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.

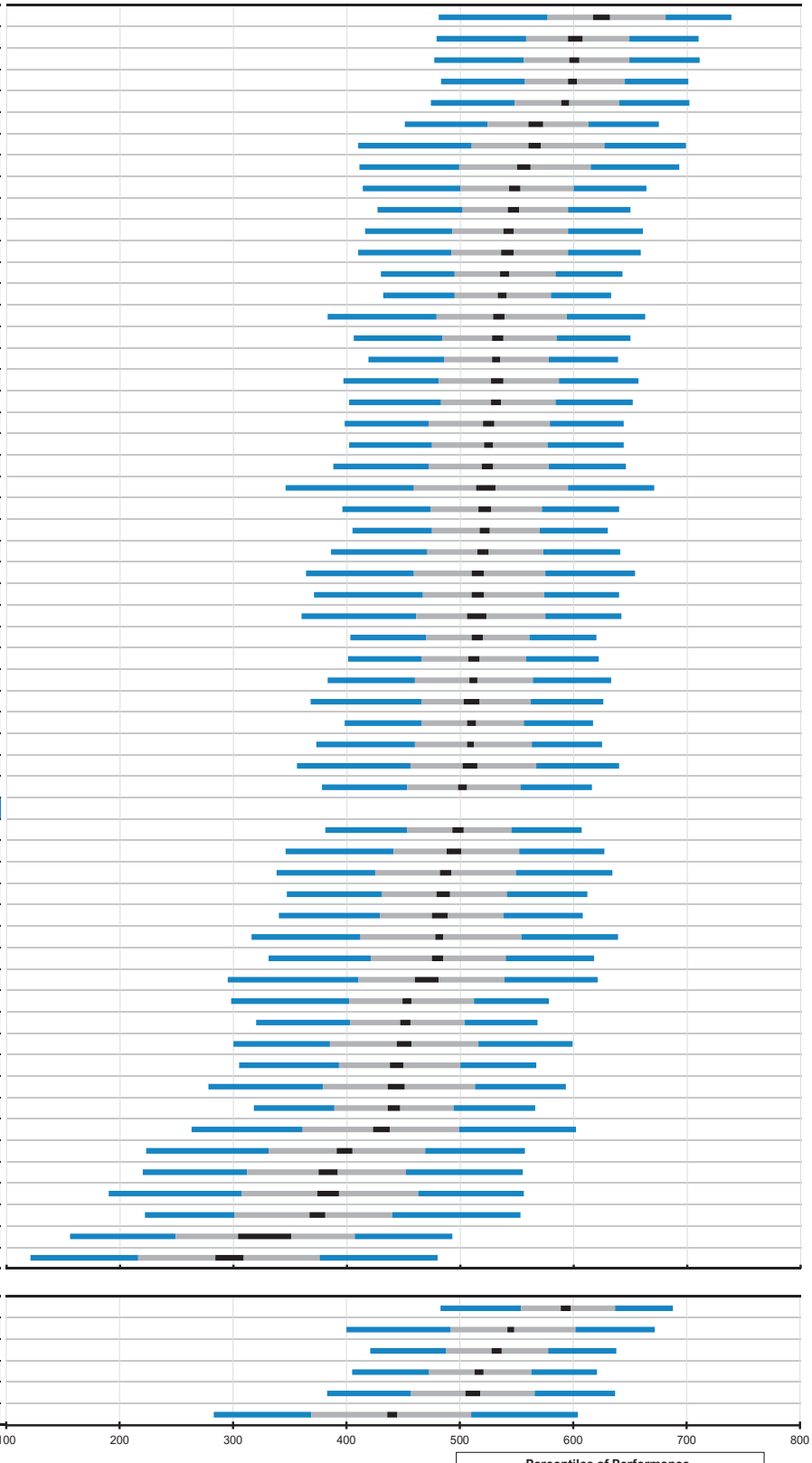
Exhibit 1.1 presents the average achievement at the fourth grade for each participating country (from highest to lowest) together with the scale score distribution underlying the average scale score. Exhibit 1.2 shows whether relatively small differences in average achievement between one country and 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. If no statistically significant difference was found, no symbol is present. If the difference is significant ($p < 0.05$), a symbol indicates whether the estimated achievement of the country in the row is higher (▲) than that of the comparison country, or lower (▽).

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)	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				▲	▲	▲	▲	▲	▲	▲

Benchmarking Participants	Moscow City, Russian Fed.	Dubai, UAE	Quebec, Canada	Madrid, Spain	Ontario, Canada	Abu Dhabi, UAE
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

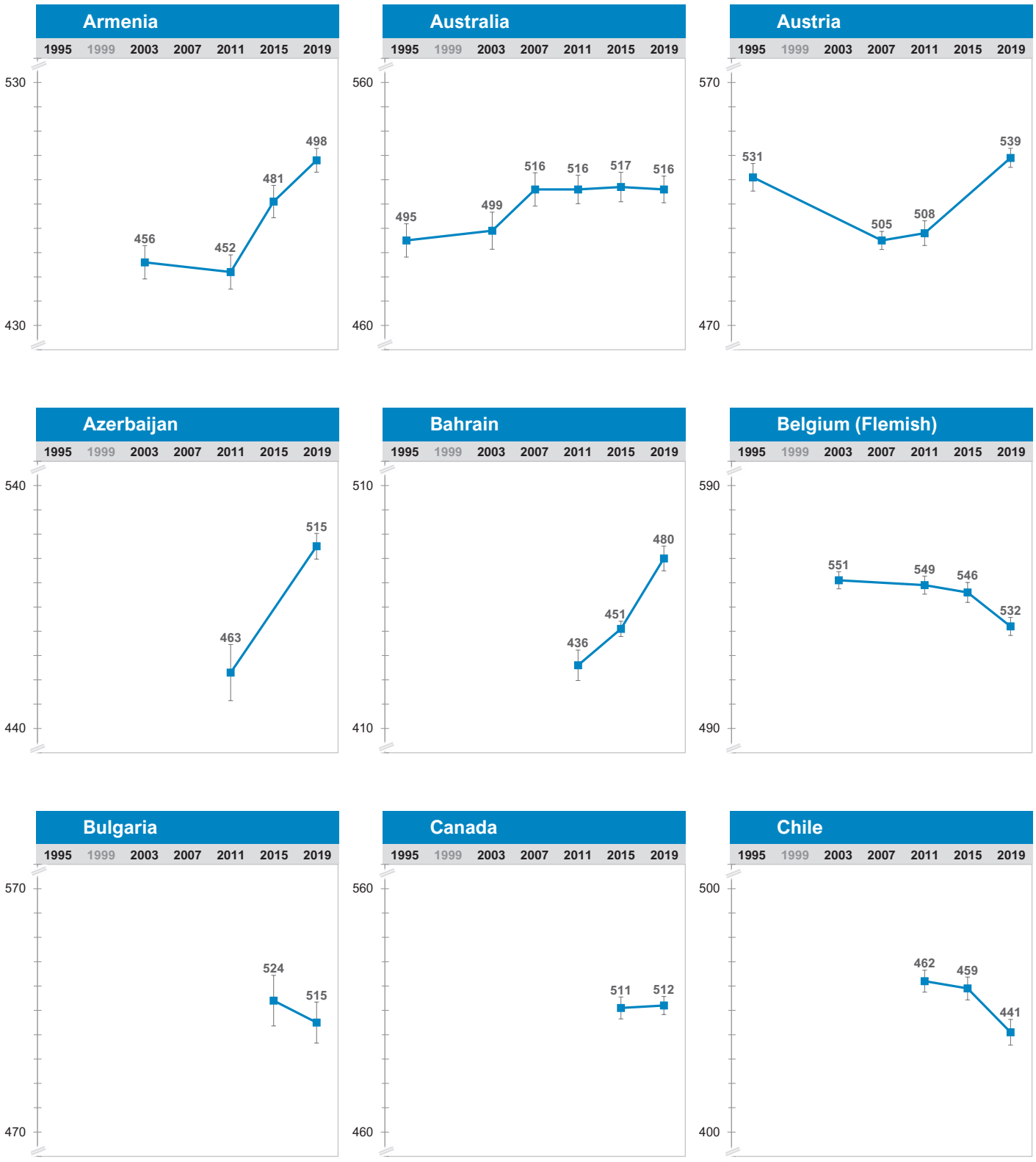
Trends in Average Achievement

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.



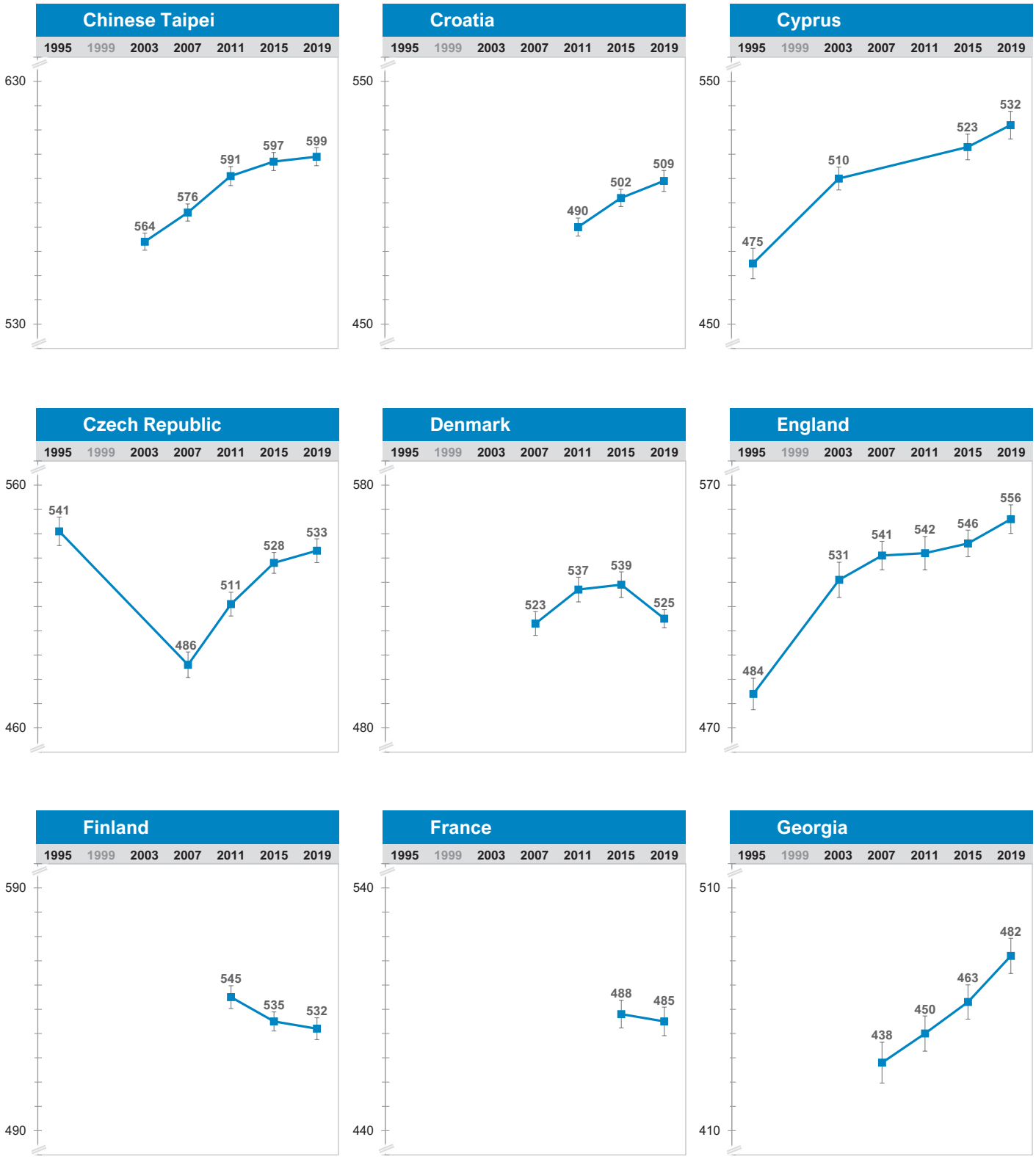
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95%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

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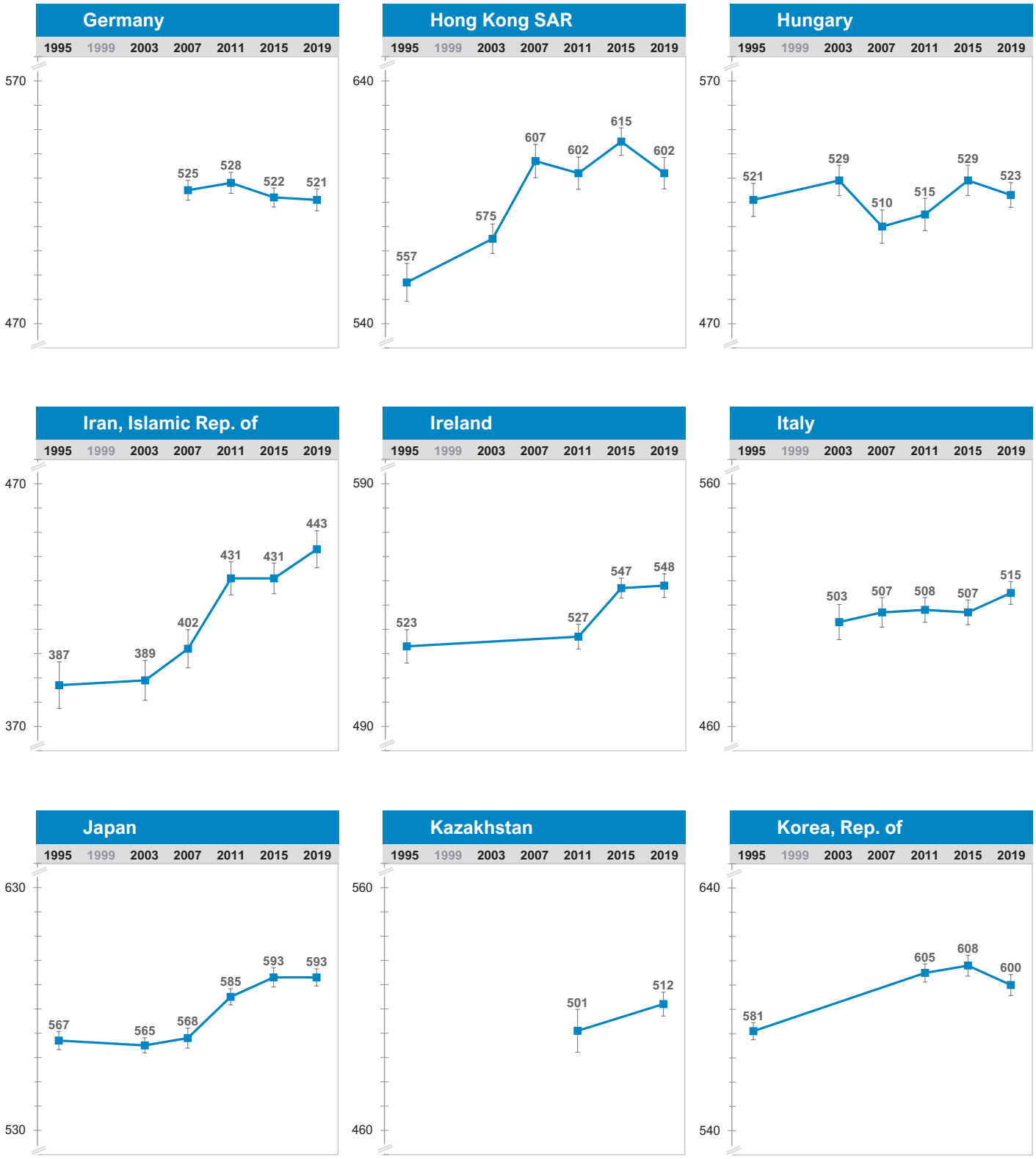
Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

(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.

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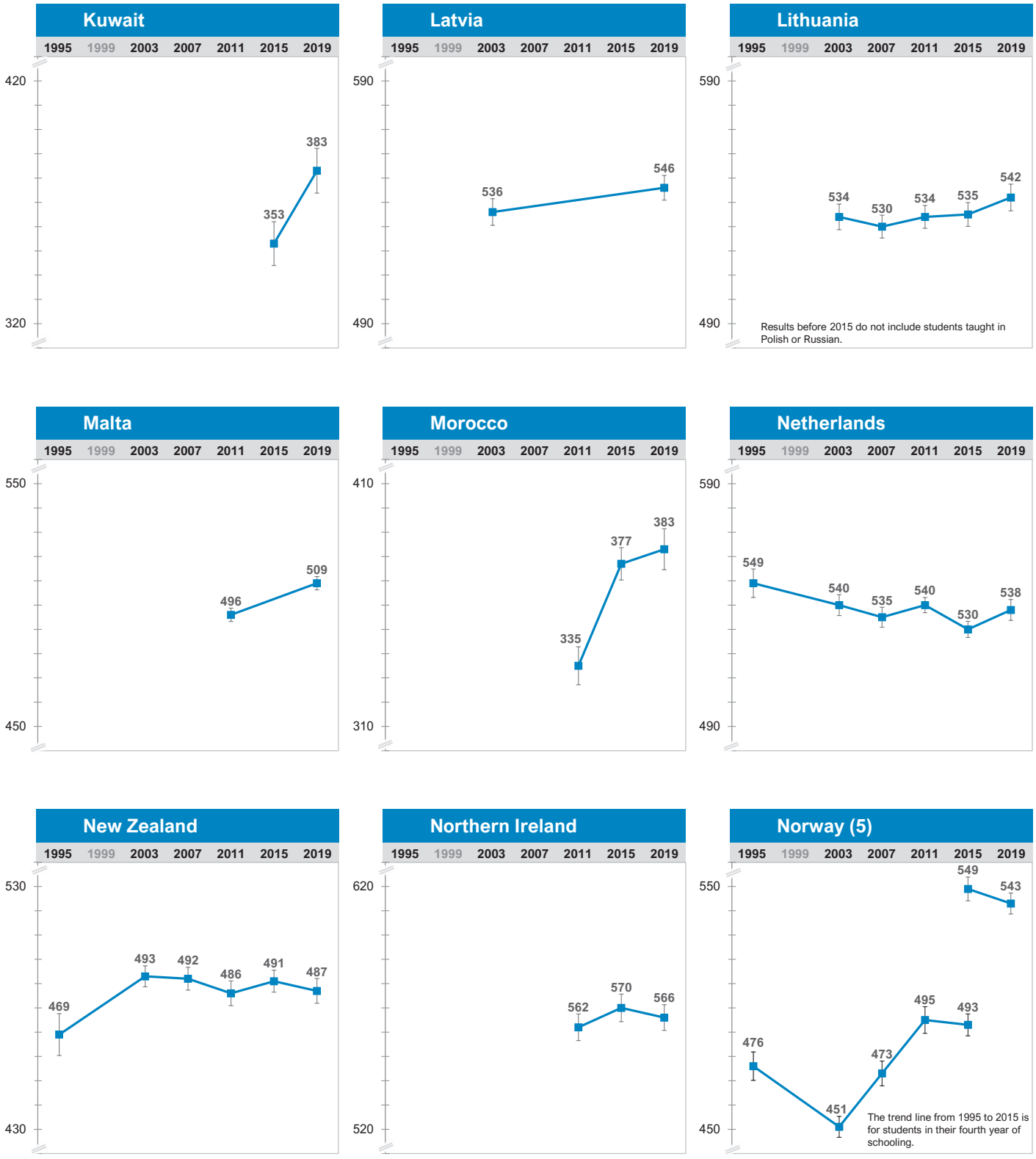
Exhibit 1.3: Trend Plots of Average Mathematics Achievement Across Assessment Years◊

(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.



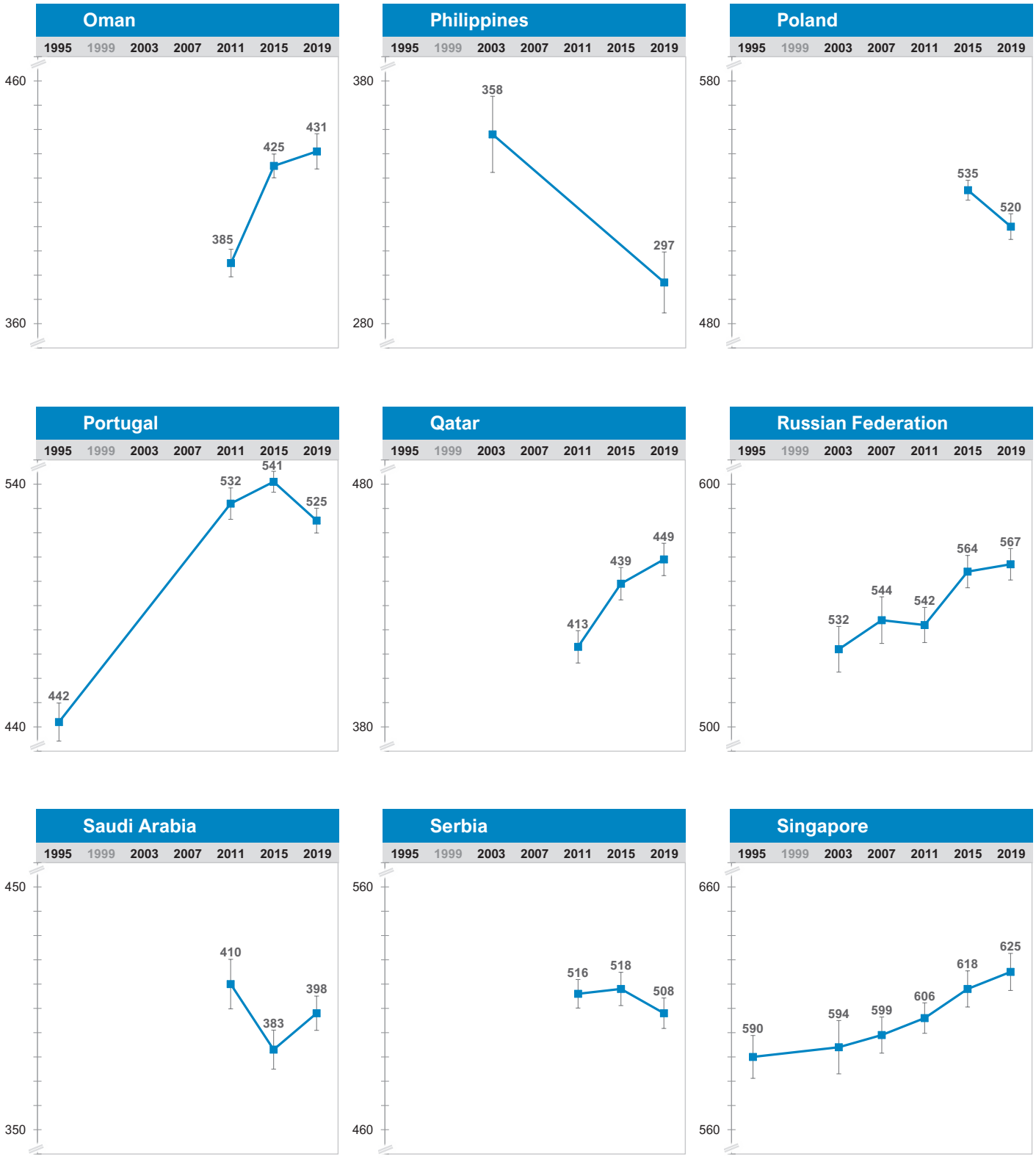
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95%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



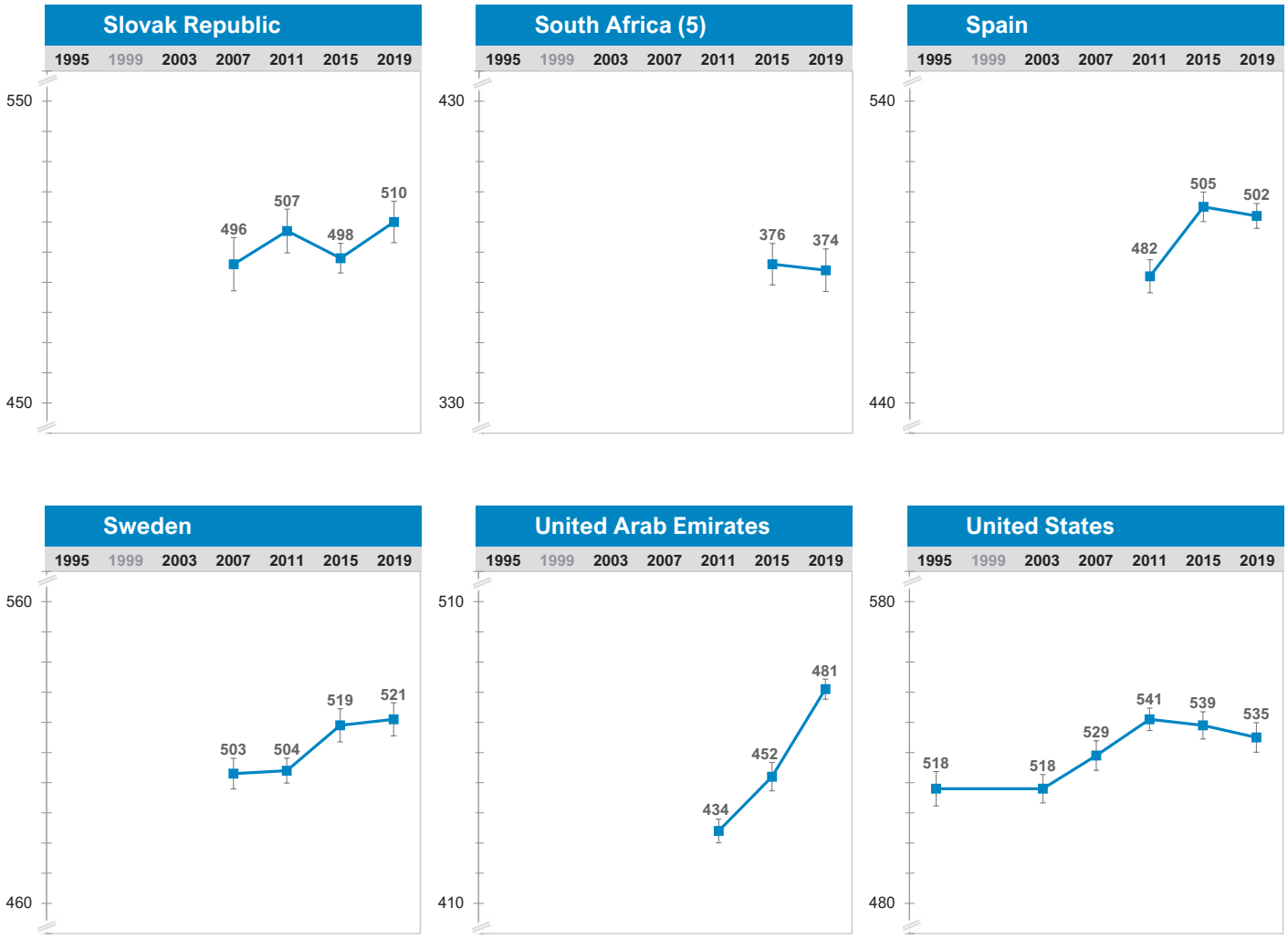
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95%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

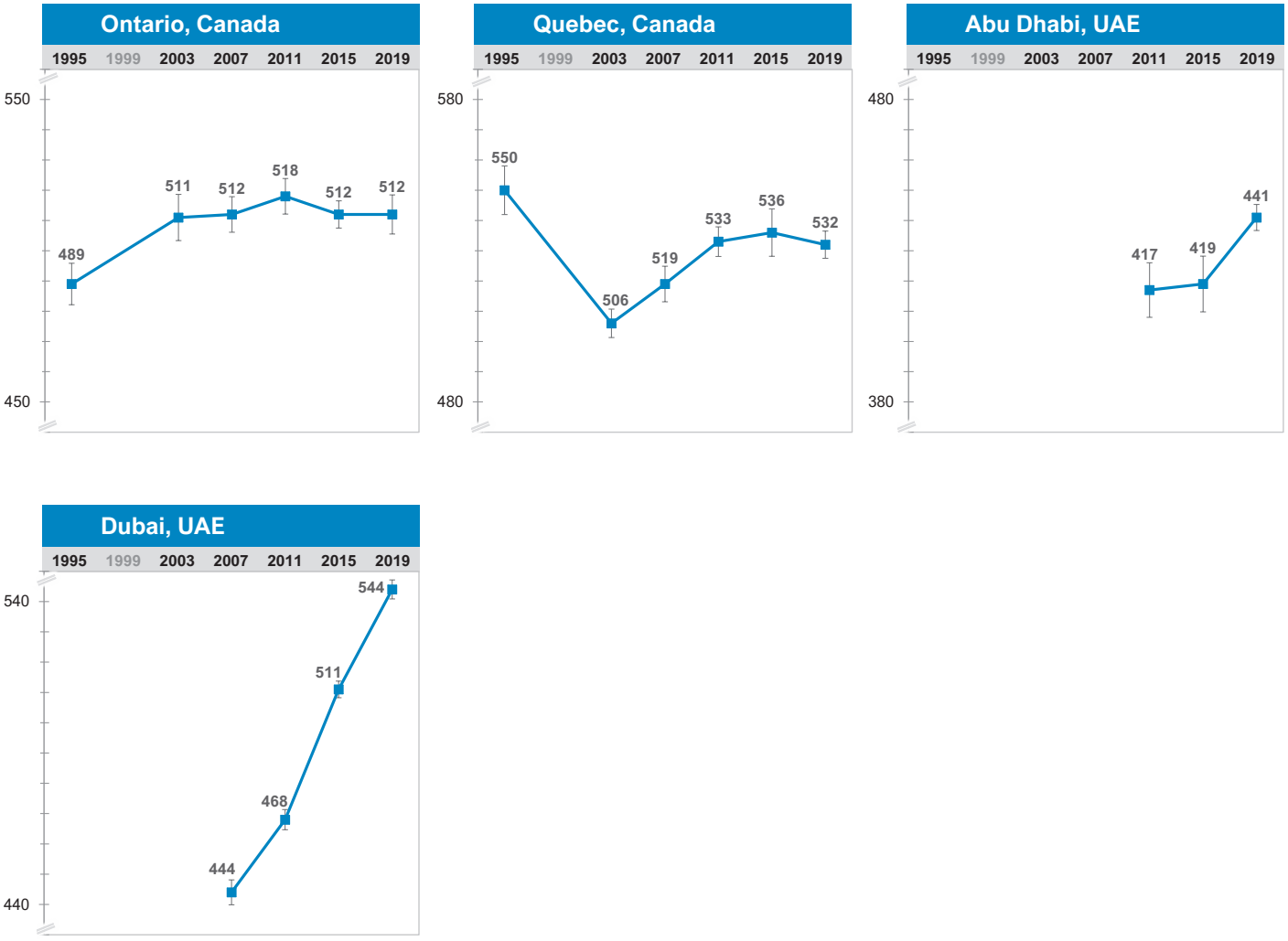
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

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



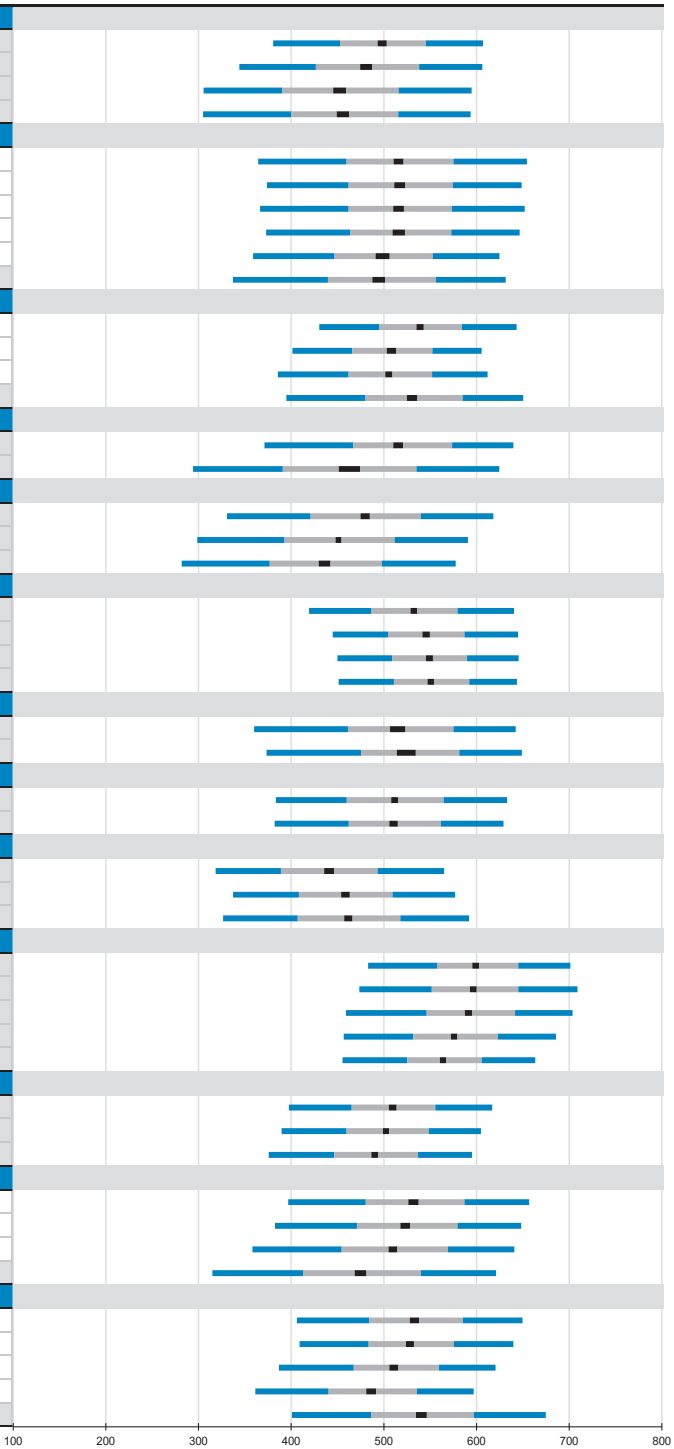
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95%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

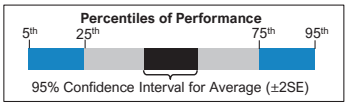
Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

Country	Average Scale Score	Differences Between Years					Mathematics Achievement Distribution
		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



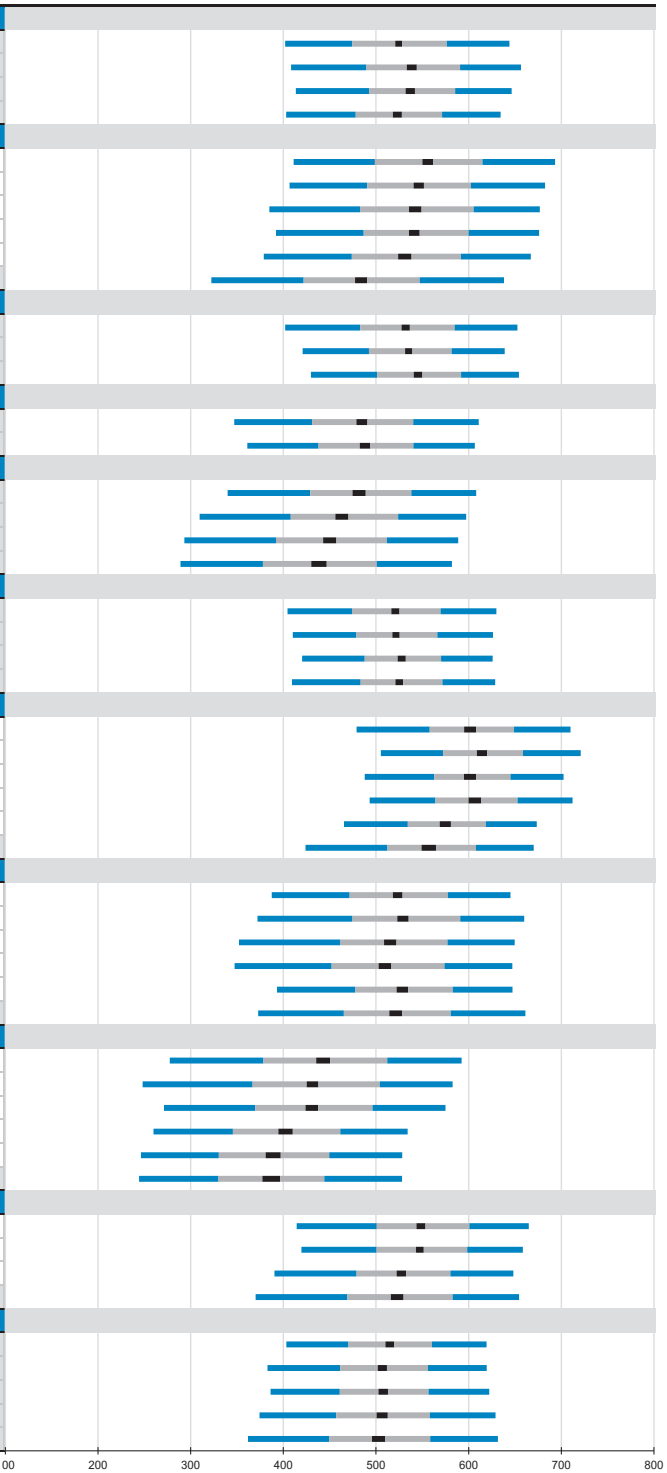
See Appendix A for country participation in previous TIMSS assessments.
See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear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

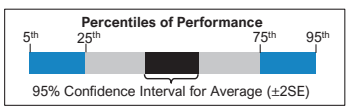
(Continued)

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



SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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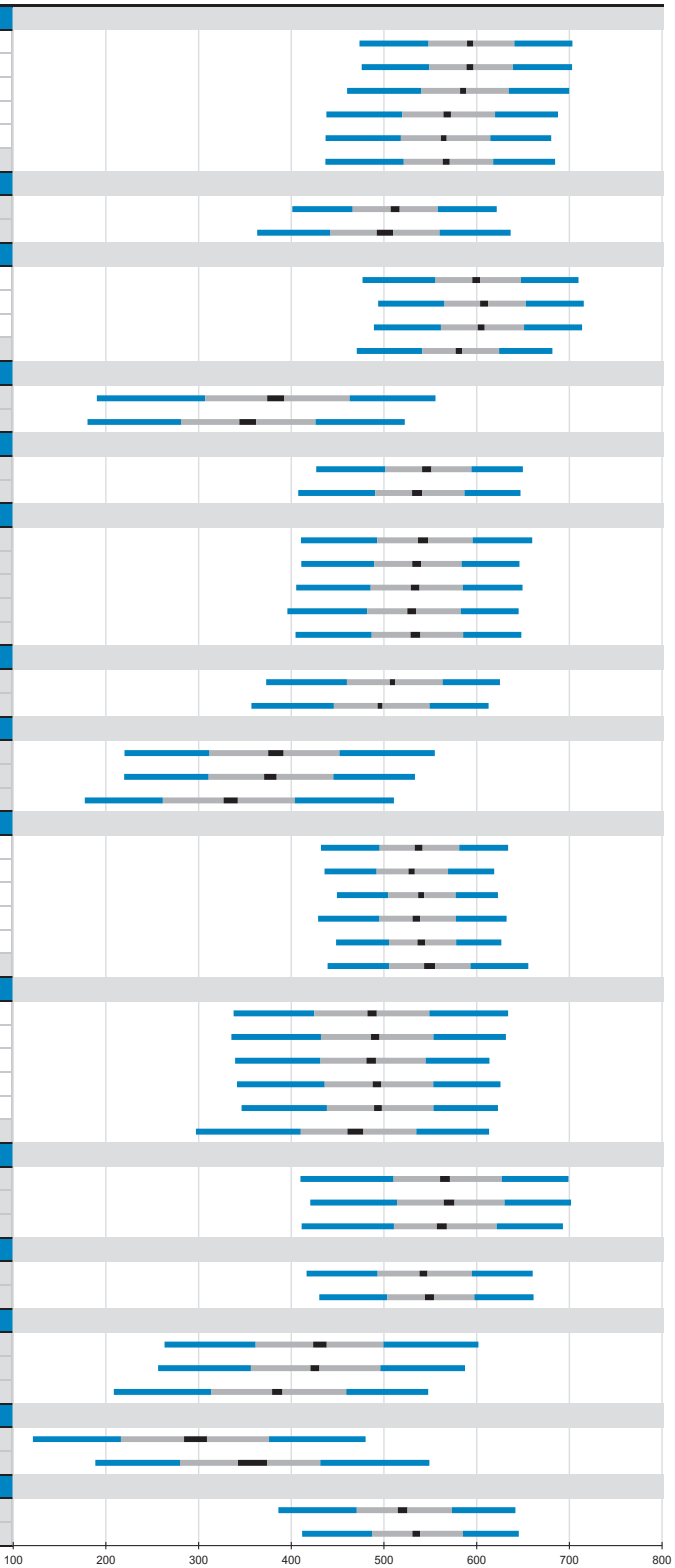
Exhibit 1.4: Differences in Average Mathematics Achievement Across Assessment Years

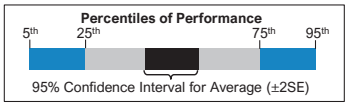
(Continued)

Country	Average Scale Score	Differences Between Years					Mathematics Achievement Distribution
		2015	2011	2007	2003	1995	
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)						



▲ 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 1.4: Differences in Average Mathematics Achievement Across Assessment Years

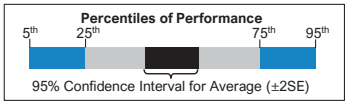
(Continued)

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



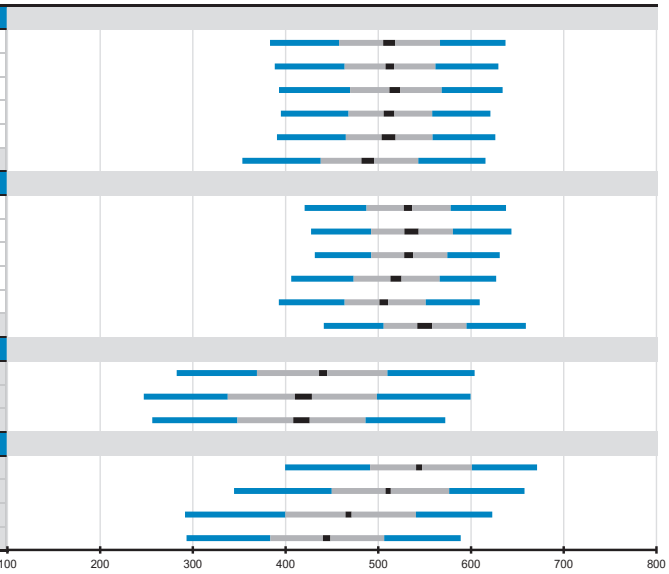
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

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

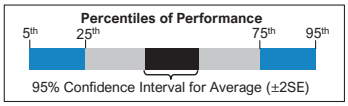
(Continued)

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%.

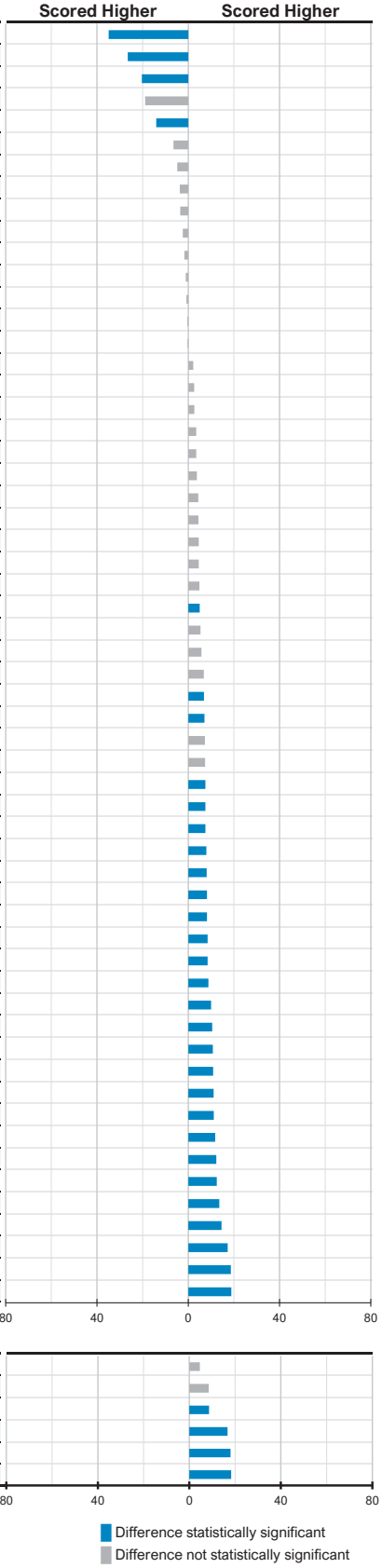
SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

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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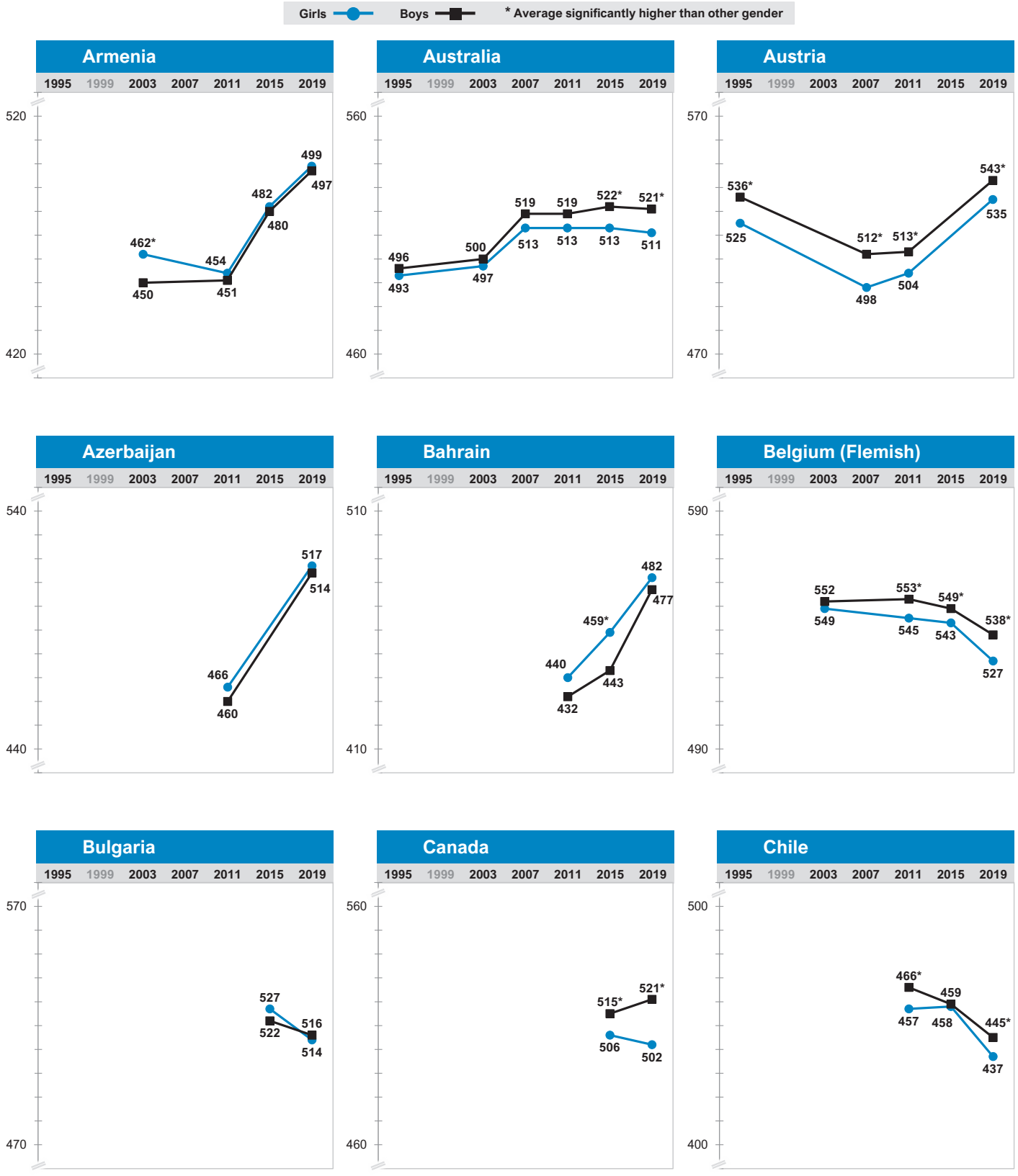
Trends in Average Achievement by Gender

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.



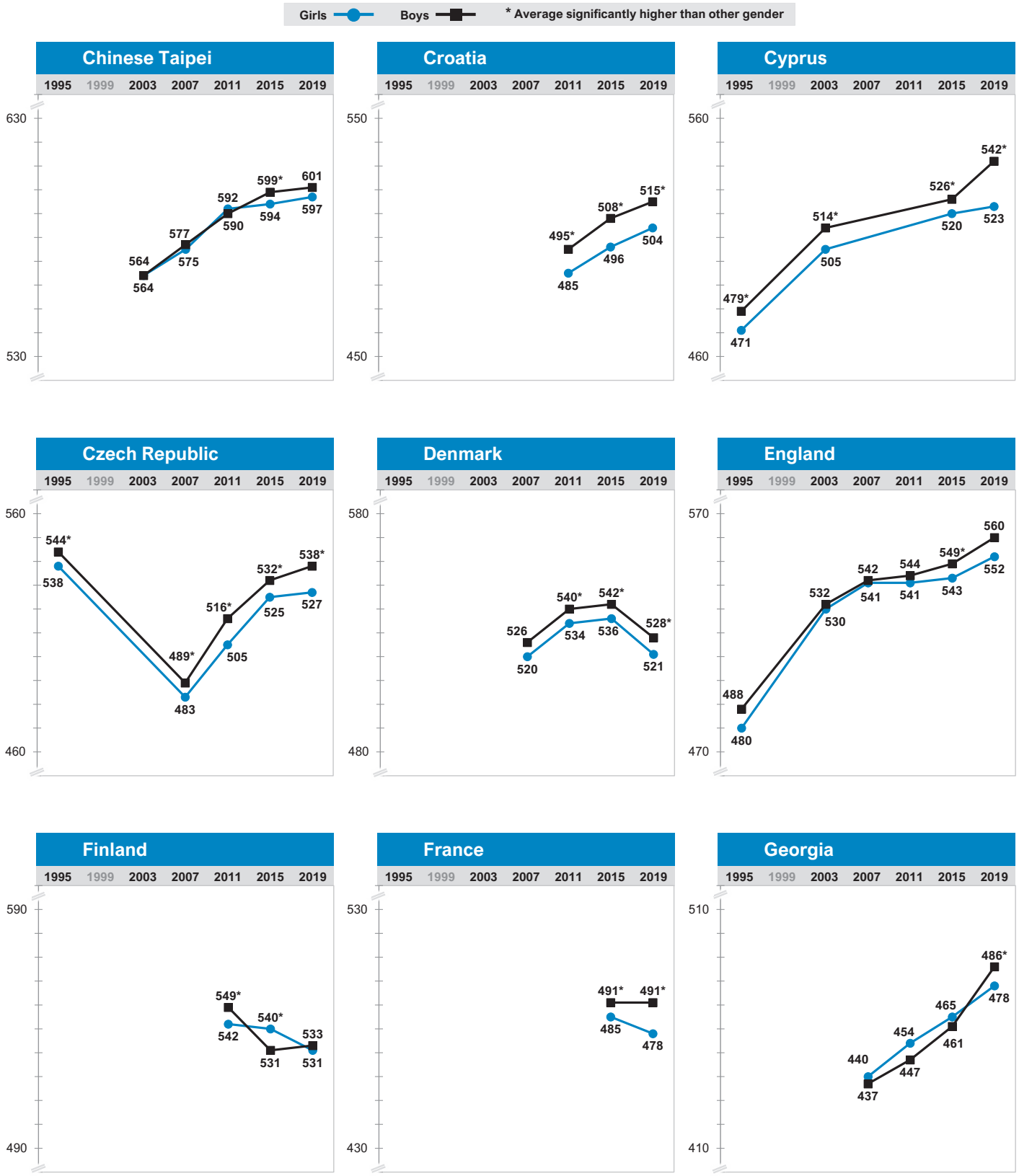
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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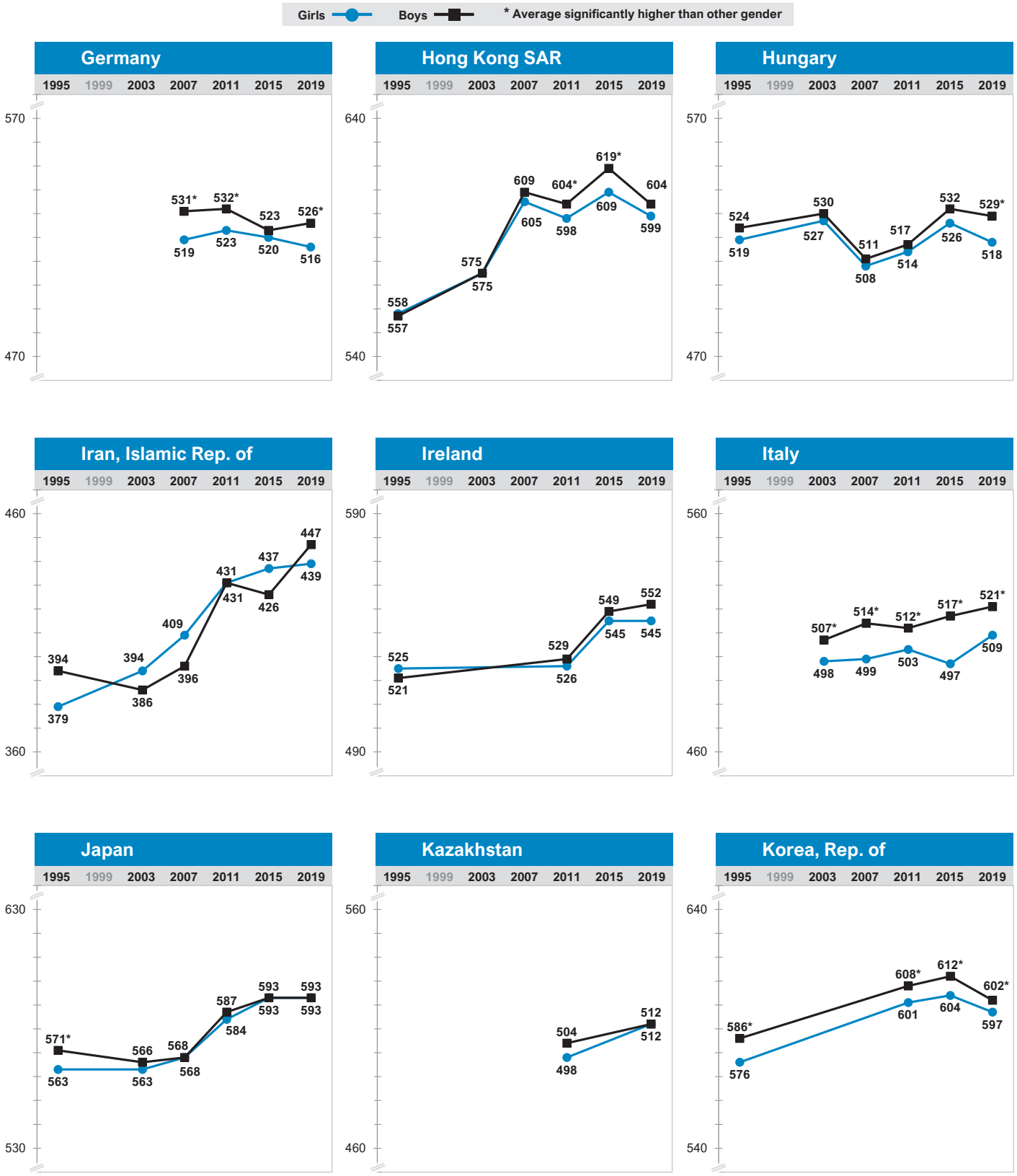
Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(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.



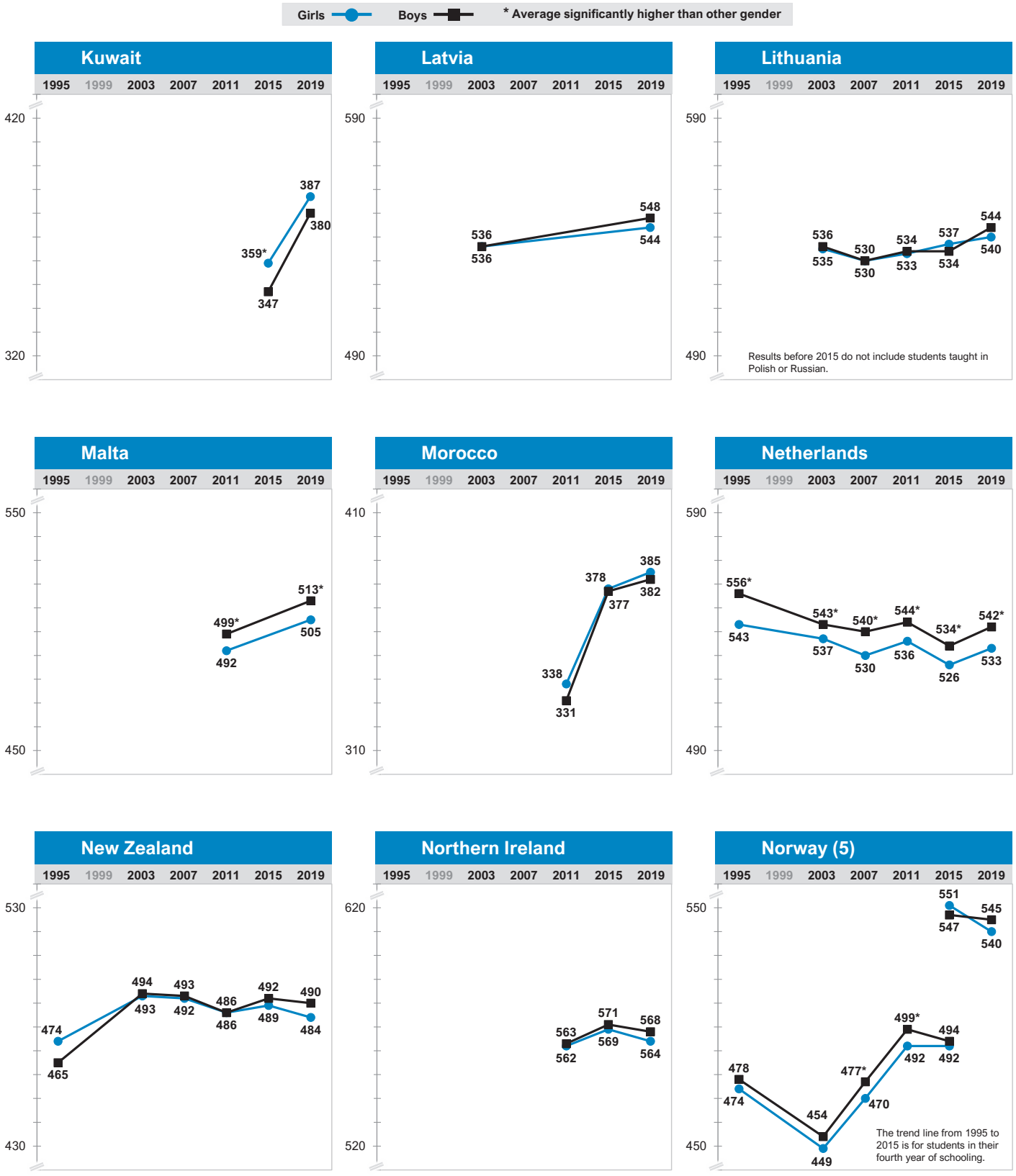
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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.



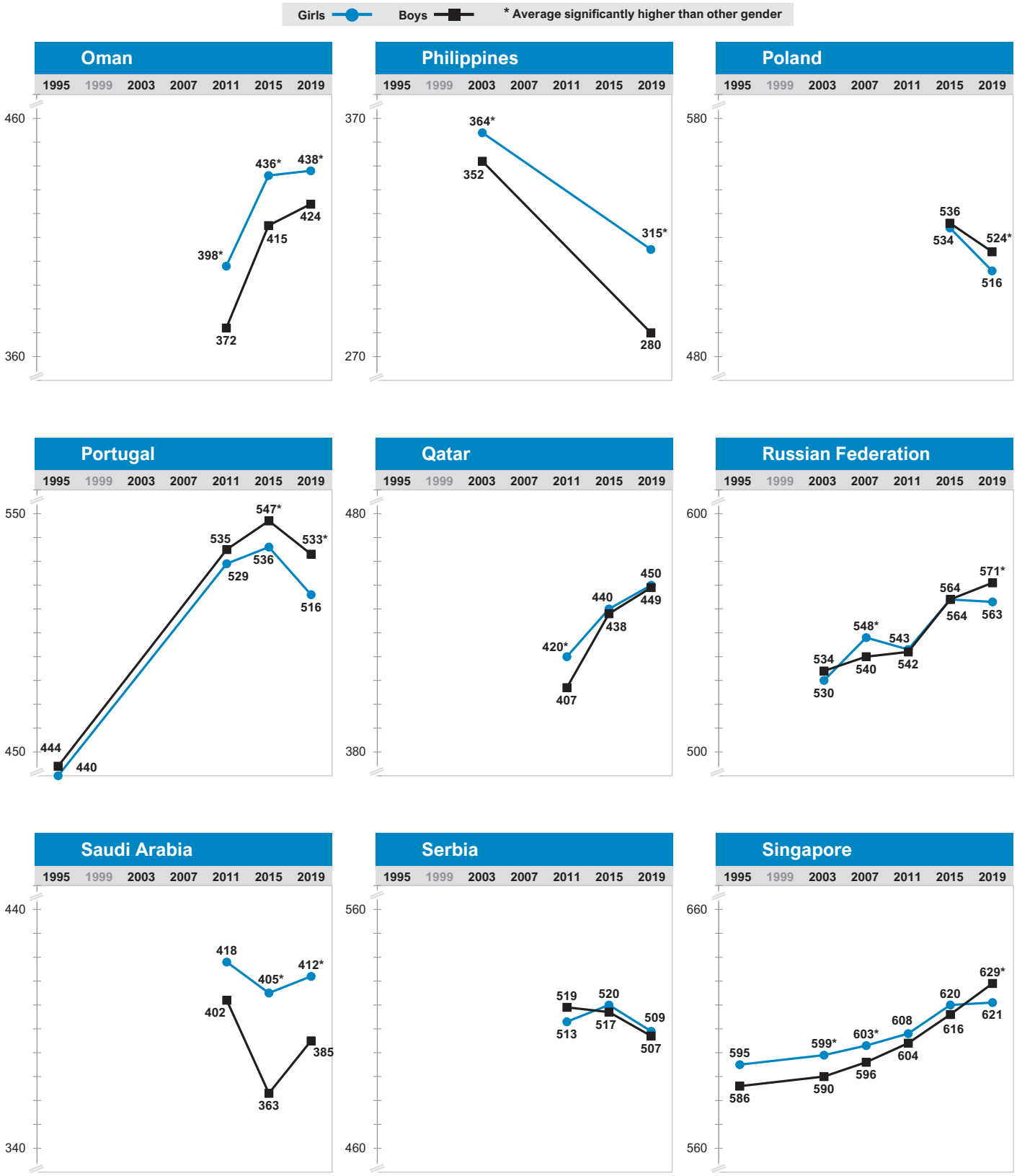
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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.



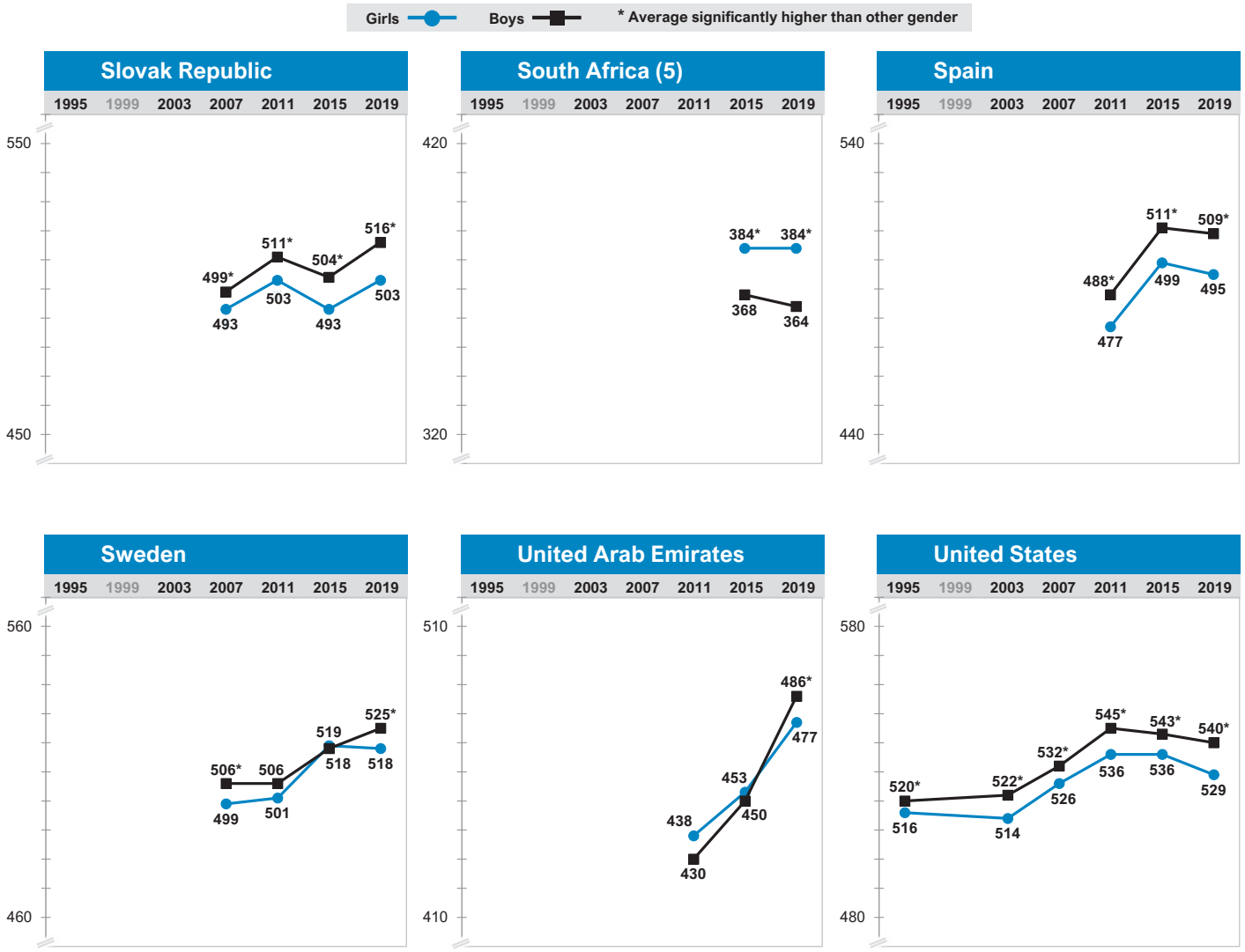
◊ There was no TIMSS fourth grade assessment in 1999. See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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

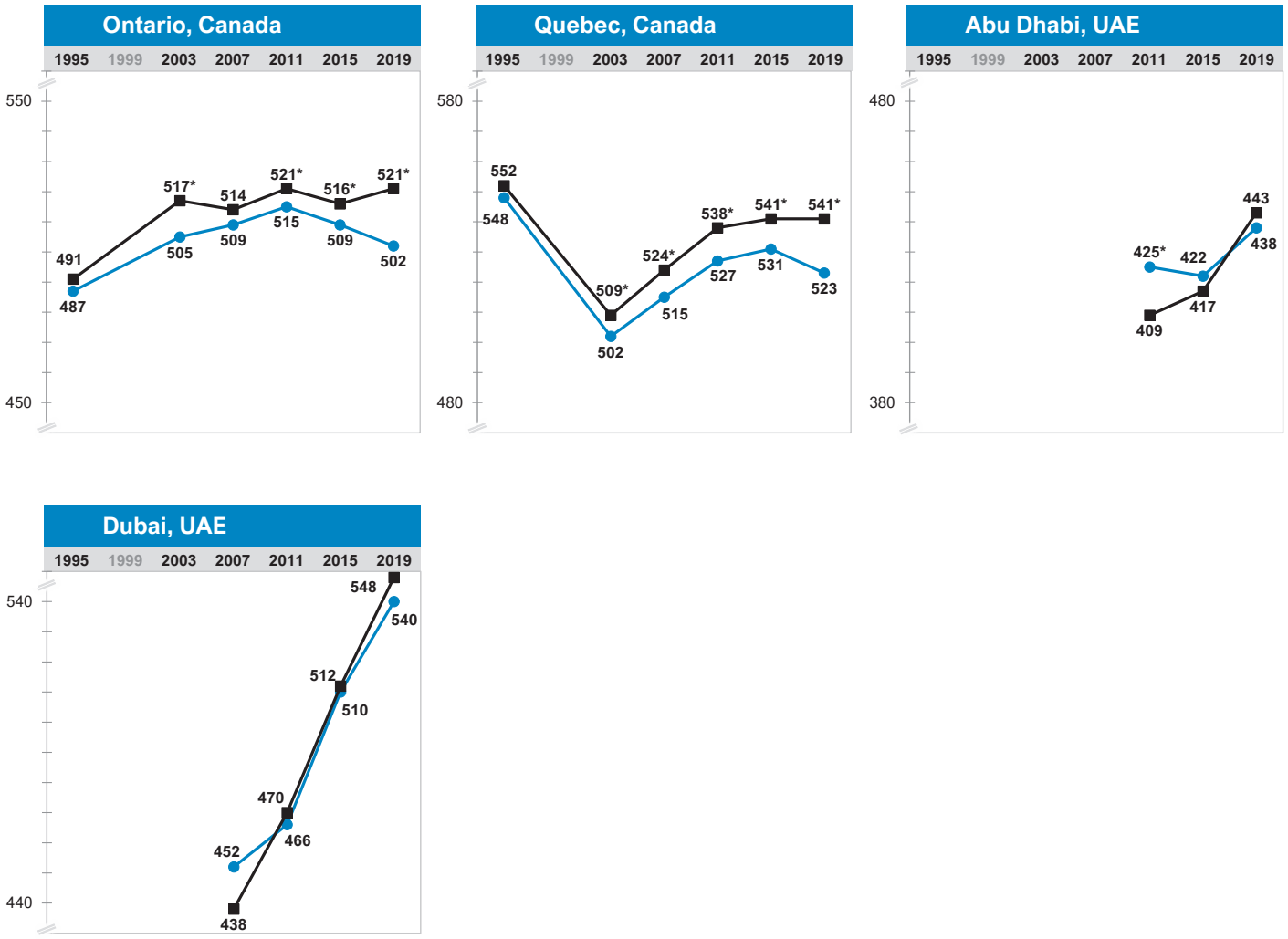
Exhibit 1.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender◊

(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

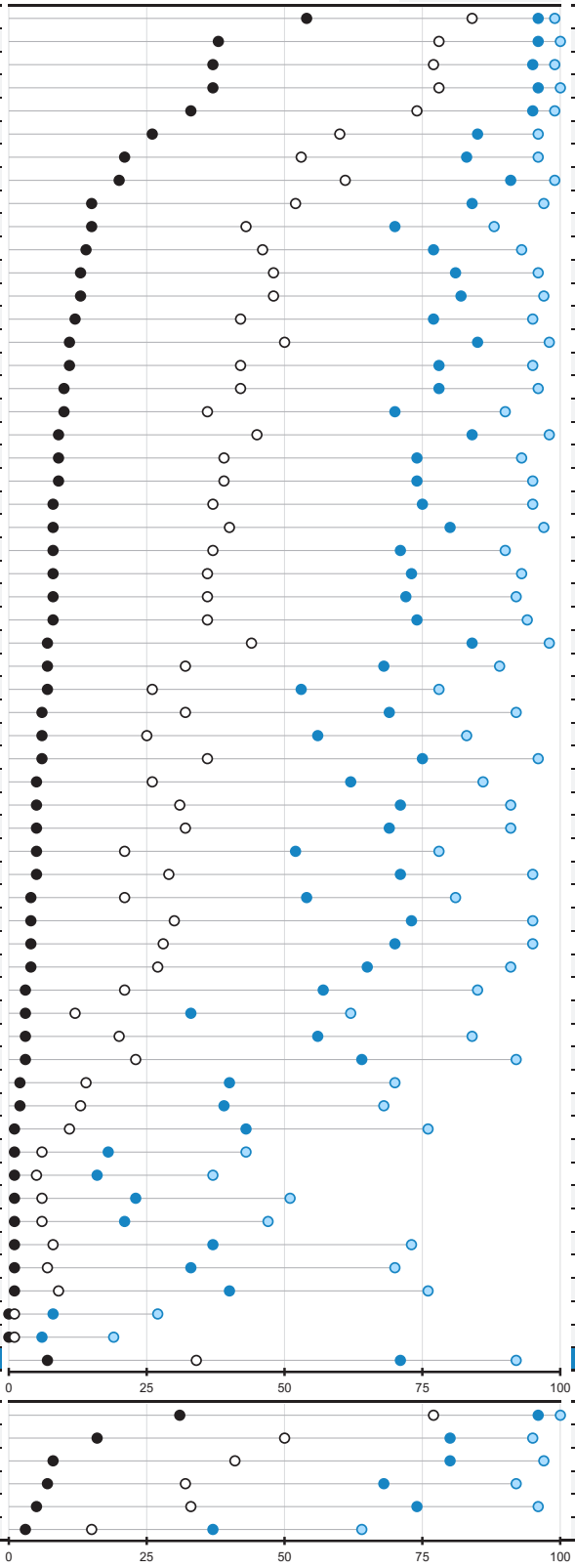
Percentages of Students Reaching International Benchmarks

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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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 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.

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

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

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.

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

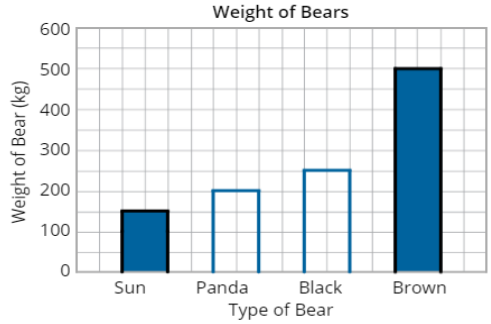
Cognitive Domain: Applying

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.

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.

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)	▽

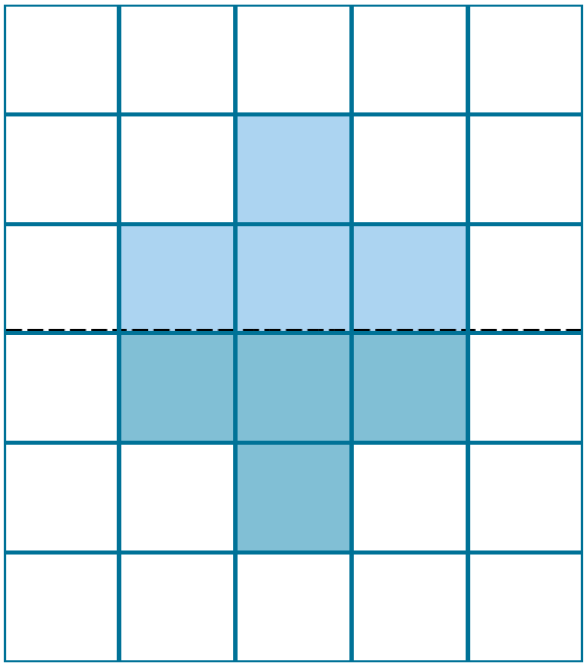
Content Domain: Measurement and Geometry

Cognitive Domain: Applying

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

Complete this figure so the dashed line is a line of symmetry.

Click squares on the grid.



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.

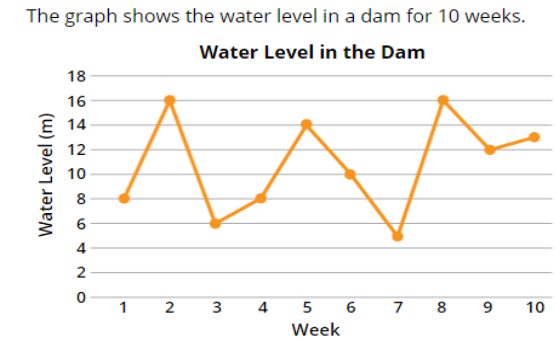
Exhibit 1.11.2: Intermediate International Benchmark of Mathematics Achievement – Example Item 2

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 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.

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.

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.

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.

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

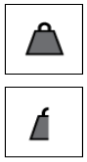
Animal Weights

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.

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.

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

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.

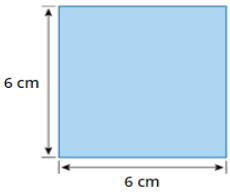
Exhibit 1.13.2: Advanced International Benchmark of Mathematics Achievement – Example Item 2

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

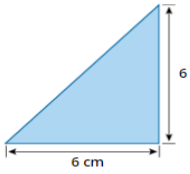
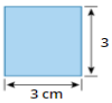
Cognitive Domain: Applying

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.

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

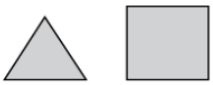
Country	Percent Full Credit	
† Hong Kong SAR	49 (2.4)	▲
Japan	47 (2.0)	▲
† Northern Ireland	46 (2.4)	▲
1 2 Canada	43 (1.6)	▲
2 Lithuania	42 (2.6)	▲
Ireland	40 (2.5)	▲
Korea, Rep. of	38 (2.5)	▲
Cyprus	38 (2.4)	▲
Australia	37 (2.6)	▲
Chinese Taipei	36 (2.2)	▲
2 Portugal	34 (1.9)	▲
3 Singapore	34 (1.9)	▲
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

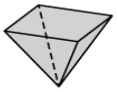
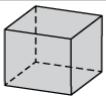
Description: Determines the number of square and triangular faces of three-dimensional shapes (2 of 2 points)

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.

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

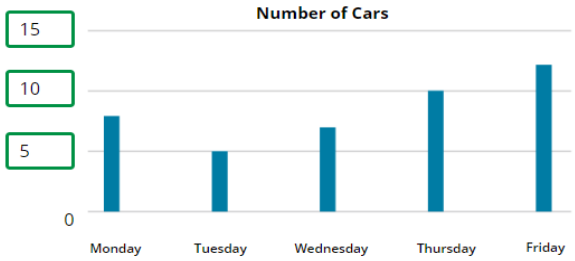
Skylar recorded the number of cars that traveled along her street each morning.

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.

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
Downloaded from http://timss2019.org/download

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.

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 ▲
[12] 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%.

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%.

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
Downloaded from http://timss2019.org/download

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
Downloaded from http://timss2019.org/download

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.

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%.

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%.

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
Downloaded from http://timss2019.org/download

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
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