, Rep. of | | 73 (3.7) | 602 (2.7) | 16 (2.8) | 595 (5.7) | 12 (3.0) | 588 (7.1) | 10.6 (0.18) |
| Northern Ireland | r | 73 (3.8) | 573 (4.2) | 27 (3.9) | 552 (6.2) | 1 (0.8) | ~ ~ | 10.4 (0.11) |
| Chinese Taipei | | 73 (3.2) | 600 (2.2) | 26 (3.2) | 597 (3.7) | 1 (1.0) | ~ ~ | 10.8 (0.12) |
| Lithuania | | 72 (3.8) | 537 (3.4) | 28 (3.8) | 556 (7.4) | 0 (0.3) | ~ ~ | 10.4 (0.11) |
| Latvia | | 72 (3.2) | 548 (3.3) | 27 (3.2) | 541 (4.7) | 1 (0.0) | ~ ~ | 10.4 (0.09) |
| Czech Republic | | 71 (3.5) | 538 (3.1) | 26 (3.3) | 525 (4.8) | 3 (1.2) | 494 (6.6) | 10.3 (0.11) |
| Azerbaijan | | 71 (3.2) | 514 (3.5) | 17 (2.9) | 529 (6.2) | 12 (2.7) | 508 (5.5) | 10.0 (0.16) |
| United Arab Emirates | r | 70 (2.0) | 494 (2.0) | 26 (2.0) | 444 (3.6) | 4 (0.3) | 446 (9.9) | 10.5 (0.07) |
| Bulgaria | | 70 (4.1) | 528 (4.1) | 24 (3.9) | 477 (11.9) | 6 (2.0) | 517 (17.7) | 10.4 (0.17) |
| Malta | | 69 (0.4) | 519 (1.4) | 29 (0.4) | 490 (3.0) | 2 (0.1) | ~ ~ | 10.4 (0.01) |
| North Macedonia | | 68 (3.7) | 478 (5.8) | 24 (4.2) | 461 (11.1) | 8 (2.7) | 458 (24.9) | 10.4 (0.16) |
| Qatar | | 68 (3.8) | 455 (4.7) | 24 (3.6) | 439 (8.8) | 8 (1.8) | 434 (13.1) | 10.2 (0.13) |
| Russian Federation | | 68 (3.6) | 569 (4.5) | 32 (3.5) | 563 (4.1) | 1 (0.6) | ~ ~ | 10.2 (0.08) |
| England | s | 67 (5.1) | 566 (5.5) | 33 (5.1) | 540 (7.6) | 0 (0.0) | ~ ~ | 10.1 (0.10) |
| Italy | | 66 (4.0) | 517 (2.8) | 29 (4.2) | 510 (4.9) | 5 (1.8) | 509 (7.6) | 10.0 (0.12) |
| Georgia | | 66 (4.4) | 486 (4.6) | 23 (3.8) | 473 (6.0) | 11 (2.9) | 479 (11.6) | 10.1 (0.19) |
| Bahrain | | 65 (2.8) | 486 (2.7) | 27 (2.8) | 476 (5.0) | 8 (0.7) | 442 (7.8) | 10.2 (0.09) |
| Saudi Arabia | | 64 (3.5) | 404 (4.7) | 23 (3.2) | 394 (7.8) | 14 (2.7) | 385 (15.5) | 10.0 (0.16) |
| Belgium (Flemish) | | 61 (4.5) | 540 (2.7) | 37 (4.6) | 523 (3.8) | 2 (1.4) | ~ ~ | 10.1 (0.12) |
| Iran, Islamic Rep. of | | 59 (3.7) | 450 (5.4) | 33 (3.6) | 436 (8.2) | 8 (1.8) | 423 (15.4) | 10.1 (0.12) |
| New Zealand | | 59 (3.6) | 504 (3.8) | 38 (3.7) | 466 (5.5) | 3 (1.4) | 438 (9.9) | 10.1 (0.10) |
| Norway (5) | r | 58 (4.3) | 547 (3.7) | 33 (4.1) | 540 (4.9) | 9 (3.2) | 533 (7.4) | 9.7 (0.12) |
| France | | 57 (4.1) | 494 (4.3) | 39 (4.3) | 476 (4.8) | 4 (1.4) | 445 (9.2) | 9.9 (0.11) |
| Australia | | 57 (3.5) | 529 (4.0) | 40 (3.4) | 500 (4.8) | 3 (1.3) | 442 (15.7) | 9.9 (0.11) |
| Serbia | | 55 (4.3) | 505 (4.4) | 32 (3.7) | 513 (5.8) | 12 (2.8) | 512 (8.9) | 9.7 (0.16) |
| Bosnia and Herzegovina | | 55 (3.7) | 453 (3.6) | 29 (3.5) | 453 (4.8) | 16 (3.1) | 447 (7.6) | 9.6 (0.18) |
| United States | | 55 (2.6) | 547 (3.9) | 41 (2.6) | 521 (4.4) | 4 (1.1) | 501 (18.4) | 9.9 (0.08) |
| Finland | | 53 (3.8) | 537 (3.4) | 42 (3.8) | 529 (3.1) | 5 (1.9) | 499 (11.9) | 9.9 (0.10) |
| Canada | | 53 (2.9) | 516 (2.4) | 43 (3.0) | 510 (4.7) | 4 (1.0) | 470 (9.4) | 9.9 (0.09) |
| Montenegro | | 52 (0.5) | 452 (2.3) | 34 (0.4) | 457 (3.6) | 14 (0.3) | 447 (3.8) | 9.7 (0.02) |
| Pakistan | | 51 (6.5) | 321 (16.7) | 38 (6.4) | 331 (20.2) | 11 (2.7) | 352 (17.7) | 9.4 (0.19) |
| Hungary | | 50 (4.7) | 532 (4.1) | 42 (4.5) | 520 (6.0) | 8 (2.3) | 474 (15.0) | 9.7 (0.12) |
| Cyprus | | 49 (4.8) | 540 (3.4) | 45 (4.6) | 527 (5.0) | 6 (2.3) | 502 (12.5) | 9.8 (0.16) |
| Austria | | 49 (3.7) | 548 (3.3) | 41 (3.8) | 535 (3.3) | 10 (2.3) | 515 (9.2) | 9.6 (0.11) |
| Kosovo | | 47 (4.4) | 439 (4.9) | 26 (3.6) | 447 (5.7) | 27 (3.7) | 451 (4.5) | 8.9 (0.21) |
| Denmark | r | 47 (4.0) | 534 (3.4) | 52 (3.9) | 517 (2.7) | 1 (1.0) | ~ ~ | 9.7 (0.11) |
| Portugal | | 46 (3.8) | 533 (4.1) | 45 (3.8) | 521 (4.2) | 9 (2.1) | 511 (6.9) | 9.6 (0.14) |
| Philippines | | 44 (4.1) | 319 (9.5) | 52 (3.9) | 276 (8.3) | 4 (1.6) | 317 (13.7) | 9.5 (0.11) |
| Kuwait | | 44 (3.9) | 401 (7.1) | 37 (4.1) | 373 (8.5) | 19 (3.2) | 364 (11.6) | 9.1 (0.15) |
| Chile | | 41 (4.1) | 454 (5.8) | 49 (4.4) | 435 (4.0) | 9 (2.5) | 416 (11.8) | 9.4 (0.13) |
| Oman | | 36 (3.2) | 436 (5.6) | 36 (3.1) | 422 (5.2) | 28 (3.3) | 435 (11.1) | 8.7 (0.18) |
| Poland | | 36 (4.1) | 522 (4.9) | 60 (4.2) | 518 (3.2) | 4 (1.6) | 538 (7.6) | 9.3 (0.10) |
| Germany | | 36 (3.2) | 541 (2.9) | 52 (3.5) | 516 (3.3) | 12 (2.0) | 484 (9.2) | 9.2 (0.09) |
| Turkey (5) | | 33 (3.4) | 552 (6.1) | 40 (3.7) | 517 (7.5) | 27 (3.3) | 496 (9.4) | 8.8 (0.16) |
| Sweden | | 30 (3.8) | 529 (3.9) | 65 (4.1) | 518 (4.4) | 5 (1.5) | 491 (13.4) | 9.2 (0.10) |
| Morocco | | 28 (2.8) | 406 (12.9) | 24 (2.7) | 365 (10.8) | 48 (3.5) | 380 (7.4) | 7.8 (0.18) |
| South Africa (5) | | 19 (2.6) | 397 (12.0) | 53 (3.8) | 373 (5.9) | 28 (3.7) | 364 (7.3) | 8.5 (0.09) |
| **International Average** | | **60 (0.5)** | **508 (0.7)** | **32 (0.5)** | **494 (0.9)** | **8 (0.3)** | **466 (1.8)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | r | 89 (0.1) | 546 (1.8) | 10 (0.1) | 530 (4.8) | 0 (0.0) | ~ ~ | 11.1 (0.01) |
| Madrid, Spain | | 77 (3.8) | 523 (2.1) | 19 (3.6) | 497 (7.4) | 4 (1.4) | 528 (9.3) | 10.7 (0.14) |
| Moscow City, Russian Fed. | | 73 (4.2) | 595 (2.6) | 26 (4.3) | 587 (4.1) | 1 (0.6) | ~ ~ | 10.4 (0.11) |
| Quebec, Canada | | 60 (4.4) | 534 (3.2) | 37 (4.4) | 528 (3.6) | 2 (0.8) | ~ ~ | 10.1 (0.13) |
| Abu Dhabi, UAE | r | 59 (1.1) | 452 (2.8) | 38 (1.1) | 414 (4.1) | 3 (0.1) | 392 (11.3) | 10.1 (0.04) |
| Ontario, Canada | | 42 (5.3) | 519 (5.5) | 51 (5.5) | 513 (7.8) | 7 (2.0) | 456 (9.9) | 9.6 (0.14) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 8.3: School Discipline – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | Hardly Any Problems | | Minor Problems | | Moderate to Severe Problems | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 82 (3.4) | 490 (3.9) | 16 (3.2) | 483 (10.5) | 2 (1.1) | ~ ~ | 10.9 (0.14) |
| Ireland | 82 (3.2) | 530 (3.9) | 16 (3.1) | 524 (5.9) | 2 (1.2) | ~ ~ | 10.8 (0.11) |
| Kazakhstan | 82 (3.3) | 497 (3.5) | 7 (2.0) | 481 (15.6) | 12 (2.6) | 488 (10.3) | 10.9 (0.19) |
| Netherlands s | 81 (5.0) | 522 (3.6) | 19 (5.0) | 504 (6.4) | 0 (0.0) | ~ ~ | 10.9 (0.15) |
| Hong Kong SAR | 77 (4.3) | 538 (3.2) | 23 (4.2) | 510 (7.7) | 1 (0.7) | ~ ~ | 10.7 (0.14) |
| Singapore | 76 (0.0) | 597 (3.8) | 24 (0.0) | 585 (7.5) | 0 (0.0) | ~ ~ | 10.6 (0.00) |
| Armenia | 76 (3.4) | 469 (3.9) | 13 (3.2) | 448 (7.0) | 11 (2.3) | 468 (8.6) | 10.4 (0.15) |
| Croatia | 76 (3.6) | 524 (2.6) | 22 (3.5) | 526 (4.4) | 2 (1.3) | ~ ~ | 10.5 (0.12) |
| Spain | 75 (3.4) | 517 (2.6) | 22 (3.1) | 495 (7.1) | 3 (1.2) | 498 (13.0) | 10.6 (0.13) |
| Slovak Republic | 73 (3.6) | 529 (4.1) | 20 (3.5) | 519 (7.4) | 6 (1.7) | 429 (17.1) | 10.3 (0.11) |
| Japan | 73 (3.6) | 564 (2.1) | 23 (3.6) | 557 (3.2) | 4 (1.8) | 554 (8.2) | 10.4 (0.12) |
| Korea, Rep. of | 73 (3.7) | 590 (2.5) | 16 (2.8) | 582 (5.6) | 12 (3.0) | 579 (6.2) | 10.6 (0.18) |
| Northern Ireland r | 73 (3.8) | 524 (3.3) | 27 (3.9) | 508 (5.0) | 1 (0.8) | ~ ~ | 10.4 (0.11) |
| Chinese Taipei | 73 (3.2) | 558 (2.0) | 26 (3.2) | 557 (3.6) | 1 (1.0) | ~ ~ | 10.8 (0.12) |
| Lithuania | 72 (3.8) | 533 (3.2) | 28 (3.8) | 551 (6.8) | 0 (0.3) | ~ ~ | 10.4 (0.11) |
| Latvia | 72 (3.2) | 544 (3.1) | 27 (3.2) | 535 (4.1) | 1 (0.0) | ~ ~ | 10.4 (0.09) |
| Czech Republic | 71 (3.5) | 538 (3.1) | 26 (3.3) | 527 (4.4) | 3 (1.2) | 497 (7.5) | 10.3 (0.11) |
| Azerbaijan | 71 (3.2) | 424 (4.2) | 17 (2.9) | 446 (7.8) | 12 (2.7) | 418 (6.5) | 10.0 (0.16) |
| United Arab Emirates r | 70 (2.0) | 489 (2.4) | 26 (2.0) | 428 (4.2) | 4 (0.3) | 433 (11.6) | 10.5 (0.07) |
| Bulgaria | 70 (4.1) | 537 (5.5) | 24 (3.9) | 477 (13.1) | 6 (2.0) | 520 (25.5) | 10.4 (0.17) |
| Malta | 69 (0.4) | 507 (1.5) | 29 (0.4) | 475 (2.9) | 2 (0.1) | ~ ~ | 10.4 (0.01) |
| North Macedonia | 68 (3.7) | 435 (6.5) | 24 (4.2) | 409 (13.8) | 8 (2.7) | 410 (23.9) | 10.4 (0.16) |
| Qatar | 68 (3.8) | 456 (5.0) | 24 (3.6) | 439 (10.3) | 8 (1.8) | 430 (13.0) | 10.2 (0.13) |
| Russian Federation | 68 (3.6) | 570 (4.1) | 32 (3.5) | 562 (3.8) | 1 (0.6) | ~ ~ | 10.2 (0.08) |
| England s | 67 (5.1) | 545 (4.8) | 33 (5.1) | 521 (7.3) | 0 (0.0) | ~ ~ | 10.1 (0.10) |
| Italy | 66 (4.0) | 513 (3.1) | 29 (4.2) | 503 (5.8) | 5 (1.8) | 507 (9.8) | 10.0 (0.12) |
| Georgia | 66 (4.4) | 458 (4.9) | 23 (3.8) | 446 (5.7) | 11 (2.9) | 449 (11.2) | 10.1 (0.19) |
| Bahrain | 65 (2.8) | 505 (3.5) | 27 (2.8) | 483 (7.9) | 8 (0.7) | 431 (11.4) | 10.2 (0.09) |
| Saudi Arabia | 64 (3.5) | 410 (5.2) | 23 (3.2) | 390 (9.8) | 14 (2.7) | 389 (16.9) | 10.0 (0.16) |
| Belgium (Flemish) | 61 (4.5) | 508 (2.9) | 37 (4.6) | 491 (4.3) | 2 (1.4) | ~ ~ | 10.1 (0.12) |
| Iran, Islamic Rep. of | 59 (3.7) | 449 (5.7) | 33 (3.6) | 432 (8.7) | 8 (1.8) | 415 (11.1) | 10.1 (0.12) |
| New Zealand | 59 (3.6) | 519 (3.3) | 38 (3.7) | 482 (4.9) | 3 (1.4) | 451 (10.7) | 10.1 (0.10) |
| Norway (5) r | 58 (4.3) | 543 (3.2) | 33 (4.1) | 539 (4.7) | 9 (3.2) | 525 (7.6) | 9.7 (0.12) |
| France | 57 (4.1) | 497 (4.3) | 39 (4.3) | 480 (4.7) | 4 (1.4) | 442 (8.0) | 9.9 (0.11) |
| Australia | 57 (3.5) | 545 (3.6) | 40 (3.4) | 519 (4.2) | 3 (1.3) | 467 (14.3) | 9.9 (0.11) |
| Serbia | 55 (4.3) | 515 (4.6) | 32 (3.7) | 519 (6.1) | 12 (2.8) | 523 (8.8) | 9.7 (0.16) |
| Bosnia and Herzegovina | 55 (3.7) | 462 (4.0) | 29 (3.5) | 459 (5.5) | 16 (3.1) | 447 (6.9) | 9.6 (0.18) |
| United States | 55 (2.6) | 552 (4.2) | 41 (2.6) | 524 (4.4) | 4 (1.1) | 503 (16.7) | 9.9 (0.08) |
| Finland | 53 (3.8) | 560 (3.6) | 42 (3.8) | 552 (2.9) | 5 (1.9) | 518 (13.4) | 9.9 (0.10) |
| Canada | 53 (2.9) | 528 (2.3) | 43 (3.0) | 521 (3.6) | 4 (1.0) | 489 (9.6) | 9.9 (0.09) |
| Montenegro | 52 (0.5) | 452 (3.0) | 34 (0.4) | 458 (4.0) | 14 (0.3) | 447 (4.2) | 9.7 (0.02) |
| Pakistan | 51 (6.5) | 281 (19.4) | 38 (6.4) | 296 (20.1) | 11 (2.7) | 318 (23.7) | 9.4 (0.19) |
| Hungary | 50 (4.7) | 538 (3.9) | 42 (4.5) | 526 (5.8) | 8 (2.3) | 485 (14.7) | 9.7 (0.12) |
| Cyprus | 49 (4.8) | 518 (3.7) | 45 (4.6) | 508 (4.8) | 6 (2.3) | 483 (7.4) | 9.8 (0.16) |
| Austria | 49 (3.7) | 533 (3.8) | 41 (3.8) | 517 (4.4) | 10 (2.3) | 488 (11.9) | 9.6 (0.11) |
| Kosovo | 47 (4.4) | 406 (5.7) | 26 (3.6) | 417 (6.9) | 27 (3.7) | 423 (6.2) | 8.9 (0.21) |
| Denmark r | 47 (4.0) | 530 (3.8) | 52 (3.9) | 516 (3.0) | 1 (1.0) | ~ ~ | 9.7 (0.11) |
| Portugal | 46 (3.8) | 510 (3.5) | 45 (3.8) | 500 (3.6) | 9 (2.1) | 494 (5.9) | 9.6 (0.14) |
| Philippines | 44 (4.1) | 275 (11.2) | 52 (3.9) | 225 (10.0) | 4 (1.6) | 268 (19.5) | 9.5 (0.11) |
| Kuwait | 44 (3.9) | 419 (8.6) | 37 (4.1) | 377 (10.7) | 19 (3.2) | 366 (14.6) | 9.1 (0.15) |
| Chile | 41 (4.1) | 481 (5.0) | 49 (4.4) | 465 (4.1) | 9 (2.5) | 443 (10.8) | 9.4 (0.13) |
| Oman | 36 (3.2) | 437 (6.0) | 36 (3.1) | 429 (6.0) | 28 (3.3) | 438 (11.8) | 8.7 (0.18) |
| Poland | 36 (4.1) | 533 (4.6) | 60 (4.2) | 528 (3.0) | 4 (1.6) | 549 (7.7) | 9.3 (0.10) |
| Germany | 36 (3.2) | 541 (3.1) | 52 (3.5) | 514 (3.3) | 12 (2.0) | 473 (8.9) | 9.2 (0.09) |
| Turkey (5) | 33 (3.4) | 553 (5.3) | 40 (3.7) | 521 (7.3) | 27 (3.3) | 502 (9.5) | 8.8 (0.16) |
| Sweden | 30 (3.8) | 545 (3.9) | 65 (4.1) | 534 (5.1) | 5 (1.5) | 509 (15.9) | 9.2 (0.10) |
| Morocco | 28 (2.8) | 396 (15.4) | 24 (2.7) | 356 (11.8) | 48 (3.5) | 371 (9.5) | 7.8 (0.18) |
| South Africa (5) | 19 (2.6) | 355 (16.5) | 53 (3.8) | 323 (8.1) | 28 (3.7) | 313 (10.8) | 8.5 (0.09) |
| **International Average** | **60 (0.5)** | **498 (0.8)** | **32 (0.5)** | **483 (1.0)** | **8 (0.3)** | **457 (1.9)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 89 (0.1) | 547 (2.0) | 10 (0.1) | 532 (6.1) | 0 (0.0) | ~ ~ | 11.1 (0.01) |
| Madrid, Spain | 77 (3.8) | 527 (2.0) | 19 (3.6) | 507 (5.9) | 4 (1.4) | 522 (8.7) | 10.7 (0.14) |
| Moscow City, Russian Fed. | 73 (4.2) | 597 (2.6) | 26 (4.3) | 589 (4.1) | 1 (0.6) | ~ ~ | 10.4 (0.11) |
| Quebec, Canada | 60 (4.4) | 525 (2.8) | 37 (4.4) | 518 (4.0) | 2 (0.8) | ~ ~ | 10.1 (0.13) |
| Abu Dhabi, UAE r | 59 (1.1) | 434 (3.6) | 38 (1.1) | 384 (4.8) | 3 (0.1) | 350 (12.3) | 10.1 (0.04) |
| Ontario, Canada | 42 (5.3) | 529 (4.5) | 51 (5.5) | 525 (5.6) | 7 (2.0) | 480 (10.2) | 9.6 (0.14) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.4: School Discipline – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | | Hardly Any Problems | | Minor Problems | | Moderate to Severe Problems | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Kazakhstan | | 78 (3.7) | 491 (3.9) | 11 (2.6) | 480 (9.6) | 11 (2.6) | 467 (18.0) | 11.7 (0.21) |
| Hong Kong SAR | | 76 (3.6) | 586 (4.9) | 24 (3.6) | 555 (13.3) | 0 (0.0) | ~ ~ | 11.7 (0.12) |
| United Arab Emirates | | 72 (1.5) | 486 (2.2) | 25 (1.5) | 437 (4.0) | 3 (0.2) | 383 (8.4) | 11.6 (0.05) |
| Singapore | | 70 (0.0) | 624 (4.6) | 30 (0.0) | 597 (7.6) | 0 (0.0) | ~ ~ | 11.4 (0.00) |
| Chinese Taipei | | 68 (3.0) | 619 (3.4) | 32 (3.0) | 600 (5.7) | 0 (0.0) | ~ ~ | 11.7 (0.11) |
| Japan | | 68 (3.5) | 598 (3.6) | 25 (3.3) | 590 (5.1) | 7 (2.2) | 576 (8.0) | 11.0 (0.14) |
| Ireland | | 60 (4.1) | 534 (3.3) | 36 (4.0) | 515 (4.4) | 3 (1.5) | 467 (19.4) | 10.9 (0.14) |
| Bahrain | | 59 (0.2) | 487 (1.9) | 28 (0.2) | 470 (2.7) | 13 (0.1) | 476 (8.0) | 10.7 (0.01) |
| Saudi Arabia | | 58 (3.6) | 399 (3.2) | 24 (2.8) | 391 (4.8) | 18 (2.8) | 381 (5.5) | 10.8 (0.21) |
| Qatar | | 53 (3.9) | 451 (5.9) | 39 (3.5) | 439 (9.3) | 8 (1.9) | 415 (14.6) | 10.8 (0.15) |
| Oman | | 51 (3.4) | 420 (4.6) | 27 (3.5) | 412 (7.1) | 22 (3.1) | 388 (7.7) | 10.3 (0.20) |
| Russian Federation | | 51 (4.0) | 547 (5.4) | 48 (3.9) | 540 (6.4) | 1 (0.6) | ~ ~ | 10.7 (0.11) |
| Korea, Rep. of | | 50 (4.6) | 608 (4.1) | 40 (4.3) | 605 (4.3) | 9 (2.6) | 610 (7.1) | 10.8 (0.19) |
| Australia | | 50 (3.2) | 549 (5.5) | 44 (3.4) | 491 (5.8) | 6 (1.7) | 467 (7.6) | 10.7 (0.10) |
| Romania | | 49 (4.1) | 497 (6.5) | 43 (4.1) | 464 (5.5) | 8 (2.6) | 454 (15.7) | 10.6 (0.19) |
| Lithuania | | 49 (4.5) | 521 (4.3) | 50 (4.5) | 517 (4.8) | 1 (0.7) | ~ ~ | 10.7 (0.12) |
| Iran, Islamic Rep. of | | 47 (3.8) | 465 (6.4) | 46 (3.9) | 431 (5.3) | 7 (1.9) | 419 (12.8) | 10.6 (0.13) |
| Georgia | | 46 (4.3) | 466 (5.9) | 41 (4.1) | 468 (6.4) | 13 (3.0) | 425 (11.3) | 10.3 (0.19) |
| Israel | | 46 (3.6) | 541 (7.2) | 49 (3.8) | 504 (6.4) | 5 (1.6) | 464 (20.2) | 10.5 (0.11) |
| Hungary | | 45 (4.0) | 535 (6.7) | 50 (4.2) | 508 (4.7) | 5 (1.7) | 436 (20.1) | 10.4 (0.14) |
| Malaysia | | 45 (4.1) | 477 (5.5) | 49 (4.0) | 450 (5.1) | 6 (2.0) | 424 (14.1) | 10.5 (0.15) |
| Cyprus | r | 44 (0.5) | 529 (2.8) | 40 (0.5) | 483 (2.4) | 17 (0.4) | 475 (5.5) | 10.2 (0.02) |
| England | s | 43 (5.2) | 534 (10.0) | 57 (5.2) | 511 (9.1) | 0 (0.0) | ~ ~ | 10.8 (0.13) |
| Lebanon | | 41 (4.3) | 436 (4.3) | 35 (4.0) | 420 (5.9) | 24 (3.7) | 428 (7.9) | 9.6 (0.22) |
| United States | | 40 (3.0) | 549 (6.3) | 54 (2.9) | 503 (6.4) | 6 (1.7) | 466 (15.2) | 10.3 (0.10) |
| Chile | | 38 (3.9) | 464 (5.5) | 51 (3.9) | 429 (5.0) | 12 (2.4) | 418 (8.4) | 10.1 (0.14) |
| New Zealand | | 37 (4.8) | 510 (6.3) | 61 (4.6) | 474 (4.6) | 2 (1.3) | ~ ~ | 10.4 (0.16) |
| France | r | 37 (4.3) | 502 (4.3) | 56 (4.7) | 481 (3.6) | 7 (2.5) | 427 (7.7) | 10.1 (0.14) |
| Turkey | | 36 (3.6) | 519 (6.6) | 44 (4.0) | 482 (6.7) | 19 (3.2) | 483 (14.0) | 9.8 (0.18) |
| Norway (9) | r | 36 (4.7) | 511 (3.7) | 60 (4.8) | 501 (4.3) | 4 (1.7) | 497 (10.3) | 10.2 (0.14) |
| Jordan | | 36 (3.6) | 432 (9.0) | 41 (3.6) | 418 (6.5) | 23 (3.1) | 406 (5.3) | 9.8 (0.20) |
| Italy | | 33 (4.1) | 508 (4.9) | 62 (4.2) | 493 (3.6) | 5 (1.7) | 497 (10.8) | 10.1 (0.13) |
| Portugal | | 32 (3.8) | 511 (6.0) | 60 (4.1) | 497 (4.4) | 8 (2.4) | 485 (15.1) | 10.0 (0.13) |
| Kuwait | | 28 (3.9) | 421 (9.7) | 45 (4.2) | 401 (5.9) | 28 (3.8) | 384 (9.7) | 9.3 (0.21) |
| Finland | | 26 (3.3) | 519 (4.6) | 71 (3.3) | 506 (2.9) | 3 (1.6) | 468 (11.4) | 10.0 (0.10) |
| Egypt | | 25 (3.7) | 432 (8.9) | 34 (3.9) | 407 (8.6) | 41 (4.0) | 407 (7.9) | 8.6 (0.19) |
| Morocco | | 17 (3.1) | 400 (7.3) | 31 (3.2) | 380 (5.6) | 52 (3.5) | 390 (3.5) | 8.1 (0.19) |
| Sweden | | 14 (3.1) | 522 (8.4) | 78 (3.8) | 503 (2.8) | 9 (2.4) | 475 (6.4) | 9.4 (0.09) |
| South Africa (9) | | 11 (1.9) | 420 (13.0) | 50 (3.0) | 395 (3.7) | 39 (2.7) | 373 (2.9) | 8.7 (0.09) |
| **International Average** | | **45 (0.6)** | **503 (1.0)** | **43 (0.6)** | **481 (1.0)** | **11 (0.4)** | **448 (2.1)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | r | 87 (0.2) | 543 (2.5) | 12 (0.2) | 486 (7.4) | 0 (0.0) | ~ ~ | 12.0 (0.01) |
| Abu Dhabi, UAE | r | 64 (1.3) | 447 (4.4) | 31 (1.3) | 417 (4.7) | 5 (0.1) | 361 (11.0) | 11.3 (0.06) |
| Moscow City, Russian Fed. | | 56 (4.6) | 579 (5.4) | 44 (4.6) | 570 (6.4) | 0 (0.0) | ~ ~ | 10.8 (0.09) |
| Quebec, Canada | | 46 (4.7) | 555 (5.0) | 49 (4.9) | 540 (6.4) | 5 (2.2) | 538 (7.0) | 10.5 (0.15) |
| Ontario, Canada | r | 37 (5.1) | 542 (5.9) | 56 (5.5) | 522 (8.1) | 6 (2.3) | 499 (15.6) | 10.2 (0.15) |
| Western Cape, RSA (9) | | 13 (2.3) | 559 (9.4) | 43 (3.9) | 445 (7.2) | 43 (3.9) | 402 (5.1) | 8.7 (0.12) |
| Gauteng, RSA (9) | | 10 (2.1) | 502 (13.2) | 44 (4.3) | 427 (5.5) | 46 (3.9) | 395 (3.9) | 8.5 (0.10) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 8.5: School Discipline – Principals' Reports

*Students' Results based on Principals' Reports*

| Country | Hardly Any Problems | | Minor Problems | | Moderate to Severe Problems | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Kazakhstan | 78 (3.7) | 481 (3.7) | 11 (2.6) | 472 (10.9) | 11 (2.6) | 464 (18.0) | 11.7 (0.21) |
| Hong Kong SAR | 76 (3.6) | 505 (6.2) | 24 (3.6) | 499 (13.2) | 0 (0.0) | ~ ~ | 11.7 (0.12) |
| United Arab Emirates | 72 (1.5) | 489 (2.7) | 25 (1.5) | 430 (5.0) | 3 (0.2) | 345 (7.6) | 11.6 (0.05) |
| Singapore | 70 (0.0) | 615 (4.4) | 30 (0.0) | 590 (7.7) | 0 (0.0) | ~ ~ | 11.4 (0.00) |
| Chinese Taipei | 68 (3.0) | 579 (2.4) | 32 (3.0) | 564 (4.3) | 0 (0.0) | ~ ~ | 11.7 (0.11) |
| Japan | 68 (3.5) | 572 (2.7) | 25 (3.3) | 565 (4.0) | 7 (2.2) | 559 (6.6) | 11.0 (0.14) |
| Ireland | 60 (4.1) | 535 (3.5) | 36 (4.0) | 513 (5.1) | 3 (1.5) | 469 (23.4) | 10.9 (0.14) |
| Bahrain | 59 (0.2) | 496 (2.4) | 28 (0.2) | 465 (2.7) | 13 (0.1) | 485 (4.8) | 10.7 (0.01) |
| Saudi Arabia | 58 (3.6) | 438 (3.7) | 24 (2.8) | 427 (5.9) | 18 (2.8) | 416 (5.6) | 10.8 (0.21) |
| Qatar | 53 (3.9) | 479 (5.7) | 39 (3.5) | 470 (10.0) | 8 (1.9) | 462 (11.2) | 10.8 (0.15) |
| Oman | 51 (3.4) | 466 (4.8) | 27 (3.5) | 456 (8.1) | 22 (3.1) | 437 (8.7) | 10.3 (0.20) |
| Russian Federation | 51 (4.0) | 546 (4.8) | 48 (3.9) | 540 (5.7) | 1 (0.6) | ~ ~ | 10.7 (0.11) |
| Korea, Rep. of | 50 (4.6) | 561 (3.3) | 40 (4.3) | 560 (3.3) | 9 (2.6) | 560 (5.5) | 10.8 (0.19) |
| Australia | 50 (3.2) | 556 (4.1) | 44 (3.4) | 506 (5.1) | 6 (1.7) | 482 (7.7) | 10.7 (0.10) |
| Romania | 49 (4.1) | 486 (6.2) | 43 (4.1) | 457 (4.8) | 8 (2.6) | 445 (11.2) | 10.6 (0.19) |
| Lithuania | 49 (4.5) | 534 (4.1) | 50 (4.5) | 531 (4.5) | 1 (0.7) | ~ ~ | 10.7 (0.12) |
| Iran, Islamic Rep. of | 47 (3.8) | 466 (6.1) | 46 (3.9) | 436 (5.3) | 7 (1.9) | 426 (12.6) | 10.6 (0.13) |
| Georgia | 46 (4.3) | 451 (5.3) | 41 (4.1) | 451 (5.7) | 13 (3.0) | 420 (11.1) | 10.3 (0.19) |
| Israel | 46 (3.6) | 533 (6.5) | 49 (3.8) | 499 (6.5) | 5 (1.6) | 472 (20.8) | 10.5 (0.11) |
| Hungary | 45 (4.0) | 546 (5.7) | 50 (4.2) | 523 (4.3) | 5 (1.7) | 457 (18.5) | 10.4 (0.14) |
| Malaysia | 45 (4.1) | 476 (5.7) | 49 (4.0) | 449 (5.5) | 6 (2.0) | 430 (16.0) | 10.5 (0.15) |
| Cyprus r | 44 (0.5) | 509 (3.0) | 40 (0.5) | 466 (3.3) | 17 (0.4) | 461 (5.9) | 10.2 (0.02) |
| England s | 43 (5.2) | 535 (9.7) | 57 (5.2) | 512 (8.3) | 0 (0.0) | ~ ~ | 10.8 (0.13) |
| Lebanon | 41 (4.3) | 390 (7.7) | 35 (4.0) | 362 (8.7) | 24 (3.7) | 374 (12.1) | 9.6 (0.22) |
| United States | 40 (3.0) | 555 (5.0) | 54 (2.9) | 511 (6.6) | 6 (1.7) | 473 (14.6) | 10.3 (0.10) |
| Chile | 38 (3.9) | 486 (5.1) | 51 (3.9) | 451 (4.9) | 12 (2.4) | 439 (8.7) | 10.1 (0.14) |
| New Zealand | 37 (4.8) | 524 (7.6) | 61 (4.6) | 493 (4.7) | 2 (1.3) | ~ ~ | 10.4 (0.16) |
| France r | 37 (4.3) | 511 (4.3) | 56 (4.7) | 484 (3.9) | 7 (2.5) | 426 (8.3) | 10.1 (0.14) |
| Turkey | 36 (3.6) | 535 (5.7) | 44 (4.0) | 504 (5.7) | 19 (3.2) | 505 (12.5) | 9.8 (0.18) |
| Norway (9) r | 36 (4.7) | 506 (5.1) | 60 (4.8) | 492 (4.7) | 4 (1.7) | 488 (12.6) | 10.2 (0.14) |
| Jordan | 36 (3.6) | 468 (10.2) | 41 (3.6) | 446 (7.0) | 23 (3.1) | 437 (7.4) | 9.8 (0.20) |
| Italy | 33 (4.1) | 509 (4.5) | 62 (4.2) | 498 (3.6) | 5 (1.7) | 498 (11.1) | 10.1 (0.13) |
| Portugal | 32 (3.8) | 527 (5.1) | 60 (4.1) | 516 (4.0) | 8 (2.4) | 506 (15.0) | 10.0 (0.13) |
| Kuwait | 28 (3.9) | 468 (9.6) | 45 (4.2) | 440 (7.5) | 28 (3.8) | 423 (10.7) | 9.3 (0.21) |
| Finland | 26 (3.3) | 555 (5.4) | 71 (3.3) | 540 (3.7) | 3 (1.6) | 491 (8.7) | 10.0 (0.10) |
| Egypt | 25 (3.7) | 409 (8.8) | 34 (3.9) | 386 (9.9) | 41 (4.0) | 381 (8.3) | 8.6 (0.19) |
| Morocco | 17 (3.1) | 406 (8.7) | 31 (3.2) | 384 (7.0) | 52 (3.5) | 396 (4.2) | 8.1 (0.19) |
| Sweden | 14 (3.1) | 545 (9.6) | 78 (3.8) | 522 (3.5) | 9 (2.4) | 484 (10.2) | 9.4 (0.09) |
| South Africa (9) | 11 (1.9) | 406 (18.4) | 50 (3.0) | 377 (5.0) | 39 (2.7) | 350 (4.3) | 8.7 (0.09) |
| **International Average** | **45 (0.6)** | **504 (1.0)** | **43 (0.6)** | **482 (1.0)** | **11 (0.4)** | **452 (2.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 87 (0.2) | 554 (2.3) | 12 (0.2) | 499 (7.6) | 0 (0.0) | ~ ~ | 12.0 (0.01) |
| Abu Dhabi, UAE r | 64 (1.3) | 436 (5.4) | 31 (1.3) | 395 (6.3) | 5 (0.1) | 305 (8.0) | 11.3 (0.06) |
| Moscow City, Russian Fed. | 56 (4.6) | 568 (4.0) | 44 (4.6) | 565 (4.5) | 0 (0.0) | ~ ~ | 10.8 (0.09) |
| Quebec, Canada | 46 (4.7) | 547 (4.5) | 49 (4.9) | 535 (6.0) | 5 (2.2) | 531 (8.9) | 10.5 (0.15) |
| Ontario, Canada r | 37 (5.1) | 531 (5.4) | 56 (5.5) | 516 (5.2) | 6 (2.3) | 494 (14.7) | 10.2 (0.15) |
| Western Cape, RSA (9) | 13 (2.3) | 585 (11.5) | 43 (3.9) | 443 (8.9) | 43 (3.9) | 392 (6.2) | 8.7 (0.12) |
| Gauteng, RSA (9) | 10 (2.1) | 524 (16.6) | 44 (4.3) | 432 (7.0) | 46 (3.9) | 388 (5.2) | 8.5 (0.10) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Safe and Orderly School

In addition to principals' reports, previous TIMSS assessments have also asked teachers about their perceptions of school safety and found that a strong perception of safety and order in school was related to higher average achievement in mathematics and science. For TIMSS 2019, teachers of students in both the fourth and eighth grade assessments were asked the degree to which they agreed or disagreed with eight statements on the *Safe and Orderly School* scale (see About the Scale in Exhibit 8.6). Based on their teachers' responses, students were categorized as being in "very safe and orderly" schools, "somewhat safe and orderly" schools, and "less than safe and orderly" schools.

Exhibits 8.7 and 8.8 present the percentages of fourth grade students in the three categories in relation to average mathematics achievement and average science achievement, respectively. Across countries, on average, more than half the fourth grade students (61%) attended schools judged by their teachers to be "very safe and orderly," with almost all of the remaining students (36%) in schools perceived to be "somewhat safe and orderly." Internationally, on average, students attending "very safe and orderly" schools as reported by their teachers had the highest average mathematics achievement (507) and science achievement (497) compared with students in "somewhat safe and orderly" schools (495 in mathematics and 484 in science). Only small percentages of students (4%, on average) were in schools judged to be "less than safe and orderly."

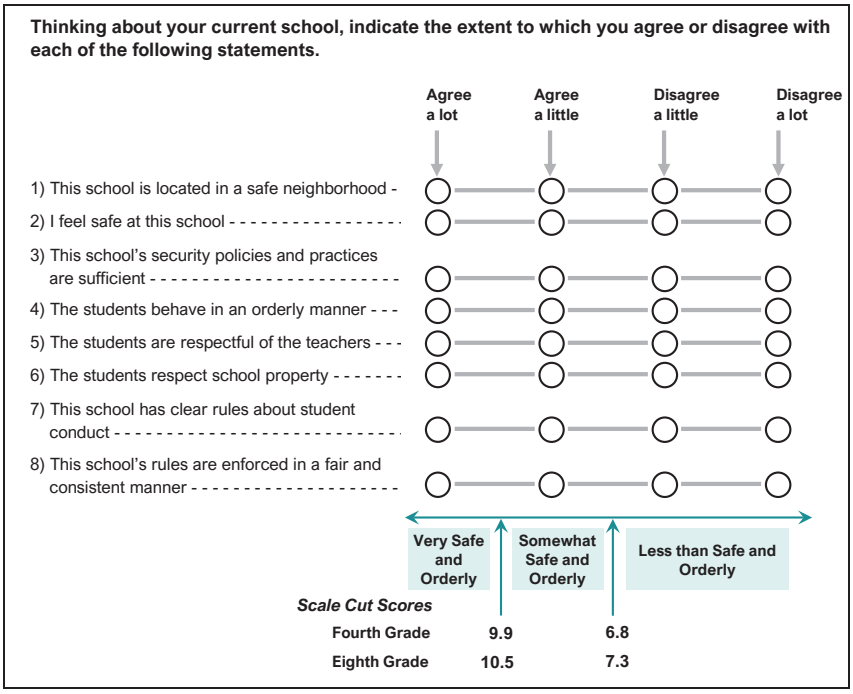
Exhibits 8.9 and 8.10 present the corresponding *Safe and Orderly School* scale results at the eighth grade in relation to mathematics achievement and science achievement, respectively. Similar to the fourth grade, almost all the eighth grade students (93% on average across countries) were in "very safe and orderly" or "somewhat safe and orderly" schools, but smaller percentages of eighth grade students were in the "very safe and orderly" category, and larger percentages of were in the "somewhat safe and orderly" category. On average, 48 percent of eighth grade students attended schools judged by their teachers to be "very safe and orderly," 45 percent were in "somewhat safe and orderly" schools, and 6 percent were in "less than safe and orderly" schools. There was a strong positive association between eighth grade students' average achievement and their teachers' reports about school safety, with students in "very safe and orderly" schools having average mathematics achievement 41 points higher than students in "less than safe and orderly" schools (501 vs. 460). Similarly, students in "very safe and orderly" schools had average science achievement 35 points higher than students in "less than safe and orderly" schools (501 vs. 466).

## Exhibit 8.6: Safe and Orderly School – Teachers' Reports

*Students' Results based on Teachers' Reports*

### About the Scale

Students were scored according to their teachers' responses to eight statements on the *Safe and Orderly School* scale. Cut scores divide the scale into three categories. Students in **Very Safe and Orderly** schools had a score at or above the cut score corresponding to their teachers "agreeing a lot" with four of the eight statements and "agreeing a little" with the other four, on average. Students in **Less than Safe and Orderly** schools had a score at or below the cut score corresponding to their teachers "disagreeing a little" with four of the eight statements and "agreeing a little" with the other four, on average. All other students were in **Somewhat Safe and Orderly** schools.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.7: Safe and Orderly School – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | Very Safe and Orderly | | Somewhat Safe and Orderly | | Less than Safe and Orderly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 97 (1.3) | 494 (3.5) | 3 (1.3) | 502 (17.7) | 0 (0.0) | ~ ~ | 12.6 (0.10) |
| Kosovo | 91 (2.3) | 445 (3.2) | 9 (2.4) | 432 (10.3) | 0 (0.5) | ~ ~ | 12.2 (0.12) |
| Azerbaijan | 86 (2.8) | 513 (2.9) | 13 (2.6) | 525 (9.0) | 1 (0.8) | ~ ~ | 11.5 (0.14) |
| Armenia | 85 (3.0) | 502 (2.8) | 15 (3.0) | 483 (6.4) | 0 (0.2) | ~ ~ | 11.4 (0.13) |
| Montenegro | 85 (1.7) | 453 (2.2) | 14 (1.7) | 452 (7.7) | 0 (0.0) | ~ ~ | 11.5 (0.07) |
| Kuwait | 82 (2.9) | 387 (5.4) | 17 (2.8) | 365 (13.2) | 1 (0.7) | ~ ~ | 11.3 (0.13) |
| Georgia | 81 (3.3) | 479 (3.9) | 18 (3.3) | 493 (7.7) | 1 (0.5) | ~ ~ | 11.2 (0.14) |
| Bosnia and Herzegovina | 80 (2.8) | 452 (3.1) | 18 (2.7) | 454 (5.2) | 1 (0.7) | ~ ~ | 11.3 (0.13) |
| Saudi Arabia | 79 (3.1) | 403 (4.6) | 20 (3.0) | 382 (8.0) | 1 (0.7) | ~ ~ | 11.3 (0.13) |
| Pakistan | 79 (3.9) | 343 (14.0) | 19 (3.5) | 293 (17.4) | 2 (1.4) | ~ ~ | 11.2 (0.27) |
| Ireland | 78 (3.1) | 553 (2.8) | 19 (2.9) | 535 (5.8) | 3 (1.4) | 511 (11.3) | 11.5 (0.15) |
| North Macedonia | 76 (3.4) | 469 (6.3) | 22 (3.4) | 484 (10.1) | 1 (0.7) | ~ ~ | 11.2 (0.15) |
| Spain | 76 (3.1) | 508 (2.3) | 22 (2.9) | 489 (3.8) | 2 (0.9) | ~ ~ | 11.2 (0.14) |
| Northern Ireland | 75 (3.6) | 572 (3.4) | 23 (3.4) | 545 (6.1) | 2 (1.5) | ~ ~ | 11.6 (0.18) |
| United Arab Emirates r | 75 (1.0) | 496 (2.0) | 22 (0.9) | 441 (5.7) | 3 (0.4) | 393 (11.9) | 11.4 (0.05) |
| Qatar | 74 (2.5) | 448 (4.6) | 25 (2.5) | 452 (8.1) | 2 (0.9) | ~ ~ | 11.2 (0.13) |
| Bulgaria | 73 (3.1) | 521 (5.6) | 26 (2.9) | 497 (7.3) | 1 (0.8) | ~ ~ | 10.8 (0.13) |
| Serbia | 73 (4.2) | 504 (3.9) | 24 (4.0) | 518 (6.2) | 3 (1.4) | 516 (10.9) | 10.8 (0.15) |
| Kazakhstan | 72 (3.4) | 514 (3.1) | 27 (3.3) | 510 (5.2) | 1 (0.6) | ~ ~ | 11.2 (0.14) |
| Portugal | 71 (2.9) | 533 (2.8) | 27 (2.9) | 509 (5.1) | 1 (0.4) | ~ ~ | 10.7 (0.12) |
| Philippines | 70 (3.8) | 304 (7.4) | 27 (3.8) | 272 (10.7) | 2 (1.2) | ~ ~ | 10.8 (0.15) |
| Netherlands r | 69 (3.6) | 541 (3.3) | 28 (3.6) | 529 (3.4) | 3 (1.5) | 513 (7.3) | 10.6 (0.17) |
| Singapore | 68 (2.5) | 627 (4.6) | 30 (2.5) | 624 (6.4) | 3 (0.9) | 594 (29.4) | 10.9 (0.10) |
| Iran, Islamic Rep. of | 67 (3.1) | 445 (4.8) | 30 (3.1) | 439 (8.4) | 2 (1.1) | ~ ~ | 10.7 (0.13) |
| New Zealand | 67 (2.8) | 496 (3.4) | 29 (2.5) | 473 (5.6) | 4 (1.3) | 451 (20.6) | 10.7 (0.13) |
| Oman | 66 (3.4) | 435 (5.3) | 33 (3.4) | 427 (7.5) | 1 (0.5) | ~ ~ | 10.7 (0.13) |
| Bahrain | 65 (2.8) | 481 (3.1) | 33 (2.9) | 480 (5.4) | 2 (1.1) | ~ ~ | 10.7 (0.11) |
| Australia | 64 (3.5) | 529 (3.7) | 28 (3.0) | 504 (7.4) | 8 (2.3) | 479 (9.0) | 10.6 (0.16) |
| Lithuania | 63 (3.6) | 543 (3.8) | 36 (3.5) | 539 (3.3) | 1 (0.6) | ~ ~ | 10.4 (0.12) |
| Russian Federation | 62 (3.5) | 567 (4.4) | 36 (3.4) | 566 (4.5) | 2 (1.0) | ~ ~ | 10.3 (0.14) |
| Hong Kong SAR | 61 (4.3) | 612 (3.7) | 38 (4.4) | 585 (5.4) | 0 (0.5) | ~ ~ | 10.5 (0.16) |
| Austria | 60 (2.7) | 545 (2.4) | 37 (2.8) | 533 (3.5) | 2 (0.9) | ~ ~ | 10.2 (0.10) |
| Norway (5) r | 59 (4.1) | 549 (3.4) | 38 (4.0) | 540 (3.5) | 3 (1.1) | 535 (6.6) | 10.2 (0.18) |
| Cyprus | 59 (3.4) | 534 (3.8) | 37 (3.1) | 532 (4.0) | 4 (1.2) | 539 (16.5) | 10.4 (0.16) |
| Latvia | 58 (3.6) | 552 (2.8) | 40 (3.4) | 541 (4.1) | 2 (1.3) | ~ ~ | 10.0 (0.10) |
| Italy | 57 (3.7) | 518 (2.8) | 41 (3.5) | 512 (4.2) | 2 (1.2) | ~ ~ | 10.0 (0.12) |
| England s | 55 (5.6) | 564 (6.1) | 41 (5.6) | 553 (7.9) | 4 (1.9) | 537 (20.9) | 10.4 (0.22) |
| Morocco | 54 (3.5) | 399 (5.4) | 40 (3.3) | 367 (6.4) | 6 (1.8) | 336 (9.4) | 10.1 (0.16) |
| Slovak Republic | 53 (3.0) | 515 (4.2) | 45 (3.0) | 504 (4.7) | 2 (0.9) | ~ ~ | 9.8 (0.10) |
| Czech Republic | 52 (4.1) | 539 (3.6) | 47 (4.1) | 527 (4.3) | 1 (0.5) | ~ ~ | 10.0 (0.14) |
| Poland | 51 (3.8) | 520 (3.4) | 47 (3.9) | 520 (4.4) | 2 (1.0) | ~ ~ | 9.7 (0.12) |
| Turkey (5) | 51 (3.8) | 538 (5.5) | 41 (3.9) | 515 (7.6) | 8 (2.0) | 461 (12.4) | 9.8 (0.16) |
| Canada | 48 (2.9) | 515 (4.4) | 45 (2.9) | 512 (3.6) | 7 (1.3) | 493 (7.8) | 10.0 (0.13) |
| Germany | 47 (3.8) | 534 (3.1) | 46 (4.0) | 513 (3.9) | 7 (1.8) | 486 (10.4) | 9.6 (0.14) |
| Denmark | 47 (4.1) | 531 (3.3) | 44 (4.1) | 520 (3.4) | 9 (2.1) | 513 (5.9) | 9.7 (0.16) |
| United States | 47 (2.7) | 552 (3.3) | 43 (2.6) | 527 (3.8) | 10 (1.3) | 495 (6.1) | 9.8 (0.13) |
| Croatia | 47 (3.2) | 508 (3.6) | 52 (3.2) | 510 (2.7) | 1 (0.7) | ~ ~ | 10.0 (0.12) |
| Hungary | 45 (3.7) | 532 (4.5) | 48 (3.9) | 524 (4.7) | 7 (1.9) | 476 (16.1) | 9.5 (0.12) |
| Malta | 45 (0.4) | 517 (1.8) | 48 (0.4) | 505 (2.1) | 8 (0.2) | 491 (3.0) | 9.7 (0.02) |
| Chinese Taipei | 40 (3.7) | 602 (2.7) | 54 (3.6) | 596 (2.7) | 6 (1.9) | 603 (5.9) | 9.4 (0.15) |
| France | 37 (3.2) | 501 (4.7) | 60 (3.2) | 477 (4.0) | 3 (1.0) | 456 (13.3) | 9.5 (0.11) |
| Sweden | 37 (3.9) | 538 (4.3) | 59 (3.9) | 514 (3.3) | 4 (1.6) | 497 (13.9) | 9.3 (0.13) |
| South Africa (5) | 35 (3.5) | 387 (7.8) | 51 (4.0) | 366 (5.8) | 14 (2.0) | 366 (8.8) | 9.0 (0.12) |
| Korea, Rep. of | 33 (4.1) | 610 (4.1) | 61 (4.2) | 594 (2.9) | 6 (1.7) | 599 (7.3) | 9.5 (0.18) |
| Chile | 31 (4.1) | 453 (6.0) | 59 (4.2) | 438 (3.8) | 10 (2.2) | 420 (8.8) | 9.0 (0.16) |
| Finland | 31 (2.9) | 542 (3.7) | 63 (3.1) | 528 (2.4) | 6 (1.5) | 516 (9.5) | 9.2 (0.10) |
| Belgium (Flemish) | 28 (3.0) | 544 (3.1) | 66 (3.0) | 531 (2.3) | 5 (1.5) | 505 (8.8) | 9.1 (0.11) |
| Japan | 8 (1.8) | 596 (3.8) | 80 (2.9) | 594 (2.1) | 12 (2.6) | 583 (3.3) | 8.2 (0.09) |
| **International Average** | **61 (0.4)** | **507 (0.6)** | **36 (0.4)** | **495 (0.9)** | **4 (0.2)** | **495 (2.4)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 85 (1.6) | 550 (2.2) | 15 (1.7) | 525 (8.7) | 0 (0.4) | ~ ~ | 11.9 (0.08) |
| Madrid, Spain | 72 (3.8) | 523 (2.1) | 25 (3.9) | 508 (5.1) | 2 (1.5) | ~ ~ | 11.1 (0.14) |
| Moscow City, Russian Fed. | 60 (4.3) | 595 (2.6) | 39 (4.3) | 588 (4.0) | 1 (0.7) | ~ ~ | 10.4 (0.16) |
| Abu Dhabi, UAE | 57 (2.1) | 470 (3.5) | 36 (2.1) | 406 (5.8) | 6 (1.1) | 388 (13.1) | 10.5 (0.10) |
| Ontario, Canada r | 49 (5.7) | 522 (8.4) | 43 (5.3) | 506 (7.2) | 9 (2.3) | 484 (10.6) | 10.0 (0.26) |
| Quebec, Canada | 31 (4.1) | 537 (3.9) | 62 (4.4) | 531 (3.1) | 7 (2.3) | 523 (7.4) | 9.2 (0.12) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 8.8: Safe and Orderly School – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | Very Safe and Orderly | | Somewhat Safe and Orderly | | Less than Safe and Orderly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 97 (1.2) | 489 (3.7) | 3 (1.2) | 504 (18.3) | 0 (0.0) | ~ ~ | 12.6 (0.10) |
| Kosovo | 91 (2.3) | 414 (4.0) | 9 (2.4) | 396 (12.3) | 0 (0.5) | ~ ~ | 12.2 (0.12) |
| Armenia | 88 (2.2) | 468 (3.9) | 12 (2.2) | 466 (6.1) | 0 (0.2) | ~ ~ | 11.5 (0.12) |
| Azerbaijan | 85 (2.8) | 425 (3.4) | 13 (2.6) | 441 (9.4) | 1 (0.8) | ~ ~ | 11.5 (0.14) |
| Montenegro | 85 (1.7) | 453 (2.8) | 14 (1.7) | 455 (8.6) | 0 (0.0) | ~ ~ | 11.5 (0.07) |
| Pakistan | 81 (3.4) | 303 (15.5) | 17 (3.0) | 249 (17.2) | 2 (1.4) | ~ ~ | 11.2 (0.25) |
| Bosnia and Herzegovina | 80 (2.8) | 459 (3.7) | 18 (2.7) | 460 (5.7) | 1 (0.7) | ~ ~ | 11.3 (0.13) |
| Kuwait | 78 (3.3) | 401 (7.5) | 22 (3.3) | 360 (10.6) | 0 (0.0) | ~ ~ | 11.2 (0.15) |
| Georgia | 78 (3.5) | 453 (4.3) | 21 (3.4) | 458 (8.9) | 1 (0.5) | ~ ~ | 11.1 (0.13) |
| Ireland | 78 (3.1) | 533 (3.7) | 19 (2.9) | 512 (6.4) | 3 (1.4) | 491 (10.4) | 11.5 (0.15) |
| Philippines | 77 (3.3) | 251 (8.4) | 21 (3.3) | 237 (15.4) | 1 (0.9) | ~ ~ | 11.2 (0.14) |
| North Macedonia | 76 (3.4) | 422 (7.3) | 22 (3.4) | 442 (10.8) | 1 (0.7) | ~ ~ | 11.2 (0.15) |
| Saudi Arabia | 76 (3.6) | 412 (4.4) | 21 (3.5) | 387 (10.7) | 2 (1.4) | ~ ~ | 11.3 (0.17) |
| Spain | 76 (3.4) | 514 (2.6) | 23 (3.3) | 502 (6.3) | 2 (0.9) | ~ ~ | 11.1 (0.14) |
| United Arab Emirates | 75 (1.0) | 490 (2.7) | 22 (1.1) | 419 (4.6) | 2 (0.6) | ~ ~ | 11.4 (0.05) |
| Northern Ireland | 75 (3.6) | 524 (2.6) | 23 (3.4) | 503 (4.4) | 2 (1.5) | ~ ~ | 11.6 (0.18) |
| Qatar | 75 (2.9) | 447 (5.1) | 22 (2.8) | 455 (12.0) | 3 (1.4) | 457 (18.4) | 11.3 (0.15) |
| Kazakhstan | 73 (3.4) | 497 (4.0) | 26 (3.3) | 488 (6.6) | 1 (0.6) | ~ ~ | 11.3 (0.14) |
| Serbia | 73 (4.2) | 514 (4.2) | 24 (4.0) | 523 (6.3) | 3 (1.4) | 527 (10.2) | 10.8 (0.15) |
| Bulgaria | 72 (3.0) | 531 (6.4) | 25 (2.8) | 498 (8.7) | 3 (1.4) | 466 (39.6) | 10.6 (0.15) |
| Portugal | 71 (2.9) | 510 (2.6) | 27 (2.9) | 491 (4.6) | 1 (0.4) | ~ ~ | 10.7 (0.12) |
| Oman | 70 (3.2) | 436 (5.5) | 29 (3.1) | 438 (8.9) | 2 (0.8) | ~ ~ | 10.7 (0.13) |
| Netherlands r | 69 (3.6) | 525 (3.9) | 28 (3.6) | 507 (4.9) | 3 (1.5) | 487 (9.7) | 10.6 (0.17) |
| Bahrain | 68 (3.0) | 500 (3.9) | 28 (2.7) | 480 (8.3) | 4 (1.6) | 450 (15.9) | 10.6 (0.12) |
| Iran, Islamic Rep. of | 67 (3.1) | 444 (5.1) | 30 (3.1) | 435 (8.7) | 2 (1.1) | ~ ~ | 10.7 (0.13) |
| Singapore | 67 (2.0) | 594 (4.2) | 31 (2.0) | 597 (5.7) | 2 (0.7) | ~ ~ | 10.9 (0.08) |
| New Zealand | 66 (2.8) | 510 (3.0) | 29 (2.5) | 491 (5.1) | 4 (1.3) | 467 (16.6) | 10.8 (0.13) |
| Australia | 65 (3.5) | 544 (3.0) | 26 (2.9) | 518 (6.1) | 8 (2.3) | 497 (5.8) | 10.6 (0.17) |
| Lithuania | 65 (3.6) | 540 (3.3) | 35 (3.5) | 534 (3.0) | 1 (0.6) | ~ ~ | 10.4 (0.11) |
| Norway (5) s | 62 (4.2) | 541 (3.1) | 34 (4.0) | 539 (4.5) | 4 (1.6) | 531 (6.8) | 10.3 (0.19) |
| Austria | 62 (2.4) | 532 (2.9) | 36 (2.5) | 509 (4.3) | 2 (0.9) | ~ ~ | 10.2 (0.10) |
| Russian Federation | 61 (3.6) | 565 (4.0) | 37 (3.5) | 570 (4.0) | 2 (1.0) | ~ ~ | 10.3 (0.13) |
| Cyprus | 57 (3.9) | 515 (4.1) | 40 (3.9) | 509 (3.9) | 3 (1.3) | 505 (15.7) | 10.4 (0.17) |
| Italy | 57 (3.7) | 513 (3.6) | 41 (3.5) | 506 (4.3) | 2 (1.2) | ~ ~ | 10.0 (0.12) |
| Latvia | 56 (4.0) | 545 (2.7) | 44 (3.9) | 538 (4.3) | 1 (0.5) | ~ ~ | 10.0 (0.11) |
| Hong Kong SAR | 55 (4.2) | 536 (4.5) | 42 (4.2) | 528 (5.5) | 2 (1.4) | ~ ~ | 10.3 (0.17) |
| England s | 55 (5.6) | 542 (5.5) | 41 (5.6) | 535 (6.8) | 4 (1.9) | 515 (21.4) | 10.4 (0.22) |
| Poland | 55 (4.1) | 529 (3.2) | 42 (4.0) | 536 (4.4) | 3 (1.4) | 528 (10.6) | 9.8 (0.13) |
| Morocco | 55 (3.3) | 393 (9.1) | 43 (3.6) | 354 (6.5) | 2 (1.1) | ~ ~ | 10.2 (0.14) |
| Slovak Republic | 54 (3.0) | 528 (4.1) | 43 (3.0) | 512 (6.0) | 3 (1.1) | 510 (26.5) | 9.9 (0.12) |
| Czech Republic | 52 (3.9) | 540 (3.2) | 47 (3.9) | 527 (3.9) | 1 (0.5) | ~ ~ | 9.9 (0.13) |
| Turkey (5) | 52 (3.9) | 538 (5.2) | 41 (3.4) | 519 (6.4) | 7 (2.0) | 481 (20.0) | 9.9 (0.16) |
| Germany | 50 (3.9) | 530 (3.3) | 44 (3.9) | 509 (4.0) | 6 (1.8) | 484 (14.5) | 9.7 (0.15) |
| Canada r | 49 (2.5) | 532 (2.6) | 44 (2.5) | 520 (2.9) | 7 (1.3) | 500 (4.5) | 10.0 (0.11) |
| Hungary | 49 (3.7) | 534 (4.0) | 46 (3.9) | 529 (4.7) | 5 (1.8) | 487 (14.2) | 9.7 (0.12) |
| Denmark | 48 (3.6) | 528 (3.5) | 40 (3.9) | 519 (3.8) | 12 (2.1) | 512 (4.6) | 9.7 (0.14) |
| Croatia | 47 (3.2) | 523 (3.2) | 52 (3.2) | 524 (2.6) | 1 (0.7) | ~ ~ | 10.0 (0.12) |
| United States | 46 (2.8) | 556 (3.8) | 44 (2.6) | 531 (3.8) | 10 (1.5) | 493 (6.4) | 9.8 (0.13) |
| Malta | 45 (0.4) | 504 (1.9) | 47 (0.4) | 490 (1.9) | 8 (0.2) | 481 (5.0) | 9.7 (0.02) |
| Chinese Taipei | 42 (3.5) | 560 (2.6) | 52 (3.7) | 557 (2.5) | 5 (1.8) | 551 (7.4) | 9.6 (0.15) |
| South Africa (5) | 42 (3.5) | 341 (9.1) | 46 (3.8) | 314 (7.8) | 12 (2.1) | 319 (12.2) | 9.3 (0.15) |
| Sweden | 38 (4.2) | 552 (4.1) | 56 (4.2) | 534 (3.7) | 6 (1.6) | 511 (13.1) | 9.3 (0.13) |
| France | 37 (3.0) | 501 (4.7) | 60 (3.1) | 482 (3.9) | 3 (1.0) | 452 (13.7) | 9.5 (0.11) |
| Korea, Rep. of | 35 (3.7) | 595 (3.9) | 59 (3.6) | 584 (2.6) | 6 (2.0) | 582 (7.0) | 9.5 (0.16) |
| Finland | 32 (2.8) | 562 (3.2) | 62 (3.0) | 552 (3.1) | 7 (1.5) | 538 (10.4) | 9.2 (0.11) |
| Chile | 28 (3.5) | 483 (5.7) | 60 (4.2) | 465 (3.4) | 12 (2.6) | 446 (8.7) | 8.9 (0.15) |
| Belgium (Flemish) | 28 (2.9) | 512 (3.3) | 66 (2.9) | 499 (2.5) | 6 (1.6) | 473 (10.2) | 9.1 (0.11) |
| Japan | 11 (2.8) | 564 (6.3) | 80 (3.4) | 562 (2.1) | 9 (2.2) | 553 (4.2) | 8.4 (0.11) |
| **International Average** | **61 (0.4)** | **497 (0.6)** | **35 (0.4)** | **484 (0.9)** | **4 (0.2)** | **493 (2.7)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 85 (1.4) | 553 (2.4) | 14 (1.4) | 518 (7.3) | 0 (0.0) | ~ ~ | 12.1 (0.08) |
| Madrid, Spain | 75 (3.8) | 528 (2.1) | 22 (3.4) | 510 (3.6) | 3 (1.7) | 473 (18.1) | 11.0 (0.18) |
| Abu Dhabi, UAE | 63 (2.0) | 449 (4.3) | 32 (2.1) | 370 (6.8) | 6 (1.3) | 357 (17.0) | 10.5 (0.10) |
| Moscow City, Russian Fed. | 60 (4.3) | 596 (2.6) | 39 (4.3) | 593 (4.0) | 1 (0.7) | ~ ~ | 10.4 (0.16) |
| Ontario, Canada r | 52 (4.7) | 536 (4.9) | 38 (4.7) | 522 (5.5) | 10 (2.5) | 497 (7.2) | 10.1 (0.21) |
| Quebec, Canada | 30 (4.0) | 527 (3.7) | 64 (4.4) | 522 (3.3) | 6 (2.4) | 508 (6.4) | 9.1 (0.13) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.9: Safe and Orderly School – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | Very Safe and Orderly | | Somewhat Safe and Orderly | | Less than Safe and Orderly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Kuwait | 77 (3.3) | 405 (5.2) | 22 (3.3) | 392 (10.5) | 1 (0.5) | ~ ~ | 11.5 (0.13) |
| Kazakhstan | 74 (3.1) | 486 (4.2) | 26 (3.1) | 487 (6.8) | 0 (0.0) | ~ ~ | 11.6 (0.12) |
| United Arab Emirates | 72 (1.6) | 491 (2.8) | 25 (1.6) | 432 (5.4) | 2 (0.4) | ~ ~ | 11.9 (0.06) |
| Romania | 70 (3.4) | 486 (5.6) | 29 (3.5) | 465 (8.3) | 1 (0.6) | ~ ~ | 11.5 (0.14) |
| Saudi Arabia | 70 (3.5) | 397 (2.9) | 27 (3.4) | 383 (4.7) | 3 (1.5) | 379 (19.7) | 11.5 (0.16) |
| Georgia | 65 (4.1) | 465 (5.8) | 34 (4.1) | 456 (7.9) | 0 (0.4) | ~ ~ | 11.0 (0.12) |
| Qatar | 64 (3.4) | 451 (6.5) | 32 (3.3) | 429 (6.0) | 4 (1.2) | 441 (16.1) | 11.2 (0.15) |
| Ireland | 62 (2.8) | 537 (3.6) | 33 (2.6) | 509 (4.2) | 5 (1.3) | 475 (19.2) | 11.1 (0.13) |
| Egypt | 61 (4.4) | 421 (6.7) | 36 (4.3) | 405 (8.6) | 3 (1.4) | 356 (20.1) | 10.9 (0.16) |
| Oman | 61 (3.6) | 417 (4.2) | 39 (3.6) | 403 (5.2) | 0 (0.0) | ~ ~ | 11.0 (0.12) |
| Iran, Islamic Rep. of | 59 (2.9) | 453 (5.2) | 36 (2.7) | 439 (8.0) | 4 (1.4) | 413 (18.6) | 10.9 (0.13) |
| Australia | 59 (3.0) | 535 (5.9) | 35 (2.9) | 502 (6.4) | 6 (1.7) | 472 (19.9) | 10.7 (0.14) |
| Singapore | 58 (2.9) | 621 (5.5) | 38 (2.9) | 610 (6.8) | 5 (0.8) | 599 (11.0) | 11.1 (0.12) |
| England s | 57 (5.6) | 532 (9.4) | 35 (5.4) | 505 (14.7) | 8 (3.1) | 519 (24.0) | 10.7 (0.22) |
| Lithuania | 55 (3.6) | 524 (4.8) | 43 (3.5) | 517 (4.5) | 2 (0.8) | ~ ~ | 10.6 (0.14) |
| Israel | 55 (2.9) | 533 (7.5) | 37 (3.0) | 516 (9.1) | 8 (1.8) | 442 (15.6) | 10.7 (0.14) |
| Hong Kong SAR | 54 (4.1) | 587 (7.3) | 44 (4.0) | 568 (7.2) | 3 (1.3) | 522 (24.4) | 10.6 (0.15) |
| Norway (9) r | 53 (4.0) | 511 (3.3) | 43 (3.9) | 498 (4.4) | 4 (2.4) | 493 (6.0) | 10.4 (0.16) |
| Bahrain | 53 (2.6) | 486 (2.9) | 44 (2.6) | 477 (2.9) | 4 (1.0) | 455 (7.0) | 10.8 (0.09) |
| Lebanon | 48 (4.4) | 444 (4.8) | 48 (4.5) | 419 (4.4) | 4 (1.5) | 372 (11.3) | 10.4 (0.17) |
| Russian Federation | 48 (3.1) | 546 (5.8) | 50 (3.0) | 541 (5.2) | 2 (0.9) | ~ ~ | 10.5 (0.13) |
| Jordan | 47 (4.4) | 432 (7.3) | 46 (4.4) | 417 (5.6) | 7 (2.3) | 375 (11.3) | 10.4 (0.17) |
| New Zealand | 47 (3.5) | 503 (5.2) | 45 (3.1) | 470 (6.1) | 9 (2.0) | 437 (9.7) | 10.4 (0.15) |
| Morocco | 45 (3.6) | 398 (3.4) | 42 (3.4) | 381 (4.0) | 12 (2.5) | 382 (6.3) | 9.9 (0.18) |
| Portugal | 45 (3.7) | 511 (4.9) | 47 (4.0) | 492 (5.3) | 8 (2.5) | 484 (12.7) | 10.2 (0.17) |
| Hungary | 43 (3.6) | 533 (5.6) | 52 (3.8) | 504 (5.7) | 5 (1.5) | 465 (16.4) | 10.2 (0.13) |
| Chinese Taipei | 42 (3.5) | 619 (4.5) | 55 (3.6) | 608 (3.9) | 2 (1.1) | ~ ~ | 10.2 (0.11) |
| Cyprus s | 38 (3.4) | 521 (5.7) | 47 (3.6) | 501 (5.3) | 15 (2.7) | 481 (6.6) | 9.8 (0.13) |
| United States | 38 (2.6) | 532 (6.5) | 52 (2.7) | 517 (6.1) | 11 (1.5) | 459 (10.3) | 10.0 (0.11) |
| Turkey | 38 (3.7) | 508 (8.8) | 52 (3.4) | 494 (6.5) | 10 (2.3) | 465 (13.2) | 10.0 (0.19) |
| Chile | 31 (3.3) | 468 (5.8) | 51 (3.9) | 439 (4.4) | 18 (3.2) | 399 (6.3) | 9.4 (0.16) |
| Malaysia | 30 (3.1) | 477 (6.8) | 66 (3.2) | 453 (4.7) | 4 (1.3) | 468 (12.2) | 9.6 (0.11) |
| France r | 29 (4.0) | 496 (5.8) | 54 (4.6) | 483 (4.3) | 16 (3.2) | 454 (6.6) | 9.5 (0.16) |
| Sweden | 28 (2.7) | 523 (5.0) | 66 (3.1) | 497 (3.2) | 6 (2.0) | 478 (12.2) | 9.5 (0.08) |
| Korea, Rep. of | 24 (2.9) | 615 (6.1) | 70 (3.3) | 606 (3.4) | 6 (2.0) | 590 (8.9) | 9.5 (0.15) |
| Finland | 23 (2.6) | 520 (4.2) | 66 (2.6) | 507 (3.1) | 11 (2.0) | 495 (6.7) | 9.3 (0.12) |
| Italy | 20 (3.3) | 507 (5.7) | 75 (3.5) | 498 (3.3) | 5 (1.7) | 461 (9.6) | 9.4 (0.12) |
| South Africa (9) | 18 (2.0) | 423 (7.7) | 58 (2.9) | 384 (3.1) | 24 (2.6) | 378 (4.5) | 8.7 (0.12) |
| Japan | 17 (2.6) | 608 (8.1) | 69 (3.2) | 594 (3.3) | 14 (2.5) | 583 (4.5) | 8.9 (0.11) |
| **International Average** | **48 (0.5)** | **501 (0.9)** | **45 (0.6)** | **482 (1.0)** | **6 (0.3)** | **460 (2.5)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 75 (2.5) | 547 (3.2) | 23 (2.5) | 509 (6.1) | 2 (0.1) | ~ ~ | 12.0 (0.12) |
| Abu Dhabi, UAE r | 63 (2.1) | 467 (4.8) | 33 (2.2) | 381 (5.6) | 4 (1.1) | 371 (17.0) | 11.3 (0.11) |
| Ontario, Canada | 57 (3.9) | 544 (6.6) | 37 (3.9) | 520 (5.0) | 6 (2.1) | 491 (10.5) | 10.7 (0.20) |
| Moscow City, Russian Fed. | 46 (4.1) | 587 (5.9) | 51 (4.1) | 566 (5.2) | 3 (1.3) | 563 (16.8) | 10.3 (0.14) |
| Quebec, Canada | 35 (4.1) | 557 (6.3) | 57 (4.2) | 538 (5.8) | 7 (2.4) | 511 (11.3) | 9.8 (0.16) |
| Gauteng, RSA (9) | 19 (2.6) | 468 (8.8) | 52 (4.1) | 419 (4.7) | 29 (4.2) | 391 (4.2) | 8.6 (0.16) |
| Western Cape, RSA (9) | 18 (3.0) | 521 (14.9) | 50 (4.4) | 437 (6.7) | 32 (3.8) | 401 (5.6) | 8.5 (0.15) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 8.10: Safe and Orderly School – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | | Very Safe and Orderly | | Somewhat Safe and Orderly | | Less than Safe and Orderly | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Romania | | 79 (2.4) | 477 (4.8) | 20 (2.3) | 453 (6.0) | 1 (0.7) | ~ ~ | 11.9 (0.11) |
| Kuwait | | 75 (3.6) | 446 (6.1) | 25 (3.7) | 439 (10.9) | 0 (0.3) | ~ ~ | 11.5 (0.15) |
| United Arab Emirates | | 73 (1.2) | 493 (3.1) | 24 (1.3) | 429 (6.5) | 3 (0.4) | 338 (14.0) | 11.7 (0.06) |
| Qatar | | 70 (4.1) | 477 (5.9) | 27 (4.1) | 468 (8.5) | 3 (1.2) | 477 (18.3) | 11.4 (0.16) |
| Saudi Arabia | | 69 (3.7) | 440 (3.0) | 28 (3.5) | 415 (6.6) | 3 (1.4) | 406 (20.9) | 11.3 (0.17) |
| Singapore | | 68 (2.7) | 613 (4.5) | 29 (2.8) | 594 (7.9) | 2 (0.7) | ~ ~ | 11.4 (0.12) |
| Kazakhstan | | 68 (1.9) | 482 (3.6) | 32 (1.8) | 470 (4.5) | 1 (0.5) | ~ ~ | 11.4 (0.09) |
| Georgia | | 67 (2.9) | 450 (4.3) | 32 (2.8) | 441 (4.5) | 1 (0.6) | ~ ~ | 11.1 (0.10) |
| Egypt | | 64 (4.0) | 396 (7.1) | 33 (3.8) | 383 (9.5) | 2 (1.2) | ~ ~ | 11.1 (0.17) |
| Ireland | | 62 (3.4) | 539 (3.3) | 30 (3.3) | 516 (6.9) | 8 (1.9) | 485 (10.2) | 11.1 (0.17) |
| Iran, Islamic Rep. of | | 62 (3.3) | 457 (4.6) | 31 (2.9) | 443 (6.4) | 7 (1.7) | 413 (6.7) | 10.9 (0.15) |
| Oman | | 60 (3.6) | 469 (4.5) | 37 (3.6) | 442 (5.9) | 2 (1.0) | ~ ~ | 10.8 (0.10) |
| Norway (9) | r | 58 (3.6) | 505 (3.7) | 37 (3.5) | 489 (5.2) | 4 (2.4) | 476 (14.4) | 10.5 (0.15) |
| Hong Kong SAR | | 56 (4.2) | 514 (8.3) | 43 (4.1) | 494 (8.6) | 1 (0.8) | ~ ~ | 11.0 (0.15) |
| Israel | | 56 (2.7) | 520 (6.3) | 39 (3.1) | 514 (8.4) | 5 (1.7) | 455 (25.5) | 10.6 (0.13) |
| Australia | r | 54 (3.4) | 547 (5.4) | 37 (3.2) | 518 (4.6) | 10 (2.0) | 509 (10.6) | 10.6 (0.15) |
| Russian Federation | | 53 (2.6) | 548 (3.8) | 44 (2.4) | 538 (5.3) | 3 (0.8) | 533 (8.0) | 10.6 (0.08) |
| Lithuania | | 52 (2.5) | 538 (3.4) | 45 (2.3) | 528 (3.2) | 4 (0.9) | 522 (9.1) | 10.5 (0.10) |
| Jordan | | 49 (3.9) | 466 (4.7) | 45 (4.2) | 440 (8.2) | 6 (1.7) | 429 (18.9) | 10.4 (0.16) |
| New Zealand | | 49 (3.6) | 516 (6.0) | 44 (3.3) | 487 (4.9) | 7 (1.8) | 481 (13.9) | 10.4 (0.17) |
| Bahrain | | 49 (3.1) | 498 (4.0) | 48 (3.3) | 478 (3.9) | 3 (1.5) | 439 (19.8) | 10.5 (0.10) |
| Lebanon | | 47 (3.4) | 401 (6.5) | 48 (3.4) | 356 (6.2) | 5 (1.3) | 347 (15.7) | 10.4 (0.14) |
| Turkey | | 47 (3.7) | 534 (6.1) | 45 (3.7) | 504 (6.2) | 8 (2.2) | 471 (13.5) | 10.3 (0.16) |
| Portugal | | 46 (3.0) | 527 (3.5) | 47 (2.9) | 515 (3.8) | 7 (1.6) | 500 (8.6) | 10.2 (0.12) |
| England | s | 45 (4.8) | 532 (9.4) | 49 (4.8) | 518 (11.3) | 7 (2.7) | 512 (16.9) | 10.5 (0.23) |
| Cyprus | s | 44 (2.0) | 496 (3.4) | 44 (2.5) | 484 (3.3) | 12 (1.6) | 465 (6.9) | 10.0 (0.09) |
| Chinese Taipei | | 43 (3.4) | 583 (3.7) | 50 (3.5) | 566 (2.9) | 6 (1.8) | 581 (9.1) | 10.2 (0.14) |
| Hungary | | 43 (2.6) | 541 (3.7) | 52 (2.4) | 523 (3.5) | 5 (1.1) | 473 (11.3) | 10.2 (0.10) |
| Morocco | | 42 (2.5) | 400 (5.1) | 45 (2.4) | 390 (4.2) | 13 (1.9) | 398 (4.7) | 9.9 (0.11) |
| United States | | 34 (2.3) | 545 (6.4) | 49 (2.6) | 528 (7.8) | 16 (2.1) | 471 (10.4) | 9.6 (0.12) |
| Korea, Rep. of | | 33 (3.6) | 565 (3.7) | 62 (3.9) | 560 (2.5) | 6 (1.9) | 543 (10.8) | 9.7 (0.16) |
| Malaysia | | 32 (3.0) | 483 (7.2) | 63 (3.0) | 449 (5.1) | 4 (1.6) | 446 (27.3) | 9.8 (0.12) |
| Sweden | | 29 (2.7) | 545 (5.8) | 64 (3.2) | 513 (3.6) | 7 (2.1) | 500 (22.4) | 9.6 (0.12) |
| France | r | 26 (2.8) | 508 (4.1) | 64 (2.8) | 486 (3.2) | 10 (1.7) | 448 (7.2) | 9.4 (0.13) |
| Chile | | 26 (3.3) | 486 (5.8) | 59 (4.1) | 463 (4.2) | 16 (2.9) | 431 (7.2) | 9.2 (0.14) |
| South Africa (9) | | 24 (2.8) | 390 (10.7) | 51 (2.9) | 371 (5.1) | 25 (2.1) | 350 (4.7) | 8.9 (0.12) |
| Italy | | 20 (3.4) | 505 (4.6) | 76 (3.4) | 502 (3.2) | 4 (1.2) | 464 (10.2) | 9.3 (0.12) |
| Finland | | 20 (2.0) | 555 (4.9) | 67 (2.2) | 542 (2.9) | 13 (1.7) | 526 (7.2) | 9.2 (0.09) |
| Japan | | 13 (2.7) | 566 (3.9) | 77 (3.4) | 572 (2.7) | 11 (2.3) | 558 (4.8) | 8.9 (0.11) |
| **International Average** | | **49 (0.5)** | **501 (0.9)** | **45 (0.5)** | **483 (1.0)** | **6 (0.3)** | **466 (2.5)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | | 79 (2.0) | 556 (3.4) | 20 (2.1) | 530 (6.8) | 1 (0.4) | ~ ~ | 12.1 (0.09) |
| Abu Dhabi, UAE | | 61 (2.7) | 452 (5.9) | 33 (2.5) | 375 (8.9) | 6 (0.8) | 302 (15.8) | 11.2 (0.11) |
| Ontario, Canada | s | 50 (5.6) | 537 (6.6) | 42 (5.8) | 507 (6.5) | 9 (2.8) | 505 (8.3) | 10.6 (0.27) |
| Moscow City, Russian Fed. | | 45 (2.2) | 571 (3.3) | 51 (2.1) | 564 (3.1) | 4 (1.0) | 546 (8.1) | 10.3 (0.09) |
| Gauteng, RSA (9) | | 23 (3.6) | 467 (12.5) | 51 (4.7) | 421 (6.5) | 26 (3.7) | 385 (6.3) | 8.8 (0.16) |
| Western Cape, RSA (9) | | 20 (3.0) | 558 (13.9) | 47 (4.6) | 431 (8.2) | 33 (3.9) | 382 (6.2) | 8.4 (0.16) |
| Quebec, Canada | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Student Bullying

Since 2011, TIMSS has asked students about how often they experienced various bullying behaviors by their school peers, such as being teased, excluded from activities, or physically hurt. The TIMSS 2019 fourth grade *Student Bullying* scale is described in Exhibit 8.11 (see About the Scale). Students were assigned to one of three categories of the scale ("never or almost never," "about monthly," "about weekly") according to their reports of how often they experienced 11 bullying behaviors.

Exhibits 8.12 and 8.13 present the scale results in relation to mathematics achievement and science achievement, respectively. Internationally, the majority of fourth grade students (63%, on average) reported to be "never or almost never" bullied by school peers, 29 percent reported being bullied "about monthly," and only 8 percent were bullied "about weekly." Reports from fourth grade students' about being bullied were related to their average achievement in mathematics and science. Across countries, there was a negative association between fourth grade students' reports about the frequency of being bullied and average achievement, with students bullied "about weekly" having substantially lower average mathematics achievement (451) and lower average science achievement (437) than students bullied "about monthly" (495 and 486 in mathematics and science, respectively). Students in the "never or almost never" category had the highest achievement on average—512 in mathematics and 503 in science.

The eighth grade *Student Bullying* scale used in previous TIMSS assessments was revised in TIMSS 2019 to better reflect current trends related to social media and cyberbullying. As described in Exhibit 8.14, the scale in 2019 included 14 items with an emphasis on bullying experienced through digital devices (see About the Scale). Students were assigned to one of three scale categories ("never or almost never," "about monthly," "about weekly") according to their reports of how often they experienced these 14 behaviors.

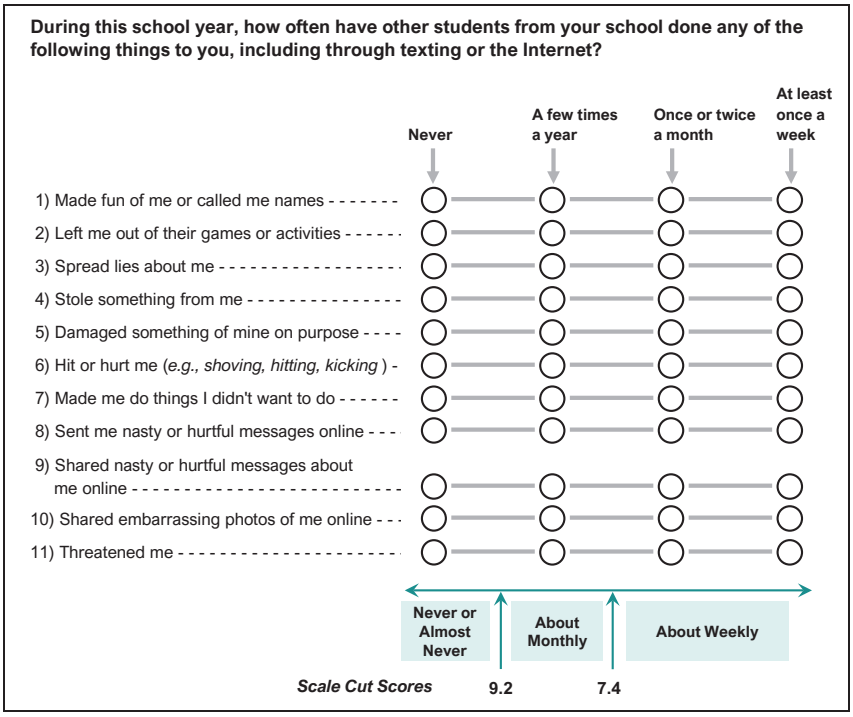
Exhibits 8.15 and 8.16 provide the results for the TIMSS 2019 eighth grade *Student Bullying* scale in relation to mathematics achievement and science achievement, respectively. On average, more than two-thirds of eighth grade students (71%) reported being bullied "never or almost never," and these students had the highest average achievement—496 in mathematics and 499 in science. With each reported increase in the frequency they experienced bullying, eighth grade students had progressively lower average achievement to the extent that there was a 68-point difference in mathematics achievement and a 78-point difference in science achievement between students in the "never or almost never" category and students in the "about weekly" category. Students bullied "about monthly" also had much higher achievement than students bullied "about weekly" (482 vs. 428 in mathematics and 482 vs. 421 in science).

## Exhibit 8.11: Student Bullying

*Students' Reports*

### About the Scale

Students were scored according to their reports regarding eleven bullying behaviors on the *Student Bullying* scale. Cut scores divide the scale into three categories. Students bullied **Never or Almost Never** had a score at or above the cut score corresponding to reporting that they "never" experienced six of the eleven bullying behaviors and experienced the other five "a few times a year," on average. Students bullied **About Weekly** had a score at or below the cut score corresponding to reporting that they experienced six of the eleven behaviors "once or twice a month" and the other five "a few times a year," on average. All other students were bullied **About Monthly**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.12: Student Bullying

*Students' Reports*

| Country | Never or Almost Never | | About Monthly | | About Weekly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 85 (0.9) | 500 (3.2) | 12 (0.8) | 480 (5.7) | 3 (0.4) | 404 (15.7) | 11.3 (0.05) |
| Armenia | 84 (0.9) | 506 (2.5) | 11 (0.7) | 494 (4.5) | 5 (0.5) | 463 (7.1) | 11.3 (0.05) |
| Serbia | 83 (1.2) | 513 (3.3) | 15 (0.9) | 497 (5.6) | 3 (0.4) | 443 (12.6) | 11.1 (0.06) |
| Kosovo | 82 (1.0) | 453 (2.8) | 13 (0.8) | 435 (4.8) | 5 (0.5) | 368 (9.2) | 11.1 (0.06) |
| Montenegro | 81 (0.7) | 461 (1.8) | 15 (0.6) | 438 (4.0) | 4 (0.3) | 391 (7.4) | 11.1 (0.04) |
| Japan | 81 (0.9) | 595 (1.8) | 18 (0.9) | 585 (3.3) | 1 (0.2) | ~ ~ | 10.9 (0.05) |
| Georgia | 80 (1.1) | 486 (3.8) | 16 (0.9) | 470 (6.4) | 4 (0.4) | 418 (11.0) | 10.9 (0.06) |
| Finland | 79 (1.0) | 538 (2.2) | 19 (0.9) | 519 (4.0) | 2 (0.2) | ~ ~ | 10.7 (0.04) |
| Azerbaijan | 78 (1.1) | 528 (2.3) | 18 (0.9) | 511 (4.6) | 4 (0.4) | 465 (9.6) | 10.9 (0.06) |
| Bosnia and Herzegovina | 78 (0.8) | 458 (2.3) | 17 (0.7) | 446 (3.7) | 5 (0.4) | 402 (5.2) | 10.8 (0.05) |
| Korea, Rep. of | 77 (1.1) | 601 (2.3) | 21 (1.0) | 596 (3.9) | 2 (0.3) | ~ ~ | 10.6 (0.05) |
| Ireland | 76 (0.9) | 555 (2.6) | 21 (0.7) | 536 (3.8) | 3 (0.4) | 497 (8.5) | 10.5 (0.05) |
| France | 74 (1.0) | 494 (3.2) | 22 (0.9) | 463 (4.0) | 3 (0.4) | 430 (10.1) | 10.5 (0.05) |
| Norway (5) | 73 (1.2) | 548 (2.3) | 24 (1.1) | 536 (3.1) | 3 (0.4) | 503 (15.9) | 10.3 (0.05) |
| Croatia | 73 (1.3) | 513 (2.3) | 22 (1.2) | 506 (3.8) | 5 (0.4) | 476 (8.2) | 10.4 (0.05) |
| Poland | 73 (0.9) | 527 (2.8) | 22 (0.8) | 513 (3.4) | 5 (0.4) | 470 (8.4) | 10.4 (0.04) |
| Lithuania | 72 (1.3) | 548 (3.0) | 25 (1.2) | 534 (4.2) | 3 (0.3) | 475 (11.9) | 10.3 (0.06) |
| Kazakhstan | 69 (1.3) | 517 (2.7) | 25 (1.1) | 507 (3.7) | 6 (0.4) | 486 (5.1) | 10.5 (0.07) |
| Northern Ireland | 68 (1.4) | 574 (3.2) | 28 (1.3) | 556 (3.7) | 4 (0.4) | 501 (9.4) | 10.1 (0.06) |
| North Macedonia | 68 (2.3) | 489 (4.7) | 23 (2.0) | 464 (7.8) | 9 (0.8) | 403 (10.4) | 10.3 (0.09) |
| Chinese Taipei | 67 (1.2) | 604 (1.8) | 28 (1.0) | 593 (3.3) | 5 (0.4) | 576 (7.5) | 10.3 (0.05) |
| Austria | 67 (1.3) | 547 (2.3) | 28 (1.1) | 530 (2.9) | 5 (0.5) | 499 (5.0) | 10.2 (0.06) |
| Sweden | 66 (1.5) | 530 (2.8) | 30 (1.5) | 511 (3.4) | 4 (0.4) | 474 (9.4) | 10.0 (0.06) |
| Czech Republic | 66 (1.1) | 542 (2.5) | 28 (0.9) | 526 (3.6) | 6 (0.6) | 470 (7.0) | 10.2 (0.06) |
| Netherlands | 66 (1.3) | 541 (2.2) | 30 (1.1) | 535 (2.9) | 4 (0.5) | 512 (8.7) | 10.0 (0.05) |
| Slovak Republic | 66 (1.3) | 519 (3.2) | 29 (1.1) | 500 (5.5) | 6 (0.5) | 461 (10.8) | 10.2 (0.06) |
| United States | 64 (0.8) | 548 (2.7) | 29 (0.8) | 527 (3.1) | 7 (0.4) | 477 (5.7) | 10.0 (0.03) |
| Hungary | 63 (1.2) | 530 (2.8) | 32 (1.2) | 516 (3.6) | 4 (0.5) | 492 (7.7) | 9.9 (0.04) |
| Cyprus | 63 (1.2) | 541 (2.8) | 30 (1.0) | 523 (3.7) | 7 (0.5) | 493 (6.2) | 10.0 (0.05) |
| Germany | 62 (1.1) | 535 (2.4) | 32 (1.0) | 512 (3.4) | 6 (0.6) | 466 (6.9) | 9.8 (0.04) |
| Hong Kong SAR | 62 (1.2) | 608 (3.1) | 32 (1.0) | 595 (4.7) | 6 (0.5) | 576 (7.8) | 9.9 (0.05) |
| Spain | 61 (1.1) | 512 (2.2) | 31 (0.9) | 495 (3.3) | 7 (0.6) | 460 (5.2) | 9.9 (0.05) |
| Iran, Islamic Rep. of | 61 (1.3) | 450 (4.8) | 32 (1.2) | 443 (4.4) | 7 (0.4) | 405 (7.3) | 10.0 (0.06) |
| Portugal | 61 (0.9) | 532 (2.8) | 32 (0.9) | 523 (3.0) | 7 (0.5) | 480 (6.2) | 9.8 (0.04) |
| Denmark | 61 (1.4) | 532 (2.3) | 35 (1.3) | 519 (2.5) | 4 (0.4) | 481 (7.7) | 9.7 (0.05) |
| England | 60 (1.3) | 566 (4.4) | 34 (1.1) | 546 (4.1) | 6 (0.6) | 513 (8.5) | 9.8 (0.05) |
| Bulgaria | 60 (1.9) | 528 (3.5) | 31 (1.3) | 511 (4.3) | 9 (1.0) | 463 (10.4) | 9.8 (0.08) |
| Chile | 60 (1.2) | 454 (2.3) | 29 (0.9) | 437 (3.6) | 11 (0.7) | 392 (5.9) | 9.8 (0.05) |
| Turkey (5) | 60 (1.3) | 540 (4.3) | 32 (1.1) | 511 (5.8) | 9 (0.6) | 451 (9.0) | 9.9 (0.06) |
| Singapore | 59 (0.9) | 638 (3.6) | 34 (0.7) | 616 (4.0) | 7 (0.4) | 569 (9.1) | 9.7 (0.03) |
| Italy | 58 (1.3) | 522 (2.6) | 36 (1.1) | 510 (2.9) | 7 (0.6) | 482 (6.9) | 9.7 (0.05) |
| Malta | 57 (0.8) | 519 (1.7) | 35 (0.8) | 504 (2.6) | 8 (0.5) | 469 (5.2) | 9.7 (0.03) |
| Russian Federation | 56 (1.2) | 575 (3.2) | 37 (1.0) | 563 (4.0) | 8 (0.5) | 538 (6.3) | 9.6 (0.05) |
| Canada | 55 (0.7) | 520 (2.2) | 38 (0.7) | 505 (2.2) | 8 (0.3) | 477 (4.4) | 9.6 (0.03) |
| Australia | 54 (1.3) | 525 (3.1) | 39 (1.0) | 513 (3.4) | 7 (0.6) | 470 (6.2) | 9.5 (0.04) |
| Belgium (Flemish) | 53 (1.4) | 538 (2.1) | 41 (1.2) | 529 (2.5) | 5 (0.4) | 506 (6.5) | 9.5 (0.04) |
| Morocco | 53 (1.6) | 397 (4.4) | 37 (1.3) | 379 (5.6) | 10 (0.8) | 342 (8.0) | 9.6 (0.07) |
| Latvia | 52 (1.1) | 556 (2.7) | 38 (0.9) | 541 (2.8) | 10 (0.8) | 514 (6.0) | 9.4 (0.05) |
| United Arab Emirates | 51 (0.8) | 501 (1.9) | 34 (0.6) | 476 (2.1) | 15 (0.4) | 434 (3.2) | 9.5 (0.04) |
| Saudi Arabia | 50 (1.2) | 421 (4.3) | 33 (1.0) | 399 (3.8) | 17 (0.7) | 349 (5.8) | 9.6 (0.06) |
| New Zealand | 48 (1.1) | 503 (2.8) | 40 (0.9) | 486 (3.1) | 12 (0.5) | 438 (4.4) | 9.3 (0.04) |
| Oman | 47 (1.4) | 451 (4.9) | 38 (1.2) | 429 (3.9) | 15 (0.8) | 385 (5.4) | 9.3 (0.06) |
| Bahrain | 46 (1.1) | 491 (3.0) | 37 (0.9) | 481 (3.4) | 17 (0.7) | 452 (4.4) | 9.3 (0.05) |
| Kuwait | 45 (1.3) | 406 (6.0) | 34 (0.9) | 392 (5.2) | 21 (1.1) | 344 (7.5) | 9.2 (0.07) |
| Pakistan | 45 (3.4) | 344 (13.0) | 36 (2.8) | 326 (13.2) | 19 (2.1) | 301 (13.0) | 9.3 (0.15) |
| Qatar | 42 (1.3) | 473 (4.1) | 37 (1.3) | 456 (4.0) | 21 (1.2) | 397 (3.8) | 9.0 (0.06) |
| South Africa (5) | 26 (1.1) | 423 (5.5) | 45 (1.1) | 376 (3.3) | 29 (1.4) | 333 (4.0) | 8.4 (0.05) |
| Philippines | 11 (1.0) | 351 (10.3) | 44 (1.3) | 314 (6.6) | 45 (1.8) | 269 (6.4) | 7.7 (0.06) |
| **International Average** | **63 (0.2)** | **512 (0.5)** | **29 (0.1)** | **495 (0.6)** | **8 (0.1)** | **451 (1.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Madrid, Spain | 65 (1.3) | 523 (2.2) | 30 (1.1) | 514 (2.7) | 5 (0.5) | 483 (5.4) | 10.1 (0.06) |
| Dubai, UAE | 58 (1.2) | 552 (1.8) | 32 (0.9) | 538 (3.0) | 10 (0.5) | 514 (4.6) | 9.8 (0.05) |
| Ontario, Canada | 55 (1.3) | 523 (3.9) | 38 (1.2) | 506 (3.5) | 7 (0.5) | 475 (7.8) | 9.6 (0.04) |
| Quebec, Canada | 54 (1.3) | 539 (3.0) | 39 (1.0) | 526 (3.0) | 7 (0.7) | 499 (6.2) | 9.5 (0.05) |
| Moscow City, Russian Fed. | 54 (1.2) | 602 (2.3) | 37 (0.9) | 587 (2.8) | 9 (0.6) | 563 (5.0) | 9.5 (0.04) |
| Abu Dhabi, UAE | 44 (1.0) | 462 (2.7) | 37 (0.8) | 439 (3.0) | 19 (0.7) | 399 (4.0) | 9.1 (0.05) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 8.13: Student Bullying

*Students' Reports*

| Country | Never or Almost Never | | About Monthly | | About Weekly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 85 (0.9) | 495 (3.4) | 12 (0.8) | 481 (6.5) | 3 (0.4) | 398 (15.7) | 11.3 (0.05) |
| Armenia | 84 (0.9) | 476 (3.3) | 11 (0.7) | 459 (5.5) | 5 (0.5) | 420 (7.5) | 11.3 (0.05) |
| Serbia | 83 (1.2) | 522 (3.5) | 15 (0.9) | 505 (5.7) | 3 (0.4) | 451 (13.1) | 11.1 (0.06) |
| Kosovo | 82 (1.0) | 424 (3.4) | 13 (0.8) | 396 (6.4) | 5 (0.5) | 326 (9.9) | 11.1 (0.06) |
| Montenegro | 81 (0.7) | 460 (2.4) | 15 (0.6) | 444 (5.1) | 4 (0.3) | 390 (8.6) | 11.1 (0.04) |
| Japan | 81 (0.9) | 564 (1.7) | 18 (0.9) | 553 (3.4) | 1 (0.2) | ~ ~ | 10.9 (0.05) |
| Georgia | 80 (1.1) | 459 (4.0) | 16 (0.9) | 444 (6.7) | 4 (0.4) | 376 (10.5) | 10.9 (0.06) |
| Finland | 79 (1.0) | 560 (2.4) | 19 (0.9) | 542 (4.3) | 2 (0.2) | ~ ~ | 10.7 (0.04) |
| Azerbaijan | 78 (1.1) | 441 (2.7) | 18 (0.9) | 424 (5.2) | 4 (0.4) | 364 (13.4) | 10.9 (0.06) |
| Bosnia and Herzegovina | 78 (0.8) | 465 (2.7) | 17 (0.7) | 455 (5.1) | 5 (0.4) | 410 (8.5) | 10.8 (0.05) |
| Korea, Rep. of | 77 (1.1) | 589 (2.3) | 21 (1.0) | 585 (3.5) | 2 (0.3) | ~ ~ | 10.6 (0.05) |
| Ireland | 76 (0.9) | 534 (3.3) | 21 (0.7) | 517 (4.0) | 3 (0.4) | 471 (9.7) | 10.5 (0.05) |
| France | 74 (1.0) | 496 (3.1) | 22 (0.9) | 470 (4.2) | 3 (0.4) | 435 (9.3) | 10.5 (0.05) |
| Norway (5) | 73 (1.2) | 544 (2.4) | 24 (1.1) | 534 (3.0) | 3 (0.4) | 498 (12.8) | 10.3 (0.05) |
| Croatia | 73 (1.3) | 527 (2.5) | 22 (1.2) | 521 (4.1) | 5 (0.4) | 500 (7.5) | 10.4 (0.05) |
| Poland | 73 (0.9) | 538 (2.7) | 22 (0.8) | 523 (3.2) | 5 (0.4) | 481 (8.2) | 10.4 (0.04) |
| Lithuania | 72 (1.3) | 544 (2.8) | 25 (1.2) | 529 (4.1) | 3 (0.3) | 469 (11.7) | 10.3 (0.06) |
| Kazakhstan | 69 (1.3) | 500 (3.4) | 25 (1.1) | 490 (4.3) | 6 (0.4) | 468 (6.6) | 10.5 (0.07) |
| Northern Ireland | 68 (1.4) | 526 (2.4) | 28 (1.3) | 511 (3.7) | 4 (0.4) | 458 (8.2) | 10.1 (0.06) |
| North Macedonia | 68 (2.3) | 445 (5.5) | 23 (2.0) | 412 (10.0) | 9 (0.8) | 355 (11.2) | 10.3 (0.09) |
| Chinese Taipei | 67 (1.2) | 564 (1.9) | 28 (1.0) | 550 (2.9) | 5 (0.4) | 526 (7.2) | 10.3 (0.05) |
| Austria | 67 (1.3) | 532 (2.8) | 28 (1.1) | 509 (4.3) | 5 (0.5) | 473 (7.2) | 10.2 (0.06) |
| Sweden | 66 (1.5) | 545 (3.3) | 30 (1.5) | 529 (4.1) | 4 (0.4) | 485 (10.3) | 10.0 (0.06) |
| Czech Republic | 66 (1.1) | 541 (2.6) | 28 (0.9) | 528 (3.3) | 6 (0.6) | 478 (6.2) | 10.2 (0.06) |
| Netherlands | 66 (1.3) | 523 (2.8) | 30 (1.1) | 515 (4.0) | 4 (0.5) | 479 (10.4) | 10.0 (0.05) |
| Slovak Republic | 66 (1.3) | 531 (3.0) | 29 (1.1) | 508 (6.3) | 6 (0.5) | 467 (12.3) | 10.2 (0.06) |
| United States | 64 (0.8) | 551 (2.8) | 29 (0.8) | 531 (3.3) | 7 (0.4) | 481 (5.6) | 10.0 (0.03) |
| Hungary | 63 (1.2) | 536 (2.9) | 32 (1.2) | 521 (3.5) | 4 (0.5) | 500 (9.0) | 9.9 (0.04) |
| Cyprus | 63 (1.2) | 520 (3.1) | 30 (1.0) | 505 (3.5) | 7 (0.5) | 473 (7.0) | 10.0 (0.05) |
| Germany | 62 (1.1) | 533 (2.2) | 32 (1.0) | 511 (3.5) | 6 (0.6) | 459 (8.5) | 9.8 (0.04) |
| Hong Kong SAR | 62 (1.2) | 536 (3.3) | 32 (1.0) | 526 (4.2) | 6 (0.5) | 508 (9.2) | 9.9 (0.05) |
| Spain | 61 (1.1) | 521 (1.9) | 31 (0.9) | 506 (3.0) | 7 (0.6) | 465 (5.5) | 9.9 (0.05) |
| Iran, Islamic Rep. of | 61 (1.3) | 446 (5.1) | 32 (1.2) | 444 (4.6) | 7 (0.4) | 402 (8.1) | 10.0 (0.06) |
| Portugal | 61 (0.9) | 510 (2.8) | 32 (0.9) | 502 (3.2) | 7 (0.5) | 459 (5.5) | 9.8 (0.04) |
| Denmark | 61 (1.4) | 528 (2.6) | 35 (1.3) | 517 (3.4) | 4 (0.4) | 490 (6.9) | 9.7 (0.05) |
| England | 60 (1.3) | 545 (3.9) | 34 (1.1) | 531 (3.5) | 6 (0.6) | 505 (7.3) | 9.8 (0.05) |
| Bulgaria | 60 (1.9) | 535 (4.3) | 31 (1.3) | 520 (5.5) | 9 (1.0) | 457 (11.6) | 9.8 (0.08) |
| Chile | 60 (1.2) | 482 (2.3) | 29 (0.9) | 466 (3.5) | 11 (0.7) | 419 (4.6) | 9.8 (0.05) |
| Turkey (5) | 60 (1.3) | 541 (3.9) | 32 (1.1) | 520 (6.0) | 9 (0.6) | 461 (10.1) | 9.9 (0.06) |
| Singapore | 59 (0.9) | 606 (3.2) | 34 (0.7) | 586 (3.6) | 7 (0.4) | 542 (9.1) | 9.7 (0.03) |
| Italy | 58 (1.3) | 517 (3.1) | 36 (1.1) | 507 (3.3) | 7 (0.6) | 473 (6.8) | 9.7 (0.05) |
| Malta | 57 (0.8) | 505 (1.6) | 35 (0.8) | 492 (2.7) | 8 (0.5) | 450 (6.2) | 9.7 (0.03) |
| Russian Federation | 56 (1.2) | 574 (3.0) | 37 (1.0) | 563 (3.2) | 8 (0.5) | 542 (6.8) | 9.6 (0.05) |
| Canada | 55 (0.7) | 533 (2.2) | 38 (0.7) | 517 (2.2) | 8 (0.3) | 491 (4.3) | 9.6 (0.03) |
| Australia | 54 (1.3) | 541 (2.9) | 39 (1.0) | 530 (2.9) | 7 (0.6) | 490 (6.1) | 9.5 (0.04) |
| Belgium (Flemish) | 53 (1.4) | 508 (2.2) | 41 (1.2) | 496 (2.8) | 5 (0.4) | 474 (6.3) | 9.5 (0.04) |
| Morocco | 53 (1.6) | 389 (5.7) | 37 (1.3) | 369 (7.8) | 10 (0.8) | 327 (10.9) | 9.6 (0.07) |
| Latvia | 52 (1.1) | 553 (2.5) | 38 (0.9) | 536 (2.4) | 10 (0.8) | 508 (6.2) | 9.4 (0.05) |
| United Arab Emirates | 51 (0.8) | 497 (2.2) | 34 (0.6) | 467 (2.4) | 15 (0.4) | 413 (3.7) | 9.5 (0.04) |
| Saudi Arabia | 50 (1.2) | 432 (4.6) | 33 (1.0) | 404 (4.6) | 17 (0.7) | 335 (7.3) | 9.6 (0.06) |
| New Zealand | 48 (1.1) | 519 (2.4) | 40 (0.9) | 500 (2.9) | 12 (0.5) | 456 (4.5) | 9.3 (0.04) |
| Oman | 47 (1.4) | 458 (4.8) | 38 (1.2) | 437 (4.5) | 15 (0.8) | 380 (6.1) | 9.3 (0.06) |
| Bahrain | 46 (1.1) | 515 (3.3) | 37 (0.9) | 493 (3.8) | 17 (0.7) | 440 (5.5) | 9.3 (0.05) |
| Kuwait | 45 (1.3) | 421 (7.5) | 34 (0.9) | 398 (7.1) | 21 (1.1) | 347 (8.0) | 9.2 (0.07) |
| Pakistan | 45 (3.4) | 313 (13.5) | 36 (2.8) | 282 (16.0) | 19 (2.1) | 260 (17.0) | 9.3 (0.15) |
| Qatar | 42 (1.3) | 479 (4.2) | 37 (1.3) | 458 (4.2) | 21 (1.2) | 383 (5.2) | 9.0 (0.06) |
| South Africa (5) | 26 (1.1) | 392 (7.9) | 45 (1.1) | 328 (4.8) | 29 (1.4) | 268 (5.3) | 8.4 (0.05) |
| Philippines | 11 (1.0) | 318 (13.0) | 44 (1.3) | 270 (8.1) | 45 (1.8) | 214 (7.0) | 7.7 (0.06) |
| **International Average** | **63 (0.2)** | **503 (0.5)** | **29 (0.1)** | **486 (0.7)** | **8 (0.1)** | **437 (1.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Madrid, Spain | 65 (1.3) | 528 (2.1) | 30 (1.1) | 518 (2.8) | 5 (0.5) | 485 (5.9) | 10.1 (0.06) |
| Dubai, UAE | 58 (1.2) | 553 (1.9) | 32 (0.9) | 540 (3.1) | 10 (0.5) | 507 (4.8) | 9.8 (0.05) |
| Ontario, Canada | 55 (1.3) | 535 (3.5) | 38 (1.2) | 518 (3.8) | 7 (0.5) | 490 (7.0) | 9.6 (0.04) |
| Quebec, Canada | 54 (1.3) | 530 (3.1) | 39 (1.0) | 515 (2.8) | 7 (0.7) | 494 (4.9) | 9.5 (0.05) |
| Moscow City, Russian Fed. | 54 (1.2) | 604 (2.5) | 37 (0.9) | 590 (2.5) | 9 (0.6) | 563 (4.9) | 9.5 (0.04) |
| Abu Dhabi, UAE | 44 (1.0) | 446 (3.4) | 37 (0.8) | 417 (3.8) | 19 (0.7) | 365 (5.3) | 9.1 (0.05) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

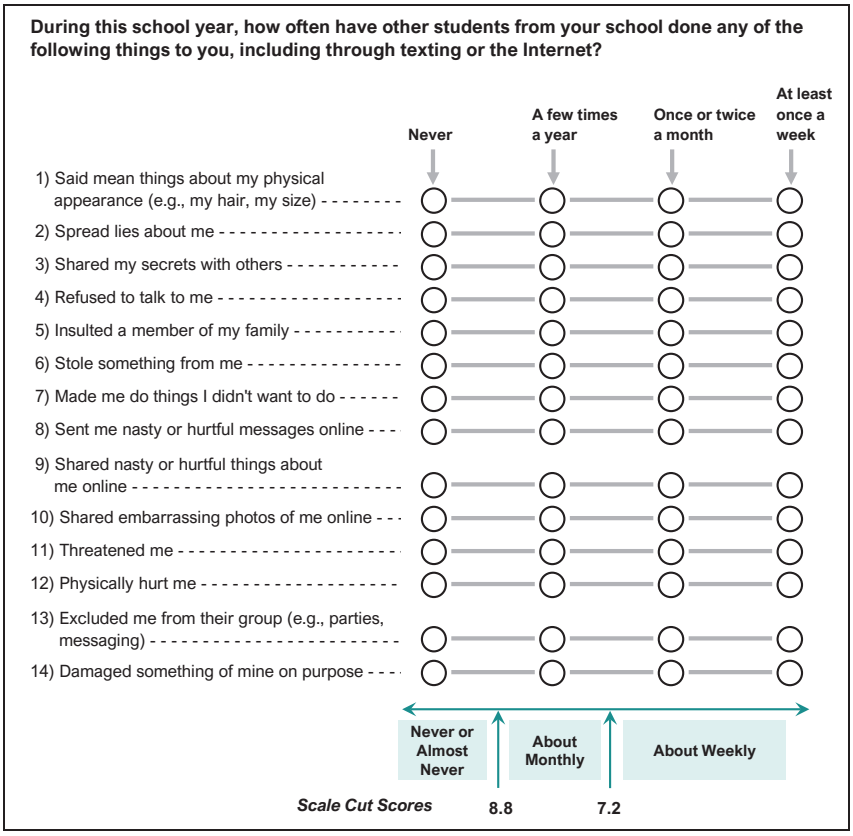
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.14: Student Bullying

*Students' Reports*

### About the Scale

Students were scored according to their reports regarding fourteen bullying behaviors on the *Student Bullying* scale. Cut scores divide the scale into three categories. Students bullied **Never or Almost Never** had a score at or above the cut score corresponding to reporting that they "never" experienced seven of the fourteen bullying behaviors and experienced the other seven "a few times a year," on average. Students bullied **About Weekly** had a score at or below the cut score corresponding to reporting that they experienced seven of the fourteen behaviors "once or twice a month" and the other seven "a few times a year," on average. All other students were bullied **About Monthly**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 8.15: Student Bullying

*Students' Reports*

| Country | Never or Almost Never | | About Monthly | | About Weekly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 93 (0.4) | 595 (2.8) | 6 (0.4) | 591 (5.9) | 0 (0.1) | ~ ~ | 11.3 (0.04) |
| Georgia | 89 (0.9) | 464 (4.3) | 9 (0.8) | 453 (8.6) | 2 (0.3) | ~ ~ | 11.2 (0.06) |
| Chinese Taipei | 88 (0.5) | 614 (2.8) | 11 (0.5) | 608 (4.9) | 1 (0.1) | ~ ~ | 11.0 (0.04) |
| Korea, Rep. of | 87 (0.7) | 606 (2.9) | 12 (0.6) | 611 (5.5) | 1 (0.1) | ~ ~ | 11.0 (0.05) |
| Finland | 86 (0.6) | 512 (2.5) | 12 (0.6) | 498 (4.4) | 2 (0.2) | ~ ~ | 10.8 (0.04) |
| Kazakhstan | 85 (0.8) | 488 (3.3) | 14 (0.7) | 487 (5.5) | 1 (0.2) | ~ ~ | 10.4 (0.05) |
| Portugal | 83 (0.9) | 502 (3.3) | 16 (0.8) | 493 (5.3) | 2 (0.3) | ~ ~ | 10.5 (0.05) |
| Lithuania | 81 (0.8) | 523 (2.9) | 17 (0.8) | 516 (4.6) | 2 (0.2) | ~ ~ | 10.3 (0.04) |
| Russian Federation | 80 (0.7) | 545 (4.6) | 17 (0.7) | 542 (5.6) | 3 (0.3) | 519 (11.8) | 10.3 (0.04) |
| Hungary | 79 (1.0) | 523 (3.0) | 18 (0.9) | 498 (4.6) | 3 (0.4) | 438 (12.4) | 10.2 (0.04) |
| Norway (9) | 79 (0.9) | 507 (2.6) | 19 (0.8) | 498 (4.3) | 2 (0.3) | ~ ~ | 10.3 (0.04) |
| Sweden | 78 (0.8) | 508 (2.6) | 18 (0.7) | 493 (3.9) | 3 (0.3) | 456 (10.2) | 10.3 (0.04) |
| Italy | 78 (1.1) | 501 (2.8) | 20 (1.0) | 491 (3.7) | 2 (0.2) | ~ ~ | 10.0 (0.05) |
| Cyprus | 76 (0.9) | 505 (1.9) | 20 (0.8) | 493 (3.4) | 4 (0.3) | 463 (10.3) | 10.1 (0.04) |
| France | 75 (0.8) | 486 (2.6) | 23 (0.7) | 475 (3.3) | 2 (0.3) | ~ ~ | 10.1 (0.04) |
| Iran, Islamic Rep. of | 74 (1.0) | 456 (3.8) | 21 (0.9) | 426 (5.1) | 5 (0.4) | 386 (10.9) | 10.2 (0.05) |
| Ireland | 74 (1.0) | 530 (2.6) | 22 (0.9) | 513 (3.4) | 4 (0.3) | 493 (7.6) | 10.0 (0.05) |
| Chile | 73 (0.9) | 446 (3.0) | 23 (0.8) | 434 (3.8) | 4 (0.4) | 393 (8.6) | 9.9 (0.04) |
| Jordan | 72 (1.0) | 433 (3.6) | 18 (0.6) | 409 (5.8) | 9 (0.7) | 362 (6.7) | 10.2 (0.06) |
| Saudi Arabia | 72 (1.1) | 403 (2.5) | 20 (0.8) | 386 (3.7) | 8 (0.6) | 347 (5.3) | 10.2 (0.05) |
| Turkey | 72 (1.1) | 503 (4.3) | 24 (1.0) | 485 (6.6) | 4 (0.4) | 445 (8.7) | 9.9 (0.05) |
| Hong Kong SAR | 69 (1.3) | 580 (3.9) | 24 (1.0) | 586 (5.3) | 7 (0.6) | 539 (12.4) | 9.9 (0.05) |
| United States | 69 (0.7) | 526 (4.9) | 25 (0.6) | 509 (4.3) | 7 (0.4) | 467 (7.8) | 9.8 (0.03) |
| England | 69 (0.9) | 526 (5.3) | 26 (0.8) | 510 (6.5) | 6 (0.5) | 459 (9.3) | 9.8 (0.05) |
| Kuwait | 68 (0.9) | 409 (5.0) | 24 (0.7) | 403 (6.2) | 8 (0.7) | 360 (7.6) | 9.9 (0.05) |
| Romania | 66 (1.4) | 489 (4.1) | 27 (1.1) | 473 (6.3) | 8 (0.7) | 434 (7.4) | 9.6 (0.07) |
| Singapore | 65 (0.8) | 625 (4.0) | 30 (0.7) | 604 (4.5) | 5 (0.4) | 570 (9.2) | 9.5 (0.03) |
| New Zealand | 64 (0.9) | 490 (3.4) | 28 (0.8) | 479 (4.0) | 7 (0.4) | 441 (7.0) | 9.6 (0.04) |
| Oman | 64 (1.0) | 427 (2.8) | 27 (0.9) | 400 (3.7) | 9 (0.5) | 350 (6.3) | 9.6 (0.05) |
| Australia | 64 (0.8) | 529 (4.1) | 28 (0.7) | 505 (4.2) | 8 (0.4) | 478 (4.9) | 9.5 (0.03) |
| Qatar | 63 (1.5) | 454 (5.0) | 25 (1.0) | 448 (4.4) | 12 (0.9) | 383 (6.8) | 9.6 (0.07) |
| Lebanon | 63 (1.6) | 438 (3.3) | 27 (1.2) | 425 (3.9) | 10 (0.9) | 403 (4.9) | 9.5 (0.07) |
| United Arab Emirates | 63 (0.6) | 492 (2.1) | 25 (0.5) | 470 (2.5) | 12 (0.3) | 398 (3.4) | 9.6 (0.02) |
| Bahrain | 62 (0.9) | 489 (2.1) | 28 (0.7) | 474 (2.7) | 10 (0.5) | 449 (4.7) | 9.6 (0.04) |
| Egypt | 61 (1.3) | 434 (5.2) | 23 (0.8) | 402 (5.7) | 16 (1.0) | 360 (7.2) | 9.7 (0.08) |
| Morocco | 57 (0.9) | 395 (2.9) | 34 (0.8) | 384 (2.7) | 9 (0.5) | 366 (3.4) | 9.3 (0.04) |
| Malaysia | 35 (1.0) | 474 (3.7) | 49 (0.8) | 456 (3.6) | 16 (0.6) | 445 (4.6) | 8.6 (0.04) |
| South Africa (9) | 35 (0.7) | 413 (2.1) | 47 (0.5) | 389 (2.4) | 18 (0.5) | 353 (3.2) | 8.4 (0.02) |
| Israel | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **71 (0.2)** | **496 (0.6)** | **23 (0.1)** | **482 (0.8)** | **6 (0.1)** | **428 (1.5)** | |
| **Benchmarking Participants** | | | | | | | |
| Quebec, Canada | 78 (1.0) | 549 (3.7) | 20 (0.9) | 531 (5.2) | 3 (0.4) | 501 (9.8) | 10.2 (0.06) |
| Moscow City, Russian Fed. | 77 (1.1) | 580 (4.2) | 20 (1.0) | 566 (5.6) | 3 (0.4) | 525 (9.2) | 10.0 (0.04) |
| Dubai, UAE | 71 (1.0) | 544 (2.2) | 23 (0.7) | 528 (3.7) | 6 (0.5) | 485 (7.7) | 9.9 (0.05) |
| Ontario, Canada | 65 (1.4) | 536 (4.5) | 28 (1.2) | 524 (4.9) | 7 (0.6) | 510 (10.4) | 9.6 (0.06) |
| Abu Dhabi, UAE | 53 (1.0) | 465 (3.3) | 28 (0.7) | 438 (4.0) | 19 (0.7) | 366 (4.3) | 9.1 (0.04) |
| Western Cape, RSA (9) | 52 (0.9) | 458 (5.3) | 36 (0.7) | 434 (4.3) | 12 (0.7) | 395 (4.8) | 9.0 (0.04) |
| Gauteng, RSA (9) | 39 (1.0) | 443 (3.7) | 47 (0.8) | 415 (2.8) | 14 (0.5) | 381 (4.0) | 8.6 (0.03) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 8.16: Student Bullying

*Students' Reports*

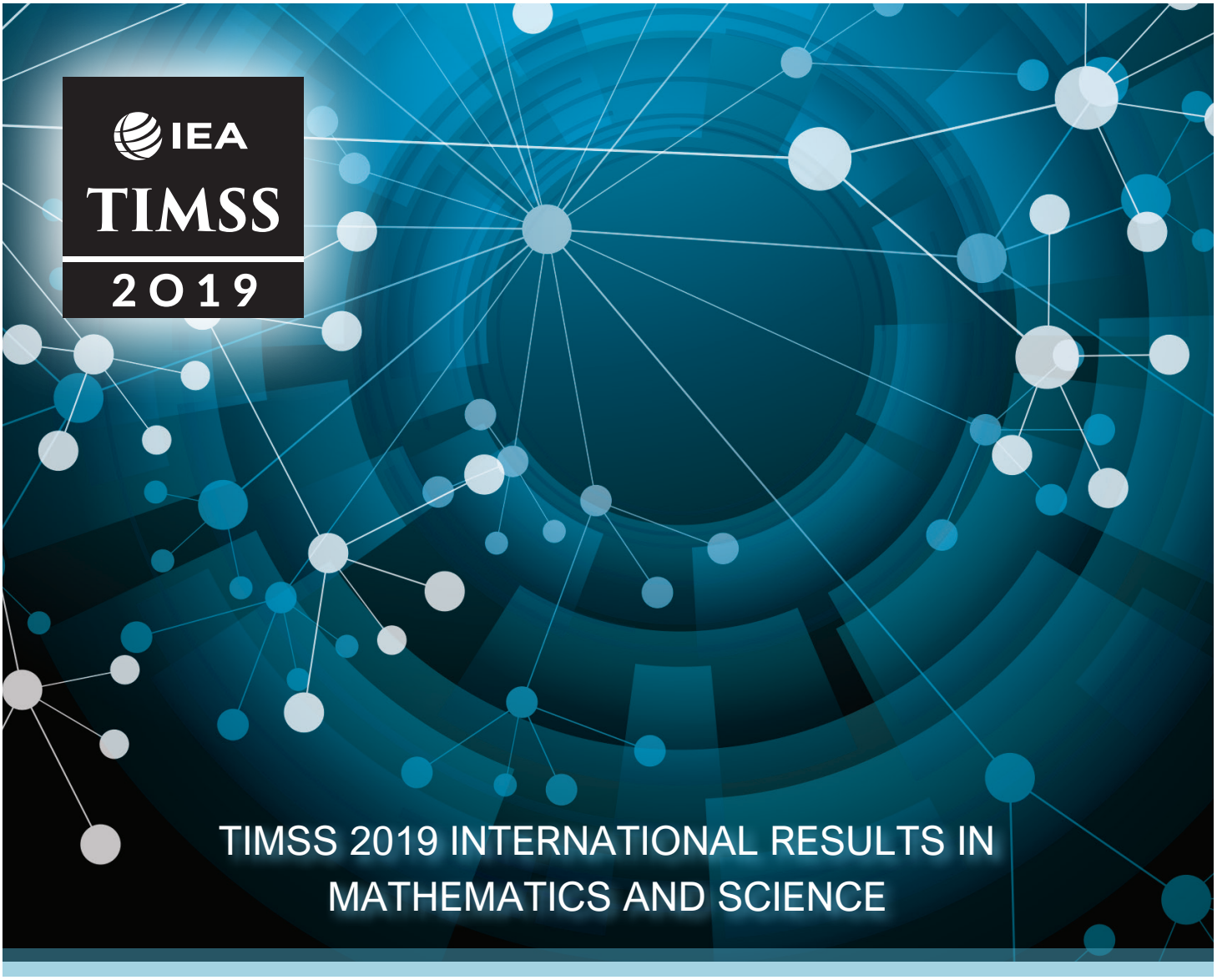
| Country | Never or Almost Never | | About Monthly | | About Weekly | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 93 (0.4) | 570 (2.1) | 6 (0.4) | 566 (5.8) | 0 (0.1) | ~ ~ | 11.3 (0.04) |
| Georgia | 89 (0.9) | 450 (4.0) | 9 (0.8) | 437 (7.7) | 2 (0.3) | ~ ~ | 11.2 (0.06) |
| Chinese Taipei | 88 (0.5) | 576 (2.0) | 11 (0.5) | 566 (4.5) | 1 (0.1) | ~ ~ | 11.0 (0.04) |
| Korea, Rep. of | 87 (0.7) | 561 (2.2) | 12 (0.6) | 561 (4.6) | 1 (0.1) | ~ ~ | 11.0 (0.05) |
| Finland | 86 (0.6) | 547 (3.0) | 12 (0.6) | 529 (4.9) | 2 (0.2) | ~ ~ | 10.8 (0.04) |
| Kazakhstan | 85 (0.8) | 478 (3.0) | 14 (0.7) | 482 (6.3) | 1 (0.2) | ~ ~ | 10.4 (0.05) |
| Portugal | 83 (0.9) | 520 (3.0) | 16 (0.8) | 513 (4.8) | 2 (0.3) | ~ ~ | 10.5 (0.05) |
| Lithuania | 81 (0.8) | 536 (2.9) | 17 (0.8) | 530 (5.3) | 2 (0.2) | ~ ~ | 10.3 (0.04) |
| Russian Federation | 80 (0.7) | 544 (4.5) | 17 (0.7) | 544 (4.8) | 3 (0.3) | 516 (11.4) | 10.3 (0.04) |
| Hungary | 79 (1.0) | 535 (2.7) | 18 (0.9) | 515 (4.3) | 3 (0.4) | 471 (10.5) | 10.2 (0.04) |
| Norway (9) | 79 (0.9) | 499 (3.3) | 19 (0.8) | 491 (4.0) | 2 (0.3) | ~ ~ | 10.3 (0.04) |
| Sweden | 78 (0.8) | 528 (3.2) | 18 (0.7) | 513 (5.2) | 3 (0.3) | 456 (12.9) | 10.3 (0.04) |
| Italy | 78 (1.1) | 505 (2.6) | 20 (1.0) | 491 (4.4) | 2 (0.2) | ~ ~ | 10.0 (0.05) |
| Cyprus | 76 (0.9) | 489 (2.3) | 20 (0.8) | 473 (3.6) | 4 (0.3) | 439 (9.2) | 10.1 (0.04) |
| France | 75 (0.8) | 493 (2.7) | 23 (0.7) | 476 (4.3) | 2 (0.3) | ~ ~ | 10.1 (0.04) |
| Iran, Islamic Rep. of | 74 (1.0) | 460 (3.5) | 21 (0.9) | 427 (5.3) | 5 (0.4) | 379 (10.7) | 10.2 (0.05) |
| Ireland | 74 (1.0) | 530 (2.9) | 22 (0.9) | 509 (4.1) | 4 (0.3) | 490 (9.3) | 10.0 (0.05) |
| Chile | 73 (0.9) | 470 (2.8) | 23 (0.8) | 451 (4.0) | 4 (0.4) | 407 (7.6) | 9.9 (0.04) |
| Jordan | 72 (1.0) | 471 (3.8) | 18 (0.6) | 436 (6.5) | 9 (0.7) | 364 (7.2) | 10.2 (0.06) |
| Saudi Arabia | 72 (1.1) | 446 (2.6) | 20 (0.8) | 418 (3.5) | 8 (0.6) | 358 (6.2) | 10.2 (0.05) |
| Turkey | 72 (1.1) | 523 (3.8) | 24 (1.0) | 503 (5.5) | 4 (0.4) | 463 (8.6) | 9.9 (0.05) |
| Hong Kong SAR | 69 (1.3) | 506 (5.0) | 24 (1.0) | 509 (6.9) | 7 (0.6) | 464 (13.4) | 9.9 (0.05) |
| United States | 69 (0.7) | 533 (4.8) | 25 (0.6) | 518 (4.2) | 7 (0.4) | 475 (7.5) | 9.8 (0.03) |
| England | 69 (0.9) | 527 (5.0) | 26 (0.8) | 512 (6.2) | 6 (0.5) | 461 (10.6) | 9.8 (0.05) |
| Kuwait | 68 (0.9) | 456 (5.3) | 24 (0.7) | 442 (6.7) | 8 (0.7) | 376 (10.0) | 9.9 (0.05) |
| Romania | 66 (1.4) | 478 (4.3) | 27 (1.1) | 467 (5.4) | 8 (0.7) | 428 (7.1) | 9.6 (0.07) |
| Singapore | 65 (0.8) | 616 (3.8) | 30 (0.7) | 598 (4.5) | 5 (0.4) | 564 (9.5) | 9.5 (0.03) |
| New Zealand | 64 (0.9) | 509 (3.6) | 28 (0.8) | 493 (4.3) | 7 (0.4) | 457 (6.6) | 9.6 (0.04) |
| Oman | 64 (1.0) | 478 (2.6) | 27 (0.9) | 444 (4.5) | 9 (0.5) | 378 (6.5) | 9.6 (0.05) |
| Australia | 64 (0.8) | 540 (3.4) | 28 (0.7) | 517 (3.7) | 8 (0.4) | 487 (5.0) | 9.5 (0.03) |
| Qatar | 63 (1.5) | 491 (4.9) | 25 (1.0) | 475 (5.4) | 12 (0.9) | 391 (8.1) | 9.6 (0.07) |
| Lebanon | 63 (1.6) | 391 (4.9) | 27 (1.2) | 372 (6.8) | 10 (0.9) | 328 (7.3) | 9.5 (0.07) |
| United Arab Emirates | 63 (0.6) | 501 (2.4) | 25 (0.5) | 468 (2.9) | 12 (0.3) | 362 (4.6) | 9.6 (0.02) |
| Bahrain | 62 (0.9) | 503 (2.1) | 28 (0.7) | 479 (2.8) | 10 (0.5) | 406 (5.8) | 9.6 (0.04) |
| Egypt | 61 (1.3) | 417 (5.1) | 23 (0.8) | 379 (5.8) | 16 (1.0) | 318 (7.8) | 9.7 (0.08) |
| Morocco | 57 (0.9) | 406 (3.1) | 34 (0.8) | 384 (3.2) | 9 (0.5) | 364 (3.9) | 9.3 (0.04) |
| Malaysia | 35 (1.0) | 476 (3.8) | 49 (0.8) | 457 (3.8) | 16 (0.6) | 439 (6.3) | 8.6 (0.04) |
| South Africa (9) | 35 (0.7) | 407 (3.1) | 47 (0.5) | 369 (3.2) | 18 (0.5) | 311 (4.1) | 8.4 (0.02) |
| Israel | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **71 (0.2)** | **499 (0.6)** | **23 (0.1)** | **482 (0.8)** | **6 (0.1)** | **421 (1.6)** | |
| **Benchmarking Participants** | | | | | | | |
| Quebec, Canada | 78 (1.0) | 541 (3.8) | 20 (0.9) | 524 (4.7) | 3 (0.4) | 509 (10.4) | 10.2 (0.06) |
| Moscow City, Russian Fed. | 77 (1.1) | 570 (3.0) | 20 (1.0) | 558 (4.2) | 3 (0.4) | 533 (7.6) | 10.0 (0.04) |
| Dubai, UAE | 71 (1.0) | 558 (2.2) | 23 (0.7) | 535 (3.4) | 6 (0.5) | 480 (9.1) | 9.9 (0.05) |
| Ontario, Canada | 65 (1.4) | 528 (2.9) | 28 (1.2) | 513 (4.4) | 7 (0.6) | 507 (10.6) | 9.6 (0.06) |
| Abu Dhabi, UAE | 53 (1.0) | 463 (4.2) | 28 (0.7) | 424 (4.9) | 19 (0.7) | 311 (6.0) | 9.1 (0.04) |
| Western Cape, RSA (9) | 52 (0.9) | 464 (6.0) | 36 (0.7) | 429 (5.1) | 12 (0.7) | 371 (6.4) | 9.0 (0.04) |
| Gauteng, RSA (9) | 39 (1.0) | 456 (4.5) | 47 (0.8) | 414 (3.7) | 14 (0.5) | 361 (5.6) | 8.6 (0.03) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

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# CLASSROOM CONTEXTS

IEA
TIMSS & PIRLS
International Study Center
Lynch School of Education
BOSTON COLLEGE

# Teacher Preparation, Professional Development, and Job Satisfaction

## Teachers' Formal Education

Exhibits 9.1, 9.2, 9.3, and 9.4 present teachers' reports about their highest level of formal education for fourth grade mathematics and science teachers and eighth grade mathematics and science teachers, respectively. Teachers' highest levels of formal education are reported by four categories: completed postgraduate university degree, completed a bachelor's degree or equivalent, completed post-secondary education but not a bachelor's degree, or completed upper-secondary education.

Internationally, on average, 28 percent of the fourth grade students had mathematics teachers with a postgraduate university degree, 56 percent had teachers with a bachelor's degree, 10 percent had teachers who had completed post-secondary education, and 5 percent had teachers who completed upper-secondary education (Exhibit 9.1). Similarly, on average, 29 percent of fourth grade students had science teachers with a postgraduate university degree, 56 percent had teachers with a bachelor's degree, 10 percent had teachers with some post-secondary education, and 5 percent had teachers who completed upper-secondary education (Exhibit 9.2).

Parallel results are shown for eighth grade students in Exhibit 9.3 (mathematics) and Exhibit 9.4 (science), although in both subjects, more eighth grade students than fourth grade students had teachers with bachelor's degrees and postgraduate university degrees, on average. Internationally, 35 percent of students had mathematics teachers with a postgraduate university degree, and 61 percent had mathematics teachers with a bachelor's degree. Also internationally, 38 percent of students had science teachers with a postgraduate university degree, and 58 percent had science teachers with a bachelor's degree.

In fourth and eighth grades and in both subjects, there was considerable variation across countries in teachers' education levels, reflecting countries' different education paths and requirements for teachers. The *TIMSS 2019 Encyclopedia* provides information about the main teacher preparation routes and current requirements for teachers in each country, based on information provided by National Research Coordinators in the TIMSS 2019 Curriculum Questionnaire.

## Exhibit 9.1: Teachers' Formal Education*

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teacher Education Level | | | |
|---|---|---|---|---|
| | Completed Postgraduate University Degree** | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Completed Post-Secondary Education but Not a Bachelor's Degree | No Further than Upper-Secondary Education |
| Albania r | 59 (5.0) | 19 (3.4) | 3 (1.5) | 19 (3.9) |
| Armenia | 7 (1.9) | 9 (1.9) | 44 (3.7) | 40 (4.0) |
| Australia | 15 (2.4) | 82 (2.5) | 3 (1.1) | 0 (0.0) |
| Austria | 11 (1.8) | 51 (3.4) | 38 (3.2) | 0 (0.0) |
| Azerbaijan | 5 (1.8) | 49 (3.5) | 34 (3.6) | 12 (2.5) |
| Bahrain | 16 (3.3) | 84 (3.4) | 0 (0.2) | 0 (0.0) |
| Belgium (Flemish) | 3 (1.1) | 97 (1.2) | 0 (0.4) | 0 (0.0) |
| Bosnia and Herzegovina | 4 (1.1) | 67 (3.3) | 29 (3.4) | 0 (0.3) |
| Bulgaria | 73 (3.7) | 21 (3.1) | 6 (2.3) | 0 (0.0) |
| Canada | 19 (2.0) | 80 (2.0) | 0 (0.4) | 0 (0.0) |
| Chile | 12 (3.1) | 86 (3.3) | 2 (1.0) | 0 (0.0) |
| Chinese Taipei | 55 (4.0) | 45 (3.9) | 1 (0.6) | 0 (0.0) |
| Croatia | 50 (3.4) | 13 (2.5) | 37 (2.7) | 0 (0.5) |
| Cyprus | 63 (3.6) | 35 (3.5) | 2 (0.9) | 0 (0.0) |
| Czech Republic | 92 (1.9) | 2 (1.1) | 1 (0.9) | 5 (1.4) |
| Denmark | 8 (2.4) | 82 (3.1) | 2 (1.5) | 7 (2.4) |
| England s | 6 (2.7) | 94 (2.7) | 0 (0.0) | 0 (0.0) |
| Finland | 93 (1.8) | 6 (1.6) | 1 (0.6) | 0 (0.4) |
| France r | 49 (3.8) | 37 (3.6) | 10 (2.1) | 4 (1.6) |
| Georgia | 79 (3.2) | 19 (3.1) | 1 (0.6) | 1 (0.9) |
| Germany | 90 (2.5) | 0 (0.0) | 10 (2.5) | 0 (0.0) |
| Hong Kong SAR | 25 (4.4) | 71 (4.6) | 4 (1.8) | 0 (0.0) |
| Hungary | 9 (2.3) | 90 (2.4) | 1 (0.5) | 0 (0.0) |
| Iran, Islamic Rep. of | 12 (2.1) | 75 (3.4) | 11 (2.3) | 2 (1.0) |
| Ireland | 31 (3.5) | 69 (3.5) | 0 (0.4) | 0 (0.2) |
| Italy | 31 (3.6) | 4 (1.6) | 5 (1.8) | 59 (3.6) |
| Japan | 5 (1.3) | 91 (1.6) | 4 (1.4) | 0 (0.0) |
| Kazakhstan | 3 (1.4) | 89 (2.5) | 8 (2.1) | 0 (0.2) |
| Korea, Rep. of | 25 (3.3) | 73 (3.3) | 2 (1.2) | 0 (0.0) |
| Kosovo | 8 (2.1) | 77 (3.5) | 10 (2.5) | 6 (1.8) |
| Kuwait | 12 (3.2) | 82 (3.2) | 3 (1.3) | 3 (1.4) |
| Latvia | 51 (4.0) | 48 (4.1) | 0 (0.5) | 1 (0.8) |
| Lithuania | 29 (3.7) | 67 (4.0) | 4 (1.2) | 0 (0.0) |
| Malta | 18 (0.3) | 70 (0.4) | 6 (0.2) | 7 (0.2) |
| Montenegro | 3 (1.0) | 75 (2.9) | 22 (2.7) | 0 (0.0) |
| Morocco r | 8 (2.0) | 44 (4.1) | 6 (1.9) | 43 (3.9) |
| Netherlands r | 1 (0.7) | 80 (3.6) | 17 (3.4) | 1 (1.1) |
| New Zealand | 33 (2.9) | 59 (3.2) | 8 (1.5) | 0 (0.0) |
| North Macedonia | 6 (2.9) | 76 (3.5) | 11 (2.5) | 7 (2.2) |
| Northern Ireland | 15 (3.1) | 78 (3.8) | 2 (1.4) | 4 (2.2) |
| Norway (5) r | 35 (4.3) | 65 (4.3) | 0 (0.0) | 0 (0.0) |
| Oman | 6 (1.1) | 87 (2.2) | 5 (1.6) | 2 (1.0) |
| Pakistan | 29 (7.1) | 5 (2.2) | 30 (6.4) | 36 (7.2) |
| Philippines | 30 (3.7) | 57 (4.1) | 2 (1.1) | 12 (2.8) |
| Poland | 96 (1.1) | 4 (1.1) | 0 (0.0) | 0 (0.0) |
| Portugal | 10 (2.2) | 84 (2.7) | 5 (1.5) | 0 (0.0) |
| Qatar | 19 (3.5) | 80 (3.5) | 0 (0.3) | 0 (0.0) |
| Russian Federation | 44 (3.8) | 31 (3.6) | 18 (2.7) | 6 (1.6) |
| Saudi Arabia | 0 (0.2) | 1 (0.4) | 93 (1.7) | 6 (1.7) |
| Serbia | 15 (2.5) | 62 (3.8) | 23 (3.4) | 1 (0.6) |
| Singapore | 13 (1.8) | 76 (2.2) | 10 (1.5) | 0 (0.3) |
| Slovak Republic | 99 (0.7) | 0 (0.0) | 1 (0.7) | 0 (0.0) |
| South Africa (5) | 2 (1.2) | 60 (3.8) | 33 (3.0) | 5 (1.5) |
| Spain | 25 (2.8) | 72 (3.2) | 2 (1.2) | 0 (0.0) |
| Sweden r | 13 (3.6) | 77 (4.1) | 6 (2.1) | 4 (1.4) |
| Turkey (5) | 6 (1.6) | 94 (1.6) | 0 (0.0) | 0 (0.0) |
| United Arab Emirates r | 27 (2.0) | 70 (2.1) | 3 (0.7) | 1 (0.3) |
| United States | 49 (2.3) | 51 (2.3) | 0 (0.0) | 0 (0.0) |
| **International Average** | **28 (0.4)** | **56 (0.4)** | **10 (0.3)** | **5 (0.2)** |
| **Benchmarking Participants** | | | | |
| Ontario, Canada r | 27 (3.8) | 72 (3.8) | 1 (0.9) | 0 (0.0) |
| Quebec, Canada | 9 (2.6) | 91 (2.6) | 0 (0.0) | 0 (0.0) |
| Moscow City, Russian Fed. | 56 (4.8) | 39 (4.8) | 3 (1.5) | 2 (1.0) |
| Madrid, Spain | 31 (3.7) | 66 (3.6) | 3 (0.9) | 0 (0.0) |
| Abu Dhabi, UAE | 26 (2.1) | 70 (2.2) | 3 (1.1) | 1 (0.7) |
| Dubai, UAE r | 30 (3.9) | 68 (3.9) | 1 (0.5) | 0 (0.3) |

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011)
** For example, doctorate, master's, or other postgraduate degree.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.2: Teachers' Formal Education*

*Students' Results based on Teachers' Reports*

| Country | | Percent of Students by Teacher Education Level | | | |
|---|---|---|---|---|---|
| | | Completed Postgraduate University Degree** | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Completed Post-Secondary Education but Not a Bachelor's Degree | No Further than Upper-Secondary Education |
| Albania | r | 61 (4.9) | 19 (3.4) | 2 (1.1) | 18 (3.9) |
| Armenia | | 6 (1.6) | 11 (2.4) | 48 (3.9) | 35 (4.0) |
| Australia | | 16 (2.0) | 80 (2.3) | 3 (1.2) | 0 (0.0) |
| Austria | | 10 (1.8) | 51 (3.5) | 39 (3.5) | 0 (0.0) |
| Azerbaijan | | 4 (1.0) | 48 (3.6) | 37 (3.6) | 11 (2.3) |
| Bahrain | | 14 (2.2) | 86 (2.2) | 0 (0.2) | 0 (0.0) |
| Belgium (Flemish) | | 3 (1.1) | 97 (1.1) | 0 (0.0) | 0 (0.0) |
| Bosnia and Herzegovina | | 4 (1.1) | 67 (3.3) | 29 (3.4) | 0 (0.3) |
| Bulgaria | | 70 (3.8) | 22 (3.2) | 7 (2.4) | 0 (0.0) |
| Canada | r | 16 (2.5) | 83 (2.5) | 0 (0.4) | 0 (0.0) |
| Chile | | 7 (2.4) | 91 (2.6) | 1 (0.9) | 0 (0.0) |
| Chinese Taipei | | 49 (4.0) | 51 (4.0) | 0 (0.3) | 0 (0.0) |
| Croatia | | 50 (3.4) | 13 (2.5) | 37 (2.7) | 0 (0.5) |
| Cyprus | | 72 (4.3) | 27 (4.1) | 1 (0.8) | 0 (0.0) |
| Czech Republic | | 92 (1.8) | 3 (1.3) | 0 (0.0) | 5 (1.4) |
| Denmark | | 12 (2.7) | 82 (3.1) | 1 (0.6) | 6 (2.1) |
| England | s | 6 (2.7) | 94 (2.7) | 0 (0.0) | 0 (0.0) |
| Finland | | 93 (1.7) | 6 (1.7) | 1 (0.6) | 0 (0.4) |
| France | r | 50 (3.9) | 37 (3.6) | 9 (2.0) | 4 (1.5) |
| Georgia | | 81 (3.3) | 18 (3.2) | 1 (0.6) | 0 (0.0) |
| Germany | | 93 (1.9) | 1 (0.6) | 6 (1.8) | 0 (0.0) |
| Hong Kong SAR | | 25 (4.2) | 70 (4.4) | 5 (1.9) | 0 (0.0) |
| Hungary | | 6 (1.4) | 93 (1.5) | 1 (0.6) | 0 (0.5) |
| Iran, Islamic Rep. of | | 12 (2.1) | 75 (3.4) | 11 (2.3) | 2 (1.0) |
| Ireland | | 31 (3.5) | 69 (3.5) | 0 (0.4) | 0 (0.2) |
| Italy | | 31 (3.6) | 4 (1.6) | 5 (1.8) | 59 (3.6) |
| Japan | | 4 (1.6) | 93 (1.4) | 2 (1.2) | 0 (0.0) |
| Kazakhstan | | 3 (1.5) | 89 (2.5) | 8 (2.0) | 0 (0.2) |
| Korea, Rep. of | | 26 (3.5) | 73 (3.4) | 1 (1.1) | 0 (0.0) |
| Kosovo | | 8 (2.1) | 77 (3.5) | 10 (2.5) | 6 (1.8) |
| Kuwait | | 14 (2.8) | 77 (3.5) | 6 (2.0) | 3 (1.5) |
| Latvia | | 52 (3.8) | 48 (3.8) | 0 (0.0) | 0 (0.0) |
| Lithuania | | 30 (3.8) | 66 (4.0) | 4 (1.2) | 0 (0.0) |
| Malta | | 16 (0.3) | 74 (0.3) | 5 (0.2) | 5 (0.1) |
| Montenegro | | 3 (1.0) | 75 (2.9) | 22 (2.7) | 0 (0.0) |
| Morocco | r | 6 (2.1) | 37 (4.3) | 4 (1.7) | 53 (4.5) |
| Netherlands | r | 1 (0.7) | 80 (3.6) | 17 (3.4) | 1 (1.1) |
| New Zealand | | 34 (2.9) | 58 (3.1) | 8 (1.4) | 0 (0.0) |
| North Macedonia | | 6 (2.9) | 76 (3.5) | 11 (2.5) | 7 (2.2) |
| Northern Ireland | | 15 (3.1) | 78 (3.8) | 2 (1.4) | 4 (2.2) |
| Norway (5) | r | 30 (4.0) | 69 (4.0) | 0 (0.3) | 0 (0.0) |
| Oman | | 12 (2.0) | 81 (2.4) | 5 (1.8) | 1 (0.6) |
| Pakistan | | 35 (6.4) | 8 (2.5) | 28 (6.1) | 29 (5.0) |
| Philippines | | 33 (4.1) | 51 (4.3) | 0 (0.0) | 16 (3.0) |
| Poland | | 99 (0.7) | 1 (0.7) | 0 (0.0) | 0 (0.0) |
| Portugal | | 10 (2.2) | 84 (2.7) | 5 (1.5) | 0 (0.0) |
| Qatar | | 27 (3.0) | 72 (3.1) | 1 (1.0) | 0 (0.0) |
| Russian Federation | | 44 (3.8) | 31 (3.6) | 18 (2.7) | 6 (1.6) |
| Saudi Arabia | | 0 (0.0) | 8 (2.5) | 89 (2.8) | 4 (1.4) |
| Serbia | | 15 (2.5) | 62 (3.8) | 23 (3.4) | 1 (0.6) |
| Singapore | | 17 (1.9) | 74 (2.2) | 9 (1.4) | 1 (0.4) |
| Slovak Republic | | 98 (1.1) | 1 (0.8) | 1 (0.7) | 0 (0.2) |
| South Africa (5) | | 1 (0.6) | 57 (2.9) | 37 (3.2) | 6 (1.7) |
| Spain | | 26 (3.1) | 73 (3.3) | 2 (0.8) | 0 (0.0) |
| Sweden | r | 17 (4.3) | 70 (4.9) | 7 (2.2) | 6 (2.2) |
| Turkey (5) | | 9 (2.0) | 91 (2.0) | 0 (0.0) | 0 (0.0) |
| United Arab Emirates | | 33 (1.6) | 65 (1.6) | 2 (0.5) | 1 (0.4) |
| United States | | 52 (2.2) | 48 (2.2) | 0 (0.0) | 0 (0.0) |
| **International Average** | | **29 (0.4)** | **56 (0.4)** | **10 (0.3)** | **5 (0.2)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | r | 22 (5.0) | 77 (5.0) | 1 (1.0) | 0 (0.0) |
| Quebec, Canada | | 8 (2.4) | 92 (2.4) | 0 (0.0) | 0 (0.0) |
| Moscow City, Russian Fed. | | 56 (4.8) | 38 (4.8) | 3 (1.5) | 2 (1.0) |
| Madrid, Spain | | 31 (2.9) | 66 (2.8) | 3 (1.4) | 0 (0.0) |
| Abu Dhabi, UAE | | 35 (2.5) | 61 (2.8) | 2 (1.0) | 2 (1.0) |
| Dubai, UAE | r | 40 (2.5) | 59 (2.5) | 0 (0.2) | 0 (0.2) |

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011)

** For example, doctorate, master's, or other postgraduate degree.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 9.3: Teachers' Formal Education*

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teacher Education Level | | | |
|---|---|---|---|---|
| | Completed Postgraduate University Degree** | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Completed Post-Secondary Education but Not a Bachelor's Degree | No Further than Upper-Secondary Education |
| Australia | 22 (3.3) | 77 (3.2) | 1 (0.8) | 0 (0.0) |
| Bahrain | 18 (1.7) | 81 (1.8) | 1 (0.6) | 1 (0.4) |
| Chile | 10 (2.7) | 88 (2.8) | 1 (1.0) | 0 (0.0) |
| Chinese Taipei | 60 (3.3) | 40 (3.3) | 0 (0.0) | 0 (0.0) |
| Cyprus r | 62 (4.0) | 38 (4.0) | 0 (0.0) | 0 (0.0) |
| Egypt | 6 (2.3) | 76 (4.3) | 15 (3.3) | 3 (1.4) |
| England s | 29 (5.2) | 71 (5.2) | 0 (0.0) | 0 (0.0) |
| Finland | 95 (1.1) | 3 (0.8) | 0 (0.1) | 1 (0.7) |
| France r | 66 (4.1) | 33 (4.0) | 1 (1.0) | 0 (0.0) |
| Georgia | 87 (3.3) | 10 (2.9) | 0 (0.0) | 3 (1.8) |
| Hong Kong SAR | 45 (3.9) | 55 (3.9) | 0 (0.2) | 0 (0.0) |
| Hungary | 29 (3.4) | 71 (3.5) | 0 (0.4) | 0 (0.0) |
| Iran, Islamic Rep. of | 26 (3.1) | 68 (3.5) | 7 (1.8) | 0 (0.0) |
| Ireland | 44 (3.1) | 55 (3.0) | 0 (0.1) | 0 (0.4) |
| Israel | 50 (3.6) | 46 (3.6) | 3 (1.0) | 1 (0.5) |
| Italy | 100 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Japan | 12 (2.4) | 87 (2.4) | 1 (0.4) | 0 (0.0) |
| Jordan | 6 (2.0) | 76 (3.2) | 13 (2.0) | 5 (1.8) |
| Kazakhstan | 16 (2.7) | 81 (2.9) | 2 (1.1) | 1 (0.6) |
| Korea, Rep. of | 35 (3.6) | 65 (3.6) | 0 (0.0) | 0 (0.0) |
| Kuwait | 12 (3.2) | 88 (3.3) | 0 (0.0) | 1 (0.5) |
| Lebanon | 37 (4.1) | 51 (3.6) | 7 (2.2) | 4 (1.8) |
| Lithuania | 51 (4.3) | 47 (4.2) | 1 (0.6) | 0 (0.0) |
| Malaysia | 7 (1.8) | 89 (2.5) | 3 (1.2) | 1 (0.9) |
| Morocco r | 11 (2.8) | 43 (4.1) | 12 (2.8) | 34 (3.7) |
| New Zealand | 53 (3.3) | 44 (3.1) | 3 (1.1) | 0 (0.0) |
| Norway (9) r | 41 (4.1) | 57 (4.1) | 2 (1.3) | 0 (0.0) |
| Oman | 9 (1.9) | 89 (2.2) | 1 (0.6) | 1 (1.1) |
| Portugal | 18 (2.8) | 80 (3.0) | 2 (1.4) | 0 (0.0) |
| Qatar | 26 (3.6) | 73 (3.5) | 1 (0.5) | 0 (0.0) |
| Romania | 30 (3.6) | 59 (3.9) | 10 (2.3) | 0 (0.0) |
| Russian Federation | 74 (3.7) | 24 (3.8) | 1 (0.7) | 0 (0.0) |
| Saudi Arabia r | 1 (0.8) | 99 (0.8) | 0 (0.0) | 0 (0.0) |
| Singapore | 18 (2.2) | 82 (2.3) | 0 (0.4) | 0 (0.0) |
| South Africa (9) | 2 (0.8) | 77 (2.4) | 20 (2.2) | 0 (0.3) |
| Sweden | 40 (3.5) | 52 (3.4) | 4 (1.6) | 5 (1.6) |
| Turkey | 7 (1.8) | 93 (1.8) | 0 (0.0) | 0 (0.0) |
| United Arab Emirates | 33 (2.0) | 65 (2.0) | 1 (0.3) | 1 (0.3) |
| United States | 57 (3.2) | 43 (3.2) | 0 (0.0) | 0 (0.0) |
| **International Average** | **35 (0.5)** | **61 (0.5)** | **3 (0.2)** | **2 (0.1)** |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | 19 (3.6) | 81 (3.6) | 0 (0.0) | 0 (0.0) |
| Quebec, Canada | 12 (2.9) | 88 (2.9) | 0 (0.0) | 0 (0.0) |
| Moscow City, Russian Fed. | 88 (2.6) | 11 (2.6) | 0 (0.0) | 1 (0.5) |
| Gauteng, RSA (9) | 2 (1.3) | 75 (3.8) | 22 (3.6) | 1 (0.8) |
| Western Cape, RSA (9) | 2 (1.0) | 80 (3.3) | 17 (3.1) | 1 (0.8) |
| Abu Dhabi, UAE r | 33 (2.3) | 64 (2.2) | 2 (0.9) | 1 (0.7) |
| Dubai, UAE | 41 (3.4) | 59 (3.5) | 0 (0.0) | 0 (0.0) |

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011)
** For example, doctorate, master's, or other postgraduate degree.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 9.4: Teachers' Formal Education*

*Students' Results based on Teachers' Reports*

| Country | | Percent of Students by Teacher Education Level | | | |
|---|---|---|---|---|---|
| | | Completed Postgraduate University Degree** | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Completed Post-Secondary Education but Not a Bachelor's Degree | No Further than Upper-Secondary Education |
| Australia | | 24 (2.6) | 76 (2.6) | 0 (0.2) | 0 (0.0) |
| Bahrain | | 19 (3.0) | 79 (3.1) | 1 (0.7) | 0 (0.0) |
| Chile | | 12 (2.5) | 86 (2.7) | 1 (1.0) | 0 (0.1) |
| Chinese Taipei | | 67 (3.3) | 33 (3.3) | 0 (0.0) | 0 (0.0) |
| Cyprus | s | 59 (1.8) | 41 (1.8) | 0 (0.0) | 0 (0.0) |
| Egypt | | 3 (1.5) | 87 (3.1) | 9 (2.6) | 1 (0.8) |
| England | s | 34 (5.1) | 66 (5.1) | 0 (0.0) | 0 (0.0) |
| Finland | | 97 (0.7) | 3 (0.7) | 0 (0.1) | 1 (0.4) |
| France | r | 85 (2.3) | 14 (2.3) | 0 (0.0) | 0 (0.4) |
| Georgia | | 90 (1.4) | 9 (1.3) | 0 (0.2) | 1 (0.5) |
| Hong Kong SAR | | 48 (4.4) | 50 (4.3) | 2 (1.3) | 0 (0.0) |
| Hungary | | 44 (2.6) | 55 (2.6) | 0 (0.2) | 1 (0.3) |
| Iran, Islamic Rep. of | | 29 (3.3) | 67 (3.4) | 3 (1.5) | 1 (0.7) |
| Ireland | | 35 (3.5) | 61 (3.6) | 1 (1.2) | 2 (0.8) |
| Israel | | 53 (3.7) | 43 (3.9) | 2 (0.9) | 2 (1.1) |
| Italy | | 100 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Japan | | 15 (2.9) | 85 (2.9) | 0 (0.0) | 0 (0.0) |
| Jordan | | 13 (2.4) | 78 (3.2) | 0 (0.3) | 9 (2.1) |
| Kazakhstan | | 15 (1.9) | 84 (1.9) | 1 (0.3) | 1 (0.3) |
| Korea, Rep. of | | 40 (3.4) | 60 (3.4) | 0 (0.0) | 0 (0.0) |
| Kuwait | | 14 (3.5) | 86 (3.5) | 0 (0.0) | 0 (0.0) |
| Lebanon | | 49 (2.7) | 44 (2.8) | 3 (1.3) | 3 (0.8) |
| Lithuania | | 54 (2.4) | 44 (2.3) | 1 (0.5) | 0 (0.2) |
| Malaysia | | 5 (1.6) | 92 (1.9) | 1 (0.7) | 1 (0.6) |
| Morocco | s | 15 (1.9) | 55 (2.8) | 15 (2.1) | 16 (2.0) |
| New Zealand | | 69 (3.2) | 30 (3.3) | 1 (1.1) | 0 (0.0) |
| Norway (9) | r | 51 (4.5) | 48 (4.6) | 2 (1.3) | 0 (0.0) |
| Oman | | 11 (1.8) | 87 (2.1) | 2 (1.1) | 0 (0.0) |
| Portugal | | 24 (2.6) | 74 (2.4) | 2 (0.8) | 0 (0.0) |
| Qatar | | 37 (3.6) | 62 (3.6) | 1 (0.4) | 0 (0.0) |
| Romania | | 33 (2.4) | 55 (2.4) | 11 (1.8) | 1 (0.6) |
| Russian Federation | | 76 (2.0) | 21 (1.8) | 1 (0.6) | 2 (0.4) |
| Saudi Arabia | r | 5 (1.8) | 93 (2.0) | 1 (0.8) | 0 (0.2) |
| Singapore | | 22 (2.4) | 77 (2.4) | 1 (0.6) | 0 (0.0) |
| South Africa (9) | | 2 (0.7) | 80 (2.3) | 16 (2.4) | 2 (1.3) |
| Sweden | | 43 (3.8) | 49 (3.8) | 1 (0.8) | 6 (1.5) |
| Turkey | | 9 (2.4) | 90 (2.4) | 1 (0.0) | 0 (0.0) |
| United Arab Emirates | | 39 (1.4) | 60 (1.4) | 0 (0.2) | 1 (0.2) |
| United States | | 61 (2.7) | 39 (2.7) | 0 (0.0) | 0 (0.0) |
| **International Average** | | **38 (0.4)** | **58 (0.5)** | **2 (0.2)** | **1 (0.1)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | s | 22 (4.1) | 78 (4.1) | 0 (0.0) | 0 (0.0) |
| Moscow City, Russian Fed. | | 86 (1.4) | 13 (1.3) | 0 (0.2) | 0 (0.3) |
| Gauteng, RSA (9) | | 1 (0.9) | 86 (3.5) | 13 (3.1) | 1 (0.6) |
| Western Cape, RSA (9) | | 5 (1.7) | 86 (2.8) | 10 (2.4) | 0 (0.0) |
| Abu Dhabi, UAE | | 36 (2.1) | 64 (2.1) | 0 (0.5) | 0 (0.3) |
| Dubai, UAE | | 53 (3.1) | 46 (3.2) | 0 (0.0) | 1 (0.6) |
| Quebec, Canada | y | - - | - - | - - | - - |

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011)

** For example, doctorate, master's, or other postgraduate degree.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

Downloaded from http://timss2019.org/download

## Teachers' Major

Exhibits 9.5 and 9.6 present fourth grade teachers' reports about their majors or specializations in primary education and/or mathematics and in primary education and/or science, respectively. Exhibits 9.7 and 9.8 present eighth grade teachers' reports about their majors or specializations in mathematics and/or mathematics education and in science and/or science education, respectively. For each category of teachers' major or specialization, average student achievement is also shown.

As shown in Exhibit 9.5, on average across countries, three-quarters of fourth grade students were taught by teachers with a major in primary education and a major or specialization in mathematics (32%) or by teachers with a major in primary education but no major or specialization in mathematics (43%), and just 11 percent were taught by teachers with a major in mathematics but not primary education. Another 8 percent were taught by teachers who had some other major, and 6 percent by teachers with no formal education beyond upper-secondary. The distribution of students by teachers' major was similar for science (shown in Exhibit 9.6), with 28 percent of fourth grade students taught by science teachers with a major in primary education and science, 44 percent by teachers with a major in primary education but not in science, 13 percent by teachers with a major in science but not primary education, and 9 and 5 percent by teachers with other majors or no education beyond upper-secondary, respectively. In both mathematics and science, there was considerable variation in the distribution of students by teachers' majors across countries, however, reflecting countries' different education pathways and requirements for primary school teachers.

On average across countries, mathematics achievement was highest for fourth grade students whose teachers had a major in primary education but no major in mathematics (503), followed by students with teachers with a major in both primary education and mathematics (497), and then by students with teachers who majored in mathematics but not primary education (487) and teachers who had other majors (490). Students whose teachers did not go beyond upper-secondary education had the lowest average mathematics achievement (457). Likewise, for science, students who had teachers with a major in primary education but no major in science and students who had teachers with a major in primary education and science had the highest average achievement (491 and 489, respectively), followed by students whose teachers majored in science but not primary education (480), and then by students who had teachers with other majors (478). Students whose teachers had no formal education beyond upper-secondary had the lowest average science achievement (442). However, within most countries, there was no clear relationship between teachers' major and average achievement in mathematics and science.

As shown in Exhibit 9.7, about three-quarters (78%) of eighth grade students were taught mathematics by teachers who had a major in mathematics and mathematics education (39%) or who majored in mathematics but not in mathematics education (39%). A further 11 percent were taught by teachers who majored in mathematics education only, and 10 percent by teachers with other majors. A slightly higher percentage (83%) of eighth grade students were taught science by teachers who majored in science and science education (33%) or in science but not in science education (50%), as shown

in Exhibit 9.8. A further 9 percent were taught by teachers who majored in science education but not science and 6 percent by teachers with other majors. Internationally, just 1 percent of eighth grade students were taught mathematics or science by teachers who had not completed formal education beyond upper-secondary.

In mathematics, eighth grade students with teachers who majored in mathematics and mathematics education or in mathematics education but not mathematics had higher average achievement than students with teachers who majored in mathematics and not mathematics education (averages scores of 492 and 494 compared with 488, respectively). That was not the case in all countries, however, and in many countries, there was no clear relationship between teachers' major and average mathematics achievement. In science, eighth grade students whose teachers majored in science and science education or in science but not science education had higher average scores than students whose teachers majored in science education but not science (494 and 491 compared with 482, respectively). However, within most countries, there was no clear relationship between teachers' major and average achievement science.

## Exhibit 9.5: Teachers Majored in Education and Mathematics

*Students' Results based on Teachers' Reports*

| Country | | Major in Primary Education and Major (or Specialization) in Mathematics | | Major in Primary Education but No Major (or Specialization) in Mathematics | | Major in Mathematics but No Major in Primary Education | | All Other Majors | | No Formal Education Beyond Upper-Secondary* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | r | 15 (3.3) | 512 (9.7) | 65 (4.8) | 491 (5.1) | 1 (0.1) | ~ ~ | 1 (1.1) | ~ ~ | 17 (3.7) | 498 (7.8) |
| Armenia | | 40 (4.0) | 498 (4.5) | 7 (2.2) | 500 (6.7) | 11 (2.7) | 504 (6.2) | 1 (0.7) | ~ ~ | 42 (4.2) | 495 (4.1) |
| Australia | | 16 (2.6) | 522 (10.2) | 80 (2.9) | 518 (2.9) | 0 (0.1) | ~ ~ | 4 (1.2) | 477 (13.1) | 0 (0.0) | ~ ~ |
| Austria | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Azerbaijan | r | 54 (4.1) | 515 (4.0) | 21 (3.4) | 510 (6.3) | 5 (1.7) | 511 (19.1) | 6 (2.0) | 505 (14.1) | 14 (2.9) | 524 (6.9) |
| Bahrain | | 44 (3.3) | 477 (4.0) | 5 (1.2) | 503 (15.0) | 45 (3.2) | 479 (3.8) | 5 (1.6) | 491 (7.7) | 0 (0.0) | ~ ~ |
| Belgium (Flemish) | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Bosnia and Herzegovina | | 41 (3.4) | 454 (4.1) | 54 (3.4) | 452 (4.0) | 1 (0.8) | ~ ~ | 2 (1.0) | ~ ~ | 0 (0.3) | ~ ~ |
| Bulgaria | r | 8 (2.2) | 521 (16.1) | 87 (3.5) | 513 (4.3) | 0 (0.3) | ~ ~ | 5 (2.8) | 476 (64.3) | 0 (0.0) | ~ ~ |
| Canada | r | 11 (1.4) | 509 (5.5) | 74 (1.9) | 515 (2.4) | 2 (0.9) | ~ ~ | 13 (1.4) | 504 (4.3) | 0 (0.0) | ~ ~ |
| Chile | | 63 (3.7) | 449 (3.2) | 35 (3.6) | 425 (5.6) | 1 (0.9) | ~ ~ | 1 (0.5) | ~ ~ | 0 (0.0) | ~ ~ |
| Chinese Taipei | | 33 (3.6) | 597 (3.5) | 46 (4.0) | 597 (2.7) | 3 (1.4) | 614 (4.5) | 18 (3.0) | 602 (4.6) | 0 (0.0) | ~ ~ |
| Croatia | | 13 (2.6) | 508 (6.8) | 84 (2.7) | 509 (2.4) | 0 (0.0) | ~ ~ | 2 (0.9) | ~ ~ | 0 (0.5) | ~ ~ |
| Cyprus | | 24 (3.1) | 543 (5.1) | 73 (3.2) | 530 (3.4) | 1 (0.7) | ~ ~ | 2 (1.1) | ~ ~ | 0 (0.0) | ~ ~ |
| Czech Republic | | 2 (0.9) | ~ ~ | 81 (2.3) | 535 (2.9) | 1 (0.5) | ~ ~ | 11 (1.9) | 528 (7.3) | 5 (1.5) | 523 (11.3) |
| Denmark | r | 31 (4.4) | 518 (3.9) | 8 (2.4) | 552 (7.6) | 42 (4.5) | 525 (3.3) | 11 (2.5) | 517 (6.4) | 8 (2.5) | 520 (7.6) |
| England | s | 20 (4.6) | 563 (9.9) | 56 (5.1) | 553 (6.6) | 3 (2.1) | 578 (14.5) | 20 (4.2) | 558 (11.8) | 0 (0.0) | ~ ~ |
| Finland | | 9 (2.0) | 541 (8.4) | 84 (2.5) | 532 (2.5) | 0 (0.1) | ~ ~ | 7 (1.7) | 530 (7.4) | 0 (0.4) | ~ ~ |
| France | r | 12 (2.3) | 470 (7.4) | 31 (4.0) | 492 (5.0) | 21 (3.7) | 484 (7.1) | 31 (3.7) | 484 (6.9) | 5 (1.9) | 491 (14.4) |
| Georgia | r | 81 (3.6) | 477 (4.6) | 4 (2.0) | 482 (9.2) | 12 (3.1) | 494 (12.3) | 2 (0.9) | ~ ~ | 1 (1.2) | ~ ~ |
| Germany | r | 67 (3.3) | 520 (3.3) | 22 (3.1) | 523 (6.7) | 3 (1.5) | 522 (12.0) | 8 (2.1) | 517 (10.0) | 0 (0.0) | ~ ~ |
| Hong Kong SAR | | 53 (4.8) | 602 (4.6) | 20 (3.8) | 605 (7.7) | 20 (4.2) | 596 (10.9) | 8 (2.6) | 621 (16.8) | 0 (0.0) | ~ ~ |
| Hungary | r | 4 (1.4) | 528 (16.7) | 95 (1.6) | 522 (3.6) | 0 (0.0) | ~ ~ | 1 (0.7) | ~ ~ | 0 (0.0) | ~ ~ |
| Iran, Islamic Rep. of | | 13 (2.7) | 440 (9.0) | 43 (3.3) | 445 (7.0) | 8 (2.2) | 461 (14.1) | 34 (3.8) | 438 (7.7) | 2 (1.1) | ~ ~ |
| Ireland | | 12 (2.5) | 550 (5.0) | 84 (2.8) | 549 (3.0) | 2 (1.0) | ~ ~ | 3 (1.1) | 535 (13.7) | 0 (0.2) | ~ ~ |
| Italy | | 3 (1.2) | 509 (12.5) | 9 (2.9) | 531 (6.7) | 6 (1.9) | 506 (7.8) | 21 (3.2) | 515 (4.6) | 60 (3.6) | 513 (2.8) |
| Japan | | 21 (3.3) | 598 (3.8) | 62 (3.8) | 591 (2.3) | 2 (0.8) | ~ ~ | 15 (2.6) | 591 (4.1) | 0 (0.0) | ~ ~ |
| Kazakhstan | | 55 (3.9) | 515 (3.3) | 44 (3.8) | 509 (4.4) | 0 (0.0) | ~ ~ | 1 (0.8) | ~ ~ | 0 (0.2) | ~ ~ |
| Korea, Rep. of | | 19 (3.4) | 600 (6.7) | 78 (3.4) | 599 (2.4) | 0 (0.0) | ~ ~ | 2 (1.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Kuwait | | 45 (4.7) | 382 (7.0) | 4 (1.5) | 437 (25.9) | 44 (4.7) | 379 (9.6) | 4 (1.7) | 413 (24.0) | 3 (1.4) | 350 (27.7) |
| Latvia | | 42 (3.9) | 550 (3.4) | 53 (3.6) | 546 (3.7) | 3 (1.5) | 511 (33.5) | 1 (0.6) | ~ ~ | 1 (0.9) | ~ ~ |
| Lithuania | | 15 (2.8) | 529 (6.8) | 80 (3.2) | 543 (2.9) | 1 (0.9) | ~ ~ | 3 (1.3) | 504 (22.0) | 0 (0.0) | ~ ~ |
| Malta | | 24 (0.4) | 503 (2.6) | 48 (0.5) | 511 (2.0) | 4 (0.1) | 505 (6.8) | 18 (0.3) | 514 (2.3) | 7 (0.2) | 506 (4.0) |
| Montenegro | | 46 (2.6) | 449 (3.2) | 53 (2.5) | 453 (2.9) | 2 (0.7) | ~ ~ | 0 (0.2) | ~ ~ | 0 (0.0) | ~ ~ |
| Morocco | s | 3 (1.5) | 317 (13.3) | 6 (1.8) | 359 (33.8) | 14 (2.2) | 434 (26.9) | 29 (4.2) | 377 (9.7) | 48 (4.2) | 377 (8.6) |
| New Zealand | | 13 (1.9) | 500 (10.1) | 79 (2.7) | 483 (3.1) | 1 (0.5) | ~ ~ | 8 (1.8) | 481 (13.7) | 0 (0.0) | ~ ~ |
| North Macedonia | s | 11 (3.7) | 442 (29.4) | 58 (5.6) | 471 (7.6) | 6 (2.6) | 466 (20.7) | 16 (4.3) | 495 (14.6) | 10 (3.0) | 457 (15.0) |
| Northern Ireland | r | 15 (3.1) | 557 (8.2) | 66 (4.7) | 570 (4.6) | 1 (1.2) | ~ ~ | 13 (3.1) | 553 (9.5) | 5 (2.4) | 552 (17.6) |
| Norway (5) | r | 63 (4.2) | 545 (2.7) | 30 (3.8) | 547 (5.4) | 6 (2.1) | 530 (12.2) | 1 (0.5) | ~ ~ | 0 (0.0) | ~ ~ |
| Oman | | 55 (3.2) | 436 (5.6) | 13 (2.2) | 422 (11.7) | 17 (2.4) | 436 (9.7) | 13 (2.6) | 407 (12.9) | 2 (1.1) | ~ ~ |
| Pakistan | | 23 (4.1) | 318 (14.7) | 7 (2.2) | 304 (38.5) | 22 (8.2) | 344 (38.7) | 12 (3.8) | 299 (20.1) | 35 (7.7) | 344 (20.0) |
| Philippines | | 18 (3.5) | 289 (10.8) | 41 (4.0) | 285 (9.5) | 14 (2.5) | 324 (11.9) | 15 (2.9) | 318 (20.2) | 13 (3.0) | 286 (15.2) |
| Poland | | 11 (2.4) | 515 (6.3) | 0 (0.0) | ~ ~ | 89 (2.4) | 521 (2.9) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Portugal | | 42 (3.3) | 525 (4.2) | 56 (3.4) | 526 (3.5) | 0 (0.3) | ~ ~ | 1 (0.6) | ~ ~ | 0 (0.0) | ~ ~ |
| Qatar | | 33 (4.0) | 458 (5.7) | 13 (2.4) | 502 (10.7) | 39 (4.1) | 421 (6.1) | 16 (3.0) | 459 (10.4) | 0 (0.0) | ~ ~ |
| Russian Federation | | 41 (3.2) | 566 (4.8) | 49 (3.3) | 569 (4.7) | 1 (0.6) | ~ ~ | 2 (1.1) | ~ ~ | 6 (1.6) | 568 (12.2) |
| Saudi Arabia | | 31 (3.6) | 391 (8.3) | 2 (1.2) | ~ ~ | 53 (3.5) | 400 (5.4) | 7 (1.8) | 405 (15.7) | 6 (1.6) | 392 (17.8) |
| Serbia | | 43 (3.8) | 506 (4.5) | 55 (3.8) | 511 (4.7) | 0 (0.1) | ~ ~ | 1 (0.5) | ~ ~ | 1 (0.6) | ~ ~ |
| Singapore | | 66 (2.6) | 624 (4.9) | 11 (1.7) | 643 (8.4) | 14 (2.0) | 618 (9.9) | 9 (1.6) | 629 (10.4) | 0 (0.3) | ~ ~ |
| Slovak Republic | | 25 (3.0) | 503 (7.8) | 71 (3.3) | 512 (4.1) | 3 (1.2) | 504 (21.7) | 1 (0.8) | ~ ~ | 0 (0.0) | ~ ~ |
| South Africa (5) | | 48 (4.3) | 375 (6.3) | 13 (2.4) | 397 (15.2) | 19 (2.9) | 353 (7.9) | 15 (3.1) | 381 (11.8) | 5 (1.5) | 340 (11.7) |
| Spain | | 30 (3.4) | 504 (6.1) | 53 (3.6) | 500 (3.8) | 4 (1.3) | 538 (9.4) | 13 (2.7) | 505 (5.3) | 0 (0.0) | ~ ~ |
| Sweden | | 77 (3.8) | 524 (3.6) | 11 (3.0) | 522 (5.9) | 5 (1.7) | 529 (8.7) | 3 (1.8) | 502 (13.9) | 3 (1.3) | 495 (10.3) |
| Turkey (5) | | 62 (3.7) | 522 (5.8) | 1 (0.7) | ~ ~ | 35 (3.6) | 532 (7.6) | 1 (1.1) | ~ ~ | 0 (0.0) | ~ ~ |
| United Arab Emirates | r | 39 (2.2) | 479 (4.5) | 16 (0.8) | 473 (6.0) | 37 (2.0) | 482 (3.8) | 8 (0.8) | 492 (8.7) | 1 (0.3) | ~ ~ |
| United States | | 10 (1.5) | 538 (6.9) | 71 (2.5) | 537 (3.0) | 2 (0.8) | ~ ~ | 17 (1.9) | 525 (7.2) | 0 (0.0) | ~ ~ |
| Kosovo | x | 43 (6.7) | 443 (7.0) | 43 (7.1) | 439 (9.0) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ | 14 (4.1) | 444 (13.1) |
| Netherlands | y | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | | **32 (0.4)** | **497 (1.1)** | **43 (0.4)** | **503 (1.4)** | **11 (0.3)** | **487 (2.6)** | **8 (0.3)** | **490 (2.7)** | **6 (0.3)** | **457 (3.1)** |
| **Benchmarking Participants** | | | | | | | | | | | |
| Ontario, Canada | r | 12 (2.7) | 514 (8.9) | 70 (3.3) | 515 (4.8) | 3 (1.8) | 496 (7.7) | 15 (2.6) | 504 (6.0) | 0 (0.0) | ~ ~ |
| Quebec, Canada | | 9 (1.9) | 522 (6.8) | 82 (2.7) | 534 (2.6) | 1 (0.8) | ~ ~ | 8 (2.1) | 535 (5.1) | 0 (0.0) | ~ ~ |
| Moscow City, Russian Fed. | | 54 (4.3) | 591 (3.0) | 44 (4.3) | 597 (3.4) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ | 2 (1.0) | ~ ~ |
| Madrid, Spain | | 30 (3.4) | 520 (3.5) | 59 (3.8) | 516 (3.2) | 3 (1.4) | 521 (10.1) | 8 (2.0) | 517 (8.5) | 0 (0.0) | ~ ~ |
| Abu Dhabi, UAE | r | 42 (2.6) | 435 (5.3) | 26 (2.2) | 429 (6.5) | 23 (2.5) | 454 (8.3) | 8 (1.5) | 469 (15.5) | 1 (0.7) | ~ ~ |
| Dubai, UAE | r | 38 (3.5) | 552 (4.0) | 20 (2.2) | 555 (5.3) | 33 (3.4) | 530 (4.8) | 9 (1.4) | 548 (9.6) | 0 (0.3) | ~ ~ |

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 9.6: Teachers Majored in Education and Science

*Students' Results based on Teachers' Reports*

| Country | | Major in Primary Education and Major (or Specialization) in Science | | Major in Primary Education but No Major (or Specialization) in Science | | Major in Science but No Major in Primary Education | | All Other Majors | | No Formal Education Beyond Upper-Secondary* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | r | 16 (3.2) | 504 (11.0) | 61 (4.6) | 488 (5.4) | 4 (1.1) | 514 (14.6) | 2 (1.2) | ~ ~ | 17 (3.7) | 491 (8.4) |
| Armenia | | 20 (2.7) | 467 (6.2) | 25 (3.4) | 464 (5.6) | 13 (2.9) | 482 (7.2) | 4 (1.5) | 455 (13.6) | 38 (4.2) | 461 (5.4) |
| Australia | | 22 (3.5) | 535 (6.6) | 73 (3.5) | 534 (3.0) | 2 (1.0) | ~ ~ | 3 (1.4) | 506 (17.5) | 0 (0.0) | ~ ~ |
| Austria | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Azerbaijan | r | 41 (4.2) | 431 (5.1) | 33 (3.6) | 421 (6.6) | 3 (1.2) | 420 (25.7) | 10 (2.6) | 412 (14.6) | 13 (2.7) | 436 (9.4) |
| Bahrain | | 39 (4.4) | 499 (8.7) | 3 (1.3) | 546 (18.0) | 54 (4.3) | 484 (4.5) | 3 (1.5) | 497 (16.9) | 0 (0.0) | ~ ~ |
| Belgium (Flemish) | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Bosnia and Herzegovina | r | 39 (3.5) | 459 (3.8) | 57 (3.5) | 460 (4.4) | 1 (0.7) | ~ ~ | 3 (1.1) | 450 (13.2) | 0 (0.3) | ~ ~ |
| Bulgaria | r | 7 (2.3) | 527 (19.8) | 83 (3.5) | 519 (5.4) | 7 (3.1) | 467 (44.2) | 3 (1.4) | 562 (14.3) | 0 (0.0) | ~ ~ |
| Canada | r | 13 (1.8) | 530 (5.7) | 69 (2.6) | 525 (2.4) | 6 (2.1) | 526 (9.6) | 12 (1.5) | 520 (3.7) | 0 (0.0) | ~ ~ |
| Chile | | 43 (4.3) | 474 (4.5) | 52 (4.4) | 461 (4.2) | 3 (1.7) | 490 (24.8) | 2 (1.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Chinese Taipei | | 31 (3.5) | 561 (2.9) | 36 (4.1) | 554 (3.8) | 16 (2.8) | 559 (4.9) | 17 (3.2) | 561 (4.1) | 0 (0.0) | ~ ~ |
| Croatia | | 22 (2.8) | 525 (3.8) | 76 (2.8) | 523 (2.5) | 1 (0.6) | ~ ~ | 1 (0.7) | ~ ~ | 0 (0.5) | ~ ~ |
| Cyprus | | 33 (4.3) | 515 (4.8) | 62 (4.3) | 509 (3.4) | 1 (0.6) | ~ ~ | 4 (2.3) | 536 (19.2) | 0 (0.0) | ~ ~ |
| Czech Republic | | 3 (1.0) | 535 (7.0) | 69 (3.5) | 536 (3.0) | 12 (2.6) | 528 (8.6) | 11 (2.1) | 532 (5.3) | 5 (1.5) | 529 (10.0) |
| Denmark | r | 23 (3.4) | 522 (5.6) | 19 (3.8) | 519 (6.1) | 29 (4.4) | 526 (4.7) | 23 (3.7) | 520 (5.3) | 6 (2.3) | 512 (8.5) |
| England | s | 19 (4.0) | 522 (4.7) | 56 (5.4) | 542 (5.8) | 8 (2.7) | 582 (15.6) | 17 (3.8) | 524 (7.2) | 0 (0.0) | ~ ~ |
| Finland | | 8 (1.8) | 544 (8.9) | 83 (2.2) | 556 (2.7) | 1 (0.4) | ~ ~ | 8 (1.8) | 555 (6.8) | 0 (0.4) | ~ ~ |
| France | r | 14 (2.9) | 475 (7.2) | 25 (4.0) | 497 (5.4) | 32 (4.1) | 489 (5.6) | 25 (3.5) | 488 (7.9) | 4 (1.7) | 500 (12.2) |
| Georgia | s | 84 (3.8) | 446 (5.1) | 6 (2.7) | 453 (12.8) | 7 (2.4) | 466 (9.3) | 2 (1.3) | ~ ~ | 0 (0.0) | ~ ~ |
| Germany | | 55 (3.9) | 521 (3.2) | 31 (3.6) | 512 (5.7) | 8 (2.2) | 530 (8.0) | 6 (1.9) | 522 (9.5) | 0 (0.0) | ~ ~ |
| Hong Kong SAR | | 27 (4.1) | 526 (5.7) | 52 (4.6) | 532 (4.6) | 4 (1.7) | 531 (22.4) | 17 (3.6) | 541 (13.1) | 0 (0.0) | ~ ~ |
| Hungary | r | 8 (2.4) | 514 (10.2) | 90 (2.5) | 531 (3.2) | 0 (0.4) | ~ ~ | 1 (0.6) | ~ ~ | 1 (0.6) | ~ ~ |
| Iran, Islamic Rep. of | | 12 (2.8) | 429 (15.3) | 43 (3.7) | 448 (5.6) | 6 (1.8) | 451 (18.1) | 38 (3.5) | 438 (7.6) | 2 (1.1) | ~ ~ |
| Ireland | | 9 (2.0) | 532 (8.4) | 87 (2.5) | 528 (3.7) | 1 (0.5) | ~ ~ | 3 (1.4) | 511 (11.9) | 0 (0.2) | ~ ~ |
| Italy | | 2 (0.9) | ~ ~ | 11 (3.0) | 518 (9.3) | 5 (1.7) | 505 (11.0) | 22 (3.4) | 508 (4.7) | 61 (3.6) | 508 (3.2) |
| Japan | | 23 (3.3) | 562 (3.0) | 61 (4.3) | 561 (2.5) | 3 (1.2) | 553 (10.9) | 13 (2.7) | 567 (4.3) | 0 (0.0) | ~ ~ |
| Kazakhstan | | 42 (4.2) | 496 (6.9) | 56 (4.2) | 494 (4.8) | 0 (0.2) | ~ ~ | 2 (1.1) | ~ ~ | 0 (0.2) | ~ ~ |
| Korea, Rep. of | | 16 (3.2) | 589 (5.9) | 80 (3.3) | 588 (2.3) | 2 (0.8) | ~ ~ | 2 (0.9) | ~ ~ | 0 (0.0) | ~ ~ |
| Kuwait | | 39 (4.6) | 387 (10.4) | 5 (1.7) | 389 (22.0) | 46 (4.8) | 396 (8.8) | 7 (2.4) | 367 (30.5) | 3 (1.4) | 424 (46.5) |
| Latvia | | 40 (3.7) | 542 (4.6) | 51 (3.9) | 543 (3.0) | 8 (1.9) | 550 (9.3) | 2 (1.2) | ~ ~ | 0 (0.0) | ~ ~ |
| Lithuania | | 17 (2.9) | 531 (6.0) | 79 (3.2) | 540 (2.9) | 1 (0.9) | ~ ~ | 2 (1.1) | ~ ~ | 0 (0.0) | ~ ~ |
| Malta | | 23 (0.4) | 491 (2.7) | 46 (0.4) | 493 (2.0) | 7 (0.2) | 514 (4.8) | 19 (0.3) | 505 (2.3) | 5 (0.1) | 498 (5.6) |
| Montenegro | | 42 (2.4) | 449 (4.0) | 56 (2.3) | 453 (3.5) | 1 (0.7) | ~ ~ | 1 (0.1) | ~ ~ | 0 (0.0) | ~ ~ |
| Morocco | r | 3 (1.4) | 342 (16.7) | 9 (2.6) | 344 (19.1) | 16 (2.6) | 377 (13.8) | 23 (4.1) | 387 (18.7) | 49 (4.3) | 377 (8.8) |
| New Zealand | | 12 (2.0) | 507 (9.0) | 80 (2.9) | 499 (3.2) | 2 (0.9) | ~ ~ | 7 (1.8) | 497 (14.3) | 0 (0.0) | ~ ~ |
| North Macedonia | s | 12 (4.1) | 391 (33.5) | 54 (6.3) | 433 (9.1) | 5 (2.3) | 377 (12.1) | 17 (4.8) | 462 (16.4) | 11 (3.5) | 408 (13.9) |
| Northern Ireland | r | 13 (3.0) | 516 (5.8) | 67 (4.1) | 522 (3.3) | 2 (1.2) | ~ ~ | 13 (3.1) | 511 (7.6) | 5 (2.4) | 498 (12.7) |
| Norway (5) | r | 44 (4.7) | 548 (3.0) | 46 (5.3) | 535 (3.5) | 5 (2.3) | 535 (12.1) | 5 (1.7) | 519 (15.3) | 0 (0.0) | ~ ~ |
| Oman | | 48 (3.5) | 439 (6.8) | 13 (2.5) | 446 (9.0) | 33 (3.4) | 427 (6.6) | 5 (1.7) | 414 (22.1) | 1 (0.7) | ~ ~ |
| Pakistan | | 31 (7.2) | 326 (20.3) | 7 (2.1) | 235 (28.7) | 27 (7.4) | 300 (34.9) | 7 (2.8) | 289 (33.8) | 29 (5.5) | 268 (14.2) |
| Philippines | r | 14 (3.2) | 237 (24.4) | 47 (4.3) | 234 (8.8) | 10 (2.7) | 253 (20.6) | 12 (2.8) | 273 (27.1) | 17 (3.2) | 251 (15.0) |
| Poland | | 28 (3.9) | 530 (4.8) | 0 (0.0) | ~ ~ | 72 (3.9) | 532 (2.8) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Portugal | | 38 (3.1) | 506 (4.0) | 61 (3.2) | 503 (3.2) | 0 (0.3) | ~ ~ | 1 (0.6) | ~ ~ | 0 (0.0) | ~ ~ |
| Qatar | | 30 (4.1) | 445 (7.0) | 14 (2.7) | 505 (11.3) | 50 (4.2) | 435 (6.9) | 5 (1.7) | 465 (20.2) | 0 (0.0) | ~ ~ |
| Russian Federation | | 40 (3.2) | 565 (4.4) | 50 (3.2) | 569 (4.2) | 2 (1.1) | ~ ~ | 2 (1.0) | ~ ~ | 6 (1.6) | 565 (10.9) |
| Saudi Arabia | | 30 (3.5) | 383 (11.0) | 1 (0.9) | ~ ~ | 57 (4.0) | 411 (5.9) | 8 (2.1) | 370 (16.2) | 4 (1.3) | 410 (18.8) |
| Serbia | | 40 (3.8) | 515 (5.2) | 58 (3.7) | 521 (4.8) | 1 (0.5) | ~ ~ | 0 (0.2) | ~ ~ | 1 (0.6) | ~ ~ |
| Singapore | | 57 (2.7) | 591 (4.6) | 10 (1.5) | 598 (9.9) | 25 (2.5) | 603 (5.2) | 8 (1.3) | 588 (8.7) | 1 (0.5) | ~ ~ |
| Slovak Republic | | 23 (2.9) | 508 (10.2) | 63 (3.4) | 525 (4.7) | 8 (2.2) | 511 (11.9) | 6 (1.9) | 531 (10.1) | 0 (0.2) | ~ ~ |
| South Africa (5) | | 34 (4.3) | 316 (10.3) | 22 (3.0) | 344 (19.2) | 19 (2.7) | 321 (14.3) | 19 (2.8) | 311 (9.4) | 6 (1.8) | 288 (18.3) |
| Spain | | 28 (3.2) | 508 (4.6) | 55 (3.7) | 512 (3.3) | 5 (1.6) | 517 (15.0) | 11 (2.5) | 517 (4.9) | 0 (0.0) | ~ ~ |
| Sweden | | 70 (4.4) | 544 (3.6) | 18 (3.7) | 536 (7.5) | 4 (1.7) | 540 (9.1) | 3 (1.6) | 470 (21.9) | 5 (2.1) | 528 (13.9) |
| Turkey (5) | | 52 (3.7) | 528 (6.0) | 0 (0.4) | ~ ~ | 44 (3.8) | 530 (6.9) | 3 (1.4) | 478 (23.9) | 0 (0.0) | ~ ~ |
| United Arab Emirates | r | 36 (2.1) | 470 (3.7) | 15 (1.0) | 429 (6.7) | 43 (2.3) | 491 (3.9) | 5 (0.8) | 451 (13.2) | 1 (0.4) | ~ ~ |
| United States | | 10 (1.4) | 544 (8.0) | 73 (2.4) | 540 (3.1) | 3 (1.3) | 530 (21.4) | 14 (1.8) | 526 (6.9) | 0 (0.0) | ~ ~ |
| Kosovo | y | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Netherlands | y | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | | **28 (0.5)** | **489 (1.3)** | **44 (0.5)** | **491 (1.2)** | **13 (0.3)** | **480 (2.5)** | **9 (0.3)** | **478 (2.4)** | **5 (0.2)** | **442 (3.8)** |
| **Benchmarking Participants** | | | | | | | | | | | |
| Ontario, Canada | r | 18 (3.7) | 532 (8.3) | 58 (4.6) | 527 (5.2) | 8 (4.3) | 534 (14.4) | 15 (2.9) | 519 (5.4) | 0 (0.0) | ~ ~ |
| Quebec, Canada | | 6 (1.4) | 522 (6.1) | 84 (3.1) | 523 (2.8) | 3 (1.7) | 519 (12.5) | 7 (2.2) | 528 (7.3) | 0 (0.0) | ~ ~ |
| Moscow City, Russian Fed. | | 50 (4.4) | 593 (3.1) | 47 (4.5) | 598 (3.4) | 0 (0.3) | ~ ~ | 0 (0.0) | ~ ~ | 2 (1.0) | ~ ~ |
| Madrid, Spain | | 31 (3.6) | 522 (3.3) | 58 (3.8) | 524 (2.9) | 4 (2.1) | 519 (13.2) | 7 (2.3) | 516 (9.9) | 0 (0.0) | ~ ~ |
| Abu Dhabi, UAE | | 34 (2.0) | 405 (6.9) | 27 (1.9) | 381 (7.3) | 30 (2.0) | 468 (6.7) | 7 (1.4) | 400 (16.8) | 2 (1.1) | ~ ~ |
| Dubai, UAE | r | 33 (2.7) | 543 (5.6) | 14 (1.5) | 560 (5.7) | 49 (2.6) | 552 (2.8) | 4 (0.9) | 528 (16.8) | 0 (0.2) | ~ ~ |

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 9.7: Teachers Majored in Education and Mathematics

*Students' Results based on Teachers' Reports*

| Country | Major in Mathematics and Mathematics Education | | Major in Mathematics but No Major in Mathematics Education | | Major in Mathematics Education but No Major in Mathematics | | All Other Majors | | No Formal Education Beyond Upper-Secondary* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 46 (3.1) | 531 (8.6) | 14 (2.2) | 523 (9.8) | 17 (2.9) | 511 (10.7) | 23 (2.3) | 501 (6.7) | 0 (0.0) | ~ ~ |
| Bahrain | 47 (2.6) | 479 (2.6) | 42 (3.1) | 481 (3.4) | 10 (1.8) | 494 (6.9) | 1 (0.3) | ~ ~ | 1 (0.4) | ~ ~ |
| Chile | 59 (3.8) | 447 (4.9) | 27 (3.2) | 432 (5.6) | 7 (2.1) | 447 (14.8) | 8 (1.9) | 412 (11.0) | 0 (0.0) | ~ ~ |
| Chinese Taipei | 39 (3.6) | 618 (5.0) | 44 (3.8) | 617 (4.7) | 3 (1.0) | 597 (17.3) | 15 (2.4) | 589 (9.4) | 0 (0.0) | ~ ~ |
| Cyprus r | 18 (3.0) | 515 (9.6) | 79 (2.7) | 499 (2.7) | 0 (0.0) | ~ ~ | 2 (1.3) | ~ ~ | 0 (0.0) | ~ ~ |
| Egypt | 41 (3.8) | 411 (8.6) | 37 (3.4) | 412 (9.0) | 18 (3.6) | 423 (12.9) | 2 (0.8) | ~ ~ | 3 (1.4) | 389 (29.9) |
| England s | 43 (5.1) | 519 (10.6) | 45 (5.1) | 523 (12.3) | 6 (2.7) | 536 (35.0) | 6 (2.3) | 511 (34.1) | 0 (0.0) | ~ ~ |
| Finland | 18 (2.4) | 523 (4.5) | 55 (3.2) | 512 (3.4) | 0 (0.0) | ~ ~ | 25 (2.6) | 493 (5.3) | 1 (0.7) | ~ ~ |
| France r | 44 (4.3) | 481 (4.1) | 48 (4.3) | 484 (4.2) | 2 (1.2) | ~ ~ | 7 (1.9) | 474 (15.8) | 0 (0.0) | ~ ~ |
| Georgia s | 78 (5.1) | 461 (7.5) | 15 (4.2) | 458 (14.8) | 0 (0.0) | ~ ~ | 2 (1.9) | ~ ~ | 5 (2.9) | 437 (19.3) |
| Hong Kong SAR | 29 (3.7) | 594 (8.5) | 33 (3.9) | 580 (8.7) | 15 (2.8) | 574 (13.3) | 24 (3.7) | 560 (12.0) | 0 (0.0) | ~ ~ |
| Hungary | 14 (2.3) | 516 (9.4) | 9 (2.0) | 503 (14.6) | 77 (2.8) | 517 (3.8) | 1 (0.5) | ~ ~ | 0 (0.0) | ~ ~ |
| Iran, Islamic Rep. of | 27 (3.4) | 449 (7.3) | 46 (3.9) | 448 (6.7) | 12 (2.7) | 446 (15.2) | 14 (2.4) | 433 (12.0) | 0 (0.0) | ~ ~ |
| Ireland | 38 (2.7) | 529 (4.7) | 40 (2.9) | 521 (5.7) | 8 (1.5) | 536 (8.8) | 14 (1.7) | 516 (6.4) | 0 (0.4) | ~ ~ |
| Israel | 67 (3.2) | 528 (5.3) | 20 (2.8) | 487 (10.5) | 8 (1.9) | 530 (17.4) | 4 (1.0) | 506 (17.1) | 1 (0.5) | ~ ~ |
| Italy | 45 (3.7) | 495 (4.3) | 17 (3.0) | 501 (6.8) | 8 (2.2) | 485 (11.4) | 30 (3.5) | 504 (4.1) | 0 (0.0) | ~ ~ |
| Japan | 44 (3.6) | 594 (3.6) | 36 (3.6) | 597 (6.0) | 8 (2.1) | 584 (5.6) | 12 (2.0) | 593 (5.6) | 0 (0.0) | ~ ~ |
| Jordan | 12 (2.5) | 397 (13.9) | 74 (3.1) | 424 (5.1) | 4 (1.4) | 438 (16.0) | 6 (1.3) | 432 (10.1) | 5 (1.7) | 401 (8.5) |
| Kazakhstan | 40 (3.9) | 494 (5.6) | 57 (4.0) | 479 (6.0) | 1 (0.7) | ~ ~ | 1 (0.7) | ~ ~ | 1 (0.6) | ~ ~ |
| Korea, Rep. of | 20 (2.6) | 608 (7.1) | 24 (3.3) | 597 (5.8) | 54 (3.5) | 611 (3.9) | 2 (1.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Kuwait | 16 (3.7) | 398 (12.6) | 62 (4.4) | 403 (5.3) | 19 (3.4) | 402 (11.6) | 3 (1.4) | 445 (29.8) | 1 (0.5) | ~ ~ |
| Lebanon | 19 (3.2) | 433 (9.8) | 49 (4.3) | 425 (5.3) | 4 (1.9) | 498 (15.7) | 23 (3.7) | 419 (8.1) | 4 (1.8) | 438 (16.4) |
| Lithuania | 49 (4.0) | 531 (4.9) | 39 (4.2) | 515 (4.6) | 8 (1.9) | 496 (9.4) | 3 (1.6) | 485 (11.5) | 0 (0.0) | ~ ~ |
| Malaysia | 41 (3.8) | 459 (6.2) | 30 (2.9) | 464 (6.6) | 10 (2.4) | 469 (19.6) | 18 (2.8) | 459 (9.7) | 1 (0.9) | ~ ~ |
| Morocco | 14 (2.8) | 386 (10.8) | 45 (3.8) | 393 (4.2) | 0 (0.1) | ~ ~ | 14 (2.6) | 388 (8.1) | 26 (2.9) | 382 (4.4) |
| New Zealand | 25 (3.5) | 484 (10.3) | 28 (2.9) | 488 (6.5) | 10 (2.2) | 490 (11.5) | 37 (3.6) | 476 (5.3) | 0 (0.0) | ~ ~ |
| Norway (9) r | 13 (3.1) | 499 (9.6) | 67 (4.2) | 506 (3.2) | 3 (1.2) | 509 (11.5) | 16 (3.1) | 508 (4.8) | 0 (0.0) | ~ ~ |
| Oman | 35 (3.7) | 410 (5.1) | 48 (4.0) | 406 (4.7) | 13 (2.4) | 413 (8.8) | 1 (1.0) | ~ ~ | 1 (1.0) | ~ ~ |
| Portugal | 87 (2.6) | 502 (3.5) | 8 (2.2) | 493 (8.1) | 3 (1.4) | 482 (18.5) | 1 (1.2) | ~ ~ | 0 (0.0) | ~ ~ |
| Qatar | 49 (4.6) | 445 (8.6) | 43 (4.8) | 439 (6.9) | 3 (1.3) | 472 (49.5) | 5 (1.5) | 447 (17.2) | 0 (0.0) | ~ ~ |
| Romania r | 23 (3.4) | 474 (9.0) | 75 (3.2) | 486 (5.9) | 2 (1.1) | ~ ~ | 1 (0.6) | ~ ~ | 0 (0.0) | ~ ~ |
| Russian Federation | 68 (3.5) | 545 (5.1) | 31 (3.5) | 543 (5.7) | 1 (0.7) | ~ ~ | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Saudi Arabia | 18 (2.9) | 391 (6.3) | 69 (3.3) | 393 (3.4) | 12 (2.6) | 398 (7.5) | 0 (0.1) | ~ ~ | 0 (0.0) | ~ ~ |
| Singapore | 60 (2.5) | 618 (5.3) | 27 (2.0) | 614 (7.7) | 5 (1.2) | 618 (17.9) | 8 (1.6) | 605 (16.1) | 0 (0.0) | ~ ~ |
| South Africa (9) | 32 (2.7) | 395 (4.9) | 51 (2.8) | 388 (3.0) | 7 (1.5) | 385 (13.1) | 9 (1.7) | 387 (7.1) | 0 (0.3) | ~ ~ |
| Sweden | 48 (3.6) | 509 (4.1) | 20 (3.1) | 493 (5.8) | 12 (1.7) | 490 (8.7) | 16 (2.7) | 509 (5.5) | 4 (1.5) | 492 (8.7) |
| Turkey | 55 (4.1) | 496 (6.3) | 18 (3.1) | 496 (15.4) | 24 (3.9) | 497 (10.2) | 3 (1.4) | 452 (34.1) | 0 (0.0) | ~ ~ |
| United Arab Emirates | 48 (2.0) | 481 (4.3) | 41 (2.1) | 472 (4.1) | 5 (0.8) | 441 (13.6) | 5 (0.7) | 466 (12.3) | 1 (0.3) | ~ ~ |
| United States | 36 (2.9) | 539 (6.4) | 11 (1.8) | 521 (10.4) | 24 (2.1) | 512 (6.2) | 29 (2.3) | 490 (10.1) | 0 (0.0) | ~ ~ |
| **International Average** | **39 (0.6)** | **492 (1.2)** | **39 (0.5)** | **488 (1.2)** | **11 (0.3)** | **494 (2.9)** | **10 (0.3)** | **484 (2.8)** | **1 (0.1)** | **423 (6.9)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Ontario, Canada | 9 (3.4) | 569 (27.1) | 5 (2.1) | 524 (15.2) | 9 (2.6) | 532 (7.5) | 77 (4.9) | 529 (3.9) | 0 (0.0) | ~ ~ |
| Quebec, Canada | 49 (4.9) | 545 (6.4) | 7 (2.6) | 529 (8.4) | 23 (4.1) | 548 (9.2) | 21 (4.2) | 535 (7.5) | 0 (0.0) | ~ ~ |
| Moscow City, Russian Fed. | 81 (2.9) | 577 (4.6) | 18 (2.8) | 570 (7.8) | 1 (0.6) | ~ ~ | 0 (0.0) | ~ ~ | 1 (0.6) | ~ ~ |
| Gauteng, RSA (9) | 37 (4.2) | 431 (7.0) | 50 (4.1) | 411 (5.2) | 8 (2.5) | 431 (17.1) | 5 (1.9) | 437 (22.3) | 1 (0.7) | ~ ~ |
| Western Cape, RSA (9) | 41 (4.5) | 444 (8.1) | 35 (4.4) | 445 (9.4) | 14 (2.8) | 447 (15.0) | 10 (2.3) | 404 (9.7) | 1 (0.7) | ~ ~ |
| Abu Dhabi, UAE r | 44 (3.0) | 425 (6.4) | 40 (3.0) | 453 (6.8) | 5 (1.2) | 405 (21.9) | 9 (1.5) | 425 (17.2) | 1 (0.7) | ~ ~ |
| Dubai, UAE | 55 (3.6) | 542 (4.4) | 35 (3.9) | 527 (7.5) | 4 (1.4) | 523 (15.9) | 5 (0.8) | 570 (7.3) | 0 (0.0) | ~ ~ |

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 9.8: Teachers Majored in Education and Science

*Students' Results based on Teachers' Reports*

| Country | Major in Science and Science Education | | Major in Science but No Major in Science Education | | Major in Science Education but No Major in Science | | All Other Majors | | No Formal Education Beyond Upper-Secondary* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 65 (2.6) | 534 (4.2) | 19 (2.4) | 540 (6.5) | 7 (1.4) | 522 (8.4) | 9 (1.7) | 512 (8.8) | 0 (0.0) | ~ ~ |
| Bahrain | 36 (3.3) | 478 (4.9) | 59 (3.4) | 492 (3.5) | 5 (1.0) | 479 (12.5) | 0 (0.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Chile | 55 (3.3) | 477 (4.4) | 18 (3.0) | 464 (5.5) | 9 (1.9) | 434 (8.3) | 18 (3.0) | 438 (7.9) | 0 (0.1) | ~ ~ |
| Chinese Taipei | 20 (3.0) | 575 (5.5) | 75 (3.4) | 576 (2.1) | 0 (0.3) | ~ ~ | 5 (1.6) | 548 (14.1) | 0 (0.0) | ~ ~ |
| Cyprus s | 12 (2.0) | 506 (10.4) | 85 (2.0) | 483 (2.8) | 0 (0.0) | ~ ~ | 3 (0.2) | 497 (7.6) | 0 (0.0) | ~ ~ |
| Egypt | 34 (4.2) | 387 (9.9) | 46 (4.2) | 396 (7.2) | 18 (3.2) | 385 (14.3) | 2 (1.1) | ~ ~ | 1 (0.8) | ~ ~ |
| England s | 44 (5.1) | 513 (9.1) | 54 (5.0) | 532 (10.3) | 0 (0.0) | ~ ~ | 2 (1.4) | ~ ~ | 0 (0.0) | ~ ~ |
| Finland | 17 (1.8) | 549 (6.4) | 65 (2.5) | 546 (3.4) | 0 (0.2) | ~ ~ | 17 (1.5) | 524 (5.4) | 1 (0.4) | ~ ~ |
| France r | 44 (3.2) | 485 (3.9) | 53 (3.3) | 491 (3.4) | 2 (0.8) | ~ ~ | 1 (0.6) | ~ ~ | 0 (0.4) | ~ ~ |
| Georgia | 30 (2.2) | 448 (5.4) | 64 (2.2) | 445 (4.1) | 2 (0.6) | ~ ~ | 3 (0.9) | 462 (10.6) | 1 (0.5) | ~ ~ |
| Hong Kong SAR | 41 (4.2) | 516 (8.7) | 42 (4.2) | 499 (9.8) | 10 (2.5) | 474 (19.0) | 8 (2.1) | 508 (16.7) | 0 (0.0) | ~ ~ |
| Hungary | 20 (1.8) | 527 (6.3) | 7 (1.1) | 514 (8.5) | 69 (2.3) | 534 (3.1) | 3 (0.8) | 474 (13.7) | 1 (0.3) | ~ ~ |
| Iran, Islamic Rep. of | 9 (2.1) | 472 (15.4) | 36 (3.7) | 453 (9.1) | 48 (3.5) | 447 (5.1) | 7 (1.8) | 418 (14.5) | 1 (0.7) | ~ ~ |
| Ireland | 50 (3.2) | 531 (3.8) | 42 (3.0) | 526 (5.3) | 3 (1.0) | 513 (4.5) | 3 (1.2) | 513 (16.1) | 2 (0.8) | ~ ~ |
| Israel | 62 (3.8) | 522 (5.5) | 28 (3.6) | 503 (11.4) | 4 (1.5) | 496 (25.4) | 5 (1.5) | 514 (15.7) | 2 (1.1) | ~ ~ |
| Italy | 51 (3.7) | 496 (4.0) | 44 (3.6) | 504 (3.2) | 1 (0.8) | ~ ~ | 4 (1.5) | 499 (16.2) | 0 (0.0) | ~ ~ |
| Japan | 32 (3.7) | 569 (3.9) | 53 (3.9) | 571 (3.1) | 7 (2.2) | 571 (5.7) | 8 (2.0) | 562 (6.4) | 0 (0.0) | ~ ~ |
| Jordan | 11 (2.6) | 440 (16.3) | 63 (4.1) | 447 (5.8) | 16 (3.3) | 475 (8.5) | 2 (1.0) | ~ ~ | 8 (1.9) | 448 (13.4) |
| Kazakhstan | 23 (2.4) | 491 (5.2) | 73 (2.3) | 473 (3.7) | 0 (0.0) | ~ ~ | 2 (0.7) | ~ ~ | 1 (0.3) | ~ ~ |
| Korea, Rep. of | 41 (3.4) | 559 (3.2) | 49 (3.5) | 563 (3.3) | 9 (2.2) | 559 (6.2) | 1 (0.4) | ~ ~ | 0 (0.0) | ~ ~ |
| Kuwait | 15 (3.7) | 454 (17.8) | 60 (4.0) | 435 (6.9) | 20 (2.7) | 455 (7.0) | 5 (1.9) | 475 (15.6) | 0 (0.0) | ~ ~ |
| Lebanon | 15 (2.0) | 383 (11.8) | 71 (2.4) | 373 (5.3) | 2 (0.5) | ~ ~ | 9 (1.3) | 382 (12.5) | 4 (0.8) | 360 (13.3) |
| Lithuania | 23 (1.8) | 537 (3.5) | 74 (1.9) | 532 (3.0) | 1 (0.5) | ~ ~ | 1 (0.5) | ~ ~ | 0 (0.2) | ~ ~ |
| Malaysia | 34 (3.0) | 457 (8.6) | 38 (3.2) | 469 (6.6) | 15 (2.4) | 453 (7.5) | 12 (2.5) | 433 (13.6) | 1 (0.6) | ~ ~ |
| Morocco | 8 (1.1) | 395 (8.2) | 80 (1.8) | 392 (3.0) | 0 (0.1) | ~ ~ | 1 (0.5) | ~ ~ | 11 (1.4) | 409 (6.1) |
| New Zealand | 47 (3.8) | 502 (7.0) | 40 (3.8) | 502 (6.1) | 3 (1.5) | 464 (24.2) | 10 (1.8) | 505 (14.4) | 0 (0.0) | ~ ~ |
| Norway (9) r | 12 (2.9) | 508 (7.4) | 35 (4.7) | 507 (5.7) | 8 (2.0) | 493 (9.1) | 45 (4.8) | 488 (4.8) | 0 (0.0) | ~ ~ |
| Oman | 28 (3.5) | 463 (6.9) | 69 (3.3) | 453 (4.0) | 2 (1.0) | ~ ~ | 1 (0.5) | ~ ~ | 0 (0.0) | ~ ~ |
| Portugal | 66 (2.7) | 521 (3.1) | 34 (2.7) | 517 (4.6) | 0 (0.0) | ~ ~ | 0 (0.2) | ~ ~ | 0 (0.0) | ~ ~ |
| Qatar | 41 (3.7) | 493 (6.2) | 53 (3.7) | 460 (6.3) | 3 (1.4) | 507 (46.8) | 2 (1.0) | ~ ~ | 0 (0.0) | ~ ~ |
| Romania r | 8 (1.4) | 460 (12.6) | 85 (1.9) | 471 (4.7) | 0 (0.3) | ~ ~ | 5 (1.1) | 481 (16.0) | 1 (0.7) | ~ ~ |
| Russian Federation | 49 (2.3) | 545 (4.3) | 49 (2.4) | 542 (5.0) | 0 (0.0) | ~ ~ | 1 (0.3) | ~ ~ | 2 (0.4) | ~ ~ |
| Saudi Arabia | 19 (2.9) | 421 (8.3) | 75 (2.9) | 433 (3.3) | 5 (1.6) | 446 (14.2) | 1 (0.4) | ~ ~ | 0 (0.2) | ~ ~ |
| Singapore | 57 (2.7) | 608 (5.5) | 37 (2.7) | 607 (6.8) | 2 (0.9) | ~ ~ | 4 (1.0) | 609 (27.0) | 0 (0.0) | ~ ~ |
| South Africa (9) | 20 (2.3) | 390 (9.7) | 59 (3.1) | 366 (4.0) | 6 (1.6) | 358 (14.3) | 12 (2.0) | 375 (12.3) | 2 (1.2) | ~ ~ |
| Sweden | 50 (3.2) | 524 (5.5) | 28 (3.3) | 518 (6.0) | 9 (2.1) | 530 (8.5) | 7 (1.9) | 515 (8.0) | 6 (1.4) | 513 (7.5) |
| Turkey | 38 (4.0) | 517 (6.5) | 16 (3.0) | 539 (10.3) | 42 (4.1) | 507 (6.2) | 4 (1.5) | 495 (20.5) | 0 (0.0) | ~ ~ |
| United Arab Emirates | 45 (1.4) | 478 (5.4) | 46 (1.8) | 472 (4.8) | 6 (1.1) | 435 (17.2) | 3 (0.5) | 485 (14.4) | 1 (0.2) | ~ ~ |
| United States | 30 (2.5) | 534 (6.5) | 27 (2.3) | 530 (9.4) | 15 (2.0) | 536 (9.1) | 28 (2.6) | 503 (11.6) | 0 (0.0) | ~ ~ |
| **International Average** | **33 (0.5)** | **494 (1.3)** | **50 (0.5)** | **491 (1.0)** | **9 (0.3)** | **482 (3.2)** | **6 (0.3)** | **489 (2.8)** | **1 (0.1)** | **432 (5.3)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Ontario, Canada s | 27 (5.1) | 523 (10.5) | 10 (3.2) | 501 (14.7) | 6 (2.4) | 532 (15.9) | 57 (5.4) | 524 (5.9) | 0 (0.0) | ~ ~ |
| Moscow City, Russian Fed. | 59 (2.0) | 567 (3.4) | 40 (2.0) | 565 (3.3) | 0 (0.1) | ~ ~ | 0 (0.2) | ~ ~ | 0 (0.3) | ~ ~ |
| Gauteng, RSA (9) | 20 (3.6) | 431 (14.6) | 61 (4.3) | 417 (5.9) | 8 (2.3) | 431 (13.7) | 11 (2.8) | 425 (15.2) | 1 (0.6) | ~ ~ |
| Western Cape, RSA (9) | 45 (4.6) | 450 (10.7) | 43 (4.2) | 440 (8.9) | 4 (1.7) | 439 (46.1) | 8 (1.7) | 381 (13.8) | 0 (0.0) | ~ ~ |
| Abu Dhabi, UAE | 51 (2.6) | 408 (9.3) | 41 (2.8) | 430 (9.8) | 5 (1.0) | 365 (22.0) | 4 (0.7) | 453 (14.2) | 0 (0.3) | ~ ~ |
| Dubai, UAE | 52 (3.3) | 567 (4.8) | 40 (3.6) | 541 (8.4) | 4 (0.4) | 428 (16.1) | 3 (1.5) | 538 (18.6) | 1 (0.6) | ~ ~ |
| Quebec, Canada y | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Teachers' Years of Experience

Exhibits 9.9, 9.10, 9.11, and 9.12 present teachers' reports about their years of teaching experience, including the average years of experience in each country and the percentage of students and average achievement by four categories: 20 years or more, at least 10 but less than 20 years, at least 5 but less than 10 years, and less than 5 years.

There was considerable variation in teacher experience across countries in both grades and subjects. In some countries, two-thirds or more of the students were taught by very experienced teachers with more than 20 years of experience, while in others, about a quarter of students were taught by teachers with less than 5 years of experience.

On average across countries, fourth grade students' mathematics and science teachers had been teaching for 17 years. In mathematics, experience ranged from an average of 9 years in Turkey and 10 years in England to more than 25 years in Bulgaria (26 years), Latvia and Lithuania (27 years), and the Russian Federation (26 years). In science, experience ranged from 10 years in England and Pakistan to 25 years or more in Bulgaria, Hungary, and Latvia (25 years); the Russian Federation (26 years); and Lithuania (27 years). On average across countries, just over 40 percent of fourth grade students were taught by teachers with 20 years of experience (41% for mathematics and 40% for science); 29 and 28 percent by mathematics and science teachers, respectively, with at least 10 but less than 20 years; 15 percent by mathematics teachers and 17 percent by science teachers with at least 5 but less than 10 years of experience; and 14 percent by mathematics teachers and 15 percent by science teachers with less than 5 years of experience.

On average, eighth grade teachers were slightly less experienced than their fourth grade counterparts (16 years of experience for both subjects, compared with 17 years in fourth grade). In mathematics, experience ranged from an average of 10 years in Turkey to 29 years in Lithuania. In science, teachers' average years of experience ranged from 11 years in Jordan, Lebanon, and Qatar to 26 years in Georgia and Lithuania. In both subjects, just over one-third of eighth grade students had teachers with more than 20 years of experience (35% in mathematics and 34% in science); about one-third had at least 10 but less than 20 years of experience (33% in mathematics and 32% in science); 18 percent had teachers with at least 5 but less than 10 years; and 14 percent (mathematics) and 15 percent (science) had teachers with less than 5 years of experience.

Internationally, average mathematics and average science achievement were generally higher for students whose teachers had more experience. For example, in mathematics in fourth grade, average achievement rose from 494 among students of teachers with less than 5 years of experience to 500 to 504 for the other categories. Similarly, in science in fourth grade, the average achievement was 485 for the lowest category of experience and rose to 492 for each of the other three categories. The relationship between experience and average student achievement was also more pronounced in mathematics than in science, in both grades.

Policies for teacher assignment may play a role in the relationship between teacher experience and average student achievement, as sometimes, more experienced teachers are assigned to students of higher ability and with fewer discipline problems and, conversely, less experienced teachers are assigned to students of lower ability.

## Exhibit 9.9: Teachers' Years of Experience

*Students' Results based on Teachers' Reports*

| Country | 20 Years or More | | At Least 10 but Less than 20 Years | | At Least 5 but Less than 10 Years | | Less than 5 Years | | Average Years of Experience |
|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 61 (3.8) | 497 (4.1) | 26 (3.7) | 493 (9.0) | 8 (2.6) | 495 (6.8) | 5 (1.9) | 480 (13.2) | 22 (0.9) |
| Armenia | 63 (3.9) | 498 (2.7) | 12 (2.4) | 517 (8.4) | 18 (3.0) | 488 (5.8) | 6 (1.7) | 487 (7.8) | 23 (1.1) |
| Australia | 31 (3.4) | 526 (6.4) | 20 (2.4) | 526 (5.4) | 25 (3.1) | 510 (6.7) | 24 (3.5) | 508 (6.2) | 13 (0.8) |
| Austria | 53 (3.4) | 538 (3.1) | 17 (2.5) | 546 (4.1) | 16 (2.2) | 539 (5.4) | 14 (2.2) | 535 (5.1) | 19 (0.8) |
| Azerbaijan r | 59 (4.1) | 516 (3.9) | 28 (3.8) | 514 (6.4) | 6 (1.5) | 495 (13.5) | 7 (2.0) | 505 (9.6) | 22 (0.9) |
| Bahrain | 13 (2.3) | 478 (7.8) | 43 (2.9) | 480 (4.5) | 24 (2.7) | 479 (4.6) | 20 (2.6) | 486 (4.5) | 11 (0.5) |
| Belgium (Flemish) | 32 (3.5) | 542 (2.6) | 37 (3.7) | 532 (3.7) | 16 (2.7) | 527 (5.9) | 15 (2.3) | 528 (4.8) | 16 (0.8) |
| Bosnia and Herzegovina | 50 (2.7) | 452 (3.6) | 34 (3.2) | 455 (4.2) | 9 (1.7) | 451 (7.2) | 7 (1.4) | 437 (11.7) | 18 (0.5) |
| Bulgaria | 77 (3.2) | 517 (5.1) | 8 (1.9) | 501 (15.5) | 7 (2.1) | 528 (14.9) | 8 (2.1) | 500 (20.6) | 26 (0.8) |
| Canada | 31 (2.8) | 513 (4.1) | 39 (2.7) | 513 (5.4) | 17 (1.9) | 513 (4.6) | 13 (1.7) | 508 (4.2) | 15 (0.4) |
| Chile | 32 (4.0) | 455 (5.6) | 35 (4.0) | 440 (5.3) | 20 (3.4) | 435 (6.5) | 13 (3.0) | 415 (6.0) | 16 (1.0) |
| Chinese Taipei | 53 (4.1) | 597 (2.7) | 38 (4.1) | 604 (3.4) | 6 (1.8) | 589 (8.1) | 4 (1.6) | 598 (6.4) | 19 (0.5) |
| Croatia | 63 (3.4) | 508 (2.9) | 25 (2.9) | 510 (4.4) | 5 (1.6) | 512 (7.1) | 6 (1.8) | 508 (11.0) | 22 (0.7) |
| Cyprus | 51 (4.0) | 537 (3.0) | 35 (4.1) | 533 (5.5) | 5 (1.5) | 524 (11.9) | 9 (2.0) | 518 (9.9) | 18 (0.6) |
| Czech Republic | 60 (3.3) | 531 (3.4) | 17 (2.5) | 544 (6.4) | 11 (2.0) | 526 (6.1) | 13 (2.3) | 532 (7.7) | 21 (0.8) |
| Denmark | 27 (3.7) | 525 (4.9) | 43 (4.4) | 524 (3.4) | 12 (2.7) | 526 (6.8) | 18 (3.1) | 523 (6.1) | 15 (0.8) |
| England s | 13 (4.0) | 561 (16.5) | 30 (5.1) | 558 (11.2) | 31 (4.8) | 561 (6.9) | 25 (4.8) | 552 (4.5) | 10 (0.8) |
| Finland | 40 (3.4) | 532 (3.6) | 26 (2.6) | 533 (4.2) | 18 (2.6) | 535 (4.7) | 16 (2.3) | 527 (5.8) | 16 (0.7) |
| France | 38 (3.6) | 498 (5.4) | 32 (3.3) | 479 (5.4) | 14 (2.3) | 478 (6.1) | 16 (2.8) | 480 (6.7) | 16 (0.8) |
| Georgia | 68 (3.9) | 478 (4.7) | 23 (3.4) | 490 (8.0) | 5 (1.8) | 486 (9.2) | 4 (1.5) | 492 (17.6) | 24 (1.0) |
| Germany | 43 (3.6) | 526 (3.7) | 29 (3.7) | 519 (5.6) | 17 (2.8) | 514 (5.2) | 11 (2.5) | 512 (9.7) | 18 (0.8) |
| Hong Kong SAR | 30 (4.2) | 611 (6.4) | 27 (4.8) | 605 (8.0) | 22 (4.5) | 585 (7.9) | 21 (3.6) | 601 (6.3) | 13 (0.9) |
| Hungary | 68 (3.7) | 526 (3.6) | 18 (3.0) | 525 (6.9) | 9 (1.9) | 531 (10.3) | 5 (1.7) | 504 (13.0) | 24 (0.9) |
| Iran, Islamic Rep. of | 35 (3.2) | 441 (7.1) | 25 (3.1) | 441 (9.2) | 14 (2.4) | 466 (11.4) | 26 (2.9) | 436 (6.9) | 14 (0.7) |
| Ireland | 24 (3.9) | 550 (3.8) | 37 (4.1) | 549 (4.1) | 18 (3.2) | 560 (6.1) | 21 (3.3) | 536 (5.9) | 14 (1.0) |
| Italy | 64 (3.9) | 516 (3.0) | 24 (3.0) | 515 (4.5) | 6 (1.9) | 509 (9.6) | 6 (2.6) | 516 (14.3) | 23 (1.0) |
| Japan | 35 (3.3) | 590 (2.6) | 23 (3.0) | 593 (3.3) | 16 (3.0) | 596 (4.9) | 26 (3.1) | 594 (3.2) | 15 (0.8) |
| Kazakhstan | 55 (4.3) | 515 (3.6) | 19 (3.1) | 505 (4.6) | 14 (2.7) | 521 (7.2) | 11 (2.4) | 498 (7.1) | 20 (1.0) |
| Korea, Rep. of | 25 (3.2) | 605 (5.0) | 37 (3.9) | 604 (3.4) | 23 (3.5) | 593 (5.3) | 15 (3.2) | 590 (5.8) | 14 (0.8) |
| Kosovo | 38 (4.2) | 443 (4.9) | 28 (3.9) | 456 (6.2) | 17 (3.2) | 434 (8.0) | 18 (3.3) | 444 (7.9) | 16 (1.1) |
| Kuwait | 9 (2.5) | 387 (18.2) | 50 (3.8) | 381 (7.3) | 27 (3.5) | 389 (12.0) | 13 (3.0) | 378 (18.8) | 12 (0.6) |
| Latvia | 73 (3.4) | 546 (2.9) | 12 (2.3) | 564 (6.7) | 8 (1.9) | 546 (7.6) | 7 (1.9) | 511 (16.0) | 27 (1.1) |
| Lithuania | 83 (2.7) | 538 (3.1) | 9 (2.2) | 556 (8.2) | 2 (1.2) | ~ ~ | 5 (1.6) | 557 (11.3) | 27 (0.8) |
| Malta | 24 (0.4) | 504 (2.6) | 21 (0.4) | 521 (2.7) | 24 (0.4) | 512 (2.2) | 31 (0.4) | 503 (2.7) | 12 (0.1) |
| Montenegro | 56 (3.3) | 451 (2.8) | 28 (2.7) | 456 (4.0) | 10 (2.0) | 457 (8.1) | 6 (0.9) | 446 (4.8) | 20 (0.6) |
| Morocco | 44 (3.3) | 369 (7.6) | 19 (2.8) | 384 (10.5) | 10 (2.2) | 393 (16.2) | 27 (3.1) | 399 (13.8) | 16 (0.7) |
| Netherlands r | 30 (4.7) | 537 (4.5) | 32 (4.9) | 539 (3.5) | 20 (4.5) | 536 (5.5) | 18 (4.4) | 533 (5.6) | 15 (1.2) |
| New Zealand | 25 (2.5) | 491 (6.2) | 32 (2.7) | 490 (4.6) | 21 (2.5) | 492 (7.3) | 23 (2.4) | 479 (6.1) | 13 (0.6) |
| North Macedonia r | 52 (4.9) | 478 (6.4) | 29 (3.7) | 463 (12.6) | 10 (2.7) | 504 (18.0) | 9 (2.4) | 460 (13.5) | 19 (1.0) |
| Northern Ireland | 33 (4.1) | 571 (5.4) | 38 (4.1) | 560 (5.5) | 21 (3.4) | 562 (6.7) | 8 (2.5) | 575 (9.8) | 15 (0.9) |
| Norway (5) r | 30 (4.0) | 542 (4.1) | 36 (3.8) | 551 (4.1) | 10 (2.7) | 541 (9.8) | 23 (4.1) | 542 (5.1) | 14 (0.9) |
| Oman | 9 (2.0) | 442 (23.0) | 57 (3.3) | 435 (4.8) | 25 (2.8) | 425 (7.8) | 8 (2.0) | 405 (8.4) | 12 (0.4) |
| Pakistan | 25 (4.0) | 293 (10.3) | 14 (6.5) | 370 (45.4) | 22 (5.2) | 328 (19.0) | 40 (8.1) | 337 (21.8) | 11 (1.2) |
| Philippines | 30 (3.8) | 310 (12.5) | 32 (3.6) | 284 (10.1) | 24 (3.3) | 298 (13.6) | 14 (2.6) | 295 (13.4) | 14 (0.7) |
| Poland | 51 (4.0) | 517 (3.4) | 31 (4.0) | 522 (4.6) | 10 (2.3) | 520 (9.2) | 8 (1.9) | 534 (10.1) | 20 (0.8) |
| Portugal | 67 (2.7) | 523 (3.3) | 30 (2.8) | 534 (4.3) | 2 (0.9) | ~ ~ | 1 (0.7) | ~ ~ | 24 (0.6) |
| Qatar | 13 (3.1) | 445 (14.5) | 35 (3.6) | 441 (6.5) | 33 (3.6) | 457 (7.1) | 19 (2.9) | 455 (11.8) | 11 (0.6) |
| Russian Federation | 74 (3.2) | 565 (3.1) | 11 (2.4) | 590 (10.0) | 8 (1.8) | 568 (12.0) | 6 (1.8) | 550 (11.9) | 26 (0.9) |
| Saudi Arabia | 31 (3.4) | 407 (6.8) | 43 (3.2) | 401 (5.5) | 15 (2.8) | 399 (9.5) | 11 (2.0) | 372 (9.3) | 15 (0.6) |
| Serbia | 74 (3.4) | 509 (3.4) | 18 (3.0) | 510 (9.0) | 8 (2.0) | 501 (9.1) | 1 (0.5) | ~ ~ | 24 (0.7) |
| Singapore | 22 (2.2) | 630 (7.7) | 37 (2.2) | 632 (6.2) | 27 (2.0) | 615 (6.5) | 14 (1.9) | 621 (8.7) | 13 (0.5) |
| Slovak Republic | 64 (3.0) | 511 (3.7) | 20 (2.7) | 509 (7.3) | 9 (1.7) | 501 (16.8) | 7 (1.7) | 506 (7.5) | 23 (0.7) |
| South Africa (5) | 45 (3.4) | 379 (6.0) | 24 (2.9) | 353 (8.5) | 14 (3.0) | 388 (13.7) | 18 (2.4) | 378 (11.0) | 17 (0.7) |
| Spain | 45 (3.4) | 506 (4.7) | 34 (3.5) | 499 (5.5) | 8 (1.7) | 490 (11.3) | 13 (1.7) | 501 (4.8) | 19 (0.7) |
| Sweden | 20 (3.5) | 537 (6.8) | 35 (4.5) | 526 (4.8) | 21 (3.4) | 516 (6.7) | 25 (3.6) | 510 (5.9) | 12 (0.7) |
| Turkey (5) | 9 (2.3) | 544 (10.3) | 34 (3.4) | 552 (7.0) | 22 (3.3) | 535 (8.5) | 35 (3.4) | 480 (7.7) | 9 (0.6) |
| United Arab Emirates | 14 (1.6) | 486 (7.0) | 33 (1.4) | 469 (3.8) | 31 (1.6) | 483 (5.0) | 21 (1.9) | 492 (5.1) | 11 (0.3) |
| United States | 26 (2.3) | 537 (4.6) | 36 (2.6) | 542 (3.7) | 21 (2.1) | 539 (6.3) | 18 (1.9) | 514 (6.2) | 13 (0.4) |
| **International Average** | **41 (0.5)** | **503 (0.9)** | **29 (0.4)** | **504 (1.2)** | **15 (0.4)** | **500 (1.2)** | **14 (0.4)** | **494 (1.3)** | **17 (0.1)** |
| **Benchmarking Participants** | | | | | | | | | |
| Ontario, Canada r | 26 (4.5) | 508 (9.6) | 42 (5.5) | 512 (10.4) | 20 (3.3) | 519 (6.7) | 11 (2.6) | 508 (9.6) | 15 (0.6) |
| Quebec, Canada | 36 (4.6) | 533 (2.8) | 37 (4.5) | 532 (3.8) | 14 (3.1) | 534 (5.6) | 13 (3.0) | 532 (6.9) | 16 (0.8) |
| Moscow City, Russian Fed. | 79 (3.3) | 594 (2.3) | 12 (2.3) | 599 (4.8) | 6 (1.8) | 567 (12.6) | 4 (1.6) | 589 (11.9) | 25 (0.8) |
| Madrid, Spain | 36 (3.4) | 522 (3.1) | 38 (4.1) | 510 (4.2) | 8 (2.2) | 533 (8.3) | 18 (3.6) | 519 (3.9) | 16 (0.8) |
| Abu Dhabi, UAE | 14 (1.9) | 440 (9.6) | 39 (2.6) | 435 (5.9) | 32 (2.6) | 442 (5.9) | 15 (1.8) | 458 (9.9) | 12 (0.5) |
| Dubai, UAE r | 18 (3.6) | 556 (8.3) | 27 (2.8) | 536 (5.7) | 36 (3.6) | 546 (4.9) | 19 (3.0) | 551 (6.3) | 11 (0.7) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 9.10: Teachers' Years of Experience

*Students' Results based on Teachers' Reports*

| Country | 20 Years or More | | At Least 10 but Less than 20 Years | | At Least 5 but Less than 10 Years | | Less than 5 Years | | Average Years of Experience |
|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 59 (3.9) | 492 (4.5) | 26 (3.7) | 489 (9.5) | 9 (2.7) | 488 (8.3) | 6 (2.0) | 493 (14.7) | 21 (0.9) |
| Armenia | 58 (3.8) | 469 (4.5) | 15 (2.7) | 470 (7.5) | 20 (3.4) | 459 (5.5) | 7 (1.8) | 454 (10.6) | 22 (1.1) |
| Australia | 31 (3.2) | 539 (6.1) | 19 (2.5) | 537 (4.2) | 24 (3.0) | 531 (5.9) | 26 (3.2) | 526 (5.5) | 13 (0.7) |
| Austria | 54 (3.2) | 522 (3.7) | 15 (2.4) | 527 (5.3) | 16 (2.1) | 525 (6.2) | 15 (2.1) | 512 (5.9) | 19 (0.7) |
| Azerbaijan r | 55 (4.0) | 428 (4.5) | 31 (4.0) | 422 (7.8) | 6 (1.7) | 396 (15.4) | 8 (2.3) | 425 (12.4) | 21 (0.8) |
| Bahrain | 15 (3.6) | 483 (19.0) | 35 (3.0) | 508 (5.9) | 28 (3.9) | 481 (8.0) | 22 (3.0) | 491 (6.1) | 11 (0.7) |
| Belgium (Flemish) | 31 (3.5) | 511 (2.6) | 36 (3.7) | 500 (4.2) | 17 (2.8) | 496 (6.3) | 16 (2.5) | 496 (4.9) | 15 (0.8) |
| Bosnia and Herzegovina | 50 (2.7) | 461 (3.9) | 34 (3.2) | 460 (4.3) | 9 (1.7) | 456 (7.8) | 7 (1.4) | 437 (11.6) | 18 (0.5) |
| Bulgaria | 76 (3.4) | 523 (6.0) | 9 (2.2) | 510 (18.7) | 7 (2.1) | 540 (20.8) | 8 (2.1) | 497 (23.8) | 25 (0.8) |
| Canada r | 26 (2.4) | 522 (2.9) | 39 (2.8) | 525 (3.2) | 19 (2.0) | 526 (3.9) | 16 (2.6) | 526 (8.0) | 14 (0.6) |
| Chile | 28 (4.1) | 473 (5.2) | 34 (3.7) | 469 (5.4) | 23 (3.5) | 467 (6.0) | 15 (3.1) | 456 (7.7) | 15 (1.0) |
| Chinese Taipei | 44 (3.9) | 558 (3.0) | 29 (3.3) | 557 (3.8) | 16 (3.0) | 559 (5.5) | 11 (2.6) | 563 (4.8) | 17 (0.7) |
| Croatia | 63 (3.4) | 523 (2.6) | 25 (2.9) | 524 (3.8) | 5 (1.6) | 524 (7.0) | 6 (1.8) | 524 (9.5) | 22 (0.7) |
| Cyprus | 33 (4.6) | 517 (4.4) | 43 (5.1) | 509 (4.9) | 18 (4.3) | 511 (8.0) | 6 (2.0) | 504 (8.9) | 16 (0.7) |
| Czech Republic | 56 (3.4) | 530 (3.5) | 21 (3.1) | 540 (5.0) | 12 (2.2) | 533 (7.3) | 11 (2.2) | 540 (6.3) | 20 (0.8) |
| Denmark | 22 (3.2) | 527 (4.4) | 45 (4.2) | 522 (3.4) | 16 (2.7) | 515 (6.6) | 17 (3.2) | 525 (6.2) | 14 (0.7) |
| England s | 13 (4.0) | 539 (13.9) | 31 (5.1) | 538 (9.6) | 31 (5.1) | 542 (6.7) | 25 (4.8) | 532 (4.6) | 10 (0.8) |
| Finland | 38 (3.3) | 558 (3.8) | 27 (2.8) | 554 (4.4) | 20 (2.8) | 557 (4.8) | 15 (2.4) | 543 (6.3) | 16 (0.7) |
| France | 32 (3.4) | 501 (5.6) | 34 (3.6) | 480 (5.2) | 16 (2.4) | 482 (6.1) | 18 (3.0) | 490 (6.5) | 15 (0.7) |
| Georgia | 62 (4.0) | 447 (5.6) | 27 (3.7) | 466 (6.5) | 8 (2.3) | 457 (11.4) | 4 (1.5) | 460 (9.6) | 24 (1.1) |
| Germany | 39 (3.8) | 521 (3.7) | 26 (3.0) | 513 (5.4) | 18 (2.6) | 520 (6.7) | 17 (2.9) | 518 (8.5) | 17 (0.9) |
| Hong Kong SAR | 25 (3.6) | 534 (7.0) | 22 (3.9) | 538 (7.0) | 20 (4.0) | 531 (5.5) | 32 (4.1) | 528 (5.5) | 11 (0.8) |
| Hungary | 71 (3.3) | 530 (3.3) | 14 (2.5) | 522 (8.5) | 7 (1.6) | 542 (7.3) | 7 (1.8) | 516 (10.0) | 25 (0.8) |
| Iran, Islamic Rep. of | 35 (3.2) | 441 (7.2) | 25 (3.1) | 438 (9.8) | 14 (2.4) | 461 (11.3) | 26 (2.9) | 432 (7.3) | 14 (0.7) |
| Ireland | 24 (3.9) | 532 (4.4) | 37 (4.1) | 530 (4.3) | 18 (3.2) | 536 (7.8) | 21 (3.3) | 511 (9.5) | 14 (1.0) |
| Italy | 64 (3.9) | 510 (3.4) | 24 (3.0) | 510 (4.7) | 6 (1.9) | 504 (10.2) | 6 (2.6) | 514 (17.2) | 23 (1.0) |
| Japan | 37 (4.0) | 559 (2.4) | 25 (3.8) | 564 (3.9) | 12 (2.6) | 561 (5.1) | 26 (3.6) | 563 (3.3) | 16 (1.0) |
| Kazakhstan | 53 (4.3) | 499 (5.1) | 20 (3.1) | 487 (6.3) | 14 (2.6) | 497 (9.5) | 13 (2.6) | 479 (8.1) | 20 (1.0) |
| Korea, Rep. of | 26 (3.1) | 591 (4.1) | 40 (3.5) | 588 (2.8) | 21 (3.1) | 586 (4.9) | 13 (2.8) | 581 (5.6) | 15 (0.8) |
| Kosovo | 38 (4.2) | 412 (6.2) | 28 (3.9) | 427 (7.8) | 17 (3.2) | 403 (8.8) | 18 (3.3) | 411 (9.0) | 16 (1.1) |
| Kuwait | 6 (2.0) | 363 (27.4) | 53 (4.3) | 406 (9.1) | 28 (3.8) | 395 (10.8) | 13 (2.5) | 354 (15.3) | 11 (0.5) |
| Latvia | 69 (3.3) | 541 (3.2) | 16 (2.7) | 547 (5.7) | 9 (2.0) | 547 (6.6) | 6 (1.5) | 531 (13.1) | 25 (0.9) |
| Lithuania | 83 (2.6) | 534 (2.8) | 9 (2.2) | 552 (7.8) | 3 (1.2) | 534 (12.4) | 6 (1.7) | 556 (9.2) | 27 (0.8) |
| Malta | 22 (0.3) | 492 (2.8) | 22 (0.4) | 507 (2.8) | 24 (0.4) | 498 (2.8) | 32 (0.4) | 489 (2.2) | 11 (0.1) |
| Montenegro | 56 (3.3) | 452 (3.3) | 28 (2.7) | 457 (4.8) | 10 (2.0) | 458 (10.2) | 6 (0.9) | 445 (6.3) | 20 (0.6) |
| Morocco | 43 (3.4) | 356 (8.6) | 22 (3.3) | 382 (11.5) | 12 (2.4) | 385 (18.4) | 23 (2.8) | 390 (16.1) | 17 (0.8) |
| Netherlands r | 30 (4.7) | 519 (5.6) | 32 (4.9) | 521 (4.5) | 20 (4.5) | 514 (7.5) | 18 (4.4) | 517 (6.4) | 15 (1.2) |
| New Zealand | 27 (2.6) | 505 (5.1) | 33 (2.5) | 507 (3.7) | 20 (2.5) | 506 (6.4) | 20 (2.1) | 493 (6.5) | 14 (0.6) |
| North Macedonia r | 52 (4.9) | 433 (8.3) | 29 (3.7) | 418 (13.4) | 10 (2.7) | 459 (17.4) | 9 (2.4) | 413 (16.2) | 19 (1.0) |
| Northern Ireland | 33 (4.1) | 525 (4.3) | 38 (4.1) | 514 (3.9) | 21 (3.4) | 515 (5.1) | 8 (2.5) | 526 (7.5) | 15 (0.9) |
| Norway (5) r | 25 (3.9) | 543 (5.0) | 30 (3.5) | 542 (4.4) | 18 (3.9) | 536 (6.3) | 26 (4.4) | 537 (5.0) | 12 (0.8) |
| Oman | 7 (1.8) | 457 (23.8) | 54 (3.7) | 441 (5.7) | 21 (3.2) | 432 (11.3) | 17 (2.9) | 421 (8.1) | 11 (0.5) |
| Pakistan | 23 (4.9) | 275 (15.0) | 7 (2.6) | 239 (41.9) | 26 (6.7) | 330 (20.6) | 43 (6.7) | 288 (21.5) | 10 (1.3) |
| Philippines | 25 (3.8) | 234 (13.2) | 34 (4.0) | 251 (12.1) | 21 (3.3) | 249 (14.6) | 20 (3.1) | 260 (15.1) | 13 (0.8) |
| Poland | 67 (3.9) | 530 (3.3) | 23 (3.4) | 532 (4.5) | 4 (1.4) | 538 (10.9) | 6 (2.2) | 545 (10.9) | 24 (0.9) |
| Portugal | 67 (2.7) | 502 (3.1) | 30 (2.8) | 512 (3.4) | 2 (0.9) | ~ ~ | 1 (0.7) | ~ ~ | 24 (0.6) |
| Qatar | 15 (3.4) | 453 (15.2) | 38 (4.2) | 442 (5.7) | 32 (4.1) | 452 (8.8) | 15 (2.5) | 462 (10.3) | 11 (0.6) |
| Russian Federation | 73 (3.5) | 565 (3.1) | 12 (2.5) | 587 (8.6) | 8 (1.8) | 567 (10.1) | 7 (2.0) | 563 (10.0) | 26 (0.9) |
| Saudi Arabia | 31 (3.1) | 394 (7.1) | 31 (3.4) | 405 (8.6) | 25 (3.6) | 417 (6.5) | 13 (2.7) | 388 (18.2) | 14 (0.6) |
| Serbia | 74 (3.4) | 518 (3.8) | 18 (3.0) | 521 (9.3) | 8 (2.0) | 510 (10.5) | 1 (0.5) | ~ ~ | 24 (0.7) |
| Singapore | 16 (2.0) | 597 (8.5) | 41 (2.8) | 598 (5.8) | 29 (2.5) | 598 (5.7) | 14 (1.9) | 577 (8.3) | 12 (0.4) |
| Slovak Republic | 61 (3.1) | 523 (4.6) | 20 (2.7) | 517 (6.5) | 14 (2.5) | 506 (14.6) | 6 (1.5) | 528 (7.8) | 23 (0.8) |
| South Africa (5) | 42 (3.8) | 331 (11.4) | 21 (2.6) | 304 (11.9) | 14 (3.0) | 336 (19.5) | 23 (2.8) | 329 (15.6) | 16 (0.8) |
| Spain | 39 (2.8) | 514 (4.0) | 38 (3.4) | 508 (4.6) | 11 (2.6) | 500 (9.2) | 13 (2.1) | 516 (5.3) | 17 (0.7) |
| Sweden | 23 (4.0) | 550 (6.7) | 29 (4.5) | 542 (4.8) | 23 (4.1) | 535 (6.3) | 25 (4.1) | 527 (7.2) | 13 (0.9) |
| Turkey (5) | 18 (2.7) | 558 (6.2) | 28 (3.4) | 548 (7.9) | 29 (3.5) | 527 (5.9) | 25 (2.9) | 478 (10.1) | 11 (0.6) |
| United Arab Emirates | 13 (1.1) | 452 (7.6) | 39 (1.6) | 466 (4.4) | 31 (1.7) | 478 (4.9) | 17 (1.5) | 486 (6.3) | 11 (0.2) |
| United States | 27 (2.3) | 543 (4.4) | 35 (2.7) | 546 (4.4) | 21 (2.1) | 538 (6.4) | 18 (2.0) | 518 (6.1) | 14 (0.4) |
| **International Average** | **40 (0.5)** | **492 (1.1)** | **28 (0.4)** | **492 (1.2)** | **17 (0.4)** | **492 (1.3)** | **15 (0.4)** | **485 (1.4)** | **17 (0.1)** |
| **Benchmarking Participants** | | | | | | | | | |
| Ontario, Canada r | 20 (3.3) | 518 (6.7) | 46 (5.8) | 526 (4.8) | 20 (3.4) | 530 (6.9) | 14 (5.1) | 537 (20.6) | 14 (0.9) |
| Quebec, Canada | 33 (4.5) | 524 (3.2) | 32 (4.5) | 521 (4.9) | 19 (3.5) | 530 (4.4) | 17 (3.5) | 517 (5.2) | 14 (0.8) |
| Moscow City, Russian Fed. | 79 (3.3) | 596 (2.3) | 12 (2.2) | 600 (5.4) | 6 (1.8) | 570 (11.4) | 4 (1.6) | 597 (11.0) | 25 (0.8) |
| Madrid, Spain | 29 (4.2) | 530 (3.8) | 40 (4.3) | 516 (3.8) | 15 (2.7) | 521 (3.5) | 16 (2.6) | 527 (4.8) | 14 (0.8) |
| Abu Dhabi, UAE | 13 (1.3) | 368 (13.1) | 40 (2.1) | 418 (7.2) | 31 (2.3) | 426 (6.5) | 15 (2.0) | 440 (11.3) | 11 (0.4) |
| Dubai, UAE r | 12 (2.2) | 560 (10.2) | 32 (3.5) | 544 (6.6) | 38 (4.6) | 543 (5.5) | 18 (3.6) | 561 (5.9) | 10 (0.5) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.11: Teachers' Years of Experience

*Students' Results based on Teachers' Reports*

| Country | 20 Years or More | | At Least 10 but Less than 20 Years | | At Least 5 but Less than 10 Years | | Less than 5 Years | | Average Years of Experience |
|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Australia | 31 (3.2) | 527 (7.5) | 26 (3.0) | 518 (7.9) | 19 (2.6) | 514 (9.2) | 25 (2.6) | 515 (8.3) | 14 (0.8) |
| Bahrain | 28 (3.1) | 471 (4.6) | 41 (3.4) | 486 (3.7) | 21 (2.6) | 486 (3.3) | 10 (2.3) | 479 (8.4) | 14 (0.5) |
| Chile | 29 (3.5) | 444 (7.0) | 24 (3.3) | 454 (7.8) | 28 (3.4) | 435 (7.4) | 20 (3.4) | 427 (7.3) | 15 (1.0) |
| Chinese Taipei | 40 (3.5) | 618 (4.8) | 42 (3.3) | 608 (4.5) | 16 (2.5) | 609 (8.0) | 3 (1.1) | 622 (32.6) | 17 (0.5) |
| Cyprus r | 16 (3.7) | 517 (11.7) | 47 (4.4) | 507 (5.1) | 19 (4.0) | 495 (8.9) | 19 (3.5) | 497 (5.3) | 12 (0.7) |
| Egypt | 45 (3.6) | 423 (7.6) | 29 (4.0) | 410 (9.9) | 18 (3.4) | 396 (14.0) | 7 (2.1) | 406 (16.8) | 18 (0.7) |
| England s | 26 (4.4) | 546 (12.4) | 40 (4.8) | 517 (11.0) | 16 (3.8) | 528 (12.2) | 19 (4.4) | 491 (22.1) | 14 (0.9) |
| Finland | 29 (2.9) | 514 (4.8) | 38 (2.9) | 508 (3.6) | 14 (2.1) | 511 (5.3) | 19 (2.8) | 501 (4.1) | 14 (0.6) |
| France r | 29 (3.6) | 488 (5.2) | 38 (4.0) | 479 (4.9) | 18 (3.5) | 470 (6.4) | 14 (2.9) | 492 (11.4) | 15 (0.6) |
| Georgia | 65 (4.3) | 457 (6.0) | 22 (3.9) | 473 (9.0) | 10 (2.7) | 452 (11.3) | 3 (1.6) | 525 (40.8) | 24 (1.0) |
| Hong Kong SAR | 35 (4.2) | 571 (9.4) | 29 (3.9) | 585 (11.0) | 15 (2.7) | 589 (11.0) | 20 (3.3) | 569 (13.5) | 15 (0.8) |
| Hungary | 70 (3.5) | 513 (4.4) | 19 (2.8) | 525 (8.0) | 7 (2.0) | 514 (8.0) | 4 (1.4) | 509 (25.1) | 26 (0.9) |
| Iran, Islamic Rep. of | 42 (3.2) | 462 (7.2) | 36 (3.4) | 432 (6.8) | 8 (2.1) | 456 (19.1) | 14 (2.5) | 430 (11.8) | 17 (0.7) |
| Ireland | 28 (3.0) | 524 (5.0) | 30 (2.7) | 526 (5.5) | 26 (2.7) | 524 (6.1) | 16 (2.5) | 521 (6.1) | 14 (0.7) |
| Israel | 40 (3.4) | 547 (8.6) | 26 (2.8) | 510 (9.8) | 19 (2.2) | 493 (9.2) | 15 (1.9) | 499 (12.8) | 16 (0.6) |
| Italy | 42 (3.5) | 499 (3.9) | 43 (3.7) | 495 (4.2) | 11 (2.3) | 500 (8.9) | 5 (1.8) | 506 (8.8) | 19 (0.8) |
| Japan | 35 (3.9) | 588 (4.1) | 27 (3.6) | 604 (7.4) | 21 (3.2) | 593 (5.1) | 18 (3.0) | 592 (4.9) | 16 (0.8) |
| Jordan | 16 (2.5) | 432 (8.0) | 34 (3.4) | 424 (6.5) | 24 (3.5) | 426 (6.6) | 25 (3.6) | 403 (9.8) | 11 (0.6) |
| Kazakhstan | 51 (3.9) | 490 (5.4) | 22 (3.2) | 497 (9.9) | 18 (3.0) | 467 (9.1) | 9 (2.1) | 472 (15.5) | 20 (0.9) |
| Korea, Rep. of | 34 (3.7) | 607 (4.1) | 32 (3.9) | 611 (5.9) | 17 (3.3) | 610 (7.3) | 17 (2.6) | 595 (8.6) | 15 (0.8) |
| Kuwait | 19 (3.2) | 398 (9.8) | 50 (4.2) | 401 (6.3) | 26 (3.0) | 403 (7.4) | 6 (2.1) | 397 (30.7) | 13 (0.6) |
| Lebanon | 26 (3.7) | 452 (7.7) | 30 (3.8) | 430 (7.9) | 26 (3.1) | 418 (6.4) | 18 (3.7) | 419 (9.1) | 13 (0.8) |
| Lithuania | 78 (3.4) | 519 (3.9) | 18 (3.2) | 527 (9.0) | 3 (1.4) | 536 (28.9) | 1 (0.7) | ~ ~ | 29 (0.7) |
| Malaysia | 28 (2.7) | 442 (7.4) | 43 (3.8) | 469 (5.4) | 18 (2.9) | 466 (10.7) | 11 (2.2) | 466 (17.9) | 14 (0.5) |
| Morocco | 30 (3.2) | 391 (4.6) | 10 (1.7) | 407 (11.7) | 18 (2.5) | 406 (5.5) | 42 (3.1) | 374 (3.7) | 13 (0.9) |
| New Zealand | 34 (3.8) | 475 (7.9) | 34 (3.4) | 480 (6.2) | 17 (2.8) | 491 (7.8) | 16 (2.9) | 494 (8.6) | 16 (0.9) |
| Norway (9) r | 25 (3.8) | 504 (5.3) | 31 (4.0) | 506 (5.5) | 18 (3.1) | 499 (5.7) | 27 (4.0) | 508 (4.1) | 13 (0.9) |
| Oman | 12 (1.8) | 439 (9.1) | 67 (3.2) | 406 (3.8) | 17 (2.6) | 403 (8.1) | 4 (1.3) | 429 (16.5) | 14 (0.3) |
| Portugal | 65 (3.4) | 501 (4.1) | 30 (3.2) | 502 (5.1) | 5 (1.8) | 482 (19.0) | 0 (0.5) | ~ ~ | 22 (0.6) |
| Qatar | 20 (2.8) | 418 (11.6) | 36 (4.3) | 433 (6.9) | 30 (4.1) | 474 (11.2) | 14 (2.8) | 443 (9.6) | 13 (0.6) |
| Romania | 67 (3.6) | 486 (5.5) | 24 (2.8) | 465 (7.7) | 4 (1.5) | 477 (23.0) | 4 (1.6) | 453 (26.8) | 24 (0.8) |
| Russian Federation | 73 (3.7) | 545 (4.8) | 15 (3.4) | 545 (8.1) | 6 (1.8) | 533 (17.8) | 6 (1.8) | 533 (27.0) | 26 (1.0) |
| Saudi Arabia | 18 (2.7) | 408 (6.2) | 34 (3.6) | 397 (4.1) | 25 (3.4) | 395 (5.6) | 23 (2.8) | 378 (5.2) | 11 (0.5) |
| Singapore | 14 (1.8) | 645 (13.6) | 34 (2.8) | 608 (6.5) | 37 (2.7) | 617 (7.0) | 16 (2.4) | 604 (8.2) | 11 (0.4) |
| South Africa (9) | 29 (2.8) | 395 (4.9) | 28 (2.9) | 385 (5.3) | 21 (2.7) | 383 (6.8) | 22 (2.3) | 397 (5.4) | 14 (0.5) |
| Sweden | 35 (3.7) | 506 (5.4) | 38 (3.7) | 500 (3.7) | 15 (2.7) | 500 (8.3) | 12 (2.5) | 507 (8.2) | 16 (0.7) |
| Turkey | 11 (2.0) | 530 (9.3) | 38 (4.0) | 516 (8.3) | 30 (3.8) | 499 (9.0) | 21 (2.5) | 438 (9.4) | 10 (0.5) |
| United Arab Emirates | 22 (1.3) | 445 (5.2) | 43 (1.7) | 475 (4.4) | 23 (1.6) | 495 (4.9) | 12 (1.1) | 481 (8.0) | 14 (0.3) |
| United States | 28 (2.4) | 525 (9.8) | 39 (2.8) | 522 (6.3) | 19 (2.3) | 493 (9.9) | 13 (1.6) | 516 (9.8) | 15 (0.5) |
| **International Average** | **35 (0.5)** | **494 (1.2)** | **33 (0.6)** | **491 (1.1)** | **18 (0.5)** | **488 (1.8)** | **14 (0.4)** | **483 (2.6)** | **16 (0.1)** |
| **Benchmarking Participants** | | | | | | | | | |
| Ontario, Canada | 26 (4.8) | 549 (12.1) | 44 (4.2) | 524 (5.3) | 20 (4.2) | 531 (7.8) | 9 (2.7) | 527 (5.8) | 15 (0.8) |
| Quebec, Canada | 35 (4.5) | 558 (7.4) | 46 (5.2) | 535 (6.2) | 10 (2.8) | 529 (15.3) | 9 (2.9) | 532 (10.7) | 17 (0.9) |
| Moscow City, Russian Fed. | 66 (3.8) | 579 (4.9) | 18 (2.6) | 577 (9.9) | 9 (2.2) | 544 (7.9) | 7 (2.0) | 575 (14.4) | 24 (1.0) |
| Gauteng, RSA (9) | 29 (4.1) | 415 (7.7) | 31 (4.0) | 413 (7.0) | 19 (3.4) | 424 (8.2) | 21 (3.7) | 436 (10.6) | 14 (1.0) |
| Western Cape, RSA (9) | 39 (4.1) | 445 (8.7) | 18 (3.4) | 452 (16.2) | 19 (3.2) | 425 (10.0) | 23 (3.7) | 439 (10.0) | 15 (0.9) |
| Abu Dhabi, UAE r | 26 (1.9) | 423 (7.1) | 40 (2.6) | 416 (7.0) | 25 (2.2) | 467 (8.0) | 10 (1.7) | 456 (23.0) | 14 (0.4) |
| Dubai, UAE | 12 (2.1) | 505 (14.8) | 53 (2.8) | 542 (5.2) | 21 (2.2) | 551 (4.2) | 14 (2.3) | 526 (10.3) | 12 (0.5) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.12: Teachers' Years of Experience

*Students' Results based on Teachers' Reports*

| Country | | 20 Years or More | | At Least 10 but Less than 20 Years | | At Least 5 but Less than 10 Years | | Less than 5 Years | | Average Years of Experience |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Australia | | 28 (3.1) | 535 (6.9) | 22 (2.5) | 533 (8.2) | 21 (2.6) | 535 (7.2) | 28 (3.1) | 526 (4.9) | 13 (0.7) |
| Bahrain | | 24 (3.0) | 464 (7.9) | 37 (3.7) | 499 (5.3) | 23 (2.4) | 500 (5.9) | 15 (2.5) | 479 (8.1) | 13 (0.4) |
| Chile | | 21 (3.0) | 454 (7.0) | 34 (3.3) | 475 (5.4) | 27 (3.5) | 464 (6.6) | 18 (3.5) | 455 (9.4) | 13 (0.8) |
| Chinese Taipei | | 35 (3.2) | 573 (3.5) | 42 (4.0) | 576 (4.1) | 12 (2.3) | 563 (6.3) | 11 (2.6) | 580 (5.6) | 16 (0.6) |
| Cyprus | s | 20 (2.0) | 490 (7.1) | 42 (1.5) | 483 (3.3) | 25 (2.0) | 489 (5.7) | 13 (0.9) | 490 (4.2) | 13 (0.3) |
| Egypt | | 40 (3.8) | 389 (8.5) | 37 (4.2) | 390 (9.6) | 21 (3.1) | 382 (14.7) | 2 (1.1) | ~ ~ | 17 (0.6) |
| England | s | 18 (4.4) | 520 (18.5) | 34 (4.9) | 524 (8.6) | 34 (5.3) | 529 (15.8) | 13 (3.5) | 507 (16.3) | 12 (0.8) |
| Finland | | 32 (2.2) | 546 (3.9) | 32 (2.3) | 544 (4.3) | 20 (1.6) | 540 (4.1) | 15 (1.4) | 536 (6.1) | 15 (0.4) |
| France | r | 29 (2.7) | 497 (4.1) | 36 (2.7) | 490 (4.0) | 13 (2.0) | 489 (7.2) | 22 (2.7) | 475 (5.7) | 14 (0.6) |
| Georgia | | 70 (2.2) | 445 (4.3) | 21 (1.9) | 448 (5.3) | 6 (1.0) | 457 (5.4) | 3 (0.7) | 466 (18.7) | 26 (0.6) |
| Hong Kong SAR | | 37 (3.6) | 500 (10.5) | 30 (4.0) | 498 (12.3) | 13 (3.0) | 526 (17.1) | 20 (3.2) | 507 (11.1) | 15 (0.8) |
| Hungary | | 66 (2.4) | 527 (3.3) | 20 (2.0) | 538 (5.6) | 7 (1.2) | 528 (6.6) | 6 (1.2) | 514 (8.9) | 24 (0.7) |
| Iran, Islamic Rep. of | | 45 (3.3) | 464 (5.8) | 30 (3.1) | 441 (7.7) | 9 (2.0) | 422 (11.8) | 15 (2.8) | 440 (13.0) | 17 (0.7) |
| Ireland | | 37 (3.8) | 534 (4.3) | 26 (3.2) | 530 (6.0) | 21 (2.8) | 516 (6.4) | 17 (2.2) | 520 (8.7) | 16 (0.8) |
| Israel | | 38 (3.5) | 528 (7.1) | 23 (3.0) | 506 (9.9) | 16 (2.9) | 504 (13.1) | 23 (3.5) | 509 (11.5) | 15 (0.9) |
| Italy | | 41 (3.8) | 503 (3.9) | 44 (4.0) | 499 (4.7) | 11 (2.4) | 494 (8.4) | 4 (1.5) | 516 (7.6) | 19 (0.8) |
| Japan | | 32 (3.7) | 570 (4.4) | 19 (3.3) | 566 (3.3) | 27 (3.8) | 570 (3.7) | 23 (3.7) | 571 (6.0) | 15 (1.0) |
| Jordan | | 13 (2.9) | 449 (14.9) | 33 (3.6) | 459 (8.6) | 33 (4.1) | 451 (9.2) | 21 (3.0) | 441 (11.1) | 11 (0.5) |
| Kazakhstan | | 45 (2.0) | 484 (3.7) | 27 (1.8) | 469 (5.3) | 16 (1.6) | 468 (6.3) | 12 (1.3) | 484 (6.7) | 18 (0.5) |
| Korea, Rep. of | | 38 (3.2) | 561 (3.3) | 28 (3.3) | 562 (3.4) | 14 (2.6) | 565 (3.7) | 20 (2.4) | 555 (5.2) | 16 (0.7) |
| Kuwait | | 19 (3.7) | 454 (11.5) | 42 (3.5) | 442 (9.2) | 25 (3.6) | 439 (12.0) | 13 (3.4) | 446 (15.2) | 12 (0.8) |
| Lebanon | | 16 (2.1) | 381 (13.2) | 36 (2.7) | 366 (7.7) | 24 (2.4) | 385 (8.6) | 24 (2.1) | 387 (7.9) | 11 (0.4) |
| Lithuania | | 76 (2.0) | 531 (3.1) | 18 (1.6) | 539 (3.7) | 4 (0.9) | 552 (11.5) | 2 (0.7) | ~ ~ | 26 (0.5) |
| Malaysia | | 20 (2.9) | 452 (8.7) | 48 (4.0) | 457 (6.1) | 21 (3.0) | 473 (9.9) | 11 (2.6) | 464 (15.2) | 13 (0.5) |
| Morocco | | 27 (2.2) | 405 (4.6) | 19 (2.0) | 403 (4.3) | 20 (1.9) | 396 (5.8) | 33 (2.3) | 378 (5.3) | 13 (0.6) |
| New Zealand | | 32 (3.1) | 494 (10.4) | 32 (3.3) | 508 (6.3) | 16 (2.5) | 507 (6.7) | 20 (2.7) | 495 (7.5) | 15 (0.9) |
| Norway (9) | r | 26 (4.1) | 503 (5.9) | 27 (4.2) | 491 (6.3) | 16 (2.9) | 487 (7.9) | 31 (4.6) | 504 (5.0) | 12 (1.0) |
| Oman | | 13 (2.4) | 459 (9.6) | 70 (2.9) | 460 (3.9) | 12 (2.6) | 453 (9.0) | 5 (1.2) | 449 (11.6) | 14 (0.4) |
| Portugal | | 71 (2.6) | 518 (3.3) | 22 (2.7) | 517 (5.6) | 6 (1.9) | 537 (7.5) | 1 (0.3) | ~ ~ | 23 (0.5) |
| Qatar | | 12 (2.2) | 464 (10.9) | 38 (3.9) | 469 (7.4) | 35 (2.5) | 473 (8.7) | 15 (2.9) | 495 (11.2) | 11 (0.5) |
| Romania | | 68 (2.4) | 468 (5.0) | 23 (2.2) | 474 (6.0) | 4 (0.9) | 485 (15.3) | 6 (1.5) | 475 (11.5) | 24 (0.5) |
| Russian Federation | | 66 (2.0) | 544 (3.8) | 16 (1.5) | 540 (7.1) | 8 (1.2) | 541 (7.3) | 10 (1.1) | 541 (8.4) | 23 (0.5) |
| Saudi Arabia | | 23 (2.9) | 433 (6.6) | 37 (3.8) | 435 (4.3) | 27 (3.5) | 430 (7.5) | 13 (2.6) | 423 (7.6) | 13 (0.5) |
| Singapore | | 15 (1.9) | 617 (11.0) | 30 (2.6) | 606 (7.6) | 36 (2.4) | 606 (7.8) | 19 (2.0) | 605 (10.0) | 12 (0.5) |
| South Africa (9) | | 33 (2.8) | 376 (6.8) | 31 (3.0) | 368 (6.6) | 12 (1.8) | 376 (10.2) | 24 (3.0) | 363 (8.3) | 15 (0.6) |
| Sweden | | 28 (3.2) | 526 (5.8) | 45 (3.4) | 519 (4.4) | 10 (2.2) | 520 (6.3) | 17 (2.8) | 523 (8.5) | 15 (0.6) |
| Turkey | | 23 (3.2) | 542 (6.8) | 32 (3.5) | 529 (7.5) | 24 (3.2) | 503 (7.8) | 21 (2.4) | 480 (13.6) | 12 (0.6) |
| United Arab Emirates | | 19 (1.5) | 448 (8.4) | 39 (1.5) | 473 (5.8) | 30 (1.7) | 485 (6.6) | 12 (1.0) | 486 (10.3) | 13 (0.4) |
| United States | | 26 (2.3) | 535 (11.3) | 36 (2.5) | 532 (5.4) | 17 (1.8) | 526 (9.5) | 20 (2.3) | 497 (11.7) | 14 (0.5) |
| **International Average** | | **34 (0.5)** | **492 (1.3)** | **32 (0.5)** | **491 (1.0)** | **18 (0.4)** | **491 (1.5)** | **15 (0.4)** | **488 (1.7)** | **16 (0.1)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Ontario, Canada | s | 24 (4.9) | 541 (9.8) | 50 (5.7) | 514 (5.5) | 19 (3.9) | 509 (9.1) | 7 (1.6) | 550 (20.0) | 15 (0.7) |
| Moscow City, Russian Fed. | | 63 (2.0) | 567 (2.9) | 19 (2.0) | 566 (3.9) | 9 (1.4) | 563 (7.1) | 9 (1.2) | 564 (4.7) | 22 (0.5) |
| Gauteng, RSA (9) | | 27 (4.0) | 418 (9.5) | 38 (3.8) | 419 (7.8) | 13 (2.8) | 420 (14.8) | 22 (3.4) | 432 (12.2) | 14 (0.8) |
| Western Cape, RSA (9) | | 43 (4.5) | 450 (9.2) | 22 (3.6) | 424 (12.6) | 11 (2.3) | 473 (24.5) | 24 (3.9) | 421 (11.8) | 16 (1.1) |
| Abu Dhabi, UAE | | 19 (1.6) | 390 (15.3) | 39 (2.6) | 425 (8.7) | 31 (2.5) | 416 (9.8) | 11 (1.9) | 445 (13.1) | 13 (0.4) |
| Dubai, UAE | | 12 (1.9) | 514 (11.5) | 38 (3.5) | 541 (8.5) | 34 (3.4) | 571 (8.4) | 16 (2.3) | 555 (6.3) | 11 (0.4) |
| Quebec, Canada | y | - - | - - | - - | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Teachers' Participation in Professional Development

Exhibits 9.13, 9.14, 9.15, and 9.16 present, for fourth grade mathematics and science and eighth grade mathematics and science, respectively, teachers' reports about their participation in professional development during the last two years. Mathematics teachers in both grades were asked whether they had participated in professional development in the following areas: mathematics content, mathematics pedagogy/instruction, mathematics curriculum, integrating technology into mathematics instruction, improving students' critical thinking or problem solving skills, mathematics assessment, and addressing individual students' needs. Science teachers in both grades were asked about the same areas, though specific to science instead of mathematics, including asking about professional development related to students' critical thinking and inquiry skills rather than problem solving skills. Teachers of fourth grade science were also asked about professional development related to integrating science with other subjects.

Although there was variation across countries, the most common areas of mathematics professional development for mathematics teachers of fourth grade students on average were mathematics content, mathematics pedagogy/instruction, and improving students' critical thinking or problem solving skills. As shown in Exhibit 9.13, on average across countries, between 44 and 46 percent of fourth grade students' teachers participated in professional development related to mathematics content (46%), mathematics pedagogy/instruction (45%), and improving students' critical thinking or problem solving skills (44%). Integrating technology into mathematics instruction and mathematics assessment were the least common areas, with teachers of 35 percent and 37 percent of students, respectively, reporting that they participated in professional development in these areas. In science in the fourth grade, improving students' critical thinking or inquiry skills in science, science content, and science curriculum were the three most common areas of professional development. However, participation in professional development related to science was on the whole less common than for mathematics in the fourth grade. As shown in Exhibit 9.14, just over one-third of students, on average, had science teachers who reported that they participated in professional development related to critical thinking or inquiry skills in science (36%), science content (35%), and science curriculum (34%). Integrating technology into the science curriculum and science assessment were two of the least common areas for professional development (32% and 28% of students, respectively), along with integrating science with other subjects (31% of students).

Teachers of eighth grade students reported somewhat higher levels of participation in professional development than teachers of fourth grade students. Eighth grade teachers of mathematics and science reported similar levels of participation. As shown in Exhibits 9.15 and 9.16, the three most common areas of professional development for both teachers of mathematics and science were pedagogy/instruction, content, and curriculum. More than 50 percent of students, on average, had teachers who reported that they participated in professional development related to pedagogy/instruction (60% in mathematics and 59% in science), content (57% in both), and curriculum (53% in mathematics and 52% in science). From 44 percent to 50 percent of eighth grade students were taught by teachers who had some professional development in the other four areas, with addressing individual students' needs being the least common area (44% of students for both subjects).

## Exhibit 9.13: Teachers' Participation in Professional Development in Mathematics in the Past Two Years

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teachers' Participation in Professional Development* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mathematics Content | Mathematics Pedagogy/ Instruction | Mathematics Curriculum | Integrating Technology into Mathematics Instruction | Improving Students' Critical Thinking or Problem Solving Skills | Mathematics Assessment | Addressing Individual Students' Needs |
| Albania | 29 (3.6) | 33 (3.3) | 48 (4.0) | 32 (4.0) | 52 (3.9) | 49 (4.0) | 46 (3.9) |
| Armenia | 46 (3.4) | 48 (4.0) | 55 (4.1) | 48 (4.1) | 40 (3.7) | 44 (3.7) | 47 (3.8) |
| Australia | 56 (3.7) | 54 (3.4) | 53 (3.4) | 30 (3.3) | 55 (3.6) | 43 (3.2) | 52 (3.8) |
| Austria | 50 (3.1) | 41 (3.0) | 16 (2.4) | 13 (1.9) | 34 (3.4) | 22 (2.7) | 51 (2.9) |
| Azerbaijan | 49 (4.0) | 39 (3.7) | 61 (3.7) | 33 (3.7) | 43 (3.7) | 57 (3.6) | 39 (3.6) |
| Bahrain | 51 (3.5) | 68 (2.6) | 45 (3.3) | 72 (3.1) | 69 (2.6) | 52 (3.0) | 61 (3.0) |
| Belgium (Flemish) | 17 (2.7) | 19 (2.9) | 35 (3.8) | 8 (1.9) | 15 (3.0) | 5 (1.7) | 34 (3.5) |
| Bosnia and Herzegovina | 15 (2.1) | 10 (1.7) | 19 (2.6) | 12 (2.1) | 20 (2.7) | 15 (2.5) | 21 (2.7) |
| Bulgaria | 30 (3.3) | 25 (3.1) | 29 (3.9) | 26 (3.5) | 19 (3.1) | 26 (3.4) | 25 (3.5) |
| Canada | 62 (2.1) | r 68 (1.8) | 47 (2.8) | 37 (3.0) | 58 (2.1) | 52 (2.9) | 52 (2.1) |
| Chile | 43 (4.3) | 33 (4.3) | 30 (3.9) | 17 (3.4) | 36 (4.4) | 24 (3.8) | 42 (3.6) |
| Chinese Taipei | 53 (3.8) | 46 (4.0) | 59 (4.1) | 41 (3.8) | 45 (3.7) | 44 (3.6) | 54 (4.0) |
| Croatia | 49 (3.4) | 35 (4.0) | 36 (3.1) | 43 (3.3) | 44 (3.4) | 36 (3.4) | 43 (3.6) |
| Cyprus | 67 (3.8) | 51 (4.5) | 64 (3.8) | 26 (3.0) | 32 (3.7) | 25 (2.5) | 15 (2.6) |
| Czech Republic | 32 (3.6) | 43 (3.8) | 14 (2.7) | 31 (3.4) | 47 (3.8) | 28 (3.7) | 51 (3.1) |
| Denmark | r 26 (3.5) | r 22 (3.2) | r 13 (2.7) | r 20 (3.1) | r 15 (2.9) | r 17 (2.7) | r 15 (3.2) |
| Finland | 7 (1.9) | 17 (2.6) | 12 (2.0) | 15 (2.3) | 8 (2.0) | 9 (1.9) | 17 (2.6) |
| France | 64 (3.5) | 68 (3.5) | 36 (3.7) | 13 (2.4) | 39 (3.2) | 6 (1.6) | 21 (2.6) |
| Georgia | 48 (3.8) | 57 (3.8) | 59 (4.1) | 57 (3.6) | 50 (4.3) | 46 (3.4) | 48 (4.3) |
| Germany | 37 (3.3) | 28 (3.5) | 27 (3.3) | 8 (2.0) | 20 (3.2) | 18 (2.9) | 29 (3.3) |
| Hong Kong SAR | 72 (3.2) | 72 (3.3) | 72 (3.9) | 77 (3.9) | 58 (4.3) | 40 (4.3) | 56 (4.2) |
| Hungary | 5 (1.4) | 16 (2.4) | 4 (1.4) | 12 (2.0) | 21 (2.4) | 5 (1.3) | 30 (3.2) |
| Iran, Islamic Rep. of | 59 (3.7) | 64 (3.6) | 35 (3.8) | 24 (3.5) | 32 (3.0) | 35 (3.8) | 57 (3.8) |
| Ireland | 36 (3.6) | 33 (3.5) | 23 (3.5) | 23 (3.2) | 34 (3.6) | 19 (2.7) | 31 (3.4) |
| Italy | 33 (3.6) | 47 (3.5) | 30 (3.6) | 33 (3.0) | 27 (3.4) | 25 (3.4) | 42 (3.9) |
| Japan | 55 (3.7) | 58 (2.9) | 23 (2.8) | 11 (2.6) | 29 (3.0) | 21 (3.1) | 33 (3.4) |
| Kazakhstan | 54 (3.9) | 60 (3.8) | 63 (3.4) | 62 (3.7) | 69 (3.6) | 65 (3.5) | 58 (3.8) |
| Korea, Rep. of | 30 (4.3) | 28 (3.7) | 39 (4.1) | 15 (2.9) | 38 (3.8) | 38 (4.1) | 49 (4.0) |
| Kosovo | 24 (3.5) | 20 (3.4) | 15 (3.4) | 16 (3.3) | 39 (3.8) | 31 (4.0) | 24 (3.4) |
| Kuwait | 78 (3.6) | 75 (3.6) | 74 (3.5) | 70 (4.0) | 66 (3.9) | 67 (4.4) | 69 (3.5) |
| Latvia | 42 (3.7) | 37 (3.5) | 34 (3.7) | 48 (3.7) | 67 (3.6) | 37 (3.4) | 42 (3.6) |
| Lithuania | 24 (3.0) | 29 (3.5) | 24 (3.6) | 55 (3.5) | 53 (3.6) | 34 (3.7) | 45 (4.2) |
| Malta | 60 (0.4) | 62 (0.4) | 55 (0.5) | 41 (0.4) | 62 (0.4) | 67 (0.4) | 45 (0.4) |
| Montenegro | 30 (2.4) | 23 (1.9) | 21 (2.2) | 14 (1.9) | 38 (2.4) | 35 (2.7) | 30 (2.5) |
| Morocco | 30 (3.7) | 35 (3.0) | 33 (3.4) | 18 (3.2) | 32 (3.5) | 48 (3.3) | 37 (3.6) |
| Netherlands | r 39 (4.6) | r 34 (4.6) | r 24 (5.1) | r 4 (1.5) | r 26 (4.8) | r 22 (4.3) | r 46 (5.2) |
| New Zealand | 59 (3.7) | 61 (3.3) | 50 (3.6) | 26 (2.9) | 58 (3.3) | 36 (3.4) | 46 (3.1) |
| North Macedonia | 36 (4.3) | 22 (3.6) | 25 (3.7) | 22 (3.8) | 31 (4.4) | 32 (4.3) | 29 (4.3) |
| Northern Ireland | 50 (4.2) | 57 (3.9) | 39 (4.2) | 37 (4.2) | 56 (4.2) | 30 (4.2) | 33 (4.2) |
| Norway (5) | r 23 (4.0) | r 25 (4.0) | r 8 (2.5) | r 18 (3.8) | r 19 (3.4) | r 12 (3.1) | r 14 (3.3) |
| Oman | 66 (3.2) | 65 (3.4) | 64 (3.3) | 42 (3.3) | 56 (3.7) | 73 (2.8) | 50 (3.4) |
| Pakistan | 72 (5.0) | 63 (6.9) | 63 (7.7) | 42 (7.8) | 79 (4.1) | 75 (4.7) | 75 (4.6) |
| Philippines | 68 (3.5) | 71 (3.9) | 67 (3.7) | 56 (4.2) | 66 (3.8) | 63 (3.8) | 65 (3.7) |
| Poland | 74 (3.5) | 55 (3.6) | 69 (3.7) | 63 (3.6) | 46 (4.0) | 38 (4.2) | 54 (3.6) |
| Portugal | 41 (3.3) | 37 (3.6) | 30 (3.0) | 25 (3.1) | 33 (3.2) | 14 (2.2) | 37 (3.4) |
| Qatar | 64 (3.7) | 68 (3.0) | 60 (3.2) | 70 (3.5) | 72 (3.3) | 54 (3.0) | 71 (2.9) |
| Russian Federation | 37 (3.8) | 43 (3.8) | 50 (3.8) | 55 (3.4) | 51 (3.6) | 55 (3.7) | 51 (4.2) |
| Saudi Arabia | 55 (3.7) | 59 (3.9) | 43 (3.7) | 53 (3.4) | 52 (4.1) | 35 (3.5) | 50 (4.1) |
| Serbia | 42 (3.7) | 30 (3.8) | 29 (3.7) | 27 (4.0) | 44 (3.8) | 29 (3.4) | 47 (3.8) |
| Singapore | 74 (2.4) | 82 (2.6) | 69 (2.4) | 61 (2.3) | 62 (2.7) | 67 (2.6) | 46 (2.6) |
| Slovak Republic | 15 (2.4) | 23 (2.7) | 42 (2.6) | 37 (3.0) | 21 (2.4) | 15 (2.3) | 22 (2.7) |
| South Africa (5) | 85 (2.1) | 57 (3.9) | 85 (2.7) | 46 (3.9) | 67 (3.2) | 78 (2.9) | 60 (3.3) |
| Spain | 37 (3.1) | 45 (3.1) | 28 (3.4) | 28 (3.3) | 45 (3.5) | 24 (2.8) | 49 (3.7) |
| Sweden | 22 (3.1) | 23 (3.2) | 23 (3.8) | 29 (4.1) | 17 (3.0) | 24 (3.9) | 33 (4.6) |
| Turkey (5) | 22 (3.3) | 27 (3.1) | 32 (3.1) | 32 (3.5) | 17 (3.4) | 15 (2.9) | 14 (2.6) |
| United Arab Emirates | r 68 (1.5) | r 70 (1.3) | r 71 (1.8) | r 70 (1.3) | r 78 (1.2) | r 67 (1.3) | r 75 (1.6) |
| United States | 66 (2.3) | 65 (2.6) | 70 (2.3) | 47 (2.4) | 59 (2.5) | 48 (2.6) | 56 (2.6) |
| England | x 66 (5.9) | x 63 (6.9) | x 57 (6.9) | x 17 (4.4) | x 63 (5.5) | x 47 (6.9) | x 42 (6.8) |
| **International Average** | **46 (0.5)** | **45 (0.5)** | **41 (0.5)** | **35 (0.4)** | **44 (0.5)** | **37 (0.4)** | **43 (0.5)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | r 81 (2.6) | r 81 (2.4) | r 66 (5.1) | r 49 (5.5) | r 76 (3.3) | r 61 (5.4) | r 68 (3.7) |
| Quebec, Canada | 38 (4.0) | 50 (4.5) | 20 (3.3) | 22 (4.0) | 34 (4.4) | 44 (4.2) | 27 (3.9) |
| Moscow City, Russian Fed. | 26 (3.6) | 27 (3.9) | 37 (4.1) | 62 (4.2) | 36 (4.4) | 35 (4.4) | 40 (4.0) |
| Madrid, Spain | 39 (4.0) | 44 (4.0) | 23 (3.4) | 33 (4.6) | 41 (4.0) | 22 (3.8) | 50 (4.2) |
| Abu Dhabi, UAE | r 64 (2.2) | r 65 (2.1) | r 62 (2.5) | r 58 (2.7) | r 68 (2.3) | r 57 (2.4) | r 65 (2.5) |
| Dubai, UAE | r 69 (2.2) | r 69 (2.5) | r 73 (1.3) | r 77 (1.8) | r 84 (2.1) | r 69 (2.4) | r 81 (2.1) |

* Teachers could indicate participating in more than one area of professional development.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Exhibit 9.14: Teachers' Participation in Professional Development in Science in the Past Two Years

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teachers' Participation in Professional Development* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Science Content | Science Pedagogy/ Instruction | Science Curriculum | Integrating Technology into Science Instruction | Improving Students' Critical Thinking or Inquiry Skills | Science Assessment | Addressing Individual Students' Needs | Integrating Science with Other Subjects |
| Albania | 29 (3.9) | 29 (3.9) | 43 (3.7) | 26 (3.9) | 51 (3.9) | 45 (3.8) | 28 (3.6) | 38 (4.3) |
| Armenia | 35 (4.2) | 39 (4.0) | r 44 (4.0) | 41 (4.4) | r 43 (3.8) | r 40 (4.5) | r 43 (4.2) | r 57 (4.1) |
| Australia | 35 (3.6) | 31 (3.5) | 35 (3.4) | 34 (3.8) | 43 (3.9) | 18 (2.8) | 30 (3.6) | 30 (3.3) |
| Austria | 40 (3.1) | 19 (2.3) | 15 (2.3) | 9 (1.9) | 24 (3.1) | 6 (1.9) | 15 (2.5) | 14 (2.4) |
| Azerbaijan | 25 (2.9) | 16 (2.5) | 38 (3.5) | 30 (3.3) | 36 (3.7) | 38 (3.9) | 39 (3.6) | 45 (3.9) |
| Bahrain | 42 (3.3) | 69 (3.0) | 47 (2.8) | 80 (2.3) | 78 (2.7) | 61 (3.0) | 57 (3.0) | 70 (3.1) |
| Belgium (Flemish) | 17 (3.0) | 11 (2.5) | 37 (3.4) | 10 (2.3) | 6 (1.8) | 6 (1.9) | 14 (2.7) | 21 (3.4) |
| Bosnia and Herzegovina | 13 (2.0) | 12 (1.9) | 16 (2.3) | 10 (1.7) | 17 (2.5) | 12 (2.1) | 16 (2.3) | 12 (1.7) |
| Bulgaria | 15 (2.4) | 14 (2.8) | 20 (2.8) | 19 (2.8) | 9 (2.2) | 14 (2.7) | 12 (2.7) | 15 (2.7) |
| Canada | r 16 (1.7) | r 14 (1.8) | r 15 (1.5) | r 18 (1.7) | r 24 (2.4) | r 9 (1.7) | r 23 (2.2) | r 20 (2.0) |
| Chile | r 20 (3.5) | r 12 (2.8) | r 15 (3.2) | r 16 (3.2) | r 27 (4.4) | r 11 (3.0) | r 36 (4.8) | r 23 (3.9) |
| Chinese Taipei | 61 (3.8) | 41 (3.9) | 61 (4.0) | 53 (4.0) | 44 (3.6) | 29 (4.1) | 50 (3.5) | 45 (3.6) |
| Croatia | 57 (3.6) | 41 (3.6) | 34 (3.4) | 43 (4.1) | 38 (3.4) | 32 (3.2) | 35 (3.4) | 34 (3.0) |
| Cyprus | 55 (5.1) | 47 (4.7) | 54 (4.9) | 23 (4.2) | 38 (4.1) | 15 (3.5) | 12 (3.3) | 17 (3.6) |
| Czech Republic | 22 (3.0) | 14 (2.6) | 6 (1.6) | 14 (2.3) | 26 (3.3) | 10 (2.2) | 35 (3.5) | 20 (2.9) |
| Denmark | r 24 (3.8) | r 16 (3.3) | r 13 (3.2) | r 16 (3.9) | r 18 (3.5) | r 8 (2.3) | r 7 (2.2) | r 10 (2.8) |
| Finland | 5 (1.6) | 7 (2.0) | 8 (1.6) | 11 (2.1) | 7 (1.9) | 7 (1.7) | 10 (1.8) | 7 (1.8) |
| France | 14 (2.4) | 15 (2.5) | 13 (2.8) | 10 (2.5) | 14 (2.5) | 4 (1.4) | 11 (2.3) | 12 (2.7) |
| Georgia | 41 (4.1) | 48 (3.9) | 48 (4.4) | 50 (4.4) | 55 (4.4) | 42 (4.4) | 49 (4.2) | 44 (4.3) |
| Germany | 33 (3.4) | 22 (3.0) | 21 (2.9) | 13 (2.7) | 14 (3.2) | 12 (2.6) | 19 (3.1) | 13 (2.8) |
| Hong Kong SAR | 53 (4.2) | 47 (4.6) | 54 (4.8) | 66 (4.9) | 61 (4.8) | 34 (4.3) | 48 (4.2) | 58 (4.5) |
| Hungary | 4 (1.4) | 8 (1.9) | 1 (0.7) | 8 (2.5) | 24 (2.6) | 2 (1.1) | 26 (3.4) | 8 (1.8) |
| Iran, Islamic Rep. of | 49 (3.6) | 51 (3.2) | 34 (3.1) | 26 (2.9) | 32 (3.5) | 32 (3.7) | 39 (3.7) | 29 (3.0) |
| Ireland | 25 (3.6) | 22 (3.0) | 21 (3.2) | 22 (3.3) | 29 (3.9) | 12 (2.5) | 19 (2.8) | 28 (3.6) |
| Italy | 13 (2.5) | 18 (2.7) | 18 (3.1) | 19 (3.1) | 22 (3.5) | 18 (3.2) | 28 (3.5) | 20 (3.0) |
| Japan | 40 (3.9) | 37 (4.0) | 18 (3.0) | 11 (2.4) | 12 (2.5) | 13 (2.9) | 14 (3.0) | 4 (1.7) |
| Kazakhstan | 51 (4.1) | 56 (4.0) | 54 (4.0) | 57 (4.2) | 66 (3.4) | 61 (3.6) | 63 (3.4) | 56 (3.9) |
| Korea, Rep. of | 31 (3.8) | 35 (3.5) | 46 (3.7) | 27 (3.7) | 32 (3.6) | 33 (3.6) | 33 (3.5) | 35 (3.9) |
| Kosovo | 16 (2.7) | 16 (3.2) | 10 (2.3) | 9 (2.4) | 28 (3.5) | 24 (3.5) | 18 (4.0) | 19 (3.4) |
| Kuwait | 78 (3.9) | 80 (2.6) | 82 (3.1) | 75 (3.4) | 78 (3.6) | 76 (3.5) | 70 (3.4) | 71 (3.9) |
| Latvia | 37 (3.9) | 33 (3.7) | 32 (3.8) | 44 (3.9) | 62 (4.0) | 28 (3.5) | 41 (4.3) | 40 (3.7) |
| Lithuania | 28 (3.7) | 26 (3.2) | 22 (3.4) | 35 (3.5) | 44 (3.9) | 20 (2.7) | 38 (3.8) | 37 (3.9) |
| Malta | 31 (0.4) | 33 (0.4) | 25 (0.4) | 19 (0.3) | 33 (0.4) | 30 (0.4) | 23 (0.3) | 26 (0.4) |
| Montenegro | 31 (2.2) | 19 (1.8) | 28 (2.4) | 15 (1.9) | 33 (2.3) | 27 (1.8) | 25 (2.2) | 22 (2.5) |
| Morocco | 24 (3.3) | 33 (3.8) | 30 (3.3) | 23 (3.1) | 28 (3.4) | 39 (3.5) | 38 (4.1) | 25 (3.2) |
| Netherlands | r 8 (3.2) | r 9 (3.3) | r 8 (3.2) | r 16 (4.6) | r 24 (5.2) | r 8 (3.5) | r 17 (4.5) | r 15 (4.6) |
| New Zealand | 29 (3.0) | 30 (2.8) | 28 (2.8) | 20 (2.5) | 34 (3.1) | 13 (2.2) | 21 (2.7) | 25 (3.0) |
| North Macedonia | 22 (3.5) | 15 (3.0) | 19 (3.5) | 14 (2.8) | 21 (3.2) | 23 (3.7) | 26 (3.6) | 17 (2.9) |
| Northern Ireland | 21 (3.3) | 25 (3.5) | 17 (3.6) | 25 (3.7) | 31 (4.3) | 5 (2.1) | 14 (3.2) | 27 (3.8) |
| Norway (5) | s 11 (2.8) | s 8 (2.4) | s 5 (2.0) | s 8 (2.6) | s 7 (2.2) | s 5 (2.1) | s 9 (2.9) | s 9 (2.3) |
| Oman | 63 (3.2) | 59 (3.3) | 55 (3.1) | 37 (2.9) | 50 (3.7) | 65 (2.9) | 49 (3.7) | 50 (3.7) |
| Pakistan | r 66 (6.2) | r 72 (5.8) | r 73 (5.4) | r 56 (7.5) | r 75 (5.2) | r 70 (5.8) | r 72 (5.8) | r 54 (7.8) |
| Philippines | 76 (3.6) | 68 (3.6) | 73 (3.6) | 61 (4.4) | 68 (3.7) | 63 (4.0) | 63 (4.0) | 62 (3.8) |
| Poland | 64 (4.0) | 33 (4.0) | 57 (4.3) | 56 (3.8) | 45 (3.9) | 34 (3.9) | 52 (4.3) | 28 (3.8) |
| Portugal | 24 (2.6) | 26 (2.9) | 15 (2.5) | 15 (2.4) | 24 (3.1) | 9 (1.9) | 24 (3.1) | 17 (2.5) |
| Qatar | 59 (4.1) | 62 (3.2) | 46 (4.0) | 65 (3.4) | 69 (3.3) | 54 (3.2) | 67 (3.2) | 60 (3.7) |
| Russian Federation | 33 (3.4) | 36 (3.5) | 48 (3.9) | 50 (3.6) | 46 (3.4) | 48 (3.6) | 47 (3.9) | 50 (3.5) |
| Saudi Arabia | 49 (3.6) | 47 (3.6) | 52 (3.8) | r 51 (3.6) | r 39 (4.5) | r 39 (4.5) | r 56 (4.0) | r 44 (4.4) |
| Serbia | 28 (3.5) | 17 (2.9) | 21 (3.5) | 26 (3.6) | 35 (3.8) | 19 (3.3) | 36 (3.9) | 34 (4.1) |
| Singapore | 67 (2.7) | 81 (2.1) | 63 (2.6) | 58 (2.5) | 49 (2.6) | 71 (2.6) | 36 (2.7) | 30 (2.6) |
| Slovak Republic | 24 (3.1) | 25 (3.2) | 45 (3.7) | 35 (2.7) | 19 (2.6) | 12 (2.4) | 17 (2.7) | 20 (2.8) |
| South Africa (5) | 68 (3.8) | 46 (4.5) | 76 (3.2) | 59 (3.5) | 60 (4.3) | 63 (4.1) | 55 (4.2) | 61 (3.8) |
| Spain | 16 (2.5) | 25 (3.2) | 16 (2.5) | 29 (3.3) | 33 (3.1) | 19 (2.7) | 40 (3.1) | 23 (3.5) |
| Sweden | 17 (3.4) | 13 (2.8) | 10 (2.4) | 19 (3.4) | 10 (2.6) | 15 (3.2) | 19 (3.6) | 17 (3.4) |
| Turkey (5) | 28 (3.4) | 28 (3.7) | 36 (3.6) | 31 (3.8) | 20 (3.0) | 25 (3.5) | 19 (3.2) | 20 (3.0) |
| United Arab Emirates | r 70 (2.1) | r 67 (2.1) | r 72 (2.3) | r 69 (2.2) | r 77 (1.8) | r 68 (2.3) | r 73 (2.1) | r 70 (2.1) |
| United States | 40 (2.3) | 34 (2.2) | 43 (2.4) | 29 (2.2) | 37 (2.2) | 21 (1.7) | 29 (2.3) | 26 (2.0) |
| England | y - - | y - - | y - - | y - - | y - - | y - - | y - - | y - - |
| **International Average** | **35 (0.4)** | **33 (0.4)** | **34 (0.4)** | **32 (0.4)** | **36 (0.5)** | **28 (0.4)** | **33 (0.5)** | **31 (0.5)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | r 10 (2.7) | r 9 (2.4) | r 19 (3.1) | r 21 (3.3) | r 35 (4.9) | r 9 (3.2) | r 34 (4.4) | r 23 (3.6) |
| Quebec, Canada | r 19 (3.4) | r 17 (3.6) | r 3 (1.6) | r 12 (3.0) | r 5 (1.7) | r 7 (2.4) | r 5 (1.6) | r 9 (2.8) |
| Moscow City, Russian Fed. | 18 (3.2) | 21 (3.4) | 38 (4.3) | 50 (4.5) | 35 (4.5) | 28 (3.7) | 31 (4.2) | 42 (4.3) |
| Madrid, Spain | 22 (3.0) | 28 (3.8) | 19 (3.0) | 34 (4.4) | 36 (3.7) | 15 (2.5) | 45 (4.0) | 22 (3.5) |
| Abu Dhabi, UAE | r 65 (2.7) | r 61 (2.6) | r 65 (2.5) | r 55 (2.7) | r 70 (2.5) | r 59 (2.4) | r 64 (2.4) | r 61 (2.3) |
| Dubai, UAE | r 71 (2.0) | r 67 (2.3) | r 74 (1.9) | r 78 (2.0) | r 82 (2.0) | r 75 (2.0) | r 81 (2.1) | r 75 (1.5) |

* Teachers could indicate participating in more than one area of professional development.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.15: Teachers' Participation in Professional Development in Mathematics in the Past Two Years

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teachers' Participation in Professional Development* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mathematics Content | Mathematics Pedagogy/ Instruction | Mathematics Curriculum | Integrating Technology into Mathematics Instruction | Improving Students' Critical Thinking or Problem Solving Skills | Mathematics Assessment | Addressing Individual Students' Needs |
| Australia | 58 (3.0) | 63 (3.2) | 63 (2.9) | 55 (3.0) | 58 (3.7) | 52 (3.0) | 60 (3.2) |
| Bahrain | 52 (3.3) | 70 (2.8) | 45 (3.0) | 79 (2.8) | 75 (3.1) | 57 (3.8) | 59 (3.3) |
| Chile | 50 (4.5) | 40 (4.3) | 33 (4.0) | 28 (3.6) | 38 (3.7) | 23 (3.3) | 36 (3.8) |
| Chinese Taipei | 80 (2.9) | 67 (3.2) | 77 (3.1) | 63 (3.5) | 45 (3.0) | 52 (3.4) | 49 (3.2) |
| Cyprus | s 68 (3.5) | s 56 (4.0) | s 73 (3.9) | s 38 (4.9) | s 36 (3.8) | s 48 (4.4) | s 38 (4.6) |
| Egypt | 67 (3.9) | 69 (3.7) | 58 (4.0) | 52 (4.1) | 66 (4.3) | 55 (4.0) | 61 (4.3) |
| England | s 72 (5.6) | s 67 (5.2) | s 75 (5.0) | s 22 (5.4) | s 47 (5.6) | s 45 (5.9) | s 42 (5.9) |
| Finland | 15 (2.3) | 29 (2.9) | 35 (3.2) | 45 (3.4) | 15 (2.1) | 28 (2.7) | 16 (2.4) |
| France | r 43 (4.3) | r 46 (4.2) | r 47 (4.4) | r 55 (4.5) | r 15 (3.3) | r 33 (4.2) | r 22 (3.3) |
| Georgia | 69 (4.4) | 83 (3.5) | 69 (3.5) | 71 (4.0) | 76 (4.3) | 68 (4.3) | 67 (4.2) |
| Hong Kong SAR | 60 (3.8) | 63 (4.3) | 54 (4.0) | 66 (4.2) | 36 (3.8) | 35 (4.2) | 45 (4.5) |
| Hungary | 17 (3.0) | 32 (3.3) | 9 (2.4) | 28 (3.3) | 20 (2.9) | 18 (2.9) | 24 (3.1) |
| Iran, Islamic Rep. of | 60 (3.1) | 65 (3.6) | 44 (3.9) | 46 (3.1) | 36 (3.6) | 41 (3.8) | 43 (3.4) |
| Ireland | 83 (1.9) | 72 (2.6) | 86 (2.2) | 38 (3.0) | 55 (3.0) | 48 (2.9) | 32 (2.4) |
| Israel | 68 (2.9) | 69 (3.0) | 48 (3.2) | 59 (3.2) | 46 (3.2) | 42 (2.9) | 43 (2.8) |
| Italy | 35 (3.2) | 60 (3.9) | 35 (3.8) | 58 (3.4) | 28 (3.4) | 32 (3.6) | 55 (3.8) |
| Japan | 67 (3.8) | 71 (3.6) | 35 (3.8) | 18 (2.5) | 40 (3.6) | 28 (3.2) | 28 (3.3) |
| Jordan | 39 (3.7) | 44 (4.0) | 50 (4.2) | 48 (3.6) | 53 (4.2) | 48 (4.6) | 46 (4.1) |
| Kazakhstan | 75 (3.3) | 80 (3.1) | 74 (3.7) | 65 (3.9) | 68 (3.6) | 71 (3.5) | 54 (4.2) |
| Korea, Rep. of | 52 (3.8) | 65 (3.5) | 60 (3.4) | 32 (3.6) | 40 (3.8) | 60 (3.6) | 40 (3.6) |
| Kuwait | 84 (2.8) | 79 (3.8) | 71 (5.1) | 65 (4.3) | 66 (4.1) | 65 (4.6) | 60 (4.2) |
| Lebanon | 61 (4.2) | 56 (3.9) | 54 (4.5) | 59 (4.0) | 65 (4.1) | 58 (3.8) | 56 (3.9) |
| Lithuania | 54 (4.1) | 59 (3.7) | 32 (4.0) | 63 (3.6) | 51 (3.8) | 57 (4.5) | 58 (4.1) |
| Malaysia | 74 (2.5) | 61 (3.3) | 74 (2.8) | 46 (3.3) | 47 (3.2) | 56 (3.7) | 32 (3.1) |
| Morocco | 49 (3.8) | 48 (3.5) | 40 (3.4) | 40 (3.4) | 43 (3.4) | 62 (3.2) | 42 (3.4) |
| New Zealand | 61 (2.7) | 66 (2.9) | 54 (3.4) | 58 (3.2) | 54 (3.2) | 40 (3.5) | 51 (3.1) |
| Norway (9) | s 21 (3.7) | s 23 (3.6) | s 15 (2.6) | s 30 (4.1) | s 16 (3.5) | s 21 (4.0) | s 10 (2.5) |
| Oman | 58 (3.6) | 62 (3.4) | 52 (3.8) | 42 (3.5) | 37 (3.5) | 57 (3.8) | 32 (3.6) |
| Portugal | 57 (4.2) | 58 (4.1) | 43 (4.3) | 61 (3.8) | 18 (3.2) | 26 (3.6) | 30 (3.6) |
| Qatar | 70 (3.5) | 77 (3.2) | 68 (3.9) | 75 (3.9) | 70 (3.4) | 63 (3.7) | 71 (3.6) |
| Romania | 38 (3.2) | 35 (3.8) | 28 (2.8) | 31 (3.8) | 22 (3.3) | 33 (3.1) | 33 (3.1) |
| Russian Federation | 68 (3.4) | 74 (3.8) | 70 (3.3) | 69 (3.4) | 47 (3.4) | 56 (3.7) | 51 (3.6) |
| Saudi Arabia | 46 (3.8) | 64 (4.0) | 38 (4.1) | 59 (3.6) | 62 (4.1) | 35 (3.8) | 47 (4.0) |
| Singapore | 60 (2.7) | 82 (2.3) | 62 (2.7) | 57 (2.6) | 57 (2.6) | 60 (2.6) | 43 (2.7) |
| South Africa (9) | 84 (2.3) | 58 (3.0) | 74 (2.4) | 46 (3.1) | 56 (2.8) | 70 (2.5) | 50 (3.0) |
| Sweden | 34 (3.3) | 41 (4.0) | 29 (3.2) | 51 (3.8) | 23 (3.2) | 29 (3.7) | 40 (3.5) |
| Turkey | 26 (3.0) | 27 (3.4) | 33 (3.5) | 34 (3.8) | 22 (2.9) | 24 (3.8) | 19 (3.1) |
| United Arab Emirates | 76 (1.7) | 75 (1.6) | r 71 (2.0) | r 79 (1.3) | r 83 (1.1) | 74 (1.4) | r 77 (1.4) |
| United States | 74 (2.3) | 73 (2.7) | 77 (2.7) | 67 (2.9) | 60 (2.9) | 56 (2.8) | 61 (3.0) |
| **International Average** | **57 (0.6)** | **60 (0.6)** | **53 (0.6)** | **51 (0.6)** | **46 (0.6)** | **47 (0.6)** | **44 (0.6)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 71 (3.9) | 83 (2.7) | 56 (4.6) | 55 (3.8) | 75 (3.9) | 60 (4.9) | 62 (4.2) |
| Quebec, Canada | 32 (3.9) | 54 (4.6) | 17 (3.3) | 67 (4.1) | 25 (3.6) | 36 (4.0) | 36 (4.5) |
| Moscow City, Russian Fed. | 61 (3.5) | 59 (3.6) | 57 (3.8) | 78 (3.8) | 39 (3.9) | 47 (4.1) | 42 (3.8) |
| Gauteng, RSA (9) | 90 (2.7) | 64 (4.1) | 79 (3.3) | 60 (3.9) | 61 (4.4) | 77 (3.7) | 52 (4.8) |
| Western Cape, RSA (9) | 85 (2.8) | 58 (4.4) | 79 (3.2) | 58 (4.5) | 47 (4.1) | 62 (4.3) | 40 (4.2) |
| Abu Dhabi, UAE | r 76 (3.1) | r 74 (2.3) | r 73 (2.7) | r 77 (2.4) | r 78 (2.1) | r 71 (2.6) | r 71 (2.7) |
| Dubai, UAE | r 73 (2.0) | r 75 (1.9) | r 73 (3.2) | r 81 (1.6) | r 86 (1.6) | r 77 (2.1) | r 82 (1.9) |

* Teachers could indicate participating in more than one area of professional development.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 9.16: Teachers' Participation in Professional Development in Science in the Past Two Years

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teachers' Participation in Professional Development* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Science Content | Science Pedagogy/ Instruction | Science Curriculum | Integrating Technology into Science Instruction | Improving Students' Critical Thinking or Inquiry Skills | Science Assessment | Addressing Individual Students' Needs |
| Australia | r 50 (3.5) | r 54 (3.5) | r 62 (2.9) | r 49 (3.1) | r 55 (3.6) | r 44 (3.2) | r 66 (2.8) |
| Bahrain | 39 (2.6) | 59 (2.8) | 36 (2.8) | 78 (2.0) | 69 (2.8) | 58 (2.2) | 60 (3.0) |
| Chile | 34 (3.9) | 34 (4.0) | 23 (3.4) | 21 (3.1) | 31 (4.1) | 22 (3.4) | 26 (3.5) |
| Chinese Taipei | 76 (3.5) | 69 (3.6) | 74 (3.6) | 71 (3.3) | 43 (3.3) | 49 (3.4) | 39 (3.4) |
| Cyprus | s 62 (1.8) | s 65 (1.6) | s 67 (2.1) | s 43 (1.7) | s 52 (2.2) | s 59 (2.0) | s 36 (2.0) |
| Egypt | 71 (3.6) | 76 (3.8) | 59 (4.0) | 57 (4.1) | 52 (4.0) | 49 (4.4) | 43 (4.4) |
| England | s 72 (5.3) | s 56 (6.3) | s 72 (5.0) | s 23 (5.2) | s 35 (5.3) | s 60 (5.7) | s 50 (5.8) |
| Finland | 20 (1.7) | 27 (2.0) | 32 (2.0) | 38 (2.4) | 10 (1.4) | 25 (1.9) | 17 (1.8) |
| France | r 47 (3.2) | r 57 (3.5) | r 60 (3.1) | r 47 (3.2) | r 22 (2.9) | r 37 (3.2) | r 34 (3.2) |
| Georgia | 72 (2.2) | 83 (2.1) | 74 (2.2) | 67 (2.9) | 74 (2.7) | 76 (2.1) | 70 (2.4) |
| Hong Kong SAR | 72 (4.0) | 69 (4.1) | 64 (3.9) | 65 (4.0) | 37 (4.6) | 46 (4.1) | 48 (4.4) |
| Hungary | 17 (1.8) | 26 (2.4) | 7 (1.1) | 21 (2.0) | 19 (2.0) | 10 (1.2) | 25 (2.1) |
| Iran, Islamic Rep. of | 63 (3.6) | 65 (3.3) | 42 (3.9) | 44 (3.7) | 42 (3.8) | 47 (3.4) | 49 (3.3) |
| Ireland | 87 (2.1) | 76 (2.9) | 95 (1.5) | 39 (3.1) | 51 (3.7) | 74 (3.1) | 34 (3.5) |
| Israel | 75 (3.0) | 79 (2.9) | 53 (4.0) | 56 (3.7) | 49 (3.6) | 41 (4.2) | 43 (3.6) |
| Italy | 28 (3.5) | 39 (4.0) | 25 (3.6) | 44 (3.5) | 22 (3.0) | 17 (2.7) | 44 (3.8) |
| Japan | 76 (3.3) | 72 (3.6) | 39 (3.7) | 27 (3.3) | 26 (3.9) | 26 (3.9) | 26 (3.7) |
| Jordan | 43 (3.9) | 62 (4.2) | 46 (4.3) | 52 (3.7) | 57 (3.7) | 39 (3.4) | 44 (4.2) |
| Kazakhstan | 76 (1.9) | 78 (2.1) | 75 (2.3) | 67 (2.3) | 67 (2.2) | 72 (2.0) | 58 (2.3) |
| Korea, Rep. of | 60 (3.1) | 69 (3.5) | 54 (3.1) | 41 (3.7) | 46 (3.8) | 55 (3.3) | 37 (3.4) |
| Kuwait | 87 (2.8) | 82 (3.8) | 79 (3.2) | 71 (3.3) | 78 (3.8) | 66 (4.0) | 63 (3.8) |
| Lebanon | 65 (2.5) | 60 (2.9) | 64 (2.6) | 52 (2.5) | 58 (2.8) | 63 (2.6) | 53 (2.8) |
| Lithuania | 60 (2.0) | 48 (2.3) | 41 (1.9) | 58 (2.4) | 56 (2.8) | 51 (2.2) | 53 (2.1) |
| Malaysia | 69 (3.5) | 62 (3.8) | 73 (3.0) | 47 (3.8) | 46 (3.6) | 65 (3.1) | 29 (3.5) |
| Morocco | 49 (2.3) | 52 (2.5) | 38 (2.1) | 44 (2.4) | 40 (2.2) | 58 (2.5) | 33 (2.0) |
| New Zealand | 52 (3.3) | 56 (3.6) | 46 (4.3) | 54 (3.7) | 44 (3.3) | 42 (3.5) | 51 (3.9) |
| Norway (9) | s 11 (2.8) | s 11 (2.8) | s 7 (2.3) | s 5 (1.6) | s 8 (2.6) | s 11 (2.7) | s 9 (3.1) |
| Oman | 56 (3.7) | 65 (3.3) | 57 (3.5) | 48 (3.3) | 42 (3.9) | 52 (4.1) | 37 (3.6) |
| Portugal | 57 (3.3) | 52 (3.1) | 30 (2.8) | 58 (3.1) | 24 (2.4) | 22 (2.6) | 32 (3.0) |
| Qatar | 62 (4.3) | 83 (2.7) | 53 (3.5) | 78 (3.3) | 78 (4.0) | 65 (3.5) | 67 (4.3) |
| Romania | 37 (3.2) | 36 (3.1) | 26 (2.5) | 38 (2.8) | 29 (2.9) | 30 (2.2) | 34 (2.6) |
| Russian Federation | 78 (1.9) | 75 (1.5) | 69 (1.9) | 69 (1.9) | 51 (2.5) | 56 (1.9) | 53 (2.0) |
| Saudi Arabia | 53 (3.5) | 67 (3.8) | 41 (3.9) | 65 (3.9) | 62 (4.4) | 33 (3.9) | 51 (3.6) |
| Singapore | 58 (3.1) | 88 (1.9) | 61 (2.7) | 69 (2.9) | 61 (2.7) | 67 (2.3) | 44 (2.5) |
| South Africa (9) | 67 (3.3) | 44 (2.7) | 68 (2.9) | 38 (3.2) | 43 (3.0) | 57 (3.2) | 40 (3.3) |
| Sweden | 32 (3.6) | 24 (3.2) | 20 (2.9) | 33 (3.3) | 15 (2.6) | 28 (3.4) | 45 (3.4) |
| Turkey | 29 (3.3) | 37 (3.7) | 46 (3.5) | 42 (3.9) | 21 (3.6) | 22 (3.0) | 19 (3.2) |
| United Arab Emirates | r 72 (1.7) | r 75 (1.3) | r 72 (1.2) | r 79 (1.5) | r 83 (1.1) | r 69 (1.8) | r 79 (1.1) |
| United States | r 72 (2.2) | r 61 (2.6) | r 74 (2.4) | r 64 (2.9) | r 66 (2.8) | r 51 (2.9) | r 64 (2.8) |
| **International Average** | **57 (0.5)** | **59 (0.5)** | **52 (0.5)** | **50 (0.5)** | **45 (0.5)** | **46 (0.5)** | **44 (0.5)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | s 21 (4.7) | s 26 (4.2) | s 19 (3.8) | s 34 (5.7) | s 44 (5.3) | s 19 (4.5) | s 45 (5.6) |
| Moscow City, Russian Fed. | 66 (2.1) | 57 (2.2) | 49 (2.3) | 76 (2.0) | 42 (2.2) | 40 (2.5) | 42 (2.4) |
| Gauteng, RSA (9) | 78 (3.7) | 50 (4.6) | 73 (3.8) | 51 (4.4) | 50 (3.6) | 65 (3.7) | 44 (4.8) |
| Western Cape, RSA (9) | 74 (3.4) | 57 (3.6) | 72 (3.3) | 52 (4.4) | 42 (4.3) | 62 (3.6) | 38 (4.3) |
| Abu Dhabi, UAE | r 72 (2.6) | r 75 (2.2) | r 72 (1.9) | r 77 (2.1) | r 79 (1.9) | r 64 (2.5) | r 72 (2.1) |
| Dubai, UAE | r 63 (2.6) | r 71 (1.6) | r 68 (2.3) | r 78 (2.5) | r 82 (2.0) | r 71 (2.6) | r 84 (1.1) |
| Quebec, Canada | y - - | y - - | y - - | y - - | y - - | y - - | y - - |

* Teachers could indicate participating in more than one area of professional development.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Teachers' Professional Development Needs

Along with being asked about participation in professional development in the last two years (Exhibits 9.13 through 9.16), teachers were asked about their *need* for future professional development in the same areas. Teachers' reports on their professional development needs are presented in Exhibits 9.17, 9.18, 9.19, and 9.20, for fourth grade mathematics and science and eighth grade mathematics and science, respectively.

On average across countries, professional development related to integrating technology into instruction and improving students' critical thinking skills were the two areas of need most commonly reported by mathematics and science teachers in the fourth and eighth grades. In both grades and both subjects, 68 to 72 percent of students had teachers who identified integrating technology into instruction as a need (72% in fourth grade mathematics, 68% in fourth grade science, 71% in eighth grade mathematics, and 70% in eighth grade science); 65 to 69 percent of students had teachers who identified improving critical thinking or problem solving/inquiry skills as a need (69% in fourth and eighth grade mathematics, 65% in fourth grade science, and 68% in eighth grade science). Addressing individual students' needs was the third most commonly reported area of need for teachers of mathematics in both grades and teachers of science in eighth grade; 64 to 66 percent of students had teachers who identified addressing individual students' needs as a professional development need (64% for fourth grade mathematics, 65% for eighth grade mathematics, and 66% for eighth grade science). In fourth grade science, the third area of greatest need was integrating science into other subjects (62%).

It is perhaps not surprising that integrating technology into instruction was a common need given the growing role of technology in instruction and, in fourth grade, it was one of the less common areas of teachers' reported participation. Addressing individual students' needs was also one of the less commonly reported areas of professional development participation for eighth grade mathematics teachers and science teachers in both grades (see Exhibits 9.13 through 9.16).

## Exhibit 9.17: Teachers' Needs for Future Professional Development in Mathematics

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teachers Indicating a Need for Future Professional Development* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mathematics Content | Mathematics Pedagogy/ Instruction | Mathematics Curriculum | Integrating Technology into Mathematics Instruction | Improving Students' Critical Thinking or Problem Solving Skills | Mathematics Assessment | Addressing Individual Students' Needs |
| Albania | 53 (3.7) | 65 (3.2) | 57 (3.9) | 78 (3.3) | 60 (4.2) | 52 (4.2) | 59 (4.3) |
| Armenia | r 47 (3.9) | r 48 (4.5) | r 61 (4.4) | r 80 (3.7) | r 65 (4.4) | r 50 (4.2) | r 68 (4.1) |
| Australia | 43 (3.7) | 54 (3.7) | 40 (3.5) | 78 (2.8) | 76 (3.1) | 63 (3.2) | 63 (3.8) |
| Austria | 17 (2.4) | 20 (2.8) | 11 (1.9) | 43 (3.2) | 52 (3.0) | 41 (3.0) | 52 (3.1) |
| Azerbaijan | r 56 (3.7) | r 56 (4.3) | r 59 (4.2) | r 63 (3.9) | r 61 (3.8) | r 57 (3.8) | r 54 (4.1) |
| Bahrain | 56 (3.5) | 71 (2.9) | 54 (3.3) | 78 (3.2) | 76 (2.9) | 70 (3.3) | 74 (2.8) |
| Belgium (Flemish) | 14 (2.6) | 27 (3.2) | 29 (2.8) | 66 (3.8) | 52 (4.1) | 20 (2.9) | 46 (3.5) |
| Bosnia and Herzegovina | 29 (3.1) | 30 (3.0) | 28 (2.8) | 72 (3.5) | 63 (3.4) | 36 (3.4) | 54 (3.6) |
| Bulgaria | 21 (3.8) | 28 (4.2) | 12 (3.1) | 65 (4.3) | 69 (3.8) | 25 (3.7) | 50 (4.5) |
| Canada | r 32 (2.4) | r 50 (3.0) | r 32 (2.3) | r 75 (2.4) | r 64 (2.4) | r 50 (3.0) | r 56 (2.5) |
| Chile | 61 (4.3) | 66 (3.8) | 63 (4.0) | 85 (2.8) | 83 (3.2) | 77 (3.9) | 78 (3.4) |
| Chinese Taipei | 79 (3.2) | 80 (3.1) | 77 (3.1) | 86 (2.8) | 91 (2.2) | 79 (3.2) | 83 (3.1) |
| Croatia | 63 (3.3) | 59 (3.6) | 58 (3.5) | 90 (2.7) | 87 (2.6) | 77 (3.3) | 83 (2.7) |
| Cyprus | 33 (4.0) | 46 (3.9) | 33 (3.5) | 76 (3.3) | 65 (3.6) | 50 (4.1) | 67 (3.9) |
| Czech Republic | 28 (3.7) | 44 (3.5) | 28 (3.3) | 62 (3.4) | 58 (3.5) | 40 (3.5) | 47 (3.7) |
| Denmark | r 27 (3.6) | r 31 (4.0) | r 19 (3.8) | r 49 (4.7) | r 56 (4.2) | r 31 (4.3) | r 44 (4.0) |
| Finland | 22 (2.5) | 54 (3.0) | 24 (2.8) | 70 (3.0) | 65 (2.6) | 44 (2.6) | 56 (3.3) |
| France | 25 (3.2) | 56 (3.2) | 20 (2.5) | 76 (3.0) | 63 (3.6) | 40 (3.7) | 68 (3.3) |
| Georgia | r 52 (4.5) | r 68 (4.7) | r 62 (5.0) | r 75 (4.0) | r 77 (3.6) | r 72 (4.0) | r 75 (3.7) |
| Germany | r 24 (3.5) | r 34 (3.9) | r 16 (3.2) | r 57 (4.5) | r 60 (3.8) | r 34 (3.7) | r 46 (3.7) |
| Hong Kong SAR | 73 (4.5) | 82 (4.5) | 71 (4.3) | 86 (3.4) | 82 (4.4) | 73 (4.4) | 75 (3.6) |
| Hungary | 20 (3.5) | 47 (3.7) | 18 (3.0) | 56 (3.3) | 65 (3.3) | 36 (3.7) | 53 (4.1) |
| Iran, Islamic Rep. of | 66 (3.7) | 63 (3.4) | 51 (3.7) | 81 (2.9) | 71 (3.9) | 58 (3.9) | 63 (3.9) |
| Ireland | 37 (3.8) | 54 (3.7) | 37 (3.9) | 81 (3.1) | 75 (3.5) | 49 (3.9) | 58 (3.8) |
| Italy | 41 (3.7) | 59 (3.6) | 40 (3.7) | 81 (2.7) | 64 (3.7) | 52 (3.9) | 63 (3.6) |
| Japan | 74 (3.2) | 88 (2.3) | 60 (3.6) | 69 (3.7) | 84 (2.8) | 68 (3.0) | 86 (2.2) |
| Kazakhstan | r 46 (4.0) | 55 (3.9) | 55 (4.0) | r 66 (3.8) | r 61 (3.8) | 55 (3.4) | r 56 (3.8) |
| Korea, Rep. of | 58 (4.3) | 78 (2.8) | 60 (4.4) | 76 (3.2) | 83 (3.0) | 67 (4.0) | 78 (3.4) |
| Kosovo | r 74 (5.3) | r 74 (5.0) | r 84 (3.0) | s 84 (3.6) | r 83 (3.6) | r 83 (3.6) | r 80 (3.5) |
| Kuwait | r 60 (4.0) | r 60 (4.0) | r 50 (4.2) | r 70 (4.0) | r 65 (4.1) | r 57 (5.1) | r 67 (3.9) |
| Latvia | 44 (4.1) | 47 (3.6) | 35 (3.1) | 73 (3.3) | 58 (3.5) | 49 (3.8) | 59 (3.8) |
| Lithuania | 47 (3.7) | 51 (3.5) | 45 (3.4) | 73 (3.4) | 67 (3.3) | 51 (3.5) | 59 (3.8) |
| Malta | 51 (0.4) | 64 (0.4) | 55 (0.4) | 82 (0.3) | 78 (0.4) | 64 (0.4) | 73 (0.4) |
| Montenegro | 50 (2.4) | 49 (2.1) | 57 (2.8) | 81 (2.4) | 66 (2.5) | 50 (2.8) | 63 (2.7) |
| Morocco | 57 (4.0) | 65 (3.8) | 61 (3.9) | 81 (3.3) | 73 (3.2) | 65 (3.3) | 76 (3.3) |
| Netherlands | r 29 (4.4) | r 38 (5.6) | r 14 (3.8) | r 52 (5.1) | r 48 (6.2) | r 33 (5.5) | r 47 (6.0) |
| New Zealand | 48 (3.3) | 57 (3.0) | 37 (2.8) | 74 (2.8) | 75 (2.6) | 52 (3.0) | 59 (3.0) |
| North Macedonia | 42 (4.4) | 43 (4.4) | 43 (4.8) | 63 (4.2) | 54 (4.4) | 42 (4.4) | 55 (3.8) |
| Northern Ireland | 33 (4.1) | 41 (4.1) | 33 (4.1) | 71 (4.0) | 67 (4.3) | 46 (4.4) | 54 (4.7) |
| Norway (5) | r 41 (4.8) | r 56 (4.7) | r 38 (4.6) | r 76 (3.6) | r 61 (4.6) | r 54 (4.5) | r 60 (4.8) |
| Oman | 63 (3.2) | 56 (3.4) | 58 (3.6) | 75 (3.2) | 66 (3.4) | 60 (3.7) | 67 (4.2) |
| Pakistan | r 74 (7.2) | r 66 (7.2) | r 57 (7.7) | r 73 (5.6) | r 78 (5.2) | r 70 (7.9) | r 75 (7.2) |
| Philippines | 93 (1.6) | 92 (1.9) | 89 (2.5) | 96 (1.5) | 96 (1.5) | 92 (1.7) | 93 (2.0) |
| Poland | 32 (3.6) | 40 (4.1) | 20 (3.2) | 53 (3.4) | 63 (3.4) | 32 (3.8) | 49 (4.2) |
| Portugal | 34 (3.0) | 57 (3.5) | 37 (3.0) | 79 (2.8) | 68 (3.2) | 46 (3.4) | 55 (3.3) |
| Qatar | 44 (3.9) | 53 (4.1) | 48 (4.1) | 63 (3.3) | 63 (3.0) | 50 (3.6) | 58 (3.9) |
| Russian Federation | 68 (3.3) | 69 (3.5) | 72 (2.9) | 82 (3.3) | 82 (3.0) | 73 (3.5) | 83 (2.6) |
| Saudi Arabia | r 31 (3.8) | r 37 (3.7) | r 27 (3.3) | r 61 (3.5) | r 47 (4.2) | r 38 (3.7) | r 53 (4.1) |
| Serbia | 24 (3.3) | 30 (3.5) | 27 (3.5) | 64 (4.0) | 56 (4.2) | 36 (4.0) | 49 (3.6) |
| Singapore | 44 (2.9) | 64 (2.5) | 45 (2.7) | 75 (2.2) | 79 (2.1) | 63 (2.4) | 75 (2.1) |
| Slovak Republic | 30 (2.5) | 45 (3.2) | 31 (3.1) | 62 (3.3) | 68 (3.0) | 40 (3.2) | 56 (2.8) |
| South Africa (5) | 70 (3.7) | 78 (3.3) | 68 (4.1) | 83 (3.3) | 84 (3.0) | 73 (3.8) | 83 (3.8) |
| Spain | 39 (3.4) | 65 (4.1) | 31 (3.3) | 79 (3.3) | 70 (3.6) | 56 (3.5) | 69 (3.6) |
| Sweden | r 35 (4.0) | r 49 (4.3) | r 26 (3.4) | r 68 (4.1) | r 61 (4.5) | r 58 (4.5) | r 60 (4.6) |
| Turkey (5) | 48 (4.0) | 62 (3.7) | 64 (3.5) | 86 (2.8) | 87 (2.8) | 64 (3.7) | 74 (3.4) |
| United Arab Emirates | r 50 (1.8) | r 56 (1.5) | r 52 (1.9) | r 66 (1.5) | r 66 (1.5) | r 55 (1.8) | r 59 (1.6) |
| United States | 38 (2.5) | 45 (2.3) | 41 (2.6) | 66 (2.5) | 64 (2.6) | 45 (3.0) | 58 (2.6) |
| England | x 31 (6.7) | y - - | x 31 (6.4) | y - - | y - - | y - - | y - - |
| **International Average** | **45 (0.5)** | **55 (0.5)** | **44 (0.5)** | **72 (0.5)** | **69 (0.5)** | **54 (0.5)** | **64 (0.5)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | r 38 (4.2) | r 49 (5.9) | r 38 (4.0) | r 79 (3.7) | r 61 (4.4) | r 55 (5.6) | r 56 (4.6) |
| Quebec, Canada | 15 (2.7) | 45 (4.1) | 12 (2.8) | 72 (4.0) | 56 (4.6) | 34 (3.9) | 48 (4.2) |
| Moscow City, Russian Fed. | 59 (4.2) | 66 (4.2) | 73 (4.0) | 85 (3.2) | 90 (2.4) | 75 (3.9) | 85 (3.3) |
| Madrid, Spain | 52 (4.8) | 79 (3.6) | 44 (4.6) | 89 (2.6) | 86 (3.0) | 62 (3.9) | 81 (3.7) |
| Abu Dhabi, UAE | r 44 (2.8) | r 52 (2.8) | r 47 (2.6) | r 64 (2.5) | r 66 (2.8) | r 53 (3.0) | r 60 (3.0) |
| Dubai, UAE | r 58 (2.2) | r 65 (2.4) | r 58 (2.3) | r 73 (2.4) | r 74 (2.2) | r 63 (2.5) | r 65 (2.4) |

* Teachers could indicate needing professional development in more than one area.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 9.18: Teachers' Needs for Future Professional Development in Science

*Students' Results based on Teachers' Reports*

| Country | Science Content | Science Pedagogy/ Instruction | Science Curriculum | Integrating Technology into Science Instruction | Improving Students' Critical Thinking or Inquiry Skills | Science Assessment | Addressing Individual Students' Needs | Integrating Science with Other Subjects |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students by Teachers Indicating a Need for Future Professional Development* | | | | | | | |
| Albania | 55 (4.1) | 60 (4.1) | 59 (4.2) | 75 (3.8) | 66 (4.4) | 53 (4.7) | 63 (4.3) | 67 (4.1) |
| Armenia | r 66 (3.9) | r 65 (3.7) | r 67 (4.1) | r 76 (3.9) | r 63 (4.4) | r 52 (4.3) | r 64 (4.8) | r 68 (4.5) |
| Australia | 54 (3.9) | 59 (3.7) | 54 (3.7) | 74 (3.3) | 68 (4.0) | 66 (4.3) | 61 (4.4) | 67 (3.7) |
| Austria | 39 (2.8) | 32 (2.8) | 21 (2.1) | 37 (3.7) | 45 (3.4) | 29 (3.0) | 30 (2.8) | 43 (3.6) |
| Azerbaijan | r 59 (4.0) | r 59 (3.8) | r 58 (3.7) | r 51 (3.8) | r 57 (4.5) | r 55 (3.7) | r 53 (3.9) | r 53 (4.1) |
| Bahrain | 52 (3.4) | r 53 (3.3) | r 53 (3.5) | r 63 (3.3) | r 56 (3.6) | r 54 (3.2) | r 59 (3.1) | r 53 (3.7) |
| Belgium (Flemish) | 25 (3.9) | 28 (3.3) | 25 (3.0) | 55 (3.4) | 36 (3.4) | 32 (3.2) | 36 (3.8) | 50 (4.2) |
| Bosnia and Herzegovina | 34 (3.3) | 34 (3.0) | 31 (3.0) | 73 (3.6) | 60 (3.5) | 31 (3.1) | 50 (3.5) | 61 (3.9) |
| Bulgaria | 24 (4.0) | 26 (3.6) | 12 (3.2) | 65 (3.9) | 65 (3.9) | 32 (4.2) | 44 (4.8) | 47 (3.7) |
| Canada | r 50 (2.5) | r 56 (2.9) | r 41 (2.4) | r 70 (2.0) | r 62 (2.8) | r 50 (2.4) | r 48 (3.2) | r 62 (2.2) |
| Chile | r 70 (4.1) | r 70 (4.5) | r 62 (4.4) | r 81 (3.6) | r 82 (3.5) | r 72 (3.7) | r 70 (4.1) | r 77 (4.1) |
| Chinese Taipei | 82 (3.2) | 76 (3.6) | 82 (3.1) | 88 (2.6) | 85 (2.9) | 77 (3.2) | 78 (3.2) | 85 (2.9) |
| Croatia | 71 (2.6) | 61 (3.5) | 58 (3.4) | 88 (2.6) | 85 (2.8) | 79 (2.8) | 80 (2.7) | 79 (3.1) |
| Cyprus | 45 (4.8) | 50 (5.3) | 40 (4.6) | 77 (4.3) | 60 (5.0) | 64 (4.3) | 67 (5.1) | 62 (4.9) |
| Czech Republic | 27 (3.6) | 33 (3.8) | 20 (3.3) | 51 (3.7) | 46 (3.2) | 26 (3.3) | 25 (2.9) | 37 (3.5) |
| Denmark | r 44 (4.0) | r 37 (4.0) | r 22 (3.5) | r 37 (3.7) | r 46 (4.7) | r 30 (4.2) | r 31 (3.7) | r 36 (4.3) |
| Finland | 32 (2.9) | 46 (2.9) | 29 (2.9) | 61 (3.0) | 53 (3.0) | 40 (3.0) | 45 (3.4) | 51 (2.8) |
| France | 46 (3.9) | 65 (3.7) | 35 (3.5) | 74 (3.0) | 56 (3.0) | 40 (4.0) | 50 (3.5) | 63 (3.6) |
| Georgia | r 63 (4.7) | r 68 (4.9) | r 60 (5.1) | r 80 (3.8) | r 72 (4.0) | r 65 (4.4) | r 69 (4.0) | r 74 (3.9) |
| Germany | r 43 (3.9) | r 43 (3.5) | r 18 (3.0) | r 54 (4.1) | r 45 (4.2) | r 27 (3.7) | r 33 (4.2) | r 41 (3.5) |
| Hong Kong SAR | r 69 (4.0) | 75 (4.5) | 68 (3.9) | 75 (4.0) | 79 (4.1) | r 66 (4.0) | 70 (4.1) | 80 (3.8) |
| Hungary | 28 (3.0) | 39 (3.4) | 17 (3.0) | 42 (4.0) | 54 (3.7) | 25 (3.4) | 47 (4.0) | 37 (3.7) |
| Iran, Islamic Rep. of | 58 (3.7) | 60 (3.6) | 50 (3.4) | 74 (3.2) | 68 (3.7) | 54 (3.6) | 60 (3.7) | 69 (3.5) |
| Ireland | 47 (3.7) | 58 (3.9) | 42 (3.7) | 78 (3.1) | 73 (3.6) | 62 (4.1) | 54 (3.6) | 67 (3.3) |
| Italy | 48 (4.2) | 66 (3.7) | 39 (3.9) | 77 (3.1) | 66 (3.8) | 47 (4.1) | 64 (4.1) | 72 (3.8) |
| Japan | 72 (3.7) | 89 (2.8) | 63 (3.9) | 69 (4.1) | 80 (3.4) | 71 (3.7) | 80 (3.0) | 53 (4.1) |
| Kazakhstan | r 57 (3.9) | r 55 (4.1) | r 56 (4.3) | r 65 (4.2) | r 66 (4.2) | r 60 (4.2) | r 57 (4.4) | r 57 (4.1) |
| Korea, Rep. of | 62 (3.8) | 66 (3.9) | 59 (4.1) | 75 (3.7) | 79 (3.2) | 58 (4.4) | 66 (3.7) | 74 (3.4) |
| Kosovo | r 80 (3.7) | r 77 (4.2) | r 84 (4.0) | r 88 (3.0) | r 84 (3.5) | r 82 (3.7) | r 87 (2.9) | r 86 (3.3) |
| Kuwait | 60 (4.5) | 57 (4.6) | 56 (4.6) | 66 (3.8) | 67 (3.9) | 59 (4.5) | 68 (4.3) | 60 (4.4) |
| Latvia | 46 (3.9) | 45 (3.6) | 38 (3.8) | 65 (3.3) | 54 (3.9) | 54 (3.6) | 45 (3.9) | 66 (3.8) |
| Lithuania | 49 (3.6) | 51 (3.5) | 44 (3.9) | 73 (3.1) | 57 (3.1) | 56 (3.5) | 54 (3.6) | 55 (3.6) |
| Malta | 69 (0.4) | 72 (0.4) | 74 (0.4) | 86 (0.3) | 81 (0.3) | 79 (0.3) | 73 (0.3) | 74 (0.3) |
| Montenegro | 59 (2.8) | 56 (2.8) | 59 (2.4) | 81 (2.3) | 66 (2.3) | 50 (2.6) | 65 (2.6) | 63 (3.1) |
| Morocco | 66 (3.7) | 77 (3.4) | 72 (3.8) | 85 (2.4) | 79 (3.3) | 71 (3.9) | 76 (3.3) | 77 (3.6) |
| Netherlands | r 29 (4.1) | r 27 (4.3) | r 26 (3.4) | r 43 (3.7) | r 43 (3.9) | r 18 (2.6) | r 26 (4.6) | r 50 (4.8) |
| New Zealand | 69 (2.8) | 70 (2.9) | 60 (3.3) | 76 (2.7) | 71 (2.5) | 64 (2.9) | 62 (2.8) | 72 (2.6) |
| North Macedonia | 45 (4.2) | 47 (4.3) | 43 (4.7) | 60 (4.2) | 64 (4.3) | 48 (4.7) | 52 (4.5) | 53 (4.7) |
| Northern Ireland | 62 (4.4) | 63 (4.8) | 61 (4.5) | r 74 (4.1) | r 66 (4.3) | 59 (4.3) | r 55 (4.4) | 64 (4.2) |
| Norway (5) | s 65 (4.3) | s 68 (4.5) | s 53 (4.9) | s 73 (4.5) | s 62 (5.1) | s 53 (4.7) | s 52 (5.5) | s 61 (4.6) |
| Oman | 62 (3.0) | 58 (3.7) | 59 (3.3) | 67 (3.3) | 70 (3.3) | 63 (3.3) | 59 (3.5) | 66 (4.0) |
| Pakistan | s 70 (8.7) | s 79 (5.2) | s 67 (8.8) | s 58 (8.3) | s 78 (5.5) | s 70 (9.0) | s 70 (8.7) | s 68 (9.0) |
| Philippines | s 81 (3.9) | s 77 (4.2) | s 78 (4.2) | s 76 (3.8) | s 78 (4.2) | s 77 (4.1) | s 78 (3.9) | s 75 (4.2) |
| Poland | 25 (4.2) | 23 (3.5) | 17 (3.4) | 47 (4.6) | 46 (4.0) | r 29 (4.3) | r 35 (4.0) | 33 (4.1) |
| Portugal | 38 (3.4) | 59 (3.2) | 37 (3.5) | 77 (2.9) | 58 (3.2) | 43 (3.6) | 48 (3.1) | 72 (2.7) |
| Qatar | 50 (3.4) | 54 (4.0) | 48 (3.2) | 64 (2.8) | 64 (2.9) | 54 (3.6) | 60 (4.1) | 58 (3.9) |
| Russian Federation | 67 (4.2) | 68 (3.8) | 68 (3.8) | 78 (3.2) | 79 (3.3) | 68 (3.6) | 72 (3.4) | 72 (3.9) |
| Saudi Arabia | 63 (3.6) | 55 (3.4) | 42 (3.7) | 42 (3.7) | r 40 (4.0) | r 56 (4.2) | r 38 (4.2) | r 44 (3.9) |
| Serbia | 30 (3.5) | 38 (4.0) | 32 (2.8) | 61 (3.9) | 54 (4.4) | 36 (3.3) | 44 (3.5) | 54 (4.3) |
| Singapore | 53 (2.3) | 71 (2.1) | 56 (2.6) | 78 (2.2) | 81 (2.4) | 68 (2.4) | 70 (2.5) | 66 (2.6) |
| Slovak Republic | 46 (3.7) | 46 (3.0) | 31 (2.9) | 55 (3.5) | 61 (2.6) | 35 (2.8) | 46 (3.3) | 43 (3.3) |
| South Africa (5) | 78 (3.5) | 75 (3.6) | 74 (3.7) | 78 (3.5) | 81 (3.4) | 74 (3.8) | 79 (3.4) | 79 (3.4) |
| Spain | 48 (3.7) | 72 (3.0) | 42 (3.9) | 82 (2.8) | 68 (3.4) | 55 (3.5) | 63 (3.0) | 73 (2.7) |
| Sweden | r 55 (4.7) | r 46 (4.7) | r 33 (4.3) | r 68 (4.5) | r 65 (4.5) | r 55 (4.9) | r 52 (4.6) | r 57 (4.5) |
| Turkey (5) | 61 (3.8) | 74 (3.3) | 69 (3.8) | 84 (2.6) | 84 (2.9) | 76 (3.3) | 78 (3.6) | 83 (3.0) |
| United Arab Emirates | r 48 (1.9) | r 54 (1.7) | r 49 (2.0) | r 64 (1.7) | r 62 (1.8) | r 51 (1.6) | r 55 (1.9) | r 57 (1.9) |
| United States | 61 (2.5) | 58 (2.2) | 60 (2.6) | 70 (2.5) | 67 (2.6) | 57 (2.7) | 56 (2.4) | 65 (2.5) |
| England | y - - | y - - | y - - | y - - | y - - | y - - | y - - | y - - |
| **International Average** | **54 (0.5)** | **57 (0.5)** | **49 (0.5)** | **68 (0.5)** | **65 (0.5)** | **54 (0.5)** | **57 (0.5)** | **62 (0.5)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | r 49 (4.7) | r 58 (5.9) | r 38 (4.3) | r 76 (2.9) | r 63 (5.4) | r 50 (4.6) | r 50 (6.3) | r 63 (4.3) |
| Quebec, Canada | r 52 (4.8) | r 59 (4.4) | r 39 (4.5) | r 66 (4.3) | r 57 (4.5) | r 53 (5.0) | r 45 (4.9) | r 61 (4.6) |
| Moscow City, Russian Fed. | 61 (4.2) | 61 (4.3) | 65 (3.9) | 84 (2.9) | 82 (3.4) | 72 (3.5) | 79 (3.5) | 85 (3.2) |
| Madrid, Spain | 54 (4.9) | 71 (4.0) | 40 (4.8) | 77 (3.4) | 70 (3.9) | 53 (4.1) | 66 (4.5) | 72 (3.5) |
| Abu Dhabi, UAE | r 49 (3.0) | r 53 (2.4) | r 49 (2.7) | r 67 (2.5) | r 60 (2.8) | r 51 (2.8) | r 55 (3.0) | r 55 (2.6) |
| Dubai, UAE | r 50 (3.4) | r 62 (3.4) | r 54 (2.9) | r 65 (3.3) | s 68 (3.4) | r 58 (3.4) | r 61 (3.5) | r 63 (3.7) |

* Teachers could indicate needing professional development in more than one area.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.19: Teachers' Needs for Future Professional Development in Mathematics

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teacher Indicating a Need for Future Professional Development* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mathematics Content | | Mathematics Pedagogy/ Instruction | | Mathematics Curriculum | | Integrating Technology into Mathematics Instruction | | Improving Students' Critical Thinking or Problem Solving Skills | | Mathematics Assessment | | Addressing Individual Students' Needs | |
| Australia | | 58 (3.3) | | 70 (2.9) | | 61 (3.7) | | 81 (2.7) | | 84 (2.2) | | 71 (3.1) | | 77 (3.2) |
| Bahrain | | 48 (3.8) | r | 59 (4.0) | | 45 (4.1) | r | 79 (3.4) | | 74 (3.7) | r | 56 (3.4) | | 64 (3.5) |
| Chile | | 40 (3.8) | | 48 (3.7) | | 44 (3.8) | | 75 (3.5) | | 70 (3.7) | | 65 (3.5) | | 68 (3.7) |
| Chinese Taipei | | 76 (2.8) | | 80 (3.1) | | 76 (3.2) | | 87 (2.4) | | 82 (2.5) | | 73 (2.8) | | 79 (2.9) |
| Cyprus | s | 24 (3.2) | s | 41 (4.6) | s | 21 (2.9) | s | 67 (4.4) | s | 68 (4.9) | s | 44 (5.0) | s | 61 (4.7) |
| Egypt | r | 46 (4.4) | r | 51 (4.5) | r | 49 (4.9) | r | 69 (4.1) | r | 59 (4.3) | r | 53 (4.7) | r | 53 (4.7) |
| England | s | 28 (5.2) | s | 44 (6.2) | s | 36 (5.4) | s | 57 (6.0) | s | 61 (6.4) | s | 38 (5.3) | s | 38 (5.4) |
| Finland | | 25 (2.9) | | 48 (3.4) | | 31 (2.5) | | 70 (3.2) | | 50 (3.0) | | 46 (2.8) | | 57 (3.1) |
| France | r | 28 (3.6) | r | 61 (4.3) | r | 39 (4.0) | r | 61 (4.3) | r | 60 (4.3) | r | 49 (4.2) | r | 71 (3.7) |
| Georgia | r | 44 (4.3) | r | 68 (4.8) | r | 48 (4.7) | r | 82 (3.1) | r | 72 (3.9) | r | 60 (4.7) | r | 65 (4.6) |
| Hong Kong SAR | r | 60 (4.7) | r | 76 (3.9) | r | 60 (4.6) | r | 73 (4.3) | r | 80 (3.4) | r | 54 (4.3) | r | 77 (3.5) |
| Hungary | | 21 (2.4) | | 44 (3.7) | | 14 (2.0) | | 53 (3.8) | | 58 (3.8) | | 34 (3.6) | | 57 (3.6) |
| Iran, Islamic Rep. of | | 67 (3.6) | | 59 (3.8) | | 64 (3.7) | | 81 (3.5) | | 76 (3.4) | | 68 (3.5) | | 72 (3.6) |
| Ireland | | 54 (3.2) | | 61 (2.8) | | 67 (2.9) | | 79 (2.9) | | 84 (1.8) | | 66 (2.9) | | 71 (3.0) |
| Israel | | 47 (3.2) | | 51 (3.2) | | 43 (3.1) | | 74 (3.0) | | 68 (2.9) | | 52 (3.0) | | 56 (3.4) |
| Italy | | 24 (2.8) | | 60 (4.0) | | 37 (3.6) | | 65 (3.7) | | 60 (3.7) | | 38 (4.1) | | 60 (3.6) |
| Japan | | 80 (2.8) | | 86 (2.3) | | 64 (3.5) | | 75 (3.1) | | 86 (2.7) | | 72 (3.0) | | 79 (3.1) |
| Jordan | | 50 (4.5) | | 44 (3.8) | | 38 (3.9) | | 48 (4.1) | | 44 (3.7) | | 47 (4.4) | | 52 (4.0) |
| Kazakhstan | | 47 (4.2) | | 50 (4.2) | | 46 (3.6) | | 63 (4.2) | | 61 (4.2) | | 56 (4.4) | | 57 (3.8) |
| Korea, Rep. of | | 66 (4.1) | | 82 (3.3) | | 65 (3.7) | | 84 (2.7) | | 83 (2.6) | | 86 (2.5) | | 76 (3.3) |
| Kuwait | | 65 (3.9) | | 71 (3.7) | | 60 (3.8) | | 78 (3.6) | | 73 (4.1) | | 66 (3.6) | | 71 (3.1) |
| Lebanon | r | 51 (4.1) | r | 58 (3.8) | r | 59 (3.9) | r | 61 (4.0) | r | 61 (4.0) | r | 53 (4.1) | r | 62 (4.9) |
| Lithuania | | 48 (4.2) | | 61 (3.9) | | 47 (4.0) | | 77 (3.0) | | 83 (2.8) | | 67 (4.1) | | 69 (4.2) |
| Malaysia | | 60 (3.4) | | 70 (3.3) | | 60 (3.4) | | 77 (3.1) | | 77 (3.3) | | 67 (3.2) | | 72 (3.1) |
| Morocco | | 50 (3.8) | | 70 (3.4) | | 55 (3.1) | | 82 (2.6) | | 73 (3.5) | | 63 (3.4) | | 73 (3.6) |
| New Zealand | r | 53 (3.0) | r | 63 (3.5) | r | 54 (3.6) | | 72 (2.9) | | 80 (2.8) | | 60 (3.2) | | 71 (3.2) |
| Norway (9) | s | 25 (4.1) | s | 52 (4.7) | s | 36 (4.1) | s | 60 (4.1) | s | 56 (4.5) | s | 42 (4.4) | s | 59 (4.5) |
| Oman | | 57 (3.8) | | 55 (4.0) | | 60 (3.6) | | 74 (3.5) | | 63 (3.9) | | 56 (4.5) | | 57 (4.2) |
| Portugal | | 25 (3.3) | | 50 (4.2) | | 39 (3.7) | | 60 (4.2) | | 65 (4.0) | | 50 (4.5) | | 67 (3.4) |
| Qatar | | 38 (4.8) | | 57 (5.0) | | 44 (4.1) | | 63 (4.2) | | 62 (4.6) | | 45 (4.8) | | 57 (5.1) |
| Romania | | 29 (3.0) | | 39 (3.6) | | 37 (3.4) | | 59 (3.6) | | 59 (4.0) | | 37 (3.8) | | 54 (3.8) |
| Russian Federation | | 68 (3.8) | | 73 (3.3) | | 75 (2.9) | | 77 (3.7) | | 79 (2.9) | | 73 (3.3) | | 79 (2.8) |
| Saudi Arabia | r | 40 (4.1) | r | 46 (3.8) | r | 37 (4.0) | r | 62 (4.0) | r | 52 (4.5) | r | 51 (4.4) | r | 51 (4.2) |
| Singapore | | 49 (2.9) | | 69 (2.3) | | 58 (2.9) | | 78 (2.1) | | 82 (2.2) | | 69 (2.6) | | 68 (2.9) |
| South Africa (9) | | 77 (2.4) | | 81 (2.3) | | 71 (2.6) | | 88 (2.0) | | 89 (1.7) | | 77 (2.0) | | 86 (2.0) |
| Sweden | | 38 (3.7) | | 59 (4.3) | | 27 (3.3) | | 79 (2.9) | | 64 (3.3) | | 51 (3.8) | | 67 (3.5) |
| Turkey | | 42 (4.0) | | 61 (4.2) | | 61 (4.1) | | 81 (2.9) | | 81 (3.1) | | 61 (3.9) | | 67 (3.8) |
| United Arab Emirates | r | 44 (2.0) | r | 55 (1.9) | r | 47 (1.9) | r | 64 (2.2) | r | 62 (1.6) | r | 47 (1.8) | r | 54 (1.7) |
| United States | | 36 (2.9) | | 49 (2.6) | | 43 (2.8) | | 72 (2.1) | | 71 (2.2) | | 50 (3.0) | | 63 (2.6) |
| **International Average** | | **47 (0.6)** | | **60 (0.6)** | | **49 (0.6)** | | **71 (0.6)** | | **69 (0.6)** | | **57 (0.6)** | | **65 (0.6)** |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Ontario, Canada | | 39 (3.9) | | 55 (4.2) | | 35 (4.8) | | 70 (4.5) | | 70 (4.2) | | 60 (4.1) | | 55 (4.9) |
| Quebec, Canada | | 25 (4.4) | | 52 (4.8) | | 23 (4.1) | | 78 (4.0) | | 58 (5.1) | | 47 (5.0) | | 59 (4.9) |
| Moscow City, Russian Fed. | | 72 (3.2) | | 76 (3.3) | | 72 (3.4) | | 76 (3.3) | | 81 (2.9) | | 73 (3.2) | | 84 (2.5) |
| Gauteng, RSA (9) | r | 60 (4.7) | r | 72 (4.1) | r | 63 (4.3) | r | 83 (3.8) | r | 88 (3.2) | r | 68 (4.5) | r | 82 (3.5) |
| Western Cape, RSA (9) | | 53 (3.9) | | 62 (3.8) | r | 46 (4.2) | | 80 (3.5) | | 80 (3.5) | r | 50 (4.4) | | 75 (3.9) |
| Abu Dhabi, UAE | r | 49 (3.3) | r | 57 (2.9) | r | 53 (3.3) | r | 71 (2.5) | r | 66 (2.9) | r | 51 (3.1) | r | 60 (2.6) |
| Dubai, UAE | r | 49 (3.1) | r | 63 (2.8) | r | 54 (3.0) | r | 72 (2.5) | r | 71 (2.3) | r | 57 (3.0) | r | 58 (3.0) |

* Teachers could indicate needing professional development in more than one area.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.20: Teachers' Needs for Future Professional Development in Science

*Students' Results based on Teachers' Reports*

| Country | Percent of Students by Teachers Indicating a Need for Future Professional Development* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Science Content | | Science Pedagogy/ Instruction | | Science Curriculum | | Integrating Technology into Science Instruction | | Improving Students' Critical Thinking or Inquiry Skills | | Science Assessment | | Addressing Individual Students' Needs | |
| Australia | r | 52 (3.1) | r | 65 (3.0) | r | 51 (3.1) | r | 77 (2.6) | r | 81 (2.3) | r | 59 (2.9) | r | 71 (3.0) |
| Bahrain | | 52 (3.5) | | 53 (3.1) | | 48 (3.1) | | 61 (3.1) | | 62 (3.0) | | 58 (3.3) | | 56 (3.1) |
| Chile | | 44 (4.1) | | 54 (3.9) | | 53 (4.0) | | 83 (2.8) | | 68 (3.3) | | 67 (3.5) | | 80 (3.0) |
| Chinese Taipei | | 75 (3.1) | | 75 (3.0) | | 75 (3.0) | | 84 (2.6) | | 82 (3.0) | | 69 (3.7) | | 71 (3.6) |
| Cyprus | s | 33 (1.6) | s | 45 (2.2) | s | 26 (2.1) | s | 65 (2.5) | s | 57 (1.6) | s | 44 (2.8) | s | 60 (2.6) |
| Egypt | r | 47 (4.7) | r | 49 (5.0) | r | 49 (4.4) | r | 64 (4.7) | r | 60 (4.6) | r | 54 (4.6) | r | 64 (5.0) |
| England | s | 34 (5.6) | s | 44 (5.5) | s | 35 (6.1) | s | 55 (6.4) | s | 56 (5.4) | s | 44 (6.1) | s | 41 (5.3) |
| Finland | | 32 (1.8) | | 51 (1.9) | | 34 (1.9) | | 69 (1.8) | | 56 (2.2) | | 54 (2.2) | | 63 (1.9) |
| France | r | 58 (3.4) | r | 65 (2.8) | r | 53 (2.9) | r | 67 (3.0) | r | 62 (3.1) | r | 56 (2.9) | r | 70 (2.8) |
| Georgia | s | 48 (3.1) | s | 55 (3.2) | s | 54 (3.1) | r | 80 (2.4) | r | 68 (2.8) | s | 54 (2.9) | s | 63 (3.2) |
| Hong Kong SAR | r | 65 (4.2) | r | 77 (3.4) | r | 65 (4.3) | r | 80 (4.0) | r | 74 (3.8) | r | 66 (4.6) | r | 76 (3.9) |
| Hungary | | 29 (2.0) | | 47 (2.2) | | 26 (1.8) | | 54 (1.9) | | 59 (2.2) | | 40 (2.4) | | 51 (2.5) |
| Iran, Islamic Rep. of | | 69 (3.4) | | 63 (3.6) | | 60 (3.9) | | 80 (3.2) | | 77 (3.6) | | 62 (3.5) | | 68 (3.6) |
| Ireland | | 56 (3.6) | | 58 (3.1) | | 63 (3.8) | | 76 (2.9) | | 79 (2.6) | | 59 (3.1) | | 71 (3.6) |
| Israel | | 48 (4.0) | | 49 (4.4) | | 41 (3.9) | | 63 (3.6) | | 60 (4.1) | | 45 (3.6) | | 57 (3.8) |
| Italy | | 26 (3.3) | | 54 (3.5) | | 32 (3.5) | | 59 (3.6) | | 58 (3.8) | | 33 (3.4) | | 54 (3.6) |
| Japan | | 89 (2.6) | | 90 (2.5) | | 67 (3.7) | | 83 (2.9) | | 84 (3.0) | | 75 (3.7) | | 76 (3.5) |
| Jordan | | 47 (4.2) | | 48 (4.3) | | 42 (4.1) | | 62 (4.0) | | 50 (3.8) | | 52 (3.5) | | 49 (4.0) |
| Kazakhstan | | 46 (2.6) | | 54 (2.6) | | 48 (2.7) | | 62 (2.8) | | 62 (2.4) | | 57 (2.4) | | 63 (2.1) |
| Korea, Rep. of | | 68 (3.3) | | 86 (2.6) | | 70 (3.1) | | 83 (2.4) | | 85 (2.6) | | 77 (2.5) | | 78 (2.7) |
| Kuwait | | 62 (4.5) | | 58 (4.7) | | 55 (4.2) | | 79 (3.8) | | 68 (3.7) | | 63 (4.4) | | 70 (4.2) |
| Lebanon | | 56 (2.8) | r | 65 (3.1) | r | 57 (2.4) | r | 74 (2.3) | r | 69 (2.6) | r | 58 (2.7) | r | 65 (3.1) |
| Lithuania | | 58 (2.0) | | 64 (2.3) | | 59 (2.2) | | 74 (2.2) | | 73 (1.9) | | 68 (1.8) | | 69 (2.2) |
| Malaysia | | 56 (4.1) | | 67 (3.7) | | 58 (3.6) | | 80 (2.7) | | 79 (2.9) | | 68 (3.3) | | 71 (3.4) |
| Morocco | | 58 (2.5) | | 68 (2.2) | | 63 (2.4) | | 73 (2.5) | | 78 (2.4) | | 65 (2.5) | | 78 (2.4) |
| New Zealand | | 46 (4.1) | | 62 (3.6) | | 54 (3.9) | | 75 (3.2) | | 77 (3.6) | | 59 (3.3) | | 71 (3.7) |
| Norway (9) | s | 46 (4.5) | s | 53 (4.9) | s | 35 (4.8) | s | 51 (5.1) | s | 55 (5.0) | s | 45 (5.2) | s | 52 (4.8) |
| Oman | | 70 (3.6) | | 64 (3.5) | | 62 (3.8) | | 80 (3.1) | | 66 (3.7) | | 55 (4.1) | | 65 (4.0) |
| Portugal | | 36 (2.9) | | 49 (2.8) | | 35 (2.8) | | 68 (2.6) | | 69 (3.2) | | 54 (2.6) | | 64 (3.1) |
| Qatar | | 38 (4.2) | | 41 (4.4) | | 37 (4.2) | | 48 (3.7) | | 51 (4.7) | | 45 (5.0) | | 49 (4.5) |
| Romania | | 36 (2.5) | | 48 (3.1) | | 45 (2.7) | | 54 (2.9) | | 56 (3.2) | | 46 (2.9) | | 59 (2.9) |
| Russian Federation | | 79 (1.6) | | 79 (1.9) | | 79 (1.4) | | 82 (1.7) | | 83 (1.3) | | 81 (1.4) | | 84 (1.4) |
| Saudi Arabia | r | 48 (4.5) | r | 50 (4.3) | r | 48 (4.7) | r | 64 (3.7) | r | 57 (4.2) | r | 54 (4.4) | r | 55 (4.5) |
| Singapore | | 48 (2.7) | | 75 (2.7) | | 56 (2.7) | | 80 (2.0) | | 83 (2.2) | | 70 (2.3) | | 78 (2.4) |
| South Africa (9) | | 72 (2.7) | | 76 (2.4) | | 69 (2.5) | | 81 (2.2) | | 85 (2.0) | | 76 (2.6) | | 81 (2.5) |
| Sweden | | 51 (3.7) | | 58 (3.9) | | 33 (3.3) | | 69 (3.4) | | 66 (3.4) | | 51 (3.5) | | 61 (3.0) |
| Turkey | | 55 (3.6) | | 67 (3.8) | | 65 (3.3) | | 83 (3.0) | | 84 (3.0) | | 72 (3.0) | | 79 (2.8) |
| United Arab Emirates | r | 43 (1.8) | r | 49 (1.7) | r | 49 (1.8) | r | 62 (2.0) | r | 62 (1.7) | r | 50 (1.8) | r | 59 (1.5) |
| United States | r | 48 (3.0) | r | 51 (3.3) | r | 56 (3.0) | r | 64 (3.1) | r | 65 (2.9) | r | 57 (3.1) | r | 62 (2.9) |
| **International Average** | | **52 (0.5)** | | **60 (0.5)** | | **51 (0.5)** | | **70 (0.5)** | | **68 (0.5)** | | **58 (0.5)** | | **66 (0.5)** |
| **Benchmarking Participants** | | | | | | | | | | | | | | |
| Ontario, Canada | s | 45 (6.3) | s | 49 (5.8) | s | 43 (6.0) | s | 63 (5.9) | s | 60 (6.0) | s | 54 (5.8) | s | 52 (5.7) |
| Moscow City, Russian Fed. | | 72 (2.3) | | 74 (2.0) | | 72 (2.0) | | 76 (2.0) | | 78 (1.8) | | 69 (2.4) | | 79 (1.9) |
| Gauteng, RSA (9) | | 59 (4.9) | r | 64 (4.9) | r | 58 (4.7) | | 79 (4.1) | | 80 (3.9) | | 67 (4.5) | | 74 (4.0) |
| Western Cape, RSA (9) | | 47 (4.5) | | 59 (4.2) | | 46 (4.8) | | 72 (3.9) | | 78 (3.5) | r | 62 (4.1) | | 73 (4.1) |
| Abu Dhabi, UAE | r | 44 (2.6) | r | 51 (2.7) | r | 49 (3.1) | r | 62 (2.9) | r | 67 (2.8) | r | 53 (2.8) | r | 65 (2.4) |
| Dubai, UAE | r | 46 (3.1) | r | 55 (1.6) | r | 52 (2.6) | r | 70 (2.8) | r | 67 (2.0) | r | 56 (2.7) | r | 59 (3.0) |
| Quebec, Canada | y | - - | y | - - | y | - - | y | - - | y | - - | y | - - | y | - - |

* Teachers could indicate needing professional development in more than one area.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Teachers' Job Satisfaction

Teachers who are satisfied with their profession are more motivated, may be more likely to continue teaching into the future, and may experience greater overall well-being. The TIMSS 2019 *Teachers' Job Satisfaction* scale, based on teachers' responses to five statements about how they feel about being a teacher, is described in Exhibit 9.21 (see About the Scale). Exhibits 9.22, 9.23, 9.24, and 9.25 present teachers' reports of their job satisfaction, including the percentage and average achievement of students with teachers who reported they were "very satisfied," "somewhat satisfied," and "less than satisfied," and the average scale score on the *Teachers' Job Satisfaction* scale, for each country. Countries are ordered by the percent "very satisfied."

Across the TIMSS 2019 countries, almost all students in fourth and eighth grades were taught mathematics and science by teachers who were "very satisfied" or "somewhat satisfied" with being a teacher, with job satisfaction somewhat higher among fourth grade teachers than eighth grade teachers. In fourth grade, 61 percent of students were taught mathematics and science by teachers who reported they were "very satisfied," and 34 percent were taught by teachers who reported they were "somewhat satisfied." Only 5 percent of students had mathematics or science teachers who reported they were "less than satisfied." In eighth grade, 54 percent of students had mathematics teachers and 53 percent of students had science teachers who said they were "very satisfied," 39 percent of students had mathematics and science teachers who said they were "somewhat satisfied," and 7 and 8 percent of students had mathematics and science teachers, respectively, who reported they were "less than satisfied."

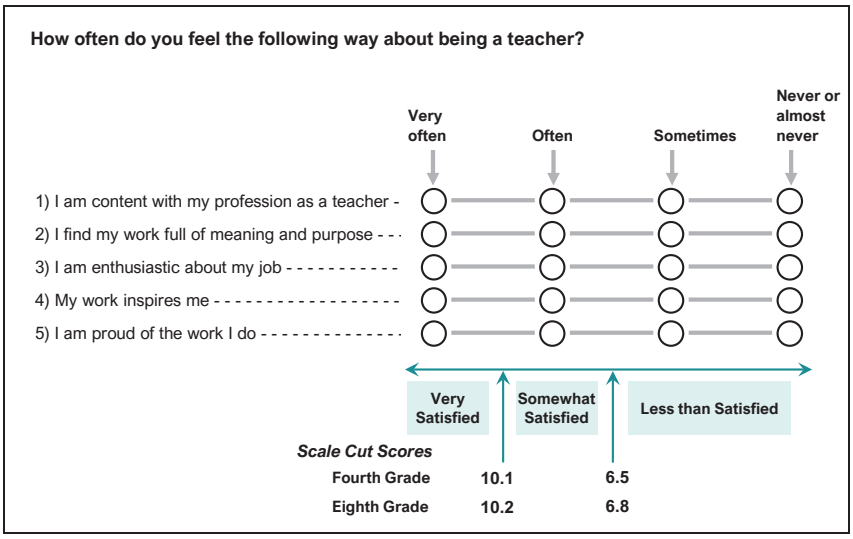
In fourth grade, average achievement was somewhat higher for students of "very satisfied" teachers compared with "somewhat satisfied" teachers (503 vs. 499 in mathematics and 493 vs. 490 in science). Counterintuitively, in both subjects, average achievement was highest for students with "less than satisfied" teachers (515 for mathematics and 508 for science), though there were few students in this category, and in some countries, there were so few that average achievement could not be estimated. In the eighth grade, average achievement was also higher for students with "very satisfied" compared with "somewhat satisfied" teachers (493 vs. 486 for mathematics and 494 vs. 486 for science). In both subjects, for the few students with "less than satisfied" teachers, average achievement was close to that of students with "somewhat satisfied" teachers (490 in mathematics and 488 in science).

## Exhibit 9.21: Teachers' Job Satisfaction

*Students' Results based on Teachers' Reports*

### About the Scale

Students were scored according to their teachers' responses to five statements on the *Teachers' Job Satisfaction* scale. Cut scores divide the scale into three categories. Students with **Very Satisfied** teachers had a score at or above the cut score corresponding to their teachers responding "very often" to three of the five statements and "often" to the other two, on average. Students with **Less than Satisfied** teachers had a score at or below the cut score corresponding to their teachers responding "sometimes" to three of the five statements and "often" to the other two, on average. All other students had **Somewhat Satisfied** teachers.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.22: Teachers' Job Satisfaction

*Students' Results based on Teachers' Reports*

| Country | Very Satisfied | | Somewhat Satisfied | | Less than Satisfied | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Kosovo | 94 (1.9) | 446 (3.0) | 6 (1.9) | 425 (12.0) | 0 (0.0) | ~ ~ | 11.2 (0.06) |
| Albania | 91 (2.5) | 494 (3.6) | 9 (2.5) | 496 (13.0) | 0 (0.0) | ~ ~ | 11.2 (0.07) |
| Iran, Islamic Rep. of | 87 (2.4) | 444 (4.0) | 11 (2.3) | 441 (9.6) | 2 (0.9) | ~ ~ | 11.0 (0.09) |
| Oman | 87 (2.3) | 431 (4.5) | 13 (2.3) | 431 (10.7) | 0 (0.3) | ~ ~ | 11.0 (0.08) |
| Philippines | 87 (2.7) | 294 (6.8) | 12 (2.6) | 304 (15.3) | 1 (0.8) | ~ ~ | 11.1 (0.10) |
| Armenia | 83 (3.1) | 498 (2.9) | 16 (3.1) | 499 (5.3) | 1 (0.5) | ~ ~ | 10.9 (0.08) |
| Kuwait | 83 (3.1) | 384 (5.5) | 17 (3.0) | 377 (14.0) | 1 (0.6) | ~ ~ | 11.0 (0.10) |
| North Macedonia | 80 (3.7) | 470 (6.1) | 20 (3.7) | 478 (9.3) | 0 (0.0) | ~ ~ | 10.8 (0.11) |
| Pakistan | 79 (5.4) | 333 (14.8) | 21 (5.3) | 318 (20.2) | 1 (0.7) | ~ ~ | 10.7 (0.14) |
| Qatar | 78 (2.7) | 447 (4.6) | 19 (2.2) | 460 (9.7) | 3 (1.1) | 442 (19.5) | 10.9 (0.10) |
| Bahrain | 78 (2.9) | 481 (2.9) | 21 (3.0) | 479 (5.7) | 1 (0.8) | ~ ~ | 10.8 (0.10) |
| Saudi Arabia | 78 (2.9) | 405 (4.6) | 21 (2.9) | 375 (7.5) | 1 (0.7) | ~ ~ | 10.9 (0.08) |
| Bosnia and Herzegovina | 78 (2.7) | 453 (2.6) | 20 (2.5) | 449 (6.2) | 2 (0.9) | ~ ~ | 10.7 (0.09) |
| United Arab Emirates r | 78 (1.1) | 486 (2.5) | 19 (1.1) | 473 (5.4) | 3 (0.3) | 398 (10.5) | 10.7 (0.04) |
| Georgia | 77 (3.3) | 480 (4.7) | 23 (3.3) | 488 (6.2) | 0 (0.0) | ~ ~ | 10.8 (0.09) |
| Chile | 77 (3.7) | 442 (3.6) | 23 (3.7) | 436 (5.7) | 0 (0.4) | ~ ~ | 10.8 (0.12) |
| Azerbaijan | 77 (2.7) | 517 (3.2) | 22 (2.6) | 512 (5.9) | 1 (0.5) | ~ ~ | 10.8 (0.08) |
| Spain | 73 (3.5) | 503 (2.6) | 25 (3.5) | 499 (4.8) | 2 (0.8) | ~ ~ | 10.6 (0.11) |
| Italy | 71 (3.5) | 515 (2.8) | 28 (3.5) | 515 (4.7) | 1 (0.7) | ~ ~ | 10.5 (0.11) |
| Serbia | 70 (3.2) | 507 (4.2) | 27 (3.0) | 507 (4.4) | 3 (1.3) | 530 (6.5) | 10.5 (0.11) |
| Montenegro | 70 (2.6) | 450 (2.7) | 30 (2.5) | 459 (3.4) | 0 (0.4) | ~ ~ | 10.4 (0.07) |
| Kazakhstan | 68 (2.8) | 512 (3.1) | 32 (2.8) | 513 (4.3) | 0 (0.4) | ~ ~ | 10.4 (0.09) |
| Austria | 68 (3.2) | 541 (2.4) | 31 (3.2) | 535 (4.2) | 2 (0.8) | ~ ~ | 10.4 (0.11) |
| Morocco | 67 (3.3) | 395 (6.0) | 28 (3.3) | 360 (6.5) | 5 (1.3) | 348 (10.8) | 10.2 (0.13) |
| Australia | 65 (3.4) | 519 (3.9) | 29 (2.9) | 516 (7.0) | 6 (1.6) | 517 (14.3) | 10.3 (0.14) |
| South Africa (5) | 64 (3.4) | 367 (5.0) | 31 (3.4) | 385 (9.1) | 5 (1.5) | 390 (36.6) | 10.4 (0.11) |
| Turkey (5) | 64 (3.6) | 526 (5.3) | 31 (3.3) | 522 (10.4) | 5 (1.8) | 489 (18.1) | 10.3 (0.15) |
| Netherlands r | 64 (5.0) | 535 (3.1) | 33 (4.9) | 541 (3.7) | 3 (1.6) | 530 (15.4) | 10.3 (0.15) |
| Croatia | 62 (3.8) | 510 (2.7) | 36 (3.9) | 509 (3.8) | 2 (0.7) | ~ ~ | 10.3 (0.10) |
| Canada | 59 (2.5) | 509 (2.8) | 36 (2.2) | 516 (2.3) | 5 (1.2) | 518 (9.4) | 10.0 (0.10) |
| Lithuania | 58 (3.7) | 548 (4.1) | 38 (3.6) | 531 (4.5) | 5 (1.6) | 539 (3.9) | 10.0 (0.13) |
| United States | 56 (2.3) | 538 (3.4) | 33 (2.3) | 531 (4.4) | 11 (1.6) | 535 (6.0) | 9.8 (0.11) |
| Russian Federation | 55 (3.8) | 564 (4.6) | 43 (3.7) | 571 (4.2) | 2 (1.1) | ~ ~ | 10.0 (0.13) |
| Bulgaria | 53 (4.0) | 526 (5.1) | 43 (3.9) | 505 (9.0) | 4 (1.4) | 478 (20.2) | 9.7 (0.14) |
| Ireland | 52 (3.9) | 549 (3.8) | 40 (3.6) | 551 (3.2) | 8 (2.3) | 533 (6.5) | 9.7 (0.15) |
| Malta | 52 (0.4) | 516 (1.7) | 34 (0.4) | 502 (2.2) | 14 (0.3) | 500 (3.4) | 9.5 (0.02) |
| Portugal | 52 (3.3) | 528 (3.2) | 41 (3.4) | 525 (3.9) | 7 (1.6) | 511 (7.1) | 9.8 (0.12) |
| Northern Ireland | 50 (4.3) | 566 (4.1) | 39 (4.1) | 568 (6.1) | 11 (3.0) | 561 (8.3) | 9.6 (0.19) |
| Hong Kong SAR | 50 (4.4) | 609 (5.6) | 40 (4.3) | 599 (4.5) | 10 (2.5) | 576 (7.8) | 9.6 (0.17) |
| Cyprus | 49 (3.7) | 536 (4.1) | 45 (3.8) | 531 (3.7) | 6 (2.0) | 529 (4.6) | 9.7 (0.14) |
| Norway (5) r | 48 (3.9) | 547 (3.3) | 48 (4.0) | 542 (3.4) | 4 (1.7) | 549 (14.2) | 9.7 (0.13) |
| Latvia | 48 (3.6) | 547 (3.5) | 50 (3.6) | 545 (4.2) | 2 (0.5) | ~ ~ | 9.9 (0.12) |
| Singapore | 47 (2.3) | 631 (5.6) | 44 (2.5) | 618 (5.1) | 9 (1.4) | 637 (10.7) | 9.6 (0.09) |
| Slovak Republic | 46 (3.6) | 516 (4.6) | 43 (3.4) | 507 (5.9) | 11 (2.2) | 494 (10.8) | 9.4 (0.14) |
| New Zealand | 46 (3.2) | 493 (4.7) | 44 (3.1) | 485 (4.8) | 10 (1.8) | 467 (10.1) | 9.5 (0.13) |
| Hungary | 44 (4.2) | 523 (5.4) | 50 (4.0) | 527 (4.7) | 6 (1.6) | 510 (15.8) | 9.5 (0.15) |
| Sweden | 43 (4.3) | 525 (5.3) | 50 (4.2) | 519 (3.8) | 6 (1.9) | 516 (6.6) | 9.7 (0.15) |
| Chinese Taipei | 42 (3.8) | 600 (2.5) | 48 (4.2) | 598 (2.8) | 10 (2.4) | 602 (6.3) | 9.4 (0.15) |
| England s | 41 (6.1) | 566 (7.4) | 57 (5.9) | 553 (6.6) | 1 (1.2) | ~ ~ | 9.8 (0.19) |
| Denmark | 41 (4.2) | 524 (3.5) | 47 (3.9) | 525 (3.6) | 12 (2.6) | 523 (5.7) | 9.2 (0.17) |
| Belgium (Flemish) | 40 (3.4) | 535 (2.8) | 51 (3.4) | 532 (2.9) | 9 (2.2) | 538 (7.3) | 9.3 (0.13) |
| Finland | 39 (3.0) | 534 (3.7) | 52 (3.3) | 531 (3.0) | 9 (1.6) | 531 (5.1) | 9.3 (0.09) |
| Korea, Rep. of | 38 (3.6) | 601 (4.2) | 49 (3.7) | 602 (3.4) | 13 (2.5) | 587 (5.0) | 9.1 (0.16) |
| Germany | 38 (3.7) | 519 (4.7) | 57 (3.9) | 523 (3.9) | 5 (1.7) | 513 (11.1) | 9.5 (0.13) |
| Czech Republic | 36 (3.9) | 536 (5.0) | 54 (4.2) | 533 (3.6) | 10 (1.9) | 522 (6.9) | 9.1 (0.14) |
| France | 35 (3.2) | 484 (5.5) | 55 (3.1) | 487 (3.5) | 10 (2.6) | 483 (10.2) | 9.0 (0.13) |
| Poland | 32 (3.4) | 523 (4.4) | 49 (3.2) | 518 (3.4) | 18 (2.8) | 520 (6.3) | 8.6 (0.15) |
| Japan | 31 (3.3) | 591 (2.8) | 58 (3.5) | 592 (2.3) | 11 (2.3) | 602 (6.0) | 8.9 (0.14) |
| **International Average** | **61 (0.5)** | **503 (0.6)** | **34 (0.4)** | **499 (0.9)** | **5 (0.2)** | **515 (2.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 79 (1.7) | 546 (2.4) | 18 (1.7) | 545 (7.0) | 2 (0.3) | ~ ~ | 10.9 (0.05) |
| Madrid, Spain | 78 (3.4) | 519 (2.1) | 19 (3.4) | 519 (5.6) | 3 (1.3) | 473 (26.3) | 10.6 (0.12) |
| Abu Dhabi, UAE r | 67 (2.3) | 453 (4.1) | 27 (2.3) | 430 (7.4) | 7 (0.8) | 366 (10.1) | 10.3 (0.08) |
| Ontario, Canada r | 65 (4.2) | 512 (5.0) | 30 (3.8) | 510 (4.3) | 5 (1.7) | 518 (18.2) | 10.2 (0.17) |
| Moscow City, Russian Fed. | 59 (4.1) | 596 (2.6) | 38 (4.1) | 587 (3.9) | 3 (1.3) | 604 (23.9) | 10.1 (0.14) |
| Quebec, Canada | 40 (4.6) | 530 (4.0) | 52 (4.4) | 534 (2.5) | 8 (2.7) | 530 (10.2) | 9.3 (0.19) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 9.23: Teachers' Job Satisfaction

*Students' Results based on Teachers' Reports*

| Country | Very Satisfied | | Somewhat Satisfied | | Less than Satisfied | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Kosovo | 94 (1.9) | 414 (3.8) | 6 (1.9) | 392 (13.6) | 0 (0.0) | ~ ~ | 11.2 (0.06) |
| Albania | 90 (2.4) | 488 (3.8) | 10 (2.4) | 499 (13.6) | 0 (0.0) | ~ ~ | 11.2 (0.07) |
| Iran, Islamic Rep. of | 87 (2.4) | 442 (4.2) | 11 (2.3) | 436 (10.0) | 2 (0.9) | ~ ~ | 11.0 (0.09) |
| Philippines | 87 (2.9) | 246 (7.8) | 11 (2.9) | 265 (19.2) | 2 (1.2) | ~ ~ | 11.1 (0.10) |
| Kuwait | 82 (3.3) | 394 (7.1) | 17 (3.4) | 390 (15.3) | 1 (0.6) | ~ ~ | 11.0 (0.10) |
| Oman | 81 (2.6) | 434 (4.8) | 17 (2.6) | 450 (10.9) | 2 (0.8) | ~ ~ | 10.8 (0.08) |
| Qatar | 81 (2.6) | 449 (5.0) | 16 (2.4) | 456 (12.8) | 3 (1.1) | 437 (16.7) | 10.9 (0.10) |
| Armenia | 81 (3.2) | 468 (3.9) | 19 (3.2) | 460 (5.9) | 0 (0.2) | ~ ~ | 10.9 (0.09) |
| North Macedonia | 80 (3.7) | 424 (7.0) | 20 (3.7) | 436 (11.3) | 0 (0.0) | ~ ~ | 10.8 (0.11) |
| Pakistan | 80 (4.6) | 294 (16.1) | 19 (4.5) | 287 (18.3) | 1 (0.8) | ~ ~ | 10.6 (0.17) |
| Saudi Arabia | 79 (3.2) | 406 (4.4) | 20 (3.2) | 379 (12.2) | 1 (0.8) | ~ ~ | 10.9 (0.09) |
| Georgia | 78 (3.4) | 455 (4.9) | 22 (3.4) | 454 (6.2) | 0 (0.0) | ~ ~ | 10.8 (0.09) |
| Bosnia and Herzegovina | 78 (2.7) | 461 (2.9) | 20 (2.5) | 453 (7.1) | 2 (0.9) | ~ ~ | 10.7 (0.09) |
| Chile | 77 (3.6) | 466 (3.3) | 22 (3.6) | 474 (5.5) | 0 (0.4) | ~ ~ | 10.8 (0.11) |
| Bahrain | 77 (2.7) | 493 (3.7) | 18 (2.7) | 496 (10.4) | 5 (1.1) | 473 (7.7) | 10.5 (0.09) |
| Azerbaijan | 76 (2.9) | 428 (3.7) | 23 (2.9) | 425 (6.8) | 1 (0.5) | ~ ~ | 10.7 (0.08) |
| United Arab Emirates r | 75 (1.3) | 481 (2.5) | 21 (1.3) | 456 (5.8) | 4 (0.5) | 389 (12.2) | 10.6 (0.05) |
| Italy | 71 (3.5) | 509 (3.3) | 28 (3.5) | 511 (4.8) | 1 (0.7) | ~ ~ | 10.5 (0.11) |
| Spain | 71 (3.6) | 512 (2.4) | 27 (3.5) | 507 (4.4) | 2 (1.1) | ~ ~ | 10.5 (0.11) |
| Turkey (5) | 70 (3.4) | 531 (4.5) | 27 (3.4) | 514 (9.7) | 3 (1.2) | 537 (21.5) | 10.6 (0.12) |
| Serbia | 70 (3.2) | 517 (4.5) | 27 (3.0) | 514 (4.9) | 3 (1.3) | 543 (6.5) | 10.5 (0.11) |
| Montenegro | 70 (2.6) | 450 (3.2) | 30 (2.5) | 462 (4.2) | 0 (0.4) | ~ ~ | 10.4 (0.07) |
| Kazakhstan | 68 (2.8) | 494 (4.0) | 31 (2.8) | 495 (5.3) | 0 (0.4) | ~ ~ | 10.4 (0.09) |
| South Africa (5) | 68 (3.5) | 318 (6.6) | 27 (3.1) | 339 (12.0) | 5 (1.4) | 321 (35.2) | 10.3 (0.15) |
| Austria | 68 (3.1) | 524 (2.9) | 30 (3.1) | 518 (5.5) | 2 (0.8) | ~ ~ | 10.3 (0.10) |
| Morocco | 64 (3.4) | 393 (7.9) | 32 (3.4) | 343 (8.0) | 4 (1.3) | 331 (17.4) | 10.3 (0.13) |
| Netherlands r | 64 (5.0) | 517 (4.0) | 33 (4.9) | 521 (4.4) | 3 (1.6) | 507 (21.8) | 10.3 (0.15) |
| Croatia | 62 (3.8) | 525 (2.7) | 36 (3.9) | 522 (3.0) | 2 (0.7) | ~ ~ | 10.3 (0.10) |
| Australia | 61 (3.7) | 533 (3.3) | 34 (3.3) | 533 (4.8) | 6 (1.4) | 542 (11.1) | 10.2 (0.14) |
| Canada r | 58 (2.6) | 526 (2.7) | 36 (2.4) | 523 (2.3) | 6 (1.3) | 521 (6.4) | 10.0 (0.10) |
| Lithuania | 58 (3.7) | 544 (3.7) | 38 (3.6) | 526 (4.5) | 5 (1.6) | 537 (3.8) | 10.0 (0.13) |
| Chinese Taipei | 57 (3.3) | 558 (2.5) | 39 (3.2) | 559 (2.6) | 4 (1.5) | 552 (7.4) | 10.0 (0.13) |
| United States | 56 (2.4) | 541 (3.6) | 33 (2.3) | 534 (4.4) | 11 (1.5) | 541 (6.0) | 9.8 (0.11) |
| Russian Federation | 54 (3.8) | 565 (3.8) | 42 (3.7) | 570 (3.9) | 3 (1.2) | 579 (8.8) | 10.0 (0.13) |
| Malta | 53 (0.5) | 504 (1.9) | 32 (0.4) | 487 (2.1) | 15 (0.3) | 485 (3.4) | 9.5 (0.02) |
| Cyprus | 53 (4.4) | 517 (4.7) | 40 (4.5) | 507 (3.6) | 7 (2.2) | 508 (9.0) | 9.7 (0.18) |
| Ireland | 52 (3.9) | 528 (5.0) | 40 (3.6) | 532 (3.4) | 8 (2.3) | 511 (8.1) | 9.7 (0.15) |
| Bulgaria | 52 (4.0) | 537 (6.8) | 42 (4.0) | 509 (9.7) | 6 (1.7) | 475 (26.0) | 9.7 (0.16) |
| Portugal | 52 (3.3) | 507 (3.1) | 41 (3.4) | 504 (3.5) | 7 (1.6) | 490 (6.8) | 9.8 (0.12) |
| Northern Ireland | 50 (4.3) | 518 (3.3) | 39 (4.1) | 520 (4.6) | 11 (3.0) | 515 (6.5) | 9.6 (0.19) |
| Norway (5) s | 49 (4.3) | 540 (4.0) | 48 (4.4) | 540 (3.1) | 3 (1.7) | 532 (19.5) | 9.6 (0.15) |
| Latvia | 48 (3.7) | 543 (3.2) | 48 (3.7) | 542 (3.2) | 4 (1.7) | 532 (27.8) | 9.8 (0.13) |
| Sweden | 48 (4.3) | 540 (4.7) | 46 (4.4) | 538 (4.6) | 5 (1.8) | 548 (7.4) | 9.8 (0.15) |
| Hong Kong SAR | 47 (4.3) | 535 (5.1) | 44 (4.1) | 533 (4.7) | 8 (2.1) | 511 (8.6) | 9.6 (0.16) |
| Hungary | 47 (3.8) | 528 (4.2) | 46 (3.7) | 532 (4.1) | 6 (1.9) | 519 (15.3) | 9.6 (0.15) |
| Slovak Republic | 46 (3.4) | 517 (5.8) | 45 (3.5) | 526 (5.8) | 9 (2.0) | 505 (16.7) | 9.4 (0.12) |
| New Zealand | 45 (3.4) | 507 (4.2) | 46 (3.2) | 501 (3.8) | 10 (1.7) | 486 (10.1) | 9.4 (0.14) |
| Singapore | 43 (2.6) | 593 (4.8) | 47 (2.7) | 593 (4.9) | 9 (1.5) | 611 (10.4) | 9.4 (0.11) |
| Germany | 42 (4.3) | 518 (3.8) | 50 (4.4) | 519 (4.1) | 8 (2.3) | 516 (8.5) | 9.5 (0.15) |
| Belgium (Flemish) | 42 (3.4) | 503 (2.9) | 50 (3.4) | 499 (3.4) | 9 (2.2) | 506 (7.1) | 9.4 (0.13) |
| England s | 41 (6.1) | 544 (6.3) | 56 (5.9) | 536 (5.9) | 2 (1.7) | ~ ~ | 9.7 (0.20) |
| Korea, Rep. of | 41 (3.4) | 589 (3.3) | 45 (3.5) | 588 (3.1) | 14 (2.4) | 581 (6.1) | 9.1 (0.15) |
| Finland | 39 (3.1) | 557 (3.6) | 51 (3.3) | 554 (3.3) | 10 (1.6) | 550 (5.9) | 9.3 (0.10) |
| Denmark | 39 (3.8) | 524 (3.7) | 52 (4.1) | 524 (3.9) | 9 (2.1) | 508 (5.3) | 9.3 (0.13) |
| France | 35 (3.4) | 489 (5.0) | 53 (3.2) | 490 (3.7) | 12 (3.0) | 481 (10.2) | 9.0 (0.14) |
| Czech Republic | 35 (3.6) | 538 (4.3) | 53 (3.9) | 532 (3.6) | 12 (2.3) | 529 (5.7) | 9.0 (0.15) |
| Poland | 32 (4.0) | 531 (4.9) | 46 (4.6) | 531 (4.0) | 22 (3.7) | 533 (4.2) | 8.6 (0.18) |
| Japan | 30 (3.8) | 559 (3.0) | 59 (4.2) | 563 (2.5) | 11 (2.3) | 562 (4.5) | 8.9 (0.14) |
| **International Average** | **61 (0.5)** | **493 (0.6)** | **34 (0.5)** | **490 (1.0)** | **5 (0.2)** | **508 (2.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 79 (2.0) | 552 (2.7) | 18 (1.9) | 539 (6.6) | 3 (0.7) | 510 (12.6) | 10.8 (0.06) |
| Madrid, Spain | 71 (3.6) | 527 (2.0) | 27 (3.3) | 515 (3.8) | 2 (1.4) | ~ ~ | 10.5 (0.12) |
| Abu Dhabi, UAE | 66 (2.3) | 432 (4.1) | 28 (2.3) | 406 (8.3) | 7 (1.0) | 342 (10.0) | 10.2 (0.09) |
| Ontario, Canada r | 65 (4.6) | 527 (5.0) | 29 (4.2) | 526 (4.3) | 6 (1.8) | 529 (11.3) | 10.2 (0.18) |
| Moscow City, Russian Fed. | 59 (4.1) | 598 (2.6) | 39 (4.1) | 589 (3.9) | 3 (1.3) | 610 (25.0) | 10.1 (0.14) |
| Quebec, Canada | 40 (4.6) | 523 (3.4) | 51 (4.4) | 523 (3.1) | 9 (2.9) | 518 (8.9) | 9.3 (0.19) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 9.24: Teachers' Job Satisfaction

*Students' Results based on Teachers' Reports*

| Country | | Very Satisfied | | Somewhat Satisfied | | Less than Satisfied | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Saudi Arabia | | 86 (2.3) | 391 (2.7) | 12 (2.4) | 398 (9.0) | 2 (1.2) | ~ ~ | 11.0 (0.09) |
| Kuwait | | 86 (2.2) | 400 (5.2) | 14 (2.2) | 415 (13.1) | 0 (0.0) | ~ ~ | 11.1 (0.07) |
| Bahrain | | 78 (3.0) | 483 (2.2) | 21 (3.0) | 474 (4.8) | 1 (0.7) | ~ ~ | 10.8 (0.08) |
| United Arab Emirates | | 77 (1.2) | 483 (2.8) | 20 (1.1) | 448 (6.4) | 3 (0.4) | 419 (13.7) | 10.8 (0.04) |
| Qatar | | 74 (4.0) | 448 (5.8) | 24 (3.7) | 426 (8.4) | 2 (0.9) | ~ ~ | 10.8 (0.12) |
| Egypt | | 72 (3.9) | 422 (6.4) | 25 (3.6) | 398 (7.9) | 3 (1.4) | 341 (21.2) | 10.4 (0.13) |
| Chile | | 72 (3.8) | 439 (3.9) | 27 (3.9) | 445 (5.8) | 1 (0.8) | ~ ~ | 10.6 (0.12) |
| Lebanon | | 70 (3.6) | 432 (4.2) | 29 (3.6) | 425 (8.0) | 1 (0.7) | ~ ~ | 10.5 (0.11) |
| Israel | | 68 (2.8) | 524 (6.5) | 26 (2.8) | 506 (10.5) | 6 (1.7) | 524 (18.1) | 10.4 (0.10) |
| South Africa (9) | | 64 (2.9) | 388 (3.3) | 31 (2.7) | 395 (5.0) | 5 (1.4) | 379 (8.3) | 10.3 (0.10) |
| Morocco | | 63 (3.5) | 393 (3.5) | 31 (3.5) | 382 (4.2) | 6 (1.6) | 378 (9.2) | 10.1 (0.12) |
| Oman | | 63 (3.3) | 415 (4.0) | 28 (3.2) | 405 (6.3) | 10 (2.3) | 394 (8.2) | 10.1 (0.13) |
| Iran, Islamic Rep. of | | 63 (3.4) | 448 (4.9) | 29 (3.3) | 445 (8.9) | 8 (1.8) | 436 (13.5) | 10.2 (0.12) |
| Kazakhstan | | 62 (3.7) | 480 (4.5) | 36 (3.8) | 495 (5.7) | 2 (1.2) | ~ ~ | 10.3 (0.13) |
| Georgia | | 62 (4.3) | 461 (5.2) | 37 (4.4) | 462 (8.4) | 1 (0.8) | ~ ~ | 10.3 (0.11) |
| Jordan | | 58 (4.1) | 422 (5.8) | 31 (3.9) | 422 (7.5) | 11 (2.5) | 406 (8.1) | 10.0 (0.15) |
| Romania | | 57 (3.6) | 486 (6.2) | 37 (3.3) | 469 (6.9) | 5 (1.7) | 482 (15.5) | 10.1 (0.13) |
| Ireland | | 57 (2.9) | 531 (3.6) | 35 (2.5) | 519 (5.4) | 8 (1.7) | 504 (12.2) | 9.9 (0.12) |
| Turkey | | 55 (4.4) | 501 (8.3) | 38 (4.0) | 487 (8.3) | 7 (2.1) | 512 (20.7) | 10.1 (0.16) |
| Cyprus | r | 51 (3.7) | 511 (3.6) | 35 (4.0) | 496 (5.1) | 14 (3.4) | 503 (7.2) | 9.7 (0.17) |
| Malaysia | | 49 (3.4) | 456 (5.9) | 48 (3.4) | 463 (6.3) | 3 (1.4) | 487 (24.4) | 10.0 (0.12) |
| United States | | 49 (2.9) | 521 (7.0) | 40 (2.8) | 512 (6.1) | 11 (1.9) | 513 (11.9) | 9.7 (0.12) |
| New Zealand | | 48 (3.8) | 481 (6.9) | 39 (3.5) | 481 (5.3) | 14 (2.8) | 488 (8.8) | 9.5 (0.16) |
| Chinese Taipei | | 47 (3.5) | 618 (4.3) | 43 (3.3) | 608 (4.2) | 10 (2.0) | 608 (12.4) | 9.7 (0.12) |
| Norway (9) | r | 45 (4.2) | 510 (4.0) | 53 (4.3) | 501 (3.6) | 2 (1.0) | ~ ~ | 9.9 (0.13) |
| Australia | | 45 (3.4) | 529 (5.6) | 46 (3.5) | 515 (6.0) | 9 (1.9) | 492 (12.1) | 9.6 (0.12) |
| Italy | | 43 (4.1) | 495 (4.4) | 50 (3.8) | 501 (3.8) | 7 (2.1) | 492 (10.7) | 9.7 (0.15) |
| Sweden | | 41 (3.6) | 508 (4.1) | 53 (3.8) | 501 (3.7) | 6 (1.5) | 488 (12.8) | 9.6 (0.12) |
| Singapore | | 40 (2.6) | 627 (7.2) | 49 (2.5) | 609 (5.4) | 11 (1.5) | 604 (11.0) | 9.4 (0.11) |
| Russian Federation | | 39 (3.1) | 542 (6.7) | 53 (3.2) | 545 (5.6) | 8 (1.7) | 539 (13.5) | 9.5 (0.11) |
| Hong Kong SAR | | 39 (4.1) | 579 (9.4) | 49 (4.1) | 580 (6.2) | 13 (2.5) | 562 (13.3) | 9.3 (0.15) |
| Portugal | | 37 (4.1) | 505 (5.5) | 49 (4.3) | 498 (5.0) | 14 (2.9) | 496 (7.2) | 9.2 (0.15) |
| Hungary | | 37 (3.3) | 532 (6.0) | 54 (3.5) | 507 (5.1) | 9 (1.9) | 490 (14.6) | 9.3 (0.12) |
| Korea, Rep. of | | 37 (3.3) | 608 (4.8) | 52 (3.6) | 603 (3.8) | 11 (2.3) | 622 (8.6) | 9.1 (0.14) |
| England | s | 37 (4.9) | 533 (11.3) | 58 (4.6) | 522 (10.6) | 6 (2.5) | 440 (23.7) | 9.4 (0.18) |
| Lithuania | | 36 (3.8) | 526 (6.0) | 52 (3.8) | 517 (4.9) | 11 (3.0) | 522 (9.4) | 9.3 (0.14) |
| France | r | 32 (4.1) | 485 (6.4) | 53 (4.5) | 482 (3.9) | 15 (3.3) | 479 (7.1) | 9.1 (0.15) |
| Finland | | 30 (2.3) | 512 (4.1) | 56 (2.7) | 508 (3.1) | 14 (2.1) | 508 (6.3) | 9.0 (0.10) |
| Japan | | 27 (3.1) | 603 (5.2) | 58 (3.3) | 591 (3.6) | 15 (2.3) | 592 (6.9) | 8.9 (0.12) |
| **International Average** | | **54 (0.6)** | **493 (0.9)** | **39 (0.6)** | **486 (1.1)** | **7 (0.3)** | **490 (2.4)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | | 77 (1.5) | 542 (3.3) | 21 (1.7) | 523 (7.9) | 2 (0.6) | ~ ~ | 10.8 (0.05) |
| Abu Dhabi, UAE | r | 72 (2.4) | 448 (5.0) | 25 (2.4) | 405 (9.6) | 3 (0.9) | 370 (17.6) | 10.6 (0.08) |
| Ontario, Canada | | 67 (4.3) | 531 (4.3) | 29 (4.3) | 535 (10.9) | 3 (1.4) | 525 (15.9) | 10.4 (0.14) |
| Gauteng, RSA (9) | | 65 (4.2) | 420 (5.1) | 31 (4.0) | 423 (7.3) | 4 (1.3) | 408 (20.0) | 10.3 (0.14) |
| Moscow City, Russian Fed. | | 50 (3.8) | 586 (6.2) | 46 (3.7) | 565 (5.4) | 3 (1.4) | 554 (18.2) | 9.8 (0.13) |
| Quebec, Canada | | 49 (5.2) | 547 (5.7) | 45 (5.2) | 540 (6.3) | 6 (2.3) | 523 (16.4) | 9.8 (0.17) |
| Western Cape, RSA (9) | | 47 (4.1) | 439 (8.6) | 46 (3.8) | 444 (7.8) | 7 (2.2) | 449 (15.5) | 9.6 (0.14) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 9.25: Teachers' Job Satisfaction

*Students' Results based on Teachers' Reports*

| Country | | Very Satisfied | | Somewhat Satisfied | | Less than Satisfied | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Kuwait | | 85 (3.0) | 450 (6.0) | 15 (3.0) | 419 (16.0) | 0 (0.0) | ~ ~ | 11.1 (0.10) |
| Saudi Arabia | | 81 (3.1) | 437 (3.0) | 15 (2.7) | 403 (9.1) | 3 (1.6) | 421 (15.4) | 11.0 (0.11) |
| United Arab Emirates | r | 76 (1.4) | 481 (3.2) | 20 (1.4) | 449 (8.1) | 4 (0.5) | 438 (15.6) | 10.7 (0.05) |
| Qatar | | 75 (3.5) | 475 (5.4) | 22 (3.1) | 474 (7.9) | 3 (1.5) | 478 (17.4) | 10.8 (0.11) |
| Egypt | | 73 (3.2) | 395 (6.0) | 25 (3.4) | 376 (9.9) | 2 (1.3) | ~ ~ | 10.5 (0.11) |
| Bahrain | | 72 (2.9) | 492 (2.4) | 24 (3.0) | 475 (6.0) | 4 (1.3) | 456 (13.3) | 10.6 (0.11) |
| Oman | | 70 (3.1) | 463 (3.6) | 22 (2.9) | 445 (9.1) | 8 (2.2) | 438 (9.0) | 10.3 (0.13) |
| Chile | | 69 (3.4) | 468 (3.2) | 29 (3.4) | 452 (6.9) | 2 (1.1) | ~ ~ | 10.6 (0.11) |
| Turkey | | 68 (3.3) | 522 (4.5) | 28 (3.1) | 504 (5.8) | 4 (1.6) | 485 (17.0) | 10.5 (0.11) |
| Morocco | | 65 (2.4) | 393 (3.5) | 30 (2.4) | 398 (3.3) | 5 (1.2) | 392 (7.7) | 10.3 (0.08) |
| Iran, Islamic Rep. of | | 63 (3.3) | 449 (4.5) | 32 (3.3) | 455 (8.0) | 5 (1.5) | 421 (10.9) | 10.2 (0.13) |
| Lebanon | | 63 (3.2) | 385 (6.0) | 35 (3.1) | 362 (8.1) | 2 (0.6) | ~ ~ | 10.3 (0.09) |
| Georgia | | 62 (2.7) | 450 (4.1) | 36 (2.5) | 441 (4.6) | 1 (0.5) | ~ ~ | 10.3 (0.07) |
| Israel | | 60 (3.4) | 516 (6.4) | 34 (3.7) | 513 (7.2) | 7 (1.9) | 499 (18.7) | 10.1 (0.12) |
| Kazakhstan | | 59 (1.9) | 473 (3.7) | 39 (1.9) | 485 (4.7) | 2 (0.5) | ~ ~ | 10.2 (0.06) |
| South Africa (9) | | 57 (2.9) | 366 (4.3) | 35 (2.7) | 374 (6.0) | 8 (1.7) | 379 (10.9) | 10.0 (0.11) |
| Ireland | | 55 (3.6) | 532 (3.5) | 38 (3.4) | 527 (4.4) | 7 (2.1) | 501 (14.2) | 9.8 (0.13) |
| Jordan | | 55 (3.9) | 467 (4.9) | 37 (3.9) | 440 (8.6) | 8 (1.7) | 405 (17.3) | 9.9 (0.13) |
| Australia | r | 55 (3.0) | 535 (4.2) | 34 (3.0) | 531 (6.3) | 11 (2.0) | 520 (8.9) | 9.9 (0.11) |
| Romania | | 54 (2.4) | 477 (5.5) | 41 (2.3) | 466 (5.2) | 5 (1.2) | 447 (10.2) | 10.0 (0.09) |
| Cyprus | s | 53 (2.5) | 487 (3.2) | 37 (2.3) | 489 (4.7) | 9 (1.3) | 476 (7.5) | 9.8 (0.09) |
| Chinese Taipei | | 49 (3.6) | 576 (3.0) | 34 (3.0) | 571 (3.8) | 17 (2.4) | 575 (6.4) | 9.5 (0.15) |
| United States | | 49 (2.6) | 532 (5.5) | 39 (2.6) | 515 (8.8) | 12 (1.9) | 522 (11.3) | 9.7 (0.10) |
| Malaysia | | 48 (3.7) | 470 (5.5) | 49 (3.9) | 448 (6.8) | 3 (1.0) | 487 (20.3) | 9.9 (0.12) |
| Singapore | | 48 (2.8) | 612 (6.2) | 41 (2.8) | 604 (6.6) | 11 (1.7) | 598 (12.4) | 9.7 (0.11) |
| Sweden | | 44 (3.6) | 524 (4.9) | 47 (3.7) | 522 (4.7) | 9 (2.3) | 505 (10.2) | 9.6 (0.13) |
| Italy | | 43 (3.8) | 497 (4.7) | 49 (3.5) | 504 (3.4) | 8 (2.3) | 500 (9.3) | 9.6 (0.15) |
| Norway (9) | r | 41 (4.2) | 496 (4.3) | 57 (4.2) | 499 (4.8) | 2 (1.4) | ~ ~ | 9.6 (0.13) |
| Korea, Rep. of | | 40 (3.6) | 566 (3.1) | 46 (3.4) | 560 (3.4) | 14 (2.7) | 549 (5.5) | 9.3 (0.16) |
| England | s | 39 (5.0) | 526 (10.4) | 46 (5.5) | 528 (8.4) | 15 (3.9) | 496 (23.5) | 9.3 (0.22) |
| Hong Kong SAR | | 39 (3.8) | 504 (9.8) | 48 (4.2) | 511 (8.4) | 14 (3.2) | 482 (18.5) | 9.3 (0.15) |
| Russian Federation | | 38 (1.8) | 545 (4.3) | 55 (2.0) | 543 (4.6) | 7 (1.1) | 529 (7.7) | 9.4 (0.07) |
| New Zealand | | 37 (3.4) | 504 (5.3) | 51 (4.1) | 501 (6.9) | 12 (2.4) | 494 (12.5) | 9.4 (0.12) |
| Lithuania | | 34 (2.2) | 538 (4.0) | 53 (2.0) | 533 (3.3) | 13 (1.6) | 520 (4.4) | 9.2 (0.09) |
| Finland | | 32 (2.0) | 546 (4.5) | 55 (2.1) | 542 (3.3) | 13 (1.6) | 539 (5.5) | 9.0 (0.09) |
| Portugal | | 31 (2.8) | 524 (5.3) | 46 (2.6) | 519 (3.7) | 22 (2.4) | 513 (4.5) | 8.7 (0.13) |
| Hungary | | 31 (2.2) | 533 (4.7) | 58 (2.4) | 531 (3.4) | 11 (1.5) | 504 (7.4) | 9.1 (0.09) |
| France | r | 26 (2.6) | 493 (4.5) | 54 (3.3) | 489 (3.6) | 20 (2.9) | 480 (5.6) | 8.7 (0.12) |
| Japan | | 22 (3.5) | 568 (3.5) | 63 (3.9) | 571 (3.0) | 16 (2.7) | 565 (4.2) | 8.6 (0.14) |
| **International Average** | | **53 (0.5)** | **494 (0.8)** | **39 (0.5)** | **486 (1.1)** | **8 (0.3)** | **488 (2.2)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | r | 77 (2.4) | 554 (3.8) | 19 (2.4) | 533 (9.5) | 5 (1.0) | 565 (15.1) | 10.8 (0.07) |
| Abu Dhabi, UAE | | 69 (2.4) | 433 (6.2) | 24 (2.3) | 384 (10.3) | 6 (1.2) | 364 (15.3) | 10.5 (0.09) |
| Ontario, Canada | s | 68 (5.2) | 524 (5.8) | 26 (4.6) | 514 (7.7) | 6 (2.6) | 521 (9.9) | 10.4 (0.20) |
| Gauteng, RSA (9) | | 53 (4.2) | 416 (6.9) | 38 (4.1) | 424 (8.8) | 9 (2.6) | 441 (18.5) | 9.9 (0.16) |
| Moscow City, Russian Fed. | | 46 (2.3) | 567 (3.4) | 49 (2.1) | 567 (3.3) | 5 (0.9) | 557 (6.9) | 9.8 (0.08) |
| Western Cape, RSA (9) | | 45 (4.5) | 458 (11.1) | 45 (4.3) | 434 (8.5) | 11 (2.4) | 392 (10.7) | 9.6 (0.15) |
| Quebec, Canada | y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Challenges to Teaching and Learning

## Student Absenteeism

Exhibits 10.1, 10.2, 10.3, and 10.4 present students' reports about the frequency they are absent from school—"never or almost never," "once every two months," "once a month," "once every two weeks," and "once a week," with the percentage of students and average achievement reported for each category. Countries are sorted by the percentage of students reporting they are "never or almost never" absent. In fourth grade (Exhibits 10.1 and 10.2), 61 percent of students, on average, reported they are "never or almost never" absent, 13 percent that they are absent "once every two months," 10 percent that they are absent "once a month," 5 percent that they are absent "once every two weeks," and 11 percent that they are absent "once a week." Just over half (55%) of eighth grade students said they are absent "never or almost never," 16 percent that they are absent "once every two months," 14 percent "once a month," 7 percent "once every two weeks," and 8 percent "once a week" (Exhibits 10.3 and 10.4). In both grades, students in Korea reported the lowest rate of absenteeism, with 88 percent of fourth grade students and 94 percent of eighth grade students reporting that they are "never or almost never" absent, and just 1 percent or less saying that they are absent "once a week." In contrast, in some countries, more than one-fifth or more of students miss school "once a week."

Because coming to school is the foundation for having an opportunity to learn, it is not surprising that an increase in frequency of being absent is highly related to a decrease in average achievement, especially for students absent "once every two weeks" or more. For example, the average mathematics score in eighth grade decreased from 502 for students "never or almost never" absent to 495 for students absent "once every two months," to 475 for students absent "once a month," to 452 for students absent "once every two weeks," and to 412 for students absent "once a week"—a 90-point difference between regular attendance and missing school very often. Frequently missing school may indicate that a student has other challenges, which can cause or compound the problem of missed instruction.

## Exhibit 10.1: Frequency of Student Absences

*Students' Reports*

| Country | Never or Almost Never | | Once Every Two Months | | Once a Month | | Once Every Two Weeks | | Once a Week | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Korea, Rep. of | 88 (0.7) | 604 (2.2) | 7 (0.6) | 585 (5.8) | 3 (0.3) | 575 (11.3) | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| France | 82 (0.9) | 491 (3.0) | 6 (0.5) | 494 (6.3) | 5 (0.4) | 474 (6.2) | 2 (0.3) | ~ ~ | 5 (0.5) | 406 (7.0) |
| Portugal | 82 (0.8) | 530 (2.7) | 6 (0.5) | 531 (6.2) | 5 (0.4) | 520 (6.0) | 2 (0.2) | ~ ~ | 5 (0.4) | 469 (5.4) |
| Chinese Taipei | 81 (0.8) | 604 (1.8) | 11 (0.7) | 598 (4.1) | 3 (0.3) | 589 (7.8) | 1 (0.2) | ~ ~ | 3 (0.3) | 519 (6.6) |
| Japan | 79 (0.7) | 602 (1.7) | 12 (0.5) | 582 (3.8) | 5 (0.4) | 557 (5.4) | 1 (0.2) | ~ ~ | 3 (0.3) | 506 (6.8) |
| Spain | 79 (0.9) | 509 (2.3) | 6 (0.5) | 510 (6.1) | 6 (0.4) | 491 (5.0) | 3 (0.3) | 468 (8.9) | 7 (0.5) | 448 (6.6) |
| Belgium (Flemish) | 79 (0.8) | 538 (1.8) | 11 (0.6) | 529 (3.6) | 5 (0.3) | 511 (5.6) | 2 (0.3) | ~ ~ | 3 (0.3) | 480 (6.8) |
| Austria | 78 (0.8) | 543 (2.1) | 10 (0.5) | 548 (3.6) | 6 (0.5) | 535 (5.5) | 2 (0.2) | ~ ~ | 4 (0.4) | 482 (5.7) |
| Germany | 77 (0.8) | 529 (2.4) | 9 (0.6) | 529 (4.8) | 6 (0.4) | 518 (5.3) | 2 (0.3) | ~ ~ | 5 (0.4) | 471 (6.9) |
| Lithuania | 76 (1.0) | 546 (2.8) | 10 (0.6) | 548 (5.2) | 6 (0.5) | 552 (7.9) | 3 (0.3) | 515 (10.5) | 4 (0.4) | 482 (6.6) |
| Hong Kong SAR | 74 (1.2) | 610 (3.5) | 14 (0.8) | 591 (4.4) | 5 (0.5) | 590 (7.7) | 3 (0.3) | 557 (8.9) | 4 (0.6) | 537 (7.0) |
| Singapore | 74 (0.8) | 638 (3.5) | 13 (0.5) | 623 (4.0) | 6 (0.3) | 596 (6.6) | 2 (0.2) | ~ ~ | 5 (0.5) | 516 (7.6) |
| Cyprus | 74 (0.9) | 540 (2.7) | 11 (0.7) | 526 (4.8) | 8 (0.4) | 519 (5.6) | 3 (0.3) | 485 (8.7) | 4 (0.4) | 475 (7.9) |
| Montenegro | 72 (0.7) | 464 (2.0) | 5 (0.4) | 463 (6.3) | 7 (0.4) | 451 (4.4) | 4 (0.3) | 437 (8.1) | 12 (0.5) | 405 (4.3) |
| Netherlands | 71 (1.1) | 543 (1.9) | 15 (0.8) | 539 (3.4) | 8 (0.6) | 525 (5.7) | 2 (0.3) | ~ ~ | 4 (0.4) | 496 (7.9) |
| Russian Federation | 71 (1.2) | 570 (3.5) | 12 (0.7) | 573 (4.4) | 8 (0.5) | 565 (5.2) | 3 (0.4) | 539 (10.2) | 6 (0.4) | 535 (6.8) |
| Albania | 69 (1.5) | 502 (3.4) | 11 (0.9) | 513 (5.9) | 6 (0.6) | 499 (7.5) | 3 (0.3) | 451 (12.7) | 10 (0.7) | 449 (5.4) |
| England | 68 (1.0) | 565 (3.4) | 17 (0.7) | 554 (5.3) | 8 (0.6) | 547 (6.3) | 3 (0.3) | 524 (14.0) | 4 (0.4) | 472 (9.0) |
| Serbia | 68 (1.5) | 518 (3.3) | 9 (1.0) | 525 (6.7) | 10 (0.9) | 504 (7.9) | 5 (0.4) | 488 (6.8) | 9 (0.7) | 440 (7.7) |
| Latvia | 67 (1.0) | 550 (3.1) | 11 (0.5) | 551 (4.3) | 10 (0.5) | 548 (4.7) | 4 (0.4) | 530 (5.5) | 8 (0.5) | 518 (6.1) |
| Northern Ireland | 67 (1.0) | 580 (2.9) | 18 (0.9) | 563 (4.6) | 9 (0.6) | 541 (6.0) | 3 (0.4) | 514 (10.9) | 4 (0.4) | 450 (9.3) |
| Italy | 66 (0.9) | 519 (2.4) | 8 (0.5) | 523 (5.3) | 10 (0.5) | 519 (5.6) | 6 (0.4) | 502 (6.3) | 10 (0.7) | 480 (4.4) |
| Kosovo | 66 (1.0) | 457 (2.9) | 11 (0.9) | 452 (6.1) | 5 (0.4) | 439 (5.5) | 3 (0.3) | 421 (11.4) | 15 (0.8) | 403 (5.8) |
| Malta | 66 (0.8) | 517 (1.7) | 14 (0.6) | 514 (4.0) | 9 (0.5) | 501 (4.4) | 4 (0.3) | 478 (8.5) | 6 (0.4) | 458 (5.0) |
| Norway (5) | 66 (1.2) | 549 (2.5) | 15 (0.9) | 557 (3.7) | 11 (0.6) | 533 (4.5) | 4 (0.5) | 504 (9.0) | 5 (0.4) | 495 (7.0) |
| Morocco | 64 (1.2) | 394 (4.5) | 11 (0.8) | 400 (10.4) | 9 (0.5) | 372 (12.8) | 4 (0.4) | 334 (12.0) | 12 (0.7) | 353 (7.1) |
| United States | 63 (0.9) | 547 (2.5) | 15 (0.6) | 548 (3.4) | 9 (0.4) | 536 (4.5) | 5 (0.3) | 507 (7.4) | 8 (0.4) | 457 (4.7) |
| Bulgaria | 62 (1.5) | 527 (3.4) | 14 (0.9) | 538 (4.9) | 9 (0.6) | 505 (6.5) | 5 (0.6) | 484 (8.4) | 11 (1.3) | 445 (11.0) |
| Chile | 61 (0.9) | 451 (2.6) | 7 (0.4) | 460 (6.1) | 8 (0.4) | 447 (5.7) | 6 (0.4) | 432 (6.6) | 18 (0.9) | 409 (4.4) |
| Bosnia and Herzegovina | 61 (1.0) | 462 (2.7) | 13 (0.7) | 463 (3.4) | 9 (0.4) | 456 (4.4) | 4 (0.4) | 415 (6.9) | 13 (0.7) | 410 (4.1) |
| Poland | 60 (0.9) | 531 (2.7) | 15 (0.6) | 527 (4.4) | 11 (0.6) | 523 (4.9) | 5 (0.4) | 490 (6.5) | 9 (0.5) | 458 (4.3) |
| Canada | 60 (0.9) | 519 (2.3) | 16 (0.6) | 517 (3.1) | 12 (0.5) | 506 (3.1) | 5 (0.3) | 487 (6.0) | 6 (0.4) | 455 (4.8) |
| Ireland | 60 (0.9) | 559 (2.5) | 20 (0.7) | 552 (4.1) | 11 (0.7) | 535 (5.2) | 4 (0.3) | 515 (7.7) | 4 (0.5) | 472 (7.8) |
| Turkey (5) | 60 (1.1) | 542 (4.4) | 14 (0.7) | 534 (5.5) | 11 (0.6) | 511 (5.6) | 5 (0.3) | 485 (12.1) | 10 (0.6) | 440 (5.8) |
| Sweden | 60 (1.1) | 526 (3.2) | 16 (0.7) | 534 (4.9) | 14 (0.8) | 514 (5.1) | 5 (0.5) | 511 (6.9) | 5 (0.4) | 472 (7.1) |
| Bahrain | 59 (0.8) | 491 (2.8) | 8 (0.4) | 485 (6.5) | 8 (0.4) | 484 (4.3) | 5 (0.4) | 467 (6.5) | 19 (0.8) | 451 (3.5) |
| United Arab Emirates | 58 (0.5) | 497 (1.9) | 10 (0.3) | 500 (2.8) | 9 (0.3) | 481 (3.5) | 6 (0.2) | 445 (3.5) | 17 (0.3) | 439 (2.8) |
| Croatia | 57 (1.1) | 517 (2.9) | 22 (0.9) | 514 (3.6) | 12 (0.7) | 496 (4.8) | 3 (0.3) | 498 (8.0) | 7 (0.7) | 459 (5.8) |
| Denmark | 57 (1.1) | 532 (2.3) | 17 (0.7) | 533 (3.4) | 13 (0.7) | 524 (4.1) | 5 (0.4) | 514 (6.8) | 9 (0.6) | 477 (5.7) |
| Australia | 57 (0.9) | 525 (3.2) | 18 (0.8) | 531 (4.1) | 13 (0.6) | 513 (4.2) | 6 (0.4) | 489 (7.2) | 7 (0.5) | 435 (7.5) |
| Oman | 55 (0.9) | 452 (4.2) | 10 (0.8) | 438 (6.5) | 9 (0.5) | 409 (5.0) | 5 (0.3) | 382 (7.4) | 21 (1.0) | 401 (5.3) |
| New Zealand | 55 (0.9) | 499 (2.9) | 18 (0.6) | 506 (4.1) | 12 (0.6) | 484 (5.1) | 5 (0.4) | 456 (6.6) | 9 (0.4) | 407 (4.8) |
| North Macedonia | 54 (1.9) | 494 (5.7) | 13 (1.1) | 488 (8.3) | 9 (0.7) | 468 (7.6) | 4 (0.4) | 429 (12.8) | 20 (1.2) | 433 (7.3) |
| Iran, Islamic Rep. of | 53 (1.3) | 461 (3.8) | 16 (0.8) | 456 (6.8) | 9 (0.5) | 433 (5.3) | 7 (1.0) | 405 (9.7) | 15 (0.8) | 397 (5.9) |
| Kazakhstan | 53 (1.5) | 523 (3.1) | 12 (0.7) | 519 (4.4) | 10 (0.5) | 512 (5.0) | 3 (0.3) | 494 (6.6) | 21 (1.1) | 483 (4.0) |
| Qatar | 53 (1.0) | 472 (4.3) | 11 (0.5) | 474 (5.3) | 9 (0.5) | 441 (7.2) | 6 (0.5) | 416 (7.7) | 21 (0.8) | 403 (4.5) |
| Azerbaijan | 50 (1.4) | 535 (2.9) | 18 (0.9) | 525 (4.2) | 12 (0.7) | 510 (4.5) | 5 (0.4) | 504 (6.8) | 15 (0.9) | 486 (4.4) |
| South Africa (5) | 49 (1.2) | 401 (4.0) | 8 (0.4) | 379 (6.1) | 11 (0.6) | 357 (5.9) | 7 (0.5) | 318 (4.7) | 24 (0.7) | 348 (3.8) |
| Armenia | 49 (1.1) | 511 (2.7) | 11 (0.6) | 503 (4.0) | 12 (0.6) | 499 (4.5) | 6 (0.5) | 487 (5.3) | 22 (0.9) | 474 (3.3) |
| Kuwait | 47 (1.6) | 410 (5.4) | 7 (0.5) | 407 (9.8) | 11 (0.7) | 379 (7.9) | 8 (0.5) | 350 (9.0) | 28 (1.2) | 354 (5.4) |
| Hungary | 42 (1.0) | 541 (3.3) | 27 (0.9) | 529 (3.2) | 16 (0.6) | 517 (4.3) | 6 (0.4) | 497 (5.6) | 9 (0.7) | 458 (5.0) |
| Saudi Arabia | 42 (1.2) | 419 (4.4) | 10 (0.6) | 420 (5.1) | 11 (0.6) | 408 (6.4) | 9 (0.5) | 376 (6.5) | 28 (0.9) | 367 (4.2) |
| Czech Republic | 41 (1.0) | 540 (3.3) | 29 (0.8) | 539 (2.9) | 16 (0.7) | 541 (4.7) | 7 (0.4) | 518 (6.1) | 8 (0.5) | 484 (6.3) |
| Finland | 39 (1.0) | 537 (3.0) | 36 (0.8) | 537 (2.6) | 17 (0.7) | 529 (3.9) | 5 (0.3) | 515 (6.7) | 4 (0.4) | 477 (8.1) |
| Georgia | 38 (1.2) | 495 (4.1) | 17 (1.0) | 496 (6.9) | 14 (0.9) | 489 (4.8) | 9 (0.7) | 464 (7.1) | 21 (1.2) | 446 (6.3) |
| Slovak Republic | 35 (1.0) | 527 (3.3) | 25 (0.9) | 522 (4.0) | 19 (0.9) | 515 (4.8) | 8 (0.5) | 487 (8.0) | 13 (1.0) | 451 (7.2) |
| Philippines | 32 (1.5) | 329 (7.3) | 9 (0.5) | 294 (7.6) | 14 (0.8) | 265 (8.1) | 13 (0.8) | 263 (7.3) | 32 (1.1) | 301 (6.5) |
| Pakistan | 30 (3.6) | 337 (18.2) | 11 (0.8) | 323 (13.7) | 23 (2.3) | 335 (16.3) | 10 (1.4) | 318 (12.4) | 26 (2.4) | 320 (11.3) |
| **International Average** | **61 (0.2)** | **512 (0.5)** | **13 (0.1)** | **509 (0.7)** | **10 (0.1)** | **495 (0.8)** | **5 (0.1)** | **462 (1.2)** | **11 (0.1)** | **448 (0.8)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Madrid, Spain | 81 (0.8) | 522 (2.1) | 6 (0.4) | 530 (5.1) | 6 (0.5) | 511 (5.2) | 2 (0.2) | ~ ~ | 5 (0.5) | 465 (7.2) |
| Quebec, Canada r | 71 (0.9) | 534 (2.8) | 13 (0.6) | 539 (4.6) | 10 (0.6) | 525 (4.7) | 3 (0.3) | 513 (13.5) | 4 (0.5) | 484 (8.3) |
| Moscow City, Russian Fed. | 67 (1.0) | 594 (2.4) | 13 (0.6) | 604 (3.5) | 11 (0.6) | 595 (4.0) | 5 (0.3) | 583 (6.3) | 5 (0.4) | 549 (6.3) |
| Dubai, UAE | 60 (0.9) | 551 (1.7) | 12 (0.6) | 551 (3.8) | 11 (0.5) | 545 (4.3) | 5 (0.3) | 528 (8.1) | 13 (0.5) | 511 (3.9) |
| Ontario, Canada | 55 (1.7) | 521 (4.2) | 18 (1.1) | 519 (4.5) | 14 (0.9) | 507 (5.2) | 6 (0.5) | 493 (8.6) | 7 (0.6) | 455 (7.5) |
| Abu Dhabi, UAE | 54 (0.9) | 460 (2.3) | 9 (0.5) | 464 (3.9) | 9 (0.4) | 439 (5.6) | 7 (0.3) | 403 (5.0) | 20 (0.6) | 397 (3.4) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 10.2: Frequency of Student Absences

*Students' Reports*

| Country | Never or Almost Never | | Once Every Two Months | | Once a Month | | Once Every Two Weeks | | Once a Week | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Korea, Rep. of | 88 (0.7) | 591 (2.1) | 7 (0.6) | 577 (5.4) | 3 (0.3) | 569 (10.4) | 1 (0.2) | ~ ~ | 1 (0.2) | ~ ~ |
| France | 82 (0.9) | 494 (3.0) | 6 (0.5) | 495 (6.2) | 5 (0.4) | 473 (6.9) | 2 (0.3) | ~ ~ | 5 (0.5) | 411 (7.6) |
| Portugal | 82 (0.8) | 507 (2.6) | 6 (0.5) | 512 (6.7) | 5 (0.4) | 506 (6.4) | 2 (0.2) | ~ ~ | 5 (0.4) | 454 (4.7) |
| Chinese Taipei | 81 (0.8) | 563 (1.9) | 11 (0.7) | 556 (3.7) | 3 (0.3) | 544 (6.5) | 1 (0.2) | ~ ~ | 3 (0.3) | 481 (7.6) |
| Japan | 79 (0.7) | 568 (1.8) | 12 (0.5) | 562 (3.8) | 5 (0.4) | 537 (5.5) | 1 (0.2) | ~ ~ | 3 (0.3) | 473 (7.2) |
| Spain | 79 (0.9) | 518 (2.0) | 6 (0.5) | 511 (6.0) | 6 (0.4) | 503 (5.6) | 3 (0.3) | 478 (8.5) | 7 (0.5) | 454 (5.9) |
| Belgium (Flemish) | 79 (0.8) | 506 (2.1) | 11 (0.6) | 500 (3.8) | 5 (0.3) | 473 (7.2) | 2 (0.3) | ~ ~ | 3 (0.3) | 450 (8.8) |
| Austria | 78 (0.8) | 528 (2.8) | 10 (0.5) | 522 (4.5) | 6 (0.5) | 509 (6.5) | 2 (0.2) | ~ ~ | 4 (0.4) | 441 (7.5) |
| Germany | 77 (0.8) | 527 (2.4) | 9 (0.6) | 527 (5.6) | 6 (0.4) | 517 (6.8) | 2 (0.3) | ~ ~ | 5 (0.4) | 463 (7.5) |
| Lithuania | 76 (1.0) | 541 (2.6) | 10 (0.6) | 547 (4.7) | 6 (0.5) | 548 (6.8) | 3 (0.3) | 510 (11.1) | 4 (0.4) | 485 (6.4) |
| Hong Kong SAR | 74 (1.2) | 539 (3.5) | 14 (0.8) | 526 (5.6) | 5 (0.5) | 518 (9.3) | 3 (0.3) | 493 (9.6) | 4 (0.6) | 455 (7.2) |
| Singapore | 74 (0.8) | 608 (3.0) | 13 (0.5) | 592 (3.9) | 6 (0.3) | 561 (6.4) | 2 (0.2) | ~ ~ | 5 (0.5) | 483 (7.6) |
| Cyprus | 74 (0.9) | 520 (3.1) | 11 (0.7) | 504 (4.5) | 8 (0.4) | 498 (6.1) | 3 (0.3) | 468 (8.7) | 4 (0.4) | 454 (8.3) |
| Montenegro | 72 (0.7) | 466 (2.7) | 5 (0.4) | 464 (5.7) | 7 (0.4) | 452 (6.1) | 4 (0.3) | 437 (10.2) | 12 (0.5) | 402 (4.6) |
| Netherlands | 71 (1.1) | 525 (2.6) | 15 (0.8) | 519 (4.6) | 8 (0.6) | 504 (5.9) | 2 (0.3) | ~ ~ | 4 (0.4) | 466 (8.4) |
| Russian Federation | 71 (1.2) | 570 (3.1) | 12 (0.7) | 577 (4.1) | 8 (0.5) | 559 (6.4) | 3 (0.4) | 539 (10.4) | 6 (0.4) | 543 (6.3) |
| Albania | 69 (1.5) | 499 (3.6) | 11 (0.9) | 499 (5.7) | 6 (0.6) | 495 (10.2) | 3 (0.3) | 457 (13.0) | 10 (0.7) | 442 (7.0) |
| England | 68 (1.0) | 544 (3.2) | 17 (0.7) | 542 (4.9) | 8 (0.6) | 528 (5.0) | 3 (0.3) | 515 (13.1) | 4 (0.4) | 461 (9.2) |
| Serbia | 68 (1.5) | 527 (3.4) | 9 (1.0) | 531 (7.2) | 10 (0.9) | 507 (7.6) | 5 (0.4) | 503 (8.2) | 9 (0.7) | 458 (10.0) |
| Latvia | 67 (1.0) | 545 (2.8) | 11 (0.5) | 544 (4.7) | 10 (0.5) | 546 (5.2) | 4 (0.4) | 535 (4.7) | 8 (0.5) | 516 (5.3) |
| Northern Ireland | 67 (1.0) | 528 (2.4) | 18 (0.9) | 520 (4.0) | 9 (0.6) | 498 (4.8) | 3 (0.4) | 488 (8.6) | 4 (0.4) | 435 (7.7) |
| Italy | 66 (0.9) | 517 (3.0) | 8 (0.5) | 509 (4.6) | 10 (0.5) | 508 (7.5) | 6 (0.4) | 494 (6.1) | 10 (0.7) | 473 (5.6) |
| Kosovo | 66 (1.0) | 427 (3.8) | 11 (0.9) | 414 (6.5) | 5 (0.4) | 394 (8.0) | 3 (0.3) | 380 (11.4) | 15 (0.8) | 379 (5.9) |
| Malta | 66 (0.8) | 505 (1.6) | 14 (0.6) | 502 (3.9) | 9 (0.5) | 482 (4.6) | 4 (0.3) | 460 (8.5) | 6 (0.4) | 436 (6.1) |
| Norway (5) | 66 (1.2) | 543 (2.6) | 15 (0.9) | 552 (3.6) | 11 (0.6) | 536 (5.3) | 4 (0.5) | 522 (8.2) | 5 (0.4) | 498 (8.0) |
| Morocco | 64 (1.2) | 388 (6.0) | 11 (0.8) | 384 (11.3) | 9 (0.5) | 356 (15.0) | 4 (0.4) | 332 (13.4) | 12 (0.7) | 337 (8.9) |
| United States | 63 (0.9) | 549 (2.7) | 15 (0.6) | 557 (3.7) | 9 (0.4) | 537 (4.9) | 5 (0.3) | 510 (7.3) | 8 (0.4) | 461 (5.3) |
| Bulgaria | 62 (1.5) | 536 (4.3) | 14 (0.9) | 551 (6.0) | 9 (0.6) | 512 (7.8) | 5 (0.6) | 480 (9.5) | 11 (1.3) | 435 (10.1) |
| Chile | 61 (0.9) | 480 (2.6) | 7 (0.4) | 480 (6.9) | 8 (0.4) | 478 (5.4) | 6 (0.4) | 457 (5.9) | 18 (0.9) | 438 (4.0) |
| Bosnia and Herzegovina | 61 (1.0) | 468 (3.3) | 13 (0.7) | 474 (4.0) | 9 (0.4) | 463 (5.9) | 4 (0.4) | 430 (7.2) | 13 (0.7) | 414 (4.6) |
| Poland | 60 (0.9) | 541 (2.6) | 15 (0.6) | 536 (3.9) | 11 (0.6) | 535 (4.4) | 5 (0.4) | 507 (7.9) | 9 (0.5) | 474 (5.6) |
| Canada | 60 (0.9) | 529 (2.1) | 16 (0.6) | 530 (3.1) | 12 (0.5) | 521 (3.0) | 5 (0.3) | 510 (5.4) | 6 (0.4) | 471 (5.4) |
| Ireland | 60 (0.9) | 537 (2.8) | 20 (0.7) | 532 (4.5) | 11 (0.7) | 517 (5.8) | 4 (0.3) | 509 (7.6) | 4 (0.5) | 447 (9.5) |
| Turkey (5) | 60 (1.1) | 543 (3.9) | 14 (0.7) | 536 (5.6) | 11 (0.6) | 520 (5.1) | 5 (0.3) | 490 (12.4) | 10 (0.6) | 456 (6.1) |
| Sweden | 60 (1.1) | 542 (3.6) | 16 (0.7) | 552 (5.0) | 14 (0.8) | 534 (4.4) | 5 (0.5) | 520 (6.2) | 5 (0.4) | 479 (7.9) |
| Bahrain | 59 (0.8) | 512 (3.0) | 8 (0.4) | 496 (8.3) | 8 (0.4) | 491 (5.2) | 5 (0.4) | 467 (9.0) | 19 (0.8) | 446 (4.7) |
| United Arab Emirates | 58 (0.5) | 492 (2.3) | 10 (0.3) | 489 (3.3) | 9 (0.3) | 471 (4.3) | 6 (0.2) | 426 (4.7) | 17 (0.3) | 425 (3.0) |
| Croatia | 57 (1.1) | 532 (3.0) | 22 (0.9) | 525 (2.7) | 12 (0.7) | 512 (4.6) | 3 (0.3) | 509 (9.0) | 7 (0.7) | 479 (4.6) |
| Denmark | 57 (1.1) | 527 (2.6) | 17 (0.7) | 533 (3.5) | 13 (0.7) | 527 (4.4) | 5 (0.4) | 508 (6.1) | 9 (0.6) | 481 (5.1) |
| Australia | 57 (0.9) | 538 (2.5) | 18 (0.8) | 549 (4.4) | 13 (0.6) | 536 (4.2) | 6 (0.4) | 508 (7.2) | 7 (0.5) | 460 (6.8) |
| Oman | 55 (0.9) | 463 (4.6) | 10 (0.8) | 432 (7.6) | 9 (0.5) | 405 (5.2) | 5 (0.3) | 379 (8.8) | 21 (1.0) | 402 (5.4) |
| New Zealand | 55 (0.9) | 514 (2.6) | 18 (0.6) | 519 (3.5) | 12 (0.6) | 502 (4.4) | 5 (0.4) | 472 (6.0) | 9 (0.4) | 424 (5.1) |
| North Macedonia | 54 (1.9) | 448 (7.3) | 13 (1.1) | 442 (9.8) | 9 (0.7) | 427 (9.2) | 4 (0.4) | 388 (11.8) | 20 (1.2) | 384 (8.1) |
| Iran, Islamic Rep. of | 53 (1.3) | 459 (4.4) | 16 (0.8) | 448 (6.6) | 9 (0.5) | 427 (6.4) | 7 (1.0) | 410 (8.5) | 15 (0.8) | 398 (5.8) |
| Kazakhstan | 53 (1.5) | 510 (3.8) | 12 (0.7) | 498 (5.1) | 10 (0.5) | 493 (5.3) | 3 (0.3) | 486 (8.3) | 21 (1.1) | 456 (4.4) |
| Qatar | 53 (1.0) | 477 (4.9) | 11 (0.5) | 471 (6.6) | 9 (0.5) | 441 (7.6) | 6 (0.5) | 402 (9.1) | 21 (0.8) | 399 (4.6) |
| Azerbaijan | 50 (1.4) | 446 (3.7) | 18 (0.9) | 438 (5.2) | 12 (0.7) | 422 (5.9) | 5 (0.4) | 422 (8.1) | 15 (0.9) | 396 (5.0) |
| South Africa (5) | 49 (1.2) | 360 (5.3) | 8 (0.4) | 333 (9.7) | 11 (0.6) | 307 (7.5) | 7 (0.5) | 251 (7.1) | 24 (0.7) | 290 (5.6) |
| Armenia | 49 (1.1) | 482 (3.2) | 11 (0.6) | 472 (5.5) | 12 (0.6) | 465 (5.4) | 6 (0.5) | 451 (7.3) | 22 (0.9) | 441 (4.9) |
| Kuwait | 47 (1.6) | 422 (6.6) | 7 (0.5) | 407 (12.5) | 11 (0.7) | 387 (10.1) | 8 (0.5) | 353 (10.8) | 28 (1.2) | 363 (6.6) |
| Hungary | 42 (1.0) | 547 (3.1) | 27 (0.9) | 533 (3.2) | 16 (0.6) | 523 (4.5) | 6 (0.4) | 504 (6.1) | 9 (0.7) | 469 (5.9) |
| Saudi Arabia | 42 (1.2) | 422 (5.0) | 10 (0.6) | 424 (7.2) | 11 (0.6) | 411 (6.4) | 9 (0.5) | 383 (7.7) | 28 (0.9) | 375 (4.9) |
| Czech Republic | 41 (1.0) | 540 (3.0) | 29 (0.8) | 541 (4.0) | 16 (0.7) | 543 (3.6) | 7 (0.4) | 515 (5.5) | 8 (0.5) | 484 (6.5) |
| Finland | 39 (1.0) | 556 (3.4) | 36 (0.8) | 561 (2.7) | 17 (0.7) | 554 (4.2) | 5 (0.3) | 542 (6.2) | 4 (0.4) | 499 (7.6) |
| Georgia | 38 (1.2) | 469 (4.7) | 17 (1.0) | 466 (6.2) | 14 (0.9) | 457 (5.8) | 9 (0.7) | 443 (7.1) | 21 (1.2) | 420 (7.3) |
| Slovak Republic | 35 (1.0) | 541 (3.4) | 25 (0.9) | 536 (3.7) | 19 (0.9) | 520 (6.3) | 8 (0.5) | 498 (7.9) | 13 (1.0) | 457 (7.6) |
| Philippines | 32 (1.5) | 287 (8.9) | 9 (0.5) | 249 (10.5) | 14 (0.8) | 219 (8.9) | 13 (0.8) | 220 (9.8) | 32 (1.1) | 244 (7.6) |
| Pakistan | 30 (3.6) | 303 (22.8) | 11 (0.8) | 300 (16.3) | 23 (2.3) | 290 (17.7) | 10 (1.4) | 279 (16.4) | 26 (2.4) | 279 (13.0) |
| **International Average** | **61 (0.2)** | **503 (0.6)** | **13 (0.1)** | **498 (0.8)** | **10 (0.1)** | **484 (0.9)** | **5 (0.1)** | **455 (1.3)** | **11 (0.1)** | **437 (0.9)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Madrid, Spain | 81 (0.8) | 527 (2.1) | 6 (0.4) | 527 (5.2) | 6 (0.5) | 518 (4.5) | 2 (0.2) | ~ ~ | 5 (0.5) | 471 (6.1) |
| Quebec, Canada r | 71 (0.9) | 524 (2.8) | 13 (0.6) | 527 (4.6) | 10 (0.6) | 516 (5.8) | 3 (0.3) | 510 (8.8) | 4 (0.5) | 477 (9.7) |
| Moscow City, Russian Fed. | 67 (1.0) | 596 (2.7) | 13 (0.6) | 605 (3.9) | 11 (0.6) | 601 (4.0) | 5 (0.3) | 590 (7.4) | 5 (0.4) | 549 (8.1) |
| Dubai, UAE | 60 (0.9) | 552 (1.6) | 12 (0.6) | 549 (3.8) | 11 (0.5) | 544 (4.6) | 5 (0.3) | 529 (8.5) | 13 (0.5) | 513 (4.8) |
| Ontario, Canada | 55 (1.7) | 533 (3.3) | 18 (1.1) | 530 (5.3) | 14 (0.9) | 522 (4.4) | 6 (0.5) | 513 (8.1) | 7 (0.6) | 468 (8.0) |
| Abu Dhabi, UAE | 54 (0.9) | 442 (3.1) | 9 (0.5) | 442 (4.9) | 9 (0.4) | 417 (6.0) | 7 (0.3) | 369 (7.2) | 20 (0.6) | 369 (3.9) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 10.3: Frequency of Student Absences

*Students' Reports*

| Country | Never or Almost Never | | Once Every Two Months | | Once a Month | | Once Every Two Weeks | | Once a Week | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Korea, Rep. of | 94 (0.4) | 612 (2.8) | 3 (0.3) | 558 (10.5) | 2 (0.2) | ~ ~ | 1 (0.1) | ~ ~ | 0 (0.1) | ~ ~ |
| Japan | 84 (0.7) | 600 (2.7) | 9 (0.4) | 583 (5.0) | 4 (0.3) | 554 (7.4) | 2 (0.2) | ~ ~ | 2 (0.2) | ~ ~ |
| Chinese Taipei | 83 (0.8) | 620 (2.8) | 9 (0.5) | 607 (5.0) | 4 (0.3) | 568 (8.1) | 2 (0.2) | ~ ~ | 2 (0.3) | ~ ~ |
| Hong Kong SAR | 81 (0.9) | 584 (3.9) | 11 (0.7) | 584 (6.3) | 5 (0.4) | 550 (10.7) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ |
| Portugal | 79 (0.9) | 504 (3.2) | 10 (0.6) | 505 (6.0) | 7 (0.5) | 485 (5.6) | 2 (0.4) | ~ ~ | 2 (0.3) | ~ ~ |
| Singapore | 75 (0.8) | 629 (3.3) | 13 (0.5) | 607 (5.6) | 7 (0.4) | 569 (7.5) | 3 (0.3) | 538 (9.2) | 2 (0.3) | ~ ~ |
| Iran, Islamic Rep. of | 65 (1.0) | 456 (3.8) | 18 (0.7) | 450 (6.0) | 10 (0.5) | 427 (6.2) | 3 (0.2) | 415 (7.8) | 5 (0.4) | 367 (7.9) |
| Morocco | 63 (1.0) | 396 (2.7) | 11 (0.5) | 392 (3.6) | 10 (0.5) | 380 (3.6) | 4 (0.3) | 369 (5.0) | 12 (0.6) | 359 (3.6) |
| France | 63 (1.0) | 494 (2.8) | 16 (0.7) | 484 (3.6) | 13 (0.7) | 466 (3.6) | 5 (0.5) | 448 (6.3) | 4 (0.5) | 416 (7.6) |
| South Africa (9) | 62 (0.8) | 399 (2.3) | 9 (0.3) | 418 (3.8) | 10 (0.4) | 384 (2.7) | 4 (0.2) | 377 (4.7) | 15 (0.5) | 345 (2.7) |
| Lebanon | 62 (1.3) | 438 (3.6) | 15 (0.7) | 436 (4.5) | 11 (0.6) | 422 (5.3) | 4 (0.3) | 413 (6.5) | 9 (0.7) | 384 (4.3) |
| Cyprus | 60 (1.1) | 514 (2.4) | 20 (0.8) | 499 (3.6) | 14 (0.7) | 474 (4.6) | 4 (0.3) | 478 (7.1) | 2 (0.3) | ~ ~ |
| Romania | 60 (1.4) | 494 (4.8) | 12 (0.7) | 482 (7.7) | 12 (0.8) | 469 (6.0) | 7 (0.6) | 457 (6.4) | 10 (0.7) | 422 (7.7) |
| Turkey | 59 (1.0) | 523 (4.1) | 16 (0.6) | 489 (5.6) | 13 (0.7) | 459 (5.5) | 5 (0.4) | 436 (10.0) | 5 (0.5) | 383 (8.5) |
| Oman | 59 (0.9) | 429 (2.5) | 15 (0.5) | 416 (3.8) | 10 (0.4) | 397 (5.6) | 5 (0.4) | 375 (6.4) | 11 (0.5) | 344 (5.7) |
| England | 59 (1.1) | 529 (5.5) | 23 (0.9) | 517 (5.9) | 11 (0.7) | 496 (7.7) | 4 (0.4) | 473 (9.1) | 3 (0.3) | 447 (15.4) |
| Lithuania | 57 (1.1) | 523 (3.3) | 14 (0.7) | 529 (5.0) | 18 (0.8) | 525 (3.8) | 7 (0.5) | 512 (6.3) | 3 (0.3) | 457 (9.1) |
| Chile | 57 (0.9) | 445 (3.1) | 11 (0.6) | 460 (4.5) | 15 (0.6) | 448 (3.8) | 8 (0.5) | 435 (6.0) | 9 (0.6) | 392 (4.4) |
| Norway (9) | 57 (1.0) | 510 (2.7) | 19 (0.8) | 511 (3.8) | 16 (0.7) | 503 (4.7) | 6 (0.4) | 479 (5.7) | 3 (0.3) | 448 (11.8) |
| Kazakhstan | 54 (1.2) | 499 (3.6) | 20 (0.9) | 486 (4.3) | 12 (0.6) | 477 (5.4) | 4 (0.4) | 460 (7.4) | 9 (0.7) | 454 (5.4) |
| Russian Federation | 54 (1.1) | 545 (4.6) | 15 (0.6) | 551 (5.5) | 16 (0.7) | 546 (6.2) | 9 (0.5) | 540 (6.5) | 6 (0.5) | 515 (8.5) |
| Sweden | 54 (1.0) | 511 (3.0) | 16 (0.6) | 508 (4.2) | 15 (0.7) | 504 (3.8) | 8 (0.4) | 489 (4.9) | 6 (0.5) | 454 (5.1) |
| United Arab Emirates | 52 (0.5) | 495 (2.0) | 16 (0.5) | 495 (3.3) | 14 (0.3) | 462 (2.6) | 8 (0.3) | 428 (3.8) | 10 (0.3) | 395 (3.3) |
| United States | 51 (0.7) | 524 (6.0) | 22 (0.6) | 528 (4.5) | 15 (0.5) | 515 (4.4) | 8 (0.4) | 493 (6.2) | 4 (0.3) | 424 (8.3) |
| Bahrain | 48 (0.9) | 491 (2.9) | 14 (0.6) | 492 (4.4) | 17 (0.6) | 481 (4.3) | 9 (0.5) | 471 (5.1) | 12 (0.5) | 435 (3.9) |
| Ireland | 46 (1.0) | 534 (2.9) | 23 (0.7) | 535 (3.5) | 18 (0.7) | 519 (3.6) | 9 (0.6) | 490 (4.5) | 4 (0.4) | 461 (9.9) |
| Jordan | 46 (1.0) | 438 (3.7) | 18 (0.6) | 428 (5.0) | 16 (0.7) | 411 (5.2) | 9 (0.5) | 398 (6.4) | 11 (0.8) | 379 (10.6) |
| Italy | 46 (1.1) | 504 (2.9) | 16 (0.8) | 514 (3.8) | 21 (0.8) | 503 (3.5) | 12 (0.7) | 477 (4.7) | 5 (0.5) | 428 (6.5) |
| Australia | 46 (1.1) | 535 (4.2) | 23 (0.7) | 524 (4.9) | 17 (0.6) | 509 (4.6) | 8 (0.4) | 477 (4.8) | 5 (0.4) | 439 (6.8) |
| New Zealand | 44 (1.1) | 492 (4.3) | 22 (0.6) | 506 (4.2) | 18 (0.6) | 480 (3.6) | 10 (0.6) | 462 (4.9) | 7 (0.4) | 405 (6.5) |
| Qatar | 43 (1.5) | 476 (4.7) | 18 (0.8) | 449 (5.4) | 17 (0.9) | 431 (5.5) | 10 (0.6) | 411 (4.2) | 12 (0.8) | 360 (4.7) |
| Kuwait | 43 (1.5) | 427 (4.9) | 10 (0.6) | 423 (6.6) | 15 (0.6) | 395 (5.5) | 13 (0.6) | 386 (5.9) | 20 (1.0) | 362 (6.8) |
| Malaysia | 40 (1.4) | 495 (3.3) | 18 (0.7) | 475 (4.2) | 14 (0.7) | 450 (4.2) | 10 (0.6) | 428 (4.6) | 17 (1.1) | 394 (4.4) |
| Israel | 40 (1.1) | 534 (5.0) | 18 (0.7) | 541 (5.6) | 20 (0.6) | 522 (5.5) | 11 (0.6) | 508 (6.3) | 11 (0.7) | 452 (6.3) |
| Egypt | 38 (1.1) | 427 (5.5) | 9 (0.6) | 413 (8.0) | 9 (0.6) | 407 (7.9) | 10 (0.4) | 404 (6.7) | 34 (1.3) | 408 (6.2) |
| Finland | 33 (0.8) | 520 (3.0) | 32 (0.8) | 516 (3.2) | 22 (0.6) | 505 (3.0) | 9 (0.4) | 492 (5.0) | 4 (0.4) | 461 (6.2) |
| Hungary | 32 (0.9) | 532 (4.2) | 36 (0.9) | 523 (3.7) | 22 (0.7) | 508 (3.9) | 7 (0.6) | 485 (7.0) | 3 (0.4) | 409 (10.8) |
| Saudi Arabia | 27 (1.0) | 419 (3.5) | 14 (0.5) | 407 (4.4) | 20 (0.7) | 398 (3.9) | 18 (0.6) | 388 (3.3) | 22 (0.8) | 358 (3.3) |
| Georgia | 25 (1.1) | 477 (5.4) | 17 (0.8) | 472 (5.5) | 26 (1.0) | 464 (5.2) | 16 (0.8) | 465 (6.3) | 16 (0.9) | 418 (6.6) |
| **International Average** | **55 (0.2)** | **502 (0.6)** | **16 (0.1)** | **495 (0.8)** | **14 (0.1)** | **475 (0.9)** | **7 (0.1)** | **452 (1.1)** | **8 (0.1)** | **412 (1.3)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Gauteng, RSA (9) | 62 (1.0) | 431 (3.2) | 12 (0.5) | 443 (4.8) | 11 (0.5) | 405 (4.2) | 3 (0.3) | 406 (9.0) | 11 (0.5) | 365 (4.0) |
| Western Cape, RSA (9) | 60 (1.0) | 449 (4.9) | 12 (0.5) | 480 (6.1) | 11 (0.5) | 435 (6.0) | 5 (0.4) | 436 (7.7) | 12 (0.6) | 375 (3.6) |
| Quebec, Canada | 60 (1.3) | 548 (4.0) | 18 (0.9) | 556 (4.4) | 13 (0.7) | 538 (4.3) | 6 (0.6) | 520 (5.8) | 4 (0.5) | 492 (12.3) |
| Dubai, UAE | 55 (1.0) | 547 (2.2) | 19 (0.6) | 551 (2.9) | 13 (0.5) | 528 (3.8) | 7 (0.5) | 498 (6.4) | 6 (0.5) | 458 (7.2) |
| Abu Dhabi, UAE | 45 (0.8) | 468 (3.3) | 17 (0.6) | 458 (3.7) | 15 (0.5) | 423 (4.5) | 10 (0.4) | 389 (5.1) | 13 (0.6) | 365 (4.6) |
| Moscow City, Russian Fed. | 44 (1.1) | 578 (4.4) | 17 (0.7) | 585 (4.7) | 21 (0.7) | 577 (4.9) | 11 (0.6) | 572 (7.0) | 7 (0.5) | 535 (8.5) |
| Ontario, Canada | 39 (1.3) | 540 (4.8) | 24 (0.9) | 538 (5.5) | 21 (0.8) | 528 (5.1) | 12 (0.8) | 508 (5.4) | 4 (0.4) | 470 (9.7) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 10.4: Frequency of Student Absences

*Students' Reports*

| Country | Never or Almost Never | | Once Every Two Months | | Once a Month | | Once Every Two Weeks | | Once a Week | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Korea, Rep. of | 94 (0.4) | 565 (2.1) | 3 (0.3) | 515 (9.4) | 2 (0.2) | ~ ~ | 1 (0.1) | ~ ~ | 0 (0.1) | ~ ~ |
| Japan | 84 (0.7) | 574 (2.1) | 9 (0.4) | 560 (5.0) | 4 (0.3) | 548 (7.0) | 2 (0.2) | ~ ~ | 2 (0.2) | ~ ~ |
| Chinese Taipei | 83 (0.8) | 581 (1.9) | 9 (0.5) | 569 (4.2) | 4 (0.3) | 542 (6.2) | 2 (0.2) | ~ ~ | 2 (0.3) | ~ ~ |
| Hong Kong SAR | 81 (0.9) | 508 (5.2) | 11 (0.7) | 508 (8.1) | 5 (0.4) | 487 (10.6) | 1 (0.2) | ~ ~ | 2 (0.4) | ~ ~ |
| Portugal | 79 (0.9) | 521 (2.9) | 10 (0.6) | 524 (5.0) | 7 (0.5) | 516 (6.8) | 2 (0.4) | ~ ~ | 2 (0.3) | ~ ~ |
| Singapore | 75 (0.8) | 620 (3.2) | 13 (0.5) | 598 (5.7) | 7 (0.4) | 563 (7.7) | 3 (0.3) | 536 (9.3) | 2 (0.3) | ~ ~ |
| Iran, Islamic Rep. of | 65 (1.0) | 459 (3.6) | 18 (0.7) | 452 (5.6) | 10 (0.5) | 430 (5.8) | 3 (0.2) | 421 (8.9) | 5 (0.4) | 371 (8.7) |
| Morocco | 63 (1.0) | 406 (3.0) | 11 (0.5) | 390 (4.6) | 10 (0.5) | 380 (3.3) | 4 (0.3) | 370 (6.7) | 12 (0.6) | 360 (4.2) |
| France | 63 (1.0) | 500 (2.7) | 16 (0.7) | 492 (4.2) | 13 (0.7) | 471 (4.4) | 5 (0.5) | 451 (6.6) | 4 (0.5) | 407 (7.6) |
| South Africa (9) | 62 (0.8) | 383 (3.1) | 9 (0.3) | 402 (5.0) | 10 (0.4) | 365 (4.3) | 4 (0.2) | 352 (6.8) | 15 (0.5) | 313 (3.6) |
| Lebanon | 62 (1.3) | 389 (5.4) | 15 (0.7) | 385 (7.4) | 11 (0.6) | 365 (8.2) | 4 (0.3) | 361 (11.1) | 9 (0.7) | 317 (7.0) |
| Cyprus | 60 (1.1) | 498 (2.6) | 20 (0.8) | 482 (3.9) | 14 (0.7) | 456 (4.8) | 4 (0.3) | 460 (7.9) | 2 (0.3) | ~ ~ |
| Romania | 60 (1.4) | 486 (4.8) | 12 (0.7) | 473 (7.2) | 12 (0.8) | 455 (6.5) | 7 (0.6) | 455 (6.5) | 10 (0.7) | 410 (8.3) |
| Turkey | 59 (1.0) | 539 (3.7) | 16 (0.6) | 509 (4.8) | 13 (0.7) | 488 (5.2) | 5 (0.4) | 465 (8.8) | 5 (0.5) | 405 (6.9) |
| Oman | 59 (0.9) | 478 (2.5) | 15 (0.5) | 466 (4.0) | 10 (0.4) | 438 (6.0) | 5 (0.4) | 407 (7.0) | 11 (0.5) | 387 (6.4) |
| England | 59 (1.1) | 531 (5.1) | 23 (0.9) | 520 (5.2) | 11 (0.7) | 496 (8.5) | 4 (0.4) | 467 (10.4) | 3 (0.3) | 439 (17.2) |
| Lithuania | 57 (1.1) | 535 (3.2) | 14 (0.7) | 543 (4.5) | 18 (0.8) | 539 (3.7) | 7 (0.5) | 529 (6.3) | 3 (0.3) | 482 (9.1) |
| Chile | 57 (0.9) | 467 (3.2) | 11 (0.6) | 484 (5.1) | 15 (0.6) | 467 (4.2) | 8 (0.5) | 458 (4.8) | 9 (0.6) | 412 (4.8) |
| Norway (9) | 57 (1.0) | 501 (3.3) | 19 (0.8) | 505 (4.0) | 16 (0.7) | 495 (4.6) | 6 (0.4) | 476 (7.4) | 3 (0.3) | 446 (14.6) |
| Kazakhstan | 54 (1.2) | 492 (3.3) | 20 (0.9) | 476 (3.9) | 12 (0.6) | 460 (5.5) | 4 (0.4) | 459 (10.3) | 9 (0.7) | 436 (6.2) |
| Russian Federation | 54 (1.1) | 546 (4.2) | 15 (0.6) | 546 (5.7) | 16 (0.7) | 544 (5.7) | 9 (0.5) | 537 (6.5) | 6 (0.5) | 512 (7.9) |
| Sweden | 54 (1.0) | 535 (3.6) | 16 (0.6) | 529 (5.0) | 15 (0.7) | 519 (4.7) | 8 (0.4) | 504 (5.8) | 6 (0.5) | 457 (8.0) |
| United Arab Emirates | 52 (0.5) | 502 (2.5) | 16 (0.5) | 500 (4.2) | 14 (0.3) | 459 (3.1) | 8 (0.3) | 414 (4.8) | 10 (0.3) | 367 (4.5) |
| United States | 51 (0.7) | 529 (5.9) | 22 (0.6) | 537 (4.3) | 15 (0.5) | 524 (4.1) | 8 (0.4) | 506 (5.8) | 4 (0.3) | 422 (9.5) |
| Bahrain | 48 (0.9) | 503 (3.0) | 14 (0.6) | 515 (4.2) | 17 (0.6) | 485 (4.1) | 9 (0.5) | 457 (5.4) | 12 (0.5) | 410 (5.9) |
| Ireland | 46 (1.0) | 534 (3.3) | 23 (0.7) | 533 (3.7) | 18 (0.7) | 519 (4.1) | 9 (0.6) | 491 (5.1) | 4 (0.4) | 449 (12.5) |
| Jordan | 46 (1.0) | 476 (4.3) | 18 (0.6) | 458 (5.5) | 16 (0.7) | 442 (5.8) | 9 (0.5) | 439 (8.7) | 11 (0.8) | 389 (8.1) |
| Italy | 46 (1.1) | 510 (2.6) | 16 (0.8) | 516 (4.3) | 21 (0.8) | 501 (3.7) | 12 (0.7) | 479 (4.6) | 5 (0.5) | 428 (9.2) |
| Australia | 46 (1.1) | 543 (3.6) | 23 (0.7) | 537 (4.4) | 17 (0.6) | 524 (4.1) | 8 (0.4) | 494 (5.1) | 5 (0.4) | 454 (8.0) |
| New Zealand | 44 (1.1) | 509 (4.3) | 22 (0.6) | 523 (4.4) | 18 (0.6) | 501 (4.3) | 10 (0.6) | 479 (5.1) | 7 (0.4) | 415 (6.6) |
| Qatar | 43 (1.5) | 507 (5.3) | 18 (0.8) | 483 (5.6) | 17 (0.9) | 465 (6.3) | 10 (0.6) | 438 (6.4) | 12 (0.8) | 388 (5.2) |
| Kuwait | 43 (1.5) | 475 (5.3) | 10 (0.6) | 463 (7.9) | 15 (0.6) | 436 (6.6) | 13 (0.6) | 425 (6.7) | 20 (1.0) | 391 (7.0) |
| Malaysia | 40 (1.4) | 492 (3.7) | 18 (0.7) | 475 (3.9) | 14 (0.7) | 460 (4.7) | 10 (0.6) | 434 (5.6) | 17 (1.1) | 386 (5.4) |
| Israel | 40 (1.1) | 528 (4.8) | 18 (0.7) | 532 (5.1) | 20 (0.6) | 517 (5.9) | 11 (0.6) | 500 (5.9) | 11 (0.7) | 455 (7.0) |
| Egypt | 38 (1.1) | 407 (6.0) | 9 (0.6) | 388 (8.0) | 9 (0.6) | 382 (7.9) | 10 (0.4) | 385 (7.4) | 34 (1.3) | 383 (6.8) |
| Finland | 33 (0.8) | 558 (3.7) | 32 (0.8) | 550 (3.6) | 22 (0.6) | 537 (3.3) | 9 (0.4) | 520 (5.5) | 4 (0.4) | 492 (8.5) |
| Hungary | 32 (0.9) | 548 (3.5) | 36 (0.9) | 536 (3.3) | 22 (0.7) | 518 (3.5) | 7 (0.6) | 495 (6.5) | 3 (0.4) | 427 (10.1) |
| Saudi Arabia | 27 (1.0) | 449 (3.9) | 14 (0.5) | 443 (4.2) | 20 (0.7) | 439 (4.9) | 18 (0.6) | 434 (4.1) | 22 (0.8) | 397 (3.6) |
| Georgia | 25 (1.1) | 464 (5.4) | 17 (0.8) | 463 (5.2) | 26 (1.0) | 449 (4.4) | 16 (0.8) | 444 (5.8) | 16 (0.9) | 405 (5.9) |
| **International Average** | **55 (0.2)** | **504 (0.6)** | **16 (0.1)** | **497 (0.8)** | **14 (0.1)** | **479 (0.9)** | **7 (0.1)** | **457 (1.2)** | **8 (0.1)** | **413 (1.4)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Gauteng, RSA (9) | 62 (1.0) | 436 (3.9) | 12 (0.5) | 446 (6.0) | 11 (0.5) | 402 (6.5) | 3 (0.3) | 399 (11.8) | 11 (0.5) | 352 (4.6) |
| Western Cape, RSA (9) | 60 (1.0) | 450 (5.6) | 12 (0.5) | 480 (7.1) | 11 (0.5) | 433 (7.0) | 5 (0.4) | 435 (9.7) | 12 (0.6) | 359 (5.4) |
| Quebec, Canada | 60 (1.3) | 540 (4.0) | 18 (0.9) | 544 (4.3) | 13 (0.7) | 535 (4.7) | 6 (0.6) | 517 (6.1) | 4 (0.5) | 495 (10.6) |
| Dubai, UAE | 55 (1.0) | 561 (2.3) | 19 (0.6) | 563 (3.7) | 13 (0.5) | 539 (3.9) | 7 (0.5) | 498 (6.5) | 6 (0.5) | 455 (9.0) |
| Abu Dhabi, UAE | 45 (0.8) | 465 (4.1) | 17 (0.6) | 449 (5.1) | 15 (0.5) | 404 (5.4) | 10 (0.4) | 357 (7.4) | 13 (0.6) | 319 (6.1) |
| Moscow City, Russian Fed. | 44 (1.1) | 570 (3.3) | 17 (0.7) | 576 (3.6) | 21 (0.7) | 565 (3.9) | 11 (0.6) | 561 (5.6) | 7 (0.5) | 537 (7.2) |
| Ontario, Canada | 39 (1.3) | 530 (3.5) | 24 (0.9) | 527 (4.6) | 21 (0.8) | 524 (4.5) | 12 (0.8) | 502 (5.6) | 4 (0.4) | 471 (10.4) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Students Feel Tired or Hungry

Exhibits 10.5, 10.6, 10.7, and 10.8 contain students' reports about the frequency with which they arrive at school feeling tired or hungry, along with average achievement by frequency. Lack of adequate sleep or nutrition can have serious implications for a student's ability to focus on learning and also may be indicative of other challenges that students face.

On average across countries, just over one-third (35%) of fourth grade students and 45 percent of eighth grade students reported that they arrive at school feeling tired "every day or almost every day." Only 19 percent of fourth grade students and 8 percent of eighth grade students reported "never" arriving at school feeling tired, and nearly half (47%) of students in both grades reported "sometimes" arriving feeling tired. On average, achievement was lowest for fourth grade students who reported feeling tired "every day or almost every day," though it was highest for students "sometimes" arriving at school feeling tired compared with "never" doing so. In eighth grade, average mathematics achievement was 488 for "never" arriving at school feeling tired and 487 for doing so "every day or almost every day," while it was 493 for "sometimes" arriving at school feeling tired (Exhibit 10.7). Average science achievement was lowest for the 8 percent of eighth grade students reporting they "never" arrived at school feeling tired (Exhibit 10.8).

More than one-quarter (28%) of fourth grade students reported that they arrived at school hungry "every day or almost every day," and 41 percent said they "sometimes" did. Just under one-third (31%) reported that they "never" arrived at school hungry. Frequent hunger was a somewhat bigger problem in eighth grade, with 33 percent of students reporting that they arrived at school hungry "every day or almost every day" and another 42 percent of reporting that they did so "sometimes." Only 25 percent said they "never" arrived at school hungry. There was a direct relationship between the frequency of arriving at school hungry and average achievement in both grades and subjects. For example, in fourth grade science (Exhibit 10.6), students arriving at school hungry "every day or almost day" had an average score of 478, compared with 497 for students who did so "sometimes" and 504 for students who "never" did.

## Exhibit 10.5: Students Report Arriving at School Feeling Tired or Hungry

*Students' Reports*

| Country | Students Feel Tired | | | | | | Students Feel Hungry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Never | | Sometimes | | Every Day or Almost Every Day | | Never | | Sometimes | | Every Day or Almost Every Day | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 41 (1.9) | 500 (3.5) | 46 (1.6) | 502 (4.1) | 13 (1.0) | 467 (7.3) | 44 (2.0) | 504 (3.9) | 34 (2.0) | 504 (4.3) | 22 (1.4) | 479 (4.8) |
| Armenia | 38 (1.4) | 505 (3.1) | 37 (1.1) | 509 (3.2) | 26 (1.1) | 486 (3.5) | r 41 (1.2) | 512 (2.6) | 32 (1.1) | 503 (3.6) | 27 (1.0) | 489 (3.6) |
| Australia | 13 (0.7) | 519 (5.3) | 53 (1.0) | 528 (3.3) | 34 (1.1) | 499 (3.1) | 30 (1.1) | 541 (4.2) | 43 (0.9) | 522 (3.0) | 28 (1.0) | 486 (3.5) |
| Austria | 9 (0.5) | 534 (4.9) | 47 (1.0) | 546 (2.2) | 44 (1.1) | 534 (2.6) | 30 (0.9) | 552 (2.9) | 43 (0.8) | 541 (2.4) | 26 (0.9) | 528 (2.8) |
| Azerbaijan | 29 (1.2) | 529 (3.5) | 49 (1.1) | 524 (2.7) | 22 (0.9) | 516 (4.3) | 42 (1.4) | 531 (2.8) | 44 (1.2) | 525 (3.3) | 13 (0.8) | 504 (5.5) |
| Bahrain | 24 (0.8) | 481 (4.1) | 41 (0.8) | 487 (3.2) | 35 (1.0) | 474 (3.6) | 27 (0.9) | 490 (3.5) | 36 (0.9) | 480 (2.8) | 37 (0.9) | 477 (3.4) |
| Belgium (Flemish) | 12 (0.5) | 537 (4.2) | 57 (0.8) | 536 (2.1) | 31 (0.8) | 525 (2.5) | 34 (1.2) | 544 (2.5) | 41 (1.0) | 533 (2.4) | 25 (1.0) | 519 (2.6) |
| Bosnia and Herzegovina | 17 (0.8) | 452 (3.9) | 51 (1.0) | 461 (2.4) | 32 (1.1) | 444 (3.4) | 29 (1.0) | 464 (3.5) | 41 (0.7) | 457 (2.6) | 30 (1.0) | 447 (3.1) |
| Bulgaria | 17 (1.3) | 504 (9.5) | 44 (1.6) | 525 (4.6) | 38 (2.0) | 513 (5.5) | 36 (2.1) | 530 (5.1) | 34 (1.3) | 523 (3.8) | 30 (2.0) | 501 (7.5) |
| Canada | 10 (0.3) | 514 (5.0) | 47 (0.6) | 523 (2.0) | 43 (0.7) | 500 (2.2) | 25 (0.7) | 526 (3.9) | 42 (0.6) | 516 (2.2) | 33 (1.0) | 499 (2.6) |
| Chile | 17 (0.8) | 439 (4.2) | 36 (0.7) | 457 (2.9) | 47 (1.0) | 434 (3.4) | 20 (0.8) | 458 (3.9) | 36 (0.9) | 444 (3.5) | 44 (0.9) | 440 (3.2) |
| Chinese Taipei | 17 (0.7) | 588 (4.0) | 59 (0.9) | 605 (2.1) | 24 (0.8) | 596 (2.8) | 17 (0.7) | 599 (3.9) | 56 (0.8) | 603 (2.1) | 27 (0.9) | 593 (2.9) |
| Croatia | 13 (0.9) | 518 (5.4) | 57 (1.5) | 512 (2.7) | 30 (1.2) | 504 (2.7) | 20 (1.2) | 521 (5.0) | 53 (1.2) | 511 (2.8) | 28 (1.2) | 501 (3.0) |
| Cyprus | 23 (0.8) | 537 (3.5) | 40 (0.9) | 542 (2.8) | 37 (1.1) | 521 (4.0) | 44 (1.1) | 547 (3.3) | 32 (0.8) | 532 (3.5) | 24 (0.9) | 512 (3.9) |
| Czech Republic | 7 (0.5) | 534 (6.6) | 42 (1.1) | 546 (2.9) | 51 (1.1) | 523 (3.0) | 25 (1.1) | 551 (3.2) | 45 (1.1) | 536 (2.7) | 30 (0.8) | 520 (4.2) |
| Denmark | 7 (0.5) | 525 (5.6) | 51 (1.1) | 531 (2.6) | 42 (1.1) | 518 (2.4) | 27 (1.1) | 541 (3.4) | 46 (1.1) | 524 (2.6) | 27 (1.1) | 514 (3.0) |
| England | 9 (0.6) | 554 (6.8) | 48 (1.3) | 568 (4.6) | 43 (1.5) | 545 (3.3) | 27 (1.2) | 575 (5.3) | 42 (1.1) | 565 (4.0) | 30 (1.2) | 531 (3.7) |
| Finland | 8 (0.5) | 531 (5.2) | 59 (0.9) | 540 (2.3) | 33 (0.9) | 519 (3.3) | 29 (1.0) | 540 (3.3) | 52 (0.9) | 537 (2.5) | 20 (0.7) | 511 (4.0) |
| France | 16 (0.7) | 481 (4.7) | 50 (1.0) | 493 (3.3) | 34 (1.1) | 478 (4.1) | 32 (1.2) | 503 (3.0) | 37 (1.0) | 487 (3.8) | 31 (1.3) | 469 (4.1) |
| Georgia | 27 (1.3) | 497 (4.3) | 46 (1.6) | 482 (4.2) | 27 (1.3) | 467 (5.6) | 41 (1.6) | 486 (4.5) | 39 (1.4) | 489 (4.6) | 21 (1.3) | 472 (5.6) |
| Germany | r 8 (0.6) | 519 (6.4) | 40 (1.1) | 536 (3.1) | 52 (1.0) | 517 (2.4) | r 29 (1.0) | 537 (3.4) | 43 (0.9) | 531 (2.6) | 28 (1.0) | 507 (3.4) |
| Hong Kong SAR | 16 (0.8) | 610 (5.2) | 51 (1.2) | 607 (3.4) | 33 (1.3) | 589 (4.2) | 26 (0.8) | 612 (4.8) | 46 (1.1) | 606 (3.2) | 28 (1.2) | 586 (4.6) |
| Hungary | 6 (0.5) | 515 (7.3) | 41 (1.0) | 528 (3.1) | 53 (1.1) | 522 (2.8) | 29 (0.8) | 536 (3.6) | 47 (0.8) | 525 (2.9) | 24 (0.8) | 515 (4.3) |
| Iran, Islamic Rep. of | 39 (1.4) | 442 (4.5) | 41 (1.3) | 453 (4.4) | 20 (0.9) | 434 (6.0) | 38 (1.0) | 458 (4.6) | 41 (1.2) | 447 (4.5) | 21 (0.8) | 427 (4.8) |
| Ireland | 11 (0.8) | 544 (5.3) | 55 (1.1) | 558 (2.8) | 34 (1.0) | 537 (3.1) | 36 (1.0) | 567 (3.2) | 44 (1.0) | 549 (3.1) | 20 (0.9) | 529 (4.3) |
| Italy | 13 (0.8) | 514 (4.6) | 43 (1.1) | 523 (2.9) | 45 (1.3) | 508 (2.7) | 28 (1.0) | 529 (3.2) | 36 (0.9) | 519 (2.7) | 36 (0.9) | 504 (2.9) |
| Japan | 26 (1.0) | 601 (2.5) | 51 (0.9) | 596 (2.2) | 23 (0.9) | 579 (3.1) | 44 (1.1) | 607 (2.3) | 37 (0.7) | 593 (2.4) | 19 (0.7) | 568 (2.8) |
| Kazakhstan | 32 (1.4) | 515 (3.5) | 47 (1.2) | 516 (2.7) | 21 (1.0) | 502 (3.9) | 36 (1.5) | 521 (3.4) | 47 (1.2) | 512 (2.8) | 17 (0.8) | 508 (5.2) |
| Korea, Rep. of | 15 (0.8) | 610 (4.6) | 49 (1.2) | 605 (2.4) | 36 (1.2) | 590 (3.3) | 21 (0.8) | 613 (3.3) | 46 (1.1) | 602 (2.6) | 34 (1.2) | 591 (3.0) |
| Kosovo | 38 (1.3) | 452 (3.3) | 46 (1.1) | 453 (3.0) | 17 (0.9) | 423 (5.2) | 35 (1.3) | 459 (3.9) | 40 (1.2) | 452 (3.4) | 25 (1.0) | 433 (4.0) |
| Kuwait | 25 (1.3) | 390 (5.8) | 40 (1.2) | 404 (5.2) | 35 (1.5) | 373 (6.0) | 24 (1.1) | 407 (6.5) | 39 (1.1) | 404 (4.9) | 37 (1.2) | 377 (6.1) |
| Latvia | 7 (0.4) | 546 (5.8) | 49 (1.0) | 555 (2.6) | 44 (1.1) | 538 (3.4) | 22 (1.0) | 555 (3.4) | 44 (1.0) | 552 (3.1) | 34 (1.1) | 537 (3.1) |
| Lithuania | 25 (1.2) | 543 (4.3) | 54 (1.0) | 545 (3.0) | 21 (0.9) | 537 (4.8) | 49 (1.3) | 545 (3.3) | 39 (1.0) | 546 (3.3) | 12 (0.8) | 530 (5.6) |
| Malta | 15 (0.6) | 504 (4.3) | 42 (0.7) | 517 (2.2) | 43 (0.8) | 505 (2.2) | 22 (0.6) | 521 (3.5) | 36 (0.8) | 517 (2.0) | 42 (0.8) | 498 (2.4) |
| Montenegro | 26 (0.8) | 458 (2.8) | 50 (0.8) | 461 (2.6) | 24 (0.6) | 441 (3.1) | 37 (1.0) | 467 (2.4) | 36 (0.8) | 459 (2.7) | 27 (0.9) | 438 (2.8) |
| Morocco | 39 (1.5) | 388 (4.2) | 40 (1.5) | 395 (5.7) | 21 (1.1) | 362 (6.6) | 31 (1.2) | 393 (5.1) | 39 (1.2) | 392 (5.0) | 30 (1.4) | 377 (7.7) |
| Netherlands | 8 (0.5) | 533 (4.5) | 50 (1.5) | 543 (2.4) | 42 (1.5) | 534 (2.7) | 32 (0.9) | 548 (2.4) | 45 (1.0) | 540 (3.0) | 23 (1.1) | 523 (3.4) |
| New Zealand | 11 (0.6) | 484 (5.6) | 50 (0.9) | 501 (3.1) | 39 (0.9) | 475 (2.9) | 29 (0.9) | 510 (3.7) | 42 (1.0) | 497 (3.4) | 29 (0.9) | 462 (3.1) |
| North Macedonia | 28 (1.5) | 475 (7.2) | 46 (1.4) | 491 (5.6) | 26 (1.2) | 451 (7.7) | 29 (1.3) | 484 (5.9) | 40 (1.9) | 488 (6.0) | 31 (2.0) | 465 (6.9) |
| Northern Ireland | 7 (0.5) | 567 (8.1) | 49 (1.2) | 581 (3.4) | 43 (1.2) | 552 (3.6) | 33 (0.9) | 586 (4.1) | 41 (0.8) | 566 (3.5) | 26 (1.0) | 550 (4.6) |
| Norway (5) | 8 (0.7) | 537 (6.3) | 47 (1.2) | 551 (2.9) | 46 (1.3) | 539 (3.0) | 27 (1.0) | 557 (3.6) | 51 (0.8) | 547 (2.7) | 22 (1.0) | 527 (3.5) |
| Oman | 24 (1.2) | 433 (5.2) | 46 (1.1) | 446 (4.8) | 30 (1.2) | 418 (4.5) | 25 (1.2) | 446 (5.0) | 38 (0.8) | 437 (4.6) | 37 (1.3) | 428 (4.5) |
| Pakistan | 43 (3.4) | 329 (15.0) | 31 (2.5) | 348 (15.8) | 25 (2.8) | 309 (10.2) | r 33 (2.6) | 322 (13.6) | 29 (2.6) | 349 (14.5) | 38 (2.4) | 334 (12.9) |
| Philippines | 24 (1.1) | 306 (6.8) | 42 (1.4) | 337 (6.5) | 33 (1.5) | 259 (6.3) | 27 (1.4) | 313 (7.4) | 44 (1.4) | 327 (5.8) | 29 (1.1) | 273 (8.1) |
| Poland | 17 (0.7) | 528 (4.4) | 46 (1.1) | 529 (2.8) | 37 (1.3) | 510 (3.4) | 45 (1.1) | 536 (3.0) | 38 (0.9) | 520 (3.0) | 18 (0.7) | 500 (4.2) |
| Portugal | 23 (0.7) | 532 (3.8) | 46 (0.8) | 532 (2.8) | 31 (0.8) | 513 (3.2) | 47 (1.0) | 538 (3.4) | 32 (0.7) | 530 (3.3) | 22 (0.9) | 503 (3.7) |
| Qatar | 17 (0.8) | 452 (4.9) | 40 (0.9) | 462 (4.1) | 43 (1.1) | 445 (4.1) | 20 (0.8) | 468 (5.4) | 37 (0.9) | 460 (4.4) | 43 (0.9) | 442 (3.7) |
| Russian Federation | 20 (1.1) | 571 (5.9) | 51 (0.9) | 573 (3.4) | 29 (1.3) | 556 (4.0) | 42 (1.3) | 572 (4.8) | 39 (1.0) | 569 (3.6) | 19 (0.9) | 560 (3.7) |
| Saudi Arabia | 26 (0.9) | 409 (5.0) | 45 (1.0) | 412 (4.1) | 29 (1.0) | 379 (4.5) | 24 (1.1) | 417 (5.3) | 39 (1.1) | 412 (4.4) | 36 (1.2) | 393 (3.6) |
| Serbia | 13 (0.9) | 507 (5.2) | 56 (1.1) | 516 (3.8) | 31 (1.1) | 497 (4.4) | 29 (1.5) | 519 (3.8) | 41 (1.2) | 519 (3.8) | 30 (1.5) | 489 (5.3) |
| Singapore | 12 (0.5) | 633 (5.1) | 45 (0.7) | 637 (3.9) | 44 (0.8) | 612 (4.4) | 34 (0.8) | 647 (3.6) | 40 (0.7) | 628 (4.3) | 26 (0.8) | 596 (4.3) |
| Slovak Republic | 8 (0.6) | 508 (6.8) | 38 (1.0) | 518 (5.0) | 54 (1.2) | 506 (2.8) | 30 (1.0) | 523 (3.9) | 43 (1.2) | 513 (4.3) | 27 (1.2) | 496 (3.9) |
| South Africa (5) | 27 (1.0) | 378 (4.6) | 45 (0.9) | 393 (3.6) | 28 (1.0) | 352 (4.5) | 31 (1.0) | 391 (4.5) | 38 (0.7) | 388 (3.8) | 31 (1.0) | 358 (4.8) |
| Spain | 17 (0.8) | 503 (5.5) | 47 (1.1) | 513 (2.1) | 36 (1.1) | 492 (2.8) | 40 (1.0) | 515 (2.6) | 36 (0.8) | 509 (3.1) | 24 (1.0) | 482 (3.1) |
| Sweden | 7 (0.6) | 511 (7.1) | 51 (1.2) | 528 (3.3) | 42 (1.3) | 517 (3.0) | 33 (1.3) | 534 (3.9) | 44 (1.3) | 523 (2.8) | 24 (1.3) | 506 (4.1) |
| Turkey (5) | 17 (0.7) | 523 (5.7) | 51 (1.0) | 533 (4.7) | 32 (1.0) | 513 (5.6) | 15 (0.7) | 528 (5.2) | 44 (1.0) | 532 (5.3) | 40 (1.1) | 521 (5.0) |
| United Arab Emirates | 23 (0.5) | 489 (2.5) | 42 (0.4) | 491 (2.1) | 34 (0.5) | 471 (2.1) | 26 (0.5) | 498 (2.2) | 40 (0.4) | 490 (1.8) | 34 (0.5) | 469 (2.2) |
| United States | 8 (0.4) | 539 (5.7) | 36 (0.7) | 554 (2.6) | 56 (0.8) | 528 (2.7) | 23 (0.7) | 556 (3.5) | 40 (0.5) | 545 (2.6) | 38 (0.8) | 523 (2.9) |
| **International Average** | **19 (0.1)** | **503 (0.7)** | **47 (0.1)** | **511 (0.5)** | **35 (0.2)** | **490 (0.6)** | **31 (0.2)** | **515 (0.6)** | **41 (0.1)** | **507 (0.5)** | **28 (0.1)** | **488 (0.6)** |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Ontario, Canada | 10 (0.6) | 517 (8.2) | 46 (1.2) | 525 (3.3) | 44 (1.2) | 500 (3.8) | 27 (1.3) | 528 (6.5) | 41 (1.1) | 518 (3.9) | 32 (1.9) | 496 (4.7) |
| Quebec, Canada | r 9 (0.7) | 527 (5.6) | 53 (1.2) | 537 (2.8) | 38 (1.4) | 525 (2.6) | r 19 (1.0) | 548 (3.6) | 44 (1.2) | 534 (3.1) | 37 (1.1) | 523 (3.0) |
| Moscow City, Russian Fed. | 16 (0.9) | 603 (3.4) | 48 (1.0) | 599 (2.5) | 36 (1.1) | 582 (3.1) | 33 (1.3) | 602 (2.6) | 40 (1.0) | 595 (2.7) | 26 (1.0) | 581 (3.1) |
| Madrid, Spain | 14 (0.7) | 515 (4.2) | 48 (0.9) | 525 (2.3) | 37 (0.9) | 512 (2.6) | 42 (1.1) | 528 (2.3) | 37 (1.0) | 520 (2.7) | 21 (0.9) | 500 (3.8) |
| Abu Dhabi, UAE | 18 (0.7) | 438 (4.7) | 41 (0.7) | 450 (2.7) | 42 (0.7) | 437 (3.2) | 21 (0.7) | 454 (4.2) | 39 (0.8) | 452 (2.8) | 39 (0.8) | 432 (2.6) |
| Dubai, UAE | 23 (0.6) | 543 (2.8) | 45 (0.8) | 551 (2.1) | 32 (0.7) | 536 (2.5) | 30 (0.7) | 549 (2.7) | 40 (0.7) | 549 (1.9) | 30 (0.6) | 533 (3.2) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 10.6: Students Report Arriving at School Feeling Tired or Hungry

*Students' Reports*

| Country | Students Feel Tired | | | | | | Students Feel Hungry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Never | | Sometimes | | Every Day or Almost Every Day | | Never | | Sometimes | | Every Day or Almost Every Day | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 41 (1.9) | 495 (3.6) | 46 (1.6) | 496 (4.3) | 13 (1.0) | 469 (7.1) | 44 (2.0) | 498 (4.5) | 34 (2.0) | 500 (4.1) | 22 (1.4) | 476 (4.8) |
| Armenia | 38 (1.4) | 473 (4.0) | 37 (1.1) | 481 (3.9) | 26 (1.1) | 453 (4.5) | r 41 (1.2) | 480 (3.5) | 32 (1.1) | 476 (4.3) | 27 (1.0) | 455 (5.4) |
| Australia | 13 (0.7) | 527 (5.7) | 53 (1.0) | 542 (3.0) | 34 (1.1) | 522 (2.9) | 30 (1.1) | 551 (3.6) | 43 (0.9) | 539 (2.6) | 28 (1.0) | 508 (3.3) |
| Austria | 9 (0.5) | 518 (5.9) | 47 (1.0) | 528 (3.0) | 44 (1.1) | 518 (3.3) | 30 (0.9) | 539 (3.2) | 43 (0.8) | 523 (3.4) | 26 (0.9) | 507 (3.2) |
| Azerbaijan | 29 (1.2) | 437 (4.2) | 49 (1.1) | 439 (3.3) | 22 (0.9) | 429 (5.2) | 42 (1.4) | 441 (3.4) | 44 (1.2) | 440 (3.6) | 13 (0.8) | 415 (7.0) |
| Bahrain | 24 (0.8) | 500 (3.8) | 41 (0.8) | 504 (3.9) | 35 (1.0) | 481 (4.4) | 27 (0.9) | 513 (4.1) | 36 (0.9) | 495 (3.7) | 37 (0.9) | 486 (4.0) |
| Belgium (Flemish) | 12 (0.5) | 497 (4.4) | 57 (0.8) | 505 (2.3) | 31 (0.8) | 497 (2.7) | 34 (1.2) | 512 (2.8) | 41 (1.0) | 502 (2.8) | 25 (1.0) | 487 (3.5) |
| Bosnia and Herzegovina | 17 (0.8) | 461 (4.8) | 51 (1.0) | 468 (2.9) | 32 (1.1) | 450 (3.6) | 29 (1.0) | 468 (3.9) | 41 (0.7) | 465 (3.1) | 30 (1.0) | 454 (3.4) |
| Bulgaria | 17 (1.3) | 498 (11.7) | 44 (1.6) | 535 (5.7) | 38 (2.0) | 521 (6.4) | 36 (2.1) | 539 (6.7) | 34 (1.3) | 528 (4.6) | 30 (2.0) | 508 (8.4) |
| Canada | 10 (0.3) | 522 (4.6) | 47 (0.6) | 531 (2.4) | 43 (0.7) | 518 (2.2) | 25 (0.7) | 536 (3.4) | 42 (0.6) | 529 (2.2) | 33 (1.0) | 512 (2.3) |
| Chile | 17 (0.8) | 462 (4.0) | 36 (0.7) | 484 (3.1) | 47 (1.0) | 464 (3.2) | 20 (0.8) | 486 (4.0) | 36 (0.9) | 470 (3.0) | 44 (0.9) | 469 (2.9) |
| Chinese Taipei | 17 (0.7) | 544 (3.5) | 59 (0.9) | 565 (2.2) | 24 (0.8) | 555 (2.6) | 17 (0.7) | 561 (3.9) | 56 (0.8) | 561 (2.1) | 27 (0.9) | 552 (2.8) |
| Croatia | 13 (0.9) | 527 (4.1) | 57 (1.5) | 526 (2.6) | 30 (1.2) | 520 (2.9) | 20 (1.2) | 534 (4.6) | 53 (1.2) | 526 (2.6) | 28 (1.2) | 515 (3.3) |
| Cyprus | 23 (0.8) | 518 (4.3) | 40 (0.9) | 520 (3.0) | 37 (1.1) | 500 (3.7) | 44 (1.1) | 525 (3.8) | 32 (0.8) | 512 (3.4) | 24 (0.9) | 493 (3.9) |
| Czech Republic | 7 (0.5) | 537 (6.0) | 42 (1.1) | 542 (3.0) | 51 (1.1) | 527 (2.8) | 25 (1.1) | 550 (3.4) | 45 (1.1) | 537 (2.8) | 30 (0.8) | 520 (3.7) |
| Denmark | 7 (0.5) | 518 (6.1) | 51 (1.1) | 524 (2.7) | 42 (1.1) | 521 (2.9) | 27 (1.1) | 535 (3.2) | 46 (1.1) | 521 (3.2) | 27 (1.1) | 515 (3.1) |
| England | 9 (0.6) | 527 (6.6) | 48 (1.3) | 548 (3.8) | 43 (1.5) | 530 (3.2) | 27 (1.2) | 552 (4.7) | 42 (1.1) | 543 (3.6) | 30 (1.2) | 520 (3.7) |
| Finland | 8 (0.5) | 547 (5.3) | 59 (0.9) | 562 (2.8) | 33 (0.9) | 544 (3.4) | 29 (1.0) | 564 (3.0) | 52 (0.9) | 556 (3.1) | 20 (0.7) | 540 (4.0) |
| France | 16 (0.7) | 478 (4.3) | 50 (1.0) | 495 (3.1) | 34 (1.1) | 484 (4.1) | 32 (1.2) | 503 (3.3) | 37 (1.0) | 490 (3.9) | 31 (1.3) | 473 (4.1) |
| Georgia | 27 (1.3) | 464 (4.8) | 46 (1.6) | 458 (4.4) | 27 (1.3) | 438 (5.6) | 41 (1.6) | 456 (5.2) | 39 (1.4) | 463 (4.9) | 21 (1.3) | 445 (6.0) |
| Germany | r 8 (0.6) | 501 (7.8) | 40 (1.1) | 531 (3.0) | 52 (1.0) | 519 (2.6) | r 29 (1.0) | 532 (3.6) | 43 (0.9) | 531 (3.1) | 28 (1.0) | 507 (3.7) |
| Hong Kong SAR | 16 (0.8) | 532 (4.6) | 51 (1.2) | 538 (3.3) | 33 (1.3) | 520 (4.7) | 26 (0.8) | 544 (3.9) | 46 (1.1) | 535 (3.8) | 28 (1.2) | 515 (5.2) |
| Hungary | 6 (0.5) | 514 (7.2) | 41 (1.0) | 534 (3.6) | 53 (1.1) | 529 (3.0) | 29 (0.8) | 539 (3.7) | 47 (0.8) | 533 (3.0) | 24 (0.8) | 521 (3.4) |
| Iran, Islamic Rep. of | 39 (1.4) | 441 (5.3) | 41 (1.3) | 449 (4.8) | 20 (0.9) | 433 (5.5) | 38 (1.0) | 456 (5.0) | 41 (1.2) | 446 (4.5) | 21 (0.8) | 423 (4.9) |
| Ireland | 11 (0.8) | 519 (5.6) | 55 (1.1) | 537 (3.3) | 34 (1.0) | 518 (4.1) | 36 (1.0) | 546 (3.5) | 44 (1.0) | 528 (3.8) | 20 (0.9) | 508 (4.7) |
| Italy | 13 (0.8) | 508 (3.7) | 43 (1.1) | 514 (3.2) | 45 (1.3) | 507 (3.8) | 28 (1.0) | 521 (3.2) | 36 (0.9) | 515 (3.6) | 36 (0.9) | 499 (3.3) |
| Japan | 26 (1.0) | 565 (2.6) | 51 (0.9) | 565 (2.3) | 23 (0.9) | 553 (3.2) | 44 (1.1) | 573 (2.4) | 37 (0.7) | 561 (2.4) | 19 (0.7) | 542 (3.0) |
| Kazakhstan | 32 (1.4) | 495 (4.6) | 47 (1.2) | 500 (3.4) | 21 (1.0) | 484 (4.4) | 36 (1.5) | 504 (4.9) | 47 (1.2) | 492 (3.3) | 17 (0.8) | 496 (6.2) |
| Korea, Rep. of | 15 (0.8) | 591 (4.7) | 49 (1.2) | 593 (2.1) | 36 (1.2) | 581 (3.1) | 21 (0.8) | 596 (3.1) | 46 (1.1) | 591 (2.3) | 34 (1.2) | 580 (3.2) |
| Kosovo | 38 (1.3) | 424 (3.9) | 46 (1.1) | 423 (4.0) | 17 (0.9) | 383 (5.2) | 35 (1.3) | 432 (4.2) | 40 (1.2) | 423 (4.8) | 25 (1.0) | 394 (4.6) |
| Kuwait | 25 (1.3) | 409 (7.4) | 40 (1.2) | 412 (6.7) | 35 (1.5) | 377 (6.6) | 24 (1.1) | 425 (8.4) | 39 (1.1) | 414 (6.1) | 37 (1.2) | 382 (6.9) |
| Latvia | 7 (0.4) | 540 (5.2) | 49 (1.0) | 550 (2.4) | 44 (1.1) | 535 (3.4) | 22 (1.0) | 552 (3.3) | 44 (1.0) | 546 (2.7) | 34 (1.1) | 534 (2.8) |
| Lithuania | 25 (1.2) | 541 (4.0) | 54 (1.0) | 540 (2.7) | 21 (0.9) | 531 (4.5) | 49 (1.3) | 542 (3.0) | 39 (1.0) | 543 (2.9) | 12 (0.8) | 520 (5.4) |
| Malta | 15 (0.6) | 479 (4.6) | 42 (0.7) | 503 (2.6) | 43 (0.8) | 496 (2.7) | 22 (0.6) | 504 (3.6) | 36 (0.8) | 504 (2.4) | 42 (0.8) | 486 (2.4) |
| Montenegro | 26 (0.8) | 453 (3.5) | 50 (0.8) | 465 (2.8) | 24 (0.6) | 442 (3.4) | 37 (1.0) | 468 (2.7) | 36 (0.8) | 460 (3.0) | 27 (0.9) | 439 (3.8) |
| Morocco | 39 (1.5) | 381 (5.6) | 40 (1.5) | 388 (6.6) | 21 (1.1) | 348 (10.2) | 31 (1.2) | 387 (6.4) | 39 (1.2) | 380 (6.4) | 30 (1.4) | 369 (10.8) |
| Netherlands | 8 (0.5) | 505 (4.8) | 50 (1.5) | 524 (3.5) | 42 (1.5) | 516 (4.0) | 32 (0.9) | 530 (3.3) | 45 (1.0) | 520 (3.5) | 23 (1.1) | 507 (4.3) |
| New Zealand | 11 (0.6) | 495 (6.0) | 50 (0.9) | 514 (2.8) | 39 (0.9) | 495 (2.3) | 29 (0.9) | 523 (3.1) | 42 (1.0) | 513 (2.9) | 29 (0.9) | 475 (2.9) |
| North Macedonia | 28 (1.5) | 437 (8.4) | 46 (1.4) | 441 (6.7) | 26 (1.2) | 406 (8.0) | 29 (1.3) | 441 (7.2) | 40 (1.9) | 444 (6.4) | 31 (2.0) | 416 (8.9) |
| Northern Ireland | 7 (0.5) | 519 (6.4) | 49 (1.2) | 528 (2.4) | 43 (1.2) | 510 (3.1) | 33 (0.9) | 535 (3.4) | 41 (0.8) | 518 (2.9) | 26 (1.0) | 507 (3.8) |
| Norway (5) | 8 (0.7) | 523 (7.2) | 47 (1.2) | 546 (2.8) | 46 (1.3) | 537 (3.2) | 27 (1.0) | 550 (3.4) | 51 (0.8) | 544 (2.9) | 22 (1.0) | 525 (3.7) |
| Oman | 24 (1.2) | 436 (5.8) | 46 (1.1) | 453 (4.7) | 30 (1.2) | 422 (5.2) | 25 (1.2) | 450 (6.0) | 38 (0.8) | 443 (4.6) | 37 (1.3) | 435 (5.4) |
| Pakistan | 43 (3.4) | 297 (16.3) | 31 (2.5) | 309 (17.7) | 25 (2.8) | 264 (13.2) | r 33 (2.6) | 285 (16.6) | 29 (2.6) | 317 (14.9) | 38 (2.4) | 294 (15.6) |
| Philippines | 24 (1.1) | 255 (8.3) | 42 (1.4) | 292 (8.6) | 33 (1.5) | 212 (7.0) | 27 (1.4) | 264 (8.5) | 44 (1.4) | 280 (7.5) | 29 (1.1) | 225 (10.2) |
| Poland | 17 (0.7) | 536 (4.7) | 46 (1.1) | 537 (2.8) | 37 (1.3) | 525 (3.1) | 45 (1.1) | 544 (3.3) | 38 (0.9) | 532 (2.9) | 18 (0.7) | 512 (4.0) |
| Portugal | 23 (0.7) | 508 (3.5) | 46 (0.8) | 509 (3.1) | 31 (0.8) | 496 (2.7) | 47 (1.0) | 515 (3.3) | 32 (0.7) | 507 (2.7) | 22 (0.9) | 486 (3.8) |
| Qatar | 17 (0.8) | 454 (6.1) | 40 (0.9) | 469 (4.7) | 43 (1.1) | 439 (4.4) | 20 (0.8) | 469 (6.2) | 37 (0.9) | 462 (4.5) | 43 (0.9) | 442 (4.7) |
| Russian Federation | 20 (1.1) | 569 (5.6) | 51 (0.9) | 571 (3.0) | 29 (1.3) | 561 (3.5) | 42 (1.3) | 571 (4.4) | 39 (1.0) | 569 (3.2) | 19 (0.9) | 563 (3.4) |
| Saudi Arabia | 26 (0.9) | 418 (4.8) | 45 (1.0) | 417 (4.3) | 29 (1.0) | 379 (5.7) | 24 (1.1) | 429 (5.4) | 39 (1.1) | 417 (4.5) | 36 (1.2) | 396 (5.0) |
| Serbia | 13 (0.9) | 520 (5.5) | 56 (1.1) | 524 (3.8) | 31 (1.1) | 505 (4.8) | 29 (1.5) | 533 (4.0) | 41 (1.2) | 524 (3.9) | 30 (1.5) | 498 (5.1) |
| Singapore | 12 (0.5) | 600 (4.8) | 45 (0.7) | 604 (3.4) | 44 (0.8) | 584 (3.9) | 34 (0.8) | 615 (3.2) | 40 (0.7) | 596 (3.8) | 26 (0.8) | 568 (3.8) |
| Slovak Republic | 8 (0.6) | 512 (7.9) | 38 (1.0) | 526 (5.3) | 54 (1.2) | 520 (3.2) | 30 (1.0) | 533 (4.3) | 43 (1.2) | 524 (4.2) | 27 (1.2) | 508 (5.0) |
| South Africa (5) | 27 (1.0) | 330 (6.3) | 45 (0.9) | 349 (5.1) | 28 (1.0) | 296 (6.4) | 31 (1.0) | 353 (6.0) | 38 (0.7) | 340 (5.2) | 31 (1.0) | 301 (6.4) |
| Spain | 17 (0.8) | 511 (3.7) | 47 (1.1) | 521 (1.9) | 36 (1.1) | 502 (3.0) | 40 (1.0) | 525 (2.5) | 36 (0.8) | 515 (2.5) | 24 (1.0) | 490 (3.5) |
| Sweden | 7 (0.6) | 512 (7.2) | 51 (1.2) | 542 (3.5) | 42 (1.3) | 537 (3.7) | 33 (1.3) | 547 (4.5) | 44 (1.3) | 540 (3.1) | 24 (1.3) | 523 (4.7) |
| Turkey (5) | 17 (0.7) | 525 (5.3) | 51 (1.0) | 535 (4.4) | 32 (1.0) | 519 (5.5) | 15 (0.7) | 532 (5.2) | 44 (1.0) | 534 (4.9) | 40 (1.1) | 526 (5.1) |
| United Arab Emirates | 23 (0.5) | 483 (3.2) | 42 (0.4) | 484 (2.3) | 34 (0.5) | 460 (2.6) | 26 (0.5) | 493 (2.9) | 40 (0.4) | 484 (2.3) | 34 (0.5) | 458 (2.5) |
| United States | 8 (0.4) | 538 (5.7) | 36 (0.7) | 553 (2.7) | 56 (0.8) | 534 (3.1) | 23 (0.7) | 561 (3.8) | 40 (0.5) | 549 (2.6) | 38 (0.8) | 525 (3.2) |
| **International Average** | **19 (0.1)** | **490 (0.8)** | **47 (0.1)** | **501 (0.6)** | **35 (0.2)** | **481 (0.6)** | **31 (0.2)** | **504 (0.6)** | **41 (0.1)** | **497 (0.6)** | **28 (0.1)** | **478 (0.7)** |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Ontario, Canada | 10 (0.6) | 522 (7.2) | 46 (1.2) | 534 (3.7) | 44 (1.2) | 518 (3.5) | 27 (1.3) | 537 (5.4) | 41 (1.1) | 532 (3.3) | 32 (1.9) | 510 (4.1) |
| Quebec, Canada | r 9 (0.7) | 515 (5.3) | 53 (1.2) | 526 (3.1) | 38 (1.4) | 518 (3.0) | r 19 (1.0) | 535 (4.2) | 44 (1.2) | 524 (3.3) | 37 (1.1) | 514 (3.4) |
| Moscow City, Russian Fed. | 16 (0.9) | 605 (4.0) | 48 (1.0) | 597 (2.7) | 36 (1.1) | 589 (3.0) | 33 (1.3) | 602 (2.5) | 40 (1.0) | 597 (2.9) | 26 (1.0) | 586 (3.0) |
| Madrid, Spain | 14 (0.7) | 517 (3.8) | 48 (0.9) | 529 (2.2) | 37 (0.9) | 518 (2.6) | 42 (1.1) | 535 (2.3) | 37 (1.0) | 522 (2.4) | 21 (0.9) | 503 (3.6) |
| Abu Dhabi, UAE | 18 (0.7) | 416 (5.5) | 41 (0.7) | 429 (3.2) | 42 (0.7) | 415 (3.8) | 21 (0.7) | 436 (5.6) | 39 (0.8) | 431 (3.5) | 39 (0.8) | 409 (3.2) |
| Dubai, UAE | 23 (0.6) | 543 (2.8) | 45 (0.8) | 551 (1.9) | 32 (0.7) | 537 (3.0) | 30 (0.7) | 549 (2.6) | 40 (0.7) | 550 (1.9) | 30 (0.6) | 532 (3.6) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 10.7: Students Report Arriving at School Feeling Tired or Hungry

*Students' Reports*

| Country | Students Feel Tired | | | | | | Students Feel Hungry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Never | | Sometimes | | Every Day or Almost Every Day | | Never | | Sometimes | | Every Day or Almost Every Day | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 4 (0.2) | 523 (9.4) | 47 (0.9) | 526 (4.6) | 49 (0.9) | 510 (3.5) | 28 (0.8) | 540 (5.8) | 45 (0.6) | 521 (4.0) | 27 (0.8) | 493 (3.6) |
| Bahrain | 8 (0.7) | 489 (6.0) | 39 (1.0) | 493 (2.6) | 53 (0.8) | 472 (1.7) | 21 (0.7) | 497 (3.6) | 36 (0.8) | 485 (2.6) | 43 (0.9) | 472 (2.6) |
| Chile | 6 (0.5) | 434 (7.4) | 46 (1.1) | 442 (3.2) | 48 (1.1) | 442 (3.2) | 14 (0.7) | 459 (5.1) | 34 (1.0) | 443 (3.4) | 53 (1.0) | 437 (2.7) |
| Chinese Taipei | 4 (0.3) | 596 (10.2) | 50 (1.0) | 616 (3.3) | 46 (1.0) | 610 (3.1) | 8 (0.4) | 607 (6.2) | 49 (0.9) | 616 (3.0) | 44 (1.0) | 611 (3.6) |
| Cyprus | 8 (0.6) | 507 (7.5) | 42 (0.9) | 505 (2.2) | 50 (1.0) | 498 (2.5) | 37 (1.0) | 516 (3.1) | 38 (1.0) | 499 (2.8) | 25 (0.9) | 487 (3.3) |
| Egypt | 15 (0.9) | 424 (7.2) | 58 (1.0) | 420 (5.3) | 27 (1.0) | 403 (5.9) | 20 (0.9) | 427 (7.0) | 41 (1.1) | 418 (5.3) | 39 (1.2) | 415 (5.4) |
| England | 4 (0.4) | 510 (14.0) | 39 (1.1) | 525 (5.7) | 57 (1.2) | 513 (5.7) | 30 (1.3) | 533 (6.7) | 45 (1.1) | 521 (5.1) | 26 (1.1) | 497 (6.4) |
| Finland | 2 (0.2) | ~ ~ | 52 (1.2) | 518 (2.7) | 46 (1.2) | 500 (3.1) | 19 (0.7) | 534 (3.7) | 50 (0.8) | 511 (2.8) | 31 (0.8) | 493 (3.2) |
| France | 4 (0.4) | 479 (7.2) | 41 (0.9) | 488 (2.7) | 54 (1.0) | 480 (2.9) | 18 (0.7) | 499 (4.0) | 33 (0.9) | 486 (3.5) | 49 (1.1) | 476 (2.6) |
| Georgia | 11 (0.9) | 471 (7.4) | 47 (1.2) | 459 (4.5) | 42 (1.4) | 463 (5.3) | 30 (1.4) | 469 (5.2) | 44 (1.4) | 464 (5.3) | 26 (1.4) | 457 (4.9) |
| Hong Kong SAR | 5 (0.5) | 577 (9.1) | 45 (1.1) | 585 (4.2) | 49 (1.1) | 575 (4.6) | 14 (1.1) | 600 (8.3) | 46 (1.3) | 584 (4.5) | 40 (1.0) | 569 (4.7) |
| Hungary | 2 (0.2) | ~ ~ | 33 (1.1) | 513 (4.4) | 65 (1.1) | 518 (3.0) | 28 (1.0) | 535 (4.8) | 43 (0.8) | 516 (3.6) | 29 (1.1) | 502 (4.0) |
| Iran, Islamic Rep. of | 21 (1.0) | 445 (5.6) | 60 (1.1) | 450 (3.8) | 19 (0.8) | 439 (5.5) | 42 (0.9) | 458 (4.3) | 42 (0.9) | 446 (3.8) | 17 (0.6) | 429 (5.2) |
| Ireland | 3 (0.3) | 528 (8.8) | 41 (1.0) | 529 (3.3) | 56 (1.0) | 522 (2.7) | 35 (1.0) | 542 (3.5) | 43 (0.9) | 524 (3.0) | 22 (0.9) | 507 (3.8) |
| Israel | 8 (0.4) | 519 (9.3) | 42 (1.1) | 520 (5.3) | 51 (1.1) | 522 (4.4) | 28 (0.9) | 530 (5.9) | 45 (0.9) | 526 (4.8) | 27 (1.0) | 507 (4.7) |
| Italy | 3 (0.3) | 505 (7.9) | 43 (1.2) | 502 (3.4) | 54 (1.3) | 494 (3.0) | 23 (1.0) | 514 (4.0) | 34 (0.9) | 500 (3.3) | 43 (1.1) | 488 (3.0) |
| Japan | 11 (0.6) | 600 (4.6) | 47 (0.9) | 601 (3.4) | 41 (1.2) | 585 (3.3) | 34 (1.1) | 608 (3.1) | 43 (0.9) | 592 (3.3) | 24 (0.7) | 579 (3.7) |
| Jordan | 14 (0.6) | 439 (5.2) | 51 (1.0) | 423 (3.8) | 35 (1.0) | 416 (5.7) | 23 (0.9) | 443 (4.5) | 39 (1.0) | 419 (4.7) | 38 (1.2) | 419 (4.8) |
| Kazakhstan | 14 (0.8) | 485 (5.7) | 66 (0.9) | 488 (3.2) | 19 (0.8) | 492 (4.5) | 31 (0.9) | 488 (4.0) | 53 (0.9) | 488 (3.6) | 17 (0.6) | 490 (4.7) |
| Korea, Rep. of | 5 (0.3) | 626 (8.9) | 35 (0.9) | 619 (3.4) | 60 (1.0) | 599 (3.3) | 12 (0.5) | 623 (5.4) | 38 (0.8) | 611 (3.3) | 51 (0.8) | 602 (3.3) |
| Kuwait | 10 (0.6) | 412 (8.2) | 51 (0.9) | 408 (5.2) | 38 (1.1) | 398 (5.8) | 26 (0.9) | 420 (5.7) | 43 (1.0) | 408 (4.8) | 30 (1.0) | 392 (6.4) |
| Lebanon | 13 (1.0) | 420 (5.7) | 52 (1.3) | 429 (3.6) | 35 (1.2) | 437 (3.5) | 25 (1.1) | 435 (4.3) | 38 (0.9) | 431 (3.9) | 37 (1.2) | 429 (3.6) |
| Lithuania | 9 (0.6) | 515 (6.0) | 53 (0.9) | 517 (3.3) | 38 (1.0) | 529 (3.9) | 46 (1.1) | 524 (3.4) | 40 (0.9) | 522 (3.7) | 14 (0.8) | 517 (4.7) |
| Malaysia | 8 (0.5) | 452 (6.1) | 55 (0.9) | 459 (3.4) | 37 (1.0) | 467 (3.6) | 9 (0.5) | 460 (6.5) | 45 (0.9) | 460 (4.0) | 47 (1.0) | 463 (3.1) |
| Morocco | 13 (0.6) | 397 (4.7) | 59 (0.9) | 388 (2.5) | 28 (0.9) | 387 (3.2) | 17 (0.6) | 392 (3.9) | 47 (0.7) | 391 (2.7) | 36 (1.0) | 385 (2.8) |
| New Zealand | 5 (0.4) | 467 (10.0) | 46 (1.1) | 491 (4.1) | 50 (1.2) | 477 (3.4) | 29 (0.7) | 502 (3.7) | 45 (0.8) | 485 (3.4) | 25 (0.9) | 459 (5.2) |
| Norway (9) | 4 (0.5) | 492 (8.0) | 39 (1.1) | 510 (3.0) | 57 (1.1) | 501 (2.9) | 31 (0.9) | 517 (3.1) | 45 (1.0) | 505 (2.9) | 24 (0.9) | 487 (3.8) |
| Oman | 12 (0.5) | 424 (5.2) | 55 (0.8) | 416 (2.8) | 33 (1.0) | 404 (4.2) | 23 (0.8) | 433 (3.7) | 45 (0.9) | 415 (2.9) | 32 (1.1) | 400 (3.6) |
| Portugal | 12 (0.6) | 500 (5.4) | 50 (1.1) | 504 (3.3) | 39 (1.2) | 496 (4.1) | 48 (1.2) | 514 (3.4) | 31 (0.9) | 495 (3.8) | 21 (1.1) | 482 (5.2) |
| Qatar | 7 (0.5) | 445 (8.8) | 41 (1.3) | 452 (5.4) | 52 (1.4) | 438 (4.5) | 20 (0.8) | 475 (7.0) | 38 (1.0) | 451 (5.0) | 42 (1.1) | 427 (3.6) |
| Romania | 4 (0.4) | 475 (10.2) | 47 (1.3) | 477 (4.6) | 49 (1.4) | 484 (5.4) | 14 (0.9) | 502 (7.5) | 33 (1.1) | 487 (4.3) | 53 (1.4) | 473 (5.2) |
| Russian Federation | 10 (0.7) | 542 (7.3) | 52 (1.1) | 541 (5.5) | 38 (1.2) | 548 (3.8) | 33 (1.1) | 544 (4.9) | 43 (0.9) | 545 (5.1) | 24 (0.9) | 546 (5.0) |
| Saudi Arabia | 14 (0.7) | 400 (4.4) | 53 (0.8) | 397 (2.8) | 32 (0.9) | 390 (3.2) | 30 (0.9) | 403 (2.8) | 43 (0.7) | 396 (3.0) | 28 (0.8) | 394 (3.2) |
| Singapore | 3 (0.3) | 619 (9.5) | 34 (0.8) | 620 (4.6) | 63 (0.8) | 614 (4.2) | 20 (0.7) | 647 (4.1) | 43 (0.8) | 620 (4.3) | 36 (0.8) | 593 (4.7) |
| South Africa (9) | 20 (0.6) | 380 (3.1) | 59 (0.7) | 390 (2.2) | 21 (0.5) | 402 (3.4) | 22 (0.4) | 404 (3.3) | 46 (0.5) | 389 (2.3) | 33 (0.7) | 387 (2.6) |
| Sweden | 2 (0.3) | ~ ~ | 39 (1.1) | 508 (3.3) | 59 (1.2) | 502 (2.7) | 24 (1.0) | 522 (4.1) | 43 (1.0) | 505 (3.0) | 33 (1.0) | 489 (3.5) |
| Turkey | 6 (0.5) | 468 (9.9) | 56 (1.1) | 497 (4.4) | 37 (1.1) | 502 (4.8) | 11 (0.7) | 484 (8.2) | 42 (1.1) | 494 (5.8) | 46 (1.2) | 507 (4.2) |
| United Arab Emirates | 11 (0.4) | 493 (4.6) | 43 (0.6) | 485 (2.2) | 46 (0.5) | 463 (2.0) | 23 (0.6) | 505 (2.8) | 39 (0.5) | 483 (2.3) | 38 (0.6) | 455 (2.3) |
| United States | 3 (0.3) | 503 (12.6) | 34 (0.8) | 526 (5.3) | 62 (0.8) | 514 (4.6) | 26 (0.8) | 538 (6.8) | 41 (0.7) | 524 (4.5) | 33 (0.8) | 495 (4.5) |
| **International Average** | **8 (0.1)** | **488 (1.3)** | **47 (0.2)** | **493 (0.6)** | **45 (0.2)** | **487 (0.6)** | **25 (0.1)** | **504 (0.8)** | **42 (0.1)** | **492 (0.6)** | **33 (0.2)** | **480 (0.7)** |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Ontario, Canada | 3 (0.4) | 542 (10.1) | 41 (1.0) | 536 (4.4) | 56 (1.1) | 526 (4.7) | 31 (0.9) | 545 (5.7) | 45 (0.9) | 531 (4.8) | 24 (0.8) | 515 (4.7) |
| Quebec, Canada | 3 (0.4) | 538 (11.2) | 45 (1.3) | 548 (3.9) | 52 (1.4) | 540 (4.4) | 24 (1.2) | 563 (4.5) | 42 (1.0) | 546 (4.0) | 34 (1.1) | 528 (4.2) |
| Moscow City, Russian Fed. | 5 (0.4) | 589 (9.3) | 41 (1.2) | 577 (4.7) | 54 (1.2) | 574 (4.2) | 26 (1.0) | 585 (6.2) | 42 (0.9) | 575 (4.5) | 32 (1.1) | 570 (4.2) |
| Gauteng, RSA (9) | 15 (0.6) | 406 (4.0) | 58 (0.9) | 419 (2.9) | 27 (1.0) | 438 (4.4) | 21 (0.7) | 441 (5.0) | 42 (0.8) | 421 (3.2) | 37 (0.9) | 413 (3.1) |
| Western Cape, RSA (9) | 12 (0.6) | 410 (4.0) | 59 (0.9) | 435 (4.3) | 29 (1.0) | 472 (6.2) | 23 (0.9) | 468 (6.7) | 44 (0.8) | 442 (4.4) | 33 (1.1) | 426 (4.3) |
| Abu Dhabi, UAE | 9 (0.4) | 446 (6.6) | 40 (0.9) | 450 (3.4) | 52 (0.9) | 432 (3.5) | 20 (0.7) | 470 (4.5) | 38 (0.7) | 450 (3.4) | 43 (0.8) | 421 (3.9) |
| Dubai, UAE | 11 (0.9) | 558 (6.0) | 45 (1.1) | 542 (2.6) | 44 (0.9) | 526 (2.7) | 27 (1.0) | 564 (3.4) | 39 (0.9) | 539 (3.0) | 34 (1.2) | 512 (3.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

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## Exhibit 10.8: Students Report Arriving at School Feeling Tired or Hungry

*Students' Reports*

| Country | Students Feel Tired | | | | | | Students Feel Hungry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Never | | Sometimes | | Every Day or Almost Every Day | | Never | | Sometimes | | Every Day or Almost Every Day | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 4 (0.2) | 526 (9.3) | 47 (0.9) | 536 (3.8) | 49 (0.9) | 523 (3.1) | 28 (0.8) | 553 (5.1) | 45 (0.6) | 532 (3.2) | 27 (0.8) | 502 (3.4) |
| Bahrain | 8 (0.7) | 502 (7.2) | 39 (1.0) | 501 (2.6) | 53 (0.8) | 476 (2.7) | 21 (0.7) | 510 (3.4) | 36 (0.8) | 498 (2.8) | 43 (0.9) | 470 (2.8) |
| Chile | 6 (0.5) | 455 (8.5) | 46 (1.1) | 466 (3.2) | 48 (1.1) | 463 (3.8) | 14 (0.7) | 483 (4.9) | 34 (1.0) | 467 (3.7) | 53 (1.0) | 458 (2.9) |
| Chinese Taipei | 4 (0.3) | 551 (9.2) | 50 (1.0) | 576 (2.4) | 46 (1.0) | 575 (2.2) | 8 (0.4) | 571 (5.3) | 49 (0.9) | 577 (2.4) | 44 (1.0) | 573 (2.5) |
| Cyprus | 8 (0.6) | 492 (7.6) | 42 (0.9) | 488 (2.6) | 50 (1.0) | 480 (2.7) | 37 (1.0) | 501 (3.2) | 38 (1.0) | 482 (3.3) | 25 (0.9) | 466 (3.3) |
| Egypt | 15 (0.9) | 410 (8.0) | 58 (1.0) | 399 (5.3) | 27 (1.0) | 373 (6.5) | 20 (0.9) | 412 (7.1) | 41 (1.1) | 397 (5.3) | 39 (1.2) | 389 (5.6) |
| England | 4 (0.4) | 505 (15.5) | 39 (1.1) | 527 (5.3) | 57 (1.2) | 515 (5.4) | 30 (1.3) | 536 (6.4) | 45 (1.1) | 520 (5.0) | 26 (1.1) | 501 (5.9) |
| Finland | 2 (0.2) | ~ ~ | 52 (1.2) | 552 (3.2) | 46 (1.2) | 534 (3.6) | 19 (0.7) | 571 (4.5) | 50 (0.8) | 546 (3.6) | 31 (0.8) | 525 (4.1) |
| France | 4 (0.4) | 482 (8.3) | 41 (0.9) | 494 (3.4) | 54 (1.0) | 485 (2.9) | 18 (0.7) | 509 (4.6) | 33 (0.9) | 489 (3.7) | 49 (1.1) | 483 (2.9) |
| Georgia | 11 (0.9) | 450 (6.7) | 47 (1.2) | 450 (4.3) | 42 (1.4) | 444 (4.7) | 30 (1.4) | 456 (4.7) | 44 (1.4) | 446 (4.5) | 26 (1.4) | 447 (5.9) |
| Hong Kong SAR | 5 (0.5) | 501 (9.7) | 45 (1.1) | 510 (5.5) | 49 (1.1) | 500 (5.6) | 14 (1.1) | 534 (10.4) | 46 (1.3) | 506 (5.4) | 40 (1.0) | 493 (5.5) |
| Hungary | 2 (0.2) | ~ ~ | 33 (1.1) | 528 (4.0) | 65 (1.1) | 530 (2.6) | 28 (1.0) | 550 (4.2) | 43 (0.8) | 529 (3.1) | 29 (1.1) | 515 (4.0) |
| Iran, Islamic Rep. of | 21 (1.0) | 446 (5.4) | 60 (1.1) | 453 (3.8) | 19 (0.8) | 443 (5.2) | 42 (0.9) | 460 (4.1) | 42 (0.9) | 450 (3.7) | 17 (0.6) | 432 (5.0) |
| Ireland | 3 (0.3) | 522 (10.1) | 41 (1.0) | 526 (3.5) | 56 (1.0) | 523 (3.1) | 35 (1.0) | 544 (3.7) | 43 (0.9) | 521 (3.4) | 22 (0.9) | 504 (4.2) |
| Israel | 8 (0.4) | 516 (7.9) | 42 (1.1) | 517 (5.0) | 51 (1.1) | 515 (4.4) | 28 (0.9) | 524 (5.7) | 45 (0.9) | 520 (4.6) | 27 (1.0) | 504 (5.0) |
| Italy | 3 (0.3) | 504 (8.2) | 43 (1.2) | 503 (3.2) | 54 (1.3) | 499 (2.9) | 23 (1.0) | 521 (3.7) | 34 (0.9) | 501 (3.5) | 43 (1.1) | 491 (3.0) |
| Japan | 11 (0.6) | 580 (4.1) | 47 (0.9) | 574 (2.5) | 41 (1.2) | 561 (2.7) | 34 (1.1) | 585 (2.6) | 43 (0.9) | 569 (2.7) | 24 (0.7) | 551 (3.0) |
| Jordan | 14 (0.6) | 476 (5.4) | 51 (1.0) | 457 (4.6) | 35 (1.0) | 444 (6.0) | 23 (0.9) | 477 (5.1) | 39 (1.0) | 453 (5.2) | 38 (1.2) | 452 (4.7) |
| Kazakhstan | 14 (0.8) | 473 (5.7) | 66 (0.9) | 478 (3.1) | 19 (0.8) | 486 (5.0) | 31 (0.9) | 479 (3.7) | 53 (0.9) | 477 (3.4) | 17 (0.6) | 485 (5.3) |
| Korea, Rep. of | 5 (0.3) | 575 (8.5) | 35 (0.9) | 569 (3.2) | 60 (1.0) | 555 (2.6) | 12 (0.5) | 579 (5.0) | 38 (0.8) | 565 (2.8) | 51 (0.8) | 555 (2.7) |
| Kuwait | 10 (0.6) | 449 (10.2) | 51 (0.9) | 453 (5.6) | 38 (1.1) | 438 (6.1) | 26 (0.9) | 466 (6.9) | 43 (1.0) | 451 (5.3) | 30 (1.0) | 432 (7.2) |
| Lebanon | 13 (1.0) | 356 (9.0) | 52 (1.3) | 377 (5.2) | 35 (1.2) | 389 (5.9) | 25 (1.1) | 380 (6.3) | 38 (0.9) | 380 (6.4) | 37 (1.2) | 380 (5.0) |
| Lithuania | 9 (0.6) | 528 (5.2) | 53 (0.9) | 532 (3.3) | 38 (1.0) | 540 (4.0) | 46 (1.1) | 539 (3.4) | 40 (0.9) | 534 (3.7) | 14 (0.8) | 529 (4.7) |
| Malaysia | 8 (0.5) | 453 (6.3) | 55 (0.9) | 461 (3.7) | 37 (1.0) | 463 (4.0) | 9 (0.5) | 452 (7.5) | 45 (0.9) | 463 (4.1) | 47 (1.0) | 462 (3.7) |
| Morocco | 13 (0.6) | 409 (6.0) | 59 (0.9) | 395 (2.9) | 28 (0.9) | 388 (3.4) | 17 (0.6) | 402 (4.7) | 47 (0.7) | 399 (3.0) | 36 (1.0) | 387 (3.1) |
| New Zealand | 5 (0.4) | 471 (9.3) | 46 (1.1) | 506 (4.1) | 50 (1.2) | 498 (3.6) | 29 (0.7) | 523 (3.5) | 45 (0.8) | 500 (3.6) | 25 (0.9) | 474 (5.0) |
| Norway (9) | 4 (0.5) | 457 (12.1) | 39 (1.1) | 502 (3.7) | 57 (1.1) | 495 (3.4) | 31 (0.9) | 509 (4.5) | 45 (1.0) | 497 (3.4) | 24 (0.9) | 480 (5.1) |
| Oman | 12 (0.5) | 471 (5.3) | 55 (0.8) | 463 (2.9) | 33 (1.0) | 450 (4.5) | 23 (0.8) | 480 (3.8) | 45 (0.9) | 464 (2.8) | 32 (1.1) | 446 (4.0) |
| Portugal | 12 (0.6) | 515 (4.9) | 50 (1.1) | 522 (2.9) | 39 (1.2) | 516 (3.9) | 48 (1.2) | 532 (2.9) | 31 (0.9) | 515 (3.7) | 21 (1.1) | 499 (4.7) |
| Qatar | 7 (0.5) | 476 (10.0) | 41 (1.3) | 485 (5.8) | 52 (1.4) | 468 (4.7) | 20 (0.8) | 506 (7.1) | 38 (1.0) | 481 (5.8) | 42 (1.1) | 461 (4.4) |
| Romania | 4 (0.4) | 475 (8.8) | 47 (1.3) | 470 (4.4) | 49 (1.4) | 473 (5.1) | 14 (0.9) | 491 (6.9) | 33 (1.1) | 476 (4.9) | 53 (1.4) | 465 (4.8) |
| Russian Federation | 10 (0.7) | 541 (6.2) | 52 (1.1) | 540 (5.2) | 38 (1.2) | 548 (3.7) | 33 (1.1) | 545 (4.5) | 43 (0.9) | 543 (4.7) | 24 (0.9) | 544 (5.0) |
| Saudi Arabia | 14 (0.7) | 438 (5.2) | 53 (0.8) | 434 (2.8) | 32 (0.9) | 429 (3.9) | 30 (0.9) | 444 (3.6) | 43 (0.7) | 433 (3.5) | 28 (0.8) | 433 (3.3) |
| Singapore | 3 (0.3) | 615 (9.1) | 34 (0.8) | 609 (4.4) | 63 (0.8) | 607 (4.1) | 20 (0.7) | 641 (3.5) | 43 (0.8) | 611 (4.2) | 36 (0.8) | 585 (4.7) |
| South Africa (9) | 20 (0.6) | 359 (3.8) | 59 (0.7) | 370 (3.3) | 21 (0.5) | 388 (4.5) | 22 (0.4) | 389 (4.0) | 46 (0.5) | 368 (3.4) | 33 (0.7) | 370 (3.2) |
| Sweden | 2 (0.3) | ~ ~ | 39 (1.1) | 524 (4.4) | 59 (1.2) | 524 (3.3) | 24 (1.0) | 547 (5.3) | 43 (1.0) | 524 (3.9) | 33 (1.0) | 507 (3.7) |
| Turkey | 6 (0.5) | 476 (8.5) | 56 (1.1) | 518 (3.8) | 37 (1.1) | 522 (4.2) | 11 (0.7) | 506 (6.6) | 42 (1.1) | 513 (5.2) | 46 (1.2) | 526 (3.8) |
| United Arab Emirates | 11 (0.4) | 497 (5.3) | 43 (0.6) | 489 (2.8) | 46 (0.5) | 461 (2.3) | 23 (0.6) | 513 (3.4) | 39 (0.5) | 485 (2.6) | 38 (0.6) | 450 (2.8) |
| United States | 3 (0.3) | 499 (14.4) | 34 (0.8) | 528 (5.1) | 62 (0.8) | 524 (4.4) | 26 (0.8) | 542 (6.4) | 41 (0.7) | 530 (4.2) | 33 (0.8) | 506 (4.9) |
| **International Average** | **8 (0.1)** | **485 (1.4)** | **47 (0.2)** | **494 (0.6)** | **45 (0.2)** | **488 (0.7)** | **25 (0.1)** | **507 (0.8)** | **42 (0.1)** | **493 (0.6)** | **33 (0.2)** | **480 (0.7)** |
| **Benchmarking Participants** | | | | | | | | | | | | |
| Ontario, Canada | 3 (0.4) | 529 (10.0) | 41 (1.0) | 525 (3.6) | 56 (1.1) | 520 (3.3) | 31 (0.9) | 539 (4.5) | 45 (0.9) | 520 (3.4) | 24 (0.8) | 508 (3.9) |
| Quebec, Canada | 3 (0.4) | 530 (10.9) | 45 (1.3) | 540 (3.7) | 52 (1.4) | 534 (4.4) | 24 (1.2) | 560 (4.7) | 42 (1.0) | 538 (4.2) | 34 (1.1) | 520 (4.0) |
| Moscow City, Russian Fed. | 5 (0.4) | 573 (7.7) | 41 (1.2) | 567 (3.7) | 54 (1.2) | 566 (2.9) | 26 (1.0) | 575 (4.3) | 42 (0.9) | 566 (3.3) | 32 (1.1) | 562 (3.2) |
| Gauteng, RSA (9) | 15 (0.6) | 405 (5.4) | 58 (0.9) | 419 (4.1) | 27 (1.0) | 445 (5.6) | 21 (0.7) | 449 (6.0) | 42 (0.8) | 420 (4.2) | 37 (0.9) | 414 (4.0) |
| Western Cape, RSA (9) | 12 (0.6) | 399 (4.8) | 59 (0.9) | 431 (5.0) | 29 (1.0) | 481 (7.1) | 23 (0.9) | 475 (7.7) | 44 (0.8) | 438 (5.5) | 33 (1.1) | 422 (5.1) |
| Abu Dhabi, UAE | 9 (0.4) | 435 (8.2) | 40 (0.9) | 439 (4.4) | 52 (0.9) | 415 (4.3) | 20 (0.7) | 467 (5.8) | 38 (0.7) | 440 (4.2) | 43 (0.8) | 399 (4.9) |
| Dubai, UAE | 11 (0.9) | 571 (6.3) | 45 (1.1) | 555 (3.0) | 44 (0.9) | 535 (2.7) | 27 (1.0) | 576 (3.5) | 39 (0.9) | 551 (3.2) | 34 (1.2) | 522 (3.7) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Classroom Teaching Limited by Students Not Ready for Instruction

Exhibits 10.10, 10.11, 10.12, and 10.13 present teachers' reports about the extent to which their fourth and eighth grade classroom teaching is limited by students not ready to learn (i.e., lacking prerequisite knowledge or skills, lacking basic nutrition, being sleep deprived, absent, disruptive, or uninterested, or having learning impairments or difficulties understanding the language of instruction), along with student achievement. The results are summarized on the *Classroom Teaching Limited by Students Not Ready for Instruction* scale described in Exhibit 10.9 (see About the Scale), with three categories that describe how much classroom teaching is limited: "very little," "some," and "a lot." A higher score on the scale indicates that classroom instruction was limited less by these student attributes or behavior, and a lower score indicates it was limited more. Countries are sorted by the percentage "very little."

On average, across countries, just over one-third of the fourth grade students (36% for mathematics and 37% for science) had classroom teachers who reported that their teaching was limited "very little" by students not ready for instruction. Most of the rest of the students (59% in mathematics and 58% in science) had teachers who reported that instruction was limited "some." Unfortunately, 6 percent of students were in classrooms where teachers reported instruction was limited "a lot." The picture was even less positive in eighth grade, where only about one-quarter of students (24% in mathematics and 26% in science) had teachers who reported that classroom instruction was limited "very little," and about two-thirds (67% for mathematics and 66% for science) had teachers who reported that classroom instruction was limited "some" by students not ready for instruction. The remaining 8–9 percent of students (9% in mathematics and 8% in science) had teachers reporting instruction was limited "a lot."

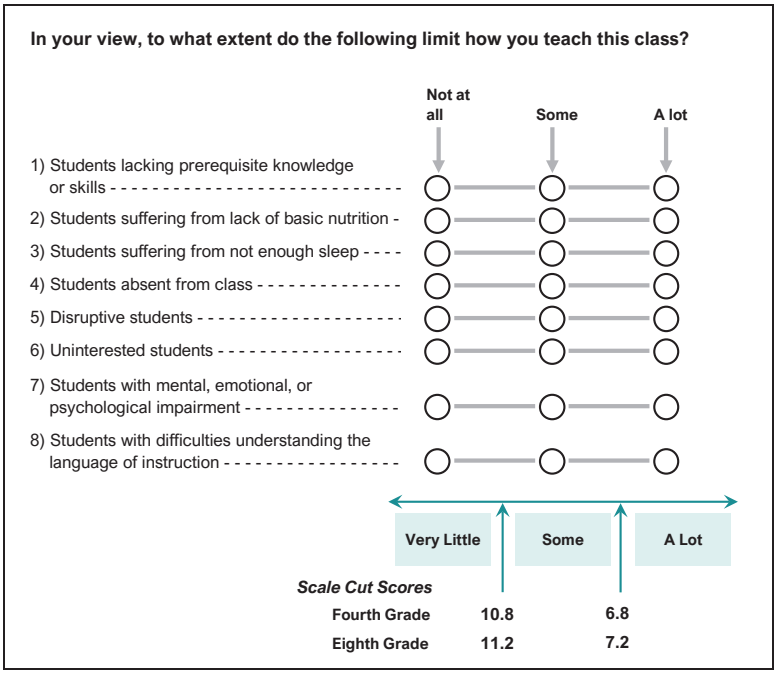
In both subjects and both grades, there was a direct relationship between the degree that instruction was limited by students not ready for instruction and students' average achievement, with successively lower achievement for each category of increased impact on teaching. For example, in eighth grade science (Exhibit 10.13), average achievement was 515 for students where instruction was limited "very little," 484 for students where instruction was limited "some," and 457 for students where instruction was limited "a lot."

## Exhibit 10.9: Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports

*Students' Results based on Teachers' Reports*

### About the Scale

Students were scored according to their teachers' reports regarding eight student attributes on the *Classroom Teaching Limited by Students Not Ready for Instruction* scale. Cut scores divide the scale into three categories. Students with teachers who felt their teaching was limited **Very Little** had a score at or above the cut score corresponding to their teachers reporting they were "not at all" limited by four of the eight student attributes and were limited "some" by the other four, on average. Students with teachers who felt their teaching was limited **A Lot** had a score at or below the cut score corresponding to their teachers reporting they were limited "a lot" by four of the eight attributes and were limited "some" by the other four, on average. All other students had teachers who felt their teaching was limited **Some**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 10.10: Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | Very Little | | Some | | A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 79 (3.0) | 593 (2.1) | 20 (2.9) | 591 (3.4) | 1 (0.6) | ~ ~ | 12.1 (0.14) |
| Albania | 71 (3.8) | 499 (4.0) | 24 (3.3) | 490 (8.7) | 4 (2.2) | 441 (14.9) | 11.3 (0.17) |
| Kosovo | 63 (3.8) | 448 (3.7) | 37 (3.8) | 438 (5.0) | 0 (0.0) | ~ ~ | 11.1 (0.12) |
| Czech Republic | 61 (3.6) | 543 (2.8) | 39 (3.6) | 517 (4.5) | 0 (0.0) | ~ ~ | 11.0 (0.12) |
| North Macedonia | 60 (3.9) | 482 (5.5) | 40 (3.9) | 456 (9.7) | 0 (0.0) | ~ ~ | 11.1 (0.12) |
| Azerbaijan | 53 (3.8) | 516 (4.0) | 45 (3.8) | 515 (4.1) | 3 (1.1) | 500 (17.2) | 10.6 (0.11) |
| Singapore | 52 (2.8) | 656 (3.9) | 45 (2.9) | 591 (5.0) | 3 (0.9) | 613 (23.1) | 10.8 (0.11) |
| Serbia | 49 (4.1) | 508 (3.9) | 47 (4.1) | 507 (5.6) | 4 (1.6) | 517 (8.1) | 10.6 (0.15) |
| Croatia | 49 (3.4) | 507 (3.1) | 50 (3.5) | 511 (3.4) | 2 (0.8) | ~ ~ | 10.8 (0.14) |
| Latvia | 49 (3.9) | 553 (3.3) | 49 (3.9) | 541 (4.0) | 2 (1.1) | ~ ~ | 10.6 (0.14) |
| Slovak Republic | 48 (3.5) | 521 (3.5) | 45 (3.4) | 503 (5.8) | 7 (1.9) | 472 (12.7) | 10.4 (0.16) |
| Hong Kong SAR | 47 (3.8) | 614 (5.6) | 53 (3.8) | 590 (4.1) | 0 (0.0) | ~ ~ | 10.7 (0.13) |
| Netherlands r | 47 (4.2) | 546 (3.6) | 51 (4.3) | 529 (2.8) | 2 (1.2) | ~ ~ | 10.6 (0.14) |
| Austria | 46 (3.2) | 552 (2.7) | 51 (3.3) | 530 (3.1) | 2 (0.9) | ~ ~ | 10.5 (0.09) |
| Montenegro | 46 (2.7) | 458 (2.5) | 51 (2.6) | 450 (3.1) | 3 (1.0) | 410 (9.0) | 10.4 (0.10) |
| Spain | 46 (3.7) | 514 (3.6) | 50 (3.9) | 492 (3.7) | 4 (1.3) | 479 (9.7) | 10.4 (0.12) |
| Bosnia and Herzegovina | 45 (3.2) | 454 (4.2) | 49 (3.2) | 451 (3.1) | 6 (1.7) | 443 (10.6) | 10.4 (0.14) |
| Bulgaria | 44 (3.8) | 540 (4.2) | 52 (3.7) | 495 (6.4) | 3 (1.2) | 497 (37.0) | 10.4 (0.14) |
| Georgia | 42 (3.8) | 482 (5.8) | 57 (3.9) | 482 (4.4) | 1 (0.7) | ~ ~ | 10.4 (0.12) |
| Russian Federation | 41 (3.1) | 569 (4.9) | 47 (3.7) | 562 (4.6) | 12 (2.2) | 574 (8.4) | 10.1 (0.16) |
| Germany | 40 (3.8) | 538 (3.1) | 55 (3.8) | 514 (3.0) | 4 (1.3) | 450 (17.2) | 10.0 (0.13) |
| Finland | 40 (2.9) | 542 (3.2) | 58 (3.1) | 527 (3.0) | 1 (0.5) | ~ ~ | 10.4 (0.09) |
| Ireland | 40 (3.7) | 557 (4.6) | 59 (3.7) | 542 (2.9) | 1 (0.4) | ~ ~ | 10.3 (0.14) |
| Poland | 39 (3.6) | 533 (4.5) | 59 (3.7) | 513 (3.1) | 2 (0.9) | ~ ~ | 10.4 (0.12) |
| United Arab Emirates r | 39 (1.9) | 515 (3.1) | 57 (2.0) | 464 (2.7) | 4 (0.5) | 415 (7.9) | 10.1 (0.05) |
| Sweden | 37 (3.8) | 530 (5.1) | 61 (3.8) | 517 (3.6) | 2 (1.0) | ~ ~ | 10.3 (0.13) |
| Belgium (Flemish) | 37 (3.4) | 546 (2.3) | 59 (3.5) | 527 (2.4) | 4 (1.1) | 521 (11.7) | 10.2 (0.11) |
| Italy | 36 (4.1) | 518 (3.9) | 57 (4.0) | 513 (3.2) | 7 (2.0) | 514 (7.3) | 9.9 (0.16) |
| France | 35 (3.2) | 506 (4.1) | 58 (3.2) | 476 (3.8) | 7 (1.4) | 456 (10.3) | 9.8 (0.11) |
| Portugal | 33 (3.3) | 540 (3.8) | 56 (3.4) | 519 (3.7) | 11 (2.1) | 516 (8.1) | 9.6 (0.16) |
| Denmark r | 33 (4.4) | 531 (4.7) | 63 (4.5) | 522 (2.3) | 4 (1.6) | 506 (10.2) | 9.9 (0.14) |
| Hungary | 33 (3.4) | 543 (3.8) | 63 (3.6) | 516 (4.3) | 4 (1.4) | 507 (18.7) | 10.1 (0.14) |
| Armenia | 32 (3.8) | 505 (4.7) | 63 (3.9) | 494 (3.1) | 5 (1.5) | 507 (11.5) | 9.7 (0.13) |
| Korea, Rep. of | 32 (3.8) | 608 (4.6) | 52 (3.7) | 597 (3.1) | 16 (2.9) | 590 (6.3) | 9.5 (0.20) |
| Qatar | 30 (3.5) | 464 (7.5) | 66 (3.4) | 443 (5.2) | 4 (1.5) | 465 (23.1) | 9.8 (0.15) |
| Kazakhstan | 30 (3.3) | 517 (4.2) | 49 (3.8) | 512 (4.7) | 21 (2.9) | 507 (6.9) | 9.3 (0.15) |
| Bahrain | 28 (3.3) | 489 (4.3) | 64 (3.1) | 477 (3.1) | 8 (2.1) | 478 (9.2) | 9.7 (0.13) |
| Malta | 28 (0.4) | 532 (2.1) | 63 (0.4) | 499 (1.8) | 10 (0.2) | 507 (3.1) | 9.4 (0.02) |
| Chinese Taipei | 26 (3.7) | 602 (3.0) | 64 (4.0) | 599 (2.6) | 10 (2.4) | 595 (6.4) | 9.5 (0.16) |
| Northern Ireland | 26 (3.9) | 583 (6.6) | 72 (4.1) | 560 (3.7) | 2 (1.3) | ~ ~ | 9.9 (0.12) |
| Norway (5) r | 25 (4.4) | 560 (4.8) | 70 (4.1) | 541 (2.8) | 5 (1.7) | 518 (12.3) | 9.7 (0.22) |
| Australia | 24 (3.8) | 545 (6.9) | 69 (4.0) | 514 (3.4) | 6 (1.7) | 458 (11.0) | 9.6 (0.13) |
| New Zealand | 24 (2.4) | 515 (5.0) | 71 (2.6) | 481 (3.3) | 5 (1.3) | 446 (17.3) | 9.6 (0.09) |
| Oman | 24 (2.9) | 450 (7.5) | 54 (3.5) | 418 (4.6) | 22 (2.9) | 441 (11.5) | 9.0 (0.14) |
| Cyprus | 23 (3.3) | 547 (5.0) | 68 (3.4) | 533 (3.0) | 9 (1.7) | 507 (6.7) | 9.4 (0.13) |
| Iran, Islamic Rep. of | 22 (2.9) | 465 (9.2) | 63 (3.4) | 436 (4.9) | 14 (2.7) | 439 (8.5) | 9.1 (0.15) |
| Canada | 22 (1.9) | 537 (4.7) | 71 (2.2) | 507 (2.4) | 6 (1.3) | 484 (7.9) | 9.4 (0.09) |
| England s | 22 (3.9) | 576 (12.2) | 71 (4.5) | 551 (5.2) | 7 (2.9) | 552 (5.4) | 9.5 (0.17) |
| Pakistan | 19 (4.1) | 353 (23.2) | 79 (4.2) | 324 (14.5) | 2 (1.3) | ~ ~ | 9.7 (0.13) |
| Turkey (5) | 19 (3.2) | 568 (9.0) | 67 (3.7) | 520 (5.0) | 14 (2.6) | 478 (17.1) | 9.0 (0.14) |
| Philippines | 18 (3.1) | 326 (15.1) | 79 (3.1) | 290 (6.1) | 3 (1.4) | 259 (19.2) | 9.3 (0.12) |
| Kuwait | 18 (3.2) | 420 (12.2) | 79 (3.5) | 376 (5.3) | 3 (1.3) | 345 (28.8) | 9.4 (0.12) |
| Lithuania | 18 (2.8) | 565 (6.9) | 63 (3.9) | 536 (3.9) | 19 (3.0) | 534 (6.0) | 8.9 (0.15) |
| Saudi Arabia | 18 (2.8) | 419 (7.4) | 76 (3.5) | 393 (4.9) | 6 (1.9) | 385 (15.8) | 9.3 (0.13) |
| United States | 15 (1.6) | 568 (4.5) | 77 (1.9) | 533 (2.9) | 7 (1.3) | 491 (7.8) | 9.1 (0.09) |
| Morocco | 13 (2.5) | 418 (15.6) | 79 (3.2) | 378 (5.9) | 8 (2.1) | 375 (9.6) | 8.8 (0.11) |
| Chile | 12 (2.5) | 477 (9.9) | 74 (4.0) | 437 (3.2) | 13 (3.2) | 425 (8.8) | 8.7 (0.15) |
| South Africa (5) | 12 (2.0) | 409 (15.4) | 81 (2.6) | 369 (4.1) | 7 (1.6) | 370 (14.0) | 9.0 (0.10) |
| **International Average** | **36 (0.4)** | **517 (0.9)** | **59 (0.5)** | **495 (0.6)** | **6 (0.2)** | **476 (2.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 57 (2.4) | 563 (3.3) | 41 (2.4) | 525 (4.0) | 1 (0.3) | ~ ~ | 10.8 (0.07) |
| Madrid, Spain | 51 (4.2) | 524 (2.7) | 46 (4.4) | 512 (3.3) | 4 (1.7) | 495 (31.3) | 10.6 (0.13) |
| Moscow City, Russian Fed. | 46 (4.2) | 599 (3.1) | 46 (3.8) | 587 (3.2) | 8 (2.3) | 590 (6.5) | 10.3 (0.20) |
| Ontario, Canada r | 26 (3.7) | 541 (8.7) | 65 (4.1) | 504 (4.3) | 9 (2.5) | 487 (9.9) | 9.4 (0.16) |
| Abu Dhabi, UAE r | 26 (2.3) | 487 (7.7) | 66 (2.4) | 431 (3.9) | 8 (1.2) | 394 (10.7) | 9.5 (0.09) |
| Quebec, Canada | 20 (2.9) | 545 (4.2) | 77 (3.2) | 530 (2.6) | 3 (1.2) | 519 (12.8) | 9.5 (0.11) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 10.11: Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | Very Little | | Some | | A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 78 (3.3) | 561 (2.2) | 22 (3.3) | 562 (3.5) | 0 (0.0) | ~ ~ | 12.2 (0.16) |
| Albania | 71 (3.9) | 494 (4.3) | 25 (3.3) | 484 (8.5) | 4 (2.2) | 444 (20.2) | 11.3 (0.17) |
| Kosovo | 63 (3.8) | 417 (4.6) | 37 (3.8) | 406 (5.8) | 0 (0.0) | ~ ~ | 11.1 (0.12) |
| Czech Republic | 61 (3.5) | 542 (2.8) | 39 (3.5) | 520 (4.2) | 0 (0.0) | ~ ~ | 11.0 (0.10) |
| North Macedonia | 60 (3.9) | 438 (6.1) | 40 (3.9) | 408 (11.4) | 0 (0.0) | ~ ~ | 11.1 (0.12) |
| Slovak Republic | 54 (3.5) | 537 (3.2) | 38 (3.4) | 509 (7.0) | 8 (2.0) | 468 (15.3) | 10.6 (0.17) |
| Azerbaijan | 52 (4.3) | 427 (5.1) | 46 (4.3) | 425 (5.4) | 2 (0.9) | ~ ~ | 10.5 (0.12) |
| Singapore | 52 (3.2) | 620 (3.7) | 46 (3.1) | 568 (4.6) | 2 (0.7) | ~ ~ | 10.8 (0.11) |
| Latvia | 51 (3.9) | 544 (3.2) | 47 (4.0) | 538 (3.8) | 2 (1.0) | ~ ~ | 10.8 (0.14) |
| Serbia | 49 (4.1) | 518 (4.1) | 47 (4.1) | 515 (6.0) | 4 (1.6) | 523 (10.1) | 10.6 (0.15) |
| Croatia | 49 (3.4) | 522 (2.9) | 50 (3.5) | 525 (3.0) | 2 (0.8) | ~ ~ | 10.8 (0.14) |
| Netherlands r | 47 (4.2) | 530 (4.6) | 51 (4.3) | 509 (3.5) | 2 (1.2) | ~ ~ | 10.6 (0.14) |
| Austria | 47 (3.4) | 537 (3.5) | 51 (3.4) | 511 (4.0) | 2 (0.9) | ~ ~ | 10.5 (0.11) |
| Montenegro | 46 (2.7) | 458 (2.8) | 51 (2.6) | 451 (3.8) | 3 (1.0) | 406 (10.4) | 10.4 (0.10) |
| Poland | 46 (3.4) | 539 (4.3) | 52 (3.3) | 526 (2.9) | 2 (0.9) | ~ ~ | 10.6 (0.12) |
| Spain | 46 (4.1) | 520 (3.7) | 51 (4.2) | 503 (4.0) | 3 (1.1) | 486 (9.6) | 10.4 (0.12) |
| Hong Kong SAR | 45 (3.7) | 550 (4.7) | 54 (3.8) | 518 (4.7) | 1 (0.7) | ~ ~ | 10.7 (0.16) |
| Georgia | 45 (4.1) | 457 (6.4) | 55 (4.2) | 452 (4.7) | 0 (0.5) | ~ ~ | 10.5 (0.12) |
| Bosnia and Herzegovina | 45 (3.2) | 460 (4.6) | 49 (3.2) | 458 (3.7) | 6 (1.7) | 452 (9.8) | 10.4 (0.14) |
| Bulgaria | 45 (3.7) | 553 (5.5) | 53 (3.6) | 495 (7.6) | 2 (1.0) | ~ ~ | 10.4 (0.14) |
| Germany | 43 (3.9) | 534 (3.3) | 54 (4.0) | 510 (3.4) | 3 (1.0) | 445 (20.1) | 10.2 (0.14) |
| Ireland | 40 (3.7) | 534 (6.7) | 59 (3.7) | 523 (3.2) | 1 (0.4) | ~ ~ | 10.3 (0.14) |
| Russian Federation | 40 (3.1) | 570 (4.2) | 49 (3.5) | 564 (4.2) | 11 (2.2) | 571 (7.2) | 10.1 (0.16) |
| United Arab Emirates r | 40 (1.8) | 510 (3.4) | 55 (2.0) | 452 (3.9) | 5 (0.8) | 427 (16.8) | 10.2 (0.07) |
| Finland | 40 (2.9) | 565 (3.3) | 59 (3.1) | 549 (3.1) | 1 (0.5) | ~ ~ | 10.3 (0.09) |
| Chinese Taipei | 39 (3.7) | 561 (2.8) | 54 (3.8) | 557 (2.4) | 7 (2.1) | 548 (8.2) | 10.0 (0.14) |
| Denmark r | 38 (4.2) | 528 (3.9) | 60 (4.3) | 519 (3.2) | 2 (0.9) | ~ ~ | 10.2 (0.12) |
| Sweden | 37 (4.0) | 549 (4.1) | 61 (4.1) | 533 (4.3) | 1 (1.0) | ~ ~ | 10.2 (0.13) |
| France | 36 (3.4) | 507 (4.3) | 57 (3.3) | 480 (3.9) | 7 (1.5) | 456 (8.7) | 9.8 (0.12) |
| Belgium (Flemish) | 36 (3.3) | 516 (2.5) | 61 (3.4) | 495 (2.5) | 3 (1.1) | 480 (11.2) | 10.2 (0.11) |
| Italy | 36 (4.1) | 513 (4.7) | 57 (4.0) | 508 (3.4) | 7 (2.0) | 508 (7.6) | 9.9 (0.16) |
| Armenia | 35 (4.2) | 470 (5.9) | 60 (4.1) | 464 (4.0) | 5 (1.7) | 479 (11.1) | 10.0 (0.15) |
| Hungary | 35 (3.4) | 544 (4.3) | 61 (3.4) | 523 (4.1) | 4 (1.5) | 507 (11.1) | 10.1 (0.14) |
| Portugal | 33 (3.3) | 515 (3.0) | 56 (3.4) | 499 (3.4) | 11 (2.1) | 498 (6.1) | 9.6 (0.16) |
| Qatar | 31 (3.2) | 467 (7.9) | 65 (3.2) | 441 (5.8) | 4 (1.6) | 462 (21.5) | 9.9 (0.14) |
| Kazakhstan | 30 (3.2) | 498 (5.6) | 49 (4.0) | 495 (6.0) | 21 (2.9) | 488 (9.1) | 9.3 (0.15) |
| Korea, Rep. of | 30 (3.7) | 599 (3.7) | 57 (3.5) | 584 (2.8) | 13 (2.7) | 577 (6.3) | 9.4 (0.18) |
| Bahrain | 30 (2.6) | 512 (5.9) | 67 (2.8) | 486 (4.5) | 3 (1.0) | 451 (15.3) | 9.8 (0.10) |
| Norway (5) s | 28 (4.6) | 552 (4.8) | 66 (4.5) | 535 (3.4) | 5 (1.8) | 524 (14.6) | 9.8 (0.21) |
| Malta | 27 (0.4) | 523 (2.4) | 63 (0.4) | 484 (1.8) | 10 (0.3) | 497 (4.2) | 9.4 (0.02) |
| Kuwait | 26 (4.2) | 419 (13.9) | 70 (4.5) | 382 (7.4) | 4 (1.5) | 396 (19.4) | 9.7 (0.15) |
| New Zealand | 26 (2.6) | 528 (4.2) | 69 (2.7) | 496 (3.1) | 5 (1.4) | 468 (15.0) | 9.7 (0.09) |
| Northern Ireland | 26 (3.9) | 530 (4.7) | 72 (4.1) | 515 (3.0) | 2 (1.3) | ~ ~ | 9.9 (0.12) |
| Australia | 26 (3.8) | 559 (5.0) | 69 (4.0) | 528 (3.1) | 6 (1.6) | 481 (10.4) | 9.7 (0.13) |
| Canada r | 24 (2.1) | 543 (3.4) | 70 (2.5) | 521 (2.2) | 6 (1.2) | 499 (7.0) | 9.5 (0.09) |
| Pakistan | 23 (6.4) | 301 (35.9) | 73 (6.5) | 286 (15.7) | 3 (1.9) | 327 (48.1) | 9.8 (0.16) |
| Oman | 23 (3.0) | 456 (9.0) | 55 (3.2) | 425 (5.9) | 23 (2.9) | 441 (10.0) | 9.0 (0.16) |
| Iran, Islamic Rep. of | 22 (2.9) | 461 (9.2) | 63 (3.4) | 434 (5.1) | 14 (2.7) | 440 (7.7) | 9.1 (0.15) |
| England s | 22 (3.9) | 557 (9.9) | 71 (4.5) | 531 (4.7) | 7 (2.9) | 534 (5.7) | 9.5 (0.17) |
| Turkey (5) | 22 (2.9) | 559 (7.9) | 71 (3.3) | 519 (5.4) | 8 (1.9) | 503 (12.6) | 9.4 (0.14) |
| Saudi Arabia | 20 (3.0) | 409 (9.7) | 78 (3.2) | 397 (5.0) | 2 (1.2) | ~ ~ | 9.5 (0.09) |
| Cyprus | 19 (3.7) | 530 (5.5) | 74 (4.0) | 508 (3.2) | 7 (2.5) | 508 (14.5) | 9.3 (0.17) |
| Chile | 18 (3.3) | 498 (6.9) | 69 (3.9) | 463 (3.1) | 13 (3.1) | 450 (8.0) | 8.9 (0.16) |
| Lithuania | 18 (2.8) | 561 (6.6) | 63 (4.0) | 533 (3.5) | 19 (3.0) | 527 (5.7) | 8.9 (0.15) |
| Philippines | 17 (2.7) | 303 (16.9) | 76 (3.0) | 239 (8.0) | 7 (2.2) | 213 (27.4) | 9.3 (0.13) |
| Morocco | 15 (2.6) | 399 (15.0) | 77 (3.3) | 370 (6.9) | 8 (2.2) | 378 (26.3) | 9.1 (0.11) |
| United States | 15 (1.9) | 572 (4.9) | 78 (2.0) | 537 (3.1) | 7 (1.2) | 490 (8.4) | 9.1 (0.10) |
| South Africa (5) | 12 (2.3) | 360 (24.2) | 78 (2.9) | 319 (6.2) | 9 (1.9) | 322 (17.5) | 8.9 (0.11) |
| **International Average** | **37 (0.5)** | **506 (1.1)** | **58 (0.5)** | **484 (0.7)** | **6 (0.2)** | **465 (2.5)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 60 (2.7) | 565 (3.3) | 38 (2.7) | 526 (4.1) | 2 (0.3) | ~ ~ | 11.1 (0.09) |
| Madrid, Spain | 48 (4.4) | 531 (2.3) | 49 (4.3) | 517 (2.8) | 3 (1.6) | 473 (18.9) | 10.7 (0.16) |
| Moscow City, Russian Fed. | 46 (4.2) | 602 (3.2) | 46 (3.8) | 589 (3.2) | 8 (2.3) | 592 (6.5) | 10.3 (0.20) |
| Abu Dhabi, UAE r | 29 (2.5) | 464 (6.9) | 63 (2.6) | 405 (5.5) | 8 (1.7) | 377 (22.2) | 9.6 (0.12) |
| Ontario, Canada r | 27 (4.3) | 545 (6.1) | 65 (4.7) | 523 (4.3) | 8 (2.4) | 498 (9.8) | 9.6 (0.19) |
| Quebec, Canada | 23 (3.5) | 534 (4.1) | 74 (3.9) | 520 (2.8) | 4 (1.6) | 511 (10.9) | 9.5 (0.12) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 10.12: Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | | Very Little | | Some | | A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | | 71 (3.5) | 596 (3.6) | 29 (3.5) | 590 (5.0) | 1 (0.4) | ~ ~ | 12.3 (0.17) |
| Hungary | | 41 (3.2) | 546 (5.8) | 58 (3.3) | 495 (4.9) | 2 (0.9) | ~ ~ | 10.6 (0.12) |
| Singapore | | 40 (2.8) | 655 (4.9) | 55 (2.8) | 592 (5.7) | 5 (1.2) | 554 (20.3) | 10.6 (0.10) |
| Kazakhstan | | 39 (3.8) | 493 (6.3) | 53 (4.1) | 481 (5.4) | 8 (2.2) | 498 (17.4) | 10.3 (0.15) |
| Italy | | 38 (3.7) | 503 (4.6) | 58 (3.8) | 494 (3.6) | 5 (1.3) | 500 (10.3) | 10.4 (0.15) |
| United Arab Emirates | r | 38 (1.8) | 520 (3.8) | 56 (2.1) | 453 (3.3) | 6 (0.9) | 401 (9.8) | 10.4 (0.07) |
| Ireland | | 35 (2.6) | 548 (4.7) | 59 (2.7) | 517 (3.5) | 6 (1.1) | 457 (11.1) | 10.4 (0.09) |
| England | s | 35 (5.0) | 564 (11.8) | 61 (5.0) | 503 (9.8) | 4 (2.3) | 453 (37.6) | 10.4 (0.19) |
| Hong Kong SAR | | 32 (3.7) | 625 (7.3) | 66 (3.9) | 558 (6.2) | 2 (1.1) | ~ ~ | 10.5 (0.13) |
| Romania | | 31 (3.5) | 520 (8.9) | 66 (3.7) | 461 (5.1) | 3 (1.2) | 481 (20.8) | 10.3 (0.13) |
| Finland | | 30 (2.4) | 529 (3.6) | 66 (2.5) | 503 (3.2) | 4 (1.1) | 465 (14.8) | 10.3 (0.10) |
| New Zealand | | 29 (2.8) | 532 (5.4) | 63 (3.3) | 470 (4.0) | 8 (1.9) | 438 (8.5) | 10.0 (0.10) |
| Russian Federation | | 28 (2.9) | 563 (6.9) | 59 (3.0) | 539 (5.4) | 13 (2.8) | 525 (16.1) | 9.8 (0.17) |
| Australia | | 27 (2.8) | 580 (8.5) | 64 (2.9) | 502 (3.2) | 9 (2.1) | 449 (9.0) | 9.8 (0.12) |
| Chinese Taipei | | 26 (3.0) | 636 (5.8) | 63 (3.5) | 604 (3.4) | 10 (2.2) | 605 (12.9) | 9.6 (0.14) |
| Sweden | | 25 (3.0) | 521 (6.0) | 72 (3.3) | 500 (3.0) | 3 (1.3) | 442 (9.6) | 10.3 (0.12) |
| France | r | 23 (3.7) | 504 (6.5) | 71 (3.6) | 477 (3.1) | 5 (1.5) | 453 (9.9) | 9.8 (0.14) |
| Turkey | | 21 (3.1) | 554 (8.9) | 63 (3.7) | 483 (4.4) | 15 (2.7) | 470 (15.8) | 9.3 (0.16) |
| United States | | 21 (2.0) | 582 (7.9) | 72 (2.2) | 503 (4.9) | 8 (1.4) | 458 (9.9) | 9.7 (0.09) |
| Norway (9) | s | 21 (3.1) | 522 (5.7) | 73 (3.2) | 503 (3.0) | 6 (2.2) | 476 (16.1) | 9.9 (0.15) |
| Lithuania | | 20 (2.7) | 548 (8.5) | 59 (3.6) | 519 (3.5) | 20 (3.0) | 501 (6.2) | 9.3 (0.14) |
| Saudi Arabia | | 20 (3.2) | 407 (6.9) | 72 (3.6) | 390 (3.1) | 8 (2.0) | 393 (7.9) | 9.5 (0.13) |
| Cyprus | s | 20 (3.8) | 530 (8.7) | 66 (4.3) | 499 (3.8) | 15 (2.5) | 498 (5.6) | 9.5 (0.15) |
| Qatar | | 20 (2.3) | 480 (10.7) | 75 (2.4) | 434 (5.5) | 6 (1.5) | 445 (14.5) | 9.8 (0.12) |
| Israel | | 18 (2.5) | 582 (9.9) | 57 (3.4) | 517 (6.6) | 25 (2.7) | 481 (9.2) | 9.0 (0.14) |
| Malaysia | | 18 (1.9) | 524 (7.6) | 68 (2.8) | 453 (3.9) | 14 (2.5) | 420 (10.7) | 9.3 (0.12) |
| Bahrain | | 17 (2.7) | 485 (5.1) | 79 (3.1) | 480 (2.2) | 4 (1.5) | 488 (21.7) | 9.9 (0.10) |
| Lebanon | | 17 (3.1) | 442 (8.9) | 78 (3.5) | 426 (3.7) | 6 (1.9) | 421 (17.6) | 9.5 (0.12) |
| Georgia | | 16 (2.8) | 460 (8.8) | 78 (3.5) | 461 (5.2) | 6 (2.2) | 464 (15.1) | 9.8 (0.12) |
| Kuwait | | 15 (2.5) | 440 (10.0) | 80 (3.0) | 395 (5.0) | 5 (1.8) | 375 (20.6) | 9.7 (0.11) |
| Portugal | | 14 (2.7) | 526 (7.9) | 78 (3.4) | 497 (4.0) | 8 (2.1) | 485 (8.1) | 9.5 (0.12) |
| Jordan | | 14 (3.0) | 454 (9.7) | 78 (3.8) | 418 (4.3) | 8 (2.2) | 391 (13.9) | 9.3 (0.11) |
| Oman | | 12 (2.1) | 443 (9.8) | 72 (3.2) | 409 (3.7) | 16 (2.8) | 394 (7.9) | 9.1 (0.12) |
| Korea, Rep. of | | 11 (2.0) | 615 (6.9) | 71 (3.2) | 604 (3.3) | 17 (2.9) | 613 (9.1) | 9.1 (0.14) |
| Iran, Islamic Rep. of | | 11 (2.3) | 486 (22.3) | 73 (3.1) | 442 (3.7) | 16 (2.7) | 436 (9.9) | 8.9 (0.13) |
| Chile | | 11 (2.2) | 467 (14.1) | 73 (3.7) | 445 (3.5) | 16 (3.1) | 405 (8.9) | 9.2 (0.13) |
| Egypt | | 9 (2.3) | 418 (13.9) | 82 (3.4) | 416 (5.8) | 9 (2.3) | 383 (19.3) | 9.4 (0.11) |
| Morocco | | 8 (1.9) | 433 (14.3) | 80 (2.6) | 385 (2.3) | 11 (2.1) | 375 (7.6) | 9.2 (0.11) |
| South Africa (9) | | 8 (1.6) | 433 (16.4) | 78 (2.3) | 387 (2.5) | 14 (2.0) | 379 (6.6) | 8.9 (0.09) |
| **International Average** | | **24 (0.5)** | **520 (1.5)** | **67 (0.5)** | **482 (0.7)** | **9 (0.3)** | **458 (2.4)** | |
| **Benchmarking Participants** | | | | | | | | |
| Dubai, UAE | | 48 (3.3) | 570 (4.4) | 50 (3.3) | 507 (5.0) | 3 (0.7) | 520 (6.7) | 11.0 (0.12) |
| Quebec, Canada | | 34 (3.8) | 571 (6.2) | 60 (3.9) | 530 (4.9) | 6 (1.8) | 512 (17.2) | 10.5 (0.15) |
| Moscow City, Russian Fed. | | 33 (3.8) | 597 (7.2) | 50 (3.9) | 562 (5.6) | 17 (3.2) | 573 (9.0) | 9.9 (0.21) |
| Abu Dhabi, UAE | r | 26 (3.1) | 493 (7.5) | 64 (3.7) | 422 (5.4) | 10 (1.9) | 371 (14.3) | 9.8 (0.11) |
| Ontario, Canada | | 19 (4.3) | 575 (12.0) | 74 (4.8) | 524 (3.5) | 6 (2.2) | 496 (12.2) | 9.7 (0.16) |
| Western Cape, RSA (9) | | 9 (2.4) | 538 (20.0) | 77 (3.2) | 440 (4.3) | 14 (2.8) | 385 (5.6) | 8.9 (0.16) |
| Gauteng, RSA (9) | | 8 (1.9) | 497 (10.5) | 74 (3.5) | 415 (3.7) | 18 (3.4) | 407 (10.0) | 8.9 (0.13) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 10.13: Classroom Teaching Limited by Students Not Ready for Instruction – Teachers' Reports

*Students' Results based on Teachers' Reports*

| Country | Very Little | | Some | | A Lot | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 74 (3.3) | 573 (2.6) | 26 (3.3) | 560 (3.6) | 0 (0.0) | ~ ~ | 12.4 (0.14) |
| Singapore | 48 (2.7) | 631 (4.9) | 50 (2.8) | 587 (6.4) | 2 (0.8) | ~ ~ | 11.0 (0.10) |
| Kazakhstan | 39 (2.4) | 479 (4.2) | 54 (2.6) | 474 (4.2) | 7 (1.3) | 501 (10.4) | 10.4 (0.11) |
| England s | 38 (4.6) | 550 (10.9) | 58 (4.8) | 512 (7.6) | 4 (2.5) | 434 (51.6) | 10.3 (0.19) |
| Hungary | 37 (2.2) | 552 (3.7) | 59 (2.3) | 519 (3.4) | 4 (0.9) | 458 (13.4) | 10.5 (0.08) |
| Romania | 37 (2.9) | 491 (6.1) | 59 (3.2) | 459 (4.4) | 4 (1.1) | 460 (17.9) | 10.4 (0.11) |
| Russian Federation | 37 (2.0) | 554 (4.6) | 52 (1.8) | 538 (4.0) | 11 (1.3) | 529 (10.8) | 10.2 (0.12) |
| United Arab Emirates r | 37 (1.8) | 532 (4.4) | 58 (1.9) | 446 (4.1) | 5 (0.5) | 384 (13.3) | 10.4 (0.06) |
| Sweden | 35 (3.3) | 539 (5.1) | 65 (3.3) | 512 (4.3) | 1 (0.4) | ~ ~ | 10.5 (0.12) |
| Finland | 34 (2.0) | 565 (3.6) | 64 (1.9) | 533 (3.6) | 3 (0.6) | 495 (10.9) | 10.5 (0.08) |
| Hong Kong SAR | 32 (4.3) | 535 (11.9) | 67 (4.2) | 487 (6.7) | 1 (0.8) | ~ ~ | 10.4 (0.13) |
| Italy | 32 (3.6) | 508 (4.2) | 61 (3.8) | 495 (3.4) | 7 (1.7) | 510 (10.6) | 10.4 (0.16) |
| France r | 30 (2.8) | 510 (3.7) | 66 (3.0) | 479 (2.7) | 5 (1.3) | 472 (13.8) | 10.0 (0.11) |
| Portugal | 29 (3.1) | 543 (4.4) | 62 (3.1) | 510 (3.2) | 9 (1.8) | 512 (6.3) | 9.9 (0.13) |
| Ireland | 27 (3.2) | 546 (5.0) | 64 (3.5) | 527 (2.9) | 9 (2.4) | 479 (13.0) | 10.1 (0.12) |
| Chinese Taipei | 27 (3.3) | 586 (4.2) | 61 (3.7) | 569 (2.8) | 13 (2.4) | 574 (7.4) | 9.8 (0.16) |
| Cyprus s | 26 (2.5) | 504 (5.6) | 63 (2.5) | 481 (3.4) | 11 (0.9) | 477 (5.1) | 9.8 (0.08) |
| Qatar | 25 (3.8) | 500 (8.8) | 70 (4.1) | 468 (5.7) | 4 (1.9) | 450 (15.0) | 10.1 (0.15) |
| New Zealand | 25 (2.8) | 542 (5.8) | 70 (2.9) | 493 (4.6) | 5 (1.3) | 422 (10.4) | 9.9 (0.11) |
| Malaysia | 24 (2.8) | 512 (8.3) | 67 (3.5) | 449 (4.6) | 9 (2.1) | 404 (16.8) | 9.9 (0.13) |
| Australia r | 23 (2.8) | 579 (7.2) | 72 (3.0) | 521 (3.6) | 5 (1.3) | 481 (17.3) | 10.0 (0.10) |
| Norway (9) s | 23 (3.5) | 520 (6.7) | 75 (3.8) | 492 (3.9) | 2 (1.5) | ~ ~ | 10.2 (0.13) |
| Lithuania | 23 (2.0) | 552 (5.0) | 62 (2.6) | 528 (3.0) | 15 (1.7) | 525 (5.8) | 9.5 (0.10) |
| Georgia | 22 (2.2) | 462 (6.2) | 76 (2.1) | 444 (3.8) | 2 (0.6) | ~ ~ | 10.1 (0.07) |
| Bahrain | 22 (3.5) | 526 (5.6) | 71 (4.0) | 478 (3.5) | 8 (2.0) | 471 (13.2) | 10.0 (0.11) |
| Israel | 20 (3.0) | 572 (8.8) | 59 (3.9) | 508 (6.4) | 21 (3.2) | 476 (11.2) | 9.2 (0.16) |
| Turkey | 20 (2.7) | 554 (9.1) | 68 (3.3) | 510 (5.2) | 13 (2.5) | 485 (15.0) | 9.5 (0.15) |
| Saudi Arabia | 19 (2.8) | 459 (6.0) | 71 (3.6) | 426 (3.5) | 9 (2.5) | 415 (9.1) | 9.6 (0.14) |
| Korea, Rep. of | 19 (2.9) | 569 (4.2) | 70 (3.3) | 561 (2.6) | 11 (2.1) | 546 (5.3) | 9.5 (0.13) |
| Chile | 18 (2.7) | 488 (8.2) | 65 (3.5) | 464 (4.1) | 16 (3.1) | 437 (6.6) | 9.5 (0.17) |
| Kuwait | 18 (3.5) | 454 (10.7) | 80 (3.6) | 442 (6.3) | 2 (1.1) | ~ ~ | 9.9 (0.12) |
| Oman | 17 (2.6) | 468 (7.4) | 64 (3.6) | 459 (4.1) | 18 (3.0) | 442 (8.7) | 9.3 (0.13) |
| Lebanon | 17 (2.0) | 393 (12.7) | 76 (2.1) | 376 (5.4) | 7 (1.4) | 350 (16.1) | 9.6 (0.11) |
| Jordan | 14 (2.9) | 490 (11.4) | 75 (3.3) | 453 (5.3) | 11 (2.0) | 401 (18.6) | 9.4 (0.13) |
| Egypt | 12 (2.9) | 402 (16.6) | 82 (3.5) | 386 (5.7) | 7 (1.9) | 408 (20.2) | 9.4 (0.11) |
| Morocco | 11 (1.4) | 431 (8.5) | 78 (1.9) | 392 (3.1) | 11 (1.4) | 374 (6.2) | 9.2 (0.07) |
| Iran, Islamic Rep. of | 11 (2.4) | 459 (13.2) | 76 (3.2) | 449 (4.4) | 13 (2.4) | 443 (12.3) | 9.1 (0.10) |
| United States r | 11 (1.8) | 545 (13.6) | 78 (2.8) | 533 (4.0) | 11 (2.1) | 462 (18.6) | 9.3 (0.10) |
| South Africa (9) | 8 (1.3) | 413 (12.0) | 77 (2.6) | 367 (3.6) | 15 (2.3) | 360 (5.9) | 9.0 (0.08) |
| **International Average** | **26 (0.5)** | **515 (1.3)** | **66 (0.5)** | **484 (0.7)** | **8 (0.3)** | **457 (2.7)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE r | 51 (3.0) | 583 (4.7) | 47 (3.1) | 522 (5.4) | 3 (0.6) | 488 (13.9) | 11.0 (0.08) |
| Moscow City, Russian Fed. | 42 (2.5) | 579 (3.3) | 49 (2.3) | 559 (3.7) | 9 (1.4) | 553 (4.7) | 10.5 (0.13) |
| Abu Dhabi, UAE r | 26 (2.6) | 502 (9.5) | 67 (3.0) | 391 (5.6) | 7 (1.3) | 349 (18.5) | 9.9 (0.10) |
| Ontario, Canada s | 23 (5.2) | 556 (10.4) | 72 (5.5) | 512 (4.5) | 6 (2.5) | 503 (7.0) | 9.9 (0.23) |
| Western Cape, RSA (9) | 13 (3.2) | 506 (31.8) | 62 (4.3) | 447 (6.7) | 25 (3.3) | 389 (7.0) | 8.8 (0.17) |
| Gauteng, RSA (9) | 10 (2.3) | 452 (19.9) | 75 (3.5) | 424 (5.0) | 15 (2.9) | 389 (10.7) | 9.2 (0.11) |
| Quebec, Canada y | - - | - - | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Students' Attitudes

## Students Like Learning Mathematics and Science

Exhibit 11.1 presents the *Students Like Learning Mathematics* scale administered to fourth and eighth grade students. In TIMSS 2019, the scale had nine items covering students' attitudes toward mathematics and studying mathematics (see Mathematics—About the Scale). In each TIMSS cycle since 1995, there has been a positive relationship between students liking mathematics and higher mathematics achievement. Since the inception of an item response theory (IRT) scale in 2011 to measure attitudes more broadly and reliably, the *Students Like Learning Mathematics* scale has had a very strong relationship with achievement in mathematics, and TIMSS 2019 was no exception. At both fourth and eighth grades, students who reported they "very much" like learning mathematics had substantially higher average achievement than students who reported they "do not like" learning mathematics.

Exhibit 11.2 presents the results for fourth grade according to the percentage of students who reported they like to learn mathematics "very much" (from highest to lowest). In general, fourth grade students were positive about learning mathematics—45 percent, on average, responded they like it "very much," and another 35 percent reported that they "somewhat" like it. However, even at the fourth grade, 20 percent, on average, responded negatively that they "do not like" learning mathematics.

Exhibit 11.3 shows that at the eighth grade, the percentage of students responding negatively increased substantially. At the eighth grade, only 20 percent responded that they like learning mathematics "very much." Thirty-nine percent responded "somewhat," and 41 percent (double compared with fourth grade) responded that they "do not like" learning mathematics. The difference in average achievement between eighth grade students who like learning mathematics "very much" and those who "do not like" learning mathematics was 62 scale score points.

Exhibit 11.4 presents the *Students Like Learning Science* scale (parallel to the mathematics scale) which was administered to fourth and eighth grade students (see Science—About the Scale). At both grades, the *Students Like Learning Science* scale was related to higher average achievement in science.

Exhibit 11.5 shows the science scale results at fourth grade. Compared with mathematics, a greater percentage of fourth grade students were positive about learning science, with 52 percent responding that they like it "very much," and another 36 percent that they "somewhat" like it. A smaller percentage were negative about learning science—12 percent reported they "do not like" it.

Exhibit 11.6 contains the eighth grade results for the *Students Like Learning Science* scale. The first panel is for the 26 countries that taught science as an integrated subject, then there are separate panels for the countries with courses for biology, chemistry, physics, and Earth science. The eighth grade students generally were positive about their integrated science courses, with 35 percent of students

responding that they like to learn science "very much," another 44 percent liking it "somewhat," and only 20 percent of students in the "do not like" category. Similar to the relationship with mathematics achievement, the difference in average science achievement between eighth grade students who like learning science "very much" and those who "do not like" learning science was 64 scale score points.

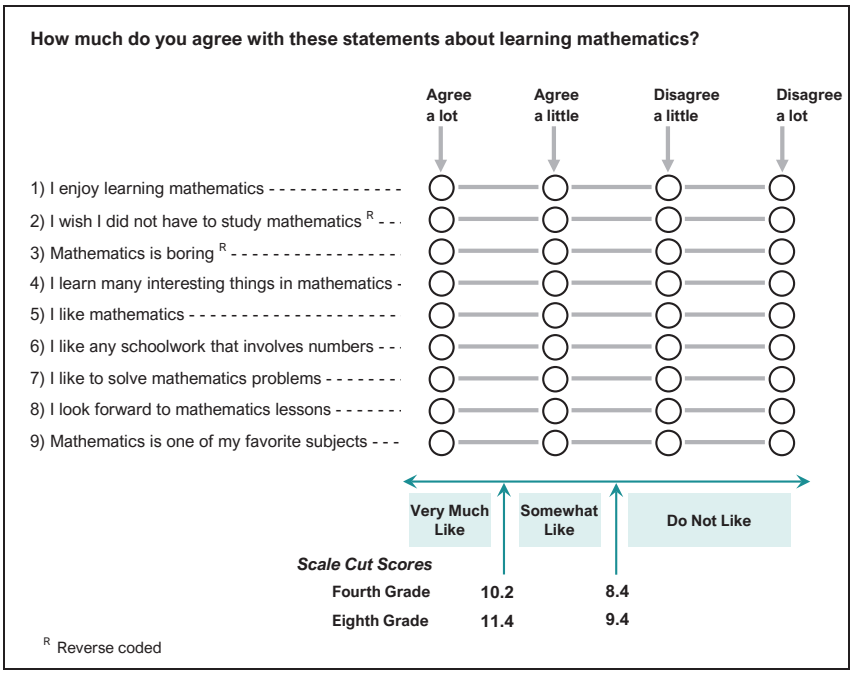
In countries where science is taught as separate subjects, students were positive about learning biology, with only 22 percent of students in the "do not like" learning biology category. Students were less positive about their separate courses in chemistry, physics, and Earth science, with 28 percent, 31 percent, and 26 percent of students in the "do not like" category of the three respective subjects, but not as negative as they were about eighth grade mathematics. The difference in average achievement between eighth grade students in the "very much like" and "do not like" categories was smaller for students taking separate subject courses and varied across the four subjects—30 points for biology, 45 points for chemistry, 46 points for physics, and 22 points for Earth science.

## Exhibit 11.1: Students Like Learning Mathematics

*Students' Reports*

### About the Scale

Students were scored according to their responses to nine statements on the *Students Like Learning Mathematics* scale. Cut scores divide the scale into three categories. Students who **Very Much Like Learning Mathematics** had a score at or above the cut score corresponding to "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who **Do Not Like Learning Mathematics** had a score at or below the cut score corresponding to "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students **Somewhat Like Learning Mathematics**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 11.2: Students Like Learning Mathematics

*Students' Reports*

| Country | Very Much Like Learning Mathematics | | Somewhat Like Learning Mathematics | | Do Not Like Learning Mathematics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 83 (1.2) | 504 (3.2) | 15 (1.0) | 455 (7.6) | 2 (0.4) | ~ ~ | 11.8 (0.05) |
| Kosovo | 78 (0.9) | 459 (2.7) | 20 (0.8) | 404 (4.7) | 2 (0.3) | ~ ~ | 11.4 (0.04) |
| Georgia | 74 (1.5) | 489 (3.7) | 22 (1.1) | 459 (6.6) | 4 (0.6) | 446 (11.3) | 11.4 (0.06) |
| Armenia | 72 (1.1) | 511 (2.6) | 23 (1.0) | 481 (4.0) | 5 (0.4) | 465 (5.6) | 11.4 (0.05) |
| Morocco | 70 (1.2) | 402 (4.1) | 25 (1.1) | 344 (6.4) | 5 (0.4) | 326 (10.2) | 11.3 (0.05) |
| Azerbaijan | 68 (1.2) | 536 (2.3) | 27 (1.1) | 495 (3.6) | 5 (0.4) | 477 (7.5) | 10.9 (0.05) |
| Kazakhstan | 68 (1.0) | 518 (2.6) | 28 (1.0) | 504 (3.6) | 5 (0.5) | 494 (6.3) | 11.1 (0.05) |
| Turkey (5) | 66 (1.2) | 540 (4.1) | 25 (0.9) | 491 (6.1) | 9 (0.6) | 495 (7.0) | 10.9 (0.05) |
| North Macedonia | 66 (1.3) | 495 (5.3) | 29 (1.1) | 436 (6.8) | 5 (0.6) | 448 (12.0) | 11.0 (0.06) |
| Montenegro | 64 (1.0) | 467 (1.9) | 25 (0.8) | 433 (3.5) | 10 (0.6) | 427 (5.0) | 10.9 (0.04) |
| Oman | 59 (1.2) | 455 (4.5) | 34 (1.1) | 401 (4.7) | 7 (0.5) | 394 (5.7) | 10.8 (0.05) |
| Iran, Islamic Rep. of | 59 (1.4) | 457 (3.6) | 30 (0.9) | 421 (5.2) | 11 (0.7) | 437 (7.3) | 10.8 (0.06) |
| Saudi Arabia | 59 (1.2) | 424 (3.6) | 30 (1.0) | 371 (4.1) | 11 (0.8) | 370 (8.7) | 10.8 (0.05) |
| Cyprus | 56 (1.5) | 547 (2.8) | 28 (0.9) | 522 (3.9) | 16 (1.1) | 497 (4.9) | 10.5 (0.07) |
| Bahrain | 56 (1.4) | 494 (2.6) | 31 (0.9) | 465 (3.2) | 13 (0.8) | 458 (4.4) | 10.6 (0.07) |
| Bulgaria | 54 (1.5) | 526 (3.9) | 30 (1.1) | 508 (5.4) | 17 (1.3) | 496 (10.1) | 10.4 (0.08) |
| United Arab Emirates | 54 (0.7) | 503 (1.8) | 33 (0.5) | 461 (2.3) | 13 (0.4) | 455 (2.8) | 10.5 (0.03) |
| Portugal | 49 (1.3) | 542 (2.9) | 36 (1.0) | 513 (3.1) | 15 (0.9) | 499 (4.4) | 10.3 (0.05) |
| France | 49 (1.0) | 499 (3.6) | 36 (0.9) | 479 (3.9) | 15 (0.8) | 454 (4.8) | 10.2 (0.04) |
| Bosnia and Herzegovina | 49 (1.0) | 466 (2.8) | 32 (0.6) | 443 (3.3) | 20 (1.0) | 437 (3.4) | 10.1 (0.06) |
| Malta | 48 (0.7) | 522 (1.7) | 34 (0.7) | 502 (2.2) | 18 (0.7) | 488 (3.2) | 10.1 (0.03) |
| Lithuania | 47 (1.3) | 553 (3.2) | 39 (0.9) | 538 (3.3) | 14 (0.9) | 521 (5.7) | 10.1 (0.05) |
| Kuwait | 46 (1.6) | 416 (6.0) | 37 (1.1) | 372 (5.5) | 17 (1.1) | 352 (5.4) | 10.2 (0.08) |
| South Africa (5) | 46 (1.5) | 415 (3.3) | 43 (1.1) | 345 (3.7) | 12 (0.6) | 334 (5.4) | 10.3 (0.05) |
| Italy | 45 (1.3) | 525 (2.9) | 34 (1.1) | 511 (3.2) | 20 (1.1) | 502 (3.5) | 10.0 (0.06) |
| England | 44 (1.6) | 576 (4.4) | 34 (1.1) | 549 (4.4) | 23 (1.1) | 530 (3.8) | 9.9 (0.07) |
| Qatar | 43 (1.4) | 474 (3.8) | 38 (0.9) | 434 (4.8) | 20 (0.9) | 436 (4.9) | 10.0 (0.07) |
| Chile | 43 (1.2) | 458 (3.2) | 39 (0.9) | 437 (3.4) | 19 (1.0) | 418 (4.1) | 10.0 (0.05) |
| Russian Federation | 42 (1.1) | 579 (4.0) | 41 (0.8) | 563 (3.5) | 17 (0.9) | 547 (4.3) | 10.0 (0.05) |
| Austria | 40 (1.0) | 552 (2.5) | 34 (0.8) | 538 (2.7) | 25 (0.9) | 522 (2.9) | 9.8 (0.05) |
| New Zealand | 40 (0.9) | 503 (3.2) | 35 (0.8) | 485 (3.6) | 25 (0.9) | 469 (3.3) | 9.8 (0.04) |
| Australia | 40 (1.0) | 536 (3.6) | 34 (0.9) | 516 (3.4) | 26 (1.2) | 487 (3.6) | 9.7 (0.05) |
| Hungary | 38 (1.2) | 543 (3.3) | 37 (0.9) | 517 (3.4) | 25 (1.3) | 504 (3.4) | 9.7 (0.06) |
| United States | 38 (0.9) | 559 (2.8) | 35 (0.7) | 530 (3.7) | 27 (0.8) | 515 (3.1) | 9.7 (0.04) |
| Canada | 38 (0.9) | 531 (2.9) | 38 (0.8) | 508 (2.1) | 25 (0.6) | 485 (2.5) | 9.7 (0.04) |
| Spain | 37 (1.0) | 519 (3.5) | 39 (0.9) | 500 (2.9) | 23 (1.1) | 484 (2.9) | 9.7 (0.04) |
| Singapore | 37 (0.9) | 654 (3.5) | 40 (0.7) | 618 (4.4) | 23 (0.8) | 594 (4.1) | 9.7 (0.04) |
| Slovak Republic | 37 (1.5) | 520 (4.4) | 39 (1.1) | 506 (4.5) | 24 (1.0) | 500 (3.8) | 9.7 (0.06) |
| Ireland | 35 (1.1) | 566 (2.9) | 37 (1.0) | 549 (3.2) | 28 (1.1) | 529 (3.3) | 9.5 (0.05) |
| Pakistan | 35 (3.6) | 354 (14.7) | 52 (3.2) | 318 (11.5) | 13 (1.3) | 307 (11.5) | 9.9 (0.09) |
| Serbia | 35 (1.3) | 526 (4.4) | 40 (1.1) | 505 (3.3) | 26 (1.4) | 490 (5.1) | 9.6 (0.07) |
| Sweden | 34 (1.6) | 530 (4.5) | 37 (1.1) | 523 (3.3) | 29 (1.6) | 511 (3.2) | 9.5 (0.08) |
| Germany | 33 (1.0) | 544 (3.1) | 38 (1.0) | 522 (2.8) | 29 (1.2) | 503 (3.1) | 9.5 (0.05) |
| Belgium (Flemish) | 33 (1.0) | 547 (2.8) | 39 (0.9) | 531 (2.3) | 28 (1.0) | 518 (2.8) | 9.4 (0.04) |
| Czech Republic | 32 (1.2) | 553 (3.6) | 39 (1.1) | 532 (3.2) | 28 (1.2) | 514 (3.2) | 9.4 (0.05) |
| Latvia | 32 (1.2) | 565 (3.5) | 40 (1.1) | 549 (2.7) | 28 (1.3) | 521 (3.7) | 9.5 (0.05) |
| Norway (5) | 32 (1.4) | 558 (3.4) | 39 (1.1) | 541 (3.4) | 29 (1.3) | 533 (3.4) | 9.4 (0.07) |
| Philippines | 32 (1.8) | 362 (6.7) | 53 (1.3) | 278 (6.0) | 16 (0.9) | 242 (6.8) | 9.8 (0.07) |
| Northern Ireland | 31 (1.2) | 589 (4.0) | 39 (1.1) | 572 (3.6) | 30 (1.2) | 535 (3.8) | 9.4 (0.05) |
| Hong Kong SAR | 30 (1.3) | 626 (4.9) | 38 (1.2) | 596 (3.9) | 32 (1.4) | 585 (3.9) | 9.3 (0.06) |
| Netherlands | 30 (1.3) | 553 (2.9) | 39 (0.8) | 538 (2.6) | 32 (1.2) | 524 (3.2) | 9.3 (0.06) |
| Poland | 28 (1.0) | 544 (3.4) | 41 (0.8) | 517 (3.1) | 31 (1.2) | 505 (3.4) | 9.2 (0.05) |
| Japan | 28 (1.0) | 622 (2.4) | 45 (0.9) | 591 (2.2) | 27 (1.2) | 568 (2.8) | 9.4 (0.05) |
| Denmark | 28 (1.2) | 543 (3.3) | 41 (1.1) | 525 (2.9) | 31 (1.1) | 510 (3.0) | 9.2 (0.05) |
| Finland | 28 (0.9) | 546 (3.8) | 41 (0.7) | 535 (2.8) | 31 (0.9) | 518 (3.2) | 9.2 (0.04) |
| Croatia | 25 (1.6) | 534 (2.9) | 40 (1.4) | 506 (3.1) | 35 (1.5) | 497 (3.1) | 9.1 (0.07) |
| Korea, Rep. of | 22 (0.9) | 631 (3.2) | 38 (1.1) | 607 (3.0) | 40 (1.1) | 576 (2.9) | 8.9 (0.04) |
| Chinese Taipei | 22 (0.9) | 624 (3.4) | 38 (0.9) | 603 (2.8) | 41 (1.1) | 582 (2.2) | 8.9 (0.05) |
| **International Average** | **45 (0.2)** | **520 (0.5)** | **35 (0.1)** | **491 (0.6)** | **20 (0.1)** | **479 (0.7)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 61 (0.7) | 553 (1.8) | 27 (0.5) | 533 (2.5) | 11 (0.5) | 526 (4.1) | 10.7 (0.04) |
| Abu Dhabi, UAE | 44 (1.1) | 462 (2.8) | 38 (0.8) | 427 (3.1) | 18 (0.7) | 423 (3.7) | 10.1 (0.05) |
| Quebec, Canada | 43 (1.3) | 548 (3.1) | 37 (1.1) | 527 (3.3) | 20 (1.0) | 502 (3.8) | 9.9 (0.05) |
| Moscow City, Russian Fed. | 41 (1.1) | 610 (2.6) | 39 (0.9) | 586 (2.8) | 20 (0.9) | 572 (3.0) | 9.9 (0.04) |
| Madrid, Spain | 37 (1.3) | 531 (3.1) | 42 (0.9) | 516 (2.8) | 22 (1.0) | 503 (3.2) | 9.7 (0.05) |
| Ontario, Canada | 36 (1.6) | 532 (5.5) | 39 (1.4) | 511 (3.4) | 25 (1.1) | 488 (4.4) | 9.6 (0.06) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 11.3: Students Like Learning Mathematics

*Students' Reports*

| Country | Very Much Like Learning Mathematics | | Somewhat Like Learning Mathematics | | Do Not Like Learning Mathematics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Egypt | 42 (1.3) | 437 (5.4) | 41 (0.9) | 396 (5.6) | 17 (0.9) | 405 (6.4) | 11.1 (0.06) |
| Morocco | 38 (1.1) | 409 (3.0) | 40 (0.7) | 380 (2.9) | 22 (0.9) | 368 (2.7) | 10.8 (0.05) |
| Jordan | 37 (1.3) | 441 (4.2) | 39 (0.8) | 413 (4.8) | 24 (1.0) | 408 (5.6) | 10.8 (0.06) |
| South Africa (9) | 36 (0.7) | 403 (2.5) | 44 (0.5) | 382 (2.6) | 19 (0.5) | 385 (3.0) | 10.8 (0.03) |
| Iran, Islamic Rep. of | 34 (0.9) | 478 (5.1) | 39 (0.8) | 438 (4.6) | 27 (1.1) | 418 (4.5) | 10.6 (0.05) |
| Oman | 31 (0.9) | 455 (3.4) | 46 (0.7) | 396 (3.0) | 23 (1.0) | 390 (4.1) | 10.6 (0.04) |
| Turkey | 29 (1.0) | 539 (5.8) | 41 (0.8) | 485 (4.9) | 30 (1.1) | 470 (4.8) | 10.3 (0.05) |
| Lebanon | 28 (1.3) | 456 (3.6) | 44 (1.1) | 425 (3.9) | 28 (1.1) | 413 (3.7) | 10.4 (0.06) |
| Saudi Arabia | 27 (1.1) | 413 (4.0) | 36 (0.7) | 391 (3.2) | 37 (1.0) | 386 (3.0) | 10.1 (0.05) |
| Kazakhstan | 26 (1.2) | 509 (4.9) | 54 (1.1) | 484 (4.0) | 20 (1.1) | 472 (5.0) | 10.6 (0.05) |
| United Arab Emirates | 26 (0.6) | 512 (3.0) | 41 (0.6) | 471 (2.4) | 33 (0.6) | 451 (1.9) | 10.2 (0.03) |
| Georgia | 25 (1.4) | 493 (6.1) | 43 (1.1) | 461 (4.9) | 32 (1.3) | 438 (5.3) | 10.2 (0.06) |
| Bahrain | 24 (0.8) | 510 (3.4) | 36 (0.8) | 483 (2.4) | 40 (1.2) | 462 (2.9) | 9.9 (0.06) |
| Singapore | 22 (0.7) | 653 (4.0) | 43 (0.7) | 624 (3.9) | 35 (0.8) | 582 (5.0) | 10.1 (0.03) |
| Malaysia | 20 (0.8) | 498 (5.2) | 57 (0.8) | 455 (3.3) | 23 (1.0) | 442 (4.2) | 10.3 (0.04) |
| Kuwait | 20 (0.9) | 429 (7.0) | 34 (1.0) | 406 (6.3) | 45 (1.3) | 392 (4.4) | 9.7 (0.05) |
| Israel | 19 (1.0) | 544 (6.3) | 36 (1.0) | 527 (5.3) | 45 (1.4) | 505 (4.1) | 9.6 (0.06) |
| Cyprus | 19 (0.8) | 549 (3.8) | 35 (0.8) | 513 (2.8) | 46 (1.0) | 473 (2.4) | 9.6 (0.04) |
| Portugal | 19 (0.9) | 548 (4.7) | 34 (1.0) | 508 (3.9) | 48 (1.3) | 477 (3.3) | 9.6 (0.06) |
| Russian Federation | 17 (0.7) | 583 (6.3) | 46 (0.9) | 549 (4.7) | 37 (1.1) | 519 (5.0) | 9.9 (0.04) |
| United States | 17 (0.8) | 561 (6.2) | 37 (0.6) | 528 (5.0) | 45 (1.0) | 493 (4.7) | 9.6 (0.05) |
| Italy | 16 (0.9) | 537 (4.3) | 34 (1.1) | 513 (3.3) | 49 (1.3) | 474 (2.9) | 9.4 (0.06) |
| Romania | 16 (1.0) | 537 (6.0) | 39 (1.1) | 486 (5.6) | 44 (1.6) | 454 (4.8) | 9.7 (0.06) |
| Qatar | 16 (0.8) | 486 (5.6) | 39 (1.1) | 449 (5.9) | 45 (1.4) | 424 (3.5) | 9.6 (0.06) |
| Ireland | 14 (0.7) | 567 (4.4) | 35 (1.1) | 537 (3.1) | 50 (1.3) | 504 (2.7) | 9.4 (0.05) |
| Chile | 14 (0.7) | 468 (5.7) | 40 (1.2) | 449 (3.4) | 46 (1.5) | 426 (2.9) | 9.6 (0.05) |
| New Zealand | 14 (0.6) | 528 (5.4) | 39 (1.1) | 495 (4.1) | 47 (1.2) | 460 (3.6) | 9.5 (0.04) |
| Australia | 13 (0.7) | 576 (5.1) | 37 (0.8) | 536 (4.5) | 50 (1.2) | 489 (3.4) | 9.4 (0.05) |
| Hong Kong SAR | 13 (0.7) | 622 (5.8) | 39 (1.0) | 595 (4.9) | 48 (1.4) | 554 (4.4) | 9.4 (0.05) |
| Sweden | 13 (0.7) | 545 (4.7) | 34 (0.9) | 522 (3.4) | 53 (1.2) | 482 (2.5) | 9.3 (0.05) |
| England | 12 (0.8) | 552 (8.5) | 38 (1.1) | 530 (6.6) | 50 (1.2) | 500 (5.0) | 9.4 (0.04) |
| Norway (9) | 12 (0.8) | 558 (4.8) | 34 (0.9) | 524 (2.5) | 54 (1.1) | 479 (2.7) | 9.2 (0.04) |
| Lithuania | 12 (0.8) | 563 (6.3) | 43 (1.2) | 531 (3.7) | 44 (1.3) | 500 (3.0) | 9.6 (0.04) |
| Chinese Taipei | 12 (0.6) | 685 (5.2) | 33 (0.7) | 643 (3.0) | 56 (0.9) | 579 (2.7) | 9.2 (0.04) |
| France | 11 (0.7) | 524 (4.8) | 43 (1.2) | 498 (3.1) | 46 (1.3) | 459 (2.5) | 9.5 (0.04) |
| Hungary | 11 (0.6) | 590 (7.0) | 32 (0.9) | 538 (4.2) | 57 (1.1) | 491 (2.9) | 9.2 (0.04) |
| Japan | 10 (0.6) | 658 (5.3) | 34 (0.9) | 618 (3.2) | 56 (1.1) | 569 (2.8) | 9.3 (0.04) |
| Finland | 9 (0.6) | 572 (4.3) | 34 (1.0) | 533 (3.3) | 57 (1.2) | 485 (2.3) | 9.1 (0.05) |
| Korea, Rep. of | 8 (0.5) | 685 (5.3) | 32 (0.9) | 638 (3.8) | 61 (0.9) | 581 (2.8) | 9.0 (0.03) |
| **International Average** | **20 (0.1)** | **530 (0.8)** | **39 (0.1)** | **496 (0.7)** | **41 (0.2)** | **468 (0.6)** | |
| **Benchmarking Participants** | | | | | | | |
| Gauteng, RSA (9) | 33 (1.1) | 432 (4.1) | 44 (0.7) | 415 (3.4) | 23 (0.9) | 417 (4.0) | 10.6 (0.05) |
| Dubai, UAE | 28 (1.1) | 569 (4.1) | 42 (1.3) | 537 (2.6) | 29 (0.8) | 505 (2.7) | 10.4 (0.04) |
| Western Cape, RSA (9) | 27 (1.0) | 457 (4.7) | 44 (0.8) | 434 (5.2) | 29 (1.0) | 440 (4.8) | 10.3 (0.04) |
| Ontario, Canada | 24 (1.1) | 569 (3.9) | 39 (1.0) | 540 (4.8) | 37 (1.0) | 495 (4.8) | 10.0 (0.05) |
| Abu Dhabi, UAE | 21 (0.9) | 489 (4.2) | 43 (0.9) | 425 (3.5) | 36 (0.9) | 422 (3.5) | 10.0 (0.05) |
| Moscow City, Russian Fed. | 19 (0.9) | 625 (5.3) | 44 (1.1) | 586 (4.7) | 37 (1.4) | 538 (3.8) | 9.9 (0.05) |
| Quebec, Canada | 13 (1.0) | 586 (4.9) | 38 (1.0) | 556 (3.3) | 48 (1.6) | 522 (4.5) | 9.5 (0.07) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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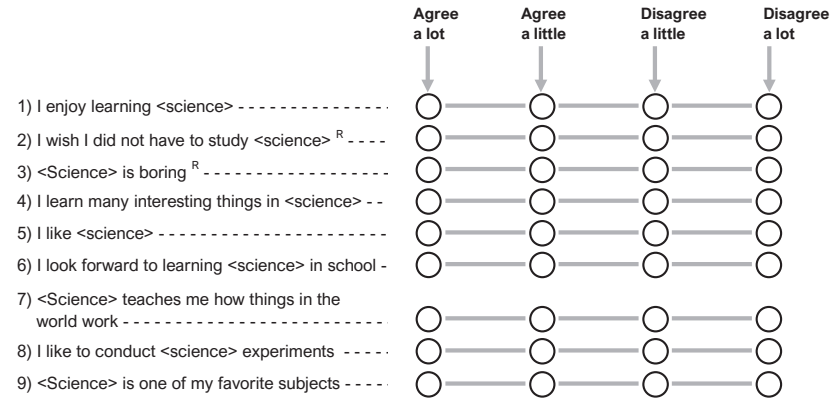
## Exhibit 11.4: Students Like Learning Science

*Students' Reports*

### About the Scale

Students were scored according to their responses to nine statements on the *Students Like Learning Science* scale. Cut scores divide the scale into three categories. Students who **Very Much Like Learning Science** had a score at or above the cut score corresponding to "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who **Do Not Like Learning Science** had a score at or below the cut score corresponding to "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students **Somewhat Like Learning Science**. At the eighth grade, a comparable approach was used for biology, chemistry, physics, and Earth science in countries where these were taught as separate subjects.

**How much do you agree with these statements about learning <science / biology / chemistry / physics / earth science>?**




| *Scale Cut Scores* | | |
|---|---|---|
| **Fourth Grade** | **9.7** | **7.6** |
| **Eighth Grade** | | |
| General/Integrated Science | **10.6** | **8.3** |
| Biology | **11.0** | **8.5** |
| Chemistry | **11.1** | **8.8** |
| Physics | **11.3** | **9.0** |
| Earth Science | **11.2** | **8.8** |

R Reverse coded

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## Exhibit 11.5: Students Like Learning Science

*Students' Reports*

| Country | Very Much Like Learning Science | | Somewhat Like Learning Science | | Do Not Like Learning Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 83 (1.1) | 498 (3.3) | 15 (1.0) | 457 (7.8) | 1 (0.2) | ~ ~ | 11.6 (0.06) |
| Portugal | 74 (1.0) | 513 (2.6) | 21 (0.9) | 480 (3.7) | 4 (0.4) | 477 (6.9) | 11.2 (0.05) |
| Kosovo | 72 (1.5) | 429 (3.9) | 25 (1.3) | 383 (5.0) | 3 (0.4) | 364 (14.2) | 10.9 (0.06) |
| Iran, Islamic Rep. of | 70 (1.1) | 459 (3.4) | 24 (1.0) | 402 (6.6) | 5 (0.5) | 402 (9.1) | 11.0 (0.06) |
| Bulgaria | 69 (1.6) | 533 (4.5) | 25 (1.2) | 504 (6.8) | 6 (0.9) | 486 (18.3) | 10.8 (0.08) |
| Morocco | 69 (1.3) | 401 (5.8) | 26 (1.1) | 322 (7.6) | 5 (0.4) | 294 (12.9) | 11.0 (0.06) |
| Turkey (5) | 69 (1.6) | 544 (3.4) | 25 (1.2) | 493 (6.5) | 6 (0.7) | 473 (10.0) | 10.9 (0.07) |
| Bahrain | 68 (1.2) | 514 (2.9) | 24 (0.9) | 454 (4.9) | 7 (0.6) | 445 (7.4) | 11.0 (0.06) |
| Oman | 68 (1.3) | 464 (4.7) | 27 (1.2) | 387 (5.4) | 5 (0.5) | 360 (9.2) | 10.9 (0.07) |
| Armenia | 66 (1.3) | 483 (3.2) | 27 (1.2) | 450 (5.3) | 8 (0.6) | 439 (6.7) | 10.8 (0.07) |
| United Arab Emirates | 64 (0.6) | 500 (2.2) | 28 (0.5) | 435 (2.6) | 8 (0.3) | 410 (4.4) | 10.8 (0.03) |
| Georgia | 62 (1.6) | 459 (4.1) | 32 (1.4) | 442 (6.0) | 6 (0.6) | 459 (9.1) | 10.6 (0.07) |
| Saudi Arabia | 61 (1.2) | 438 (3.5) | 29 (1.0) | 356 (5.7) | 9 (0.6) | 369 (8.2) | 10.7 (0.06) |
| Montenegro | 61 (1.2) | 467 (2.6) | 32 (0.9) | 440 (3.3) | 7 (0.5) | 434 (7.8) | 10.5 (0.05) |
| Azerbaijan | 61 (1.4) | 448 (2.8) | 33 (1.3) | 414 (4.2) | 6 (0.5) | 409 (8.6) | 10.3 (0.06) |
| Kazakhstan | 59 (1.3) | 503 (3.8) | 36 (1.2) | 484 (3.4) | 5 (0.5) | 488 (7.4) | 10.4 (0.06) |
| North Macedonia | 59 (1.7) | 455 (4.9) | 36 (1.7) | 397 (8.2) | 6 (0.7) | 383 (12.5) | 10.5 (0.07) |
| Kuwait | 58 (1.4) | 430 (6.4) | 33 (1.1) | 360 (7.7) | 9 (0.7) | 333 (10.0) | 10.5 (0.07) |
| Malta | 58 (0.8) | 509 (1.6) | 29 (0.6) | 484 (3.0) | 13 (0.6) | 466 (4.0) | 10.3 (0.04) |
| Qatar | 56 (1.6) | 485 (3.5) | 34 (1.3) | 415 (5.4) | 10 (0.6) | 396 (7.4) | 10.4 (0.07) |
| Ireland | 56 (1.3) | 537 (3.3) | 33 (1.0) | 523 (4.0) | 12 (0.7) | 507 (5.2) | 10.2 (0.06) |
| Northern Ireland | 56 (1.1) | 530 (2.4) | 33 (1.0) | 510 (3.4) | 11 (0.7) | 487 (4.5) | 10.2 (0.05) |
| Italy | 55 (1.1) | 514 (3.5) | 35 (0.8) | 509 (3.4) | 10 (0.7) | 495 (4.8) | 10.2 (0.05) |
| Lithuania | 53 (1.7) | 541 (3.0) | 38 (1.3) | 538 (3.5) | 9 (0.8) | 524 (5.0) | 9.9 (0.07) |
| Japan | 52 (1.2) | 569 (2.1) | 39 (1.0) | 554 (2.3) | 9 (0.6) | 551 (4.0) | 10.1 (0.06) |
| United States | 52 (1.0) | 551 (2.6) | 34 (0.8) | 533 (3.6) | 14 (0.7) | 523 (4.8) | 10.1 (0.05) |
| New Zealand | 52 (1.1) | 513 (3.0) | 34 (0.9) | 500 (2.8) | 14 (0.8) | 479 (3.5) | 10.0 (0.05) |
| Chinese Taipei | 51 (1.5) | 566 (2.0) | 37 (1.1) | 554 (2.6) | 12 (0.9) | 537 (4.3) | 10.1 (0.07) |
| Australia | 50 (1.4) | 539 (3.1) | 34 (0.9) | 533 (2.9) | 16 (1.0) | 515 (4.6) | 9.9 (0.07) |
| Singapore | 49 (1.0) | 605 (3.6) | 39 (0.7) | 588 (3.9) | 12 (0.5) | 574 (4.7) | 10.0 (0.04) |
| Bosnia and Herzegovina | 49 (1.1) | 467 (3.5) | 35 (0.8) | 453 (3.6) | 16 (0.8) | 454 (4.6) | 9.8 (0.06) |
| Hong Kong SAR | 49 (1.5) | 547 (3.5) | 37 (1.2) | 519 (4.8) | 15 (1.0) | 509 (6.7) | 10.0 (0.08) |
| Austria | 49 (1.1) | 533 (2.8) | 38 (0.9) | 517 (3.5) | 13 (0.7) | 501 (5.3) | 9.9 (0.05) |
| Canada | 49 (1.0) | 528 (2.2) | 36 (0.8) | 524 (2.2) | 15 (0.6) | 511 (2.8) | 9.9 (0.05) |
| Spain | 48 (1.4) | 520 (2.7) | 40 (1.0) | 506 (2.5) | 13 (0.8) | 503 (6.7) | 9.8 (0.06) |
| Germany r | 47 (1.4) | 535 (2.6) | 38 (1.0) | 517 (3.7) | 15 (0.9) | 498 (4.4) | 9.8 (0.07) |
| Norway (5) | 47 (1.4) | 546 (2.6) | 41 (1.0) | 540 (2.7) | 12 (0.8) | 524 (5.2) | 9.9 (0.06) |
| England | 46 (1.6) | 542 (3.7) | 37 (1.2) | 540 (3.6) | 16 (1.1) | 528 (4.8) | 9.8 (0.09) |
| Hungary | 46 (1.3) | 538 (2.5) | 38 (1.0) | 523 (3.6) | 15 (1.0) | 520 (5.0) | 9.7 (0.06) |
| Cyprus | 46 (1.7) | 525 (3.5) | 32 (1.1) | 504 (3.2) | 22 (1.4) | 496 (4.4) | 9.6 (0.10) |
| France | 45 (1.2) | 496 (3.8) | 38 (0.9) | 487 (3.4) | 17 (1.0) | 467 (5.1) | 9.7 (0.06) |
| Russian Federation | 44 (1.3) | 570 (3.8) | 42 (0.9) | 565 (3.1) | 14 (0.9) | 567 (4.2) | 9.5 (0.06) |
| Chile | 44 (1.1) | 486 (3.2) | 44 (0.9) | 462 (3.2) | 12 (0.8) | 450 (5.9) | 9.7 (0.06) |
| South Africa (5) | 43 (1.2) | 390 (5.2) | 45 (0.9) | 284 (5.1) | 11 (0.5) | 264 (6.3) | 9.8 (0.05) |
| Pakistan | 42 (3.2) | 323 (15.0) | 49 (2.5) | 269 (15.2) | 9 (1.5) | 258 (16.1) | 9.8 (0.16) |
| Netherlands | 41 (1.3) | 530 (3.1) | 40 (0.9) | 516 (3.6) | 19 (0.9) | 504 (4.6) | 9.5 (0.06) |
| Belgium (Flemish) | 41 (1.4) | 507 (2.9) | 41 (0.9) | 502 (2.8) | 19 (1.0) | 486 (3.0) | 9.5 (0.07) |
| Latvia | 39 (1.3) | 546 (3.0) | 47 (1.2) | 542 (2.7) | 14 (0.8) | 534 (4.5) | 9.4 (0.05) |
| Sweden | 39 (1.5) | 538 (4.5) | 41 (1.2) | 543 (3.4) | 20 (1.3) | 527 (4.5) | 9.4 (0.08) |
| Serbia | 39 (1.5) | 522 (4.2) | 46 (1.1) | 512 (4.3) | 15 (1.1) | 527 (4.3) | 9.5 (0.07) |
| Slovak Republic | 38 (1.6) | 525 (4.1) | 43 (0.9) | 522 (4.7) | 19 (1.1) | 512 (5.5) | 9.4 (0.08) |
| Poland | 38 (1.3) | 541 (3.3) | 44 (1.0) | 527 (2.8) | 18 (0.9) | 528 (3.7) | 9.3 (0.06) |
| Korea, Rep. of | 37 (1.3) | 602 (2.7) | 47 (0.9) | 581 (2.8) | 16 (1.0) | 572 (3.6) | 9.5 (0.06) |
| Denmark | 35 (1.4) | 534 (3.1) | 43 (1.1) | 521 (3.0) | 22 (1.3) | 509 (3.3) | 9.2 (0.07) |
| Croatia | 34 (1.3) | 531 (3.2) | 50 (1.0) | 521 (2.4) | 16 (0.9) | 518 (4.1) | 9.3 (0.06) |
| Czech Republic | 34 (1.4) | 541 (4.0) | 44 (1.0) | 534 (2.9) | 22 (1.1) | 527 (2.9) | 9.2 (0.07) |
| Philippines | 32 (1.8) | 334 (7.5) | 53 (1.4) | 221 (7.1) | 15 (0.9) | 180 (7.3) | 9.3 (0.07) |
| Finland | 26 (1.0) | 554 (3.2) | 45 (0.9) | 556 (3.1) | 29 (1.1) | 554 (3.1) | 8.7 (0.05) |
| **International Average** | **52 (0.2)** | **506 (0.5)** | **36 (0.1)** | **478 (0.6)** | **12 (0.1)** | **467 (0.9)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 72 (0.7) | 552 (1.6) | 23 (0.6) | 525 (3.3) | 5 (0.4) | 523 (6.4) | 11.2 (0.04) |
| Abu Dhabi, UAE | 52 (1.1) | 455 (3.5) | 35 (0.8) | 386 (3.7) | 14 (0.6) | 373 (5.1) | 10.2 (0.06) |
| Quebec, Canada r | 48 (1.3) | 526 (3.1) | 34 (1.0) | 523 (3.4) | 17 (1.0) | 507 (3.7) | 9.8 (0.07) |
| Ontario, Canada | 46 (1.7) | 529 (3.9) | 38 (1.3) | 527 (3.6) | 15 (1.0) | 513 (4.3) | 9.8 (0.09) |
| Madrid, Spain | 43 (1.5) | 530 (2.7) | 43 (1.3) | 519 (2.3) | 13 (0.8) | 514 (4.5) | 9.7 (0.06) |
| Moscow City, Russian Fed. | 40 (1.2) | 597 (2.8) | 43 (1.1) | 594 (2.8) | 17 (1.0) | 593 (3.3) | 9.4 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 11.6: Students Like Learning Science

*Students' Reports*

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and Earth science summarize responses for countries where students are taught science as separate subjects.

*Students Like Learning General/Integrated Science*

| General/Integrated Science | Very Much Like Learning Science | | Somewhat Like Learning Science | | Do Not Like Learning Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Jordan | 56 (1.6) | 479 (3.8) | 36 (1.4) | 426 (6.1) | 8 (0.5) | 424 (7.0) | 11.1 (0.06) |
| Egypt | 54 (1.6) | 426 (5.0) | 38 (1.3) | 358 (6.5) | 8 (0.7) | 345 (8.6) | 11.0 (0.06) |
| Turkey | 54 (1.4) | 536 (3.3) | 37 (0.9) | 494 (5.0) | 10 (0.8) | 481 (8.4) | 10.8 (0.06) |
| Iran, Islamic Rep. of | 53 (1.3) | 469 (3.9) | 37 (1.0) | 428 (4.4) | 11 (0.6) | 429 (5.9) | 10.8 (0.06) |
| Kuwait | 46 (1.7) | 468 (5.5) | 39 (1.1) | 435 (6.4) | 15 (1.1) | 414 (7.2) | 10.5 (0.07) |
| Malaysia | 46 (1.1) | 484 (3.3) | 46 (0.8) | 450 (3.9) | 8 (0.7) | 388 (8.0) | 10.6 (0.05) |
| Saudi Arabia | 46 (1.3) | 454 (3.1) | 40 (0.8) | 417 (3.3) | 14 (0.9) | 417 (4.1) | 10.6 (0.06) |
| Oman | 46 (1.0) | 495 (3.0) | 44 (0.8) | 438 (3.7) | 10 (0.6) | 412 (7.0) | 10.6 (0.05) |
| United Arab Emirates | 44 (0.6) | 523 (2.7) | 41 (0.6) | 445 (2.6) | 15 (0.4) | 412 (3.8) | 10.5 (0.03) |
| Bahrain | 44 (1.2) | 516 (2.4) | 40 (0.9) | 474 (3.2) | 16 (0.7) | 448 (4.6) | 10.5 (0.06) |
| South Africa (9) | 42 (0.9) | 398 (3.4) | 45 (0.6) | 352 (3.3) | 13 (0.5) | 353 (4.2) | 10.4 (0.04) |
| Qatar | 38 (1.4) | 509 (5.0) | 45 (1.2) | 459 (4.8) | 17 (0.9) | 441 (5.7) | 10.2 (0.06) |
| Singapore | 37 (0.9) | 635 (3.8) | 49 (0.8) | 601 (3.8) | 14 (0.6) | 558 (6.0) | 10.2 (0.04) |
| United States | 31 (0.9) | 550 (5.0) | 46 (0.7) | 522 (4.9) | 23 (0.7) | 499 (5.7) | 9.8 (0.05) |
| Italy | 29 (1.2) | 519 (3.4) | 50 (1.0) | 499 (2.8) | 20 (0.9) | 481 (3.8) | 9.8 (0.05) |
| Ireland | 27 (1.2) | 558 (3.5) | 42 (1.0) | 532 (2.8) | 30 (1.3) | 493 (4.3) | 9.5 (0.06) |
| Australia | 27 (1.1) | 569 (4.1) | 45 (0.8) | 526 (3.5) | 28 (1.3) | 499 (3.6) | 9.6 (0.06) |
| Israel | 27 (1.2) | 547 (4.8) | 42 (0.8) | 512 (5.0) | 31 (1.1) | 496 (5.2) | 9.4 (0.06) |
| Chile | 26 (1.2) | 482 (4.7) | 53 (1.0) | 460 (3.4) | 22 (1.2) | 450 (3.9) | 9.6 (0.06) |
| New Zealand | 25 (1.1) | 532 (4.8) | 49 (0.9) | 499 (4.2) | 25 (1.2) | 471 (4.6) | 9.6 (0.06) |
| Norway (9) | 25 (1.1) | 530 (4.5) | 51 (1.0) | 495 (3.3) | 25 (1.0) | 467 (4.3) | 9.6 (0.05) |
| England | 24 (1.3) | 556 (5.9) | 45 (1.1) | 524 (5.0) | 30 (1.3) | 485 (5.7) | 9.4 (0.06) |
| Hong Kong SAR | 23 (1.0) | 541 (6.1) | 55 (1.1) | 501 (6.1) | 22 (1.1) | 472 (7.5) | 9.6 (0.05) |
| Chinese Taipei | 20 (0.8) | 616 (3.2) | 51 (0.9) | 576 (2.5) | 30 (1.0) | 544 (2.6) | 9.3 (0.04) |
| Japan | 16 (0.8) | 605 (4.2) | 49 (1.1) | 577 (2.4) | 35 (1.4) | 544 (2.6) | 9.1 (0.05) |
| Korea, Rep. of | 12 (0.5) | 625 (4.6) | 41 (1.0) | 577 (3.0) | 47 (1.2) | 531 (2.4) | 8.7 (0.04) |
| **International Average** | **35 (0.2)** | **524 (0.8)** | **44 (0.2)** | **484 (0.8)** | **20 (0.2)** | **460 (1.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 50 (1.0) | 574 (2.7) | 38 (0.9) | 528 (3.3) | 12 (0.6) | 498 (5.2) | 10.8 (0.05) |
| Gauteng, RSA (9) | 45 (1.2) | 438 (4.0) | 42 (0.8) | 409 (4.9) | 13 (0.8) | 418 (6.1) | 10.5 (0.05) |
| Abu Dhabi, UAE | 35 (1.1) | 498 (4.0) | 45 (0.8) | 389 (4.5) | 20 (0.9) | 364 (6.4) | 10.1 (0.06) |
| Western Cape, RSA (9) | 35 (1.1) | 463 (5.8) | 48 (0.7) | 426 (5.5) | 18 (1.0) | 439 (6.9) | 10.0 (0.05) |
| Ontario, Canada | 33 (1.2) | 542 (4.1) | 44 (1.2) | 518 (3.6) | 23 (1.1) | 500 (4.5) | 9.9 (0.06) |
| Quebec, Canada | 27 (1.5) | 556 (4.3) | 49 (1.2) | 539 (3.8) | 24 (1.6) | 510 (5.5) | 9.6 (0.08) |

## Separate Science Results

*Students Like Learning Biology*

| Biology | Very Much Like Learning Biology | | Somewhat Like Learning Biology | | Do Not Like Learning Biology | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Morocco | 46 (1.1) | 414 (3.4) | 43 (0.8) | 382 (2.9) | 11 (0.7) | 372 (4.9) | 10.9 (0.05) |
| Georgia | 43 (1.9) | 461 (4.3) | 43 (1.6) | 442 (4.2) | 14 (1.2) | 437 (7.6) | 10.6 (0.08) |
| Portugal | 38 (1.7) | 534 (3.2) | 47 (1.2) | 515 (3.3) | 15 (1.1) | 505 (4.2) | 10.5 (0.08) |
| Kazakhstan | 36 (1.3) | 486 (4.0) | 56 (1.2) | 475 (3.5) | 8 (0.6) | 471 (7.6) | 10.5 (0.05) |
| Lebanon | 36 (1.4) | 415 (5.6) | 46 (1.0) | 361 (5.7) | 18 (1.1) | 350 (7.2) | 10.3 (0.07) |
| Cyprus | 30 (1.1) | 511 (3.1) | 42 (0.9) | 479 (2.8) | 28 (1.1) | 467 (3.1) | 9.8 (0.06) |
| Romania | 29 (1.4) | 486 (5.0) | 49 (1.2) | 464 (4.8) | 21 (1.4) | 472 (6.3) | 10.0 (0.08) |
| Russian Federation | 26 (1.2) | 550 (4.8) | 52 (1.1) | 540 (4.5) | 21 (1.1) | 541 (5.3) | 9.9 (0.06) |
| Lithuania | 26 (1.3) | 548 (3.7) | 50 (1.1) | 531 (3.6) | 24 (1.3) | 527 (4.7) | 9.8 (0.06) |
| Hungary | 23 (1.3) | 544 (4.7) | 45 (0.9) | 526 (3.2) | 32 (1.5) | 526 (4.0) | 9.5 (0.08) |
| Sweden | 20 (1.1) | 549 (5.0) | 49 (1.2) | 529 (3.9) | 30 (1.3) | 510 (4.2) | 9.5 (0.05) |
| France | 19 (1.0) | 509 (4.5) | 53 (1.1) | 491 (3.0) | 28 (1.4) | 472 (3.7) | 9.5 (0.06) |
| Finland | 16 (0.9) | 574 (4.2) | 48 (0.9) | 549 (3.9) | 36 (1.2) | 531 (3.5) | 9.2 (0.05) |
| **International Average** | **30 (0.4)** | **506 (1.2)** | **48 (0.3)** | **483 (1.1)** | **22 (0.3)** | **476 (1.5)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 22 (1.2) | 571 (3.6) | 49 (1.0) | 566 (3.3) | 29 (1.4) | 566 (4.2) | 9.6 (0.07) |

This TIMSS context questionnaire scale for general/integrated science was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011 where science is taught as a single subject. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution. The separate scales for biology, chemistry, physics, and Earth science were each established in 2019 using a comparable approach.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 11.6: Students Like Learning Science

*Students' Reports*

### Separate Science Results (Continued)

*Students Like Learning Chemistry*

| Chemistry | Very Much Like Learning Chemistry | | Somewhat Like Learning Chemistry | | Do Not Like Learning Chemistry | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Morocco | 42 (1.1) | 419 (3.7) | 45 (0.8) | 379 (2.9) | 13 (0.8) | 376 (4.0) | 10.9 (0.06) |
| Cyprus | 42 (1.1) | 506 (2.8) | 40 (1.1) | 480 (2.5) | 18 (0.9) | 460 (3.7) | 10.7 (0.05) |
| Lebanon | 37 (1.7) | 415 (5.2) | 46 (1.3) | 357 (5.8) | 16 (1.1) | 362 (8.7) | 10.6 (0.08) |
| Georgia | 35 (1.5) | 472 (4.8) | 41 (1.2) | 441 (4.5) | 23 (1.4) | 431 (5.3) | 10.4 (0.07) |
| Kazakhstan | 31 (1.3) | 496 (4.1) | 53 (1.1) | 474 (3.5) | 16 (1.0) | 461 (6.1) | 10.4 (0.05) |
| Portugal | 29 (1.4) | 545 (3.8) | 45 (1.2) | 514 (3.4) | 26 (1.7) | 500 (4.2) | 10.1 (0.08) |
| Russian Federation | 27 (1.1) | 562 (4.8) | 47 (1.1) | 541 (4.2) | 26 (1.1) | 530 (5.7) | 10.1 (0.05) |
| Lithuania | 26 (1.3) | 559 (4.3) | 44 (0.9) | 533 (3.4) | 30 (1.6) | 516 (3.6) | 9.9 (0.07) |
| Romania | 24 (1.4) | 501 (5.7) | 46 (1.2) | 465 (4.6) | 30 (1.6) | 460 (5.9) | 9.7 (0.08) |
| Sweden | 18 (1.1) | 561 (5.1) | 45 (1.1) | 525 (4.3) | 37 (1.3) | 510 (3.7) | 9.5 (0.06) |
| Finland | 17 (0.9) | 600 (3.4) | 42 (0.9) | 550 (3.6) | 41 (1.3) | 521 (3.3) | 9.4 (0.06) |
| Hungary | 14 (0.9) | 557 (5.7) | 38 (1.1) | 526 (3.8) | 47 (1.5) | 525 (2.8) | 9.1 (0.06) |
| France | 14 (1.0) | 520 (5.5) | 47 (1.0) | 493 (3.3) | 39 (1.4) | 473 (3.0) | 9.3 (0.06) |
| **International Average** | **27 (0.3)** | **516 (1.3)** | **45 (0.3)** | **483 (1.1)** | **28 (0.4)** | **471 (1.4)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 24 (1.2) | 586 (3.0) | 43 (1.0) | 566 (3.4) | 33 (1.5) | 554 (3.7) | 9.8 (0.07) |

*Students Like Learning Physics*

| Physics | Very Much Like Learning Physics | | Somewhat Like Learning Physics | | Do Not Like Learning Physics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Morocco | 43 (1.1) | 420 (3.5) | 44 (0.9) | 380 (2.9) | 13 (0.7) | 374 (3.7) | 11.1 (0.05) |
| Lebanon | 32 (1.4) | 413 (5.4) | 48 (1.2) | 362 (5.5) | 20 (1.0) | 369 (8.1) | 10.5 (0.07) |
| Kazakhstan | 30 (1.1) | 496 (3.9) | 56 (1.1) | 475 (3.7) | 14 (0.8) | 460 (5.2) | 10.6 (0.04) |
| Georgia | 30 (1.6) | 474 (4.8) | 46 (1.3) | 439 (4.5) | 25 (1.6) | 438 (5.5) | 10.3 (0.08) |
| Portugal | 29 (1.4) | 545 (3.8) | 45 (1.2) | 514 (3.4) | 26 (1.7) | 500 (4.2) | 10.3 (0.08) |
| Cyprus | 29 (1.1) | 518 (3.0) | 40 (1.0) | 481 (2.7) | 31 (1.2) | 467 (3.5) | 10.1 (0.06) |
| Russian Federation | 29 (1.0) | 560 (4.3) | 50 (1.0) | 541 (4.3) | 22 (1.1) | 528 (6.0) | 10.3 (0.05) |
| Romania | 17 (1.1) | 509 (5.7) | 48 (1.1) | 465 (4.5) | 34 (1.4) | 465 (5.2) | 9.7 (0.07) |
| Lithuania | 16 (1.2) | 561 (5.2) | 42 (1.2) | 534 (3.4) | 42 (1.8) | 525 (3.8) | 9.4 (0.08) |
| Hungary | 16 (1.1) | 560 (5.3) | 38 (1.0) | 533 (3.2) | 46 (1.7) | 517 (3.1) | 9.4 (0.07) |
| Sweden | 16 (0.9) | 573 (5.4) | 43 (1.0) | 530 (4.1) | 42 (1.2) | 510 (3.9) | 9.5 (0.05) |
| France | 14 (1.0) | 520 (5.5) | 47 (1.0) | 493 (3.3) | 39 (1.4) | 473 (3.0) | 9.5 (0.06) |
| Finland | 13 (0.7) | 600 (4.5) | 38 (0.9) | 549 (3.8) | 49 (1.3) | 525 (3.6) | 9.2 (0.05) |
| **International Average** | **24 (0.3)** | **519 (1.3)** | **45 (0.3)** | **484 (1.1)** | **31 (0.4)** | **473 (1.3)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 24 (1.0) | 585 (3.9) | 47 (1.1) | 567 (3.3) | 29 (1.4) | 551 (3.1) | 10.1 (0.06) |

*Students Like Learning Earth Science*

| Earth Science | Very Much Like Learning Earth Science | | Somewhat Like Learning Earth Science | | Do Not Like Learning Earth Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Morocco | 40 (0.9) | 415 (3.3) | 46 (0.6) | 384 (2.9) | 14 (0.9) | 385 (4.7) | 10.9 (0.05) |
| Portugal | 38 (1.7) | 534 (3.2) | 47 (1.2) | 515 (3.3) | 15 (1.1) | 505 (4.2) | 10.7 (0.08) |
| Georgia | 33 (1.7) | 460 (5.3) | 49 (1.3) | 446 (3.9) | 18 (1.2) | 444 (8.1) | 10.4 (0.07) |
| Kazakhstan | 30 (1.3) | 485 (4.5) | 58 (1.2) | 475 (3.7) | 12 (0.8) | 477 (7.2) | 10.5 (0.05) |
| Romania r | 29 (1.8) | 492 (6.2) | 52 (1.5) | 462 (5.9) | 19 (1.4) | 473 (8.4) | 10.3 (0.08) |
| Lithuania | 23 (1.4) | 544 (3.8) | 48 (1.1) | 532 (3.4) | 29 (1.6) | 532 (4.0) | 9.8 (0.07) |
| Russian Federation | 22 (1.0) | 548 (5.2) | 52 (1.0) | 542 (4.1) | 26 (0.9) | 544 (5.8) | 9.9 (0.05) |
| France | 19 (1.0) | 509 (4.5) | 53 (1.1) | 491 (3.0) | 28 (1.4) | 472 (3.7) | 9.7 (0.06) |
| Cyprus | 19 (0.8) | 502 (4.0) | 37 (1.1) | 489 (3.4) | 45 (1.1) | 480 (2.8) | 9.2 (0.05) |
| Finland | 17 (0.8) | 573 (3.7) | 50 (0.9) | 547 (3.9) | 34 (1.1) | 529 (3.3) | 9.5 (0.05) |
| Hungary | 16 (1.1) | 544 (5.3) | 39 (1.1) | 525 (3.7) | 45 (1.8) | 529 (3.1) | 9.2 (0.08) |
| Lebanon | - - | - - | - - | - - | - - | - - | - - |
| Sweden | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **26 (0.4)** | **510 (1.4)** | **48 (0.3)** | **492 (1.2)** | **26 (0.4)** | **488 (1.6)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 17 (1.1) | 570 (4.7) | 47 (1.3) | 568 (3.5) | 36 (1.8) | 565 (3.4) | 9.5 (0.08) |

A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Students Confident in Mathematics and Science

Exhibit 11.7 presents the *Students Confident in Mathematics* scale, which contains nine statements about how well students think they can do mathematics (see Mathematics—About the Scale). Both fourth grade and eighth grade students responded to the scale and appear to have a good idea about their relative abilities. At both grades, students expressing confidence had substantially higher average achievement than those not expressing confidence.

Exhibit 11.8 presents the fourth grade results for the *Students Confident in Mathematics* scale. Thirty-two percent of the fourth grade students reported being "very confident," 44 percent "somewhat confident," and 23 percent "not confident." Exhibit 11.9 presents the eighth grade results. At the eighth grade, students' confidence had eroded, with only 15 percent reporting they are "very confident," 42 percent "somewhat confident," and 44 percent "not confident." The gap in average achievement between the "very confident" and "not confident" eighth grade students was more than 100 scale score points (562 vs. 456).

Exhibit 11.10 contains the corresponding confidence scale for science (see Science—About the Scale). Both fourth and eighth grade students responded, with the results at the fourth grade being similar to but slightly more positive than those in mathematics. As shown in Exhibit 11.11, 38 percent of the fourth grade students reported being "very confident," 43 percent "somewhat confident," and 19 percent "not confident."

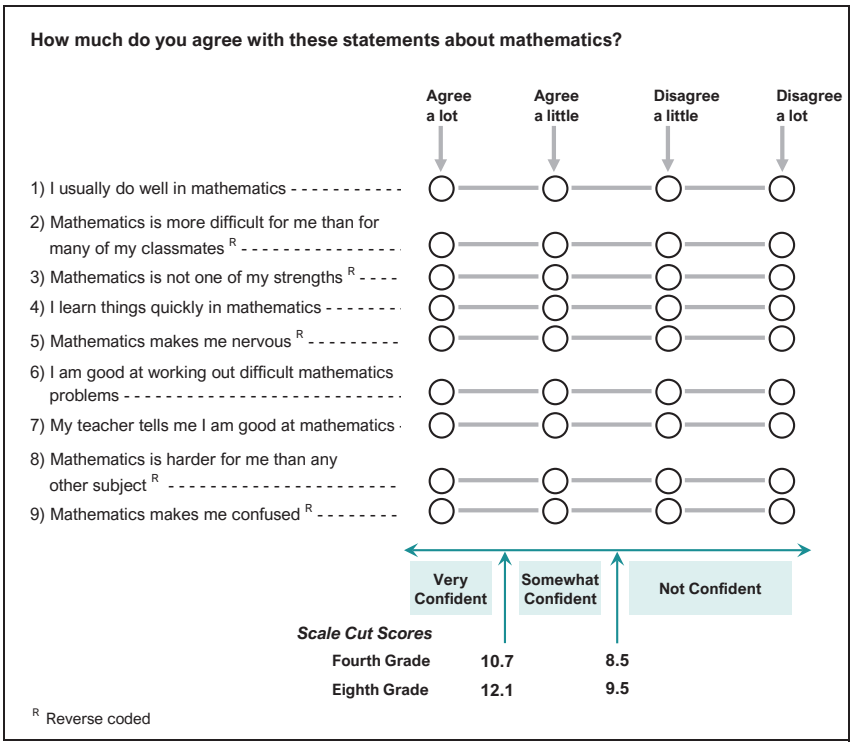
Exhibit 11.12 presents the eighth grade results for the *Students Confident in Science* scale. The first panel shows the results for countries that have science as an integrated subject, followed by the results for biology, chemistry, physics, and Earth science as separate courses. Eighth grade students did not report being as confident in doing science as did fourth grade students. However, relatively speaking, the eighth grade students expressed the most confidence in biology and Earth science, with 22–23 percent "very confident," 46 percent "somewhat confident," and 31–32 percent "not confident." Although less positive, the results also were similar for integrated science and chemistry—20–23 percent "very confident," 39 percent "somewhat confident," and 38–41 percent "not confident." Eighth grade students' confidence in physics was the lowest of the science results (and similar to mathematics). Only 17 percent reported "very confident," 38 percent "somewhat confident," and 44 percent "not confident."

## Exhibit 11.7: Students Confident in Mathematics

*Students' Reports*

### About the Scale

Students were scored according to their responses to nine statements on the *Students Confident in Mathematics* scale. Cut scores divide the scale into three categories. Students **Very Confident in Mathematics** had a score at or above the cut score corresponding to "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who were **Not Confident in Mathematics** had a score at or below the cut score corresponding to "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students were **Somewhat Confident in Mathematics**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 11.8: Students Confident in Mathematics

*Students' Reports*

| Country | Very Confident in Mathematics | | Somewhat Confident in Mathematics | | Not Confident in Mathematics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Montenegro | 52 (0.9) | 485 (2.2) | 35 (0.9) | 431 (2.6) | 14 (0.5) | 394 (4.7) | 11.1 (0.04) |
| Albania | 52 (1.4) | 524 (3.1) | 37 (1.1) | 476 (4.0) | 12 (0.8) | 426 (6.9) | 11.0 (0.07) |
| Kosovo | 51 (1.0) | 473 (3.1) | 38 (1.1) | 430 (3.4) | 11 (0.7) | 381 (7.1) | 11.0 (0.04) |
| North Macedonia | 49 (1.5) | 513 (5.1) | 36 (1.3) | 455 (6.0) | 15 (0.9) | 401 (7.7) | 10.9 (0.06) |
| Cyprus | 48 (1.2) | 568 (2.7) | 37 (0.9) | 512 (2.8) | 14 (0.8) | 468 (4.6) | 10.8 (0.06) |
| Azerbaijan | 44 (1.3) | 553 (2.8) | 41 (1.1) | 504 (3.2) | 15 (0.8) | 480 (3.9) | 10.7 (0.05) |
| Bulgaria | 44 (1.2) | 553 (3.7) | 37 (1.0) | 506 (4.0) | 19 (1.4) | 455 (8.1) | 10.5 (0.09) |
| Saudi Arabia | 44 (1.2) | 440 (3.6) | 39 (0.9) | 385 (3.7) | 17 (0.8) | 342 (6.1) | 10.6 (0.05) |
| Armenia | 43 (1.1) | 528 (2.9) | 40 (0.8) | 492 (3.0) | 17 (0.7) | 459 (4.3) | 10.6 (0.05) |
| Bosnia and Herzegovina | 42 (0.9) | 486 (2.6) | 37 (0.7) | 441 (3.0) | 21 (0.8) | 410 (3.0) | 10.5 (0.05) |
| Bahrain | 42 (1.4) | 504 (3.1) | 40 (1.0) | 471 (2.8) | 18 (1.0) | 446 (3.3) | 10.5 (0.07) |
| Kazakhstan | 41 (1.4) | 532 (2.8) | 47 (1.2) | 503 (2.9) | 12 (0.7) | 487 (4.8) | 10.6 (0.06) |
| Georgia | 40 (1.3) | 511 (4.0) | 44 (1.2) | 472 (4.1) | 16 (0.9) | 431 (6.3) | 10.4 (0.06) |
| Austria | 39 (0.9) | 573 (2.0) | 40 (0.9) | 531 (2.4) | 20 (0.8) | 493 (3.5) | 10.3 (0.04) |
| Netherlands | 38 (1.0) | 574 (2.7) | 41 (1.1) | 529 (2.3) | 21 (0.9) | 488 (2.8) | 10.3 (0.05) |
| Morocco | 37 (1.2) | 425 (4.3) | 48 (1.1) | 370 (5.7) | 16 (0.8) | 336 (6.7) | 10.4 (0.05) |
| Norway (5) | 37 (1.1) | 581 (3.1) | 46 (1.2) | 534 (2.6) | 18 (0.8) | 496 (4.3) | 10.3 (0.05) |
| Sweden | 37 (1.3) | 551 (3.6) | 48 (1.1) | 513 (3.2) | 15 (0.8) | 479 (4.1) | 10.2 (0.06) |
| Hungary | 36 (1.0) | 571 (2.6) | 42 (0.9) | 512 (2.9) | 22 (0.9) | 468 (3.8) | 10.2 (0.05) |
| Oman | 36 (1.2) | 479 (5.2) | 46 (0.9) | 418 (4.1) | 18 (0.9) | 378 (4.2) | 10.3 (0.05) |
| Turkey (5) | 34 (1.0) | 575 (4.2) | 42 (0.7) | 513 (4.7) | 23 (0.9) | 468 (5.9) | 10.1 (0.05) |
| Italy | 34 (1.1) | 537 (3.4) | 46 (1.1) | 513 (2.8) | 20 (1.0) | 483 (3.4) | 10.2 (0.05) |
| Serbia | 34 (1.2) | 555 (3.4) | 45 (1.2) | 500 (3.7) | 21 (1.2) | 450 (4.5) | 10.1 (0.07) |
| Iran, Islamic Rep. of | 34 (1.1) | 480 (4.7) | 46 (1.1) | 435 (4.1) | 20 (1.2) | 406 (6.1) | 10.2 (0.06) |
| Germany | 33 (0.9) | 565 (2.7) | 43 (1.0) | 518 (2.4) | 23 (1.1) | 477 (3.1) | 10.0 (0.04) |
| United Arab Emirates | 33 (0.6) | 514 (1.9) | 44 (0.5) | 478 (2.0) | 22 (0.5) | 448 (2.7) | 10.2 (0.03) |
| Malta | 33 (0.7) | 547 (2.0) | 41 (0.9) | 504 (2.1) | 26 (0.7) | 468 (2.5) | 10.0 (0.03) |
| France | 33 (0.9) | 524 (3.5) | 46 (1.0) | 483 (3.5) | 21 (0.8) | 428 (3.9) | 10.0 (0.04) |
| Ireland | 33 (0.7) | 585 (3.0) | 45 (1.0) | 545 (3.0) | 22 (0.9) | 503 (3.3) | 10.0 (0.03) |
| United States | 32 (0.8) | 587 (2.6) | 42 (0.6) | 533 (2.4) | 26 (0.7) | 482 (3.3) | 10.0 (0.04) |
| Finland | 32 (0.9) | 573 (2.5) | 50 (0.9) | 524 (2.7) | 17 (0.7) | 481 (3.4) | 10.1 (0.03) |
| Canada | 32 (0.5) | 555 (2.4) | 45 (0.6) | 506 (2.3) | 24 (0.6) | 464 (2.2) | 10.0 (0.03) |
| England | 31 (1.2) | 607 (4.5) | 45 (1.0) | 549 (3.7) | 24 (1.0) | 506 (4.2) | 9.9 (0.05) |
| Kuwait | 31 (1.5) | 432 (5.4) | 44 (1.2) | 383 (5.4) | 25 (1.1) | 347 (5.6) | 10.0 (0.06) |
| Slovak Republic | 31 (1.1) | 550 (3.4) | 47 (1.1) | 506 (3.7) | 22 (0.9) | 463 (4.5) | 9.9 (0.05) |
| Belgium (Flemish) | 30 (0.7) | 573 (2.3) | 45 (0.9) | 529 (2.3) | 25 (0.8) | 489 (2.7) | 9.9 (0.03) |
| Croatia | 30 (1.4) | 550 (2.7) | 50 (1.1) | 503 (2.6) | 20 (1.0) | 467 (3.7) | 10.0 (0.06) |
| Lithuania | 29 (1.0) | 590 (3.6) | 51 (1.0) | 535 (3.0) | 20 (0.9) | 492 (4.0) | 9.9 (0.04) |
| Northern Ireland | 29 (1.0) | 613 (3.8) | 45 (1.0) | 569 (3.2) | 26 (0.8) | 510 (3.8) | 9.8 (0.04) |
| Denmark | 29 (0.9) | 569 (2.8) | 49 (1.1) | 521 (2.6) | 23 (0.8) | 478 (2.8) | 9.8 (0.03) |
| Australia | 29 (0.8) | 568 (3.4) | 46 (0.8) | 513 (3.2) | 25 (0.9) | 465 (3.2) | 9.9 (0.04) |
| Qatar | 28 (1.2) | 491 (4.3) | 43 (0.9) | 447 (4.4) | 28 (0.9) | 418 (4.2) | 9.9 (0.05) |
| Spain | 27 (0.7) | 550 (2.5) | 43 (0.7) | 502 (2.5) | 30 (0.7) | 463 (2.8) | 9.7 (0.03) |
| Russian Federation | 24 (0.9) | 603 (3.4) | 46 (1.1) | 571 (3.1) | 30 (1.1) | 533 (4.4) | 9.6 (0.04) |
| Latvia | 23 (0.9) | 595 (3.0) | 45 (0.9) | 551 (2.6) | 31 (0.9) | 503 (3.5) | 9.5 (0.04) |
| Poland | 23 (0.8) | 571 (3.5) | 47 (0.9) | 526 (2.7) | 30 (1.0) | 476 (2.8) | 9.5 (0.04) |
| Czech Republic | 23 (1.0) | 577 (3.5) | 49 (0.8) | 539 (2.6) | 29 (1.0) | 492 (3.2) | 9.5 (0.04) |
| Portugal | 22 (0.9) | 580 (2.8) | 43 (1.0) | 532 (3.1) | 36 (1.2) | 485 (2.7) | 9.5 (0.05) |
| Chile | 22 (0.8) | 495 (3.3) | 46 (0.9) | 441 (2.9) | 33 (0.9) | 411 (3.4) | 9.5 (0.04) |
| Singapore | 21 (0.9) | 683 (2.9) | 42 (0.8) | 637 (3.9) | 37 (1.2) | 579 (3.4) | 9.3 (0.05) |
| New Zealand | 20 (0.6) | 546 (3.6) | 49 (0.9) | 492 (2.6) | 31 (0.9) | 446 (3.2) | 9.4 (0.03) |
| Hong Kong SAR | 18 (0.8) | 652 (4.2) | 43 (1.1) | 606 (3.6) | 39 (1.2) | 573 (3.7) | 9.2 (0.05) |
| Pakistan | 18 (3.1) | 374 (19.2) | 56 (2.2) | 328 (10.5) | 26 (2.3) | 302 (12.6) | 9.7 (0.17) |
| South Africa (5) | 17 (0.7) | 456 (4.9) | 53 (0.5) | 371 (3.6) | 31 (0.9) | 340 (3.7) | 9.4 (0.03) |
| Japan | 16 (0.6) | 646 (3.3) | 53 (0.9) | 601 (2.0) | 32 (0.9) | 554 (2.3) | 9.2 (0.03) |
| Chinese Taipei | 15 (0.7) | 650 (3.5) | 41 (1.0) | 610 (2.6) | 44 (1.0) | 572 (2.4) | 9.0 (0.03) |
| Korea, Rep. of | 15 (0.7) | 651 (2.6) | 49 (1.1) | 614 (2.5) | 36 (0.9) | 559 (2.7) | 9.2 (0.03) |
| Philippines | 8 (0.7) | 403 (9.9) | 56 (1.0) | 306 (6.0) | 36 (1.2) | 269 (6.7) | 9.0 (0.04) |
| **International Average** | **32 (0.1)** | **545 (0.6)** | **44 (0.1)** | **497 (0.5)** | **23 (0.1)** | **456 (0.6)** | |
| **Benchmarking Participants** | | | | | | | |
| Quebec, Canada | 39 (1.1) | 568 (2.8) | 44 (1.2) | 521 (2.7) | 17 (0.9) | 476 (3.4) | 10.3 (0.05) |
| Dubai, UAE | 32 (0.9) | 565 (2.5) | 46 (0.9) | 541 (2.3) | 21 (0.8) | 519 (3.0) | 10.1 (0.04) |
| Ontario, Canada | 29 (0.8) | 558 (4.4) | 45 (1.0) | 509 (4.0) | 26 (0.9) | 470 (3.6) | 9.8 (0.04) |
| Abu Dhabi, UAE | 29 (0.9) | 481 (2.7) | 45 (0.7) | 437 (2.6) | 26 (0.6) | 408 (3.5) | 9.9 (0.04) |
| Madrid, Spain | 28 (0.8) | 562 (2.7) | 45 (0.9) | 516 (2.4) | 27 (0.9) | 477 (2.9) | 9.8 (0.04) |
| Moscow City, Russian Fed. | 27 (0.8) | 630 (2.5) | 46 (0.8) | 596 (2.5) | 27 (0.8) | 550 (2.9) | 9.7 (0.03) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 11.9: Students Confident in Mathematics

*Students' Reports*

| Country | Very Confident in Mathematics | | Somewhat Confident in Mathematics | | Not Confident in Mathematics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Israel | 25 (1.1) | 582 (5.4) | 43 (0.9) | 515 (4.4) | 32 (1.2) | 482 (4.1) | 10.7 (0.07) |
| Egypt | 23 (1.0) | 459 (4.8) | 49 (0.8) | 413 (5.6) | 28 (1.0) | 385 (5.8) | 10.8 (0.05) |
| Norway (9) | 21 (0.8) | 580 (2.9) | 39 (1.1) | 513 (2.8) | 40 (1.0) | 456 (2.7) | 10.3 (0.05) |
| Lebanon | 21 (1.0) | 479 (4.2) | 45 (1.1) | 429 (3.0) | 34 (1.3) | 405 (4.0) | 10.5 (0.06) |
| Cyprus | 20 (0.7) | 569 (3.1) | 37 (0.9) | 513 (2.8) | 43 (0.9) | 460 (3.0) | 10.1 (0.04) |
| Jordan | 20 (1.0) | 478 (4.1) | 47 (0.7) | 420 (4.2) | 32 (1.1) | 392 (5.0) | 10.6 (0.05) |
| United States | 20 (0.8) | 578 (5.0) | 40 (0.7) | 537 (4.5) | 40 (1.0) | 471 (4.2) | 10.3 (0.05) |
| Iran, Islamic Rep. of | 20 (0.7) | 517 (5.9) | 43 (1.0) | 447 (4.6) | 37 (1.0) | 408 (3.8) | 10.4 (0.04) |
| Bahrain | 20 (0.7) | 533 (3.6) | 44 (0.8) | 482 (2.5) | 36 (0.9) | 452 (2.8) | 10.4 (0.04) |
| Saudi Arabia | 19 (0.8) | 444 (4.0) | 49 (0.7) | 395 (3.1) | 32 (0.9) | 366 (2.6) | 10.5 (0.05) |
| United Arab Emirates | 18 (0.5) | 536 (2.9) | 45 (0.4) | 478 (2.2) | 37 (0.4) | 442 (2.3) | 10.4 (0.02) |
| Italy | 18 (0.7) | 554 (3.9) | 37 (1.0) | 514 (2.9) | 45 (1.2) | 462 (2.9) | 9.9 (0.06) |
| Oman | 17 (0.7) | 486 (4.5) | 50 (0.8) | 411 (3.2) | 33 (0.8) | 380 (2.9) | 10.5 (0.04) |
| Hungary | 16 (0.6) | 609 (4.1) | 39 (0.8) | 530 (3.5) | 45 (1.0) | 471 (3.1) | 10.0 (0.05) |
| Sweden | 16 (0.8) | 578 (3.1) | 43 (0.9) | 516 (2.8) | 41 (1.1) | 461 (2.9) | 10.1 (0.05) |
| Turkey | 15 (0.7) | 600 (5.6) | 35 (0.9) | 513 (5.2) | 50 (1.0) | 453 (4.0) | 9.8 (0.05) |
| Georgia | 15 (0.9) | 537 (6.1) | 44 (1.2) | 473 (4.3) | 41 (1.4) | 422 (4.8) | 10.2 (0.06) |
| Ireland | 15 (0.7) | 584 (3.6) | 44 (1.1) | 533 (3.1) | 41 (1.3) | 495 (2.2) | 10.0 (0.05) |
| Finland | 15 (0.7) | 586 (3.3) | 40 (0.7) | 523 (2.9) | 45 (1.0) | 473 (2.4) | 10.0 (0.04) |
| Morocco | 15 (0.6) | 440 (3.6) | 47 (0.6) | 390 (2.6) | 39 (0.9) | 368 (2.1) | 10.2 (0.04) |
| England | 14 (0.9) | 588 (6.6) | 49 (1.0) | 528 (5.7) | 38 (1.3) | 480 (5.2) | 10.1 (0.05) |
| Australia | 14 (0.6) | 594 (5.1) | 42 (0.8) | 540 (4.3) | 44 (1.0) | 474 (3.3) | 9.9 (0.05) |
| France | 13 (0.7) | 556 (3.8) | 42 (0.9) | 498 (3.0) | 45 (1.1) | 446 (2.4) | 9.8 (0.05) |
| Lithuania | 13 (0.7) | 604 (4.1) | 42 (0.9) | 535 (4.1) | 45 (1.2) | 484 (2.9) | 9.9 (0.05) |
| Qatar | 13 (0.9) | 516 (7.5) | 44 (1.1) | 455 (4.5) | 43 (1.2) | 413 (3.9) | 10.0 (0.06) |
| Kazakhstan | 13 (0.7) | 539 (4.5) | 54 (1.2) | 494 (3.7) | 34 (1.3) | 459 (3.6) | 10.3 (0.05) |
| Singapore | 12 (0.5) | 679 (3.5) | 40 (0.8) | 637 (3.6) | 48 (0.9) | 582 (5.0) | 9.7 (0.04) |
| Kuwait | 12 (0.6) | 466 (7.6) | 43 (0.8) | 408 (5.5) | 45 (0.9) | 385 (4.5) | 9.9 (0.04) |
| Russian Federation | 12 (0.7) | 609 (5.3) | 44 (0.9) | 563 (4.3) | 45 (0.9) | 508 (5.1) | 9.9 (0.04) |
| Portugal | 11 (0.7) | 580 (5.6) | 34 (1.1) | 525 (3.3) | 55 (1.2) | 469 (3.4) | 9.5 (0.05) |
| Romania | 10 (0.7) | 579 (5.9) | 31 (1.0) | 510 (5.6) | 58 (1.2) | 446 (4.2) | 9.4 (0.05) |
| New Zealand | 10 (0.6) | 569 (4.6) | 44 (0.9) | 502 (3.8) | 45 (0.7) | 445 (3.6) | 9.8 (0.04) |
| Chile | 10 (0.6) | 509 (5.1) | 41 (1.1) | 452 (3.2) | 49 (1.3) | 418 (2.9) | 9.7 (0.04) |
| Chinese Taipei | 9 (0.4) | 706 (5.4) | 31 (0.7) | 656 (3.2) | 59 (0.8) | 575 (2.6) | 9.2 (0.04) |
| Hong Kong SAR | 9 (0.7) | 646 (7.3) | 37 (1.0) | 600 (4.5) | 54 (1.1) | 554 (4.3) | 9.4 (0.05) |
| Korea, Rep. of | 8 (0.5) | 695 (4.8) | 38 (0.8) | 644 (3.8) | 54 (0.9) | 567 (2.7) | 9.5 (0.03) |
| South Africa (9) | 7 (0.3) | 468 (4.2) | 40 (0.5) | 396 (2.6) | 53 (0.6) | 376 (2.1) | 9.6 (0.02) |
| Japan | 6 (0.4) | 688 (5.8) | 33 (0.8) | 629 (3.1) | 61 (0.9) | 567 (2.9) | 9.1 (0.04) |
| Malaysia | 3 (0.3) | 584 (10.5) | 33 (0.8) | 478 (4.6) | 64 (0.9) | 448 (2.7) | 9.2 (0.03) |
| **International Average** | **15 (0.1)** | **562 (0.8)** | **42 (0.1)** | **502 (0.6)** | **44 (0.2)** | **456 (0.6)** | |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 27 (1.0) | 587 (3.8) | 43 (1.1) | 536 (5.8) | 30 (1.1) | 472 (4.0) | 10.8 (0.06) |
| Quebec, Canada | 25 (1.4) | 592 (3.4) | 41 (1.3) | 548 (4.2) | 34 (1.5) | 503 (4.2) | 10.6 (0.08) |
| Dubai, UAE | 21 (0.9) | 591 (4.2) | 46 (0.8) | 539 (2.5) | 33 (0.7) | 500 (2.6) | 10.5 (0.04) |
| Moscow City, Russian Fed. | 14 (0.6) | 640 (4.7) | 45 (1.1) | 599 (4.4) | 40 (1.2) | 526 (3.7) | 10.0 (0.05) |
| Abu Dhabi, UAE | 14 (0.6) | 516 (4.0) | 45 (0.7) | 441 (3.6) | 41 (0.8) | 407 (3.3) | 10.2 (0.04) |
| Western Cape, RSA (9) | 9 (0.7) | 536 (7.6) | 36 (1.0) | 459 (5.3) | 55 (1.4) | 416 (3.8) | 9.5 (0.06) |
| Gauteng, RSA (9) | 8 (0.7) | 501 (7.3) | 38 (0.9) | 430 (3.0) | 54 (1.1) | 403 (3.0) | 9.5 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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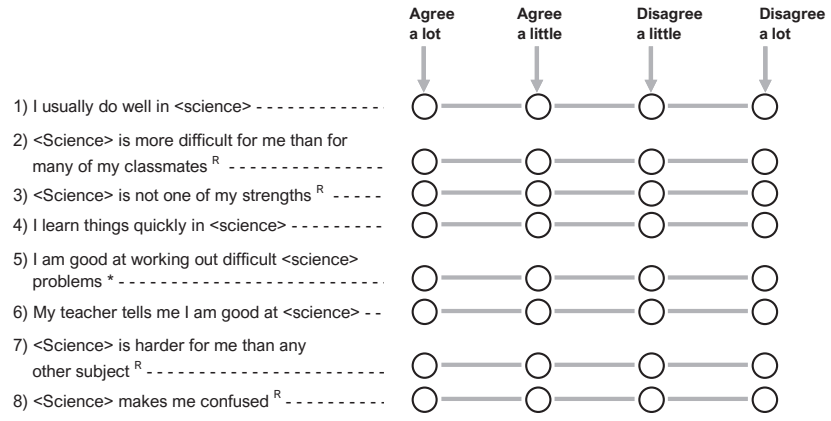
## Exhibit 11.10: Students Confident in Science

*Students' Reports*

### About the Scale

Students were scored according to their responses to eight statements on the *Students Confident in Science* scale. Cut scores divide the scale into three categories. Students **Very Confident in Science** had a score at or above the cut score corresponding to "agreeing a lot" with four of the eight statements and "agreeing a little" with the other four, on average. Students who were **Not Confident in Science** had a score at or below the cut score corresponding to "disagreeing a little" with four of the eight statements and "agreeing a little" with the other four, on average. All other students were **Somewhat Confident in Science**. At the eighth grade, a comparable approach was used for biology, chemistry, physics, and Earth science in countries where these were taught as separate subjects.

**How much do you agree with these statements about <science / biology / chemistry / physics / earth science>?**




| *Scale Cut Scores* | | |
|---|---|---|
| **Fourth Grade** | **10.2** | **8.2** |
| **Eighth Grade** | | |
| General/Integrated Science | **11.3** | **9.2** |
| Biology | **11.3** | **8.8** |
| Chemistry | **11.5** | **9.3** |
| Physics | **11.7** | **9.5** |
| Earth Science | **11.4** | **8.9** |

R Reverse coded

* Item not included in scale at the fourth grade

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## Exhibit 11.11: Students Confident in Science

*Students' Reports*

| Country | Very Confident in Science | | Somewhat Confident in Science | | Not Confident in Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 60 (1.6) | 509 (3.7) | 30 (1.4) | 474 (5.0) | 9 (0.7) | 428 (9.0) | 10.9 (0.07) |
| Bulgaria | 58 (1.8) | 555 (3.9) | 30 (1.1) | 499 (6.5) | 12 (1.1) | 443 (8.3) | 10.7 (0.08) |
| Iran, Islamic Rep. of | 57 (1.4) | 472 (4.2) | 30 (1.0) | 416 (5.5) | 13 (1.0) | 374 (7.5) | 10.7 (0.06) |
| Bahrain | 57 (1.3) | 521 (3.2) | 30 (0.9) | 473 (4.0) | 13 (0.7) | 430 (6.3) | 10.8 (0.06) |
| Montenegro | 53 (1.1) | 482 (2.8) | 30 (0.8) | 443 (3.2) | 17 (0.7) | 403 (4.5) | 10.5 (0.04) |
| Saudi Arabia | 51 (1.2) | 444 (3.7) | 32 (1.0) | 386 (5.6) | 16 (0.9) | 341 (7.7) | 10.5 (0.06) |
| Turkey (5) | 50 (1.4) | 556 (3.8) | 36 (1.0) | 510 (4.6) | 14 (0.9) | 470 (7.0) | 10.4 (0.06) |
| Oman | 50 (1.4) | 480 (5.2) | 35 (1.1) | 412 (4.4) | 15 (0.8) | 363 (6.3) | 10.5 (0.06) |
| Austria | 49 (1.1) | 544 (2.7) | 37 (1.0) | 511 (3.0) | 13 (0.7) | 474 (4.8) | 10.4 (0.04) |
| North Macedonia | 49 (2.0) | 471 (5.1) | 35 (1.7) | 403 (7.1) | 16 (0.9) | 365 (8.2) | 10.4 (0.08) |
| Azerbaijan | 48 (1.4) | 457 (3.2) | 36 (1.2) | 422 (3.8) | 16 (0.8) | 395 (6.0) | 10.3 (0.06) |
| Armenia | 47 (1.3) | 490 (3.3) | 36 (1.1) | 462 (4.2) | 17 (0.8) | 436 (5.8) | 10.3 (0.06) |
| Kosovo | 47 (1.2) | 444 (3.9) | 37 (1.0) | 404 (4.2) | 16 (0.9) | 361 (7.0) | 10.3 (0.05) |
| United Arab Emirates | 46 (0.6) | 505 (2.5) | 36 (0.5) | 465 (2.5) | 17 (0.4) | 417 (3.2) | 10.3 (0.03) |
| Kuwait | 46 (1.4) | 435 (6.7) | 36 (0.9) | 384 (6.7) | 18 (0.9) | 338 (9.0) | 10.3 (0.06) |
| Bosnia and Herzegovina | 46 (0.9) | 482 (3.3) | 36 (0.7) | 451 (3.5) | 19 (0.7) | 425 (4.3) | 10.2 (0.04) |
| Morocco | 46 (1.2) | 416 (4.9) | 39 (0.8) | 355 (7.9) | 15 (0.8) | 305 (9.0) | 10.3 (0.05) |
| Hungary | 45 (1.2) | 553 (2.6) | 39 (0.8) | 520 (3.2) | 16 (0.8) | 484 (5.1) | 10.2 (0.05) |
| Georgia | 44 (1.4) | 472 (4.3) | 38 (1.1) | 448 (5.3) | 19 (1.1) | 423 (6.1) | 10.1 (0.06) |
| Kazakhstan | 43 (1.4) | 511 (3.9) | 46 (1.1) | 485 (3.4) | 11 (0.7) | 479 (5.4) | 10.2 (0.06) |
| Portugal | 43 (1.2) | 522 (2.8) | 44 (1.0) | 499 (2.8) | 13 (0.6) | 463 (4.0) | 10.1 (0.04) |
| Qatar | 42 (1.4) | 488 (3.9) | 38 (1.0) | 441 (6.2) | 20 (1.0) | 395 (5.6) | 10.1 (0.06) |
| Malta | 42 (0.9) | 521 (2.1) | 38 (0.8) | 488 (2.4) | 20 (0.7) | 457 (3.0) | 9.9 (0.03) |
| Norway (5) | 41 (1.1) | 557 (2.4) | 46 (1.1) | 535 (3.0) | 12 (0.8) | 511 (5.0) | 10.0 (0.04) |
| Germany r | 40 (1.1) | 551 (2.8) | 44 (0.8) | 517 (3.1) | 17 (0.9) | 471 (4.6) | 9.9 (0.04) |
| Cyprus | 39 (1.5) | 535 (3.1) | 37 (1.1) | 504 (2.9) | 23 (1.1) | 485 (4.6) | 9.9 (0.07) |
| Italy | 39 (1.0) | 522 (3.8) | 46 (0.9) | 509 (3.1) | 15 (0.9) | 483 (4.5) | 10.0 (0.04) |
| Croatia | 39 (1.2) | 541 (2.5) | 49 (1.2) | 518 (2.4) | 12 (0.9) | 496 (4.9) | 10.0 (0.05) |
| United States | 38 (0.9) | 565 (2.7) | 42 (0.7) | 540 (2.9) | 20 (0.7) | 500 (4.4) | 9.8 (0.04) |
| Belgium (Flemish) | 37 (1.1) | 521 (2.5) | 45 (0.9) | 498 (2.5) | 18 (0.8) | 467 (3.5) | 9.8 (0.05) |
| Serbia | 37 (1.4) | 540 (4.0) | 47 (1.2) | 515 (4.1) | 17 (1.0) | 476 (6.7) | 9.9 (0.06) |
| Sweden | 36 (1.5) | 552 (4.0) | 49 (1.1) | 538 (3.2) | 14 (0.9) | 504 (6.5) | 9.8 (0.06) |
| Spain | 35 (1.1) | 535 (2.7) | 41 (1.0) | 508 (2.2) | 23 (1.0) | 486 (3.4) | 9.8 (0.05) |
| Canada | 35 (0.7) | 540 (2.4) | 46 (0.7) | 523 (2.1) | 19 (0.7) | 498 (2.5) | 9.7 (0.03) |
| Ireland | 35 (0.9) | 542 (4.0) | 48 (0.9) | 529 (3.9) | 18 (0.9) | 502 (4.4) | 9.7 (0.04) |
| Slovak Republic | 33 (1.2) | 546 (3.4) | 46 (1.0) | 519 (4.1) | 21 (0.9) | 487 (6.9) | 9.6 (0.05) |
| Netherlands | 32 (1.1) | 541 (3.7) | 48 (1.0) | 519 (3.1) | 19 (1.0) | 486 (3.8) | 9.6 (0.05) |
| Australia | 32 (1.1) | 553 (3.0) | 47 (0.9) | 532 (2.8) | 21 (0.9) | 508 (4.1) | 9.6 (0.04) |
| Poland | 32 (1.2) | 553 (3.3) | 49 (0.9) | 531 (2.8) | 19 (0.8) | 503 (3.6) | 9.6 (0.05) |
| Chinese Taipei | 31 (1.0) | 583 (2.2) | 51 (0.9) | 556 (2.1) | 18 (1.0) | 522 (3.4) | 9.6 (0.04) |
| Latvia | 31 (1.1) | 559 (2.8) | 51 (1.1) | 540 (2.8) | 18 (1.0) | 520 (3.7) | 9.6 (0.04) |
| Russian Federation | 29 (1.0) | 583 (3.1) | 46 (1.1) | 567 (3.5) | 24 (0.9) | 550 (3.5) | 9.5 (0.05) |
| Lithuania | 29 (1.2) | 564 (3.0) | 52 (1.0) | 533 (3.1) | 19 (1.0) | 516 (4.3) | 9.6 (0.05) |
| Northern Ireland | 29 (1.0) | 536 (3.1) | 49 (0.9) | 523 (2.9) | 22 (0.8) | 487 (4.1) | 9.4 (0.04) |
| Denmark | 29 (1.2) | 545 (3.3) | 50 (1.1) | 522 (2.6) | 21 (1.0) | 493 (3.2) | 9.5 (0.05) |
| England | 28 (1.0) | 559 (4.2) | 47 (1.0) | 538 (3.2) | 25 (1.2) | 516 (3.9) | 9.4 (0.05) |
| Finland | 27 (0.8) | 573 (3.4) | 57 (0.9) | 555 (2.6) | 16 (0.7) | 525 (4.0) | 9.5 (0.03) |
| France | 27 (0.9) | 517 (3.8) | 48 (1.0) | 492 (3.3) | 25 (1.0) | 451 (4.1) | 9.4 (0.04) |
| Japan | 27 (0.9) | 582 (2.7) | 59 (0.8) | 558 (1.9) | 14 (0.7) | 540 (3.7) | 9.5 (0.03) |
| Czech Republic | 25 (1.0) | 560 (3.9) | 50 (1.0) | 535 (3.3) | 25 (1.2) | 507 (2.9) | 9.3 (0.05) |
| South Africa (5) | 23 (0.8) | 421 (6.3) | 47 (0.7) | 317 (5.4) | 30 (0.7) | 274 (5.2) | 9.3 (0.03) |
| Singapore | 23 (0.6) | 626 (3.6) | 44 (0.7) | 599 (3.6) | 33 (0.7) | 567 (3.9) | 9.1 (0.03) |
| Pakistan | 23 (3.2) | 333 (19.9) | 49 (2.3) | 289 (14.4) | 28 (3.5) | 262 (14.1) | 9.4 (0.16) |
| Chile | 23 (1.0) | 508 (3.8) | 48 (0.8) | 473 (2.8) | 30 (0.9) | 439 (3.6) | 9.2 (0.04) |
| Hong Kong SAR | 23 (0.9) | 562 (3.9) | 49 (1.1) | 532 (3.5) | 29 (1.2) | 506 (4.9) | 9.2 (0.05) |
| New Zealand | 21 (0.7) | 529 (3.3) | 53 (0.9) | 508 (2.7) | 26 (0.8) | 476 (3.3) | 9.2 (0.03) |
| Korea, Rep. of | 17 (0.8) | 620 (3.1) | 59 (1.1) | 587 (2.6) | 23 (1.0) | 564 (3.2) | 9.1 (0.03) |
| Philippines | 10 (0.9) | 372 (10.6) | 52 (0.9) | 258 (7.2) | 38 (1.2) | 212 (7.4) | 8.8 (0.04) |
| **International Average** | **38 (0.2)** | **520 (0.6)** | **43 (0.1)** | **486 (0.6)** | **19 (0.1)** | **453 (0.7)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 48 (0.9) | 559 (2.0) | 38 (0.9) | 537 (2.9) | 13 (0.5) | 516 (4.3) | 10.3 (0.03) |
| Abu Dhabi, UAE | 37 (1.0) | 462 (4.1) | 39 (0.7) | 412 (3.4) | 24 (0.8) | 369 (4.3) | 9.9 (0.04) |
| Quebec, Canada r | 36 (1.1) | 537 (3.4) | 47 (1.2) | 519 (3.0) | 17 (1.0) | 496 (3.5) | 9.8 (0.05) |
| Madrid, Spain | 34 (1.1) | 546 (2.5) | 41 (1.0) | 521 (2.7) | 25 (0.9) | 496 (3.1) | 9.6 (0.05) |
| Moscow City, Russian Fed. | 33 (1.2) | 606 (3.2) | 45 (0.9) | 599 (2.6) | 22 (1.0) | 571 (3.7) | 9.6 (0.04) |
| Ontario, Canada | 32 (1.1) | 541 (4.6) | 46 (1.1) | 527 (3.2) | 22 (1.1) | 501 (4.0) | 9.6 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 11.12: Students Confident in Science

*Students' Reports*

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and Earth science summarize responses for countries where students are taught science as separate subjects.

*Students Confident in General/Integrated Science*

| General/Integrated Science | Very Confident in Science | | Somewhat Confident in Science | | Not Confident in Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Iran, Islamic Rep. of | 38 (1.1) | 490 (3.9) | 40 (0.9) | 434 (4.3) | 22 (0.9) | 407 (4.0) | 11.0 (0.06) |
| Turkey | 38 (1.2) | 569 (3.5) | 37 (0.8) | 502 (4.2) | 25 (1.0) | 455 (4.5) | 10.9 (0.06) |
| Jordan | 37 (1.4) | 502 (3.6) | 38 (0.6) | 448 (4.5) | 25 (1.3) | 400 (5.8) | 11.0 (0.07) |
| Bahrain | 36 (1.3) | 531 (2.4) | 38 (0.7) | 487 (3.8) | 26 (1.0) | 432 (4.1) | 10.8 (0.06) |
| Egypt | 35 (1.1) | 445 (5.1) | 38 (0.7) | 384 (5.7) | 27 (1.1) | 343 (6.8) | 10.8 (0.06) |
| Saudi Arabia | 33 (1.0) | 474 (3.4) | 42 (0.8) | 425 (3.1) | 25 (1.0) | 399 (3.7) | 10.7 (0.05) |
| Israel | 31 (1.2) | 568 (4.4) | 37 (0.9) | 513 (4.3) | 32 (1.2) | 471 (5.0) | 10.5 (0.06) |
| Kuwait | 31 (1.3) | 490 (5.1) | 42 (0.7) | 440 (5.6) | 27 (1.2) | 410 (7.6) | 10.6 (0.06) |
| Oman | 29 (1.0) | 516 (4.1) | 46 (0.8) | 457 (3.5) | 26 (0.7) | 408 (4.3) | 10.6 (0.04) |
| United Arab Emirates | 29 (0.6) | 541 (2.6) | 41 (0.6) | 476 (2.7) | 30 (0.5) | 413 (2.9) | 10.5 (0.03) |
| Qatar | 28 (1.3) | 527 (4.7) | 39 (1.1) | 480 (4.6) | 33 (1.2) | 427 (5.2) | 10.4 (0.06) |
| United States | 26 (0.9) | 570 (5.4) | 41 (0.7) | 528 (4.9) | 33 (0.9) | 487 (4.5) | 10.2 (0.04) |
| Norway (9) | 24 (0.9) | 548 (4.1) | 43 (0.8) | 503 (3.0) | 34 (1.1) | 454 (4.2) | 10.1 (0.04) |
| Italy | 23 (1.0) | 536 (3.6) | 50 (1.1) | 501 (2.5) | 27 (1.1) | 471 (3.6) | 10.2 (0.04) |
| Ireland | 19 (0.9) | 581 (3.7) | 36 (1.1) | 543 (3.1) | 45 (1.3) | 492 (3.3) | 9.6 (0.06) |
| South Africa (9) | 18 (0.6) | 425 (4.0) | 45 (0.5) | 370 (3.5) | 37 (0.8) | 349 (3.1) | 9.9 (0.03) |
| Singapore | 17 (0.6) | 652 (3.9) | 37 (0.8) | 621 (4.2) | 46 (1.0) | 581 (4.1) | 9.6 (0.04) |
| Australia | 16 (0.7) | 586 (4.2) | 39 (0.8) | 543 (3.3) | 45 (1.1) | 499 (3.6) | 9.6 (0.05) |
| England | 15 (1.0) | 581 (6.9) | 38 (1.2) | 539 (4.6) | 48 (1.7) | 488 (5.5) | 9.4 (0.07) |
| New Zealand | 12 (0.7) | 567 (5.5) | 40 (1.0) | 517 (4.5) | 47 (1.2) | 470 (4.0) | 9.5 (0.04) |
| Chile | 12 (0.8) | 511 (5.4) | 45 (1.1) | 469 (3.2) | 43 (1.4) | 445 (3.2) | 9.6 (0.04) |
| Hong Kong SAR | 11 (0.6) | 566 (6.2) | 38 (1.1) | 527 (5.8) | 50 (1.2) | 472 (6.3) | 9.4 (0.05) |
| Chinese Taipei | 10 (0.5) | 645 (3.5) | 27 (0.7) | 609 (2.7) | 63 (0.9) | 548 (2.1) | 8.9 (0.04) |
| Korea, Rep. of | 9 (0.5) | 639 (4.9) | 25 (0.9) | 602 (2.9) | 65 (1.1) | 533 (2.2) | 8.9 (0.04) |
| Malaysia | 8 (0.4) | 523 (5.0) | 47 (0.9) | 469 (3.7) | 45 (1.1) | 441 (4.0) | 9.5 (0.03) |
| Japan | 6 (0.4) | 636 (3.9) | 28 (0.8) | 601 (2.8) | 66 (0.9) | 550 (2.3) | 8.7 (0.04) |
| **International Average** | **23 (0.2)** | **547 (0.9)** | **39 (0.2)** | **500 (0.8)** | **38 (0.2)** | **456 (0.9)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 32 (1.5) | 588 (3.8) | 44 (1.4) | 546 (2.9) | 25 (0.7) | 500 (3.5) | 10.7 (0.06) |
| Quebec, Canada | 25 (1.1) | 570 (4.2) | 46 (1.1) | 542 (3.7) | 29 (1.5) | 503 (4.9) | 10.2 (0.07) |
| Abu Dhabi, UAE | 22 (0.8) | 524 (4.2) | 39 (0.6) | 423 (4.5) | 38 (0.9) | 363 (4.7) | 10.2 (0.04) |
| Gauteng, RSA (9) | 22 (1.0) | 463 (5.3) | 44 (0.7) | 421 (4.0) | 34 (1.2) | 401 (5.2) | 10.1 (0.05) |
| Ontario, Canada | 21 (1.2) | 561 (4.6) | 43 (1.3) | 527 (3.3) | 36 (1.3) | 493 (3.5) | 10.0 (0.06) |
| Western Cape, RSA (9) | 16 (0.8) | 494 (7.3) | 42 (0.9) | 443 (5.5) | 42 (1.2) | 421 (5.1) | 9.7 (0.05) |

## Separate Science Results

*Students Confident in Biology*

| Biology | Very Confident in Biology | | Somewhat Confident in Biology | | Not Confident in Biology | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Georgia | 30 (1.4) | 481 (4.9) | 41 (1.2) | 444 (4.2) | 28 (1.4) | 423 (5.4) | 10.4 (0.07) |
| Hungary | 28 (1.3) | 560 (3.6) | 45 (1.0) | 527 (3.1) | 26 (1.3) | 504 (4.3) | 10.3 (0.07) |
| Cyprus | 27 (1.0) | 529 (2.7) | 35 (1.0) | 487 (3.0) | 38 (1.2) | 455 (2.9) | 9.9 (0.06) |
| Lebanon | 27 (1.3) | 436 (7.0) | 40 (1.0) | 372 (5.9) | 33 (1.3) | 344 (5.7) | 10.2 (0.07) |
| Romania | 24 (1.2) | 506 (4.7) | 46 (1.1) | 467 (4.6) | 30 (1.4) | 453 (5.5) | 10.1 (0.07) |
| Morocco | 24 (1.0) | 442 (4.0) | 44 (0.8) | 390 (3.1) | 32 (0.9) | 370 (3.0) | 10.1 (0.05) |
| Kazakhstan | 24 (1.1) | 502 (4.6) | 55 (1.0) | 476 (3.3) | 21 (1.1) | 458 (4.7) | 10.3 (0.05) |
| Portugal | 22 (1.1) | 559 (4.1) | 50 (1.1) | 522 (2.8) | 28 (1.3) | 487 (4.1) | 10.0 (0.06) |
| Russian Federation | 21 (1.0) | 559 (5.8) | 51 (0.8) | 546 (4.3) | 28 (1.1) | 526 (4.6) | 10.0 (0.06) |
| Lithuania | 19 (1.0) | 567 (3.4) | 49 (1.2) | 533 (3.2) | 32 (1.6) | 517 (4.8) | 9.8 (0.07) |
| Sweden | 18 (0.9) | 579 (4.9) | 51 (1.0) | 532 (3.7) | 31 (1.2) | 491 (4.4) | 9.8 (0.05) |
| Finland | 17 (0.9) | 593 (3.4) | 51 (0.8) | 553 (3.4) | 31 (1.0) | 508 (4.1) | 9.8 (0.05) |
| France | 13 (0.6) | 539 (4.7) | 46 (1.3) | 498 (3.1) | 41 (1.5) | 462 (3.1) | 9.3 (0.06) |
| **International Average** | **23 (0.3)** | **527 (1.3)** | **46 (0.3)** | **488 (1.0)** | **31 (0.4)** | **461 (1.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 21 (1.2) | 580 (3.9) | 48 (1.1) | 567 (3.3) | 31 (1.3) | 559 (4.2) | 9.9 (0.06) |

This TIMSS context questionnaire scale for general/integrated science was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011 where science is taught as a single subject. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution. The separate scales for biology, chemistry, physics, and Earth science were each established in 2019 using a comparable approach.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 11.12: Students Confident in Science

*Students' Reports*

### Separate Science Results (Continued)

*Students Confident in Chemistry*

| Chemistry | Very Confident in Chemistry | | Somewhat Confident in Chemistry | | Not Confident in Chemistry | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Cyprus | 38 (1.2) | 518 (2.9) | 36 (1.1) | 484 (2.9) | 25 (1.0) | 446 (3.0) | 11.0 (0.05) |
| Lebanon | 31 (1.5) | 428 (5.8) | 40 (1.1) | 368 (5.5) | 30 (1.3) | 346 (7.0) | 10.7 (0.07) |
| Georgia | 25 (1.3) | 493 (4.7) | 35 (1.1) | 451 (4.7) | 40 (1.5) | 422 (4.4) | 10.2 (0.07) |
| Morocco | 23 (0.9) | 444 (4.1) | 44 (0.7) | 390 (3.2) | 34 (0.9) | 371 (2.7) | 10.4 (0.04) |
| Kazakhstan | 20 (0.9) | 511 (4.2) | 46 (1.0) | 479 (3.5) | 34 (1.3) | 460 (4.5) | 10.2 (0.05) |
| Lithuania | 18 (1.0) | 579 (4.1) | 40 (1.0) | 538 (3.9) | 42 (1.6) | 513 (3.5) | 9.8 (0.07) |
| Portugal | 17 (1.0) | 571 (4.6) | 38 (1.3) | 526 (3.2) | 45 (1.8) | 495 (3.3) | 9.8 (0.07) |
| Sweden | 17 (0.9) | 581 (6.3) | 42 (1.1) | 537 (3.9) | 41 (1.3) | 493 (3.8) | 9.9 (0.05) |
| Russian Federation | 17 (0.8) | 577 (5.1) | 36 (0.9) | 550 (4.7) | 48 (1.1) | 527 (4.4) | 9.7 (0.05) |
| Romania | 16 (1.0) | 521 (5.7) | 33 (1.1) | 478 (5.0) | 51 (1.5) | 454 (4.7) | 9.6 (0.06) |
| Finland | 15 (0.9) | 613 (3.1) | 36 (0.9) | 562 (3.5) | 48 (1.2) | 515 (3.2) | 9.6 (0.05) |
| Hungary | 14 (0.8) | 575 (5.5) | 35 (1.1) | 530 (3.0) | 51 (1.5) | 518 (3.4) | 9.5 (0.07) |
| France | 12 (0.8) | 549 (4.4) | 38 (1.1) | 501 (3.6) | 49 (1.6) | 465 (2.9) | 9.5 (0.06) |
| **International Average** | **20 (0.3)** | **535 (1.3)** | **39 (0.3)** | **492 (1.1)** | **41 (0.4)** | **463 (1.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 15 (0.9) | 598 (4.3) | 34 (0.9) | 575 (3.1) | 50 (1.3) | 552 (3.3) | 9.5 (0.06) |

*Students Confident in Physics*

| Physics | Very Confident in Physics | | Somewhat Confident in Physics | | Not Confident in Physics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Lebanon | 25 (1.3) | 435 (5.9) | 38 (0.9) | 372 (5.7) | 36 (1.4) | 352 (6.0) | 10.6 (0.07) |
| Cyprus | 24 (1.0) | 533 (3.3) | 31 (1.0) | 491 (2.8) | 45 (1.2) | 460 (3.0) | 10.1 (0.06) |
| Morocco | 23 (0.9) | 443 (4.1) | 44 (0.7) | 390 (2.9) | 33 (0.9) | 374 (3.1) | 10.6 (0.04) |
| Kazakhstan | 19 (0.9) | 512 (5.2) | 49 (1.0) | 478 (3.3) | 32 (1.2) | 461 (4.1) | 10.3 (0.05) |
| Hungary | 18 (1.0) | 582 (4.5) | 37 (1.0) | 534 (3.2) | 45 (1.5) | 506 (3.3) | 10.0 (0.06) |
| Georgia | 18 (1.1) | 497 (5.3) | 36 (1.1) | 456 (5.0) | 46 (1.4) | 427 (4.0) | 10.0 (0.06) |
| Portugal | 17 (1.0) | 571 (4.6) | 38 (1.3) | 526 (3.2) | 45 (1.8) | 495 (3.3) | 10.0 (0.08) |
| Russian Federation | 17 (0.8) | 572 (6.2) | 45 (1.0) | 548 (3.7) | 38 (1.1) | 526 (4.9) | 10.2 (0.04) |
| Sweden | 16 (0.9) | 592 (5.3) | 43 (0.9) | 541 (3.6) | 42 (1.1) | 491 (3.9) | 10.0 (0.04) |
| Finland | 13 (0.7) | 613 (3.6) | 35 (1.0) | 560 (3.9) | 52 (1.3) | 516 (3.7) | 9.6 (0.05) |
| France | 12 (0.8) | 549 (4.4) | 38 (1.1) | 501 (3.6) | 50 (1.6) | 465 (2.9) | 9.6 (0.06) |
| Romania | 12 (0.7) | 529 (6.2) | 34 (1.1) | 476 (5.2) | 54 (1.3) | 458 (4.3) | 9.6 (0.05) |
| Lithuania | 11 (0.7) | 589 (4.8) | 32 (1.1) | 543 (3.5) | 57 (1.5) | 520 (3.5) | 9.4 (0.06) |
| **International Average** | **17 (0.3)** | **540 (1.4)** | **38 (0.3)** | **494 (1.1)** | **44 (0.4)** | **465 (1.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 17 (0.9) | 601 (4.2) | 41 (0.9) | 573 (3.4) | 42 (1.2) | 547 (3.1) | 10.0 (0.05) |

*Students Confident in Earth Science*

| Earth Science | Very Confident in Earth Science | | Somewhat Confident in Earth Science | | Not Confident in Earth Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Cyprus | 30 (1.0) | 522 (2.8) | 37 (1.1) | 489 (2.9) | 33 (1.1) | 456 (3.3) | 10.2 (0.05) |
| Georgia | 25 (1.5) | 493 (4.5) | 42 (1.3) | 451 (4.4) | 33 (1.7) | 418 (5.3) | 10.1 (0.07) |
| Hungary | 25 (1.2) | 563 (4.1) | 42 (1.0) | 526 (3.0) | 33 (1.4) | 510 (3.5) | 10.0 (0.08) |
| Romania r | 24 (1.6) | 509 (6.4) | 46 (1.2) | 470 (5.9) | 31 (1.8) | 450 (6.8) | 10.2 (0.08) |
| Russian Federation | 23 (0.8) | 560 (5.1) | 51 (0.9) | 546 (3.9) | 26 (0.9) | 524 (5.2) | 10.2 (0.04) |
| Kazakhstan | 23 (1.0) | 505 (4.7) | 54 (1.0) | 477 (3.5) | 22 (1.0) | 454 (4.9) | 10.2 (0.05) |
| Portugal | 22 (1.1) | 559 (4.1) | 50 (1.1) | 522 (2.8) | 28 (1.3) | 487 (4.1) | 10.0 (0.06) |
| Lithuania | 21 (1.1) | 564 (3.6) | 45 (1.1) | 534 (3.2) | 34 (1.5) | 516 (4.1) | 9.9 (0.07) |
| Morocco | 21 (0.9) | 440 (4.2) | 43 (0.7) | 393 (3.2) | 35 (0.8) | 376 (2.8) | 10.0 (0.05) |
| Finland | 18 (0.8) | 588 (3.5) | 50 (0.9) | 554 (3.2) | 31 (1.1) | 508 (4.0) | 9.9 (0.04) |
| France | 13 (0.6) | 539 (4.6) | 46 (1.3) | 498 (3.1) | 41 (1.5) | 462 (3.1) | 9.4 (0.06) |
| Lebanon | - - | - - | - - | - - | - - | - - | - - |
| Sweden | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **22 (0.3)** | **531 (1.3)** | **46 (0.3)** | **496 (1.1)** | **32 (0.4)** | **469 (1.3)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 24 (1.2) | 584 (4.5) | 49 (1.0) | 568 (3.0) | 27 (1.2) | 551 (4.2) | 10.1 (0.06) |

A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Students Value Mathematics and Science

Exhibits 11.13 and 11.15 present the two parallel scales: *Students Value Mathematics* and *Students Value Science*, respectively (see About the Scale). The TIMSS 2019 context questionnaire framework cites research showing that if students understand the value of learning these subjects, it may ameliorate some of their other negative attitudes.

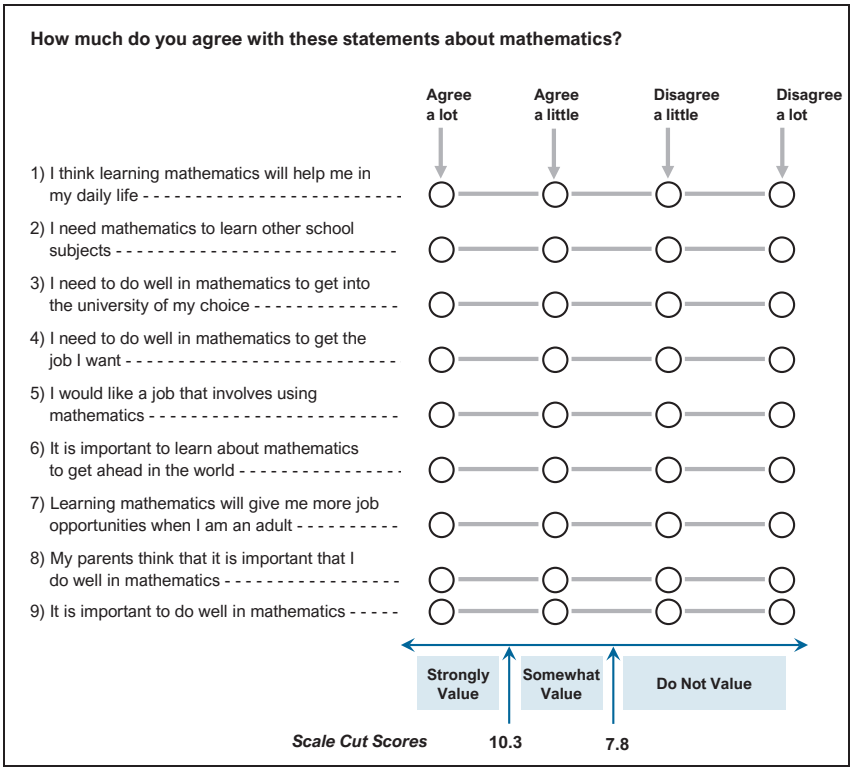
Exhibit 11.14 shows that eighth grade students generally value mathematics. Thirty-seven percent responded that they "strongly value" mathematics, 47 percent responded "somewhat value," and only 16 percent responded "do not value." The results were similar, but slightly less positive for science, shown in Exhibit 11.16—36 percent "strongly value," 42 percent "somewhat value," and 22 percent "do not value" science. There was a strong positive relationship between valuing mathematics and science and average achievement in each of the respective curriculum areas. However, the relationship between higher achievement and valuing the subjects was less pronounced than between higher achievement and attitudes toward liking the subjects or having confidence in your ability to do well in the subjects.

## Exhibit 11.13: Students Value Mathematics

*Students' Reports*

### About the Scale

Students were scored according to their responses to nine statements on the *Students Value Mathematics* scale. Cut scores divide the scale into three categories. Students who **Strongly Value Mathematics** had a score at or above the cut score corresponding to "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who **Do Not Value Mathematics** had a score at or below the cut score corresponding to "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students **Somewhat Value Mathematics**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 11.14: Students Value Mathematics

*Students' Reports*

| Country | Strongly Value Mathematics | | Somewhat Value Mathematics | | Do Not Value Mathematics | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| South Africa (9) | 68 (0.6) | 399 (2.2) | 27 (0.6) | 377 (2.7) | 5 (0.2) | 357 (4.1) | 10.9 (0.03) |
| Egypt | 63 (1.2) | 425 (5.3) | 31 (0.9) | 403 (5.5) | 6 (0.5) | 381 (9.3) | 10.9 (0.06) |
| Jordan | 62 (1.2) | 433 (3.6) | 31 (1.0) | 411 (5.4) | 7 (0.5) | 384 (8.8) | 10.8 (0.05) |
| Morocco | 60 (0.9) | 400 (2.7) | 32 (0.7) | 374 (2.4) | 8 (0.4) | 368 (3.8) | 10.7 (0.04) |
| Israel | 54 (1.2) | 529 (4.9) | 37 (1.0) | 514 (4.6) | 9 (0.5) | 501 (6.5) | 10.4 (0.05) |
| Oman | 53 (0.9) | 432 (3.0) | 39 (0.8) | 397 (3.5) | 8 (0.4) | 375 (5.8) | 10.3 (0.04) |
| Iran, Islamic Rep. of | 49 (1.2) | 457 (4.4) | 40 (1.0) | 440 (3.9) | 11 (0.6) | 426 (6.2) | 10.2 (0.05) |
| Turkey | 48 (1.2) | 520 (4.9) | 40 (0.8) | 480 (4.7) | 12 (0.8) | 454 (6.4) | 10.1 (0.06) |
| Georgia | 47 (1.3) | 474 (4.8) | 43 (1.2) | 455 (4.8) | 10 (0.8) | 436 (9.3) | 10.1 (0.06) |
| United Arab Emirates | 47 (0.6) | 492 (2.7) | 41 (0.6) | 468 (1.8) | 12 (0.3) | 431 (3.4) | 10.1 (0.03) |
| Saudi Arabia | 46 (1.1) | 403 (3.3) | 42 (0.8) | 391 (2.7) | 12 (0.6) | 380 (4.5) | 10.1 (0.05) |
| Lebanon | 45 (1.3) | 447 (3.0) | 43 (1.0) | 422 (4.0) | 12 (0.8) | 409 (5.5) | 10.0 (0.06) |
| Kuwait | 41 (1.2) | 416 (5.8) | 43 (0.9) | 401 (5.0) | 16 (0.7) | 384 (5.8) | 9.7 (0.05) |
| Bahrain | 40 (0.9) | 493 (2.6) | 44 (0.6) | 479 (2.4) | 16 (0.8) | 459 (3.2) | 9.7 (0.04) |
| United States | 40 (0.8) | 532 (5.0) | 48 (0.7) | 516 (4.7) | 12 (0.5) | 484 (6.1) | 9.8 (0.04) |
| Qatar | 38 (1.1) | 456 (5.7) | 44 (1.1) | 449 (4.5) | 18 (1.1) | 409 (4.8) | 9.6 (0.06) |
| Australia | 38 (0.9) | 539 (4.5) | 48 (0.8) | 514 (3.8) | 14 (0.6) | 479 (4.8) | 9.7 (0.04) |
| England | 38 (1.2) | 528 (6.1) | 51 (0.9) | 515 (5.6) | 10 (0.7) | 500 (7.3) | 9.8 (0.05) |
| New Zealand | 37 (1.0) | 494 (4.2) | 50 (0.9) | 481 (3.6) | 14 (0.7) | 461 (5.1) | 9.6 (0.05) |
| Cyprus | 37 (1.0) | 523 (2.8) | 46 (0.9) | 499 (2.2) | 17 (0.7) | 467 (3.9) | 9.6 (0.04) |
| Ireland | 35 (1.0) | 538 (3.5) | 49 (0.9) | 525 (2.6) | 16 (0.7) | 496 (4.3) | 9.5 (0.04) |
| Chile | 35 (1.0) | 446 (3.5) | 53 (1.0) | 442 (3.1) | 12 (0.6) | 425 (5.2) | 9.7 (0.04) |
| Romania | 35 (1.3) | 502 (5.6) | 43 (1.0) | 472 (4.8) | 22 (1.3) | 461 (4.9) | 9.4 (0.07) |
| Norway (9) | 35 (1.0) | 524 (3.4) | 51 (0.9) | 503 (2.4) | 15 (0.7) | 467 (4.4) | 9.6 (0.05) |
| Malaysia | 34 (1.0) | 486 (3.3) | 56 (0.9) | 453 (3.7) | 10 (0.8) | 421 (5.6) | 9.6 (0.04) |
| Portugal | 34 (1.1) | 525 (4.8) | 48 (1.3) | 493 (3.1) | 17 (1.0) | 473 (4.0) | 9.5 (0.05) |
| Singapore | 34 (0.8) | 628 (4.8) | 56 (0.8) | 614 (4.1) | 10 (0.4) | 584 (6.3) | 9.6 (0.03) |
| Kazakhstan | 31 (1.0) | 493 (4.6) | 53 (0.9) | 487 (3.6) | 15 (0.8) | 482 (5.1) | 9.5 (0.05) |
| France | 27 (0.9) | 493 (3.8) | 57 (1.0) | 485 (2.7) | 16 (0.7) | 458 (3.8) | 9.3 (0.04) |
| Russian Federation | 26 (1.0) | 560 (6.1) | 53 (0.9) | 543 (4.5) | 21 (1.0) | 526 (5.0) | 9.2 (0.05) |
| Lithuania | 26 (1.2) | 533 (4.7) | 56 (1.1) | 520 (3.2) | 19 (0.9) | 508 (4.3) | 9.2 (0.04) |
| Hungary | 25 (0.9) | 543 (5.5) | 53 (0.9) | 516 (3.4) | 22 (0.8) | 489 (3.8) | 9.1 (0.04) |
| Italy | 25 (0.8) | 511 (4.0) | 54 (0.9) | 498 (2.9) | 21 (0.8) | 482 (3.6) | 9.1 (0.04) |
| Finland | 24 (0.9) | 535 (3.3) | 54 (0.8) | 513 (2.5) | 22 (0.9) | 473 (3.7) | 9.0 (0.04) |
| Sweden | 24 (0.9) | 515 (4.1) | 58 (0.8) | 505 (2.7) | 18 (0.7) | 487 (3.5) | 9.2 (0.04) |
| Hong Kong SAR | 18 (1.0) | 605 (6.3) | 54 (1.0) | 586 (4.3) | 28 (0.9) | 547 (5.2) | 8.7 (0.05) |
| Korea, Rep. of | 14 (0.6) | 668 (5.0) | 56 (0.9) | 620 (2.9) | 30 (1.1) | 554 (3.1) | 8.5 (0.04) |
| Japan | 14 (0.7) | 629 (5.7) | 59 (0.8) | 598 (2.7) | 27 (0.8) | 568 (3.7) | 8.6 (0.03) |
| Chinese Taipei | 12 (0.5) | 659 (5.8) | 48 (0.8) | 634 (3.1) | 40 (1.0) | 573 (3.0) | 8.2 (0.04) |
| **International Average** | **37 (0.2)** | **507 (0.7)** | **47 (0.1)** | **487 (0.6)** | **16 (0.1)** | **462 (0.8)** | |
| **Benchmarking Participants** | | | | | | | |
| Gauteng, RSA (9) | 69 (1.1) | 423 (3.0) | 27 (0.9) | 416 (3.9) | 4 (0.4) | 423 (7.6) | 10.9 (0.04) |
| Western Cape, RSA (9) | 63 (1.0) | 444 (4.6) | 31 (0.8) | 441 (5.2) | 5 (0.5) | 438 (8.7) | 10.7 (0.04) |
| Ontario, Canada | 51 (1.4) | 545 (5.4) | 42 (1.2) | 521 (4.3) | 8 (0.6) | 487 (6.6) | 10.3 (0.05) |
| Dubai, UAE | 47 (1.1) | 549 (3.0) | 43 (1.0) | 531 (2.4) | 10 (0.4) | 499 (3.8) | 10.1 (0.04) |
| Abu Dhabi, UAE | 42 (0.8) | 462 (3.6) | 44 (0.7) | 429 (3.3) | 14 (0.6) | 394 (4.9) | 9.8 (0.05) |
| Quebec, Canada | 37 (1.3) | 556 (3.9) | 52 (1.1) | 541 (3.9) | 11 (0.8) | 513 (6.6) | 9.7 (0.05) |
| Moscow City, Russian Fed. | 25 (0.9) | 606 (5.7) | 50 (0.9) | 575 (4.3) | 25 (1.0) | 546 (4.4) | 9.1 (0.04) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

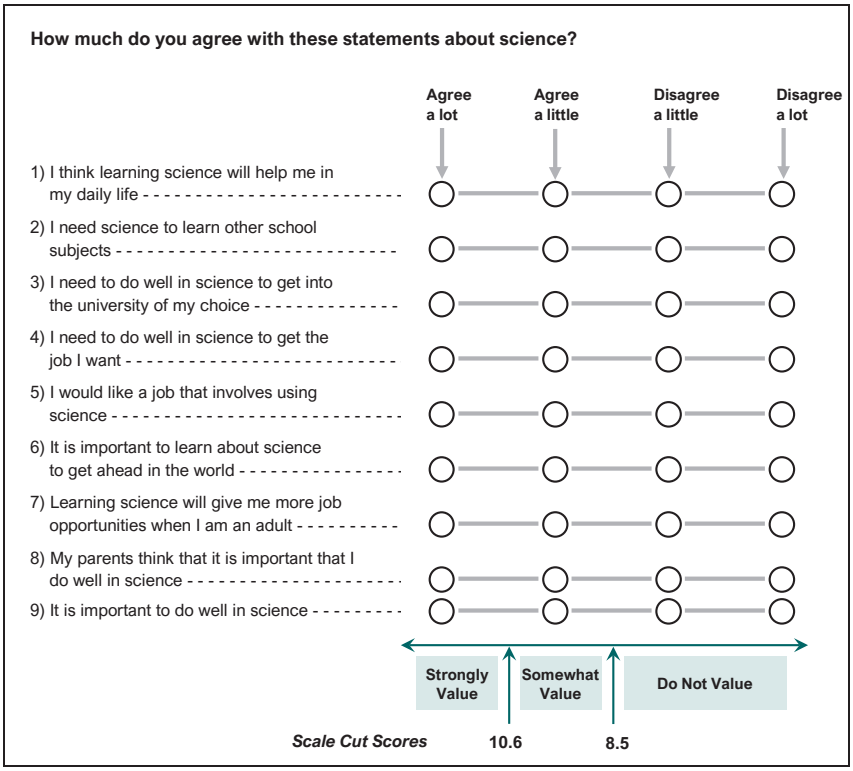
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 11.15: Students Value Science

*Students' Reports*

### About the Scale

Students were scored according to their responses to nine statements on the *Students Value Science* scale. Cut scores divide the scale into three categories. Students who **Strongly Value Science** had a score at or above the cut score corresponding to "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who **Do Not Value Science** had a score at or below the cut score corresponding to "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students **Somewhat Value Science**.




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## Exhibit 11.16: Students Value Science

*Students' Reports*

| Country | Strongly Value Science | | Somewhat Value Science | | Do Not Value Science | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Egypt | 67 (1.1) | 412 (5.2) | 26 (0.9) | 362 (6.7) | 7 (0.5) | 344 (7.8) | 11.3 (0.05) |
| Jordan | 64 (1.2) | 468 (4.4) | 29 (0.9) | 438 (4.8) | 7 (0.5) | 418 (8.6) | 11.2 (0.05) |
| Oman | 57 (0.9) | 483 (3.0) | 35 (0.8) | 440 (3.7) | 8 (0.6) | 409 (7.9) | 10.8 (0.04) |
| Iran, Islamic Rep. of | 57 (1.2) | 462 (4.3) | 33 (1.0) | 434 (3.8) | 11 (0.6) | 436 (7.3) | 10.8 (0.05) |
| United Arab Emirates | 55 (0.7) | 501 (2.6) | 34 (0.6) | 453 (2.8) | 11 (0.3) | 417 (4.4) | 10.7 (0.02) |
| Saudi Arabia | 55 (1.3) | 442 (3.3) | 34 (0.9) | 427 (3.4) | 11 (0.7) | 414 (4.5) | 10.7 (0.06) |
| Kuwait | 54 (1.2) | 460 (5.5) | 34 (1.1) | 439 (5.9) | 12 (0.7) | 419 (7.3) | 10.7 (0.05) |
| South Africa (9) | 54 (0.7) | 380 (3.5) | 34 (0.5) | 353 (3.1) | 12 (0.4) | 387 (4.4) | 10.6 (0.03) |
| Bahrain | 51 (0.9) | 507 (1.8) | 36 (0.7) | 479 (3.5) | 13 (0.6) | 445 (5.9) | 10.5 (0.04) |
| Morocco | 49 (0.9) | 409 (2.7) | 39 (0.7) | 383 (3.2) | 12 (0.6) | 386 (4.0) | 10.5 (0.03) |
| Qatar | 49 (1.0) | 495 (5.4) | 37 (0.8) | 467 (5.0) | 15 (0.9) | 436 (5.8) | 10.4 (0.05) |
| Lebanon | 49 (1.1) | 404 (5.3) | 39 (0.9) | 360 (5.0) | 12 (0.6) | 350 (9.2) | 10.5 (0.04) |
| Turkey | 46 (1.2) | 529 (4.1) | 38 (0.8) | 506 (4.4) | 15 (0.9) | 499 (5.8) | 10.3 (0.05) |
| Malaysia | 45 (1.2) | 492 (3.0) | 46 (0.9) | 445 (4.2) | 9 (0.7) | 384 (6.9) | 10.4 (0.04) |
| Georgia | 43 (1.2) | 457 (4.2) | 43 (1.1) | 445 (4.3) | 14 (0.9) | 430 (5.6) | 10.3 (0.05) |
| Singapore | 42 (1.0) | 632 (3.5) | 48 (0.8) | 598 (4.1) | 11 (0.6) | 557 (6.3) | 10.3 (0.03) |
| United States | 36 (0.9) | 540 (5.9) | 43 (0.7) | 526 (4.7) | 21 (0.6) | 503 (4.3) | 9.9 (0.03) |
| Israel | 36 (1.3) | 531 (5.2) | 36 (0.9) | 518 (4.7) | 29 (1.2) | 498 (5.6) | 9.7 (0.06) |
| England | 33 (1.1) | 540 (5.3) | 45 (1.1) | 523 (5.6) | 22 (1.0) | 491 (5.5) | 9.8 (0.05) |
| Cyprus | 33 (1.0) | 510 (2.9) | 43 (1.2) | 485 (2.5) | 24 (0.9) | 458 (3.4) | 9.7 (0.04) |
| Russian Federation | 32 (1.0) | 548 (4.8) | 50 (0.8) | 540 (4.7) | 18 (0.9) | 545 (4.5) | 9.9 (0.04) |
| Romania | 31 (1.3) | 487 (5.3) | 41 (1.1) | 468 (4.6) | 28 (1.2) | 462 (4.5) | 9.6 (0.06) |
| Kazakhstan | 30 (1.0) | 487 (4.0) | 51 (0.9) | 477 (3.4) | 19 (0.8) | 471 (5.1) | 9.9 (0.04) |
| Australia | 28 (0.9) | 561 (4.1) | 42 (0.6) | 530 (3.5) | 29 (0.8) | 501 (3.1) | 9.5 (0.04) |
| Portugal | 27 (1.1) | 542 (4.2) | 44 (1.1) | 517 (3.4) | 28 (1.1) | 503 (3.0) | 9.6 (0.05) |
| Lithuania | 27 (1.0) | 549 (4.3) | 51 (1.1) | 531 (3.4) | 21 (0.8) | 526 (4.0) | 9.7 (0.03) |
| New Zealand | 26 (0.9) | 520 (5.0) | 47 (0.8) | 503 (3.9) | 28 (1.0) | 479 (4.2) | 9.5 (0.04) |
| Chile | 25 (0.9) | 471 (3.8) | 48 (0.8) | 462 (3.4) | 27 (1.0) | 459 (3.9) | 9.5 (0.04) |
| Ireland | 25 (1.0) | 555 (3.9) | 42 (1.1) | 534 (2.8) | 33 (1.1) | 500 (3.7) | 9.3 (0.05) |
| Hong Kong SAR | 23 (0.9) | 526 (7.6) | 49 (1.1) | 509 (5.5) | 29 (1.1) | 478 (6.4) | 9.4 (0.05) |
| Norway (9) | 21 (0.9) | 516 (5.4) | 48 (0.9) | 501 (3.1) | 31 (1.1) | 478 (4.4) | 9.3 (0.04) |
| Hungary | 21 (1.1) | 553 (4.8) | 47 (0.9) | 527 (3.5) | 33 (1.1) | 519 (3.0) | 9.3 (0.05) |
| Sweden | 20 (0.9) | 541 (5.7) | 48 (1.1) | 527 (3.9) | 32 (1.0) | 510 (3.6) | 9.3 (0.03) |
| Italy | 19 (0.8) | 515 (4.0) | 45 (1.0) | 506 (2.9) | 35 (1.1) | 487 (2.9) | 9.2 (0.04) |
| France | 19 (0.8) | 516 (4.5) | 47 (0.9) | 496 (3.2) | 34 (1.1) | 465 (2.7) | 9.2 (0.04) |
| Finland | 18 (0.9) | 586 (4.3) | 48 (0.9) | 550 (3.2) | 35 (1.1) | 514 (3.0) | 9.1 (0.04) |
| Korea, Rep. of | 16 (0.7) | 611 (4.2) | 50 (0.9) | 573 (2.6) | 34 (1.1) | 519 (2.7) | 9.1 (0.04) |
| Chinese Taipei | 14 (0.7) | 609 (4.4) | 41 (0.8) | 589 (2.5) | 45 (1.0) | 551 (2.4) | 8.9 (0.04) |
| Japan | 11 (0.6) | 598 (4.9) | 48 (1.0) | 581 (2.5) | 41 (1.1) | 550 (2.5) | 8.8 (0.04) |
| **International Average** | **36 (0.2)** | **511 (0.7)** | **42 (0.1)** | **487 (0.6)** | **22 (0.1)** | **467 (0.8)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 56 (1.0) | 563 (2.6) | 34 (0.9) | 535 (3.2) | 10 (0.5) | 505 (6.1) | 10.8 (0.04) |
| Gauteng, RSA (9) | 53 (1.2) | 424 (4.1) | 31 (0.7) | 411 (4.6) | 15 (0.8) | 448 (6.3) | 10.5 (0.05) |
| Abu Dhabi, UAE | 49 (1.1) | 461 (4.1) | 38 (0.9) | 396 (4.4) | 13 (0.7) | 358 (7.3) | 10.5 (0.05) |
| Western Cape, RSA (9) | 42 (1.2) | 446 (6.4) | 38 (0.8) | 432 (5.7) | 19 (0.9) | 456 (5.7) | 10.1 (0.05) |
| Ontario, Canada | 38 (1.0) | 540 (4.5) | 43 (1.0) | 519 (3.3) | 19 (1.1) | 495 (4.9) | 10.0 (0.04) |
| Quebec, Canada | 32 (1.3) | 558 (4.0) | 45 (1.0) | 538 (3.6) | 24 (1.3) | 508 (4.9) | 9.7 (0.06) |
| Moscow City, Russian Fed. | 24 (1.0) | 570 (3.7) | 46 (0.9) | 565 (3.7) | 30 (1.1) | 567 (3.6) | 9.4 (0.05) |

This TIMSS context questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Mathematics Curriculum and Instruction

## Instructional Time in Mathematics

Though many factors influence the relationship between amount of instructional time and student achievement—primarily, the quality of the instruction and the students' readiness to learn—instructional time remains a crucial component in considering students' opportunity to learn. Instructional time was calculated using principals' reports on the number of school days per year and the number of instructional hours per day and teachers' reports on the weekly number of hours of mathematics instruction, as explained in Exhibit 12.1 (see About the Scale). Exhibits 12.2 and 12.3 present principals' and teachers' reports about the instructional hours per year overall spent on mathematics instruction in fourth grade and eighth grade, respectively. Countries are ordered by the number of hours per year for mathematics instruction.

On average, the fourth grade students across the TIMSS 2019 countries received 895 hours per year of instruction across all subjects, and 154 hours, or about 17 percent of the total, were devoted to mathematics instruction. The number of hours devoted to mathematics instruction ranged from a high of 250 hours in Portugal to 101 in Korea. The amount of mathematics instructional time relative to total instructional time varied considerably across countries, reflecting different approaches to organizing and addressing the mathematics curriculum. As might be anticipated, within-country estimates of instructional time can vary somewhat from the levels of instructional time established by policy (see *TIMSS 2019 Encyclopedia*).

The eighth grade students across the TIMSS 2019 countries received an average of 1,023 hours of instruction across all subjects, and 137 hours, or 13 percent of the total, were devoted to mathematics instruction. The number of hours for mathematics instruction ranged from 200 in Chile to 102 in Cyprus. Of the countries that participated in TIMSS at the fourth and eighth grades, in most countries, the number of annual hours devoted to mathematics instruction decreased between fourth and eighth grades, likely because by eighth grade, the school curriculum covers many more subjects than in fourth grade.

## Exhibit 12.1: Instructional Time Spent on Mathematics

*Students' Results based on Principals' and Teachers' Reports*

### About the Scale

**Total Instructional Hours Per Year** = Principal Reports of School Days per Year × Principal Reports of Instructional Hours per Day

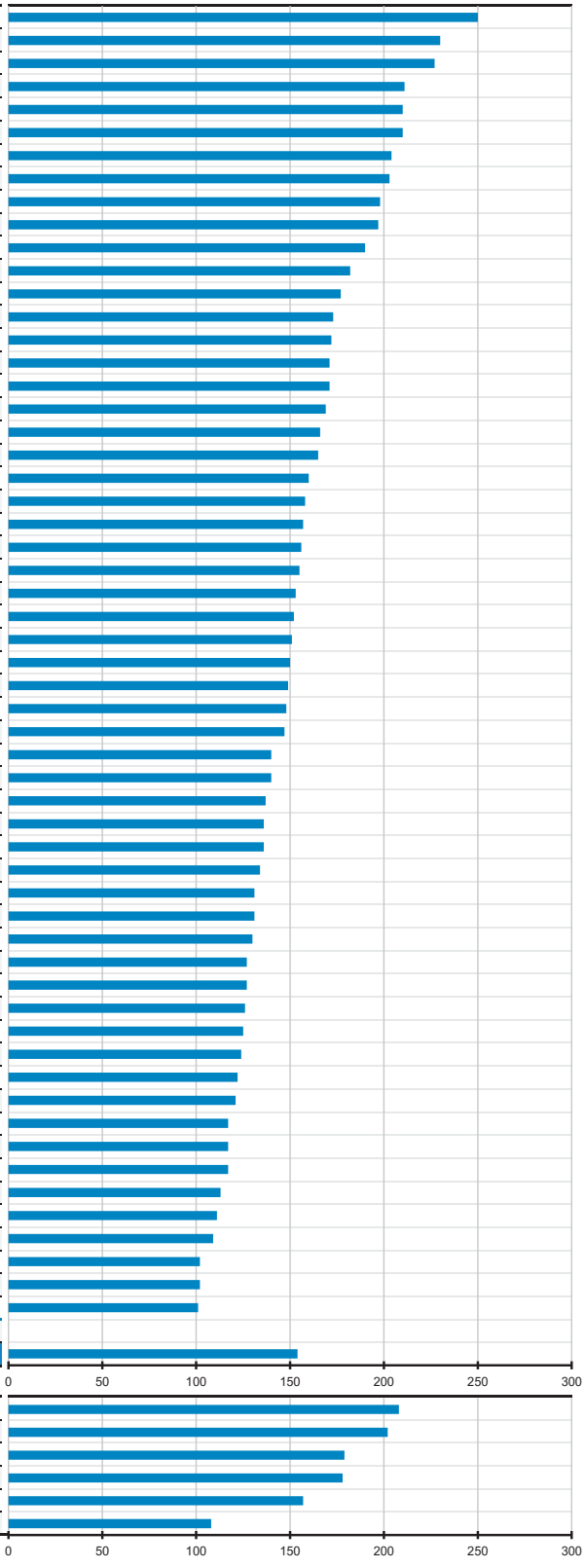
**Hours per Year for Mathematics Instruction** = $\frac{\text{Teacher Reports of Weekly Mathematics Instructional Hours}}{\text{Principal Reports of School Days per Week}}$ × Principal Reports of School Days per Year

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## Exhibit 12.2: Instructional Time Spent on Mathematics

*Students' Results based on Principals' and Teachers' Reports*

| Country | Total Instructional Hours per Year | Hours per Year for Mathematics Instruction |
|---|---|---|
| Portugal | 887 (14.8) | 250 (5.3) |
| Italy | 1098 (15.0) | 230 (5.3) |
| South Africa (5) | r 1205 (12.1) | r 227 (4.5) |
| Singapore | 1009 (0.0) | 211 (2.7) |
| United States | 1106 (8.4) | 210 (3.9) |
| Belgium (Flemish) | r 951 (14.6) | r 210 (2.9) |
| Chile | r 1186 (22.3) | r 204 (6.9) |
| Northern Ireland | r 947 (7.1) | r 203 (3.9) |
| Canada | 951 (3.9) | r 198 (2.7) |
| Netherlands | s 1049 (10.3) | s 197 (6.4) |
| Australia | r 1015 (11.8) | r 190 (5.2) |
| France | r 820 (7.4) | r 182 (2.5) |
| Bahrain | 1012 (8.2) | 177 (2.5) |
| Philippines | 1225 (12.6) | 173 (3.6) |
| Qatar | 1011 (11.8) | 172 (4.7) |
| Cyprus | 849 (10.6) | r 171 (3.1) |
| Morocco | 1081 (20.4) | 171 (3.9) |
| United Arab Emirates | r 1034 (3.9) | s 169 (1.7) |
| Malta | 930 (1.4) | 166 (0.4) |
| Ireland | 925 (5.0) | 165 (2.6) |
| New Zealand | 917 (5.7) | 160 (2.7) |
| Oman | r 1016 (13.9) | r 158 (3.1) |
| Pakistan | 1218 (22.3) | r 157 (11.2) |
| Spain | 869 (7.1) | 156 (2.5) |
| Denmark | r 1043 (10.4) | s 155 (2.7) |
| Germany | r 833 (10.1) | r 153 (2.2) |
| Hong Kong SAR | r 1022 (14.3) | r 152 (3.3) |
| Japan | 904 (4.9) | 151 (1.0) |
| Kosovo | 777 (32.0) | r 150 (4.4) |
| Czech Republic | 763 (8.9) | 149 (1.5) |
| Serbia | 794 (19.2) | 148 (2.5) |
| Chinese Taipei | 953 (8.9) | 147 (8.5) |
| Turkey (5) | 1001 (24.2) | 140 (5.1) |
| Hungary | 842 (13.8) | 140 (2.8) |
| Sweden | r 854 (10.7) | r 137 (2.7) |
| Saudi Arabia | 1056 (18.0) | r 136 (4.7) |
| Kuwait | r 899 (24.3) | s 136 (4.3) |
| Kazakhstan | 732 (14.0) | 134 (4.6) |
| North Macedonia | 818 (22.0) | 131 (2.7) |
| Georgia | 750 (18.7) | 131 (2.6) |
| Austria | 759 (3.1) | 130 (1.0) |
| Slovak Republic | 784 (9.9) | 127 (2.0) |
| Norway (5) | r 868 (14.4) | s 127 (4.1) |
| Armenia | 752 (6.4) | 126 (0.7) |
| Lithuania | 725 (10.0) | 125 (2.1) |
| Azerbaijan | 731 (19.4) | 124 (1.9) |
| Bosnia and Herzegovina | 851 (35.9) | 122 (2.4) |
| Croatia | 859 (26.2) | 121 (3.0) |
| Finland | 746 (9.9) | 117 (2.0) |
| Montenegro | 653 (1.6) | 117 (1.2) |
| Latvia | 689 (8.9) | 117 (1.7) |
| Albania | 729 (10.3) | 113 (1.4) |
| Poland | r 737 (10.1) | r 111 (1.4) |
| Iran, Islamic Rep. of | 627 (6.0) | 109 (1.6) |
| Russian Federation | 663 (6.8) | 102 (1.6) |
| Bulgaria | 700 (14.9) | 102 (1.3) |
| Korea, Rep. of | 694 (8.7) | 101 (1.9) |
| England | s 989 (11.2) | y - - |
| **International Average** | **895 (1.9)** | **154 (0.5)** |
| **Benchmarking Participants** | | |
| Ontario, Canada | 954 (7.5) | r 208 (3.9) |
| Quebec, Canada | 922 (8.2) | r 202 (6.2) |
| Madrid, Spain | 909 (12.5) | 179 (2.6) |
| Abu Dhabi, UAE | r 1075 (3.2) | s 178 (2.3) |
| Dubai, UAE | r 1038 (0.6) | s 157 (2.2) |
| Moscow City, Russian Fed. | 645 (9.6) | 108 (2.1) |



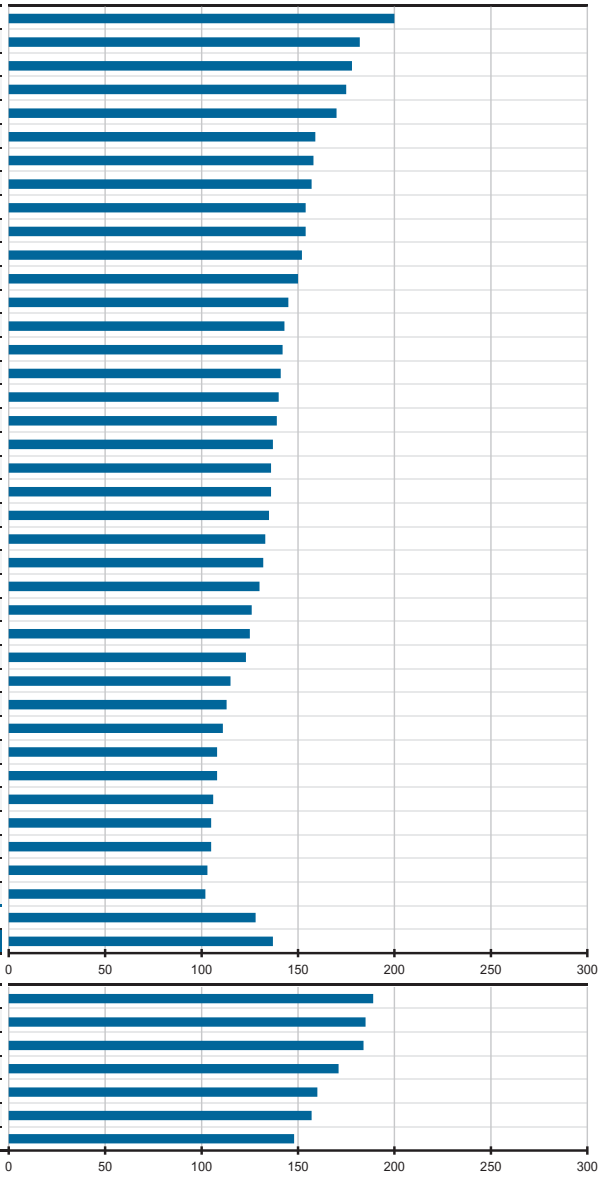

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 12.3: Instructional Time Spent on Mathematics

*Students' Results based on Principals' and Teachers' Reports*

| Country | | Total Instructional Hours per Year | | Hours per Year for Mathematics Instruction |
|---|---|---|---|---|
| Chile | | 1221 (20.5) | r | 200 (6.1) |
| South Africa (9) | s | 1212 (13.5) | s | 182 (2.7) |
| Oman | r | 1056 (18.9) | r | 178 (4.1) |
| United Arab Emirates | r | 1094 (2.7) | s | 175 (1.9) |
| Lebanon | | 960 (7.3) | | 170 (3.8) |
| Bahrain | | 1115 (0.6) | | 159 (1.6) |
| Israel | | 1118 (13.6) | r | 158 (3.2) |
| Chinese Taipei | | 1137 (12.3) | | 157 (1.7) |
| United States | | 1148 (9.9) | r | 154 (3.3) |
| Qatar | | 1090 (9.9) | r | 154 (5.8) |
| Morocco | r | 1341 (30.8) | r | 152 (3.4) |
| Turkey | | 1009 (27.5) | | 150 (6.4) |
| Italy | | 1065 (11.2) | | 145 (2.8) |
| Hong Kong SAR | | 999 (12.6) | | 143 (4.7) |
| Russian Federation | | 868 (13.3) | | 142 (3.6) |
| Australia | | 1013 (6.8) | r | 141 (2.4) |
| Jordan | | 1020 (13.0) | | 140 (3.6) |
| Kuwait | r | 982 (21.2) | r | 139 (4.1) |
| New Zealand | r | 967 (10.2) | r | 137 (2.5) |
| Egypt | s | 1110 (34.6) | s | 136 (3.3) |
| Saudi Arabia | r | 1069 (18.9) | r | 136 (6.9) |
| Singapore | | 1053 (0.0) | | 135 (2.6) |
| Romania | | 926 (19.8) | | 133 (4.3) |
| Portugal | | 1138 (31.4) | | 132 (3.5) |
| Malaysia | | 1165 (18.7) | | 130 (2.5) |
| Lithuania | | 918 (12.6) | | 126 (2.2) |
| France | r | 1112 (19.3) | s | 125 (3.2) |
| Kazakhstan | | 886 (15.7) | | 123 (3.1) |
| Hungary | | 899 (11.5) | | 115 (2.3) |
| Georgia | | 850 (14.5) | | 113 (2.1) |
| Finland | | 912 (9.4) | | 111 (1.9) |
| Norway (9) | r | 949 (8.2) | s | 108 (2.2) |
| Ireland | | 973 (4.7) | r | 108 (1.3) |
| Korea, Rep. of | | 933 (10.7) | | 106 (2.6) |
| Sweden | r | 926 (11.4) | | 105 (1.6) |
| Japan | | 1018 (3.0) | | 105 (1.0) |
| Iran, Islamic Rep. of | | 768 (8.1) | | 103 (2.6) |
| Cyprus | r | 882 (1.0) | s | 102 (2.3) |
| England | s | 995 (13.3) | x | 128 (4.9) |
| **International Average** | | **1023 (2.5)** | | **137 (0.6)** |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | r | 966 (8.2) | s | 189 (3.6) |
| Gauteng, RSA (9) | s | 1193 (21.1) | s | 185 (6.5) |
| Abu Dhabi, UAE | r | 1138 (3.5) | s | 184 (4.5) |
| Western Cape, RSA (9) | r | 1190 (11.6) | s | 171 (3.7) |
| Dubai, UAE | r | 1066 (1.0) | s | 160 (3.4) |
| Moscow City, Russian Fed. | | 825 (8.2) | | 157 (3.3) |
| Quebec, Canada | r | 936 (16.4) | r | 148 (3.3) |




( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Students Taught the TIMSS Mathematics Topics

The mathematics content domains and underlying topic areas assessed in TIMSS 2019 are documented in the TIMSS 2019 Mathematics Framework, which was developed in collaboration with the participating countries. The mathematics topics included in the TIMSS assessments do not represent the intersection of the topics that are universally taught but rather are a forward looking conception of mathematics teaching and learning.

Exhibit 12.4 shows the TIMSS mathematics content domains—number, measurement and geometry, and data—and the 17 underlying topics in the TIMSS fourth grade mathematics assessment (see About the Scale). There were 7 topics in number, 7 in measurement and geometry, and 3 in data. Exhibit 12.6 shows the same information for the eighth grade mathematics assessment, with its four content domains—number, algebra, geometry, and data and probability and the 22 underlying topics. There were 3 topics in number, 7 in algebra, 6 in geometry, and 6 in data and probability. Teachers were asked to indicate, for each topic, whether it had been "mostly taught before this year" to students in the assessed class or "mostly taught this year," or had been "not taught or just introduced" to students. This information serves as an indicator of the "implemented curriculum." It also can be examined together with information provided by TIMSS National Research Coordinators about whether each of the TIMSS 2019 mathematics topics was included in their countries' intended curriculum through the fourth or eighth grade and, if so, whether the topics were intended to be taught to "all or almost all students" or "only the more able students." This information about the intended curriculum is reported in the *TIMSS 2019 Encyclopedia*.

Exhibit 12.5 presents fourth grade teachers' reports about the TIMSS mathematics topics that had been taught to students in fourth grade classrooms either prior to or during the year of the assessment. The exhibit shows, for each country and the international average, the percentage of students whose teachers reported that the students had been taught each of the topics (before or during the year), averaged across all topics in each mathematics content domain, and also across all topics in all mathematics domains. Exhibit 12.7 presents parallel information for the eighth grade, reported by teachers about the TIMSS mathematics topics in the eighth grade assessment.

In the fourth grade, according to their teachers, 80 percent of students, on average, had been taught the TIMSS mathematics topics overall. This finding ranged from 97 percent in Azerbaijan and Portugal to 62 percent in Morocco. On average, 86 percent of students had been taught the TIMSS number topics, and 76 percent and 78 percent had been taught the measurement and geometry and data topics, respectively. There was, however, considerable variation from content domain to content domain and from country to country, reflecting differing mathematics curricular emphases.

In the eighth grade, on average, 72 percent of students had been taught the TIMSS mathematics topics overall, according to their teachers. Teachers' reports about the degree of implementation ranged from 95 percent of students in Malaysia to 49 percent in Finland. Almost all of the students (98%), on average, had been taught the number topics by the end of eighth grade, according to their teachers, with 100 percent of students in a number of countries. The coverage of algebra and geometry

was lower, with 68 percent of the students having been taught the algebra topics and 76 percent having been taught the geometry topics, on average. The least instructional attention was given to the topics in data and probability, with 60 percent of students having been taught the topics in this domain, on average. There was considerable variation across countries, particularly in the percentages of students taught the data and probability topics.

## Exhibit 12.4: Percentages of Students Taught the TIMSS Mathematics Topics

*Students' Results based on Teachers' Reports*

### About the Scale

Exhibit 12.5 reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

**Choose the response that best describes when students in this class have been taught each topic.**

| | Mostly taught before this year | Mostly taught this year | Not yet taught or just introduced |
|---|---|---|---|
| **A. Number** | | | |
| 1) Concepts of whole numbers, including place value and ordering | ○ | ○ | ○ |
| 2) Adding, subtracting, multiplying, and dividing with whole numbers | ○ | ○ | ○ |
| 3) Concepts of multiples and factors; odd and even numbers | ○ | ○ | ○ |
| 4) Number sentences (finding the missing number, representing problem situations with number sentences) | ○ | ○ | ○ |
| 5) Number patterns (extending number patterns and finding missing terms) | ○ | ○ | ○ |
| 6) Concepts of fractions, including representing, comparing and ordering, adding and subtracting simple fractions | ○ | ○ | ○ |
| 7) Concepts of decimals, including place value and ordering, adding and subtracting with decimals | ○ | ○ | ○ |
| **B. Measurement and Geometry** | | | |
| 1) Solving problems involving length, including measuring and estimating | ○ | ○ | ○ |
| 2) Solving problems involving mass, volume, and time | ○ | ○ | ○ |
| 3) Finding and estimating perimeter, area, and volume | ○ | ○ | ○ |
| 4) Parallel and perpendicular lines | ○ | ○ | ○ |
| 5) Comparing and drawing angles | ○ | ○ | ○ |
| 6) Elementary properties of common geometric shapes | ○ | ○ | ○ |
| 7) Three-dimensional shapes, including relationships with their two-dimensional representations | ○ | ○ | ○ |
| **C. Data** | | | |
| 1) Reading and interpreting data from tables, pictographs, bar graphs, line graphs, and pie charts | ○ | ○ | ○ |
| 2) Organizing and representing data to help answer questions | ○ | ○ | ○ |
| 3) Drawing conclusions from data displays | ○ | ○ | ○ |

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## Exhibit 12.5: Percentages of Students Taught the TIMSS Mathematics Topics

*Students' Results based on Teachers' Reports*

The exhibit reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

| Country | All Mathematics (17 Topics) | Number (7 Topics) | Measurement and Geometry (7 Topics) | Data (3 Topics) |
|---|---|---|---|---|
| Albania | 84 (1.0) | 87 (0.6) | 86 (1.4) | 73 (2.9) |
| Armenia | 81 (1.3) | 83 (0.8) | 78 (1.8) | 82 (2.9) |
| Australia | 89 (0.9) | 93 (0.9) | 84 (1.4) | 92 (1.5) |
| Austria | 78 (0.9) | 79 (1.0) | 75 (1.4) | 84 (2.0) |
| Azerbaijan | 97 (0.4) | 97 (0.5) | 96 (0.6) | 98 (0.8) |
| Bahrain | 89 (0.6) | 90 (0.7) | 87 (0.7) | 90 (1.2) |
| Belgium (Flemish) | 78 (1.0) | 93 (0.9) | 63 (1.3) | 76 (2.4) |
| Bosnia and Herzegovina | 65 (0.9) | 70 (0.9) | 66 (1.2) | 51 (3.0) |
| Bulgaria | 67 (0.8) | 71 (0.4) | 66 (1.1) | 60 (3.2) |
| Canada | r 82 (0.8) | r 86 (0.9) | r 76 (1.0) | r 89 (1.3) |
| Chile | 81 (1.1) | 88 (1.0) | 78 (1.8) | 73 (3.4) |
| Chinese Taipei | 84 (1.0) | 83 (1.1) | 84 (1.3) | 88 (1.9) |
| Croatia | 71 (1.1) | 71 (0.8) | 81 (1.4) | 46 (3.5) |
| Cyprus | 89 (1.1) | 92 (0.8) | 86 (1.8) | 87 (1.9) |
| Czech Republic | 71 (0.9) | 79 (0.6) | 67 (1.0) | 60 (3.0) |
| Denmark | r 77 (1.1) | r 84 (1.3) | r 75 (1.5) | r 62 (2.8) |
| Finland | 77 (1.0) | 93 (0.8) | 69 (1.5) | 58 (2.5) |
| France | 79 (1.0) | 81 (0.9) | 78 (1.2) | 74 (2.7) |
| Georgia | 74 (1.3) | 75 (1.2) | 65 (2.1) | 92 (1.9) |
| Germany | 77 (1.0) | 75 (1.1) | 75 (1.3) | 86 (2.2) |
| Hong Kong SAR | 89 (0.8) | 95 (0.8) | 84 (1.3) | 89 (2.6) |
| Hungary | 81 (1.0) | 82 (0.6) | 82 (1.4) | 79 (2.7) |
| Iran, Islamic Rep. of | 80 (1.1) | 94 (0.8) | 74 (1.5) | 61 (3.1) |
| Ireland | 88 (0.8) | 94 (0.9) | 81 (1.4) | 92 (1.9) |
| Italy | 79 (0.9) | 89 (0.9) | 63 (1.3) | 90 (1.8) |
| Japan | 80 (1.2) | 82 (1.0) | 81 (1.4) | 71 (2.9) |
| Kazakhstan | 86 (1.0) | 85 (1.2) | 92 (0.9) | 71 (2.9) |
| Korea, Rep. of | 77 (1.0) | 84 (1.3) | 70 (1.1) | 77 (2.8) |
| Kosovo | 80 (1.0) | 75 (1.4) | 94 (0.8) | 58 (4.0) |
| Kuwait | 90 (1.0) | 95 (0.8) | 84 (1.7) | 92 (1.6) |
| Latvia | 79 (0.9) | 86 (0.8) | 75 (1.3) | 73 (2.5) |
| Lithuania | 89 (0.8) | 93 (0.8) | 82 (1.3) | 96 (1.3) |
| Malta | 78 (0.1) | 92 (0.1) | 61 (0.2) | 82 (0.3) |
| Montenegro | 74 (0.7) | 69 (0.5) | 75 (0.8) | 86 (1.6) |
| Morocco | 62 (1.2) | 66 (1.3) | 67 (1.4) | 39 (3.2) |
| Netherlands | r 63 (1.3) | r 79 (1.3) | r 40 (2.0) | r 79 (2.8) |
| New Zealand | 83 (0.9) | 89 (0.7) | 74 (1.4) | 89 (1.6) |
| North Macedonia | 90 (0.9) | 95 (0.8) | 85 (1.4) | 90 (2.1) |
| Northern Ireland | 94 (0.8) | 98 (0.5) | 94 (1.1) | 87 (2.4) |
| Norway (5) | r 70 (1.5) | r 77 (1.7) | r 60 (2.2) | r 78 (3.7) |
| Oman | 92 (0.6) | 94 (0.9) | 90 (0.8) | 92 (1.4) |
| Pakistan | 83 (2.2) | 94 (1.3) | 78 (3.6) | 66 (4.2) |
| Philippines | 93 (0.9) | 99 (0.7) | 93 (1.0) | 78 (3.0) |
| Poland | 68 (1.5) | 75 (1.6) | 73 (1.7) | 40 (3.7) |
| Portugal | 97 (0.3) | 98 (0.3) | 95 (0.7) | 99 (0.5) |
| Qatar | 74 (1.5) | 91 (0.9) | 60 (2.5) | 68 (3.2) |
| Russian Federation | 77 (0.9) | 75 (0.9) | 76 (1.2) | 85 (2.0) |
| Saudi Arabia | 89 (1.0) | r 91 (1.0) | r 85 (1.3) | 91 (1.6) |
| Serbia | 83 (1.1) | 81 (0.7) | 88 (1.3) | 75 (3.3) |
| Singapore | 93 (0.3) | 99 (0.2) | 87 (0.7) | 95 (0.7) |
| Slovak Republic | 65 (0.8) | 75 (0.6) | 50 (1.2) | 78 (2.0) |
| South Africa (5) | 88 (1.1) | 94 (1.0) | 79 (1.6) | 96 (1.2) |
| Spain | 76 (1.4) | 88 (1.1) | 61 (2.3) | 80 (2.6) |
| Sweden | 65 (1.5) | 72 (1.4) | 57 (2.4) | 68 (3.7) |
| Turkey (5) | 70 (1.4) | 80 (1.7) | 61 (1.9) | 68 (3.2) |
| United Arab Emirates | r 84 (0.7) | r 94 (0.8) | r 74 (1.0) | r 84 (1.2) |
| United States | 85 (0.9) | 95 (0.5) | 76 (1.6) | 82 (1.8) |
| England | x 88 (1.7) | x 94 (1.3) | x 83 (2.9) | x 84 (3.7) |
| **International Average** | **80 (0.1)** | **86 (0.1)** | **76 (0.2)** | **78 (0.3)** |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | r 86 (1.1) | r 84 (1.6) | r 81 (1.6) | r 98 (0.8) |
| Quebec, Canada | 89 (1.1) | 91 (1.0) | 88 (1.2) | 84 (3.3) |
| Moscow City, Russian Fed. | 77 (1.0) | 76 (1.1) | 73 (1.3) | 91 (1.9) |
| Madrid, Spain | 76 (1.2) | 93 (0.9) | 60 (2.4) | 72 (3.3) |
| Abu Dhabi, UAE | r 80 (1.0) | r 94 (0.6) | r 69 (1.7) | r 75 (2.1) |
| Dubai, UAE | r 89 (0.7) | r 93 (0.6) | r 84 (1.2) | r 93 (0.9) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

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## Exhibit 12.6: Percentages of Students Taught the TIMSS Mathematics Topics

*Students' Results based on Teachers' Reports*

### About the Scale

Exhibit 12.7 reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

**Choose the response that best describes when students in this class have been taught each topic.**

| | Mostly taught before this year | Mostly taught this year | Not yet taught or just introduced |
|---|---|---|---|
| **A. Number** | | | |
| 1) Computing with negative numbers | ○ | ○ | ○ |
| 2) Concepts of fractions and decimals | ○ | ○ | ○ |
| 3) Solving problems involving proportions and percents | ○ | ○ | ○ |
| **B. Algebra** | | | |
| 1) Simplifying and evaluating algebraic expressions | ○ | ○ | ○ |
| 2) Simple linear equations | ○ | ○ | ○ |
| 3) Simple linear inequalities | ○ | ○ | ○ |
| 4) Simultaneous (two variables) equations | ○ | ○ | ○ |
| 5) Representation of linear and quadratic functions in tables, graphs, words, or equations | ○ | ○ | ○ |
| 6) Properties of functions (slopes, intercepts, etc.) | ○ | ○ | ○ |
| 7) Numeric, algebraic, and geometric patterns or sequences (extension, missing terms, generalization of patterns) | ○ | ○ | ○ |
| **C. Geometry** | | | |
| 1) Geometric properties of angles, pairs of lines, and geometric shapes (triangles, quadrilaterals, and other common polygons) | ○ | ○ | ○ |
| 2) Solving problems involving perimeters, circumferences, and areas | ○ | ○ | ○ |
| 3) Solving problems involving the Pythagorean Theorem | ○ | ○ | ○ |
| 4) Translation, reflection, and rotation | ○ | ○ | ○ |
| 5) Congruent figures and similar triangles | ○ | ○ | ○ |
| 6) Solving problems with three-dimensional shapes | ○ | ○ | ○ |
| **D. Data and Probability** | | | |
| 1) Reading and interpreting data from one or more sources to solve problems (interpolating, extrapolating, drawing conclusions) | ○ | ○ | ○ |
| 2) Identifying appropriate procedures for collecting data | ○ | ○ | ○ |
| 3) Organizing and representing data to help answer questions | ○ | ○ | ○ |
| 4) Calculating and interpreting statistics summarizing data distributions | ○ | ○ | ○ |
| 5) Theoretical and empirical probability of simple events | ○ | ○ | ○ |
| 6) Theoretical and empirical probability of compound events | ○ | ○ | ○ |

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## Exhibit 12.7: Percentages of Students Taught the TIMSS Mathematics Topics

*Students' Results based on Teachers' Reports*

The exhibit reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

| Country | All Mathematics (22 Topics) | Number (3 Topics) | Algebra (7 Topics) | Geometry (6 Topics) | Data and Probability (6 Topics) |
|---|---|---|---|---|---|
| Australia | 72 (1.2) | 97 (0.7) | 60 (1.5) | 72 (1.3) | 72 (2.1) |
| Bahrain | 88 (0.4) | 100 (0.0) | 80 (0.8) | 95 (0.3) | 86 (0.8) |
| Chile | 71 (1.4) | 98 (0.7) | 69 (1.7) | 76 (2.3) | 53 (2.7) |
| Chinese Taipei | 62 (0.7) | 99 (0.2) | 85 (0.9) | 72 (1.2) | 7 (1.3) |
| Cyprus | s 62 (0.9) | s 97 (0.8) | s 67 (1.0) | s 60 (0.8) | s 40 (2.2) |
| Egypt | 80 (0.8) | 97 (1.0) | 63 (1.4) | 90 (0.9) | 82 (1.4) |
| England | s 76 (1.8) | s 97 (1.1) | s 70 (2.3) | s 75 (2.7) | s 72 (3.0) |
| Finland | 49 (0.9) | 94 (0.9) | 46 (1.1) | 65 (1.5) | 13 (2.0) |
| France | r 57 (0.8) | r 98 (0.7) | r 22 (1.0) | r 76 (1.4) | r 57 (2.0) |
| Georgia | 65 (1.0) | 100 (0.0) | 66 (1.2) | 66 (1.3) | 47 (2.4) |
| Hong Kong SAR | 70 (0.9) | 100 (0.3) | 65 (1.3) | 82 (1.1) | 49 (2.0) |
| Hungary | 83 (0.9) | 100 (0.0) | 79 (0.9) | 96 (0.8) | 66 (2.4) |
| Iran, Islamic Rep. of | 66 (1.0) | 98 (0.6) | 38 (1.3) | 84 (1.2) | 62 (2.5) |
| Ireland | 68 (1.1) | 99 (0.3) | 73 (1.3) | 49 (2.3) | 66 (2.2) |
| Israel | 80 (0.8) | 98 (0.4) | 88 (0.8) | 76 (1.1) | 65 (2.2) |
| Italy | 65 (1.0) | 99 (0.4) | 34 (1.4) | 89 (1.1) | 60 (2.4) |
| Japan | 79 (0.8) | 100 (0.3) | 80 (1.1) | 73 (0.9) | 72 (2.2) |
| Jordan | 82 (1.0) | 100 (0.4) | 83 (1.2) | 81 (1.5) | 75 (2.1) |
| Kazakhstan | 77 (1.1) | 100 (0.0) | 91 (1.1) | 71 (1.6) | 56 (2.2) |
| Korea, Rep. of | 78 (0.6) | 100 (0.2) | 87 (0.8) | 71 (0.9) | 63 (1.7) |
| Kuwait | 82 (0.7) | 100 (0.0) | 60 (1.4) | 94 (0.8) | 86 (1.2) |
| Lebanon | 56 (1.1) | 92 (1.0) | 50 (1.4) | 64 (1.3) | 39 (2.8) |
| Lithuania | 58 (0.8) | 100 (0.3) | 52 (1.3) | 62 (1.2) | 41 (2.1) |
| Malaysia | 95 (0.7) | 100 (0.0) | 97 (0.7) | 97 (0.8) | 89 (1.9) |
| Morocco | 56 (0.9) | 97 (0.7) | 50 (1.2) | 57 (1.1) | 41 (1.9) |
| New Zealand | 60 (1.4) | 94 (1.1) | 52 (2.1) | 52 (2.0) | 59 (2.8) |
| Norway (9) | s 54 (1.3) | s 92 (1.5) | s 43 (2.2) | s 54 (1.7) | s 49 (2.8) |
| Oman | 75 (0.7) | 100 (0.3) | 63 (1.0) | 77 (1.1) | 76 (1.4) |
| Portugal | 70 (0.9) | 100 (0.3) | 60 (1.6) | 90 (0.9) | 46 (2.2) |
| Qatar | 73 (1.4) | 100 (0.1) | 69 (1.8) | 74 (2.2) | 65 (2.6) |
| Romania | 86 (0.9) | 100 (0.0) | 82 (1.1) | 90 (0.8) | 78 (2.1) |
| Russian Federation | 65 (1.0) | 100 (0.3) | 78 (1.1) | 71 (0.9) | 28 (2.6) |
| Saudi Arabia | 89 (0.7) | 99 (0.7) | 79 (1.4) | 96 (0.8) | 88 (1.3) |
| Singapore | 85 (0.5) | 99 (0.3) | 93 (0.8) | 85 (0.6) | 70 (1.3) |
| South Africa (9) | 76 (1.2) | 97 (0.6) | 78 (1.1) | 86 (1.2) | 54 (3.0) |
| Sweden | 53 (1.2) | 88 (1.5) | 51 (1.8) | 53 (1.4) | 36 (2.6) |
| Turkey | 81 (0.9) | 100 (0.0) | 79 (1.5) | 63 (1.9) | 91 (1.0) |
| United Arab Emirates | r 82 (0.5) | r 99 (0.2) | r 80 (0.7) | r 87 (0.4) | r 72 (1.1) |
| United States | 83 (0.9) | 100 (0.1) | 87 (0.9) | 84 (1.7) | 68 (1.9) |
| **International Average** | **72 (0.2)** | **98 (0.1)** | **68 (0.2)** | **76 (0.2)** | **60 (0.3)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | r 76 (1.1) | r 92 (1.4) | r 62 (2.0) | r 86 (1.5) | r 75 (2.3) |
| Quebec, Canada | 61 (1.2) | 100 (0.3) | 44 (1.5) | 72 (1.3) | 52 (3.4) |
| Moscow City, Russian Fed. | 67 (0.9) | 100 (0.0) | 76 (1.1) | 65 (1.1) | 41 (2.6) |
| Gauteng, RSA (9) | 79 (1.5) | 98 (0.7) | 79 (1.6) | 88 (1.5) | 59 (3.7) |
| Western Cape, RSA (9) | 74 (1.5) | 99 (0.6) | 78 (1.5) | 80 (1.6) | 51 (3.8) |
| Abu Dhabi, UAE | r 82 (0.8) | r 99 (0.4) | r 81 (0.9) | r 89 (0.7) | r 66 (1.9) |
| Dubai, UAE | 80 (0.8) | 99 (0.1) | 76 (1.5) | 82 (0.7) | r 73 (1.4) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Instructional Clarity in Mathematics Lessons

The clarity with which teachers convey the curriculum to students has significant implications for student learning. Students were asked about aspects of teachers' mathematics instruction during their mathematics lessons: whether they know what their teacher expects them to do, and whether their teacher is easy to understand, has clear answers to their questions, is good at explaining mathematics, does a variety of things to help the students learn, links new lessons to previous knowledge (eighth grade only), and explains a topic again when the students do not understand. Responses were combined into the TIMSS *Instructional Clarity in Mathematics Lessons* scale, as described in Exhibit 12.8 (see About the Scale). Exhibits 12.9 and 12.10 present students' reports about the clarity of their mathematics lessons, for fourth grade and eighth grade, respectively. Countries are ordered by percentage reporting "high clarity of instruction."

On average, about three-quarters (74%) of fourth grade students reported that their mathematics instruction had "high clarity," 21 percent reported "moderate clarity," and just 5 percent characterized their instruction as having "low clarity." There was a range in views across countries with, interestingly, lower percentages of students characterizing their instruction as having "high clarity" in some of the higher performing countries, such as Korea and Japan. On average, internationally and within most countries, however, more clarity was associated with higher average achievement. Across countries, average achievement was 508 among students reporting that their instruction had "high clarity," 488 among students reporting "moderate clarity," and 466 among students reporting "low clarity," a remarkable 42-point difference between "high clarity" and "low clarity."

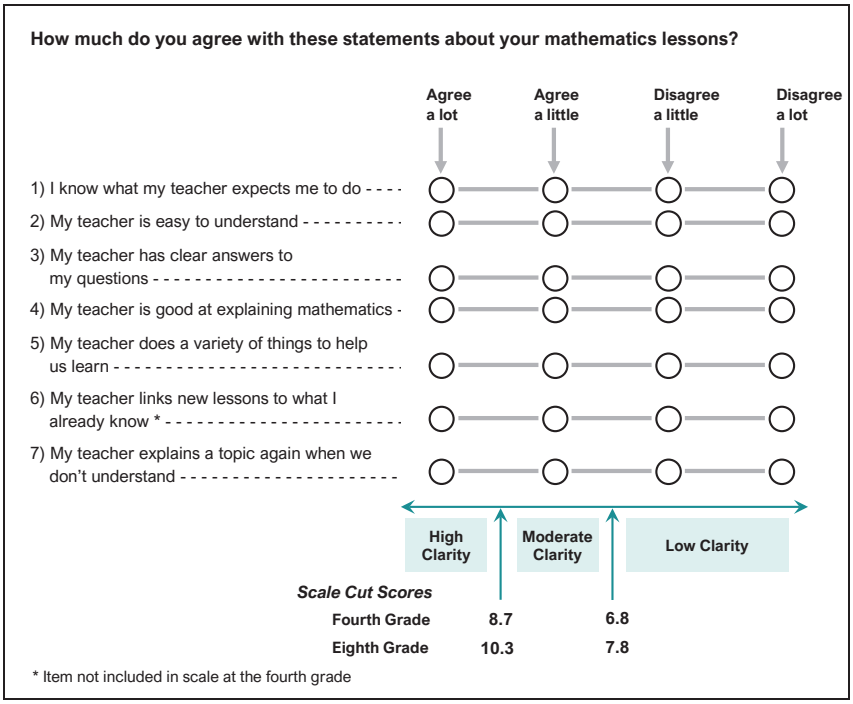
Eighth grade students were less positive about the clarity of their mathematics instruction, with less than half (46%) internationally reporting that their instruction had "high clarity," 41 percent reporting "moderate clarity," and 13 percent reporting "low clarity." As in fourth grade, some of the higher performing countries had the lowest percentages of students reporting that their instruction had "high clarity," including Korea, Japan, and Hong Kong SAR. Also as seen in fourth grade, clarity of instruction was positively associated with achievement. On average, students reporting "high clarity" of instruction had an average score of 504, followed by an average of 482 for "moderate clarity," and 467 for those reporting "low clarity."

## Exhibit 12.8: Instructional Clarity in Mathematics Lessons – Students' Reports

*Students' Reports*

### About the Scale

Students were scored according to their responses to seven statements on the *Instructional Clarity in Mathematics Lessons* scale. Cut scores divide the scale into three categories. Students who reported **High Clarity of Instruction** in their mathematics lessons had a score at or above the cut score corresponding to "agreeing a lot" with four of the seven statements and "agreeing a little" with the other three, on average. Students who reported **Low Clarity of Instruction** in their mathematics lessons had a score at or below the cut score corresponding to "disagreeing a little" with four of the seven statements and "agreeing a little" with the other three, on average. All other students reported **Moderate Clarity of Instruction** in their mathematics lessons.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 12.9: Instructional Clarity in Mathematics Lessons – Students' Reports

*Students' Reports*

| Country | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 98 (0.2) | 497 (3.4) | 2 (0.2) | ~ ~ | 0 (0.1) | ~ ~ | 11.7 (0.04) |
| Kosovo | 95 (0.5) | 449 (2.8) | 3 (0.4) | 402 (11.1) | 1 (0.2) | ~ ~ | 11.3 (0.05) |
| North Macedonia | 93 (0.6) | 480 (5.1) | 6 (0.6) | 421 (11.0) | 1 (0.2) | ~ ~ | 11.3 (0.05) |
| Montenegro | 90 (0.6) | 458 (2.0) | 8 (0.5) | 432 (5.1) | 2 (0.2) | ~ ~ | 11.1 (0.03) |
| Azerbaijan | 88 (0.7) | 527 (2.4) | 9 (0.6) | 493 (5.0) | 2 (0.3) | ~ ~ | 10.8 (0.05) |
| Iran, Islamic Rep. of | 88 (0.9) | 450 (3.5) | 9 (0.7) | 416 (8.8) | 4 (0.5) | 380 (9.6) | 10.8 (0.06) |
| Georgia | 88 (1.0) | 483 (4.1) | 11 (0.9) | 473 (6.5) | 1 (0.3) | ~ ~ | 10.8 (0.06) |
| Bosnia and Herzegovina | 87 (0.7) | 458 (2.2) | 10 (0.6) | 429 (4.6) | 3 (0.3) | 385 (7.8) | 10.8 (0.04) |
| Bulgaria | 87 (1.1) | 520 (3.6) | 11 (0.9) | 499 (9.4) | 2 (0.3) | ~ ~ | 10.7 (0.06) |
| Armenia | 85 (0.6) | 505 (2.6) | 12 (0.6) | 483 (4.2) | 3 (0.4) | 471 (7.7) | 10.8 (0.05) |
| Portugal | 85 (0.9) | 528 (2.7) | 13 (0.8) | 514 (4.6) | 2 (0.2) | ~ ~ | 10.4 (0.05) |
| Malta | 82 (0.7) | 513 (1.4) | 16 (0.7) | 495 (3.6) | 3 (0.3) | 469 (9.8) | 10.3 (0.03) |
| Lithuania | 82 (1.1) | 543 (2.9) | 17 (1.0) | 539 (5.2) | 1 (0.2) | ~ ~ | 10.2 (0.06) |
| Cyprus | 81 (1.3) | 536 (2.8) | 15 (1.0) | 521 (4.9) | 4 (0.4) | 504 (7.7) | 10.4 (0.07) |
| Morocco | 81 (1.3) | 391 (4.6) | 15 (1.0) | 363 (6.3) | 3 (0.3) | 310 (12.5) | 10.3 (0.07) |
| Spain | 80 (1.1) | 508 (2.4) | 16 (0.9) | 490 (4.2) | 4 (0.4) | 472 (8.1) | 10.2 (0.05) |
| Northern Ireland | 80 (1.2) | 571 (2.9) | 17 (1.0) | 552 (5.3) | 3 (0.4) | 527 (9.8) | 10.2 (0.05) |
| Oman | 78 (1.0) | 443 (4.0) | 17 (0.8) | 404 (4.6) | 5 (0.4) | 377 (7.0) | 10.1 (0.05) |
| Serbia | 78 (1.3) | 513 (3.5) | 20 (1.1) | 493 (6.6) | 2 (0.4) | ~ ~ | 10.2 (0.07) |
| Hungary | 77 (1.1) | 530 (2.8) | 19 (0.9) | 503 (4.2) | 4 (0.5) | 493 (8.0) | 10.2 (0.06) |
| Turkey (5) | 77 (1.2) | 538 (3.9) | 18 (0.9) | 485 (7.3) | 5 (0.4) | 448 (9.0) | 10.1 (0.06) |
| United Arab Emirates | 77 (0.6) | 493 (1.9) | 17 (0.4) | 460 (2.7) | 6 (0.2) | 420 (4.7) | 10.2 (0.03) |
| Ireland | 77 (1.2) | 551 (2.5) | 20 (0.9) | 544 (3.9) | 3 (0.5) | 528 (8.9) | 10.1 (0.06) |
| Bahrain | 77 (1.2) | 487 (2.6) | 18 (0.8) | 462 (4.3) | 5 (0.6) | 450 (5.0) | 10.1 (0.07) |
| Kazakhstan | 77 (1.1) | 516 (2.7) | 22 (1.1) | 502 (3.3) | 1 (0.2) | ~ ~ | 10.1 (0.06) |
| Austria | 77 (1.2) | 542 (2.1) | 20 (1.0) | 535 (3.1) | 3 (0.3) | 512 (6.6) | 10.0 (0.05) |
| United States | 76 (0.9) | 543 (2.6) | 19 (0.7) | 524 (4.0) | 4 (0.3) | 488 (6.4) | 10.1 (0.04) |
| Belgium (Flemish) | 76 (1.0) | 534 (2.0) | 22 (0.9) | 529 (2.8) | 2 (0.3) | ~ ~ | 9.8 (0.04) |
| England | 76 (1.1) | 561 (3.6) | 21 (0.9) | 548 (4.5) | 4 (0.5) | 524 (9.4) | 10.0 (0.05) |
| Canada | 75 (0.8) | 514 (2.1) | 21 (0.7) | 505 (3.0) | 4 (0.3) | 481 (4.8) | 10.0 (0.04) |
| Slovak Republic | 75 (1.2) | 511 (3.7) | 21 (0.9) | 512 (4.8) | 4 (0.4) | 491 (8.8) | 9.9 (0.06) |
| Australia | 74 (1.2) | 522 (2.9) | 21 (0.9) | 505 (3.4) | 5 (0.5) | 473 (7.6) | 9.9 (0.06) |
| Saudi Arabia | 74 (1.0) | 413 (3.7) | 19 (0.8) | 374 (5.0) | 7 (0.5) | 355 (7.9) | 10.1 (0.06) |
| Pakistan | 74 (2.9) | 342 (12.1) | 18 (2.2) | 285 (12.4) | 8 (1.3) | 310 (13.3) | 10.2 (0.14) |
| Russian Federation | 74 (1.1) | 570 (3.8) | 24 (0.9) | 563 (3.5) | 3 (0.4) | 540 (8.0) | 9.8 (0.05) |
| Netherlands | 73 (1.1) | 540 (2.2) | 23 (1.0) | 536 (3.1) | 4 (0.4) | 506 (8.9) | 9.8 (0.05) |
| Czech Republic | 71 (1.2) | 536 (3.0) | 24 (0.9) | 533 (3.0) | 5 (0.5) | 504 (8.0) | 9.8 (0.05) |
| Germany | 71 (1.1) | 528 (2.3) | 24 (0.9) | 517 (3.7) | 5 (0.5) | 500 (8.2) | 9.7 (0.05) |
| Qatar | 71 (1.2) | 465 (3.4) | 21 (0.9) | 427 (6.0) | 8 (0.5) | 401 (6.9) | 9.8 (0.06) |
| Norway (5) | 70 (1.3) | 547 (2.6) | 25 (1.1) | 540 (3.5) | 5 (0.7) | 523 (9.5) | 9.6 (0.06) |
| Italy | 70 (1.1) | 519 (2.6) | 26 (0.8) | 508 (3.3) | 3 (0.5) | 478 (7.5) | 9.6 (0.05) |
| Kuwait | 70 (1.3) | 402 (5.5) | 22 (1.0) | 368 (5.8) | 8 (0.7) | 337 (8.1) | 9.9 (0.08) |
| New Zealand | 70 (1.3) | 491 (2.7) | 25 (1.0) | 487 (3.7) | 5 (0.5) | 465 (7.9) | 9.7 (0.05) |
| South Africa (5) | 70 (1.4) | 396 (3.6) | 21 (1.0) | 344 (4.1) | 10 (0.6) | 306 (4.1) | 9.8 (0.07) |
| Latvia | 68 (1.2) | 551 (2.7) | 27 (1.0) | 541 (3.6) | 5 (0.5) | 520 (5.8) | 9.5 (0.05) |
| Singapore | 66 (1.0) | 637 (3.7) | 28 (0.8) | 608 (4.6) | 6 (0.4) | 582 (6.4) | 9.6 (0.05) |
| Chile | 66 (1.1) | 450 (2.9) | 27 (1.0) | 436 (3.4) | 7 (0.5) | 397 (7.4) | 9.6 (0.05) |
| Croatia | 65 (1.2) | 513 (2.1) | 32 (1.2) | 503 (4.0) | 3 (0.3) | 506 (8.5) | 9.6 (0.05) |
| Finland | 65 (1.1) | 538 (2.4) | 30 (1.0) | 526 (3.6) | 5 (0.4) | 506 (5.8) | 9.5 (0.05) |
| Sweden | 64 (1.6) | 524 (3.5) | 31 (1.3) | 522 (3.3) | 5 (0.6) | 491 (7.7) | 9.5 (0.06) |
| France | 62 (1.1) | 486 (3.5) | 34 (0.9) | 487 (3.8) | 4 (0.5) | 459 (8.7) | 9.4 (0.04) |
| Chinese Taipei | 62 (1.2) | 608 (2.2) | 30 (0.9) | 590 (2.3) | 8 (0.7) | 564 (5.9) | 9.4 (0.05) |
| Poland | 60 (1.1) | 527 (3.0) | 32 (0.9) | 517 (3.1) | 8 (0.5) | 498 (4.9) | 9.2 (0.05) |
| Denmark | 58 (1.4) | 533 (2.3) | 35 (1.2) | 520 (3.2) | 7 (0.6) | 492 (5.5) | 9.1 (0.06) |
| Hong Kong SAR | 55 (1.5) | 613 (3.9) | 33 (1.0) | 592 (3.5) | 12 (1.0) | 573 (7.6) | 9.2 (0.07) |
| Philippines | 48 (2.0) | 333 (7.2) | 37 (1.3) | 280 (6.6) | 15 (1.0) | 245 (5.9) | 8.8 (0.09) |
| Japan | 43 (1.3) | 597 (2.4) | 47 (1.0) | 591 (2.1) | 10 (0.7) | 587 (4.9) | 8.5 (0.05) |
| Korea, Rep. of | 43 (1.4) | 614 (2.5) | 50 (1.1) | 592 (2.6) | 7 (0.7) | 570 (5.8) | 8.5 (0.05) |
| **International Average** | **74 (0.2)** | **508 (0.5)** | **21 (0.1)** | **488 (0.7)** | **5 (0.1)** | **466 (1.2)** | |
| **Benchmarking Participants** | | | | | | | |
| Madrid, Spain | 83 (0.9) | 521 (2.2) | 15 (0.8) | 508 (3.7) | 2 (0.3) | ~ ~ | 10.3 (0.04) |
| Dubai, UAE | 82 (0.7) | 548 (1.8) | 15 (0.7) | 532 (3.2) | 3 (0.3) | 504 (9.5) | 10.4 (0.04) |
| Ontario, Canada | 75 (1.1) | 517 (3.7) | 21 (0.9) | 502 (4.5) | 4 (0.4) | 482 (8.0) | 10.0 (0.05) |
| Quebec, Canada | 74 (1.5) | 533 (2.7) | 22 (1.3) | 530 (4.7) | 4 (0.5) | 496 (8.2) | 9.9 (0.07) |
| Abu Dhabi, UAE | 71 (0.9) | 454 (2.5) | 21 (0.6) | 425 (3.4) | 9 (0.5) | 391 (5.9) | 9.8 (0.05) |
| Moscow City, Russian Fed. | 69 (1.3) | 597 (2.4) | 27 (1.1) | 588 (2.8) | 5 (0.4) | 565 (7.3) | 9.6 (0.05) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 12.10: Instructional Clarity in Mathematics Lessons – Students' Reports

*Students' Reports*

| Country | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Jordan | 70 (1.5) | 431 (3.5) | 24 (1.1) | 404 (7.1) | 6 (0.6) | 395 (9.4) | 11.0 (0.07) |
| Turkey | 68 (1.4) | 510 (4.4) | 26 (1.0) | 469 (5.5) | 6 (0.7) | 452 (10.2) | 10.9 (0.07) |
| Egypt | 66 (1.2) | 424 (5.2) | 27 (0.8) | 401 (6.0) | 6 (0.6) | 391 (8.5) | 10.8 (0.06) |
| Georgia | 63 (1.8) | 470 (4.6) | 30 (1.4) | 447 (5.1) | 6 (0.8) | 449 (10.0) | 10.8 (0.08) |
| Lebanon | 61 (1.9) | 441 (3.2) | 32 (1.6) | 416 (4.3) | 7 (0.6) | 403 (6.4) | 10.7 (0.07) |
| Saudi Arabia | 60 (1.2) | 404 (2.8) | 32 (1.0) | 382 (3.1) | 8 (0.5) | 374 (5.4) | 10.6 (0.05) |
| Romania | 60 (1.6) | 491 (4.9) | 27 (1.1) | 468 (5.7) | 12 (1.3) | 457 (6.6) | 10.5 (0.08) |
| Iran, Islamic Rep. of | 60 (1.2) | 457 (4.1) | 30 (0.8) | 432 (4.5) | 10 (0.8) | 424 (6.4) | 10.6 (0.06) |
| Oman | 56 (1.4) | 433 (3.0) | 35 (0.9) | 390 (3.6) | 9 (0.9) | 380 (8.3) | 10.3 (0.06) |
| United States | 55 (1.4) | 531 (4.7) | 33 (0.9) | 510 (5.0) | 12 (1.0) | 491 (6.1) | 10.4 (0.07) |
| United Arab Emirates | 55 (0.7) | 494 (2.1) | 33 (0.5) | 460 (2.4) | 12 (0.4) | 429 (3.6) | 10.3 (0.03) |
| Morocco | 52 (1.5) | 396 (3.1) | 34 (0.9) | 380 (2.2) | 14 (0.9) | 382 (3.8) | 10.1 (0.07) |
| South Africa (9) | 52 (0.9) | 395 (2.2) | 38 (0.7) | 386 (2.8) | 10 (0.5) | 387 (4.3) | 10.2 (0.04) |
| Bahrain | 52 (1.4) | 493 (2.5) | 35 (0.8) | 473 (2.6) | 13 (0.9) | 457 (4.0) | 10.2 (0.07) |
| Kuwait | 51 (1.5) | 413 (5.8) | 35 (0.9) | 398 (5.2) | 14 (1.1) | 386 (5.9) | 10.1 (0.07) |
| Israel | 50 (1.6) | 529 (5.6) | 36 (1.0) | 516 (4.6) | 14 (1.0) | 505 (6.7) | 10.1 (0.07) |
| Malaysia | 47 (1.5) | 470 (3.6) | 46 (1.2) | 455 (3.8) | 7 (0.8) | 439 (6.3) | 10.1 (0.06) |
| Portugal | 46 (2.2) | 509 (4.1) | 39 (1.3) | 495 (3.6) | 15 (1.8) | 488 (7.5) | 9.9 (0.11) |
| England | 45 (1.7) | 528 (5.5) | 40 (1.3) | 512 (7.1) | 15 (1.1) | 507 (6.8) | 9.9 (0.08) |
| Qatar | 45 (1.6) | 456 (4.7) | 39 (1.2) | 445 (5.4) | 17 (1.3) | 413 (5.6) | 9.8 (0.08) |
| Cyprus | 45 (1.5) | 519 (2.7) | 38 (1.2) | 494 (2.6) | 18 (1.1) | 475 (3.3) | 9.8 (0.07) |
| Ireland | 44 (1.4) | 527 (3.1) | 38 (1.1) | 523 (3.3) | 18 (1.2) | 522 (5.1) | 9.8 (0.07) |
| Kazakhstan | 44 (1.3) | 502 (4.1) | 52 (1.2) | 477 (3.7) | 4 (0.6) | 474 (11.1) | 10.1 (0.05) |
| Finland | 42 (1.3) | 526 (3.0) | 45 (1.0) | 502 (2.8) | 13 (1.0) | 481 (4.3) | 9.9 (0.06) |
| Russian Federation | 42 (1.3) | 557 (5.7) | 49 (1.0) | 536 (4.3) | 9 (0.8) | 526 (6.5) | 9.9 (0.05) |
| Italy | 42 (1.7) | 504 (3.7) | 46 (1.3) | 495 (2.9) | 12 (1.2) | 486 (4.7) | 9.8 (0.07) |
| Lithuania | 41 (1.8) | 538 (4.7) | 47 (1.1) | 511 (3.0) | 12 (1.2) | 502 (5.1) | 9.8 (0.08) |
| Singapore | 40 (1.2) | 632 (4.0) | 48 (0.9) | 609 (4.4) | 11 (0.8) | 586 (7.6) | 9.9 (0.05) |
| Norway (9) | 40 (1.7) | 521 (3.2) | 45 (1.1) | 501 (2.5) | 15 (1.0) | 468 (5.6) | 9.8 (0.07) |
| Australia | 40 (1.5) | 540 (4.3) | 42 (1.0) | 511 (3.8) | 18 (1.3) | 487 (4.4) | 9.7 (0.08) |
| New Zealand | 39 (1.4) | 495 (3.6) | 43 (0.9) | 480 (3.7) | 18 (1.3) | 464 (6.5) | 9.7 (0.07) |
| Hungary | 38 (1.6) | 539 (3.8) | 42 (1.0) | 508 (3.4) | 20 (1.5) | 492 (5.8) | 9.6 (0.08) |
| Chinese Taipei | 38 (1.2) | 639 (3.4) | 50 (1.0) | 604 (3.2) | 12 (0.8) | 565 (5.7) | 9.8 (0.06) |
| Sweden | 35 (1.7) | 511 (3.2) | 48 (1.2) | 503 (3.5) | 17 (1.4) | 490 (4.4) | 9.5 (0.08) |
| Chile | 33 (1.3) | 451 (3.7) | 54 (1.0) | 440 (3.4) | 13 (1.2) | 424 (4.7) | 9.6 (0.06) |
| France | 32 (1.8) | 491 (3.9) | 55 (1.5) | 483 (2.7) | 14 (1.3) | 464 (4.1) | 9.5 (0.08) |
| Hong Kong SAR | 28 (1.6) | 601 (5.3) | 51 (1.4) | 578 (5.3) | 21 (1.5) | 554 (6.5) | 9.2 (0.08) |
| Japan | 18 (1.0) | 618 (3.8) | 60 (1.1) | 596 (3.4) | 22 (1.5) | 573 (3.3) | 8.8 (0.06) |
| Korea, Rep. of | 18 (1.0) | 650 (3.8) | 63 (1.1) | 608 (3.2) | 19 (1.1) | 564 (4.8) | 8.8 (0.05) |
| **International Average** | **46 (0.2)** | **504 (0.6)** | **41 (0.2)** | **482 (0.7)** | **13 (0.2)** | **467 (1.0)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 61 (0.9) | 549 (2.5) | 31 (0.9) | 522 (2.9) | 8 (0.5) | 501 (4.5) | 10.6 (0.04) |
| Ontario, Canada | 59 (2.2) | 542 (5.0) | 33 (1.5) | 516 (4.1) | 8 (1.0) | 507 (7.2) | 10.6 (0.10) |
| Western Cape, RSA (9) | 54 (1.7) | 441 (5.0) | 36 (1.1) | 441 (4.8) | 10 (0.9) | 450 (8.7) | 10.3 (0.07) |
| Gauteng, RSA (9) | 50 (1.7) | 425 (3.6) | 38 (1.1) | 416 (3.3) | 13 (1.3) | 424 (5.2) | 10.1 (0.08) |
| Abu Dhabi, UAE | 47 (1.1) | 464 (3.4) | 37 (0.8) | 422 (3.2) | 15 (0.8) | 396 (5.5) | 10.0 (0.06) |
| Quebec, Canada | 46 (2.1) | 551 (3.8) | 43 (1.4) | 542 (4.1) | 11 (1.1) | 521 (8.5) | 10.1 (0.09) |
| Moscow City, Russian Fed. | 41 (1.7) | 588 (4.9) | 49 (1.4) | 569 (4.5) | 10 (1.0) | 555 (7.7) | 9.8 (0.07) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Disorderly Behavior During Mathematics Lessons

Good classroom management and having students who pay attention and focus on the lessons help create a classroom environment conducive to student learning. Students were asked about the frequency of disorderly behavior during mathematics lessons, including whether students do not listen to what the teacher says, there is disruptive noise, it is too disorderly for students to work well, the teacher has to wait a long time for students to quiet down, students interrupt the teacher, and the teacher has to keep telling students to follow the classroom rules. These responses were combined into the *Disorderly Behavior During Mathematics Lessons* scale, described in Exhibit 12.11 (see About the Scale). Exhibits 12.12 and 12.13 present students' reports about disorderly behavior for fourth and eighth grades, respectively. Countries are ordered by the percentage reporting disorderly behavior in "few or no lessons."

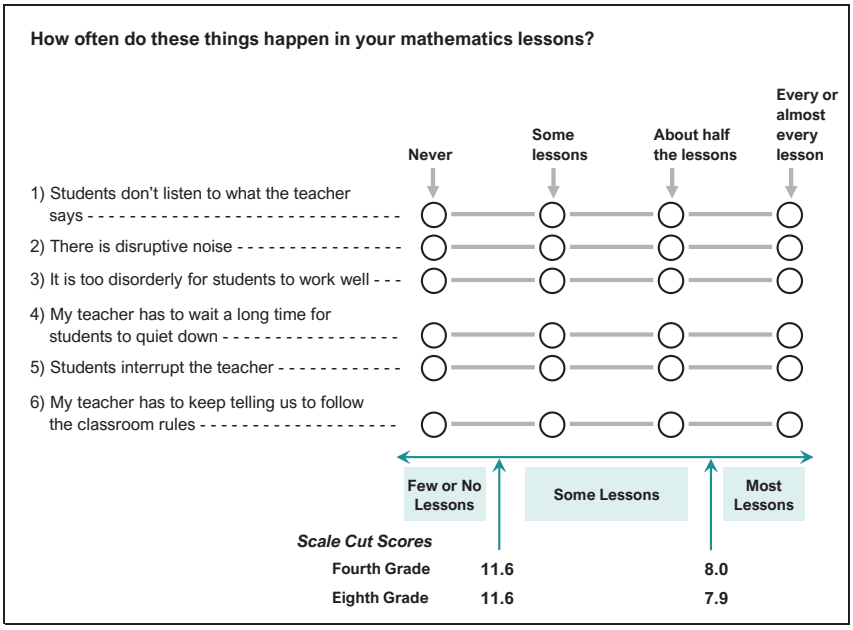
In fourth and eighth grades, about two-third of students (68% in fourth grade and 65% in eighth grade) reported disorderly behavior in "some lessons," on average, and about one-fifth (18% in fourth grade and 21% in eighth grade) reported it in "few or no lessons." Fourteen percent of fourth grade students and 13 percent of eighth grade students reported disorderly behavior in "most lessons." Internationally and in most countries, there was a clear negative association between the frequency of disorderly behavior and average student achievement, with average achievement decreasing with higher frequencies of disorderly behavior. For example, in eighth grade, students reporting disorderly behavior in "few or no lessons" had an average score of 502, followed by 485 for students reporting it in "some lessons," and 466 for students reporting it in "most lessons."

## Exhibit 12.11: Disorderly Behavior During Mathematics Lessons

*Students' Reports*

### About the Scale

Students were scored according to their responses to six statements on the *Disorderly Behavior During Mathematics Lessons* scale. Cut scores divide the scale into three categories. Students who reported disorderly behavior in **Few or No Lessons** had a score at or above the cut score corresponding to reporting that three of the six situations "never" happened in their mathematics lessons and the other three happened in "some lessons," on average. Students who reported disorderly behavior in **Most Lessons** had a score at or below the cut score corresponding to reporting that three of the six situations happened in "every or almost every lesson" and the other three happened in "about half the lessons," on average. All other students reported disorderly behavior in **Some Lessons**.




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## Exhibit 12.12: Disorderly Behavior During Mathematics Lessons

*Students' Reports*

| Country | Few or No Lessons | | Some Lessons | | Most Lessons | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 41 (1.8) | 598 (2.4) | 54 (1.6) | 592 (2.3) | 5 (0.5) | 570 (6.9) | 11.3 (0.09) |
| Armenia | 37 (1.7) | 504 (3.5) | 52 (1.4) | 505 (2.7) | 11 (0.7) | 479 (4.4) | 11.0 (0.10) |
| Albania | 35 (2.5) | 503 (5.4) | 59 (2.4) | 496 (3.7) | 6 (1.0) | 446 (11.3) | 10.9 (0.12) |
| Kazakhstan | 33 (1.9) | 524 (3.7) | 60 (1.6) | 509 (2.7) | 7 (0.7) | 492 (5.0) | 10.8 (0.10) |
| Georgia | 33 (1.8) | 490 (5.2) | 57 (1.6) | 481 (4.1) | 9 (1.0) | 451 (7.8) | 10.8 (0.10) |
| Kosovo | 32 (1.5) | 447 (3.8) | 58 (1.4) | 454 (3.1) | 9 (0.8) | 400 (7.1) | 10.7 (0.07) |
| Bulgaria | 30 (2.1) | 532 (4.3) | 60 (1.5) | 519 (3.3) | 10 (1.8) | 461 (16.2) | 10.6 (0.14) |
| North Macedonia | 29 (2.1) | 488 (6.8) | 59 (2.1) | 480 (5.6) | 12 (0.9) | 424 (8.8) | 10.5 (0.09) |
| Azerbaijan | 29 (1.9) | 522 (3.5) | 62 (1.7) | 524 (3.0) | 9 (0.7) | 510 (5.9) | 10.6 (0.08) |
| Saudi Arabia | 27 (1.3) | 418 (5.4) | 62 (1.2) | 398 (3.8) | 11 (0.6) | 367 (5.3) | 10.4 (0.07) |
| Lithuania | 26 (2.0) | 551 (4.1) | 67 (1.7) | 542 (3.1) | 7 (0.7) | 516 (7.4) | 10.6 (0.09) |
| Montenegro | 26 (1.0) | 457 (2.7) | 62 (0.9) | 459 (2.2) | 12 (0.8) | 424 (6.0) | 10.4 (0.05) |
| Morocco | 25 (2.2) | 384 (8.2) | 65 (2.1) | 389 (4.6) | 10 (0.8) | 357 (6.6) | 10.4 (0.11) |
| Serbia | 24 (1.6) | 511 (5.4) | 65 (1.5) | 512 (3.7) | 11 (1.1) | 485 (6.0) | 10.3 (0.08) |
| United Arab Emirates | 24 (0.9) | 498 (2.6) | 61 (0.8) | 482 (1.9) | 15 (0.4) | 463 (3.3) | 10.2 (0.05) |
| Russian Federation | 24 (1.8) | 576 (5.3) | 60 (1.4) | 570 (3.6) | 16 (1.2) | 546 (4.4) | 10.1 (0.11) |
| Oman | 23 (1.6) | 449 (6.4) | 64 (1.5) | 431 (4.1) | 13 (0.7) | 413 (7.1) | 10.2 (0.09) |
| Pakistan | 23 (3.6) | 356 (16.5) | 67 (2.7) | 326 (11.7) | 10 (1.6) | 292 (12.3) | 10.3 (0.24) |
| Iran, Islamic Rep. of | 22 (1.6) | 430 (9.0) | 61 (1.5) | 450 (4.3) | 17 (1.0) | 443 (4.6) | 10.1 (0.08) |
| Hong Kong SAR | 21 (1.3) | 607 (4.1) | 67 (1.4) | 602 (3.6) | 12 (1.1) | 591 (8.0) | 10.2 (0.08) |
| Bosnia and Herzegovina | 20 (1.4) | 456 (3.8) | 62 (1.2) | 458 (2.6) | 18 (1.1) | 432 (3.8) | 9.9 (0.08) |
| Turkey (5) | 20 (1.3) | 540 (6.3) | 67 (1.0) | 523 (4.6) | 13 (0.9) | 505 (7.5) | 10.1 (0.07) |
| Hungary | 19 (1.3) | 537 (3.9) | 70 (1.1) | 524 (2.8) | 11 (0.9) | 498 (5.6) | 10.2 (0.07) |
| Korea, Rep. of | 19 (1.6) | 601 (4.3) | 73 (1.3) | 600 (2.3) | 8 (0.8) | 596 (5.0) | 10.3 (0.08) |
| Bahrain | 19 (1.3) | 491 (4.4) | 65 (1.1) | 480 (2.7) | 16 (0.8) | 467 (4.0) | 10.0 (0.07) |
| Austria | 18 (1.4) | 556 (3.2) | 65 (1.1) | 541 (2.2) | 16 (1.1) | 516 (4.6) | 9.9 (0.09) |
| Ireland | 18 (1.3) | 565 (4.1) | 74 (1.3) | 549 (2.5) | 8 (0.7) | 515 (6.9) | 10.2 (0.06) |
| Chinese Taipei | 18 (1.3) | 602 (3.6) | 72 (1.1) | 599 (2.3) | 10 (0.8) | 598 (3.9) | 10.1 (0.07) |
| Slovak Republic | 17 (1.6) | 523 (6.5) | 66 (1.7) | 512 (3.5) | 17 (1.4) | 489 (5.9) | 9.8 (0.09) |
| Croatia | 17 (1.3) | 516 (4.3) | 68 (1.5) | 511 (2.3) | 15 (1.6) | 496 (4.9) | 9.9 (0.09) |
| Qatar | 17 (1.2) | 460 (4.7) | 66 (1.2) | 455 (3.8) | 17 (0.9) | 429 (4.8) | 9.8 (0.07) |
| Czech Republic | 16 (1.7) | 552 (5.1) | 67 (1.6) | 535 (2.6) | 17 (1.2) | 508 (4.8) | 9.9 (0.09) |
| Latvia | 15 (1.3) | 561 (3.3) | 72 (1.0) | 547 (2.8) | 12 (0.9) | 526 (5.5) | 10.0 (0.08) |
| Finland | 15 (1.1) | 538 (4.0) | 77 (1.0) | 532 (2.6) | 8 (0.7) | 525 (5.1) | 10.2 (0.05) |
| Northern Ireland | 14 (1.2) | 592 (5.4) | 77 (1.2) | 566 (2.8) | 9 (0.9) | 527 (7.2) | 10.0 (0.06) |
| Kuwait | 14 (1.5) | 393 (8.0) | 68 (1.6) | 393 (5.1) | 18 (0.9) | 375 (6.6) | 9.6 (0.07) |
| Poland | 13 (1.1) | 527 (5.3) | 67 (1.1) | 525 (2.7) | 19 (1.2) | 505 (4.1) | 9.6 (0.08) |
| England | 11 (1.1) | 587 (8.2) | 74 (1.1) | 558 (3.3) | 14 (1.1) | 530 (5.1) | 9.8 (0.07) |
| Cyprus | 11 (0.8) | 552 (4.8) | 73 (1.0) | 535 (3.0) | 15 (1.2) | 507 (4.0) | 9.7 (0.06) |
| Belgium (Flemish) | 11 (1.2) | 547 (4.3) | 80 (1.2) | 533 (1.9) | 9 (0.7) | 514 (5.3) | 9.9 (0.06) |
| Norway (5) | 11 (1.0) | 549 (6.2) | 79 (0.9) | 545 (2.3) | 10 (0.8) | 532 (6.1) | 10.0 (0.06) |
| Portugal | 11 (0.8) | 533 (4.9) | 72 (0.9) | 529 (2.5) | 17 (1.0) | 503 (4.9) | 9.7 (0.05) |
| France | 10 (0.9) | 509 (6.1) | 74 (1.2) | 488 (3.1) | 16 (1.1) | 455 (5.1) | 9.6 (0.06) |
| Sweden | 10 (1.3) | 537 (5.9) | 75 (1.3) | 523 (2.8) | 15 (1.3) | 507 (4.6) | 9.7 (0.09) |
| United States | 9 (0.6) | 558 (5.3) | 70 (0.7) | 542 (2.7) | 21 (0.8) | 511 (3.2) | 9.4 (0.04) |
| South Africa (5) | 9 (0.7) | 387 (7.7) | 68 (0.8) | 374 (3.7) | 23 (0.7) | 378 (4.5) | 9.2 (0.05) |
| Netherlands | 8 (0.9) | 539 (4.9) | 80 (1.0) | 539 (2.2) | 11 (1.0) | 530 (4.9) | 9.7 (0.06) |
| Canada | 7 (0.5) | 531 (6.0) | 77 (0.6) | 514 (2.0) | 16 (0.6) | 491 (3.3) | 9.5 (0.03) |
| Malta | 7 (0.4) | 511 (4.3) | 73 (0.7) | 513 (1.6) | 19 (0.6) | 493 (3.0) | 9.4 (0.02) |
| Germany | 7 (0.7) | 534 (6.1) | 72 (1.1) | 527 (2.4) | 20 (1.1) | 512 (4.0) | 9.3 (0.06) |
| Australia | 7 (0.8) | 542 (6.4) | 76 (0.9) | 522 (2.6) | 17 (1.1) | 479 (5.5) | 9.5 (0.06) |
| Denmark | 7 (1.0) | 533 (6.6) | 80 (1.2) | 527 (1.9) | 13 (1.0) | 512 (5.6) | 9.7 (0.06) |
| Spain | 7 (0.6) | 513 (6.5) | 77 (1.0) | 508 (2.0) | 16 (1.0) | 478 (4.2) | 9.4 (0.05) |
| Italy | 7 (0.8) | 518 (4.8) | 72 (1.1) | 518 (2.7) | 22 (1.1) | 506 (3.8) | 9.2 (0.05) |
| New Zealand | 6 (0.5) | 525 (6.6) | 73 (1.1) | 495 (2.9) | 21 (1.0) | 455 (4.0) | 9.3 (0.05) |
| Philippines | 6 (0.9) | 309 (8.9) | 78 (1.4) | 305 (6.5) | 16 (1.4) | 274 (8.5) | 9.3 (0.07) |
| Chile | 5 (0.5) | 449 (6.4) | 61 (1.1) | 448 (2.9) | 34 (1.3) | 433 (3.7) | 8.7 (0.05) |
| Singapore | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **18 (0.2)** | **511 (0.8)** | **68 (0.2)** | **502 (0.5)** | **14 (0.1)** | **478 (0.8)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 24 (1.4) | 549 (3.2) | 62 (1.3) | 545 (2.1) | 14 (0.9) | 531 (4.0) | 10.3 (0.09) |
| Abu Dhabi, UAE | 18 (1.1) | 456 (5.5) | 65 (1.1) | 444 (2.4) | 17 (0.7) | 420 (3.9) | 9.9 (0.06) |
| Moscow City, Russian Fed. | 18 (1.3) | 613 (2.9) | 65 (1.2) | 593 (2.4) | 17 (1.2) | 573 (3.6) | 9.9 (0.08) |
| Quebec, Canada | 10 (1.2) | 546 (5.2) | 76 (1.1) | 532 (2.7) | 14 (1.0) | 517 (3.9) | 9.7 (0.07) |
| Madrid, Spain | 7 (0.9) | 524 (6.5) | 79 (1.1) | 523 (1.9) | 14 (1.0) | 494 (5.0) | 9.5 (0.07) |
| Ontario, Canada | 6 (0.7) | 539 (13.5) | 77 (1.0) | 515 (3.4) | 17 (1.0) | 493 (5.1) | 9.4 (0.05) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 12.13: Disorderly Behavior During Mathematics Lessons

*Students' Reports*

| Country | Few or No Lessons | | Some Lessons | | Most Lessons | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Japan | 60 (1.8) | 599 (3.0) | 38 (1.7) | 588 (3.3) | 2 (0.3) | ~ ~ | 11.8 (0.09) |
| Kazakhstan | 42 (1.4) | 499 (4.1) | 55 (1.3) | 480 (3.7) | 3 (0.4) | 476 (12.2) | 11.2 (0.05) |
| Ireland | 35 (1.4) | 548 (2.9) | 55 (1.3) | 516 (3.1) | 10 (0.8) | 490 (5.5) | 10.6 (0.06) |
| Russian Federation | 33 (1.8) | 556 (5.8) | 58 (1.5) | 540 (4.8) | 9 (0.8) | 521 (6.2) | 10.6 (0.09) |
| Chinese Taipei | 32 (1.5) | 615 (3.4) | 60 (1.2) | 612 (3.1) | 9 (0.8) | 607 (6.5) | 10.6 (0.08) |
| Romania | 31 (1.8) | 506 (6.5) | 60 (1.5) | 473 (4.3) | 9 (0.8) | 438 (7.8) | 10.5 (0.08) |
| Oman | 26 (1.1) | 423 (3.8) | 66 (0.9) | 411 (3.2) | 8 (0.6) | 400 (6.9) | 10.3 (0.06) |
| United Arab Emirates | 25 (0.9) | 501 (3.5) | 62 (0.7) | 472 (1.8) | 13 (0.5) | 440 (3.7) | 10.2 (0.04) |
| Lithuania | 25 (1.5) | 534 (4.0) | 65 (1.3) | 518 (3.2) | 10 (1.0) | 508 (7.1) | 10.4 (0.08) |
| Turkey | 25 (1.7) | 513 (6.4) | 64 (1.2) | 490 (4.8) | 11 (0.9) | 490 (7.6) | 10.3 (0.09) |
| France | 25 (2.0) | 489 (3.9) | 64 (1.6) | 482 (2.8) | 11 (1.1) | 475 (5.4) | 10.2 (0.10) |
| Iran, Islamic Rep. of | 25 (1.1) | 461 (5.4) | 65 (0.9) | 443 (3.5) | 11 (0.7) | 429 (6.5) | 10.2 (0.06) |
| Korea, Rep. of | 25 (1.8) | 600 (4.7) | 66 (1.4) | 608 (3.3) | 9 (0.9) | 620 (5.2) | 10.3 (0.09) |
| Israel | 24 (1.3) | 548 (6.5) | 63 (1.3) | 519 (4.6) | 12 (0.7) | 483 (6.5) | 10.2 (0.06) |
| Georgia | 23 (1.6) | 474 (6.9) | 68 (1.6) | 460 (4.2) | 9 (0.8) | 446 (10.8) | 10.2 (0.08) |
| Hungary | 23 (1.5) | 533 (5.0) | 66 (1.3) | 516 (3.2) | 11 (0.9) | 488 (6.4) | 10.2 (0.08) |
| United States | 23 (1.2) | 555 (5.3) | 63 (1.0) | 514 (4.8) | 14 (0.8) | 482 (5.3) | 10.0 (0.07) |
| Jordan | 22 (1.1) | 437 (6.0) | 65 (1.1) | 424 (3.8) | 12 (0.8) | 391 (6.1) | 10.0 (0.06) |
| Saudi Arabia | 21 (0.9) | 403 (4.6) | 66 (1.0) | 395 (2.7) | 12 (0.7) | 382 (4.6) | 10.0 (0.05) |
| Finland | 21 (1.4) | 509 (3.6) | 69 (1.2) | 511 (2.8) | 10 (0.8) | 499 (4.9) | 10.1 (0.07) |
| Hong Kong SAR | 21 (1.5) | 577 (5.6) | 64 (1.2) | 583 (4.0) | 16 (1.1) | 563 (7.8) | 9.9 (0.09) |
| Lebanon | 21 (1.3) | 438 (4.3) | 64 (1.4) | 429 (3.2) | 15 (1.2) | 426 (7.0) | 9.9 (0.07) |
| Egypt | 18 (1.0) | 427 (7.0) | 69 (1.0) | 418 (4.8) | 13 (0.7) | 389 (8.9) | 9.8 (0.05) |
| England | 18 (1.5) | 554 (6.9) | 63 (1.2) | 519 (5.6) | 19 (1.2) | 481 (7.1) | 9.7 (0.08) |
| Norway (9) | 17 (1.4) | 509 (4.4) | 72 (1.4) | 504 (2.7) | 10 (0.9) | 496 (6.1) | 10.1 (0.07) |
| Qatar | 16 (1.1) | 465 (8.6) | 67 (1.1) | 446 (4.1) | 16 (0.9) | 415 (5.7) | 9.7 (0.07) |
| Bahrain | 16 (0.8) | 494 (5.9) | 68 (0.8) | 480 (2.5) | 16 (0.9) | 473 (4.4) | 9.6 (0.05) |
| Italy | 15 (1.6) | 513 (4.5) | 67 (1.5) | 497 (3.1) | 18 (1.5) | 487 (4.3) | 9.5 (0.09) |
| Kuwait | 15 (0.9) | 407 (7.0) | 69 (0.9) | 408 (4.9) | 16 (1.1) | 387 (5.3) | 9.6 (0.07) |
| Cyprus | 14 (1.3) | 524 (5.6) | 69 (1.2) | 500 (1.9) | 17 (1.2) | 491 (6.0) | 9.6 (0.08) |
| Morocco | 12 (0.7) | 405 (5.6) | 73 (0.8) | 388 (2.3) | 15 (0.8) | 382 (3.1) | 9.5 (0.05) |
| Sweden | 11 (0.9) | 506 (5.7) | 72 (1.1) | 505 (2.7) | 17 (1.3) | 495 (4.5) | 9.5 (0.07) |
| Australia | 11 (0.9) | 565 (7.5) | 65 (1.1) | 520 (3.9) | 24 (1.1) | 493 (4.2) | 9.2 (0.06) |
| Portugal | 11 (1.5) | 510 (6.5) | 64 (1.7) | 499 (3.8) | 25 (1.8) | 499 (5.2) | 9.2 (0.10) |
| South Africa (9) | 9 (0.5) | 421 (5.0) | 71 (0.5) | 388 (2.3) | 19 (0.5) | 384 (3.0) | 9.2 (0.04) |
| New Zealand | 9 (0.9) | 514 (7.4) | 69 (1.6) | 485 (3.2) | 23 (1.8) | 464 (6.5) | 9.2 (0.09) |
| Chile | 8 (0.9) | 452 (6.6) | 72 (1.2) | 442 (3.1) | 20 (1.3) | 435 (3.8) | 9.3 (0.07) |
| Malaysia | 7 (0.5) | 507 (6.0) | 85 (0.5) | 460 (3.1) | 8 (0.5) | 428 (6.4) | 9.6 (0.04) |
| Singapore | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **21 (0.2)** | **502 (0.9)** | **65 (0.2)** | **485 (0.6)** | **13 (0.2)** | **466 (1.0)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 29 (1.6) | 586 (5.0) | 62 (1.4) | 574 (4.6) | 10 (0.8) | 553 (7.8) | 10.4 (0.08) |
| Dubai, UAE | 28 (1.3) | 558 (3.5) | 63 (1.2) | 533 (2.4) | 10 (0.6) | 500 (5.1) | 10.4 (0.06) |
| Abu Dhabi, UAE | 19 (1.0) | 472 (5.6) | 64 (0.9) | 434 (3.4) | 17 (0.8) | 414 (4.6) | 9.8 (0.06) |
| Quebec, Canada | 17 (1.7) | 554 (4.7) | 68 (1.6) | 546 (3.9) | 15 (1.3) | 525 (7.4) | 9.7 (0.10) |
| Ontario, Canada | 17 (1.6) | 553 (6.2) | 66 (1.8) | 531 (4.2) | 17 (1.9) | 504 (8.5) | 9.7 (0.10) |
| Western Cape, RSA (9) | 13 (1.5) | 495 (8.7) | 65 (1.4) | 442 (4.5) | 22 (1.5) | 413 (5.1) | 9.3 (0.09) |
| Gauteng, RSA (9) | 11 (1.0) | 464 (7.9) | 68 (1.1) | 420 (3.0) | 20 (1.1) | 403 (4.3) | 9.3 (0.07) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Science Curriculum and Instruction

## Instructional Time in Science

Though many factors influence the relationship between amount of instructional time and student achievement—primarily, the quality of the instruction and the students' readiness to learn—instructional time remains a crucial component in considering students' opportunity to learn. Instructional time was calculated using principals' reports on the number of school days per year and the number of instructional hours per day and teachers' reports on the weekly number of hours of science instruction, as explained in Exhibit 13.1 (see About the Scale). Exhibits 13.2 and 13.3 present principals' and teachers' reports about the instructional hours overall per year and hours spent on science instruction in fourth grade and eighth grade, respectively. For countries teaching science as separate subjects in the eighth grade, the instructional time included the amount of time spent on each individual science subject. Countries are ordered by the number of hours per year for science instruction.

On average, the fourth grade students across the TIMSS 2019 countries received 895 hours per year of instruction across all subjects; 73 hours, or about 8 percent of the total, were devoted to science instruction. The number of hours devoted to science instruction ranged from a high of 158 hours in the Philippines to just 34 hours in Ireland. The amount of science instructional time relative to total instructional time also varied across countries, reflecting different approaches to organizing and addressing the science curriculum. It is notable, though, that there is much less science instructional time for fourth grade students across countries compared with mathematics. As shown in Exhibit 12.2, fourth grade students had an average of 154 hours of mathematics instruction, more than twice that for science (Exhibit 13.2). As might be anticipated, within-country of estimates instructional time can vary somewhat from the levels of instructional time established by policy.

The eighth grade students across the TIMSS 2019 countries received an average of 1,023 hours of instruction across all subjects; 137 hours, or about 13 percent of the total, were devoted to science instruction. The number of hours for science instruction ranged from 243 in Lebanon, where science is taught as separate subjects, to 70 in Italy. In nearly all of the countries that participated in TIMSS at the fourth and eighth grades, the number of hours devoted to science instruction increased between fourth and eighth grades—sometimes by three or more times the average hours in fourth grade—reflecting the increased emphasis on science in the curriculum by the eighth grade.

Exhibit 13.3 also includes, for countries teaching separate science subjects, the average number of hours for biology, chemistry, physics, and Earth science. In this subset of countries, students had an estimated 181 hours of science instruction. On average, the highest number of annual hours were devoted to instruction in physics (52 hours), followed by chemistry (51 hours), biology (45 hours), and Earth science (40 hours).

## Exhibit 13.1: Instructional Time Spent on Science

*Students' Results based on Principals' and Teachers' Reports*

### About the Scale

**Total Instructional Hours Per Year** = Principal Reports of School Days per Year × Principal Reports of Instructional Hours per Day

**Hours per Year for Science Instruction** = $\frac{\text{Teacher Reports of Weekly Science Instructional Hours}}{\text{Principal Reports of School Days per Week}}$ × Principal Reports of School Days per Year

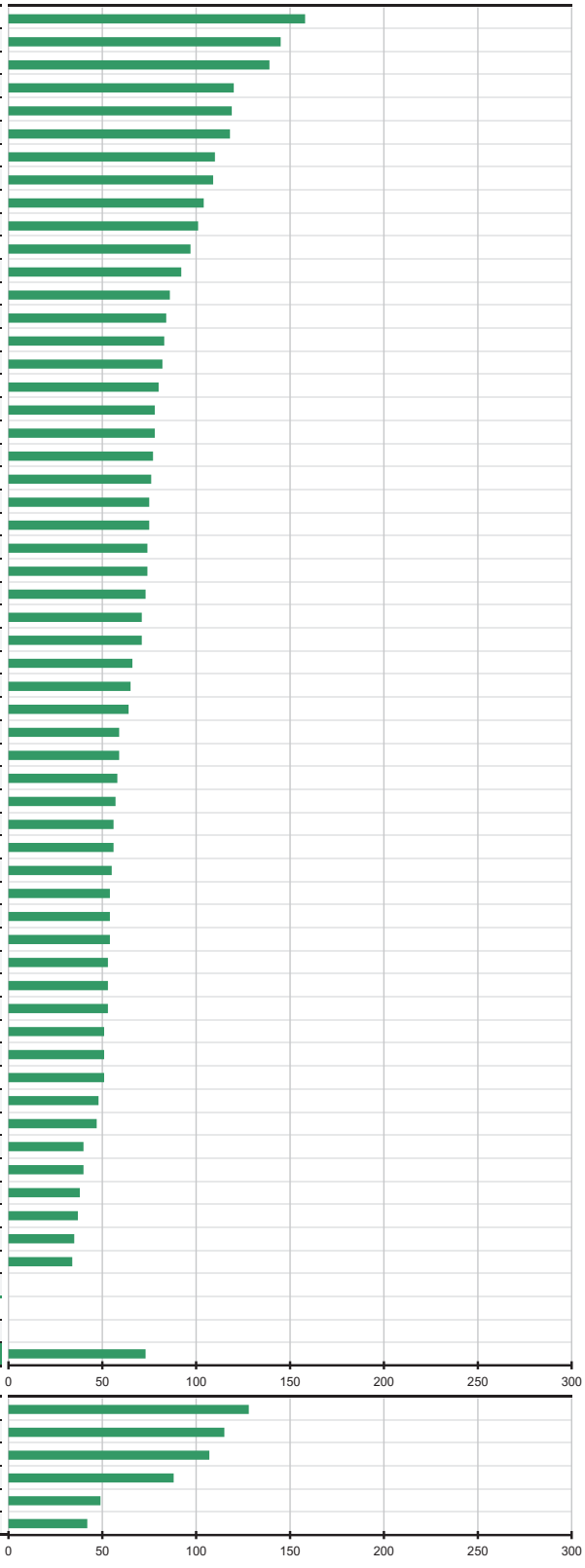
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Exhibit 13.2: Instructional Time Spent on Science

*Students' Results based on Principals' and Teachers' Reports*

| Country | Total Instructional Hours per Year | Hours per Year for Science Instruction |
|---|---|---|
| Philippines | 1225 (12.6) | 158 (3.4) |
| South Africa (5) | r 1205 (12.1) | r 145 (4.4) |
| Pakistan | 1218 (22.3) | s 139 (10.1) |
| Oman | r 1016 (13.9) | r 120 (1.9) |
| United Arab Emirates | r 1034 (3.9) | s 119 (1.7) |
| Bahrain | 1012 (8.2) | 118 (2.8) |
| Spain | 869 (7.1) | 110 (3.3) |
| Turkey (5) | 1001 (24.2) | 109 (4.7) |
| Portugal | 887 (14.8) | 104 (3.1) |
| Qatar | 1011 (11.8) | 101 (3.8) |
| Chile | r 1186 (22.3) | r 97 (3.0) |
| Japan | 904 (4.9) | 92 (0.6) |
| Chinese Taipei | 953 (8.9) | 86 (0.9) |
| Singapore | 1009 (0.0) | 84 (0.9) |
| United States | 1106 (8.4) | 83 (2.4) |
| Croatia | 859 (26.2) | 82 (1.6) |
| Canada | 951 (3.9) | r 80 (2.0) |
| Iran, Islamic Rep. of | 627 (6.0) | 78 (1.1) |
| Kuwait | r 899 (24.3) | r 78 (4.2) |
| Serbia | 794 (19.2) | 77 (4.9) |
| Austria | 759 (3.1) | r 76 (2.0) |
| Montenegro | 653 (1.6) | 75 (2.5) |
| Sweden | r 854 (10.7) | s 75 (2.2) |
| Denmark | r 1043 (10.4) | r 74 (1.5) |
| Bosnia and Herzegovina | 851 (35.9) | 74 (2.6) |
| Italy | 1098 (15.0) | 73 (1.5) |
| Finland | 746 (9.9) | 71 (1.6) |
| Korea, Rep. of | 694 (8.7) | 71 (1.5) |
| Saudi Arabia | 1056 (18.0) | r 66 (3.9) |
| Norway (5) | r 868 (14.4) | s 65 (1.8) |
| Slovak Republic | 784 (9.9) | 64 (1.5) |
| Lithuania | 725 (10.0) | 59 (1.4) |
| Kosovo | 777 (32.0) | 59 (2.3) |
| North Macedonia | 818 (22.0) | 58 (2.0) |
| Georgia | 750 (18.7) | 57 (1.8) |
| Germany | r 833 (10.1) | s 56 (3.9) |
| Hungary | 842 (13.8) | 56 (2.9) |
| Poland | r 737 (10.1) | s 55 (0.9) |
| Albania | 729 (10.3) | 54 (0.7) |
| Morocco | 1081 (20.4) | 54 (1.5) |
| Armenia | 752 (6.4) | 54 (1.0) |
| Australia | r 1015 (11.8) | s 53 (2.0) |
| Azerbaijan | 731 (19.4) | 53 (0.8) |
| Latvia | 689 (8.9) | 53 (1.4) |
| Czech Republic | 763 (8.9) | 51 (1.5) |
| Malta | 930 (1.4) | 51 (0.2) |
| Cyprus | 849 (10.6) | 51 (1.8) |
| Russian Federation | 663 (6.8) | 48 (1.0) |
| France | r 820 (7.4) | r 47 (1.8) |
| New Zealand | 917 (5.7) | r 40 (2.9) |
| Kazakhstan | 732 (14.0) | r 40 (3.3) |
| Northern Ireland | r 947 (7.1) | r 38 (2.8) |
| Bulgaria | 700 (14.9) | 37 (0.7) |
| Netherlands | s 1049 (10.3) | s 35 (3.2) |
| Ireland | 925 (5.0) | 34 (0.9) |
| Belgium (Flemish) | r 951 (14.6) | - - |
| England | s 989 (11.2) | y - - |
| Hong Kong SAR | r 1022 (14.3) | y - - |
| **International Average** | **895 (1.9)** | **73 (0.4)** |
| **Benchmarking Participants** | | |
| Abu Dhabi, UAE | r 1075 (3.2) | s 128 (2.9) |
| Madrid, Spain | 909 (12.5) | 115 (3.5) |
| Dubai, UAE | r 1038 (0.6) | s 107 (2.6) |
| Ontario, Canada | 954 (7.5) | s 88 (3.8) |
| Moscow City, Russian Fed. | 645 (9.6) | 49 (1.1) |
| Quebec, Canada | 922 (8.2) | r 42 (1.9) |



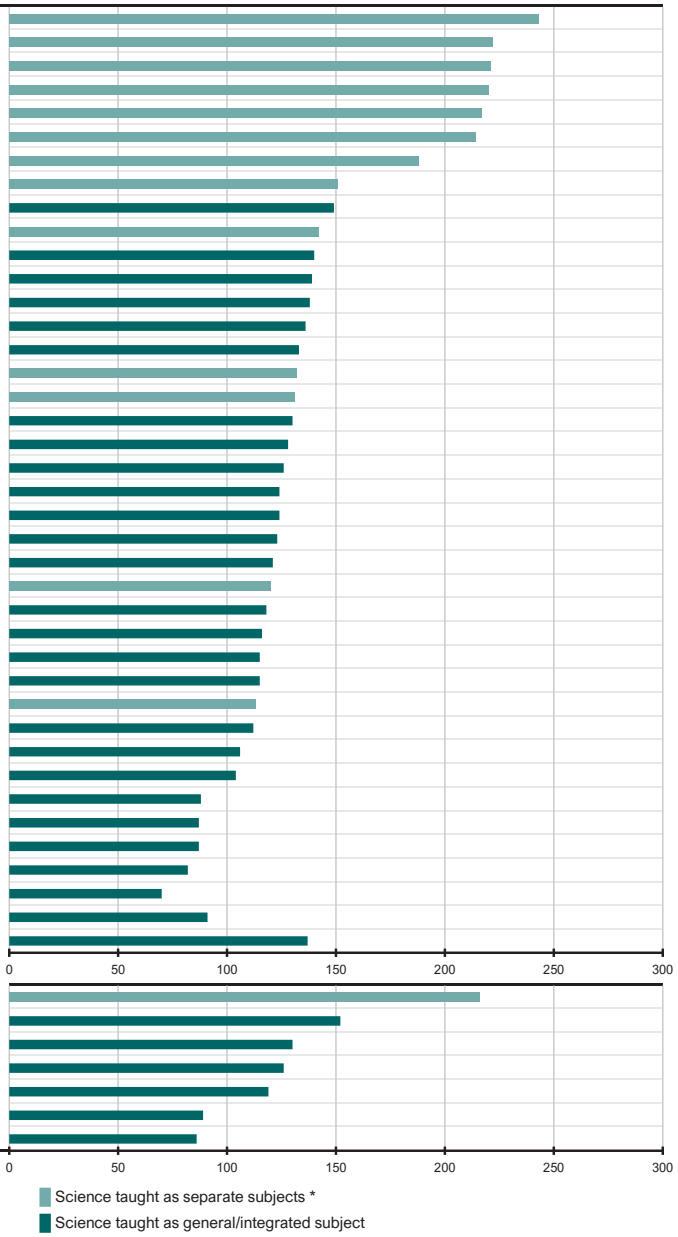

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 13.3: Instructional Time Spent on Science

*Students' Results based on Principals' and Teachers' Reports*

| Country | Total Instructional Hours per Year | Hours per Year for Science Instruction * |
|---|---|---|
| Lebanon * | 960 (7.3) | 243 (8.8) |
| Georgia * | 850 (14.5) | 222 (6.6) |
| Kazakhstan * | 886 (15.7) | 221 (5.5) |
| Russian Federation * | 868 (13.3) | 220 (6.7) |
| Lithuania * | 918 (12.6) | 217 (4.5) |
| Hungary * | 899 (11.5) | r 214 (5.4) |
| Romania * | 926 (19.8) | 188 (10.4) |
| Morocco * | r 1341 (30.8) | r 151 (2.1) |
| Oman | r 1056 (18.9) | s 149 (3.6) |
| Finland * | 912 (9.4) | 142 (3.0) |
| United States | 1148 (9.9) | s 140 (3.6) |
| United Arab Emirates | r 1094 (2.7) | s 139 (1.5) |
| Bahrain | 1115 (0.6) | 138 (4.1) |
| Chinese Taipei | 1137 (12.3) | 136 (2.1) |
| Japan | 1018 (3.0) | 133 (0.8) |
| Portugal * | 1138 (31.4) | 132 (2.9) |
| Sweden * | r 926 (11.4) | 131 (6.5) |
| Malaysia | 1165 (18.7) | 130 (3.3) |
| South Africa (9) | s 1212 (13.5) | s 128 (3.6) |
| Israel | 1118 (13.6) | r 126 (2.8) |
| New Zealand | r 967 (10.2) | r 124 (2.7) |
| Australia | 1013 (6.8) | r 124 (1.8) |
| Qatar | 1090 (9.9) | 123 (3.8) |
| Turkey | 1009 (27.5) | 121 (4.6) |
| Cyprus * | r 882 (1.0) | s 120 (1.4) |
| Kuwait | r 982 (21.2) | r 118 (3.5) |
| Saudi Arabia | r 1069 (18.9) | r 116 (4.6) |
| Chile | 1221 (20.5) | r 115 (4.1) |
| Jordan | 1020 (13.0) | 115 (2.2) |
| France * | r 1112 (19.3) | s 113 (1.4) |
| Singapore | 1053 (0.0) | 112 (1.9) |
| Egypt | s 1110 (34.6) | s 106 (3.1) |
| Hong Kong SAR | 999 (12.6) | r 104 (3.3) |
| Norway (9) | r 949 (8.2) | s 88 (2.2) |
| Korea, Rep. of | 933 (10.7) | 87 (3.0) |
| Ireland | 973 (4.7) | r 87 (1.4) |
| Iran, Islamic Rep. of | 768 (8.1) | 82 (2.7) |
| Italy | 1065 (11.2) | 70 (1.6) |
| England | s 995 (13.3) | x 91 (7.7) |
| **International Average** | **1023 (2.5)** | **137 (0.7)** |
| **Benchmarking Participants** | | |
| Moscow City, Russian Fed. * | 825 (8.2) | 216 (3.6) |
| Abu Dhabi, UAE | r 1138 (3.5) | s 152 (2.6) |
| Dubai, UAE | r 1066 (1.0) | s 130 (2.8) |
| Gauteng, RSA (9) | s 1193 (21.1) | s 126 (4.1) |
| Western Cape, RSA (9) | r 1190 (11.6) | s 119 (3.3) |
| Ontario, Canada | r 966 (8.2) | x 89 (4.3) |
| Quebec, Canada | r 936 (16.4) | x 86 (9.5) |




* For countries teaching science as separate subjects, hours per year for science instruction is based on total hours across subjects.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 13.3: Instructional Time Spent on Science

*Students' Results based on Principals' and Teachers' Reports*

**(Continued)**

### Separate Science Results

| Country | Hours per Year for Instruction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | All Science Subjects | | Biology | | Chemistry | | Physics | | Earth Science | |
| Lebanon | | 243 (8.8) | | 83 (4.7) | | 78 (3.3) | r | 82 (3.8) | | - - |
| Georgia | | 222 (6.6) | | 53 (2.7) | | 55 (2.7) | | 58 (2.1) | r | 55 (2.8) |
| Kazakhstan | | 221 (5.5) | | 56 (2.0) | | 57 (2.3) | | 55 (1.4) | | 53 (1.9) |
| Russian Federation | | 220 (6.7) | | 54 (2.4) | | 54 (1.7) | | 60 (3.0) | | 53 (1.4) |
| Lithuania | | 217 (4.5) | | 36 (1.9) | | 62 (1.7) | | 63 (1.7) | | 57 (1.6) |
| Hungary | r | 214 (5.4) | r | 52 (1.9) | r | 60 (2.3) | r | 50 (2.5) | r | 54 (1.7) |
| Romania | | 188 (10.4) | | 41 (3.7) | r | 75 (5.3) | | 72 (4.7) | | - - |
| Morocco | r | 151 (2.1) | r | 38 (0.6) | r | 38 (0.7) | r | 38 (0.7) | r | 38 (0.6) |
| Finland | | 142 (3.0) | | 33 (1.1) | | 38 (0.9) | | 38 (0.9) | | 33 (1.1) |
| Portugal | | 132 (2.9) | | 37 (0.7) | | 44 (1.2) | | 44 (1.2) | | 6 (0.1) |
| Sweden | | 131 (6.5) | | 44 (2.6) | | 42 (2.2) | | 45 (2.5) | | - - |
| Cyprus | s | 120 (1.4) | s | 25 (0.3) | s | 26 (0.6) | r | 40 (0.5) | r | 28 (0.8) |
| France | s | 113 (1.4) | | - - | | - - | | - - | | - - |
| **International Average** | | **181 (1.5)** | | **45 (0.6)** | | **51 (0.6)** | | **52 (0.6)** | | **40 (0.5)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Moscow City, Russian Fed. | | 216 (3.6) | | 52 (1.3) | | 54 (1.4) | | 57 (2.1) | | 53 (2.3) |

France teaches the science subjects in two courses: one for biology and Earth science and one for chemistry and physics.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Students Taught the TIMSS Science Topics

The science content domains and underlying topic areas assessed in TIMSS 2019 are documented in the TIMSS 2019 Science Framework, which was developed in collaboration with the participating countries. The science topics included in the TIMSS assessments do not represent the intersection of the topics that are universally taught but rather are a forward looking conception of science teaching and learning.

Exhibit 13.4 (see About the Scale) shows the science content domains—life science, physical science, and Earth science—and the 26 underlying topics in the TIMSS fourth grade science assessment. There were 7 topics in life science, 12 in physical science, and 7 in Earth science. Exhibit 13.6 (see About the Scale) shows the same information for the eighth grade science assessment, with its four content domains—biology, chemistry, physics, and Earth science, and the 26 underlying topics. There were 7 topics in biology, 8 in chemistry, 7 in physics, and 4 in Earth science. Teachers were asked to indicate, for each topic, whether it had been "mostly taught before this year" to students in the assessed class or "mostly taught this year," or had been "not taught or just introduced" to students. This information serves as an indicator of the "implemented curriculum." It can be examined together with information provided by TIMSS National Research Coordinators about whether each of the TIMSS 2019 science topics was included in their countries' intended curriculum through the fourth or eighth grade and, if so, whether the topics were intended to be taught to "all or almost all students" or "only the more able students." This information about the intended curriculum is reported in the *TIMSS 2019 Encyclopedia*.

Exhibit 13.5 presents fourth grade teachers' reports about the TIMSS science topics that had been taught to students in fourth grade classrooms either prior to or during the year of the TIMSS assessment. The exhibit shows, for each country and the international average, the percentage of students whose teachers reported that the students had been taught each of the topics (before or during the school year), averaged across all topics in each science content domain, and also across all topics in all science domains. Exhibit 13.7 presents parallel information for the eighth grade, reported by teachers about the TIMSS science topics in the eighth grade assessment.

In the fourth grade, according to their teachers, 62 percent of students, on average, had been taught the TIMSS science topics overall. On average, 73 percent of students had been taught the TIMSS life science topics, and 58 percent and 60 percent had been taught the TIMSS physical science and Earth science topics, respectively. There was, however, considerable variation from content domain to content domain and from country to country, reflecting differing science curricular emphases.

In the eighth grade, on average, 72 percent of students had been taught the TIMSS science topics overall, according to their teachers. Close to three-quarters, on average, had been taught the TIMSS biology topics (74%) and chemistry topics (74%) by the eighth grade, according to their teachers, with slightly less having been taught the Earth science (71%) and physics (68%) topics. There was considerable variation across countries with respect to topic coverage by content domain.

# Exhibit 13.4: Percentages of Students Taught the TIMSS Science Topics

*Students' Results based on Teachers' Reports*

## About the Scale

Exhibit 13.5 reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

**Choose the response that best describes when students in this class have been taught each topic.**

| | Mostly taught before this year | Mostly taught this year | Not yet taught or just introduced |
|---|---|---|---|
| **A. Life Science** | | | |
| 1) Physical and behavioral characteristics of living things and major groups of living things (e.g., mammals, birds, insects, flowering plants) | ○ | ○ | ○ |
| 2) Major body structures and their functions in humans, other animals, and plants | ○ | ○ | ○ |
| 3) Life cycles of common plants and animals (e.g., flowering plants, butterflies, frogs) | ○ | ○ | ○ |
| 4) Characteristics of plants and animals that are inherited | ○ | ○ | ○ |
| 5) Interactions between organisms and their environments (e.g., physical features and behaviors that help living things survive in their environments) | ○ | ○ | ○ |
| 6) Relationships in ecosystems (e.g., simple food chains, predator-prey relationships, competition) | ○ | ○ | ○ |
| 7) Human health (transmission and prevention of diseases, everyday behaviors that promote good health) | ○ | ○ | ○ |
| **B. Physical Science** | | | |
| 1) States of matter (solid, liquid, gas) and their properties (volume, shape) | ○ | ○ | ○ |
| 2) Classifying materials based on physical properties (e.g., weight/mass, volume, state of matter, conductivity of heat or electricity) | ○ | ○ | ○ |
| 3) Mixtures, including methods for separating a mixture into its components (e.g., sifting, filtering, evaporation, using a magnet) | ○ | ○ | ○ |
| 4) Properties of magnets (e.g., like poles repel and opposite poles attract, magnets can attract some objects) | ○ | ○ | ○ |
| 5) Physical changes in everyday life (e.g., changes of state, dissolving) | ○ | ○ | ○ |
| 6) Chemical changes in everyday life (e.g., decaying, burning, rusting, cooking) | ○ | ○ | ○ |
| 7) Common sources of energy (e.g., the Sun, wind, oil) and uses of energy (heating and cooling homes, providing light) | ○ | ○ | ○ |
| 8) Light and sound in everyday life (e.g., shadows and reflections, vibrating objects make sound) | ○ | ○ | ○ |
| 9) Heat transfer (e.g., energy flows from a hot object to a colder object) | ○ | ○ | ○ |
| 10) Electricity and simple electrical circuits (e.g., a circuit must be complete to work correctly) | ○ | ○ | ○ |
| 11) Forces that cause objects to move (e.g., gravity, pushing/pulling) or change their motion (e.g., friction) | ○ | ○ | ○ |
| 12) Simple machines (e.g., levers, pulleys, wheels, ramps) that help make motion easier | ○ | ○ | ○ |
| **C. Earth Science** | | | |
| 1) Physical makeup of Earth's surface (e.g., land and water in unequal proportions, sources of fresh and salt water) | ○ | ○ | ○ |
| 2) Earth's resources used in everyday life (e.g., water, wind, soil, forests, oil, natural gas, minerals) | ○ | ○ | ○ |
| 3) Changes in Earth's surface over time (e.g., mountain building, weathering, erosion) | ○ | ○ | ○ |
| 4) Fossils and what they can tell us about past conditions on Earth | ○ | ○ | ○ |
| 5) Weather and climate (e.g., daily, seasonal, and locational variations versus long term trends) | ○ | ○ | ○ |
| 6) Objects in the Solar System (the Sun, the Earth, the Moon, and other planets) and their movements | ○ | ○ | ○ |
| 7) Earth's motion and related patterns observed on Earth (e.g., day and night, seasons) | ○ | ○ | ○ |

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 13.5: Percentages of Students Taught the TIMSS Science Topics

*Students' Results based on Teachers' Reports*

The exhibit reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

| Country | All Science (26 Topics) | Life Science (7 Topics) | Physical Science (12 Topics) | Earth Science (7 Topics) |
|---|---|---|---|---|
| Albania | 66 (1.7) | 81 (1.7) | 68 (1.9) | 46 (3.2) |
| Armenia | r 60 (2.1) | r 67 (2.7) | r 46 (2.5) | 77 (1.9) |
| Australia | 65 (1.6) | 70 (1.9) | 63 (2.0) | r 65 (2.1) |
| Austria | 58 (1.3) | 70 (1.5) | 47 (1.5) | 65 (1.9) |
| Azerbaijan | 58 (2.3) | 65 (2.6) | r 42 (3.0) | 77 (2.0) |
| Bahrain | 77 (1.1) | 75 (1.3) | 76 (1.4) | 80 (1.3) |
| Belgium (Flemish) | 44 (1.4) | 54 (2.2) | 36 (1.9) | 49 (1.9) |
| Bosnia and Herzegovina | 40 (1.3) | 53 (2.0) | 34 (1.4) | 39 (1.5) |
| Bulgaria | 73 (1.1) | 89 (0.9) | 67 (1.6) | 69 (1.4) |
| Canada | r 56 (1.2) | r 68 (1.6) | r 50 (1.3) | r 53 (1.7) |
| Chile | r 69 (1.6) | r 81 (2.1) | r 63 (2.4) | r 67 (2.7) |
| Chinese Taipei | 50 (1.5) | 64 (2.1) | 51 (1.6) | 35 (1.8) |
| Croatia | 48 (1.3) | 53 (2.2) | 39 (1.3) | 58 (1.9) |
| Cyprus | 62 (1.4) | 85 (1.5) | 55 (2.1) | 51 (2.3) |
| Czech Republic | 50 (1.2) | 71 (1.4) | 30 (1.3) | 66 (1.9) |
| Denmark | r 57 (1.7) | r 67 (2.1) | r 45 (2.0) | r 67 (2.0) |
| Finland | 54 (1.3) | 70 (1.3) | 46 (1.8) | 54 (1.5) |
| France | 54 (1.0) | 70 (1.3) | 44 (1.2) | 55 (1.7) |
| Georgia | 63 (1.8) | 70 (2.1) | 60 (2.2) | 60 (2.2) |
| Germany | 57 (1.3) | 63 (1.8) | 53 (1.5) | 59 (2.1) |
| Hong Kong SAR | 54 (1.5) | 67 (2.6) | 51 (1.6) | 46 (2.2) |
| Hungary | 57 (1.1) | 75 (1.3) | 44 (1.5) | 61 (1.7) |
| Iran, Islamic Rep. of | 72 (1.1) | 72 (1.5) | 79 (1.1) | 61 (1.8) |
| Ireland | 71 (1.3) | 76 (1.6) | 68 (1.6) | 72 (1.5) |
| Italy | 53 (1.1) | 66 (1.5) | 41 (1.5) | 60 (2.2) |
| Japan | 39 (1.3) | 41 (1.6) | 45 (1.6) | 26 (1.5) |
| Kazakhstan | 73 (1.6) | 89 (1.2) | 58 (2.5) | 83 (1.8) |
| Korea, Rep. of | 48 (1.4) | 55 (1.9) | 46 (1.5) | 46 (2.2) |
| Kosovo | 71 (1.6) | 73 (2.1) | 71 (1.9) | 70 (1.9) |
| Kuwait | 86 (1.0) | 93 (0.8) | 84 (1.4) | 83 (1.4) |
| Latvia | 74 (1.4) | 75 (2.0) | 74 (1.7) | 74 (1.5) |
| Lithuania | 76 (1.6) | 90 (1.2) | 69 (2.1) | 72 (1.8) |
| Malta | 63 (0.2) | 73 (0.2) | 60 (0.2) | 60 (0.3) |
| Montenegro | 51 (0.9) | 76 (1.3) | 42 (1.0) | 42 (0.9) |
| Morocco | 45 (1.0) | 65 (1.5) | 52 (1.1) | 13 (1.3) |
| Netherlands | r 45 (2.0) | r 53 (2.0) | r 37 (2.7) | r 51 (2.3) |
| New Zealand | 60 (1.6) | 70 (1.8) | 53 (1.8) | 59 (2.2) |
| North Macedonia | 76 (2.2) | 74 (2.7) | 85 (1.8) | 60 (3.3) |
| Northern Ireland | 62 (2.0) | 75 (2.3) | 55 (2.7) | 60 (2.4) |
| Norway (5) | s 48 (1.9) | s 57 (2.4) | s 34 (2.0) | s 61 (3.1) |
| Oman | 65 (1.5) | 77 (1.6) | 70 (1.4) | 44 (2.7) |
| Pakistan | r 77 (2.6) | r 87 (3.2) | r 80 (3.2) | r 62 (5.7) |
| Philippines | 87 (1.2) | 95 (1.0) | 90 (1.2) | 73 (2.4) |
| Poland | 35 (1.2) | 61 (1.5) | 21 (1.4) | 35 (1.9) |
| Portugal | 85 (0.9) | 97 (0.5) | 77 (1.6) | 88 (1.0) |
| Qatar | 59 (1.3) | 73 (2.0) | 59 (1.5) | 45 (1.9) |
| Russian Federation | 66 (1.1) | 89 (0.9) | 40 (2.0) | 87 (1.2) |
| Saudi Arabia | 86 (1.2) | 84 (1.4) | 88 (1.1) | 84 (1.9) |
| Serbia | 78 (1.4) | 76 (2.1) | 91 (1.2) | 57 (2.3) |
| Singapore | 39 (0.4) | 51 (0.8) | 54 (0.5) | 2 (0.4) |
| Slovak Republic | 77 (1.3) | 84 (1.2) | 80 (1.4) | 67 (2.0) |
| South Africa (5) | 80 (1.4) | 88 (1.1) | 76 (2.0) | 78 (1.6) |
| Spain | 67 (1.0) | 86 (1.2) | 48 (1.6) | 79 (1.3) |
| Sweden | r 49 (1.4) | r 60 (2.0) | 39 (1.7) | r 56 (2.4) |
| Turkey (5) | 62 (1.5) | 66 (1.7) | 62 (1.4) | 58 (2.2) |
| United Arab Emirates | r 78 (0.8) | r 86 (0.7) | r 78 (0.9) | r 70 (1.3) |
| United States | 70 (1.2) | 74 (1.4) | 66 (1.5) | 74 (1.5) |
| England | y - - | y - - | y - - | y - - |
| **International Average** | **62 (0.2)** | **73 (0.2)** | **58 (0.2)** | **60 (0.3)** |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | r 57 (2.0) | r 70 (2.6) | r 52 (2.4) | r 52 (2.8) |
| Quebec, Canada | r 55 (1.8) | r 68 (2.6) | r 45 (2.0) | r 60 (2.6) |
| Moscow City, Russian Fed. | 65 (1.3) | 88 (1.0) | 40 (2.0) | 83 (1.4) |
| Madrid, Spain | 66 (1.6) | 82 (1.7) | 48 (2.3) | 81 (1.9) |
| Abu Dhabi, UAE | r 76 (0.9) | r 86 (0.8) | r 77 (1.1) | r 63 (1.7) |
| Dubai, UAE | r 83 (0.6) | r 86 (0.8) | r 84 (0.6) | r 80 (1.2) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Exhibit 13.6: Percentages of Students Taught the TIMSS Science Topics

*Students' Results based on Teachers' Reports*

## About the Scale

Exhibit 13.7 reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

**Choose the response that best describes when students in this class have been taught each topic.**

| | Mostly taught before this year | Mostly taught this year | Not yet taught or just introduced |
|---|---|---|---|
| **A. Biology** | | | |
| 1) Differences among major taxonomic groups of organisms (plants, animals, fungi, mammals, birds, reptiles, fish, amphibians, insects) | ○ | ○ | ○ |
| 2) Major organs and organ systems in humans and other organisms (structure/function, life processes) | ○ | ○ | ○ |
| 3) Cells, their structure and functions, including respiration and photosynthesis as cellular processes | ○ | ○ | ○ |
| 4) Life cycles, sexual reproduction, and heredity (inherited versus acquired/learned characteristics) | ○ | ○ | ○ |
| 5) Role of variation and adaptation in survival/extinction of species (including fossil evidence) | ○ | ○ | ○ |
| 6) Interdependence of populations of organisms in an ecosystem (e.g., carbon and water cycles, energy flow, food webs, competition, predation, human impacts on ecosystems) | ○ | ○ | ○ |
| 7) Human health (e.g., causes, transmission, and prevention of common infectious diseases, immunity) and the importance of diet, exercise, and other lifestyle choices in maintaining health | ○ | ○ | ○ |
| **B. Chemistry** | | | |
| 1) Particulate structure, classification, and composition of matter (protons, neutrons, electrons, atoms, molecules, elements, compounds, mixtures) | ○ | ○ | ○ |
| 2) The periodic table as an organizing principle for the known elements | ○ | ○ | ○ |
| 3) Physical and chemical properties of matter | ○ | ○ | ○ |
| 4) Mixtures and solutions (e.g., solvent, solute, concentration/dilution) | ○ | ○ | ○ |
| 5) Properties of common acids and bases (e.g., acids have pH less than 7, reactions with indicators produce color changes, acids and bases neutralize each other) | ○ | ○ | ○ |
| 6) Characteristics of chemical reactions (e.g., transformation of reactants, evidence of chemical change) | ○ | ○ | ○ |
| 7) Matter and energy in chemical reactions (conservation of matter, familiar exothermic and endothermic reactions, factors affecting reaction rates) | ○ | ○ | ○ |
| 8) The role of electrons in chemical bonds | ○ | ○ | ○ |
| **C. Physics** | | | |
| 1) Physical states and changes in matter (explanations of properties in terms of movement and distance between particles; phase change, changes in volume and/or pressure, physical changes) | ○ | ○ | ○ |
| 2) Energy transformation and transfer (e.g., forms of energy, energy conservation, heat, temperature, equilibrium) | ○ | ○ | ○ |
| 3) Basic properties/behaviors of light (reflection, refraction, color, shadows, simple ray diagrams) | ○ | ○ | ○ |
| 4) Basic properties/behaviors of sound (vibrations that produce sound, transmission through media, loudness, pitch) | ○ | ○ | ○ |
| 5) Electric circuits (e.g., electrical conductors/insulators and the flow of electricity in series/parallel circuits) | ○ | ○ | ○ |
| 6) Properties and uses of permanent magnets and electromagnets | ○ | ○ | ○ |
| 7) Motion and forces (e.g., basic description of motion, common mechanical forces, properties of forces, effects of forces, simple machines, buoyancy, effects of density and pressure) | ○ | ○ | ○ |
| **D. Earth Science** | | | |
| 1) Earth's structure and physical features (e.g., Earth's crust, mantle, and core; composition and relative distribution of water; composition of Earth's atmosphere) | ○ | ○ | ○ |
| 2) Earth's processes, cycles, and history (e.g., rock cycle, major geological events, formation of fossils and fossil fuels, water cycle, weather versus climate) | ○ | ○ | ○ |
| 3) Earth's resources, their use, and conservation (e.g., renewable/nonrenewable resources, human use of land and water resources) | ○ | ○ | ○ |
| 4) Earth in the Solar System and the universe (phenomena on Earth: seasons, eclipses, tides, phases of moon; members of the Solar System; physical features of Earth) | ○ | ○ | ○ |

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## Exhibit 13.7: Percentages of Students Taught the TIMSS Science Topics

*Students' Results based on Teachers' Reports*

The exhibit reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

| Country | All Science (26 Topics) | Biology (7 Topics) | Chemistry (8 Topics) | Physics (7 Topics) | Earth Science (4 Topics) |
|---|---|---|---|---|---|
| Australia | r 63 (1.2) | r 61 (1.7) | r 64 (1.5) | r 56 (1.4) | r 79 (1.9) |
| Bahrain | 81 (1.1) | 92 (0.7) | 74 (1.7) | 72 (2.0) | 93 (1.0) |
| Chile | 71 (1.4) | 77 (1.8) | 60 (2.1) | 69 (2.0) | 85 (2.4) |
| Chinese Taipei | 70 (0.6) | 92 (2.2) | 92 (0.5) | 61 (1.0) | 7 (1.5) |
| Cyprus | r 49 (0.7) | s 63 (1.1) | s 47 (1.2) | r 34 (1.5) | r 54 (1.1) |
| Egypt | 82 (1.1) | 78 (1.5) | 78 (1.3) | 84 (1.4) | 91 (1.5) |
| England | s 71 (2.3) | s 71 (3.0) | s 79 (2.2) | s 72 (3.4) | x 54 (5.3) |
| Finland | 72 (0.6) | 51 (1.0) | 91 (1.0) | 63 (1.0) | 87 (1.3) |
| France | r 59 (0.9) | r 70 (1.6) | r 54 (1.5) | r 46 (1.7) | r 69 (2.5) |
| Georgia | 67 (0.8) | 55 (1.4) | 66 (1.6) | 61 (1.3) | 99 (0.5) |
| Hong Kong SAR | 53 (1.8) | 64 (2.3) | 43 (2.2) | 64 (2.0) | 33 (3.0) |
| Hungary | 91 (0.6) | 85 (0.9) | 97 (0.6) | 88 (1.1) | 91 (1.8) |
| Iran, Islamic Rep. of | 70 (0.9) | 61 (1.3) | 78 (1.1) | 70 (1.4) | 71 (1.5) |
| Ireland | 63 (0.8) | 66 (1.2) | 77 (1.1) | 48 (1.4) | 54 (2.5) |
| Israel | 65 (1.2) | 64 (1.6) | 82 (1.1) | 62 (1.6) | 39 (3.1) |
| Italy | 69 (1.2) | 81 (1.2) | 81 (2.0) | 48 (2.1) | 60 (2.5) |
| Japan | 65 (0.6) | 56 (1.0) | 73 (0.9) | 77 (1.1) | 41 (1.7) |
| Jordan | 80 (1.3) | 87 (1.3) | 76 (1.4) | 80 (1.9) | 78 (2.2) |
| Kazakhstan | 87 (0.5) | 83 (1.3) | 94 (0.8) | 80 (1.1) | 97 (0.7) |
| Korea, Rep. of | 57 (1.0) | 50 (1.5) | 49 (1.4) | 68 (0.9) | 67 (1.4) |
| Kuwait | 87 (0.9) | 91 (0.9) | 94 (1.1) | 83 (1.2) | 75 (2.2) |
| Lebanon | 76 (0.8) | 76 (1.9) | 80 (1.3) | 71 (1.5) | - - |
| Lithuania | 73 (1.0) | 78 (1.7) | 62 (2.3) | 69 (1.7) | 93 (1.2) |
| Malaysia | 88 (0.8) | 93 (0.9) | 82 (1.3) | 93 (1.2) | 82 (1.9) |
| Morocco | 57 (0.6) | 69 (1.1) | 45 (1.0) | 48 (0.8) | 74 (1.7) |
| New Zealand | 48 (1.2) | 48 (1.7) | 55 (1.8) | 48 (1.7) | 37 (2.7) |
| Norway (9) | s 55 (1.2) | s 51 (2.2) | s 71 (1.5) | s 35 (2.1) | s 68 (2.9) |
| Oman | 73 (0.9) | 82 (0.8) | 54 (1.5) | 79 (1.4) | 89 (1.5) |
| Portugal | 63 (0.7) | 63 (1.4) | 73 (1.0) | 40 (1.2) | 80 (1.5) |
| Qatar | 77 (1.0) | 80 (1.5) | 76 (1.3) | 75 (1.4) | 76 (1.9) |
| Romania | 95 (0.5) | 93 (1.0) | 95 (0.8) | 98 (0.5) | - - |
| Russian Federation | 79 (0.6) | 68 (1.6) | 82 (1.4) | 75 (1.0) | 97 (0.8) |
| Saudi Arabia | 84 (1.0) | 89 (1.0) | 82 (1.6) | 77 (1.6) | 95 (0.8) |
| Singapore | 65 (0.8) | 71 (1.2) | 73 (1.2) | 75 (1.2) | 20 (1.5) |
| South Africa (9) | 76 (1.2) | 83 (1.3) | 84 (1.2) | 72 (1.5) | 55 (3.0) |
| Sweden | 71 (0.8) | 72 (1.4) | 68 (1.3) | 74 (1.7) | - - |
| Turkey | 93 (0.5) | 94 (0.7) | 95 (0.6) | 88 (1.1) | 92 (1.5) |
| United Arab Emirates | r 86 (0.5) | r 85 (0.6) | r 85 (0.6) | r 86 (0.8) | r 86 (0.9) |
| United States | r 84 (1.1) | r 89 (1.2) | r 82 (1.8) | r 76 (1.7) | r 91 (1.5) |
| **International Average** | **72 (0.2)** | **74 (0.2)** | **74 (0.2)** | **68 (0.2)** | **71 (0.3)** |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | s 65 (1.7) | s 81 (1.9) | s 41 (2.5) | s 69 (2.7) | s 79 (3.0) |
| Moscow City, Russian Fed. | 74 (0.7) | 62 (1.6) | 76 (1.3) | 70 (0.9) | 98 (0.5) |
| Gauteng, RSA (9) | 76 (1.6) | 85 (1.8) | 82 (1.7) | 70 (2.3) | 57 (3.4) |
| Western Cape, RSA (9) | 75 (1.3) | 80 (1.7) | 83 (1.3) | 72 (2.1) | 56 (3.4) |
| Abu Dhabi, UAE | r 86 (0.8) | r 85 (1.0) | r 86 (1.0) | r 88 (1.2) | r 83 (1.4) |
| Dubai, UAE | r 85 (0.9) | r 84 (0.9) | r 84 (0.8) | r 84 (1.5) | r 89 (1.5) |
| Quebec, Canada | y - - | y - - | y - - | y - - | y - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Instructional Clarity in Science Lessons

The clarity with which teachers convey the curriculum to students has significant implications for student learning. Students were asked about aspects of teachers' instruction during their science lessons: whether they know what their teacher expects them to do, and whether their teacher is easy to understand, has clear answers to their questions, is good at explaining science, does a variety of things to help the students learn, links new lessons to previous knowledge (eighth grade only), and explains a topic again when the students do not understand. Responses were combined into the TIMSS 2019 *Instructional Clarity in Science Lessons* scale, as described in Exhibit 13.8 (see About the Scale). Exhibits 13.9 and 13.10 present students' reports about the clarity of their science lessons, for fourth grade and eighth grade, respectively. Countries are reported by percentage of students reporting "high clarity of instruction."

On average, slightly less than three-quarters (72%) of fourth grade students reported "high clarity" of instruction in their science lessons, 22 percent reported "moderate clarity," and just 6 percent characterized their lessons as having "low clarity." There was a range in views across countries with, interestingly, lower percentages of students characterizing their lessons as having "high clarity" in some of the higher performing countries, such as Korea and Japan. On average, internationally and within most countries, however, higher clarity was associated with higher average achievement. Across countries, average achievement was 498 among students reporting "high clarity" of instruction, 480 among students reporting "moderate clarity" of instruction, and 466 among students reporting "low clarity" of instruction.

Eighth grade students' reports are presented separately for countries in which science is taught as an integrated subject in eighth grade (first panel of the exhibit) and for countries in which science is taught as separate subjects (following four panels). Eighth grade students were, on average, less positive about the clarity of their science instruction compared with fourth grade students. Similar percentages of students reported "high," "moderate," and "low clarity of instruction" for integrated science, biology, chemistry, physics, and Earth science. For all science subjects, 44 to 49 percent of eighth grade students, on average, characterized instruction as having "high clarity," 38 to 41 percent reported "moderate clarity," and 12 to 16 percent reported "low clarity." As seen in fourth grade, clarity of instruction was positively associated with science achievement. In countries teaching science as an integrated subject and for each of the separate science subjects, average achievement increased with each successively higher level of students' reports of instructional clarity.

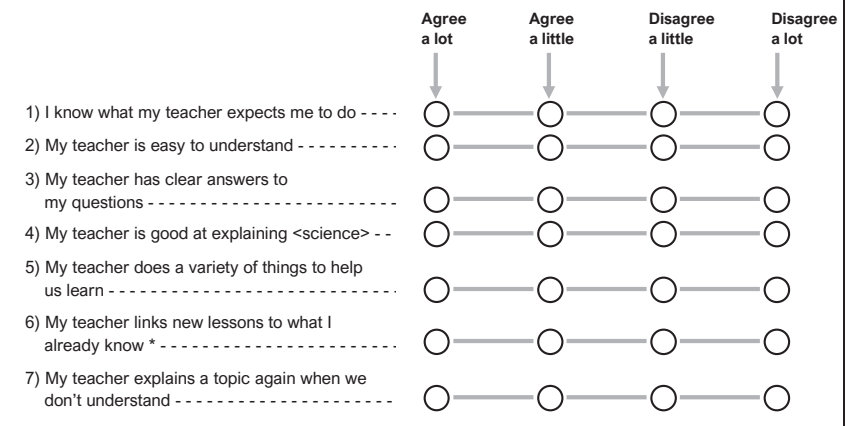
## Exhibit 13.8: Instructional Clarity in Science Lessons – Students' Reports

*Students' Reports*

### About the Scale

Students were scored according to their responses to seven statements on the *Instructional Clarity in Science Lessons* scale. Cut scores divide the scale into three categories. Students who reported **High Clarity of Instruction** in their science lessons had a score at or above the cut score corresponding to "agreeing a lot" with four of the seven statements and "agreeing a little" with the other three, on average. Students who reported **Low Clarity of Instruction** in their science lessons had a score at or below the cut score corresponding to "disagreeing a little" with four of the seven statements and "agreeing a little" with the other three, on average. All other students reported **Moderate Clarity of Instruction** in their science lessons. At the eighth grade, a comparable approach was used for biology, chemistry, physics, and Earth science in countries where these were taught as separate subjects.

**How much do you agree with these statements about your <science / biology / chemistry / physics / earth science> lessons?**




| *Scale Cut Scores* | | |
|---|---|---|
| **Fourth Grade** | **8.8** | **6.9** |
| **Eighth Grade** | | |
| General/Integrated Science | **10.3** | **7.8** |
| Biology | **10.3** | **7.7** |
| Chemistry | **10.5** | **7.9** |
| Physics | **10.5** | **8.0** |
| Earth Science | **10.5** | **7.8** |

* Item not included in scale at the fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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# Exhibit 13.9: Instructional Clarity in Science Lessons – Students' Reports

*Students' Reports*

| Country | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Albania | 97 (0.3) | 493 (3.5) | 2 (0.3) | ~ ~ | 1 (0.1) | ~ ~ | 11.6 (0.04) |
| Kosovo | 95 (0.6) | 420 (3.4) | 4 (0.4) | 355 (11.0) | 1 (0.2) | ~ ~ | 11.2 (0.04) |
| North Macedonia | 92 (0.7) | 436 (6.2) | 6 (0.6) | 372 (11.8) | 1 (0.2) | ~ ~ | 11.2 (0.05) |
| Montenegro | 90 (0.6) | 460 (2.5) | 8 (0.5) | 431 (6.5) | 2 (0.2) | ~ ~ | 11.1 (0.04) |
| Iran, Islamic Rep. of | 88 (0.9) | 449 (3.7) | 9 (0.7) | 407 (8.3) | 3 (0.4) | 369 (13.0) | 10.9 (0.05) |
| Bosnia and Herzegovina | 86 (0.8) | 465 (3.0) | 11 (0.7) | 435 (6.1) | 2 (0.2) | ~ ~ | 10.8 (0.04) |
| Bulgaria | 86 (1.1) | 527 (4.3) | 11 (0.9) | 505 (11.2) | 3 (0.4) | 480 (24.3) | 10.8 (0.06) |
| Armenia | 86 (0.8) | 475 (3.3) | 11 (0.6) | 449 (5.1) | 3 (0.4) | 427 (11.8) | 10.8 (0.06) |
| Georgia | 85 (1.2) | 456 (4.0) | 12 (1.0) | 448 (9.8) | 3 (0.5) | 411 (18.0) | 10.7 (0.06) |
| Azerbaijan | 85 (1.0) | 438 (3.0) | 11 (0.8) | 421 (6.3) | 4 (0.4) | 389 (11.7) | 10.6 (0.06) |
| Portugal | 82 (0.9) | 507 (2.6) | 15 (0.8) | 494 (4.0) | 3 (0.3) | 489 (9.8) | 10.4 (0.04) |
| Oman | 80 (1.0) | 451 (4.4) | 15 (0.7) | 397 (6.0) | 4 (0.4) | 356 (8.6) | 10.4 (0.06) |
| Lithuania | 80 (1.2) | 539 (2.6) | 18 (1.1) | 537 (4.2) | 2 (0.3) | ~ ~ | 10.2 (0.06) |
| Morocco | 80 (1.2) | 386 (5.9) | 16 (0.9) | 346 (9.8) | 4 (0.5) | 292 (10.2) | 10.3 (0.07) |
| Bahrain | 79 (1.1) | 504 (2.9) | 17 (0.8) | 468 (6.2) | 5 (0.4) | 438 (8.2) | 10.3 (0.06) |
| Spain | 78 (1.2) | 517 (2.3) | 18 (1.0) | 500 (4.1) | 4 (0.4) | 485 (8.9) | 10.1 (0.06) |
| United Arab Emirates | 78 (0.5) | 488 (2.2) | 16 (0.3) | 440 (3.0) | 6 (0.3) | 400 (5.6) | 10.3 (0.03) |
| Serbia | 77 (1.3) | 521 (3.2) | 20 (1.0) | 510 (7.7) | 3 (0.5) | 502 (10.8) | 10.3 (0.06) |
| Turkey (5) | 77 (1.2) | 540 (3.8) | 18 (0.9) | 497 (6.6) | 5 (0.5) | 451 (10.6) | 10.2 (0.05) |
| Hungary | 77 (1.2) | 533 (2.6) | 19 (0.9) | 520 (4.6) | 4 (0.5) | 511 (8.3) | 10.3 (0.06) |
| Kuwait | 76 (1.2) | 413 (6.1) | 17 (0.9) | 364 (9.0) | 7 (0.6) | 324 (9.9) | 10.2 (0.07) |
| Russian Federation | 76 (1.0) | 568 (3.3) | 21 (0.9) | 569 (3.6) | 3 (0.3) | 552 (8.7) | 10.0 (0.04) |
| Malta | 76 (0.6) | 498 (1.6) | 19 (0.5) | 491 (3.5) | 5 (0.3) | 486 (7.0) | 10.1 (0.03) |
| Austria | 75 (1.0) | 525 (2.5) | 21 (0.9) | 514 (4.7) | 4 (0.5) | 513 (8.3) | 10.1 (0.05) |
| United States | 74 (0.8) | 546 (2.6) | 20 (0.7) | 536 (3.9) | 6 (0.4) | 502 (6.2) | 10.1 (0.04) |
| Kazakhstan | 74 (1.1) | 502 (3.5) | 25 (1.0) | 479 (4.3) | 2 (0.2) | ~ ~ | 10.0 (0.06) |
| Saudi Arabia | 73 (1.0) | 424 (4.0) | 19 (0.7) | 372 (5.5) | 7 (0.6) | 349 (11.6) | 10.1 (0.06) |
| Belgium (Flemish) | 73 (0.9) | 502 (2.3) | 24 (0.9) | 500 (3.5) | 3 (0.2) | 481 (6.1) | 9.9 (0.04) |
| Northern Ireland | 73 (1.2) | 519 (2.4) | 22 (1.0) | 521 (4.2) | 5 (0.5) | 511 (6.9) | 9.9 (0.05) |
| Ireland | 73 (1.3) | 530 (3.3) | 21 (1.0) | 525 (4.4) | 6 (0.5) | 529 (5.7) | 9.9 (0.06) |
| Slovak Republic | 73 (1.3) | 521 (3.9) | 23 (1.0) | 524 (4.7) | 4 (0.6) | 510 (12.0) | 10.0 (0.06) |
| Canada | 72 (0.9) | 526 (2.0) | 23 (0.8) | 521 (2.5) | 5 (0.3) | 512 (5.0) | 10.0 (0.04) |
| Qatar | 72 (1.2) | 469 (3.4) | 20 (1.0) | 419 (7.1) | 8 (0.5) | 383 (8.2) | 10.0 (0.06) |
| Pakistan | 71 (2.3) | 302 (13.5) | 21 (1.6) | 267 (21.1) | 8 (1.1) | 260 (19.5) | 10.0 (0.11) |
| Cyprus | 71 (1.6) | 516 (3.1) | 20 (0.8) | 505 (4.0) | 9 (1.1) | 500 (5.8) | 9.8 (0.09) |
| Czech Republic | 70 (1.3) | 535 (2.9) | 24 (1.0) | 538 (3.1) | 5 (0.6) | 514 (5.9) | 9.9 (0.06) |
| Norway (5) | 70 (1.2) | 540 (2.5) | 25 (1.0) | 543 (3.7) | 5 (0.6) | 544 (7.2) | 9.8 (0.05) |
| Italy | 70 (1.1) | 514 (3.2) | 25 (0.9) | 501 (4.0) | 4 (0.4) | 495 (7.7) | 9.7 (0.04) |
| Germany r | 70 (1.3) | 526 (2.3) | 24 (0.8) | 517 (3.3) | 6 (0.7) | 501 (8.3) | 9.7 (0.05) |
| England | 70 (1.4) | 539 (3.2) | 25 (1.1) | 538 (3.9) | 6 (0.6) | 540 (6.6) | 9.9 (0.06) |
| Australia | 68 (1.2) | 533 (2.8) | 24 (0.9) | 538 (3.6) | 8 (0.8) | 519 (7.0) | 9.8 (0.06) |
| Netherlands | 67 (1.3) | 520 (2.9) | 28 (1.0) | 523 (4.1) | 5 (0.5) | 488 (9.5) | 9.7 (0.06) |
| Croatia | 67 (1.1) | 527 (2.2) | 30 (1.2) | 518 (3.3) | 3 (0.4) | 510 (11.4) | 9.9 (0.04) |
| Chile | 67 (1.2) | 478 (2.8) | 27 (1.0) | 463 (3.7) | 6 (0.5) | 433 (7.0) | 9.8 (0.05) |
| Latvia | 66 (1.2) | 543 (2.7) | 29 (1.0) | 544 (3.0) | 6 (0.6) | 533 (6.0) | 9.6 (0.05) |
| South Africa (5) | 65 (1.1) | 355 (5.2) | 23 (0.8) | 288 (5.8) | 12 (0.6) | 258 (6.1) | 9.7 (0.06) |
| Sweden | 65 (1.5) | 536 (4.0) | 30 (1.2) | 546 (3.7) | 6 (0.6) | 520 (7.6) | 9.5 (0.06) |
| Chinese Taipei | 64 (1.5) | 562 (2.1) | 28 (1.2) | 556 (3.0) | 8 (0.7) | 532 (5.7) | 9.7 (0.07) |
| New Zealand | 64 (1.2) | 503 (2.8) | 27 (0.9) | 508 (3.3) | 9 (0.6) | 500 (4.9) | 9.5 (0.05) |
| Singapore | 63 (1.0) | 601 (3.3) | 29 (0.7) | 587 (4.1) | 8 (0.5) | 569 (6.6) | 9.6 (0.04) |
| Finland | 61 (1.2) | 559 (2.7) | 32 (1.1) | 552 (3.3) | 7 (0.6) | 539 (5.5) | 9.4 (0.05) |
| Poland | 60 (1.3) | 535 (2.8) | 31 (0.9) | 533 (3.1) | 9 (0.7) | 517 (6.0) | 9.5 (0.06) |
| France | 56 (1.2) | 488 (3.7) | 37 (0.9) | 491 (3.5) | 7 (0.6) | 477 (6.5) | 9.3 (0.05) |
| Hong Kong SAR | 55 (1.4) | 543 (3.3) | 30 (1.0) | 523 (3.6) | 15 (1.0) | 505 (7.3) | 9.2 (0.07) |
| Denmark | 49 (1.7) | 526 (3.0) | 37 (1.3) | 520 (3.3) | 13 (1.2) | 517 (4.6) | 8.8 (0.07) |
| Philippines | 48 (1.9) | 288 (8.9) | 36 (1.2) | 227 (7.1) | 16 (1.0) | 196 (7.2) | 8.9 (0.08) |
| Japan | 44 (1.6) | 561 (2.4) | 44 (1.1) | 564 (2.3) | 13 (1.0) | 558 (3.4) | 8.6 (0.06) |
| Korea, Rep. of | 42 (1.4) | 596 (2.8) | 48 (1.3) | 584 (2.3) | 11 (1.0) | 573 (5.5) | 8.5 (0.05) |
| **International Average** | **72 (0.2)** | **498 (0.5)** | **22 (0.1)** | **480 (0.8)** | **6 (0.1)** | **466 (1.3)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 82 (0.6) | 548 (1.6) | 14 (0.5) | 532 (3.4) | 4 (0.3) | 510 (8.7) | 10.4 (0.03) |
| Madrid, Spain | 77 (1.1) | 526 (2.3) | 19 (0.9) | 519 (2.5) | 4 (0.4) | 501 (9.2) | 10.1 (0.06) |
| Ontario, Canada | 72 (1.4) | 528 (3.4) | 23 (1.2) | 521 (4.0) | 5 (0.5) | 516 (7.8) | 9.9 (0.06) |
| Moscow City, Russian Fed. | 70 (1.2) | 597 (2.5) | 25 (0.9) | 594 (2.9) | 5 (0.5) | 576 (6.0) | 9.7 (0.05) |
| Abu Dhabi, UAE | 69 (0.9) | 438 (3.0) | 21 (0.7) | 388 (4.4) | 10 (0.6) | 365 (7.7) | 9.8 (0.05) |
| Quebec, Canada r | 68 (1.5) | 523 (3.1) | 26 (1.1) | 521 (3.5) | 6 (0.7) | 508 (7.1) | 9.8 (0.07) |

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 13.10: Instructional Clarity in Science Lessons – Students' Reports

*Students' Reports*

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and Earth science summarize responses for countries where students are taught science as separate subjects.

*Instructional Clarity in General/Integrated Science Lessons*

| General/Integrated Science | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Jordan | 72 (1.3) | 467 (4.5) | 22 (1.0) | 431 (5.7) | 6 (0.5) | 410 (7.7) | 11.0 (0.05) |
| Turkey | 69 (1.7) | 524 (3.4) | 22 (1.0) | 498 (6.4) | 8 (0.9) | 496 (8.0) | 10.8 (0.08) |
| Egypt | 68 (1.2) | 413 (5.0) | 26 (1.0) | 359 (6.8) | 6 (0.5) | 340 (9.0) | 10.8 (0.05) |
| Iran, Islamic Rep. of | 67 (1.2) | 458 (3.5) | 27 (1.1) | 433 (5.3) | 6 (0.6) | 436 (6.8) | 10.8 (0.05) |
| Saudi Arabia | 66 (1.4) | 445 (2.9) | 27 (0.9) | 416 (3.5) | 7 (0.7) | 410 (6.1) | 10.7 (0.06) |
| Kuwait | 61 (1.5) | 459 (5.5) | 28 (1.0) | 434 (5.8) | 11 (0.8) | 419 (8.1) | 10.4 (0.07) |
| Oman | 61 (1.0) | 480 (2.8) | 31 (0.9) | 437 (4.2) | 8 (0.6) | 413 (8.7) | 10.4 (0.04) |
| Bahrain | 59 (1.5) | 504 (2.0) | 31 (1.1) | 473 (3.5) | 10 (0.8) | 446 (7.6) | 10.4 (0.07) |
| United Arab Emirates | 57 (0.7) | 497 (2.7) | 32 (0.6) | 454 (3.0) | 11 (0.4) | 420 (5.9) | 10.4 (0.03) |
| South Africa (9) | 53 (1.1) | 379 (3.8) | 37 (0.8) | 361 (3.4) | 9 (0.6) | 375 (6.5) | 10.2 (0.05) |
| United States | 53 (1.3) | 532 (5.2) | 33 (0.8) | 522 (4.7) | 14 (0.8) | 515 (5.2) | 10.2 (0.06) |
| Qatar | 53 (1.5) | 487 (5.0) | 33 (1.0) | 470 (5.3) | 14 (1.1) | 451 (6.5) | 10.1 (0.07) |
| Malaysia | 51 (1.3) | 476 (3.4) | 42 (1.0) | 452 (4.6) | 7 (0.9) | 405 (9.6) | 10.1 (0.05) |
| Israel | 48 (1.7) | 522 (4.4) | 33 (1.0) | 511 (5.1) | 19 (1.2) | 509 (7.2) | 9.8 (0.08) |
| New Zealand | 43 (1.4) | 511 (3.9) | 42 (0.9) | 499 (4.2) | 15 (1.1) | 476 (6.1) | 9.8 (0.07) |
| Italy | 42 (1.6) | 505 (3.4) | 45 (1.3) | 500 (2.6) | 13 (1.2) | 490 (4.1) | 9.7 (0.07) |
| England | 42 (1.6) | 534 (5.0) | 41 (1.2) | 521 (6.0) | 17 (1.2) | 487 (7.1) | 9.7 (0.07) |
| Singapore | 42 (1.1) | 617 (4.2) | 48 (0.8) | 607 (3.9) | 10 (0.7) | 574 (7.5) | 9.8 (0.04) |
| Ireland | 41 (1.7) | 537 (3.2) | 38 (1.1) | 525 (3.5) | 21 (1.5) | 515 (5.4) | 9.6 (0.09) |
| Australia | 41 (1.4) | 548 (3.4) | 40 (0.8) | 523 (3.5) | 18 (1.3) | 507 (5.2) | 9.7 (0.07) |
| Norway (9) | 40 (1.6) | 511 (3.7) | 44 (1.1) | 495 (3.4) | 16 (1.0) | 466 (6.2) | 9.7 (0.07) |
| Chinese Taipei | 37 (1.3) | 593 (3.1) | 51 (1.1) | 570 (2.2) | 13 (0.9) | 538 (5.1) | 9.7 (0.06) |
| Chile | 34 (1.4) | 468 (4.0) | 50 (1.0) | 462 (3.5) | 17 (1.2) | 457 (5.4) | 9.5 (0.07) |
| Hong Kong SAR | 32 (1.4) | 516 (5.9) | 51 (1.5) | 502 (6.1) | 17 (1.3) | 489 (8.9) | 9.4 (0.07) |
| Japan | 17 (1.2) | 591 (3.6) | 57 (1.2) | 572 (2.6) | 25 (1.6) | 550 (3.1) | 8.7 (0.06) |
| Korea, Rep. of | 17 (0.9) | 600 (3.9) | 59 (1.1) | 565 (2.4) | 24 (1.5) | 524 (3.6) | 8.7 (0.05) |
| **International Average** | **49 (0.3)** | **507 (0.8)** | **38 (0.2)** | **484 (0.9)** | **13 (0.2)** | **466 (1.3)** | |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | 59 (1.2) | 557 (2.2) | 33 (1.0) | 539 (3.3) | 9 (0.7) | 524 (6.3) | 10.5 (0.05) |
| Western Cape, RSA (9) | 53 (1.5) | 438 (5.2) | 36 (1.2) | 445 (6.8) | 10 (0.9) | 448 (9.0) | 10.2 (0.06) |
| Gauteng, RSA (9) | 53 (1.2) | 427 (3.9) | 36 (0.8) | 415 (4.7) | 11 (0.9) | 430 (9.1) | 10.1 (0.06) |
| Ontario, Canada | 50 (2.4) | 528 (4.1) | 36 (1.5) | 518 (3.8) | 14 (1.3) | 513 (6.4) | 10.1 (0.11) |
| Abu Dhabi, UAE | 50 (1.1) | 460 (4.0) | 35 (1.0) | 394 (5.4) | 15 (0.9) | 364 (8.2) | 10.0 (0.06) |
| Quebec, Canada | 42 (2.2) | 546 (3.8) | 43 (1.2) | 535 (4.2) | 15 (1.7) | 520 (8.2) | 9.7 (0.10) |

## Separate Science Results

*Instructional Clarity in Biology Lessons*

| Biology | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Georgia | 70 (1.6) | 454 (4.1) | 25 (1.4) | 438 (5.6) | 5 (0.5) | 438 (12.2) | 11.0 (0.07) |
| Romania | 64 (2.0) | 472 (4.4) | 25 (1.2) | 468 (6.1) | 11 (1.3) | 479 (8.8) | 10.6 (0.10) |
| Lebanon | 58 (1.7) | 394 (5.1) | 33 (1.4) | 359 (6.0) | 9 (0.7) | 354 (8.5) | 10.5 (0.07) |
| Morocco | 56 (1.2) | 404 (3.5) | 34 (0.8) | 385 (3.1) | 10 (0.8) | 385 (6.7) | 10.3 (0.06) |
| Portugal | 51 (1.9) | 525 (3.0) | 40 (1.5) | 518 (3.8) | 9 (1.2) | 505 (6.7) | 10.2 (0.09) |
| Kazakhstan | 46 (1.3) | 490 (3.9) | 50 (1.2) | 471 (3.3) | 4 (0.4) | 438 (10.0) | 10.1 (0.05) |
| Hungary | 45 (1.9) | 536 (3.5) | 40 (1.1) | 523 (3.3) | 15 (1.5) | 532 (7.2) | 9.9 (0.10) |
| Cyprus | 44 (1.5) | 500 (3.1) | 37 (1.0) | 480 (3.1) | 19 (1.3) | 467 (4.4) | 9.7 (0.08) |
| Russian Federation | 43 (1.4) | 548 (5.3) | 47 (1.3) | 539 (4.4) | 10 (0.8) | 542 (4.7) | 9.9 (0.05) |
| Finland | 40 (1.5) | 563 (3.6) | 48 (1.1) | 538 (3.6) | 12 (1.0) | 520 (7.9) | 9.7 (0.07) |
| Lithuania | 37 (1.7) | 538 (3.2) | 48 (1.2) | 531 (3.7) | 15 (1.6) | 537 (6.3) | 9.6 (0.08) |
| Sweden | 31 (1.5) | 536 (4.8) | 51 (1.2) | 526 (3.5) | 18 (1.3) | 515 (5.8) | 9.3 (0.07) |
| France | 29 (1.3) | 491 (4.0) | 53 (1.3) | 490 (3.4) | 18 (1.8) | 481 (4.1) | 9.2 (0.08) |
| **International Average** | **47 (0.4)** | **496 (1.1)** | **41 (0.3)** | **482 (1.2)** | **12 (0.3)** | **476 (2.1)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 38 (1.8) | 570 (3.4) | 47 (1.2) | 565 (3.4) | 14 (1.2) | 564 (5.5) | 9.6 (0.08) |

This TIMSS context questionnaire scale for general/integrated science was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019 where science is taught as a single subject. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution. The separate scales for biology, chemistry, physics, and Earth science were each established in 2019 using a comparable approach.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 13.10: Instructional Clarity in Science Lessons – Students' Reports

*Students' Reports*

### Separate Science Results (Continued)

*Instructional Clarity in Chemistry Lessons*

| Chemistry | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Georgia | 60 (1.7) | 459 (4.0) | 30 (1.3) | 437 (4.9) | 10 (1.1) | 428 (7.8) | 10.6 (0.07) |
| Lebanon | 60 (1.6) | 396 (5.0) | 30 (1.3) | 356 (6.7) | 10 (0.9) | 355 (8.9) | 10.6 (0.07) |
| Romania | 58 (1.6) | 479 (4.3) | 29 (0.9) | 465 (5.5) | 14 (1.3) | 461 (8.1) | 10.4 (0.08) |
| Cyprus | 55 (1.3) | 498 (2.4) | 33 (1.3) | 482 (2.7) | 12 (1.0) | 453 (4.8) | 10.4 (0.06) |
| Morocco | 54 (1.2) | 409 (3.3) | 35 (0.8) | 379 (3.3) | 11 (0.8) | 383 (5.0) | 10.4 (0.06) |
| Russian Federation | 45 (1.3) | 554 (4.6) | 43 (0.9) | 536 (4.4) | 12 (1.0) | 532 (5.9) | 10.1 (0.06) |
| Portugal | 43 (2.1) | 527 (3.9) | 41 (1.4) | 516 (3.4) | 15 (1.5) | 508 (5.6) | 9.9 (0.09) |
| Lithuania | 43 (1.7) | 544 (3.8) | 42 (1.2) | 530 (3.4) | 15 (1.4) | 522 (4.5) | 9.9 (0.08) |
| Kazakhstan | 42 (1.2) | 497 (4.0) | 49 (1.0) | 466 (3.3) | 8 (0.9) | 459 (9.1) | 10.1 (0.06) |
| Finland | 37 (1.4) | 571 (2.9) | 46 (1.0) | 541 (3.2) | 17 (1.1) | 511 (5.5) | 9.7 (0.06) |
| Sweden | 32 (1.7) | 540 (4.9) | 48 (1.2) | 522 (4.0) | 19 (1.6) | 514 (5.1) | 9.5 (0.08) |
| Hungary | 32 (1.5) | 534 (4.7) | 43 (1.1) | 529 (3.1) | 25 (1.6) | 528 (4.3) | 9.4 (0.08) |
| France | 24 (1.4) | 494 (4.3) | 50 (1.5) | 491 (3.0) | 26 (1.8) | 482 (4.5) | 9.1 (0.08) |
| **International Average** | **45 (0.4)** | **500 (1.1)** | **40 (0.3)** | **481 (1.1)** | **15 (0.4)** | **472 (1.7)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 39 (1.6) | 575 (3.0) | 43 (1.1) | 564 (3.6) | 18 (1.3) | 559 (4.5) | 9.7 (0.07) |

*Instructional Clarity in Physics Lessons*

| Physics | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Georgia | 61 (1.8) | 457 (4.0) | 30 (1.4) | 439 (5.1) | 9 (1.1) | 432 (8.9) | 10.7 (0.08) |
| Lebanon | 58 (1.6) | 395 (4.8) | 32 (1.2) | 357 (5.6) | 10 (0.8) | 364 (11.1) | 10.6 (0.07) |
| Romania | 55 (1.7) | 479 (4.5) | 30 (1.0) | 465 (5.3) | 15 (1.4) | 464 (6.1) | 10.4 (0.08) |
| Morocco | 54 (1.1) | 409 (3.3) | 35 (0.7) | 381 (3.0) | 10 (0.8) | 385 (4.5) | 10.4 (0.06) |
| Cyprus | 51 (1.4) | 502 (2.5) | 32 (1.0) | 480 (3.0) | 18 (1.1) | 461 (4.9) | 10.1 (0.07) |
| Russian Federation | 46 (1.2) | 549 (4.3) | 43 (1.0) | 540 (4.5) | 11 (0.9) | 537 (7.8) | 10.2 (0.06) |
| Portugal | 43 (2.1) | 527 (3.9) | 41 (1.4) | 516 (3.4) | 15 (1.5) | 508 (5.6) | 10.0 (0.09) |
| Kazakhstan | 43 (1.2) | 494 (4.1) | 50 (1.1) | 470 (3.6) | 7 (0.6) | 456 (5.9) | 10.2 (0.04) |
| Finland | 35 (1.5) | 568 (3.7) | 45 (1.1) | 538 (3.5) | 20 (1.3) | 513 (6.2) | 9.7 (0.07) |
| Hungary | 34 (1.6) | 543 (3.9) | 42 (1.2) | 526 (3.5) | 24 (1.7) | 520 (4.4) | 9.5 (0.09) |
| Lithuania | 33 (1.9) | 539 (4.4) | 44 (1.3) | 533 (3.1) | 22 (2.1) | 532 (5.7) | 9.5 (0.10) |
| Sweden | 32 (1.4) | 544 (4.5) | 51 (1.1) | 526 (3.8) | 18 (1.1) | 510 (6.1) | 9.6 (0.06) |
| France | 24 (1.4) | 494 (4.3) | 50 (1.5) | 490 (3.0) | 26 (1.8) | 482 (4.5) | 9.1 (0.08) |
| **International Average** | **44 (0.4)** | **500 (1.1)** | **40 (0.3)** | **482 (1.1)** | **16 (0.4)** | **474 (1.8)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 42 (1.6) | 575 (3.6) | 42 (1.0) | 563 (3.2) | 16 (1.3) | 556 (4.1) | 9.9 (0.08) |

*Instructional Clarity in Earth Science Lessons*

| Earth Science | High Clarity of Instruction | | Moderate Clarity of Instruction | | Low Clarity of Instruction | | Average Scale Score |
|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Romania r | 65 (1.8) | 479 (5.7) | 28 (1.4) | 462 (6.3) | 7 (0.9) | 461 (13.5) | 10.8 (0.07) |
| Georgia | 62 (1.9) | 456 (4.1) | 30 (1.5) | 436 (5.3) | 7 (0.9) | 455 (12.1) | 10.7 (0.08) |
| Morocco | 54 (1.1) | 407 (3.5) | 35 (0.7) | 385 (3.0) | 11 (0.8) | 388 (5.8) | 10.3 (0.05) |
| Portugal | 51 (1.9) | 525 (3.0) | 40 (1.5) | 518 (3.8) | 9 (1.2) | 505 (6.7) | 10.3 (0.08) |
| Russian Federation | 45 (1.1) | 546 (4.5) | 45 (1.0) | 541 (4.2) | 10 (0.8) | 547 (7.8) | 10.1 (0.05) |
| Kazakhstan | 43 (1.3) | 489 (4.3) | 50 (1.1) | 471 (3.6) | 7 (0.6) | 465 (8.1) | 10.1 (0.05) |
| Lithuania | 41 (1.8) | 538 (3.7) | 43 (1.2) | 532 (3.6) | 16 (1.5) | 532 (5.0) | 9.8 (0.09) |
| Cyprus | 40 (1.2) | 498 (3.0) | 35 (1.0) | 484 (2.9) | 25 (1.1) | 474 (3.5) | 9.5 (0.07) |
| Finland | 39 (1.4) | 562 (3.2) | 48 (0.9) | 538 (3.4) | 13 (1.0) | 523 (7.1) | 9.8 (0.06) |
| Hungary | 38 (1.6) | 536 (4.1) | 43 (1.1) | 523 (3.6) | 19 (1.6) | 533 (4.0) | 9.6 (0.08) |
| France | 29 (1.3) | 491 (4.0) | 53 (1.3) | 490 (3.4) | 18 (1.8) | 481 (4.1) | 9.3 (0.08) |
| Lebanon | - - | - - | - - | - - | - - | - - | - - |
| Sweden | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **46 (0.5)** | **503 (1.2)** | **41 (0.4)** | **489 (1.2)** | **13 (0.4)** | **488 (2.3)** | |
| **Benchmarking Participants** | | | | | | | |
| Moscow City, Russian Fed. | 39 (1.7) | 572 (3.8) | 44 (1.0) | 565 (3.3) | 17 (1.3) | 563 (4.3) | 9.7 (0.08) |

A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Teachers' Emphasis on Science Investigation

Science practices, and in particular scientific inquiry and investigation knowledge and skills, are important components of many science curricula. Teachers were asked the frequency with which they have their students engage in various instructional activities related to science investigations and experiments. Responses were combined into the TIMSS *Teachers' Emphasis on Science Investigation* scale, described in Exhibit 13.11 (see About the Scale), to report two categories: "about half the lessons or more" and "less than half the lessons." Results of teachers' reports are presented in Exhibits 13.12 and 13.13 for fourth and eighth grades, respectively, together with students' average achievement. Countries are ordered by the percentage of students in "about half the lessons or more."

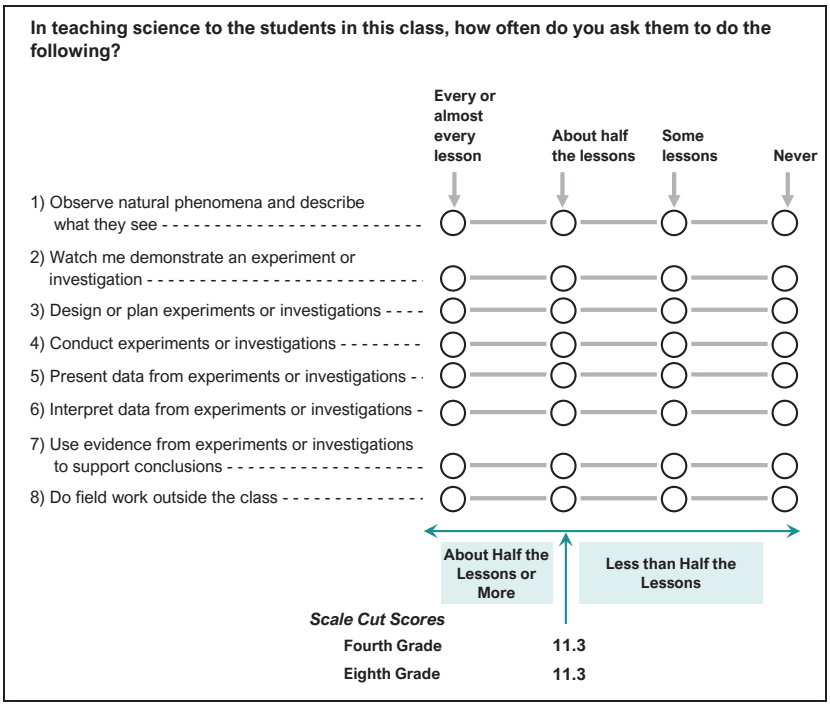
On average, 31 percent of fourth grade students had teachers who reported an emphasis on science investigation in "about half the lessons or more," and 69 percent had teachers who reported an emphasis on science investigation in "less than half the lessons." Average achievement was similar for students in both categories of emphasis. Just 27 percent of eighth grade students were taught by teachers reporting an emphasis on science investigation in "about half the lessons or more," and 73 percent had teachers who reported an emphasis on science investigation in "less than half the lessons." In eighth grade, average achievement for students in the "about half the lessons or more" category was 492, and was 490 for those in the "less than half the lessons" category.

## Exhibit 13.11: Teachers' Emphasis on Science Investigation

*Students' Results Based on Teachers' Reports*

### About the Scale

Students were scored according to their teachers' reports regarding how often they asked students to do eight instructional activities on the *Emphasis on Science Investigation* scale. Cut scores divide the scale into two categories. Students with teachers reporting they emphasize science investigation in **About Half the Lessons or More** had a score at or above the cut score corresponding to their teachers reporting they do all eight activities in "about half the lessons," on average. All other students had teachers reporting they emphasize science investigation in **Less than Half the Lessons**.




SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 13.12: Teachers' Emphasis on Science Investigation

*Students' Results Based on Teachers' Reports*

| Country | | About Half the Lessons or More | | Less than Half the Lessons | | Average Scale Score |
|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Oman | | 82 (2.4) | 431 (5.0) | 18 (2.4) | 457 (11.0) | 12.5 (0.11) |
| Iran, Islamic Rep. of | | 78 (3.1) | 444 (5.4) | 22 (3.1) | 428 (8.2) | 12.5 (0.15) |
| Philippines | | 75 (3.8) | 248 (8.8) | 25 (3.8) | 249 (12.4) | 12.3 (0.20) |
| Cyprus | | 72 (3.9) | 513 (3.8) | 28 (3.9) | 510 (4.2) | 12.0 (0.12) |
| Turkey (5) | | 69 (3.6) | 522 (6.1) | 31 (3.6) | 536 (5.2) | 12.2 (0.22) |
| Pakistan | r | 66 (7.0) | 303 (22.1) | 34 (7.0) | 278 (15.8) | 12.0 (0.30) |
| Korea, Rep. of | | 66 (4.1) | 590 (2.9) | 34 (4.1) | 583 (3.0) | 11.6 (0.14) |
| Kuwait | | 61 (3.5) | 392 (7.7) | 39 (3.5) | 394 (10.0) | 11.6 (0.19) |
| United Arab Emirates | r | 58 (2.2) | 486 (3.3) | 42 (2.2) | 458 (4.5) | 11.5 (0.10) |
| Albania | | 57 (3.6) | 493 (5.7) | 43 (3.6) | 485 (5.6) | 11.5 (0.20) |
| Qatar | | 54 (2.9) | 441 (7.1) | 46 (2.9) | 460 (4.8) | 11.3 (0.13) |
| Japan | | 53 (4.4) | 561 (2.0) | 47 (4.4) | 563 (3.0) | 11.3 (0.14) |
| Bahrain | | 51 (4.0) | 496 (6.6) | 49 (4.0) | 488 (6.3) | 11.0 (0.13) |
| North Macedonia | | 48 (4.4) | 429 (8.3) | 52 (4.4) | 424 (8.8) | 11.3 (0.21) |
| Kosovo | | 46 (4.3) | 419 (4.8) | 54 (4.3) | 408 (4.8) | 11.2 (0.19) |
| Morocco | | 43 (4.1) | 373 (8.4) | 57 (4.1) | 376 (8.2) | 10.9 (0.17) |
| South Africa (5) | | 43 (4.2) | 316 (8.8) | 57 (4.2) | 332 (7.2) | 10.9 (0.22) |
| Kazakhstan | | 43 (3.8) | 499 (6.7) | 57 (3.8) | 489 (4.3) | 11.0 (0.20) |
| Saudi Arabia | | 43 (3.4) | 416 (6.6) | 57 (3.4) | 391 (6.3) | 10.9 (0.13) |
| Australia | | 35 (3.3) | 531 (4.7) | 65 (3.3) | 535 (3.6) | 10.0 (0.15) |
| Azerbaijan | | 33 (3.4) | 423 (5.8) | 67 (3.4) | 429 (4.2) | 10.3 (0.16) |
| Italy | | 32 (3.4) | 511 (5.1) | 68 (3.4) | 509 (3.3) | 10.0 (0.19) |
| Chile | r | 31 (4.1) | 473 (5.9) | 69 (4.1) | 466 (3.9) | 10.2 (0.18) |
| Serbia | | 30 (3.9) | 522 (4.8) | 70 (3.9) | 515 (4.4) | 10.0 (0.20) |
| Singapore | | 30 (2.7) | 602 (5.5) | 70 (2.7) | 591 (4.3) | 10.4 (0.08) |
| Portugal | | 29 (3.1) | 501 (4.3) | 71 (3.1) | 505 (2.8) | 9.9 (0.16) |
| Croatia | | 28 (3.5) | 524 (4.6) | 72 (3.5) | 523 (2.4) | 9.8 (0.20) |
| Chinese Taipei | | 27 (3.2) | 559 (3.0) | 73 (3.2) | 558 (2.1) | 10.2 (0.14) |
| Montenegro | | 26 (2.2) | 448 (4.8) | 74 (2.2) | 455 (2.8) | 9.6 (0.11) |
| Slovak Republic | | 25 (3.0) | 532 (6.2) | 75 (3.0) | 518 (4.0) | 9.8 (0.17) |
| United States | | 24 (2.3) | 545 (5.4) | 76 (2.3) | 537 (3.2) | 9.7 (0.13) |
| Malta | | 24 (0.3) | 498 (2.2) | 76 (0.3) | 495 (1.5) | 9.6 (0.02) |
| Bosnia and Herzegovina | | 20 (2.3) | 454 (6.8) | 80 (2.3) | 460 (3.0) | 9.4 (0.14) |
| Ireland | | 19 (2.9) | 524 (6.9) | 81 (2.9) | 529 (3.1) | 9.4 (0.15) |
| Spain | | 19 (3.3) | 504 (6.3) | 81 (3.3) | 512 (2.8) | 9.2 (0.16) |
| Bulgaria | | 19 (3.1) | 540 (11.8) | 81 (3.1) | 517 (5.3) | 9.4 (0.15) |
| France | | 18 (2.6) | 491 (6.0) | 82 (2.6) | 488 (3.5) | 9.3 (0.15) |
| Canada | r | 17 (1.7) | 519 (3.9) | 83 (1.7) | 526 (2.2) | 9.6 (0.09) |
| Georgia | | 16 (2.6) | 450 (13.0) | 84 (2.6) | 456 (3.9) | 9.5 (0.16) |
| Russian Federation | | 15 (2.6) | 563 (6.9) | 85 (2.6) | 568 (3.2) | 8.8 (0.16) |
| New Zealand | | 15 (2.1) | 500 (7.0) | 85 (2.1) | 503 (2.9) | 9.1 (0.13) |
| Armenia | | 15 (2.9) | 470 (8.0) | 85 (2.9) | 467 (3.9) | 9.2 (0.15) |
| Northern Ireland | | 14 (3.3) | 528 (6.2) | 86 (3.3) | 517 (2.6) | 8.5 (0.18) |
| Latvia | | 13 (2.7) | 542 (5.3) | 87 (2.7) | 542 (2.7) | 9.4 (0.16) |
| Lithuania | | 12 (2.5) | 534 (10.0) | 88 (2.5) | 537 (2.7) | 8.8 (0.14) |
| Denmark | r | 8 (2.5) | 517 (9.2) | 92 (2.5) | 522 (2.8) | 8.6 (0.16) |
| Hong Kong SAR | | 8 (2.8) | 543 (20.8) | 92 (2.8) | 531 (3.6) | 8.7 (0.22) |
| Sweden | | 7 (2.4) | 533 (12.3) | 93 (2.4) | 540 (3.3) | 8.4 (0.18) |
| Germany | | 7 (1.9) | 509 (13.1) | 93 (1.9) | 519 (2.3) | 8.5 (0.14) |
| Hungary | | 6 (1.6) | 525 (8.9) | 94 (1.6) | 529 (2.9) | 8.4 (0.13) |
| Poland | | 6 (1.8) | 527 (8.4) | 94 (1.8) | 532 (2.7) | 8.5 (0.14) |
| Finland | | 6 (1.4) | 559 (7.7) | 94 (1.4) | 555 (2.6) | 8.2 (0.10) |
| Netherlands | r | 6 (2.7) | 528 (13.2) | 94 (2.7) | 517 (3.2) | 7.8 (0.16) |
| Austria | | 5 (1.3) | 519 (10.3) | 95 (1.3) | 522 (2.6) | 8.2 (0.12) |
| Czech Republic | | 4 (1.1) | 544 (11.1) | 96 (1.1) | 533 (2.6) | 8.3 (0.12) |
| Belgium (Flemish) | | 3 (1.2) | 509 (10.2) | 97 (1.2) | 502 (2.1) | 7.6 (0.13) |
| Norway (5) | s | 2 (1.0) | ~ ~ | 98 (1.0) | 540 (2.8) | 7.7 (0.14) |
| England | x | 12 (4.0) | 538 (9.9) | 88 (4.0) | 538 (5.2) | 9.8 (0.19) |
| **International Average** | | **31 (0.4)** | **491 (1.1)** | **69 (0.4)** | **490 (0.7)** | |
| **Benchmarking Participants** | | | | | | |
| Dubai, UAE | r | 67 (2.2) | 554 (2.5) | 33 (2.2) | 541 (4.8) | 12.2 (0.12) |
| Abu Dhabi, UAE | r | 46 (3.0) | 430 (7.3) | 54 (3.0) | 405 (6.0) | 11.0 (0.15) |
| Ontario, Canada | r | 16 (3.1) | 519 (8.4) | 84 (3.1) | 528 (3.9) | 9.6 (0.14) |
| Madrid, Spain | | 16 (3.5) | 530 (7.6) | 84 (3.5) | 521 (1.9) | 9.2 (0.16) |
| Quebec, Canada | r | 15 (3.0) | 523 (4.9) | 85 (3.0) | 522 (2.7) | 9.3 (0.17) |
| Moscow City, Russian Fed. | | 10 (3.1) | 599 (8.3) | 90 (3.1) | 594 (2.3) | 8.6 (0.17) |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 13.13: Teachers' Emphasis on Science Investigation

*Students' Results Based on Teachers' Reports*

| Country | | About Half the Lessons or More | | Less than Half the Lessons | | Average Scale Score |
|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Oman | | 75 (2.8) | 458 (3.7) | 25 (2.8) | 456 (7.5) | 12.1 (0.11) |
| Iran, Islamic Rep. of | | 61 (3.4) | 452 (5.3) | 39 (3.4) | 445 (6.2) | 11.6 (0.14) |
| Kuwait | | 55 (4.8) | 435 (6.2) | 45 (4.8) | 455 (9.6) | 11.5 (0.17) |
| Morocco | | 49 (2.8) | 395 (3.3) | 51 (2.8) | 393 (3.7) | 11.0 (0.10) |
| Turkey | | 48 (4.2) | 521 (7.6) | 52 (4.2) | 510 (4.2) | 11.1 (0.22) |
| United Arab Emirates | r | 48 (1.7) | 489 (4.4) | 52 (1.7) | 461 (4.5) | 10.9 (0.07) |
| Bahrain | | 46 (2.3) | 481 (3.6) | 54 (2.3) | 490 (3.1) | 10.9 (0.13) |
| Qatar | | 45 (4.6) | 477 (8.0) | 55 (4.6) | 473 (6.0) | 10.8 (0.14) |
| Saudi Arabia | | 44 (3.9) | 438 (4.3) | 56 (3.9) | 426 (4.1) | 10.9 (0.17) |
| Egypt | | 43 (4.2) | 401 (8.5) | 57 (4.2) | 382 (6.2) | 10.9 (0.19) |
| Jordan | | 43 (4.0) | 455 (7.3) | 57 (4.0) | 449 (5.5) | 10.9 (0.15) |
| Malaysia | | 41 (3.6) | 472 (7.7) | 59 (3.6) | 451 (5.4) | 10.7 (0.15) |
| Lebanon | | 37 (2.7) | 377 (6.6) | 63 (2.7) | 377 (6.7) | 10.6 (0.11) |
| Kazakhstan | | 36 (2.0) | 481 (4.4) | 64 (2.0) | 476 (3.6) | 10.3 (0.12) |
| Chile | | 27 (3.6) | 456 (6.5) | 73 (3.6) | 465 (3.3) | 9.9 (0.15) |
| France | r | 25 (3.1) | 494 (5.2) | 75 (3.1) | 486 (2.9) | 10.1 (0.12) |
| South Africa (9) | | 25 (2.4) | 360 (6.8) | 75 (2.4) | 374 (4.0) | 9.6 (0.13) |
| United States | r | 25 (2.2) | 531 (7.5) | 75 (2.2) | 525 (5.4) | 9.8 (0.11) |
| Cyprus | s | 24 (2.2) | 481 (6.2) | 76 (2.2) | 488 (2.9) | 9.8 (0.10) |
| Korea, Rep. of | | 23 (3.6) | 563 (4.1) | 77 (3.6) | 560 (2.3) | 9.8 (0.16) |
| Finland | | 23 (1.5) | 549 (4.1) | 77 (1.5) | 541 (3.2) | 9.4 (0.06) |
| Japan | | 21 (3.4) | 574 (6.3) | 79 (3.4) | 568 (2.4) | 10.1 (0.12) |
| Romania | | 20 (2.1) | 473 (7.5) | 80 (2.1) | 471 (4.3) | 9.6 (0.10) |
| Israel | | 20 (3.1) | 506 (11.2) | 80 (3.1) | 515 (4.8) | 9.4 (0.15) |
| Hong Kong SAR | | 18 (3.5) | 526 (16.0) | 82 (3.5) | 499 (6.2) | 9.3 (0.16) |
| Georgia | | 16 (1.5) | 441 (6.5) | 84 (1.5) | 448 (3.8) | 9.3 (0.08) |
| Ireland | | 14 (1.9) | 520 (7.9) | 86 (1.9) | 529 (2.7) | 9.8 (0.10) |
| Russian Federation | | 14 (1.2) | 550 (6.6) | 86 (1.2) | 542 (4.2) | 9.0 (0.09) |
| Australia | r | 14 (2.3) | 542 (10.8) | 86 (2.3) | 532 (3.8) | 9.5 (0.09) |
| England | s | 13 (3.9) | 505 (18.9) | 87 (3.9) | 525 (7.6) | 9.6 (0.16) |
| Italy | | 11 (2.0) | 494 (7.9) | 89 (2.0) | 502 (2.6) | 9.0 (0.12) |
| New Zealand | | 10 (2.2) | 513 (15.2) | 90 (2.2) | 500 (3.9) | 9.2 (0.12) |
| Hungary | | 8 (1.3) | 544 (6.3) | 92 (1.3) | 527 (2.8) | 8.7 (0.08) |
| Portugal | | 8 (1.2) | 514 (6.2) | 92 (1.2) | 520 (2.9) | 8.8 (0.10) |
| Chinese Taipei | | 8 (2.0) | 587 (8.8) | 92 (2.0) | 573 (2.0) | 8.6 (0.13) |
| Lithuania | | 7 (1.0) | 529 (5.5) | 93 (1.0) | 533 (2.9) | 8.3 (0.08) |
| Sweden | | 6 (1.3) | 530 (13.9) | 94 (1.3) | 521 (3.3) | 8.2 (0.14) |
| Singapore | | 3 (1.0) | 597 (27.0) | 97 (1.0) | 607 (4.1) | 8.5 (0.08) |
| Norway (9) | s | 1 (0.7) | ~ ~ | 99 (0.7) | 498 (3.6) | 7.8 (0.12) |
| **International Average** | | **27 (0.5)** | **492 (1.5)** | **73 (0.5)** | **490 (0.7)** | |
| **Benchmarking Participants** | | | | | | |
| Dubai, UAE | r | 53 (3.3) | 553 (5.6) | 47 (3.3) | 549 (5.0) | 11.3 (0.10) |
| Abu Dhabi, UAE | r | 42 (2.3) | 448 (9.4) | 58 (2.3) | 395 (7.2) | 10.6 (0.11) |
| Gauteng, RSA (9) | | 31 (3.5) | 412 (7.8) | 69 (3.5) | 427 (5.3) | 10.0 (0.20) |
| Western Cape, RSA (9) | | 21 (3.4) | 418 (11.2) | 79 (3.4) | 446 (6.6) | 9.2 (0.18) |
| Moscow City, Russian Fed. | | 12 (1.3) | 571 (4.9) | 88 (1.3) | 566 (3.0) | 8.8 (0.08) |
| Ontario, Canada | s | 11 (3.3) | 522 (11.6) | 89 (3.3) | 521 (4.9) | 8.7 (0.21) |
| Quebec, Canada | y | - - | - - | - - | - - | - - |

This TIMSS context questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## School Resources for Science Experiments

Undertaking hands-on science investigations is an important component of science curricula in many countries. Exhibits 13.14 (fourth grade) and 13.15 (eighth grade) present principals' reports on whether their schools have two resources for facilitating hands-on science experiments—a science laboratory and assistance for teachers when students are conducting experiments—along with student achievement. Countries are ordered by the percentage of students in schools with a science laboratory.

On average across countries, 36 percent of fourth grade students were in schools with a science laboratory, and their average achievement was higher than that of the 64 percent of students who were in schools without a laboratory (496 vs. 486). Of course, the availability of a laboratory in the school could be related to other economic factors that are related to achievement. On average, 35 percent of fourth grade students were in schools in which assistance is available to teachers when students are conducting experiments. This finding also ranged considerably across countries, and there are countries in which many schools have a science laboratory, but assistance is not available to teachers when students conduct experiments.

A much higher percentage of eighth grade students (85%) were in schools with a science laboratory. Average achievement for these students was substantially higher than for students in schools without this resource (494 compared with 457). Still, only about half (54%) of students were in schools in which assistance was available to teachers when students are conducting experiments, and this finding was likewise associated with higher average science achievement (494 compared with 483).

# Exhibit 13.14: School Resources for Conducting Science Experiments

*Students' Results based on Principals' Reports*

| Country | Schools Have a Science Laboratory | | | | Teachers Have Assistance Available when Students are Conducting Experiments | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Japan | 100 (0.0) | 562 (1.8) | 0 (0.0) | ~ ~ | 36 (4.3) | 559 (3.0) | 64 (4.3) | 563 (2.0) |
| Korea, Rep. of | 99 (0.9) | 588 (2.2) | 1 (0.9) | ~ ~ | 74 (4.0) | 590 (2.4) | 26 (4.0) | 581 (4.3) |
| Singapore | 98 (0.0) | 595 (3.4) | 2 (0.0) | ~ ~ | 67 (0.0) | 597 (4.3) | 33 (0.0) | 590 (5.1) |
| Kuwait | 95 (1.5) | 392 (6.5) | 5 (1.5) | 400 (28.9) | 78 (3.3) | 393 (7.2) | 22 (3.3) | 388 (15.8) |
| Chinese Taipei | 93 (1.9) | 557 (1.8) | 7 (1.9) | 567 (5.1) | 90 (2.5) | 558 (1.9) | 10 (2.5) | 558 (5.2) |
| United Arab Emirates | 85 (1.2) | 468 (2.5) | 15 (1.2) | 488 (6.2) | 83 (1.1) | 474 (2.5) | 17 (1.1) | 455 (3.5) |
| Bahrain | 85 (2.0) | 490 (4.0) | 15 (2.0) | 507 (6.4) | 74 (2.7) | 489 (4.0) | 26 (2.7) | 501 (6.2) |
| Denmark | r 84 (3.2) | 522 (2.8) | 16 (3.2) | 526 (4.8) | r 7 (1.9) | 532 (5.6) | 93 (1.9) | 522 (2.7) |
| Qatar | 83 (3.0) | 440 (4.6) | 17 (3.0) | 497 (11.2) | 86 (2.0) | 442 (4.5) | 14 (2.0) | 495 (9.1) |
| Saudi Arabia | 80 (2.9) | 405 (4.9) | 20 (2.9) | 391 (13.6) | 71 (3.5) | 398 (5.3) | 29 (3.5) | 416 (7.1) |
| Poland | 66 (3.2) | 535 (3.1) | 34 (3.2) | 524 (4.8) | 50 (4.5) | 532 (3.7) | 50 (4.5) | 529 (3.8) |
| Cyprus | 66 (4.5) | 514 (3.8) | 34 (4.5) | 504 (4.8) | 20 (3.8) | 519 (7.2) | 80 (3.8) | 508 (3.4) |
| Turkey (5) | 62 (4.3) | 534 (5.2) | 38 (4.3) | 514 (8.4) | 13 (2.7) | 536 (13.1) | 87 (2.7) | 525 (4.8) |
| Chile | 57 (3.9) | 478 (3.7) | 43 (3.9) | 458 (5.0) | 39 (4.5) | 473 (3.9) | 61 (4.5) | 467 (4.1) |
| Georgia | 50 (3.8) | 454 (5.1) | 50 (3.8) | 455 (5.6) | 8 (2.5) | 470 (10.2) | 92 (2.5) | 453 (4.2) |
| Lithuania | 48 (4.8) | 537 (4.2) | 52 (4.8) | 539 (4.8) | 12 (2.8) | 542 (10.9) | 88 (2.8) | 538 (2.9) |
| Armenia | 45 (4.3) | 464 (4.3) | 55 (4.3) | 468 (4.7) | 89 (2.5) | 465 (3.4) | 11 (2.5) | 476 (8.8) |
| Iran, Islamic Rep. of | 42 (3.1) | 458 (6.8) | 58 (3.1) | 429 (5.5) | 18 (3.1) | 455 (9.5) | 82 (3.1) | 438 (4.8) |
| Hong Kong SAR | 42 (4.8) | 543 (5.5) | 58 (4.8) | 523 (5.6) | 62 (3.9) | 534 (3.8) | 38 (3.9) | 528 (6.4) |
| Portugal | 41 (3.7) | 504 (3.9) | 59 (3.7) | 504 (3.1) | 39 (4.0) | 500 (3.3) | 61 (4.0) | 506 (3.1) |
| Kazakhstan | 38 (3.8) | 494 (6.4) | 62 (3.8) | 495 (4.5) | 61 (3.9) | 494 (4.5) | 39 (3.9) | 492 (6.0) |
| Italy | 36 (3.9) | 505 (4.9) | 64 (3.9) | 513 (3.4) | 13 (2.8) | 508 (7.7) | 87 (2.8) | 510 (3.1) |
| Pakistan | 36 (8.2) | 297 (29.4) | 64 (8.2) | 287 (11.8) | 55 (6.4) | 300 (20.4) | 45 (6.4) | 279 (14.1) |
| Latvia | 36 (3.7) | 542 (4.3) | 64 (3.7) | 542 (2.8) | 71 (3.5) | 541 (3.1) | 29 (3.5) | 543 (3.8) |
| Czech Republic | 35 (3.9) | 521 (4.2) | 65 (3.9) | 541 (3.0) | 8 (2.3) | 535 (12.6) | 92 (2.3) | 534 (2.6) |
| Russian Federation | 33 (3.0) | 572 (5.2) | 67 (3.0) | 565 (3.9) | 30 (3.0) | 566 (4.0) | 70 (3.0) | 568 (4.0) |
| Spain | 32 (2.9) | 524 (3.4) | 68 (2.9) | 505 (2.8) | 20 (2.9) | 515 (7.9) | 80 (2.9) | 510 (2.6) |
| Sweden | 31 (4.1) | 529 (6.7) | 69 (4.1) | 540 (3.7) | 17 (3.7) | 533 (6.9) | 83 (3.7) | 537 (4.1) |
| Oman | 30 (2.3) | 418 (7.2) | 70 (2.3) | 441 (5.4) | 29 (2.7) | 423 (7.7) | 71 (2.7) | 437 (5.3) |
| Norway (5) | r 28 (4.7) | 545 (4.5) | 72 (4.7) | 538 (3.0) | r 24 (4.1) | 539 (6.4) | 76 (4.1) | 540 (2.7) |
| England | s 24 (4.6) | 543 (11.3) | 76 (4.6) | 536 (4.3) | s 37 (5.3) | 537 (8.3) | 63 (5.3) | 538 (4.7) |
| Slovak Republic | 22 (3.4) | 531 (5.4) | 78 (3.4) | 518 (4.8) | 13 (2.4) | 516 (9.6) | 87 (2.4) | 522 (4.3) |
| United States | 21 (2.5) | 547 (6.1) | 79 (2.5) | 537 (3.5) | 19 (2.4) | 539 (7.8) | 81 (2.4) | 538 (3.5) |
| Australia | 21 (2.9) | 537 (6.3) | 79 (2.9) | 531 (3.5) | 15 (2.7) | 537 (6.6) | 85 (2.7) | 531 (3.2) |
| Montenegro | 21 (0.3) | 453 (5.9) | 79 (0.3) | 453 (2.6) | 27 (0.6) | 456 (3.8) | 73 (0.6) | 452 (2.6) |
| Kosovo | 20 (3.9) | 419 (8.5) | 80 (3.9) | 412 (4.4) | 12 (3.1) | 410 (8.6) | 88 (3.1) | 413 (3.9) |
| Albania | 18 (2.3) | 525 (5.5) | 82 (2.3) | 482 (3.9) | 15 (2.8) | 519 (8.7) | 85 (2.8) | 485 (3.9) |
| Malta | 16 (0.3) | 518 (2.7) | 84 (0.3) | 492 (1.5) | 47 (0.4) | 496 (1.7) | 53 (0.4) | 496 (1.8) |
| Philippines | 16 (2.8) | 294 (18.7) | 84 (2.8) | 241 (8.7) | 65 (4.2) | 240 (8.3) | 35 (4.2) | 266 (11.8) |
| Bosnia and Herzegovina | 14 (2.8) | 462 (7.6) | 86 (2.8) | 458 (3.0) | 25 (3.4) | 457 (6.1) | 75 (3.4) | 459 (3.0) |
| Azerbaijan | 13 (2.7) | 425 (9.9) | 87 (2.7) | 427 (3.4) | 48 (3.8) | 425 (4.9) | 52 (3.8) | 429 (5.0) |
| Finland | 13 (3.0) | 556 (6.9) | 87 (3.0) | 554 (2.7) | 32 (3.4) | 556 (4.8) | 68 (3.4) | 554 (2.7) |
| Germany | 13 (2.1) | 512 (7.1) | 87 (2.1) | 519 (2.6) | 6 (1.6) | 526 (9.3) | 94 (1.6) | 518 (2.4) |
| South Africa (5) | 13 (2.4) | 401 (21.9) | 87 (2.4) | 314 (5.0) | 20 (3.3) | 302 (11.5) | 80 (3.3) | 332 (5.9) |
| Serbia | 11 (2.4) | 506 (8.1) | 89 (2.4) | 518 (3.7) | 33 (4.3) | 522 (5.1) | 67 (4.3) | 514 (4.2) |
| Canada | 11 (1.1) | 537 (7.1) | 89 (1.1) | 522 (1.9) | 20 (2.4) | 528 (5.7) | 80 (2.4) | 522 (2.2) |
| Morocco | 10 (2.5) | 450 (24.1) | 90 (2.5) | 365 (6.6) | 50 (3.1) | 392 (7.9) | 50 (3.1) | 359 (8.1) |
| Hungary | 9 (2.5) | 546 (9.9) | 91 (2.5) | 527 (3.0) | 17 (3.3) | 537 (9.1) | 83 (3.3) | 527 (3.3) |
| Croatia | 6 (2.2) | 530 (10.5) | 94 (2.2) | 524 (2.2) | 15 (3.0) | 532 (6.5) | 85 (3.0) | 523 (2.0) |
| North Macedonia | 6 (2.0) | 400 (17.4) | 94 (2.0) | 428 (6.4) | 34 (4.1) | 437 (9.3) | 66 (4.1) | 420 (8.5) |
| New Zealand | 6 (1.5) | 539 (13.4) | 94 (1.5) | 500 (2.5) | 18 (3.1) | 484 (9.0) | 82 (3.1) | 507 (3.0) |
| Bulgaria | 5 (1.8) | 554 (14.9) | 95 (1.8) | 519 (5.3) | 1 (1.0) | ~ ~ | 99 (1.0) | 521 (5.1) |
| Netherlands | s 3 (1.9) | 525 (16.8) | 97 (1.9) | 518 (3.3) | s 21 (4.6) | 517 (6.9) | 79 (4.6) | 519 (3.6) |
| Austria | 2 (1.1) | ~ ~ | 98 (1.1) | 522 (2.6) | 5 (1.6) | 505 (15.3) | 95 (1.6) | 523 (2.7) |
| Ireland | 2 (1.0) | ~ ~ | 98 (1.0) | 528 (3.2) | 9 (2.5) | 519 (24.0) | 91 (2.5) | 529 (2.6) |
| France | 2 (1.1) | ~ ~ | 98 (1.1) | 488 (3.0) | 5 (1.8) | 494 (16.5) | 95 (1.8) | 488 (3.0) |
| Belgium (Flemish) | 1 (0.8) | ~ ~ | 99 (0.8) | 501 (2.2) | 61 (4.1) | 497 (3.0) | 39 (4.1) | 508 (3.0) |
| Northern Ireland | r 0 (0.0) | ~ ~ | 100 (0.0) | 520 (2.7) | r 19 (3.7) | 517 (7.4) | 81 (3.7) | 521 (2.7) |
| **International Average** | **36 (0.4)** | **496 (1.3)** | **64 (0.4)** | **486 (0.9)** | **35 (0.4)** | **491 (1.1)** | **65 (0.4)** | **491 (0.7)** |
| **Benchmarking Participants** | | | | | | | | |
| Abu Dhabi, UAE | r 87 (1.0) | 407 (3.6) | 13 (1.0) | 447 (7.3) | r 79 (0.7) | 414 (3.4) | 21 (0.7) | 405 (4.7) |
| Dubai, UAE | r 77 (0.3) | 541 (2.3) | 23 (0.3) | 560 (2.9) | r 81 (0.2) | 543 (2.2) | 19 (0.2) | 556 (3.1) |
| Moscow City, Russian Fed. | 64 (4.2) | 595 (2.8) | 36 (4.2) | 595 (3.5) | 17 (3.2) | 600 (5.2) | 83 (3.2) | 594 (2.4) |
| Madrid, Spain | 44 (3.5) | 529 (2.6) | 56 (3.5) | 518 (3.1) | 16 (2.7) | 526 (4.8) | 84 (2.7) | 523 (2.3) |
| Ontario, Canada | 8 (1.4) | 562 (14.7) | 92 (1.4) | 521 (3.0) | 9 (4.0) | 534 (28.5) | 91 (4.0) | 523 (3.2) |
| Quebec, Canada | 7 (2.1) | 510 (9.1) | 93 (2.1) | 523 (2.7) | 33 (4.2) | 524 (4.1) | 67 (4.2) | 521 (3.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

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Downloaded from http://timss2019.org/download

## Exhibit 13.15: School Resources for Conducting Science Experiments

*Students' Results based on Principals' Reports*

| Country | Schools Have a Science Laboratory | | | | | Teachers Have Assistance Available when Students are Conducting Experiments | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | | Yes | | No | | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | |
| Australia | 100 (0.0) | 530 (3.3) | 0 (0.0) | ~ ~ | | 66 (3.4) | 532 (3.5) | 34 (3.4) | 526 (7.6) | |
| Ireland | 100 (0.0) | 525 (2.8) | 0 (0.0) | ~ ~ | | 14 (2.9) | 535 (8.2) | 86 (2.9) | 523 (3.1) | |
| Korea, Rep. of | 100 (0.0) | 561 (2.1) | 0 (0.0) | ~ ~ | | 46 (3.6) | 565 (3.7) | 54 (3.6) | 557 (2.9) | |
| Singapore | 100 (0.0) | 608 (3.9) | 0 (0.0) | ~ ~ | | 99 (0.0) | 609 (4.0) | 1 (0.0) | ~ ~ | |
| Sweden | 100 (0.0) | 522 (3.2) | 0 (0.0) | ~ ~ | | 15 (3.2) | 501 (12.3) | 85 (3.2) | 526 (3.6) | |
| Oman | 100 (0.3) | 457 (3.0) | 0 (0.3) | ~ ~ | | 82 (3.0) | 459 (3.4) | 18 (3.0) | 452 (7.3) | |
| Bahrain | 100 (0.1) | 486 (1.9) | 0 (0.1) | ~ ~ | | 92 (0.1) | 487 (2.0) | 8 (0.1) | 476 (5.6) | |
| Hong Kong SAR | 99 (0.7) | 504 (5.3) | 1 (0.7) | ~ ~ | | 98 (1.3) | 504 (5.4) | 2 (1.3) | ~ ~ | |
| Japan | 99 (0.9) | 570 (2.2) | 1 (0.9) | ~ ~ | | 35 (4.0) | 570 (4.2) | 65 (4.0) | 569 (2.9) | |
| Kuwait | 99 (0.6) | 443 (5.4) | 1 (0.6) | ~ ~ | | 83 (3.3) | 443 (6.2) | 17 (3.3) | 445 (13.1) | |
| New Zealand | 99 (0.9) | 505 (3.6) | 1 (0.9) | ~ ~ | | 53 (5.1) | 500 (5.1) | 47 (5.1) | 507 (5.7) | |
| England | s 99 (1.0) | 521 (5.7) | 1 (1.0) | ~ ~ | | s 71 (4.6) | 518 (7.2) | 29 (4.6) | 526 (12.8) | |
| Malaysia | 99 (0.3) | 460 (3.6) | 1 (0.3) | ~ ~ | | 91 (2.1) | 461 (4.0) | 9 (2.1) | 449 (10.1) | |
| Cyprus | r 99 (0.0) | 483 (2.2) | 1 (0.0) | ~ ~ | | r 36 (0.4) | 494 (3.6) | 64 (0.4) | 477 (2.6) | |
| Chinese Taipei | 99 (0.8) | 575 (2.0) | 1 (0.8) | ~ ~ | | 92 (1.6) | 577 (2.0) | 8 (1.6) | 544 (8.4) | |
| Qatar | 99 (1.0) | 475 (4.3) | 1 (1.0) | ~ ~ | | 94 (1.7) | 473 (4.5) | 6 (1.7) | 502 (21.0) | |
| Portugal | 98 (1.3) | 519 (2.9) | 2 (1.3) | ~ ~ | | 46 (4.8) | 524 (4.7) | 54 (4.8) | 514 (4.2) | |
| United Arab Emirates | 97 (0.7) | 472 (2.4) | 3 (0.7) | 430 (6.1) | | 91 (1.0) | 471 (2.4) | 9 (1.0) | 462 (5.6) | |
| Egypt | 95 (1.8) | 390 (5.6) | 5 (1.8) | 374 (22.8) | | 94 (1.8) | 391 (6.0) | 6 (1.8) | 373 (24.7) | |
| Norway (9) | r 93 (2.4) | 497 (3.6) | 7 (2.4) | 490 (12.6) | | r 34 (4.6) | 494 (5.8) | 66 (4.6) | 498 (4.3) | |
| Saudi Arabia | 92 (1.8) | 433 (2.8) | 8 (1.8) | 420 (14.3) | | 82 (3.4) | 433 (3.2) | 18 (3.4) | 434 (8.4) | |
| Jordan | 92 (1.9) | 458 (4.5) | 8 (1.9) | 390 (13.1) | | 89 (2.0) | 456 (5.2) | 11 (2.0) | 420 (8.9) | |
| Israel | 90 (2.7) | 514 (4.7) | 10 (2.7) | 509 (15.8) | | 85 (2.8) | 513 (4.6) | 15 (2.8) | 516 (10.9) | |
| Lebanon | 89 (2.5) | 378 (5.2) | 11 (2.5) | 368 (12.8) | | 65 (3.2) | 388 (6.4) | 35 (3.2) | 355 (9.9) | |
| Finland | 87 (3.2) | 544 (3.3) | 13 (3.2) | 535 (9.5) | | 19 (3.2) | 542 (6.0) | 81 (3.2) | 543 (3.7) | |
| Morocco | 83 (2.4) | 395 (3.3) | 17 (2.4) | 393 (7.5) | | 43 (3.7) | 400 (4.7) | 57 (3.7) | 390 (4.3) | |
| Kazakhstan | 81 (2.8) | 480 (3.7) | 19 (2.8) | 467 (7.0) | | 92 (1.5) | 478 (3.4) | 8 (1.5) | 476 (8.8) | |
| United States | 80 (2.8) | 531 (3.9) | 20 (2.8) | 510 (15.1) | | 34 (3.4) | 519 (7.2) | 66 (3.4) | 530 (6.1) | |
| Russian Federation | 79 (3.1) | 545 (4.0) | 21 (3.1) | 535 (9.0) | | 46 (3.6) | 540 (6.3) | 54 (3.6) | 545 (4.0) | |
| France | r 75 (4.1) | 493 (3.6) | 25 (4.1) | 482 (6.6) | | r 13 (2.8) | 510 (10.5) | 87 (2.8) | 488 (3.4) | |
| Italy | 75 (3.7) | 501 (2.9) | 25 (3.7) | 504 (5.7) | | 13 (2.9) | 492 (11.3) | 87 (2.9) | 503 (2.5) | |
| Georgia | 70 (3.7) | 446 (4.6) | 30 (3.7) | 450 (5.8) | | 6 (2.2) | 488 (24.7) | 94 (2.2) | 444 (3.8) | |
| Chile | 68 (3.1) | 473 (3.8) | 32 (3.1) | 439 (6.1) | | 32 (3.5) | 474 (6.5) | 68 (3.5) | 457 (4.1) | |
| Iran, Islamic Rep. of | 67 (3.5) | 461 (4.9) | 33 (3.5) | 424 (6.0) | | 27 (3.1) | 465 (8.0) | 73 (3.1) | 444 (4.4) | |
| Turkey | 63 (3.7) | 525 (5.1) | 37 (3.7) | 500 (5.7) | | 14 (2.6) | 542 (13.5) | 86 (2.6) | 511 (4.2) | |
| Romania | 62 (3.3) | 485 (6.3) | 38 (3.3) | 447 (4.9) | | 38 (3.3) | 491 (7.2) | 62 (3.3) | 458 (4.7) | |
| South Africa (9) | 46 (2.5) | 406 (5.6) | 54 (2.5) | 339 (3.6) | | 35 (2.7) | 371 (6.7) | 65 (2.7) | 370 (3.8) | |
| Lithuania | 27 (3.8) | 547 (5.2) | 73 (3.8) | 526 (3.9) | | 7 (2.3) | 519 (6.7) | 93 (2.3) | 533 (3.0) | |
| Hungary | 26 (3.8) | 553 (8.0) | 74 (3.8) | 522 (3.3) | | 17 (3.1) | 560 (10.6) | 83 (3.1) | 524 (3.7) | |
| **International Average** | **85 (0.4)** | **494 (0.7)** | **15 (0.4)** | **457 (2.2)** | | **54 (0.5)** | **494 (1.2)** | **46 (0.5)** | **483 (1.4)** | |
| **Benchmarking Participants** | | | | | | | | | | |
| Quebec, Canada | 100 (0.0) | 540 (3.5) | 0 (0.0) | ~ ~ | | 98 (1.3) | 540 (3.6) | 2 (1.3) | ~ ~ | |
| Dubai, UAE | r 98 (0.0) | 546 (2.3) | 2 (0.0) | ~ ~ | | r 92 (0.2) | 546 (2.4) | 8 (0.2) | 555 (6.0) | |
| Abu Dhabi, UAE | r 98 (0.1) | 418 (4.3) | 2 (0.1) | ~ ~ | | r 91 (0.9) | 416 (4.6) | 9 (0.9) | 430 (8.5) | |
| Moscow City, Russian Fed. | 97 (1.3) | 567 (3.0) | 3 (1.3) | 567 (16.1) | | 28 (3.6) | 573 (6.0) | 72 (3.6) | 564 (3.3) | |
| Western Cape, RSA (9) | 73 (3.8) | 452 (7.3) | 27 (3.8) | 408 (9.1) | | 22 (3.9) | 476 (20.3) | 78 (3.9) | 431 (6.7) | |
| Gauteng, RSA (9) | 65 (3.9) | 434 (5.3) | 35 (3.9) | 400 (8.7) | | 42 (4.5) | 429 (8.0) | 58 (4.5) | 416 (6.2) | |
| Ontario, Canada | r 44 (4.7) | 532 (4.3) | 56 (4.7) | 512 (4.3) | | r 18 (4.6) | 530 (12.7) | 82 (4.6) | 519 (3.4) | |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Experiments in Science Lessons

Students were asked about the frequency with which they conduct science experiments in their science lessons. Their reports are presented in Exhibits 13.16 (fourth grade) and 13.17 (eighth grade).

In fourth grade, 31 percent of students, on average, reported that they conducted experiments "at least once a week," 26 percent "once or twice a month," 24 percent "a few times a year," and 18 percent "never." Across countries, students reporting that they do experiments "once or twice a month" or "a few times a year" had higher average achievement than students who said they do them "at least once a week" or "never."

In the eighth grade, the frequency with which students conduct science experiments varied by science subject. In countries teaching science as an integrated subject, 28 percent of students reported that they do them "at least once a week," 37 percent said "once or twice a month," 24 percent said "a few times a year," and 11 percent said they "never" do them, on average. In countries teaching science as separate subjects, frequencies were similar to those for integrated science in chemistry and physics lessons, but much less frequent in biology and Earth science lessons. As in fourth grade, across countries, students reporting that they do experiments "once or twice a month" or "a few times a year" had higher average achievement than students doing them "at least once a week" or "never."

## Exhibit 13.16: Frequency Students Conduct Experiments in Science Lessons

*Students' Reports*

| Country | At Least Once a Week | | Once or Twice a Month | | A Few Times a Year | | Never | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 54 (2.2) | 490 (4.4) | 26 (2.3) | 498 (4.7) | 13 (2.0) | 502 (11.0) | 7 (0.8) | 472 (9.0) |
| Armenia | 40 (1.3) | 462 (3.6) | 24 (1.4) | 481 (4.7) | 16 (1.2) | 473 (6.0) | 21 (1.3) | 465 (4.5) |
| Australia | 26 (1.4) | 516 (4.5) | 30 (1.4) | 542 (3.2) | 31 (1.6) | 547 (3.8) | 13 (1.0) | 515 (4.2) |
| Austria | 16 (0.8) | 480 (4.8) | 19 (0.8) | 516 (4.1) | 26 (1.0) | 543 (3.6) | 39 (1.3) | 530 (2.8) |
| Azerbaijan | 48 (1.9) | 433 (3.9) | 18 (1.3) | 432 (5.0) | 16 (1.5) | 431 (5.2) | 17 (1.2) | 439 (5.6) |
| Bahrain | 45 (1.2) | 490 (3.4) | 26 (1.1) | 504 (4.4) | 17 (0.8) | 507 (5.5) | 12 (0.9) | 480 (6.1) |
| Belgium (Flemish) | 17 (1.1) | 482 (4.3) | 40 (1.7) | 507 (2.8) | 32 (1.6) | 510 (3.1) | 10 (0.8) | 483 (4.7) |
| Bosnia and Herzegovina | 24 (1.1) | 438 (4.2) | 16 (0.9) | 459 (4.7) | 29 (1.3) | 485 (3.6) | 31 (1.7) | 458 (3.0) |
| Bulgaria | 21 (1.5) | 502 (7.1) | 21 (1.7) | 521 (7.1) | 32 (2.1) | 538 (7.8) | 27 (1.5) | 527 (7.3) |
| Canada | 20 (0.8) | 495 (3.2) | 35 (1.1) | 530 (2.4) | 30 (1.1) | 538 (3.3) | 14 (0.8) | 520 (3.4) |
| Chile | 27 (1.3) | 448 (4.1) | 25 (1.1) | 483 (3.8) | 27 (1.3) | 493 (3.5) | 20 (1.4) | 459 (4.0) |
| Chinese Taipei | 58 (1.8) | 562 (2.0) | 31 (1.5) | 558 (2.8) | 6 (0.5) | 546 (5.8) | 5 (0.4) | 529 (5.9) |
| Croatia | 18 (1.3) | 496 (4.3) | 23 (1.2) | 526 (3.1) | 45 (1.7) | 538 (2.3) | 15 (1.4) | 515 (4.0) |
| Cyprus | 43 (2.6) | 512 (3.9) | 32 (1.5) | 523 (3.8) | 16 (1.2) | 512 (4.6) | 10 (1.3) | 479 (5.8) |
| Czech Republic | 13 (0.7) | 487 (6.0) | 18 (0.9) | 525 (4.2) | 23 (1.3) | 555 (4.3) | 46 (1.5) | 539 (2.5) |
| Denmark | 24 (1.9) | 500 (4.3) | 38 (1.4) | 528 (3.0) | 28 (1.5) | 537 (3.6) | 10 (1.2) | 521 (5.9) |
| England | 26 (1.3) | 526 (5.7) | 41 (1.2) | 550 (3.4) | 24 (1.3) | 539 (4.7) | 9 (0.8) | 520 (5.7) |
| Finland | 7 (0.6) | 505 (7.8) | 30 (1.1) | 554 (2.8) | 43 (1.1) | 567 (3.0) | 20 (0.9) | 553 (3.9) |
| France | 16 (1.0) | 462 (5.4) | 16 (1.0) | 495 (4.6) | 40 (1.4) | 500 (3.8) | 28 (1.8) | 483 (4.0) |
| Georgia | 38 (1.7) | 446 (5.0) | 30 (1.7) | 461 (5.3) | 15 (1.1) | 474 (7.8) | 16 (1.4) | 448 (7.0) |
| Germany r | 27 (1.2) | 493 (3.5) | 31 (1.2) | 532 (3.2) | 31 (1.3) | 547 (3.4) | 11 (1.0) | 514 (6.0) |
| Hong Kong SAR | 13 (1.1) | 512 (6.2) | 28 (1.3) | 535 (4.3) | 36 (1.7) | 546 (3.2) | 22 (1.6) | 515 (5.7) |
| Hungary | 14 (0.8) | 478 (4.3) | 16 (0.8) | 539 (3.9) | 26 (1.1) | 547 (3.3) | 43 (1.3) | 534 (3.2) |
| Iran, Islamic Rep. of | 54 (1.8) | 439 (4.6) | 26 (1.3) | 451 (6.7) | 13 (0.8) | 453 (6.4) | 8 (1.0) | 414 (10.6) |
| Ireland | 13 (1.0) | 494 (4.7) | 32 (1.4) | 533 (4.1) | 42 (1.3) | 538 (3.7) | 13 (1.0) | 523 (5.2) |
| Italy | 24 (0.9) | 488 (4.0) | 23 (0.9) | 519 (3.7) | 32 (1.0) | 524 (3.8) | 21 (0.9) | 504 (3.6) |
| Japan | 64 (1.5) | 561 (2.0) | 32 (1.5) | 572 (2.6) | 3 (0.3) | 505 (9.6) | 1 (0.1) | ~ ~ |
| Kazakhstan | 42 (1.3) | 485 (4.2) | 22 (1.0) | 504 (4.0) | 14 (0.8) | 514 (4.9) | 22 (1.1) | 491 (4.7) |
| Korea, Rep. of | 72 (1.8) | 587 (2.2) | 25 (1.5) | 591 (3.6) | 3 (0.5) | 585 (8.2) | 1 (0.1) | ~ ~ |
| Kosovo | 45 (1.4) | 414 (4.0) | 16 (1.1) | 421 (4.5) | 17 (1.5) | 428 (5.3) | 22 (1.3) | 414 (6.1) |
| Kuwait | 52 (1.5) | 402 (6.4) | 20 (1.1) | 398 (8.7) | 13 (0.8) | 396 (10.3) | 16 (1.1) | 379 (8.9) |
| Latvia | 23 (1.5) | 523 (4.4) | 36 (1.2) | 549 (2.9) | 29 (1.3) | 553 (2.6) | 11 (0.9) | 535 (6.3) |
| Lithuania | 16 (1.2) | 507 (5.2) | 30 (1.6) | 541 (3.7) | 36 (1.5) | 553 (3.7) | 18 (1.3) | 533 (4.7) |
| Malta | 29 (0.8) | 474 (2.7) | 32 (0.7) | 512 (2.6) | 27 (0.6) | 507 (2.4) | 12 (0.5) | 486 (5.6) |
| Montenegro | 28 (1.1) | 440 (4.1) | 18 (1.0) | 469 (3.8) | 17 (1.2) | 470 (4.0) | 37 (1.6) | 461 (3.4) |
| Morocco | 45 (1.8) | 376 (7.1) | 24 (1.5) | 378 (8.4) | 16 (1.4) | 382 (8.1) | 15 (1.6) | 371 (18.4) |
| Netherlands | 11 (0.8) | 494 (7.1) | 22 (1.1) | 517 (3.2) | 38 (1.2) | 533 (3.7) | 30 (1.3) | 514 (3.9) |
| New Zealand | 16 (1.0) | 471 (4.7) | 21 (1.0) | 508 (4.2) | 36 (1.4) | 520 (3.5) | 27 (1.5) | 499 (3.6) |
| North Macedonia | 40 (2.0) | 409 (6.8) | 31 (1.5) | 454 (7.5) | 22 (2.4) | 447 (12.5) | 7 (0.7) | 406 (8.9) |
| Northern Ireland | 10 (0.9) | 488 (5.5) | 24 (1.5) | 521 (3.3) | 41 (1.7) | 533 (3.1) | 24 (1.8) | 507 (4.1) |
| Norway (5) | 26 (1.8) | 523 (4.1) | 35 (1.5) | 547 (3.0) | 33 (1.8) | 553 (3.2) | 6 (0.8) | 516 (6.5) |
| Oman | 47 (1.6) | 437 (5.3) | 22 (1.1) | 441 (5.1) | 22 (1.2) | 448 (6.6) | 9 (0.7) | 423 (7.1) |
| Pakistan | 43 (2.9) | 305 (15.5) | 22 (2.5) | 291 (21.2) | 13 (2.0) | 297 (20.1) | 22 (3.0) | 261 (20.0) |
| Philippines | 43 (1.4) | 263 (7.8) | 27 (0.9) | 256 (9.5) | 16 (0.7) | 252 (8.2) | 14 (1.0) | 221 (8.0) |
| Poland | 12 (0.8) | 492 (4.8) | 18 (0.7) | 535 (3.3) | 32 (1.2) | 548 (3.3) | 38 (1.1) | 531 (3.0) |
| Portugal | 36 (1.2) | 490 (3.5) | 25 (1.2) | 515 (2.8) | 26 (1.2) | 521 (3.1) | 13 (0.9) | 491 (5.5) |
| Qatar | 45 (1.2) | 437 (4.4) | 24 (1.1) | 475 (5.8) | 18 (1.0) | 480 (6.1) | 13 (0.7) | 428 (7.7) |
| Russian Federation | 14 (1.1) | 535 (4.8) | 22 (1.5) | 572 (5.7) | 33 (1.6) | 575 (2.8) | 32 (1.4) | 570 (3.1) |
| Saudi Arabia | 47 (1.5) | 407 (4.4) | 18 (0.7) | 413 (6.6) | 12 (0.7) | 425 (6.0) | 23 (1.4) | 390 (7.2) |
| Serbia | 31 (1.6) | 507 (4.2) | 24 (1.5) | 532 (4.8) | 28 (1.7) | 529 (4.7) | 17 (1.4) | 504 (7.3) |
| Singapore | 39 (0.7) | 588 (4.0) | 40 (0.7) | 605 (3.7) | 17 (0.6) | 595 (4.3) | 4 (0.3) | 558 (7.0) |
| Slovak Republic | 17 (1.1) | 477 (6.8) | 23 (1.2) | 522 (4.9) | 34 (1.4) | 544 (3.4) | 27 (1.3) | 519 (6.2) |
| South Africa (5) | 38 (0.9) | 327 (5.0) | 22 (0.8) | 320 (6.1) | 22 (0.9) | 347 (8.2) | 19 (1.0) | 310 (6.5) |
| Spain | 16 (0.8) | 472 (4.6) | 17 (0.9) | 515 (3.3) | 28 (1.0) | 528 (2.2) | 39 (1.5) | 518 (2.5) |
| Sweden | 24 (1.9) | 526 (5.7) | 36 (1.7) | 548 (3.7) | 26 (1.8) | 548 (4.0) | 15 (1.6) | 517 (6.4) |
| Turkey (5) | 38 (1.7) | 515 (5.0) | 38 (1.4) | 552 (4.2) | 11 (0.7) | 538 (6.9) | 13 (0.9) | 489 (7.9) |
| United Arab Emirates | 43 (0.7) | 467 (2.3) | 29 (0.7) | 494 (3.0) | 18 (0.7) | 484 (3.0) | 10 (0.3) | 444 (4.3) |
| United States | 22 (1.0) | 510 (4.7) | 27 (0.9) | 554 (2.9) | 31 (0.8) | 557 (3.3) | 20 (0.9) | 532 (3.7) |
| **International Average** | **31 (0.2)** | **475 (0.7)** | **26 (0.2)** | **499 (0.7)** | **24 (0.2)** | **503 (0.8)** | **18 (0.2)** | **478 (0.9)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 21 (1.3) | 491 (5.2) | 32 (1.8) | 533 (4.2) | 31 (2.0) | 541 (5.7) | 16 (0.9) | 525 (4.7) |
| Quebec, Canada r | 16 (1.3) | 493 (5.0) | 39 (2.0) | 524 (2.9) | 33 (1.8) | 536 (3.2) | 12 (2.2) | 514 (5.9) |
| Moscow City, Russian Fed. | 11 (0.6) | 562 (4.8) | 14 (0.8) | 596 (5.1) | 27 (0.9) | 607 (3.1) | 48 (1.6) | 596 (2.6) |
| Madrid, Spain | 14 (1.2) | 485 (4.7) | 19 (1.3) | 526 (3.4) | 29 (1.6) | 540 (2.2) | 38 (1.8) | 524 (2.6) |
| Abu Dhabi, UAE | 41 (1.1) | 406 (3.7) | 27 (0.9) | 437 (4.8) | 20 (0.8) | 441 (4.3) | 13 (0.7) | 406 (7.1) |
| Dubai, UAE | 40 (0.9) | 535 (2.6) | 35 (0.8) | 555 (2.2) | 18 (0.7) | 551 (3.0) | 6 (0.3) | 527 (5.1) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 13.17: Frequency Students Conduct Experiments in Science Lessons

*Students' Reports*

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and Earth science summarize responses for countries where students are taught science as separate subjects.

*Frequency Students Conduct Experiments in General/Integrated Science Lessons*

| General/Integrated Science | At Least Once a Week | | Once or Twice a Month | | A Few Times a Year | | Never | |
|---|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | 39 (1.6) | 534 (4.1) | 42 (1.2) | 541 (3.6) | 14 (1.0) | 516 (3.8) | 5 (0.7) | 443 (10.1) |
| Bahrain | 20 (0.7) | 465 (4.6) | 29 (0.9) | 493 (3.4) | 34 (0.8) | 508 (2.7) | 17 (0.8) | 470 (4.8) |
| Chile | 11 (0.9) | 407 (6.5) | 33 (1.7) | 468 (3.5) | 44 (1.5) | 477 (3.2) | 12 (1.4) | 452 (5.9) |
| Chinese Taipei | 13 (1.5) | 558 (5.5) | 53 (2.1) | 579 (2.3) | 25 (1.9) | 586 (3.8) | 9 (1.5) | 542 (6.1) |
| Egypt | 49 (1.5) | 395 (5.7) | 24 (1.2) | 406 (6.0) | 13 (1.1) | 404 (8.6) | 15 (1.1) | 363 (8.1) |
| England | 32 (2.0) | 512 (7.2) | 49 (1.6) | 537 (5.2) | 14 (1.1) | 505 (6.8) | 4 (0.6) | 453 (12.6) |
| Hong Kong SAR | 57 (2.2) | 510 (5.8) | 37 (2.1) | 504 (7.0) | 4 (0.7) | 460 (10.8) | 2 (0.3) | ~ ~ |
| Iran, Islamic Rep. of | 32 (1.3) | 433 (4.1) | 36 (1.0) | 458 (4.0) | 21 (0.9) | 471 (6.1) | 11 (0.7) | 432 (6.0) |
| Ireland | 35 (2.1) | 521 (4.2) | 45 (1.7) | 538 (3.0) | 15 (1.2) | 528 (5.1) | 5 (0.8) | 460 (16.0) |
| Israel | 16 (1.1) | 490 (6.0) | 35 (1.1) | 519 (5.0) | 33 (1.2) | 535 (5.1) | 16 (1.0) | 496 (6.5) |
| Italy | 3 (0.5) | 430 (8.0) | 18 (1.2) | 494 (5.0) | 45 (1.3) | 512 (2.8) | 33 (1.7) | 497 (3.3) |
| Japan | 35 (2.3) | 575 (3.5) | 60 (2.2) | 569 (2.5) | 5 (0.9) | 546 (5.5) | 0 (0.2) | ~ ~ |
| Jordan | 41 (1.1) | 439 (4.8) | 29 (0.9) | 475 (4.9) | 15 (0.8) | 482 (5.3) | 16 (1.0) | 434 (7.0) |
| Korea, Rep. of | 6 (0.7) | 547 (8.6) | 49 (1.9) | 559 (2.7) | 39 (1.9) | 571 (2.8) | 6 (1.1) | 522 (7.2) |
| Kuwait | 45 (1.5) | 444 (6.2) | 27 (0.8) | 448 (6.9) | 17 (1.4) | 466 (6.0) | 11 (0.8) | 425 (9.5) |
| Malaysia | 29 (1.3) | 450 (5.5) | 41 (1.2) | 474 (3.4) | 26 (0.8) | 461 (3.9) | 5 (0.6) | 411 (11.7) |
| New Zealand | 37 (2.2) | 507 (5.5) | 42 (1.3) | 509 (3.5) | 14 (1.3) | 488 (6.2) | 6 (0.9) | 437 (9.1) |
| Norway (9) | 14 (1.9) | 491 (7.2) | 42 (1.9) | 503 (3.3) | 39 (2.1) | 500 (3.9) | 4 (0.7) | 429 (13.0) |
| Oman | 47 (1.1) | 462 (3.1) | 31 (0.8) | 466 (3.6) | 17 (0.6) | 467 (4.8) | 6 (0.5) | 409 (7.2) |
| Qatar | 33 (1.7) | 460 (6.6) | 37 (1.3) | 493 (4.9) | 20 (1.2) | 493 (7.5) | 10 (0.8) | 430 (9.3) |
| Saudi Arabia | 27 (1.0) | 407 (4.2) | 25 (0.7) | 448 (3.6) | 26 (0.9) | 459 (3.3) | 21 (1.1) | 418 (5.0) |
| Singapore | 12 (0.6) | 612 (8.2) | 42 (0.8) | 617 (3.7) | 43 (0.8) | 602 (4.6) | 3 (0.3) | 541 (11.1) |
| South Africa (9) | 42 (0.8) | 335 (3.9) | 22 (0.6) | 401 (3.9) | 22 (0.6) | 409 (4.0) | 15 (1.1) | 370 (5.4) |
| Turkey | 15 (1.1) | 475 (8.4) | 40 (1.7) | 523 (4.5) | 26 (1.4) | 541 (4.9) | 19 (1.2) | 498 (6.8) |
| United Arab Emirates | 28 (0.7) | 452 (4.5) | 37 (0.5) | 492 (2.3) | 24 (0.6) | 498 (3.4) | 11 (0.4) | 436 (6.2) |
| United States | 20 (1.1) | 526 (6.2) | 45 (1.2) | 535 (6.4) | 26 (0.9) | 530 (4.1) | 10 (0.8) | 466 (5.1) |
| **International Average** | **28 (0.3)** | **478 (1.2)** | **37 (0.3)** | **502 (0.9)** | **24 (0.2)** | **501 (1.0)** | **11 (0.2)** | **451 (1.8)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 12 (1.2) | 519 (4.9) | 49 (2.0) | 530 (3.5) | 32 (1.8) | 520 (4.0) | 8 (1.2) | 491 (8.9) |
| Quebec, Canada | 14 (1.7) | 530 (5.4) | 58 (1.9) | 541 (4.1) | 24 (2.0) | 539 (4.6) | 3 (0.6) | 474 (13.6) |
| Gauteng, RSA (9) | 32 (1.0) | 367 (4.2) | 27 (0.9) | 441 (4.0) | 26 (0.9) | 465 (5.7) | 15 (0.9) | 431 (5.2) |
| Western Cape, RSA (9) | 30 (1.2) | 375 (4.6) | 26 (0.9) | 465 (6.3) | 28 (1.2) | 491 (7.9) | 16 (1.1) | 437 (6.7) |
| Abu Dhabi, UAE | 27 (0.8) | 387 (6.7) | 34 (0.8) | 441 (3.8) | 25 (0.7) | 458 (4.7) | 14 (0.8) | 394 (9.1) |
| Dubai, UAE | 25 (1.4) | 535 (5.5) | 44 (1.1) | 556 (2.8) | 25 (1.3) | 555 (6.0) | 6 (0.7) | 518 (10.3) |

## Separate Science Results

*Frequency Students Conduct Experiments in Biology Lessons*

| Biology | At Least Once a Week | | Once or Twice a Month | | A Few Times a Year | | Never | |
|---|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Cyprus | 6 (0.5) | 434 (7.8) | 28 (1.0) | 480 (3.5) | 45 (1.1) | 498 (2.2) | 21 (1.1) | 481 (4.2) |
| Finland | 4 (0.4) | 493 (10.8) | 32 (1.2) | 534 (3.6) | 50 (1.1) | 559 (3.2) | 13 (1.1) | 549 (6.9) |
| France | 15 (1.2) | 463 (5.4) | 38 (1.5) | 492 (3.9) | 36 (1.7) | 500 (3.7) | 11 (1.4) | 478 (6.1) |
| Georgia | 20 (1.4) | 432 (7.8) | 29 (1.7) | 454 (4.8) | 21 (1.4) | 462 (5.2) | 30 (1.9) | 447 (6.0) |
| Hungary | 4 (0.4) | 458 (11.0) | 11 (1.0) | 525 (7.4) | 30 (1.1) | 543 (3.7) | 55 (1.8) | 530 (3.0) |
| Kazakhstan | 37 (1.4) | 460 (4.4) | 33 (0.9) | 490 (3.6) | 20 (1.0) | 499 (4.6) | 11 (0.8) | 469 (6.5) |
| Lebanon | 29 (1.6) | 364 (5.7) | 23 (1.5) | 377 (8.1) | 25 (1.2) | 405 (6.8) | 22 (2.2) | 367 (8.7) |
| Lithuania | 3 (0.5) | 465 (11.3) | 23 (1.4) | 522 (4.6) | 56 (1.7) | 543 (3.4) | 18 (1.6) | 533 (5.4) |
| Morocco | 38 (0.9) | 376 (3.4) | 23 (0.7) | 400 (3.6) | 22 (0.7) | 424 (4.5) | 18 (0.8) | 395 (3.4) |
| Portugal | 10 (1.4) | 497 (6.5) | 35 (1.8) | 518 (3.6) | 40 (1.7) | 528 (3.3) | 15 (1.9) | 523 (6.1) |
| Romania | 10 (1.1) | 429 (8.3) | 15 (1.0) | 466 (5.6) | 37 (1.4) | 487 (4.6) | 38 (2.1) | 471 (5.7) |
| Russian Federation | 6 (0.6) | 503 (8.8) | 29 (1.5) | 547 (5.2) | 39 (1.1) | 552 (4.1) | 26 (1.5) | 535 (5.3) |
| Sweden | 19 (1.4) | 508 (7.0) | 39 (1.4) | 532 (3.9) | 32 (1.4) | 543 (3.7) | 10 (1.0) | 501 (7.6) |
| **International Average** | **16 (0.3)** | **452 (2.2)** | **28 (0.4)** | **488 (1.4)** | **35 (0.4)** | **503 (1.2)** | **22 (0.4)** | **483 (1.7)** |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 3 (0.4) | 535 (9.1) | 23 (1.6) | 569 (4.5) | 46 (1.6) | 573 (3.2) | 28 (1.9) | 559 (4.2) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# Exhibit 13.17: Frequency Students Conduct Experiments in Science Lessons

*Students' Reports*

## Separate Science Results

(Continued)

*Frequency Students Conduct Experiments in Chemistry Lessons*

| Chemistry | At Least Once a Week | | Once or Twice a Month | | A Few Times a Year | | Never | |
|---|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Cyprus | 23 (0.9) | 460 (4.0) | 54 (1.2) | 494 (2.4) | 19 (1.0) | 502 (3.7) | 4 (0.7) | 473 (10.8) |
| Finland | 47 (1.7) | 562 (3.5) | 39 (1.3) | 544 (3.4) | 13 (0.8) | 515 (5.3) | 1 (0.2) | ~ ~ |
| France | 32 (1.7) | 469 (3.8) | 45 (1.4) | 503 (3.3) | 18 (1.2) | 494 (4.6) | 6 (1.1) | 474 (10.5) |
| Georgia | 26 (1.7) | 436 (6.6) | 35 (1.6) | 455 (4.7) | 19 (1.3) | 464 (6.3) | 20 (1.9) | 442 (6.4) |
| Hungary | 18 (1.3) | 518 (6.9) | 34 (1.3) | 540 (3.3) | 26 (1.2) | 542 (4.2) | 22 (1.3) | 511 (4.6) |
| Kazakhstan | 43 (1.6) | 467 (4.1) | 35 (1.2) | 490 (4.5) | 15 (1.0) | 499 (5.2) | 8 (0.7) | 453 (8.2) |
| Lebanon | 33 (1.7) | 363 (6.3) | 27 (1.5) | 386 (7.6) | 24 (1.2) | 412 (7.5) | 16 (1.50) | 353 (9.4) |
| Lithuania | 6 (0.8) | 481 (10.2) | 40 (1.8) | 533 (4.1) | 45 (1.7) | 547 (3.4) | 9 (1.10) | 516 (5.9) |
| Morocco | 44 (1.0) | 383 (3.2) | 24 (0.8) | 403 (4.3) | 18 (0.8) | 414 (4.4) | 14 (0.90) | 398 (4.4) |
| Portugal | 18 (1.9) | 505 (5.8) | 48 (1.8) | 519 (2.9) | 30 (1.9) | 529 (3.6) | 4 (0.80) | 526 (13.9) |
| Romania | 17 (1.5) | 443 (7.0) | 28 (1.5) | 478 (5.5) | 36 (1.9) | 487 (5.3) | 19 (2.00) | 462 (6.6) |
| Russian Federation | 20 (1.6) | 531 (6.1) | 52 (1.6) | 547 (4.3) | 21 (1.4) | 551 (4.6) | 7 (0.80) | 530 (9.2) |
| Sweden | 37 (1.6) | 527 (4.9) | 40 (1.0) | 533 (3.7) | 19 (1.5) | 524 (5.9) | 4 (0.60) | 482 (14.3) |
| **International Average** | **28 (0.4)** | **473 (1.6)** | **38 (0.4)** | **494 (1.2)** | **23 (0.4)** | **499 (1.4)** | **10 (0.3)** | **468 (2.7)** |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 13 (1.1) | 551 (5.8) | 54 (1.9) | 570 (3.2) | 25 (1.5) | 574 (3.7) | 8 (1.30) | 553 (7.3) |

*Frequency Students Conduct Experiments in Physics Lessons*

| Physics | At Least Once a Week | | Once or Twice a Month | | A Few Times a Year | | Never | |
|---|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Cyprus | 33 (1.0) | 478 (3.2) | 40 (1.0) | 492 (2.9) | 20 (0.9) | 505 (4.4) | 7 (0.6) | 462 (7.4) |
| Finland | 36 (1.8) | 557 (4.2) | 42 (1.4) | 546 (3.9) | 20 (1.0) | 525 (4.6) | 3 (0.3) | 497 (12.0) |
| France | 32 (1.7) | 469 (3.8) | 45 (1.4) | 503 (3.3) | 18 (1.2) | 494 (4.6) | 6 (1.1) | 474 (10.5) |
| Georgia | 28 (1.9) | 440 (6.3) | 33 (1.7) | 456 (5.5) | 19 (1.3) | 463 (6.8) | 20 (2.1) | 436 (5.5) |
| Hungary | 17 (1.1) | 519 (6.7) | 33 (1.2) | 538 (3.8) | 26 (1.0) | 542 (3.8) | 24 (1.5) | 513 (4.3) |
| Kazakhstan | 46 (1.6) | 467 (3.7) | 35 (1.1) | 496 (4.4) | 12 (0.8) | 492 (6.4) | 7 (0.6) | 450 (7.7) |
| Lebanon | 32 (1.5) | 365 (5.7) | 24 (1.2) | 382 (7.1) | 22 (1.0) | 411 (7.0) | 22 (1.8) | 366 (9.0) |
| Lithuania | 8 (0.7) | 495 (6.6) | 40 (1.7) | 533 (3.8) | 43 (1.8) | 546 (4.2) | 10 (1.1) | 520 (6.0) |
| Morocco | 46 (1.0) | 384 (3.2) | 24 (0.8) | 404 (3.9) | 17 (0.7) | 417 (5.3) | 13 (0.8) | 397 (4.2) |
| Portugal | 18 (1.9) | 505 (5.8) | 48 (1.8) | 519 (2.9) | 30 (1.9) | 529 (3.6) | 4 (0.8) | 526 (13.9) |
| Romania | 15 (1.2) | 434 (8.9) | 27 (1.6) | 477 (5.2) | 36 (1.8) | 491 (4.9) | 21 (1.9) | 461 (6.1) |
| Russian Federation | 26 (1.4) | 534 (5.0) | 52 (1.2) | 552 (3.9) | 17 (1.2) | 543 (6.7) | 6 (0.7) | 519 (9.1) |
| Sweden | 30 (1.5) | 524 (5.3) | 39 (1.1) | 535 (3.8) | 25 (1.5) | 536 (5.0) | 6 (0.6) | 495 (11.2) |
| **International Average** | **28 (0.4)** | **475 (1.5)** | **37 (0.4)** | **495 (1.2)** | **24 (0.4)** | **500 (1.5)** | **11 (0.3)** | **470 (2.4)** |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 17 (1.2) | 554 (5.2) | 59 (1.5) | 571 (3.0) | 19 (1.4) | 574 (4.9) | 5 (0.9) | 545 (7.3) |

*Frequency Students Conduct Experiments in Earth Science Lessons*

| Earth Science | At Least Once a Week | | Once or Twice a Month | | A Few Times a Year | | Never | |
|---|---|---|---|---|---|---|---|---|
| Country | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Cyprus | 5 (0.5) | 435 (9.5) | 7 (0.6) | 459 (6.0) | 17 (0.7) | 483 (4.7) | 70 (1.1) | 495 (2.3) |
| Finland | 5 (0.4) | 477 (9.0) | 27 (1.0) | 528 (3.5) | 44 (0.9) | 552 (3.1) | 24 (1.0) | 570 (4.1) |
| France | 15 (1.2) | 463 (5.4) | 38 (1.5) | 492 (3.9) | 36 (1.7) | 500 (3.7) | 11 (1.4) | 478 (6.1) |
| Georgia | 15 (1.0) | 420 (9.1) | 22 (1.6) | 443 (6.2) | 19 (1.3) | 459 (5.5) | 45 (1.9) | 460 (4.9) |
| Hungary | 7 (0.6) | 479 (8.7) | 12 (0.8) | 510 (5.4) | 22 (0.8) | 542 (4.3) | 59 (1.4) | 536 (2.8) |
| Kazakhstan | 33 (1.5) | 456 (4.3) | 28 (1.0) | 484 (4.5) | 19 (1.1) | 504 (4.9) | 21 (1.1) | 483 (5.0) |
| Lebanon | - - | - - | - - | - - | - - | - - | - - | - - |
| Lithuania | 2 (0.4) | ~ ~ | 11 (0.9) | 514 (5.5) | 32 (1.6) | 533 (3.5) | 54 (2.1) | 544 (3.7) |
| Morocco | 38 (0.8) | 378 (3.3) | 23 (0.6) | 399 (3.4) | 21 (0.7) | 425 (4.9) | 18 (0.9) | 401 (3.6) |
| Portugal | 10 (1.4) | 497 (6.5) | 35 (1.8) | 518 (3.6) | 40 (1.7) | 528 (3.3) | 15 (1.9) | 523 (6.1) |
| Romania r | 12 (1.6) | 427 (9.0) | 14 (1.1) | 470 (7.8) | 32 (2.1) | 488 (6.4) | 42 (2.3) | 476 (8.1) |
| Russian Federation | 6 (0.5) | 519 (8.2) | 15 (1.0) | 538 (7.1) | 27 (1.2) | 548 (4.5) | 53 (1.6) | 546 (4.3) |
| Sweden | - - | - - | - - | - - | - - | - - | - - | - - |
| **International Average** | **13 (0.3)** | **455 (2.4)** | **21 (0.3)** | **487 (1.6)** | **28 (0.4)** | **506 (1.4)** | **37 (0.5)** | **501 (1.5)** |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 4 (0.8) | 533 (7.8) | 9 (0.7) | 558 (5.3) | 20 (1.1) | 567 (3.5) | 66 (1.7) | 570 (3.1) |

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# Technology in Instruction

## Computer Access for Instruction

Information about students' access to computers as part of their mathematics and science lessons is provided in Exhibits 14.1 (fourth grade mathematics), 14.2 (fourth grade science), 14.3 (eighth grade mathematics), and 14.4 (eighth grade science). Each exhibit presents teachers' reports on whether computers are available for students to use during lessons as well as the types of access they have: whether each student in the class has a computer, the class has computers that students can share, and/or the school has computers that the class can sometimes share (teachers could indicate more than one type of access to computers). Average student achievement is also reported for each category. Countries are ordered by the percent of students having access to computers.

In fourth grade, computers are available for students to use during mathematics lessons for 39 percent of students, on average (Exhibit 14.1), and during science lessons for 45 percent of students, on average (Exhibit 14.2). Availability of computers during mathematics and science lessons was similar for eighth grade students: 37 percent had mathematics teachers who said computers were available (Exhibit 14.3) and 48 percent had science teachers who said computers were available (Exhibit 14.4). There was wide variation across countries in computer availability, with 80 percent or more of students having access in some countries and as few as 5 or 6 percent in others. Having computers available for instruction was associated with higher achievement, on average, in both mathematics and science and at both grades. Of course, access to computers is likely associated with access to other resources that are associated with higher achievement. There was also quite a bit of variation across countries in the types of access to computers, though the most frequent type of access was that the school has computers that the class can sometimes use (28–29% of students in mathematics lessons and 36–39% of students in science lessons).

## Exhibit 14.1: Access to Computers for Mathematics Lessons

*Students' Results based on Teachers' Reports*

| Country | Computers Available for Students to Use During Mathematics Lessons | | | | Percent of Students by Computer Access* | | |
|---|---|---|---|---|---|---|---|
| | Yes | | No | | Each Student has a Computer | The Class has Computers that Students can Share | The School has Computers that the Class can Sometimes Use |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | | |
| Malta | 95 (0.2) | 508 (1.4) | 5 (0.2) | 518 (5.0) | 63 (0.4) | 16 (0.3) | 34 (0.4) |
| New Zealand | 92 (1.8) | 487 (2.9) | 8 (1.8) | 491 (12.6) | 33 (3.3) | 67 (3.3) | 39 (3.2) |
| Denmark | r 87 (3.1) | 523 (2.3) | 13 (3.1) | 533 (7.2) | r 63 (4.7) | r 8 (2.4) | r 34 (4.7) |
| Sweden | 85 (2.4) | 522 (2.8) | 15 (2.4) | 519 (10.8) | 50 (4.3) | 19 (3.1) | 34 (4.1) |
| Hong Kong SAR | 81 (4.6) | 602 (3.9) | 19 (4.6) | 599 (12.2) | 38 (4.3) | 23 (3.8) | 67 (4.8) |
| Norway (5) | r 76 (3.8) | 546 (2.6) | 24 (3.8) | 539 (5.7) | r 39 (4.2) | r 29 (4.2) | r 50 (4.6) |
| United States | 76 (2.5) | 536 (2.9) | 24 (2.5) | 534 (5.8) | 51 (3.0) | 36 (2.1) | 41 (2.1) |
| Australia | 71 (3.5) | 521 (3.9) | 29 (3.5) | 511 (7.0) | 32 (3.2) | 39 (3.8) | 44 (4.0) |
| Netherlands | r 71 (5.1) | 534 (2.8) | 29 (5.1) | 542 (4.5) | r 35 (4.7) | r 46 (5.9) | r 34 (4.8) |
| Georgia | 70 (3.8) | 481 (4.5) | 30 (3.8) | 483 (6.5) | s 75 (4.0) | s 38 (4.8) | s 90 (2.8) |
| Northern Ireland | 69 (4.0) | 564 (4.3) | 31 (4.0) | 568 (5.9) | 3 (1.2) | 48 (4.3) | 58 (4.2) |
| Finland | 65 (3.6) | 531 (2.9) | 35 (3.6) | 535 (3.3) | 15 (2.5) | 17 (2.4) | 57 (3.5) |
| Kazakhstan | 61 (3.5) | 511 (3.1) | 39 (3.5) | 514 (4.9) | 10 (2.2) | 17 (2.9) | 52 (3.6) |
| Japan | 59 (3.9) | 591 (2.4) | 41 (3.9) | 595 (2.8) | 5 (1.6) | 19 (2.7) | 57 (3.9) |
| Belgium (Flemish) | 52 (3.9) | 531 (2.8) | 48 (3.9) | 536 (2.7) | 3 (1.2) | 34 (4.0) | 43 (3.7) |
| Canada | 51 (2.9) | 506 (3.0) | 49 (2.9) | 520 (4.2) | 13 (2.1) | 32 (2.7) | r 43 (2.8) |
| Lithuania | 51 (3.8) | 541 (4.5) | 49 (3.8) | 541 (3.9) | 8 (2.0) | 16 (3.1) | 48 (3.9) |
| Germany | 48 (3.7) | 519 (3.9) | 52 (3.7) | 523 (3.4) | 0 (0.3) | 32 (3.6) | 37 (3.4) |
| North Macedonia | 47 (4.5) | 472 (7.7) | 53 (4.5) | 471 (7.3) | 14 (2.9) | 26 (4.3) | 29 (4.5) |
| Singapore | 46 (2.6) | 626 (5.4) | 54 (2.6) | 625 (4.7) | 18 (1.9) | 18 (2.0) | 44 (2.5) |
| United Arab Emirates | r 45 (1.8) | 512 (2.5) | 55 (1.8) | 457 (3.0) | r 23 (1.6) | r 25 (1.8) | r 39 (1.8) |
| Austria | 44 (3.3) | 549 (3.1) | 56 (3.3) | 532 (2.8) | 1 (0.4) | 39 (3.2) | 21 (2.7) |
| Ireland | 43 (4.0) | 548 (4.7) | 57 (4.0) | 548 (2.8) | 5 (2.0) | 19 (2.9) | 36 (4.1) |
| Russian Federation | 42 (3.5) | 568 (4.5) | 58 (3.5) | 566 (4.1) | 7 (1.7) | 28 (3.3) | 41 (3.5) |
| Qatar | 37 (3.5) | 449 (7.5) | 63 (3.5) | 450 (5.0) | 18 (2.8) | 11 (2.3) | 33 (3.3) |
| Chile | 34 (3.9) | 441 (5.4) | 66 (3.9) | 442 (4.0) | 16 (3.2) | 16 (2.9) | 33 (3.8) |
| Korea, Rep. of | 34 (3.8) | 595 (4.2) | 66 (3.8) | 602 (2.7) | 6 (2.1) | 6 (2.1) | 32 (3.8) |
| Latvia | 34 (3.1) | 539 (5.0) | 66 (3.1) | 550 (3.0) | 6 (2.0) | 10 (2.5) | 32 (3.3) |
| Spain | 33 (2.6) | 503 (3.7) | 67 (2.6) | 501 (3.4) | 7 (1.4) | 11 (2.1) | 31 (2.6) |
| Bahrain | 32 (2.9) | 489 (4.1) | 68 (2.9) | 475 (3.1) | 6 (1.6) | 9 (1.8) | 28 (2.8) |
| Saudi Arabia | 31 (3.3) | 411 (6.4) | 69 (3.3) | 393 (4.8) | 4 (1.3) | 9 (2.0) | 26 (3.2) |
| Hungary | 31 (3.6) | 522 (5.3) | 69 (3.6) | 525 (4.1) | 2 (1.0) | 7 (1.8) | 29 (3.5) |
| Cyprus | 30 (2.5) | 538 (4.1) | 70 (2.5) | 532 (3.3) | 0 (0.2) | 14 (2.2) | 26 (2.8) |
| Poland | 29 (3.4) | 514 (4.6) | 71 (3.4) | 522 (3.0) | 6 (1.8) | 4 (1.4) | 27 (3.2) |
| Czech Republic | 29 (3.4) | 540 (5.6) | 71 (3.4) | 530 (3.0) | 7 (1.9) | 12 (2.2) | 28 (3.4) |
| Iran, Islamic Rep. of | 25 (2.8) | 463 (9.7) | 75 (2.8) | 436 (4.5) | 2 (1.0) | 3 (1.4) | 18 (2.6) |
| Kuwait | 24 (3.3) | 391 (11.5) | 76 (3.3) | 381 (5.4) | 6 (2.0) | 5 (1.8) | 19 (3.1) |
| Chinese Taipei | 23 (3.4) | 600 (3.9) | 77 (3.4) | 599 (2.1) | 3 (1.4) | 14 (2.6) | 16 (2.7) |
| Italy | 23 (3.3) | 515 (4.8) | 77 (3.3) | 515 (2.7) | 2 (1.0) | 14 (2.5) | 20 (3.1) |
| Philippines | 23 (3.3) | 315 (13.2) | 77 (3.3) | 290 (6.9) | 0 (0.2) | 12 (2.3) | 22 (3.2) |
| France | 21 (3.4) | 471 (6.0) | 79 (3.4) | 489 (3.2) | 1 (0.7) | 10 (2.2) | 16 (3.2) |
| Bulgaria | 19 (3.1) | 516 (7.9) | 81 (3.1) | 515 (5.3) | 2 (0.9) | 8 (2.4) | 18 (3.2) |
| Azerbaijan | 18 (2.9) | 508 (6.5) | 82 (2.9) | 517 (3.0) | 4 (1.4) | 6 (1.7) | 15 (2.6) |
| Oman | 17 (2.3) | 437 (6.8) | 83 (2.3) | 429 (4.5) | 3 (1.0) | 4 (1.3) | 14 (2.5) |
| Turkey (5) | 16 (3.1) | 533 (10.2) | 84 (3.1) | 521 (5.1) | 2 (1.3) | 8 (2.3) | 13 (2.8) |
| Armenia | 14 (2.9) | 505 (6.5) | 86 (2.9) | 497 (2.8) | 3 (1.3) | 3 (1.2) | 13 (2.8) |
| Slovak Republic | 14 (2.1) | 523 (8.9) | 86 (2.1) | 508 (3.6) | 3 (1.0) | 5 (1.0) | 11 (2.0) |
| Serbia | 13 (2.6) | 512 (8.9) | 87 (2.6) | 507 (3.4) | 0 (0.3) | 9 (2.2) | 10 (2.5) |
| Bosnia and Herzegovina | 13 (2.2) | 477 (6.3) | 87 (2.2) | 448 (2.5) | 4 (1.3) | 7 (1.8) | 10 (2.3) |
| Portugal | 13 (2.0) | 524 (6.1) | 87 (2.0) | 526 (2.9) | 2 (0.9) | 7 (1.4) | 12 (2.0) |
| Montenegro | 11 (1.1) | 455 (5.7) | 89 (1.1) | 453 (2.2) | 1 (0.0) | 6 (0.7) | 10 (1.1) |
| Albania | 9 (2.7) | 530 (17.2) | 91 (2.7) | 491 (3.5) | 2 (1.2) | 8 (2.6) | 8 (2.6) |
| South Africa (5) | 8 (1.6) | 430 (15.2) | 92 (1.6) | 368 (3.8) | 1 (0.5) | 2 (0.7) | 6 (1.5) |
| Kosovo | 6 (2.0) | 451 (7.9) | 94 (2.0) | 443 (3.3) | s 0 (0.0) | s 7 (3.1) | s 9 (3.2) |
| Croatia | 6 (2.0) | 503 (11.4) | 94 (2.0) | 509 (2.3) | 1 (0.8) | 4 (1.7) | 6 (2.0) |
| Pakistan | 6 (1.4) | 303 (54.2) | 94 (1.4) | 329 (12.8) | 2 (1.5) | 3 (0.6) | 4 (1.0) |
| Morocco | 5 (1.9) | 430 (28.6) | 95 (1.9) | 379 (4.8) | 0 (0.3) | 2 (1.2) | 4 (1.6) |
| England | x 32 (4.4) | 566 (5.6) | 68 (4.4) | 554 (6.5) | x 7 (2.3) | x 20 (4.4) | x 24 (4.9) |
| **International Average** | **39 (0.4)** | **506 (1.4)** | **61 (0.4)** | **500 (0.7)** | **13 (0.3)** | **17 (0.4)** | **29 (0.4)** |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | r 78 (1.3) | 555 (2.4) | 22 (1.3) | 514 (5.1) | r 50 (2.3) | r 40 (1.8) | r 65 (1.8) |
| Ontario, Canada | r 59 (5.5) | 509 (4.9) | 41 (5.5) | 518 (10.5) | r 13 (4.1) | r 42 (5.5) | r 49 (5.3) |
| Moscow City, Russian Fed. | 53 (4.5) | 600 (2.9) | 47 (4.5) | 585 (3.1) | 10 (2.4) | 27 (3.6) | 49 (4.6) |
| Madrid, Spain | 39 (4.5) | 516 (4.4) | 61 (4.5) | 519 (2.5) | 10 (2.8) | 9 (2.8) | 33 (4.6) |
| Abu Dhabi, UAE | r 33 (2.4) | 476 (5.4) | 67 (2.4) | 426 (3.9) | r 15 (1.5) | r 18 (2.5) | r 28 (2.4) |
| Quebec, Canada | 32 (4.1) | 528 (3.7) | 68 (4.1) | 535 (2.8) | 8 (2.1) | 17 (3.7) | 28 (4.2) |

* Teachers could indicate the class having more than one type of computer access.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

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## Exhibit 14.2: Access to Computers for Science Lessons

*Students' Results based on Teachers' Reports*

| Country | Computers Available for Students to Use During Science Lessons | | | | Percent of Students by Computer Access* | | |
|---|---|---|---|---|---|---|---|
| | Yes | | No | | Each Student has a Computer | The Class has Computers that Students can Share | The School has Computers that the Class can Sometimes Use |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | | |
| Denmark | r 93 (2.4) | 522 (2.8) | 7 (2.4) | 519 (5.8) | r 63 (4.4) | r 8 (2.4) | r 48 (4.6) |
| New Zealand | 91 (1.5) | 503 (2.5) | 9 (1.5) | 500 (8.3) | 30 (3.3) | 69 (3.0) | 41 (2.8) |
| Belgium (Flemish) | 90 (2.2) | 502 (2.3) | 10 (2.2) | 500 (6.3) | 8 (1.7) | 58 (4.0) | 76 (3.0) |
| Sweden | 89 (2.2) | 540 (3.4) | 11 (2.2) | 534 (11.9) | r 54 (4.5) | r 26 (3.6) | 35 (4.5) |
| Malta | 87 (0.3) | 497 (1.3) | 13 (0.3) | 491 (3.4) | 62 (0.4) | 19 (0.3) | 32 (0.4) |
| Finland | 83 (2.5) | 554 (2.8) | 17 (2.5) | 557 (4.8) | 18 (2.7) | 25 (2.7) | 76 (2.8) |
| Georgia | 82 (3.3) | 450 (4.6) | 18 (3.3) | 471 (8.6) | r 76 (3.6) | r 34 (4.2) | r 90 (2.6) |
| Northern Ireland | 80 (3.5) | 518 (2.8) | 20 (3.5) | 518 (5.9) | 7 (2.1) | 60 (4.4) | 71 (4.2) |
| United States | 79 (2.6) | 541 (3.1) | 21 (2.6) | 534 (6.3) | 53 (3.0) | 38 (2.5) | 42 (2.5) |
| Australia | 78 (2.8) | 535 (3.1) | 22 (2.8) | 529 (6.5) | 33 (3.4) | 41 (3.7) | 49 (4.3) |
| Norway (5) | s 75 (4.2) | 537 (3.3) | 25 (4.2) | 547 (5.1) | s 43 (5.0) | s 31 (4.9) | s 42 (5.0) |
| Netherlands | r 72 (4.8) | 519 (4.0) | 28 (4.8) | 515 (4.4) | r 34 (5.3) | r 49 (5.7) | r 40 (5.6) |
| North Macedonia | 71 (4.2) | 422 (7.3) | 29 (4.2) | 436 (11.5) | 19 (3.4) | 43 (4.5) | 44 (4.4) |
| Japan | 70 (3.7) | 560 (2.2) | 30 (3.7) | 565 (2.9) | 10 (2.1) | 24 (3.7) | 66 (4.1) |
| Hong Kong SAR | 70 (4.4) | 533 (4.5) | 30 (4.4) | 532 (8.4) | 45 (5.0) | 28 (4.4) | 59 (4.6) |
| Canada | r 64 (3.0) | 524 (2.3) | 36 (3.0) | 525 (4.1) | r 16 (2.0) | r 40 (3.1) | r 52 (3.1) |
| Kazakhstan | 63 (4.1) | 488 (4.6) | 37 (4.1) | 499 (6.2) | 16 (2.8) | 24 (3.5) | 52 (4.4) |
| Singapore | 60 (2.6) | 594 (4.4) | 40 (2.6) | 595 (4.6) | 25 (2.4) | 29 (2.2) | 57 (2.8) |
| Germany | 59 (3.8) | 519 (3.1) | 41 (3.8) | 518 (4.5) | 2 (1.1) | 39 (3.8) | 50 (3.9) |
| Lithuania | 51 (3.6) | 537 (4.2) | 49 (3.6) | 537 (4.0) | 8 (2.0) | 19 (2.9) | 46 (3.8) |
| Chinese Taipei | 50 (3.9) | 557 (2.4) | 50 (3.9) | 559 (2.6) | 6 (1.7) | 26 (3.4) | 39 (3.8) |
| Qatar | 50 (4.3) | 447 (5.6) | 50 (4.3) | 453 (7.0) | 19 (3.4) | 23 (3.2) | 46 (4.0) |
| Korea, Rep. of | 49 (3.8) | 587 (3.6) | 51 (3.8) | 588 (2.3) | 15 (2.6) | 12 (2.8) | 45 (4.0) |
| United Arab Emirates | r 48 (1.9) | 507 (3.1) | 52 (1.9) | 445 (3.8) | r 25 (1.8) | r 30 (1.4) | r 42 (1.7) |
| Russian Federation | 47 (3.7) | 569 (3.9) | 53 (3.7) | 566 (4.0) | 7 (1.6) | 30 (3.7) | 44 (3.9) |
| Spain | 47 (2.9) | 513 (3.0) | 53 (2.9) | 509 (3.3) | 8 (1.7) | 16 (2.2) | 43 (2.9) |
| Latvia | 45 (3.1) | 535 (4.4) | 55 (3.1) | 547 (2.6) | 5 (1.8) | 17 (3.1) | 42 (3.1) |
| Ireland | 45 (3.8) | 526 (5.6) | 55 (3.8) | 530 (3.5) | 7 (2.2) | 20 (3.2) | 36 (3.8) |
| Austria | 45 (3.2) | 525 (3.5) | 55 (3.2) | 520 (3.6) | 1 (0.7) | 41 (3.0) | 26 (3.3) |
| Kuwait | 42 (4.0) | 398 (10.6) | 58 (4.0) | 389 (8.3) | 8 (2.1) | 13 (2.7) | 36 (3.6) |
| Cyprus | 40 (4.7) | 515 (5.0) | 60 (4.7) | 511 (3.8) | 0 (0.5) | 18 (3.7) | 36 (4.8) |
| Chile | r 40 (3.6) | 468 (4.6) | 60 (3.6) | 468 (4.2) | r 19 (3.2) | r 25 (4.0) | r 40 (3.6) |
| Bahrain | 40 (2.9) | 511 (4.8) | 60 (2.9) | 480 (4.7) | 7 (1.5) | 10 (2.0) | 36 (2.7) |
| Saudi Arabia | 37 (3.3) | 413 (6.5) | 63 (3.3) | 394 (5.9) | 3 (0.7) | 16 (2.9) | 31 (3.3) |
| Hungary | 34 (3.3) | 522 (4.8) | 66 (3.3) | 533 (3.7) | 5 (1.5) | 9 (2.1) | 32 (3.2) |
| Italy | 32 (3.4) | 507 (4.6) | 68 (3.4) | 511 (3.6) | 2 (0.9) | 18 (2.8) | 27 (3.2) |
| Slovak Republic | 30 (3.3) | 526 (7.1) | 70 (3.3) | 518 (4.1) | 8 (1.8) | 10 (1.8) | 25 (3.1) |
| Iran, Islamic Rep. of | 29 (3.2) | 461 (8.1) | 71 (3.2) | 432 (5.1) | 1 (0.7) | 7 (2.0) | 23 (3.2) |
| Philippines | 29 (3.4) | 255 (13.5) | 71 (3.4) | 245 (9.4) | x 3 (2.3) | x 32 (5.0) | x 55 (5.9) |
| Czech Republic | 29 (3.0) | 537 (4.7) | 71 (3.0) | 532 (3.0) | 6 (1.8) | 13 (2.1) | 26 (2.8) |
| Oman | 28 (3.2) | 445 (9.3) | 72 (3.2) | 431 (4.8) | 4 (1.2) | 10 (2.0) | 23 (2.9) |
| Armenia | 25 (3.4) | 476 (6.9) | 75 (3.4) | 464 (3.9) | 9 (2.3) | 6 (2.1) | 23 (3.2) |
| France | 23 (3.7) | 482 (4.9) | 77 (3.7) | 490 (3.5) | 0 (0.4) | 12 (2.4) | 19 (3.5) |
| Bulgaria | 23 (3.3) | 515 (12.2) | 77 (3.3) | 523 (6.2) | 0 (0.3) | 9 (2.5) | 22 (3.3) |
| Poland | 20 (2.9) | 522 (5.7) | 80 (2.9) | 534 (2.8) | 2 (1.2) | 5 (1.8) | 18 (2.7) |
| Turkey (5) | 20 (3.2) | 539 (6.0) | 80 (3.2) | 523 (5.4) | 2 (0.9) | 15 (2.9) | 16 (3.0) |
| Serbia | 19 (3.1) | 520 (7.6) | 81 (3.1) | 516 (4.0) | 0 (0.0) | 13 (2.7) | 16 (3.3) |
| Bosnia and Herzegovina | 18 (2.4) | 472 (6.0) | 82 (2.4) | 456 (3.0) | 5 (1.4) | 10 (2.1) | 16 (2.6) |
| Portugal | 18 (2.3) | 507 (4.5) | 82 (2.3) | 503 (2.8) | 3 (1.1) | 10 (2.0) | 18 (2.2) |
| Montenegro | 18 (1.4) | 442 (6.3) | 82 (1.4) | 456 (2.6) | 1 (0.0) | 10 (1.2) | 15 (1.1) |
| Azerbaijan | 17 (2.2) | 433 (6.3) | 83 (2.2) | 425 (3.9) | 5 (1.7) | 9 (1.6) | 13 (1.9) |
| Kosovo | 12 (3.1) | 416 (7.1) | 88 (3.1) | 413 (4.1) | s 0 (0.0) | s 10 (3.6) | s 17 (5.3) |
| Croatia | 11 (2.4) | 518 (8.6) | 89 (2.4) | 524 (2.2) | 3 (1.2) | 6 (2.5) | 11 (2.3) |
| Albania | 11 (2.6) | 523 (12.2) | 89 (2.6) | 485 (3.9) | 2 (1.2) | 8 (2.3) | 9 (2.5) |
| Morocco | 11 (2.3) | 412 (21.0) | 89 (2.3) | 370 (6.6) | 0 (0.4) | 4 (1.5) | 8 (2.1) |
| Pakistan | r 8 (2.4) | 297 (27.3) | 92 (2.4) | 292 (17.0) | r 0 (0.2) | r 4 (1.5) | r 4 (1.7) |
| South Africa (5) | 7 (1.6) | 422 (18.5) | 93 (1.6) | 319 (5.0) | 1 (0.6) | 2 (0.7) | 6 (1.5) |
| England | x 36 (4.9) | 550 (7.0) | 64 (4.9) | 533 (5.9) | x 4 (2.0) | x 24 (5.1) | x 27 (5.2) |
| **International Average** | **45 (0.4)** | **496 (1.0)** | **55 (0.4)** | **490 (0.8)** | **14 (0.3)** | **22 (0.4)** | **36 (0.5)** |
| **Benchmarking Participants** | | | | | | | |
| Dubai, UAE | r 80 (0.9) | 554 (3.0) | 20 (0.9) | 531 (5.5) | r 47 (2.0) | r 50 (2.8) | r 69 (1.7) |
| Ontario, Canada | r 75 (5.9) | 525 (3.7) | 25 (5.9) | 533 (11.9) | r 15 (4.3) | r 52 (6.0) | r 61 (6.2) |
| Moscow City, Russian Fed. | 60 (4.3) | 600 (2.7) | 40 (4.3) | 587 (3.4) | 12 (2.6) | 31 (3.6) | 58 (4.5) |
| Madrid, Spain | 53 (4.4) | 524 (2.4) | 47 (4.4) | 521 (3.5) | 16 (3.1) | 13 (3.2) | 49 (4.2) |
| Abu Dhabi, UAE | r 40 (2.3) | 449 (6.0) | 60 (2.3) | 395 (5.9) | r 16 (1.9) | r 21 (2.3) | r 34 (2.6) |
| Quebec, Canada | 38 (4.4) | 522 (4.1) | 62 (4.4) | 523 (2.6) | 10 (2.1) | 20 (3.9) | 32 (4.4) |

* Teachers could indicate the class having more than one type of computer access.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019

Downloaded from http://timss2019.org/download

## Exhibit 14.3: Access to Computers for Mathematics Lessons

*Students' Results based on Teachers' Reports*

| Country | Computers Available for Students to Use During Mathematics Lessons | | | | Percent of Students by Computer Access* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Each Student has a Computer | | The Class has Computers that Students can Share | | The School has Computers that the Class can Sometimes Use | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | | | | | |
| Sweden | 89 (2.6) | 502 (2.7) | 11 (2.6) | 515 (8.2) | | 80 (3.1) | | 2 (1.1) | | 15 (3.0) |
| Norway (9) | s 82 (3.5) | 506 (3.3) | 18 (3.5) | 501 (5.1) | s | 73 (3.9) | s | 13 (3.6) | s | 20 (3.6) |
| New Zealand | 81 (3.5) | 488 (3.8) | 19 (3.5) | 460 (12.3) | | 61 (4.3) | | 24 (3.2) | | 55 (4.2) |
| Australia | 76 (2.9) | 529 (4.9) | 24 (2.9) | 488 (8.2) | | 62 (2.9) | | 10 (2.1) | | 40 (3.3) |
| United States | 72 (2.8) | 510 (4.7) | 28 (2.8) | 533 (9.2) | | 58 (3.0) | | 27 (2.2) | | 35 (2.4) |
| United Arab Emirates | r 56 (1.7) | 480 (3.1) | 44 (1.7) | 468 (4.3) | r | 32 (1.4) | r | 24 (1.4) | r | 43 (1.8) |
| Finland | 55 (3.1) | 508 (3.5) | 45 (3.1) | 510 (2.9) | | 24 (3.0) | | 13 (1.8) | | 47 (3.2) |
| Japan | 54 (3.8) | 595 (4.9) | 46 (3.8) | 594 (2.9) | | 8 (2.0) | | 19 (3.0) | | 52 (4.0) |
| Kazakhstan | 46 (3.7) | 484 (5.4) | 54 (3.7) | 490 (5.3) | | 15 (2.9) | | 30 (3.5) | | 36 (3.8) |
| Jordan | 44 (3.6) | 429 (6.5) | 56 (3.6) | 414 (6.1) | | 9 (2.7) | | 10 (1.8) | | 43 (3.7) |
| Chile | 43 (4.1) | 440 (5.0) | 57 (4.1) | 441 (4.9) | | 23 (3.6) | | 19 (3.2) | | 41 (4.1) |
| Hungary | 42 (3.6) | 514 (6.6) | 58 (3.6) | 515 (5.6) | | 6 (1.6) | | 7 (1.6) | | 39 (3.7) |
| Georgia | 41 (4.0) | 467 (7.2) | 59 (4.0) | 459 (5.5) | x | 25 (6.4) | y | - - | x | 84 (5.1) |
| Lithuania | 41 (3.9) | 514 (4.9) | 59 (3.9) | 526 (4.3) | | 10 (2.0) | | 12 (2.4) | | 40 (3.9) |
| Egypt | 39 (4.3) | 424 (8.7) | 61 (4.3) | 407 (6.7) | | 2 (1.1) | | 11 (2.8) | | 38 (4.3) |
| Qatar | 38 (3.3) | 440 (8.8) | 62 (3.3) | 446 (4.6) | | 17 (2.3) | | 8 (2.3) | | 33 (3.3) |
| Hong Kong SAR | 37 (4.0) | 584 (7.9) | 63 (4.0) | 572 (6.5) | | 22 (3.4) | | 7 (2.1) | | 29 (4.0) |
| Singapore | 35 (2.7) | 615 (8.1) | 65 (2.7) | 616 (5.0) | | 19 (1.7) | | 11 (1.5) | | 30 (2.7) |
| Chinese Taipei | 35 (3.4) | 608 (5.4) | 65 (3.4) | 615 (3.2) | | 2 (1.0) | | 26 (3.1) | | 26 (3.1) |
| Romania | 33 (3.7) | 488 (8.9) | 67 (3.7) | 476 (5.4) | r | 8 (2.1) | r | 7 (2.2) | r | 31 (3.8) |
| Bahrain | 33 (2.7) | 481 (3.8) | 67 (2.7) | 481 (2.5) | | 5 (0.7) | | 8 (1.6) | | 32 (2.8) |
| Israel | 33 (3.2) | 516 (10.7) | 67 (3.2) | 521 (6.0) | | 9 (2.2) | | 7 (1.3) | | 30 (3.0) |
| Russian Federation | 31 (3.5) | 558 (7.0) | 69 (3.5) | 537 (6.1) | | 7 (1.9) | | 16 (3.1) | | 30 (3.4) |
| Ireland | 31 (3.2) | 521 (5.5) | 69 (3.2) | 526 (3.1) | | 14 (2.3) | | 3 (1.2) | | 22 (2.6) |
| Korea, Rep. of | 29 (3.5) | 607 (4.6) | 71 (3.5) | 607 (3.6) | | 3 (1.1) | | 14 (2.6) | | 22 (3.2) |
| Saudi Arabia | 29 (3.5) | 401 (4.8) | 71 (3.5) | 389 (3.0) | | 5 (1.6) | | 14 (3.1) | | 23 (3.0) |
| Kuwait | 28 (3.5) | 426 (10.0) | 72 (3.5) | 392 (4.8) | | 6 (1.2) | | 5 (1.8) | | 25 (3.8) |
| Iran, Islamic Rep. of | 25 (3.2) | 465 (8.9) | 75 (3.2) | 440 (4.0) | | 0 (0.1) | | 3 (1.2) | | 22 (3.3) |
| England | s 24 (4.8) | 521 (15.8) | 76 (4.8) | 522 (9.9) | s | 13 (3.9) | s | 4 (2.1) | s | 17 (4.3) |
| Italy | 23 (3.4) | 484 (5.3) | 77 (3.4) | 502 (3.2) | r | 6 (1.8) | r | 15 (2.8) | r | 24 (3.6) |
| France | r 19 (3.6) | 483 (5.7) | 81 (3.6) | 482 (3.1) | r | 6 (2.0) | r | 5 (2.1) | r | 16 (3.5) |
| Lebanon | 16 (3.4) | 447 (10.4) | 84 (3.4) | 426 (3.4) | | 2 (1.0) | | 6 (2.1) | | 14 (3.3) |
| Turkey | 15 (2.8) | 512 (12.1) | 85 (2.8) | 493 (4.9) | | 1 (0.9) | | 9 (2.3) | | 12 (2.5) |
| Oman | 13 (2.6) | 434 (10.1) | 87 (2.6) | 407 (3.2) | | 2 (0.7) | | 4 (1.3) | | 12 (2.5) |
| Malaysia | 13 (2.1) | 477 (9.8) | 87 (2.1) | 458 (3.7) | | 4 (1.3) | | 5 (1.5) | | 12 (2.2) |
| South Africa (9) | 9 (1.3) | 417 (11.5) | 91 (1.3) | 388 (2.8) | | 2 (0.4) | | 1 (0.4) | | 4 (0.7) |
| Portugal | 9 (2.5) | 503 (14.0) | 91 (2.5) | 500 (3.3) | | 3 (1.5) | | 1 (1.0) | | 8 (2.4) |
| Cyprus | s 9 (1.9) | 517 (8.6) | 91 (1.9) | 504 (2.5) | s | 0 (0.0) | s | 2 (0.6) | s | 6 (1.4) |
| Morocco | 5 (1.6) | 416 (15.5) | 95 (1.6) | 386 (2.4) | | 0 (0.0) | | 1 (0.7) | | 4 (1.3) |
| **International Average** | **37 (0.5)** | **495 (1.3)** | **63 (0.5)** | **487 (0.9)** | | **17 (0.4)** | | **11 (0.4)** | | **28 (0.5)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Dubai, UAE | 74 (2.3) | 548 (3.2) | 26 (2.3) | 507 (6.8) | | 36 (2.8) | | 35 (2.2) | | 62 (3.1) |
| Ontario, Canada | 70 (4.5) | 539 (5.7) | 30 (4.5) | 516 (5.0) | r | 21 (4.6) | r | 50 (5.3) | r | 57 (5.3) |
| Abu Dhabi, UAE | r 59 (1.8) | 421 (5.0) | 41 (1.8) | 454 (4.6) | r | 48 (1.9) | r | 21 (2.5) | r | 38 (2.5) |
| Moscow City, Russian Fed. | 37 (4.1) | 587 (7.0) | 63 (4.1) | 568 (4.8) | | 7 (2.2) | | 11 (2.5) | | 35 (4.0) |
| Quebec, Canada | 29 (4.3) | 557 (7.2) | 71 (4.3) | 537 (4.7) | | 14 (2.6) | | 6 (2.5) | | 17 (3.7) |
| Western Cape, RSA (9) | 23 (3.6) | 462 (14.2) | 77 (3.6) | 434 (5.7) | | 5 (1.6) | | 2 (1.0) | | 16 (3.8) |
| Gauteng, RSA (9) | 15 (3.2) | 434 (14.8) | 85 (3.2) | 418 (4.0) | | 5 (1.5) | | 1 (0.5) | | 7 (2.2) |

* Teachers could indicate the class having more than one type of computer access.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 14.4: Access to Computers for Science Lessons

*Students' Results based on Teachers' Reports*

| Country | Computers Available for Students to Use During Science Lessons | | | | Percent of Students by Computer Access* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Each Student has a Computer | | The Class has Computers that Students can Share | | The School has Computers that the Class can Sometimes Use | |
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | | | | | | |
| Sweden | 96 (1.7) | 521 (3.1) | 4 (1.7) | 528 (31.8) | | 87 (2.8) | | 4 (1.2) | | 19 (3.0) |
| New Zealand | 90 (2.6) | 506 (4.2) | 10 (2.6) | 464 (22.8) | | 55 (4.1) | | 24 (3.5) | | 67 (4.1) |
| Australia | r 87 (1.6) | 537 (3.8) | 13 (1.6) | 505 (10.6) | r | 67 (2.8) | r | 18 (2.4) | r | 51 (2.7) |
| Norway (9) | s 85 (3.3) | 497 (3.9) | 15 (3.3) | 500 (7.9) | s | 77 (3.8) | s | 16 (3.6) | s | 21 (3.9) |
| United States | r 82 (2.3) | 530 (4.2) | 18 (2.3) | 511 (14.3) | r | 58 (2.9) | r | 35 (3.1) | r | 50 (2.9) |
| Finland | 78 (1.9) | 542 (3.3) | 22 (1.9) | 545 (4.9) | | 27 (3.0) | | 18 (1.8) | | 70 (2.3) |
| Japan | 67 (3.8) | 568 (2.8) | 33 (3.8) | 572 (3.9) | | 17 (3.2) | | 29 (3.5) | | 62 (4.0) |
| Chile | 65 (3.9) | 468 (4.2) | 35 (3.9) | 454 (5.7) | | 40 (4.0) | | 39 (3.8) | | 63 (3.8) |
| Kazakhstan | 64 (2.9) | 477 (4.2) | 36 (2.9) | 480 (5.7) | | 19 (2.2) | | 37 (2.8) | | 56 (3.0) |
| United Arab Emirates | r 59 (1.4) | 483 (2.8) | 41 (1.4) | 462 (4.2) | r | 39 (1.3) | r | 27 (1.6) | r | 47 (1.6) |
| Egypt | 58 (3.7) | 399 (7.8) | 42 (3.7) | 379 (8.0) | | 3 (1.4) | | 14 (2.9) | | 56 (3.6) |
| Hong Kong SAR | 57 (4.0) | 512 (7.5) | 43 (4.0) | 494 (8.9) | | 30 (3.8) | | 20 (3.6) | | 45 (4.3) |
| Singapore | 56 (2.2) | 605 (6.0) | 44 (2.2) | 611 (5.8) | | 29 (1.9) | | 21 (2.1) | | 53 (2.4) |
| Israel | 56 (4.3) | 510 (5.8) | 44 (4.3) | 519 (6.4) | | 10 (2.5) | | 22 (3.1) | | 53 (4.1) |
| Iran, Islamic Rep. of | 54 (3.8) | 465 (5.4) | 46 (3.8) | 431 (5.8) | | 2 (1.2) | | 6 (1.9) | | 49 (3.8) |
| Jordan | 54 (3.6) | 468 (5.1) | 46 (3.6) | 434 (7.8) | | 13 (2.6) | | 11 (2.1) | | 50 (3.8) |
| Chinese Taipei | 54 (3.6) | 572 (2.6) | 46 (3.6) | 576 (3.7) | | 5 (1.4) | | 37 (3.5) | | 40 (3.6) |
| Lithuania | 53 (2.3) | 529 (3.6) | 47 (2.3) | 538 (2.9) | | 16 (1.7) | | 20 (1.7) | | 48 (2.1) |
| Qatar | 50 (4.5) | 477 (5.7) | 50 (4.5) | 472 (7.5) | | 24 (2.7) | | 19 (2.7) | | 46 (4.1) |
| Georgia | 49 (2.4) | 445 (4.4) | 51 (2.4) | 449 (4.2) | x | 26 (3.5) | x | 27 (3.4) | s | 87 (2.2) |
| Korea, Rep. of | 49 (4.2) | 560 (3.3) | 51 (4.2) | 561 (2.6) | | 7 (1.9) | | 27 (3.1) | | 39 (4.1) |
| Kuwait | 48 (4.6) | 457 (7.4) | 52 (4.6) | 432 (6.9) | | 8 (2.3) | | 10 (2.6) | | 42 (4.8) |
| Hungary | 46 (2.6) | 529 (3.5) | 54 (2.6) | 528 (3.7) | | 3 (0.7) | | 10 (1.4) | | 43 (2.7) |
| Russian Federation | 46 (2.5) | 548 (4.2) | 54 (2.5) | 539 (5.8) | | 8 (1.5) | | 28 (2.2) | | 44 (2.5) |
| Ireland | 45 (3.7) | 527 (3.9) | 55 (3.7) | 528 (4.3) | | 17 (2.7) | | 10 (2.0) | | 33 (3.2) |
| Bahrain | 44 (2.8) | 483 (3.8) | 56 (2.8) | 488 (3.5) | | 6 (1.1) | | 11 (2.5) | | 39 (2.7) |
| Romania | 40 (2.9) | 481 (5.7) | 60 (2.9) | 464 (4.9) | r | 12 (2.0) | r | 12 (2.2) | r | 41 (3.3) |
| Italy | 36 (3.8) | 493 (4.7) | 64 (3.8) | 506 (3.3) | | 6 (1.8) | | 25 (3.6) | | 32 (3.7) |
| France | r 35 (3.5) | 487 (4.4) | 65 (3.5) | 489 (3.9) | r | 4 (1.5) | r | 19 (2.6) | r | 31 (3.2) |
| England | s 32 (4.8) | 524 (14.2) | 68 (4.8) | 522 (8.2) | s | 14 (3.6) | s | 7 (2.9) | s | 29 (5.1) |
| Saudi Arabia | 30 (3.8) | 441 (6.9) | 70 (3.8) | 428 (3.4) | | 5 (1.6) | | 11 (2.3) | | 26 (3.3) |
| Malaysia | 20 (3.3) | 452 (10.9) | 80 (3.3) | 462 (4.5) | | 4 (1.3) | | 7 (1.7) | | 17 (3.0) |
| Lebanon | 19 (2.6) | 409 (11.4) | 81 (2.6) | 370 (5.2) | | 1 (0.7) | | 6 (1.9) | | 14 (2.3) |
| Oman | 18 (2.4) | 475 (8.2) | 82 (2.4) | 453 (3.2) | | 3 (1.0) | | 8 (1.6) | | 16 (2.3) |
| Turkey | 18 (3.2) | 536 (11.2) | 82 (3.2) | 511 (4.8) | | 3 (1.5) | | 10 (2.5) | | 14 (2.9) |
| Portugal | 17 (3.1) | 536 (5.4) | 83 (3.1) | 516 (3.0) | | 3 (1.2) | | 8 (1.9) | | 17 (3.0) |
| Morocco | 15 (1.9) | 411 (7.3) | 85 (1.9) | 391 (3.2) | | 0 (0.0) | | 5 (1.1) | | 12 (1.7) |
| South Africa (9) | 10 (1.8) | 404 (16.9) | 90 (1.8) | 366 (3.2) | | 3 (0.9) | | 2 (0.8) | | 6 (1.4) |
| Cyprus | s 7 (1.0) | 494 (6.7) | 93 (1.0) | 486 (2.5) | s | 1 (0.0) | s | 3 (0.6) | s | 4 (0.8) |
| **International Average** | **48 (0.5)** | **496 (1.1)** | **52 (0.5)** | **486 (1.4)** | | **19 (0.4)** | | **17 (0.4)** | | **39 (0.5)** |
| **Benchmarking Participants** | | | | | | | | | | |
| Ontario, Canada | s 88 (3.4) | 522 (5.0) | 12 (3.4) | 516 (9.4) | s | 29 (4.9) | s | 66 (5.6) | s | 72 (5.4) |
| Dubai, UAE | r 81 (1.4) | 565 (2.6) | 19 (1.4) | 494 (8.1) | r | 52 (1.7) | r | 38 (1.9) | r | 65 (2.6) |
| Abu Dhabi, UAE | r 62 (2.5) | 397 (6.2) | 38 (2.5) | 451 (7.8) | r | 50 (1.6) | r | 22 (2.5) | r | 44 (2.7) |
| Moscow City, Russian Fed. | 40 (2.6) | 571 (3.7) | 60 (2.6) | 563 (3.2) | | 9 (1.6) | | 17 (1.9) | | 37 (2.5) |
| Western Cape, RSA (9) | 21 (3.5) | 472 (17.8) | 79 (3.5) | 432 (6.6) | | 8 (2.1) | | 5 (1.9) | | 17 (3.2) |
| Gauteng, RSA (9) | 8 (1.9) | 517 (18.8) | 92 (1.9) | 415 (4.6) | | 5 (1.9) | | 0 (0.0) | | 3 (0.5) |
| Quebec, Canada | y - - | - - | - - | - - | y | - - | y | - - | y | - - |

* Teachers could indicate the class having more than one type of computer access.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution. A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Technology to Support Learning

Exhibits 14.5, 14.6, 14.7, and 14.8 presents teachers' reports on the frequency they do activities on computers to support learning during mathematics and science lessons, together with average achievement by frequency. Across both grades and subjects, 5 to 9 percent of students on average are in classes in which their teacher reported doing computer activities to support learning "every day or almost every day," 10 to 14 percent had teachers who reported "once or twice a week," 13 to 21 percent "once or twice a month," and 56 to 68 percent "never or almost never."

Teachers reported doing computer activities more frequently in science lessons than in mathematics lessons. Although 60 percent of fourth grade students (Exhibit 14.6) and 56 percent of eighth grade students (Exhibit 14.8) had science teachers who said they "never or almost never" did computer activities to support learning, 67 percent of fourth grade students (Exhibit 14.5) and 68 percent of eighth grade students (Exhibit 14.7) had mathematics teachers who reported "never or almost never" doing computer activities to support learning. Though few students are in classes where computers are used on a frequent basis, there was a substantial range across countries. For example, in fourth grade mathematics, on average only 7 percent of students' mathematics teachers said they use computers to support learning "every day or almost every day," on average, but more than 25 percent did so in Denmark, the Netherlands, New Zealand, and the United States.

Students in classes where teachers "never or almost never" used computers to support learning had the lowest achievement, on average. At both the fourth and the eighth grades, there was a 10-point difference in average mathematics achievement as well as average science achievement between students in the two lowest categories. Beyond that, the relationship with achievement varied across grades and subjects. In fourth grade mathematics (Exhibit 14.5) and eighth grade science (Exhibit 14.8), students with teachers who did computer activities "every day or almost every day" had the highest average achievement compared to students in the other three categories (515 vs. 509, 510, and 500 for fourth grade mathematics; 509 vs. 495, 497, and 487 for eighth grade science), while in fourth grade science (Exhibit 14.6), average achievement was similar for students in the "every day or almost every day," "once or twice a week," and "once or twice a month" categories (498, 498, and 500, respectively). In eighth grade mathematics (Exhibit 14.7), students in the two highest frequency categories had the same average achievement (505), which was higher than for students in the "once or twice a month" (497) and "never or almost never" (487) categories.

## Exhibit 14.5: Teachers Do Computer Activities to Support Learning in Mathematics Lessons

*Students' Results based on Teachers' Reports*

| Country | Every or Almost Every Day | | Once or Twice a Week | | Once or Twice a Month | | Never or Almost Never | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 1 (0.6) | ~ ~ | 1 (0.7) | ~ ~ | 7 (2.5) | 532 (21.0) | 91 (2.6) | 491 (3.5) |
| Armenia | 1 (0.9) | ~ ~ | 5 (2.0) | 494 (14.1) | 5 (1.7) | 519 (7.9) | 89 (2.6) | 497 (2.7) |
| Australia | 14 (2.2) | 528 (8.0) | 37 (3.3) | 518 (5.3) | 11 (2.4) | 531 (13.5) | 38 (3.8) | 511 (5.5) |
| Austria | 1 (0.8) | ~ ~ | 10 (2.0) | 549 (6.2) | 10 (1.8) | 552 (5.1) | 78 (2.6) | 536 (2.4) |
| Azerbaijan | 2 (0.8) | ~ ~ | 10 (2.5) | 515 (8.1) | 3 (1.3) | 485 (18.9) | 85 (2.8) | 517 (3.0) |
| Bahrain | 7 (1.7) | 498 (8.2) | 8 (1.7) | 495 (8.4) | 13 (2.1) | 486 (6.3) | 71 (2.7) | 475 (3.0) |
| Belgium (Flemish) | 3 (1.3) | 536 (23.2) | 10 (2.1) | 535 (5.2) | 17 (3.0) | 527 (4.3) | 71 (3.8) | 535 (2.2) |
| Bosnia and Herzegovina | 1 (0.5) | ~ ~ | 2 (0.8) | ~ ~ | 9 (2.0) | 484 (6.7) | 88 (2.1) | 448 (2.5) |
| Bulgaria | 3 (1.5) | 528 (14.1) | 5 (1.6) | 520 (18.5) | 8 (2.6) | 514 (15.3) | 83 (2.7) | 514 (5.1) |
| Canada | 6 (1.0) | 503 (6.2) | 24 (2.0) | 503 (3.9) | 19 (2.5) | 511 (6.1) | 52 (3.0) | 519 (4.0) |
| Chile | 0 (0.0) | ~ ~ | 7 (2.3) | 446 (14.0) | 18 (3.1) | 429 (7.3) | 76 (3.6) | 443 (3.3) |
| Chinese Taipei | 5 (1.5) | 611 (8.5) | 10 (2.4) | 604 (5.8) | 7 (2.0) | 588 (8.3) | 78 (3.3) | 599 (2.1) |
| Croatia | 0 (0.0) | ~ ~ | 1 (0.7) | ~ ~ | 5 (1.8) | 501 (14.3) | 94 (2.0) | 509 (2.3) |
| Cyprus | 12 (1.8) | 540 (5.7) | 10 (2.1) | 536 (7.4) | 7 (1.5) | 539 (9.0) | 71 (2.5) | 532 (3.2) |
| Czech Republic | 2 (1.3) | ~ ~ | 9 (2.0) | 543 (9.1) | 16 (2.4) | 540 (7.0) | 73 (3.3) | 531 (2.9) |
| Denmark r | 26 (3.6) | 522 (4.5) | 39 (4.0) | 522 (3.7) | 21 (3.3) | 528 (6.0) | 14 (3.2) | 532 (6.5) |
| Finland | 3 (0.8) | 529 (10.2) | 19 (2.5) | 523 (5.4) | 36 (3.4) | 536 (3.6) | 43 (3.8) | 534 (3.7) |
| France | 1 (0.4) | ~ ~ | 5 (2.1) | 488 (8.2) | 3 (1.2) | 437 (15.4) | 91 (2.4) | 487 (3.2) |
| Georgia s | 7 (1.6) | 491 (33.1) | 44 (4.3) | 475 (6.5) | 46 (4.3) | 485 (4.7) | 3 (1.2) | 466 (23.2) |
| Germany | 1 (0.7) | ~ ~ | 7 (2.1) | 508 (7.2) | 17 (2.6) | 518 (6.6) | 75 (3.3) | 524 (2.9) |
| Hong Kong SAR | 12 (3.2) | 587 (10.5) | 15 (3.3) | 597 (10.6) | 42 (4.2) | 609 (4.6) | 30 (4.8) | 600 (8.5) |
| Hungary | 7 (1.7) | 524 (8.8) | 10 (2.1) | 517 (9.1) | 10 (2.6) | 520 (8.8) | 72 (3.4) | 526 (3.9) |
| Iran, Islamic Rep. of | 6 (1.8) | 486 (18.1) | 9 (2.2) | 440 (16.6) | 7 (1.8) | 460 (11.0) | 78 (2.9) | 438 (4.5) |
| Ireland | 3 (1.2) | 519 (18.3) | 15 (3.1) | 543 (7.4) | 15 (2.9) | 559 (6.9) | 66 (3.5) | 548 (2.6) |
| Italy | 7 (1.8) | 504 (6.5) | 8 (2.0) | 519 (9.1) | 8 (2.0) | 519 (9.4) | 78 (3.2) | 515 (2.7) |
| Japan | 10 (2.4) | 582 (5.9) | 9 (2.0) | 593 (4.3) | 10 (2.1) | 589 (4.4) | 71 (3.4) | 595 (2.1) |
| Kazakhstan | 9 (2.1) | 508 (7.3) | 23 (3.3) | 508 (5.1) | 13 (2.6) | 504 (5.5) | 55 (4.0) | 516 (4.2) |
| Korea, Rep. of | 0 (0.0) | ~ ~ | 0 (0.4) | ~ ~ | 10 (2.5) | 590 (7.0) | 90 (2.6) | 600 (2.4) |
| Kosovo s | 0 (0.0) | ~ ~ | 5 (2.2) | 438 (15.5) | 7 (3.3) | 455 (8.1) | 88 (3.8) | 443 (4.6) |
| Kuwait | 6 (1.6) | 401 (24.2) | 9 (2.5) | 377 (20.5) | 7 (1.9) | 402 (20.5) | 78 (3.5) | 381 (5.5) |
| Latvia | 1 (0.8) | ~ ~ | 4 (1.6) | 535 (14.1) | 16 (2.8) | 543 (5.4) | 78 (3.3) | 548 (3.1) |
| Lithuania | 3 (1.2) | 543 (14.4) | 20 (3.2) | 546 (9.6) | 26 (3.6) | 536 (5.8) | 52 (3.8) | 542 (3.6) |
| Malta | 20 (0.3) | 500 (2.1) | 43 (0.4) | 509 (1.8) | 21 (0.4) | 515 (3.0) | 16 (0.3) | 515 (3.3) |
| Montenegro | 1 (0.0) | ~ ~ | 2 (0.1) | ~ ~ | 7 (1.1) | 466 (6.4) | 90 (1.1) | 453 (2.2) |
| Morocco | 1 (0.8) | ~ ~ | 1 (0.6) | ~ ~ | 3 (1.5) | 408 (40.1) | 95 (1.8) | 379 (4.8) |
| Netherlands r | 43 (5.0) | 536 (3.9) | 19 (4.2) | 533 (4.7) | 2 (1.0) | ~ ~ | 37 (4.4) | 539 (4.4) |
| New Zealand | 32 (3.5) | 481 (5.5) | 40 (3.2) | 492 (5.2) | 10 (1.9) | 489 (7.9) | 18 (2.3) | 486 (5.9) |
| North Macedonia | 1 (0.6) | ~ ~ | 24 (3.9) | 468 (10.9) | 21 (3.8) | 476 (11.2) | 53 (4.5) | 471 (7.2) |
| Northern Ireland | 12 (2.9) | 566 (11.9) | 19 (3.0) | 565 (6.7) | 31 (3.8) | 563 (6.0) | 38 (3.9) | 567 (5.2) |
| Norway (5) r | 9 (2.8) | 548 (8.9) | 40 (4.5) | 545 (3.0) | 23 (4.1) | 550 (6.2) | 29 (4.2) | 538 (5.2) |
| Oman | 2 (0.7) | ~ ~ | 9 (2.0) | 441 (12.3) | 5 (1.5) | 459 (20.1) | 85 (2.4) | 430 (4.5) |
| Pakistan | 1 (0.9) | ~ ~ | 2 (1.5) | ~ ~ | 1 (0.5) | ~ ~ | 96 (1.0) | 329 (12.7) |
| Philippines | 3 (1.4) | 321 (32.5) | 9 (1.9) | 284 (20.8) | 11 (2.6) | 341 (16.3) | 77 (3.3) | 290 (6.9) |
| Poland | 1 (0.8) | ~ ~ | 5 (1.5) | 513 (12.0) | 17 (2.7) | 511 (5.9) | 76 (3.2) | 523 (3.0) |
| Portugal | 1 (0.5) | ~ ~ | 5 (1.0) | 527 (10.9) | 4 (1.3) | 523 (12.3) | 90 (1.6) | 526 (2.8) |
| Qatar | 7 (2.1) | 457 (16.6) | 12 (2.3) | 455 (8.6) | 14 (2.4) | 431 (13.9) | 66 (3.5) | 451 (4.7) |
| Russian Federation | 3 (1.5) | 545 (16.3) | 12 (2.2) | 574 (10.3) | 24 (3.1) | 567 (4.9) | 61 (3.5) | 567 (3.9) |
| Saudi Arabia | 14 (3.0) | 409 (8.9) | 11 (2.0) | 420 (11.3) | 5 (1.6) | 398 (23.3) | 70 (3.3) | 393 (4.7) |
| Serbia | 4 (1.6) | 522 (12.2) | 4 (1.6) | 517 (20.3) | 4 (1.5) | 496 (9.8) | 88 (2.4) | 507 (3.4) |
| Singapore | 0 (0.3) | ~ ~ | 11 (1.7) | 626 (10.8) | 30 (2.4) | 629 (7.2) | 59 (2.6) | 623 (4.4) |
| Slovak Republic | 3 (1.3) | 534 (20.6) | 5 (1.3) | 518 (12.9) | 5 (1.4) | 524 (11.6) | 87 (1.9) | 507 (3.6) |
| South Africa (5) | 0 (0.0) | ~ ~ | 4 (1.0) | 449 (26.5) | 2 (0.6) | ~ ~ | 95 (1.1) | 370 (3.6) |
| Spain | 3 (0.7) | 504 (12.6) | 13 (2.6) | 502 (6.3) | 13 (2.2) | 500 (7.3) | 71 (2.9) | 502 (3.2) |
| Sweden | 6 (1.9) | 515 (10.5) | 45 (4.5) | 521 (3.8) | 27 (3.9) | 522 (6.6) | 22 (3.0) | 522 (8.5) |
| Turkey (5) | 5 (2.0) | 531 (17.9) | 6 (1.9) | 516 (15.9) | 2 (1.1) | ~ ~ | 86 (2.8) | 521 (4.9) |
| United Arab Emirates r | 15 (1.1) | 509 (5.2) | 24 (1.7) | 508 (4.1) | 6 (0.7) | 531 (8.1) | 55 (1.8) | 458 (3.0) |
| United States | 36 (2.5) | 537 (4.4) | 27 (2.4) | 531 (4.7) | 9 (1.3) | 537 (7.6) | 28 (2.6) | 536 (5.3) |
| England x | 5 (1.5) | 587 (10.0) | 10 (3.4) | 578 (17.0) | 13 (4.0) | 557 (6.0) | 72 (4.3) | 553 (6.2) |
| **International Average** | **7 (0.2)** | **515 (2.4)** | **14 (0.3)** | **509 (1.6)** | **13 (0.3)** | **510 (1.6)** | **67 (0.4)** | **500 (0.7)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada r | 6 (1.8) | 509 (8.6) | 23 (3.5) | 505 (6.7) | 25 (5.1) | 514 (9.5) | 47 (5.7) | 516 (9.6) |
| Quebec, Canada | 3 (1.3) | 526 (13.0) | 15 (3.2) | 531 (4.3) | 14 (3.4) | 525 (6.6) | 68 (4.1) | 535 (2.8) |
| Moscow City, Russian Fed. | 1 (1.3) | ~ ~ | 21 (3.1) | 605 (5.1) | 26 (4.1) | 597 (4.1) | 52 (4.5) | 585 (2.8) |
| Madrid, Spain | 7 (2.0) | 518 (6.2) | 9 (2.4) | 511 (6.6) | 17 (3.3) | 518 (8.4) | 68 (4.2) | 520 (2.5) |
| Abu Dhabi, UAE r | 13 (2.0) | 490 (11.5) | 14 (1.9) | 468 (9.6) | 5 (1.3) | 468 (20.0) | 68 (2.4) | 426 (3.9) |
| Dubai, UAE r | 23 (2.2) | 542 (6.5) | 38 (2.4) | 561 (3.1) | 15 (2.3) | 561 (6.8) | 24 (1.5) | 516 (5.1) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 14.6: Teachers Do Computer Activities to Support Learning in Science Lessons

*Students' Results based on Teachers' Reports*

| Country | | Every or Almost Every Day | | Once or Twice a Week | | Once or Twice a Month | | Never or Almost Never | |
|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | | 1 (0.6) | ~ ~ | 3 (1.2) | 491 (13.8) | 6 (2.1) | 522 (20.5) | 91 (2.4) | 486 (3.9) |
| Armenia | | 4 (1.8) | 468 (26.8) | 8 (2.3) | 488 (9.6) | 10 (2.2) | 465 (10.6) | 78 (3.2) | 465 (3.9) |
| Australia | | 7 (1.4) | 547 (6.5) | 28 (3.9) | 532 (5.5) | 30 (3.9) | 531 (5.5) | 35 (3.1) | 534 (5.0) |
| Austria | | 1 (0.4) | ~ ~ | 11 (2.0) | 527 (7.1) | 22 (2.4) | 523 (5.3) | 66 (3.1) | 521 (3.3) |
| Azerbaijan | | 2 (0.9) | ~ ~ | 9 (1.9) | 420 (9.2) | 5 (1.3) | 454 (8.4) | 84 (2.2) | 425 (3.8) |
| Bahrain | | 17 (2.5) | 511 (10.1) | 8 (1.9) | 511 (11.4) | 11 (2.0) | 514 (9.0) | 64 (2.9) | 481 (4.5) |
| Belgium (Flemish) | | 4 (1.7) | 501 (14.8) | 12 (2.8) | 511 (5.2) | 50 (3.3) | 500 (3.2) | 33 (3.9) | 501 (3.5) |
| Bosnia and Herzegovina | | 2 (1.0) | ~ ~ | 3 (1.0) | 479 (12.9) | 12 (2.2) | 471 (8.0) | 84 (2.6) | 456 (2.9) |
| Bulgaria | | 5 (1.7) | 546 (15.1) | 4 (1.6) | 554 (32.6) | 14 (3.1) | 495 (15.4) | 78 (3.3) | 523 (6.0) |
| Canada | r | 5 (1.2) | 526 (9.8) | 18 (2.1) | 521 (3.8) | 32 (2.4) | 524 (3.3) | 45 (2.6) | 526 (2.9) |
| Chile | r | 4 (1.7) | 477 (15.8) | 7 (2.5) | 451 (6.2) | 24 (3.0) | 464 (5.8) | 65 (3.2) | 471 (3.9) |
| Chinese Taipei | | 15 (2.8) | 555 (4.4) | 20 (3.2) | 552 (4.3) | 12 (2.2) | 565 (6.3) | 53 (4.0) | 560 (2.3) |
| Croatia | | 2 (1.1) | ~ ~ | 2 (1.1) | ~ ~ | 6 (1.5) | 518 (11.6) | 90 (2.4) | 524 (2.2) |
| Cyprus | | 11 (2.5) | 511 (7.5) | 9 (2.5) | 516 (11.2) | 18 (3.9) | 519 (7.6) | 62 (4.5) | 510 (3.8) |
| Czech Republic | | 2 (1.0) | ~ ~ | 4 (1.2) | 514 (9.6) | 21 (2.8) | 544 (5.5) | 73 (2.9) | 532 (3.0) |
| Denmark | r | 28 (3.8) | 510 (4.5) | 31 (3.9) | 521 (3.8) | 30 (4.1) | 534 (4.4) | 10 (2.3) | 522 (5.7) |
| Finland | | 4 (1.2) | 544 (8.7) | 19 (2.7) | 554 (4.3) | 51 (3.3) | 557 (3.2) | 25 (2.8) | 552 (5.0) |
| France | | 0 (0.3) | ~ ~ | 0 (0.3) | ~ ~ | 9 (2.8) | 490 (8.2) | 90 (2.8) | 488 (3.2) |
| Georgia | r | 6 (2.0) | 458 (23.8) | 35 (4.5) | 449 (7.1) | 56 (4.9) | 453 (4.8) | 4 (2.0) | 437 (15.5) |
| Germany | | 1 (0.5) | ~ ~ | 7 (1.9) | 522 (8.1) | 33 (3.5) | 522 (4.7) | 60 (3.7) | 516 (3.4) |
| Hong Kong SAR | | 10 (2.6) | 534 (11.3) | 16 (3.3) | 540 (8.7) | 39 (4.0) | 529 (4.5) | 36 (4.1) | 532 (6.5) |
| Hungary | | 5 (1.6) | 516 (17.6) | 15 (2.4) | 522 (7.3) | 10 (2.2) | 520 (10.5) | 70 (3.1) | 533 (3.5) |
| Iran, Islamic Rep. of | | 5 (1.7) | 484 (13.7) | 13 (2.5) | 452 (16.2) | 9 (1.7) | 455 (6.9) | 72 (3.1) | 434 (4.9) |
| Ireland | | 1 (0.8) | ~ ~ | 8 (2.0) | 510 (12.8) | 21 (3.0) | 532 (7.4) | 69 (3.5) | 530 (3.0) |
| Italy | | 6 (1.9) | 511 (9.8) | 11 (2.1) | 503 (6.5) | 11 (2.3) | 500 (6.1) | 73 (3.6) | 512 (3.4) |
| Japan | | 8 (2.1) | 548 (5.2) | 10 (2.6) | 564 (6.2) | 29 (3.7) | 562 (3.3) | 53 (4.2) | 563 (2.5) |
| Kazakhstan | | 8 (1.7) | 507 (15.4) | 25 (3.3) | 486 (8.8) | 16 (2.8) | 481 (7.6) | 51 (4.3) | 496 (5.3) |
| Korea, Rep. of | | 2 (1.1) | ~ ~ | 3 (1.5) | 568 (16.7) | 28 (3.6) | 586 (4.2) | 66 (3.3) | 589 (2.2) |
| Kosovo | s | 1 (0.8) | ~ ~ | 14 (5.2) | 411 (10.5) | 5 (1.9) | 424 (14.3) | 80 (5.5) | 413 (5.8) |
| Kuwait | | 18 (2.9) | 390 (14.3) | 12 (2.8) | 418 (19.9) | 12 (2.8) | 390 (17.6) | 59 (4.0) | 389 (8.3) |
| Latvia | | 4 (1.8) | 517 (19.3) | 7 (2.2) | 540 (11.3) | 25 (3.1) | 536 (6.1) | 64 (3.1) | 546 (2.4) |
| Lithuania | | 6 (1.9) | 535 (7.9) | 19 (2.8) | 538 (8.0) | 21 (3.3) | 540 (6.5) | 53 (3.6) | 536 (3.9) |
| Malta | | 11 (0.2) | 490 (3.2) | 30 (0.4) | 489 (2.5) | 29 (0.4) | 496 (2.5) | 29 (0.4) | 503 (2.4) |
| Montenegro | | 1 (0.6) | ~ ~ | 3 (1.1) | 431 (18.4) | 11 (1.0) | 432 (10.1) | 84 (1.1) | 456 (2.6) |
| Morocco | | 1 (0.8) | ~ ~ | 1 (0.5) | ~ ~ | 5 (1.9) | 427 (29.4) | 93 (2.0) | 370 (6.6) |
| Netherlands | r | 9 (2.2) | 513 (11.1) | 19 (2.7) | 521 (8.3) | 28 (5.1) | 517 (6.9) | 44 (5.1) | 518 (3.3) |
| New Zealand | | 13 (2.4) | 502 (8.0) | 27 (2.6) | 502 (6.4) | 34 (2.9) | 504 (4.7) | 27 (2.9) | 501 (4.5) |
| North Macedonia | | 4 (1.6) | 415 (15.6) | 25 (4.1) | 405 (14.4) | 33 (4.1) | 442 (9.4) | 37 (4.4) | 427 (9.7) |
| Northern Ireland | | 5 (1.6) | 514 (13.3) | 14 (3.1) | 529 (7.9) | 42 (3.9) | 520 (3.6) | 40 (4.4) | 513 (4.1) |
| Norway (5) | s | 9 (2.9) | 534 (10.6) | 23 (3.7) | 546 (5.0) | 36 (4.6) | 528 (4.8) | 32 (4.6) | 548 (4.3) |
| Oman | | 3 (0.7) | 461 (20.4) | 12 (2.3) | 445 (14.6) | 8 (1.8) | 429 (15.1) | 77 (2.8) | 430 (4.6) |
| Pakistan | r | 0 (0.3) | ~ ~ | 5 (1.9) | 310 (33.7) | 1 (1.0) | ~ ~ | 94 (2.2) | 292 (17.0) |
| Poland | | 2 (1.0) | ~ ~ | 5 (1.8) | 527 (8.0) | 6 (1.6) | 510 (7.8) | 86 (2.4) | 533 (2.8) |
| Portugal | | 2 (0.8) | ~ ~ | 7 (1.4) | 503 (6.3) | 9 (1.9) | 512 (6.8) | 82 (2.2) | 503 (2.8) |
| Qatar | | 12 (2.2) | 438 (15.9) | 16 (2.6) | 444 (8.9) | 16 (2.2) | 436 (11.4) | 55 (3.9) | 458 (6.7) |
| Russian Federation | | 2 (0.9) | ~ ~ | 13 (2.9) | 584 (8.2) | 27 (3.7) | 563 (4.3) | 59 (3.8) | 567 (3.7) |
| Saudi Arabia | | 16 (2.9) | 417 (11.5) | 13 (2.5) | 420 (10.6) | 6 (1.9) | 390 (30.3) | 65 (3.4) | 394 (5.9) |
| Serbia | | 4 (1.5) | 533 (14.0) | 8 (2.0) | 523 (10.8) | 7 (2.2) | 509 (11.4) | 81 (3.1) | 516 (3.9) |
| Singapore | | 1 (0.5) | ~ ~ | 9 (1.3) | 592 (13.0) | 40 (2.8) | 595 (5.8) | 50 (2.7) | 595 (4.1) |
| Slovak Republic | | 1 (0.6) | ~ ~ | 8 (1.9) | 526 (12.2) | 20 (2.9) | 528 (8.9) | 70 (3.3) | 518 (4.0) |
| South Africa (5) | | 0 (0.2) | ~ ~ | 2 (0.7) | ~ ~ | 2 (1.2) | ~ ~ | 95 (1.3) | 320 (5.2) |
| Spain | | 3 (1.1) | 498 (17.7) | 18 (2.3) | 510 (4.6) | 21 (2.9) | 514 (4.4) | 58 (3.0) | 510 (3.0) |
| Sweden | | 7 (2.4) | 512 (15.2) | 33 (4.5) | 540 (5.0) | 37 (4.6) | 543 (4.8) | 23 (3.9) | 540 (7.1) |
| Turkey (5) | | 12 (2.6) | 544 (7.4) | 5 (1.6) | 526 (10.8) | 3 (1.4) | 539 (18.9) | 80 (3.2) | 523 (5.4) |
| United Arab Emirates | r | 18 (1.2) | 508 (6.4) | 24 (1.6) | 508 (5.0) | 5 (0.6) | 504 (12.4) | 54 (1.9) | 446 (3.9) |
| United States | | 14 (1.5) | 532 (6.8) | 30 (2.2) | 546 (4.3) | 24 (2.4) | 543 (5.4) | 33 (2.6) | 533 (4.8) |
| England | x | 5 (1.9) | 566 (13.5) | 10 (3.0) | 556 (17.5) | 18 (4.5) | 543 (11.2) | 68 (4.8) | 533 (5.7) |
| Philippines | x | 12 (3.8) | 253 (34.6) | 28 (5.8) | 253 (20.2) | 19 (4.7) | 256 (25.7) | 41 (6.2) | 251 (14.9) |
| **International Average** | | **6 (0.2)** | **498 (2.3)** | **13 (0.3)** | **498 (1.6)** | **20 (0.4)** | **500 (1.5)** | **60 (0.4)** | **490 (0.7)** |
| **Benchmarking Participants** | | | | | | | | | |
| Ontario, Canada | r | 6 (2.3) | 529 (15.9) | 28 (4.4) | 522 (5.0) | 33 (4.3) | 524 (5.7) | 32 (4.3) | 535 (7.4) |
| Quebec, Canada | | 2 (0.5) | ~ ~ | 4 (1.5) | 504 (11.2) | 22 (3.7) | 522 (4.9) | 72 (3.9) | 524 (2.7) |
| Moscow City, Russian Fed. | | 2 (1.5) | ~ ~ | 10 (2.6) | 602 (7.3) | 42 (4.4) | 600 (3.4) | 45 (4.4) | 588 (3.0) |
| Madrid, Spain | | 6 (1.7) | 518 (7.8) | 11 (2.9) | 518 (5.5) | 23 (3.3) | 527 (3.4) | 60 (4.5) | 522 (3.0) |
| Abu Dhabi, UAE | r | 14 (2.3) | 461 (15.3) | 18 (2.5) | 442 (9.9) | 6 (0.8) | 444 (18.6) | 62 (2.4) | 398 (6.0) |
| Dubai, UAE | r | 30 (2.3) | 549 (6.5) | 41 (2.3) | 555 (3.5) | 8 (1.4) | 576 (8.0) | 22 (1.1) | 531 (5.3) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 14.7: Teachers Do Computer Activities to Support Learning in Mathematics Lessons

*Students' Results based on Teachers' Reports*

| Country | | Every or Almost Every Day | | Once or Twice a Week | | Once or Twice a Month | | Never or Almost Never | |
|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | | 25 (3.1) | 520 (7.2) | 27 (3.8) | 525 (8.1) | 18 (2.6) | 535 (10.2) | 30 (3.2) | 502 (8.7) |
| Bahrain | | 13 (1.8) | 488 (6.4) | 10 (1.9) | 484 (7.8) | 9 (1.1) | 473 (5.3) | 68 (2.8) | 481 (2.5) |
| Chile | | 1 (0.7) | ~ ~ | 5 (1.8) | 444 (13.7) | 23 (3.6) | 441 (6.6) | 71 (3.9) | 441 (4.2) |
| Chinese Taipei | | 5 (1.6) | 583 (8.3) | 3 (1.0) | 603 (17.1) | 15 (2.6) | 600 (8.5) | 77 (3.0) | 617 (2.8) |
| Cyprus | s | 3 (1.0) | 487 (9.5) | 3 (0.7) | 556 (7.2) | 1 (0.1) | ~ ~ | 93 (1.3) | 504 (2.5) |
| Egypt | | 2 (1.0) | ~ ~ | 19 (3.5) | 433 (10.8) | 16 (3.4) | 416 (14.5) | 62 (4.3) | 407 (6.6) |
| England | s | 6 (2.9) | 555 (22.7) | 7 (2.9) | 509 (26.3) | 7 (2.5) | 490 (31.5) | 80 (4.7) | 523 (9.5) |
| Finland | | 2 (1.0) | ~ ~ | 9 (1.8) | 513 (7.3) | 33 (2.8) | 506 (4.4) | 55 (3.1) | 510 (3.0) |
| France | r | 0 (0.0) | ~ ~ | 3 (1.6) | 457 (24.9) | 12 (3.1) | 490 (9.8) | 85 (3.2) | 482 (3.0) |
| Hong Kong SAR | | 4 (1.4) | 646 (23.6) | 5 (2.1) | 610 (16.5) | 21 (3.5) | 574 (11.7) | 70 (3.9) | 571 (5.8) |
| Hungary | | 1 (0.5) | ~ ~ | 13 (2.7) | 530 (11.9) | 21 (2.6) | 507 (8.3) | 65 (3.4) | 513 (4.7) |
| Iran, Islamic Rep. of | | 6 (2.0) | 490 (15.0) | 7 (1.9) | 444 (11.4) | 10 (2.2) | 472 (15.9) | 77 (3.1) | 440 (3.9) |
| Ireland | | 4 (1.5) | 516 (6.4) | 5 (1.3) | 514 (18.7) | 12 (1.8) | 530 (7.0) | 79 (2.6) | 525 (3.0) |
| Israel | | 0 (0.2) | ~ ~ | 6 (1.5) | 464 (26.9) | 20 (2.6) | 519 (11.9) | 74 (2.9) | 525 (5.3) |
| Italy | r | 3 (1.3) | 471 (10.6) | 9 (2.3) | 486 (7.3) | 12 (2.6) | 489 (10.0) | 76 (3.7) | 500 (3.3) |
| Japan | | 5 (1.6) | 565 (8.5) | 4 (1.5) | 602 (9.0) | 8 (2.2) | 600 (11.0) | 83 (2.8) | 595 (2.9) |
| Jordan | | 3 (1.4) | 461 (36.6) | 6 (1.8) | 448 (16.3) | 30 (3.7) | 428 (8.3) | 61 (3.8) | 412 (5.7) |
| Kazakhstan | | 6 (1.8) | 486 (12.2) | 22 (3.0) | 482 (8.6) | 16 (2.9) | 478 (11.3) | 56 (3.8) | 491 (5.2) |
| Korea, Rep. of | | 3 (1.4) | 594 (8.7) | 3 (1.2) | 596 (13.8) | 10 (2.2) | 614 (11.2) | 84 (2.7) | 607 (3.0) |
| Kuwait | | 7 (2.0) | 392 (12.3) | 12 (3.7) | 452 (15.5) | 7 (2.2) | 418 (21.0) | 74 (3.7) | 392 (4.9) |
| Lebanon | | 1 (0.7) | ~ ~ | 5 (1.8) | 438 (26.5) | 7 (2.4) | 457 (13.3) | 88 (3.0) | 426 (3.1) |
| Lithuania | | 0 (0.2) | ~ ~ | 8 (1.9) | 503 (7.4) | 23 (3.4) | 510 (6.9) | 69 (3.6) | 527 (4.2) |
| Malaysia | | 1 (0.6) | ~ ~ | 2 (1.0) | ~ ~ | 7 (1.6) | 494 (11.9) | 90 (2.1) | 456 (3.7) |
| Morocco | | 0 (0.4) | ~ ~ | 1 (0.8) | ~ ~ | 2 (1.2) | ~ ~ | 96 (1.4) | 386 (2.4) |
| New Zealand | | 21 (4.3) | 500 (8.6) | 41 (3.9) | 481 (5.7) | 16 (2.3) | 495 (5.5) | 22 (3.7) | 461 (10.7) |
| Norway (9) | s | 5 (1.5) | 513 (11.7) | 30 (3.9) | 515 (5.2) | 38 (3.9) | 495 (4.9) | 26 (4.2) | 506 (4.5) |
| Oman | | 2 (1.1) | ~ ~ | 2 (0.7) | ~ ~ | 6 (1.9) | 404 (11.4) | 90 (2.3) | 408 (3.1) |
| Portugal | | 2 (1.1) | ~ ~ | 2 (1.2) | ~ ~ | 4 (1.7) | 473 (17.6) | 93 (2.4) | 500 (3.3) |
| Qatar | | 6 (1.9) | 480 (27.6) | 7 (1.5) | 445 (15.2) | 22 (3.4) | 424 (12.2) | 65 (3.4) | 446 (4.5) |
| Romania | r | 1 (0.7) | ~ ~ | 3 (1.2) | 557 (42.3) | 21 (3.4) | 490 (10.1) | 75 (3.3) | 478 (5.1) |
| Russian Federation | | 1 (0.8) | ~ ~ | 6 (1.8) | 563 (11.8) | 16 (3.1) | 548 (9.1) | 77 (3.5) | 541 (5.5) |
| Saudi Arabia | | 8 (2.3) | 413 (9.0) | 11 (2.2) | 408 (7.3) | 6 (2.0) | 374 (11.1) | 75 (3.4) | 390 (2.9) |
| Singapore | | 0 (0.0) | ~ ~ | 7 (1.0) | 604 (18.3) | 21 (2.3) | 616 (9.9) | 72 (2.3) | 617 (4.7) |
| South Africa (9) | | 1 (0.4) | ~ ~ | 2 (0.5) | ~ ~ | 2 (0.5) | ~ ~ | 96 (0.8) | 388 (2.6) |
| Sweden | | 7 (2.4) | 481 (10.2) | 17 (3.0) | 507 (6.7) | 43 (4.2) | 507 (4.8) | 33 (3.8) | 503 (4.2) |
| Turkey | | 5 (1.8) | 522 (18.4) | 7 (2.0) | 496 (18.0) | 2 (1.2) | ~ ~ | 86 (2.8) | 493 (4.9) |
| United Arab Emirates | r | 23 (1.0) | 440 (5.6) | 25 (1.6) | 501 (4.8) | 7 (0.9) | 538 (7.4) | 45 (1.7) | 468 (4.3) |
| United States | | 19 (2.2) | 505 (9.0) | 30 (2.6) | 511 (6.5) | 17 (2.0) | 514 (8.0) | 33 (2.7) | 529 (8.7) |
| Georgia | x | 0 (0.4) | ~ ~ | 18 (4.5) | 486 (17.9) | 64 (5.6) | 463 (9.0) | 17 (3.6) | 450 (15.7) |
| **International Average** | | **5 (0.3)** | **505 (3.2)** | **10 (0.4)** | **505 (2.8)** | **16 (0.4)** | **497 (2.0)** | **68 (0.5)** | **487 (0.9)** |
| **Benchmarking Participants** | | | | | | | | | |
| Ontario, Canada | r | 12 (3.8) | 559 (23.1) | 26 (3.8) | 518 (6.2) | 20 (4.1) | 545 (7.2) | 42 (4.5) | 527 (5.4) |
| Quebec, Canada | | 2 (1.1) | ~ ~ | 10 (2.9) | 574 (13.7) | 12 (2.9) | 560 (9.8) | 76 (3.6) | 535 (4.6) |
| Moscow City, Russian Fed. | | 2 (1.3) | ~ ~ | 5 (1.9) | 582 (15.4) | 13 (2.7) | 584 (12.0) | 80 (3.5) | 573 (4.5) |
| Gauteng, RSA (9) | | 1 (0.7) | ~ ~ | 4 (1.6) | 467 (34.1) | 2 (1.3) | ~ ~ | 93 (2.2) | 417 (3.6) |
| Western Cape, RSA (9) | | 2 (1.0) | ~ ~ | 5 (2.9) | 409 (29.5) | 7 (2.2) | 459 (22.4) | 86 (2.9) | 438 (5.4) |
| Abu Dhabi, UAE | r | 41 (2.0) | 399 (7.9) | 14 (1.8) | 460 (11.9) | 4 (1.1) | 483 (10.2) | 42 (1.9) | 456 (4.6) |
| Dubai, UAE | | 17 (1.8) | 533 (9.8) | 42 (2.7) | 550 (4.7) | 15 (1.7) | 562 (6.9) | 26 (2.3) | 507 (6.8) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 14.8: Teachers Do Computer Activities to Support Learning in Science Lessons

*Students' Results based on Teachers' Reports*

| Country | | Every or Almost Every Day | | Once or Twice a Week | | Once or Twice a Month | | Never or Almost Never | |
|---|---|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | r | 30 (2.9) | 547 (6.1) | 40 (2.9) | 540 (4.9) | 17 (2.7) | 511 (9.4) | 14 (1.6) | 507 (10.9) |
| Bahrain | | 17 (2.3) | 479 (6.9) | 11 (1.9) | 455 (7.4) | 12 (2.5) | 503 (14.6) | 60 (2.6) | 489 (3.5) |
| Chile | | 1 (0.4) | ~ ~ | 6 (1.9) | 448 (16.7) | 42 (3.8) | 466 (4.9) | 51 (3.9) | 462 (4.6) |
| Chinese Taipei | | 12 (2.2) | 565 (7.8) | 13 (2.2) | 579 (6.1) | 20 (3.2) | 576 (4.4) | 55 (3.6) | 574 (3.2) |
| Cyprus | s | 2 (0.4) | ~ ~ | 1 (0.3) | ~ ~ | 4 (0.8) | 505 (10.9) | 93 (1.0) | 486 (2.5) |
| Egypt | | 3 (1.3) | 363 (17.9) | 20 (3.4) | 409 (13.4) | 30 (3.7) | 397 (11.3) | 47 (3.7) | 380 (7.3) |
| England | s | 3 (2.3) | 560 (16.9) | 3 (2.0) | 532 (52.2) | 18 (4.7) | 515 (24.8) | 75 (4.0) | 523 (7.8) |
| Finland | | 11 (1.7) | 545 (7.6) | 15 (1.6) | 539 (6.9) | 45 (2.5) | 542 (3.8) | 29 (2.1) | 545 (4.0) |
| France | r | 1 (0.5) | ~ ~ | 2 (1.0) | ~ ~ | 17 (2.6) | 489 (5.6) | 80 (3.0) | 488 (3.2) |
| Georgia | s | 4 (1.2) | 477 (11.2) | 17 (2.1) | 450 (8.7) | 62 (3.1) | 441 (4.8) | 16 (2.3) | 440 (6.8) |
| Hong Kong SAR | | 9 (2.1) | 536 (12.8) | 11 (3.1) | 477 (23.4) | 31 (4.2) | 519 (12.9) | 49 (4.1) | 497 (8.3) |
| Hungary | | 9 (1.5) | 528 (7.9) | 12 (1.5) | 531 (5.6) | 18 (1.7) | 528 (5.3) | 61 (2.5) | 529 (3.7) |
| Iran, Islamic Rep. of | | 6 (2.0) | 474 (12.0) | 10 (2.3) | 483 (14.3) | 33 (3.6) | 460 (6.7) | 51 (3.7) | 433 (5.6) |
| Ireland | | 5 (1.3) | 529 (8.9) | 10 (2.1) | 525 (10.5) | 20 (2.6) | 528 (4.9) | 65 (3.4) | 528 (3.7) |
| Israel | | 4 (1.6) | 498 (30.2) | 18 (2.8) | 490 (9.9) | 33 (3.7) | 524 (7.2) | 45 (4.2) | 518 (6.4) |
| Italy | | 7 (2.2) | 497 (11.3) | 8 (1.8) | 481 (12.9) | 17 (2.9) | 495 (5.8) | 68 (3.7) | 506 (3.1) |
| Japan | | 10 (2.5) | 565 (4.4) | 8 (2.0) | 570 (5.4) | 21 (3.6) | 565 (5.4) | 61 (4.2) | 572 (3.1) |
| Jordan | | 3 (1.2) | 521 (24.6) | 14 (2.5) | 471 (9.9) | 32 (3.1) | 464 (6.9) | 51 (3.4) | 435 (7.4) |
| Kazakhstan | | 8 (1.5) | 481 (9.1) | 33 (2.4) | 467 (6.0) | 20 (2.2) | 490 (6.3) | 39 (2.9) | 480 (5.2) |
| Korea, Rep. of | | 12 (2.5) | 570 (8.0) | 10 (2.1) | 564 (8.1) | 16 (2.5) | 550 (4.5) | 62 (3.8) | 561 (2.3) |
| Kuwait | | 23 (3.4) | 453 (10.1) | 16 (4.5) | 453 (14.1) | 8 (2.5) | 479 (16.6) | 53 (4.6) | 432 (6.9) |
| Lebanon | | 2 (1.3) | ~ ~ | 5 (1.4) | 389 (29.9) | 11 (2.0) | 417 (14.4) | 83 (2.6) | 369 (5.1) |
| Lithuania | | 6 (1.1) | 535 (8.7) | 6 (0.9) | 525 (8.6) | 30 (2.2) | 526 (3.6) | 58 (2.2) | 537 (2.9) |
| Malaysia | | 2 (0.9) | ~ ~ | 4 (1.7) | 409 (22.1) | 12 (2.6) | 457 (12.2) | 82 (3.2) | 462 (4.3) |
| Morocco | | 5 (1.1) | 416 (13.6) | 4 (1.2) | 411 (15.2) | 5 (1.1) | 400 (14.7) | 86 (1.9) | 391 (3.2) |
| New Zealand | | 26 (3.3) | 516 (7.4) | 41 (3.8) | 505 (5.5) | 20 (3.5) | 492 (12.8) | 13 (3.0) | 475 (18.4) |
| Norway (9) | s | 12 (3.3) | 493 (9.6) | 28 (4.3) | 499 (5.5) | 41 (4.2) | 497 (5.5) | 19 (3.6) | 499 (6.4) |
| Oman | | 3 (1.1) | 496 (25.9) | 8 (1.5) | 468 (14.8) | 6 (1.8) | 471 (11.3) | 84 (2.2) | 453 (3.2) |
| Portugal | | 3 (1.1) | 530 (11.9) | 3 (1.1) | 530 (11.5) | 8 (1.9) | 541 (7.3) | 86 (2.8) | 517 (2.8) |
| Qatar | | 13 (2.8) | 508 (15.0) | 11 (2.2) | 454 (10.0) | 23 (2.9) | 471 (7.9) | 53 (4.2) | 473 (7.3) |
| Romania | | 3 (0.6) | 483 (10.8) | 8 (1.4) | 501 (11.2) | 32 (3.4) | 477 (6.2) | 57 (3.4) | 470 (5.1) |
| Russian Federation | | 1 (0.3) | ~ ~ | 10 (1.3) | 544 (6.4) | 27 (2.2) | 548 (4.6) | 63 (2.6) | 540 (5.3) |
| Saudi Arabia | | 11 (2.6) | 460 (9.6) | 12 (2.6) | 428 (12.2) | 5 (1.8) | 428 (12.8) | 71 (3.8) | 428 (3.4) |
| Singapore | | 3 (0.7) | 618 (16.7) | 7 (1.1) | 618 (14.8) | 32 (2.2) | 606 (7.7) | 58 (2.1) | 606 (5.1) |
| South Africa (9) | | 1 (0.5) | ~ ~ | 1 (0.4) | ~ ~ | 4 (1.1) | 418 (28.1) | 94 (1.2) | 366 (3.3) |
| Sweden | | 29 (3.2) | 517 (5.8) | 28 (3.2) | 517 (5.5) | 30 (3.2) | 527 (5.8) | 13 (2.5) | 525 (11.9) |
| Turkey | | 9 (2.5) | 544 (17.7) | 7 (2.1) | 523 (18.2) | 1 (0.7) | ~ ~ | 82 (3.2) | 511 (4.8) |
| United Arab Emirates | r | 28 (1.0) | 460 (5.2) | 24 (1.3) | 493 (6.7) | 7 (1.1) | 537 (10.4) | 41 (1.4) | 463 (4.2) |
| United States | r | 25 (2.7) | 526 (7.2) | 41 (3.2) | 530 (6.3) | 14 (1.8) | 539 (10.5) | 20 (2.4) | 509 (13.8) |
| **International Average** | | **9 (0.3)** | **509 (2.4)** | **13 (0.4)** | **495 (2.5)** | **21 (0.4)** | **497 (1.7)** | **56 (0.5)** | **487 (1.0)** |
| **Benchmarking Participants** | | | | | | | | | |
| Ontario, Canada | s | 17 (4.7) | 543 (15.5) | 33 (4.7) | 511 (8.1) | 32 (5.3) | 521 (6.0) | 18 (4.4) | 519 (6.5) |
| Moscow City, Russian Fed. | | 2 (0.7) | ~ ~ | 6 (1.3) | 563 (6.8) | 19 (1.9) | 574 (5.1) | 73 (2.2) | 565 (3.1) |
| Gauteng, RSA (9) | | 2 (1.2) | ~ ~ | 0 (0.5) | ~ ~ | 3 (1.1) | 537 (37.1) | 94 (1.7) | 417 (4.6) |
| Western Cape, RSA (9) | | 1 (0.9) | ~ ~ | 6 (2.0) | 514 (37.7) | 8 (2.3) | 475 (30.6) | 84 (3.1) | 430 (6.2) |
| Abu Dhabi, UAE | r | 38 (2.2) | 371 (8.0) | 18 (1.8) | 422 (13.5) | 5 (1.1) | 501 (19.9) | 39 (2.5) | 451 (7.7) |
| Dubai, UAE | r | 32 (1.5) | 585 (4.1) | 37 (2.2) | 547 (4.8) | 11 (1.2) | 565 (4.5) | 19 (1.4) | 497 (7.9) |
| Quebec, Canada | y | - - | - - | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Tests Delivered on Digital Devices

Exhibits 14.9, 14.10, 14.11, and 14.12 present teachers' reports on the frequency with which students take mathematics and science tests on computers or tablets. On average, 61 to 69 percent of fourth and eighth grade students "never" take mathematics and science tests on computers or tablets according to their teachers, 14 to 21 percent do so "once or twice a year," and 17 to 20 percent do so "once a month or more." At the fourth grade, taking tests on digital devices was slightly less common in science compared to mathematics, with 69 percent of students "never" taking them and just 14 percent taking them "once a month or more," compared to 64 percent and 18 percent in mathematics, respectively. There is tremendous variation across countries, however, with a number of countries at both grades having 90 percent or more of students "never" taking mathematics and science tests on digital devices, and some countries having about half or more of students doing so "once a month or more."

The relationship between the frequency of taking tests on digital devices and average achievement varied across grades and subjects. At the eighth grade (Exhibits 14.11 and 14.12), although taking mathematics tests on computers "once a month or more" was associated with lower average achievement than "once or twice a year" and "never" (482 vs. 494 and 491, respectively), average achievement was similar across the three categories for taking science tests (492, 496, and 491, respectively). Average achievement was also similar across the three categories at the fourth grade (Exhibits 14.9 and 14.10), for both mathematics tests (502, 504, and 501, respectively) and science tests (489, 491, and 491, respectively).

## Exhibit 14.9: Students Take Mathematics Tests on Computers or Tablets

*Students' Results based on Teachers' Reports*

| Country | Once a Month or More | | Once or Twice a Year | | Never | |
|---|---|---|---|---|---|---|
| | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | 6 (2.1) | 515 (12.1) | 11 (2.5) | 513 (10.8) | 83 (3.3) | 490 (3.6) |
| Armenia | 16 (2.8) | 501 (7.3) | 16 (3.2) | 500 (6.3) | 68 (3.5) | 498 (3.3) |
| Australia | 21 (2.6) | 528 (8.0) | 56 (4.0) | 521 (4.2) | 23 (3.0) | 503 (7.2) |
| Austria | 4 (1.4) | 553 (16.3) | 2 (0.8) | ~ ~ | 94 (1.7) | 539 (2.0) |
| Azerbaijan | 28 (3.5) | 513 (4.3) | 6 (1.8) | 509 (9.0) | 66 (3.8) | 518 (3.5) |
| Bahrain | 10 (2.0) | 500 (5.8) | 28 (2.9) | 484 (5.2) | 63 (3.2) | 476 (3.2) |
| Belgium (Flemish) | 4 (1.2) | 532 (9.3) | 11 (2.6) | 543 (4.9) | 85 (2.9) | 532 (2.2) |
| Bosnia and Herzegovina | 5 (1.5) | 464 (12.0) | 4 (1.6) | 480 (8.0) | 91 (2.0) | 450 (2.5) |
| Bulgaria | 16 (3.0) | 517 (9.2) | 9 (2.5) | 512 (12.0) | 75 (3.3) | 515 (5.7) |
| Canada | 13 (1.5) | 500 (7.5) | 9 (1.1) | 508 (7.2) | 79 (1.9) | 515 (2.3) |
| Chile | 11 (2.7) | 437 (8.5) | 22 (3.5) | 426 (7.0) | 67 (4.0) | 446 (3.5) |
| Chinese Taipei | 13 (2.6) | 599 (5.0) | 11 (2.1) | 589 (9.8) | 75 (3.0) | 601 (2.1) |
| Croatia | 7 (1.9) | 498 (9.7) | 5 (1.4) | 506 (6.3) | 88 (2.4) | 510 (2.4) |
| Cyprus | 13 (2.6) | 530 (7.2) | 8 (1.8) | 548 (8.8) | 78 (3.0) | 533 (2.9) |
| Czech Republic | 17 (2.7) | 529 (7.2) | 26 (3.3) | 542 (4.4) | 57 (3.9) | 529 (3.7) |
| Denmark r | 18 (3.2) | 524 (5.8) | 64 (4.4) | 526 (2.7) | 18 (3.4) | 518 (6.2) |
| Finland | 14 (2.2) | 538 (5.5) | 26 (3.1) | 531 (4.4) | 60 (3.3) | 531 (2.5) |
| France | 2 (0.9) | ~ ~ | 4 (1.2) | 483 (11.3) | 94 (1.5) | 486 (3.3) |
| Georgia | 55 (3.7) | 475 (5.5) | 19 (2.8) | 489 (5.9) | 26 (3.5) | 491 (7.4) |
| Germany | 8 (2.2) | 522 (11.1) | 4 (1.4) | 506 (11.4) | 88 (2.5) | 521 (2.4) |
| Hong Kong SAR | 30 (4.5) | 601 (6.1) | 25 (3.6) | 593 (5.9) | 45 (4.9) | 607 (6.4) |
| Hungary | 3 (1.1) | 530 (7.1) | 20 (3.2) | 517 (7.3) | 78 (3.3) | 526 (3.8) |
| Iran, Islamic Rep. of | 14 (2.0) | 446 (9.8) | 10 (2.4) | 447 (14.2) | 76 (2.8) | 442 (5.0) |
| Ireland | 8 (2.5) | 554 (6.6) | 10 (2.8) | 546 (12.9) | 82 (3.5) | 548 (2.5) |
| Italy | 21 (3.1) | 516 (4.6) | 18 (3.2) | 506 (6.3) | 61 (3.6) | 517 (3.0) |
| Japan | 3 (1.1) | 586 (14.8) | 5 (1.9) | 589 (7.5) | 92 (2.2) | 593 (1.9) |
| Kazakhstan | 48 (4.1) | 510 (4.2) | 15 (2.7) | 497 (6.9) | 37 (3.9) | 520 (5.7) |
| Korea, Rep. of | 2 (0.9) | ~ ~ | 6 (1.8) | 592 (11.3) | 93 (2.1) | 600 (2.4) |
| Kosovo | 19 (3.1) | 444 (7.9) | 12 (3.0) | 437 (10.3) | 69 (3.8) | 445 (3.7) |
| Kuwait | 25 (3.4) | 379 (9.0) | 13 (2.6) | 385 (12.4) | 62 (3.8) | 385 (7.6) |
| Latvia | 22 (3.2) | 551 (6.0) | 30 (3.7) | 540 (5.5) | 47 (3.5) | 549 (3.5) |
| Lithuania | 19 (2.8) | 537 (8.3) | 29 (3.3) | 535 (5.5) | 52 (3.7) | 546 (4.3) |
| Malta | 50 (0.4) | 505 (1.9) | 21 (0.3) | 497 (2.7) | 30 (0.4) | 525 (2.5) |
| Montenegro | 5 (0.6) | 446 (9.2) | 6 (1.1) | 464 (4.9) | 90 (1.2) | 452 (2.1) |
| Morocco | 3 (1.4) | 419 (41.7) | 1 (0.8) | ~ ~ | 96 (1.6) | 381 (4.4) |
| Netherlands r | 30 (4.8) | 539 (3.4) | 2 (1.3) | ~ ~ | 68 (4.8) | 535 (3.3) |
| New Zealand | 14 (2.4) | 496 (9.4) | 45 (4.0) | 494 (5.6) | 41 (4.0) | 478 (6.1) |
| North Macedonia | 22 (3.4) | 465 (9.6) | 23 (3.6) | 451 (13.0) | 55 (4.3) | 483 (6.9) |
| Northern Ireland | 8 (2.4) | 567 (8.0) | 70 (3.9) | 564 (3.7) | 23 (3.6) | 568 (6.3) |
| Norway (5) r | 8 (1.7) | 534 (11.1) | 74 (3.7) | 546 (2.6) | 18 (3.5) | 540 (8.0) |
| Oman | 8 (2.0) | 447 (20.5) | 17 (2.6) | 444 (12.3) | 74 (2.9) | 425 (3.7) |
| Pakistan | 24 (4.9) | 306 (18.0) | 5 (3.1) | 277 (12.5) | 71 (5.8) | 340 (15.5) |
| Philippines | 15 (2.8) | 314 (13.8) | 6 (2.0) | 294 (21.1) | 79 (2.9) | 293 (7.9) |
| Poland | 9 (2.0) | 510 (8.7) | 20 (3.0) | 518 (6.6) | 71 (3.6) | 522 (3.1) |
| Portugal | 6 (1.5) | 539 (7.9) | 3 (0.9) | 527 (11.4) | 91 (1.8) | 525 (2.8) |
| Qatar | 43 (4.2) | 427 (5.1) | 19 (3.2) | 464 (10.7) | 38 (3.5) | 469 (6.7) |
| Russian Federation | 35 (3.7) | 569 (5.4) | 25 (3.0) | 561 (4.7) | 40 (4.1) | 569 (5.5) |
| Saudi Arabia | 38 (3.3) | 421 (7.1) | 9 (2.1) | 394 (15.4) | 53 (3.5) | 381 (6.6) |
| Serbia | 6 (1.9) | 515 (13.5) | 5 (1.9) | 508 (10.0) | 89 (2.1) | 507 (3.4) |
| Singapore | 14 (1.5) | 625 (8.7) | 31 (2.5) | 626 (6.5) | 54 (2.4) | 625 (5.5) |
| Slovak Republic | 15 (2.0) | 515 (9.6) | 27 (2.8) | 510 (5.7) | 58 (2.9) | 508 (4.2) |
| South Africa (5) | 10 (1.9) | 372 (14.3) | 2 (0.8) | ~ ~ | 88 (2.0) | 373 (4.2) |
| Spain | 12 (2.4) | 498 (8.2) | 10 (1.7) | 512 (6.5) | 78 (2.8) | 501 (2.7) |
| Sweden | 20 (3.5) | 521 (5.5) | 9 (2.3) | 517 (7.2) | 71 (4.2) | 522 (4.0) |
| Turkey (5) | 4 (1.7) | 572 (11.9) | 4 (1.7) | 547 (14.9) | 92 (2.1) | 520 (4.8) |
| United Arab Emirates r | 45 (1.9) | 499 (2.6) | 35 (2.1) | 474 (3.4) | 20 (1.6) | 456 (5.5) |
| United States | 50 (2.7) | 530 (3.5) | 38 (2.8) | 539 (3.9) | 12 (1.6) | 549 (9.0) |
| England x | 11 (3.9) | 545 (5.5) | 27 (5.2) | 564 (11.5) | 62 (5.6) | 559 (6.1) |
| **International Average** | **17 (0.4)** | **502 (1.4)** | **18 (0.4)** | **504 (1.2)** | **64 (0.4)** | **501 (0.7)** |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada r | 14 (2.9) | 494 (10.4) | 8 (1.6) | 521 (11.9) | 78 (3.3) | 514 (4.2) |
| Quebec, Canada | 10 (2.6) | 533 (5.8) | 5 (2.1) | 527 (9.1) | 85 (3.2) | 533 (2.4) |
| Moscow City, Russian Fed. | 49 (4.2) | 594 (3.1) | 29 (4.1) | 594 (4.3) | 22 (3.2) | 589 (4.3) |
| Madrid, Spain | 13 (3.1) | 519 (5.9) | 5 (2.6) | 527 (7.4) | 82 (3.9) | 517 (2.6) |
| Abu Dhabi, UAE r | 38 (2.7) | 461 (4.9) | 40 (2.7) | 429 (4.7) | 23 (2.4) | 436 (10.3) |
| Dubai, UAE r | 67 (1.6) | 547 (2.8) | 30 (1.7) | 548 (3.1) | 4 (0.9) | 532 (12.6) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit 14.10: Students Take Science Tests on Computers or Tablets

*Students' Results based on Teachers' Reports*

| Country | | Once a Month or More | | Once or Twice a Year | | Never | |
|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Albania | | 3 (1.6) | 503 (9.6) | 12 (2.6) | 512 (10.6) | 85 (3.0) | 486 (4.0) |
| Armenia | | 16 (2.9) | 483 (8.6) | 17 (3.0) | 461 (7.0) | 67 (3.8) | 464 (4.3) |
| Australia | | 7 (2.3) | 545 (12.5) | 21 (3.0) | 540 (6.9) | 73 (3.8) | 531 (3.1) |
| Austria | | 4 (1.3) | 524 (13.3) | 3 (0.8) | 530 (11.7) | 93 (1.6) | 522 (2.8) |
| Azerbaijan | | 31 (3.0) | 424 (5.4) | 7 (2.0) | 408 (15.7) | 62 (3.6) | 432 (4.4) |
| Bahrain | | 18 (2.0) | 494 (8.2) | 25 (2.5) | 493 (7.2) | 58 (2.7) | 490 (4.4) |
| Belgium (Flemish) | | 11 (2.4) | 501 (6.1) | 12 (2.6) | 512 (5.1) | 77 (3.3) | 500 (2.5) |
| Bosnia and Herzegovina | | 5 (1.2) | 450 (12.4) | 6 (1.7) | 485 (6.8) | 89 (2.1) | 457 (3.1) |
| Bulgaria | | 27 (3.3) | 535 (8.0) | 11 (2.7) | 513 (15.7) | 62 (3.7) | 516 (7.7) |
| Canada | r | 11 (1.5) | 520 (4.3) | 10 (1.5) | 536 (5.3) | 79 (2.1) | 524 (2.3) |
| Chile | r | 13 (3.2) | 469 (6.5) | 19 (3.6) | 462 (8.5) | 69 (4.1) | 469 (3.8) |
| Chinese Taipei | | 17 (2.8) | 555 (3.6) | 11 (2.4) | 560 (7.0) | 72 (3.6) | 558 (2.2) |
| Croatia | | 14 (2.8) | 518 (6.1) | 5 (1.3) | 520 (6.9) | 81 (3.2) | 525 (2.3) |
| Cyprus | | 10 (2.9) | 520 (11.0) | 13 (2.7) | 494 (7.3) | 77 (3.6) | 514 (3.3) |
| Czech Republic | | 10 (2.2) | 531 (7.6) | 19 (2.6) | 536 (5.8) | 71 (3.1) | 533 (2.9) |
| Denmark | r | 11 (2.7) | 521 (7.8) | 25 (3.7) | 518 (5.7) | 64 (4.3) | 523 (3.2) |
| Finland | | 21 (2.4) | 550 (5.8) | 35 (3.3) | 560 (3.0) | 45 (3.3) | 553 (3.2) |
| France | | 1 (0.5) | ~ ~ | 5 (2.1) | 478 (14.9) | 94 (2.1) | 489 (3.2) |
| Georgia | | 56 (3.9) | 453 (6.0) | 21 (3.4) | 451 (6.8) | 23 (2.9) | 463 (7.3) |
| Germany | | 6 (1.9) | 518 (7.2) | 9 (2.3) | 530 (8.1) | 86 (2.7) | 517 (2.6) |
| Hong Kong SAR | | 31 (4.2) | 529 (6.2) | 26 (3.1) | 527 (5.7) | 43 (4.7) | 538 (5.3) |
| Hungary | | 3 (1.3) | 483 (27.1) | 17 (2.8) | 507 (6.1) | 80 (2.9) | 534 (3.3) |
| Iran, Islamic Rep. of | | 18 (2.7) | 452 (8.1) | 9 (2.3) | 448 (14.6) | 73 (3.4) | 437 (5.3) |
| Ireland | | 2 (0.9) | ~ ~ | 5 (1.6) | 521 (19.1) | 93 (1.8) | 528 (2.8) |
| Italy | | 25 (3.0) | 506 (5.3) | 19 (3.2) | 510 (4.8) | 56 (3.5) | 511 (3.9) |
| Japan | | 3 (1.5) | 576 (13.8) | 2 (1.2) | ~ ~ | 94 (1.9) | 561 (1.8) |
| Kazakhstan | | 58 (4.1) | 490 (4.3) | 10 (2.5) | 488 (9.9) | 32 (3.7) | 501 (6.9) |
| Korea, Rep. of | | 9 (2.3) | 584 (8.2) | 9 (2.3) | 585 (7.3) | 82 (3.2) | 588 (2.1) |
| Kosovo | | 16 (2.8) | 411 (9.7) | 13 (2.8) | 407 (10.3) | 71 (3.6) | 413 (4.5) |
| Kuwait | | 34 (3.9) | 385 (12.2) | 17 (3.4) | 414 (11.5) | 49 (4.0) | 387 (9.1) |
| Latvia | | 10 (2.4) | 531 (8.6) | 35 (3.4) | 538 (5.6) | 55 (3.2) | 546 (2.8) |
| Lithuania | | 23 (2.6) | 527 (7.1) | 27 (3.6) | 537 (5.9) | 50 (3.4) | 542 (4.1) |
| Malta | | 22 (0.3) | 480 (2.8) | 24 (0.4) | 488 (2.3) | 54 (0.4) | 505 (1.8) |
| Montenegro | | 9 (1.6) | 450 (8.4) | 4 (0.2) | 460 (12.7) | 88 (1.6) | 452 (2.7) |
| Morocco | | 2 (1.0) | ~ ~ | 2 (1.3) | ~ ~ | 96 (1.7) | 373 (5.5) |
| Netherlands | r | 16 (4.5) | 516 (5.6) | 4 (1.7) | 483 (15.6) | 80 (4.7) | 520 (3.5) |
| New Zealand | | 2 (0.8) | ~ ~ | 14 (2.5) | 504 (7.7) | 85 (2.6) | 503 (2.8) |
| North Macedonia | | 28 (3.8) | 422 (11.3) | 20 (3.9) | 410 (14.7) | 52 (4.8) | 435 (7.7) |
| Northern Ireland | | 0 (0.0) | ~ ~ | 1 (0.8) | ~ ~ | 99 (0.8) | 519 (2.5) |
| Norway (5) | s | 9 (2.9) | 528 (12.7) | 27 (3.7) | 535 (5.5) | 64 (4.4) | 543 (3.3) |
| Oman | | 7 (1.8) | 430 (12.5) | 15 (2.3) | 462 (17.3) | 78 (2.8) | 431 (4.3) |
| Pakistan | r | 21 (8.1) | 256 (29.3) | 3 (1.9) | 234 (28.7) | 76 (8.2) | 306 (17.2) |
| Philippines | | 20 (2.8) | 244 (14.1) | 8 (2.4) | 217 (17.2) | 71 (3.2) | 253 (10.1) |
| Poland | | 5 (1.5) | 556 (8.7) | 20 (3.4) | 524 (5.4) | 76 (3.7) | 532 (3.0) |
| Portugal | | 5 (1.4) | 518 (7.4) | 4 (1.1) | 497 (8.0) | 91 (1.8) | 504 (2.7) |
| Qatar | | 45 (3.3) | 428 (5.2) | 11 (2.5) | 443 (11.6) | 44 (3.0) | 474 (8.0) |
| Russian Federation | | 34 (3.3) | 566 (4.6) | 26 (3.5) | 572 (5.0) | 40 (4.4) | 566 (4.9) |
| Saudi Arabia | | 37 (3.4) | 418 (6.6) | 9 (2.0) | 394 (14.1) | 54 (3.5) | 394 (6.7) |
| Serbia | | 15 (2.5) | 518 (8.2) | 8 (2.4) | 521 (7.3) | 78 (3.2) | 516 (3.8) |
| Singapore | | 9 (1.3) | 573 (12.0) | 27 (2.1) | 597 (5.6) | 64 (2.3) | 596 (4.5) |
| Slovak Republic | | 17 (2.6) | 514 (7.8) | 24 (2.8) | 530 (5.4) | 60 (3.4) | 519 (5.1) |
| South Africa (5) | | 8 (1.8) | 345 (30.2) | 0 (0.2) | ~ ~ | 92 (1.8) | 324 (5.6) |
| Spain | | 19 (3.0) | 503 (7.8) | 9 (1.8) | 510 (6.0) | 73 (3.2) | 513 (2.5) |
| Sweden | | 19 (3.7) | 535 (7.3) | 19 (3.8) | 535 (7.1) | 63 (4.3) | 542 (4.1) |
| Turkey (5) | | 6 (2.0) | 498 (18.4) | 4 (1.5) | 538 (23.6) | 90 (2.6) | 528 (4.8) |
| United Arab Emirates | r | 43 (2.1) | 500 (3.8) | 34 (1.8) | 468 (4.5) | 24 (2.3) | 434 (5.0) |
| United States | | 22 (1.8) | 540 (4.9) | 18 (1.9) | 546 (4.4) | 61 (2.2) | 536 (3.8) |
| England | y | - - | - - | - - | - - | - - | - - |
| **International Average** | | **17 (0.4)** | **489 (1.5)** | **14 (0.3)** | **491 (1.5)** | **69 (0.4)** | **491 (0.7)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | r | 8 (2.0) | 520 (7.5) | 9 (2.5) | 537 (11.6) | 83 (3.2) | 527 (4.2) |
| Quebec, Canada | r | 14 (2.9) | 516 (6.2) | 7 (2.0) | 523 (8.1) | 79 (3.5) | 524 (2.8) |
| Moscow City, Russian Fed. | | 45 (4.0) | 594 (3.6) | 29 (3.6) | 598 (3.0) | 25 (3.7) | 590 (3.7) |
| Madrid, Spain | | 14 (3.3) | 532 (3.3) | 7 (2.0) | 530 (4.5) | 78 (3.6) | 520 (2.4) |
| Abu Dhabi, UAE | r | 37 (2.5) | 451 (7.1) | 34 (2.5) | 402 (9.2) | 29 (2.4) | 391 (7.8) |
| Dubai, UAE | r | 60 (2.4) | 553 (3.4) | 32 (2.4) | 547 (3.8) | 7 (1.1) | 518 (7.8) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 14.11: Students Take Mathematics Tests on Computers or Tablets

*Students' Results based on Teachers' Reports*

| Country | | Once a Month or More | | Once or Twice a Year | | Never | |
|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | | 25 (3.0) | 515 (8.6) | 32 (2.8) | 518 (5.8) | 43 (3.1) | 522 (6.8) |
| Bahrain | | 19 (2.4) | 489 (5.4) | 27 (2.7) | 478 (3.6) | 53 (2.4) | 481 (2.8) |
| Chile | | 11 (2.7) | 434 (9.4) | 29 (3.9) | 434 (6.3) | 60 (4.3) | 444 (4.7) |
| Chinese Taipei | | 7 (1.6) | 579 (10.2) | 25 (3.3) | 607 (6.1) | 68 (3.6) | 617 (3.3) |
| Cyprus | s | 6 (2.3) | 531 (11.1) | 1 (0.6) | ~ ~ | 94 (2.2) | 503 (2.2) |
| Egypt | | 24 (3.7) | 438 (10.1) | 7 (2.2) | 404 (20.3) | 69 (3.6) | 406 (6.0) |
| England | s | 11 (3.9) | 501 (17.7) | 18 (3.9) | 521 (11.0) | 71 (5.4) | 523 (10.4) |
| Finland | | 15 (2.2) | 506 (6.1) | 31 (3.0) | 510 (4.4) | 55 (3.2) | 509 (3.3) |
| France | r | 22 (3.8) | 479 (4.8) | 47 (4.3) | 481 (4.3) | 30 (4.4) | 487 (6.3) |
| Georgia | | 29 (3.3) | 479 (8.9) | 27 (3.4) | 449 (7.1) | 44 (3.8) | 460 (6.9) |
| Hong Kong SAR | | 11 (2.6) | 551 (17.3) | 24 (4.0) | 576 (12.5) | 65 (4.3) | 582 (6.4) |
| Hungary | | 11 (2.1) | 518 (12.2) | 21 (3.1) | 497 (10.3) | 67 (3.4) | 520 (4.6) |
| Iran, Islamic Rep. of | | 7 (2.1) | 454 (21.2) | 18 (2.9) | 453 (13.4) | 75 (3.2) | 444 (4.0) |
| Ireland | | 7 (1.5) | 511 (9.4) | 9 (1.7) | 531 (5.4) | 84 (2.3) | 525 (3.0) |
| Israel | | 15 (2.1) | 479 (13.7) | 14 (2.3) | 523 (15.9) | 70 (3.1) | 527 (5.5) |
| Italy | | 23 (3.3) | 486 (6.2) | 28 (2.8) | 496 (4.9) | 49 (3.8) | 504 (3.6) |
| Japan | | 2 (0.9) | ~ ~ | 1 (0.8) | ~ ~ | 97 (1.2) | 595 (2.8) |
| Jordan | | 10 (2.5) | 401 (17.9) | 20 (3.6) | 426 (11.9) | 70 (4.0) | 420 (4.8) |
| Kazakhstan | | 71 (3.9) | 482 (4.5) | 9 (2.2) | 517 (12.9) | 20 (3.4) | 480 (9.5) |
| Korea, Rep. of | | 1 (0.7) | ~ ~ | 5 (1.5) | 605 (13.3) | 94 (1.7) | 607 (3.0) |
| Kuwait | | 25 (3.4) | 405 (8.8) | 27 (3.7) | 407 (8.1) | 47 (3.8) | 399 (7.7) |
| Lebanon | | 11 (2.3) | 431 (15.0) | 13 (2.9) | 425 (10.6) | 76 (3.4) | 429 (3.7) |
| Lithuania | | 23 (4.1) | 525 (9.7) | 43 (4.4) | 517 (4.8) | 35 (4.2) | 524 (5.5) |
| Malaysia | | 24 (3.1) | 466 (7.9) | 39 (3.4) | 453 (6.0) | 38 (3.3) | 465 (7.4) |
| Morocco | | 2 (1.0) | ~ ~ | 2 (0.9) | ~ ~ | 96 (1.2) | 387 (2.7) |
| New Zealand | | 25 (3.8) | 477 (6.2) | 43 (4.3) | 477 (6.9) | 32 (3.8) | 494 (6.0) |
| Norway (9) | s | 15 (3.3) | 517 (4.5) | 66 (4.3) | 504 (3.9) | 19 (3.6) | 500 (5.0) |
| Oman | | 9 (2.0) | 409 (11.9) | 10 (2.0) | 439 (10.3) | 82 (2.4) | 408 (3.1) |
| Portugal | | 2 (1.1) | ~ ~ | 4 (1.5) | 501 (18.2) | 95 (1.9) | 500 (3.3) |
| Qatar | | 39 (4.6) | 417 (7.2) | 19 (3.7) | 452 (13.3) | 42 (4.4) | 465 (9.5) |
| Romania | | 6 (1.9) | 500 (25.9) | 10 (2.5) | 477 (17.0) | 84 (3.3) | 477 (4.7) |
| Russian Federation | | 25 (2.7) | 551 (7.4) | 28 (3.8) | 557 (7.8) | 47 (3.6) | 531 (7.7) |
| Saudi Arabia | | 42 (3.9) | 400 (4.0) | 5 (1.7) | 403 (13.8) | 53 (3.9) | 391 (3.5) |
| Singapore | | 11 (1.6) | 595 (15.2) | 36 (2.7) | 617 (6.8) | 53 (2.6) | 620 (5.0) |
| South Africa (9) | | 8 (1.3) | 409 (10.5) | 2 (1.0) | ~ ~ | 90 (1.7) | 388 (2.5) |
| Sweden | | 13 (2.6) | 493 (7.9) | 13 (2.5) | 502 (5.6) | 74 (3.3) | 506 (3.1) |
| Turkey | | 2 (0.9) | ~ ~ | 4 (1.5) | 521 (42.8) | 95 (1.7) | 496 (5.1) |
| United Arab Emirates | r | 54 (1.8) | 462 (3.4) | 28 (1.9) | 495 (5.6) | 18 (1.8) | 481 (5.1) |
| United States | | 49 (2.6) | 502 (5.6) | 34 (2.4) | 529 (7.0) | 17 (2.2) | 533 (9.9) |
| **International Average** | | **18 (0.4)** | **482 (2.0)** | **21 (0.5)** | **494 (2.1)** | **61 (0.5)** | **491 (0.9)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | | 15 (3.4) | 528 (11.3) | 19 (4.2) | 545 (14.8) | 66 (5.0) | 530 (4.5) |
| Quebec, Canada | | 14 (3.0) | 560 (7.1) | 15 (3.6) | 559 (11.7) | 71 (4.3) | 536 (5.3) |
| Moscow City, Russian Fed. | | 19 (3.2) | 574 (9.2) | 35 (4.1) | 581 (6.3) | 46 (4.1) | 572 (6.7) |
| Gauteng, RSA (9) | | 14 (2.8) | 427 (10.2) | 2 (1.1) | ~ ~ | 84 (2.9) | 420 (3.6) |
| Western Cape, RSA (9) | | 3 (1.3) | 503 (37.0) | 4 (1.3) | 458 (24.4) | 93 (1.7) | 438 (5.1) |
| Abu Dhabi, UAE | r | 60 (2.6) | 426 (5.5) | 25 (2.4) | 445 (7.9) | 15 (1.8) | 451 (8.3) |
| Dubai, UAE | | 56 (1.7) | 525 (3.9) | 34 (2.0) | 553 (6.6) | 10 (1.9) | 554 (14.7) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Exhibit 14.12: Students Take Science Tests on Computers or Tablets

*Students' Results based on Teachers' Reports*

| Country | | Once a Month or More | | Once or Twice a Year | | Never | |
|---|---|---|---|---|---|---|---|
| | | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |
| Australia | r | 16 (2.8) | 539 (11.5) | 32 (3.0) | 534 (6.5) | 53 (3.3) | 530 (5.0) |
| Bahrain | | 29 (2.6) | 471 (4.6) | 31 (2.6) | 485 (4.8) | 41 (2.5) | 498 (4.7) |
| Chile | | 11 (2.5) | 452 (8.3) | 25 (3.0) | 473 (5.9) | 63 (3.3) | 461 (3.8) |
| Chinese Taipei | | 10 (2.0) | 555 (5.6) | 10 (2.4) | 571 (8.7) | 80 (3.0) | 577 (2.4) |
| Cyprus | s | 3 (0.7) | 483 (7.1) | 8 (0.6) | 502 (6.8) | 89 (0.9) | 485 (2.6) |
| Egypt | | 23 (3.8) | 402 (12.7) | 5 (2.1) | 437 (17.0) | 72 (4.1) | 384 (6.0) |
| England | s | 5 (2.6) | 546 (22.5) | 13 (3.5) | 487 (13.8) | 82 (4.3) | 527 (7.4) |
| Finland | | 24 (1.9) | 546 (5.1) | 41 (1.9) | 538 (3.4) | 35 (2.1) | 546 (4.1) |
| France | r | 10 (1.8) | 495 (6.5) | 35 (3.1) | 491 (4.2) | 55 (3.1) | 486 (3.7) |
| Georgia | | 34 (2.2) | 446 (5.4) | 30 (2.3) | 444 (4.5) | 37 (2.6) | 449 (4.9) |
| Hong Kong SAR | | 14 (2.8) | 486 (15.6) | 25 (4.2) | 510 (13.9) | 61 (4.8) | 506 (7.1) |
| Hungary | | 7 (1.1) | 514 (9.0) | 16 (1.8) | 528 (7.2) | 77 (2.0) | 531 (3.1) |
| Iran, Islamic Rep. of | | 18 (2.5) | 476 (12.2) | 13 (2.3) | 453 (10.5) | 69 (3.4) | 442 (3.7) |
| Ireland | | 10 (1.8) | 520 (5.8) | 12 (2.4) | 516 (8.4) | 78 (2.7) | 530 (3.0) |
| Israel | | 17 (2.8) | 500 (11.0) | 35 (3.4) | 521 (7.5) | 48 (2.9) | 513 (6.0) |
| Italy | | 16 (2.9) | 493 (7.6) | 18 (3.0) | 489 (7.7) | 66 (3.9) | 506 (2.7) |
| Japan | | 4 (1.5) | 568 (3.8) | 4 (1.7) | 564 (6.1) | 92 (2.3) | 570 (2.3) |
| Jordan | | 13 (2.4) | 462 (12.8) | 18 (2.9) | 464 (8.7) | 70 (3.7) | 447 (6.1) |
| Kazakhstan | | 81 (2.4) | 469 (3.8) | 6 (1.3) | 478 (6.3) | 13 (2.2) | 488 (8.1) |
| Korea, Rep. of | | 7 (1.6) | 552 (7.8) | 10 (1.9) | 558 (6.6) | 83 (2.3) | 562 (2.2) |
| Kuwait | | 38 (3.8) | 452 (7.4) | 24 (4.1) | 435 (10.1) | 38 (3.7) | 442 (9.4) |
| Lebanon | | 16 (2.1) | 379 (10.1) | 11 (2.0) | 381 (18.8) | 73 (2.5) | 376 (5.3) |
| Lithuania | | 21 (1.8) | 525 (4.3) | 46 (2.6) | 535 (3.6) | 33 (2.5) | 536 (3.5) |
| Malaysia | | 25 (2.8) | 463 (7.6) | 35 (3.4) | 453 (8.5) | 40 (3.8) | 464 (7.2) |
| Morocco | | 1 (0.5) | ~ ~ | 3 (1.1) | 417 (13.1) | 96 (1.2) | 393 (2.9) |
| New Zealand | | 22 (3.1) | 503 (7.1) | 28 (3.4) | 503 (7.5) | 50 (4.0) | 500 (7.0) |
| Norway (9) | s | 8 (2.5) | 499 (9.0) | 59 (5.3) | 498 (4.3) | 33 (5.0) | 496 (6.9) |
| Oman | | 7 (1.4) | 447 (18.4) | 7 (1.8) | 463 (13.2) | 87 (2.3) | 458 (3.1) |
| Portugal | | 3 (1.1) | 507 (13.2) | 5 (1.3) | 529 (9.1) | 92 (1.8) | 519 (2.8) |
| Qatar | | 46 (3.3) | 461 (5.8) | 12 (2.5) | 461 (15.5) | 41 (3.0) | 493 (7.6) |
| Romania | | 6 (1.3) | 469 (12.0) | 24 (3.1) | 481 (9.0) | 70 (2.9) | 468 (4.5) |
| Russian Federation | | 32 (1.9) | 546 (4.9) | 21 (2.3) | 542 (5.9) | 47 (2.7) | 541 (5.2) |
| Saudi Arabia | | 41 (4.0) | 439 (5.0) | 7 (2.0) | 419 (13.5) | 52 (4.1) | 428 (4.4) |
| Singapore | | 5 (1.1) | 596 (21.4) | 21 (2.2) | 601 (8.7) | 74 (2.4) | 610 (4.7) |
| South Africa (9) | | 7 (1.7) | 381 (19.1) | 2 (0.7) | ~ ~ | 90 (1.8) | 370 (3.5) |
| Sweden | | 26 (3.5) | 519 (6.5) | 22 (2.5) | 526 (6.1) | 52 (3.9) | 521 (5.6) |
| Turkey | | 5 (1.8) | 555 (28.1) | 6 (1.8) | 531 (24.7) | 90 (2.5) | 512 (4.0) |
| United Arab Emirates | r | 52 (1.7) | 469 (3.9) | 25 (1.7) | 478 (6.0) | 23 (1.5) | 486 (5.5) |
| United States | r | 52 (3.0) | 524 (4.8) | 18 (2.1) | 551 (8.3) | 30 (2.5) | 516 (11.1) |
| **International Average** | | **20 (0.4)** | **492 (1.8)** | **20 (0.4)** | **496 (1.6)** | **61 (0.5)** | **491 (0.9)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | s | 23 (4.8) | 514 (6.0) | 18 (4.1) | 504 (10.1) | 59 (5.2) | 530 (6.1) |
| Moscow City, Russian Fed. | | 27 (2.1) | 563 (4.1) | 22 (1.8) | 571 (4.5) | 51 (2.2) | 566 (3.3) |
| Gauteng, RSA (9) | | 4 (1.6) | 512 (23.7) | 4 (2.0) | 451 (57.9) | 93 (2.5) | 417 (4.7) |
| Western Cape, RSA (9) | | 7 (3.0) | 430 (34.0) | 7 (2.1) | 511 (34.7) | 86 (3.4) | 435 (6.2) |
| Abu Dhabi, UAE | r | 59 (2.3) | 399 (5.9) | 20 (1.8) | 419 (9.9) | 21 (1.8) | 469 (8.8) |
| Dubai, UAE | r | 55 (3.3) | 558 (4.2) | 29 (3.4) | 541 (7.2) | 16 (2.0) | 555 (8.2) |
| Quebec, Canada | y | - - | - - | - - | - - | - - | - - |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

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# APPENDIX A

# Country Participation in TIMSS 2019 and in Earlier TIMSS Assessments

# Appendix A.1: Country Participation in TIMSS 2019 and in Earlier TIMSS Assessments

| Country | Grade 4 | | | | | | Grade 8 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 |
| Albania | ● | | | | | | | | | | | | |
| Armenia | ● | ● | ● | ○ | ● | | | ● | ● | ○ | ● | | |
| Australia | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ○ | ● |
| Austria | ● | | ● | ● | | ● | | | | | | | ● |
| Azerbaijan | ● | | ● | | | | | | | | | | |
| Bahrain | ● | ● | ● | | | | ● | ● | ● | ● | ● | | |
| Belgium (Flemish) | ● | ● | ● | | ● | | | | | | ● | ● | ● |
| Bosnia and Herzegovina | ● | | | | | | | | | ● | | | |
| Bulgaria | ● | ● | | | | | | | | ● | ● | ● | ● |
| Canada | ● | ● | | | | ○ | | ○ | | | | ● | ● |
| Chile | ● | ● | ● | | | | ● | ● | ● | | ● | ● | |
| Chinese Taipei | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | |
| Croatia | ● | ● | ● | | | | | | | | | | |
| Cyprus | ● | ● | | | ● | ● | ● | | | ● | ● | ● | ● |
| Czech Republic | ● | ● | ● | ● | | ● | | | | ● | | ● | ● |
| Denmark | ● | ● | ● | ● | | | | | | | | | ● |
| Egypt | | | | | | | ● | ● | | ● | ● | | |
| England | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Finland | ● | ● | ● | | | | ● | | ● | | | ○ | |
| France | ● | ● | | | | | ● | | | | | | ● |
| Georgia | ● | ● | ● | ● | | | ● | ● | ● | ● | | | |
| Germany | ● | ● | ● | ● | | | | | | | | | ● |
| Hong Kong SAR | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Hungary | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Iran, Islamic Rep. of | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Ireland | ● | ● | ● | | | ● | ● | ● | | | | | ● |
| Israel | | | | | | ○ | ● | ● | ● | ○ | ○ | ○ | ○ |
| Italy | ● | ● | ● | ● | ● | ○ | ● | ● | ● | ● | ● | ● | ○ |
| Japan | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Jordan | | ● | | | | | ● | ● | ● | ● | ● | ● | |
| Kazakhstan | ● | ○ | ● | ○ | | | ● | ○ | ● | | | | |
| Korea, Rep. of | ● | ● | ● | | | ● | ● | ● | ● | ● | ● | ● | ● |
| Kosovo | ● | | | | | | | | | | | | |
| Kuwait | ● | ● | ○ | ○ | | ○ | ● | ● | | ○ | | | ○ |
| Latvia | ● | | | ○ | ● | ○ | | | | | ● | ○ | ○ |
| Lebanon | | | | | | | ● | ● | ● | ● | ● | | |
| Lithuania | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| Malaysia | | | | | | | ● | ● | ● | ● | ● | ● | |
| Malta | ● | | ● | | | | | ● | | ● | | | |
| Montenegro | ● | | | | | | | | | | | | |
| Morocco | ● | ● | ● | ○ | ○ | | ● | ● | ● | ○ | ○ | ○ | |
| Netherlands | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● |
| New Zealand | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| North Macedonia | ● | | | | | | | | ● | | ● | ● | |
| Northern Ireland | ● | ● | ● | | | | | | | | | | |
| Norway | ● | ● | ○ | ○ | ○ | ○ | ● | ● | ○ | ○ | ○ | | ○ |
| Oman | ● | ● | ● | | | | ● | ● | ● | ● | | | |
| Pakistan | ● | | | | | | | | | | | | |
| Philippines | ● | | | | ● | | | | | | ● | ● | ○ |
| Poland | ● | ● | ○ | | | | | | | | | | |
| Portugal | ● | ● | ● | | | ● | ● | | | | | | ● |
| Qatar | ● | ● | ● | ○ | | | ● | ● | ● | ○ | | | |
| Romania | | | ● | | | | ● | | ● | ● | ● | ● | ● |
| Russian Federation | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| Saudi Arabia | ● | ● | ● | | | | ● | ● | ● | ○ | ○ | | |
| Serbia | ● | ● | ● | | | | | | | ● | ● | | |
| Singapore | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Slovak Republic | ● | ● | ● | ● | | | | | | | ● | ● | ● |
| South Africa | ● | ● | | | | | ● | ● | ● | | ○ | ○ | ○ |
| Spain | ● | ● | ● | | | | | | | | | | ● |
| Sweden | ● | ● | ● | ● | | | ● | ● | ● | ● | ● | | ● |
| Turkey | ● | ○ | ○ | | | | ● | ● | ● | ○ | | ○ | |
| United Arab Emirates | ● | ● | ● | | | | ● | ● | ● | | | | |
| United States | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

● Indicates participation in that testing cycle

○ Indicates participation but data not comparable for measuring trends to 2019, primarily due to countries improving translations or to differences in population coverage.

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## Appendix A.1: Country Participation in TIMSS 2019 and in Earlier TIMSS Assessments

(Continued)

| Country | Grade 4 | | | | | | Grade 8 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2015 | 2011 | 2007 | 2003 | 1995 | 2019 | 2015 | 2011 | 2007 | 2003 | 1999 | 1995 |
| **Benchmarking Participants** | | | | | | | | | | | | | |
| Ontario, Canada | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Quebec, Canada | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Moscow City, Russian Fed. | ● | | | | | | ● | | | | | | |
| Gauteng, RSA | | | | | | | ● | | | | | | |
| Western Cape, RSA | | | | | | | ● | | | | | | |
| Madrid, Spain | ● | | | | | | | | | | | | |
| Abu Dhabi, UAE | ● | ● | ● | | | | ● | ● | ● | | | | |
| Dubai, UAE | ● | ● | ● | ● | | | ● | ● | ● | ● | | | |

● Indicates participation in that testing cycle

○ Indicates participation but data not comparable for measuring trends to 2019, primarily due to countries improving translations or to differences in population coverage.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# APPENDIX B

# Population Coverage and Sample Participation Rates

## Appendix B.1: Information About the Students Assessed in TIMSS 2019

The TIMSS target populations are the grades that represent four years and eight years of schooling counting from the first year of ISCED Level 1. However, IEA has a policy that students do not fall under the minimum average age of 9.5 years old (Grade 4) or 13.5 years old (Grade 8) at the time of testing, so England, Malta, and New Zealand assessed students in their fifth or ninth year of formal schooling. Norway chose to assess students in the fifth and ninth years of schooling, so students would be compared with similar age students in Sweden, Denmark, and Finland.

Average age at the time of testing can vary across countries by just over a year (e.g., at the fourth grade from 9.7 to 10.9 years) depending on a country's policy on age of entry to school. For information on age of entry policy and practice, see Exhibit 2 of the *TIMSS 2019 Encyclopedia*.

| Country | Grade 4 | | Grade 8 | |
|---|---|---|---|---|
| | Country's Name for Fourth Year of Schooling * | Average Age at Time of Testing | Country's Name for Eighth Year of Schooling * | Average Age at Time of Testing |
| Albania | Grade 4 | 10.0 | | |
| Armenia | Grade 4 | 9.9 | | |
| Australia | Year 4 | 10.1 | Year 8 | 14.1 |
| Austria | Grade 4 | 10.4 | | |
| Azerbaijan | Grade 4 | 10.3 | | |
| Bahrain | Grade 4 | 9.8 | Grade 8 | 13.8 |
| Belgium (Flemish) | Grade 4 | 10.0 | | |
| Bosnia and Herzegovina | Grade 4 | 10.1 | | |
| Bulgaria | Grade 4 | 10.7 | | |
| Canada | Grade 4 | 9.9 | | |
| Chile | Grade 4 | 10.1 | Grade 8 | 14.2 |
| Chinese Taipei | Grade 4 | 10.2 | Grade 8 | 14.3 |
| Croatia | Grade 4 | 10.5 | | |
| Cyprus | Grade 4 | 9.8 | Grade 8 | 13.8 |
| Czech Republic | Grade 4 | 10.4 | | |
| Denmark | Grade 4 | 10.9 | | |
| Egypt | | | Grade 8 | 13.9 |
| England | Year 5 | 10.2 | Year 9 | 14.0 |
| Finland | Grade 4 | 10.8 | Grade 8 | 14.8 |
| France | Third Cycle Year 1 (CM1) | 9.9 | Fourth Cycle Year 2 (4e) | 13.9 |
| Georgia | Grade 4 | 10.1 | Grade 8 | 13.8 |
| Germany | Grade 4 | 10.4 | | |
| Hong Kong SAR | Primary 4 | 10.1 | Secondary 2 | 14.1 |
| Hungary | Grade 4 | 10.5 | Grade 8 | 14.6 |
| Iran, Islamic Rep. of | Grade 4 | 10.2 | Grade 8 | 14.1 |
| Ireland | Fourth Class | 10.4 | Second Year | 14.4 |
| Israel | | | Grade 8 | 14.0 |
| Italy | Primary Grade 4 | 9.6 | Lower Secondary Grade 3 | 13.7 |
| Japan | Grade 4 | 10.4 | Grade 8 | 14.4 |
| Jordan | | | Grade 8 | 13.9 |
| Kazakhstan | Grade 4 | 10.4 | Grade 8 | 14.3 |
| Korea, Rep. of | Elementary School Grade 4 | 10.5 | Middle School Grade 2 | 14.5 |
| Kosovo | Grade 4 | 9.9 | | |
| Kuwait | Grade 4 | 9.7 | Grade 8 | 13.8 |
| Latvia | Grade 4 | 10.8 | | |
| Lebanon | | | Grade 8 | 14.0 |
| Lithuania | Grade 4 | 10.7 | Grade 8 | 14.7 |
| Malaysia | | | Grade 8 | 14.3 |
| Malta | Year 5 | 9.8 | | |
| Montenegro | Grade 4 | 9.8 | | |
| Morocco | Grade 4 | 10.1 | Secondary School Year 2 | 14.5 |
| Netherlands | Group 6 | 10.1 | | |
| New Zealand | Year 5 | 10.0 | Year 9 | 13.9 |
| North Macedonia | Grade 4 | 9.8 | | |
| Northern Ireland | Year 6 | 10.4 | | |
| Norway | Grade 5 | 10.7 | Grade 9 | 14.7 |
| Oman | Grade 4 | 9.7 | Grade 8 | 13.9 |
| Pakistan | Grade 4 | 10.6 | | |
| Philippines | Grade 4 | 10.1 | | |
| Poland | Grade 4 | 10.3 | | |
| Portugal | Grade 4 | 10.0 | Grade 8 | 14.0 |
| Qatar | Grade 4 | 9.9 | Grade 8 | 14.0 |
| Romania | | | Grade 8 | 14.8 |
| Russian Federation | Grade 4 | 10.8 | Grade 8 | 14.8 |
| Saudi Arabia | Grade 4 | 9.9 | Grade 8 | 13.9 |
| Serbia | Grade 4 | 10.6 | | |
| Singapore | Primary 4 | 10.4 | Secondary 2 | 14.3 |
| Slovak Republic | Grade 4 | 10.4 | | |
| South Africa | Grade 5 | 11.5 | Grade 9 | 15.5 |

* Countries' names for the fourth year and eighth year of formal schooling were reported by National Research Coordinators.
An empty cell indicates country did not participate at that grade.

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## Appendix B.1: Information About the Students Assessed in TIMSS 2019

(Continued)

| Country | Grade 4 | | Grade 8 | |
|---|---|---|---|---|
| | Country's Name for Fourth Year of Schooling * | Average Age at Time of Testing | Country's Name for Eighth Year of Schooling * | Average Age at Time of Testing |
| Spain | Grade 4 | 9.9 | | |
| Sweden | Grade 4 | 10.8 | Grade 8 | 14.8 |
| Turkey | Grade 5 | 10.6 | Grade 8 | 13.9 |
| United Arab Emirates | Grade 4 | 9.7 | Grade 8 | 13.7 |
| United States | Grade 4 | 10.2 | Grade 8 | 14.2 |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | Grade 4 | 9.8 | Grade 8 | 13.8 |
| Quebec, Canada | Grade 4 | 10.1 | Secondary 2 | 14.2 |
| Moscow City, Russian Fed. | Grade 4 | 10.8 | Grade 8 | 14.8 |
| Madrid, Spain | Grade 4 | 9.9 | | |
| Gauteng, RSA | | | Grade 9 | 15.3 |
| Western Cape, RSA | | | Grade 9 | 15.5 |
| Abu Dhabi, UAE | Grade 4 | 9.7 | Grade 8 | 13.7 |
| Dubai, UAE | Grade 4 or Year 5 | 9.9 | Grade 8 or Year 9 | 13.9 |

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## Appendix B.2: Coverage of TIMSS 2019 Target Population

| Country | International Target Population | | Exclusions from National Target Population | | |
|---|---|---|---|---|---|
| | Coverage | Notes on Coverage | School-Level Exclusions | Within-Sample Exclusions | Overall Exclusions |
| Albania | 100% | | 2.6% | 1.6% | 4.2% |
| Armenia | 100% | | 0.9% | 0.4% | 1.2% |
| Australia | 100% | | 1.9% | 2.9% | 4.8% |
| Austria | 100% | | 0.9% | 4.5% | 5.4% |
| Azerbaijan | 100% | | 2.3% | 0.3% | 2.6% |
| Bahrain | 100% | | 0.4% | 0.4% | 0.8% |
| Belgium (Flemish) | 100% | | 0.8% | 2.2% | 3.0% |
| Bosnia and Herzegovina | 100% | | 0.6% | 1.4% | 2.0% |
| Bulgaria | 100% | | 0.8% | 2.6% | 3.4% |
| [1 2] Canada | 79% | Students from the provinces of Alberta, Manitoba, Newfoundland, Ontario, and Quebec | 3.1% | 3.9% | 7.0% |
| Chile | 100% | | 1.2% | 2.6% | 3.8% |
| Chinese Taipei | 100% | | 0.3% | 1.6% | 2.0% |
| Croatia | 100% | | 1.1% | 3.1% | 4.2% |
| Cyprus | 100% | | 1.1% | 3.4% | 4.6% |
| Czech Republic | 100% | | 2.5% | 2.2% | 4.7% |
| Denmark | 100% | | 1.6% | 1.5% | 3.1% |
| [2] England | 100% | | 2.2% | 3.6% | 5.8% |
| Finland | 100% | | 1.8% | 1.5% | 3.3% |
| France | 100% | | 2.5% | 1.9% | 4.4% |
| [1] Georgia | 92% | Students taught in Georgian | 2.8% | 1.8% | 4.7% |
| Germany | 100% | | 1.7% | 2.2% | 3.9% |
| Hong Kong SAR | 100% | | 1.1% | 2.4% | 3.5% |
| Hungary | 100% | | 2.1% | 2.0% | 4.1% |
| Iran, Islamic Rep. of | 100% | | 3.0% | 1.2% | 4.2% |
| Ireland | 100% | | 1.9% | 1.1% | 3.0% |
| Italy | 100% | | 0.9% | 4.1% | 4.9% |
| Japan | 100% | | 0.6% | 1.5% | 2.2% |
| [2] Kazakhstan | 100% | | 2.7% | 3.0% | 5.8% |
| Korea, Rep. of | 100% | | 0.9% | 1.5% | 2.3% |
| [2] Kosovo | 100% | | 5.3% | 3.3% | 8.6% |
| Kuwait | 100% | | 1.0% | 0.7% | 1.7% |
| [2] Latvia | 100% | | 3.9% | 3.0% | 6.9% |
| [2] Lithuania | 100% | | 2.6% | 4.1% | 6.7% |
| Malta | 100% | | 1.4% | 3.1% | 4.5% |
| Montenegro | 100% | | 1.3% | 3.3% | 4.6% |
| Morocco | 100% | | 1.8% | 0.0% | 1.8% |
| Netherlands | 100% | | 2.6% | 0.9% | 3.5% |
| [2] New Zealand | 100% | | 2.6% | 4.2% | 6.9% |
| North Macedonia | 100% | | 1.2% | 2.5% | 3.8% |
| Northern Ireland | 100% | | 2.2% | 0.6% | 2.8% |
| Norway (5) | 100% | | 1.4% | 3.3% | 4.7% |
| Oman | 100% | | 1.4% | 0.8% | 2.2% |
| [2] Pakistan | 100% | | 7.5% | 0.0% | 7.5% |
| [2] Philippines | 100% | | 6.1% | 1.6% | 7.7% |
| Poland | 100% | | 1.1% | 2.0% | 3.1% |
| [2] Portugal | 100% | | 0.9% | 6.9% | 7.8% |
| Qatar | 100% | | 1.2% | 1.0% | 2.2% |
| [2] Russian Federation | 100% | | 2.4% | 3.9% | 6.3% |
| [2] Saudi Arabia | 100% | | 10.1% | 0.4% | 10.5% |
| [2] Serbia | 100% | | 4.0% | 4.2% | 8.2% |
| [3] Singapore | 100% | | 12.5% | 0.4% | 12.8% |
| [2] Slovak Republic | 100% | | 3.6% | 1.9% | 5.5% |
| South Africa (5) | 100% | | 1.1% | 0.0% | 1.1% |
| Spain | 100% | | 1.6% | 3.8% | 5.4% |
| Sweden | 100% | | 1.6% | 3.8% | 5.4% |
| [2] Turkey (5) | 100% | | 1.0% | 5.9% | 7.0% |
| United Arab Emirates | 100% | | 1.1% | 2.0% | 3.2% |
| [2] United States | 100% | | 0.0% | 7.2% | 7.2% |
| **Benchmarking Participants** | | | | | |
| [2] Ontario, Canada | 100% | | 2.3% | 4.7% | 7.0% |
| Quebec, Canada | 100% | | 3.3% | 1.2% | 4.4% |
| Moscow City, Russian Fed. | 100% | | 0.7% | 1.4% | 2.1% |
| Madrid, Spain | 100% | | 0.5% | 3.1% | 3.6% |
| Abu Dhabi, UAE | 100% | | 1.1% | 2.5% | 3.6% |
| [2] Dubai, UAE | 100% | | 2.6% | 3.0% | 5.6% |

1 National Target Population does not include all of the International Target Population.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).

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## Appendix B.3: School Sample Sizes

| Country | Number of Schools in Original Sample | Number of Eligible Schools in Original Sample | Number of Schools in Original Sample that Participated | Number of Replacement Schools that Participated | Total Number of Schools that Participated |
|---|---|---|---|---|---|
| Albania | 180 | 169 | 167 | 0 | 167 |
| Armenia | 150 | 150 | 150 | 0 | 150 |
| Australia | 290 | 288 | 285 | 2 | 287 |
| Austria | 197 | 194 | 193 | 0 | 193 |
| Azerbaijan | 200 | 199 | 186 | 8 | 194 |
| Bahrain | 185 | 185 | 185 | 0 | 185 |
| Belgium (Flemish) | 160 | 156 | 101 | 46 | 147 |
| Bosnia and Herzegovina | 178 | 178 | 178 | 0 | 178 |
| Bulgaria | 151 | 151 | 146 | 5 | 151 |
| Canada | 788 | 777 | 669 | 35 | 704 |
| Chile | 174 | 172 | 151 | 18 | 169 |
| Chinese Taipei | 163 | 163 | 155 | 7 | 162 |
| Croatia | 159 | 158 | 150 | 3 | 153 |
| Cyprus | 152 | 151 | 150 | 1 | 151 |
| Czech Republic | 156 | 152 | 151 | 1 | 152 |
| Denmark | 175 | 174 | 123 | 43 | 166 |
| England | 150 | 150 | 129 | 10 | 139 |
| Finland | 159 | 158 | 157 | 1 | 158 |
| France | 156 | 155 | 155 | 0 | 155 |
| Georgia | 158 | 157 | 151 | 3 | 154 |
| Germany | 206 | 203 | 198 | 5 | 203 |
| Hong Kong SAR | 159 | 159 | 109 | 30 | 139 |
| Hungary | 151 | 150 | 139 | 10 | 149 |
| Iran, Islamic Rep. of | 224 | 224 | 224 | 0 | 224 |
| Ireland | 151 | 150 | 150 | 0 | 150 |
| Italy | 162 | 162 | 153 | 9 | 162 |
| Japan | 150 | 150 | 126 | 21 | 147 |
| Kazakhstan | 169 | 168 | 168 | 0 | 168 |
| Korea, Rep. of | 152 | 152 | 151 | 0 | 151 |
| Kosovo | 150 | 145 | 145 | 0 | 145 |
| Kuwait | 170 | 167 | 163 | 1 | 164 |
| Latvia | 156 | 156 | 142 | 12 | 154 |
| Lithuania | 208 | 207 | 207 | 0 | 207 |
| Malta | 99 | 98 | 98 | 0 | 98 |
| Montenegro | 140 | 140 | 140 | 0 | 140 |
| Morocco | 265 | 264 | 264 | 0 | 264 |
| Netherlands | 151 | 149 | 71 | 41 | 112 |
| New Zealand | 164 | 161 | 138 | 22 | 160 |
| North Macedonia | 150 | 150 | 146 | 4 | 150 |
| Northern Ireland | 156 | 156 | 95 | 39 | 134 |
| Norway (5) | 167 | 167 | 119 | 31 | 150 |
| Oman | 228 | 228 | 226 | 2 | 228 |
| Pakistan | 150 | 142 | 121 | 18 | 139 |
| Philippines | 184 | 180 | 180 | 0 | 180 |
| Poland | 150 | 149 | 143 | 6 | 149 |
| Portugal | 182 | 181 | 158 | 23 | 181 |
| Qatar | 242 | 242 | 242 | 0 | 242 |
| Russian Federation | 202 | 202 | 200 | 0 | 200 |
| Saudi Arabia | 222 | 221 | 215 | 5 | 220 |
| Serbia | 170 | 165 | 159 | 6 | 165 |
| Singapore | 187 | 187 | 187 | 0 | 187 |
| Slovak Republic | 159 | 158 | 153 | 4 | 157 |
| South Africa (5) | 300 | 298 | 286 | 11 | 297 |
| Spain | 502 | 502 | 494 | 7 | 501 |
| Sweden | 150 | 145 | 144 | 1 | 145 |
| Turkey (5) | 181 | 180 | 179 | 1 | 180 |
| United Arab Emirates | 697 | 688 | 688 | 0 | 688 |
| United States | 329 | 325 | 249 | 38 | 287 |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | 171 | 170 | 160 | 3 | 163 |
| Quebec, Canada | 172 | 172 | 140 | 8 | 148 |
| Moscow City, Russian Fed. | 152 | 151 | 148 | 2 | 150 |
| Madrid, Spain | 167 | 167 | 167 | 0 | 167 |
| Abu Dhabi, UAE | 249 | 247 | 247 | 0 | 247 |
| Dubai, UAE | 205 | 199 | 199 | 0 | 199 |

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## Appendix B.4: Student Sample Sizes

| Country | Within-School Student Participation (Weighted Percentage) | Number of Students Sampled in Participating Schools | Number of Students Withdrawn from Class/School | Number of Students Excluded | Number of Students Eligible | Number of Students Absent | Number of Students Assessed |
|---|---|---|---|---|---|---|---|
| Albania | 99% | 4,548 | 31 | 25 | 4,492 | 66 | 4,426 |
| Armenia | 97% | 5,612 | 32 | 0 | 5,580 | 181 | 5,399 |
| Australia | 94% | 6,517 | 110 | 128 | 6,279 | 389 | 5,890 |
| Austria | 97% | 4,901 | 33 | 256 | 4,612 | 148 | 4,464 |
| Azerbaijan | 95% | 5,600 | 17 | 19 | 5,564 | 319 | 5,245 |
| Bahrain | 98% | 5,903 | 25 | 22 | 5,856 | 94 | 5,762 |
| Belgium (Flemish) | 93% | 5,113 | 26 | 114 | 4,973 | 318 | 4,655 |
| Bosnia and Herzegovina | 96% | 6,048 | 61 | 74 | 5,913 | 285 | 5,628 |
| Bulgaria | 95% | 4,632 | 70 | 88 | 4,474 | 206 | 4,268 |
| Canada | 95% | 15,164 | 199 | 429 | 14,536 | 883 | 13,653 |
| Chile | 96% | 4,578 | 77 | 112 | 4,389 | 215 | 4,174 |
| Chinese Taipei | 99% | 3,958 | 65 | 65 | 3,828 | 63 | 3,765 |
| Croatia | 91% | 4,395 | 8 | 148 | 4,239 | 454 | 3,785 |
| Cyprus | 97% | 4,353 | 14 | 150 | 4,189 | 127 | 4,062 |
| Czech Republic | 96% | 5,054 | 48 | 53 | 4,953 | 261 | 4,692 |
| Denmark | 87% | 3,881 | 67 | 48 | 3,766 | 539 | 3,227 |
| England | 96% | 3,759 | 78 | 127 | 3,554 | 158 | 3,396 |
| Finland | 97% | 4,987 | 37 | 45 | 4,905 | 175 | 4,730 |
| France | 98% | 4,456 | 35 | 104 | 4,317 | 131 | 4,186 |
| Georgia | 97% | 4,019 | 28 | 83 | 3,908 | 121 | 3,787 |
| Germany | 97% | 3,706 | 51 | 89 | 3,566 | 129 | 3,437 |
| Hong Kong SAR | 90% | 3,461 | 18 | 101 | 3,342 | 374 | 2,968 |
| Hungary | 97% | 4,867 | 34 | 89 | 4,744 | 173 | 4,571 |
| Iran, Islamic Rep. of | 99% | 6,194 | 46 | 76 | 6,072 | 62 | 6,010 |
| Ireland | 91% | 5,126 | 22 | 52 | 5,052 | 470 | 4,582 |
| Italy | 97% | 4,109 | 22 | 199 | 3,888 | 147 | 3,741 |
| Japan | 97% | 4,358 | 15 | 34 | 4,309 | 113 | 4,196 |
| Kazakhstan | 99% | 4,932 | 37 | 38 | 4,857 | 66 | 4,791 |
| Korea, Rep. of | 98% | 4,105 | 50 | 63 | 3,992 | 99 | 3,893 |
| Kosovo | 97% | 4,757 | 43 | 95 | 4,619 | 123 | 4,496 |
| Kuwait | 96% | 4,731 | 83 | 14 | 4,634 | 197 | 4,437 |
| Latvia | 94% | 4,886 | 15 | 68 | 4,803 | 322 | 4,481 |
| Lithuania | 94% | 4,198 | 12 | 186 | 4,000 | 259 | 3,741 |
| Malta | 96% | 3,914 | 17 | 115 | 3,782 | 152 | 3,630 |
| Montenegro | 98% | 5,248 | 49 | 37 | 5,162 | 86 | 5,076 |
| Morocco | 99% | 8,051 | 217 | 0 | 7,834 | 111 | 7,723 |
| Netherlands | 97% | 3,562 | 69 | 27 | 3,466 | 111 | 3,355 |
| New Zealand | 94% | 5,611 | 100 | 164 | 5,347 | 328 | 5,019 |
| North Macedonia | 95% | 3,531 | 32 | 44 | 3,455 | 185 | 3,270 |
| Northern Ireland | 91% | 3,877 | 21 | 23 | 3,833 | 336 | 3,497 |
| Norway (5) | 94% | 4,410 | 27 | 149 | 4,234 | 283 | 3,951 |
| Oman | 98% | 7,079 | 94 | 57 | 6,928 | 114 | 6,814 |
| Pakistan | 98% | 4,453 | 315 | 0 | 4,138 | 158 | 3,980 |
| Philippines | 98% | 5,693 | 89 | 0 | 5,604 | 89 | 5,515 |
| Poland | 93% | 5,427 | 44 | 100 | 5,283 | 401 | 4,882 |
| Portugal | 94% | 5,015 | 35 | 366 | 4,614 | 314 | 4,300 |
| Qatar | 97% | 5,251 | 127 | 60 | 5,064 | 131 | 4,933 |
| Russian Federation | 98% | 4,282 | 8 | 144 | 4,130 | 108 | 4,022 |
| Saudi Arabia | 99% | 5,585 | 23 | 25 | 5,537 | 84 | 5,453 |
| Serbia | 97% | 4,667 | 53 | 93 | 4,521 | 141 | 4,380 |
| Singapore | 97% | 6,209 | 22 | 0 | 6,187 | 201 | 5,986 |
| Slovak Republic | 97% | 4,477 | 26 | 24 | 4,427 | 180 | 4,247 |
| South Africa (5) | 98% | 12,289 | 107 | 0 | 12,182 | 291 | 11,891 |
| Spain | 95% | 10,497 | 48 | 421 | 10,028 | 473 | 9,555 |
| Sweden | 95% | 4,407 | 31 | 160 | 4,216 | 251 | 3,965 |
| Turkey (5) | 99% | 4,554 | 142 | 319 | 4,093 | 65 | 4,028 |
| United Arab Emirates | 96% | 28,029 | 414 | 564 | 27,051 | 1,217 | 25,834 |
| United States | 96% | 9,955 | 152 | 601 | 9,202 | 426 | 8,776 |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 95% | 4,251 | 83 | 95 | 4,073 | 243 | 3,830 |
| Quebec, Canada | 96% | 4,047 | 9 | 37 | 4,001 | 164 | 3,837 |
| Moscow City, Russian Fed. | 98% | 3,992 | 11 | 35 | 3,946 | 103 | 3,843 |
| Madrid, Spain | 96% | 3,666 | 17 | 123 | 3,526 | 136 | 3,390 |
| Abu Dhabi, UAE | 95% | 9,822 | 38 | 239 | 9,545 | 508 | 9,037 |
| Dubai, UAE | 97% | 8,125 | 362 | 213 | 7,550 | 285 | 7,265 |

Students attending a sampled class at the time the sample was chosen but leaving the class before the assessment was administered were classified as "withdrawn."
Students with a disability or language barrier that prevented them from participating in the assessment were classified as "excluded."
Students not present when the assessment was administered, and not subsequently assessed in a make-up session, were classified as "absent."

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.5: Participation Rates (Weighted)

| Country | School Participation | | Class Participation | Student Participation | Overall Participation | |
|---|---|---|---|---|---|---|
| | Before Replacement | After Replacement | | | Before Replacement | After Replacement |
| Albania | 99% | 99% | 100% | 99% | 98% | 98% |
| Armenia | 100% | 100% | 100% | 97% | 97% | 97% |
| Australia | 99% | 100% | 100% | 94% | 93% | 94% |
| Austria | 99% | 99% | 100% | 97% | 97% | 97% |
| Azerbaijan | 94% | 98% | 100% | 95% | 89% | 92% |
| Bahrain | 100% | 100% | 100% | 98% | 98% | 98% |
| † Belgium (Flemish) | 66% | 95% | 100% | 93% | 62% | 89% |
| Bosnia and Herzegovina | 100% | 100% | 99% | 96% | 95% | 95% |
| Bulgaria | 97% | 100% | 100% | 95% | 92% | 95% |
| Canada | 86% | 90% | 100% | 95% | 82% | 86% |
| Chile | 89% | 99% | 100% | 96% | 86% | 95% |
| Chinese Taipei | 95% | 99% | 100% | 99% | 94% | 98% |
| Croatia | 95% | 97% | 99% | 91% | 85% | 87% |
| Cyprus | 99% | 100% | 100% | 97% | 96% | 97% |
| Czech Republic | 99% | 100% | 100% | 96% | 95% | 96% |
| † Denmark | 70% | 95% | 99% | 87% | 61% | 83% |
| England | 86% | 93% | 100% | 96% | 82% | 89% |
| Finland | 99% | 100% | 100% | 97% | 96% | 97% |
| France | 100% | 100% | 100% | 98% | 98% | 98% |
| Georgia | 97% | 99% | 100% | 97% | 94% | 96% |
| Germany | 97% | 100% | 100% | 97% | 94% | 97% |
| † Hong Kong SAR | 67% | 88% | 100% | 90% | 60% | 79% |
| Hungary | 93% | 99% | 100% | 97% | 90% | 96% |
| Iran, Islamic Rep. of | 100% | 100% | 100% | 99% | 99% | 99% |
| Ireland | 100% | 100% | 100% | 91% | 91% | 91% |
| Italy | 96% | 100% | 100% | 97% | 92% | 97% |
| Japan | 84% | 98% | 100% | 97% | 82% | 95% |
| Kazakhstan | 100% | 100% | 100% | 99% | 99% | 99% |
| Korea, Rep. of | 99% | 99% | 100% | 98% | 97% | 97% |
| Kosovo | 100% | 100% | 100% | 97% | 97% | 97% |
| Kuwait | 97% | 98% | 100% | 96% | 93% | 94% |
| Latvia | 92% | 99% | 100% | 94% | 87% | 93% |
| Lithuania | 100% | 100% | 100% | 94% | 94% | 94% |
| Malta | 100% | 100% | 100% | 96% | 96% | 96% |
| Montenegro | 100% | 100% | 100% | 98% | 98% | 98% |
| Morocco | 100% | 100% | 100% | 99% | 99% | 99% |
| ≡ Netherlands | 46% | 75% | 100% | 97% | 45% | 73% |
| New Zealand | 87% | 99% | 100% | 94% | 81% | 93% |
| North Macedonia | 98% | 100% | 100% | 95% | 94% | 95% |
| † Northern Ireland | 60% | 86% | 100% | 91% | 55% | 78% |
| † Norway (5) | 70% | 90% | 100% | 94% | 66% | 84% |
| Oman | 99% | 100% | 100% | 98% | 98% | 98% |
| Pakistan | 77% | 99% | 100% | 98% | 75% | 96% |
| Philippines | 100% | 100% | 100% | 98% | 98% | 98% |
| Poland | 96% | 100% | 100% | 93% | 89% | 93% |
| Portugal | 87% | 100% | 99% | 94% | 81% | 94% |
| Qatar | 100% | 100% | 100% | 97% | 97% | 97% |
| Russian Federation | 99% | 99% | 100% | 98% | 97% | 97% |
| Saudi Arabia | 98% | 99% | 100% | 99% | 97% | 98% |
| Serbia | 97% | 100% | 100% | 97% | 95% | 97% |
| Singapore | 100% | 100% | 100% | 97% | 97% | 97% |
| Slovak Republic | 97% | 99% | 100% | 97% | 93% | 96% |
| South Africa (5) | 96% | 99% | 100% | 98% | 94% | 97% |
| Spain | 97% | 99% | 100% | 95% | 92% | 95% |
| Sweden | 100% | 100% | 100% | 95% | 95% | 95% |
| Turkey (5) | 99% | 100% | 100% | 99% | 98% | 99% |
| United Arab Emirates | 100% | 100% | 100% | 96% | 96% | 96% |
| † United States | 76% | 88% | 100% | 96% | 73% | 84% |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 93% | 95% | 100% | 95% | 88% | 90% |
| Quebec, Canada | 82% | 86% | 100% | 96% | 79% | 83% |
| Moscow City, Russian Fed. | 99% | 100% | 100% | 98% | 97% | 97% |
| Madrid, Spain | 100% | 100% | 100% | 96% | 96% | 96% |
| Abu Dhabi, UAE | 100% | 100% | 100% | 95% | 95% | 95% |
| Dubai, UAE | 100% | 100% | 100% | 97% | 97% | 97% |

TIMSS guidelines for sampling participation: The minimum acceptable participation rates were 85 percent of both schools and students, or a combined rate (the product of school and student participation) of 75 percent.
Participants not meeting these guidelines were annotated as follows:
† Met guidelines for sample participation rates only after replacement schools were included
‡ Nearly satisfied guidelines for sample participation rates after replacement schools were included
≡ Did not satisfy guidelines for sample participation rates

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.6: Trends in Student Populations

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Armenia** | | | | |
| 2019 | 4 | 9.9 | 1.2% | 97% |
| ⧖ 2015 | 4 | 9.9 | 1.0% | 96% |
| 2011 | 4 | 10.0 | 2.0% | 98% |
| 2003 | 4 | 10.9 | 2.9% | 90% |
| **Australia** | | | | |
| 2019 | 4 | 10.1 | 4.8% | 94% |
| 2015 | 4 | 10.0 | 4.2% | 94% |
| 2011 | 4 | 10.0 | 4.4% | 93% |
| 2007 | 4 | 9.9 | 4.0% | 95% |
| † 2003 | 4 | 9.9 | 2.7% | 85% |
| ≡ 1995 | 4 or 5 | 10.2 | 1.8% | 66% |
| **Austria** | | | | |
| 2019 | 4 | 10.4 | 5.4% | 97% |
| 2011 | 4 | 10.3 | 5.1% | 98% |
| 2007 | 4 | 10.3 | 5.0% | 97% |
| ≡ 1995 | 4 | 10.5 | 2.8% | 69% |
| **Azerbaijan** | | | | |
| 2019 | 4 | 10.3 | 2.6% | 92% |
| 2 2011 | 4 | 10.2 | 7.2% | 100% |
| **Bahrain** | | | | |
| 2019 | 4 | 9.8 | 0.8% | 98% |
| 2 2015 | 4 | 9.9 | 5.6% | 99% |
| ⧖ 2011 | 4 | 10.4 | 1.1% | 90% |
| **Belgium (Flemish)** | | | | |
| † 2019 | 4 | 10.0 | 3.0% | 89% |
| † 2015 | 4 | 10.1 | 1.4% | 95% |
| 2011 | 4 | 10.0 | 5.0% | 92% |
| 2 2003 | 4 | 10.0 | 6.3% | 97% |
| **Bulgaria** | | | | |
| 2019 | 4 | 10.7 | 3.4% | 95% |
| 2015 | 4 | 10.8 | 2.9% | 93% |
| **Canada** | | | | |
| 1 2 2019 | 4 | 9.9 | 7.0% | 86% |
| 1 2 † 2015 | 4 | 9.9 | 6.1% | 80% |
| **Chile** | | | | |
| 2019 | 4 | 10.1 | 3.8% | 95% |
| 2015 | 4 | 10.2 | 3.7% | 88% |
| 2011 | 4 | 10.1 | 3.7% | 95% |
| **Chinese Taipei** | | | | |
| 2019 | 4 | 10.2 | 2.0% | 98% |
| 2015 | 4 | 10.2 | 2.4% | 99% |
| 2011 | 4 | 10.2 | 1.4% | 99% |
| 2007 | 4 | 10.2 | 2.8% | 100% |
| 2003 | 4 | 10.2 | 3.1% | 99% |
| **Croatia** | | | | |
| 2019 | 4 | 10.5 | 4.2% | 87% |
| 2015 | 4 | 10.6 | 4.4% | 94% |
| 2 2011 | 4 | 10.7 | 7.9% | 95% |
| **Cyprus** | | | | |
| 2019 | 4 | 9.8 | 4.6% | 97% |
| 2015 | 4 | 9.8 | 4.6% | 98% |
| 2003 | 4 | 9.9 | 2.9% | 97% |
| 1995 | 4 | 9.8 | 3.2% | 83% |
| **Czech Republic** | | | | |
| 2019 | 4 | 10.4 | 4.7% | 96% |
| 2015 | 4 | 10.4 | 4.2% | 95% |
| 2011 | 4 | 10.4 | 5.1% | 94% |
| 2007 | 4 | 10.3 | 4.9% | 92% |
| 1995 | 4 | 10.4 | 4.1% | 86% |
| **Denmark** | | | | |
| † 2019 | 4 | 10.9 | 3.1% | 83% |
| 2 † 2015 | 4 | 10.9 | 7.5% | 86% |
| 2 2011 | 4 | 11.0 | 6.3% | 87% |
| 2 2007 | 4 | 11.0 | 4.1% | 85% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧖ Tested the same cohort of students as other countries, but later in the assessment year.
Armenia began testing younger students in 2011 due to educational reforms.
Bahrain in 2015 administered both TIMSS and TIMSS Numeracy assessments to fourth grade students. Results for 2015 in mathematics are based on the average of both.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.6: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **England** | | | | |
| [2] 2019 | 5 | 10.2 | 5.8% | 89% |
| 2015 | 5 | 10.1 | 2.3% | 96% |
| 2011 | 5 | 10.2 | 2.0% | 78% |
| 2007 | 5 | 10.2 | 2.1% | 84% |
| † 2003 | 5 | 10.3 | 1.9% | 76% |
| [3] † 1995 | 5 | 10.0 | 12.1% | 83% |
| **Finland** | | | | |
| 2019 | 4 | 10.8 | 3.3% | 97% |
| 2015 | 4 | 10.8 | 2.0% | 97% |
| 2011 | 4 | 10.8 | 3.1% | 96% |
| **France** | | | | |
| 2019 | 4 | 9.9 | 4.4% | 98% |
| 2015 | 4 | 9.9 | 5.3% | 97% |
| **Georgia** | | | | |
| [1] 2019 | 4 | 10.1 | 4.7% | 96% |
| [1] 2015 | 4 | 9.7 | 4.9% | 98% |
| [1] 2011 | 4 | 10.0 | 4.9% | 96% |
| [1] 2007 | 4 | 10.1 | 4.8% | 98% |
| **Germany** | | | | |
| 2019 | 4 | 10.4 | 3.9% | 97% |
| 2015 | 4 | 10.4 | 2.7% | 95% |
| 2011 | 4 | 10.4 | 1.9% | 95% |
| 2007 | 4 | 10.4 | 1.3% | 96% |
| **Hong Kong SAR** | | | | |
| † 2019 | 4 | 10.1 | 3.5% | 79% |
| † 2015 | 4 | 10.1 | 2.2% | 76% |
| [2] 2011 | 4 | 10.1 | 8.5% | 82% |
| 2007 | 4 | 10.2 | 5.4% | 81% |
| † 2003 | 4 | 10.2 | 3.8% | 83% |
| 1995 | 4 | 10.1 | 2.7% | 83% |
| **Hungary** | | | | |
| 2019 | 4 | 10.5 | 4.1% | 96% |
| 2015 | 4 | 10.7 | 4.8% | 96% |
| 2011 | 4 | 10.7 | 4.2% | 96% |
| 2007 | 4 | 10.7 | 4.4% | 96% |
| [2] 2003 | 4 | 10.5 | 8.1% | 93% |
| 1995 | 4 | 10.4 | 3.8% | 92% |
| **Iran, Islamic Rep. of** | | | | |
| 2019 | 4 | 10.2 | 4.2% | 99% |
| 2015 | 4 | 10.2 | 4.0% | 99% |
| 2011 | 4 | 10.2 | 4.5% | 99% |
| 2007 | 4 | 10.2 | 3.0% | 99% |
| [2] 2003 | 4 | 10.4 | 5.7% | 98% |
| 1995 | 4 | 10.5 | 1.3% | 97% |
| **Ireland** | | | | |
| 2019 | 4 | 10.4 | 3.0% | 91% |
| 2015 | 4 | 10.4 | 2.7% | 96% |
| 2011 | 4 | 10.3 | 2.5% | 95% |
| [2] 1995 | 4 | 10.3 | 6.9% | 90% |
| **Italy** | | | | |
| 2019 | 4 | 9.6 | 4.9% | 97% |
| [2] 2015 | 4 | 9.7 | 6.2% | 94% |
| 2011 | 4 | 9.7 | 3.7% | 95% |
| 2007 | 4 | 9.8 | 5.3% | 97% |
| 2003 | 4 | 9.8 | 4.2% | 97% |
| **Japan** | | | | |
| 2019 | 4 | 10.4 | 2.2% | 95% |
| 2015 | 4 | 10.5 | 2.9% | 97% |
| 2011 | 4 | 10.5 | 3.2% | 96% |
| 2007 | 4 | 10.5 | 1.1% | 95% |
| 2003 | 4 | 10.4 | 0.8% | 97% |
| 1995 | 4 | 10.4 | 3.0% | 92% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
Georgia in 2011 excluded schools in South Ossetia and Abkhazia due to lack of access and absence of official statistics. Abkhazia refugee schools in other territories of Georgia were included in the sample frame.
Iran in 2015 administered both TIMSS and TIMSS Numeracy assessments to fourth grade students. Results for 2015 in mathematics are based on the average of both.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.6: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Kazakhstan** | | | | |
| [2] 2019 | 4 | 10.4 | 5.8% | 99% |
| [2] 2011 | 4 | 10.4 | 6.3% | 99% |
| **Korea, Rep. of** | | | | |
| 2019 | 4 | 10.5 | 2.3% | 97% |
| 2015 | 4 | 10.5 | 2.5% | 97% |
| 2011 | 4 | 10.4 | 2.5% | 98% |
| [2] 1995 | 4 | 10.3 | 6.6% | 95% |
| **Kuwait** | | | | |
| 2019 | 4 | 9.7 | 1.7% | 94% |
| 2015 | 4 | 9.7 | 3.0% | 90% |
| **Latvia** | | | | |
| [2] 2019 | 4 | 10.8 | 6.9% | 93% |
| 2003 | 4 | 11.1 | 4.4% | 88% |
| **Lithuania** | | | | |
| [2] 2019 | 4 | 10.7 | 6.7% | 94% |
| [2] 2015 | 4 | 10.7 | 6.1% | 94% |
| [1 2] 2011 | 4 | 10.7 | 5.6% | 94% |
| [1] 2007 | 4 | 10.8 | 5.4% | 94% |
| [1] 2003 | 4 | 10.9 | 4.6% | 87% |
| **Malta** | | | | |
| 2019 | 4 | 9.8 | 4.5% | 96% |
| 2011 | 5 | 9.8 | 3.6% | 95% |
| **Morocco** | | | | |
| 2019 | 4 | 10.1 | 1.8% | 99% |
| 2015 | 4 | 10.3 | 1.5% | 99% |
| 2011 | 4 | 10.5 | 2.0% | 96% |
| **Netherlands** | | | | |
| ≡ 2019 | 4 | 10.1 | 3.5% | 73% |
| † 2015 | 4 | 10.0 | 3.2% | 83% |
| † 2011 | 4 | 10.2 | 4.0% | 79% |
| ‡ 2007 | 4 | 10.2 | 4.8% | 91% |
| † 2003 | 4 | 10.2 | 5.2% | 84% |
| ≡ 1995 | 4 | 10.3 | 4.4% | 59% |
| **New Zealand** | | | | |
| [2] 2019 | 4.5 - 5.5 | 10.0 | 6.9% | 93% |
| 2015 | 4.5 - 5.5 | 10.0 | 4.8% | 90% |
| 2011 | 4.5 - 5.5 | 9.9 | 4.9% | 90% |
| 2007 | 4.5 - 5.5 | 10.0 | 5.4% | 96% |
| 2003 | 4.5 - 5.5 | 10.0 | 4.0% | 93% |
| 1995 | 4.5 - 5.5 | 10.0 | 1.3% | 95% |
| **Northern Ireland** | | | | |
| † 2019 | 4 | 10.4 | 2.8% | 78% |
| ‡ 2015 | 4 | 10.4 | 2.7% | 71% |
| † 2011 | 4 | 10.4 | 3.5% | 79% |
| **Norway (5)** | | | | |
| † 2019 | 5 | 10.7 | 4.7% | 84% |
| 2015 | 5 | 10.7 | 4.7% | 89% |
| **Norway (4)** | | | | |
| 2015 | 4 | 9.7 | 5.0% | 89% |
| ‡ 2011 | 4 | 9.7 | 4.3% | 70% |
| 2007 | 4 | 9.8 | 5.1% | 92% |
| 2003 | 3 | 9.8 | 4.4% | 88% |
| 1995 | 3 | 9.9 | 3.0% | 91% |
| **Oman** | | | | |
| 2019 | 4 | 9.7 | 2.2% | 98% |
| 2015 | 4 | 9.6 | 0.8% | 97% |
| 2011 | 4 | 9.9 | 1.5% | 96% |
| **Philippines** | | | | |
| [2] 2019 | 4 | 10.1 | 7.7% | 98% |
| 2003 | 4 | 10.8 | 4.5% | 81% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
Results for Lithuania before 2015 do not include students taught in Polish or Russian.
Morocco and the Philippines in 2019 administered the less difficult fourth grade mathematics assessment.
Kuwait and Morocco in 2015 administered both TIMSS and TIMSS Numeracy assessments to fourth grade students. Results for 2015 in mathematics are based on the average of both.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.6: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Poland** | | | | |
| 2019 | 4 | 10.3 | 3.1% | 93% |
| 2015 | 4 | 10.7 | 4.0% | 92% |
| **Portugal** | | | | |
| 2 2019 | 4 | 10.0 | 7.8% | 94% |
| 2 2015 | 4 | 9.9 | 6.5% | 92% |
| 2011 | 4 | 10.0 | 2.5% | 92% |
| 2 1995 | 4 | 10.4 | 7.3% | 92% |
| **Qatar** | | | | |
| 2019 | 4 | 9.9 | 2.2% | 97% |
| 2015 | 4 | 10.1 | 3.8% | 99% |
| 2 2011 | 4 | 10.0 | 6.2% | 99% |
| **Russian Federation** | | | | |
| 2 2019 | 4 | 10.8 | 6.3% | 97% |
| 2015 | 4 | 10.8 | 4.0% | 98% |
| 2011 | 4 | 10.8 | 5.3% | 98% |
| 2007 | 4 | 10.8 | 3.6% | 98% |
| 2 2003 | 3 or 4 | 10.6 | 6.8% | 97% |
| **Saudi Arabia** | | | | |
| 2 2019 | 4 | 9.9 | 10.5% | 98% |
| 2015 | 4 | 10.0 | 1.9% | 93% |
| 2011 | 4 | 10.0 | 1.6% | 99% |
| **Serbia** | | | | |
| 2 2019 | 4 | 10.6 | 8.2% | 97% |
| 3 2015 | 4 | 10.7 | 11.3% | 96% |
| 2 2011 | 4 | 10.8 | 9.4% | 97% |
| **Singapore** | | | | |
| 3 2019 | 4 | 10.4 | 12.8% | 97% |
| 2 2015 | 4 | 10.4 | 10.1% | 96% |
| 2 2011 | 4 | 10.4 | 6.3% | 96% |
| 2007 | 4 | 10.4 | 1.5% | 96% |
| 2003 | 4 | 10.3 | 0.0% | 98% |
| 1995 | 4 | 10.3 | 0.0% | 98% |
| **Slovak Republic** | | | | |
| 2 2019 | 4 | 10.4 | 5.5% | 96% |
| 2015 | 4 | 10.4 | 4.2% | 97% |
| 2011 | 4 | 10.4 | 4.6% | 96% |
| 2007 | 4 | 10.4 | 3.3% | 97% |
| **South Africa (5)** | | | | |
| 2019 | 5 | 11.5 | 1.1% | 97% |
| ⧖ 2015 | 5 | 11.5 | 2.2% | 98% |
| **Spain** | | | | |
| 2019 | 4 | 9.9 | 5.4% | 95% |
| 2 2015 | 4 | 9.9 | 5.6% | 95% |
| 2011 | 4 | 9.8 | 5.3% | 97% |
| **Sweden** | | | | |
| 2019 | 4 | 10.8 | 5.4% | 95% |
| 2 2015 | 4 | 10.8 | 5.7% | 95% |
| 2011 | 4 | 10.7 | 4.1% | 91% |
| 2007 | 4 | 10.8 | 3.1% | 97% |
| **United Arab Emirates** | | | | |
| 2019 | 4 | 9.7 | 3.2% | 96% |
| 2015 | 4 | 9.8 | 4.7% | 97% |
| 2011 | 4 | 9.8 | 3.3% | 97% |
| **United States** | | | | |
| 2 † 2019 | 4 | 10.2 | 7.2% | 84% |
| 2 † 2015 | 4 | 10.2 | 6.8% | 81% |
| 2 2011 | 4 | 10.2 | 7.0% | 80% |
| 2 † 2007 | 4 | 10.3 | 9.2% | 84% |
| † 2003 | 4 | 10.2 | 5.1% | 78% |
| 1995 | 4 | 10.2 | 4.7% | 80% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧖ Tested the same cohort of students as other countries, but later in the assessment year.
Saudi Arabia and South Africa in 2019 administered the less difficult fourth grade mathematics assessment. South Africa in 2015 participated in only TIMSS Numeracy at the fifth grade.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.6: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Benchmarking Participants** | | | | |
| **Ontario, Canada** | | | | |
| 2 2019 | 4 | 9.8 | 7.0% | 90% |
| 2015 | 4 | 9.8 | 3.4% | 90% |
| 2011 | 4 | 9.8 | 5.3% | 94% |
| 2 2007 | 4 | 9.8 | 6.3% | 92% |
| 2003 | 4 | 9.8 | 4.8% | 90% |
| 2 1995 | 4 | 9.8 | - | 92% |
| **Quebec, Canada** | | | | |
| 2019 | 4 | 10.1 | 4.4% | 83% |
| ≡ 2015 | 4 | 10.1 | 5.4% | 59% |
| 2011 | 4 | 10.1 | 3.7% | 91% |
| 2 2007 | 4 | 10.1 | 6.4% | 84% |
| 2003 | 4 | 10.1 | 3.6% | 91% |
| 1995 | 4 | 10.3 | - | 81% |
| **Abu Dhabi, UAE** | | | | |
| 2019 | 4 | 9.7 | 3.6% | 95% |
| 2 2015 | 4 | 9.8 | 5.8% | 97% |
| 2011 | 4 | 9.7 | 2.7% | 97% |
| **Dubai, UAE** | | | | |
| 2 2019 | 4 | 9.9 | 5.6% | 97% |
| 2015 | 4 | 9.8 | 5.3% | 97% |
| 2011 | 4 | 9.8 | 5.1% | 96% |
| ⧗ ‡ 2007 | 4 | 10.0 | 5.4% | 67% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧗ Tested the same cohort of students as other countries, but later in the assessment year.
Ontario and Quebec in 1995 participated as part of Canada. A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.7: Coverage of TIMSS 2019 Target Population

| Country | International Target Population | | Exclusions from National Target Population | | |
|---|---|---|---|---|---|
| | Coverage | Notes on Coverage | School-Level Exclusions | Within-Sample Exclusions | Overall Exclusions |
| Australia | 100% | | 1.7% | 2.1% | 3.8% |
| Bahrain | 100% | | 0.3% | 0.2% | 0.6% |
| Chile | 100% | | 0.3% | 1.9% | 2.2% |
| Chinese Taipei | 100% | | 0.1% | 1.3% | 1.5% |
| Cyprus | 100% | | 0.5% | 2.3% | 2.8% |
| [2] Egypt | 100% | | 7.6% | 1.5% | 9.1% |
| England | 100% | | 2.9% | 2.0% | 4.8% |
| Finland | 100% | | 1.5% | 1.5% | 3.1% |
| France | 100% | | 2.8% | 1.0% | 3.8% |
| [1] Georgia | 91% | Students taught in Georgian | 2.2% | 2.1% | 4.3% |
| Hong Kong SAR | 100% | | 1.2% | 2.1% | 3.3% |
| Hungary | 100% | | 2.5% | 1.9% | 4.4% |
| Iran, Islamic Rep. of | 100% | | 0.4% | 0.5% | 0.9% |
| Ireland | 100% | | 0.0% | 0.9% | 1.0% |
| [3] Israel | 100% | | 19.5% | 3.8% | 23.2% |
| Italy | 100% | | 0.8% | 3.6% | 4.3% |
| Japan | 100% | | 0.9% | 1.0% | 1.8% |
| Jordan | 100% | | 0.0% | 0.2% | 0.2% |
| [2] Kazakhstan | 100% | | 2.9% | 2.9% | 5.8% |
| Korea, Rep. of | 100% | | 0.7% | 0.9% | 1.6% |
| Kuwait | 100% | | 1.0% | 1.0% | 2.0% |
| Lebanon | 100% | | 1.2% | 0.0% | 1.2% |
| Lithuania | 100% | | 3.2% | 2.0% | 5.3% |
| Malaysia | 100% | | 1.9% | 1.3% | 3.2% |
| Morocco | 100% | | 0.0% | 0.0% | 0.0% |
| New Zealand | 100% | | 1.5% | 2.7% | 4.2% |
| Norway (9) | 100% | | 1.4% | 2.5% | 4.0% |
| Oman | 100% | | 0.5% | 1.6% | 2.2% |
| Portugal | 100% | | 1.0% | 4.5% | 5.5% |
| Qatar | 100% | | 1.3% | 0.9% | 2.2% |
| Romania | 100% | | 2.7% | 0.5% | 3.2% |
| [2] Russian Federation | 100% | | 2.8% | 2.9% | 5.7% |
| [2] Saudi Arabia | 100% | | 9.1% | 0.9% | 10.0% |
| [2] Singapore | 100% | | 10.1% | 0.2% | 10.3% |
| South Africa (9) | 100% | | 1.0% | 0.1% | 1.1% |
| [2] Sweden | 100% | | 1.7% | 4.6% | 6.3% |
| Turkey | 100% | | 1.1% | 2.4% | 3.4% |
| United Arab Emirates | 100% | | 1.1% | 1.3% | 2.4% |
| United States | 100% | | 0.0% | 3.9% | 3.9% |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | 100% | | 2.1% | 3.4% | 5.5% |
| Quebec, Canada | 100% | | 3.3% | 0.9% | 4.2% |
| Moscow City, Russian Fed. | 100% | | 0.7% | 0.8% | 1.5% |
| Gauteng, RSA (9) | 100% | | 1.8% | 0.2% | 2.1% |
| Western Cape, RSA (9) | 100% | | 0.8% | 0.3% | 1.1% |
| Abu Dhabi, UAE | 100% | | 0.9% | 0.8% | 1.7% |
| [2] Dubai, UAE | 100% | | 3.0% | 2.5% | 5.5% |

1 National Target Population does not include all of the International Target Population.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.8: School Sample Sizes

| Country | Number of Schools in Original Sample | Number of Eligible Schools in Original Sample | Number of Schools in Original Sample that Participated | Number of Replacement Schools that Participated | Total Number of Schools that Participated |
|---|---|---|---|---|---|
| Australia | 289 | 284 | 282 | 2 | 284 |
| Bahrain | 112 | 112 | 112 | 0 | 112 |
| Chile | 169 | 167 | 147 | 17 | 164 |
| Chinese Taipei | 206 | 205 | 200 | 3 | 203 |
| Cyprus | 99 | 98 | 98 | 0 | 98 |
| Egypt | 174 | 169 | 168 | 1 | 169 |
| England | 151 | 151 | 125 | 11 | 136 |
| Finland | 158 | 154 | 154 | 0 | 154 |
| France | 150 | 150 | 150 | 0 | 150 |
| Georgia | 158 | 157 | 142 | 3 | 145 |
| Hong Kong SAR | 158 | 158 | 112 | 24 | 136 |
| Hungary | 155 | 155 | 146 | 8 | 154 |
| Iran, Islamic Rep. of | 220 | 220 | 220 | 0 | 220 |
| Ireland | 152 | 152 | 147 | 2 | 149 |
| Israel | 161 | 161 | 152 | 5 | 157 |
| Italy | 158 | 158 | 153 | 5 | 158 |
| Japan | 150 | 150 | 125 | 17 | 142 |
| Jordan | 248 | 235 | 235 | 0 | 235 |
| Kazakhstan | 169 | 168 | 168 | 0 | 168 |
| Korea, Rep. of | 168 | 168 | 168 | 0 | 168 |
| Kuwait | 178 | 172 | 171 | 0 | 171 |
| Lebanon | 218 | 216 | 189 | 15 | 204 |
| Lithuania | 195 | 195 | 194 | 0 | 194 |
| Malaysia | 178 | 177 | 175 | 2 | 177 |
| Morocco | 253 | 251 | 251 | 0 | 251 |
| New Zealand | 154 | 151 | 115 | 19 | 134 |
| Norway (9) | 166 | 165 | 132 | 25 | 157 |
| Oman | 230 | 228 | 223 | 5 | 228 |
| Portugal | 158 | 158 | 149 | 7 | 156 |
| Qatar | 152 | 152 | 152 | 0 | 152 |
| Romania | 198 | 198 | 189 | 9 | 198 |
| Russian Federation | 204 | 204 | 203 | 1 | 204 |
| Saudi Arabia | 212 | 209 | 208 | 1 | 209 |
| Singapore | 153 | 153 | 153 | 0 | 153 |
| South Africa (9) | 524 | 520 | 516 | 3 | 519 |
| Sweden | 153 | 151 | 149 | 1 | 150 |
| Turkey | 181 | 181 | 180 | 1 | 181 |
| United Arab Emirates | 631 | 623 | 623 | 0 | 623 |
| United States | 325 | 321 | 231 | 42 | 273 |
| **Benchmarking Participants** | | | | | |
| Ontario, Canada | 172 | 170 | 157 | 1 | 158 |
| Quebec, Canada | 166 | 161 | 119 | 5 | 124 |
| Moscow City, Russian Fed. | 152 | 151 | 147 | 3 | 150 |
| Gauteng, RSA (9) | 150 | 150 | 148 | 2 | 150 |
| Western Cape, RSA (9) | 150 | 149 | 148 | 1 | 149 |
| Abu Dhabi, UAE | 230 | 230 | 230 | 0 | 230 |
| Dubai, UAE | 171 | 163 | 163 | 0 | 163 |

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix B.9: Student Sample Sizes

| Country | Within-School Student Participation (Weighted Percentage) | Number of Students Sampled in Participating Schools | Number of Students Withdrawn from Class/School | Number of Students Excluded | Number of Students Eligible | Number of Students Absent | Number of Students Assessed |
|---|---|---|---|---|---|---|---|
| Australia | 91% | 10,383 | 213 | 161 | 10,009 | 949 | 9,060 |
| Bahrain | 97% | 5,947 | 44 | 12 | 5,891 | 166 | 5,725 |
| Chile | 96% | 4,469 | 68 | 76 | 4,325 | 210 | 4,115 |
| Chinese Taipei | 98% | 5,185 | 106 | 42 | 5,037 | 122 | 4,915 |
| Cyprus | 96% | 3,800 | 23 | 94 | 3,683 | 162 | 3,521 |
| Egypt | 97% | 7,700 | 214 | 0 | 7,486 | 276 | 7,210 |
| England | 95% | 3,785 | 140 | 70 | 3,575 | 210 | 3,365 |
| Finland | 96% | 5,252 | 62 | 62 | 5,128 | 254 | 4,874 |
| France | 97% | 4,122 | 53 | 49 | 4,020 | 146 | 3,874 |
| Georgia | 97% | 3,540 | 37 | 73 | 3,430 | 115 | 3,315 |
| Hong Kong SAR | 94% | 3,612 | 12 | 73 | 3,527 | 262 | 3,265 |
| Hungary | 97% | 4,862 | 23 | 86 | 4,753 | 184 | 4,569 |
| Iran, Islamic Rep. of | 98% | 6,242 | 110 | 35 | 6,097 | 117 | 5,980 |
| Ireland | 88% | 4,763 | 46 | 39 | 4,678 | 560 | 4,118 |
| Israel | 93% | 4,154 | 36 | 51 | 4,067 | 336 | 3,731 |
| Italy | 97% | 3,919 | 22 | 153 | 3,744 | 125 | 3,619 |
| Japan | 94% | 4,763 | 3 | 17 | 4,743 | 297 | 4,446 |
| Jordan | 98% | 7,856 | 484 | 13 | 7,359 | 183 | 7,176 |
| Kazakhstan | 99% | 4,587 | 34 | 28 | 4,525 | 72 | 4,453 |
| Korea, Rep. of | 98% | 4,025 | 18 | 37 | 3,970 | 109 | 3,861 |
| Kuwait | 97% | 4,818 | 92 | 0 | 4,726 | 152 | 4,574 |
| Lebanon | 95% | 5,117 | 151 | 0 | 4,966 | 236 | 4,730 |
| Lithuania | 93% | 4,262 | 19 | 98 | 4,145 | 319 | 3,826 |
| Malaysia | 98% | 7,323 | 120 | 0 | 7,203 | 138 | 7,065 |
| Morocco | 98% | 9,081 | 395 | 0 | 8,686 | 228 | 8,458 |
| New Zealand | 91% | 6,775 | 119 | 79 | 6,577 | 526 | 6,051 |
| Norway (9) | 89% | 5,335 | 41 | 141 | 5,153 | 578 | 4,575 |
| Oman | 99% | 7,024 | 132 | 37 | 6,855 | 104 | 6,751 |
| Portugal | 96% | 3,752 | 32 | 152 | 3,568 | 191 | 3,377 |
| Qatar | 97% | 4,196 | 138 | 32 | 4,026 | 142 | 3,884 |
| Romania | 94% | 4,803 | 13 | 15 | 4,775 | 281 | 4,494 |
| Russian Federation | 97% | 4,125 | 28 | 76 | 4,021 | 120 | 3,901 |
| Saudi Arabia | 99% | 5,762 | 19 | 13 | 5,730 | 50 | 5,680 |
| Singapore | 96% | 5,074 | 19 | 0 | 5,055 | 202 | 4,853 |
| South Africa (9) | 96% | 22,658 | 921 | 0 | 21,737 | 908 | 20,829 |
| Sweden | 92% | 4,683 | 64 | 213 | 4,406 | 410 | 3,996 |
| Turkey | 99% | 4,377 | 111 | 123 | 4,143 | 66 | 4,077 |
| United Arab Emirates | 96% | 23,974 | 251 | 315 | 23,408 | 1,074 | 22,334 |
| United States | 94% | 9,924 | 307 | 242 | 9,375 | 677 | 8,698 |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 94% | 4,194 | 63 | 75 | 4,056 | 280 | 3,776 |
| Quebec, Canada | 95% | 3,411 | 28 | 7 | 3,376 | 198 | 3,178 |
| Moscow City, Russian Fed. | 97% | 3,963 | 21 | 19 | 3,923 | 140 | 3,783 |
| Gauteng, RSA (9) | 97% | 6,025 | 188 | 0 | 5,837 | 204 | 5,633 |
| Western Cape, RSA (9) | 95% | 5,901 | 284 | 0 | 5,617 | 266 | 5,351 |
| Abu Dhabi, UAE | 96% | 8,770 | 41 | 86 | 8,643 | 439 | 8,204 |
| Dubai, UAE | 96% | 6,308 | 199 | 141 | 5,968 | 240 | 5,728 |

Students attending a sampled class at the time the sample was chosen but leaving the class before the assessment was administered were classified as "withdrawn."
Students with a disability or language barrier that prevented them from participating in the assessment were classified as "excluded."
Students not present when the assessment was administered, and not subsequently assessed in a make-up session, were classified as "absent."

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## Appendix B.10: Participation Rates (Weighted)

| Country | School Participation | | Class Participation | Student Participation | Overall Participation | |
|---|---|---|---|---|---|---|
| | Before Replacement | After Replacement | | | Before Replacement | After Replacement |
| Australia | 98% | 100% | 100% | 91% | 89% | 91% |
| Bahrain | 100% | 100% | 100% | 97% | 97% | 97% |
| Chile | 90% | 99% | 100% | 96% | 86% | 95% |
| Chinese Taipei | 98% | 99% | 100% | 98% | 96% | 97% |
| Cyprus | 100% | 100% | 100% | 96% | 96% | 96% |
| Egypt | 99% | 100% | 100% | 97% | 96% | 97% |
| England | 83% | 90% | 100% | 95% | 79% | 85% |
| Finland | 100% | 100% | 100% | 96% | 95% | 95% |
| France | 100% | 100% | 100% | 97% | 97% | 97% |
| Georgia | 90% | 92% | 100% | 97% | 88% | 89% |
| † Hong Kong SAR | 70% | 86% | 100% | 94% | 66% | 81% |
| Hungary | 95% | 99% | 100% | 97% | 92% | 96% |
| Iran, Islamic Rep. of | 100% | 100% | 100% | 98% | 98% | 98% |
| Ireland | 97% | 98% | 100% | 88% | 85% | 86% |
| Israel | 95% | 98% | 100% | 93% | 88% | 91% |
| Italy | 97% | 100% | 100% | 97% | 94% | 97% |
| Japan | 83% | 94% | 100% | 94% | 77% | 88% |
| Jordan | 100% | 100% | 100% | 98% | 98% | 98% |
| Kazakhstan | 100% | 100% | 100% | 99% | 99% | 99% |
| Korea, Rep. of | 100% | 100% | 100% | 98% | 98% | 98% |
| Kuwait | 99% | 99% | 100% | 97% | 96% | 96% |
| Lebanon | 82% | 93% | 100% | 95% | 78% | 88% |
| Lithuania | 99% | 99% | 100% | 93% | 92% | 92% |
| Malaysia | 99% | 100% | 100% | 98% | 97% | 98% |
| Morocco | 100% | 100% | 100% | 98% | 98% | 98% |
| † New Zealand | 77% | 89% | 100% | 91% | 70% | 81% |
| † Norway (9) | 79% | 95% | 99% | 89% | 70% | 84% |
| Oman | 99% | 100% | 100% | 99% | 97% | 99% |
| Portugal | 95% | 99% | 99% | 96% | 90% | 94% |
| Qatar | 100% | 100% | 100% | 97% | 97% | 97% |
| Romania | 95% | 100% | 100% | 94% | 89% | 94% |
| Russian Federation | 99% | 100% | 100% | 97% | 97% | 97% |
| Saudi Arabia | 100% | 100% | 100% | 99% | 99% | 99% |
| Singapore | 100% | 100% | 100% | 96% | 96% | 96% |
| South Africa (9) | 99% | 100% | 100% | 96% | 95% | 96% |
| Sweden | 98% | 99% | 100% | 92% | 90% | 91% |
| Turkey | 100% | 100% | 100% | 99% | 98% | 99% |
| United Arab Emirates | 100% | 100% | 100% | 96% | 96% | 96% |
| † United States | 72% | 85% | 100% | 94% | 67% | 79% |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 93% | 93% | 100% | 94% | 87% | 88% |
| ‡ Quebec, Canada | 74% | 77% | 99% | 95% | 70% | 73% |
| Moscow City, Russian Fed. | 99% | 100% | 100% | 97% | 96% | 97% |
| Gauteng, RSA (9) | 99% | 100% | 100% | 97% | 95% | 97% |
| Western Cape, RSA (9) | 99% | 100% | 100% | 95% | 95% | 95% |
| Abu Dhabi, UAE | 100% | 100% | 100% | 96% | 96% | 96% |
| Dubai, UAE | 100% | 100% | 100% | 96% | 96% | 96% |

TIMSS guidelines for sampling participation: The minimum acceptable participation rates were 85 percent of both schools and students, or a combined rate (the product of school and student participation) of 75 percent.

Participants not meeting these guidelines were annotated as follows:

† Met guidelines for sample participation rates only after replacement schools were included

‡ Nearly satisfied guidelines for sample participation rates after replacement schools were included

≡ Did not satisfy guidelines for sample participation rates

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## Appendix B.11: Trends in Student Populations

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Australia** | | | | |
| 2019 | 8 | 14.1 | 3.8% | 91% |
| 2015 | 8 | 14.0 | 3.5% | 90% |
| 2011 | 8 | 14.0 | 3.2% | 88% |
| 2007 | 8 | 13.9 | 1.9% | 93% |
| 2003 | 8 | 13.9 | 1.3% | 83% |
| ‡ 1995 | 8 or 9 | 14.2 | 0.8% | 70% |
| **Bahrain** | | | | |
| 2019 | 8 | 13.8 | 0.6% | 97% |
| 2015 | 8 | 14.0 | 3.8% | 97% |
| ⧖ 2011 | 8 | 14.4 | 1.6% | 97% |
| 2007 | 8 | 14.1 | 1.5% | 97% |
| 2003 | 8 | 14.1 | 0.0% | 98% |
| **Chile** | | | | |
| 2019 | 8 | 14.2 | 2.2% | 95% |
| 2015 | 8 | 14.3 | 1.9% | 85% |
| 2011 | 8 | 14.2 | 2.8% | 95% |
| 2003 | 8 | 14.2 | 2.2% | 99% |
| 1999 | 8 | 14.4 | 2.8% | 96% |
| **Chinese Taipei** | | | | |
| 2019 | 8 | 14.3 | 1.5% | 97% |
| 2015 | 8 | 14.3 | 1.7% | 98% |
| 2011 | 8 | 14.2 | 1.3% | 99% |
| 2007 | 8 | 14.2 | 3.3% | 99% |
| 2003 | 8 | 14.2 | 4.8% | 99% |
| 1999 | 8 | 14.2 | 1.6% | 99% |
| **Cyprus** | | | | |
| 2019 | 8 | 13.8 | 2.8% | 96% |
| 2007 | 8 | 13.8 | 2.5% | 96% |
| 2003 | 8 | 13.8 | 2.5% | 96% |
| 1999 | 8 | 13.8 | 0.8% | 97% |
| 1995 | 8 | 13.7 | 0.0% | 97% |
| **Egypt** | | | | |
| 2 2019 | 8 | 13.9 | 9.1% | 97% |
| 2015 | 8 | 14.1 | 0.1% | 91% |
| 2007 | 8 | 14.1 | 0.5% | 98% |
| 2003 | 8 | 14.4 | 3.4% | 97% |
| **England** | | | | |
| 2019 | 9 | 14.0 | 4.8% | 85% |
| 2015 | 9 | 14.1 | 2.3% | 92% |
| ‡ 2011 | 9 | 14.2 | 2.2% | 70% |
| † 2007 | 9 | 14.2 | 2.3% | 75% |
| ≡ 2003 | 9 | 14.3 | 2.1% | 46% |
| † 1999 | 9 | 14.2 | 5.0% | 77% |
| 3 † 1995 | 9 | 14.0 | 11.3% | 77% |
| **Finland** | | | | |
| 2019 | 8 | 14.8 | 3.1% | 95% |
| 2011 | 8 | 14.8 | 3.4% | 93% |
| **France** | | | | |
| 2019 | 8 | 13.9 | 3.8% | 97% |
| 1995 | 8 | 14.3 | 2.0% | 82% |
| **Georgia** | | | | |
| 1 2019 | 8 | 13.8 | 4.3% | 89% |
| 1 2 2015 | 8 | 13.7 | 6.0% | 98% |
| 1 2011 | 8 | 14.2 | 4.5% | 97% |
| 1 2007 | 8 | 14.2 | 3.9% | 97% |
| **Hong Kong SAR** | | | | |
| † 2019 | 8 | 14.1 | 3.3% | 81% |
| 2015 | 8 | 14.2 | 1.6% | 81% |
| 2011 | 8 | 14.2 | 5.3% | 75% |
| † 2007 | 8 | 14.4 | 3.8% | 75% |
| † 2003 | 8 | 14.4 | 3.4% | 80% |
| † 1999 | 8 | 14.2 | 0.8% | 74% |
| 1995 | 8 | 14.2 | 2.0% | 81% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧖ Tested the same cohort of students as other countries, but later in the assessment year.
Egypt's 2015 exclusion rate may be underestimated.
Georgia in 2011 excluded schools in South Ossetia and Abkhazia due to lack of access and absence of official statistics. Abkhazia refugee schools in other territories of Georgia were included in the sample frame.

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## Appendix B.11: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Hungary** | | | | |
| 2019 | 8 | 14.6 | 4.4% | 96% |
| 2015 | 8 | 14.7 | 5.4% | 96% |
| 2011 | 8 | 14.7 | 4.4% | 95% |
| 2007 | 8 | 14.6 | 3.9% | 96% |
| [2] 2003 | 8 | 14.5 | 8.5% | 94% |
| 1999 | 8 | 14.4 | 4.3% | 93% |
| 1995 | 8 | 14.3 | 3.8% | 87% |
| **Iran, Islamic Rep. of** | | | | |
| 2019 | 8 | 14.1 | 0.9% | 98% |
| 2015 | 8 | 14.2 | 2.2% | 98% |
| 2011 | 8 | 14.3 | 2.2% | 99% |
| 2007 | 8 | 14.2 | 0.5% | 98% |
| [2] 2003 | 8 | 14.4 | 6.5% | 98% |
| 1999 | 8 | 14.6 | 4.4% | 98% |
| 1995 | 8 | 14.6 | 0.3% | 98% |
| **Ireland** | | | | |
| 2019 | 8 | 14.4 | 1.0% | 86% |
| 2015 | 8 | 14.4 | 1.2% | 91% |
| 1995 | 8 | 14.4 | 0.4% | 81% |
| **Israel** | | | | |
| [3] 2019 | 8 | 14.0 | 23.2% | 91% |
| [3] 2015 | 8 | 14.0 | 22.8% | 93% |
| [3] 2011 | 8 | 14.0 | 22.6% | 92% |
| **Italy** | | | | |
| 2019 | 8 | 13.7 | 4.3% | 97% |
| [2] 2015 | 8 | 13.8 | 6.1% | 93% |
| 2011 | 8 | 13.8 | 4.7% | 93% |
| 2007 | 8 | 13.9 | 5.0% | 96% |
| 2003 | 8 | 13.9 | 3.6% | 97% |
| [2] 1999 | 8 | 14.0 | 6.7% | 97% |
| **Japan** | | | | |
| 2019 | 8 | 14.4 | 1.8% | 88% |
| 2015 | 8 | 14.5 | 2.3% | 93% |
| 2011 | 8 | 14.5 | 2.8% | 87% |
| 2007 | 8 | 14.5 | 3.5% | 91% |
| 2003 | 8 | 14.4 | 0.6% | 93% |
| 1999 | 8 | 14.4 | 1.3% | 89% |
| 1995 | 8 | 14.4 | 0.6% | 90% |
| **Jordan** | | | | |
| 2019 | 8 | 13.9 | 0.2% | 98% |
| 2015 | 8 | 13.8 | 1.0% | 96% |
| 2011 | 8 | 13.9 | 0.4% | 96% |
| 2007 | 8 | 14.0 | 2.0% | 96% |
| 2003 | 8 | 13.9 | 1.3% | 96% |
| 1999 | 8 | 14.0 | 3.0% | 99% |
| **Kazakhstan** | | | | |
| [2] 2019 | 8 | 14.3 | 5.8% | 99% |
| 2011 | 8 | 14.6 | 5.1% | 98% |
| **Korea, Rep. of** | | | | |
| 2019 | 8 | 14.5 | 1.6% | 98% |
| 2015 | 8 | 14.4 | 2.1% | 98% |
| 2011 | 8 | 14.3 | 1.9% | 99% |
| 2007 | 8 | 14.3 | 1.6% | 99% |
| ⧗ 2003 | 8 | 14.6 | 4.9% | 98% |
| 1999 | 8 | 14.4 | 4.0% | 100% |
| 1995 | 8 | 14.2 | 3.8% | 95% |
| **Kuwait** | | | | |
| 2019 | 8 | 13.8 | 2.0% | 96% |
| 2015 | 8 | 13.7 | 3.3% | 85% |
| **Lebanon** | | | | |
| 2019 | 8 | 14.0 | 1.2% | 88% |
| 2015 | 8 | 14.2 | 1.3% | 88% |
| 2011 | 8 | 14.3 | 1.4% | 94% |
| 2007 | 8 | 14.4 | 1.4% | 85% |
| 2003 | 8 | 14.6 | 1.4% | 91% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧗ Tested the same cohort of students as other countries, but later in the assessment year.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Appendix B.11: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Lithuania** | | | | |
| 2019 | 8 | 14.7 | 5.3% | 92% |
| 2 2015 | 8 | 14.7 | 7.0% | 93% |
| 1 2011 | 8 | 14.7 | 4.8% | 92% |
| 1 2007 | 8 | 14.9 | 4.2% | 90% |
| 1 2003 | 8 | 14.9 | 2.6% | 84% |
| 1 ⧖ 1999 | 8 | 15.2 | 4.5% | 89% |
| 1 2 1995 | 8 | 14.3 | 6.6% | 83% |
| **Malaysia** | | | | |
| 2019 | 8 | 14.3 | 3.2% | 98% |
| 2015 | 8 | 14.3 | 4.3% | 98% |
| 2011 | 8 | 14.4 | 0.1% | 98% |
| 2007 | 8 | 14.3 | 3.3% | 98% |
| 2003 | 8 | 14.3 | 4.0% | 98% |
| 1999 | 8 | 14.4 | 4.6% | 99% |
| **Morocco** | | | | |
| 2019 | 8 | 14.5 | 0.0% | 98% |
| 2015 | 8 | 14.5 | 0.0% | 95% |
| 2011 | 8 | 14.7 | 0.1% | 94% |
| **New Zealand** | | | | |
| † 2019 | 8.5 - 9.5 | 13.9 | 4.2% | 81% |
| † 2015 | 8.5 - 9.5 | 14.1 | 3.1% | 81% |
| 2011 | 8.5 - 9.5 | 14.1 | 3.2% | 88% |
| 2003 | 8.5 - 9.5 | 14.1 | 4.4% | 90% |
| 1999 | 8.5 - 9.5 | 14.0 | 2.4% | 91% |
| 1995 | 8.5 - 9.5 | 14.0 | 1.7% | 94% |
| **Norway (9)** | | | | |
| † 2019 | 9 | 14.7 | 4.0% | 84% |
| 2015 | 9 | 14.7 | 3.7% | 87% |
| **Norway (8)** | | | | |
| 2015 | 8 | 13.7 | 4.1% | 87% |
| 2011 | 8 | 13.7 | 1.9% | 84% |
| 2007 | 8 | 13.8 | 2.6% | 86% |
| 2003 | 7 | 13.8 | 2.3% | 85% |
| 1995 | 7 | 13.9 | 2.2% | 93% |
| **Oman** | | | | |
| 2019 | 8 | 13.9 | 2.2% | 99% |
| 2015 | 8 | 14.0 | 0.4% | 96% |
| 2011 | 8 | 14.1 | 1.2% | 97% |
| 2007 | 8 | 14.3 | 1.2% | 99% |
| **Portugal** | | | | |
| 2019 | 8 | 14.0 | 5.5% | 94% |
| 1995 | 8 | 14.5 | 0.3% | 92% |
| **Qatar** | | | | |
| 2019 | 8 | 14.0 | 2.2% | 97% |
| 2015 | 8 | 14.1 | 3.2% | 96% |
| 2011 | 8 | 14.0 | 4.5% | 99% |
| **Romania** | | | | |
| 2019 | 8 | 14.8 | 3.2% | 94% |
| 2011 | 8 | 14.9 | 1.3% | 99% |
| 2007 | 8 | 15.0 | 1.8% | 97% |
| 2003 | 8 | 15.0 | 0.5% | 98% |
| 1999 | 8 | 14.8 | 3.7% | 97% |
| 1995 | 8 | 14.6 | 2.8% | 89% |
| **Russian Federation** | | | | |
| 2 2019 | 8 | 14.8 | 5.7% | 97% |
| 2015 | 8 | 14.7 | 3.7% | 97% |
| 2 2011 | 8 | 14.7 | 6.0% | 98% |
| 2007 | 7 or 8 | 14.6 | 2.3% | 97% |
| 2003 | 7 or 8 | 14.2 | 5.5% | 96% |
| 1999 | 7 or 8 | 14.1 | 1.7% | 97% |
| 2 1995 | 7 or 8 | 14.0 | 6.3% | 95% |
| **Saudi Arabia** | | | | |
| 2 2019 | 8 | 13.9 | 10.0% | 99% |
| 2015 | 8 | 14.1 | 2.1% | 97% |
| 2011 | 8 | 14.1 | 1.2% | 98% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧖ Tested the same cohort of students as other countries, but later in the assessment year.
Results for Lithuania before 2015 do not include students taught in Polish or Russian. Lithuania in 1999 tested the same cohort of students as other countries, but later in the assessment year.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Appendix B.11: Trends in Student Populations

(Continued)

| Country | Years of Formal Schooling* | Average Age at Time of Testing | Overall Exclusion Rates | Overall Participation Rates (After Replacement) |
|---|---|---|---|---|
| **Singapore** | | | | |
| 2 2019 | 8 | 14.3 | 10.3% | 96% |
| 2 2015 | 8 | 14.4 | 7.0% | 97% |
| 2 2011 | 8 | 14.4 | 6.0% | 95% |
| 2007 | 8 | 14.4 | 1.8% | 95% |
| 2003 | 8 | 14.3 | 0.0% | 97% |
| 1999 | 8 | 14.4 | 0.0% | 98% |
| 1995 | 8 | 14.5 | 4.6% | 95% |
| **South Africa (9)** | | | | |
| 2019 | 9 | 15.5 | 1.1% | 96% |
| ⧖ 2015 | 9 | 15.7 | 1.5% | 96% |
| 2011 | 9 | 16.0 | 1.4% | 95% |
| **Sweden** | | | | |
| 2 2019 | 8 | 14.8 | 6.3% | 91% |
| 2015 | 8 | 14.7 | 5.4% | 94% |
| 2011 | 8 | 14.8 | 5.1% | 92% |
| 2007 | 8 | 14.8 | 3.6% | 94% |
| 2003 | 8 | 14.9 | 2.8% | 87% |
| 1995 | 7 | 14.9 | 0.9% | 90% |
| **Turkey** | | | | |
| 2019 | 8 | 13.9 | 3.4% | 99% |
| 2015 | 8 | 13.9 | 1.3% | 98% |
| 2011 | 8 | 14.0 | 1.5% | 97% |
| **United Arab Emirates** | | | | |
| 2019 | 8 | 13.7 | 2.4% | 96% |
| 2015 | 8 | 13.9 | 3.6% | 97% |
| 2011 | 8 | 13.9 | 2.8% | 97% |
| **United States** | | | | |
| † 2019 | 8 | 14.2 | 3.9% | 79% |
| † 2015 | 8 | 14.2 | 5.1% | 78% |
| 2 2011 | 8 | 14.2 | 7.2% | 81% |
| 2 † 2007 | 8 | 14.3 | 7.9% | 77% |
| ‡ 2003 | 8 | 14.2 | 4.9% | 73% |
| 1999 | 8 | 14.2 | 3.9% | 85% |
| † 1995 | 8 | 14.2 | 2.1% | 78% |
| **Benchmarking Participants** | | | | |
| **Ontario, Canada** | | | | |
| 2019 | 8 | 13.8 | 5.5% | 88% |
| 2015 | 8 | 13.8 | 2.5% | 87% |
| 2 2011 | 8 | 13.8 | 5.6% | 93% |
| 2 2007 | 8 | 13.8 | 6.2% | 89% |
| 2 2003 | 8 | 13.8 | 6.0% | 89% |
| 1999 | 8 | 13.9 | 5.1% | 93% |
| 1995 | 8 | 14.0 | - | 90% |
| **Quebec, Canada** | | | | |
| ‡ 2019 | 8 | 14.2 | 4.2% | 73% |
| ≡ 2015 | 8 | 14.3 | 5.3% | 58% |
| 2011 | 8 | 14.2 | 4.9% | 88% |
| 3 2007 | 8 | 14.2 | 13.6% | 77% |
| 2003 | 8 | 14.2 | 4.8% | 85% |
| 1999 | 8 | 14.3 | 1.3% | 92% |
| 1995 | 8 | 14.5 | - | 89% |
| **Abu Dhabi, UAE** | | | | |
| 2019 | 8 | 13.7 | 1.7% | 96% |
| 2015 | 8 | 13.9 | 4.1% | 98% |
| 2011 | 8 | 13.8 | 1.7% | 96% |
| **Dubai, UAE** | | | | |
| 2 2019 | 8 | 13.9 | 5.5% | 96% |
| 2015 | 8 | 13.9 | 5.2% | 97% |
| 2011 | 8 | 13.9 | 4.0% | 95% |
| ⧖ ‡ 2007 | 8 | 14.2 | 5.0% | 69% |

* Represents years of schooling counting from the first year of ISCED Level 1.
Data are included only for assessment years with comparable results for each country.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
⧖ Tested the same cohort of students as other countries, but later in the assessment year.
Ontario and Quebec in 1995 and 1999 participated as part of Canada. A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# APPENDIX C

# The Test-Curriculum Matching Analysis

TIMSS went to great lengths to ensure that comparisons of student achievement across countries are as fair and equitable as possible. The *TIMSS 2019 Assessment Frameworks* were designed to specify the important aspects of mathematics and science that participating countries agreed should be the focus of an international assessment of mathematics and science achievement. The assessment items were developed through a collaborative process with national representatives to reflect the assessment specifications articulated in the frameworks and all items were field tested extensively in participating countries. Finalizing the TIMSS 2019 assessments involved a series of reviews by representatives of the participating countries, experts in mathematics and science, and measurement specialists. At the end of this process, the National Research Coordinators (NRCs) from each participating country formally approved the TIMSS 2019 assessments, thus accepting the assessments as sufficiently fair to compare their students' mathematics and science achievement with that of students from other countries.

Although the assessments were developed to represent agreed-upon frameworks and were intended to have as much in common across countries as possible, it was unavoidable that the match between the TIMSS 2019 assessments (or tests) and countries' mathematics and science curricula would not be the same for all countries. To restrict test items to just those topics included in the curricula and covered in the same sequence in all participating countries would severely limit test coverage and restrict the research questions that the study is designed to address. The tests, therefore, inevitably have some items measuring topics unfamiliar to some students in some countries.

The Test-Curriculum Matching Analysis (TCMA) was conducted to investigate the extent to which the TIMSS 2019 assessments matched each country's mathematics and science curricula.[1] The TCMA also investigates the impact on a country's performance of including only achievement items that were judged to be relevant to its own curriculum.

To gather data about the extent to which the TIMSS 2019 assessments matched the curricula of the TIMSS countries and benchmarking participants, NRCs were asked to examine each TIMSS achievement item and indicate whether the particular knowledge and skills assessed by the item was in their country's intended curriculum at the grade tested (fourth or eighth grade). The NRCs were asked to choose persons very familiar with the curriculum at these grades to make this determination.

In some countries, the curriculum was prescribed for a range of grades and was not explicit about what was to be covered by the end of the fourth or eighth grades. For example, in France the curriculum specifies the curricular goals to be achieved by the end of primary school Cycle 2 (Grades

1 It should be noted that because there may be content areas covered by the curricula in some countries that are not covered by the TIMSS 2019 tests, the TCMA may not provide complete information about how well the tests cover the curricula of the countries.

1–3), Cycle 3 (Grades 4–6), and Cycle 4 (Grades 7–9), rather than a grade-by-grade specification (see *TIMSS 2019 Encyclopedia*). In such situations, coordinators were asked to make the best judgment possible. Because an item might be in the curriculum for some but not all students in a country, NRCs were asked to consider an item included if it was in the intended curriculum for more than 50 percent of the students.

## Match Between TIMSS Tests and Countries' Mathematics and Science Curricula

Exhibits C.1 through C.4 present the TCMA results for the TIMSS 2019 mathematics test and science test at the fourth and eighth grades, respectively. The bottom row of each exhibit shows the number of items, with the corresponding number of score points in parentheses, identified by each country as appropriate according to its curriculum.

In mathematics at the fourth grade (Exhibit C.1), countries' average mathematics achievement was based on students' performance on 171 items yielding 183 score points, which is the maximum number of items and score points a country could identify.[2] Generally, the proportion of mathematics items judged appropriate was fairly high. Reading along the bottom row, it can be seen that 4 of the 47 countries included in the analysis judged 100 percent of the items to be included in their curricula as did 2 of the 6 benchmarking participants. A further 36 countries and 4 benchmarking participants judged 75 percent or more (138 score points for eTIMSS, 136 score points for paperTIMSS) to be appropriate. All but 1 of the participants at the fourth grade agreed that more than half of the mathematics items were included in their curricula.

The last page of Exhibit C.1 presents the TCMA results for the 11 countries that administered the less difficult version of the fourth grade mathematics assessment, which included 177 items yielding 190 score points.[3] Two of the 11 countries judged 100 percent of the items to be included in their mathematics curricula, and an additional 7 countries judged 75 percent or more (143 score points) to be appropriate. All 11 countries identified more than half of the items as being appropriate for their students.

In fourth grade science (Exhibit C.2), the maximum number of score points in the assessment was 174 for eTIMSS countries and 173 for paperTIMSS countries. Similar to mathematics, the proportion of science items judged appropriate by the countries at the fourth grade was fairly high overall, but with more variation than for mathematics. A number of high performing countries, notably Singapore, Korea, the Russian Federation, Japan, and Chinese Taipei, chose relatively few fourth grade science items as appropriate for their students. Of the 58 countries and 6 benchmarking participants at the fourth grade, 7 countries and 2 benchmarking participants judged 100 percent of the science items to be included in their curricula. An additional 25 countries and 1 benchmarking participant judged 75 percent or more (131 score points for eTIMSS and 130 for paperTIMSS).

2 TIMSS 2019 fourth grade mathematics achievement scores were estimated based on 171 items and 183 score points for eTIMSS countries and 169 items and 181 score points for paperTIMSS countries. See Chapter 10 of *Methods and Procedures: TIMSS 2019 Technical Report* for details about items deleted or recoded for scaling.

3 About one-third of the items in the less difficult mathematics assessment are shared with the regular mathematics assessment.

At the eighth grade, the proportions of mathematics and science items judged appropriate were somewhat higher compared with the fourth grade. In mathematics (Exhibit C.3), 7 of the 39 participating countries and 2 of the 7 benchmarking participants judged 100 percent of the mathematics items to be included in their curricula, including all 206 items yielding 217 score points. Additionally, 31 countries and the remaining 5 benchmarking participants judged 75 percent or more (163 score points) to be appropriate. In science (Exhibit C.4), 4 of the 39 countries and 2 of the 7 benchmarking participants judged 100 percent of the science items to be appropriate (all 233 score points). A further 26 countries and 4 of the 5 benchmarking participants judged 75 percent or more (175 score points) to be appropriate. All but 2 countries agreed that more than half of the science items were included in their curricula at the eighth grade.

## Impact of Item Selection on Average Scale Scores

The first columns in Exhibits C.1 through C.4 show, for each grade and subject, the average scale score and its standard error, for each country on the assessment as a whole, based on all test items as reported in Exhibits 1.1, 2.1, 3.1, and 4.1 of this report. Countries are presented in descending order according to this overall achievement score. Subsequent columns show the average performance of the countries based only on those items judged appropriate by the participant listed at the head of the column. To interpret these exhibits, choosing a country at the top of the exhibit and reading down its column provides the average scale score and standard error for the country in each row, based only on the items selected as appropriate for that country's students.[4] For example, in Exhibit C.1, looking down the column for Singapore shows that Singapore had an average fourth grade mathematics scale score of 629 based on its own set of items, while Hong Kong SAR had an average scale score of 602 based on Singapore's items, Korea had an average scale score of 599 based on Singapore's items, and so forth.

The shaded diagonal element in these exhibits shows how each country performed on the set of items that it selected based on its own curriculum. In general, countries performed better on their own item sets than on the items overall, although not by much. Comparing the diagonal element for a country with the overall average scale score shows the difference between performance on the set of items chosen as appropriate for that country and performance on the test as a whole. To illustrate, Singapore's average scale score based on all fourth grade mathematics items was 625, as shown in the first column. Singapore's diagonal element in Exhibit C.1 (629) shows that students from Singapore performed slightly better on the set of items selected by Singapore than they did on the assessment as a whole, although this 4-point difference was within the margin of sampling error. In fourth grade mathematics, most participants had a difference of no more than 1 or 2 scale score points between the two scores. The largest differences occurred in the Russian Federation (16 points), Bulgaria (11 points), Croatia (11 points), and Bosnia and Herzegovina (10 points).

4 Standard errors provide a margin of error for comparing average scale scores across countries. Differences in one country's average scale scores across exhibit columns should be interpreted with caution.

Compared with mathematics at the fourth grade, the differences between countries' performance based on their chosen set of items (the diagonal element) and their overall performance based on all items were somewhat larger in science (Exhibit C.2). Although most participants had a difference of 1 or 2 scale score points or fewer, the largest difference was observed in Singapore (80 points), followed by Japan and Chinese Taipei (24–30 points). Of the 58 countries and 6 benchmarking participants included in the analysis, Singapore and Japan had the smallest proportions of science test items identified as appropriate for their students (25–27%).

The differences between countries' average scale scores based on all items and based on their item subsets were smaller at the eighth grade. In mathematics (Exhibit C.3), 27 of the 39 countries and 5 of the 7 benchmarking participants had differences of 1 scale score point or fewer. Lebanon had the largest difference in mathematics performance between the average score based on its own item selections and the average score based on all items (10 points). The results were similar in science (Exhibit C.4), with Lebanon again having the largest difference between performance estimates (17 points). Japan, Singapore, and Cyprus had the next largest differences (12–14 points).

The TCMA results show that the selection of items does not have a major effect on the relative performance of countries. Participants that had relatively high or low mathematics or science achievement based on all the items also had relatively high or low achievement based on each of the various sets of items selected for the TCMA. Although there are some changes in the ordering of countries based on the items selected for the TCMA, most of these differences are within the boundaries of sampling error.[5]

Even when countries performed better on the items identified as being appropriate for their curriculum than they did overall, their performance relative to other participants changed very little. As an example, consider the 64 items (65 score points) selected by Korea in science at the fourth grade (Exhibit C.2). The students in Korea had higher average achievement based on these items (604) than on the test as a whole (588). However, most other countries also had higher achievement based on this subset of items selected by Korea. For example, Singapore and Japan also had higher achievement based on Korea's selected items compared with their average achievement based on all items.

The TCMA results provide evidence that the TIMSS 2019 assessment provides a sound basis for comparing achievement of the participating countries and benchmarking entities. This result is not unexpected, given that making the assessment as fair as possible was a major consideration in test development and reporting. The fact that the majority of countries indicated that most items were appropriate for their students means that the different average scale scores were based on many of the same items. Insofar as countries rejected items that would be difficult for their students, these items tended to be difficult for students in other countries as well. The analysis shows that omitting such items tends to improve the results for that country, but also tends to improve the results for all other countries, so that the overall pattern of relative performance is largely unaffected.

5 Small differences in average scale scores between adjacent countries shown in the exhibits usually are not statistically significant with 95 percent confidence.

# Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

Read down the column under a country name to compare achievement scores based on the items identified by that country. Scores on the diagonal are countries' achievement scores based on the test items they identified.

| Country | Average Mathematics Scale Score based on All Items | Singapore | Hong Kong SAR | Korea, Rep. of | Chinese Taipei | Japan | Russian Federation | Northern Ireland | England | Ireland | Latvia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | 629 (3.9) | 624 (4.0) | 625 (3.9) | 626 (3.9) | 624 (3.9) | 623 (4.0) | 626 (3.8) | 625 (3.9) | 627 (3.9) | 619 (3.8) |
| Hong Kong SAR | 602 (3.3) | 602 (3.4) | 601 (3.4) | 601 (3.3) | 601 (3.4) | 601 (3.3) | 598 (3.7) | 602 (3.3) | 601 (3.3) | 602 (3.3) | 600 (3.3) |
| Korea, Rep. of | 600 (2.2) | 599 (2.2) | 599 (2.3) | 606 (2.3) | 598 (2.3) | 604 (2.3) | 592 (2.3) | 600 (2.2) | 599 (2.2) | 600 (2.2) | 596 (2.2) |
| Chinese Taipei | 599 (1.9) | 601 (2.0) | 599 (2.0) | 601 (1.9) | 601 (2.0) | 604 (2.0) | 593 (2.1) | 600 (2.0) | 600 (1.9) | 600 (1.9) | 592 (2.0) |
| Japan | 593 (1.8) | 591 (1.8) | 591 (1.8) | 598 (1.7) | 591 (1.7) | 601 (1.7) | 586 (1.8) | 593 (1.8) | 594 (1.7) | 593 (1.8) | 591 (1.7) |
| Russian Federation | 567 (3.3) | 565 (3.3) | 568 (3.4) | 566 (3.3) | 567 (3.3) | 567 (3.3) | 583 (3.5) | 566 (3.3) | 567 (3.3) | 567 (3.3) | 572 (3.4) |
| Northern Ireland | 566 (2.7) | 569 (2.8) | 567 (2.9) | 566 (2.8) | 567 (2.8) | 564 (2.8) | 566 (3.0) | 566 (2.8) | 566 (2.7) | 566 (2.7) | 565 (2.7) |
| England | 556 (3.0) | 559 (3.1) | 554 (3.1) | 556 (3.0) | 556 (3.1) | 553 (3.0) | 549 (3.3) | 557 (3.0) | 556 (3.0) | 556 (3.0) | 554 (3.0) |
| Ireland | 548 (2.5) | 550 (2.5) | 549 (2.5) | 548 (2.5) | 549 (2.5) | 547 (2.5) | 545 (2.5) | 549 (2.5) | 549 (2.5) | 549 (2.5) | 546 (2.4) |
| Latvia | 546 (2.6) | 545 (2.5) | 547 (2.7) | 545 (2.5) | 546 (2.6) | 546 (2.6) | 557 (2.9) | 546 (2.6) | 546 (2.6) | 546 (2.6) | 552 (2.7) |
| Norway (5) | 543 (2.2) | 543 (2.2) | 542 (2.2) | 542 (2.2) | 542 (2.2) | 540 (2.2) | 536 (2.2) | 544 (2.2) | 542 (2.2) | 543 (2.2) | 542 (2.2) |
| Lithuania | 542 (2.8) | 539 (2.8) | 541 (2.9) | 541 (2.7) | 540 (2.8) | 543 (2.7) | 545 (3.0) | 541 (2.8) | 541 (2.7) | 542 (2.8) | 546 (2.9) |
| Austria | 539 (2.0) | 540 (2.0) | 540 (2.0) | 538 (2.0) | 540 (2.0) | 539 (2.1) | 543 (2.0) | 539 (2.0) | 539 (2.0) | 539 (2.0) | 539 (2.1) |
| Netherlands | 538 (2.2) | 536 (2.2) | 532 (2.2) | 538 (2.2) | 536 (2.2) | 536 (2.3) | 532 (2.3) | 538 (2.2) | 537 (2.2) | 537 (2.2) | 540 (2.3) |
| United States | 535 (2.5) | 536 (2.6) | 536 (2.6) | 534 (2.5) | 536 (2.6) | 534 (2.5) | 534 (2.5) | 535 (2.5) | 534 (2.6) | 535 (2.5) | 534 (2.5) |
| Czech Republic | 533 (2.5) | 532 (2.5) | 535 (2.6) | 532 (2.6) | 533 (2.5) | 532 (2.5) | 535 (2.6) | 532 (2.5) | 533 (2.5) | 533 (2.5) | 532 (2.6) |
| Belgium (Flemish) | 532 (1.9) | 533 (2.0) | 531 (2.0) | 533 (1.9) | 532 (2.0) | 532 (1.9) | 523 (1.9) | 533 (1.9) | 533 (1.9) | 533 (1.9) | 527 (1.9) |
| Cyprus | 532 (2.9) | 534 (2.9) | 532 (2.9) | 531 (2.9) | 531 (2.8) | 531 (2.8) | 529 (2.8) | 532 (2.9) | 532 (2.9) | 532 (2.8) | 531 (2.8) |
| Finland | 532 (2.3) | 529 (2.4) | 528 (2.4) | 530 (2.4) | 530 (2.3) | 529 (2.4) | 521 (2.4) | 532 (2.3) | 531 (2.4) | 532 (2.3) | 530 (2.3) |
| Denmark | 525 (1.9) | 524 (2.0) | 522 (2.0) | 524 (1.9) | 523 (2.0) | 520 (2.0) | 516 (2.1) | 525 (1.9) | 524 (1.9) | 525 (1.9) | 524 (1.9) |
| Portugal | 525 (2.6) | 528 (2.7) | 526 (2.7) | 525 (2.6) | 526 (2.7) | 524 (2.7) | 521 (2.8) | 526 (2.6) | 526 (2.6) | 525 (2.6) | 524 (2.6) |
| Hungary | 523 (2.6) | 524 (2.6) | 525 (2.6) | 523 (2.6) | 523 (2.6) | 522 (2.6) | 531 (2.6) | 523 (2.6) | 523 (2.6) | 523 (2.6) | 524 (2.7) |
| Turkey (5) | 523 (4.4) | 526 (4.5) | 525 (4.4) | 525 (4.4) | 525 (4.4) | 525 (4.4) | 525 (4.4) | 523 (4.4) | 523 (4.5) | 523 (4.4) | 519 (4.4) |
| Germany | 521 (2.3) | 521 (2.2) | 520 (2.3) | 521 (2.3) | 520 (2.3) | 520 (2.3) | 524 (2.4) | 521 (2.3) | 521 (2.3) | 521 (2.3) | 521 (2.3) |
| Sweden | 521 (2.8) | 520 (2.8) | 519 (2.9) | 521 (2.8) | 519 (2.8) | 516 (2.8) | 519 (2.9) | 522 (2.8) | 520 (2.8) | 521 (2.8) | 524 (2.8) |
| Poland | 520 (2.7) | 520 (2.7) | 520 (2.7) | 520 (2.7) | 520 (2.7) | 520 (2.7) | 518 (2.7) | 520 (2.7) | 520 (2.7) | 520 (2.7) | 521 (2.7) |
| Australia | 516 (2.8) | 514 (2.8) | 514 (2.7) | 514 (2.8) | 514 (2.8) | 512 (2.8) | 508 (2.8) | 516 (2.8) | 515 (2.8) | 516 (2.8) | 517 (2.8) |
| Azerbaijan | 515 (2.7) | 516 (2.7) | 518 (2.8) | 516 (2.7) | 516 (2.7) | 517 (2.7) | 530 (3.0) | 515 (2.7) | 515 (2.7) | 516 (2.7) | 520 (2.8) |
| Bulgaria | 515 (4.3) | 516 (4.1) | 521 (4.1) | 515 (4.3) | 518 (4.0) | 519 (4.2) | 535 (4.5) | 514 (4.3) | 515 (4.2) | 515 (4.3) | 519 (4.5) |
| Italy | 515 (2.4) | 518 (2.5) | 517 (2.4) | 517 (2.4) | 517 (2.4) | 518 (2.4) | 516 (2.5) | 516 (2.4) | 515 (2.4) | 516 (2.4) | 514 (2.4) |
| Canada | 512 (1.9) | 511 (1.9) | 511 (1.9) | 511 (1.9) | 509 (1.9) | 509 (1.9) | 505 (1.9) | 512 (1.9) | 511 (1.9) | 512 (1.9) | 512 (1.8) |
| Kazakhstan | 512 (2.5) | 512 (2.5) | 515 (2.5) | 512 (2.5) | 514 (2.5) | 514 (2.5) | 526 (2.7) | 511 (2.5) | 512 (2.5) | 513 (2.5) | 514 (2.5) |
| Slovak Republic | 510 (3.5) | 509 (3.4) | 511 (3.4) | 509 (3.5) | 509 (3.4) | 507 (3.5) | 513 (3.6) | 509 (3.4) | 509 (3.5) | 510 (3.5) | 511 (3.5) |
| Croatia | 509 (2.2) | 510 (2.1) | 512 (2.2) | 511 (2.1) | 511 (2.1) | 510 (2.2) | 519 (2.2) | 509 (2.2) | 509 (2.2) | 509 (2.2) | 509 (2.2) |
| Malta | 509 (1.4) | 512 (1.5) | 511 (1.5) | 508 (1.5) | 509 (1.4) | 506 (1.5) | 506 (1.6) | 510 (1.4) | 510 (1.4) | 509 (1.4) | 509 (1.5) |
| Serbia | 508 (3.2) | 509 (3.1) | 512 (3.2) | 510 (3.1) | 510 (3.0) | 510 (3.1) | 524 (3.3) | 507 (3.2) | 508 (3.2) | 508 (3.2) | 511 (3.3) |
| Spain | 502 (2.1) | 505 (2.2) | 504 (2.2) | 505 (2.2) | 504 (2.2) | 505 (2.2) | 502 (2.3) | 503 (2.1) | 503 (2.1) | 503 (2.1) | 502 (2.1) |
| Armenia | 498 (2.5) | 502 (2.5) | 503 (2.4) | 500 (2.5) | 503 (2.5) | 500 (2.5) | 513 (2.4) | 498 (2.5) | 498 (2.6) | 499 (2.5) | 498 (2.6) |
| New Zealand | 487 (2.6) | 485 (2.7) | 483 (2.7) | 485 (2.7) | 485 (2.6) | 483 (2.6) | 480 (2.7) | 487 (2.6) | 487 (2.6) | 487 (2.6) | 489 (2.6) |
| France | 485 (3.0) | 486 (3.0) | 487 (3.0) | 487 (3.0) | 486 (3.0) | 486 (3.0) | 481 (3.0) | 485 (3.0) | 485 (3.0) | 485 (3.0) | 483 (3.0) |
| Georgia | 482 (3.7) | 483 (3.6) | 487 (3.5) | 485 (3.6) | 485 (3.6) | 486 (3.7) | 496 (3.7) | 481 (3.6) | 482 (3.7) | 482 (3.7) | 483 (3.7) |
| United Arab Emirates | 481 (1.7) | 483 (1.7) | 482 (1.7) | 482 (1.7) | 481 (1.7) | 481 (1.7) | 480 (1.7) | 482 (1.7) | 481 (1.7) | 482 (1.7) | 481 (1.7) |
| Bahrain | 480 (2.6) | 484 (2.6) | 480 (2.6) | 482 (2.5) | 481 (2.5) | 481 (2.5) | 477 (2.7) | 481 (2.6) | 480 (2.6) | 480 (2.6) | 478 (2.6) |
| Qatar | 449 (3.4) | 452 (3.4) | 449 (3.4) | 451 (3.4) | 451 (3.3) | 451 (3.3) | 448 (3.4) | 450 (3.4) | 450 (3.4) | 450 (3.4) | 449 (3.4) |
| Iran, Islamic Rep. of | 443 (3.9) | 447 (3.8) | 446 (3.9) | 445 (3.8) | 447 (3.8) | 448 (3.8) | 442 (3.9) | 443 (3.8) | 445 (3.8) | 444 (3.8) | 441 (3.8) |
| Chile | 441 (2.7) | 440 (2.8) | 439 (2.8) | 440 (2.7) | 439 (2.7) | 438 (2.7) | 437 (2.8) | 442 (2.7) | 440 (2.7) | 442 (2.7) | 444 (2.7) |
| Oman | 431 (3.7) | 433 (3.7) | 434 (3.6) | 431 (3.6) | 430 (3.8) | 431 (3.7) | 428 (3.7) | 431 (3.7) | 431 (3.7) | 431 (3.7) | 431 (3.6) |
| **International Average** | 523 (0.4) | 524 (0.4) | 524 (0.4) | 524 (0.4) | 523 (0.4) | 523 (0.4) | 524 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 590 (2.3) | 595 (2.3) | 593 (2.2) | 591 (2.2) | 593 (2.2) | 611 (2.6) | 592 (2.2) | 592 (2.2) | 592 (2.2) | 602 (2.4) |
| Dubai, UAE | 544 (1.6) | 546 (1.7) | 544 (1.6) | 544 (1.7) | 544 (1.7) | 543 (1.7) | 541 (1.7) | 545 (1.7) | 544 (1.6) | 545 (1.6) | 543 (1.6) |
| Quebec, Canada | 532 (2.3) | 533 (2.3) | 532 (2.3) | 532 (2.3) | 531 (2.3) | 531 (2.3) | 524 (2.4) | 533 (2.3) | 532 (2.3) | 532 (2.3) | 530 (2.3) |
| Madrid, Spain | 518 (2.2) | 521 (2.2) | 521 (2.3) | 522 (2.2) | 521 (2.2) | 522 (2.2) | 518 (2.2) | 519 (2.1) | 519 (2.2) | 519 (2.2) | 517 (2.1) |
| Ontario, Canada | 512 (3.3) | 510 (3.4) | 512 (3.4) | 511 (3.3) | 509 (3.4) | 509 (3.2) | 504 (3.4) | 513 (3.3) | 511 (3.3) | 512 (3.3) | 512 (3.3) |
| Abu Dhabi, UAE | 441 (2.2) | 442 (2.2) | 441 (2.2) | 442 (2.2) | 440 (2.2) | 441 (2.2) | 440 (2.3) | 441 (2.2) | 440 (2.2) | 441 (2.2) | 441 (2.2) |
| **Number of Items (Score Points)*** | 171 (183) | 137 (146) | 129 (138) | 132 (142) | 144 (154) | 127 (135) | 100 (108) | 164 (176) | 161 (173) | 166 (177) | 148 (160) |

* The number of items and score points are based on the number of items included in scaling the fourth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Mathematics Scale Score based on All Items | Norway (5) | Lithuania | Austria | Netherlands | United States | Czech Republic | Belgium (Flemish) | Cyprus | Finland | Denmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | 625 (3.9) | 619 (3.8) | 620 (3.8) | 617 (3.8) | 625 (3.9) | 618 (3.8) | 624 (3.9) | 624 (3.9) | 625 (3.9) | 624 (3.8) |
| Hong Kong SAR | 602 (3.3) | 602 (3.3) | 601 (3.3) | 600 (3.3) | 598 (3.5) | 602 (3.4) | 598 (3.3) | 600 (3.3) | 602 (3.4) | 601 (3.3) | 601 (3.3) |
| Korea, Rep. of | 600 (2.2) | 599 (2.2) | 599 (2.2) | 598 (2.2) | 592 (2.2) | 599 (2.2) | 594 (2.2) | 603 (2.3) | 596 (2.2) | 601 (2.2) | 601 (2.2) |
| Chinese Taipei | 599 (1.9) | 598 (1.9) | 596 (1.9) | 597 (2.0) | 593 (2.0) | 599 (1.9) | 595 (2.0) | 599 (2.0) | 594 (2.0) | 601 (2.0) | 599 (1.9) |
| Japan | 593 (1.8) | 590 (1.8) | 595 (1.7) | 593 (1.8) | 590 (1.7) | 592 (1.8) | 591 (1.7) | 594 (1.7) | 587 (1.8) | 596 (1.8) | 594 (1.8) |
| Russian Federation | 567 (3.3) | 566 (3.4) | 571 (3.4) | 570 (3.4) | 569 (3.3) | 567 (3.4) | 571 (3.4) | 566 (3.3) | 567 (3.4) | 566 (3.3) | 567 (3.4) |
| Northern Ireland | 566 (2.7) | 567 (2.8) | 564 (2.7) | 564 (2.7) | 567 (2.8) | 566 (2.8) | 565 (2.8) | 566 (2.7) | 567 (2.8) | 565 (2.8) | 565 (2.7) |
| England | 556 (3.0) | 556 (3.0) | 553 (3.0) | 554 (2.9) | 555 (3.0) | 556 (3.0) | 552 (3.0) | 556 (3.0) | 555 (3.1) | 555 (3.0) | 556 (3.0) |
| Ireland | 548 (2.5) | 549 (2.5) | 545 (2.4) | 546 (2.4) | 547 (2.5) | 549 (2.5) | 546 (2.5) | 549 (2.5) | 549 (2.5) | 548 (2.5) | 548 (2.5) |
| Latvia | 546 (2.6) | 546 (2.6) | 551 (2.7) | 548 (2.6) | 552 (2.6) | 546 (2.6) | 550 (2.6) | 546 (2.6) | 548 (2.7) | 545 (2.6) | 546 (2.6) |
| Norway (5) | 543 (2.2) | 543 (2.2) | 542 (2.2) | 542 (2.2) | 544 (2.2) | 542 (2.2) | 541 (2.2) | 543 (2.2) | 543 (2.2) | 542 (2.2) | 544 (2.2) |
| Lithuania | 542 (2.8) | 542 (2.8) | 547 (2.8) | 543 (2.8) | 545 (2.9) | 542 (2.8) | 545 (2.8) | 541 (2.7) | 543 (2.8) | 542 (2.8) | 542 (2.8) |
| Austria | 539 (2.0) | 540 (2.0) | 536 (2.1) | 543 (2.1) | 541 (2.1) | 538 (2.0) | 542 (2.1) | 539 (2.0) | 539 (2.0) | 538 (2.1) | 540 (2.0) |
| Netherlands | 538 (2.2) | 537 (2.2) | 541 (2.2) | 539 (2.3) | 544 (2.3) | 537 (2.2) | 538 (2.3) | 537 (2.2) | 537 (2.3) | 539 (2.1) | 539 (2.2) |
| United States | 535 (2.5) | 535 (2.5) | 532 (2.5) | 533 (2.5) | 533 (2.5) | 535 (2.5) | 533 (2.5) | 535 (2.5) | 536 (2.5) | 535 (2.5) | 534 (2.5) |
| Czech Republic | 533 (2.5) | 532 (2.6) | 533 (2.5) | 536 (2.6) | 532 (2.6) | 533 (2.5) | 537 (2.6) | 533 (2.5) | 533 (2.5) | 532 (2.5) | 533 (2.6) |
| Belgium (Flemish) | 532 (1.9) | 531 (1.9) | 529 (1.9) | 529 (1.9) | 528 (1.9) | 532 (1.9) | 529 (1.9) | 533 (1.9) | 531 (1.9) | 532 (1.9) | 533 (1.9) |
| Cyprus | 532 (2.9) | 533 (2.9) | 530 (2.8) | 529 (2.8) | 530 (2.9) | 532 (2.9) | 530 (2.8) | 531 (2.9) | 535 (2.9) | 531 (2.9) | 532 (2.9) |
| Finland | 532 (2.3) | 532 (2.4) | 531 (2.3) | 530 (2.3) | 533 (2.3) | 531 (2.3) | 530 (2.3) | 531 (2.4) | 532 (2.3) | 532 (2.4) | 532 (2.3) |
| Denmark | 525 (1.9) | 525 (2.0) | 524 (1.9) | 525 (1.9) | 527 (1.9) | 524 (1.9) | 522 (2.0) | 524 (1.9) | 524 (1.9) | 525 (1.9) | 526 (1.9) |
| Portugal | 525 (2.6) | 526 (2.6) | 523 (2.6) | 524 (2.6) | 523 (2.6) | 525 (2.6) | 523 (2.7) | 525 (2.6) | 524 (2.7) | 525 (2.6) | 526 (2.6) |
| Hungary | 523 (2.6) | 523 (2.6) | 524 (2.6) | 525 (2.7) | 523 (2.6) | 524 (2.6) | 527 (2.7) | 524 (2.6) | 525 (2.6) | 522 (2.6) | 524 (2.6) |
| Turkey (5) | 523 (4.4) | 524 (4.5) | 521 (4.4) | 520 (4.4) | 518 (4.4) | 523 (4.4) | 519 (4.5) | 523 (4.4) | 521 (4.4) | 524 (4.4) | 522 (4.4) |
| Germany | 521 (2.3) | 521 (2.3) | 521 (2.3) | 523 (2.4) | 523 (2.3) | 520 (2.3) | 523 (2.3) | 521 (2.3) | 522 (2.3) | 520 (2.3) | 522 (2.3) |
| Sweden | 521 (2.8) | 522 (2.8) | 523 (2.8) | 522 (2.8) | 524 (2.8) | 521 (2.8) | 521 (2.8) | 521 (2.8) | 523 (2.8) | 520 (2.8) | 522 (2.8) |
| Poland | 520 (2.7) | 520 (2.7) | 521 (2.7) | 521 (2.7) | 521 (2.7) | 520 (2.7) | 523 (2.7) | 521 (2.7) | 521 (2.7) | 521 (2.7) | 520 (2.7) |
| Australia | 516 (2.8) | 517 (2.8) | 516 (2.7) | 516 (2.8) | 518 (2.8) | 516 (2.8) | 515 (2.7) | 515 (2.8) | 517 (2.8) | 516 (2.8) | 516 (2.8) |
| Azerbaijan | 515 (2.7) | 515 (2.7) | 517 (2.8) | 519 (2.8) | 519 (2.8) | 516 (2.7) | 521 (2.8) | 515 (2.7) | 517 (2.8) | 513 (2.7) | 515 (2.7) |
| Bulgaria | 515 (4.3) | 514 (4.3) | 517 (4.4) | 514 (4.6) | 514 (4.4) | 516 (4.3) | 518 (4.6) | 516 (4.2) | 516 (4.2) | 513 (4.2) | 515 (4.3) |
| Italy | 515 (2.4) | 516 (2.5) | 513 (2.5) | 514 (2.5) | 513 (2.5) | 514 (2.4) | 513 (2.5) | 516 (2.4) | 514 (2.4) | 515 (2.4) | 516 (2.4) |
| Canada | 512 (1.9) | 512 (1.9) | 511 (1.8) | 512 (1.9) | 512 (1.9) | 511 (1.9) | 509 (1.9) | 511 (1.9) | 512 (1.9) | 512 (1.9) | 513 (1.9) |
| Kazakhstan | 512 (2.5) | 511 (2.5) | 514 (2.5) | 513 (2.6) | 514 (2.5) | 512 (2.5) | 515 (2.6) | 511 (2.5) | 512 (2.5) | 511 (2.5) | 511 (2.5) |
| Slovak Republic | 510 (3.5) | 510 (3.5) | 511 (3.5) | 512 (3.5) | 512 (3.5) | 510 (3.5) | 513 (3.6) | 510 (3.5) | 511 (3.5) | 508 (3.5) | 510 (3.4) |
| Croatia | 509 (2.2) | 508 (2.2) | 509 (2.2) | 510 (2.2) | 504 (2.1) | 510 (2.2) | 511 (2.1) | 509 (2.1) | 509 (2.1) | 509 (2.1) | 509 (2.2) |
| Malta | 509 (1.4) | 511 (1.5) | 508 (1.5) | 508 (1.5) | 511 (1.5) | 509 (1.5) | 509 (1.5) | 509 (1.5) | 510 (1.5) | 508 (1.5) | 510 (1.4) |
| Serbia | 508 (3.2) | 507 (3.2) | 510 (3.2) | 510 (3.3) | 510 (3.2) | 509 (3.2) | 513 (3.2) | 508 (3.1) | 509 (3.2) | 507 (3.2) | 507 (3.2) |
| Spain | 502 (2.1) | 502 (2.2) | 502 (2.2) | 502 (2.1) | 500 (2.1) | 502 (2.1) | 501 (2.2) | 504 (2.2) | 501 (2.2) | 504 (2.2) | 503 (2.2) |
| Armenia | 498 (2.5) | 498 (2.5) | 497 (2.6) | 498 (2.6) | 500 (2.6) | 499 (2.5) | 500 (2.6) | 497 (2.5) | 499 (2.5) | 495 (2.6) | 498 (2.5) |
| New Zealand | 487 (2.6) | 487 (2.6) | 488 (2.6) | 487 (2.6) | 489 (2.8) | 487 (2.6) | 486 (2.6) | 487 (2.6) | 487 (2.6) | 488 (2.6) | 487 (2.6) |
| France | 485 (3.0) | 484 (3.0) | 483 (3.0) | 484 (3.0) | 481 (3.0) | 484 (3.0) | 483 (3.0) | 485 (3.0) | 483 (3.0) | 485 (3.0) | 485 (3.0) |
| Georgia | 482 (3.7) | 481 (3.6) | 483 (3.7) | 483 (3.7) | 483 (3.7) | 482 (3.7) | 485 (3.7) | 481 (3.7) | 485 (3.6) | 480 (3.7) | 481 (3.7) |
| United Arab Emirates | 481 (1.7) | 482 (1.7) | 480 (1.7) | 481 (1.7) | 480 (1.7) | 482 (1.7) | 479 (1.7) | 482 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.7) |
| Bahrain | 480 (2.6) | 480 (2.6) | 477 (2.7) | 480 (2.6) | 478 (2.6) | 481 (2.6) | 477 (2.6) | 479 (2.6) | 479 (2.7) | 480 (2.6) | 480 (2.6) |
| Qatar | 449 (3.4) | 449 (3.4) | 447 (3.4) | 449 (3.4) | 449 (3.5) | 450 (3.4) | 447 (3.4) | 450 (3.4) | 450 (3.4) | 449 (3.4) | 449 (3.4) |
| Iran, Islamic Rep. of | 443 (3.9) | 444 (3.9) | 441 (3.8) | 440 (3.9) | 441 (3.9) | 444 (3.8) | 442 (3.9) | 445 (3.8) | 443 (3.9) | 445 (3.8) | 442 (3.8) |
| Chile | 441 (2.7) | 442 (2.7) | 443 (2.7) | 441 (2.7) | 444 (2.7) | 440 (2.7) | 440 (2.8) | 440 (2.7) | 442 (2.7) | 442 (2.7) | 441 (2.7) |
| Oman | 431 (3.7) | 431 (3.8) | 431 (3.7) | 430 (3.7) | 430 (3.6) | 432 (3.7) | 429 (3.6) | 431 (3.6) | 432 (3.7) | 431 (3.7) | 431 (3.7) |
| **International Average** | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 592 (2.2) | 599 (2.3) | 598 (2.3) | 597 (2.3) | 594 (2.2) | 600 (2.4) | 592 (2.2) | 595 (2.3) | 591 (2.2) | 593 (2.2) |
| Dubai, UAE | 544 (1.6) | 545 (1.7) | 542 (1.6) | 543 (1.6) | 542 (1.7) | 544 (1.7) | 541 (1.6) | 544 (1.6) | 543 (1.7) | 544 (1.6) | 544 (1.7) |
| Quebec, Canada | 532 (2.3) | 532 (2.3) | 530 (2.3) | 531 (2.3) | 530 (2.4) | 532 (2.3) | 528 (2.4) | 532 (2.3) | 531 (2.3) | 532 (2.3) | 533 (2.3) |
| Madrid, Spain | 518 (2.2) | 518 (2.1) | 517 (2.1) | 517 (2.1) | 516 (2.1) | 518 (2.2) | 517 (2.1) | 521 (2.2) | 516 (2.2) | 519 (2.2) | 519 (2.1) |
| Ontario, Canada | 512 (3.3) | 513 (3.3) | 512 (3.3) | 512 (3.4) | 512 (3.3) | 512 (3.3) | 510 (3.4) | 511 (3.3) | 513 (3.3) | 512 (3.3) | 513 (3.3) |
| Abu Dhabi, UAE | 441 (2.2) | 441 (2.3) | 440 (2.2) | 440 (2.2) | 441 (2.3) | 441 (2.2) | 438 (2.2) | 441 (2.2) | 441 (2.2) | 440 (2.3) | 440 (2.2) |
| **Number of Items (Score Points)*** | 171 (183) | 157 (168) | 152 (164) | 148 (160) | 124 (135) | 164 (176) | 137 (145) | 151 (160) | 151 (162) | 163 (175) | 164 (176) |

* The number of items and score points are based on the number of items included in scaling the fourth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

(Continued)

| Country | Average Mathematics Scale Score based on All Items | Portugal | Hungary | Turkey (5) | Germany | Sweden | Poland | Australia | Azerbaijan | Bulgaria | Italy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | 625 (3.9) | 621 (3.8) | 626 (3.9) | 616 (3.8) | 616 (3.8) | 627 (3.9) | 624 (4.1) | 626 (3.9) | 620 (3.9) | 623 (3.8) |
| Hong Kong SAR | 602 (3.3) | 602 (3.3) | 600 (3.3) | 602 (3.4) | 598 (3.3) | 598 (3.4) | 601 (3.3) | 600 (3.8) | 601 (3.3) | 600 (3.4) | 601 (3.3) |
| Korea, Rep. of | 600 (2.2) | 600 (2.2) | 597 (2.2) | 598 (2.3) | 597 (2.2) | 595 (2.2) | 600 (2.2) | 601 (2.2) | 600 (2.2) | 594 (2.2) | 601 (2.2) |
| Chinese Taipei | 599 (1.9) | 599 (1.9) | 595 (1.9) | 601 (2.0) | 594 (2.0) | 591 (2.0) | 600 (1.9) | 592 (2.4) | 599 (1.9) | 592 (2.0) | 598 (1.9) |
| Japan | 593 (1.8) | 593 (1.8) | 592 (1.7) | 590 (1.7) | 589 (1.7) | 588 (1.7) | 594 (1.8) | 590 (2.0) | 593 (1.8) | 589 (1.7) | 595 (1.7) |
| Russian Federation | 567 (3.3) | 567 (3.3) | 570 (3.4) | 566 (3.3) | 571 (3.4) | 569 (3.4) | 566 (3.3) | 566 (3.6) | 567 (3.3) | 577 (3.4) | 568 (3.3) |
| Northern Ireland | 566 (2.7) | 566 (2.7) | 565 (2.7) | 568 (2.8) | 563 (2.8) | 565 (2.8) | 565 (2.7) | 567 (3.2) | 566 (2.8) | 564 (2.7) | 565 (2.7) |
| England | 556 (3.0) | 556 (3.0) | 554 (3.0) | 556 (3.1) | 552 (2.9) | 553 (2.9) | 556 (3.0) | 552 (3.3) | 556 (3.0) | 553 (3.0) | 555 (2.9) |
| Ireland | 548 (2.5) | 548 (2.5) | 547 (2.5) | 550 (2.5) | 544 (2.5) | 546 (2.5) | 548 (2.5) | 544 (2.5) | 549 (2.5) | 544 (2.5) | 547 (2.5) |
| Latvia | 546 (2.6) | 546 (2.6) | 549 (2.7) | 545 (2.6) | 550 (2.7) | 550 (2.6) | 546 (2.6) | 554 (2.8) | 546 (2.6) | 555 (2.8) | 547 (2.6) |
| Norway (5) | 543 (2.2) | 543 (2.2) | 542 (2.2) | 541 (2.2) | 541 (2.2) | 544 (2.2) | 543 (2.2) | 547 (2.2) | 543 (2.2) | 540 (2.2) | 543 (2.2) |
| Lithuania | 542 (2.8) | 542 (2.8) | 544 (2.8) | 540 (2.8) | 544 (2.8) | 544 (2.8) | 542 (2.7) | 542 (3.0) | 542 (2.8) | 548 (2.9) | 542 (2.7) |
| Austria | 539 (2.0) | 539 (2.0) | 539 (2.1) | 540 (2.0) | 545 (2.0) | 542 (2.1) | 538 (2.0) | 539 (2.0) | 539 (2.0) | 541 (2.1) | 540 (2.0) |
| Netherlands | 538 (2.2) | 538 (2.2) | 537 (2.2) | 535 (2.2) | 538 (2.3) | 540 (2.4) | 538 (2.2) | 540 (2.6) | 537 (2.2) | 539 (2.3) | 538 (2.2) |
| United States | 535 (2.5) | 535 (2.5) | 534 (2.5) | 536 (2.6) | 530 (2.5) | 531 (2.5) | 535 (2.5) | 530 (2.4) | 535 (2.5) | 531 (2.5) | 533 (2.5) |
| Czech Republic | 533 (2.5) | 533 (2.5) | 535 (2.6) | 532 (2.5) | 537 (2.6) | 536 (2.6) | 532 (2.5) | 532 (2.6) | 533 (2.5) | 534 (2.6) | 533 (2.6) |
| Belgium (Flemish) | 532 (1.9) | 532 (1.9) | 529 (1.9) | 532 (2.0) | 529 (1.9) | 529 (1.9) | 533 (1.9) | 539 (1.9) | 532 (1.9) | 527 (1.9) | 532 (1.9) |
| Cyprus | 532 (2.9) | 532 (2.9) | 531 (2.8) | 533 (2.9) | 528 (2.8) | 531 (2.9) | 532 (2.9) | 533 (2.8) | 532 (2.9) | 528 (2.8) | 531 (2.9) |
| Finland | 532 (2.3) | 532 (2.3) | 529 (2.3) | 529 (2.4) | 528 (2.3) | 532 (2.4) | 532 (2.3) | 533 (2.3) | 532 (2.3) | 527 (2.3) | 532 (2.3) |
| Denmark | 525 (1.9) | 525 (1.9) | 523 (1.9) | 523 (2.0) | 523 (1.9) | 526 (1.9) | 525 (1.9) | 529 (2.1) | 524 (1.9) | 522 (1.9) | 525 (1.9) |
| Portugal | 525 (2.6) | 525 (2.6) | 523 (2.6) | 527 (2.7) | 524 (2.6) | 522 (2.6) | 525 (2.6) | 519 (2.7) | 525 (2.6) | 522 (2.6) | 525 (2.6) |
| Hungary | 523 (2.6) | 523 (2.6) | 526 (2.7) | 523 (2.6) | 527 (2.7) | 526 (2.7) | 523 (2.6) | 528 (2.8) | 523 (2.6) | 527 (2.7) | 524 (2.7) |
| Turkey (5) | 523 (4.4) | 523 (4.4) | 523 (4.4) | 525 (4.5) | 520 (4.4) | 517 (4.4) | 524 (4.4) | 523 (4.2) | 523 (4.4) | 521 (4.4) | 522 (4.4) |
| Germany | 521 (2.3) | 521 (2.3) | 521 (2.3) | 520 (2.3) | 528 (2.4) | 525 (2.4) | 521 (2.3) | 528 (2.3) | 521 (2.3) | 524 (2.4) | 522 (2.3) |
| Sweden | 521 (2.8) | 521 (2.8) | 522 (2.8) | 518 (2.8) | 522 (2.9) | 525 (2.8) | 521 (2.8) | 528 (2.9) | 521 (2.8) | 524 (2.8) | 522 (2.8) |
| Poland | 520 (2.7) | 520 (2.7) | 520 (2.7) | 520 (2.7) | 522 (2.7) | 523 (2.7) | 521 (2.7) | 522 (2.8) | 520 (2.7) | 521 (2.7) | 521 (2.7) |
| Australia | 516 (2.8) | 516 (2.8) | 516 (2.8) | 514 (2.8) | 514 (2.8) | 517 (2.8) | 516 (2.8) | 521 (2.8) | 516 (2.8) | 515 (2.8) | 516 (2.8) |
| Azerbaijan | 515 (2.7) | 515 (2.7) | 519 (2.8) | 516 (2.7) | 521 (2.8) | 518 (2.8) | 515 (2.7) | 514 (2.9) | 516 (2.7) | 524 (2.9) | 515 (2.8) |
| Bulgaria | 515 (4.3) | 515 (4.3) | 518 (4.5) | 518 (4.2) | 518 (4.7) | 515 (4.6) | 514 (4.3) | 524 (4.1) | 515 (4.3) | 526 (4.6) | 515 (4.4) |
| Italy | 515 (2.4) | 515 (2.4) | 513 (2.4) | 517 (2.4) | 514 (2.5) | 513 (2.5) | 515 (2.4) | 517 (2.6) | 515 (2.4) | 513 (2.5) | 515 (2.4) |
| Canada | 512 (1.9) | 512 (1.9) | 512 (1.9) | 510 (1.9) | 510 (1.9) | 512 (1.9) | 512 (1.9) | 512 (1.9) | 512 (1.9) | 509 (1.9) | 512 (1.9) |
| Kazakhstan | 512 (2.5) | 512 (2.5) | 512 (2.6) | 513 (2.5) | 515 (2.6) | 512 (2.6) | 512 (2.5) | 516 (2.7) | 512 (2.5) | 517 (2.6) | 511 (2.5) |
| Slovak Republic | 510 (3.5) | 510 (3.5) | 511 (3.5) | 508 (3.4) | 513 (3.6) | 514 (3.6) | 509 (3.5) | 511 (3.8) | 510 (3.5) | 513 (3.6) | 510 (3.5) |
| Croatia | 509 (2.2) | 509 (2.2) | 511 (2.2) | 509 (2.1) | 513 (2.2) | 509 (2.1) | 509 (2.2) | 509 (2.2) | 509 (2.2) | 514 (2.2) | 510 (2.2) |
| Malta | 509 (1.4) | 509 (1.4) | 508 (1.5) | 511 (1.4) | 510 (1.4) | 510 (1.5) | 508 (1.5) | 506 (1.7) | 509 (1.5) | 508 (1.5) | 509 (1.4) |
| Serbia | 508 (3.2) | 508 (3.2) | 510 (3.3) | 509 (3.1) | 514 (3.3) | 510 (3.3) | 508 (3.2) | 512 (3.3) | 508 (3.2) | 515 (3.3) | 508 (3.2) |
| Spain | 502 (2.1) | 502 (2.1) | 502 (2.1) | 504 (2.2) | 501 (2.2) | 500 (2.2) | 503 (2.1) | 498 (2.5) | 503 (2.1) | 501 (2.2) | 503 (2.2) |
| Armenia | 498 (2.5) | 498 (2.5) | 498 (2.6) | 501 (2.5) | 501 (2.6) | 498 (2.6) | 497 (2.6) | 500 (2.4) | 498 (2.5) | 501 (2.6) | 497 (2.6) |
| New Zealand | 487 (2.6) | 487 (2.6) | 488 (2.6) | 485 (2.6) | 484 (2.7) | 489 (2.7) | 487 (2.6) | 489 (2.9) | 487 (2.6) | 487 (2.6) | 488 (2.6) |
| France | 485 (3.0) | 485 (3.0) | 484 (3.0) | 486 (3.0) | 485 (3.0) | 483 (3.0) | 485 (3.0) | 487 (3.0) | 485 (3.0) | 482 (3.0) | 485 (3.0) |
| Georgia | 482 (3.7) | 482 (3.7) | 483 (3.7) | 484 (3.6) | 486 (3.7) | 483 (3.6) | 482 (3.6) | 484 (3.5) | 482 (3.7) | 486 (3.8) | 481 (3.7) |
| United Arab Emirates | 481 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.7) | 478 (1.7) | 480 (1.7) | 482 (1.7) | 482 (1.8) | 482 (1.7) | 480 (1.7) | 480 (1.7) |
| Bahrain | 480 (2.6) | 480 (2.6) | 479 (2.6) | 481 (2.6) | 478 (2.6) | 478 (2.6) | 480 (2.7) | 476 (2.7) | 480 (2.6) | 476 (2.6) | 479 (2.6) |
| Qatar | 449 (3.4) | 449 (3.4) | 449 (3.4) | 450 (3.4) | 446 (3.4) | 448 (3.3) | 450 (3.4) | 444 (3.4) | 450 (3.4) | 447 (3.4) | 448 (3.4) |
| Iran, Islamic Rep. of | 443 (3.9) | 443 (3.9) | 442 (3.9) | 448 (3.8) | 437 (3.9) | 440 (3.8) | 444 (3.8) | 450 (3.8) | 443 (3.8) | 440 (3.8) | 443 (3.8) |
| Chile | 441 (2.7) | 441 (2.7) | 442 (2.7) | 437 (2.8) | 439 (2.7) | 443 (2.7) | 441 (2.7) | 448 (2.7) | 442 (2.7) | 441 (2.7) | 441 (2.7) |
| Oman | 431 (3.7) | 431 (3.7) | 431 (3.7) | 433 (3.7) | 429 (3.6) | 431 (3.7) | 430 (3.7) | 437 (3.6) | 431 (3.7) | 430 (3.6) | 430 (3.7) |
| **International Average** | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 524 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 593 (2.2) | 599 (2.3) | 591 (2.2) | 599 (2.3) | 599 (2.4) | 592 (2.2) | 598 (2.6) | 592 (2.2) | 608 (2.5) | 595 (2.3) |
| Dubai, UAE | 544 (1.6) | 544 (1.6) | 543 (1.6) | 544 (1.6) | 540 (1.6) | 541 (1.6) | 544 (1.7) | 541 (1.8) | 544 (1.6) | 541 (1.6) | 543 (1.7) |
| Quebec, Canada | 532 (2.3) | 532 (2.3) | 531 (2.3) | 531 (2.3) | 529 (2.3) | 530 (2.4) | 532 (2.3) | 532 (2.7) | 532 (2.3) | 526 (2.4) | 533 (2.3) |
| Madrid, Spain | 518 (2.2) | 518 (2.2) | 517 (2.1) | 521 (2.2) | 517 (2.1) | 516 (2.1) | 519 (2.2) | 511 (2.3) | 518 (2.2) | 516 (2.1) | 519 (2.1) |
| Ontario, Canada | 512 (3.3) | 512 (3.3) | 513 (3.4) | 510 (3.4) | 511 (3.3) | 513 (3.4) | 512 (3.3) | 513 (3.2) | 512 (3.3) | 509 (3.3) | 512 (3.3) |
| Abu Dhabi, UAE | 441 (2.2) | 441 (2.2) | 440 (2.2) | 440 (2.2) | 438 (2.3) | 440 (2.2) | 441 (2.2) | 444 (2.4) | 441 (2.2) | 440 (2.2) | 440 (2.2) |
| **Number of Items (Score Points)*** | 171 (183) | 171 (183) | 155 (167) | 145 (153) | 132 (143) | 131 (142) | 163 (174) | 59 (65) | 169 (181) | 133 (143) | 162 (174) |

* The number of items and score points are based on the number of items included in scaling the fourth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

(Continued)

| Country | Average Mathematics Scale Score based on All Items | Canada | Kazakhstan | Slovak Republic | Croatia | Malta | Serbia | Spain | Armenia | New Zealand | France |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | 618 (3.8) | 626 (4.0) | 613 (3.8) | 621 (3.9) | 623 (3.9) | 626 (3.9) | 622 (3.9) | 625 (3.9) | 622 (3.7) | 623 (3.9) |
| Hong Kong SAR | 602 (3.3) | 603 (3.4) | 601 (3.4) | 596 (3.4) | 598 (3.4) | 602 (3.4) | 601 (3.5) | 600 (3.3) | 601 (3.4) | 601 (3.5) | 600 (3.3) |
| Korea, Rep. of | 600 (2.2) | 600 (2.2) | 597 (2.2) | 593 (2.2) | 596 (2.2) | 596 (2.2) | 596 (2.3) | 603 (2.2) | 599 (2.2) | 599 (2.1) | 601 (2.2) |
| Chinese Taipei | 599 (1.9) | 595 (2.0) | 596 (2.0) | 589 (2.0) | 598 (2.0) | 595 (2.0) | 597 (2.0) | 599 (1.9) | 597 (1.9) | 596 (2.1) | 599 (1.9) |
| Japan | 593 (1.8) | 593 (1.7) | 589 (1.8) | 587 (1.7) | 590 (1.8) | 588 (1.8) | 589 (1.7) | 596 (1.7) | 592 (1.8) | 590 (1.8) | 595 (1.7) |
| Russian Federation | 567 (3.3) | 565 (3.3) | 569 (3.4) | 574 (3.3) | 576 (3.4) | 569 (3.3) | 571 (3.4) | 566 (3.3) | 568 (3.4) | 566 (3.4) | 569 (3.4) |
| Northern Ireland | 566 (2.7) | 567 (2.7) | 566 (2.9) | 565 (2.8) | 562 (2.9) | 568 (2.8) | 565 (2.8) | 565 (2.7) | 566 (2.7) | 567 (2.8) | 564 (2.7) |
| England | 556 (3.0) | 556 (3.0) | 553 (3.1) | 552 (2.9) | 549 (3.1) | 556 (3.0) | 554 (3.0) | 554 (3.0) | 556 (3.0) | 557 (3.0) | 554 (2.9) |
| Ireland | 548 (2.5) | 548 (2.5) | 549 (2.5) | 544 (2.5) | 544 (2.5) | 548 (2.5) | 547 (2.5) | 548 (2.5) | 548 (2.5) | 547 (2.5) | 547 (2.5) |
| Latvia | 546 (2.6) | 546 (2.6) | 548 (2.7) | 554 (2.7) | 552 (2.7) | 550 (2.6) | 549 (2.7) | 546 (2.6) | 547 (2.6) | 547 (2.6) | 548 (2.6) |
| Norway (5) | 543 (2.2) | 547 (2.2) | 541 (2.2) | 542 (2.3) | 540 (2.2) | 543 (2.2) | 540 (2.2) | 541 (2.2) | 543 (2.2) | 544 (2.2) | 543 (2.2) |
| Lithuania | 542 (2.8) | 542 (2.8) | 542 (2.8) | 547 (2.9) | 544 (2.9) | 545 (2.8) | 542 (2.8) | 542 (2.7) | 542 (2.8) | 541 (2.7) | 543 (2.8) |
| Austria | 539 (2.0) | 539 (2.0) | 541 (2.0) | 542 (2.1) | 544 (2.0) | 540 (2.0) | 543 (2.0) | 537 (2.0) | 539 (2.1) | 540 (2.1) | 540 (2.1) |
| Netherlands | 538 (2.2) | 542 (2.3) | 535 (2.2) | 543 (2.4) | 534 (2.3) | 539 (2.2) | 536 (2.2) | 538 (2.2) | 537 (2.2) | 537 (2.2) | 538 (2.2) |
| United States | 535 (2.5) | 534 (2.5) | 535 (2.6) | 529 (2.4) | 530 (2.6) | 535 (2.5) | 536 (2.5) | 533 (2.5) | 536 (2.5) | 534 (2.5) | 533 (2.5) |
| Czech Republic | 533 (2.5) | 533 (2.6) | 535 (2.5) | 537 (2.6) | 542 (2.6) | 533 (2.6) | 535 (2.5) | 533 (2.5) | 533 (2.5) | 532 (2.6) | 536 (2.6) |
| Belgium (Flemish) | 532 (1.9) | 530 (2.0) | 530 (1.9) | 527 (1.9) | 531 (1.9) | 530 (1.9) | 531 (1.9) | 532 (1.9) | 531 (1.9) | 532 (1.9) | 533 (1.9) |
| Cyprus | 532 (2.9) | 530 (3.0) | 533 (2.8) | 528 (2.9) | 530 (2.8) | 532 (2.9) | 532 (2.8) | 531 (2.9) | 532 (2.9) | 531 (2.8) | 531 (2.8) |
| Finland | 532 (2.3) | 534 (2.4) | 530 (2.3) | 531 (2.3) | 528 (2.3) | 532 (2.3) | 529 (2.3) | 531 (2.4) | 531 (2.3) | 532 (2.4) | 532 (2.3) |
| Denmark | 525 (1.9) | 529 (2.0) | 522 (2.0) | 523 (1.9) | 522 (2.0) | 524 (1.9) | 520 (2.0) | 523 (1.9) | 524 (1.9) | 527 (2.0) | 525 (2.0) |
| Portugal | 525 (2.6) | 524 (2.5) | 523 (2.6) | 521 (2.6) | 522 (2.7) | 525 (2.6) | 524 (2.7) | 524 (2.6) | 525 (2.6) | 527 (2.6) | 525 (2.6) |
| Hungary | 523 (2.6) | 521 (2.7) | 526 (2.6) | 528 (2.7) | 532 (2.6) | 524 (2.6) | 527 (2.6) | 523 (2.6) | 524 (2.7) | 523 (2.6) | 526 (2.7) |
| Turkey (5) | 523 (4.4) | 517 (4.5) | 524 (4.4) | 516 (4.4) | 525 (4.3) | 520 (4.4) | 526 (4.4) | 523 (4.4) | 523 (4.4) | 523 (4.4) | 522 (4.5) |
| Germany | 521 (2.3) | 522 (2.3) | 521 (2.3) | 528 (2.4) | 528 (2.3) | 522 (2.3) | 524 (2.3) | 521 (2.3) | 521 (2.3) | 522 (2.4) | 523 (2.3) |
| Sweden | 521 (2.8) | 524 (2.8) | 520 (2.8) | 527 (2.9) | 521 (2.9) | 523 (2.8) | 520 (2.8) | 519 (2.8) | 522 (2.8) | 522 (2.8) | 522 (2.8) |
| Poland | 520 (2.7) | 521 (2.7) | 521 (2.7) | 524 (2.7) | 520 (2.7) | 521 (2.7) | 520 (2.7) | 521 (2.7) | 520 (2.7) | 521 (2.7) | 521 (2.7) |
| Australia | 516 (2.8) | 519 (2.8) | 515 (2.8) | 516 (2.8) | 508 (2.8) | 517 (2.8) | 513 (2.8) | 515 (2.8) | 516 (2.8) | 518 (2.8) | 515 (2.8) |
| Azerbaijan | 515 (2.7) | 511 (2.8) | 519 (2.8) | 522 (2.9) | 525 (2.9) | 518 (2.8) | 521 (2.9) | 514 (2.7) | 517 (2.8) | 515 (2.8) | 517 (2.8) |
| Bulgaria | 515 (4.3) | 507 (4.5) | 519 (4.2) | 519 (4.5) | 528 (4.3) | 517 (4.2) | 522 (4.3) | 514 (4.3) | 516 (4.4) | 515 (4.4) | 518 (4.4) |
| Italy | 515 (2.4) | 511 (2.5) | 515 (2.4) | 509 (2.5) | 515 (2.5) | 514 (2.4) | 516 (2.5) | 514 (2.4) | 515 (2.4) | 518 (2.5) | 516 (2.5) |
| Canada | 512 (1.9) | 514 (1.9) | 510 (1.9) | 510 (1.9) | 506 (1.9) | 511 (1.9) | 509 (1.9) | 511 (1.9) | 512 (1.9) | 513 (1.9) | 511 (1.9) |
| Kazakhstan | 512 (2.5) | 508 (2.6) | 515 (2.5) | 516 (2.6) | 523 (2.6) | 512 (2.5) | 516 (2.6) | 512 (2.5) | 512 (2.5) | 509 (2.6) | 513 (2.6) |
| Slovak Republic | 510 (3.5) | 511 (3.5) | 510 (3.5) | 518 (3.6) | 516 (3.5) | 511 (3.5) | 512 (3.5) | 509 (3.5) | 510 (3.5) | 509 (3.6) | 512 (3.5) |
| Croatia | 509 (2.2) | 502 (2.3) | 511 (2.1) | 511 (2.2) | 520 (2.2) | 508 (2.1) | 514 (2.2) | 510 (2.2) | 509 (2.2) | 508 (2.2) | 512 (2.2) |
| Malta | 509 (1.4) | 510 (1.5) | 508 (1.5) | 510 (1.5) | 506 (1.5) | 512 (1.5) | 508 (1.5) | 508 (1.5) | 509 (1.5) | 511 (1.5) | 509 (1.4) |
| Serbia | 508 (3.2) | 504 (3.2) | 511 (3.2) | 515 (3.3) | 518 (3.2) | 509 (3.2) | 514 (3.3) | 508 (3.2) | 508 (3.2) | 507 (3.2) | 510 (3.2) |
| Spain | 502 (2.1) | 500 (2.2) | 501 (2.2) | 497 (2.2) | 500 (2.3) | 502 (2.2) | 503 (2.2) | 504 (2.2) | 503 (2.1) | 505 (2.2) | 504 (2.2) |
| Armenia | 498 (2.5) | 491 (2.6) | 503 (2.5) | 500 (2.5) | 509 (2.4) | 499 (2.5) | 505 (2.4) | 495 (2.6) | 498 (2.6) | 496 (2.6) | 499 (2.6) |
| New Zealand | 487 (2.6) | 491 (2.7) | 485 (2.6) | 488 (2.7) | 479 (2.7) | 489 (2.6) | 483 (2.7) | 487 (2.6) | 488 (2.6) | 489 (2.6) | 486 (2.6) |
| France | 485 (3.0) | 484 (3.0) | 484 (3.0) | 481 (3.0) | 485 (3.0) | 484 (3.0) | 483 (3.0) | 486 (3.0) | 485 (3.0) | 487 (3.0) | 486 (3.0) |
| Georgia | 482 (3.7) | 477 (3.7) | 487 (3.5) | 487 (3.7) | 493 (3.6) | 483 (3.6) | 488 (3.7) | 481 (3.7) | 482 (3.7) | 479 (3.6) | 482 (3.7) |
| United Arab Emirates | 481 (1.7) | 480 (1.7) | 482 (1.7) | 478 (1.7) | 479 (1.7) | 481 (1.7) | 482 (1.7) | 480 (1.7) | 482 (1.7) | 482 (1.7) | 480 (1.7) |
| Bahrain | 480 (2.6) | 480 (2.6) | 479 (2.6) | 475 (2.6) | 476 (2.6) | 478 (2.7) | 480 (2.6) | 479 (2.6) | 480 (2.6) | 479 (2.7) | 477 (2.6) |
| Qatar | 449 (3.4) | 449 (3.5) | 449 (3.4) | 446 (3.4) | 445 (3.3) | 449 (3.4) | 451 (3.3) | 447 (3.4) | 450 (3.4) | 452 (3.4) | 448 (3.4) |
| Iran, Islamic Rep. of | 443 (3.9) | 444 (3.9) | 445 (3.9) | 436 (3.8) | 440 (3.9) | 442 (3.8) | 443 (3.9) | 443 (3.8) | 442 (3.8) | 446 (3.8) | 442 (3.8) |
| Chile | 441 (2.7) | 444 (2.7) | 442 (2.7) | 441 (2.7) | 439 (2.7) | 443 (2.7) | 438 (2.7) | 441 (2.7) | 442 (2.7) | 446 (2.7) | 441 (2.7) |
| Oman | 431 (3.7) | 432 (3.6) | 430 (3.8) | 430 (3.5) | 428 (3.7) | 431 (3.7) | 429 (3.7) | 431 (3.7) | 431 (3.7) | 432 (3.6) | 430 (3.6) |
| **International Average** | 523 (0.4) | 522 (0.4) | 523 (0.4) | 523 (0.4) | 524 (0.4) | 523 (0.4) | 524 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 593 (2.3) | 595 (2.3) | 604 (2.4) | 601 (2.4) | 597 (2.3) | 599 (2.4) | 592 (2.2) | 595 (2.3) | 593 (2.3) | 597 (2.3) |
| Dubai, UAE | 544 (1.6) | 543 (1.7) | 544 (1.6) | 539 (1.6) | 540 (1.7) | 543 (1.7) | 543 (1.7) | 542 (1.6) | 544 (1.6) | 544 (1.7) | 543 (1.6) |
| Quebec, Canada | 532 (2.3) | 533 (2.3) | 529 (2.4) | 527 (2.4) | 527 (2.4) | 530 (2.3) | 530 (2.4) | 533 (2.3) | 532 (2.3) | 533 (2.4) | 532 (2.3) |
| Madrid, Spain | 518 (2.2) | 516 (2.2) | 516 (2.2) | 513 (2.1) | 516 (2.2) | 517 (2.2) | 519 (2.1) | 520 (2.2) | 518 (2.1) | 521 (2.2) | 519 (2.2) |
| Ontario, Canada | 512 (3.3) | 515 (3.4) | 512 (3.3) | 510 (3.3) | 505 (3.4) | 512 (3.3) | 509 (3.4) | 511 (3.3) | 513 (3.3) | 513 (3.3) | 511 (3.3) |
| Abu Dhabi, UAE | 441 (2.2) | 439 (2.3) | 441 (2.3) | 439 (2.3) | 439 (2.3) | 441 (2.2) | 441 (2.3) | 439 (2.3) | 441 (2.2) | 442 (2.2) | 440 (2.2) |
| **Number of Items (Score Points)*** | 171 (183) | 125 (137) | 142 (153) | 119 (130) | 127 (136) | 147 (157) | 132 (141) | 154 (166) | 164 (176) | 119 (127) | 161 (172) |

* The number of items and score points are based on the number of items included in scaling the fourth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Mathematics Scale Score based on All Items | Georgia | United Arab Emirates | Bahrain | Qatar | Iran, Islamic Rep. of | Chile | Oman |
|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | 619 (3.9) | 625 (3.9) | 626 (3.9) | 629 (3.9) | 626 (3.9) | 626 (3.9) | 624 (3.9) |
| Hong Kong SAR | 602 (3.3) | 601 (3.4) | 602 (3.3) | 601 (3.3) | 602 (3.3) | 602 (3.4) | 602 (3.4) | 603 (3.5) |
| Korea, Rep. of | 600 (2.2) | 596 (2.2) | 600 (2.2) | 600 (2.2) | 600 (2.2) | 600 (2.2) | 600 (2.2) | 596 (2.3) |
| Chinese Taipei | 599 (1.9) | 595 (2.0) | 599 (1.9) | 599 (1.9) | 601 (2.0) | 601 (1.9) | 597 (2.0) | 594 (2.1) |
| Japan | 593 (1.8) | 590 (1.7) | 593 (1.8) | 593 (1.8) | 591 (1.8) | 594 (1.8) | 591 (1.7) | 587 (1.8) |
| Russian Federation | 567 (3.3) | 573 (3.4) | 567 (3.3) | 567 (3.3) | 566 (3.3) | 567 (3.3) | 567 (3.3) | 565 (3.4) |
| Northern Ireland | 566 (2.7) | 566 (2.8) | 566 (2.7) | 566 (2.7) | 568 (2.8) | 565 (2.8) | 566 (2.7) | 569 (2.7) |
| England | 556 (3.0) | 553 (3.0) | 556 (3.0) | 556 (3.0) | 558 (3.0) | 555 (3.0) | 557 (3.0) | 557 (3.0) |
| Ireland | 548 (2.5) | 546 (2.5) | 548 (2.5) | 548 (2.5) | 550 (2.5) | 548 (2.5) | 548 (2.5) | 548 (2.5) |
| Latvia | 546 (2.6) | 551 (2.7) | 546 (2.6) | 546 (2.6) | 546 (2.6) | 546 (2.6) | 547 (2.6) | 548 (2.6) |
| Norway (5) | 543 (2.2) | 541 (2.2) | 543 (2.2) | 543 (2.2) | 543 (2.3) | 542 (2.2) | 545 (2.2) | 545 (2.2) |
| Lithuania | 542 (2.8) | 546 (2.8) | 542 (2.8) | 542 (2.8) | 541 (2.7) | 542 (2.8) | 542 (2.8) | 542 (2.9) |
| Austria | 539 (2.0) | 543 (2.1) | 539 (2.0) | 539 (2.0) | 539 (2.1) | 538 (2.1) | 539 (2.0) | 540 (2.1) |
| Netherlands | 538 (2.2) | 539 (2.3) | 538 (2.2) | 537 (2.2) | 536 (2.2) | 537 (2.2) | 541 (2.2) | 542 (2.4) |
| United States | 535 (2.5) | 534 (2.5) | 535 (2.5) | 535 (2.5) | 536 (2.6) | 536 (2.5) | 535 (2.5) | 534 (2.5) |
| Czech Republic | 533 (2.5) | 534 (2.5) | 533 (2.5) | 533 (2.5) | 532 (2.6) | 532 (2.5) | 531 (2.5) | 531 (2.5) |
| Belgium (Flemish) | 532 (1.9) | 529 (1.9) | 532 (1.9) | 532 (1.9) | 532 (2.0) | 531 (1.9) | 533 (1.9) | 532 (1.9) |
| Cyprus | 532 (2.9) | 530 (2.8) | 532 (2.9) | 532 (2.9) | 533 (2.9) | 531 (2.9) | 532 (2.9) | 533 (2.9) |
| Finland | 532 (2.3) | 529 (2.3) | 532 (2.3) | 532 (2.3) | 531 (2.4) | 530 (2.4) | 534 (2.4) | 535 (2.4) |
| Denmark | 525 (1.9) | 522 (2.0) | 525 (1.9) | 524 (1.9) | 524 (1.9) | 524 (1.9) | 526 (1.9) | 527 (1.9) |
| Portugal | 525 (2.6) | 523 (2.7) | 525 (2.6) | 525 (2.6) | 527 (2.6) | 524 (2.7) | 525 (2.6) | 524 (2.7) |
| Hungary | 523 (2.6) | 527 (2.7) | 523 (2.6) | 523 (2.6) | 523 (2.6) | 523 (2.6) | 523 (2.7) | 522 (2.6) |
| Turkey (5) | 523 (4.4) | 520 (4.4) | 523 (4.4) | 523 (4.4) | 524 (4.4) | 525 (4.4) | 521 (4.4) | 519 (4.4) |
| Germany | 521 (2.3) | 524 (2.4) | 521 (2.3) | 521 (2.3) | 520 (2.3) | 519 (2.3) | 521 (2.3) | 523 (2.3) |
| Sweden | 521 (2.8) | 522 (2.9) | 521 (2.8) | 521 (2.8) | 521 (2.8) | 520 (2.8) | 523 (2.8) | 524 (2.7) |
| Poland | 520 (2.7) | 520 (2.8) | 520 (2.7) | 520 (2.7) | 520 (2.6) | 520 (2.7) | 520 (2.7) | 522 (2.7) |
| Australia | 516 (2.8) | 515 (2.8) | 516 (2.8) | 516 (2.8) | 515 (2.8) | 515 (2.8) | 518 (2.8) | 521 (2.8) |
| Azerbaijan | 515 (2.7) | 522 (2.8) | 515 (2.7) | 515 (2.7) | 517 (2.7) | 515 (2.8) | 515 (2.8) | 515 (2.8) |
| Bulgaria | 515 (4.3) | 522 (4.3) | 515 (4.3) | 515 (4.3) | 516 (4.2) | 514 (4.3) | 514 (4.3) | 512 (4.3) |
| Italy | 515 (2.4) | 514 (2.5) | 515 (2.4) | 515 (2.4) | 515 (2.4) | 514 (2.5) | 514 (2.4) | 512 (2.5) |
| Canada | 512 (1.9) | 510 (1.9) | 512 (1.9) | 512 (1.9) | 511 (1.9) | 512 (1.9) | 512 (1.9) | 513 (1.8) |
| Kazakhstan | 512 (2.5) | 515 (2.6) | 512 (2.5) | 512 (2.5) | 512 (2.5) | 513 (2.5) | 510 (2.5) | 507 (2.6) |
| Slovak Republic | 510 (3.5) | 512 (3.6) | 510 (3.5) | 510 (3.5) | 509 (3.5) | 508 (3.5) | 510 (3.5) | 511 (3.5) |
| Croatia | 509 (2.2) | 512 (2.1) | 509 (2.2) | 509 (2.2) | 509 (2.1) | 509 (2.2) | 506 (2.2) | 503 (2.3) |
| Malta | 509 (1.4) | 508 (1.5) | 509 (1.4) | 509 (1.4) | 512 (1.5) | 507 (1.5) | 510 (1.5) | 514 (1.5) |
| Serbia | 508 (3.2) | 513 (3.2) | 508 (3.2) | 508 (3.2) | 509 (3.2) | 508 (3.2) | 505 (3.2) | 504 (3.3) |
| Spain | 502 (2.1) | 502 (2.2) | 502 (2.1) | 503 (2.1) | 504 (2.2) | 503 (2.1) | 501 (2.2) | 498 (2.2) |
| Armenia | 498 (2.5) | 501 (2.5) | 498 (2.5) | 498 (2.5) | 500 (2.5) | 497 (2.6) | 497 (2.5) | 495 (2.6) |
| New Zealand | 487 (2.6) | 486 (2.7) | 487 (2.6) | 487 (2.6) | 486 (2.7) | 487 (2.6) | 489 (2.6) | 492 (2.7) |
| France | 485 (3.0) | 483 (3.0) | 485 (3.0) | 485 (3.0) | 485 (3.0) | 485 (3.0) | 484 (3.0) | 482 (3.0) |
| Georgia | 482 (3.7) | 486 (3.8) | 482 (3.7) | 482 (3.7) | 481 (3.7) | 482 (3.7) | 480 (3.7) | 478 (3.7) |
| United Arab Emirates | 481 (1.7) | 479 (1.7) | 481 (1.7) | 482 (1.7) | 482 (1.7) | 482 (1.7) | 482 (1.7) | 481 (1.7) |
| Bahrain | 480 (2.6) | 477 (2.6) | 480 (2.6) | 480 (2.6) | 481 (2.6) | 480 (2.6) | 480 (2.6) | 479 (2.7) |
| Qatar | 449 (3.4) | 447 (3.5) | 449 (3.4) | 450 (3.4) | 451 (3.4) | 450 (3.4) | 449 (3.4) | 449 (3.5) |
| Iran, Islamic Rep. of | 443 (3.9) | 440 (3.8) | 443 (3.9) | 443 (3.9) | 445 (3.9) | 445 (3.9) | 443 (3.8) | 444 (3.9) |
| Chile | 441 (2.7) | 441 (2.7) | 441 (2.7) | 442 (2.7) | 438 (2.8) | 442 (2.7) | 442 (2.7) | 441 (2.8) |
| Oman | 431 (3.7) | 429 (3.6) | 431 (3.7) | 431 (3.7) | 433 (3.7) | 432 (3.7) | 431 (3.7) | 434 (3.6) |
| **International Average** | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | 603 (2.4) | 593 (2.2) | 592 (2.2) | 592 (2.3) | 593 (2.2) | 593 (2.3) | 594 (2.4) |
| Dubai, UAE | 544 (1.6) | 542 (1.6) | 544 (1.6) | 544 (1.6) | 545 (1.7) | 544 (1.6) | 544 (1.7) | 543 (1.7) |
| Quebec, Canada | 532 (2.3) | 529 (2.4) | 532 (2.3) | 532 (2.3) | 533 (2.3) | 532 (2.3) | 532 (2.3) | 530 (2.4) |
| Madrid, Spain | 518 (2.2) | 517 (2.2) | 518 (2.2) | 519 (2.1) | 521 (2.2) | 519 (2.1) | 517 (2.1) | 515 (2.2) |
| Ontario, Canada | 512 (3.3) | 511 (3.3) | 512 (3.3) | 512 (3.3) | 511 (3.4) | 512 (3.3) | 512 (3.3) | 515 (3.2) |
| Abu Dhabi, UAE | 441 (2.2) | 439 (2.3) | 441 (2.2) | 441 (2.2) | 441 (2.2) | 441 (2.2) | 441 (2.2) | 440 (2.3) |
| **Number of Items (Score Points)*** | 171 (183) | 132 (141) | 171 (183) | 169 (181) | 145 (155) | 153 (163) | 151 (162) | 123 (133) |

* The number of items and score points are based on the number of items included in scaling the fourth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

(Continued)

| Country | Average Mathematics Scale Score based on All Items | Benchmarking Participants | Moscow City, Russian Fed. | Dubai, UAE | Quebec, Canada | Madrid, Spain | Ontario, Canada | Abu Dhabi, UAE |
|---|---|---|---|---|---|---|---|---|
| Singapore | 625 (3.9) | | 623 (3.9) | 625 (3.9) | 623 (3.9) | 622 (3.9) | 620 (3.8) | 625 (3.9) |
| Hong Kong SAR | 602 (3.3) | | 601 (3.4) | 602 (3.3) | 601 (3.3) | 600 (3.3) | 602 (3.3) | 602 (3.3) |
| Korea, Rep. of | 600 (2.2) | | 594 (2.2) | 600 (2.2) | 602 (2.2) | 603 (2.2) | 599 (2.2) | 600 (2.2) |
| Chinese Taipei | 599 (1.9) | | 596 (2.0) | 599 (1.9) | 598 (2.0) | 599 (1.9) | 596 (2.0) | 599 (1.9) |
| Japan | 593 (1.8) | | 588 (1.7) | 593 (1.8) | 593 (1.8) | 596 (1.7) | 593 (1.7) | 593 (1.8) |
| Russian Federation | 567 (3.3) | | 571 (3.3) | 567 (3.3) | 566 (3.3) | 566 (3.3) | 566 (3.3) | 567 (3.3) |
| Northern Ireland | 566 (2.7) | | 568 (2.8) | 566 (2.7) | 566 (2.7) | 565 (2.7) | 566 (2.7) | 566 (2.7) |
| England | 556 (3.0) | | 556 (3.0) | 556 (3.0) | 557 (2.9) | 554 (3.0) | 555 (3.0) | 556 (3.0) |
| Ireland | 548 (2.5) | | 550 (2.5) | 548 (2.5) | 548 (2.5) | 548 (2.5) | 548 (2.5) | 548 (2.5) |
| Latvia | 546 (2.6) | | 550 (2.6) | 546 (2.6) | 546 (2.6) | 546 (2.6) | 546 (2.6) | 546 (2.6) |
| Norway (5) | 543 (2.2) | | 541 (2.2) | 543 (2.2) | 545 (2.2) | 541 (2.2) | 545 (2.2) | 543 (2.2) |
| Lithuania | 542 (2.8) | | 544 (2.8) | 542 (2.8) | 540 (2.7) | 542 (2.7) | 543 (2.8) | 542 (2.8) |
| Austria | 539 (2.0) | | 541 (2.1) | 539 (2.0) | 539 (2.0) | 537 (2.0) | 539 (2.0) | 539 (2.0) |
| Netherlands | 538 (2.2) | | 537 (2.2) | 538 (2.2) | 537 (2.2) | 538 (2.2) | 542 (2.3) | 538 (2.2) |
| United States | 535 (2.5) | | 535 (2.6) | 535 (2.5) | 534 (2.5) | 533 (2.5) | 533 (2.5) | 535 (2.5) |
| Czech Republic | 533 (2.5) | | 532 (2.6) | 533 (2.5) | 532 (2.6) | 533 (2.5) | 534 (2.5) | 533 (2.5) |
| Belgium (Flemish) | 532 (1.9) | | 528 (1.9) | 532 (1.9) | 533 (1.9) | 532 (1.9) | 531 (1.9) | 532 (1.9) |
| Cyprus | 532 (2.9) | | 532 (2.9) | 532 (2.9) | 532 (2.9) | 531 (2.9) | 530 (2.9) | 532 (2.9) |
| Finland | 532 (2.3) | | 530 (2.3) | 532 (2.3) | 532 (2.4) | 531 (2.4) | 534 (2.4) | 532 (2.3) |
| Denmark | 525 (1.9) | | 523 (1.9) | 525 (1.9) | 526 (1.9) | 523 (1.9) | 528 (2.0) | 525 (1.9) |
| Portugal | 525 (2.6) | | 525 (2.7) | 525 (2.6) | 526 (2.6) | 524 (2.6) | 523 (2.6) | 525 (2.6) |
| Hungary | 523 (2.6) | | 525 (2.6) | 523 (2.6) | 523 (2.7) | 523 (2.6) | 521 (2.7) | 523 (2.6) |
| Turkey (5) | 523 (4.4) | | 521 (4.5) | 523 (4.4) | 522 (4.4) | 523 (4.4) | 518 (4.5) | 523 (4.4) |
| Germany | 521 (2.3) | | 522 (2.3) | 521 (2.3) | 521 (2.3) | 521 (2.3) | 522 (2.3) | 521 (2.3) |
| Sweden | 521 (2.8) | | 522 (2.8) | 521 (2.8) | 522 (2.8) | 519 (2.8) | 523 (2.8) | 521 (2.8) |
| Poland | 520 (2.7) | | 519 (2.7) | 520 (2.7) | 520 (2.7) | 521 (2.7) | 522 (2.6) | 520 (2.7) |
| Australia | 516 (2.8) | | 515 (2.7) | 516 (2.8) | 517 (2.8) | 515 (2.8) | 518 (2.8) | 516 (2.8) |
| Azerbaijan | 515 (2.7) | | 519 (2.8) | 515 (2.7) | 513 (2.8) | 514 (2.7) | 514 (2.8) | 515 (2.7) |
| Bulgaria | 515 (4.3) | | 520 (4.3) | 515 (4.3) | 513 (4.3) | 514 (4.3) | 510 (4.5) | 515 (4.3) |
| Italy | 515 (2.4) | | 515 (2.4) | 515 (2.4) | 515 (2.4) | 514 (2.4) | 511 (2.5) | 515 (2.4) |
| Canada | 512 (1.9) | | 511 (1.9) | 512 (1.9) | 514 (1.9) | 511 (1.9) | 512 (1.9) | 512 (1.9) |
| Kazakhstan | 512 (2.5) | | 514 (2.6) | 512 (2.5) | 509 (2.5) | 512 (2.5) | 510 (2.5) | 512 (2.5) |
| Slovak Republic | 510 (3.5) | | 511 (3.5) | 510 (3.5) | 509 (3.5) | 509 (3.5) | 511 (3.5) | 510 (3.5) |
| Croatia | 509 (2.2) | | 509 (2.1) | 509 (2.2) | 508 (2.2) | 510 (2.2) | 503 (2.3) | 509 (2.2) |
| Malta | 509 (1.4) | | 510 (1.5) | 509 (1.4) | 512 (1.4) | 508 (1.5) | 510 (1.5) | 509 (1.4) |
| Serbia | 508 (3.2) | | 512 (3.2) | 508 (3.2) | 505 (3.2) | 508 (3.2) | 506 (3.2) | 508 (3.2) |
| Spain | 502 (2.1) | | 503 (2.1) | 502 (2.1) | 503 (2.2) | 504 (2.2) | 500 (2.2) | 502 (2.1) |
| Armenia | 498 (2.5) | | 501 (2.5) | 498 (2.5) | 495 (2.6) | 495 (2.6) | 494 (2.6) | 498 (2.5) |
| New Zealand | 487 (2.6) | | 487 (2.6) | 487 (2.6) | 487 (2.6) | 487 (2.6) | 490 (2.7) | 487 (2.6) |
| France | 485 (3.0) | | 483 (3.0) | 485 (3.0) | 486 (3.0) | 486 (3.0) | 484 (3.0) | 485 (3.0) |
| Georgia | 482 (3.7) | | 484 (3.8) | 482 (3.7) | 479 (3.7) | 481 (3.7) | 479 (3.7) | 482 (3.7) |
| United Arab Emirates | 481 (1.7) | | 481 (1.7) | 481 (1.7) | 481 (1.7) | 480 (1.7) | 480 (1.8) | 481 (1.7) |
| Bahrain | 480 (2.6) | | 480 (2.7) | 480 (2.6) | 480 (2.6) | 479 (2.6) | 480 (2.6) | 480 (2.6) |
| Qatar | 449 (3.4) | | 449 (3.4) | 449 (3.4) | 450 (3.4) | 447 (3.4) | 448 (3.4) | 449 (3.4) |
| Iran, Islamic Rep. of | 443 (3.9) | | 443 (3.8) | 443 (3.9) | 442 (3.9) | 443 (3.8) | 445 (3.9) | 443 (3.9) |
| Chile | 441 (2.7) | | 441 (2.7) | 441 (2.7) | 442 (2.7) | 441 (2.7) | 443 (2.7) | 441 (2.7) |
| Oman | 431 (3.7) | | 431 (3.7) | 431 (3.7) | 433 (3.6) | 431 (3.7) | 431 (3.7) | 431 (3.7) |
| **International Average** | 523 (0.4) | | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) | 523 (0.4) |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 593 (2.2) | | 599 (2.3) | 593 (2.2) | 592 (2.3) | 592 (2.2) | 593 (2.2) | 593 (2.2) |
| Dubai, UAE | 544 (1.6) | | 543 (1.6) | 544 (1.6) | 544 (1.7) | 542 (1.6) | 543 (1.7) | 544 (1.6) |
| Quebec, Canada | 532 (2.3) | | 530 (2.3) | 532 (2.3) | 535 (2.3) | 533 (2.3) | 531 (2.3) | 532 (2.3) |
| Madrid, Spain | 518 (2.2) | | 519 (2.1) | 518 (2.2) | 519 (2.2) | 520 (2.2) | 516 (2.1) | 518 (2.2) |
| Ontario, Canada | 512 (3.3) | | 511 (3.4) | 512 (3.3) | 514 (3.4) | 511 (3.3) | 513 (3.4) | 512 (3.3) |
| Abu Dhabi, UAE | 441 (2.2) | | 440 (2.2) | 441 (2.2) | 441 (2.2) | 439 (2.3) | 439 (2.3) | 441 (2.2) |
| **Number of Items (Score Points)*** | 171 (183) | | 142 (152) | 171 (183) | 147 (159) | 154 (166) | 135 (147) | 171 (183) |

* The number of items and score points are based on the number of items included in scaling the fourth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.1: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

### Less Difficult Mathematics (Continued)

| Country | Average Mathematics Scale Score based on All Items | Albania | North Macedonia | Montenegro | Bosnia and Herzegovina | Kosovo | Saudi Arabia | Kuwait | Morocco | South Africa (5) | Pakistan | Philippines |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albania | 494 (3.4) | 495 (3.4) | 494 (3.4) | 492 (3.4) | 492 (3.4) | 494 (3.4) | 494 (3.4) | 494 (3.4) | 492 (3.4) | 494 (3.4) | 494 (3.4) | 494 (3.4) |
| North Macedonia | 472 (5.3) | 472 (5.3) | 472 (5.3) | 472 (5.2) | 471 (5.1) | 471 (5.2) | 471 (5.3) | 472 (5.3) | 471 (5.1) | 472 (5.3) | 472 (5.3) | 472 (5.3) |
| Montenegro | 453 (2.0) | 453 (2.0) | 453 (2.0) | 458 (2.0) | 463 (2.0) | 456 (2.0) | 453 (2.0) | 453 (1.9) | 461 (1.9) | 453 (2.0) | 453 (1.9) | 453 (2.0) |
| Bosnia and Herzegovina | 452 (2.4) | 451 (2.4) | 452 (2.4) | 455 (2.4) | 462 (2.4) | 453 (2.4) | 451 (2.4) | 452 (2.4) | 463 (2.4) | 451 (2.4) | 454 (2.4) | 452 (2.4) |
| Kosovo | 444 (3.0) | 444 (3.0) | 444 (3.0) | 445 (2.9) | 446 (2.9) | 445 (3.0) | 443 (3.0) | 445 (3.0) | 447 (2.9) | 444 (3.0) | 445 (3.0) | 444 (3.0) |
| Saudi Arabia | 398 (3.6) | 398 (3.5) | 398 (3.6) | 397 (3.5) | 395 (3.5) | 397 (3.6) | 399 (3.5) | 398 (3.5) | 393 (3.5) | 398 (3.5) | 397 (3.5) | 398 (3.6) |
| Kuwait | 383 (4.7) | 383 (4.7) | 383 (4.7) | 383 (4.6) | 384 (4.5) | 383 (4.7) | 384 (4.7) | 383 (4.7) | 384 (4.6) | 383 (4.7) | 382 (4.7) | 383 (4.7) |
| Morocco | 383 (4.3) | 383 (4.3) | 383 (4.3) | 382 (4.3) | 384 (4.2) | 384 (4.3) | 383 (4.3) | 383 (4.3) | 388 (4.1) | 383 (4.2) | 382 (4.3) | 383 (4.3) |
| South Africa (5) | 374 (3.6) | 373 (3.6) | 374 (3.6) | 373 (3.6) | 368 (3.6) | 373 (3.6) | 373 (3.6) | 373 (3.6) | 367 (3.6) | 375 (3.6) | 371 (3.6) | 374 (3.6) |
| Pakistan | 328 (12.0) | 327 (11.9) | 328 (12.0) | 329 (11.8) | 337 (11.6) | 328 (11.8) | 330 (12.1) | 328 (12.0) | 337 (11.7) | 328 (11.9) | 333 (12.1) | 328 (12.0) |
| Philippines | 297 (6.4) | 297 (6.3) | 297 (6.4) | 298 (6.3) | 297 (6.1) | 297 (6.3) | 297 (6.4) | 296 (6.4) | 296 (6.2) | 297 (6.3) | 298 (6.2) | 297 (6.4) |
| **International Average** | 407 (1.6) | 407 (1.6) | 407 (1.6) | 408 (1.6) | 409 (1.5) | 407 (1.6) | 407 (1.6) | 407 (1.6) | 409 (1.6) | 407 (1.6) | 407 (1.6) | 407 (1.6) |
| **Number of Items (Score Points)**** | 177 (190) | 173 (186) | 177 (190) | 140 (151) | 123 (130) | 160 (172) | 156 (166) | 172 (184) | 129 (134) | 155 (167) | 150 (158) | 177 (190) |

** The number of items and score points are based on the number of items included in scaling the fourth grade less difficult mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

Read down the column under a country name to compare achievement scores based on the items identified by that country. Scores on the diagonal are countries' achievement scores based on the test items they identified.

| Country | Average Science Scale Score based on All Items | Singapore | Korea, Rep. of | Russian Federation | Japan | Chinese Taipei | Finland | Latvia | Norway (5) | United States | Lithuania |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | 675 (4.1) | 601 (3.4) | 595 (3.7) | 619 (3.6) | 608 (3.6) | 591 (3.5) | 598 (3.4) | 594 (3.4) | 598 (3.4) | 594 (3.4) |
| Korea, Rep. of | 588 (2.1) | 577 (2.4) | 604 (2.2) | 576 (2.4) | 595 (2.4) | 599 (2.3) | 578 (2.2) | 588 (2.1) | 589 (2.1) | 588 (2.1) | 587 (2.1) |
| Russian Federation | 567 (3.0) | 569 (3.2) | 563 (3.2) | 562 (3.1) | 564 (3.0) | 565 (3.1) | 561 (3.0) | 567 (3.0) | 567 (3.0) | 568 (3.0) | 567 (3.0) |
| Japan | 562 (1.8) | 578 (2.3) | 578 (1.8) | 552 (2.2) | 592 (2.2) | 578 (2.0) | 556 (1.9) | 564 (1.7) | 560 (1.8) | 562 (1.7) | 561 (1.8) |
| Chinese Taipei | 558 (1.8) | 547 (2.0) | 558 (1.8) | 542 (1.9) | 571 (1.9) | 582 (2.0) | 551 (1.8) | 556 (1.8) | 555 (1.8) | 559 (1.7) | 559 (1.7) |
| Finland | 555 (2.6) | 540 (3.2) | 549 (2.9) | 552 (3.0) | 538 (3.2) | 549 (3.0) | 555 (2.6) | 554 (2.6) | 555 (2.6) | 555 (2.6) | 554 (2.6) |
| Latvia | 542 (2.4) | 551 (2.5) | 542 (2.4) | 546 (2.6) | 548 (2.5) | 549 (2.4) | 540 (2.5) | 542 (2.4) | 541 (2.4) | 541 (2.3) | 541 (2.4) |
| Norway (5) | 539 (2.2) | 526 (2.6) | 534 (2.3) | 537 (2.5) | 516 (2.6) | 528 (2.3) | 536 (2.2) | 539 (2.2) | 541 (2.2) | 540 (2.2) | 540 (2.2) |
| United States | 539 (2.7) | 527 (3.0) | 534 (2.9) | 536 (3.0) | 529 (3.1) | 534 (3.0) | 538 (2.9) | 537 (2.8) | 539 (2.7) | 541 (2.8) | 539 (2.7) |
| Lithuania | 538 (2.5) | 534 (2.8) | 532 (2.4) | 535 (2.8) | 544 (2.7) | 540 (2.6) | 536 (2.6) | 539 (2.5) | 537 (2.4) | 540 (2.5) | 537 (2.5) |
| England | 537 (2.7) | 535 (3.2) | 534 (2.7) | 535 (3.0) | 532 (3.2) | 536 (3.0) | 538 (2.7) | 535 (2.7) | 537 (2.7) | 537 (2.7) | 536 (2.7) |
| Sweden | 537 (3.3) | 525 (3.6) | 531 (3.5) | 543 (3.8) | 527 (3.6) | 531 (3.4) | 538 (3.5) | 537 (3.3) | 538 (3.3) | 537 (3.4) | 537 (3.3) |
| Czech Republic | 534 (2.6) | 520 (3.9) | 532 (3.2) | 535 (3.5) | 529 (3.8) | 529 (3.5) | 532 (2.9) | 534 (2.6) | 534 (2.6) | 535 (2.6) | 533 (2.6) |
| Australia | 533 (2.4) | 532 (2.2) | 527 (2.3) | 531 (2.3) | 522 (2.3) | 534 (2.4) | 535 (2.4) | 530 (2.4) | 533 (2.4) | 533 (2.4) | 533 (2.4) |
| Hong Kong SAR | 531 (3.3) | 539 (4.0) | 529 (3.7) | 536 (3.9) | 527 (4.2) | 523 (3.9) | 530 (3.4) | 530 (3.4) | 528 (3.3) | 530 (3.4) | 530 (3.4) |
| Poland | 531 (2.6) | 523 (3.4) | 534 (2.8) | 536 (3.1) | 522 (3.2) | 522 (3.0) | 531 (2.7) | 532 (2.6) | 531 (2.6) | 530 (2.6) | 532 (2.6) |
| Hungary | 529 (2.7) | 525 (3.3) | 531 (2.9) | 529 (3.1) | 526 (3.2) | 523 (3.0) | 529 (2.9) | 529 (2.7) | 531 (2.7) | 531 (2.7) | 529 (2.7) |
| Ireland | 528 (3.2) | 524 (3.0) | 528 (3.4) | 528 (3.3) | 516 (3.0) | 526 (2.9) | 529 (3.1) | 527 (3.2) | 528 (3.2) | 528 (3.3) | 529 (3.2) |
| Turkey (5) | 526 (4.2) | 540 (4.6) | 528 (4.4) | 528 (4.3) | 540 (4.7) | 540 (4.6) | 529 (4.3) | 525 (4.3) | 527 (4.2) | 527 (4.2) | 527 (4.3) |
| Croatia | 524 (2.2) | 526 (3.0) | 527 (2.6) | 525 (2.8) | 535 (2.9) | 525 (2.7) | 521 (2.4) | 525 (2.2) | 524 (2.2) | 525 (2.2) | 525 (2.2) |
| Canada | 523 (1.9) | 514 (1.8) | 518 (1.9) | 519 (1.9) | 508 (1.9) | 519 (1.9) | 522 (1.8) | 522 (1.9) | 524 (1.9) | 524 (1.9) | 523 (1.9) |
| Austria | 522 (2.6) | 512 (2.9) | 522 (2.9) | 513 (2.8) | 516 (3.0) | 521 (2.9) | 516 (2.6) | 522 (2.6) | 523 (2.6) | 524 (2.6) | 523 (2.6) |
| Denmark | 522 (2.4) | 503 (2.8) | 517 (2.7) | 518 (2.8) | 499 (2.8) | 513 (2.5) | 520 (2.4) | 521 (2.4) | 523 (2.4) | 521 (2.4) | 522 (2.4) |
| Bulgaria | 521 (4.9) | 516 (4.9) | 518 (4.6) | 521 (4.9) | 516 (5.4) | 511 (5.1) | 525 (4.7) | 521 (4.8) | 521 (4.8) | 519 (5.0) | 522 (4.9) |
| Slovak Republic | 521 (3.7) | 519 (4.0) | 517 (3.8) | 516 (3.9) | 520 (4.1) | 523 (4.0) | 517 (3.7) | 520 (3.6) | 521 (3.7) | 519 (3.7) | 520 (3.7) |
| Germany | 518 (2.2) | 508 (2.4) | 513 (2.4) | 515 (2.3) | 512 (2.5) | 522 (2.5) | 515 (2.2) | 518 (2.2) | 518 (2.1) | 519 (2.2) | 520 (2.2) |
| Netherlands | 518 (2.9) | 504 (3.6) | 511 (3.3) | 504 (3.6) | 502 (3.4) | 519 (3.2) | 514 (3.1) | 516 (2.9) | 518 (2.9) | 519 (2.9) | 520 (2.9) |
| Northern Ireland | 518 (2.3) | 512 (3.1) | 513 (2.6) | 518 (3.0) | 501 (3.1) | 509 (2.9) | 520 (2.6) | 517 (2.3) | 519 (2.3) | 519 (2.3) | 517 (2.3) |
| Serbia | 517 (3.5) | 527 (3.7) | 523 (3.6) | 513 (3.7) | 524 (3.9) | 511 (3.6) | 515 (3.5) | 520 (3.6) | 517 (3.5) | 519 (3.5) | 517 (3.5) |
| Cyprus | 511 (3.0) | 515 (3.3) | 514 (3.0) | 510 (3.2) | 519 (3.5) | 521 (3.4) | 512 (3.0) | 512 (3.0) | 512 (3.0) | 512 (3.0) | 513 (3.0) |
| Spain | 511 (2.0) | 498 (2.3) | 508 (2.1) | 511 (2.1) | 502 (2.3) | 501 (2.1) | 512 (2.1) | 513 (2.0) | 511 (2.0) | 510 (2.0) | 511 (2.0) |
| Italy | 510 (3.0) | 498 (3.4) | 511 (3.3) | 510 (3.5) | 505 (3.8) | 497 (3.6) | 511 (3.2) | 510 (3.0) | 509 (3.0) | 510 (3.1) | 508 (3.0) |
| Portugal | 504 (2.6) | 496 (3.4) | 502 (3.0) | 511 (3.2) | 505 (3.4) | 503 (3.1) | 505 (2.8) | 505 (2.6) | 504 (2.6) | 504 (2.6) | 506 (2.6) |
| New Zealand | 503 (2.3) | 494 (2.5) | 498 (2.4) | 504 (2.5) | 491 (2.5) | 501 (2.4) | 505 (2.3) | 502 (2.3) | 503 (2.3) | 503 (2.3) | 502 (2.3) |
| Belgium (Flemish) | 501 (2.1) | 491 (2.5) | 498 (2.3) | 491 (2.6) | 494 (2.5) | 504 (2.3) | 498 (2.2) | 499 (2.1) | 499 (2.1) | 501 (2.1) | 503 (2.1) |
| Malta | 496 (1.3) | 498 (1.5) | 492 (1.3) | 497 (1.3) | 493 (1.4) | 502 (1.3) | 498 (1.3) | 496 (1.3) | 495 (1.3) | 494 (1.3) | 496 (1.3) |
| Kazakhstan | 494 (3.1) | 503 (3.4) | 492 (3.3) | 489 (3.4) | 508 (3.3) | 500 (3.3) | 490 (3.0) | 493 (3.1) | 494 (3.1) | 496 (3.1) | 493 (3.1) |
| Bahrain | 493 (3.4) | 505 (3.8) | 490 (3.6) | 494 (3.8) | 497 (3.6) | 497 (3.8) | 491 (3.5) | 492 (3.4) | 493 (3.5) | 490 (3.5) | 493 (3.5) |
| Albania | 489 (3.5) | 502 (3.7) | 494 (3.4) | 487 (3.5) | 496 (3.5) | 494 (3.6) | 486 (3.4) | 491 (3.5) | 490 (3.5) | 488 (3.5) | 488 (3.5) |
| France | 488 (3.0) | 470 (3.1) | 480 (3.0) | 484 (3.1) | 473 (3.1) | 476 (3.2) | 490 (3.0) | 488 (3.0) | 487 (2.9) | 487 (2.9) | 488 (3.0) |
| United Arab Emirates | 473 (2.1) | 485 (2.2) | 469 (2.2) | 472 (2.2) | 480 (2.3) | 469 (2.3) | 471 (2.1) | 472 (2.1) | 471 (2.1) | 470 (2.1) | 473 (2.0) |
| Chile | 469 (2.6) | 464 (2.8) | 470 (2.5) | 467 (2.6) | 464 (2.8) | 460 (2.7) | 470 (2.5) | 469 (2.5) | 472 (2.6) | 470 (2.6) | 468 (2.6) |
| Armenia | 466 (3.4) | 477 (3.7) | 467 (3.6) | 474 (3.6) | 461 (4.0) | 455 (3.8) | 470 (3.5) | 466 (3.5) | 471 (3.4) | 466 (3.4) | 466 (3.5) |
| Bosnia and Herzegovina | 459 (2.9) | 463 (3.0) | 465 (3.0) | 470 (2.7) | 454 (2.9) | 453 (2.9) | 464 (2.8) | 462 (2.9) | 460 (3.0) | 462 (2.9) | 459 (3.0) |
| Georgia | 454 (3.9) | 448 (4.3) | 451 (4.2) | 453 (4.3) | 448 (4.7) | 450 (4.1) | 456 (4.2) | 454 (4.0) | 455 (4.0) | 456 (3.9) | 454 (4.0) |
| Montenegro | 453 (2.5) | 461 (3.4) | 462 (2.9) | 462 (3.2) | 457 (3.4) | 446 (3.2) | 462 (2.6) | 456 (2.5) | 455 (2.5) | 456 (2.5) | 454 (2.5) |
| Qatar | 449 (3.9) | 459 (4.0) | 447 (4.1) | 455 (4.3) | 452 (3.9) | 449 (4.3) | 451 (3.9) | 450 (3.9) | 449 (4.0) | 449 (3.9) | 450 (3.9) |
| Iran, Islamic Rep. of | 441 (4.1) | 448 (4.4) | 441 (4.2) | 440 (4.1) | 442 (4.6) | 446 (4.5) | 437 (4.0) | 441 (4.1) | 441 (4.2) | 440 (4.1) | 440 (4.1) |
| Oman | 435 (4.1) | 452 (4.0) | 434 (3.9) | 440 (3.9) | 450 (4.0) | 441 (4.2) | 434 (4.0) | 437 (4.0) | 433 (4.1) | 433 (4.1) | 435 (4.1) |
| Azerbaijan | 427 (3.3) | 445 (3.2) | 432 (3.3) | 444 (3.2) | 427 (3.4) | 424 (3.3) | 434 (3.2) | 428 (3.3) | 428 (3.3) | 427 (3.3) | 427 (3.3) |
| North Macedonia | 426 (6.2) | 434 (6.8) | 433 (6.0) | 423 (6.0) | 439 (6.3) | 432 (6.7) | 423 (6.0) | 426 (6.1) | 426 (6.3) | 426 (6.2) | 425 (6.3) |
| Kosovo | 413 (3.7) | 414 (4.4) | 412 (4.0) | 414 (4.1) | 415 (4.3) | 416 (4.1) | 408 (3.9) | 413 (3.7) | 413 (3.7) | 414 (3.7) | 412 (3.7) |
| Saudi Arabia | 402 (4.1) | 406 (4.5) | 402 (4.3) | 395 (4.3) | 405 (4.4) | 405 (4.4) | 402 (4.1) | 400 (4.1) | 402 (4.1) | 401 (4.0) | 402 (4.0) |
| Kuwait | 392 (6.1) | 387 (6.7) | 389 (6.1) | 393 (6.4) | 397 (6.4) | 389 (6.5) | 396 (6.3) | 391 (6.1) | 389 (6.2) | 392 (6.1) | 392 (6.0) |
| Morocco | 374 (5.8) | 384 (5.6) | 369 (6.0) | 372 (5.6) | 383 (6.1) | 368 (6.2) | 369 (5.8) | 377 (5.8) | 371 (5.9) | 373 (5.9) | 374 (5.9) |
| South Africa (5) | 324 (4.9) | 323 (4.9) | 316 (5.0) | 329 (5.0) | 325 (4.7) | 324 (4.9) | 333 (4.8) | 325 (4.9) | 319 (5.0) | 319 (5.0) | 322 (5.0) |
| Pakistan | 290 (13.4) | 311 (13.6) | 299 (12.4) | 297 (13.3) | 303 (13.6) | 290 (14.7) | 296 (13.7) | 291 (13.3) | 289 (13.2) | 284 (13.1) | 291 (13.6) |
| Philippines | 249 (7.5) | 267 (7.9) | 244 (7.6) | 242 (8.0) | 269 (7.7) | 247 (7.9) | 252 (7.7) | 253 (7.4) | 237 (7.8) | 242 (7.6) | 246 (7.6) |
| **International Average** | 491 (0.5) | 492 (0.5) | 490 (0.5) | 490 (0.5) | 490 (0.5) | 490 (0.5) | 490 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (3.2) | 588 (2.7) | 593 (2.8) | 590 (3.1) | 587 (2.7) | 590 (2.5) | 594 (2.3) | 595 (2.3) | 595 (2.3) | 594 (2.2) |
| Dubai, UAE | 545 (1.7) | 557 (1.9) | 542 (1.9) | 542 (1.9) | 550 (1.9) | 548 (2.0) | 542 (1.7) | 543 (1.7) | 543 (1.8) | 542 (1.8) | 544 (1.7) |
| Ontario, Canada | 524 (3.2) | 516 (3.0) | 520 (3.1) | 521 (3.2) | 507 (3.0) | 520 (3.3) | 524 (3.1) | 522 (3.1) | 525 (3.1) | 526 (3.1) | 524 (3.2) |
| Madrid, Spain | 523 (2.0) | 512 (2.5) | 519 (2.1) | 521 (2.4) | 512 (2.4) | 512 (2.2) | 523 (2.1) | 524 (2.0) | 522 (2.0) | 522 (2.0) | 522 (2.0) |
| Quebec, Canada | 522 (2.5) | 508 (3.2) | 511 (2.9) | 515 (3.0) | 506 (3.2) | 515 (2.9) | 519 (2.6) | 521 (2.6) | 523 (2.6) | 523 (2.6) | 522 (2.6) |
| Abu Dhabi, UAE | 418 (2.8) | 432 (3.3) | 414 (3.1) | 417 (3.2) | 428 (3.3) | 411 (3.2) | 418 (2.9) | 417 (2.8) | 416 (2.8) | 415 (2.8) | 419 (2.7) |
| **Number of Items (Score Points)*** | 169 (174) | 42 (43) | 64 (65) | 52 (53) | 46 (46) | 64 (64) | 97 (99) | 153 (158) | 143 (146) | 144 (149) | 154 (158) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | England | Sweden | Czech Republic | Australia | Hong Kong SAR | Poland | Hungary | Ireland | Turkey (5) | Croatia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | 595 (3.4) | 598 (3.4) | 591 (3.6) | 608 (3.4) | 604 (3.7) | 598 (3.7) | 595 (3.4) | 596 (3.4) | 599 (3.6) | 591 (3.7) |
| Korea, Rep. of | 588 (2.1) | 588 (2.1) | 588 (2.1) | 584 (2.2) | 581 (2.2) | 589 (2.3) | 583 (2.2) | 586 (2.1) | 586 (2.1) | 589 (2.2) | 589 (2.2) |
| Russian Federation | 567 (3.0) | 567 (3.0) | 566 (3.1) | 566 (3.0) | 569 (3.0) | 566 (3.2) | 568 (2.9) | 568 (3.0) | 567 (3.0) | 567 (3.0) | 562 (2.9) |
| Japan | 562 (1.8) | 562 (1.8) | 563 (1.8) | 554 (1.9) | 567 (1.9) | 559 (1.9) | 559 (1.9) | 562 (1.8) | 561 (1.8) | 559 (1.8) | 559 (2.0) |
| Chinese Taipei | 558 (1.8) | 558 (1.8) | 559 (1.8) | 554 (1.8) | 557 (1.8) | 547 (1.8) | 551 (1.8) | 557 (1.7) | 558 (1.8) | 560 (1.9) | 557 (1.8) |
| Finland | 555 (2.6) | 555 (2.6) | 555 (2.6) | 556 (2.7) | 553 (2.8) | 555 (2.7) | 556 (2.7) | 555 (2.6) | 554 (2.6) | 552 (2.7) | 558 (2.7) |
| Latvia | 542 (2.4) | 542 (2.4) | 544 (2.3) | 535 (2.4) | 541 (2.3) | 535 (2.5) | 538 (2.5) | 542 (2.3) | 542 (2.3) | 542 (2.4) | 537 (2.5) |
| Norway (5) | 539 (2.2) | 539 (2.2) | 538 (2.2) | 541 (2.2) | 540 (2.3) | 542 (2.2) | 537 (2.3) | 540 (2.2) | 536 (2.2) | 536 (2.2) | 540 (2.2) |
| United States | 539 (2.7) | 539 (2.7) | 538 (2.8) | 541 (2.8) | 540 (2.9) | 536 (2.9) | 539 (2.8) | 539 (2.8) | 537 (2.8) | 537 (2.8) | 536 (2.9) |
| Lithuania | 538 (2.5) | 538 (2.5) | 537 (2.5) | 535 (2.5) | 539 (2.4) | 529 (2.6) | 536 (2.6) | 538 (2.5) | 538 (2.5) | 538 (2.5) | 536 (2.6) |
| England | 537 (2.7) | 537 (2.7) | 538 (2.8) | 537 (2.8) | 538 (2.9) | 534 (2.9) | 538 (2.8) | 538 (2.7) | 537 (2.8) | 536 (2.9) | 537 (2.8) |
| Sweden | 537 (3.3) | 537 (3.3) | 539 (3.3) | 542 (3.5) | 539 (3.4) | 537 (3.6) | 539 (3.5) | 537 (3.3) | 535 (3.3) | 536 (3.4) | 542 (3.5) |
| Czech Republic | 534 (2.6) | 534 (2.6) | 533 (2.8) | 536 (2.9) | 537 (2.9) | 530 (3.1) | 532 (3.0) | 534 (2.6) | 534 (2.7) | 533 (2.8) | 530 (3.1) |
| Australia | 533 (2.4) | 533 (2.4) | 534 (2.5) | 533 (2.4) | 533 (2.5) | 532 (2.4) | 533 (2.4) | 533 (2.4) | 533 (2.5) | 530 (2.4) | 533 (2.5) |
| Hong Kong SAR | 531 (3.3) | 531 (3.4) | 536 (3.4) | 531 (3.5) | 528 (3.7) | 537 (3.8) | 527 (3.7) | 530 (3.3) | 530 (3.4) | 526 (3.5) | 531 (3.6) |
| Poland | 531 (2.6) | 531 (2.6) | 530 (2.7) | 535 (2.7) | 533 (2.8) | 533 (2.9) | 535 (2.8) | 531 (2.6) | 531 (2.6) | 532 (2.7) | 529 (2.8) |
| Hungary | 529 (2.7) | 529 (2.7) | 530 (2.7) | 536 (2.7) | 530 (2.8) | 530 (2.7) | 534 (2.8) | 532 (2.7) | 528 (2.7) | 530 (2.8) | 533 (2.8) |
| Ireland | 528 (3.2) | 528 (3.2) | 526 (3.1) | 527 (3.3) | 526 (3.0) | 526 (3.1) | 526 (3.2) | 528 (3.2) | 527 (3.2) | 528 (3.1) | 529 (3.1) |
| Turkey (5) | 526 (4.2) | 526 (4.2) | 530 (4.3) | 524 (4.2) | 533 (4.2) | 530 (4.3) | 527 (4.3) | 526 (4.2) | 525 (4.2) | 539 (4.4) | 526 (4.3) |
| Croatia | 524 (2.2) | 524 (2.2) | 524 (2.3) | 526 (2.3) | 523 (2.4) | 525 (2.5) | 527 (2.4) | 523 (2.2) | 526 (2.2) | 525 (2.3) | 525 (2.5) |
| Canada | 523 (1.9) | 523 (1.9) | 523 (1.9) | 525 (1.9) | 525 (1.9) | 521 (1.9) | 526 (1.9) | 523 (1.9) | 522 (1.9) | 523 (1.9) | 524 (1.9) |
| Austria | 522 (2.6) | 522 (2.6) | 522 (2.7) | 523 (2.7) | 523 (2.7) | 519 (2.7) | 519 (2.7) | 524 (2.6) | 524 (2.6) | 521 (2.7) | 515 (2.7) |
| Denmark | 522 (2.4) | 522 (2.4) | 521 (2.4) | 526 (2.5) | 517 (2.6) | 520 (2.5) | 520 (2.5) | 523 (2.4) | 521 (2.4) | 519 (2.4) | 521 (2.5) |
| Bulgaria | 521 (4.9) | 521 (4.9) | 522 (4.8) | 525 (4.9) | 521 (4.9) | 524 (4.8) | 526 (4.8) | 521 (4.8) | 525 (5.0) | 522 (5.1) | 523 (4.5) |
| Slovak Republic | 521 (3.7) | 521 (3.7) | 521 (3.6) | 519 (3.6) | 525 (3.7) | 514 (3.5) | 515 (3.7) | 522 (3.7) | 522 (3.8) | 523 (3.8) | 513 (3.6) |
| Germany | 518 (2.2) | 518 (2.2) | 521 (2.2) | 521 (2.2) | 517 (2.2) | 522 (2.2) | 521 (2.2) | 519 (2.2) | 522 (2.2) | 516 (2.2) | 523 (2.2) |
| Netherlands | 518 (2.9) | 518 (2.9) | 519 (3.0) | 512 (3.0) | 517 (3.1) | 514 (3.1) | 516 (3.2) | 518 (2.9) | 520 (3.0) | 515 (3.0) | 516 (3.2) |
| Northern Ireland | 518 (2.3) | 518 (2.3) | 517 (2.4) | 518 (2.5) | 516 (2.6) | 517 (2.7) | 517 (2.6) | 519 (2.3) | 518 (2.4) | 515 (2.5) | 518 (2.7) |
| Serbia | 517 (3.5) | 517 (3.5) | 516 (3.4) | 519 (3.6) | 520 (3.5) | 521 (3.6) | 521 (3.5) | 519 (3.5) | 521 (3.6) | 518 (3.5) | 515 (3.6) |
| Cyprus | 511 (3.0) | 511 (3.0) | 514 (3.1) | 513 (3.1) | 512 (3.1) | 508 (3.1) | 517 (3.0) | 513 (3.1) | 511 (3.1) | 517 (3.1) | 515 (3.0) |
| Spain | 511 (2.0) | 511 (2.0) | 510 (2.0) | 515 (2.0) | 509 (2.2) | 512 (2.1) | 512 (2.0) | 511 (2.0) | 509 (2.0) | 513 (2.1) | 511 (2.1) |
| Italy | 510 (3.0) | 510 (3.0) | 511 (3.1) | 519 (3.2) | 509 (3.2) | 512 (3.2) | 516 (3.2) | 509 (3.0) | 510 (3.1) | 511 (3.1) | 517 (3.2) |
| Portugal | 504 (2.6) | 504 (2.6) | 504 (2.6) | 511 (2.7) | 501 (2.9) | 504 (2.9) | 507 (2.8) | 504 (2.6) | 506 (2.6) | 507 (2.7) | 508 (2.8) |
| New Zealand | 503 (2.3) | 503 (2.3) | 501 (2.3) | 503 (2.3) | 500 (2.4) | 503 (2.3) | 501 (2.3) | 503 (2.3) | 501 (2.3) | 501 (2.3) | 503 (2.4) |
| Belgium (Flemish) | 501 (2.1) | 501 (2.1) | 500 (2.2) | 495 (2.3) | 500 (2.2) | 498 (2.4) | 497 (2.3) | 501 (2.1) | 503 (2.1) | 498 (2.2) | 499 (2.3) |
| Malta | 496 (1.3) | 496 (1.3) | 498 (1.2) | 496 (1.3) | 494 (1.2) | 497 (1.2) | 496 (1.3) | 496 (1.3) | 494 (1.3) | 497 (1.3) | 496 (1.2) |
| Kazakhstan | 494 (3.1) | 494 (3.1) | 492 (3.1) | 484 (3.2) | 499 (3.1) | 491 (3.2) | 489 (3.1) | 494 (3.1) | 493 (3.0) | 494 (3.1) | 484 (3.2) |
| Bahrain | 493 (3.4) | 493 (3.4) | 494 (3.5) | 493 (3.5) | 493 (3.5) | 496 (3.6) | 495 (3.5) | 492 (3.5) | 491 (3.5) | 499 (3.6) | 492 (3.6) |
| Albania | 489 (3.5) | 489 (3.5) | 489 (3.5) | 489 (3.4) | 488 (3.6) | 492 (3.4) | 489 (3.4) | 490 (3.5) | 487 (3.4) | 490 (3.5) | 493 (3.5) |
| France | 488 (3.0) | 488 (3.0) | 486 (3.0) | 492 (3.0) | 483 (3.1) | 490 (2.9) | 491 (2.9) | 486 (2.9) | 486 (3.0) | 488 (3.0) | 489 (3.0) |
| United Arab Emirates | 473 (2.1) | 473 (2.1) | 476 (2.1) | 470 (2.1) | 476 (2.1) | 472 (2.2) | 469 (2.1) | 470 (2.1) | 472 (2.1) | 474 (2.1) | 468 (2.1) |
| Chile | 469 (2.6) | 469 (2.6) | 470 (2.6) | 477 (2.5) | 471 (2.6) | 467 (2.4) | 472 (2.6) | 471 (2.6) | 467 (2.5) | 470 (2.6) | 473 (2.5) |
| Armenia | 466 (3.4) | 466 (3.4) | 467 (3.5) | 468 (3.6) | 473 (3.6) | 470 (3.6) | 475 (3.6) | 467 (3.5) | 466 (3.4) | 465 (3.5) | 474 (3.7) |
| Bosnia and Herzegovina | 459 (2.9) | 459 (2.9) | 457 (3.0) | 464 (2.9) | 461 (3.0) | 467 (2.8) | 468 (2.9) | 460 (2.9) | 461 (3.0) | 460 (2.9) | 465 (2.9) |
| Georgia | 454 (3.9) | 454 (3.9) | 454 (3.9) | 456 (4.0) | 455 (4.1) | 456 (4.2) | 457 (4.2) | 453 (3.9) | 453 (4.0) | 458 (4.1) | 456 (4.2) |
| Montenegro | 453 (2.5) | 453 (2.5) | 456 (2.6) | 462 (2.6) | 455 (2.8) | 465 (2.9) | 463 (2.8) | 455 (2.5) | 456 (2.5) | 453 (2.6) | 459 (2.9) |
| Qatar | 449 (3.9) | 449 (3.9) | 451 (3.9) | 450 (3.9) | 451 (3.9) | 456 (4.0) | 451 (3.9) | 447 (4.0) | 449 (3.8) | 451 (4.1) | 449 (4.0) |
| Iran, Islamic Rep. of | 441 (4.1) | 441 (4.1) | 442 (4.1) | 437 (4.0) | 438 (4.0) | 442 (3.9) | 438 (3.9) | 440 (4.1) | 445 (4.1) | 441 (4.2) | 442 (3.9) |
| Oman | 435 (4.1) | 435 (4.1) | 437 (4.1) | 434 (4.0) | 442 (4.0) | 434 (4.0) | 434 (3.9) | 434 (4.0) | 435 (4.1) | 438 (4.1) | 432 (3.9) |
| Azerbaijan | 427 (3.3) | 427 (3.3) | 431 (3.3) | 429 (3.3) | 429 (3.2) | 435 (3.2) | 426 (3.4) | 429 (3.3) | 429 (3.3) | 431 (3.3) | 431 (3.3) |
| North Macedonia | 426 (6.2) | 426 (6.2) | 425 (6.2) | 422 (5.9) | 426 (6.4) | 421 (6.1) | 423 (5.9) | 428 (6.2) | 427 (6.1) | 429 (6.5) | 422 (6.0) |
| Kosovo | 413 (3.7) | 413 (3.7) | 412 (3.8) | 406 (3.9) | 412 (3.9) | 414 (3.9) | 408 (3.9) | 413 (3.8) | 413 (3.7) | 410 (3.9) | 411 (3.9) |
| Saudi Arabia | 402 (4.1) | 402 (4.1) | 401 (4.1) | 401 (4.1) | 402 (4.1) | 400 (4.3) | 398 (4.0) | 402 (4.1) | 401 (4.1) | 408 (4.2) | 393 (4.2) |
| Kuwait | 392 (6.1) | 392 (6.1) | 391 (6.2) | 394 (6.1) | 391 (6.3) | 394 (6.3) | 393 (6.1) | 389 (6.1) | 392 (6.0) | 390 (6.3) | 392 (6.1) |
| Morocco | 374 (5.8) | 374 (5.8) | 377 (5.8) | 374 (5.8) | 382 (5.9) | 375 (5.9) | 375 (5.7) | 373 (5.9) | 376 (5.8) | 374 (5.9) | 372 (5.7) |
| South Africa (5) | 324 (4.9) | 324 (4.9) | 326 (4.8) | 325 (4.9) | 326 (4.9) | 333 (4.9) | 333 (4.7) | 321 (5.0) | 321 (4.8) | 321 (5.0) | 339 (4.6) |
| Pakistan | 290 (13.4) | 290 (13.4) | 297 (13.3) | 288 (12.9) | 297 (13.2) | 293 (13.6) | 294 (13.7) | 291 (13.2) | 291 (13.2) | 286 (14.1) | 294 (13.0) |
| Philippines | 249 (7.5) | 249 (7.5) | 255 (7.4) | 248 (7.6) | 254 (7.5) | 241 (7.9) | 256 (7.4) | 243 (7.7) | 252 (7.5) | 241 (8.0) | 259 (7.3) |
| **International Average** | 491 (0.5) | 491 (0.5) | 492 (0.5) | 491 (0.5) | 492 (0.5) | 491 (0.5) | 492 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (2.2) | 593 (2.3) | 593 (2.4) | 599 (2.5) | 590 (2.6) | 592 (2.4) | 595 (2.3) | 594 (2.3) | 596 (2.4) | 589 (2.4) |
| Dubai, UAE | 545 (1.7) | 544 (1.7) | 548 (1.8) | 540 (1.7) | 547 (1.8) | 544 (1.8) | 539 (1.8) | 542 (1.7) | 543 (1.7) | 548 (1.8) | 538 (1.8) |
| Ontario, Canada | 524 (3.2) | 524 (3.2) | 524 (3.2) | 527 (3.2) | 527 (3.2) | 523 (3.2) | 529 (3.2) | 525 (3.1) | 524 (3.2) | 523 (3.3) | 525 (3.2) |
| Madrid, Spain | 523 (2.0) | 523 (2.0) | 522 (2.0) | 525 (2.0) | 521 (2.2) | 521 (2.2) | 523 (2.1) | 523 (2.0) | 520 (2.0) | 526 (2.0) | 521 (2.2) |
| Quebec, Canada | 522 (2.5) | 522 (2.5) | 521 (2.6) | 523 (2.7) | 522 (2.8) | 518 (2.8) | 524 (2.7) | 521 (2.6) | 520 (2.6) | 523 (2.6) | 523 (2.8) |
| Abu Dhabi, UAE | 418 (2.8) | 418 (2.7) | 421 (2.8) | 416 (2.8) | 423 (2.9) | 415 (3.0) | 416 (2.9) | 416 (2.7) | 417 (2.7) | 416 (2.9) | 415 (3.0) |
| **Number of Items (Score Points)*** | 169 (174) | 169 (174) | 128 (131) | 99 (103) | 91 (92) | 73 (76) | 85 (88) | 146 (149) | 136 (139) | 106 (110) | 79 (81) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | Canada | Austria | Denmark | Bulgaria | Slovak Republic | Germany | Netherlands | Northern Ireland | Serbia | Cyprus |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | 593 (3.4) | 596 (3.4) | 591 (3.4) | 594 (3.5) | 595 (3.4) | 594 (3.4) | 601 (3.4) | 596 (3.4) | 599 (3.5) | 598 (3.4) |
| Korea, Rep. of | 588 (2.1) | 589 (2.2) | 588 (2.1) | 588 (2.2) | 584 (2.2) | 588 (2.1) | 587 (2.1) | 583 (2.1) | 581 (2.1) | 588 (2.2) | 581 (2.2) |
| Russian Federation | 567 (3.0) | 565 (3.0) | 567 (3.0) | 566 (3.0) | 568 (3.0) | 566 (3.0) | 566 (3.0) | 569 (3.0) | 566 (2.9) | 571 (2.9) | 566 (2.9) |
| Japan | 562 (1.8) | 560 (1.9) | 562 (1.7) | 563 (1.8) | 557 (1.8) | 561 (1.8) | 566 (1.7) | 564 (1.8) | 558 (1.8) | 562 (1.8) | 561 (1.9) |
| Chinese Taipei | 558 (1.8) | 561 (1.9) | 558 (1.7) | 559 (1.8) | 555 (1.8) | 559 (1.8) | 558 (1.7) | 557 (1.8) | 560 (1.8) | 557 (1.8) | 555 (1.9) |
| Finland | 555 (2.6) | 555 (2.8) | 554 (2.6) | 554 (2.6) | 554 (2.6) | 554 (2.5) | 555 (2.6) | 552 (2.6) | 554 (2.6) | 551 (2.6) | 551 (2.7) |
| Latvia | 542 (2.4) | 544 (2.3) | 541 (2.3) | 541 (2.4) | 541 (2.4) | 543 (2.4) | 543 (2.4) | 542 (2.4) | 539 (2.4) | 543 (2.4) | 546 (2.4) |
| Norway (5) | 539 (2.2) | 536 (2.3) | 539 (2.2) | 541 (2.2) | 541 (2.2) | 539 (2.2) | 539 (2.2) | 536 (2.3) | 536 (2.2) | 536 (2.3) | 531 (2.2) |
| United States | 539 (2.7) | 538 (2.8) | 539 (2.8) | 539 (2.7) | 539 (2.8) | 538 (2.8) | 538 (2.8) | 537 (2.8) | 541 (2.8) | 536 (2.8) | 534 (2.8) |
| Lithuania | 538 (2.5) | 542 (2.5) | 538 (2.5) | 536 (2.5) | 537 (2.5) | 538 (2.5) | 540 (2.5) | 542 (2.6) | 539 (2.5) | 541 (2.5) | 539 (2.5) |
| England | 537 (2.7) | 537 (2.8) | 538 (2.7) | 537 (2.7) | 537 (2.7) | 538 (2.7) | 537 (2.7) | 535 (2.8) | 539 (2.7) | 535 (2.8) | 535 (2.8) |
| Sweden | 537 (3.3) | 537 (3.5) | 537 (3.3) | 537 (3.3) | 536 (3.3) | 537 (3.3) | 539 (3.3) | 536 (3.4) | 536 (3.4) | 535 (3.4) | 537 (3.5) |
| Czech Republic | 534 (2.6) | 536 (2.9) | 534 (2.6) | 535 (2.6) | 534 (2.6) | 532 (2.6) | 535 (2.6) | 535 (2.7) | 534 (2.7) | 535 (2.7) | 535 (2.7) |
| Australia | 533 (2.4) | 533 (2.5) | 534 (2.5) | 532 (2.4) | 533 (2.4) | 534 (2.4) | 532 (2.4) | 531 (2.4) | 535 (2.5) | 530 (2.5) | 531 (2.4) |
| Hong Kong SAR | 531 (3.3) | 529 (3.4) | 531 (3.4) | 530 (3.3) | 529 (3.4) | 531 (3.3) | 532 (3.3) | 530 (3.4) | 531 (3.4) | 528 (3.4) | 530 (3.4) |
| Poland | 531 (2.6) | 530 (2.7) | 530 (2.6) | 532 (2.6) | 533 (2.6) | 530 (2.6) | 532 (2.6) | 532 (2.7) | 532 (2.7) | 531 (2.7) | 530 (2.7) |
| Hungary | 529 (2.7) | 532 (2.8) | 529 (2.7) | 530 (2.7) | 531 (2.6) | 528 (2.7) | 530 (2.7) | 531 (2.7) | 528 (2.7) | 528 (2.7) | 528 (2.8) |
| Ireland | 528 (3.2) | 526 (3.4) | 528 (3.2) | 528 (3.2) | 527 (3.2) | 528 (3.1) | 529 (3.2) | 526 (3.2) | 528 (3.2) | 525 (3.2) | 524 (3.3) |
| Turkey (5) | 526 (4.2) | 528 (4.3) | 526 (4.2) | 525 (4.2) | 525 (4.3) | 527 (4.2) | 525 (4.3) | 524 (4.3) | 526 (4.3) | 529 (4.2) | 527 (4.4) |
| Croatia | 524 (2.2) | 525 (2.4) | 525 (2.2) | 523 (2.2) | 526 (2.2) | 523 (2.2) | 525 (2.2) | 527 (2.2) | 525 (2.3) | 524 (2.2) | 523 (2.3) |
| Canada | 523 (1.9) | 524 (1.9) | 523 (1.9) | 523 (1.9) | 524 (1.9) | 522 (1.9) | 523 (1.9) | 522 (1.9) | 524 (1.9) | 522 (2.0) | 518 (1.9) |
| Austria | 522 (2.6) | 517 (2.6) | 523 (2.6) | 523 (2.6) | 523 (2.6) | 521 (2.6) | 523 (2.6) | 522 (2.7) | 521 (2.6) | 521 (2.6) | 518 (2.7) |
| Denmark | 522 (2.4) | 520 (2.5) | 522 (2.3) | 524 (2.4) | 521 (2.4) | 521 (2.4) | 522 (2.4) | 518 (2.5) | 519 (2.4) | 519 (2.4) | 518 (2.5) |
| Bulgaria | 521 (4.9) | 526 (4.9) | 521 (5.0) | 520 (4.8) | 528 (5.1) | 521 (5.0) | 521 (4.8) | 523 (4.9) | 524 (5.1) | 522 (5.1) | 523 (4.9) |
| Slovak Republic | 521 (3.7) | 523 (3.7) | 520 (3.7) | 522 (3.7) | 523 (3.7) | 520 (3.7) | 520 (3.7) | 521 (3.7) | 520 (3.7) | 519 (3.6) | 521 (3.7) |
| Germany | 518 (2.2) | 515 (2.3) | 521 (2.3) | 518 (2.2) | 519 (2.2) | 519 (2.2) | 519 (2.2) | 519 (2.2) | 521 (2.2) | 520 (2.3) | 518 (2.2) |
| Netherlands | 518 (2.9) | 514 (3.0) | 519 (2.9) | 521 (2.9) | 517 (2.9) | 518 (2.9) | 518 (3.0) | 515 (3.0) | 518 (2.9) | 518 (2.9) | 513 (2.9) |
| Northern Ireland | 518 (2.3) | 518 (2.5) | 519 (2.3) | 518 (2.3) | 520 (2.4) | 519 (2.4) | 519 (2.3) | 516 (2.4) | 521 (2.4) | 516 (2.4) | 515 (2.5) |
| Serbia | 517 (3.5) | 521 (3.4) | 519 (3.5) | 515 (3.5) | 520 (3.6) | 517 (3.5) | 519 (3.5) | 525 (3.5) | 520 (3.6) | 522 (3.6) | 521 (3.6) |
| Cyprus | 511 (3.0) | 515 (3.2) | 511 (3.0) | 512 (3.0) | 511 (3.1) | 511 (3.1) | 511 (3.0) | 511 (3.2) | 513 (3.1) | 512 (3.1) | 513 (3.2) |
| Spain | 511 (2.0) | 511 (2.0) | 510 (2.0) | 511 (2.0) | 512 (2.0) | 511 (2.0) | 511 (2.0) | 511 (2.1) | 511 (2.0) | 510 (2.0) | 511 (2.1) |
| Italy | 510 (3.0) | 514 (3.3) | 511 (3.0) | 508 (3.0) | 514 (3.1) | 511 (3.0) | 509 (3.0) | 512 (3.1) | 511 (3.1) | 512 (3.1) | 512 (3.1) |
| Portugal | 504 (2.6) | 508 (2.7) | 503 (2.6) | 505 (2.6) | 506 (2.6) | 505 (2.6) | 505 (2.6) | 507 (2.7) | 505 (2.7) | 504 (2.6) | 505 (2.7) |
| New Zealand | 503 (2.3) | 504 (2.4) | 503 (2.3) | 503 (2.3) | 504 (2.3) | 502 (2.3) | 503 (2.3) | 500 (2.4) | 504 (2.3) | 500 (2.3) | 499 (2.4) |
| Belgium (Flemish) | 501 (2.1) | 499 (2.2) | 502 (2.1) | 503 (2.1) | 501 (2.1) | 500 (2.1) | 502 (2.1) | 499 (2.2) | 501 (2.2) | 501 (2.2) | 497 (2.2) |
| Malta | 496 (1.3) | 495 (1.3) | 496 (1.3) | 496 (1.2) | 495 (1.3) | 497 (1.3) | 496 (1.3) | 494 (1.3) | 497 (1.3) | 495 (1.3) | 493 (1.3) |
| Kazakhstan | 494 (3.1) | 490 (3.0) | 493 (3.1) | 492 (3.1) | 493 (3.1) | 495 (3.1) | 493 (3.1) | 494 (3.2) | 492 (3.0) | 497 (3.1) | 495 (3.2) |
| Bahrain | 493 (3.4) | 493 (3.5) | 492 (3.4) | 491 (3.4) | 494 (3.5) | 494 (3.4) | 490 (3.4) | 494 (3.5) | 494 (3.5) | 496 (3.5) | 494 (3.6) |
| Albania | 489 (3.5) | 491 (3.6) | 490 (3.5) | 489 (3.5) | 489 (3.4) | 490 (3.5) | 489 (3.5) | 491 (3.4) | 486 (3.4) | 490 (3.4) | 491 (3.6) |
| France | 488 (3.0) | 486 (3.0) | 488 (3.0) | 487 (3.0) | 489 (2.9) | 487 (2.9) | 490 (2.9) | 487 (2.9) | 489 (3.0) | 486 (2.9) | 480 (3.0) |
| United Arab Emirates | 473 (2.1) | 468 (2.1) | 471 (2.1) | 470 (2.1) | 473 (2.1) | 474 (2.0) | 470 (2.1) | 472 (2.1) | 473 (2.1) | 472 (2.1) | 472 (2.1) |
| Chile | 469 (2.6) | 469 (2.7) | 469 (2.6) | 470 (2.5) | 471 (2.5) | 469 (2.6) | 468 (2.5) | 469 (2.5) | 469 (2.6) | 467 (2.6) | 470 (2.6) |
| Armenia | 466 (3.4) | 471 (3.4) | 465 (3.4) | 466 (3.4) | 467 (3.5) | 467 (3.4) | 466 (3.4) | 467 (3.5) | 462 (3.5) | 467 (3.5) | 467 (3.5) |
| Bosnia and Herzegovina | 459 (2.9) | 464 (2.8) | 460 (2.9) | 459 (2.9) | 462 (3.0) | 457 (3.0) | 460 (2.9) | 464 (2.9) | 460 (2.9) | 462 (2.9) | 459 (2.9) |
| Georgia | 454 (3.9) | 456 (4.0) | 455 (3.9) | 456 (3.9) | 455 (4.0) | 454 (3.9) | 454 (3.9) | 454 (4.0) | 455 (4.0) | 455 (4.0) | 452 (3.9) |
| Montenegro | 453 (2.5) | 459 (2.6) | 455 (2.5) | 453 (2.5) | 457 (2.6) | 454 (2.5) | 455 (2.5) | 460 (2.6) | 457 (2.6) | 455 (2.6) | 457 (2.6) |
| Qatar | 449 (3.9) | 445 (4.0) | 449 (3.9) | 448 (4.0) | 450 (3.9) | 451 (3.9) | 448 (3.9) | 450 (3.8) | 451 (3.9) | 450 (3.8) | 447 (3.9) |
| Iran, Islamic Rep. of | 441 (4.1) | 440 (4.2) | 441 (4.1) | 437 (4.1) | 440 (4.1) | 442 (4.2) | 443 (4.1) | 445 (4.2) | 441 (4.2) | 443 (4.2) | 444 (4.2) |
| Oman | 435 (4.1) | 438 (4.0) | 435 (4.1) | 435 (4.0) | 434 (4.2) | 436 (4.1) | 434 (4.1) | 438 (4.0) | 437 (4.2) | 437 (4.1) | 439 (4.1) |
| Azerbaijan | 427 (3.3) | 434 (3.2) | 427 (3.2) | 426 (3.3) | 428 (3.3) | 428 (3.3) | 429 (3.3) | 429 (3.3) | 428 (3.3) | 429 (3.3) | 431 (3.3) |
| North Macedonia | 426 (6.2) | 430 (6.0) | 426 (6.2) | 426 (6.2) | 425 (6.3) | 426 (6.3) | 427 (6.1) | 430 (6.2) | 424 (6.1) | 427 (6.2) | 429 (6.3) |
| Kosovo | 413 (3.7) | 408 (3.8) | 413 (3.7) | 412 (3.7) | 413 (3.7) | 414 (3.7) | 413 (3.7) | 413 (3.8) | 411 (3.7) | 413 (3.7) | 408 (3.9) |
| Saudi Arabia | 402 (4.1) | 399 (4.1) | 402 (4.1) | 400 (4.1) | 403 (4.1) | 403 (4.1) | 398 (4.1) | 400 (4.1) | 404 (4.1) | 403 (4.1) | 404 (4.2) |
| Kuwait | 392 (6.1) | 392 (6.1) | 392 (6.1) | 392 (6.0) | 393 (6.1) | 393 (6.2) | 389 (6.1) | 394 (6.0) | 394 (6.1) | 392 (6.1) | 396 (6.2) |
| Morocco | 374 (5.8) | 373 (5.7) | 374 (5.8) | 372 (5.8) | 374 (5.9) | 376 (5.8) | 375 (5.8) | 375 (5.8) | 375 (5.8) | 377 (5.9) | 375 (5.9) |
| South Africa (5) | 324 (4.9) | 322 (4.8) | 324 (4.9) | 321 (4.9) | 323 (5.0) | 326 (4.9) | 324 (4.9) | 326 (4.9) | 325 (5.0) | 325 (4.9) | 320 (4.9) |
| Pakistan | 290 (13.4) | 295 (13.0) | 289 (13.4) | 289 (13.4) | 287 (13.6) | 293 (13.5) | 291 (13.1) | 291 (13.2) | 286 (13.3) | 289 (13.6) | 292 (13.3) |
| Philippines | 249 (7.5) | 249 (7.6) | 249 (7.5) | 245 (7.6) | 249 (7.6) | 252 (7.6) | 248 (7.5) | 256 (7.4) | 250 (7.5) | 247 (7.6) | 254 (7.6) |
| **International Average** | 491 (0.5) | 491 (0.5) | 491 (0.5) | 490 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 490 (0.5) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (2.4) | 593 (2.3) | 594 (2.2) | 596 (2.3) | 593 (2.3) | 595 (2.3) | 597 (2.4) | 592 (2.3) | 597 (2.3) | 595 (2.4) |
| Dubai, UAE | 545 (1.7) | 540 (1.8) | 543 (1.7) | 542 (1.7) | 545 (1.7) | 545 (1.7) | 542 (1.7) | 543 (1.8) | 545 (1.8) | 543 (1.8) | 543 (1.8) |
| Ontario, Canada | 524 (3.2) | 526 (3.2) | 525 (3.2) | 524 (3.1) | 525 (3.2) | 523 (3.2) | 523 (3.1) | 523 (3.1) | 526 (3.2) | 524 (3.3) | 519 (3.2) |
| Madrid, Spain | 523 (2.0) | 522 (2.0) | 521 (2.0) | 523 (2.0) | 523 (2.0) | 523 (2.0) | 522 (1.9) | 522 (2.1) | 521 (2.0) | 521 (2.0) | 522 (2.1) |
| Quebec, Canada | 522 (2.5) | 521 (2.7) | 522 (2.6) | 522 (2.5) | 523 (2.6) | 521 (2.6) | 522 (2.5) | 521 (2.6) | 522 (2.5) | 520 (2.6) | 516 (2.7) |
| Abu Dhabi, UAE | 418 (2.8) | 413 (2.9) | 417 (2.8) | 415 (2.8) | 418 (2.8) | 419 (2.7) | 417 (2.8) | 418 (2.8) | 418 (2.8) | 417 (2.8) | 417 (2.8) |
| **Number of Items (Score Points)*** | 169 (174) | 102 (104) | 159 (164) | 155 (159) | 140 (145) | 159 (163) | 157 (161) | 128 (133) | 135 (139) | 125 (130) | 111 (113) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | Spain | Italy | Portugal | New Zealand | Belgium (Flemish) | Malta | Kazakhstan | Bahrain | Albania | France |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | 589 (3.5) | 595 (3.4) | 595 (3.4) | 600 (3.5) | 597 (3.6) | 600 (3.4) | 597 (3.5) | 595 (3.4) | 599 (3.5) | 595 (3.4) |
| Korea, Rep. of | 588 (2.1) | 584 (2.1) | 586 (2.2) | 588 (2.1) | 586 (2.2) | 583 (2.3) | 576 (2.2) | 587 (2.2) | 588 (2.1) | 587 (2.1) | 581 (2.1) |
| Russian Federation | 567 (3.0) | 567 (3.0) | 568 (3.0) | 567 (3.0) | 568 (2.9) | 569 (3.0) | 569 (3.0) | 569 (3.0) | 567 (3.0) | 569 (3.0) | 566 (3.0) |
| Japan | 562 (1.8) | 553 (1.8) | 561 (1.8) | 562 (1.8) | 564 (1.8) | 561 (2.0) | 560 (1.8) | 557 (1.9) | 562 (1.8) | 560 (1.8) | 558 (1.9) |
| Chinese Taipei | 558 (1.8) | 554 (1.8) | 554 (1.8) | 558 (1.8) | 556 (1.8) | 549 (1.9) | 553 (1.9) | 554 (1.8) | 558 (1.8) | 557 (1.8) | 555 (1.7) |
| Finland | 555 (2.6) | 555 (2.6) | 555 (2.6) | 555 (2.6) | 552 (2.8) | 559 (2.8) | 552 (2.7) | 556 (2.6) | 555 (2.6) | 554 (2.6) | 556 (2.6) |
| Latvia | 542 (2.4) | 540 (2.5) | 539 (2.4) | 542 (2.4) | 545 (2.5) | 541 (2.4) | 547 (2.5) | 539 (2.4) | 542 (2.4) | 541 (2.4) | 542 (2.4) |
| Norway (5) | 539 (2.2) | 540 (2.2) | 540 (2.2) | 539 (2.2) | 536 (2.2) | 539 (2.3) | 539 (2.3) | 540 (2.2) | 539 (2.2) | 539 (2.2) | 536 (2.2) |
| United States | 539 (2.7) | 541 (2.8) | 539 (2.8) | 539 (2.7) | 539 (2.9) | 538 (2.9) | 539 (2.8) | 540 (2.8) | 539 (2.7) | 538 (2.8) | 536 (2.8) |
| Lithuania | 538 (2.5) | 536 (2.5) | 535 (2.4) | 538 (2.5) | 537 (2.5) | 541 (2.5) | 542 (2.6) | 537 (2.5) | 538 (2.5) | 538 (2.5) | 541 (2.5) |
| England | 537 (2.7) | 539 (2.7) | 537 (2.7) | 537 (2.7) | 535 (2.8) | 533 (2.8) | 540 (2.7) | 538 (2.8) | 537 (2.7) | 537 (2.7) | 537 (2.7) |
| Sweden | 537 (3.3) | 540 (3.4) | 538 (3.4) | 537 (3.3) | 534 (3.4) | 537 (3.4) | 539 (3.6) | 542 (3.3) | 537 (3.3) | 535 (3.3) | 540 (3.3) |
| Czech Republic | 534 (2.6) | 535 (2.7) | 536 (2.7) | 534 (2.6) | 534 (2.8) | 532 (3.1) | 539 (2.9) | 535 (2.7) | 534 (2.6) | 532 (2.6) | 534 (2.7) |
| Australia | 533 (2.4) | 536 (2.4) | 532 (2.4) | 533 (2.4) | 533 (2.5) | 534 (2.3) | 532 (2.4) | 535 (2.4) | 533 (2.4) | 533 (2.4) | 533 (2.4) |
| Hong Kong SAR | 531 (3.3) | 531 (3.4) | 529 (3.4) | 531 (3.3) | 524 (3.4) | 528 (3.8) | 530 (3.5) | 530 (3.5) | 531 (3.3) | 529 (3.4) | 530 (3.4) |
| Poland | 531 (2.6) | 534 (2.6) | 534 (2.6) | 531 (2.6) | 529 (2.7) | 533 (2.8) | 535 (2.8) | 531 (2.7) | 531 (2.6) | 532 (2.6) | 531 (2.6) |
| Hungary | 529 (2.7) | 533 (2.7) | 532 (2.7) | 529 (2.7) | 528 (2.7) | 537 (2.9) | 526 (2.8) | 531 (2.7) | 529 (2.7) | 530 (2.6) | 531 (2.7) |
| Ireland | 528 (3.2) | 529 (3.3) | 528 (3.3) | 528 (3.2) | 527 (3.3) | 527 (3.4) | 528 (3.1) | 528 (3.2) | 528 (3.2) | 527 (3.2) | 526 (3.1) |
| Turkey (5) | 526 (4.2) | 525 (4.2) | 523 (4.2) | 526 (4.2) | 527 (4.4) | 523 (4.3) | 526 (4.5) | 522 (4.2) | 526 (4.2) | 525 (4.2) | 524 (4.3) |
| Croatia | 524 (2.2) | 523 (2.3) | 526 (2.2) | 524 (2.2) | 526 (2.4) | 529 (2.4) | 520 (2.5) | 524 (2.3) | 524 (2.2) | 525 (2.2) | 523 (2.3) |
| Canada | 523 (1.9) | 526 (1.8) | 524 (1.9) | 523 (1.9) | 523 (1.9) | 523 (1.8) | 525 (1.9) | 525 (1.8) | 523 (1.9) | 524 (1.9) | 523 (1.9) |
| Austria | 522 (2.6) | 522 (2.6) | 523 (2.6) | 522 (2.6) | 519 (2.7) | 521 (2.7) | 520 (2.6) | 520 (2.6) | 522 (2.6) | 522 (2.6) | 521 (2.6) |
| Denmark | 522 (2.4) | 523 (2.4) | 523 (2.4) | 522 (2.4) | 519 (2.5) | 521 (2.6) | 519 (2.5) | 524 (2.4) | 522 (2.4) | 521 (2.4) | 522 (2.4) |
| Bulgaria | 521 (4.9) | 523 (5.0) | 525 (4.8) | 521 (4.9) | 519 (4.9) | 531 (4.7) | 521 (5.1) | 521 (4.7) | 521 (4.9) | 522 (5.0) | 524 (4.9) |
| Slovak Republic | 521 (3.7) | 521 (3.8) | 521 (3.7) | 521 (3.7) | 522 (3.7) | 520 (3.7) | 527 (3.8) | 519 (3.7) | 521 (3.7) | 520 (3.6) | 518 (3.7) |
| Germany | 518 (2.2) | 518 (2.2) | 520 (2.2) | 518 (2.2) | 518 (2.2) | 522 (2.4) | 517 (2.3) | 520 (2.2) | 518 (2.2) | 522 (2.2) | 521 (2.2) |
| Netherlands | 518 (2.9) | 517 (2.9) | 516 (2.9) | 518 (2.9) | 516 (3.0) | 512 (3.2) | 519 (2.9) | 513 (2.9) | 518 (2.9) | 518 (2.9) | 517 (3.0) |
| Northern Ireland | 518 (2.3) | 522 (2.4) | 519 (2.3) | 518 (2.3) | 517 (2.5) | 521 (2.6) | 519 (2.5) | 519 (2.4) | 518 (2.3) | 519 (2.3) | 518 (2.4) |
| Serbia | 517 (3.5) | 514 (3.4) | 522 (3.6) | 517 (3.5) | 520 (3.7) | 523 (3.4) | 520 (3.6) | 517 (3.5) | 517 (3.5) | 521 (3.6) | 519 (3.5) |
| Cyprus | 511 (3.0) | 511 (3.0) | 510 (3.1) | 511 (3.0) | 514 (3.2) | 514 (3.2) | 508 (3.3) | 511 (3.1) | 511 (3.0) | 512 (3.1) | 511 (3.1) |
| Spain | 511 (2.0) | 514 (2.0) | 511 (2.0) | 511 (2.0) | 508 (2.1) | 507 (2.1) | 511 (2.0) | 512 (2.0) | 511 (2.0) | 510 (2.0) | 515 (2.0) |
| Italy | 510 (3.0) | 514 (3.1) | 513 (3.0) | 510 (3.0) | 508 (3.1) | 515 (3.2) | 510 (3.2) | 514 (3.1) | 510 (3.0) | 512 (3.0) | 514 (3.0) |
| Portugal | 504 (2.6) | 506 (2.6) | 504 (2.6) | 504 (2.6) | 505 (2.7) | 509 (2.8) | 505 (2.8) | 508 (2.6) | 504 (2.6) | 504 (2.6) | 507 (2.6) |
| New Zealand | 503 (2.3) | 506 (2.3) | 503 (2.3) | 503 (2.3) | 502 (2.4) | 505 (2.3) | 505 (2.4) | 506 (2.3) | 503 (2.3) | 502 (2.3) | 503 (2.3) |
| Belgium (Flemish) | 501 (2.1) | 500 (2.2) | 500 (2.1) | 501 (2.1) | 499 (2.2) | 498 (2.3) | 502 (2.2) | 496 (2.2) | 501 (2.1) | 501 (2.1) | 500 (2.1) |
| Malta | 496 (1.3) | 496 (1.3) | 494 (1.3) | 496 (1.3) | 495 (1.3) | 493 (1.2) | 500 (1.3) | 495 (1.3) | 496 (1.3) | 496 (1.3) | 496 (1.3) |
| Kazakhstan | 494 (3.1) | 489 (3.1) | 492 (3.1) | 494 (3.1) | 497 (3.1) | 492 (3.2) | 495 (3.0) | 492 (3.2) | 494 (3.1) | 492 (3.1) | 493 (3.1) |
| Bahrain | 493 (3.4) | 492 (3.4) | 491 (3.5) | 493 (3.4) | 494 (3.6) | 493 (3.5) | 494 (3.6) | 492 (3.4) | 493 (3.4) | 493 (3.4) | 493 (3.4) |
| Albania | 489 (3.5) | 487 (3.4) | 492 (3.4) | 489 (3.5) | 490 (3.4) | 491 (3.4) | 490 (3.5) | 492 (3.4) | 489 (3.5) | 489 (3.4) | 491 (3.5) |
| France | 488 (3.0) | 491 (3.0) | 486 (2.9) | 488 (3.0) | 482 (2.9) | 486 (3.0) | 486 (3.0) | 489 (3.0) | 488 (3.0) | 488 (2.9) | 492 (3.0) |
| United Arab Emirates | 473 (2.1) | 471 (2.0) | 471 (2.1) | 473 (2.1) | 469 (2.1) | 470 (2.1) | 472 (2.1) | 471 (2.1) | 473 (2.1) | 471 (2.1) | 472 (2.0) |
| Chile | 469 (2.6) | 475 (2.6) | 473 (2.5) | 469 (2.6) | 468 (2.6) | 475 (2.5) | 472 (2.5) | 475 (2.5) | 469 (2.6) | 469 (2.6) | 471 (2.6) |
| Armenia | 466 (3.4) | 467 (3.5) | 467 (3.5) | 466 (3.4) | 466 (3.6) | 474 (3.6) | 465 (3.6) | 473 (3.5) | 466 (3.4) | 466 (3.5) | 468 (3.6) |
| Bosnia and Herzegovina | 459 (2.9) | 462 (2.8) | 463 (2.9) | 459 (2.9) | 460 (3.0) | 466 (2.9) | 460 (3.0) | 465 (2.9) | 459 (2.9) | 461 (2.9) | 461 (2.9) |
| Georgia | 454 (3.9) | 458 (4.0) | 454 (4.0) | 454 (3.9) | 453 (4.0) | 459 (4.2) | 450 (4.1) | 457 (4.0) | 454 (3.9) | 455 (3.9) | 455 (4.0) |
| Montenegro | 453 (2.5) | 458 (2.5) | 459 (2.6) | 453 (2.5) | 458 (2.6) | 465 (2.9) | 450 (2.8) | 460 (2.5) | 453 (2.5) | 457 (2.5) | 460 (2.5) |
| Qatar | 449 (3.9) | 451 (4.0) | 450 (3.9) | 449 (3.9) | 447 (4.0) | 446 (3.9) | 449 (3.9) | 449 (4.1) | 449 (3.9) | 449 (3.9) | 449 (3.8) |
| Iran, Islamic Rep. of | 441 (4.1) | 437 (4.0) | 439 (4.0) | 441 (4.1) | 441 (4.3) | 435 (4.1) | 442 (4.2) | 439 (4.0) | 441 (4.1) | 442 (4.1) | 440 (4.1) |
| Oman | 435 (4.1) | 432 (4.0) | 435 (4.0) | 435 (4.1) | 437 (4.0) | 433 (4.0) | 437 (4.1) | 432 (4.0) | 435 (4.1) | 436 (4.1) | 435 (4.0) |
| Azerbaijan | 427 (3.3) | 429 (3.3) | 429 (3.3) | 427 (3.3) | 431 (3.2) | 433 (3.4) | 430 (3.4) | 431 (3.2) | 427 (3.3) | 426 (3.3) | 428 (3.3) |
| North Macedonia | 426 (6.2) | 423 (6.1) | 425 (6.0) | 426 (6.2) | 428 (6.5) | 431 (5.7) | 427 (6.5) | 423 (6.0) | 426 (6.2) | 427 (6.2) | 426 (6.2) |
| Kosovo | 413 (3.7) | 412 (3.7) | 411 (3.7) | 413 (3.7) | 416 (3.9) | 415 (4.0) | 408 (4.0) | 413 (3.8) | 413 (3.7) | 412 (3.7) | 414 (3.8) |
| Saudi Arabia | 402 (4.1) | 404 (4.0) | 402 (4.0) | 402 (4.1) | 401 (4.1) | 404 (4.1) | 401 (4.2) | 401 (4.1) | 402 (4.1) | 402 (4.1) | 399 (4.1) |
| Kuwait | 392 (6.1) | 394 (6.1) | 391 (6.0) | 392 (6.1) | 391 (6.2) | 389 (6.3) | 393 (6.1) | 392 (6.1) | 392 (6.1) | 392 (6.0) | 392 (6.2) |
| Morocco | 374 (5.8) | 370 (5.8) | 372 (5.9) | 374 (5.8) | 375 (6.0) | 375 (6.0) | 367 (5.7) | 369 (5.8) | 374 (5.8) | 375 (5.9) | 376 (5.8) |
| South Africa (5) | 324 (4.9) | 325 (5.0) | 322 (4.9) | 324 (4.9) | 320 (5.1) | 321 (5.0) | 324 (5.0) | 327 (5.0) | 324 (4.9) | 325 (4.9) | 330 (4.9) |
| Pakistan | 290 (13.4) | 289 (13.4) | 288 (12.9) | 290 (13.4) | 287 (13.3) | 288 (13.9) | 286 (13.8) | 291 (13.3) | 290 (13.4) | 289 (13.5) | 291 (13.3) |
| Philippines | 249 (7.5) | 246 (7.7) | 250 (7.5) | 249 (7.5) | 243 (7.6) | 251 (7.5) | 258 (7.6) | 252 (7.5) | 249 (7.5) | 250 (7.5) | 257 (7.4) |
| **International Average** | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 490 (0.5) | 492 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (2.3) | 593 (2.3) | 595 (2.2) | 595 (2.5) | 592 (2.6) | 600 (2.5) | 595 (2.4) | 595 (2.2) | 595 (2.3) | 594 (2.3) |
| Dubai, UAE | 545 (1.7) | 542 (1.7) | 542 (1.7) | 545 (1.7) | 542 (1.8) | 538 (1.8) | 547 (1.8) | 542 (1.7) | 544 (1.7) | 543 (1.7) | 542 (1.7) |
| Ontario, Canada | 524 (3.2) | 528 (3.0) | 526 (3.2) | 524 (3.2) | 524 (3.2) | 524 (3.0) | 526 (3.1) | 526 (3.0) | 524 (3.2) | 525 (3.2) | 522 (3.1) |
| Madrid, Spain | 523 (2.0) | 525 (2.0) | 522 (2.0) | 523 (2.0) | 520 (2.2) | 517 (2.2) | 524 (2.1) | 523 (2.0) | 523 (2.0) | 521 (2.0) | 526 (2.0) |
| Quebec, Canada | 522 (2.5) | 524 (2.6) | 521 (2.6) | 522 (2.5) | 520 (2.7) | 521 (2.8) | 523 (2.7) | 523 (2.6) | 522 (2.5) | 522 (2.6) | 524 (2.5) |
| Abu Dhabi, UAE | 418 (2.8) | 417 (2.8) | 417 (2.8) | 418 (2.8) | 414 (2.9) | 416 (3.0) | 417 (2.9) | 417 (2.8) | 418 (2.7) | 417 (2.8) | 418 (2.8) |
| **Number of Items (Score Points)*** | 169 (174) | 136 (140) | 131 (135) | 169 (174) | 105 (109) | 69 (72) | 100 (104) | 120 (124) | 168 (173) | 146 (151) | 135 (139) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | United Arab Emirates | Chile | Armenia | Bosnia and Herzegovina | Georgia | Montenegro | Qatar | Iran, Islamic Rep. of | Oman | Azerbaijan |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | 595 (3.4) | 597 (3.4) | 597 (3.4) | 591 (3.5) | 599 (3.4) | 595 (3.4) | 618 (3.5) | 601 (3.4) | 607 (3.5) | 590 (3.5) |
| Korea, Rep. of | 588 (2.1) | 588 (2.1) | 586 (2.2) | 588 (2.1) | 581 (2.2) | 588 (2.1) | 584 (2.2) | 582 (2.2) | 583 (2.2) | 587 (2.1) | 578 (2.2) |
| Russian Federation | 567 (3.0) | 567 (3.0) | 568 (3.0) | 568 (3.0) | 570 (3.0) | 567 (3.0) | 568 (3.0) | 568 (3.1) | 569 (3.1) | 568 (3.0) | 564 (3.0) |
| Japan | 562 (1.8) | 562 (1.8) | 560 (1.8) | 562 (1.8) | 554 (1.9) | 566 (1.8) | 556 (1.8) | 567 (1.8) | 560 (1.9) | 567 (1.7) | 553 (1.9) |
| Chinese Taipei | 558 (1.8) | 558 (1.8) | 556 (1.8) | 557 (1.8) | 549 (1.8) | 559 (1.8) | 553 (1.8) | 543 (1.8) | 558 (1.8) | 554 (1.8) | 551 (1.8) |
| Finland | 555 (2.6) | 555 (2.6) | 555 (2.6) | 554 (2.6) | 558 (2.7) | 554 (2.7) | 557 (2.6) | 555 (2.7) | 552 (2.7) | 552 (2.6) | 558 (2.7) |
| Latvia | 542 (2.4) | 542 (2.4) | 543 (2.4) | 542 (2.4) | 538 (2.5) | 543 (2.3) | 539 (2.5) | 547 (2.5) | 544 (2.4) | 543 (2.4) | 539 (2.5) |
| Norway (5) | 539 (2.2) | 539 (2.2) | 539 (2.2) | 539 (2.2) | 544 (2.2) | 542 (2.3) | 539 (2.2) | 541 (2.3) | 533 (2.3) | 536 (2.2) | 544 (2.3) |
| United States | 539 (2.7) | 539 (2.7) | 540 (2.7) | 540 (2.7) | 542 (2.8) | 538 (2.8) | 538 (2.8) | 541 (2.8) | 536 (2.9) | 536 (2.7) | 543 (2.8) |
| Lithuania | 538 (2.5) | 538 (2.5) | 537 (2.5) | 537 (2.5) | 534 (2.5) | 538 (2.5) | 537 (2.5) | 535 (2.5) | 540 (2.7) | 540 (2.6) | 535 (2.5) |
| England | 537 (2.7) | 537 (2.7) | 541 (2.7) | 538 (2.7) | 536 (2.8) | 536 (2.8) | 535 (2.7) | 539 (2.8) | 535 (2.8) | 537 (2.7) | 538 (2.7) |
| Sweden | 537 (3.3) | 537 (3.3) | 538 (3.3) | 538 (3.3) | 538 (3.5) | 538 (3.4) | 539 (3.3) | 536 (3.4) | 536 (3.5) | 534 (3.3) | 544 (3.5) |
| Czech Republic | 534 (2.6) | 534 (2.6) | 536 (2.6) | 534 (2.6) | 538 (2.8) | 534 (2.9) | 533 (2.7) | 528 (3.0) | 533 (2.8) | 531 (2.7) | 534 (2.9) |
| Australia | 533 (2.4) | 533 (2.4) | 535 (2.4) | 533 (2.4) | 533 (2.3) | 535 (2.5) | 534 (2.4) | 538 (2.4) | 531 (2.4) | 533 (2.4) | 537 (2.4) |
| Hong Kong SAR | 531 (3.3) | 531 (3.3) | 530 (3.4) | 532 (3.4) | 527 (3.5) | 535 (3.5) | 532 (3.4) | 532 (3.6) | 531 (3.4) | 525 (3.6) | 534 (3.4) |
| Poland | 531 (2.6) | 531 (2.6) | 533 (2.6) | 532 (2.6) | 535 (2.6) | 529 (2.7) | 531 (2.7) | 532 (2.9) | 530 (2.7) | 529 (2.7) | 532 (2.6) |
| Hungary | 529 (2.7) | 529 (2.7) | 531 (2.7) | 531 (2.7) | 534 (2.8) | 532 (2.7) | 532 (2.7) | 529 (2.8) | 529 (2.8) | 528 (2.7) | 532 (2.8) |
| Ireland | 528 (3.2) | 528 (3.2) | 529 (3.2) | 528 (3.1) | 529 (3.2) | 527 (3.3) | 527 (3.2) | 531 (3.2) | 525 (3.1) | 527 (3.1) | 530 (3.3) |
| Turkey (5) | 526 (4.2) | 526 (4.2) | 525 (4.2) | 527 (4.2) | 525 (4.3) | 529 (4.4) | 524 (4.2) | 528 (4.3) | 534 (4.4) | 531 (4.3) | 522 (4.2) |
| Croatia | 524 (2.2) | 524 (2.2) | 523 (2.2) | 524 (2.2) | 524 (2.4) | 528 (2.2) | 525 (2.3) | 525 (2.4) | 521 (2.4) | 524 (2.2) | 521 (2.4) |
| Canada | 523 (1.9) | 523 (1.9) | 524 (1.9) | 524 (1.9) | 526 (1.8) | 521 (1.8) | 523 (1.8) | 525 (1.8) | 520 (1.9) | 522 (1.9) | 526 (1.9) |
| Austria | 522 (2.6) | 522 (2.6) | 522 (2.6) | 522 (2.6) | 521 (2.6) | 522 (2.7) | 521 (2.6) | 522 (2.7) | 518 (2.7) | 521 (2.6) | 522 (2.6) |
| Denmark | 522 (2.4) | 522 (2.4) | 522 (2.4) | 522 (2.4) | 527 (2.5) | 521 (2.5) | 523 (2.4) | 520 (2.6) | 518 (2.5) | 518 (2.4) | 527 (2.5) |
| Bulgaria | 521 (4.9) | 521 (4.9) | 521 (4.8) | 520 (4.9) | 525 (4.6) | 519 (4.7) | 522 (4.8) | 518 (4.8) | 520 (5.0) | 517 (5.0) | 524 (4.8) |
| Slovak Republic | 521 (3.7) | 521 (3.7) | 524 (3.7) | 521 (3.7) | 521 (3.7) | 522 (3.7) | 517 (3.7) | 515 (3.6) | 522 (3.7) | 520 (3.7) | 519 (3.7) |
| Germany | 518 (2.2) | 518 (2.2) | 519 (2.2) | 518 (2.2) | 518 (2.2) | 520 (2.3) | 521 (2.2) | 518 (2.2) | 517 (2.4) | 521 (2.2) | 520 (2.2) |
| Netherlands | 518 (2.9) | 518 (2.9) | 516 (2.9) | 517 (2.9) | 518 (3.1) | 517 (3.0) | 514 (3.0) | 518 (3.1) | 514 (3.0) | 516 (2.9) | 515 (3.0) |
| Northern Ireland | 518 (2.3) | 518 (2.3) | 520 (2.3) | 519 (2.3) | 517 (2.5) | 517 (2.5) | 519 (2.4) | 521 (2.5) | 514 (2.5) | 517 (2.4) | 522 (2.5) |
| Serbia | 517 (3.5) | 517 (3.5) | 517 (3.5) | 517 (3.5) | 516 (3.5) | 519 (3.5) | 521 (3.6) | 519 (3.5) | 514 (3.6) | 519 (3.6) | 515 (3.5) |
| Cyprus | 511 (3.0) | 511 (3.0) | 511 (3.0) | 512 (3.1) | 513 (3.1) | 512 (3.0) | 512 (3.0) | 514 (3.0) | 512 (3.2) | 515 (3.1) | 512 (3.1) |
| Spain | 511 (2.0) | 511 (2.0) | 511 (2.0) | 512 (2.0) | 512 (2.0) | 511 (2.0) | 511 (2.0) | 508 (2.0) | 511 (2.1) | 506 (2.0) | 516 (2.0) |
| Italy | 510 (3.0) | 510 (3.0) | 511 (3.0) | 509 (3.0) | 510 (3.2) | 510 (3.2) | 512 (3.1) | 507 (3.2) | 507 (3.1) | 509 (3.1) | 514 (3.2) |
| Portugal | 504 (2.6) | 504 (2.6) | 503 (2.6) | 503 (2.6) | 508 (2.7) | 509 (2.8) | 505 (2.6) | 504 (2.8) | 505 (2.7) | 503 (2.6) | 508 (2.8) |
| New Zealand | 503 (2.3) | 503 (2.3) | 505 (2.3) | 503 (2.3) | 506 (2.3) | 503 (2.4) | 504 (2.3) | 505 (2.3) | 499 (2.4) | 503 (2.3) | 507 (2.3) |
| Belgium (Flemish) | 501 (2.1) | 501 (2.1) | 498 (2.1) | 499 (2.1) | 499 (2.2) | 502 (2.2) | 498 (2.2) | 501 (2.2) | 498 (2.2) | 501 (2.2) | 499 (2.2) |
| Malta | 496 (1.3) | 496 (1.3) | 496 (1.2) | 496 (1.3) | 497 (1.3) | 495 (1.3) | 495 (1.3) | 500 (1.3) | 497 (1.3) | 498 (1.3) | 498 (1.2) |
| Kazakhstan | 494 (3.1) | 494 (3.1) | 493 (3.1) | 493 (3.1) | 492 (3.1) | 497 (3.1) | 491 (3.1) | 492 (3.1) | 497 (3.2) | 496 (3.1) | 486 (3.1) |
| Bahrain | 493 (3.4) | 493 (3.4) | 493 (3.5) | 494 (3.4) | 493 (3.6) | 493 (3.5) | 493 (3.5) | 494 (3.6) | 499 (3.5) | 493 (3.6) | 492 (3.5) |
| Albania | 489 (3.5) | 489 (3.5) | 489 (3.5) | 490 (3.5) | 490 (3.4) | 490 (3.4) | 492 (3.4) | 490 (3.5) | 489 (3.5) | 491 (3.4) | 487 (3.5) |
| France | 488 (3.0) | 488 (3.0) | 486 (3.0) | 488 (2.9) | 490 (3.0) | 486 (3.0) | 490 (2.9) | 486 (2.9) | 479 (3.0) | 487 (2.9) | 491 (3.0) |
| United Arab Emirates | 473 (2.1) | 473 (2.1) | 471 (2.1) | 473 (2.0) | 471 (2.1) | 471 (2.1) | 471 (2.0) | 472 (2.1) | 477 (2.0) | 471 (2.2) | 472 (2.0) |
| Chile | 469 (2.6) | 469 (2.6) | 472 (2.6) | 470 (2.6) | 474 (2.5) | 471 (2.5) | 472 (2.5) | 472 (2.6) | 469 (2.6) | 467 (2.6) | 474 (2.5) |
| Armenia | 466 (3.4) | 466 (3.4) | 467 (3.4) | 465 (3.5) | 473 (3.5) | 469 (3.6) | 472 (3.5) | 472 (3.5) | 466 (3.5) | 467 (3.5) | 472 (3.5) |
| Bosnia and Herzegovina | 459 (2.9) | 459 (2.9) | 462 (2.9) | 459 (2.9) | 465 (2.8) | 462 (2.9) | 464 (2.9) | 465 (3.0) | 457 (2.9) | 461 (3.0) | 464 (2.9) |
| Georgia | 454 (3.9) | 454 (3.9) | 453 (3.9) | 455 (4.0) | 457 (4.1) | 459 (4.0) | 456 (4.0) | 452 (4.0) | 452 (4.0) | 456 (4.0) | 455 (4.0) |
| Montenegro | 453 (2.5) | 453 (2.5) | 453 (2.5) | 454 (2.5) | 461 (2.7) | 458 (2.7) | 462 (2.6) | 459 (2.8) | 452 (2.6) | 456 (2.6) | 459 (2.6) |
| Qatar | 449 (3.9) | 449 (3.9) | 449 (3.9) | 450 (4.0) | 449 (4.1) | 449 (4.1) | 451 (3.9) | 453 (4.0) | 452 (3.9) | 450 (4.0) | 451 (4.0) |
| Iran, Islamic Rep. of | 441 (4.1) | 441 (4.1) | 439 (4.1) | 441 (4.1) | 438 (4.0) | 444 (4.1) | 439 (4.0) | 438 (4.1) | 446 (4.3) | 441 (4.3) | 433 (3.9) |
| Oman | 435 (4.1) | 435 (4.1) | 434 (4.1) | 435 (4.0) | 435 (3.9) | 437 (4.0) | 434 (4.0) | 436 (3.9) | 442 (4.1) | 435 (4.0) | 435 (3.9) |
| Azerbaijan | 427 (3.3) | 427 (3.3) | 428 (3.3) | 426 (3.3) | 432 (3.3) | 436 (3.3) | 432 (3.3) | 432 (3.3) | 428 (3.3) | 430 (3.3) | 428 (3.2) |
| North Macedonia | 426 (6.2) | 426 (6.2) | 427 (6.2) | 425 (6.2) | 421 (6.0) | 428 (6.1) | 424 (5.9) | 427 (6.1) | 425 (6.5) | 429 (6.2) | 423 (5.9) |
| Kosovo | 413 (3.7) | 413 (3.7) | 411 (3.8) | 413 (3.7) | 411 (3.8) | 417 (3.8) | 414 (3.7) | 411 (3.9) | 411 (3.8) | 414 (3.9) | 408 (3.9) |
| Saudi Arabia | 402 (4.1) | 402 (4.1) | 403 (4.1) | 402 (4.1) | 401 (4.1) | 398 (4.2) | 399 (4.1) | 396 (4.1) | 405 (4.1) | 404 (4.1) | 398 (4.1) |
| Kuwait | 392 (6.1) | 392 (6.1) | 391 (6.1) | 392 (6.1) | 395 (6.1) | 389 (6.2) | 392 (6.1) | 388 (6.2) | 397 (6.1) | 388 (6.2) | 396 (6.1) |
| Morocco | 374 (5.8) | 374 (5.8) | 371 (5.8) | 374 (5.8) | 370 (5.8) | 368 (6.0) | 373 (5.7) | 369 (5.7) | 377 (5.9) | 372 (5.9) | 370 (5.7) |
| South Africa (5) | 324 (4.9) | 324 (4.9) | 322 (5.0) | 325 (4.9) | 326 (5.0) | 319 (5.1) | 329 (4.9) | 323 (5.1) | 326 (5.0) | 321 (5.1) | 328 (4.9) |
| Pakistan | 290 (13.4) | 290 (13.4) | 292 (13.4) | 289 (13.4) | 291 (13.5) | 293 (12.7) | 292 (13.2) | 289 (13.8) | 291 (13.7) | 286 (14.1) | 293 (13.1) |
| Philippines | 249 (7.5) | 249 (7.5) | 249 (7.6) | 251 (7.5) | 246 (7.6) | 241 (7.8) | 254 (7.4) | 247 (7.8) | 258 (7.7) | 246 (7.6) | 250 (7.6) |
| **International Average** | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 492 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (2.2) | 596 (2.3) | 596 (2.3) | 595 (2.4) | 592 (2.4) | 593 (2.3) | 594 (2.6) | 601 (2.4) | 594 (2.3) | 593 (2.4) |
| Dubai, UAE | 545 (1.7) | 545 (1.7) | 544 (1.7) | 545 (1.7) | 541 (1.7) | 544 (1.7) | 541 (1.7) | 544 (1.8) | 548 (1.8) | 546 (1.8) | 541 (1.7) |
| Ontario, Canada | 524 (3.2) | 524 (3.2) | 526 (3.1) | 526 (3.1) | 529 (3.1) | 522 (3.0) | 525 (3.0) | 527 (3.0) | 521 (3.2) | 522 (3.1) | 528 (3.1) |
| Madrid, Spain | 523 (2.0) | 523 (2.0) | 524 (2.0) | 524 (2.0) | 523 (2.0) | 523 (2.1) | 522 (2.0) | 520 (2.2) | 523 (2.1) | 518 (2.0) | 527 (2.1) |
| Quebec, Canada | 522 (2.5) | 522 (2.5) | 521 (2.5) | 522 (2.5) | 522 (2.6) | 521 (2.6) | 521 (2.6) | 520 (2.7) | 517 (2.6) | 521 (2.6) | 526 (2.6) |
| Abu Dhabi, UAE | 418 (2.8) | 418 (2.8) | 417 (2.8) | 418 (2.8) | 417 (2.9) | 415 (2.9) | 418 (2.8) | 418 (2.9) | 423 (2.8) | 414 (2.9) | 419 (2.8) |
| **Number of Items (Score Points)*** | 169 (174) | 169 (174) | 147 (151) | 157 (162) | 100 (104) | 99 (102) | 124 (128) | 91 (94) | 118 (122) | 129 (133) | 105 (109) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | North Macedonia | Kosovo | Saudi Arabia | Kuwait | Morocco | South Africa (5) | Pakistan | Philippines |
|---|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | 595 (3.4) | 595 (3.4) | 595 (3.4) | 598 (3.5) | 602 (3.5) | 591 (3.4) | 598 (3.4) | 595 (3.4) |
| Korea, Rep. of | 588 (2.1) | 588 (2.1) | 588 (2.1) | 587 (2.1) | 589 (2.2) | 581 (2.1) | 584 (2.2) | 589 (2.1) | 588 (2.1) |
| Russian Federation | 567 (3.0) | 567 (3.0) | 567 (3.0) | 565 (3.1) | 567 (3.1) | 567 (3.0) | 565 (3.1) | 567 (3.1) | 567 (3.0) |
| Japan | 562 (1.8) | 562 (1.8) | 562 (1.8) | 558 (1.8) | 559 (1.9) | 561 (1.8) | 560 (1.9) | 564 (1.8) | 562 (1.8) |
| Chinese Taipei | 558 (1.8) | 558 (1.8) | 558 (1.8) | 556 (1.8) | 560 (1.8) | 549 (1.8) | 553 (1.8) | 558 (1.8) | 558 (1.8) |
| Finland | 555 (2.6) | 555 (2.6) | 555 (2.6) | 550 (2.6) | 553 (2.7) | 554 (2.7) | 553 (2.7) | 554 (2.7) | 555 (2.6) |
| Latvia | 542 (2.4) | 542 (2.4) | 542 (2.4) | 541 (2.3) | 540 (2.4) | 539 (2.3) | 537 (2.4) | 545 (2.3) | 542 (2.4) |
| Norway (5) | 539 (2.2) | 539 (2.2) | 539 (2.2) | 535 (2.1) | 537 (2.3) | 536 (2.2) | 536 (2.3) | 538 (2.2) | 539 (2.2) |
| United States | 539 (2.7) | 539 (2.7) | 539 (2.7) | 538 (2.8) | 540 (2.7) | 541 (2.8) | 539 (2.8) | 536 (2.7) | 539 (2.7) |
| Lithuania | 538 (2.5) | 538 (2.5) | 538 (2.5) | 536 (2.5) | 537 (2.6) | 539 (2.5) | 541 (2.6) | 538 (2.5) | 538 (2.5) |
| England | 537 (2.7) | 537 (2.7) | 537 (2.7) | 538 (2.7) | 533 (2.7) | 536 (2.7) | 531 (2.9) | 537 (2.7) | 537 (2.7) |
| Sweden | 537 (3.3) | 537 (3.3) | 537 (3.3) | 533 (3.3) | 538 (3.4) | 537 (3.4) | 540 (3.5) | 536 (3.3) | 537 (3.3) |
| Czech Republic | 534 (2.6) | 534 (2.6) | 534 (2.6) | 534 (2.7) | 534 (2.7) | 534 (2.8) | 537 (2.8) | 532 (2.6) | 534 (2.6) |
| Australia | 533 (2.4) | 533 (2.4) | 533 (2.4) | 533 (2.4) | 534 (2.4) | 536 (2.4) | 530 (2.4) | 532 (2.4) | 533 (2.4) |
| Hong Kong SAR | 531 (3.3) | 531 (3.3) | 531 (3.3) | 530 (3.4) | 530 (3.5) | 529 (3.5) | 532 (3.5) | 530 (3.4) | 531 (3.3) |
| Poland | 531 (2.6) | 531 (2.6) | 531 (2.6) | 531 (2.7) | 532 (2.7) | 533 (2.7) | 533 (2.7) | 529 (2.6) | 531 (2.6) |
| Hungary | 529 (2.7) | 529 (2.7) | 529 (2.7) | 526 (2.7) | 527 (2.7) | 528 (2.7) | 527 (2.8) | 530 (2.7) | 529 (2.7) |
| Ireland | 528 (3.2) | 528 (3.2) | 528 (3.2) | 526 (3.1) | 528 (3.2) | 523 (3.2) | 523 (3.1) | 529 (3.1) | 528 (3.2) |
| Turkey (5) | 526 (4.2) | 526 (4.2) | 526 (4.2) | 526 (4.3) | 526 (4.3) | 525 (4.4) | 526 (4.3) | 531 (4.3) | 526 (4.2) |
| Croatia | 524 (2.2) | 524 (2.2) | 524 (2.2) | 524 (2.3) | 522 (2.3) | 526 (2.3) | 527 (2.4) | 526 (2.2) | 524 (2.2) |
| Canada | 523 (1.9) | 523 (1.9) | 523 (1.9) | 521 (1.9) | 522 (1.9) | 524 (1.8) | 521 (1.8) | 522 (1.9) | 523 (1.9) |
| Austria | 522 (2.6) | 522 (2.6) | 522 (2.6) | 521 (2.6) | 520 (2.6) | 523 (2.6) | 519 (2.7) | 522 (2.6) | 522 (2.6) |
| Denmark | 522 (2.4) | 522 (2.4) | 522 (2.4) | 519 (2.4) | 521 (2.4) | 520 (2.4) | 520 (2.5) | 520 (2.4) | 522 (2.4) |
| Bulgaria | 521 (4.9) | 521 (4.9) | 521 (4.9) | 523 (5.0) | 520 (5.1) | 525 (5.0) | 529 (5.0) | 519 (5.0) | 521 (4.9) |
| Slovak Republic | 521 (3.7) | 521 (3.7) | 521 (3.7) | 522 (3.7) | 519 (3.7) | 518 (3.8) | 519 (3.8) | 520 (3.7) | 521 (3.7) |
| Germany | 518 (2.2) | 518 (2.2) | 518 (2.2) | 517 (2.2) | 518 (2.3) | 522 (2.2) | 517 (2.2) | 518 (2.2) | 518 (2.2) |
| Netherlands | 518 (2.9) | 518 (2.9) | 518 (2.9) | 516 (2.9) | 518 (2.9) | 513 (3.0) | 510 (3.0) | 519 (2.9) | 518 (2.9) |
| Northern Ireland | 518 (2.3) | 518 (2.3) | 518 (2.3) | 517 (2.4) | 518 (2.4) | 516 (2.4) | 512 (2.5) | 518 (2.3) | 518 (2.3) |
| Serbia | 517 (3.5) | 517 (3.5) | 517 (3.5) | 516 (3.6) | 516 (3.5) | 523 (3.7) | 521 (3.5) | 518 (3.5) | 517 (3.5) |
| Cyprus | 511 (3.0) | 511 (3.0) | 511 (3.0) | 512 (3.2) | 511 (3.1) | 516 (3.1) | 510 (3.3) | 512 (3.0) | 511 (3.0) |
| Spain | 511 (2.0) | 511 (2.0) | 511 (2.0) | 510 (2.0) | 514 (2.0) | 513 (2.0) | 515 (2.1) | 511 (2.0) | 511 (2.0) |
| Italy | 510 (3.0) | 510 (3.0) | 510 (3.0) | 512 (3.1) | 510 (3.1) | 511 (3.2) | 514 (3.1) | 508 (3.0) | 510 (3.0) |
| Portugal | 504 (2.6) | 504 (2.6) | 504 (2.6) | 503 (2.7) | 505 (2.7) | 508 (2.7) | 511 (2.7) | 503 (2.6) | 504 (2.6) |
| New Zealand | 503 (2.3) | 503 (2.3) | 503 (2.3) | 502 (2.3) | 502 (2.3) | 503 (2.3) | 500 (2.4) | 502 (2.3) | 503 (2.3) |
| Belgium (Flemish) | 501 (2.1) | 501 (2.1) | 501 (2.1) | 499 (2.1) | 500 (2.2) | 498 (2.2) | 491 (2.3) | 501 (2.1) | 501 (2.1) |
| Malta | 496 (1.3) | 496 (1.3) | 496 (1.3) | 496 (1.3) | 496 (1.3) | 498 (1.3) | 496 (1.2) | 496 (1.3) | 496 (1.3) |
| Kazakhstan | 494 (3.1) | 494 (3.1) | 494 (3.1) | 494 (3.1) | 490 (3.1) | 495 (3.1) | 499 (3.1) | 497 (3.1) | 494 (3.1) |
| Bahrain | 493 (3.4) | 493 (3.4) | 493 (3.4) | 495 (3.4) | 496 (3.4) | 493 (3.5) | 500 (3.4) | 491 (3.5) | 493 (3.4) |
| Albania | 489 (3.5) | 489 (3.5) | 489 (3.5) | 490 (3.5) | 490 (3.6) | 488 (3.3) | 496 (3.5) | 490 (3.5) | 489 (3.5) |
| France | 488 (3.0) | 488 (3.0) | 488 (3.0) | 487 (3.0) | 486 (3.0) | 493 (2.9) | 490 (3.0) | 487 (2.9) | 488 (3.0) |
| United Arab Emirates | 473 (2.1) | 473 (2.1) | 473 (2.1) | 475 (2.1) | 475 (2.0) | 471 (2.1) | 480 (2.0) | 472 (2.1) | 473 (2.1) |
| Chile | 469 (2.6) | 469 (2.6) | 469 (2.6) | 469 (2.6) | 472 (2.5) | 472 (2.5) | 473 (2.5) | 466 (2.6) | 469 (2.6) |
| Armenia | 466 (3.4) | 466 (3.4) | 466 (3.4) | 463 (3.5) | 463 (3.4) | 470 (3.5) | 474 (3.6) | 467 (3.5) | 466 (3.4) |
| Bosnia and Herzegovina | 459 (2.9) | 459 (2.9) | 459 (2.9) | 458 (3.0) | 459 (2.9) | 465 (2.9) | 462 (3.0) | 459 (3.0) | 459 (2.9) |
| Georgia | 454 (3.9) | 454 (3.9) | 454 (3.9) | 453 (4.0) | 453 (3.9) | 458 (4.1) | 455 (4.1) | 455 (3.9) | 454 (3.9) |
| Montenegro | 453 (2.5) | 453 (2.5) | 453 (2.5) | 455 (2.6) | 455 (2.6) | 465 (2.7) | 464 (2.7) | 454 (2.5) | 453 (2.5) |
| Qatar | 449 (3.9) | 449 (3.9) | 449 (3.9) | 451 (4.0) | 452 (3.9) | 450 (3.9) | 455 (3.7) | 450 (4.1) | 449 (3.9) |
| Iran, Islamic Rep. of | 441 (4.1) | 441 (4.1) | 441 (4.1) | 440 (4.2) | 440 (4.1) | 440 (4.2) | 447 (4.0) | 442 (4.2) | 441 (4.1) |
| Oman | 435 (4.1) | 435 (4.1) | 435 (4.1) | 438 (4.2) | 439 (4.0) | 437 (4.0) | 446 (4.1) | 434 (4.0) | 435 (4.1) |
| Azerbaijan | 427 (3.3) | 427 (3.3) | 427 (3.3) | 428 (3.2) | 425 (3.3) | 429 (3.3) | 432 (3.2) | 429 (3.3) | 427 (3.3) |
| North Macedonia | 426 (6.2) | 426 (6.2) | 426 (6.2) | 427 (6.4) | 423 (6.2) | 427 (5.9) | 429 (6.1) | 427 (6.2) | 426 (6.2) |
| Kosovo | 413 (3.7) | 413 (3.7) | 413 (3.7) | 413 (3.8) | 408 (3.8) | 411 (3.9) | 413 (4.0) | 415 (3.7) | 413 (3.7) |
| Saudi Arabia | 402 (4.1) | 402 (4.1) | 402 (4.1) | 405 (4.2) | 406 (4.1) | 401 (4.2) | 407 (4.3) | 400 (4.1) | 402 (4.1) |
| Kuwait | 392 (6.1) | 392 (6.1) | 392 (6.1) | 394 (6.2) | 397 (6.1) | 393 (6.2) | 402 (6.3) | 390 (6.2) | 392 (6.1) |
| Morocco | 374 (5.8) | 374 (5.8) | 374 (5.8) | 373 (6.0) | 371 (5.8) | 379 (5.9) | 383 (5.8) | 371 (5.9) | 374 (5.8) |
| South Africa (5) | 324 (4.9) | 324 (4.9) | 324 (4.9) | 323 (5.0) | 325 (5.0) | 325 (5.0) | 332 (4.9) | 318 (5.0) | 324 (4.9) |
| Pakistan | 290 (13.4) | 290 (13.4) | 290 (13.4) | 290 (13.5) | 288 (13.4) | 290 (13.3) | 295 (13.8) | 291 (13.2) | 290 (13.4) |
| Philippines | 249 (7.5) | 249 (7.5) | 249 (7.5) | 249 (7.6) | 251 (7.6) | 250 (7.8) | 262 (7.5) | 244 (7.6) | 249 (7.5) |
| **International Average** | 491 (0.5) | 491 (0.5) | 491 (0.5) | 490 (0.5) | 491 (0.5) | 492 (0.5) | 493 (0.5) | 491 (0.5) | 491 (0.5) |
| **Benchmarking Participants** | | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | 595 (2.2) | 595 (2.2) | 593 (2.3) | 595 (2.3) | 593 (2.5) | 597 (2.4) | 592 (2.3) | 595 (2.2) |
| Dubai, UAE | 545 (1.7) | 545 (1.7) | 545 (1.7) | 549 (1.8) | 546 (1.7) | 541 (1.8) | 548 (1.7) | 546 (1.7) | 545 (1.7) |
| Ontario, Canada | 524 (3.2) | 524 (3.2) | 524 (3.2) | 522 (3.2) | 523 (3.1) | 525 (3.0) | 521 (3.1) | 522 (3.1) | 524 (3.2) |
| Madrid, Spain | 523 (2.0) | 523 (2.0) | 523 (2.0) | 520 (2.0) | 524 (2.0) | 522 (2.1) | 523 (2.1) | 523 (2.0) | 523 (2.0) |
| Quebec, Canada | 522 (2.5) | 522 (2.5) | 522 (2.5) | 520 (2.6) | 519 (2.6) | 524 (2.6) | 521 (2.7) | 521 (2.5) | 522 (2.5) |
| Abu Dhabi, UAE | 418 (2.8) | 418 (2.8) | 418 (2.8) | 418 (2.8) | 421 (2.8) | 418 (2.8) | 427 (2.9) | 416 (2.8) | 418 (2.8) |
| **Number of Items (Score Points)*** | 169 (174) | 168 (173) | 168 (173) | 132 (136) | 126 (131) | 107 (110) | 105 (108) | 150 (154) | 168 (173) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.2: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | Benchmarking Participants | Moscow City, Russian Fed. | Dubai, UAE | Ontario, Canada | Madrid, Spain | Quebec, Canada | Abu Dhabi, UAE |
|---|---|---|---|---|---|---|---|---|
| Singapore | 595 (3.4) | | 590 (3.5) | 595 (3.4) | 593 (3.4) | 589 (3.5) | 591 (3.4) | 595 (3.4) |
| Korea, Rep. of | 588 (2.1) | | 584 (2.2) | 588 (2.1) | 589 (2.2) | 584 (2.1) | 585 (2.2) | 588 (2.1) |
| Russian Federation | 567 (3.0) | | 567 (3.0) | 567 (3.0) | 565 (3.0) | 567 (3.0) | 567 (3.0) | 567 (3.0) |
| Japan | 562 (1.8) | | 556 (1.9) | 562 (1.8) | 559 (1.8) | 553 (1.8) | 561 (1.9) | 562 (1.8) |
| Chinese Taipei | 558 (1.8) | | 556 (1.8) | 558 (1.8) | 559 (1.9) | 554 (1.8) | 556 (1.8) | 558 (1.8) |
| Finland | 555 (2.6) | | 557 (2.7) | 555 (2.6) | 556 (2.7) | 555 (2.6) | 553 (2.7) | 555 (2.6) |
| Latvia | 542 (2.4) | | 540 (2.4) | 542 (2.4) | 542 (2.4) | 540 (2.5) | 544 (2.3) | 542 (2.4) |
| Norway (5) | 539 (2.2) | | 541 (2.2) | 539 (2.2) | 539 (2.2) | 540 (2.2) | 536 (2.3) | 539 (2.2) |
| United States | 539 (2.7) | | 541 (2.8) | 539 (2.7) | 542 (2.8) | 541 (2.8) | 535 (2.8) | 539 (2.7) |
| Lithuania | 538 (2.5) | | 532 (2.5) | 538 (2.5) | 538 (2.5) | 536 (2.5) | 540 (2.5) | 538 (2.5) |
| England | 537 (2.7) | | 540 (2.8) | 537 (2.7) | 538 (2.7) | 539 (2.7) | 537 (2.8) | 537 (2.7) |
| Sweden | 537 (3.3) | | 542 (3.4) | 537 (3.3) | 537 (3.4) | 540 (3.4) | 539 (3.4) | 537 (3.3) |
| Czech Republic | 534 (2.6) | | 535 (2.8) | 534 (2.6) | 535 (2.8) | 535 (2.7) | 539 (2.8) | 534 (2.6) |
| Australia | 533 (2.4) | | 535 (2.4) | 533 (2.4) | 534 (2.4) | 536 (2.4) | 531 (2.4) | 533 (2.4) |
| Hong Kong SAR | 531 (3.3) | | 533 (3.4) | 531 (3.3) | 531 (3.4) | 531 (3.4) | 530 (3.5) | 531 (3.3) |
| Poland | 531 (2.6) | | 535 (2.7) | 531 (2.6) | 532 (2.7) | 534 (2.6) | 533 (2.7) | 531 (2.6) |
| Hungary | 529 (2.7) | | 533 (2.7) | 529 (2.7) | 530 (2.8) | 533 (2.7) | 535 (2.8) | 529 (2.7) |
| Ireland | 528 (3.2) | | 528 (3.2) | 528 (3.2) | 529 (3.3) | 529 (3.3) | 524 (3.2) | 528 (3.2) |
| Turkey (5) | 526 (4.2) | | 524 (4.2) | 526 (4.2) | 526 (4.2) | 525 (4.2) | 531 (4.3) | 526 (4.2) |
| Croatia | 524 (2.2) | | 523 (2.2) | 524 (2.2) | 523 (2.3) | 523 (2.3) | 524 (2.4) | 524 (2.2) |
| Canada | 523 (1.9) | | 525 (1.9) | 523 (1.9) | 525 (1.9) | 526 (1.8) | 523 (1.9) | 523 (1.9) |
| Austria | 522 (2.6) | | 521 (2.6) | 522 (2.6) | 520 (2.6) | 522 (2.6) | 519 (2.6) | 522 (2.6) |
| Denmark | 522 (2.4) | | 525 (2.4) | 522 (2.4) | 524 (2.4) | 523 (2.4) | 519 (2.5) | 522 (2.4) |
| Bulgaria | 521 (4.9) | | 524 (4.7) | 521 (4.9) | 524 (5.0) | 523 (5.0) | 523 (4.9) | 521 (4.9) |
| Slovak Republic | 521 (3.7) | | 521 (3.6) | 521 (3.7) | 521 (3.7) | 521 (3.8) | 525 (3.7) | 521 (3.7) |
| Germany | 518 (2.2) | | 519 (2.2) | 518 (2.2) | 515 (2.2) | 518 (2.2) | 516 (2.3) | 518 (2.2) |
| Netherlands | 518 (2.9) | | 514 (3.0) | 518 (2.9) | 516 (2.9) | 517 (2.9) | 514 (3.1) | 518 (2.9) |
| Northern Ireland | 518 (2.3) | | 520 (2.4) | 518 (2.3) | 520 (2.4) | 522 (2.4) | 515 (2.5) | 518 (2.3) |
| Serbia | 517 (3.5) | | 515 (3.5) | 517 (3.5) | 517 (3.5) | 514 (3.4) | 520 (3.4) | 517 (3.5) |
| Cyprus | 511 (3.0) | | 511 (3.0) | 511 (3.0) | 516 (3.1) | 511 (3.0) | 511 (3.0) | 511 (3.0) |
| Spain | 511 (2.0) | | 514 (2.0) | 511 (2.0) | 511 (2.0) | 514 (2.0) | 511 (2.0) | 511 (2.0) |
| Italy | 510 (3.0) | | 513 (3.1) | 510 (3.0) | 512 (3.1) | 514 (3.1) | 513 (3.2) | 510 (3.0) |
| Portugal | 504 (2.6) | | 507 (2.7) | 504 (2.6) | 505 (2.7) | 506 (2.6) | 506 (2.7) | 504 (2.6) |
| New Zealand | 503 (2.3) | | 505 (2.3) | 503 (2.3) | 505 (2.3) | 506 (2.3) | 501 (2.4) | 503 (2.3) |
| Belgium (Flemish) | 501 (2.1) | | 497 (2.2) | 501 (2.1) | 500 (2.2) | 500 (2.2) | 499 (2.2) | 501 (2.1) |
| Malta | 496 (1.3) | | 496 (1.2) | 496 (1.3) | 497 (1.3) | 496 (1.3) | 492 (1.3) | 496 (1.3) |
| Kazakhstan | 494 (3.1) | | 489 (3.1) | 494 (3.1) | 489 (3.1) | 489 (3.1) | 495 (3.0) | 494 (3.1) |
| Bahrain | 493 (3.4) | | 492 (3.5) | 493 (3.4) | 492 (3.5) | 492 (3.4) | 493 (3.5) | 493 (3.4) |
| Albania | 489 (3.5) | | 488 (3.5) | 489 (3.5) | 488 (3.6) | 487 (3.4) | 490 (3.5) | 489 (3.5) |
| France | 488 (3.0) | | 490 (3.0) | 488 (3.0) | 488 (3.0) | 491 (3.0) | 484 (3.0) | 488 (3.0) |
| United Arab Emirates | 473 (2.1) | | 473 (2.0) | 473 (2.1) | 472 (2.1) | 471 (2.0) | 469 (2.1) | 473 (2.1) |
| Chile | 469 (2.6) | | 474 (2.5) | 469 (2.6) | 472 (2.6) | 475 (2.6) | 470 (2.6) | 469 (2.6) |
| Armenia | 466 (3.4) | | 471 (3.4) | 466 (3.4) | 467 (3.4) | 467 (3.5) | 476 (3.4) | 466 (3.4) |
| Bosnia and Herzegovina | 459 (2.9) | | 461 (2.9) | 459 (2.9) | 461 (2.9) | 462 (2.8) | 463 (2.9) | 459 (2.9) |
| Georgia | 454 (3.9) | | 454 (4.0) | 454 (3.9) | 453 (4.0) | 458 (4.0) | 460 (4.0) | 454 (3.9) |
| Montenegro | 453 (2.5) | | 456 (2.6) | 453 (2.5) | 456 (2.6) | 458 (2.5) | 457 (2.6) | 453 (2.5) |
| Qatar | 449 (3.9) | | 450 (4.0) | 449 (3.9) | 450 (3.9) | 451 (4.0) | 445 (4.0) | 449 (3.9) |
| Iran, Islamic Rep. of | 441 (4.1) | | 435 (3.9) | 441 (4.1) | 437 (4.1) | 437 (4.0) | 442 (4.2) | 441 (4.1) |
| Oman | 435 (4.1) | | 435 (4.0) | 435 (4.1) | 437 (4.0) | 432 (4.0) | 436 (4.0) | 435 (4.1) |
| Azerbaijan | 427 (3.3) | | 429 (3.2) | 427 (3.3) | 428 (3.2) | 429 (3.3) | 436 (3.3) | 427 (3.3) |
| North Macedonia | 426 (6.2) | | 424 (6.0) | 426 (6.2) | 427 (6.1) | 423 (6.1) | 428 (5.9) | 426 (6.2) |
| Kosovo | 413 (3.7) | | 408 (3.8) | 413 (3.7) | 409 (3.8) | 412 (3.7) | 410 (3.8) | 413 (3.7) |
| Saudi Arabia | 402 (4.1) | | 401 (4.0) | 402 (4.1) | 405 (4.1) | 404 (4.0) | 398 (4.1) | 402 (4.1) |
| Kuwait | 392 (6.1) | | 395 (6.1) | 392 (6.1) | 396 (6.1) | 394 (6.1) | 389 (6.1) | 392 (6.1) |
| Morocco | 374 (5.8) | | 374 (5.7) | 374 (5.8) | 371 (5.7) | 370 (5.8) | 375 (5.6) | 374 (5.8) |
| South Africa (5) | 324 (4.9) | | 327 (4.9) | 324 (4.9) | 326 (4.9) | 325 (5.0) | 323 (4.9) | 324 (4.9) |
| Pakistan | 290 (13.4) | | 295 (12.9) | 290 (13.4) | 291 (13.4) | 289 (13.4) | 296 (13.0) | 290 (13.4) |
| Philippines | 249 (7.5) | | 256 (7.5) | 249 (7.5) | 249 (7.5) | 246 (7.7) | 252 (7.7) | 249 (7.5) |
| **International Average** | 491 (0.5) | | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) | 491 (0.5) |
| **Benchmarking Participants** | | | | | | | | |
| Moscow City, Russian Fed. | 595 (2.2) | | 594 (2.4) | 595 (2.2) | 594 (2.3) | 595 (2.3) | 597 (2.4) | 595 (2.2) |
| Dubai, UAE | 545 (1.7) | | 543 (1.7) | 545 (1.7) | 543 (1.8) | 542 (1.7) | 540 (1.8) | 545 (1.7) |
| Ontario, Canada | 524 (3.2) | | 526 (3.1) | 524 (3.2) | 528 (3.2) | 528 (3.0) | 524 (3.2) | 524 (3.2) |
| Madrid, Spain | 523 (2.0) | | 526 (2.0) | 523 (2.0) | 521 (2.0) | 525 (2.0) | 523 (2.0) | 523 (2.0) |
| Quebec, Canada | 522 (2.5) | | 523 (2.6) | 522 (2.5) | 520 (2.7) | 524 (2.6) | 522 (2.6) | 522 (2.5) |
| Abu Dhabi, UAE | 418 (2.8) | | 420 (2.8) | 418 (2.8) | 417 (2.8) | 417 (2.8) | 414 (2.9) | 418 (2.8) |
| **Number of Items (Score Points)*** | 169 (174) | | 125 (129) | 169 (174) | 126 (129) | 136 (140) | 107 (110) | 169 (174) |

* The number of items and score points are based on the number of items included in scaling the fourth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Exhibit C.3: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

Read down the column under a country name to compare achievement scores based on the items identified by that country. Scores on the diagonal are countries' achievement scores based on the test items they identified.

| Country | Average Mathematics Scale Score based on All Items | Singapore | Chinese Taipei | Korea, Rep. of | Japan | Hong Kong SAR | Russian Federation | Ireland | Lithuania | Israel | Australia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | 617 (4.0) | 616 (4.0) | 615 (3.9) | 615 (3.9) | 617 (4.0) | 617 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) |
| Chinese Taipei | 612 (2.7) | 613 (2.7) | 617 (2.8) | 613 (2.7) | 611 (2.7) | 615 (2.8) | 615 (2.8) | 613 (2.7) | 615 (2.8) | 613 (2.7) | 612 (2.7) |
| Korea, Rep. of | 607 (2.8) | 608 (2.8) | 606 (2.8) | 610 (2.8) | 607 (2.8) | 606 (2.8) | 607 (2.8) | 605 (2.8) | 603 (2.8) | 607 (2.8) | 605 (2.8) |
| Japan | 594 (2.7) | 593 (2.7) | 593 (2.7) | 595 (2.7) | 599 (2.8) | 593 (2.7) | 592 (2.7) | 595 (2.8) | 591 (2.7) | 594 (2.7) | 594 (2.8) |
| Hong Kong SAR | 578 (4.1) | 578 (4.0) | 581 (4.1) | 578 (4.0) | 577 (4.0) | 583 (4.1) | 579 (4.0) | 578 (4.1) | 580 (4.1) | 578 (4.0) | 578 (4.1) |
| Russian Federation | 543 (4.5) | 544 (4.5) | 546 (4.5) | 543 (4.5) | 540 (4.5) | 546 (4.5) | 548 (4.6) | 543 (4.5) | 545 (4.5) | 544 (4.5) | 542 (4.5) |
| Ireland | 524 (2.6) | 524 (2.6) | 523 (2.7) | 526 (2.6) | 526 (2.6) | 524 (2.7) | 525 (2.7) | 524 (2.7) | 524 (2.7) | 524 (2.6) | 525 (2.7) |
| Lithuania | 520 (2.9) | 520 (2.9) | 522 (3.0) | 520 (2.9) | 521 (2.9) | 522 (3.0) | 522 (3.0) | 521 (3.0) | 523 (3.0) | 520 (2.9) | 521 (3.0) |
| Israel | 519 (4.3) | 520 (4.3) | 519 (4.3) | 520 (4.2) | 520 (4.2) | 519 (4.2) | 520 (4.3) | 519 (4.2) | 518 (4.3) | 520 (4.3) | 519 (4.2) |
| Australia | 517 (3.8) | 516 (3.8) | 515 (3.8) | 517 (3.7) | 519 (3.7) | 516 (3.8) | 515 (3.8) | 518 (3.8) | 517 (3.8) | 517 (3.8) | 518 (3.8) |
| Hungary | 517 (2.9) | 515 (2.9) | 517 (3.0) | 516 (2.9) | 518 (2.9) | 517 (2.9) | 517 (3.0) | 517 (2.9) | 518 (3.0) | 516 (2.9) | 517 (2.9) |
| England | 515 (5.3) | 514 (5.3) | 512 (5.3) | 515 (5.2) | 518 (5.2) | 515 (5.3) | 513 (5.3) | 516 (5.3) | 515 (5.3) | 515 (5.3) | 516 (5.3) |
| United States | 515 (4.8) | 515 (4.7) | 514 (4.7) | 515 (4.7) | 515 (4.7) | 514 (4.6) | 515 (4.9) | 515 (4.8) | 514 (4.7) | 516 (4.8) | 515 (4.8) |
| Finland | 509 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) | 511 (2.6) | 510 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) |
| Norway (9) | 503 (2.4) | 503 (2.4) | 501 (2.4) | 504 (2.4) | 506 (2.4) | 503 (2.4) | 502 (2.4) | 503 (2.4) | 502 (2.5) | 503 (2.4) | 504 (2.4) |
| Sweden | 503 (2.5) | 503 (2.5) | 502 (2.5) | 504 (2.6) | 506 (2.6) | 504 (2.6) | 502 (2.5) | 503 (2.6) | 502 (2.5) | 503 (2.6) | 504 (2.6) |
| Cyprus | 501 (1.6) | 501 (1.6) | 501 (1.6) | 500 (1.6) | 501 (1.6) | 501 (1.6) | 503 (1.6) | 502 (1.6) | 501 (1.6) | 501 (1.6) | 502 (1.6) |
| Portugal | 500 (3.2) | 500 (3.2) | 501 (3.2) | 500 (3.2) | 500 (3.1) | 502 (3.2) | 500 (3.2) | 500 (3.2) | 501 (3.2) | 500 (3.2) | 500 (3.2) |
| Italy | 497 (2.7) | 498 (2.7) | 498 (2.7) | 496 (2.7) | 497 (2.7) | 498 (2.8) | 497 (2.8) | 498 (2.7) | 498 (2.8) | 497 (2.7) | 498 (2.7) |
| Turkey | 496 (4.3) | 496 (4.3) | 495 (4.3) | 496 (4.2) | 495 (4.3) | 495 (4.3) | 495 (4.3) | 496 (4.3) | 494 (4.3) | 496 (4.3) | 496 (4.3) |
| Kazakhstan | 488 (3.3) | 488 (3.3) | 491 (3.4) | 487 (3.2) | 485 (3.3) | 490 (3.3) | 491 (3.4) | 487 (3.3) | 489 (3.3) | 488 (3.3) | 486 (3.2) |
| France | 483 (2.5) | 481 (2.5) | 482 (2.5) | 482 (2.5) | 484 (2.4) | 483 (2.5) | 480 (2.5) | 483 (2.5) | 481 (2.5) | 483 (2.5) | 482 (2.5) |
| New Zealand | 482 (3.4) | 480 (3.4) | 480 (3.4) | 481 (3.4) | 484 (3.4) | 480 (3.4) | 479 (3.4) | 482 (3.4) | 481 (3.4) | 482 (3.4) | 482 (3.4) |
| Bahrain | 481 (1.7) | 479 (1.8) | 479 (1.7) | 480 (1.7) | 482 (1.7) | 481 (1.7) | 478 (1.7) | 481 (1.7) | 480 (1.7) | 481 (1.7) | 480 (1.7) |
| Romania | 479 (4.3) | 480 (4.3) | 482 (4.3) | 479 (4.2) | 477 (4.1) | 481 (4.3) | 482 (4.3) | 479 (4.2) | 479 (4.3) | 479 (4.3) | 478 (4.2) |
| United Arab Emirates | 473 (1.9) | 474 (1.9) | 474 (1.9) | 473 (1.8) | 473 (1.8) | 474 (1.9) | 474 (1.9) | 474 (1.8) | 473 (1.9) | 474 (1.9) | 473 (1.8) |
| Georgia | 461 (4.3) | 462 (4.3) | 465 (4.3) | 463 (4.3) | 460 (4.3) | 464 (4.3) | 466 (4.3) | 462 (4.3) | 463 (4.3) | 462 (4.4) | 461 (4.3) |
| Malaysia | 461 (3.2) | 461 (3.1) | 461 (3.2) | 461 (3.1) | 462 (3.1) | 461 (3.1) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 460 (3.2) | 461 (3.2) |
| Iran, Islamic Rep. of | 446 (3.7) | 445 (3.7) | 446 (3.8) | 445 (3.7) | 446 (3.7) | 446 (3.8) | 446 (3.7) | 447 (3.7) | 446 (3.8) | 447 (3.7) | 447 (3.8) |
| Qatar | 443 (4.0) | 445 (3.9) | 443 (3.9) | 443 (4.0) | 443 (4.1) | 445 (3.9) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.1) | 443 (4.0) |
| Chile | 441 (2.8) | 441 (2.8) | 441 (2.9) | 440 (2.8) | 442 (2.8) | 442 (2.8) | 440 (2.9) | 441 (2.8) | 441 (2.9) | 441 (2.8) | 442 (2.8) |
| Lebanon | 429 (2.9) | 430 (2.9) | 434 (2.9) | 430 (2.9) | 428 (2.9) | 434 (2.9) | 434 (2.9) | 429 (2.9) | 431 (2.9) | 428 (3.0) | 428 (2.9) |
| Jordan | 420 (4.3) | 421 (4.3) | 422 (4.3) | 419 (4.2) | 417 (4.2) | 420 (4.2) | 421 (4.3) | 421 (4.2) | 420 (4.2) | 420 (4.3) | 420 (4.2) |
| Egypt | 413 (5.2) | 414 (5.2) | 414 (5.2) | 414 (5.2) | 411 (5.1) | 415 (5.1) | 414 (5.2) | 412 (5.2) | 412 (5.2) | 414 (5.2) | 412 (5.2) |
| Oman | 411 (2.8) | 410 (2.8) | 412 (2.8) | 410 (2.7) | 410 (2.7) | 411 (2.8) | 409 (2.8) | 410 (2.7) | 410 (2.8) | 410 (2.7) | 409 (2.8) |
| Kuwait | 403 (5.0) | 402 (5.0) | 400 (5.1) | 400 (5.0) | 402 (4.9) | 401 (5.0) | 400 (5.0) | 402 (4.9) | 402 (5.0) | 403 (5.0) | 402 (5.0) |
| Saudi Arabia | 394 (2.5) | 395 (2.5) | 390 (2.6) | 393 (2.6) | 395 (2.6) | 391 (2.6) | 392 (2.6) | 394 (2.5) | 391 (2.6) | 395 (2.5) | 392 (2.6) |
| South Africa (9) | 389 (2.3) | 391 (2.3) | 391 (2.3) | 391 (2.2) | 390 (2.2) | 392 (2.2) | 391 (2.3) | 389 (2.3) | 391 (2.3) | 390 (2.3) | 389 (2.3) |
| Morocco | 388 (2.3) | 387 (2.3) | 390 (2.3) | 390 (2.2) | 388 (2.3) | 391 (2.3) | 387 (2.4) | 387 (2.3) | 389 (2.3) | 387 (2.3) | 387 (2.3) |
| **International Average** | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.5) | 489 (0.5) | 490 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | 576 (4.2) | 577 (4.2) | 574 (4.1) | 572 (4.1) | 576 (4.2) | 580 (4.3) | 575 (4.1) | 577 (4.1) | 575 (4.2) | 574 (4.1) |
| Quebec, Canada | 543 (3.7) | 543 (3.6) | 542 (3.7) | 544 (3.7) | 545 (3.7) | 544 (3.7) | 542 (3.7) | 543 (3.7) | 543 (3.7) | 543 (3.7) | 544 (3.7) |
| Dubai, UAE | 537 (2.0) | 537 (2.0) | 536 (2.0) | 536 (2.0) | 536 (2.1) | 536 (2.1) | 536 (2.1) | 537 (2.0) | 536 (2.1) | 537 (2.0) | 536 (2.0) |
| Ontario, Canada | 530 (4.3) | 529 (4.3) | 528 (4.3) | 528 (4.2) | 532 (4.2) | 529 (4.3) | 526 (4.3) | 530 (4.3) | 530 (4.3) | 530 (4.2) | 531 (4.2) |
| Western Cape, RSA (9) | 441 (4.4) | 442 (4.4) | 443 (4.4) | 442 (4.4) | 441 (4.4) | 443 (4.4) | 442 (4.5) | 441 (4.4) | 443 (4.4) | 441 (4.4) | 441 (4.4) |
| Abu Dhabi, UAE | 436 (2.9) | 437 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 437 (2.9) | 436 (2.9) | 436 (2.9) | 435 (2.9) | 436 (2.9) | 436 (2.9) |
| Gauteng, RSA (9) | 421 (3.0) | 421 (3.0) | 422 (3.0) | 421 (2.9) | 421 (2.9) | 422 (3.0) | 421 (3.0) | 420 (3.0) | 422 (3.0) | 421 (3.0) | 421 (3.0) |
| **Number of Items (Score Points)*** | 206 (217) | 198 (209) | 185 (195) | 185 (194) | 177 (186) | 177 (187) | 170 (180) | 200 (211) | 183 (194) | 200 (211) | 188 (198) |

* The number of items and score points are based on the number of items included in scaling the eighth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.3: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Mathematics Scale Score based on All Items | Hungary | England | United States | Finland | Norway (9) | Sweden | Cyprus | Portugal | Italy | Turkey |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 614 (3.9) | 614 (4.0) | 618 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) |
| Chinese Taipei | 612 (2.7) | 612 (2.7) | 612 (2.7) | 612 (2.7) | 612 (2.7) | 611 (2.7) | 611 (2.7) | 613 (2.8) | 614 (2.8) | 611 (2.7) | 612 (2.7) |
| Korea, Rep. of | 607 (2.8) | 607 (2.8) | 606 (2.8) | 607 (2.8) | 607 (2.8) | 605 (2.8) | 604 (2.8) | 609 (2.8) | 605 (2.8) | 605 (2.8) | 606 (2.8) |
| Japan | 594 (2.7) | 594 (2.7) | 593 (2.7) | 594 (2.7) | 593 (2.7) | 592 (2.7) | 592 (2.8) | 591 (2.8) | 593 (2.7) | 593 (2.7) | 593 (2.7) |
| Hong Kong SAR | 578 (4.1) | 578 (4.1) | 578 (4.1) | 578 (4.1) | 578 (4.1) | 577 (4.1) | 578 (4.1) | 577 (4.1) | 580 (4.1) | 579 (4.1) | 578 (4.1) |
| Russian Federation | 543 (4.5) | 543 (4.5) | 543 (4.5) | 544 (4.6) | 543 (4.6) | 541 (4.5) | 541 (4.4) | 544 (4.6) | 545 (4.5) | 543 (4.5) | 543 (4.6) |
| Ireland | 524 (2.6) | 524 (2.6) | 524 (2.7) | 524 (2.6) | 524 (2.7) | 525 (2.7) | 525 (2.7) | 525 (2.7) | 523 (2.7) | 525 (2.7) | 524 (2.7) |
| Lithuania | 520 (2.9) | 520 (2.9) | 521 (2.9) | 520 (2.9) | 521 (2.9) | 521 (3.0) | 522 (3.0) | 519 (3.0) | 522 (3.0) | 521 (3.0) | 521 (3.0) |
| Israel | 519 (4.3) | 519 (4.3) | 519 (4.3) | 519 (4.3) | 520 (4.3) | 519 (4.3) | 518 (4.2) | 523 (4.3) | 518 (4.2) | 518 (4.2) | 520 (4.3) |
| Australia | 517 (3.8) | 517 (3.8) | 518 (3.8) | 517 (3.8) | 518 (3.8) | 519 (3.8) | 519 (3.8) | 517 (3.8) | 516 (3.8) | 518 (3.8) | 518 (3.8) |
| Hungary | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 516 (2.9) | 515 (3.0) | 518 (3.0) | 518 (2.9) | 517 (2.9) |
| England | 515 (5.3) | 515 (5.3) | 515 (5.3) | 515 (5.3) | 515 (5.3) | 516 (5.3) | 515 (5.3) | 515 (5.2) | 514 (5.3) | 516 (5.3) | 516 (5.2) |
| United States | 515 (4.8) | 515 (4.8) | 515 (4.8) | 515 (4.8) | 516 (4.8) | 516 (4.8) | 514 (4.7) | 516 (4.8) | 514 (4.7) | 515 (4.8) | 515 (4.7) |
| Finland | 509 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) | 510 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) |
| Norway (9) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 504 (2.5) | 504 (2.5) | 504 (2.4) | 502 (2.4) | 503 (2.4) | 504 (2.4) | 504 (2.4) |
| Sweden | 503 (2.5) | 503 (2.5) | 502 (2.6) | 503 (2.6) | 503 (2.6) | 504 (2.6) | 504 (2.6) | 503 (2.6) | 503 (2.6) | 503 (2.6) | 503 (2.6) |
| Cyprus | 501 (1.6) | 501 (1.6) | 501 (1.6) | 501 (1.6) | 501 (1.7) | 501 (1.6) | 500 (1.6) | 507 (1.6) | 501 (1.6) | 501 (1.6) | 501 (1.6) |
| Portugal | 500 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) | 497 (3.3) | 501 (3.2) | 501 (3.2) | 501 (3.2) |
| Italy | 497 (2.7) | 497 (2.7) | 498 (2.7) | 498 (2.7) | 498 (2.8) | 498 (2.7) | 496 (2.8) | 500 (2.8) | 498 (2.8) | 498 (2.8) | 498 (2.8) |
| Turkey | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 495 (4.3) | 494 (4.3) | 498 (4.4) | 494 (4.3) | 494 (4.3) | 496 (4.3) |
| Kazakhstan | 488 (3.3) | 488 (3.3) | 488 (3.3) | 488 (3.3) | 487 (3.3) | 486 (3.3) | 486 (3.2) | 488 (3.4) | 490 (3.3) | 487 (3.3) | 488 (3.3) |
| France | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 484 (2.5) | 478 (2.5) | 482 (2.5) | 483 (2.5) | 483 (2.5) |
| New Zealand | 482 (3.4) | 482 (3.4) | 481 (3.4) | 482 (3.4) | 482 (3.4) | 483 (3.4) | 483 (3.4) | 480 (3.4) | 480 (3.4) | 482 (3.4) | 481 (3.4) |
| Bahrain | 481 (1.7) | 481 (1.7) | 482 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.7) | 480 (1.7) | 480 (1.6) | 482 (1.7) | 481 (1.7) | 481 (1.7) |
| Romania | 479 (4.3) | 479 (4.3) | 479 (4.2) | 479 (4.3) | 478 (4.3) | 478 (4.2) | 476 (4.2) | 483 (4.3) | 480 (4.3) | 477 (4.2) | 479 (4.3) |
| United Arab Emirates | 473 (1.9) | 473 (1.9) | 473 (1.8) | 473 (1.9) | 473 (1.8) | 473 (1.8) | 472 (1.8) | 475 (1.9) | 474 (1.9) | 472 (1.9) | 473 (1.9) |
| Georgia | 461 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.4) | 461 (4.3) | 460 (4.3) | 468 (4.3) | 463 (4.4) | 461 (4.3) | 461 (4.3) |
| Malaysia | 461 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 462 (3.2) | 460 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) |
| Iran, Islamic Rep. of | 446 (3.7) | 446 (3.7) | 446 (3.7) | 446 (3.7) | 447 (3.8) | 447 (3.7) | 447 (3.8) | 447 (3.7) | 446 (3.8) | 447 (3.8) | 447 (3.8) |
| Qatar | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 445 (4.1) | 443 (4.0) | 442 (4.0) | 444 (4.0) |
| Chile | 441 (2.8) | 441 (2.8) | 441 (2.8) | 441 (2.8) | 441 (2.8) | 441 (2.8) | 441 (2.8) | 442 (2.9) | 440 (2.9) | 441 (2.8) | 441 (2.8) |
| Lebanon | 429 (2.9) | 429 (2.9) | 430 (2.9) | 429 (2.9) | 429 (2.9) | 428 (2.9) | 426 (2.9) | 433 (3.0) | 433 (2.9) | 430 (2.9) | 430 (2.9) |
| Jordan | 420 (4.3) | 420 (4.3) | 419 (4.3) | 420 (4.3) | 420 (4.2) | 420 (4.2) | 419 (4.1) | 419 (4.2) | 421 (4.3) | 419 (4.2) | 419 (4.3) |
| Egypt | 413 (5.2) | 413 (5.2) | 413 (5.2) | 413 (5.2) | 412 (5.2) | 412 (5.2) | 411 (5.2) | 417 (5.3) | 414 (5.2) | 412 (5.2) | 412 (5.2) |
| Oman | 411 (2.8) | 411 (2.8) | 411 (2.8) | 411 (2.8) | 410 (2.8) | 410 (2.8) | 410 (2.8) | 410 (2.9) | 412 (2.8) | 410 (2.8) | 411 (2.8) |
| Kuwait | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (4.9) | 399 (5.2) | 403 (5.0) | 402 (5.0) | 402 (5.0) |
| Saudi Arabia | 394 (2.5) | 394 (2.5) | 393 (2.6) | 394 (2.5) | 393 (2.5) | 394 (2.6) | 394 (2.6) | 393 (2.7) | 393 (2.6) | 391 (2.6) | 393 (2.5) |
| South Africa (9) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.2) | 389 (2.4) | 391 (2.3) | 389 (2.3) | 390 (2.3) |
| Morocco | 388 (2.3) | 388 (2.3) | 388 (2.3) | 388 (2.3) | 388 (2.3) | 387 (2.2) | 389 (2.3) | 385 (2.3) | 390 (2.3) | 388 (2.3) | 388 (2.3) |
| **International Average** | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | 575 (4.2) | 575 (4.1) | 575 (4.2) | 575 (4.2) | 574 (4.1) | 574 (4.1) | 576 (4.3) | 576 (4.2) | 575 (4.1) | 575 (4.2) |
| Quebec, Canada | 543 (3.7) | 543 (3.7) | 544 (3.7) | 543 (3.7) | 544 (3.7) | 544 (3.7) | 545 (3.8) | 542 (3.7) | 543 (3.8) | 545 (3.7) | 544 (3.7) |
| Dubai, UAE | 537 (2.0) | 537 (2.0) | 536 (2.0) | 537 (2.0) | 537 (2.0) | 536 (2.0) | 535 (2.0) | 538 (2.1) | 536 (2.0) | 536 (2.0) | 536 (2.0) |
| Ontario, Canada | 530 (4.3) | 530 (4.3) | 530 (4.3) | 530 (4.3) | 530 (4.2) | 531 (4.3) | 531 (4.2) | 526 (4.3) | 530 (4.3) | 531 (4.3) | 530 (4.3) |
| Western Cape, RSA (9) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 442 (4.6) | 442 (4.4) | 441 (4.4) | 442 (4.4) |
| Abu Dhabi, UAE | 436 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 435 (2.9) | 439 (3.0) | 436 (2.9) | 435 (2.9) | 436 (2.9) |
| Gauteng, RSA (9) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 420 (2.9) | 422 (3.0) | 422 (3.0) | 420 (3.0) | 421 (3.0) |
| **Number of Items (Score Points)*** | 206 (217) | 206 (217) | 202 (213) | 206 (217) | 198 (209) | 193 (204) | 177 (187) | 140 (148) | 187 (198) | 194 (204) | 197 (208) |

* The number of items and score points are based on the number of items included in scaling the eighth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.3: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Mathematics Scale Score based on All Items | Kazakhstan | France | New Zealand | Bahrain | Romania | United Arab Emirates | Georgia | Malaysia | Iran, Islamic Rep. of | Qatar |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | 616 (4.0) | 616 (4.0) | 613 (3.9) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 617 (4.0) |
| Chinese Taipei | 612 (2.7) | 612 (2.7) | 613 (2.7) | 611 (2.7) | 612 (2.7) | 612 (2.7) | 612 (2.7) | 615 (2.8) | 613 (2.7) | 615 (2.8) | 613 (2.8) |
| Korea, Rep. of | 607 (2.8) | 607 (2.8) | 604 (2.8) | 603 (2.8) | 607 (2.8) | 607 (2.8) | 607 (2.8) | 607 (2.8) | 607 (2.8) | 604 (2.7) | 607 (2.8) |
| Japan | 594 (2.7) | 594 (2.7) | 593 (2.8) | 592 (2.8) | 594 (2.7) | 594 (2.7) | 594 (2.7) | 594 (2.8) | 594 (2.7) | 591 (2.7) | 593 (2.8) |
| Hong Kong SAR | 578 (4.1) | 578 (4.1) | 579 (4.1) | 575 (4.1) | 578 (4.1) | 578 (4.1) | 578 (4.1) | 578 (4.0) | 578 (4.1) | 580 (4.2) | 579 (4.1) |
| Russian Federation | 543 (4.5) | 543 (4.5) | 543 (4.5) | 540 (4.4) | 543 (4.5) | 543 (4.5) | 543 (4.5) | 545 (4.5) | 543 (4.5) | 544 (4.4) | 545 (4.6) |
| Ireland | 524 (2.6) | 524 (2.6) | 524 (2.7) | 526 (2.7) | 524 (2.6) | 524 (2.6) | 524 (2.6) | 525 (2.7) | 524 (2.6) | 525 (2.7) | 526 (2.7) |
| Lithuania | 520 (2.9) | 520 (2.9) | 521 (3.0) | 521 (3.0) | 520 (2.9) | 520 (2.9) | 520 (2.9) | 521 (3.0) | 520 (2.9) | 522 (3.0) | 522 (3.0) |
| Israel | 519 (4.3) | 519 (4.3) | 518 (4.2) | 517 (4.2) | 519 (4.3) | 519 (4.3) | 519 (4.3) | 519 (4.3) | 519 (4.3) | 518 (4.2) | 519 (4.3) |
| Australia | 517 (3.8) | 517 (3.8) | 518 (3.8) | 520 (3.8) | 517 (3.8) | 517 (3.8) | 517 (3.8) | 517 (3.8) | 517 (3.8) | 518 (3.8) | 518 (3.8) |
| Hungary | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 518 (2.9) | 517 (2.9) | 516 (2.9) | 518 (2.9) |
| England | 515 (5.3) | 515 (5.3) | 515 (5.2) | 517 (5.3) | 515 (5.3) | 515 (5.3) | 515 (5.3) | 514 (5.2) | 515 (5.3) | 515 (5.3) | 516 (5.2) |
| United States | 515 (4.8) | 515 (4.8) | 514 (4.7) | 514 (4.8) | 515 (4.8) | 515 (4.8) | 515 (4.8) | 516 (4.8) | 515 (4.8) | 513 (4.7) | 517 (4.8) |
| Finland | 509 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) |
| Norway (9) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 505 (2.4) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 504 (2.4) |
| Sweden | 503 (2.5) | 503 (2.5) | 503 (2.5) | 504 (2.6) | 503 (2.5) | 503 (2.5) | 503 (2.5) | 502 (2.5) | 503 (2.5) | 504 (2.5) | 502 (2.5) |
| Cyprus | 501 (1.6) | 501 (1.6) | 502 (1.6) | 499 (1.7) | 501 (1.6) | 501 (1.6) | 501 (1.6) | 502 (1.6) | 501 (1.6) | 502 (1.6) | 502 (1.6) |
| Portugal | 500 (3.2) | 500 (3.2) | 501 (3.2) | 501 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) | 501 (3.2) | 500 (3.2) | 501 (3.2) | 500 (3.2) |
| Italy | 497 (2.7) | 497 (2.7) | 498 (2.7) | 498 (2.8) | 497 (2.7) | 497 (2.7) | 497 (2.7) | 497 (2.7) | 498 (2.7) | 499 (2.8) | 498 (2.8) |
| Turkey | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 495 (4.3) |
| Kazakhstan | 488 (3.3) | 488 (3.3) | 487 (3.3) | 484 (3.3) | 488 (3.3) | 488 (3.3) | 488 (3.3) | 490 (3.4) | 488 (3.3) | 486 (3.3) | 488 (3.3) |
| France | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 482 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) |
| New Zealand | 482 (3.4) | 482 (3.4) | 482 (3.4) | 484 (3.4) | 482 (3.4) | 482 (3.4) | 482 (3.4) | 481 (3.4) | 482 (3.4) | 482 (3.3) | 481 (3.4) |
| Bahrain | 481 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.6) | 481 (1.7) | 481 (1.7) | 481 (1.7) | 479 (1.7) | 481 (1.7) | 480 (1.7) | 480 (1.7) |
| Romania | 479 (4.3) | 479 (4.3) | 479 (4.3) | 476 (4.2) | 479 (4.3) | 479 (4.3) | 479 (4.3) | 481 (4.3) | 479 (4.3) | 479 (4.2) | 480 (4.3) |
| United Arab Emirates | 473 (1.9) | 473 (1.9) | 473 (1.9) | 472 (1.8) | 473 (1.9) | 473 (1.9) | 473 (1.9) | 474 (1.8) | 473 (1.9) | 473 (1.9) | 474 (1.8) |
| Georgia | 461 (4.3) | 461 (4.3) | 462 (4.3) | 460 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.3) | 463 (4.3) | 461 (4.3) | 463 (4.3) | 462 (4.4) |
| Malaysia | 461 (3.2) | 461 (3.2) | 461 (3.2) | 462 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 462 (3.1) | 461 (3.2) | 461 (3.2) | 461 (3.2) |
| Iran, Islamic Rep. of | 446 (3.7) | 446 (3.7) | 447 (3.8) | 448 (3.8) | 446 (3.7) | 446 (3.7) | 446 (3.7) | 443 (3.7) | 446 (3.7) | 448 (3.8) | 441 (3.8) |
| Qatar | 443 (4.0) | 443 (4.0) | 444 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (3.9) | 443 (4.0) | 443 (4.0) | 443 (4.0) |
| Chile | 441 (2.8) | 441 (2.8) | 441 (2.8) | 442 (2.8) | 441 (2.8) | 441 (2.8) | 441 (2.8) | 440 (2.9) | 441 (2.8) | 442 (2.8) | 440 (2.9) |
| Lebanon | 429 (2.9) | 429 (2.9) | 430 (2.9) | 423 (3.0) | 429 (2.9) | 429 (2.9) | 429 (2.9) | 431 (2.9) | 429 (2.9) | 431 (2.9) | 432 (2.9) |
| Jordan | 420 (4.3) | 420 (4.3) | 420 (4.2) | 418 (4.1) | 420 (4.3) | 420 (4.3) | 420 (4.3) | 419 (4.3) | 420 (4.3) | 419 (4.2) | 417 (4.2) |
| Egypt | 413 (5.2) | 413 (5.2) | 413 (5.2) | 409 (5.2) | 413 (5.2) | 413 (5.2) | 413 (5.2) | 414 (5.2) | 413 (5.2) | 412 (5.2) | 414 (5.2) |
| Oman | 411 (2.8) | 411 (2.8) | 410 (2.7) | 410 (2.8) | 411 (2.8) | 411 (2.8) | 411 (2.8) | 410 (2.8) | 411 (2.8) | 410 (2.8) | 411 (2.8) |
| Kuwait | 403 (5.0) | 403 (5.0) | 402 (5.0) | 402 (4.9) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 402 (5.0) | 403 (5.0) | 400 (5.0) | 403 (5.1) |
| Saudi Arabia | 394 (2.5) | 394 (2.5) | 394 (2.6) | 394 (2.5) | 394 (2.5) | 394 (2.5) | 394 (2.5) | 393 (2.5) | 394 (2.5) | 391 (2.6) | 395 (2.5) |
| South Africa (9) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 389 (2.3) | 390 (2.3) | 389 (2.3) | 388 (2.3) | 387 (2.3) |
| Morocco | 388 (2.3) | 388 (2.3) | 388 (2.3) | 387 (2.3) | 388 (2.3) | 388 (2.3) | 388 (2.3) | 389 (2.3) | 388 (2.3) | 389 (2.3) | 390 (2.3) |
| **International Average** | 489 (0.6) | 489 (0.6) | 489 (0.6) | 488 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | 575 (4.2) | 576 (4.1) | 573 (4.1) | 575 (4.2) | 575 (4.2) | 575 (4.2) | 577 (4.2) | 575 (4.2) | 575 (4.1) | 577 (4.2) |
| Quebec, Canada | 543 (3.7) | 543 (3.7) | 544 (3.7) | 545 (3.8) | 543 (3.7) | 543 (3.7) | 543 (3.7) | 542 (3.6) | 543 (3.7) | 545 (3.7) | 545 (3.7) |
| Dubai, UAE | 537 (2.0) | 537 (2.0) | 536 (2.0) | 536 (2.1) | 537 (2.0) | 537 (2.0) | 537 (2.0) | 536 (2.0) | 536 (2.0) | 536 (2.0) | 537 (2.0) |
| Ontario, Canada | 530 (4.3) | 530 (4.3) | 530 (4.3) | 533 (4.3) | 530 (4.3) | 530 (4.3) | 530 (4.3) | 528 (4.2) | 530 (4.3) | 530 (4.3) | 529 (4.3) |
| Western Cape, RSA (9) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 442 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 442 (4.4) | 441 (4.4) | 441 (4.4) | 439 (4.5) |
| Abu Dhabi, UAE | 436 (2.9) | 436 (2.9) | 436 (2.9) | 434 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 437 (2.9) | 436 (2.9) | 435 (2.9) | 437 (2.9) |
| Gauteng, RSA (9) | 421 (3.0) | 421 (3.0) | 420 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 420 (3.0) | 419 (3.0) |
| **Number of Items (Score Points)*** | 206 (217) | 206 (217) | 196 (207) | 177 (187) | 206 (217) | 206 (217) | 206 (217) | 186 (195) | 205 (216) | 184 (194) | 186 (197) |

* The number of items and score points are based on the number of items included in scaling the eighth grade mathematics achievement data.

See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.3: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Mathematics Scale Score based on All Items | Chile | Lebanon | Jordan | Egypt | Oman | Kuwait | Saudi Arabia | South Africa (9) | Morocco |
|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | 618 (4.0) | 618 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) | 617 (4.0) |
| Chinese Taipei | 612 (2.7) | 613 (2.8) | 617 (2.8) | 613 (2.7) | 613 (2.7) | 614 (2.8) | 614 (2.8) | 612 (2.7) | 613 (2.7) | 618 (2.8) |
| Korea, Rep. of | 607 (2.8) | 604 (2.7) | 608 (2.8) | 607 (2.8) | 607 (2.8) | 606 (2.8) | 606 (2.8) | 607 (2.8) | 605 (2.8) | 609 (2.8) |
| Japan | 594 (2.7) | 594 (2.7) | 590 (2.7) | 594 (2.7) | 594 (2.7) | 592 (2.7) | 591 (2.7) | 594 (2.7) | 592 (2.7) | 593 (2.7) |
| Hong Kong SAR | 578 (4.1) | 580 (4.1) | 582 (4.1) | 579 (4.1) | 578 (4.1) | 580 (4.1) | 580 (4.2) | 578 (4.1) | 579 (4.1) | 582 (4.0) |
| Russian Federation | 543 (4.5) | 544 (4.5) | 549 (4.6) | 544 (4.6) | 543 (4.6) | 544 (4.5) | 543 (4.6) | 543 (4.5) | 543 (4.5) | 548 (4.6) |
| Ireland | 524 (2.6) | 525 (2.7) | 525 (2.7) | 524 (2.7) | 524 (2.7) | 523 (2.7) | 526 (2.7) | 524 (2.6) | 524 (2.7) | 523 (2.7) |
| Lithuania | 520 (2.9) | 522 (3.0) | 523 (3.0) | 520 (2.9) | 520 (2.9) | 521 (3.0) | 522 (3.0) | 521 (2.9) | 521 (3.0) | 522 (3.0) |
| Israel | 519 (4.3) | 520 (4.2) | 519 (4.2) | 519 (4.3) | 519 (4.2) | 518 (4.2) | 518 (4.2) | 519 (4.3) | 519 (4.2) | 520 (4.2) |
| Australia | 517 (3.8) | 517 (3.8) | 515 (3.8) | 517 (3.8) | 517 (3.8) | 517 (3.8) | 518 (3.7) | 518 (3.8) | 518 (3.8) | 515 (3.8) |
| Hungary | 517 (2.9) | 518 (3.0) | 518 (3.0) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 517 (2.9) | 516 (3.0) | 518 (3.0) |
| England | 515 (5.3) | 515 (5.3) | 514 (5.2) | 515 (5.3) | 515 (5.2) | 515 (5.3) | 515 (5.2) | 515 (5.2) | 515 (5.3) | 514 (5.2) |
| United States | 515 (4.8) | 515 (4.8) | 516 (4.7) | 515 (4.8) | 515 (4.8) | 514 (4.7) | 515 (4.7) | 516 (4.8) | 514 (4.7) | 516 (4.7) |
| Finland | 509 (2.6) | 509 (2.6) | 511 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) | 509 (2.6) | 509 (2.6) | 510 (2.6) |
| Norway (9) | 503 (2.4) | 504 (2.5) | 503 (2.3) | 503 (2.4) | 503 (2.4) | 503 (2.4) | 504 (2.4) | 503 (2.4) | 504 (2.4) | 503 (2.4) |
| Sweden | 503 (2.5) | 503 (2.5) | 502 (2.5) | 503 (2.6) | 503 (2.5) | 502 (2.6) | 502 (2.6) | 502 (2.6) | 503 (2.6) | 501 (2.5) |
| Cyprus | 501 (1.6) | 501 (1.6) | 502 (1.6) | 501 (1.6) | 501 (1.6) | 501 (1.6) | 502 (1.6) | 501 (1.6) | 501 (1.6) | 502 (1.6) |
| Portugal | 500 (3.2) | 501 (3.2) | 500 (3.3) | 500 (3.2) | 500 (3.2) | 501 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) |
| Italy | 497 (2.7) | 497 (2.8) | 499 (2.8) | 497 (2.7) | 497 (2.7) | 498 (2.7) | 499 (2.8) | 497 (2.7) | 498 (2.8) | 498 (2.8) |
| Turkey | 496 (4.3) | 494 (4.4) | 494 (4.4) | 495 (4.3) | 496 (4.3) | 495 (4.3) | 497 (4.3) | 496 (4.3) | 496 (4.3) | 495 (4.3) |
| Kazakhstan | 488 (3.3) | 487 (3.3) | 492 (3.4) | 488 (3.3) | 488 (3.3) | 488 (3.3) | 488 (3.2) | 487 (3.3) | 487 (3.3) | 491 (3.4) |
| France | 483 (2.5) | 482 (2.5) | 481 (2.6) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 483 (2.5) | 482 (2.5) | 480 (2.5) |
| New Zealand | 482 (3.4) | 481 (3.5) | 478 (3.5) | 482 (3.4) | 482 (3.4) | 482 (3.4) | 481 (3.4) | 482 (3.4) | 482 (3.4) | 478 (3.4) |
| Bahrain | 481 (1.7) | 480 (1.7) | 480 (1.6) | 481 (1.7) | 481 (1.7) | 481 (1.7) | 480 (1.7) | 481 (1.7) | 481 (1.7) | 483 (1.7) |
| Romania | 479 (4.3) | 478 (4.2) | 483 (4.3) | 479 (4.3) | 479 (4.3) | 479 (4.3) | 481 (4.3) | 479 (4.3) | 478 (4.2) | 482 (4.3) |
| United Arab Emirates | 473 (1.9) | 474 (1.9) | 474 (1.9) | 473 (1.9) | 474 (1.9) | 473 (1.8) | 473 (1.8) | 474 (1.9) | 473 (1.8) | 476 (1.8) |
| Georgia | 461 (4.3) | 461 (4.4) | 466 (4.4) | 461 (4.3) | 461 (4.3) | 461 (4.3) | 462 (4.3) | 461 (4.3) | 461 (4.3) | 467 (4.4) |
| Malaysia | 461 (3.2) | 464 (3.2) | 462 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 460 (3.2) | 461 (3.2) | 461 (3.2) | 462 (3.1) |
| Iran, Islamic Rep. of | 446 (3.7) | 448 (3.8) | 441 (4.0) | 446 (3.7) | 446 (3.7) | 446 (3.8) | 443 (3.9) | 446 (3.7) | 447 (3.8) | 443 (3.9) |
| Qatar | 443 (4.0) | 445 (4.0) | 444 (3.9) | 443 (4.0) | 444 (4.0) | 444 (4.0) | 444 (4.0) | 443 (4.0) | 443 (4.0) | 445 (3.9) |
| Chile | 441 (2.8) | 440 (2.9) | 440 (2.9) | 441 (2.8) | 441 (2.8) | 441 (2.8) | 440 (2.9) | 441 (2.8) | 440 (2.8) | 441 (2.9) |
| Lebanon | 429 (2.9) | 433 (2.9) | 439 (2.9) | 429 (2.9) | 429 (2.9) | 430 (2.9) | 431 (2.9) | 428 (2.9) | 428 (2.9) | 436 (2.9) |
| Jordan | 420 (4.3) | 419 (4.2) | 418 (4.2) | 420 (4.3) | 420 (4.3) | 420 (4.2) | 417 (4.2) | 420 (4.3) | 419 (4.2) | 420 (4.3) |
| Egypt | 413 (5.2) | 413 (5.1) | 418 (5.1) | 413 (5.2) | 413 (5.2) | 412 (5.2) | 414 (5.1) | 412 (5.2) | 413 (5.2) | 417 (5.2) |
| Oman | 411 (2.8) | 410 (2.8) | 411 (2.8) | 411 (2.8) | 411 (2.7) | 411 (2.8) | 410 (2.8) | 410 (2.8) | 410 (2.8) | 413 (2.7) |
| Kuwait | 403 (5.0) | 403 (4.9) | 402 (5.1) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.1) |
| Saudi Arabia | 394 (2.5) | 392 (2.5) | 391 (2.6) | 394 (2.5) | 394 (2.5) | 393 (2.5) | 394 (2.6) | 393 (2.6) | 394 (2.5) | 392 (2.6) |
| South Africa (9) | 389 (2.3) | 392 (2.3) | 388 (2.3) | 389 (2.3) | 389 (2.3) | 390 (2.3) | 386 (2.3) | 390 (2.3) | 390 (2.3) | 389 (2.3) |
| Morocco | 388 (2.3) | 388 (2.3) | 392 (2.3) | 388 (2.3) | 388 (2.3) | 389 (2.3) | 389 (2.3) | 388 (2.3) | 388 (2.3) | 390 (2.3) |
| **International Average** | 489 (0.6) | 489 (0.6) | 490 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 490 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | 575 (4.2) | 580 (4.2) | 576 (4.2) | 575 (4.2) | 576 (4.1) | 577 (4.1) | 575 (4.2) | 575 (4.1) | 578 (4.2) |
| Quebec, Canada | 543 (3.7) | 544 (3.7) | 545 (3.7) | 543 (3.7) | 543 (3.7) | 544 (3.7) | 546 (3.7) | 544 (3.7) | 544 (3.7) | 543 (3.6) |
| Dubai, UAE | 537 (2.0) | 536 (2.1) | 536 (2.1) | 537 (2.0) | 537 (2.0) | 536 (2.0) | 536 (2.0) | 537 (2.0) | 536 (2.0) | 537 (2.0) |
| Ontario, Canada | 530 (4.3) | 531 (4.2) | 527 (4.3) | 530 (4.3) | 530 (4.3) | 530 (4.3) | 529 (4.3) | 530 (4.3) | 530 (4.3) | 528 (4.2) |
| Western Cape, RSA (9) | 441 (4.4) | 443 (4.4) | 440 (4.5) | 441 (4.4) | 441 (4.4) | 442 (4.4) | 438 (4.5) | 441 (4.4) | 441 (4.4) | 440 (4.5) |
| Abu Dhabi, UAE | 436 (2.9) | 436 (2.9) | 438 (2.8) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) | 439 (2.8) |
| Gauteng, RSA (9) | 421 (3.0) | 422 (3.0) | 420 (3.0) | 421 (3.0) | 421 (3.0) | 421 (3.0) | 418 (3.0) | 421 (3.0) | 420 (3.0) | 420 (3.0) |
| **Number of Items (Score Points)*** | 206 (217) | 174 (185) | 162 (172) | 205 (216) | 206 (217) | 198 (209) | 186 (197) | 201 (211) | 194 (205) | 169 (179) |

* The number of items and score points are based on the number of items included in scaling the eighth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.3: Average Scale Scores for the Mathematics Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Mathematics Scale Score based on All Items | Benchmarking Participants | Moscow City, Russian Fed. | Quebec, Canada | Dubai, UAE | Ontario, Canada | Western Cape, RSA (9) | Abu Dhabi, UAE | Gauteng, RSA (9) |
|---|---|---|---|---|---|---|---|---|---|
| Singapore | 616 (4.0) | | 617 (4.0) | 615 (4.0) | 616 (4.0) | 615 (4.0) | 616 (4.0) | 616 (4.0) | 616 (4.0) |
| Chinese Taipei | 612 (2.7) | | 613 (2.7) | 613 (2.7) | 612 (2.7) | 613 (2.7) | 613 (2.7) | 612 (2.7) | 613 (2.7) |
| Korea, Rep. of | 607 (2.8) | | 607 (2.8) | 606 (2.8) | 607 (2.8) | 605 (2.7) | 605 (2.8) | 607 (2.8) | 605 (2.8) |
| Japan | 594 (2.7) | | 594 (2.7) | 593 (2.7) | 594 (2.7) | 592 (2.7) | 592 (2.7) | 594 (2.7) | 592 (2.7) |
| Hong Kong SAR | 578 (4.1) | | 578 (4.0) | 579 (4.1) | 578 (4.1) | 579 (4.2) | 579 (4.1) | 578 (4.1) | 579 (4.1) |
| Russian Federation | 543 (4.5) | | 545 (4.6) | 543 (4.5) | 543 (4.5) | 542 (4.5) | 543 (4.5) | 543 (4.5) | 543 (4.5) |
| Ireland | 524 (2.6) | | 524 (2.6) | 525 (2.7) | 524 (2.6) | 525 (2.7) | 524 (2.7) | 524 (2.6) | 524 (2.7) |
| Lithuania | 520 (2.9) | | 520 (3.0) | 522 (2.9) | 520 (2.9) | 521 (3.0) | 521 (3.0) | 520 (2.9) | 521 (3.0) |
| Israel | 519 (4.3) | | 520 (4.3) | 519 (4.2) | 519 (4.3) | 518 (4.2) | 519 (4.2) | 519 (4.3) | 519 (4.2) |
| Australia | 517 (3.8) | | 516 (3.8) | 518 (3.8) | 517 (3.8) | 518 (3.8) | 518 (3.8) | 517 (3.8) | 518 (3.8) |
| Hungary | 517 (2.9) | | 517 (2.9) | 518 (2.9) | 517 (2.9) | 516 (2.9) | 516 (3.0) | 517 (2.9) | 516 (3.0) |
| England | 515 (5.3) | | 514 (5.3) | 516 (5.2) | 515 (5.3) | 516 (5.3) | 515 (5.3) | 515 (5.3) | 515 (5.3) |
| United States | 515 (4.8) | | 515 (4.8) | 514 (4.7) | 515 (4.8) | 514 (4.7) | 514 (4.7) | 515 (4.8) | 514 (4.7) |
| Finland | 509 (2.6) | | 509 (2.6) | 511 (2.6) | 509 (2.6) | 510 (2.6) | 509 (2.6) | 509 (2.6) | 509 (2.6) |
| Norway (9) | 503 (2.4) | | 502 (2.4) | 505 (2.4) | 503 (2.4) | 504 (2.4) | 504 (2.4) | 503 (2.4) | 504 (2.4) |
| Sweden | 503 (2.5) | | 503 (2.5) | 505 (2.6) | 503 (2.5) | 503 (2.6) | 503 (2.6) | 503 (2.5) | 503 (2.6) |
| Cyprus | 501 (1.6) | | 501 (1.6) | 501 (1.6) | 501 (1.6) | 500 (1.6) | 501 (1.6) | 501 (1.6) | 501 (1.6) |
| Portugal | 500 (3.2) | | 500 (3.2) | 501 (3.2) | 500 (3.2) | 501 (3.2) | 500 (3.2) | 500 (3.2) | 500 (3.2) |
| Italy | 497 (2.7) | | 498 (2.7) | 498 (2.7) | 497 (2.7) | 498 (2.8) | 498 (2.8) | 497 (2.7) | 498 (2.8) |
| Turkey | 496 (4.3) | | 495 (4.3) | 495 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) | 496 (4.3) |
| Kazakhstan | 488 (3.3) | | 489 (3.3) | 486 (3.2) | 488 (3.3) | 486 (3.2) | 487 (3.3) | 488 (3.3) | 487 (3.3) |
| France | 483 (2.5) | | 482 (2.5) | 484 (2.5) | 483 (2.5) | 483 (2.5) | 482 (2.5) | 483 (2.5) | 482 (2.5) |
| New Zealand | 482 (3.4) | | 481 (3.4) | 482 (3.4) | 482 (3.4) | 483 (3.4) | 482 (3.4) | 482 (3.4) | 482 (3.4) |
| Bahrain | 481 (1.7) | | 480 (1.7) | 480 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.7) | 481 (1.7) |
| Romania | 479 (4.3) | | 480 (4.3) | 477 (4.2) | 479 (4.3) | 478 (4.2) | 478 (4.2) | 479 (4.3) | 478 (4.2) |
| United Arab Emirates | 473 (1.9) | | 474 (1.9) | 473 (1.8) | 473 (1.9) | 473 (1.9) | 473 (1.8) | 473 (1.9) | 473 (1.8) |
| Georgia | 461 (4.3) | | 462 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.3) | 461 (4.3) |
| Malaysia | 461 (3.2) | | 461 (3.2) | 461 (3.1) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) | 461 (3.2) |
| Iran, Islamic Rep. of | 446 (3.7) | | 446 (3.7) | 447 (3.8) | 446 (3.7) | 447 (3.8) | 447 (3.8) | 446 (3.7) | 447 (3.8) |
| Qatar | 443 (4.0) | | 444 (4.0) | 445 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) | 443 (4.0) |
| Chile | 441 (2.8) | | 440 (2.9) | 442 (2.8) | 441 (2.8) | 441 (2.8) | 440 (2.8) | 441 (2.8) | 440 (2.8) |
| Lebanon | 429 (2.9) | | 431 (2.9) | 430 (2.9) | 429 (2.9) | 427 (2.9) | 428 (2.9) | 429 (2.9) | 428 (2.9) |
| Jordan | 420 (4.3) | | 421 (4.3) | 419 (4.1) | 420 (4.3) | 420 (4.2) | 419 (4.2) | 420 (4.3) | 419 (4.2) |
| Egypt | 413 (5.2) | | 414 (5.2) | 414 (5.1) | 413 (5.2) | 412 (5.2) | 413 (5.2) | 413 (5.2) | 413 (5.2) |
| Oman | 411 (2.8) | | 410 (2.8) | 411 (2.8) | 411 (2.8) | 410 (2.8) | 410 (2.8) | 411 (2.8) | 410 (2.8) |
| Kuwait | 403 (5.0) | | 402 (5.0) | 401 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) | 403 (5.0) |
| Saudi Arabia | 394 (2.5) | | 394 (2.5) | 391 (2.6) | 394 (2.5) | 394 (2.5) | 394 (2.5) | 394 (2.5) | 394 (2.5) |
| South Africa (9) | 389 (2.3) | | 390 (2.3) | 388 (2.3) | 389 (2.3) | 389 (2.3) | 390 (2.3) | 389 (2.3) | 390 (2.3) |
| Morocco | 388 (2.3) | | 388 (2.3) | 389 (2.3) | 388 (2.3) | 388 (2.3) | 388 (2.3) | 388 (2.3) | 388 (2.3) |
| **International Average** | 489 (0.6) | | 489 (0.6) | 489 (0.5) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) | 489 (0.6) |
| **Benchmarking Participants** | | | | | | | | | |
| Moscow City, Russian Fed. | 575 (4.2) | | 577 (4.2) | 575 (4.1) | 575 (4.2) | 574 (4.1) | 575 (4.1) | 575 (4.2) | 575 (4.1) |
| Quebec, Canada | 543 (3.7) | | 543 (3.7) | 546 (3.7) | 543 (3.7) | 544 (3.7) | 544 (3.7) | 543 (3.7) | 544 (3.7) |
| Dubai, UAE | 537 (2.0) | | 537 (2.0) | 536 (2.1) | 537 (2.0) | 536 (2.0) | 536 (2.0) | 537 (2.0) | 536 (2.0) |
| Ontario, Canada | 530 (4.3) | | 529 (4.2) | 530 (4.2) | 530 (4.3) | 531 (4.3) | 530 (4.3) | 530 (4.3) | 530 (4.3) |
| Western Cape, RSA (9) | 441 (4.4) | | 442 (4.4) | 440 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) | 441 (4.4) |
| Abu Dhabi, UAE | 436 (2.9) | | 436 (2.9) | 437 (2.8) | 436 (2.9) | 435 (2.9) | 436 (2.9) | 436 (2.9) | 436 (2.9) |
| Gauteng, RSA (9) | 421 (3.0) | | 421 (3.0) | 419 (3.0) | 421 (3.0) | 420 (3.0) | 420 (3.0) | 421 (3.0) | 420 (3.0) |
| **Number of Items (Score Points)*** | 206 (217) | | 195 (206) | 177 (186) | 206 (217) | 191 (202) | 194 (205) | 206 (217) | 194 (205) |

* The number of items and score points are based on the number of items included in scaling the eighth grade mathematics achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

# Exhibit C.4: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

Read down the column under a country name to compare achievement scores based on the items identified by that country. Scores on the diagonal are countries' achievement scores based on the test items they identified.

| Country | Average Science Scale Score based on All Items | Singapore | Chinese Taipei | Japan | Korea, Rep. of | Finland | Russian Federation | Lithuania | Hungary | Australia | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | 621 (4.1) | 612 (4.0) | 614 (4.0) | 613 (4.0) | 607 (3.9) | 606 (3.9) | 606 (3.9) | 608 (3.9) | 611 (3.9) | 607 (4.0) |
| Chinese Taipei | 574 (1.9) | 571 (2.0) | 578 (2.0) | 574 (2.0) | 575 (2.0) | 572 (1.9) | 571 (1.9) | 572 (1.9) | 574 (1.9) | 569 (1.9) | 572 (2.0) |
| Japan | 570 (2.1) | 568 (2.2) | 570 (2.2) | 584 (2.1) | 571 (2.2) | 568 (2.1) | 571 (2.1) | 571 (2.1) | 570 (2.1) | 569 (2.1) | 571 (2.2) |
| Korea, Rep. of | 561 (2.1) | 557 (2.2) | 558 (2.1) | 558 (2.2) | 562 (2.2) | 560 (2.1) | 562 (2.1) | 562 (2.1) | 561 (2.1) | 562 (2.2) | 561 (2.2) |
| Finland | 543 (3.1) | 538 (3.3) | 542 (3.2) | 538 (3.1) | 542 (3.2) | 543 (3.2) | 541 (3.1) | 542 (3.1) | 543 (3.2) | 539 (3.2) | 542 (3.2) |
| Russian Federation | 543 (4.2) | 541 (4.2) | 543 (4.4) | 541 (4.6) | 542 (4.2) | 542 (4.2) | 543 (4.3) | 544 (4.3) | 542 (4.2) | 544 (4.2) | 539 (4.3) |
| Lithuania | 534 (3.0) | 530 (3.1) | 534 (3.0) | 532 (3.1) | 533 (3.0) | 533 (3.0) | 534 (3.0) | 535 (3.0) | 534 (3.0) | 533 (3.0) | 534 (3.1) |
| Hungary | 530 (2.6) | 527 (2.6) | 530 (2.7) | 528 (2.6) | 530 (2.6) | 528 (2.6) | 529 (2.6) | 530 (2.6) | 530 (2.6) | 530 (2.5) | 525 (2.7) |
| Australia | 528 (3.2) | 524 (3.2) | 527 (3.2) | 524 (3.3) | 526 (3.2) | 530 (3.2) | 530 (3.2) | 530 (3.2) | 528 (3.2) | 533 (3.2) | 527 (3.3) |
| Ireland | 523 (2.9) | 517 (3.1) | 522 (2.9) | 517 (3.0) | 523 (2.9) | 524 (3.0) | 524 (3.0) | 524 (3.0) | 523 (2.9) | 523 (2.9) | 526 (2.9) |
| United States | 522 (4.7) | 518 (4.5) | 522 (4.6) | 516 (4.4) | 520 (4.6) | 524 (4.6) | 524 (4.7) | 524 (4.7) | 522 (4.7) | 525 (4.7) | 518 (4.8) |
| Sweden | 521 (3.2) | 517 (3.3) | 520 (3.2) | 517 (3.1) | 523 (3.2) | 522 (3.2) | 520 (3.2) | 520 (3.2) | 522 (3.2) | 519 (3.2) | 522 (3.2) |
| Portugal | 519 (2.9) | 518 (3.0) | 518 (2.9) | 513 (2.9) | 519 (2.9) | 520 (2.9) | 519 (2.9) | 519 (2.9) | 518 (2.9) | 519 (2.9) | 518 (3.0) |
| England | 517 (4.8) | 514 (4.8) | 517 (4.8) | 515 (4.8) | 516 (4.8) | 517 (4.8) | 516 (4.8) | 517 (4.9) | 517 (4.8) | 515 (4.8) | 518 (5.0) |
| Turkey | 515 (3.7) | 517 (3.9) | 516 (3.7) | 510 (3.7) | 512 (3.8) | 517 (3.7) | 515 (3.7) | 514 (3.7) | 515 (3.7) | 516 (3.6) | 519 (4.0) |
| Israel | 513 (4.2) | 517 (4.3) | 513 (4.2) | 514 (4.2) | 514 (4.3) | 514 (4.2) | 514 (4.3) | 514 (4.2) | 513 (4.2) | 515 (4.3) | 514 (4.3) |
| Hong Kong SAR | 504 (5.2) | 502 (5.2) | 503 (5.3) | 507 (4.9) | 505 (5.2) | 504 (5.2) | 501 (5.2) | 501 (5.2) | 504 (5.2) | 503 (5.2) | 501 (5.1) |
| Italy | 500 (2.6) | 494 (2.5) | 501 (2.5) | 497 (2.5) | 499 (2.6) | 499 (2.6) | 501 (2.6) | 501 (2.6) | 500 (2.6) | 502 (2.6) | 495 (2.5) |
| New Zealand | 499 (3.5) | 494 (3.5) | 497 (3.5) | 489 (3.5) | 498 (3.5) | 502 (3.5) | 500 (3.5) | 500 (3.5) | 499 (3.5) | 500 (3.5) | 497 (3.5) |
| Norway (9) | 495 (3.1) | 490 (3.2) | 495 (3.1) | 492 (3.1) | 496 (3.1) | 496 (3.2) | 495 (3.1) | 494 (3.1) | 495 (3.1) | 495 (3.1) | 497 (3.2) |
| France | 489 (2.7) | 486 (2.7) | 485 (2.7) | 484 (2.8) | 489 (2.7) | 489 (2.7) | 489 (2.7) | 490 (2.7) | 489 (2.7) | 493 (2.7) | 484 (2.8) |
| Bahrain | 486 (1.9) | 489 (2.0) | 487 (1.9) | 486 (2.1) | 487 (1.9) | 487 (1.9) | 487 (1.9) | 486 (2.0) | 486 (1.9) | 487 (1.9) | 486 (2.0) |
| Cyprus | 484 (1.9) | 486 (1.9) | 483 (2.0) | 489 (1.9) | 486 (1.9) | 483 (1.9) | 484 (1.9) | 486 (1.9) | 484 (1.9) | 486 (1.9) | 487 (1.9) |
| Kazakhstan | 478 (3.1) | 480 (3.1) | 480 (3.1) | 473 (3.3) | 480 (3.1) | 478 (3.1) | 478 (3.1) | 478 (3.1) | 478 (3.1) | 477 (3.0) | 479 (3.0) |
| Qatar | 475 (4.4) | 481 (4.4) | 476 (4.3) | 482 (4.3) | 478 (4.4) | 473 (4.4) | 474 (4.4) | 474 (4.3) | 475 (4.4) | 476 (4.4) | 475 (4.4) |
| United Arab Emirates | 473 (2.2) | 475 (2.3) | 475 (2.2) | 480 (2.2) | 475 (2.2) | 473 (2.2) | 474 (2.2) | 472 (2.2) | 473 (2.2) | 474 (2.2) | 473 (2.2) |
| Romania | 470 (4.2) | 466 (4.4) | 471 (4.2) | 469 (4.2) | 472 (4.2) | 469 (4.2) | 470 (4.2) | 471 (4.2) | 470 (4.2) | 468 (4.2) | 466 (4.2) |
| Chile | 462 (2.9) | 458 (2.9) | 461 (2.8) | 455 (2.8) | 460 (2.9) | 461 (2.9) | 463 (2.9) | 464 (2.9) | 462 (2.9) | 462 (2.9) | 460 (3.0) |
| Malaysia | 460 (3.5) | 464 (3.6) | 459 (3.5) | 459 (3.5) | 464 (3.5) | 463 (3.5) | 460 (3.5) | 459 (3.5) | 460 (3.5) | 461 (3.5) | 458 (3.5) |
| Oman | 457 (2.9) | 460 (2.9) | 458 (2.9) | 463 (2.9) | 459 (2.9) | 458 (2.9) | 457 (2.9) | 456 (2.9) | 457 (2.9) | 459 (2.9) | 457 (2.8) |
| Jordan | 452 (4.7) | 457 (4.8) | 453 (4.7) | 453 (4.6) | 450 (4.7) | 452 (4.6) | 451 (4.6) | 452 (4.6) | 452 (4.6) | 452 (4.6) | 446 (4.8) |
| Iran, Islamic Rep. of | 449 (3.6) | 449 (3.7) | 449 (3.6) | 447 (3.7) | 445 (3.6) | 450 (3.5) | 448 (3.6) | 448 (3.5) | 449 (3.6) | 451 (3.6) | 446 (3.6) |
| Georgia | 447 (3.9) | 447 (4.1) | 446 (3.9) | 450 (4.1) | 449 (4.0) | 444 (4.0) | 446 (3.9) | 448 (3.9) | 447 (3.9) | 450 (3.9) | 443 (3.9) |
| Kuwait | 444 (5.7) | 447 (5.6) | 445 (5.6) | 447 (5.5) | 444 (5.6) | 443 (5.6) | 444 (5.6) | 444 (5.6) | 444 (5.6) | 444 (5.4) | 444 (5.6) |
| Saudi Arabia | 431 (2.6) | 432 (2.7) | 430 (2.7) | 430 (2.9) | 430 (2.7) | 431 (2.6) | 431 (2.6) | 432 (2.6) | 432 (2.6) | 432 (2.7) | 432 (2.6) |
| Morocco | 394 (2.7) | 398 (2.8) | 396 (2.6) | 400 (2.7) | 396 (2.6) | 394 (2.7) | 394 (2.7) | 394 (2.7) | 394 (2.6) | 397 (2.6) | 390 (2.7) |
| Egypt | 389 (5.4) | 393 (5.5) | 389 (5.5) | 401 (5.2) | 394 (5.5) | 388 (5.5) | 390 (5.4) | 390 (5.4) | 389 (5.5) | 391 (5.2) | 393 (5.4) |
| Lebanon | 377 (4.6) | 385 (4.8) | 382 (4.6) | 390 (4.6) | 382 (4.6) | 375 (4.8) | 378 (4.6) | 377 (4.7) | 377 (4.6) | 377 (4.8) | 385 (4.6) |
| South Africa (9) | 370 (3.1) | 374 (3.1) | 370 (3.1) | 380 (3.1) | 372 (3.1) | 373 (3.1) | 370 (3.1) | 369 (3.1) | 370 (3.1) | 367 (3.2) | 377 (3.1) |
| **International Average** | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 491 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 489 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | 564 (2.9) | 565 (2.9) | 562 (3.0) | 566 (2.9) | 566 (3.0) | 566 (3.0) | 569 (3.0) | 566 (2.9) | 568 (3.0) | 564 (3.0) |
| Dubai, UAE | 548 (2.0) | 550 (2.1) | 550 (2.0) | 550 (2.1) | 548 (2.0) | 548 (2.0) | 548 (2.0) | 547 (2.0) | 548 (2.0) | 547 (2.1) | 549 (2.1) |
| Quebec, Canada | 537 (3.6) | 533 (3.6) | 536 (3.6) | 533 (3.4) | 535 (3.5) | 539 (3.7) | 537 (3.6) | 537 (3.6) | 537 (3.6) | 540 (3.5) | 537 (3.7) |
| Ontario, Canada | 522 (3.0) | 518 (3.1) | 523 (3.1) | 515 (3.3) | 520 (3.0) | 523 (3.0) | 523 (3.0) | 523 (3.0) | 522 (3.0) | 526 (3.0) | 520 (3.0) |
| Western Cape, RSA (9) | 439 (5.1) | 441 (5.2) | 439 (5.1) | 442 (5.3) | 438 (5.2) | 442 (5.1) | 438 (5.2) | 438 (5.1) | 439 (5.1) | 437 (5.3) | 443 (5.2) |
| Gauteng, RSA (9) | 422 (3.9) | 425 (3.9) | 422 (3.9) | 428 (4.0) | 424 (3.9) | 425 (3.8) | 422 (3.9) | 421 (3.9) | 422 (3.9) | 420 (3.9) | 428 (3.8) |
| Abu Dhabi, UAE | 420 (3.6) | 421 (3.7) | 422 (3.6) | 428 (3.6) | 422 (3.6) | 420 (3.6) | 421 (3.6) | 420 (3.6) | 420 (3.6) | 423 (3.6) | 421 (3.7) |
| **Number of Items (Score Points)*** | 211 (233) | 138 (154) | 174 (195) | 95 (109) | 159 (177) | 198 (216) | 193 (215) | 197 (219) | 208 (230) | 157 (175) | 148 (163) |

* The number of items and score points are based on the number of items included in scaling the eighth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.4: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | United States | Sweden | Portugal | England | Turkey | Israel | Hong Kong SAR | Italy | New Zealand | Norway (9) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | 605 (3.8) | 606 (3.9) | 607 (3.9) | 609 (3.9) | 611 (4.0) | 609 (4.0) | 615 (4.0) | 607 (3.9) | 608 (3.9) | 607 (4.0) |
| Chinese Taipei | 574 (1.9) | 571 (1.9) | 574 (1.9) | 575 (2.0) | 574 (1.9) | 571 (1.9) | 572 (2.0) | 570 (1.9) | 574 (2.0) | 571 (1.9) | 574 (1.9) |
| Japan | 570 (2.1) | 571 (2.1) | 570 (2.1) | 569 (2.1) | 569 (2.1) | 571 (2.2) | 565 (2.2) | 570 (2.1) | 569 (2.1) | 566 (2.2) | 570 (2.1) |
| Korea, Rep. of | 561 (2.1) | 562 (2.2) | 562 (2.1) | 560 (2.1) | 560 (2.1) | 561 (2.2) | 562 (2.3) | 563 (2.2) | 561 (2.1) | 559 (2.2) | 559 (2.1) |
| Finland | 543 (3.1) | 542 (3.1) | 544 (3.2) | 542 (3.2) | 541 (3.1) | 541 (3.2) | 537 (3.2) | 542 (3.2) | 542 (3.1) | 543 (3.2) | 543 (3.2) |
| Russian Federation | 543 (4.2) | 541 (4.3) | 543 (4.2) | 544 (4.3) | 542 (4.3) | 541 (4.3) | 543 (4.4) | 538 (4.2) | 543 (4.2) | 541 (4.3) | 541 (4.2) |
| Lithuania | 534 (3.0) | 534 (3.0) | 534 (3.0) | 534 (3.0) | 534 (3.0) | 534 (3.0) | 533 (3.2) | 533 (3.0) | 534 (3.0) | 534 (3.0) | 536 (3.0) |
| Hungary | 530 (2.6) | 529 (2.6) | 529 (2.6) | 530 (2.6) | 530 (2.6) | 528 (2.7) | 526 (2.7) | 529 (2.6) | 530 (2.6) | 531 (2.6) | 529 (2.6) |
| Australia | 528 (3.2) | 530 (3.2) | 528 (3.1) | 528 (3.1) | 528 (3.2) | 528 (3.2) | 528 (3.4) | 529 (3.1) | 528 (3.2) | 529 (3.2) | 530 (3.1) |
| Ireland | 523 (2.9) | 523 (3.0) | 522 (2.9) | 523 (3.0) | 523 (3.0) | 523 (3.0) | 519 (3.1) | 524 (3.0) | 523 (2.9) | 523 (3.0) | 525 (3.0) |
| United States | 522 (4.7) | 524 (4.7) | 522 (4.7) | 524 (4.6) | 522 (4.6) | 521 (4.6) | 521 (4.7) | 519 (4.6) | 522 (4.6) | 522 (4.7) | 524 (4.7) |
| Sweden | 521 (3.2) | 521 (3.2) | 522 (3.2) | 522 (3.2) | 521 (3.2) | 521 (3.2) | 513 (3.3) | 525 (3.2) | 521 (3.2) | 522 (3.2) | 523 (3.2) |
| Portugal | 519 (2.9) | 519 (2.9) | 520 (2.9) | 526 (3.0) | 517 (2.9) | 518 (2.9) | 516 (3.0) | 520 (2.9) | 519 (2.9) | 518 (2.9) | 523 (2.9) |
| England | 517 (4.8) | 517 (4.8) | 516 (4.9) | 517 (4.8) | 518 (4.9) | 516 (4.9) | 516 (4.8) | 516 (4.9) | 516 (4.8) | 516 (4.9) | 518 (4.8) |
| Turkey | 515 (3.7) | 513 (3.6) | 515 (3.7) | 516 (3.7) | 517 (3.8) | 519 (3.8) | 516 (3.7) | 517 (3.7) | 516 (3.7) | 517 (3.8) | 514 (3.7) |
| Israel | 513 (4.2) | 514 (4.2) | 513 (4.2) | 513 (4.1) | 513 (4.2) | 516 (4.3) | 517 (4.4) | 515 (4.2) | 513 (4.2) | 516 (4.2) | 514 (4.2) |
| Hong Kong SAR | 504 (5.2) | 502 (5.2) | 505 (5.2) | 501 (5.3) | 505 (5.1) | 504 (5.1) | 499 (5.2) | 508 (5.3) | 503 (5.2) | 504 (5.2) | 503 (5.2) |
| Italy | 500 (2.6) | 501 (2.6) | 501 (2.6) | 502 (2.5) | 500 (2.6) | 499 (2.6) | 497 (2.6) | 500 (2.6) | 500 (2.6) | 501 (2.5) | 503 (2.6) |
| New Zealand | 499 (3.5) | 500 (3.5) | 499 (3.5) | 500 (3.4) | 499 (3.5) | 498 (3.5) | 493 (3.6) | 501 (3.5) | 498 (3.5) | 501 (3.5) | 501 (3.4) |
| Norway (9) | 495 (3.1) | 495 (3.1) | 497 (3.1) | 495 (3.1) | 496 (3.1) | 496 (3.2) | 489 (3.2) | 494 (3.1) | 495 (3.1) | 497 (3.2) | 499 (3.1) |
| France | 489 (2.7) | 491 (2.7) | 489 (2.7) | 488 (2.7) | 488 (2.7) | 487 (2.7) | 482 (2.8) | 492 (2.7) | 488 (2.7) | 489 (2.7) | 491 (2.7) |
| Bahrain | 486 (1.9) | 486 (1.9) | 485 (2.0) | 487 (2.0) | 486 (1.9) | 488 (2.0) | 493 (2.0) | 486 (2.0) | 486 (1.9) | 486 (1.9) | 487 (1.9) |
| Cyprus | 484 (1.9) | 484 (1.9) | 484 (1.9) | 485 (1.9) | 485 (1.9) | 487 (1.9) | 483 (1.9) | 488 (1.9) | 483 (1.9) | 485 (1.9) | 484 (2.0) |
| Kazakhstan | 478 (3.1) | 475 (3.0) | 478 (3.1) | 478 (3.1) | 477 (3.1) | 478 (3.1) | 476 (3.1) | 475 (3.1) | 478 (3.1) | 478 (3.0) | 476 (3.1) |
| Qatar | 475 (4.4) | 475 (4.4) | 474 (4.4) | 476 (4.4) | 475 (4.4) | 476 (4.3) | 480 (4.5) | 476 (4.4) | 475 (4.3) | 474 (4.4) | 476 (4.4) |
| United Arab Emirates | 473 (2.2) | 473 (2.2) | 472 (2.2) | 473 (2.2) | 474 (2.2) | 475 (2.2) | 477 (2.3) | 471 (2.2) | 473 (2.2) | 473 (2.2) | 474 (2.2) |
| Romania | 470 (4.2) | 470 (4.1) | 470 (4.1) | 471 (4.2) | 469 (4.2) | 468 (4.2) | 465 (4.2) | 469 (4.2) | 470 (4.2) | 469 (4.2) | 469 (4.2) |
| Chile | 462 (2.9) | 462 (2.9) | 462 (2.9) | 463 (2.9) | 461 (2.9) | 461 (2.9) | 464 (3.0) | 460 (2.8) | 462 (2.9) | 459 (2.8) | 464 (2.9) |
| Malaysia | 460 (3.5) | 461 (3.5) | 462 (3.5) | 459 (3.6) | 460 (3.5) | 460 (3.6) | 453 (3.5) | 462 (3.5) | 460 (3.5) | 461 (3.5) | 457 (3.5) |
| Oman | 457 (2.9) | 459 (2.9) | 457 (2.9) | 461 (2.9) | 456 (2.9) | 458 (2.9) | 462 (2.9) | 459 (2.9) | 458 (2.9) | 457 (2.9) | 459 (2.9) |
| Jordan | 452 (4.7) | 454 (4.6) | 452 (4.6) | 453 (4.7) | 451 (4.7) | 451 (4.7) | 455 (4.7) | 452 (4.6) | 453 (4.7) | 453 (4.7) | 450 (4.7) |
| Iran, Islamic Rep. of | 449 (3.6) | 449 (3.5) | 450 (3.5) | 448 (3.5) | 448 (3.6) | 448 (3.6) | 452 (3.6) | 447 (3.6) | 449 (3.6) | 450 (3.7) | 446 (3.6) |
| Georgia | 447 (3.9) | 446 (3.9) | 447 (3.9) | 446 (4.0) | 447 (3.9) | 446 (3.9) | 444 (4.2) | 446 (3.9) | 447 (3.9) | 446 (4.0) | 445 (3.9) |
| Kuwait | 444 (5.7) | 444 (5.5) | 443 (5.6) | 445 (5.6) | 445 (5.6) | 446 (5.5) | 447 (5.7) | 445 (5.4) | 444 (5.7) | 446 (5.6) | 445 (5.6) |
| Saudi Arabia | 431 (2.6) | 434 (2.6) | 432 (2.6) | 434 (2.6) | 430 (2.6) | 431 (2.6) | 439 (2.8) | 430 (2.6) | 432 (2.6) | 432 (2.6) | 433 (2.6) |
| Morocco | 394 (2.7) | 395 (2.6) | 396 (2.6) | 391 (2.6) | 396 (2.6) | 393 (2.7) | 392 (2.8) | 394 (2.7) | 394 (2.7) | 393 (2.7) | 395 (2.6) |
| Egypt | 389 (5.4) | 390 (5.4) | 388 (5.4) | 388 (5.4) | 391 (5.4) | 391 (5.5) | 395 (5.4) | 392 (5.3) | 390 (5.4) | 391 (5.4) | 387 (5.4) |
| Lebanon | 377 (4.6) | 373 (4.7) | 375 (4.7) | 377 (4.7) | 381 (4.6) | 384 (4.6) | 381 (4.7) | 374 (4.8) | 376 (4.7) | 379 (4.6) | 377 (4.7) |
| South Africa (9) | 370 (3.1) | 367 (3.1) | 369 (3.1) | 369 (3.1) | 372 (3.1) | 373 (3.1) | 376 (3.2) | 371 (3.1) | 370 (3.1) | 371 (3.1) | 369 (3.1) |
| **International Average** | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 489 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | 568 (3.0) | 567 (2.9) | 566 (3.0) | 567 (2.9) | 564 (3.0) | 565 (3.1) | 563 (2.9) | 566 (3.0) | 566 (2.9) | 565 (2.9) |
| Dubai, UAE | 548 (2.0) | 548 (2.0) | 547 (2.0) | 549 (2.0) | 548 (2.0) | 550 (2.0) | 553 (2.0) | 545 (2.1) | 548 (2.0) | 548 (2.1) | 549 (2.0) |
| Quebec, Canada | 537 (3.6) | 535 (3.6) | 537 (3.6) | 539 (3.7) | 536 (3.6) | 536 (3.6) | 535 (3.6) | 536 (3.5) | 536 (3.6) | 537 (3.6) | 539 (3.6) |
| Ontario, Canada | 522 (3.0) | 523 (3.0) | 522 (3.0) | 524 (3.0) | 520 (3.0) | 521 (3.0) | 519 (3.3) | 524 (3.0) | 521 (3.0) | 521 (3.0) | 524 (3.0) |
| Western Cape, RSA (9) | 439 (5.1) | 438 (5.1) | 439 (5.1) | 438 (5.2) | 440 (5.1) | 440 (5.2) | 440 (5.3) | 440 (5.2) | 439 (5.1) | 441 (5.2) | 439 (5.2) |
| Gauteng, RSA (9) | 422 (3.9) | 420 (3.9) | 421 (3.9) | 422 (3.9) | 423 (3.9) | 424 (3.9) | 427 (4.0) | 423 (3.9) | 422 (3.9) | 423 (3.9) | 422 (3.9) |
| Abu Dhabi, UAE | 420 (3.6) | 420 (3.6) | 419 (3.6) | 419 (3.7) | 421 (3.6) | 423 (3.6) | 423 (3.7) | 419 (3.6) | 420 (3.6) | 420 (3.6) | 421 (3.6) |
| **Number of Items (Score Points)*** | 211 (233) | 186 (206) | 201 (221) | 175 (195) | 194 (215) | 171 (189) | 131 (149) | 150 (166) | 204 (226) | 171 (189) | 181 (202) |

* The number of items and score points are based on the number of items included in scaling the eighth grade science achievement data.

See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.4: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | France | Bahrain | Cyprus | Kazakhstan | Qatar | United Arab Emirates | Romania | Chile | Malaysia | Oman |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | 613 (4.1) | 608 (3.9) | 610 (3.9) | 608 (3.9) | 610 (3.9) | 608 (3.9) | 608 (3.9) | 607 (3.9) | 608 (3.9) | 606 (3.9) |
| Chinese Taipei | 574 (1.9) | 577 (2.1) | 574 (1.9) | 576 (2.0) | 574 (1.9) | 575 (1.9) | 574 (1.9) | 574 (1.9) | 573 (1.9) | 574 (1.9) | 573 (1.9) |
| Japan | 570 (2.1) | 565 (2.2) | 570 (2.1) | 574 (2.2) | 570 (2.1) | 570 (2.2) | 570 (2.1) | 570 (2.1) | 570 (2.1) | 569 (2.1) | 570 (2.2) |
| Korea, Rep. of | 561 (2.1) | 560 (2.2) | 561 (2.1) | 558 (2.1) | 561 (2.1) | 561 (2.2) | 561 (2.1) | 561 (2.1) | 560 (2.1) | 561 (2.1) | 561 (2.1) |
| Finland | 543 (3.1) | 541 (3.2) | 543 (3.1) | 547 (3.2) | 543 (3.1) | 541 (3.2) | 543 (3.1) | 543 (3.1) | 542 (3.1) | 542 (3.1) | 543 (3.1) |
| Russian Federation | 543 (4.2) | 538 (4.4) | 543 (4.2) | 539 (4.4) | 543 (4.2) | 541 (4.3) | 543 (4.2) | 543 (4.2) | 542 (4.3) | 543 (4.2) | 542 (4.2) |
| Lithuania | 534 (3.0) | 537 (3.0) | 534 (3.0) | 536 (3.2) | 534 (3.0) | 533 (3.0) | 534 (3.0) | 534 (3.0) | 534 (3.0) | 534 (3.0) | 533 (3.0) |
| Hungary | 530 (2.6) | 530 (2.7) | 530 (2.6) | 531 (2.7) | 530 (2.6) | 530 (2.6) | 530 (2.6) | 530 (2.6) | 529 (2.6) | 530 (2.6) | 529 (2.6) |
| Australia | 528 (3.2) | 526 (3.2) | 528 (3.2) | 528 (3.3) | 528 (3.2) | 527 (3.3) | 528 (3.2) | 528 (3.2) | 529 (3.2) | 528 (3.2) | 529 (3.2) |
| Ireland | 523 (2.9) | 522 (3.1) | 523 (2.9) | 522 (2.9) | 523 (2.9) | 521 (3.0) | 523 (2.9) | 523 (2.9) | 522 (2.9) | 523 (2.9) | 523 (2.9) |
| United States | 522 (4.7) | 520 (4.6) | 522 (4.7) | 520 (4.8) | 522 (4.7) | 521 (4.6) | 522 (4.7) | 522 (4.7) | 523 (4.7) | 522 (4.7) | 522 (4.7) |
| Sweden | 521 (3.2) | 524 (3.3) | 521 (3.2) | 520 (3.2) | 521 (3.2) | 520 (3.2) | 521 (3.2) | 521 (3.2) | 520 (3.2) | 521 (3.2) | 522 (3.2) |
| Portugal | 519 (2.9) | 524 (3.2) | 519 (2.9) | 521 (3.0) | 519 (2.9) | 518 (2.9) | 519 (2.9) | 519 (2.9) | 518 (2.9) | 518 (2.9) | 519 (2.9) |
| England | 517 (4.8) | 514 (4.8) | 517 (4.8) | 522 (4.9) | 517 (4.8) | 516 (4.9) | 517 (4.8) | 517 (4.8) | 516 (4.8) | 517 (4.9) | 516 (4.8) |
| Turkey | 515 (3.7) | 522 (4.0) | 515 (3.7) | 504 (3.6) | 515 (3.7) | 517 (3.7) | 515 (3.7) | 515 (3.7) | 515 (3.7) | 516 (3.7) | 516 (3.7) |
| Israel | 513 (4.2) | 519 (4.3) | 513 (4.2) | 512 (4.3) | 513 (4.2) | 514 (4.2) | 513 (4.2) | 513 (4.2) | 514 (4.2) | 514 (4.2) | 513 (4.2) |
| Hong Kong SAR | 504 (5.2) | 506 (5.1) | 504 (5.2) | 502 (5.4) | 504 (5.2) | 503 (5.1) | 504 (5.2) | 504 (5.2) | 502 (5.2) | 503 (5.2) | 504 (5.2) |
| Italy | 500 (2.6) | 497 (2.6) | 500 (2.6) | 509 (2.6) | 500 (2.6) | 497 (2.6) | 500 (2.6) | 500 (2.6) | 500 (2.6) | 500 (2.6) | 499 (2.6) |
| New Zealand | 499 (3.5) | 494 (3.6) | 499 (3.5) | 495 (3.4) | 499 (3.5) | 496 (3.5) | 499 (3.5) | 499 (3.5) | 499 (3.5) | 499 (3.5) | 499 (3.5) |
| Norway (9) | 495 (3.1) | 494 (3.3) | 495 (3.1) | 497 (3.2) | 495 (3.1) | 493 (3.1) | 495 (3.1) | 495 (3.1) | 494 (3.1) | 495 (3.1) | 496 (3.1) |
| France | 489 (2.7) | 491 (2.8) | 489 (2.7) | 487 (2.9) | 489 (2.7) | 486 (2.7) | 489 (2.7) | 489 (2.7) | 488 (2.7) | 488 (2.7) | 489 (2.7) |
| Bahrain | 486 (1.9) | 488 (2.0) | 486 (1.9) | 491 (2.0) | 486 (1.9) | 487 (2.0) | 486 (1.9) | 486 (1.9) | 486 (1.9) | 486 (1.9) | 486 (1.9) |
| Cyprus | 484 (1.9) | 486 (1.9) | 484 (1.9) | 496 (2.0) | 484 (1.9) | 484 (1.9) | 484 (1.9) | 484 (1.9) | 483 (1.9) | 484 (1.9) | 483 (1.9) |
| Kazakhstan | 478 (3.1) | 476 (3.1) | 478 (3.1) | 471 (3.2) | 478 (3.1) | 478 (3.1) | 478 (3.1) | 478 (3.1) | 479 (3.0) | 478 (3.1) | 477 (3.0) |
| Qatar | 475 (4.4) | 478 (4.4) | 475 (4.4) | 481 (4.5) | 475 (4.4) | 476 (4.4) | 475 (4.4) | 475 (4.4) | 474 (4.4) | 475 (4.4) | 475 (4.4) |
| United Arab Emirates | 473 (2.2) | 475 (2.2) | 473 (2.2) | 480 (2.3) | 473 (2.2) | 474 (2.2) | 473 (2.2) | 473 (2.2) | 473 (2.2) | 473 (2.2) | 472 (2.2) |
| Romania | 470 (4.2) | 466 (4.2) | 470 (4.2) | 474 (4.1) | 470 (4.2) | 469 (4.2) | 470 (4.2) | 470 (4.2) | 470 (4.2) | 470 (4.2) | 469 (4.2) |
| Chile | 462 (2.9) | 461 (2.9) | 462 (2.9) | 467 (3.1) | 462 (2.9) | 460 (2.9) | 462 (2.9) | 462 (2.9) | 462 (2.9) | 462 (2.9) | 462 (2.9) |
| Malaysia | 460 (3.5) | 464 (3.6) | 460 (3.5) | 457 (3.7) | 460 (3.5) | 459 (3.5) | 460 (3.5) | 460 (3.5) | 460 (3.5) | 460 (3.5) | 461 (3.5) |
| Oman | 457 (2.9) | 458 (2.8) | 457 (2.9) | 462 (3.0) | 457 (2.9) | 461 (2.9) | 457 (2.9) | 457 (2.9) | 457 (2.9) | 457 (2.9) | 458 (2.9) |
| Jordan | 452 (4.7) | 453 (4.7) | 452 (4.7) | 450 (4.7) | 452 (4.7) | 453 (4.6) | 452 (4.7) | 452 (4.7) | 453 (4.7) | 452 (4.7) | 452 (4.6) |
| Iran, Islamic Rep. of | 449 (3.6) | 446 (3.8) | 449 (3.6) | 445 (3.5) | 449 (3.6) | 448 (3.6) | 449 (3.6) | 449 (3.6) | 449 (3.6) | 449 (3.6) | 448 (3.6) |
| Georgia | 447 (3.9) | 442 (4.2) | 447 (3.9) | 444 (4.2) | 447 (3.9) | 448 (3.9) | 447 (3.9) | 447 (3.9) | 447 (3.9) | 447 (3.9) | 446 (3.9) |
| Kuwait | 444 (5.7) | 445 (5.5) | 444 (5.7) | 446 (5.7) | 444 (5.7) | 445 (5.6) | 444 (5.7) | 444 (5.7) | 444 (5.7) | 445 (5.7) | 444 (5.6) |
| Saudi Arabia | 431 (2.6) | 436 (2.8) | 431 (2.6) | 436 (2.9) | 431 (2.6) | 431 (2.6) | 431 (2.6) | 431 (2.6) | 432 (2.6) | 432 (2.6) | 432 (2.6) |
| Morocco | 394 (2.7) | 398 (2.7) | 394 (2.7) | 389 (2.6) | 394 (2.7) | 397 (2.6) | 394 (2.7) | 394 (2.7) | 395 (2.6) | 394 (2.7) | 395 (2.6) |
| Egypt | 389 (5.4) | 394 (5.4) | 389 (5.4) | 390 (5.4) | 389 (5.4) | 391 (5.5) | 389 (5.4) | 389 (5.4) | 390 (5.5) | 389 (5.5) | 390 (5.4) |
| Lebanon | 377 (4.6) | 387 (4.6) | 377 (4.6) | 384 (4.6) | 377 (4.6) | 380 (4.6) | 377 (4.6) | 377 (4.6) | 377 (4.7) | 377 (4.7) | 375 (4.7) |
| South Africa (9) | 370 (3.1) | 365 (3.3) | 370 (3.1) | 370 (3.2) | 370 (3.1) | 370 (3.1) | 370 (3.1) | 370 (3.1) | 369 (3.1) | 370 (3.1) | 371 (3.1) |
| **International Average** | 490 (0.6) | 491 (0.6) | 490 (0.6) | 491 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | 562 (3.1) | 567 (2.9) | 566 (3.2) | 567 (2.9) | 564 (3.0) | 567 (2.9) | 567 (2.9) | 568 (2.9) | 567 (2.9) | 566 (2.9) |
| Dubai, UAE | 548 (2.0) | 550 (2.1) | 548 (2.0) | 554 (2.1) | 548 (2.0) | 549 (2.0) | 548 (2.0) | 548 (2.0) | 548 (2.0) | 548 (2.0) | 547 (2.0) |
| Quebec, Canada | 537 (3.6) | 536 (3.7) | 537 (3.6) | 534 (3.6) | 537 (3.6) | 535 (3.6) | 537 (3.6) | 537 (3.6) | 535 (3.6) | 537 (3.6) | 537 (3.6) |
| Ontario, Canada | 522 (3.0) | 517 (3.2) | 522 (3.0) | 521 (3.2) | 522 (3.0) | 521 (3.1) | 522 (3.0) | 522 (3.0) | 522 (3.0) | 522 (3.0) | 522 (3.0) |
| Western Cape, RSA (9) | 439 (5.1) | 433 (5.5) | 439 (5.1) | 435 (5.5) | 439 (5.1) | 439 (5.2) | 439 (5.1) | 439 (5.1) | 439 (5.1) | 439 (5.1) | 440 (5.1) |
| Gauteng, RSA (9) | 422 (3.9) | 418 (4.1) | 422 (3.9) | 421 (4.0) | 422 (3.9) | 423 (3.9) | 422 (3.9) | 422 (3.9) | 421 (3.9) | 422 (3.9) | 423 (3.8) |
| Abu Dhabi, UAE | 420 (3.6) | 423 (3.7) | 420 (3.6) | 425 (3.8) | 420 (3.6) | 421 (3.6) | 420 (3.6) | 420 (3.6) | 420 (3.6) | 420 (3.6) | 419 (3.6) |
| **Number of Items (Score Points)*** | 211 (233) | 121 (131) | 211 (233) | 96 (110) | 211 (233) | 181 (201) | 211 (233) | 211 (233) | 199 (220) | 209 (231) | 202 (224) |

* The number of items and score points are based on the number of items included in scaling the eighth grade science achievement data.

See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.4: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

**(Continued)**

| Country | Average Science Scale Score based on All Items | Jordan | Iran, Islamic Rep. of | Georgia | Kuwait | Saudi Arabia | Morocco | Egypt | Lebanon | South Africa (9) |
|---|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | 608 (3.9) | 612 (4.0) | 603 (3.9) | 609 (4.0) | 608 (3.9) | 607 (4.0) | 608 (3.9) | 616 (4.0) | 610 (3.9) |
| Chinese Taipei | 574 (1.9) | 573 (1.9) | 573 (1.9) | 570 (1.9) | 574 (1.9) | 572 (1.9) | 572 (1.9) | 577 (1.9) | 576 (2.0) | 575 (1.9) |
| Japan | 570 (2.1) | 569 (2.1) | 565 (2.1) | 568 (2.1) | 569 (2.1) | 568 (2.2) | 573 (2.2) | 568 (2.2) | 571 (2.2) | 571 (2.1) |
| Korea, Rep. of | 561 (2.1) | 561 (2.1) | 559 (2.2) | 559 (2.2) | 559 (2.2) | 559 (2.2) | 561 (2.2) | 559 (2.3) | 556 (2.1) | 560 (2.1) |
| Finland | 543 (3.1) | 542 (3.1) | 540 (3.2) | 543 (3.2) | 540 (3.2) | 542 (3.1) | 542 (3.2) | 542 (3.2) | 538 (3.2) | 541 (3.1) |
| Russian Federation | 543 (4.2) | 543 (4.2) | 542 (4.3) | 544 (4.2) | 540 (4.3) | 543 (4.3) | 545 (4.2) | 542 (4.3) | 540 (4.4) | 543 (4.3) |
| Lithuania | 534 (3.0) | 534 (3.0) | 534 (3.1) | 535 (3.0) | 533 (3.0) | 533 (3.0) | 534 (3.0) | 532 (3.1) | 531 (3.1) | 533 (3.0) |
| Hungary | 530 (2.6) | 530 (2.6) | 529 (2.6) | 533 (2.6) | 530 (2.7) | 530 (2.6) | 529 (2.6) | 530 (2.5) | 528 (2.7) | 529 (2.6) |
| Australia | 528 (3.2) | 528 (3.2) | 527 (3.3) | 528 (3.2) | 526 (3.2) | 527 (3.2) | 528 (3.2) | 525 (3.3) | 525 (3.2) | 529 (3.2) |
| Ireland | 523 (2.9) | 522 (3.0) | 523 (3.1) | 523 (2.9) | 522 (3.0) | 522 (3.0) | 520 (3.0) | 519 (3.0) | 520 (3.1) | 523 (3.0) |
| United States | 522 (4.7) | 522 (4.6) | 521 (4.7) | 520 (4.7) | 519 (4.6) | 520 (4.8) | 522 (4.7) | 521 (4.7) | 520 (4.6) | 522 (4.6) |
| Sweden | 521 (3.2) | 522 (3.2) | 520 (3.2) | 521 (3.3) | 520 (3.2) | 521 (3.2) | 522 (3.1) | 517 (3.2) | 518 (3.2) | 521 (3.2) |
| Portugal | 519 (2.9) | 518 (2.9) | 517 (2.9) | 518 (2.9) | 517 (2.9) | 517 (2.9) | 519 (2.9) | 519 (2.8) | 522 (3.0) | 519 (2.9) |
| England | 517 (4.8) | 515 (4.9) | 517 (4.9) | 513 (5.0) | 518 (4.9) | 517 (4.8) | 513 (4.8) | 514 (4.8) | 518 (4.8) | 517 (4.9) |
| Turkey | 515 (3.7) | 516 (3.7) | 516 (3.8) | 516 (3.8) | 517 (3.8) | 515 (3.8) | 514 (3.7) | 514 (3.9) | 516 (3.9) | 517 (3.8) |
| Israel | 513 (4.2) | 515 (4.2) | 514 (4.3) | 512 (4.3) | 514 (4.3) | 512 (4.3) | 515 (4.3) | 514 (4.2) | 517 (4.3) | 514 (4.2) |
| Hong Kong SAR | 504 (5.2) | 503 (5.2) | 503 (5.3) | 502 (5.2) | 503 (5.2) | 503 (5.1) | 503 (5.1) | 502 (5.1) | 509 (5.2) | 504 (5.1) |
| Italy | 500 (2.6) | 500 (2.6) | 500 (2.5) | 499 (2.6) | 500 (2.5) | 500 (2.6) | 500 (2.6) | 497 (2.5) | 501 (2.5) | 500 (2.6) |
| New Zealand | 499 (3.5) | 498 (3.5) | 497 (3.5) | 498 (3.6) | 495 (3.5) | 496 (3.5) | 498 (3.5) | 491 (3.6) | 494 (3.6) | 498 (3.5) |
| Norway (9) | 495 (3.1) | 494 (3.1) | 493 (3.1) | 499 (3.2) | 493 (3.1) | 494 (3.1) | 497 (3.1) | 493 (3.1) | 491 (3.2) | 494 (3.1) |
| France | 489 (2.7) | 489 (2.7) | 485 (2.7) | 489 (2.7) | 485 (2.7) | 488 (2.7) | 489 (2.8) | 485 (2.7) | 486 (2.7) | 487 (2.7) |
| Bahrain | 486 (1.9) | 487 (1.9) | 486 (2.0) | 484 (1.9) | 485 (2.0) | 486 (1.9) | 487 (2.0) | 488 (2.0) | 489 (2.0) | 487 (1.9) |
| Cyprus | 484 (1.9) | 485 (1.9) | 485 (2.0) | 483 (1.9) | 484 (1.9) | 482 (1.9) | 486 (1.9) | 484 (1.9) | 487 (1.9) | 484 (1.9) |
| Kazakhstan | 478 (3.1) | 480 (3.0) | 477 (3.1) | 481 (3.1) | 475 (3.1) | 479 (3.1) | 479 (3.1) | 477 (3.2) | 477 (3.2) | 479 (3.1) |
| Qatar | 475 (4.4) | 475 (4.3) | 475 (4.5) | 473 (4.4) | 477 (4.4) | 476 (4.4) | 476 (4.3) | 479 (4.4) | 483 (4.5) | 476 (4.4) |
| United Arab Emirates | 473 (2.2) | 474 (2.2) | 474 (2.3) | 471 (2.2) | 474 (2.3) | 474 (2.2) | 475 (2.2) | 477 (2.3) | 479 (2.3) | 474 (2.2) |
| Romania | 470 (4.2) | 469 (4.2) | 469 (4.2) | 469 (4.2) | 469 (4.2) | 471 (4.2) | 470 (4.1) | 469 (4.2) | 468 (4.2) | 471 (4.2) |
| Chile | 462 (2.9) | 462 (2.9) | 462 (2.9) | 461 (2.9) | 461 (2.9) | 461 (2.9) | 463 (2.9) | 456 (2.9) | 457 (2.9) | 463 (2.9) |
| Malaysia | 460 (3.5) | 461 (3.5) | 460 (3.6) | 459 (3.5) | 461 (3.5) | 458 (3.6) | 464 (3.5) | 462 (3.6) | 463 (3.6) | 460 (3.5) |
| Oman | 457 (2.9) | 458 (2.9) | 458 (2.9) | 455 (2.9) | 457 (2.9) | 457 (2.9) | 461 (2.9) | 459 (2.9) | 460 (3.0) | 457 (2.9) |
| Jordan | 452 (4.7) | 453 (4.7) | 452 (4.7) | 452 (4.6) | 453 (4.8) | 453 (4.6) | 453 (4.6) | 454 (4.7) | 455 (4.7) | 452 (4.7) |
| Iran, Islamic Rep. of | 449 (3.6) | 450 (3.6) | 452 (3.7) | 450 (3.6) | 448 (3.7) | 449 (3.6) | 448 (3.6) | 448 (3.8) | 446 (3.7) | 446 (3.6) |
| Georgia | 447 (3.9) | 448 (3.9) | 445 (4.0) | 447 (3.9) | 448 (3.9) | 447 (4.0) | 447 (4.0) | 445 (4.1) | 452 (3.9) | 447 (3.9) |
| Kuwait | 444 (5.7) | 445 (5.6) | 446 (5.6) | 444 (5.6) | 447 (5.7) | 445 (5.7) | 445 (5.5) | 448 (5.4) | 447 (5.6) | 445 (5.7) |
| Saudi Arabia | 431 (2.6) | 431 (2.6) | 431 (2.6) | 431 (2.6) | 432 (2.6) | 432 (2.7) | 433 (2.6) | 436 (2.7) | 435 (2.8) | 429 (2.6) |
| Morocco | 394 (2.7) | 396 (2.6) | 394 (2.7) | 395 (2.7) | 394 (2.7) | 395 (2.6) | 399 (2.6) | 397 (2.7) | 400 (2.6) | 395 (2.6) |
| Egypt | 389 (5.4) | 392 (5.5) | 391 (5.5) | 389 (5.4) | 392 (5.5) | 390 (5.4) | 394 (5.3) | 396 (5.5) | 393 (5.6) | 390 (5.5) |
| Lebanon | 377 (4.6) | 379 (4.6) | 378 (4.7) | 379 (4.6) | 379 (4.7) | 381 (4.6) | 381 (4.6) | 383 (4.7) | 394 (4.6) | 381 (4.6) |
| South Africa (9) | 370 (3.1) | 369 (3.1) | 373 (3.1) | 367 (3.1) | 373 (3.1) | 369 (3.2) | 372 (3.1) | 372 (3.2) | 371 (3.2) | 371 (3.1) |
| **International Average** | 490 (0.6) | 490 (0.6) | 490 (0.6) | 489 (0.6) | 490 (0.6) | 490 (0.6) | 491 (0.6) | 490 (0.6) | 491 (0.6) | 490 (0.6) |
| **Benchmarking Participants** | | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | 567 (2.9) | 564 (3.0) | 567 (3.0) | 565 (2.9) | 566 (2.9) | 568 (3.0) | 564 (3.0) | 559 (3.1) | 566 (3.0) |
| Dubai, UAE | 548 (2.0) | 548 (2.0) | 550 (2.0) | 545 (2.1) | 550 (2.1) | 549 (2.0) | 548 (2.0) | 552 (2.0) | 553 (2.1) | 549 (2.0) |
| Quebec, Canada | 537 (3.6) | 537 (3.5) | 537 (3.6) | 538 (3.7) | 534 (3.6) | 534 (3.6) | 536 (3.6) | 537 (3.6) | 533 (3.6) | 537 (3.6) |
| Ontario, Canada | 522 (3.0) | 521 (3.0) | 520 (3.1) | 519 (3.1) | 518 (3.1) | 520 (3.1) | 522 (3.0) | 516 (3.1) | 517 (3.2) | 522 (3.0) |
| Western Cape, RSA (9) | 439 (5.1) | 439 (5.2) | 441 (5.1) | 439 (5.2) | 441 (5.2) | 439 (5.2) | 438 (5.1) | 440 (5.3) | 439 (5.3) | 439 (5.2) |
| Gauteng, RSA (9) | 422 (3.9) | 422 (3.9) | 424 (3.9) | 419 (3.9) | 424 (3.9) | 422 (3.9) | 424 (3.8) | 425 (4.0) | 424 (4.0) | 423 (3.9) |
| Abu Dhabi, UAE | 420 (3.6) | 421 (3.6) | 420 (3.7) | 419 (3.6) | 421 (3.7) | 422 (3.6) | 423 (3.6) | 423 (3.7) | 426 (3.7) | 421 (3.6) |
| **Number of Items (Score Points)*** | 211 (233) | 199 (219) | 177 (197) | 177 (193) | 178 (198) | 191 (211) | 168 (184) | 138 (152) | 123 (139) | 193 (214) |

* The number of items and score points are based on the number of items included in scaling the eighth grade science achievement data.

See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

## Exhibit C.4: Average Scale Scores for the Science Test-Curriculum Matching Analysis

*Results based on a subset of items specifically identified by each country as addressing its curriculum*

(Continued)

| Country | Average Science Scale Score based on All Items | Benchmarking Participants | Moscow City, Russian Fed. | Dubai, UAE | Quebec, Canada | Ontario, Canada | Western Cape, RSA (9) | Gauteng, RSA (9) | Abu Dhabi, UAE |
|---|---|---|---|---|---|---|---|---|---|
| Singapore | 608 (3.9) | | 607 (3.9) | 608 (3.9) | 604 (3.7) | 607 (3.8) | 610 (3.9) | 610 (3.9) | 608 (3.9) |
| Chinese Taipei | 574 (1.9) | | 571 (1.9) | 574 (1.9) | 567 (1.9) | 571 (1.9) | 575 (1.9) | 575 (1.9) | 574 (1.9) |
| Japan | 570 (2.1) | | 571 (2.1) | 570 (2.1) | 573 (2.1) | 571 (2.1) | 571 (2.1) | 571 (2.1) | 570 (2.1) |
| Korea, Rep. of | 561 (2.1) | | 561 (2.1) | 561 (2.1) | 559 (2.1) | 563 (2.2) | 560 (2.1) | 560 (2.1) | 561 (2.1) |
| Finland | 543 (3.1) | | 541 (3.1) | 543 (3.1) | 540 (3.1) | 541 (3.1) | 541 (3.1) | 541 (3.1) | 543 (3.1) |
| Russian Federation | 543 (4.2) | | 543 (4.2) | 543 (4.2) | 542 (4.4) | 541 (4.2) | 543 (4.3) | 543 (4.3) | 543 (4.2) |
| Lithuania | 534 (3.0) | | 534 (3.0) | 534 (3.0) | 534 (3.1) | 533 (3.0) | 533 (3.0) | 533 (3.0) | 534 (3.0) |
| Hungary | 530 (2.6) | | 529 (2.6) | 530 (2.6) | 524 (2.6) | 529 (2.6) | 529 (2.6) | 529 (2.6) | 530 (2.6) |
| Australia | 528 (3.2) | | 529 (3.2) | 528 (3.2) | 533 (3.2) | 531 (3.1) | 529 (3.2) | 529 (3.2) | 528 (3.2) |
| Ireland | 523 (2.9) | | 523 (2.9) | 523 (2.9) | 525 (3.0) | 524 (2.9) | 523 (3.0) | 523 (3.0) | 523 (2.9) |
| United States | 522 (4.7) | | 523 (4.7) | 522 (4.7) | 527 (4.6) | 525 (4.7) | 522 (4.6) | 522 (4.6) | 522 (4.7) |
| Sweden | 521 (3.2) | | 521 (3.2) | 521 (3.2) | 519 (3.3) | 521 (3.2) | 521 (3.2) | 521 (3.2) | 521 (3.2) |
| Portugal | 519 (2.9) | | 518 (2.9) | 519 (2.9) | 526 (2.9) | 520 (2.9) | 519 (2.9) | 519 (2.9) | 519 (2.9) |
| England | 517 (4.8) | | 517 (4.8) | 517 (4.8) | 518 (4.9) | 515 (4.7) | 517 (4.9) | 517 (4.9) | 517 (4.8) |
| Turkey | 515 (3.7) | | 515 (3.7) | 515 (3.7) | 515 (3.7) | 515 (3.6) | 517 (3.8) | 517 (3.8) | 515 (3.7) |
| Israel | 513 (4.2) | | 514 (4.2) | 513 (4.2) | 514 (4.3) | 513 (4.2) | 514 (4.2) | 514 (4.2) | 513 (4.2) |
| Hong Kong SAR | 504 (5.2) | | 502 (5.2) | 504 (5.2) | 501 (5.1) | 507 (5.2) | 504 (5.1) | 504 (5.1) | 504 (5.2) |
| Italy | 500 (2.6) | | 500 (2.6) | 500 (2.6) | 503 (2.6) | 500 (2.6) | 500 (2.6) | 500 (2.6) | 500 (2.6) |
| New Zealand | 499 (3.5) | | 499 (3.5) | 499 (3.5) | 501 (3.5) | 502 (3.5) | 498 (3.5) | 498 (3.5) | 499 (3.5) |
| Norway (9) | 495 (3.1) | | 495 (3.1) | 495 (3.1) | 496 (3.2) | 495 (3.1) | 494 (3.1) | 494 (3.1) | 495 (3.1) |
| France | 489 (2.7) | | 488 (2.7) | 489 (2.7) | 493 (2.8) | 493 (2.7) | 487 (2.7) | 487 (2.7) | 489 (2.7) |
| Bahrain | 486 (1.9) | | 487 (1.9) | 486 (1.9) | 489 (2.0) | 488 (2.0) | 487 (1.9) | 487 (1.9) | 486 (1.9) |
| Cyprus | 484 (1.9) | | 483 (1.9) | 484 (1.9) | 487 (2.0) | 484 (1.9) | 484 (1.9) | 484 (1.9) | 484 (1.9) |
| Kazakhstan | 478 (3.1) | | 478 (3.1) | 478 (3.1) | 471 (3.1) | 476 (3.0) | 479 (3.1) | 479 (3.1) | 478 (3.1) |
| Qatar | 475 (4.4) | | 475 (4.4) | 475 (4.4) | 476 (4.4) | 474 (4.4) | 476 (4.4) | 476 (4.4) | 475 (4.4) |
| United Arab Emirates | 473 (2.2) | | 473 (2.2) | 473 (2.2) | 475 (2.2) | 472 (2.2) | 474 (2.2) | 474 (2.2) | 473 (2.2) |
| Romania | 470 (4.2) | | 470 (4.2) | 470 (4.2) | 464 (4.3) | 469 (4.2) | 471 (4.2) | 471 (4.2) | 470 (4.2) |
| Chile | 462 (2.9) | | 463 (2.9) | 462 (2.9) | 461 (2.8) | 463 (2.9) | 463 (2.9) | 463 (2.9) | 462 (2.9) |
| Malaysia | 460 (3.5) | | 460 (3.5) | 460 (3.5) | 456 (3.6) | 464 (3.5) | 460 (3.5) | 460 (3.5) | 460 (3.5) |
| Oman | 457 (2.9) | | 457 (2.9) | 457 (2.9) | 460 (2.9) | 459 (2.9) | 457 (2.9) | 457 (2.9) | 457 (2.9) |
| Jordan | 452 (4.7) | | 451 (4.6) | 452 (4.7) | 452 (4.6) | 451 (4.6) | 452 (4.7) | 452 (4.7) | 452 (4.7) |
| Iran, Islamic Rep. of | 449 (3.6) | | 449 (3.6) | 449 (3.6) | 448 (3.6) | 447 (3.6) | 446 (3.6) | 446 (3.6) | 449 (3.6) |
| Georgia | 447 (3.9) | | 446 (3.9) | 447 (3.9) | 446 (4.0) | 444 (4.0) | 447 (3.9) | 447 (3.9) | 447 (3.9) |
| Kuwait | 444 (5.7) | | 444 (5.6) | 444 (5.7) | 445 (5.4) | 443 (5.5) | 445 (5.7) | 445 (5.7) | 444 (5.7) |
| Saudi Arabia | 431 (2.6) | | 431 (2.6) | 431 (2.6) | 436 (2.7) | 435 (2.6) | 429 (2.6) | 429 (2.6) | 431 (2.6) |
| Morocco | 394 (2.7) | | 393 (2.7) | 394 (2.7) | 394 (2.7) | 393 (2.7) | 395 (2.6) | 395 (2.6) | 394 (2.7) |
| Egypt | 389 (5.4) | | 390 (5.4) | 389 (5.4) | 387 (5.3) | 389 (5.3) | 390 (5.5) | 390 (5.5) | 389 (5.4) |
| Lebanon | 377 (4.6) | | 378 (4.6) | 377 (4.6) | 372 (5.0) | 366 (4.9) | 381 (4.6) | 381 (4.6) | 377 (4.6) |
| South Africa (9) | 370 (3.1) | | 371 (3.1) | 370 (3.1) | 370 (3.2) | 369 (3.1) | 371 (3.1) | 371 (3.1) | 370 (3.1) |
| **International Average** | 490 (0.6) | | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) | 490 (0.6) |
| **Benchmarking Participants** | | | | | | | | | |
| Moscow City, Russian Fed. | 567 (2.9) | | 565 (3.0) | 567 (2.9) | 566 (3.2) | 566 (3.0) | 566 (3.0) | 566 (3.0) | 567 (2.9) |
| Dubai, UAE | 548 (2.0) | | 548 (2.0) | 548 (2.0) | 549 (2.1) | 546 (2.0) | 549 (2.0) | 549 (2.0) | 548 (2.0) |
| Quebec, Canada | 537 (3.6) | | 536 (3.6) | 537 (3.6) | 546 (3.6) | 537 (3.6) | 537 (3.6) | 537 (3.6) | 537 (3.6) |
| Ontario, Canada | 522 (3.0) | | 522 (3.0) | 522 (3.0) | 525 (3.1) | 527 (3.0) | 522 (3.0) | 522 (3.0) | 522 (3.0) |
| Western Cape, RSA (9) | 439 (5.1) | | 440 (5.1) | 439 (5.1) | 441 (5.4) | 439 (5.1) | 439 (5.2) | 439 (5.2) | 439 (5.1) |
| Gauteng, RSA (9) | 422 (3.9) | | 423 (3.9) | 422 (3.9) | 424 (4.0) | 421 (3.9) | 423 (3.9) | 423 (3.9) | 422 (3.9) |
| Abu Dhabi, UAE | 420 (3.6) | | 420 (3.6) | 420 (3.6) | 422 (3.6) | 418 (3.6) | 421 (3.6) | 421 (3.6) | 420 (3.6) |
| **Number of Items (Score Points)*** | 211 (233) | | 198 (220) | 211 (233) | 113 (125) | 176 (196) | 193 (214) | 193 (214) | 211 (233) |

* The number of items and score points are based on the number of items included in scaling the eighth grade science achievement data.
See Chapter 10 in *Methods and Procedures: TIMSS 2019 Technical Report* for information about items deleted or recoded for scaling.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

# APPENDIX D

# Percentiles of Achievement

## Appendix D.1: Percentiles of Mathematics Achievement

| Country | 5th Percentile | 10th Percentile | 25th Percentile | 50th Percentile | 75th Percentile | 90th Percentile | 95th Percentile |
|---|---|---|---|---|---|---|---|
| Albania | 346 (10.3) | 382 (6.3) | 441 (5.6) | 500 (3.9) | 552 (4.7) | 597 (4.6) | 627 (3.7) |
| Armenia | 381 (4.0) | 407 (4.6) | 453 (3.5) | 501 (2.8) | 545 (2.6) | 584 (3.4) | 607 (4.9) |
| Australia | 364 (6.0) | 401 (5.9) | 460 (3.6) | 519 (3.0) | 575 (3.4) | 625 (3.7) | 654 (5.8) |
| Austria | 430 (4.8) | 455 (3.5) | 495 (2.9) | 541 (2.4) | 584 (2.7) | 623 (2.1) | 643 (3.5) |
| Azerbaijan | 371 (4.8) | 412 (5.6) | 467 (3.6) | 521 (2.7) | 574 (2.5) | 615 (3.1) | 640 (4.0) |
| Bahrain | 331 (6.2) | 363 (5.3) | 421 (3.5) | 484 (2.7) | 540 (2.9) | 588 (3.3) | 618 (4.5) |
| Belgium (Flemish) | 419 (3.4) | 445 (3.5) | 487 (2.8) | 534 (1.8) | 580 (2.0) | 619 (2.4) | 641 (2.7) |
| Bosnia and Herzegovina | 320 (4.9) | 352 (3.7) | 403 (3.0) | 455 (2.8) | 504 (2.6) | 545 (2.9) | 569 (3.7) |
| Bulgaria | 360 (10.9) | 397 (8.8) | 461 (6.5) | 524 (4.1) | 575 (3.6) | 618 (2.8) | 642 (3.4) |
| Canada | 383 (3.0) | 412 (3.2) | 460 (2.9) | 514 (2.0) | 564 (2.2) | 608 (2.7) | 633 (3.3) |
| Chile | 318 (5.1) | 344 (4.1) | 389 (4.2) | 441 (3.7) | 493 (3.1) | 537 (3.3) | 565 (4.3) |
| Chinese Taipei | 483 (5.6) | 513 (4.9) | 557 (2.7) | 603 (1.7) | 645 (3.2) | 681 (2.4) | 701 (2.6) |
| Croatia | 398 (5.6) | 424 (4.9) | 465 (3.2) | 511 (2.6) | 556 (2.3) | 595 (3.3) | 617 (4.3) |
| Cyprus | 397 (5.7) | 428 (3.5) | 480 (4.1) | 535 (3.3) | 587 (3.4) | 632 (3.3) | 657 (3.8) |
| Czech Republic | 406 (5.8) | 435 (5.0) | 484 (3.5) | 537 (2.7) | 585 (2.8) | 626 (3.8) | 650 (3.9) |
| Denmark | 402 (5.5) | 429 (3.0) | 474 (2.7) | 526 (2.1) | 577 (2.4) | 618 (3.5) | 644 (4.2) |
| England | 411 (5.5) | 445 (5.1) | 499 (3.5) | 558 (4.4) | 615 (4.1) | 665 (4.8) | 693 (6.5) |
| Finland | 402 (5.0) | 431 (4.9) | 483 (3.4) | 535 (3.3) | 585 (1.9) | 628 (3.6) | 653 (3.2) |
| France | 347 (6.5) | 379 (5.8) | 431 (4.3) | 488 (3.2) | 540 (3.2) | 586 (3.5) | 611 (5.0) |
| Georgia | 340 (6.2) | 371 (7.2) | 429 (5.3) | 487 (3.4) | 538 (3.9) | 583 (4.9) | 608 (4.4) |
| Germany | 405 (4.5) | 431 (3.7) | 474 (2.9) | 523 (2.8) | 570 (2.8) | 609 (2.9) | 630 (3.2) |
| Hong Kong SAR | 479 (5.2) | 509 (5.8) | 558 (4.1) | 605 (3.8) | 649 (3.7) | 689 (3.6) | 710 (4.3) |
| Hungary | 388 (5.2) | 418 (5.4) | 472 (4.1) | 529 (3.0) | 578 (2.8) | 621 (3.7) | 645 (3.3) |
| Iran, Islamic Rep. of | 278 (8.6) | 316 (8.1) | 379 (5.7) | 447 (3.2) | 512 (3.9) | 563 (3.4) | 592 (4.7) |
| Ireland | 414 (5.6) | 446 (5.2) | 501 (3.5) | 553 (2.3) | 601 (2.1) | 643 (4.2) | 665 (3.4) |
| Italy | 403 (4.8) | 427 (3.6) | 470 (3.2) | 517 (2.8) | 560 (2.8) | 598 (3.4) | 619 (4.4) |
| Japan | 474 (3.7) | 502 (3.3) | 548 (2.5) | 595 (2.0) | 641 (2.3) | 680 (2.9) | 703 (3.1) |
| Kazakhstan | 401 (4.4) | 424 (4.1) | 466 (2.8) | 511 (3.0) | 558 (3.3) | 598 (3.8) | 622 (3.3) |
| Korea, Rep. of | 477 (5.7) | 509 (4.1) | 556 (3.0) | 603 (2.3) | 648 (2.7) | 687 (3.3) | 710 (4.0) |
| Kosovo | 305 (7.7) | 337 (5.1) | 393 (4.1) | 450 (3.4) | 500 (3.5) | 543 (3.6) | 568 (3.1) |
| Kuwait | 190 (6.7) | 230 (7.8) | 307 (6.1) | 390 (5.2) | 463 (6.0) | 523 (6.5) | 555 (6.5) |
| Latvia | 427 (7.0) | 454 (4.4) | 501 (3.4) | 551 (2.3) | 594 (2.9) | 629 (3.3) | 650 (4.0) |
| Lithuania | 410 (5.7) | 442 (4.2) | 493 (3.4) | 546 (3.2) | 596 (2.8) | 636 (3.5) | 660 (4.9) |
| Malta | 373 (5.4) | 404 (2.9) | 460 (1.9) | 516 (2.1) | 563 (2.4) | 602 (1.9) | 625 (4.0) |
| Montenegro | 298 (6.3) | 340 (4.0) | 402 (2.5) | 461 (2.0) | 512 (2.4) | 554 (3.4) | 578 (3.2) |
| Morocco | 220 (7.2) | 254 (6.1) | 312 (4.5) | 381 (4.3) | 452 (5.1) | 516 (8.0) | 555 (11.3) |
| Netherlands | 432 (4.3) | 457 (4.4) | 495 (2.7) | 540 (3.2) | 581 (2.5) | 615 (3.5) | 634 (3.7) |
| New Zealand | 338 (4.7) | 368 (4.4) | 425 (3.4) | 489 (3.2) | 549 (3.3) | 602 (3.6) | 634 (4.2) |
| North Macedonia | 295 (11.2) | 339 (9.2) | 411 (6.8) | 479 (6.9) | 540 (5.5) | 591 (6.6) | 622 (7.7) |
| Northern Ireland | 410 (8.0) | 449 (5.2) | 510 (3.6) | 572 (3.6) | 627 (3.4) | 672 (5.3) | 699 (5.9) |
| Norway (5) | 416 (5.9) | 446 (4.2) | 493 (3.5) | 546 (2.3) | 595 (2.7) | 636 (2.8) | 660 (3.6) |
| Oman | 263 (5.5) | 299 (4.2) | 362 (3.6) | 431 (3.7) | 499 (5.1) | 563 (7.9) | 602 (10.6) |
| Pakistan | 156 (12.0) | 189 (10.1) | 249 (12.6) | 329 (15.5) | 407 (15.6) | 462 (10.2) | 493 (11.0) |
| Philippines | 121 (6.1) | 156 (6.7) | 216 (7.4) | 293 (7.2) | 376 (8.2) | 444 (7.7) | 480 (7.1) |
| Poland | 386 (4.1) | 418 (3.7) | 471 (3.9) | 523 (2.7) | 573 (2.9) | 617 (3.5) | 642 (5.0) |
| Portugal | 398 (4.8) | 424 (4.5) | 472 (3.1) | 529 (3.5) | 580 (3.2) | 621 (3.4) | 644 (3.9) |
| Qatar | 300 (5.3) | 329 (5.3) | 384 (4.8) | 450 (4.1) | 515 (4.7) | 569 (4.7) | 599 (5.1) |
| Russian Federation | 451 (7.7) | 479 (4.8) | 524 (4.1) | 569 (3.1) | 613 (4.0) | 653 (4.6) | 675 (5.2) |
| Saudi Arabia | 223 (7.6) | 261 (7.6) | 331 (5.2) | 403 (3.7) | 469 (4.0) | 525 (4.5) | 558 (3.9) |
| Serbia | 356 (8.1) | 395 (7.5) | 456 (5.4) | 514 (3.3) | 566 (3.5) | 611 (4.1) | 639 (4.4) |
| Singapore | 481 (8.0) | 519 (7.0) | 578 (4.9) | 633 (4.5) | 682 (3.8) | 720 (3.5) | 741 (3.8) |
| Slovak Republic | 368 (10.9) | 406 (8.8) | 466 (4.6) | 517 (3.9) | 561 (3.2) | 600 (3.8) | 626 (5.0) |
| South Africa (5) | 222 (3.6) | 251 (3.2) | 301 (3.2) | 365 (4.1) | 439 (5.0) | 509 (5.0) | 552 (5.4) |
| Spain | 378 (5.7) | 405 (4.2) | 453 (3.8) | 505 (1.9) | 554 (2.2) | 594 (2.8) | 617 (3.7) |
| Sweden | 396 (5.4) | 425 (5.2) | 474 (4.0) | 523 (3.0) | 571 (3.4) | 615 (4.1) | 640 (4.4) |
| Turkey (5) | 346 (8.0) | 385 (8.4) | 459 (6.0) | 531 (4.9) | 595 (4.1) | 644 (5.0) | 671 (5.0) |
| United Arab Emirates | 316 (2.8) | 350 (3.0) | 412 (2.3) | 484 (2.1) | 553 (1.9) | 607 (1.8) | 638 (2.4) |
| United States | 383 (5.9) | 421 (4.4) | 480 (3.2) | 542 (2.8) | 594 (3.0) | 639 (2.8) | 663 (4.0) |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 383 (5.7) | 411 (5.3) | 458 (4.5) | 513 (4.1) | 567 (4.2) | 612 (4.6) | 637 (6.1) |
| Quebec, Canada | 421 (5.3) | 445 (3.6) | 487 (3.8) | 535 (2.6) | 578 (3.2) | 616 (3.8) | 638 (3.6) |
| Moscow City, Russian Fed. | 483 (5.2) | 512 (4.9) | 554 (2.9) | 596 (2.4) | 636 (2.9) | 669 (2.6) | 686 (2.6) |
| Madrid, Spain | 405 (6.5) | 432 (3.6) | 474 (4.1) | 521 (2.7) | 565 (2.2) | 602 (2.6) | 623 (4.2) |
| Abu Dhabi, UAE | 283 (4.9) | 314 (3.5) | 369 (2.6) | 439 (3.1) | 510 (2.7) | 571 (2.5) | 604 (2.8) |
| Dubai, UAE | 400 (4.5) | 435 (3.6) | 491 (2.7) | 549 (1.9) | 601 (2.6) | 646 (3.3) | 671 (4.2) |

Percentiles are defined in terms of percentages of students at or below a point on the scale.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix D.2: Percentiles of Science Achievement

| Country | 5th Percentile | 10th Percentile | 25th Percentile | 50th Percentile | 75th Percentile | 90th Percentile | 95th Percentile |
|---|---|---|---|---|---|---|---|
| Albania | 341 (10.5) | 378 (7.7) | 437 (5.2) | 495 (3.7) | 549 (3.5) | 592 (3.4) | 619 (4.7) |
| Armenia | 336 (6.1) | 364 (6.2) | 415 (4.3) | 469 (3.3) | 520 (3.6) | 564 (4.5) | 590 (5.2) |
| Australia | 389 (6.0) | 427 (4.4) | 484 (2.8) | 538 (3.2) | 587 (2.4) | 629 (3.6) | 653 (4.3) |
| Austria | 394 (6.0) | 424 (4.2) | 474 (3.2) | 526 (2.9) | 575 (3.5) | 614 (2.5) | 636 (4.2) |
| Azerbaijan | 260 (10.3) | 309 (6.9) | 371 (4.0) | 434 (3.5) | 492 (3.3) | 542 (3.3) | 569 (4.5) |
| Bahrain | 329 (7.7) | 368 (6.3) | 432 (4.6) | 498 (3.4) | 557 (3.9) | 606 (4.0) | 635 (4.6) |
| Belgium (Flemish) | 384 (3.6) | 412 (3.8) | 458 (2.8) | 504 (2.8) | 548 (2.5) | 584 (2.7) | 605 (3.4) |
| Bosnia and Herzegovina | 321 (7.4) | 355 (4.8) | 408 (3.7) | 463 (3.0) | 514 (2.9) | 556 (3.6) | 580 (4.5) |
| Bulgaria | 326 (14.0) | 381 (10.8) | 460 (8.1) | 536 (5.2) | 595 (4.2) | 641 (3.4) | 666 (3.4) |
| Canada | 401 (3.5) | 429 (3.0) | 476 (2.8) | 526 (2.1) | 573 (2.6) | 613 (2.6) | 637 (2.5) |
| Chile | 343 (5.8) | 370 (4.4) | 419 (3.7) | 470 (4.1) | 522 (2.5) | 564 (2.9) | 589 (3.3) |
| Chinese Taipei | 444 (4.7) | 471 (4.4) | 516 (2.7) | 562 (2.0) | 604 (1.9) | 639 (2.7) | 659 (4.1) |
| Croatia | 424 (5.2) | 448 (4.5) | 485 (3.3) | 525 (3.0) | 565 (2.3) | 599 (3.4) | 618 (4.3) |
| Cyprus | 381 (5.3) | 412 (3.7) | 463 (3.4) | 515 (3.6) | 563 (3.2) | 606 (4.3) | 630 (4.5) |
| Czech Republic | 414 (5.1) | 443 (4.3) | 490 (3.4) | 538 (3.5) | 582 (2.2) | 619 (3.2) | 640 (3.2) |
| Denmark | 405 (6.6) | 433 (3.4) | 478 (3.1) | 525 (2.8) | 569 (2.7) | 607 (4.0) | 629 (3.4) |
| England | 413 (6.8) | 444 (4.5) | 491 (3.3) | 540 (2.7) | 587 (3.3) | 626 (4.6) | 648 (4.8) |
| Finland | 429 (6.9) | 464 (4.5) | 513 (3.1) | 559 (1.9) | 602 (2.8) | 640 (3.0) | 662 (3.3) |
| France | 351 (6.1) | 382 (5.0) | 435 (4.6) | 493 (3.6) | 544 (2.9) | 583 (3.4) | 608 (3.5) |
| Georgia | 307 (10.0) | 344 (7.4) | 400 (5.0) | 459 (4.6) | 512 (3.6) | 556 (4.1) | 582 (5.1) |
| Germany | 383 (4.1) | 416 (4.3) | 468 (3.4) | 524 (3.2) | 573 (2.7) | 613 (2.4) | 634 (4.8) |
| Hong Kong SAR | 408 (6.5) | 438 (5.3) | 486 (4.0) | 535 (3.8) | 580 (3.2) | 620 (4.0) | 643 (4.1) |
| Hungary | 395 (5.6) | 425 (5.0) | 479 (3.9) | 535 (2.8) | 584 (3.2) | 624 (2.5) | 647 (3.2) |
| Iran, Islamic Rep. of | 265 (10.4) | 306 (7.0) | 377 (6.0) | 450 (4.7) | 511 (3.9) | 561 (3.4) | 587 (4.4) |
| Ireland | 393 (7.1) | 427 (5.4) | 481 (4.8) | 534 (3.5) | 580 (3.2) | 620 (2.8) | 643 (4.5) |
| Italy | 400 (5.7) | 424 (4.6) | 467 (3.1) | 512 (3.1) | 555 (3.7) | 592 (4.1) | 615 (7.0) |
| Japan | 442 (4.5) | 473 (3.8) | 519 (2.7) | 566 (1.9) | 609 (2.1) | 645 (2.7) | 668 (3.4) |
| Kazakhstan | 373 (4.5) | 397 (3.4) | 441 (4.3) | 492 (3.2) | 544 (4.0) | 595 (6.3) | 625 (6.4) |
| Korea, Rep. of | 474 (7.0) | 504 (4.2) | 545 (3.2) | 590 (2.3) | 633 (2.3) | 671 (3.1) | 693 (4.1) |
| Kosovo | 260 (8.1) | 298 (6.5) | 358 (4.4) | 419 (4.0) | 474 (3.5) | 520 (4.2) | 545 (4.7) |
| Kuwait | 181 (9.6) | 226 (7.5) | 307 (7.6) | 398 (7.4) | 482 (6.9) | 548 (8.3) | 582 (7.4) |
| Latvia | 432 (6.1) | 458 (3.9) | 501 (3.5) | 546 (2.5) | 585 (2.1) | 619 (3.1) | 639 (2.4) |
| Lithuania | 414 (6.0) | 443 (4.3) | 492 (3.4) | 542 (2.9) | 588 (2.2) | 628 (3.2) | 651 (4.7) |
| Malta | 344 (4.4) | 382 (5.3) | 443 (2.5) | 504 (2.1) | 555 (1.8) | 598 (2.4) | 623 (2.8) |
| Montenegro | 292 (5.4) | 336 (5.5) | 401 (3.4) | 461 (3.4) | 516 (2.9) | 558 (2.5) | 582 (3.4) |
| Morocco | 172 (8.8) | 216 (6.8) | 291 (6.8) | 375 (6.6) | 458 (7.2) | 531 (9.5) | 571 (10.7) |
| Netherlands | 407 (5.4) | 434 (4.3) | 476 (3.9) | 522 (3.3) | 564 (2.8) | 599 (3.8) | 619 (5.7) |
| New Zealand | 360 (4.0) | 392 (4.5) | 448 (3.2) | 507 (2.6) | 561 (2.5) | 605 (3.4) | 629 (3.7) |
| North Macedonia | 244 (9.1) | 287 (10.0) | 359 (8.1) | 432 (8.8) | 501 (6.4) | 554 (6.7) | 583 (5.3) |
| Northern Ireland | 392 (7.0) | 424 (4.1) | 473 (3.3) | 524 (3.0) | 568 (2.8) | 606 (3.7) | 627 (4.7) |
| Norway (5) | 422 (5.8) | 451 (4.5) | 497 (3.4) | 543 (2.6) | 586 (2.4) | 622 (2.3) | 643 (3.5) |
| Oman | 234 (6.3) | 278 (4.8) | 355 (4.4) | 441 (4.0) | 518 (4.8) | 582 (6.4) | 619 (7.7) |
| Pakistan | 83 (13.4) | 125 (11.7) | 197 (13.6) | 288 (19.3) | 385 (15.5) | 457 (11.8) | 496 (11.4) |
| Philippines | 59 (7.2) | 93 (8.1) | 158 (8.1) | 239 (8.1) | 333 (9.3) | 418 (10.3) | 470 (9.3) |
| Poland | 401 (6.6) | 435 (4.6) | 484 (3.2) | 536 (3.3) | 582 (3.0) | 620 (3.6) | 643 (5.1) |
| Portugal | 391 (3.1) | 416 (4.2) | 459 (3.5) | 507 (3.3) | 551 (2.7) | 587 (2.7) | 608 (2.9) |
| Qatar | 271 (7.2) | 308 (6.5) | 376 (5.0) | 456 (5.6) | 526 (5.0) | 581 (4.3) | 611 (5.2) |
| Russian Federation | 457 (7.3) | 484 (4.4) | 526 (3.5) | 570 (3.1) | 611 (2.9) | 646 (3.1) | 666 (4.6) |
| Saudi Arabia | 205 (7.3) | 248 (7.6) | 327 (5.4) | 410 (4.5) | 484 (3.2) | 540 (3.8) | 571 (4.7) |
| Serbia | 368 (11.8) | 412 (7.0) | 471 (4.3) | 525 (3.3) | 571 (3.3) | 613 (3.7) | 637 (3.8) |
| Singapore | 454 (6.3) | 493 (5.8) | 548 (4.5) | 602 (3.7) | 649 (3.3) | 687 (3.2) | 708 (3.7) |
| Slovak Republic | 367 (13.8) | 415 (10.0) | 479 (4.4) | 531 (3.1) | 575 (2.6) | 612 (3.8) | 634 (4.1) |
| South Africa (5) | 129 (4.3) | 163 (4.7) | 225 (5.0) | 311 (6.6) | 414 (7.4) | 510 (8.7) | 563 (7.9) |
| Spain | 394 (4.8) | 422 (4.8) | 467 (2.8) | 516 (2.2) | 559 (2.0) | 595 (2.8) | 614 (2.3) |
| Sweden | 409 (7.2) | 439 (5.9) | 490 (4.6) | 541 (4.2) | 588 (3.8) | 629 (3.9) | 652 (3.8) |
| Turkey (5) | 350 (10.0) | 401 (8.9) | 475 (5.3) | 538 (4.4) | 591 (3.6) | 631 (3.9) | 653 (4.8) |
| United Arab Emirates | 273 (2.5) | 314 (2.9) | 395 (2.8) | 483 (2.6) | 557 (2.2) | 612 (1.9) | 641 (2.1) |
| United States | 387 (5.6) | 426 (4.8) | 486 (3.6) | 546 (3.0) | 598 (2.2) | 641 (2.5) | 664 (2.6) |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 397 (6.3) | 426 (4.7) | 474 (4.7) | 527 (3.8) | 577 (3.8) | 617 (4.5) | 641 (5.3) |
| Quebec, Canada | 413 (5.3) | 437 (4.2) | 479 (4.4) | 524 (3.4) | 566 (3.2) | 604 (3.8) | 627 (4.7) |
| Moscow City, Russian Fed. | 484 (5.8) | 514 (4.6) | 556 (2.7) | 599 (2.2) | 638 (2.3) | 671 (3.5) | 689 (3.8) |
| Madrid, Spain | 417 (4.1) | 442 (3.8) | 484 (2.8) | 526 (2.2) | 565 (2.4) | 599 (2.7) | 618 (4.4) |
| Abu Dhabi, UAE | 230 (4.1) | 265 (3.6) | 329 (4.0) | 419 (3.2) | 507 (3.3) | 570 (3.7) | 604 (3.3) |
| Dubai, UAE | 389 (5.6) | 429 (3.5) | 492 (2.8) | 554 (2.2) | 605 (1.9) | 646 (2.7) | 671 (2.9) |

Percentiles are defined in terms of percentages of students at or below a point on the scale.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix D.3: Percentiles of Mathematics Achievement

| Country | 5th Percentile | 10th Percentile | 25th Percentile | 50th Percentile | 75th Percentile | 90th Percentile | 95th Percentile |
|---|---|---|---|---|---|---|---|
| Australia | 369 (5.3) | 401 (4.0) | 456 (3.8) | 518 (4.2) | 578 (5.2) | 632 (7.0) | 666 (9.0) |
| Bahrain | 317 (3.4) | 350 (3.1) | 413 (3.3) | 488 (2.6) | 550 (2.3) | 598 (2.2) | 628 (3.2) |
| Chile | 318 (4.7) | 344 (3.9) | 388 (3.7) | 440 (4.2) | 493 (3.5) | 538 (4.7) | 568 (7.5) |
| Chinese Taipei | 435 (5.4) | 475 (3.9) | 550 (4.0) | 623 (3.3) | 682 (3.6) | 731 (3.5) | 759 (4.8) |
| Cyprus | 362 (4.7) | 392 (4.0) | 445 (3.0) | 504 (2.6) | 559 (2.6) | 604 (3.2) | 631 (5.0) |
| Egypt | 252 (6.5) | 288 (6.9) | 347 (6.1) | 414 (5.9) | 481 (5.5) | 535 (6.2) | 567 (7.3) |
| England | 363 (9.2) | 398 (8.3) | 457 (6.9) | 516 (5.9) | 575 (6.8) | 628 (7.6) | 660 (10.2) |
| Finland | 384 (6.0) | 412 (5.4) | 460 (3.6) | 512 (2.7) | 560 (2.9) | 602 (3.1) | 624 (2.9) |
| France | 369 (3.2) | 393 (3.9) | 436 (3.7) | 483 (3.3) | 531 (2.9) | 570 (3.4) | 593 (5.1) |
| Georgia | 318 (8.8) | 349 (7.4) | 400 (6.4) | 461 (4.6) | 524 (5.5) | 576 (6.6) | 604 (8.5) |
| Hong Kong SAR | 410 (11.9) | 455 (7.8) | 524 (5.7) | 587 (4.1) | 641 (4.1) | 686 (7.0) | 714 (7.1) |
| Hungary | 366 (6.7) | 398 (5.8) | 455 (4.4) | 518 (4.6) | 580 (4.1) | 631 (4.7) | 661 (7.0) |
| Iran, Islamic Rep. of | 296 (7.2) | 329 (5.9) | 383 (4.4) | 444 (3.3) | 509 (5.1) | 568 (7.0) | 602 (9.5) |
| Ireland | 395 (7.3) | 426 (5.8) | 476 (3.9) | 528 (2.7) | 574 (2.5) | 614 (3.8) | 636 (3.0) |
| Israel | 352 (6.2) | 387 (5.1) | 450 (4.4) | 523 (6.3) | 591 (5.2) | 647 (6.7) | 674 (7.0) |
| Italy | 378 (5.7) | 405 (3.4) | 448 (3.7) | 499 (3.7) | 548 (3.2) | 589 (4.1) | 611 (4.2) |
| Japan | 451 (4.3) | 485 (3.9) | 538 (2.6) | 595 (2.3) | 653 (3.5) | 700 (5.4) | 727 (6.9) |
| Jordan | 274 (7.1) | 305 (5.4) | 361 (5.4) | 423 (4.6) | 481 (4.2) | 530 (4.6) | 558 (4.5) |
| Kazakhstan | 355 (4.2) | 381 (4.6) | 431 (4.2) | 486 (3.7) | 544 (4.7) | 597 (4.9) | 624 (6.0) |
| Korea, Rep. of | 435 (6.2) | 475 (5.5) | 547 (3.1) | 613 (2.7) | 674 (4.1) | 727 (6.6) | 755 (6.0) |
| Kuwait | 262 (6.9) | 290 (5.9) | 341 (5.4) | 400 (5.4) | 462 (5.9) | 521 (7.6) | 552 (8.1) |
| Lebanon | 313 (4.3) | 337 (3.6) | 378 (2.9) | 428 (3.5) | 479 (4.0) | 525 (4.1) | 551 (4.4) |
| Lithuania | 384 (5.2) | 415 (3.7) | 466 (3.0) | 521 (4.0) | 577 (3.8) | 624 (4.2) | 652 (6.3) |
| Malaysia | 319 (4.8) | 346 (4.9) | 396 (4.7) | 457 (3.8) | 521 (3.8) | 580 (3.3) | 618 (4.6) |
| Morocco | 277 (3.7) | 300 (3.1) | 339 (2.5) | 384 (2.4) | 433 (2.9) | 482 (4.0) | 514 (5.2) |
| New Zealand | 333 (7.1) | 367 (6.3) | 422 (5.1) | 482 (3.5) | 542 (3.6) | 598 (4.0) | 629 (4.3) |
| Norway (9) | 370 (6.4) | 401 (4.1) | 450 (3.3) | 505 (3.8) | 558 (2.6) | 601 (3.4) | 626 (3.3) |
| Oman | 246 (5.5) | 281 (4.5) | 341 (3.6) | 412 (3.1) | 482 (3.1) | 537 (3.3) | 568 (3.6) |
| Portugal | 380 (6.3) | 406 (5.2) | 451 (4.6) | 499 (3.9) | 551 (3.4) | 596 (4.8) | 623 (5.6) |
| Qatar | 293 (5.8) | 322 (4.6) | 374 (4.0) | 439 (4.3) | 511 (5.8) | 571 (8.5) | 606 (8.2) |
| Romania | 317 (6.5) | 351 (5.2) | 410 (5.2) | 481 (6.8) | 550 (5.2) | 604 (5.1) | 635 (6.5) |
| Russian Federation | 409 (6.3) | 438 (7.3) | 488 (6.1) | 545 (5.1) | 598 (4.6) | 647 (6.1) | 676 (6.5) |
| Saudi Arabia | 268 (4.6) | 294 (4.3) | 339 (4.0) | 393 (3.8) | 446 (2.8) | 495 (3.2) | 523 (3.4) |
| Singapore | 445 (7.8) | 487 (10.4) | 565 (7.5) | 628 (4.6) | 679 (3.1) | 718 (2.8) | 740 (3.3) |
| South Africa (9) | 274 (3.8) | 297 (3.3) | 336 (2.3) | 383 (2.4) | 436 (2.8) | 491 (3.6) | 527 (4.2) |
| Sweden | 373 (5.5) | 401 (4.1) | 449 (3.6) | 505 (2.8) | 556 (3.3) | 601 (4.3) | 626 (4.3) |
| Turkey | 322 (6.9) | 355 (7.8) | 418 (4.9) | 493 (4.9) | 572 (4.7) | 637 (5.4) | 677 (6.9) |
| United Arab Emirates | 302 (2.5) | 336 (2.8) | 400 (2.7) | 475 (2.5) | 548 (2.3) | 607 (2.5) | 639 (2.8) |
| United States | 348 (9.4) | 385 (7.2) | 448 (5.8) | 518 (5.1) | 588 (5.3) | 642 (4.8) | 671 (4.9) |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 398 (6.1) | 427 (5.3) | 477 (4.2) | 532 (4.4) | 582 (4.4) | 629 (7.3) | 658 (8.0) |
| Quebec, Canada | 429 (8.2) | 457 (6.4) | 499 (4.6) | 545 (4.8) | 590 (4.1) | 627 (5.3) | 648 (5.7) |
| Moscow City, Russian Fed. | 436 (4.9) | 466 (5.4) | 519 (3.9) | 578 (4.6) | 634 (4.7) | 681 (5.2) | 709 (6.8) |
| Gauteng, RSA (9) | 305 (4.3) | 328 (4.1) | 367 (2.7) | 415 (2.8) | 469 (4.7) | 523 (5.1) | 558 (7.3) |
| Western Cape, RSA (9) | 311 (4.2) | 336 (4.4) | 376 (4.0) | 430 (4.6) | 498 (7.4) | 569 (9.1) | 606 (7.8) |
| Abu Dhabi, UAE | 270 (4.5) | 300 (4.2) | 357 (3.9) | 436 (4.1) | 512 (3.3) | 573 (2.9) | 605 (3.9) |
| Dubai, UAE | 371 (6.1) | 411 (4.1) | 477 (3.1) | 545 (2.7) | 603 (2.9) | 648 (3.0) | 673 (4.2) |

Percentiles are defined in terms of percentages of students at or below a point on the scale.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix D.4: Percentiles of Science Achievement

| Country | 5th Percentile | 10th Percentile | 25th Percentile | 50th Percentile | 75th Percentile | 90th Percentile | 95th Percentile |
|---|---|---|---|---|---|---|---|
| Australia | 373 (6.5) | 409 (4.6) | 473 (4.3) | 534 (3.4) | 589 (3.8) | 635 (4.8) | 663 (6.2) |
| Bahrain | 308 (5.6) | 346 (3.7) | 416 (3.6) | 493 (2.5) | 561 (2.5) | 614 (3.1) | 641 (3.5) |
| Chile | 331 (6.3) | 360 (4.9) | 409 (3.8) | 465 (2.7) | 517 (3.6) | 561 (4.6) | 586 (4.2) |
| Chinese Taipei | 426 (5.6) | 464 (3.2) | 522 (2.2) | 581 (2.6) | 634 (2.4) | 674 (2.4) | 698 (3.9) |
| Cyprus | 335 (4.0) | 370 (4.4) | 429 (4.3) | 490 (3.1) | 543 (2.5) | 587 (3.0) | 612 (3.4) |
| Egypt | 192 (10.1) | 237 (7.6) | 314 (6.6) | 398 (5.8) | 472 (5.8) | 528 (5.6) | 558 (5.4) |
| England | 356 (9.3) | 393 (8.6) | 458 (6.9) | 523 (5.0) | 580 (4.7) | 630 (6.6) | 659 (7.9) |
| Finland | 388 (8.8) | 428 (6.6) | 490 (4.2) | 549 (3.1) | 602 (2.7) | 647 (4.0) | 673 (3.8) |
| France | 355 (4.5) | 385 (4.7) | 436 (3.9) | 492 (3.4) | 543 (3.7) | 585 (3.2) | 609 (4.7) |
| Georgia | 302 (7.4) | 338 (5.2) | 392 (5.4) | 450 (3.1) | 506 (4.4) | 551 (5.4) | 577 (8.1) |
| Hong Kong SAR | 337 (7.8) | 373 (8.7) | 440 (7.6) | 510 (6.8) | 571 (5.4) | 622 (6.2) | 651 (7.2) |
| Hungary | 388 (6.4) | 421 (5.2) | 476 (4.4) | 534 (3.6) | 586 (3.0) | 632 (4.8) | 659 (5.2) |
| Iran, Islamic Rep. of | 299 (7.2) | 336 (5.0) | 391 (4.2) | 450 (4.0) | 510 (4.2) | 563 (7.0) | 594 (6.5) |
| Ireland | 376 (8.7) | 413 (5.9) | 470 (4.2) | 529 (3.4) | 582 (3.4) | 624 (3.1) | 649 (5.2) |
| Israel | 343 (9.3) | 384 (6.9) | 450 (6.0) | 521 (5.5) | 582 (5.8) | 633 (5.5) | 661 (6.3) |
| Italy | 373 (6.8) | 404 (4.5) | 453 (3.7) | 503 (3.0) | 551 (3.1) | 593 (2.7) | 619 (4.6) |
| Japan | 444 (3.7) | 473 (3.6) | 523 (2.1) | 573 (2.4) | 620 (3.2) | 659 (4.0) | 681 (4.7) |
| Jordan | 277 (8.9) | 319 (7.7) | 390 (6.3) | 462 (5.6) | 522 (4.1) | 569 (4.6) | 598 (4.4) |
| Kazakhstan | 336 (6.5) | 368 (6.5) | 422 (4.2) | 478 (3.3) | 535 (3.8) | 590 (5.4) | 620 (5.6) |
| Korea, Rep. of | 415 (6.5) | 453 (4.1) | 509 (3.4) | 563 (1.9) | 617 (2.9) | 666 (3.9) | 694 (5.6) |
| Kuwait | 276 (9.7) | 313 (7.1) | 377 (7.1) | 448 (5.9) | 515 (6.3) | 570 (6.6) | 600 (8.3) |
| Lebanon | 213 (7.0) | 243 (7.8) | 301 (6.7) | 374 (5.9) | 451 (6.7) | 515 (5.2) | 550 (6.7) |
| Lithuania | 402 (5.5) | 433 (4.9) | 483 (4.2) | 537 (3.2) | 588 (3.6) | 630 (4.2) | 656 (4.8) |
| Malaysia | 292 (7.6) | 330 (7.2) | 395 (5.6) | 467 (4.1) | 529 (3.1) | 580 (2.9) | 608 (3.4) |
| Morocco | 251 (5.5) | 284 (4.4) | 337 (3.6) | 396 (3.0) | 453 (2.9) | 503 (3.0) | 531 (3.4) |
| New Zealand | 336 (8.1) | 375 (6.5) | 440 (5.1) | 505 (3.5) | 563 (3.7) | 613 (3.4) | 643 (4.2) |
| Norway (9) | 340 (7.1) | 378 (7.4) | 439 (4.8) | 500 (3.3) | 558 (4.0) | 606 (3.2) | 632 (3.5) |
| Oman | 272 (5.3) | 313 (5.3) | 387 (4.7) | 465 (3.6) | 534 (2.9) | 586 (3.7) | 615 (4.2) |
| Portugal | 398 (7.1) | 426 (4.5) | 470 (4.8) | 520 (3.9) | 569 (3.6) | 610 (3.4) | 636 (3.9) |
| Qatar | 301 (7.2) | 337 (5.5) | 405 (5.0) | 478 (5.6) | 549 (5.5) | 607 (5.1) | 637 (6.4) |
| Romania | 313 (6.7) | 350 (5.3) | 410 (5.5) | 472 (4.7) | 533 (5.2) | 586 (6.9) | 618 (6.3) |
| Russian Federation | 415 (7.8) | 442 (6.3) | 494 (5.3) | 546 (4.3) | 595 (3.7) | 637 (5.4) | 661 (4.8) |
| Saudi Arabia | 280 (4.7) | 314 (4.3) | 371 (3.5) | 435 (3.1) | 494 (3.0) | 544 (2.7) | 572 (3.3) |
| Singapore | 439 (12.2) | 485 (9.4) | 557 (7.4) | 621 (4.5) | 669 (2.8) | 708 (3.2) | 731 (2.6) |
| South Africa (9) | 211 (4.5) | 243 (4.1) | 298 (3.6) | 364 (3.6) | 435 (4.0) | 506 (4.1) | 552 (5.0) |
| Sweden | 349 (7.2) | 391 (5.5) | 462 (5.3) | 529 (3.4) | 588 (3.9) | 638 (5.0) | 664 (3.9) |
| Turkey | 351 (7.5) | 388 (5.1) | 449 (4.5) | 519 (4.7) | 585 (4.4) | 639 (5.0) | 669 (5.1) |
| United Arab Emirates | 247 (4.4) | 296 (3.4) | 388 (3.4) | 486 (2.8) | 566 (2.4) | 627 (2.4) | 660 (2.5) |
| United States | 345 (11.0) | 388 (8.8) | 458 (6.4) | 531 (5.4) | 594 (4.1) | 642 (4.2) | 670 (3.9) |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 388 (7.2) | 419 (4.6) | 470 (4.1) | 525 (3.8) | 575 (3.7) | 621 (5.5) | 648 (5.2) |
| Quebec, Canada | 420 (8.0) | 447 (6.3) | 491 (4.5) | 539 (4.1) | 585 (4.5) | 623 (4.7) | 646 (5.2) |
| Moscow City, Russian Fed. | 450 (5.0) | 477 (3.7) | 521 (3.4) | 570 (3.5) | 615 (4.1) | 653 (3.4) | 674 (5.1) |
| Gauteng, RSA (9) | 267 (6.3) | 299 (5.1) | 353 (4.1) | 418 (4.5) | 489 (5.1) | 554 (6.2) | 591 (7.1) |
| Western Cape, RSA (9) | 272 (6.0) | 303 (4.8) | 360 (4.6) | 428 (5.0) | 513 (8.2) | 596 (10.1) | 638 (9.5) |
| Abu Dhabi, UAE | 200 (4.8) | 236 (5.5) | 313 (6.1) | 426 (6.7) | 528 (4.1) | 595 (3.8) | 629 (3.9) |
| Dubai, UAE | 360 (5.4) | 408 (4.6) | 486 (2.5) | 560 (2.2) | 619 (2.6) | 668 (3.9) | 695 (6.0) |

Percentiles are defined in terms of percentages of students at or below a point on the scale.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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# APPENDIX E

# Standard Deviations of Achievement

## Appendix E.1: Average Mathematics Achievement and Standard Deviations by Gender

| Country | Overall | | Girls | | Boys | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| Albania | 494 (3.4) | 86 (2.4) | 493 (3.8) | 85 (2.6) | 495 (3.9) | 87 (3.2) |
| Armenia | 498 (2.5) | 68 (1.5) | 499 (2.6) | 66 (1.3) | 497 (3.2) | 70 (2.1) |
| Australia | 516 (2.8) | 87 (1.9) | 511 (2.9) | 82 (2.0) | 521 (3.3) | 91 (2.3) |
| Austria | 539 (2.0) | 65 (1.1) | 535 (2.8) | 63 (1.4) | 543 (2.1) | 66 (1.3) |
| Azerbaijan | 515 (2.7) | 84 (1.7) | 517 (3.1) | 81 (2.2) | 514 (3.1) | 87 (2.1) |
| Bahrain | 480 (2.6) | 87 (1.6) | 482 (3.2) | 86 (2.2) | 477 (3.5) | 88 (1.8) |
| Belgium (Flemish) | 532 (1.9) | 68 (1.2) | 527 (2.1) | 66 (1.4) | 538 (2.8) | 68 (1.7) |
| Bosnia and Herzegovina | 452 (2.4) | 75 (1.2) | 447 (2.7) | 73 (1.5) | 456 (2.8) | 77 (1.6) |
| Bulgaria | 515 (4.3) | 86 (3.0) | 514 (4.7) | 84 (3.0) | 516 (4.6) | 88 (3.6) |
| Canada | 512 (1.9) | 76 (1.2) | 502 (2.5) | 74 (1.5) | 521 (2.0) | 77 (1.3) |
| Chile | 441 (2.7) | 75 (1.6) | 437 (3.4) | 73 (1.9) | 445 (3.1) | 76 (2.2) |
| Chinese Taipei | 599 (1.9) | 66 (1.3) | 597 (2.4) | 63 (1.7) | 601 (2.3) | 69 (1.7) |
| Croatia | 509 (2.2) | 67 (1.8) | 504 (2.6) | 65 (1.9) | 515 (2.7) | 69 (2.4) |
| Cyprus | 532 (2.9) | 79 (1.5) | 523 (3.0) | 76 (1.8) | 542 (3.5) | 80 (2.1) |
| Czech Republic | 533 (2.5) | 74 (1.8) | 527 (2.7) | 73 (1.9) | 538 (3.1) | 75 (2.2) |
| Denmark | 525 (1.9) | 73 (1.1) | 521 (2.2) | 70 (1.7) | 528 (2.6) | 76 (1.4) |
| England | 556 (3.0) | 86 (2.0) | 552 (4.0) | 83 (2.6) | 560 (3.0) | 88 (2.4) |
| Finland | 532 (2.3) | 76 (1.4) | 531 (2.9) | 75 (1.5) | 533 (2.8) | 78 (2.0) |
| France | 485 (3.0) | 80 (1.4) | 478 (3.3) | 78 (2.0) | 491 (3.5) | 81 (1.8) |
| Georgia | 482 (3.7) | 81 (1.7) | 478 (3.9) | 80 (1.9) | 486 (4.1) | 81 (2.1) |
| Germany | 521 (2.3) | 70 (1.4) | 516 (2.8) | 68 (1.6) | 526 (2.4) | 71 (1.7) |
| Hong Kong SAR | 602 (3.3) | 69 (1.5) | 599 (3.5) | 67 (1.9) | 604 (3.9) | 71 (2.3) |
| Hungary | 523 (2.6) | 78 (1.4) | 518 (3.0) | 76 (1.9) | 529 (3.1) | 79 (1.8) |
| Iran, Islamic Rep. of | 443 (3.9) | 95 (2.3) | 439 (6.4) | 93 (3.4) | 447 (5.3) | 97 (2.5) |
| Ireland | 548 (2.5) | 76 (1.3) | 545 (3.2) | 75 (1.7) | 552 (2.9) | 77 (1.7) |
| Italy | 515 (2.4) | 66 (1.0) | 509 (2.7) | 64 (1.3) | 521 (3.2) | 68 (1.3) |
| Japan | 593 (1.8) | 70 (1.0) | 593 (2.2) | 67 (1.3) | 593 (1.9) | 73 (1.3) |
| Kazakhstan | 512 (2.5) | 68 (1.4) | 512 (3.0) | 67 (1.8) | 512 (2.6) | 68 (1.5) |
| Korea, Rep. of | 600 (2.2) | 71 (1.2) | 597 (2.3) | 68 (1.7) | 602 (2.8) | 73 (1.7) |
| Kosovo | 444 (3.0) | 80 (1.5) | 442 (3.1) | 79 (1.7) | 447 (3.7) | 82 (2.0) |
| Kuwait | 383 (4.7) | 111 (2.4) | 387 (6.0) | 106 (2.7) | 380 (6.9) | 116 (3.5) |
| Latvia | 546 (2.6) | 68 (1.8) | 544 (2.9) | 67 (1.7) | 548 (3.0) | 69 (2.3) |
| Lithuania | 542 (2.8) | 76 (1.4) | 540 (2.9) | 74 (2.0) | 544 (3.7) | 77 (2.1) |
| Malta | 509 (1.4) | 76 (0.9) | 505 (2.1) | 74 (1.5) | 513 (1.9) | 79 (1.3) |
| Montenegro | 453 (2.0) | 85 (1.5) | 450 (2.6) | 84 (1.7) | 455 (2.4) | 87 (1.9) |
| Morocco | 383 (4.3) | 102 (4.0) | 385 (4.8) | 101 (4.2) | 382 (4.3) | 103 (4.2) |
| Netherlands | 538 (2.2) | 62 (1.1) | 533 (2.2) | 60 (1.4) | 542 (3.0) | 63 (1.6) |
| New Zealand | 487 (2.6) | 90 (1.3) | 484 (3.7) | 87 (1.7) | 490 (3.3) | 93 (1.8) |
| North Macedonia | 472 (5.3) | 98 (2.7) | 472 (5.9) | 100 (3.4) | 472 (5.4) | 96 (2.9) |
| Northern Ireland | 566 (2.7) | 88 (2.0) | 564 (3.2) | 86 (2.5) | 568 (3.7) | 89 (2.6) |
| Norway (5) | 543 (2.2) | 74 (1.4) | 540 (2.7) | 73 (2.1) | 545 (2.9) | 75 (1.8) |
| Oman | 431 (3.7) | 102 (2.4) | 438 (3.6) | 97 (2.7) | 424 (4.4) | 107 (2.4) |
| Pakistan | 328 (12.0) | 105 (2.6) | 338 (16.4) | 102 (3.6) | 319 (11.8) | 105 (4.4) |
| Philippines | 297 (6.4) | 110 (2.3) | 315 (6.6) | 106 (2.3) | 280 (6.4) | 111 (2.7) |
| Poland | 520 (2.7) | 77 (1.5) | 516 (3.0) | 74 (1.9) | 524 (3.0) | 80 (1.8) |
| Portugal | 525 (2.6) | 76 (1.3) | 516 (2.9) | 74 (1.4) | 533 (2.9) | 76 (1.9) |
| Qatar | 449 (3.4) | 92 (2.0) | 450 (5.1) | 87 (2.2) | 449 (3.2) | 96 (2.9) |
| Russian Federation | 567 (3.3) | 68 (1.6) | 563 (3.6) | 67 (1.9) | 571 (3.5) | 69 (1.8) |
| Saudi Arabia | 398 (3.6) | 101 (2.0) | 412 (4.9) | 91 (1.9) | 385 (5.8) | 108 (3.0) |
| Serbia | 508 (3.2) | 84 (2.2) | 509 (3.4) | 79 (2.2) | 507 (4.0) | 89 (2.9) |
| Singapore | 625 (3.9) | 79 (2.3) | 621 (4.0) | 76 (2.0) | 629 (4.2) | 81 (2.8) |
| Slovak Republic | 510 (3.5) | 77 (2.3) | 503 (3.5) | 74 (2.6) | 516 (4.2) | 79 (2.7) |
| South Africa (5) | 374 (3.6) | 100 (1.8) | 384 (4.0) | 99 (2.2) | 364 (3.7) | 100 (2.3) |
| Spain | 502 (2.1) | 73 (1.6) | 495 (2.5) | 70 (1.8) | 509 (2.6) | 75 (2.0) |
| Sweden | 521 (2.8) | 73 (1.5) | 518 (3.2) | 72 (1.7) | 525 (3.1) | 74 (2.1) |
| Turkey (5) | 523 (4.4) | 100 (2.3) | 521 (4.5) | 95 (2.5) | 525 (5.6) | 104 (2.8) |
| United Arab Emirates | 481 (1.7) | 99 (0.9) | 477 (2.5) | 95 (1.1) | 486 (2.3) | 101 (1.3) |
| United States | 535 (2.5) | 85 (1.3) | 529 (3.0) | 83 (1.8) | 540 (2.9) | 86 (1.4) |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 512 (3.3) | 78 (1.9) | 502 (4.9) | 76 (2.4) | 521 (3.2) | 79 (2.1) |
| Quebec, Canada | 532 (2.3) | 67 (1.3) | 523 (3.0) | 65 (1.8) | 541 (2.4) | 67 (1.8) |
| Moscow City, Russian Fed. | 593 (2.2) | 62 (1.3) | 588 (2.5) | 61 (1.6) | 597 (2.5) | 63 (1.6) |
| Madrid, Spain | 518 (2.2) | 66 (1.3) | 510 (2.6) | 65 (1.8) | 526 (2.4) | 67 (1.5) |
| Abu Dhabi, UAE | 441 (2.2) | 98 (1.2) | 438 (2.8) | 96 (1.6) | 443 (3.2) | 100 (1.7) |
| Dubai, UAE | 544 (1.6) | 82 (1.6) | 540 (3.2) | 80 (2.4) | 548 (2.3) | 85 (1.6) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix E.2: Average Science Achievement and Standard Deviations by Gender

| Country | Overall | | Girls | | Boys | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| Albania | 489 (3.5) | 85 (2.4) | 494 (3.9) | 84 (2.5) | 485 (3.9) | 86 (3.2) |
| Armenia | 466 (3.4) | 77 (1.6) | 471 (3.5) | 75 (1.8) | 462 (4.0) | 79 (2.1) |
| Australia | 533 (2.4) | 79 (1.4) | 533 (2.9) | 75 (1.6) | 532 (2.7) | 83 (1.9) |
| Austria | 522 (2.6) | 74 (1.4) | 519 (3.1) | 72 (1.5) | 525 (3.0) | 76 (1.9) |
| Azerbaijan | 427 (3.3) | 97 (2.0) | 429 (3.9) | 94 (2.5) | 425 (3.5) | 99 (2.3) |
| Bahrain | 493 (3.4) | 92 (2.2) | 510 (3.8) | 86 (2.2) | 476 (5.1) | 95 (2.9) |
| Belgium (Flemish) | 501 (2.1) | 67 (1.0) | 499 (2.3) | 66 (1.3) | 503 (2.8) | 68 (1.4) |
| Bosnia and Herzegovina | 459 (2.9) | 79 (1.1) | 462 (3.1) | 76 (1.4) | 455 (3.5) | 81 (1.7) |
| Bulgaria | 521 (4.9) | 103 (3.5) | 525 (5.3) | 101 (3.7) | 518 (5.4) | 105 (4.2) |
| Canada | 523 (1.9) | 72 (1.0) | 520 (2.1) | 71 (1.3) | 526 (2.2) | 73 (1.3) |
| Chile | 469 (2.6) | 75 (1.3) | 466 (3.1) | 74 (1.5) | 472 (3.3) | 76 (1.9) |
| Chinese Taipei | 558 (1.8) | 65 (1.3) | 557 (2.0) | 62 (1.9) | 559 (2.2) | 68 (1.6) |
| Croatia | 524 (2.2) | 59 (1.3) | 524 (2.6) | 57 (1.6) | 524 (2.7) | 61 (1.9) |
| Cyprus | 511 (3.0) | 75 (1.4) | 509 (2.8) | 73 (1.8) | 514 (4.1) | 77 (1.8) |
| Czech Republic | 534 (2.6) | 69 (1.8) | 529 (3.0) | 68 (2.1) | 538 (3.0) | 69 (2.0) |
| Denmark | 522 (2.4) | 68 (1.1) | 523 (2.7) | 66 (1.4) | 522 (2.8) | 71 (1.4) |
| England | 537 (2.7) | 71 (1.8) | 537 (3.6) | 69 (2.1) | 537 (2.7) | 74 (2.5) |
| Finland | 555 (2.6) | 71 (1.5) | 557 (3.5) | 69 (1.9) | 552 (2.4) | 72 (1.7) |
| France | 488 (3.0) | 78 (1.3) | 489 (3.2) | 78 (1.6) | 487 (3.4) | 78 (1.9) |
| Georgia | 454 (3.9) | 84 (2.0) | 452 (4.7) | 83 (2.6) | 457 (4.2) | 84 (2.4) |
| Germany | 518 (2.2) | 77 (1.6) | 516 (2.8) | 76 (1.8) | 520 (2.4) | 78 (1.8) |
| Hong Kong SAR | 531 (3.3) | 71 (1.7) | 531 (3.1) | 69 (2.0) | 531 (4.3) | 73 (2.1) |
| Hungary | 529 (2.7) | 77 (1.5) | 526 (3.2) | 75 (2.2) | 533 (3.1) | 78 (2.0) |
| Iran, Islamic Rep. of | 441 (4.1) | 98 (2.3) | 440 (6.6) | 98 (3.6) | 442 (5.4) | 97 (2.2) |
| Ireland | 528 (3.2) | 75 (1.8) | 526 (3.8) | 74 (2.0) | 530 (3.4) | 76 (2.0) |
| Italy | 510 (3.0) | 65 (1.5) | 506 (3.3) | 65 (1.7) | 514 (3.3) | 65 (2.1) |
| Japan | 562 (1.8) | 69 (1.6) | 565 (2.0) | 64 (1.9) | 559 (2.1) | 73 (1.8) |
| Kazakhstan | 494 (3.1) | 76 (2.1) | 497 (3.6) | 76 (2.2) | 491 (3.1) | 77 (2.3) |
| Korea, Rep. of | 588 (2.1) | 67 (1.6) | 583 (2.4) | 63 (1.4) | 592 (2.5) | 70 (2.3) |
| Kosovo | 413 (3.7) | 87 (1.8) | 420 (4.2) | 85 (2.1) | 407 (4.0) | 88 (2.3) |
| Kuwait | 392 (6.1) | 122 (2.9) | 413 (6.9) | 114 (2.7) | 374 (8.7) | 127 (4.2) |
| Latvia | 542 (2.4) | 63 (1.7) | 544 (2.6) | 63 (1.8) | 540 (3.0) | 64 (2.1) |
| Lithuania | 538 (2.5) | 73 (1.4) | 540 (2.8) | 72 (1.9) | 536 (3.3) | 74 (1.9) |
| Malta | 496 (1.3) | 84 (1.2) | 493 (2.1) | 81 (2.1) | 498 (2.4) | 86 (1.4) |
| Montenegro | 453 (2.5) | 89 (1.3) | 457 (2.9) | 87 (1.7) | 451 (2.8) | 91 (1.8) |
| Morocco | 374 (5.8) | 121 (3.3) | 379 (6.4) | 119 (3.9) | 370 (5.8) | 122 (3.8) |
| Netherlands | 518 (2.9) | 65 (1.5) | 519 (3.1) | 62 (1.8) | 518 (3.3) | 67 (2.0) |
| New Zealand | 503 (2.3) | 82 (1.4) | 505 (3.2) | 80 (1.7) | 500 (2.8) | 84 (1.7) |
| North Macedonia | 426 (6.2) | 103 (2.9) | 433 (6.5) | 103 (3.5) | 419 (6.7) | 102 (3.1) |
| Northern Ireland | 518 (2.3) | 71 (1.5) | 519 (2.9) | 70 (1.7) | 518 (2.8) | 72 (2.1) |
| Norway (5) | 539 (2.2) | 67 (1.4) | 541 (2.4) | 65 (1.7) | 538 (3.1) | 68 (2.1) |
| Oman | 435 (4.1) | 118 (2.4) | 447 (3.8) | 110 (2.7) | 423 (5.0) | 124 (2.6) |
| Pakistan | 290 (13.4) | 126 (3.4) | 311 (15.4) | 119 (4.5) | 273 (14.5) | 129 (4.9) |
| Philippines | 249 (7.5) | 124 (2.8) | 261 (7.8) | 123 (3.0) | 238 (7.8) | 124 (3.0) |
| Poland | 531 (2.6) | 74 (1.4) | 532 (2.8) | 71 (2.1) | 529 (3.2) | 76 (1.7) |
| Portugal | 504 (2.6) | 67 (1.0) | 501 (3.1) | 66 (1.2) | 506 (2.7) | 67 (1.5) |
| Qatar | 449 (3.9) | 104 (2.3) | 456 (6.0) | 99 (2.9) | 443 (3.7) | 109 (2.8) |
| Russian Federation | 567 (3.0) | 64 (1.6) | 567 (3.5) | 63 (1.8) | 568 (3.3) | 64 (1.8) |
| Saudi Arabia | 402 (4.1) | 112 (2.5) | 434 (4.8) | 97 (2.3) | 373 (6.5) | 116 (3.1) |
| Serbia | 517 (3.5) | 81 (2.7) | 521 (3.5) | 78 (2.6) | 513 (4.3) | 84 (3.7) |
| Singapore | 595 (3.4) | 78 (2.1) | 591 (3.6) | 75 (2.0) | 598 (3.8) | 80 (2.6) |
| Slovak Republic | 521 (3.7) | 81 (3.3) | 518 (3.8) | 79 (3.4) | 523 (4.4) | 82 (4.0) |
| South Africa (5) | 324 (4.9) | 133 (2.5) | 335 (5.4) | 132 (3.1) | 314 (5.2) | 133 (3.0) |
| Spain | 511 (2.0) | 67 (1.3) | 511 (2.4) | 65 (1.8) | 512 (2.5) | 69 (1.9) |
| Sweden | 537 (3.3) | 74 (1.9) | 538 (3.6) | 72 (1.8) | 536 (3.8) | 75 (2.5) |
| Turkey (5) | 526 (4.2) | 91 (2.6) | 524 (4.4) | 87 (3.0) | 529 (5.2) | 94 (3.0) |
| United Arab Emirates | 473 (2.1) | 113 (1.0) | 475 (3.1) | 109 (1.4) | 471 (2.6) | 117 (1.4) |
| United States | 539 (2.7) | 84 (1.5) | 536 (3.0) | 83 (1.7) | 541 (3.2) | 86 (1.8) |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 524 (3.2) | 74 (1.7) | 522 (4.0) | 73 (2.3) | 526 (3.3) | 75 (2.0) |
| Quebec, Canada | 522 (2.5) | 65 (1.3) | 519 (2.7) | 64 (1.3) | 525 (3.0) | 66 (1.9) |
| Moscow City, Russian Fed. | 595 (2.2) | 63 (1.7) | 595 (2.5) | 61 (1.6) | 595 (2.6) | 64 (2.1) |
| Madrid, Spain | 523 (2.0) | 61 (1.2) | 521 (2.5) | 61 (1.7) | 524 (2.3) | 61 (1.4) |
| Abu Dhabi, UAE | 418 (2.8) | 116 (1.4) | 422 (3.8) | 114 (1.9) | 413 (3.9) | 119 (1.8) |
| Dubai, UAE | 545 (1.7) | 86 (1.5) | 545 (3.6) | 84 (2.6) | 544 (2.4) | 88 (1.6) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix E.3: Average Mathematics Achievement and Standard Deviations by Gender

| Country | Overall | | Girls | | Boys | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| Australia | 517 (3.8) | 90 (2.5) | 515 (3.6) | 84 (2.0) | 519 (5.5) | 95 (3.8) |
| Bahrain | 481 (1.7) | 95 (1.1) | 492 (2.4) | 94 (1.6) | 471 (2.2) | 95 (1.7) |
| Chile | 441 (2.8) | 75 (1.9) | 436 (3.5) | 74 (2.1) | 445 (3.8) | 77 (2.2) |
| Chinese Taipei | 612 (2.7) | 98 (1.5) | 614 (3.1) | 95 (1.9) | 611 (3.2) | 101 (1.8) |
| Cyprus | 501 (1.6) | 82 (1.8) | 503 (2.1) | 77 (1.7) | 499 (2.3) | 85 (2.5) |
| Egypt | 413 (5.2) | 95 (2.3) | 420 (5.3) | 91 (2.6) | 404 (7.9) | 100 (3.4) |
| England | 515 (5.3) | 89 (3.4) | 514 (5.6) | 86 (4.2) | 516 (7.2) | 93 (4.1) |
| Finland | 509 (2.6) | 73 (1.6) | 511 (2.6) | 70 (1.9) | 507 (3.2) | 77 (1.9) |
| France | 483 (2.5) | 69 (1.5) | 478 (2.5) | 66 (1.6) | 487 (3.1) | 71 (2.1) |
| Georgia | 461 (4.3) | 88 (3.1) | 457 (4.5) | 86 (3.4) | 465 (5.2) | 90 (3.6) |
| Hong Kong SAR | 578 (4.1) | 91 (3.5) | 582 (4.9) | 85 (4.1) | 575 (5.4) | 95 (3.7) |
| Hungary | 517 (2.9) | 89 (2.4) | 510 (3.2) | 87 (2.5) | 524 (3.6) | 91 (2.8) |
| Iran, Islamic Rep. of | 446 (3.7) | 93 (2.7) | 453 (5.0) | 87 (3.1) | 440 (5.6) | 97 (4.0) |
| Ireland | 524 (2.6) | 73 (1.7) | 524 (2.9) | 70 (1.7) | 523 (3.4) | 76 (2.3) |
| Israel | 519 (4.3) | 99 (3.0) | 514 (4.3) | 95 (2.6) | 525 (5.3) | 103 (4.1) |
| Italy | 497 (2.7) | 71 (1.4) | 491 (3.0) | 70 (1.6) | 504 (3.3) | 72 (1.8) |
| Japan | 594 (2.7) | 84 (2.1) | 593 (2.9) | 80 (2.5) | 595 (3.2) | 89 (2.1) |
| Jordan | 420 (4.3) | 87 (2.1) | 432 (3.8) | 81 (1.9) | 409 (6.4) | 90 (2.9) |
| Kazakhstan | 488 (3.3) | 82 (1.8) | 490 (3.9) | 80 (1.9) | 486 (3.7) | 84 (2.4) |
| Korea, Rep. of | 607 (2.8) | 97 (1.9) | 604 (3.4) | 94 (2.3) | 609 (3.1) | 99 (2.3) |
| Kuwait | 403 (5.0) | 88 (2.1) | 407 (5.4) | 82 (2.7) | 398 (7.9) | 94 (3.0) |
| Lebanon | 429 (2.9) | 72 (1.6) | 427 (3.5) | 73 (2.2) | 432 (3.3) | 72 (2.0) |
| Lithuania | 520 (2.9) | 82 (1.9) | 519 (2.8) | 80 (2.0) | 521 (3.7) | 83 (2.4) |
| Malaysia | 461 (3.2) | 91 (1.7) | 465 (3.0) | 88 (2.0) | 456 (4.1) | 93 (1.8) |
| Morocco | 388 (2.3) | 72 (1.4) | 386 (2.5) | 72 (1.7) | 391 (2.6) | 71 (1.6) |
| New Zealand | 482 (3.4) | 90 (2.2) | 478 (3.6) | 85 (2.6) | 484 (4.7) | 93 (2.5) |
| Norway (9) | 503 (2.4) | 78 (1.4) | 503 (2.7) | 76 (1.5) | 503 (3.0) | 80 (2.1) |
| Oman | 411 (2.8) | 99 (1.6) | 432 (3.3) | 90 (1.5) | 391 (4.0) | 103 (2.5) |
| Portugal | 500 (3.2) | 74 (2.2) | 495 (3.3) | 73 (2.1) | 505 (3.9) | 75 (2.9) |
| Qatar | 443 (4.0) | 95 (2.7) | 447 (5.0) | 91 (3.1) | 440 (5.4) | 99 (3.2) |
| Romania | 479 (4.3) | 98 (2.2) | 487 (4.6) | 95 (2.3) | 471 (4.7) | 100 (2.6) |
| Russian Federation | 543 (4.5) | 81 (2.4) | 541 (4.8) | 79 (2.8) | 546 (4.9) | 83 (2.5) |
| Saudi Arabia | 394 (2.5) | 78 (1.2) | 403 (3.4) | 74 (1.5) | 385 (3.4) | 80 (1.6) |
| Singapore | 616 (4.0) | 89 (2.9) | 617 (4.6) | 83 (3.3) | 614 (4.4) | 94 (3.2) |
| South Africa (9) | 389 (2.3) | 77 (1.4) | 393 (2.4) | 77 (1.6) | 386 (2.5) | 77 (1.4) |
| Sweden | 503 (2.5) | 77 (1.5) | 504 (3.0) | 74 (1.9) | 501 (2.9) | 79 (1.9) |
| Turkey | 496 (4.3) | 109 (2.4) | 501 (4.4) | 106 (2.8) | 490 (5.8) | 113 (3.5) |
| United Arab Emirates | 473 (1.9) | 103 (1.1) | 476 (3.4) | 97 (1.9) | 471 (3.4) | 108 (1.7) |
| United States | 515 (4.8) | 99 (2.6) | 517 (4.0) | 95 (2.4) | 514 (6.1) | 103 (3.5) |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 530 (4.3) | 79 (2.7) | 528 (4.4) | 76 (2.9) | 531 (4.8) | 81 (3.4) |
| Quebec, Canada | 543 (3.7) | 67 (2.4) | 541 (4.3) | 66 (2.5) | 546 (4.0) | 67 (2.8) |
| Moscow City, Russian Fed. | 575 (4.2) | 83 (2.0) | 566 (4.2) | 82 (1.9) | 584 (4.8) | 84 (2.6) |
| Gauteng, RSA (9) | 421 (3.0) | 77 (2.0) | 423 (3.1) | 76 (2.0) | 417 (3.5) | 77 (2.4) |
| Western Cape, RSA (9) | 441 (4.4) | 89 (3.0) | 436 (5.1) | 86 (3.6) | 447 (5.4) | 92 (3.6) |
| Abu Dhabi, UAE | 436 (2.9) | 104 (1.7) | 441 (5.4) | 100 (2.4) | 431 (4.4) | 107 (2.3) |
| Dubai, UAE | 537 (2.0) | 92 (1.9) | 532 (4.8) | 88 (2.8) | 541 (5.9) | 96 (3.0) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Appendix E.4: Average Science Achievement and Standard Deviations by Gender

| Country | Overall | | Girls | | Boys | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| Australia | 528 (3.2) | 88 (2.0) | 529 (3.1) | 82 (1.6) | 528 (4.6) | 94 (3.0) |
| Bahrain | 486 (1.9) | 103 (1.7) | 512 (2.6) | 89 (1.9) | 461 (2.8) | 109 (2.3) |
| Chile | 462 (2.9) | 78 (1.7) | 457 (3.6) | 76 (2.0) | 468 (3.9) | 80 (2.2) |
| Chinese Taipei | 574 (1.9) | 83 (1.2) | 572 (2.4) | 80 (1.4) | 576 (2.5) | 85 (1.7) |
| Cyprus | 484 (1.9) | 84 (1.5) | 491 (2.4) | 78 (1.8) | 476 (2.5) | 90 (2.0) |
| Egypt | 389 (5.4) | 112 (2.4) | 402 (6.1) | 106 (2.9) | 374 (8.2) | 117 (3.8) |
| England | 517 (4.8) | 92 (3.2) | 518 (5.5) | 88 (4.1) | 515 (6.6) | 95 (3.4) |
| Finland | 543 (3.1) | 87 (2.0) | 552 (3.1) | 80 (2.2) | 533 (3.9) | 92 (2.4) |
| France | 489 (2.7) | 77 (1.3) | 487 (2.6) | 73 (1.7) | 490 (3.6) | 81 (1.8) |
| Georgia | 447 (3.9) | 83 (2.2) | 447 (4.4) | 80 (2.5) | 446 (4.5) | 86 (2.9) |
| Hong Kong SAR | 504 (5.2) | 95 (3.2) | 505 (5.9) | 92 (3.6) | 503 (6.3) | 98 (3.7) |
| Hungary | 530 (2.6) | 82 (2.0) | 520 (2.9) | 81 (2.4) | 540 (3.2) | 82 (2.1) |
| Iran, Islamic Rep. of | 449 (3.6) | 89 (2.2) | 459 (4.6) | 81 (2.6) | 441 (5.4) | 94 (3.6) |
| Ireland | 523 (2.9) | 83 (1.9) | 526 (3.0) | 79 (2.0) | 521 (3.9) | 87 (2.5) |
| Israel | 513 (4.2) | 97 (2.7) | 512 (4.5) | 90 (2.2) | 515 (5.0) | 103 (4.0) |
| Italy | 500 (2.6) | 74 (1.5) | 497 (2.8) | 72 (1.9) | 504 (3.0) | 76 (1.8) |
| Japan | 570 (2.1) | 72 (1.6) | 565 (2.4) | 67 (1.7) | 575 (2.5) | 77 (1.9) |
| Jordan | 452 (4.7) | 98 (2.6) | 480 (4.0) | 85 (2.1) | 427 (6.6) | 102 (3.4) |
| Kazakhstan | 478 (3.1) | 85 (1.8) | 483 (3.4) | 82 (1.9) | 474 (3.6) | 87 (2.3) |
| Korea, Rep. of | 561 (2.1) | 83 (1.3) | 555 (2.9) | 79 (1.8) | 566 (2.6) | 87 (2.0) |
| Kuwait | 444 (5.7) | 98 (2.0) | 461 (5.7) | 87 (2.6) | 426 (9.4) | 107 (3.0) |
| Lebanon | 377 (4.6) | 104 (2.9) | 379 (5.3) | 105 (3.4) | 374 (5.2) | 103 (2.9) |
| Lithuania | 534 (3.0) | 78 (1.6) | 535 (3.0) | 75 (1.8) | 533 (3.6) | 80 (1.9) |
| Malaysia | 460 (3.5) | 96 (2.0) | 463 (3.5) | 93 (2.3) | 458 (4.3) | 100 (2.1) |
| Morocco | 394 (2.7) | 85 (1.7) | 395 (2.9) | 85 (2.0) | 393 (2.9) | 86 (1.7) |
| New Zealand | 499 (3.5) | 93 (2.2) | 497 (3.6) | 87 (2.6) | 500 (4.9) | 97 (2.4) |
| Norway (9) | 495 (3.1) | 89 (1.7) | 495 (3.5) | 84 (1.9) | 496 (3.8) | 94 (2.1) |
| Oman | 457 (2.9) | 105 (2.0) | 485 (3.1) | 91 (2.0) | 431 (4.5) | 109 (2.8) |
| Portugal | 519 (2.9) | 72 (1.9) | 516 (3.2) | 71 (2.0) | 522 (3.4) | 73 (2.7) |
| Qatar | 475 (4.4) | 103 (2.2) | 488 (5.2) | 94 (2.3) | 461 (6.0) | 109 (2.9) |
| Romania | 470 (4.2) | 92 (2.2) | 475 (4.3) | 88 (2.5) | 465 (4.9) | 95 (2.6) |
| Russian Federation | 543 (4.2) | 75 (2.1) | 539 (4.5) | 73 (2.6) | 546 (4.6) | 77 (2.2) |
| Saudi Arabia | 431 (2.6) | 89 (1.2) | 455 (3.3) | 79 (1.5) | 408 (3.9) | 91 (1.5) |
| Singapore | 608 (3.9) | 88 (2.8) | 604 (4.5) | 82 (3.3) | 611 (4.5) | 92 (3.0) |
| South Africa (9) | 370 (3.1) | 103 (1.5) | 376 (3.2) | 101 (1.6) | 364 (3.6) | 104 (1.9) |
| Sweden | 521 (3.2) | 95 (2.1) | 527 (3.7) | 90 (2.7) | 516 (3.8) | 100 (2.4) |
| Turkey | 515 (3.7) | 98 (2.2) | 520 (3.8) | 94 (2.3) | 510 (5.1) | 102 (3.2) |
| United Arab Emirates | 473 (2.2) | 125 (1.3) | 486 (3.9) | 115 (2.5) | 461 (4.0) | 133 (1.9) |
| United States | 522 (4.7) | 99 (2.7) | 525 (3.9) | 94 (2.2) | 520 (6.1) | 103 (3.8) |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 522 (3.0) | 79 (1.8) | 520 (3.4) | 75 (1.9) | 523 (3.5) | 82 (2.8) |
| Quebec, Canada | 537 (3.6) | 69 (2.2) | 537 (4.1) | 69 (2.4) | 536 (4.0) | 70 (2.7) |
| Moscow City, Russian Fed. | 567 (2.9) | 69 (1.3) | 561 (3.2) | 68 (1.6) | 572 (3.3) | 69 (1.6) |
| Gauteng, RSA (9) | 422 (3.9) | 98 (2.3) | 427 (4.1) | 96 (2.4) | 416 (4.3) | 101 (2.6) |
| Western Cape, RSA (9) | 439 (5.1) | 111 (3.4) | 434 (6.1) | 107 (4.1) | 445 (6.2) | 115 (4.0) |
| Abu Dhabi, UAE | 420 (3.6) | 135 (2.2) | 436 (6.9) | 127 (3.5) | 406 (5.8) | 140 (2.6) |
| Dubai, UAE | 548 (2.0) | 102 (2.0) | 551 (5.5) | 95 (2.9) | 544 (6.6) | 108 (3.5) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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IEA TIMSS 2019

# APPENDIX F

# Average Percent Correct in the Content and Cognitive Domains

## Appendix F.1: Average Percent Correct in the Mathematics Content and Cognitive Domains

### eTIMSS

| Country | Overall Mathematics | Mathematics Content Domains | | | Mathematics Cognitive Domains | | |
|---|---|---|---|---|---|---|---|
| | | Number | Measurement and Geometry | Data | Knowing | Applying | Reasoning |
| Austria | 50 (0.6) | 52 (0.6) | 48 (0.6) | 50 (0.8) | 58 (0.5) | 49 (0.7) | 42 (0.6) |
| Canada | 43 (0.5) | 42 (0.5) | 42 (0.5) | 48 (0.6) | 50 (0.5) | 42 (0.5) | 37 (0.5) |
| Chile | 27 (0.5) | 27 (0.5) | 27 (0.5) | 29 (0.6) | 32 (0.5) | 26 (0.5) | 24 (0.4) |
| Chinese Taipei | 67 (0.4) | 69 (0.5) | 65 (0.5) | 66 (0.6) | 78 (0.4) | 67 (0.5) | 53 (0.5) |
| Croatia | 43 (0.5) | 44 (0.5) | 42 (0.6) | 41 (0.7) | 51 (0.6) | 41 (0.6) | 36 (0.6) |
| Czech Republic | 49 (0.6) | 51 (0.7) | 49 (0.6) | 47 (0.7) | 56 (0.6) | 48 (0.7) | 44 (0.7) |
| Denmark | 47 (0.5) | 46 (0.6) | 47 (0.5) | 49 (0.6) | 54 (0.5) | 45 (0.6) | 41 (0.5) |
| England | 55 (0.8) | 57 (0.9) | 50 (0.8) | 60 (0.7) | 63 (0.7) | 54 (0.8) | 47 (0.9) |
| Finland | 49 (0.5) | 48 (0.5) | 48 (0.6) | 52 (0.7) | 56 (0.6) | 48 (0.6) | 42 (0.5) |
| France | 37 (0.7) | 37 (0.8) | 39 (0.7) | 38 (0.8) | 46 (0.8) | 35 (0.7) | 30 (0.7) |
| Georgia | 36 (0.8) | 41 (0.8) | 32 (0.7) | 31 (0.9) | 42 (0.9) | 36 (0.8) | 29 (0.8) |
| Germany | 46 (0.6) | 45 (0.6) | 46 (0.6) | 46 (0.8) | 54 (0.6) | 42 (0.6) | 41 (0.7) |
| Hong Kong SAR | 67 (0.8) | 67 (0.9) | 66 (0.9) | 69 (0.8) | 73 (0.7) | 69 (0.9) | 58 (1.1) |
| Hungary | 47 (0.7) | 50 (0.7) | 44 (0.7) | 45 (0.8) | 56 (0.7) | 45 (0.7) | 40 (0.7) |
| Italy | 44 (0.7) | 47 (0.7) | 40 (0.7) | 42 (0.8) | 53 (0.7) | 43 (0.8) | 33 (0.6) |
| Korea, Rep. of | 67 (0.6) | 67 (0.6) | 66 (0.6) | 70 (0.6) | 75 (0.5) | 66 (0.6) | 59 (0.7) |
| Lithuania | 51 (0.7) | 51 (0.8) | 49 (0.7) | 55 (0.7) | 58 (0.7) | 52 (0.8) | 42 (0.7) |
| Malta | 43 (0.3) | 44 (0.4) | 38 (0.4) | 46 (0.6) | 51 (0.3) | 41 (0.4) | 35 (0.4) |
| Netherlands | 50 (0.6) | 49 (0.6) | 47 (0.6) | 56 (0.8) | 56 (0.5) | 48 (0.7) | 44 (0.6) |
| Norway (5) | 52 (0.6) | 52 (0.6) | 50 (0.6) | 55 (0.8) | 58 (0.5) | 50 (0.7) | 46 (0.6) |
| Portugal | 47 (0.7) | 48 (0.8) | 44 (0.7) | 49 (0.7) | 55 (0.7) | 47 (0.7) | 38 (0.7) |
| Qatar | 31 (0.7) | 33 (0.8) | 27 (0.7) | 31 (0.9) | 38 (0.8) | 29 (0.8) | 23 (0.6) |
| Russian Federation | 58 (0.9) | 60 (0.9) | 56 (1.0) | 58 (0.9) | 62 (0.8) | 59 (1.0) | 52 (1.0) |
| Singapore | 73 (0.9) | 76 (0.9) | 68 (1.0) | 72 (0.9) | 80 (0.8) | 73 (1.0) | 63 (1.1) |
| Slovak Republic | 43 (0.8) | 44 (0.8) | 40 (0.8) | 45 (0.9) | 49 (0.8) | 41 (0.9) | 39 (0.8) |
| Spain | 41 (0.4) | 42 (0.5) | 37 (0.5) | 43 (0.5) | 49 (0.4) | 40 (0.5) | 33 (0.5) |
| Sweden | 46 (0.7) | 45 (0.8) | 44 (0.7) | 50 (0.9) | 52 (0.8) | 44 (0.8) | 42 (0.7) |
| Turkey (5) | 48 (1.0) | 50 (1.1) | 46 (0.9) | 47 (1.1) | 54 (1.0) | 49 (1.1) | 38 (1.0) |
| United Arab Emirates | 38 (0.3) | 40 (0.4) | 35 (0.3) | 38 (0.3) | 45 (0.4) | 37 (0.4) | 30 (0.3) |
| United States | 50 (0.7) | 52 (0.7) | 44 (0.6) | 52 (0.7) | 58 (0.7) | 49 (0.7) | 40 (0.6) |
| **International Average** | **48 (0.1)** | **49 (0.1)** | **46 (0.1)** | **49 (0.1)** | **55 (0.1)** | **47 (0.1)** | **41 (0.1)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 44 (0.9) | 41 (0.8) | 43 (1.0) | 49 (1.0) | 49 (0.9) | 43 (1.0) | 38 (0.8) |
| Quebec, Canada | 49 (0.6) | 49 (0.6) | 47 (0.6) | 52 (0.8) | 57 (0.5) | 48 (0.7) | 38 (0.6) |
| Moscow City, Russian Fed. | 66 (0.6) | 67 (0.7) | 61 (0.7) | 70 (0.7) | 68 (0.5) | 68 (0.7) | 60 (0.8) |
| Madrid, Spain | 45 (0.6) | 47 (0.7) | 40 (0.6) | 46 (0.6) | 53 (0.6) | 43 (0.6) | 36 (0.6) |
| Abu Dhabi, UAE | 30 (0.4) | 31 (0.4) | 28 (0.4) | 30 (0.4) | 37 (0.4) | 28 (0.4) | 23 (0.4) |
| Dubai, UAE | 52 (0.4) | 54 (0.4) | 48 (0.4) | 55 (0.5) | 59 (0.5) | 52 (0.4) | 43 (0.5) |

### paperTIMSS

| Country | Overall Mathematics | Mathematics Content Domains | | | Mathematics Cognitive Domains | | |
|---|---|---|---|---|---|---|---|
| | | Number | Measurement and Geometry | Data | Knowing | Applying | Reasoning |
| Armenia | 42 (0.7) | 48 (0.6) | 38 (0.7) | 32 (0.9) | 49 (0.7) | 42 (0.8) | 31 (0.6) |
| Australia | 48 (0.7) | 46 (0.7) | 46 (0.7) | 54 (0.8) | 53 (0.7) | 47 (0.7) | 42 (0.7) |
| Azerbaijan | 48 (0.7) | 51 (0.7) | 42 (0.8) | 47 (0.8) | 54 (0.7) | 48 (0.8) | 38 (0.7) |
| Bahrain | 39 (0.6) | 39 (0.6) | 36 (0.6) | 41 (0.7) | 46 (0.5) | 37 (0.7) | 31 (0.6) |
| Belgium (Flemish) | 52 (0.5) | 51 (0.6) | 53 (0.6) | 52 (0.6) | 62 (0.5) | 49 (0.6) | 42 (0.6) |
| Bulgaria | 48 (1.0) | 50 (1.0) | 46 (1.0) | 44 (1.2) | 54 (1.0) | 48 (1.2) | 39 (1.0) |
| Cyprus | 51 (0.7) | 54 (0.8) | 48 (0.7) | 51 (0.9) | 58 (0.8) | 52 (0.8) | 42 (0.8) |
| Iran, Islamic Rep. of | 31 (0.7) | 33 (0.7) | 31 (0.7) | 29 (0.7) | 38 (0.7) | 31 (0.7) | 22 (0.6) |
| Ireland | 56 (0.7) | 58 (0.7) | 51 (0.7) | 56 (0.8) | 63 (0.7) | 56 (0.7) | 46 (0.7) |
| Japan | 68 (0.4) | 67 (0.4) | 66 (0.6) | 73 (0.5) | 74 (0.4) | 68 (0.5) | 59 (0.6) |
| Kazakhstan | 45 (0.7) | 50 (0.7) | 43 (0.7) | 40 (0.7) | 52 (0.6) | 45 (0.8) | 37 (0.7) |
| Latvia | 55 (0.7) | 57 (0.8) | 52 (0.8) | 56 (0.8) | 60 (0.7) | 55 (0.8) | 49 (0.8) |
| New Zealand | 40 (0.6) | 39 (0.6) | 37 (0.5) | 46 (0.7) | 45 (0.6) | 39 (0.6) | 36 (0.6) |
| Northern Ireland | 60 (0.7) | 63 (0.8) | 55 (0.7) | 61 (0.6) | 68 (0.7) | 60 (0.7) | 51 (0.7) |
| Oman | 30 (0.8) | 30 (0.9) | 30 (0.8) | 31 (0.8) | 36 (0.9) | 29 (0.9) | 24 (0.8) |
| Poland | 48 (0.7) | 47 (0.7) | 48 (0.7) | 51 (0.8) | 52 (0.7) | 48 (0.8) | 42 (0.7) |
| Serbia | 45 (0.7) | 49 (0.7) | 41 (0.8) | 43 (1.0) | 51 (0.8) | 45 (0.8) | 38 (0.8) |
| **International Average** | **47 (0.2)** | **49 (0.2)** | **45 (0.2)** | **48 (0.2)** | **54 (0.2)** | **47 (0.2)** | **39 (0.2)** |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix F.1: Average Percent Correct in the Mathematics Content and Cognitive Domains

paperTIMSS Less Difficult

(Continued)

| Country | Overall Mathematics | Mathematics Content Domains | | | Mathematics Cognitive Domains | | |
|---|---|---|---|---|---|---|---|
| | | Number | Measurement and Geometry | Data | Knowing | Applying | Reasoning |
| Albania | 61 (0.8) | 62 (0.9) | 58 (0.7) | 60 (0.8) | 69 (0.8) | 59 (0.8) | 45 (0.8) |
| Bosnia and Herzegovina | 49 (0.6) | 51 (0.6) | 49 (0.6) | 43 (0.7) | 57 (0.5) | 45 (0.6) | 38 (0.7) |
| Kosovo | 49 (0.7) | 50 (0.7) | 48 (0.6) | 46 (0.8) | 59 (0.7) | 46 (0.8) | 33 (0.7) |
| Kuwait | 39 (0.9) | 39 (0.9) | 37 (0.9) | 40 (1.0) | 48 (1.0) | 35 (0.9) | 25 (0.9) |
| Montenegro | 50 (0.4) | 50 (0.4) | 50 (0.4) | 49 (0.5) | 57 (0.4) | 47 (0.4) | 39 (0.5) |
| Morocco | 38 (0.8) | 38 (0.8) | 38 (0.8) | 38 (1.0) | 47 (0.8) | 35 (0.9) | 25 (0.9) |
| North Macedonia | 55 (1.1) | 56 (1.1) | 54 (1.0) | 55 (1.2) | 64 (1.0) | 53 (1.2) | 41 (1.1) |
| Ψ Pakistan | 28 (1.9) | 31 (2.0) | 25 (1.7) | 23 (2.0) | 37 (2.3) | 23 (1.8) | 18 (1.3) |
| Ψ Philippines | 25 (0.8) | 26 (0.8) | 22 (0.7) | 26 (1.0) | 33 (1.0) | 22 (0.8) | 14 (0.5) |
| Saudi Arabia | 41 (0.7) | 41 (0.7) | 40 (0.6) | 42 (0.7) | 50 (0.7) | 37 (0.7) | 29 (0.6) |
| South Africa (5) | 36 (0.6) | 35 (0.6) | 34 (0.7) | 40 (0.7) | 45 (0.7) | 33 (0.7) | 23 (0.6) |
| **International Average** | **43 (0.3)** | **44 (0.3)** | **41 (0.3)** | **42 (0.3)** | **51 (0.3)** | **40 (0.3)** | **30 (0.2)** |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix F.2: Average Percent Correct in the Science Content and Cognitive Domains

**eTIMSS**

| Country | Overall Science | Science Content Domains | | | Science Cognitive Domains | | |
|---|---|---|---|---|---|---|---|
| | | Life Science | Physical Science | Earth Science | Knowing | Applying | Reasoning |
| Austria | 51 (0.5) | 50 (0.5) | 54 (0.5) | 50 (0.6) | 54 (0.5) | 52 (0.5) | 44 (0.5) |
| Canada | 52 (0.3) | 52 (0.3) | 52 (0.4) | 49 (0.4) | 55 (0.3) | 51 (0.4) | 44 (0.4) |
| Chile | 40 (0.5) | 41 (0.5) | 40 (0.5) | 38 (0.6) | 44 (0.5) | 39 (0.5) | 34 (0.5) |
| Chinese Taipei | 60 (0.3) | 54 (0.3) | 66 (0.4) | 60 (0.4) | 62 (0.3) | 62 (0.4) | 52 (0.5) |
| Croatia | 51 (0.4) | 49 (0.4) | 55 (0.5) | 49 (0.5) | 56 (0.5) | 51 (0.5) | 44 (0.6) |
| Czech Republic | 54 (0.4) | 54 (0.5) | 55 (0.4) | 53 (0.5) | 58 (0.4) | 53 (0.5) | 48 (0.5) |
| Denmark | 51 (0.4) | 51 (0.5) | 51 (0.5) | 53 (0.6) | 54 (0.4) | 51 (0.5) | 45 (0.6) |
| England | 55 (0.5) | 53 (0.6) | 57 (0.6) | 53 (0.6) | 59 (0.5) | 53 (0.6) | 49 (0.7) |
| Finland | 59 (0.5) | 58 (0.5) | 60 (0.6) | 59 (0.6) | 61 (0.5) | 59 (0.5) | 54 (0.6) |
| France | 45 (0.6) | 45 (0.6) | 45 (0.6) | 44 (0.7) | 48 (0.7) | 47 (0.6) | 35 (0.6) |
| Georgia | 38 (0.6) | 37 (0.6) | 40 (0.7) | 35 (0.7) | 42 (0.7) | 37 (0.6) | 31 (0.6) |
| Germany | 51 (0.5) | 51 (0.5) | 53 (0.6) | 47 (0.6) | 54 (0.5) | 51 (0.5) | 44 (0.6) |
| Hong Kong SAR | 54 (0.6) | 51 (0.7) | 56 (0.7) | 56 (0.8) | 58 (0.6) | 53 (0.7) | 47 (0.7) |
| Hungary | 53 (0.5) | 53 (0.5) | 54 (0.6) | 52 (0.7) | 57 (0.6) | 53 (0.6) | 47 (0.6) |
| Italy | 49 (0.6) | 49 (0.6) | 49 (0.6) | 47 (0.7) | 53 (0.6) | 48 (0.6) | 40 (0.6) |
| Korea, Rep. of | 66 (0.4) | 62 (0.5) | 73 (0.4) | 64 (0.6) | 67 (0.4) | 69 (0.6) | 60 (0.5) |
| Lithuania | 55 (0.5) | 53 (0.5) | 60 (0.6) | 51 (0.7) | 58 (0.5) | 54 (0.6) | 50 (0.6) |
| Malta | 47 (0.3) | 46 (0.4) | 48 (0.3) | 44 (0.4) | 51 (0.4) | 47 (0.3) | 38 (0.4) |
| Netherlands | 50 (0.6) | 49 (0.6) | 52 (0.6) | 49 (0.7) | 52 (0.6) | 51 (0.6) | 44 (0.7) |
| Norway (5) | 55 (0.5) | 56 (0.5) | 55 (0.6) | 56 (0.6) | 59 (0.5) | 55 (0.5) | 48 (0.6) |
| Portugal | 47 (0.4) | 47 (0.4) | 48 (0.5) | 46 (0.5) | 50 (0.4) | 47 (0.5) | 40 (0.5) |
| Qatar | 39 (0.7) | 38 (0.7) | 41 (0.7) | 38 (0.8) | 44 (0.7) | 39 (0.7) | 30 (0.7) |
| Russian Federation | 62 (0.7) | 61 (0.7) | 66 (0.7) | 57 (0.8) | 63 (0.8) | 65 (0.7) | 55 (0.6) |
| Singapore | 68 (0.7) | 68 (0.7) | 73 (0.7) | 59 (0.8) | 69 (0.7) | 70 (0.8) | 65 (0.8) |
| Slovak Republic | 52 (0.7) | 50 (0.7) | 55 (0.7) | 49 (0.7) | 56 (0.7) | 52 (0.7) | 44 (0.7) |
| Spain | 49 (0.4) | 48 (0.3) | 50 (0.5) | 48 (0.5) | 53 (0.4) | 49 (0.5) | 40 (0.5) |
| Sweden | 55 (0.7) | 55 (0.7) | 55 (0.7) | 56 (0.8) | 59 (0.7) | 55 (0.7) | 49 (0.7) |
| Turkey (5) | 54 (0.8) | 51 (0.9) | 59 (0.9) | 51 (0.9) | 58 (0.9) | 54 (0.9) | 45 (0.8) |
| United Arab Emirates | 44 (0.3) | 42 (0.4) | 47 (0.4) | 43 (0.3) | 49 (0.3) | 44 (0.4) | 35 (0.4) |
| United States | 55 (0.5) | 56 (0.5) | 55 (0.6) | 54 (0.6) | 59 (0.5) | 55 (0.6) | 48 (0.6) |
| **International Average** | **52 (0.1)** | **51 (0.1)** | **54 (0.1)** | **50 (0.1)** | **55 (0.1)** | **52 (0.1)** | **45 (0.1)** |
| **Benchmarking Participants** | | | | | | | |
| Ontario, Canada | 52 (0.6) | 53 (0.6) | 52 (0.7) | 49 (0.8) | 55 (0.6) | 51 (0.7) | 45 (0.7) |
| Quebec, Canada | 51 (0.5) | 52 (0.5) | 52 (0.6) | 49 (0.7) | 55 (0.5) | 51 (0.6) | 44 (0.6) |
| Moscow City, Russian Fed. | 68 (0.5) | 66 (0.5) | 71 (0.6) | 65 (0.6) | 69 (0.5) | 71 (0.5) | 61 (0.6) |
| Madrid, Spain | 51 (0.4) | 50 (0.5) | 53 (0.5) | 51 (0.5) | 55 (0.6) | 52 (0.5) | 44 (0.5) |
| Abu Dhabi, UAE | 35 (0.4) | 33 (0.4) | 38 (0.4) | 35 (0.4) | 39 (0.4) | 35 (0.4) | 27 (0.3) |
| Dubai, UAE | 57 (0.3) | 55 (0.3) | 62 (0.4) | 55 (0.3) | 63 (0.3) | 57 (0.3) | 47 (0.4) |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix F.2: Average Percent Correct in the Science Content and Cognitive Domains

**paperTIMSS** (Continued)

| Country | Overall Science | Science Content Domains | | | Science Cognitive Domains | | |
|---|---|---|---|---|---|---|---|
| | | Life Science | Physical Science | Earth Science | Knowing | Applying | Reasoning |
| Albania | 47 (0.7) | 45 (0.6) | 50 (0.7) | 44 (0.9) | 51 (0.7) | 46 (0.7) | 39 (0.8) |
| Armenia | 41 (0.6) | 42 (0.6) | 41 (0.7) | 38 (0.7) | 45 (0.6) | 39 (0.6) | 38 (0.7) |
| Australia | 55 (0.5) | 55 (0.6) | 56 (0.6) | 54 (0.6) | 59 (0.6) | 54 (0.6) | 50 (0.6) |
| Azerbaijan | 36 (0.5) | 34 (0.5) | 39 (0.6) | 35 (0.5) | 39 (0.5) | 35 (0.6) | 31 (0.5) |
| Bahrain | 48 (0.6) | 47 (0.6) | 51 (0.6) | 44 (0.6) | 52 (0.6) | 48 (0.7) | 38 (0.7) |
| Belgium (Flemish) | 48 (0.4) | 46 (0.4) | 51 (0.5) | 46 (0.5) | 49 (0.5) | 48 (0.5) | 44 (0.5) |
| Bosnia and Herzegovina | 40 (0.5) | 41 (0.5) | 41 (0.6) | 35 (0.6) | 42 (0.5) | 40 (0.6) | 34 (0.6) |
| Bulgaria | 54 (1.0) | 54 (1.0) | 56 (1.1) | 51 (0.9) | 58 (0.9) | 55 (1.0) | 45 (1.0) |
| Cyprus | 50 (0.6) | 50 (0.7) | 53 (0.7) | 47 (0.6) | 52 (0.7) | 53 (0.6) | 43 (0.7) |
| Iran, Islamic Rep. of | 38 (0.7) | 35 (0.7) | 44 (0.8) | 36 (0.7) | 42 (0.7) | 38 (0.7) | 31 (0.6) |
| Ireland | 54 (0.7) | 53 (0.7) | 55 (0.6) | 55 (0.8) | 58 (0.7) | 54 (0.7) | 47 (0.7) |
| Japan | 61 (0.4) | 57 (0.4) | 68 (0.4) | 60 (0.5) | 58 (0.4) | 66 (0.4) | 60 (0.5) |
| Kazakhstan | 47 (0.6) | 44 (0.6) | 52 (0.7) | 44 (0.8) | 49 (0.6) | 47 (0.7) | 41 (0.7) |
| Kosovo | 33 (0.5) | 31 (0.6) | 36 (0.6) | 32 (0.5) | 39 (0.6) | 31 (0.5) | 26 (0.5) |
| Kuwait | 33 (0.9) | 32 (0.9) | 35 (0.9) | 32 (1.0) | 38 (1.0) | 32 (0.9) | 25 (0.8) |
| Latvia | 57 (0.5) | 54 (0.5) | 62 (0.6) | 55 (0.8) | 59 (0.5) | 58 (0.6) | 52 (0.7) |
| Montenegro | 39 (0.4) | 40 (0.4) | 40 (0.4) | 34 (0.5) | 42 (0.3) | 40 (0.5) | 32 (0.4) |
| Ψ Morocco | 30 (0.8) | 29 (0.7) | 32 (0.9) | 29 (0.9) | 33 (0.8) | 30 (0.9) | 24 (0.7) |
| New Zealand | 49 (0.4) | 49 (0.5) | 49 (0.5) | 48 (0.5) | 52 (0.4) | 48 (0.5) | 43 (0.5) |
| North Macedonia | 36 (1.0) | 34 (0.9) | 40 (1.2) | 33 (1.0) | 39 (1.0) | 35 (1.0) | 30 (0.9) |
| Northern Ireland | 52 (0.4) | 51 (0.5) | 53 (0.5) | 52 (0.5) | 56 (0.4) | 51 (0.5) | 45 (0.6) |
| Oman | 39 (0.7) | 38 (0.7) | 42 (0.8) | 36 (0.7) | 42 (0.7) | 38 (0.8) | 33 (0.7) |
| Ж Pakistan | 21 (1.1) | 20 (1.1) | 23 (1.4) | 22 (0.7) | 24 (1.2) | 21 (1.2) | 18 (0.9) |
| Ж Philippines | 20 (0.5) | 18 (0.5) | 21 (0.6) | 21 (0.5) | 22 (0.6) | 20 (0.5) | 16 (0.4) |
| Poland | 55 (0.5) | 54 (0.5) | 56 (0.6) | 53 (0.6) | 56 (0.5) | 58 (0.5) | 47 (0.7) |
| Saudi Arabia | 34 (0.5) | 32 (0.5) | 37 (0.6) | 32 (0.5) | 39 (0.6) | 33 (0.5) | 25 (0.5) |
| Serbia | 52 (0.7) | 52 (0.7) | 56 (0.8) | 45 (0.8) | 53 (0.6) | 55 (0.8) | 45 (0.7) |
| Ж South Africa (5) | 25 (0.6) | 24 (0.6) | 26 (0.6) | 26 (0.5) | 27 (0.7) | 25 (0.6) | 21 (0.5) |
| **International Average** | **43 (0.1)** | **41 (0.1)** | **45 (0.1)** | **41 (0.1)** | **46 (0.1)** | **43 (0.1)** | **37 (0.1)** |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix F.3: Average Percent Correct in the Mathematics Content and Cognitive Domains

### eTIMSS

| Country | Overall Mathematics | Mathematics Content Domains | | | | Mathematics Cognitive Domains | | |
|---|---|---|---|---|---|---|---|---|
| | | Number | Algebra | Geometry | Data and Probability | Knowing | Applying | Reasoning |
| Ψ Chile | 25 (0.5) | 28 (0.6) | 23 (0.5) | 21 (0.5) | 27 (0.6) | 31 (0.6) | 24 (0.5) | 18 (0.5) |
| Chinese Taipei | 66 (0.6) | 70 (0.6) | 66 (0.6) | 64 (0.6) | 64 (0.6) | 72 (0.5) | 66 (0.6) | 60 (0.6) |
| England | 42 (1.3) | 46 (1.3) | 37 (1.3) | 36 (1.2) | 48 (1.4) | 47 (1.2) | 43 (1.3) | 32 (1.3) |
| Finland | 39 (0.6) | 45 (0.7) | 33 (0.6) | 36 (0.6) | 45 (0.7) | 45 (0.6) | 40 (0.6) | 30 (0.6) |
| France | 33 (0.5) | 35 (0.6) | 27 (0.6) | 31 (0.6) | 40 (0.6) | 38 (0.6) | 33 (0.5) | 24 (0.5) |
| Georgia | 30 (0.9) | 35 (1.1) | 31 (1.0) | 24 (0.8) | 28 (0.8) | 37 (1.0) | 29 (0.9) | 21 (0.9) |
| Hong Kong SAR | 58 (1.0) | 61 (0.9) | 58 (0.9) | 57 (1.0) | 56 (1.2) | 65 (0.9) | 58 (1.0) | 50 (1.0) |
| Hungary | 42 (0.7) | 46 (0.8) | 38 (0.7) | 39 (0.8) | 47 (0.7) | 49 (0.8) | 43 (0.7) | 32 (0.7) |
| Israel | 44 (1.1) | 47 (1.1) | 45 (1.2) | 36 (1.0) | 45 (1.1) | 51 (1.1) | 44 (1.1) | 36 (1.1) |
| Italy | 37 (0.6) | 40 (0.7) | 32 (0.6) | 35 (0.7) | 39 (0.7) | 43 (0.7) | 36 (0.6) | 29 (0.5) |
| Korea, Rep. of | 65 (0.6) | 68 (0.6) | 63 (0.7) | 62 (0.6) | 65 (0.6) | 72 (0.6) | 65 (0.6) | 57 (0.7) |
| Lithuania | 43 (0.7) | 45 (0.8) | 40 (0.8) | 40 (0.7) | 46 (0.8) | 49 (0.7) | 44 (0.8) | 32 (0.7) |
| Malaysia | 30 (0.6) | 33 (0.6) | 28 (0.6) | 28 (0.5) | 33 (0.6) | 36 (0.6) | 31 (0.6) | 22 (0.5) |
| Norway (9) | 38 (0.5) | 43 (0.6) | 31 (0.6) | 33 (0.5) | 46 (0.8) | 44 (0.5) | 39 (0.6) | 28 (0.5) |
| Portugal | 37 (0.7) | 40 (0.7) | 35 (0.8) | 34 (0.7) | 40 (0.8) | 45 (0.8) | 37 (0.7) | 29 (0.6) |
| Ψ Qatar | 28 (0.8) | 30 (0.9) | 28 (0.8) | 22 (0.8) | 28 (1.0) | 35 (1.0) | 27 (0.9) | 20 (0.8) |
| Russian Federation | 49 (1.2) | 53 (1.2) | 51 (1.3) | 43 (1.3) | 45 (1.1) | 57 (1.3) | 49 (1.2) | 36 (1.2) |
| Singapore | 68 (1.1) | 71 (1.1) | 67 (1.2) | 63 (1.1) | 70 (1.0) | 73 (1.0) | 68 (1.1) | 61 (1.2) |
| Sweden | 38 (0.6) | 42 (0.6) | 34 (0.6) | 32 (0.6) | 46 (0.8) | 43 (0.6) | 38 (0.7) | 32 (0.7) |
| Turkey | 39 (0.9) | 41 (1.0) | 38 (1.0) | 33 (0.8) | 43 (0.9) | 47 (1.0) | 37 (0.9) | 31 (0.9) |
| United Arab Emirates | 34 (0.4) | 37 (0.4) | 35 (0.5) | 28 (0.4) | 34 (0.3) | 42 (0.4) | 33 (0.4) | 26 (0.4) |
| United States | 43 (1.1) | 47 (1.1) | 44 (1.2) | 35 (0.9) | 45 (1.1) | 52 (1.1) | 43 (1.1) | 32 (1.0) |
| **International Average** | **42 (0.2)** | **46 (0.2)** | **40 (0.2)** | **38 (0.2)** | **45 (0.2)** | **49 (0.2)** | **42 (0.2)** | **33 (0.2)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 45 (1.2) | 49 (1.2) | 38 (1.3) | 42 (1.1) | 52 (1.3) | 49 (1.1) | 45 (1.3) | 38 1.1 |
| Quebec, Canada | 48 (1.0) | 53 (1.1) | 42 (1.0) | 44 (1.1) | 54 (1.0) | 56 (0.9) | 49 (1.1) | 37 (1.1) |
| Moscow City, Russian Fed. | 57 (1.1) | 61 (1.1) | 60 (1.2) | 49 (1.1) | 58 (1.0) | 67 (1.0) | 57 (1.2) | 45 (1.2) |
| Ψ Abu Dhabi, UAE | 27 (0.5) | 30 (0.5) | 28 (0.6) | 22 (0.5) | 27 (0.5) | 35 (0.6) | 26 (0.5) | 20 (0.4) |
| Dubai, UAE | 48 (0.5) | 52 (0.6) | 49 (0.6) | 41 (0.5) | 49 (0.5) | 56 (0.6) | 47 (0.5) | 39 (0.5) |

### paperTIMSS

| Country | Overall Mathematics | Mathematics Content Domains | | | | Mathematics Cognitive Domains | | |
|---|---|---|---|---|---|---|---|---|
| | | Number | Algebra | Geometry | Data and Probability | Knowing | Applying | Reasoning |
| Australia | 45 (1.0) | 50 (1.0) | 40 (1.1) | 39 (1.0) | 53 (0.9) | 51 (1.0) | 46 (1.0) | 36 (1.1) |
| Bahrain | 38 (0.4) | 40 (0.5) | 38 (0.4) | 36 (0.5) | 38 (0.4) | 44 (0.5) | 38 (0.4) | 32 (0.5) |
| Cyprus | 41 (0.4) | 45 (0.5) | 44 (0.5) | 33 (0.5) | 42 (0.5) | 52 (0.5) | 39 (0.4) | 32 (0.4) |
| Ψ Egypt | 25 (0.9) | 29 (1.0) | 26 (1.0) | 21 (0.8) | 22 (0.8) | 34 (1.0) | 23 (0.8) | 18 (0.8) |
| Iran, Islamic Rep. of | 30 (0.8) | 33 (0.9) | 30 (0.8) | 26 (0.8) | 31 (0.8) | 38 (0.9) | 29 (0.8) | 24 (0.8) |
| Ireland | 47 (0.7) | 56 (0.7) | 40 (0.7) | 36 (0.6) | 55 (0.8) | 56 (0.7) | 47 (0.7) | 33 (0.7) |
| Japan | 65 (0.6) | 64 (0.7) | 65 (0.6) | 64 (0.7) | 69 (0.5) | 69 (0.6) | 67 (0.6) | 58 (0.7) |
| Ψ Jordan | 25 (0.7) | 26 (0.8) | 29 (1.0) | 20 (0.6) | 24 (0.6) | 33 (1.0) | 23 (0.7) | 19 (0.6) |
| Kazakhstan | 38 (0.9) | 41 (0.9) | 42 (1.1) | 32 (0.8) | 36 (0.7) | 47 (1.0) | 37 (0.9) | 29 (0.8) |
| Ψ Kuwait | 23 (0.8) | 26 (0.9) | 22 (0.8) | 19 (0.8) | 23 (0.8) | 30 (1.0) | 21 (0.8) | 16 (0.7) |
| Lebanon | 26 (0.5) | 30 (0.6) | 29 (0.6) | 20 (0.5) | 20 (0.6) | 40 (0.6) | 22 (0.5) | 15 (0.5) |
| Ψ Morocco | 19 (0.4) | 21 (0.4) | 18 (0.5) | 19 (0.4) | 18 (0.3) | 26 (0.5) | 18 (0.3) | 12 (0.4) |
| New Zealand | 37 (0.7) | 41 (0.8) | 32 (0.7) | 31 (0.6) | 44 (0.8) | 41 (0.7) | 38 (0.7) | 29 (0.6) |
| Ψ Oman | 25 (0.4) | 25 (0.4) | 27 (0.5) | 22 (0.4) | 24 (0.5) | 32 (0.5) | 23 (0.4) | 18 (0.4) |
| Romania | 37 (1.0) | 41 (1.1) | 40 (1.1) | 31 (1.0) | 35 (0.9) | 47 (1.1) | 35 (1.0) | 29 (1.0) |
| Ψ Saudi Arabia | 21 (0.3) | 22 (0.3) | 21 (0.4) | 16 (0.3) | 24 (0.3) | 27 (0.3) | 20 (0.3) | 14 (0.3) |
| Ж South Africa (9) | 19 (0.3) | 22 (0.3) | 21 (0.4) | 15 (0.2) | 19 (0.3) | 26 (0.4) | 18 (0.3) | 13 (0.2) |
| **International Average** | **33 (0.2)** | **36 (0.2)** | **33 (0.2)** | **28 (0.2)** | **34 (0.2)** | **41 (0.2)** | **32 (0.2)** | **25 (0.2)** |
| **Benchmarking Participants** | | | | | | | | |
| Ψ Gauteng, RSA (9) | 24 (0.6) | 27 (0.6) | 25 (0.6) | 18 (0.5) | 23 (0.6) | 31 (0.7) | 23 (0.6) | 17 (0.5) |
| Ψ Western Cape, RSA (9) | 28 (1.0) | 32 (1.1) | 30 (1.1) | 22 (0.9) | 28 (1.0) | 36 (1.1) | 28 (1.0) | 21 (0.9) |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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## Appendix F.4: Average Percent Correct in the Science Content and Cognitive Domains

### eTIMSS

| Country | Overall Science | Science Content Domains | | | | Science Cognitive Domains | | |
|---|---|---|---|---|---|---|---|---|
| | | Biology | Chemistry | Physics | Earth Science | Knowing | Applying | Reasoning |
| Chile | 36 (0.5) | 40 (0.6) | 30 (0.5) | 33 (0.5) | 38 (0.6) | 39 (0.5) | 37 (0.5) | 31 (0.6) |
| Chinese Taipei | 59 (0.4) | 62 (0.4) | 60 (0.5) | 54 (0.5) | 60 (0.5) | 67 (0.4) | 57 (0.5) | 52 (0.5) |
| England | 47 (0.9) | 49 (0.9) | 43 (1.0) | 45 (1.0) | 48 (1.0) | 50 (1.0) | 47 (0.9) | 42 (1.1) |
| Finland | 52 (0.6) | 53 (0.7) | 50 (0.7) | 51 (0.7) | 56 (0.6) | 55 (0.6) | 51 (0.6) | 50 (0.7) |
| France | 40 (0.5) | 43 (0.5) | 32 (0.6) | 40 (0.5) | 45 (0.6) | 42 (0.5) | 40 (0.5) | 39 (0.6) |
| Georgia | 33 (0.6) | 35 (0.7) | 32 (0.7) | 32 (0.6) | 32 (0.6) | 39 (0.6) | 32 (0.6) | 27 (0.7) |
| Hong Kong SAR | 45 (1.0) | 45 (1.1) | 39 (1.0) | 46 (1.0) | 48 (0.9) | 47 (1.1) | 45 (0.9) | 41 (1.0) |
| Hungary | 49 (0.5) | 52 (0.6) | 46 (0.6) | 48 (0.6) | 51 (0.6) | 54 (0.5) | 49 (0.5) | 44 (0.6) |
| Israel | 46 (0.8) | 48 (0.8) | 45 (0.9) | 47 (0.9) | 44 (0.9) | 50 (0.9) | 46 (0.9) | 43 (0.9) |
| Italy | 43 (0.5) | 47 (0.6) | 37 (0.6) | 39 (0.6) | 47 (0.7) | 47 (0.5) | 43 (0.6) | 37 (0.6) |
| Korea, Rep. of | 55 (0.5) | 57 (0.5) | 49 (0.5) | 56 (0.5) | 56 (0.5) | 57 (0.5) | 55 (0.5) | 53 (0.5) |
| Lithuania | 50 (0.6) | 52 (0.6) | 45 (0.7) | 48 (0.7) | 51 (0.7) | 52 (0.6) | 49 (0.6) | 48 (0.8) |
| Malaysia | 37 (0.5) | 39 (0.6) | 30 (0.5) | 38 (0.6) | 38 (0.6) | 38 (0.5) | 39 (0.5) | 32 (0.5) |
| Norway (9) | 43 (0.5) | 43 (0.5) | 39 (0.6) | 41 (0.6) | 48 (0.6) | 46 (0.5) | 43 (0.6) | 38 (0.6) |
| Portugal | 47 (0.6) | 51 (0.7) | 42 (0.7) | 41 (0.6) | 51 (0.6) | 50 (0.6) | 46 (0.6) | 42 (0.7) |
| Qatar | 40 (0.8) | 42 (0.9) | 37 (0.8) | 38 (0.8) | 40 (0.9) | 45 (0.8) | 39 (0.8) | 33 (0.9) |
| Russian Federation | 52 (0.9) | 54 (1.0) | 49 (0.9) | 50 (1.0) | 51 (0.9) | 55 (0.9) | 52 (0.9) | 47 (0.8) |
| Singapore | 66 (0.8) | 71 (0.8) | 64 (1.0) | 67 (0.9) | 56 (0.7) | 70 (0.8) | 66 (0.8) | 61 (0.9) |
| Sweden | 48 (0.6) | 50 (0.7) | 43 (0.7) | 47 (0.7) | 50 (0.7) | 51 (0.6) | 48 (0.6) | 44 (0.7) |
| Turkey | 47 (0.7) | 48 (0.7) | 45 (0.9) | 46 (0.8) | 46 (0.7) | 49 (0.8) | 46 (0.7) | 44 (0.8) |
| United Arab Emirates | 41 (0.4) | 43 (0.4) | 39 (0.4) | 39 (0.4) | 41 (0.3) | 46 (0.4) | 40 (0.4) | 35 (0.3) |
| United States | 48 (0.9) | 52 (0.9) | 42 (0.8) | 46 (0.9) | 51 (0.9) | 50 (0.9) | 49 (0.9) | 46 (0.9) |
| **International Average** | **47 (0.1)** | **49 (0.2)** | **43 (0.2)** | **45 (0.2)** | **48 (0.2)** | **50 (0.1)** | **46 (0.1)** | **42 (0.2)** |
| **Benchmarking Participants** | | | | | | | | |
| Ontario, Canada | 47 (0.6) | 52 (0.6) | 38 (0.7) | 46 (0.7) | 48 (0.6) | 47 (0.5) | 48 (0.6) | 46 (0.7) |
| Quebec, Canada | 50 (0.8) | 51 (0.8) | 48 (0.8) | 46 (0.8) | 55 (0.8) | 51 (0.7) | 51 (0.8) | 48 (1.0) |
| Moscow City, Russian Fed. | 57 (0.6) | 59 (0.7) | 51 (0.6) | 57 (0.7) | 57 (0.7) | 60 (0.6) | 56 (0.7) | 53 (0.8) |
| Abu Dhabi, UAE | 34 (0.5) | 35 (0.6) | 31 (0.5) | 32 (0.5) | 35 (0.5) | 38 (0.5) | 33 (0.5) | 28 (0.5) |
| Dubai, UAE | 54 (0.4) | 57 (0.3) | 52 (0.4) | 51 (0.5) | 53 (0.5) | 59 (0.4) | 53 (0.4) | 49 (0.4) |

### paperTIMSS

| Country | Overall Science | Science Content Domains | | | | Science Cognitive Domains | | |
|---|---|---|---|---|---|---|---|---|
| | | Biology | Chemistry | Physics | Earth Science | Knowing | Applying | Reasoning |
| Australia | 50 (0.7) | 52 (0.7) | 44 (0.7) | 49 (0.7) | 52 (0.6) | 50 (0.6) | 51 (0.7) | 48 (0.7) |
| Bahrain | 43 (0.3) | 46 (0.4) | 39 (0.4) | 41 (0.4) | 42 (0.4) | 48 (0.4) | 41 (0.3) | 38 (0.4) |
| Cyprus | 41 (0.4) | 44 (0.5) | 37 (0.4) | 40 (0.4) | 40 (0.5) | 44 (0.4) | 40 (0.4) | 38 (0.4) |
| Egypt | 28 (0.7) | 28 (0.7) | 28 (0.7) | 28 (0.6) | 28 (0.6) | 33 (0.8) | 27 (0.7) | 22 (0.6) |
| Iran, Islamic Rep. of | 35 (0.6) | 36 (0.6) | 34 (0.8) | 36 (0.6) | 35 (0.6) | 40 (0.6) | 36 (0.6) | 29 (0.6) |
| Ireland | 49 (0.5) | 51 (0.6) | 44 (0.7) | 47 (0.6) | 52 (0.5) | 50 (0.5) | 49 (0.6) | 48 (0.6) |
| Japan | 59 (0.5) | 62 (0.5) | 52 (0.5) | 58 (0.6) | 59 (0.5) | 59 (0.5) | 60 (0.5) | 56 (0.5) |
| Jordan | 37 (0.7) | 40 (0.9) | 35 (0.8) | 35 (0.7) | 34 (0.7) | 41 (0.8) | 37 (0.8) | 31 (0.7) |
| Kazakhstan | 40 (0.6) | 41 (0.6) | 40 (0.8) | 39 (0.7) | 37 (0.6) | 42 (0.6) | 40 (0.6) | 36 (0.6) |
| Kuwait | 35 (0.9) | 36 (1.0) | 35 (1.0) | 33 (0.9) | 35 (1.0) | 40 (1.1) | 34 (1.0) | 29 (0.9) |
| Lebanon | 26 (0.5) | 25 (0.5) | 28 (0.6) | 27 (0.6) | 24 (0.5) | 32 (0.5) | 26 (0.6) | 19 (0.5) |
| Morocco | 26 (0.3) | 26 (0.4) | 26 (0.4) | 28 (0.4) | 26 (0.3) | 29 (0.4) | 27 (0.3) | 23 (0.3) |
| New Zealand | 44 (0.7) | 46 (0.6) | 38 (0.7) | 44 (0.8) | 47 (0.6) | 44 (0.7) | 46 (0.7) | 42 (0.7) |
| Oman | 38 (0.4) | 41 (0.5) | 33 (0.4) | 35 (0.4) | 38 (0.5) | 42 (0.5) | 37 (0.5) | 32 (0.4) |
| Romania | 39 (0.8) | 43 (0.9) | 36 (0.8) | 37 (0.7) | 38 (0.7) | 43 (0.7) | 39 (0.8) | 34 (0.9) |
| Saudi Arabia | 32 (0.4) | 34 (0.5) | 30 (0.4) | 29 (0.4) | 35 (0.4) | 37 (0.5) | 31 (0.4) | 28 (0.4) |
| Ψ South Africa (9) | 25 (0.3) | 25 (0.3) | 23 (0.4) | 25 (0.3) | 26 (0.4) | 28 (0.4) | 25 (0.3) | 19 (0.3) |
| **International Average** | **38 (0.1)** | **40 (0.2)** | **35 (0.2)** | **37 (0.1)** | **38 (0.1)** | **41 (0.1)** | **38 (0.1)** | **34 (0.1)** |
| **Benchmarking Participants** | | | | | | | | |
| Gauteng, RSA (9) | 31 (0.6) | 32 (0.7) | 29 (0.6) | 31 (0.6) | 32 (0.7) | 33 (0.7) | 32 (0.6) | 26 (0.6) |
| Western Cape, RSA (9) | 34 (0.9) | 35 (0.9) | 32 (0.9) | 34 (0.9) | 36 (0.9) | 36 (0.8) | 35 (0.9) | 30 (1.0) |

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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IEA TIMSS 2019

# APPENDIX G

# Percentages of Students with Achievement Too Low for Estimation

## Appendix G.1: Percentages of Students with Mathematics Achievement Too Low for Estimation*

| Country | eTIMSS | | paperTIMSS | | paperTIMSS Less Difficult Mathematics | |
|---|---|---|---|---|---|---|
| | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct |
| Albania | - - | - - | - - | - - | 2 (0.3) | 61 (0.8) |
| Armenia | - - | - - | 4 (0.3) | 42 (0.7) | - - | - - |
| Australia | - - | - - | 4 (0.3) | 48 (0.7) | - - | - - |
| Austria | 1 (0.2) | 50 (0.6) | - - | - - | - - | - - |
| Azerbaijan | - - | - - | 4 (0.4) | 48 (0.7) | - - | - - |
| Bahrain | - - | - - | 9 (0.5) | 39 (0.6) | - - | - - |
| Belgium (Flemish) | - - | - - | 1 (0.2) | 52 (0.5) | - - | - - |
| Bosnia and Herzegovina | - - | - - | - - | - - | 2 (0.2) | 49 (0.6) |
| Bulgaria | - - | - - | 5 (0.8) | 48 (1.0) | - - | - - |
| Canada | 3 (0.2) | 43 (0.5) | - - | - - | - - | - - |
| Chile | 12 (0.7) | 27 (0.5) | - - | - - | - - | - - |
| Chinese Taipei | 0 (0.1) | 67 (0.4) | - - | - - | - - | - - |
| Croatia | 2 (0.3) | 43 (0.5) | - - | - - | - - | - - |
| Cyprus | - - | - - | 2 (0.3) | 51 (0.7) | - - | - - |
| Czech Republic | 2 (0.3) | 49 (0.6) | - - | - - | - - | - - |
| Denmark | 2 (0.3) | 47 (0.5) | - - | - - | - - | - - |
| England | 2 (0.3) | 55 (0.8) | - - | - - | - - | - - |
| Finland | 2 (0.2) | 49 (0.5) | - - | - - | - - | - - |
| France | 6 (0.6) | 37 (0.7) | - - | - - | - - | - - |
| Georgia | 7 (0.7) | 36 (0.8) | - - | - - | - - | - - |
| Germany | 2 (0.3) | 46 (0.6) | - - | - - | - - | - - |
| Hong Kong SAR | 0 (0.1) | 67 (0.8) | - - | - - | - - | - - |
| Hungary | 3 (0.4) | 47 (0.7) | - - | - - | - - | - - |
| Iran, Islamic Rep. of | - - | - - | 14 (0.9) | 31 (0.7) | - - | - - |
| Ireland | - - | - - | 2 (0.2) | 56 (0.7) | - - | - - |
| Italy | 2 (0.3) | 44 (0.7) | - - | - - | - - | - - |
| Japan | - - | - - | 0 (0.1) | 68 (0.4) | - - | - - |
| Kazakhstan | - - | - - | 2 (0.2) | 45 (0.7) | - - | - - |
| Korea, Rep. of | 0 (0.1) | 67 (0.6) | - - | - - | - - | - - |
| Kosovo | - - | - - | - - | - - | 2 (0.3) | 49 (0.7) |
| Kuwait | - - | - - | - - | - - | 8 (0.6) | 39 (0.9) |
| Latvia | - - | - - | 1 (0.3) | 55 (0.7) | - - | - - |
| Lithuania | 2 (0.2) | 51 (0.7) | - - | - - | - - | - - |
| Malta | 4 (0.3) | 43 (0.3) | - - | - - | - - | - - |
| Montenegro | - - | - - | - - | - - | 3 (0.3) | 50 (0.4) |
| Morocco | - - | - - | - - | - - | 6 (0.4) | 38 (0.8) |
| Netherlands | 1 (0.2) | 50 (0.6) | - - | - - | - - | - - |
| New Zealand | - - | - - | 6 (0.4) | 40 (0.6) | - - | - - |
| North Macedonia | - - | - - | - - | - - | 3 (0.5) | 55 (1.1) |
| Northern Ireland | - - | - - | 2 (0.3) | 60 (0.7) | - - | - - |
| Norway (5) | 2 (0.3) | 52 (0.6) | - - | - - | - - | - - |
| Oman | - - | - - | 14 (0.6) | 30 (0.8) | - - | - - |
| Ψ Pakistan | - - | - - | - - | - - | 16 (2.1) | 28 (1.9) |
| Ψ Philippines | - - | - - | - - | - - | 20 (1.2) | 25 (0.8) |
| Poland | - - | - - | 3 (0.3) | 48 (0.7) | - - | - - |
| Portugal | 2 (0.3) | 47 (0.7) | - - | - - | - - | - - |
| Qatar | 12 (0.8) | 31 (0.7) | - - | - - | - - | - - |
| Russian Federation | 1 (0.2) | 58 (0.9) | - - | - - | - - | - - |
| Saudi Arabia | - - | - - | - - | - - | 5 (0.6) | 41 (0.7) |
| Serbia | - - | - - | 5 (0.6) | 45 (0.7) | - - | - - |
| Singapore | 0 (0.1) | 73 (0.9) | - - | - - | - - | - - |
| Slovak Republic | 5 (0.7) | 43 (0.8) | - - | - - | - - | - - |
| South Africa (5) | - - | - - | - - | - - | 6 (0.4) | 36 (0.6) |
| Spain | 4 (0.4) | 41 (0.4) | - - | - - | - - | - - |
| Sweden | 3 (0.4) | 46 (0.7) | - - | - - | - - | - - |
| Turkey (5) | 5 (0.5) | 48 (1.0) | - - | - - | - - | - - |
| United Arab Emirates | 8 (0.3) | 38 (0.3) | - - | - - | - - | - - |
| United States | 3 (0.3) | 50 (0.7) | - - | - - | - - | - - |
| **Benchmarking Participants** | | | | | | |
| Ontario, Canada | 3 (0.4) | 44 (0.9) | - - | - - | - - | - - |
| Quebec, Canada | 1 (0.2) | 49 (0.6) | - - | - - | - - | - - |
| Moscow City, Russian Fed. | 0 (0.1) | 66 (0.6) | - - | - - | - - | - - |
| Madrid, Spain | 2 (0.3) | 45 (0.6) | - - | - - | - - | - - |
| Abu Dhabi, UAE | 14 (0.5) | 30 (0.4) | - - | - - | - - | - - |
| Dubai, UAE | 2 (0.3) | 52 (0.4) | - - | - - | - - | - - |

* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple-choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Appendix G.2: Percentages of Students with Science Achievement Too Low for Estimation*

| Country | eTIMSS | | paperTIMSS | |
|---|---|---|---|---|
| | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct |
| Albania | - - | - - | 3 (0.5) | 47 (0.7) |
| Armenia | - - | - - | 4 (0.4) | 41 (0.6) |
| Australia | - - | - - | 2 (0.3) | 55 (0.5) |
| Austria | 1 (0.2) | 51 (0.5) | - - | - - |
| Azerbaijan | - - | - - | 8 (0.6) | 36 (0.5) |
| Bahrain | - - | - - | 4 (0.4) | 48 (0.6) |
| Belgium (Flemish) | - - | - - | 2 (0.2) | 48 (0.4) |
| Bosnia and Herzegovina | - - | - - | 5 (0.4) | 40 (0.5) |
| Bulgaria | - - | - - | 4 (0.6) | 54 (1.0) |
| Canada | 2 (0.2) | 52 (0.3) | - - | - - |
| Chile | 5 (0.5) | 40 (0.5) | - - | - - |
| Chinese Taipei | 0 (0.1) | 60 (0.3) | - - | - - |
| Croatia | 1 (0.2) | 51 (0.4) | - - | - - |
| Cyprus | - - | - - | 2 (0.3) | 50 (0.6) |
| Czech Republic | 1 (0.2) | 54 (0.4) | - - | - - |
| Denmark | 1 (0.3) | 51 (0.4) | - - | - - |
| England | 1 (0.2) | 55 (0.5) | - - | - - |
| Finland | 1 (0.2) | 59 (0.5) | - - | - - |
| France | 4 (0.4) | 45 (0.6) | - - | - - |
| Georgia | 6 (0.7) | 38 (0.6) | - - | - - |
| Germany | 2 (0.3) | 51 (0.5) | - - | - - |
| Hong Kong SAR | 1 (0.2) | 54 (0.6) | - - | - - |
| Hungary | 1 (0.3) | 53 (0.5) | - - | - - |
| Iran, Islamic Rep. of | - - | - - | 9 (0.7) | 38 (0.7) |
| Ireland | - - | - - | 2 (0.4) | 54 (0.7) |
| Italy | 2 (0.2) | 49 (0.6) | - - | - - |
| Japan | - - | - - | 1 (0.1) | 61 (0.4) |
| Kazakhstan | - - | - - | 2 (0.3) | 47 (0.6) |
| Korea, Rep. of | 0 (0.1) | 66 (0.4) | - - | - - |
| Kosovo | - - | - - | 9 (0.7) | 33 (0.5) |
| Kuwait | - - | - - | 14 (0.9) | 33 (0.9) |
| Latvia | - - | - - | 0 (0.2) | 57 (0.5) |
| Lithuania | 1 (0.2) | 55 (0.5) | - - | - - |
| Malta | 3 (0.3) | 47 (0.3) | - - | - - |
| Montenegro | - - | - - | 8 (0.4) | 39 (0.4) |
| Ψ Morocco | - - | - - | 17 (0.9) | 30 (0.8) |
| Netherlands | 2 (0.3) | 50 (0.6) | - - | - - |
| New Zealand | - - | - - | 3 (0.3) | 49 (0.4) |
| North Macedonia | - - | - - | 11 (0.9) | 36 (1.0) |
| Northern Ireland | - - | - - | 2 (0.3) | 52 (0.4) |
| Norway (5) | 1 (0.2) | 55 (0.5) | - - | - - |
| Oman | - - | - - | 10 (0.6) | 39 (0.7) |
| Ж Pakistan | - - | - - | 31 (3.5) | 21 (1.1) |
| Ж Philippines | - - | - - | 34 (1.4) | 20 (0.5) |
| Poland | - - | - - | 1 (0.2) | 55 (0.5) |
| Portugal | 2 (0.2) | 47 (0.4) | - - | - - |
| Qatar | 8 (0.8) | 39 (0.7) | - - | - - |
| Russian Federation | 0 (0.1) | 62 (0.7) | - - | - - |
| Saudi Arabia | - - | - - | 12 (0.7) | 34 (0.5) |
| Serbia | - - | - - | 3 (0.6) | 52 (0.7) |
| Singapore | 1 (0.1) | 68 (0.7) | - - | - - |
| Slovak Republic | 2 (0.4) | 52 (0.7) | - - | - - |
| Ж South Africa (5) | - - | - - | 28 (1.0) | 25 (0.6) |
| Spain | 1 (0.2) | 49 (0.4) | - - | - - |
| Sweden | 1 (0.2) | 55 (0.7) | - - | - - |
| Turkey (5) | 3 (0.4) | 54 (0.8) | - - | - - |
| United Arab Emirates | 7 (0.2) | 44 (0.3) | - - | - - |
| United States | 2 (0.2) | 55 (0.5) | - - | - - |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | 2 (0.3) | 52 (0.6) | - - | - - |
| Quebec, Canada | 1 (0.2) | 51 (0.5) | - - | - - |
| Moscow City, Russian Fed. | 0 (0.1) | 68 (0.5) | - - | - - |
| Madrid, Spain | 1 (0.2) | 51 (0.4) | - - | - - |
| Abu Dhabi, UAE | 14 (0.5) | 35 (0.4) | - - | - - |
| Dubai, UAE | 1 (0.1) | 57 (0.3) | - - | - - |

* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple-choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Appendix G.3: Percentages of Students with Mathematics Achievement Too Low for Estimation*

| Country | eTIMSS | | paperTIMSS | |
|---|---|---|---|---|
| | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct |
| Australia | - - | - - | 5 (0.4) | 45 (1.0) |
| Bahrain | - - | - - | 9 (0.4) | 38 (0.4) |
| Ψ Chile | 16 (0.8) | 25 (0.5) | - - | - - |
| Chinese Taipei | 2 (0.2) | 66 (0.6) | - - | - - |
| Cyprus | - - | - - | 5 (0.4) | 41 (0.4) |
| Ψ Egypt | - - | - - | 20 (1.1) | 25 (0.9) |
| England | 7 (0.8) | 42 (1.3) | - - | - - |
| Finland | 5 (0.5) | 39 (0.6) | - - | - - |
| France | 8 (0.5) | 33 (0.5) | - - | - - |
| Georgia | 13 (1.0) | 30 (0.9) | - - | - - |
| Hong Kong SAR | 3 (0.5) | 58 (1.0) | - - | - - |
| Hungary | 6 (0.6) | 42 (0.7) | - - | - - |
| Iran, Islamic Rep. of | - - | - - | 14 (0.5) | 30 (0.8) |
| Ireland | - - | - - | 3 (0.4) | 47 (0.7) |
| Israel | 6 (0.5) | 44 (1.1) | - - | - - |
| Italy | 6 (0.5) | 37 (0.6) | - - | - - |
| Japan | - - | - - | 1 (0.1) | 65 (0.6) |
| Ψ Jordan | - - | - - | 17 (1.2) | 25 (0.7) |
| Kazakhstan | - - | - - | 7 (0.5) | 38 (0.9) |
| Korea, Rep. of | 2 (0.3) | 65 (0.6) | - - | - - |
| Ψ Kuwait | - - | - - | 21 (1.2) | 23 (0.8) |
| Lebanon | - - | - - | 14 (0.8) | 26 (0.5) |
| Lithuania | 5 (0.5) | 43 (0.7) | - - | - - |
| Malaysia | 14 (0.8) | 30 (0.6) | - - | - - |
| Ψ Morocco | - - | - - | 25 (0.9) | 19 (0.4) |
| New Zealand | - - | - - | 9 (0.8) | 37 (0.7) |
| Norway (9) | 7 (0.5) | 38 (0.5) | - - | - - |
| Ψ Oman | - - | - - | 21 (0.8) | 25 (0.4) |
| Portugal | 5 (0.6) | 37 (0.7) | - - | - - |
| Ψ Qatar | 17 (0.8) | 28 (0.8) | - - | - - |
| Romania | - - | - - | 11 (0.9) | 37 (1.0) |
| Russian Federation | 3 (0.4) | 49 (1.2) | - - | - - |
| Ψ Saudi Arabia | - - | - - | 22 (0.8) | 21 (0.3) |
| Singapore | 1 (0.2) | 68 (1.1) | - - | - - |
| Ж South Africa (9) | - - | - - | 26 (0.7) | 19 (0.3) |
| Sweden | 6 (0.4) | 38 (0.6) | - - | - - |
| Turkey | 10 (0.7) | 39 (0.9) | - - | - - |
| United Arab Emirates | 13 (0.4) | 34 (0.4) | - - | - - |
| United States | 7 (0.6) | 43 (1.1) | - - | - - |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | 4 (0.4) | 45 (1.2) | - - | - - |
| Quebec, Canada | 1 (0.3) | 48 (1.0) | - - | - - |
| Moscow City, Russian Fed. | 1 (0.2) | 57 (1.1) | - - | - - |
| Ψ Gauteng, RSA (9) | - - | - - | 18 (0.8) | 24 (0.6) |
| Ψ Western Cape, RSA (9) | - - | - - | 16 (0.8) | 28 (1.0) |
| Ψ Abu Dhabi, UAE | 18 (0.7) | 27 (0.5) | - - | - - |
| Dubai, UAE | 5 (0.4) | 48 (0.5) | - - | - - |

* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple-choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

## Appendix G.4: Percentages of Students with Science Achievement Too Low for Estimation*

| Country | eTIMSS | | paperTIMSS | |
|---|---|---|---|---|
| | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct | Percentage of Students with Achievement Too Low for Estimation | Average Percent Correct |
| Australia | - - | - - | 2 (0.3) | 50 (0.7) |
| Bahrain | - - | - - | 5 (0.3) | 43 (0.3) |
| Chile | 4 (0.4) | 36 (0.5) | - - | - - |
| Chinese Taipei | 1 (0.1) | 59 (0.4) | - - | - - |
| Cyprus | - - | - - | 3 (0.3) | 41 (0.4) |
| Egypt | - - | - - | 14 (1.0) | 28 (0.7) |
| England | 3 (0.5) | 47 (0.9) | - - | - - |
| Finland | 2 (0.3) | 52 (0.6) | - - | - - |
| France | 3 (0.4) | 40 (0.5) | - - | - - |
| Georgia | 6 (0.6) | 33 (0.6) | - - | - - |
| Hong Kong SAR | 4 (0.7) | 45 (1.0) | - - | - - |
| Hungary | 1 (0.3) | 49 (0.5) | - - | - - |
| Iran, Islamic Rep. of | - - | - - | 5 (0.4) | 35 (0.6) |
| Ireland | - - | - - | 2 (0.3) | 49 (0.5) |
| Israel | 3 (0.4) | 46 (0.8) | - - | - - |
| Italy | 2 (0.3) | 43 (0.5) | - - | - - |
| Japan | - - | - - | 1 (0.1) | 59 (0.5) |
| Jordan | - - | - - | 7 (0.5) | 37 (0.7) |
| Kazakhstan | - - | - - | 3 (0.3) | 40 (0.6) |
| Korea, Rep. of | 1 (0.2) | 55 (0.5) | - - | - - |
| Kuwait | - - | - - | 7 (0.8) | 35 (0.9) |
| Lebanon | - - | - - | 15 (0.9) | 26 (0.5) |
| Lithuania | 1 (0.1) | 50 (0.6) | - - | - - |
| Malaysia | 6 (0.5) | 37 (0.5) | - - | - - |
| Morocco | - - | - - | 11 (0.6) | 26 (0.3) |
| New Zealand | - - | - - | 3 (0.4) | 44 (0.7) |
| Norway (9) | 4 (0.4) | 43 (0.5) | - - | - - |
| Oman | - - | - - | 7 (0.4) | 38 (0.4) |
| Portugal | 1 (0.3) | 47 (0.6) | - - | - - |
| Qatar | 5 (0.5) | 40 (0.8) | - - | - - |
| Romania | - - | - - | 5 (0.5) | 39 (0.8) |
| Russian Federation | 1 (0.2) | 52 (0.9) | - - | - - |
| Saudi Arabia | - - | - - | 7 (0.5) | 32 (0.4) |
| Singapore | 1 (0.1) | 66 (0.8) | - - | - - |
| Ψ South Africa (9) | - - | - - | 17 (0.5) | 25 (0.3) |
| Sweden | 3 (0.4) | 48 (0.6) | - - | - - |
| Turkey | 3 (0.4) | 47 (0.7) | - - | - - |
| United Arab Emirates | 7 (0.3) | 41 (0.4) | - - | - - |
| United States | 3 (0.4) | 48 (0.9) | - - | - - |
| **Benchmarking Participants** | | | | |
| Ontario, Canada | 1 (0.2) | 47 (0.6) | - - | - - |
| Quebec, Canada | 1 (0.3) | 50 (0.8) | - - | - - |
| Moscow City, Russian Fed. | 0 (0.1) | 57 (0.6) | - - | - - |
| Gauteng, RSA (9) | - - | - - | 9 (0.5) | 31 (0.6) |
| Western Cape, RSA (9) | - - | - - | 7 (0.4) | 34 (0.9) |
| Abu Dhabi, UAE | 14 (0.6) | 34 (0.5) | - - | - - |
| Dubai, UAE | 2 (0.2) | 54 (0.4) | - - | - - |

* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple-choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

# APPENDIX H

# Organizations and Individuals Responsible for TIMSS 2019

## Introduction

TIMSS 2019 was a collaborative effort involving hundreds of individuals around the world. This appendix acknowledges the individuals and organizations for their contributions. Given that the work on TIMSS 2019 spanned more than four years and involved so many people and organizations, this list may not include all who contributed. Any omission is inadvertent. TIMSS 2019 also acknowledges the students, parents, teachers, and school principals who contributed their time and effort to the study. This report would not be possible without them.

## Management and Coordination

TIMSS is a major undertaking of IEA, and together with the Progress in International Reading Literacy Study (PIRLS), comprises the core of IEA's regular cycles of studies. The TIMSS assessment at the fourth grade complements PIRLS, which regularly assesses reading achievement at fourth grade.

TIMSS 2019 was conducted by IEA's TIMSS & PIRLS International Study Center at Boston College, which has responsibility for the overall direction and management of TIMSS and PIRLS, including design, development, and implementation. For TIMSS 2019, this also included managing the transition of TIMSS to a digital assessment, with the development of eTIMSS. Headed by Executive Directors Drs. Ina V.S. Mullis, Michael O. Martin, and Matthias von Davier, the study center is located in the Lynch School of Education and Human Development. The TIMSS & PIRLS International Study Center worked closely with IEA Amsterdam, which managed country participation, was responsible for verification of all translations produced by the participating countries, and coordinated the school visits by International Quality Control Monitors. In addition to developing the software system used to create and deliver the eTIMSS 2019 digital assessments, staff at IEA Hamburg worked closely with participating countries to organize sampling and data collection operations and to check all data for accuracy and consistency within and across countries. Statistics Canada in Ottawa was responsible for school and student sampling activities. Educational Testing Service in Princeton, New Jersey consulted on psychometric methodology, provided software for scaling the achievement data, and replicated the achievement scaling for quality assurance.

The Project Management Team, comprising the study directors and representatives from the TIMSS & PIRLS International Study Center, IEA Amsterdam, IEA Hamburg, and Statistics Canada

met twice a year throughout the study to discuss the study's progress, procedures, and schedule. In addition, the study directors met with members of IEA's Technical Executive Group twice each year to review technical issues.

To work with the international team and coordinate within-country activities, each participating country designates an individual to be the TIMSS National Research Coordinator (NRC). The NRCs have the challenging task of implementing TIMSS in their countries in accordance with the TIMSS guidelines and procedures. In addition, the NRCs contribute to the development of the TIMSS assessments and provide input throughout the course of the project. The quality of the TIMSS assessment and data depends on the work of the NRCs and their colleagues in carrying out the complex sampling, data collection, and scoring tasks. NRCs from countries participating in eTIMSS were responsible for carrying out additional tasks related to the transition of TIMSS to a digital assessment. Continuing the tradition of exemplary work established in previous cycles of TIMSS, the TIMSS 2019 NRCs performed their many tasks with dedication, competence, energy, and goodwill, and demonstrated a commitment to the project and high quality work.

## Funding

Funding for TIMSS 2019 was provided primarily by the participating countries. The National Center for Education Statistics of the U.S. Department of Education was a major funding partner, providing funding under contract number EDIES17C0060. The content of this publication does not necessarily reflect the views or policies of the U.S. Department of Education nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Boston College also is gratefully acknowledged for its generous financial support and stimulating educational environment.

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