Mathematics Grade 8

Average Mathematics Achievement

Average Achievement and Scale Score Distributions

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

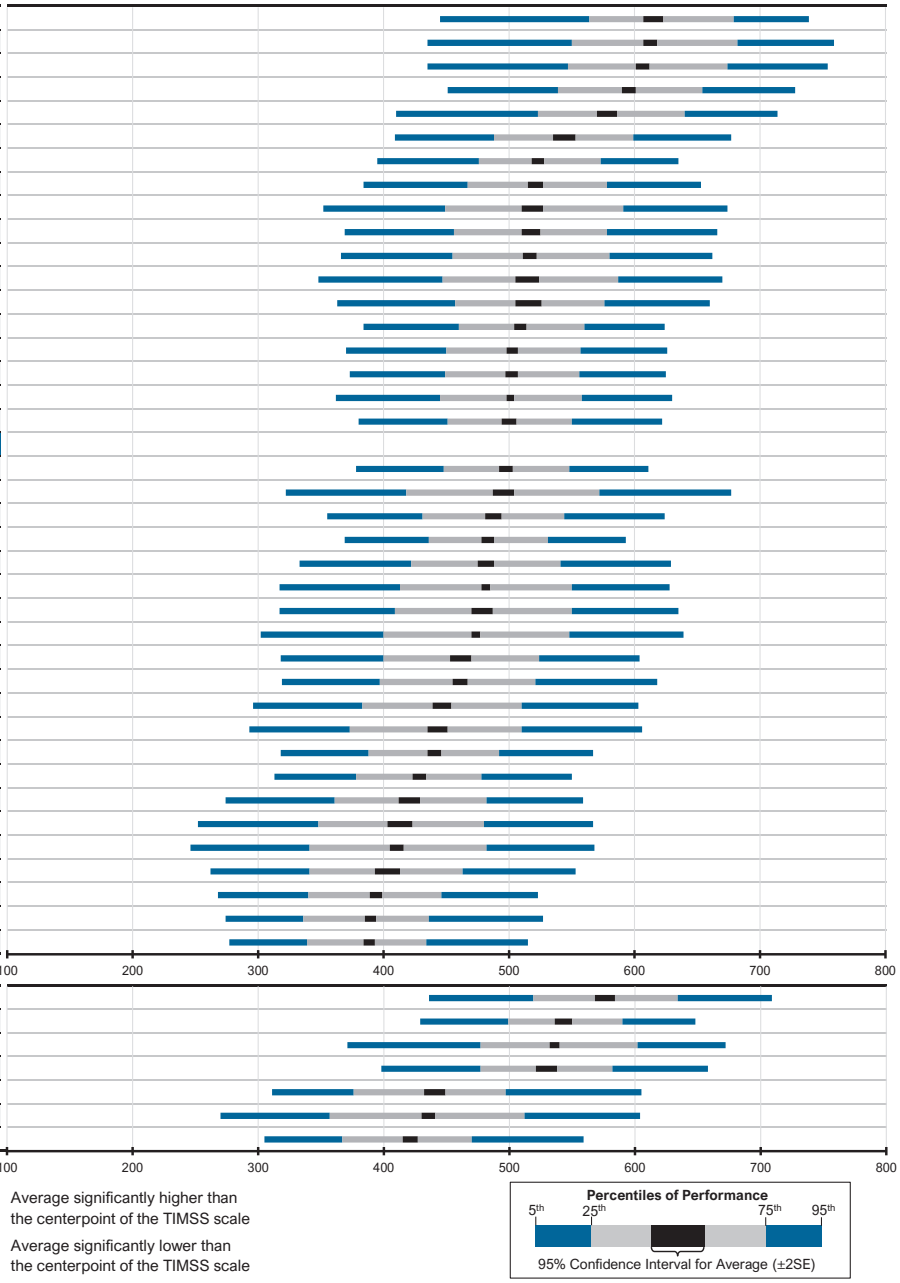
Exhibit 3.1 presents the average achievement at the eighth grade for each participating country from highest to lowest together with the scale score distribution. Exhibit 3.2 shows whether relatively small differences in average achievement between one country and the next are statistically significant.

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

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

Exhibit 3.1: Average Mathematics Achievement and Scale Score Distributions

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



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

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

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

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

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

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

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

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

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

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

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

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

(Continued)

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

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

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

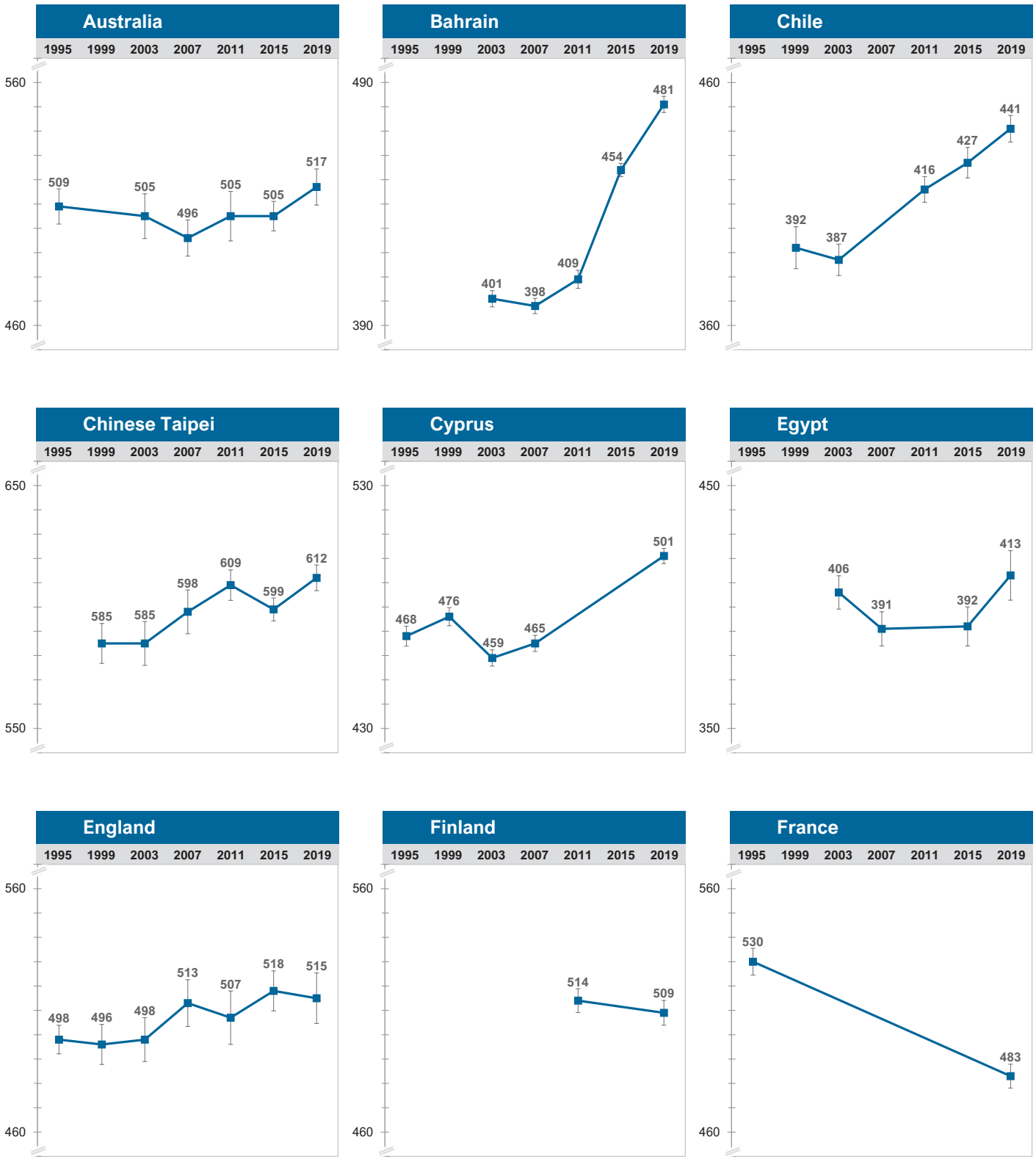
Trends in Average Achievement

Exhibit 3.3 graphs the differences in average mathematics achievement between the assessment cycles for TIMSS 2019 countries that have comparable data from previous assessments, while Exhibit 3.4 provides more details. The countries are presented in alphabetical order in both exhibits. The trends in mathematics achievement at the eighth grade signal more improvements than downturns across the assessment cycles internationally.

Most recently, for the 33 countries that participated in both TIMSS 2015 and 2019, 13 had increases in average achievement and 4 had decreases. The trends between 2007 and 2019, as well as between 1995 and 2019, also show more increases than decreases in average mathematics achievement over the long term. In 2019, compared with 2007, for the 23 countries in both assessments, there were 16 increases and only 2 decreases. In 2019, compared with 1995, for the 18 countries in both assessments, there were 9 increases and 4 decreases.

Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



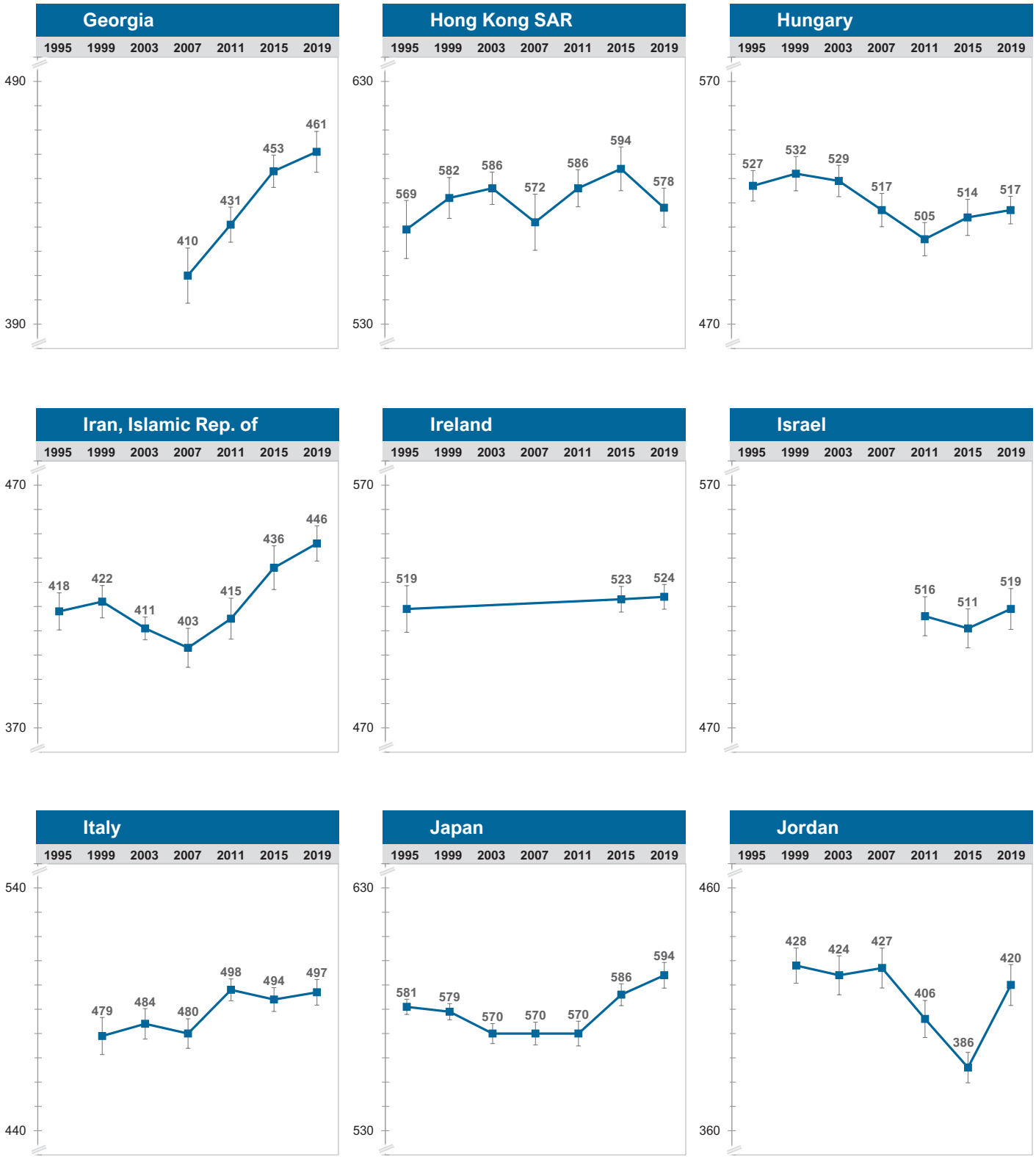
See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

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

Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



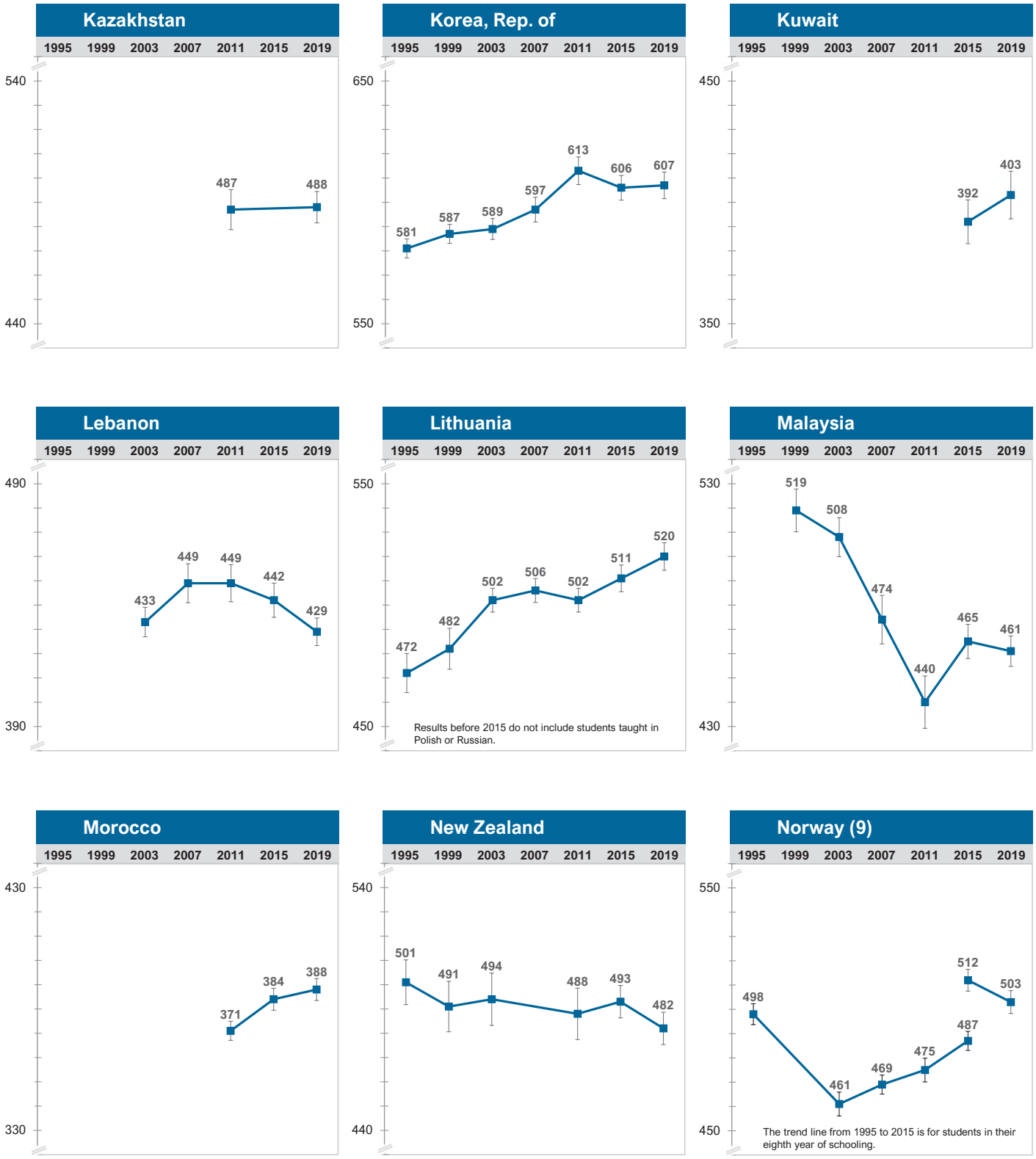
See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

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

Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



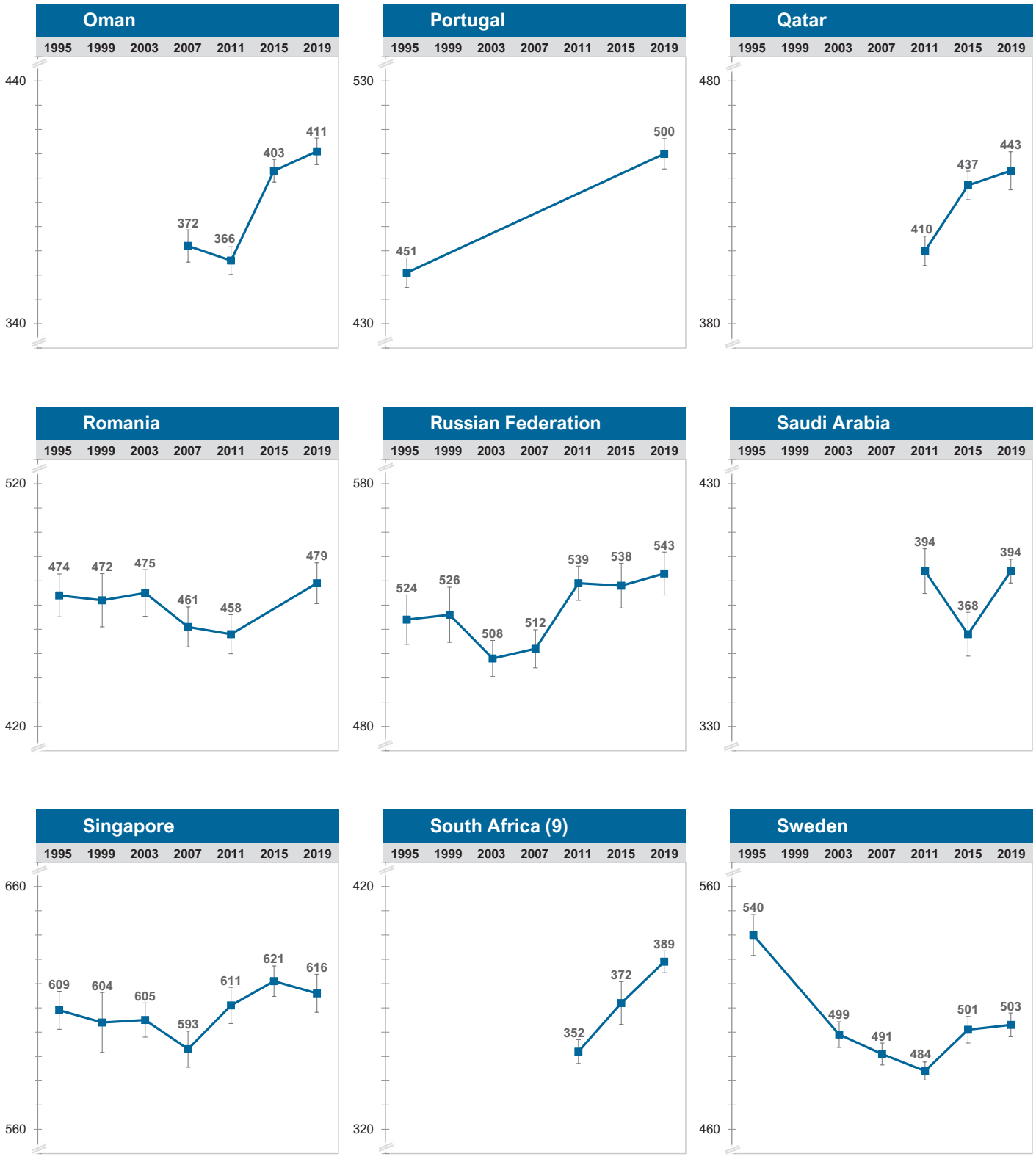
See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

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

Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



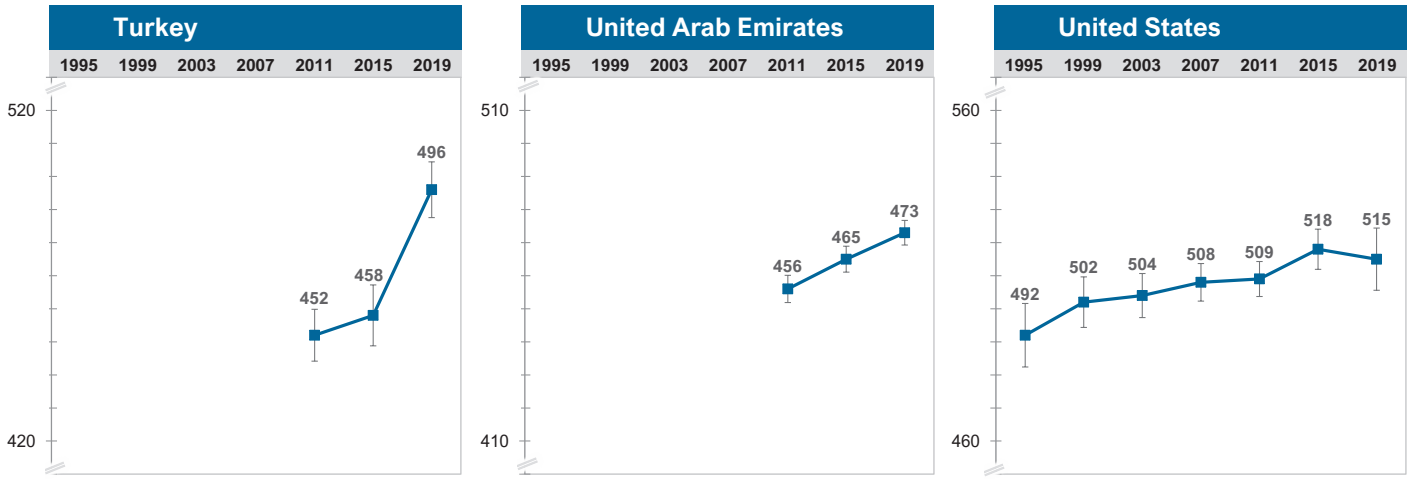
See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

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

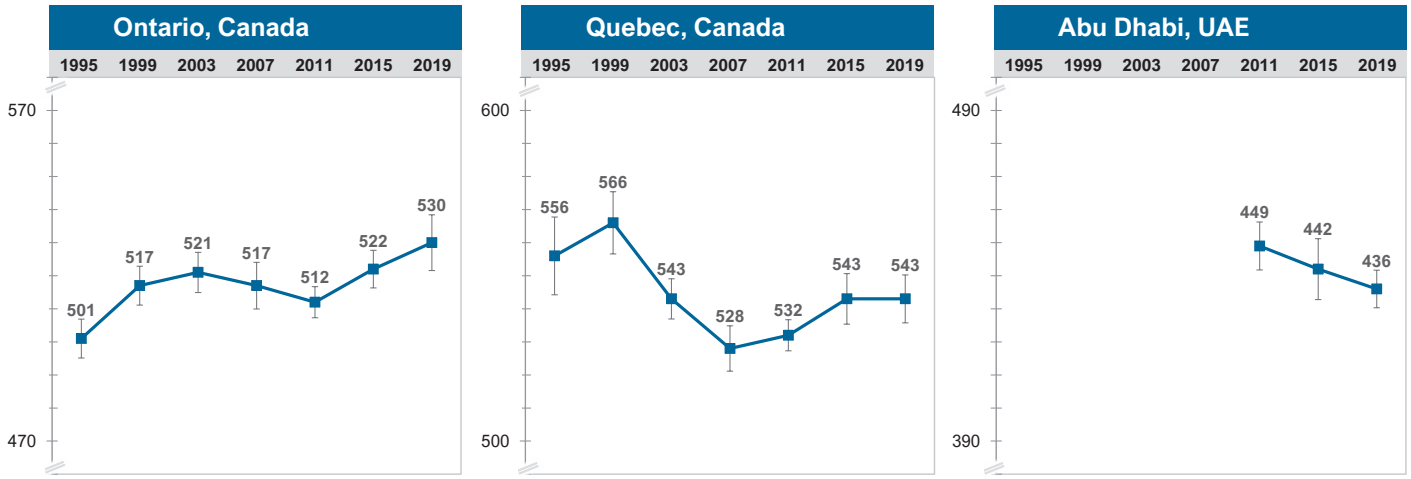
Exhibit 3.3: Trend Plots of Average Mathematics Achievement Across Assessment Years

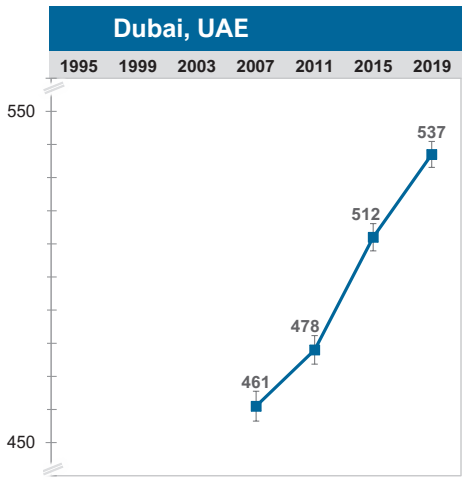
(Continued)

This exhibit displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The accompanying table (Exhibit 3.4) provides details, including statistical significance. See Appendix A for country participation in previous assessments.



Benchmarking Participants





See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.
I The black bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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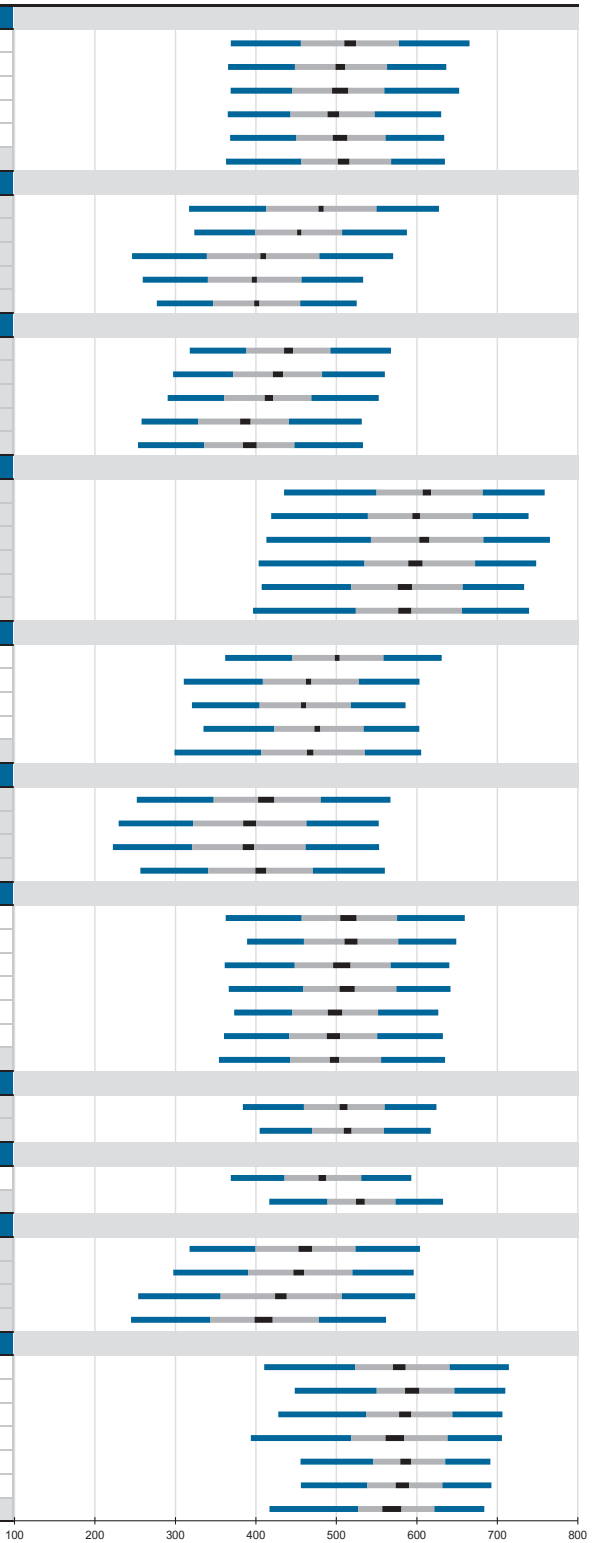
Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

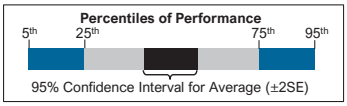
Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▽) than the performance in the column year.

Country	Average Scale Score	Differences Between Years						Mathematics Achievement Distribution
		2015	2011	2007	2003	1999	1995	
Australia								
2019	517 (3.8)	12 ▲	12	21 ▲	13 ▲		8	
2015	505 (3.1)		0	9	0		-4	
2011	505 (5.2)			9	0		-4	
2007	496 (3.8)				-8		-13 ▽	
2003	505 (4.7)						-4	
‡ 1995	509 (3.7)							
Bahrain								
2019	481 (1.7)	27 ▲	72 ▲	83 ▲	80 ▲			
2015	454 (1.4)		45 ▲	56 ▲	53 ▲			
Ψ 2011	409 (1.9)			11 ▲	8 ▲			
2007	398 (1.6)				-3			
2003	401 (1.7)							
Chile								
Ψ 2019	441 (2.8)	13 ▲	24 ▲		54 ▲	48 ▲		
Ψ 2015	427 (3.2)		11 ▲		41 ▲	35 ▲		
2011	416 (2.7)				29 ▲	24 ▲		
2003	387 (3.3)					-6		
1999	392 (4.4)							
Chinese Taipei								
2019	612 (2.7)	13 ▲	3	14 ▲	27 ▲	27 ▲		
2015	599 (2.4)		-10 ▽	1	14 ▲	14 ▲		
2011	609 (3.2)			11	24 ▲	24 ▲		
2007	598 (4.6)				13 ▲	13 ▲		
2003	585 (4.6)					0		
1999	585 (4.2)							
Cyprus								
2019	501 (1.6)			36 ▲	42 ▲	25 ▲	34 ▲	
2007	465 (1.7)				6 ▲	-11 ▽	-2	
2003	459 (1.7)					-17 ▽	-8 ▽	
1999	476 (1.9)						9 ▲	
1995	468 (2.1)							
Egypt								
2 Ψ 2019	413 (5.2)	21 ▲		22 ▲	7			
Ψ 2015	392 (4.1)			2	-14 ▽			
2007	391 (3.6)				-16 ▽			
2003	406 (3.5)							
England								
2019	515 (5.3)	-3	8	2	16 ▲	19 ▲	17 ▲	
2015	518 (4.2)		11	5	20 ▲	22 ▲	21 ▲	
‡ 2011	507 (5.6)			-7	8	10	9	
† 2007	513 (4.9)				15 ▲	17 ▲	16 ▲	
≡ 2003	498 (4.6)					2	1	
† 1999	496 (4.2)						-1	
3 † 1995	498 (3.0)							
Finland								
2019	509 (2.6)		-5					
2011	514 (2.5)							
France								
2019	483 (2.5)						-47 ▽	
1995	530 (2.8)							
Georgia								
1 2019	461 (4.3)	8	30 ▲	52 ▲				
1 2 2015	453 (3.4)		22 ▲	44 ▲				
1 2011	431 (3.7)			22 ▲				
1 2007	410 (5.8)							
Hong Kong SAR								
† 2019	578 (4.1)	-16 ▽	-7	6	-8	-4	9	
2015	594 (4.6)		9	22 ▲	8	12	25 ▲	
2011	586 (3.9)			13	0	4	17 ▲	
† 2007	572 (5.9)				-14 ▽	-10	4	
† 2003	586 (3.4)					4	17 ▲	
† 1999	582 (4.3)						13	
1995	569 (6.1)							



▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



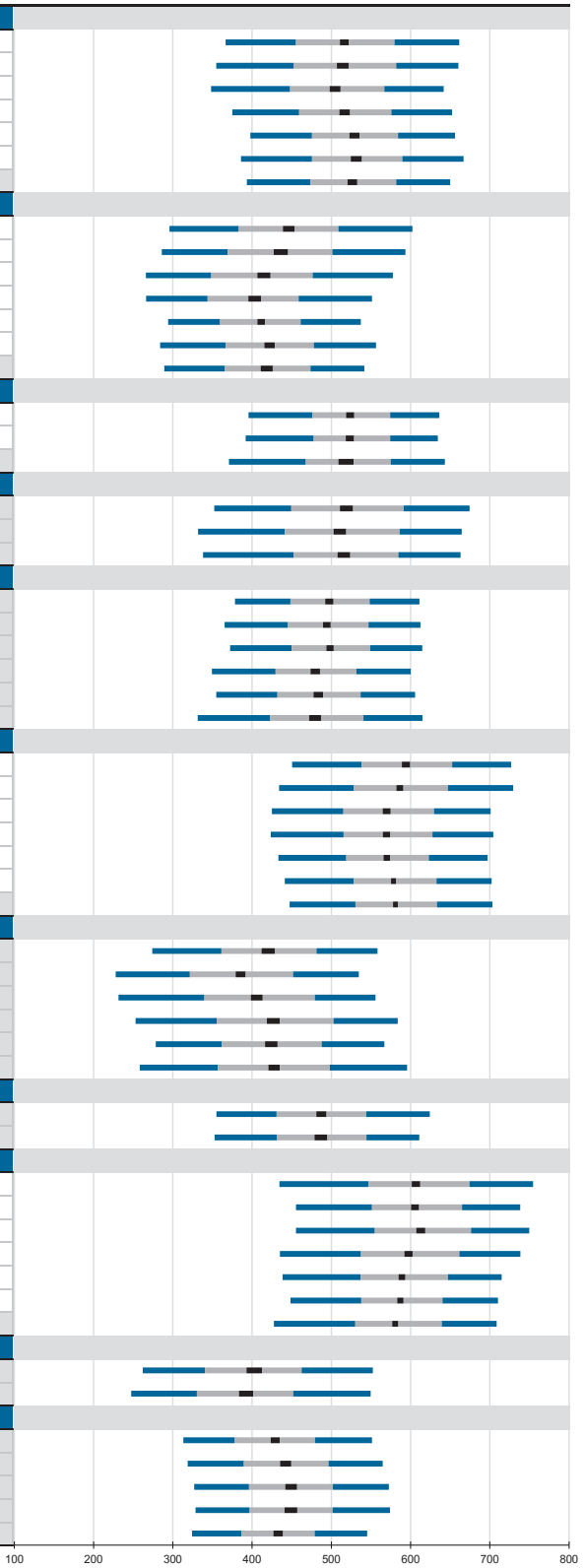
See Appendix A for country participation in previous TIMSS assessments.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

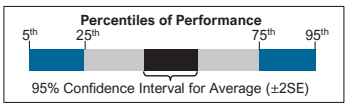
(Continued)

Country	Average Scale Score	Differences Between Years						Mathematics Achievement Distribution
		2015	2011	2007	2003	1999	1995	
Hungary								
2019	517 (2.9)	2	12 ▲	0	-13 ▽	-15 ▽	-10 ▽	
2015	514 (3.8)		10	-2	-15 ▽	-17 ▽	-12 ▽	
2011	505 (3.5)			-12 ▽	-24 ▽	-27 ▽	-22 ▽	
2007	517 (3.5)				-12 ▽	-15 ▽	-10 ▽	
[2] 2003	529 (3.3)					-2	3	
1999	532 (3.6)						5	
1995	527 (3.2)							
Iran, Islamic Rep. of								
2019	446 (3.7)	10	31 ▲	43 ▲	35 ▲	24 ▲	28 ▲	
Ψ 2015	436 (4.6)		21 ▲	33 ▲	25 ▲	14 ▲	18 ▲	
Ψ 2011	415 (4.3)			12	4	-7	-3	
2007	403 (4.1)				-8	-19 ▽	-15 ▽	
[2] 2003	411 (2.4)					-11 ▽	-7	
1999	422 (3.4)						4	
1995	418 (3.9)							
Ireland								
2019	524 (2.6)	0					5	
2015	523 (2.7)						5	
1995	519 (4.9)							
Israel								
[3] 2019	519 (4.3)	8	3					
[3] 2015	511 (4.1)		-5					
[3] 2011	516 (4.1)							
Italy								
2019	497 (2.7)	3	-1	18 ▲	14 ▲	18 ▲		
[2] 2015	494 (2.5)		-4	15 ▲	11 ▲	15 ▲		
2011	498 (2.3)			19 ▲	15 ▲	19 ▲		
2007	480 (3.1)				-4	0		
2003	484 (3.2)					4		
[2] 1999	479 (3.9)							
Japan								
2019	594 (2.7)	8 ▲	24 ▲	24 ▲	24 ▲	16 ▲	13 ▲	
2015	586 (2.3)		17 ▲	17 ▲	17 ▲	8 ▲	5	
2011	570 (2.6)			0	0	-9 ▽	-11 ▽	
2007	570 (2.4)				0	-9 ▽	-11 ▽	
2003	570 (2.1)					-9 ▽	-11 ▽	
1999	579 (1.7)						-2	
1995	581 (1.6)							
Jordan								
Ψ 2019	420 (4.3)	35 ▲	14 ▲	-7	-4	-7		
Ж 2015	386 (3.2)		-20 ▽	-41 ▽	-39 ▽	-42 ▽		
Ψ 2011	406 (3.9)			-21 ▽	-18 ▽	-22 ▽		
2007	427 (4.2)				3	-1		
2003	424 (4.1)					-3		
1999	428 (3.7)							
Kazakhstan								
[2] 2019	488 (3.3)		1					
2011	487 (4.2)							
Korea, Rep. of								
2019	607 (2.8)	1	-6	10 ▲	18 ▲	20 ▲	26 ▲	
2015	606 (2.6)		-7	8 ▲	17 ▲	19 ▲	25 ▲	
2011	613 (2.9)			16 ▲	24 ▲	26 ▲	32 ▲	
2007	597 (2.6)				8 ▲	10 ▲	17 ▲	
2003	589 (2.2)					2	8 ▲	
1999	587 (2.0)						6 ▲	
1995	581 (2.0)							
Kuwait								
Ψ 2019	403 (5.0)	10						
Ψ 2015	392 (4.6)							
Lebanon								
2019	429 (2.9)	-13 ▽	-20 ▽	-20 ▽	-4			
2015	442 (3.6)		-7	-7	9			
2011	449 (3.9)			0	16 ▲			
2007	449 (4.1)				16 ▲			
2003	433 (3.1)							



▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



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

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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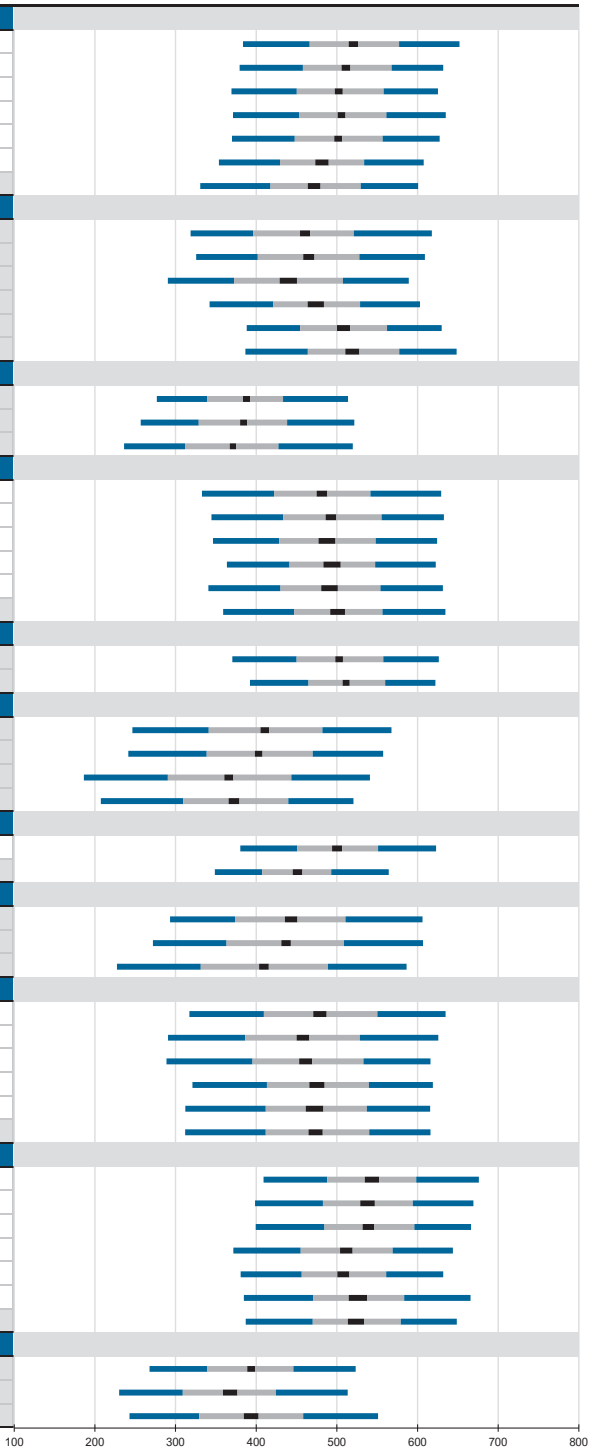
Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

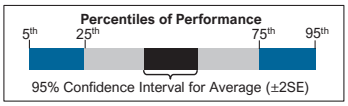
(Continued)

Country	Average Scale Score	Differences Between Years						Mathematics Achievement Distribution
		2015	2011	2007	2003	1999	1995	
Lithuania								
2019	520 (2.9)	9 ▲	18 ▲	15 ▲	19 ▲	39 ▲	49 ▲	
[2] 2015	511 (2.8)		9 ▲	5	10 ▲	30 ▲	39 ▲	
[1] 2011	502 (2.5)			-3	1	21 ▲	31 ▲	
[1] 2007	506 (2.5)				4	24 ▲	34 ▲	
[1] 2003	502 (2.5)					20 ▲	30 ▲	
[1] 1999	482 (4.3)						10	
[1 2] 1995	472 (4.1)							
Malaysia								
2019	461 (3.2)	-5	21 ▲	-13 ▽	-48 ▽	-59 ▽		
2015	465 (3.6)		25 ▲	-9	-43 ▽	-54 ▽		
2011	440 (5.5)			-34 ▽	-69 ▽	-79 ▽		
2007	474 (5.1)				-34 ▽	-45 ▽		
2003	508 (4.1)					-11		
1999	519 (4.5)							
Morocco								
Ψ 2019	388 (2.3)	4	17 ▲					
Ж 2015	384 (2.3)		13 ▲					
Ж 2011	371 (2.0)							
New Zealand								
† 2019	482 (3.4)	-11 ▽	-6		-12	-9	-19 ▽	
† 2015	493 (3.4)		5		-1	2	-8	
2011	488 (5.4)				-6	-3	-13	
2003	494 (5.5)					3	-7	
1999	491 (5.3)						-10	
1995	501 (4.7)							
Norway (9)								
† 2019	503 (2.4)	-9 ▽						
2015	512 (2.3)							
Oman								
Ψ 2019	411 (2.8)	8 ▲	45 ▲	38 ▲				
Ψ 2015	403 (2.4)		37 ▲	31 ▲				
Ψ 2011	366 (2.9)			-6				
2007	372 (3.4)							
Portugal								
2019	500 (3.2)						49 ▲	
1995	451 (3.1)							
Qatar								
Ψ 2019	443 (4.0)	6	34 ▲					
Ψ 2015	437 (3.0)		28 ▲					
Ψ 2011	410 (3.1)							
Romania								
2019	479 (4.3)		21 ▲	18 ▲	4	7	5	
2011	458 (4.1)			-3	-17 ▽	-14 ▽	-16 ▽	
2007	461 (4.2)				-14 ▽	-11	-12 ▽	
2003	475 (4.9)					3	2	
1999	472 (5.6)						-1	
1995	474 (4.5)							
Russian Federation								
[2] 2019	543 (4.5)	5	5	32 ▲	35 ▲	17 ▲	20 ▲	
2015	538 (4.7)		-1	26 ▲	30 ▲	12	14 ▲	
[2] 2011	539 (3.6)			27 ▲	31 ▲	13	15 ▲	
2007	512 (4.0)				4	-14 ▽	-12	
2003	508 (3.8)					-18 ▽	-16 ▽	
1999	526 (5.8)						2	
[2] 1995	524 (5.2)							
Saudi Arabia								
[2] Ψ 2019	394 (2.5)	26 ▲	0					
Ж 2015	368 (4.6)		-26 ▽					
Ψ 2011	394 (4.7)							



▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



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

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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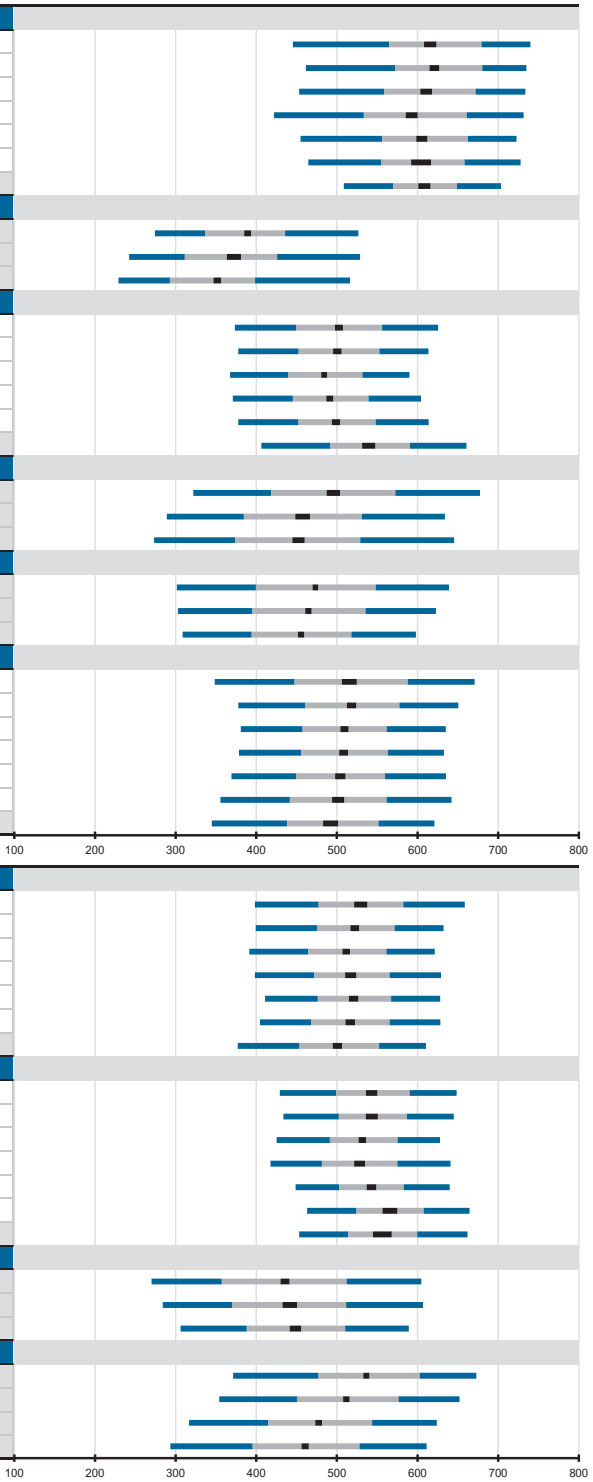
Exhibit 3.4: Differences in Average Mathematics Achievement Across Assessment Years

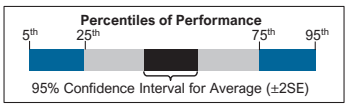
(Continued)

Country	Average Scale Score	Differences Between Years						Mathematics Achievement Distribution
		2015	2011	2007	2003	1999	1995	
Singapore								
[2] 2019	616 (4.0)	-5	5	23 ▲	10	11	7	
[2] 2015	621 (3.2)		10 ▲	28 ▲	16 ▲	17 ▲	12 ▲	
[2] 2011	611 (3.8)			18 ▲	6	7	2	
2007	593 (3.8)				-13 ▽	-12	-16 ▽	
2003	605 (3.6)					1	-3	
1999	604 (6.3)						-4	
1995	609 (4.0)							
South Africa (9)								
Ж 2019	389 (2.3)	17 ▲	38 ▲					
Ж 2015	372 (4.5)		20 ▲					
Ж 2011	352 (2.5)							
Sweden								
[2] 2019	503 (2.5)	2	18 ▲	11 ▲	3		-37 ▽	
2015	501 (2.8)		16 ▲	9 ▲	2		-39 ▽	
2011	484 (1.9)			-7 ▽	-15 ▽		-55 ▽	
2007	491 (2.3)				-8 ▽		-48 ▽	
2003	499 (2.7)						-41 ▽	
1995	540 (4.3)							
Turkey								
2019	496 (4.3)	38 ▲	43 ▲					
2015	458 (4.7)		5					
2011	452 (4.0)							
United Arab Emirates								
2019	473 (1.9)	9 ▲	18 ▲					
2015	465 (2.0)		9 ▲					
2011	456 (2.1)							
United States								
† 2019	515 (4.8)	-3	6	7	11	14 ▲	23 ▲	
† 2015	518 (3.1)		9 ▲	10 ▲	14 ▲	17 ▲	26 ▲	
[2] 2011	509 (2.7)			1	5	8	17 ▲	
[2] † 2007	508 (2.9)				4	7	16 ▲	
‡ 2003	504 (3.4)					3	12 ▲	
1999	502 (3.9)						9	
† 1995	492 (4.9)							
Benchmarking Participants								
Ontario, Canada								
2019	530 (4.3)	7	18 ▲	13 ▲	9	13 ▲	29 ▲	
2015	522 (2.9)		11 ▲	5	1	6	22 ▲	
[2] 2011	512 (2.4)			-6	-9 ▽	-5	11 ▲	
[2] 2007	517 (3.6)				-4	1	17 ▲	
[2] 2003	521 (3.1)					4	20 ▲	
1999	517 (3.0)						16 ▲	
1995	501 (3.0)							
Quebec, Canada								
‡ 2019	543 (3.7)	0	12 ▲	15 ▲	0	-23 ▽	-13	
≡ 2015	543 (3.9)		12 ▲	15 ▲	0	-22 ▽	-13	
2011	532 (2.4)			3	-12 ▽	-34 ▽	-25 ▽	
[3] 2007	528 (3.5)				-15 ▽	-38 ▽	-28 ▽	
2003	543 (3.1)					-23 ▽	-13 ▽	
1999	566 (4.8)						9	
1995	556 (6.0)							
Abu Dhabi, UAE								
Ψ 2019	436 (2.9)	-6	-13 ▽					
2015	442 (4.7)		-7					
2011	449 (3.7)							
Dubai, UAE								
[2] 2019	537 (2.0)	25 ▲	59 ▲	76 ▲				
2015	512 (2.1)		34 ▲	51 ▲				
2011	478 (2.2)			17 ▲				
‡ 2007	461 (2.3)							



▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower



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

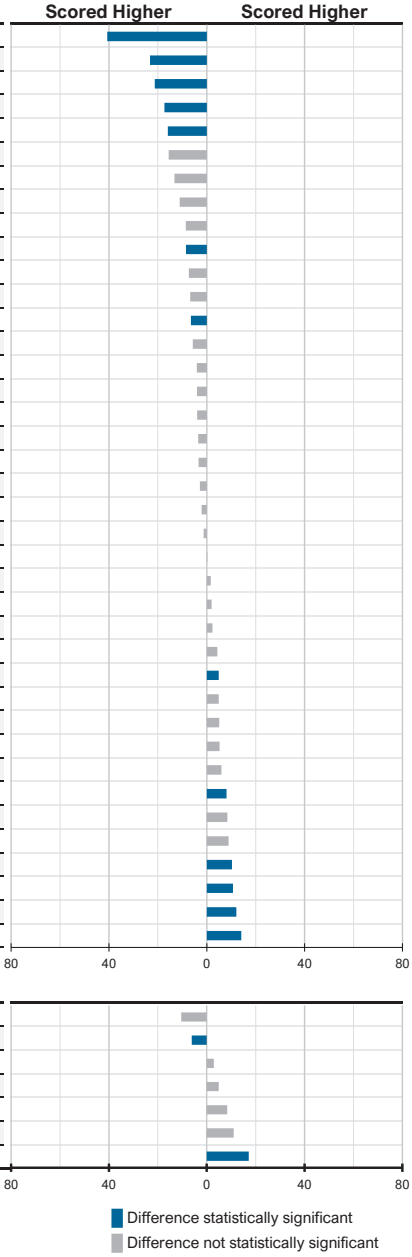
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

Average Achievement by Gender

Exhibit 3.5 shows the differences in average mathematics achievement between girls and boys. In TIMSS 2019, there was considerable gender equity in average achievement. Girls had higher average achievement than boys in 7 countries, there was gender equity in average mathematics achievement in 26 countries, and boys had higher average achievement than girls in 6 countries.

Exhibit 3.5: Average Mathematics Achievement by Gender

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher / Boys Scored Higher
Ψ Oman	48 (1.1)	432 (3.3)	52 (1.1)	391 (4.0)	41 (4.8)	
Ψ Jordan	48 (3.4)	432 (3.8)	52 (3.4)	409 (6.4)	23 (6.7)	
Bahrain	49 (0.9)	492 (2.4)	51 (0.9)	471 (2.2)	21 (3.0)	
2 Ψ Saudi Arabia	49 (0.9)	403 (3.4)	51 (0.9)	385 (3.4)	17 (4.5)	
Romania	51 (0.9)	487 (4.6)	49 (0.9)	471 (4.7)	16 (3.8)	
2 Ψ Egypt	55 (2.0)	420 (5.3)	45 (2.0)	404 (7.9)	16 (8.1)	
Iran, Islamic Rep. of	47 (1.3)	453 (5.0)	53 (1.3)	440 (5.6)	13 (7.6)	
Turkey	50 (1.3)	501 (4.4)	50 (1.3)	490 (5.8)	11 (5.7)	
Ψ Kuwait	53 (2.2)	407 (5.4)	47 (2.2)	398 (7.9)	9 (8.8)	
Malaysia	51 (1.1)	465 (3.0)	49 (1.1)	456 (4.1)	9 (3.4)	
† Hong Kong SAR	46 (2.1)	582 (4.9)	54 (2.1)	575 (5.4)	7 (6.5)	
Ψ Qatar	50 (2.4)	447 (5.0)	50 (2.4)	440 (5.4)	7 (6.6)	
Ж South Africa (9)	52 (0.6)	393 (2.4)	48 (0.6)	386 (2.5)	6 (2.1)	
United Arab Emirates	48 (1.8)	476 (3.4)	52 (1.8)	471 (3.4)	6 (5.6)	
Finland	48 (0.8)	511 (2.6)	52 (0.8)	507 (3.2)	4 (2.8)	
Cyprus	49 (0.6)	503 (2.1)	51 (0.6)	499 (2.3)	4 (3.0)	
2 Kazakhstan	49 (1.1)	490 (3.9)	51 (1.1)	486 (3.7)	4 (3.8)	
† United States	49 (0.9)	517 (4.0)	51 (0.9)	514 (6.1)	4 (3.9)	
2 Singapore	49 (0.7)	617 (4.6)	51 (0.7)	614 (4.4)	3 (4.2)	
2 Sweden	49 (0.9)	504 (3.0)	51 (0.9)	501 (2.9)	3 (3.1)	
Chinese Taipei	50 (0.9)	614 (3.1)	50 (0.9)	611 (3.2)	2 (3.3)	
Ireland	49 (1.1)	524 (2.9)	51 (1.1)	523 (3.4)	1 (3.5)	
† Norway (9)	49 (0.7)	503 (2.7)	51 (0.7)	503 (3.0)	0 (3.2)	
England	53 (1.9)	514 (5.6)	47 (1.9)	516 (7.2)	2 (7.3)	
Lithuania	50 (1.0)	519 (2.8)	50 (1.0)	521 (3.7)	2 (2.9)	
Japan	52 (1.0)	593 (2.9)	48 (1.0)	595 (3.2)	2 (2.8)	
Australia	49 (1.5)	515 (3.6)	51 (1.5)	519 (5.5)	4 (5.4)	
Ψ Morocco	50 (0.7)	386 (2.5)	50 (0.7)	391 (2.6)	5 (2.2)	
2 Russian Federation	48 (1.0)	541 (4.8)	52 (1.0)	546 (4.9)	5 (3.4)	
Korea, Rep. of	48 (1.4)	604 (3.4)	52 (1.4)	609 (3.1)	5 (3.4)	
Lebanon	49 (1.4)	427 (3.5)	51 (1.4)	432 (3.3)	5 (3.5)	
† New Zealand	48 (2.1)	478 (3.6)	52 (2.1)	484 (4.7)	6 (5.2)	
France	49 (0.8)	478 (2.5)	51 (0.8)	487 (3.1)	8 (2.7)	
1 Georgia	48 (1.2)	457 (4.5)	52 (1.2)	465 (5.2)	8 (4.5)	
Ψ Chile	49 (1.6)	436 (3.5)	51 (1.6)	445 (3.8)	9 (4.6)	
Portugal	50 (1.1)	495 (3.3)	50 (1.1)	505 (3.9)	10 (3.4)	
3 Israel	52 (1.7)	514 (4.3)	48 (1.7)	525 (5.3)	11 (4.6)	
Italy	50 (1.0)	491 (3.0)	50 (1.0)	504 (3.3)	12 (3.0)	
Hungary	50 (0.9)	510 (3.2)	50 (0.9)	524 (3.6)	14 (3.5)	
International Average	**50 (0.2)**	**491 (0.6)**	**50 (0.2)**	**488 (0.7)**		
Benchmarking Participants						
Ψ Abu Dhabi, UAE	47 (2.1)	441 (5.4)	53 (2.1)	431 (4.4)	10 (7.9)	
Ψ Gauteng, RSA (9)	55 (0.9)	423 (3.1)	45 (0.9)	417 (3.5)	6 (2.8)	
Ontario, Canada	50 (0.9)	528 (4.4)	50 (0.9)	531 (4.8)	3 (3.3)	
‡ Quebec, Canada	51 (2.0)	541 (4.3)	49 (2.0)	546 (4.0)	5 (3.8)	
2 Dubai, UAE	50 (3.6)	532 (4.8)	50 (3.6)	541 (5.9)	8 (10.0)	
Ψ Western Cape, RSA (9)	55 (1.2)	436 (5.1)	45 (1.2)	447 (5.4)	11 (5.7)	
Moscow City, Russian Fed.	48 (1.1)	566 (4.2)	52 (1.1)	584 (4.8)	17 (3.5)	



Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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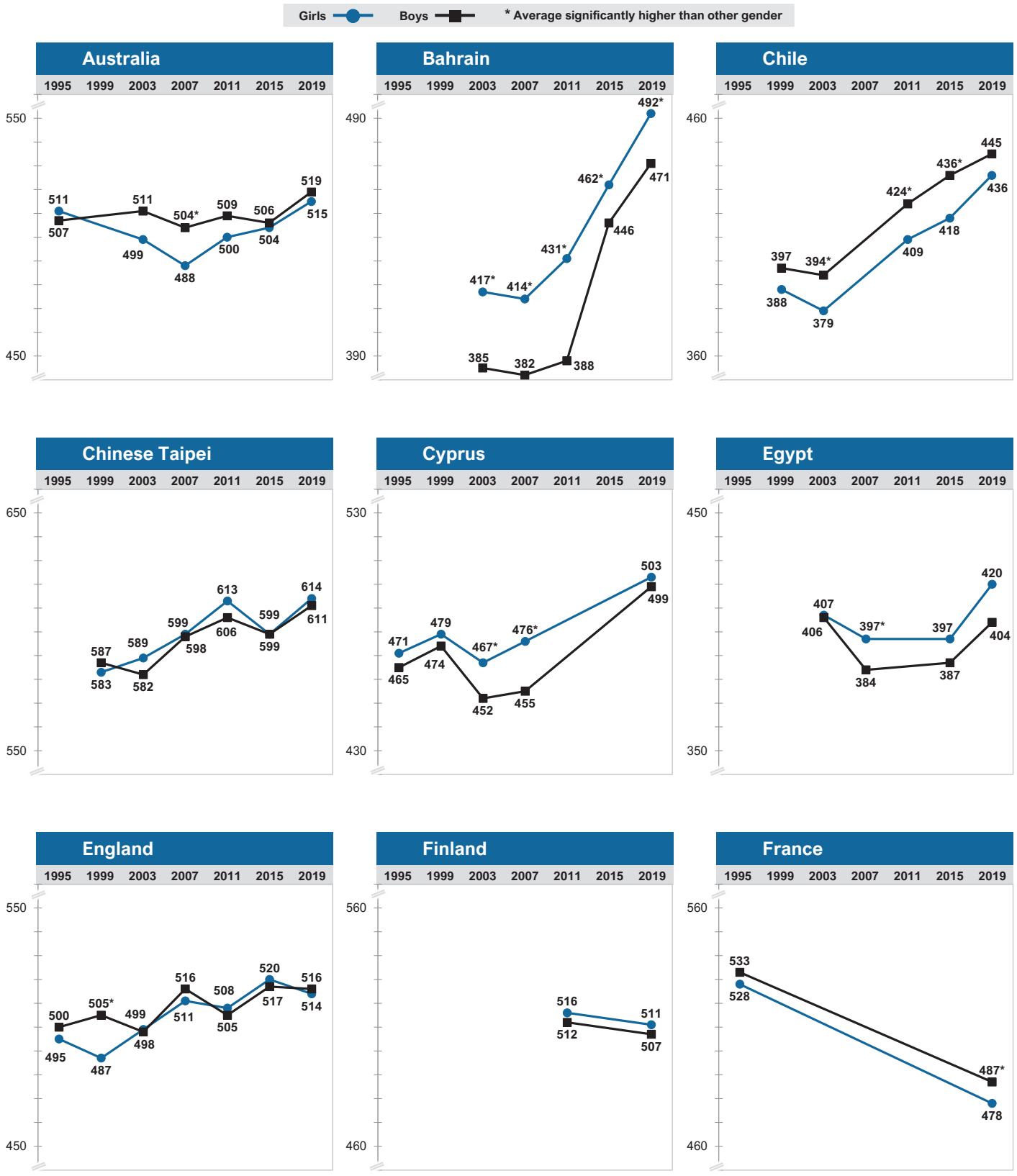
Trends in Average Achievement by Gender

For the TIMSS 2019 countries with comparable data from previous TIMSS assessments, Exhibit 3.6 contains graphs of average mathematics achievement across assessments by gender. The countries are presented in alphabetical order. The difference in average mathematics achievement between boys and girls has remained relatively stable in most countries, with any overall increases or decreases in achievement from assessment to assessment occurring similarly for both girls and boys. However, several countries with no gender gap in TIMSS 2015 had a gap favoring boys in TIMSS 2019, including Israel and Morocco, while Saudi Arabia and South Africa (ninth grade) had a gap favoring girls in 2019. Gender gaps in average achievement favoring boys in TIMSS 2015 were closed in Chile, the Russian Federation, and Sweden, and a gap favoring girls was closed in Singapore.

Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

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



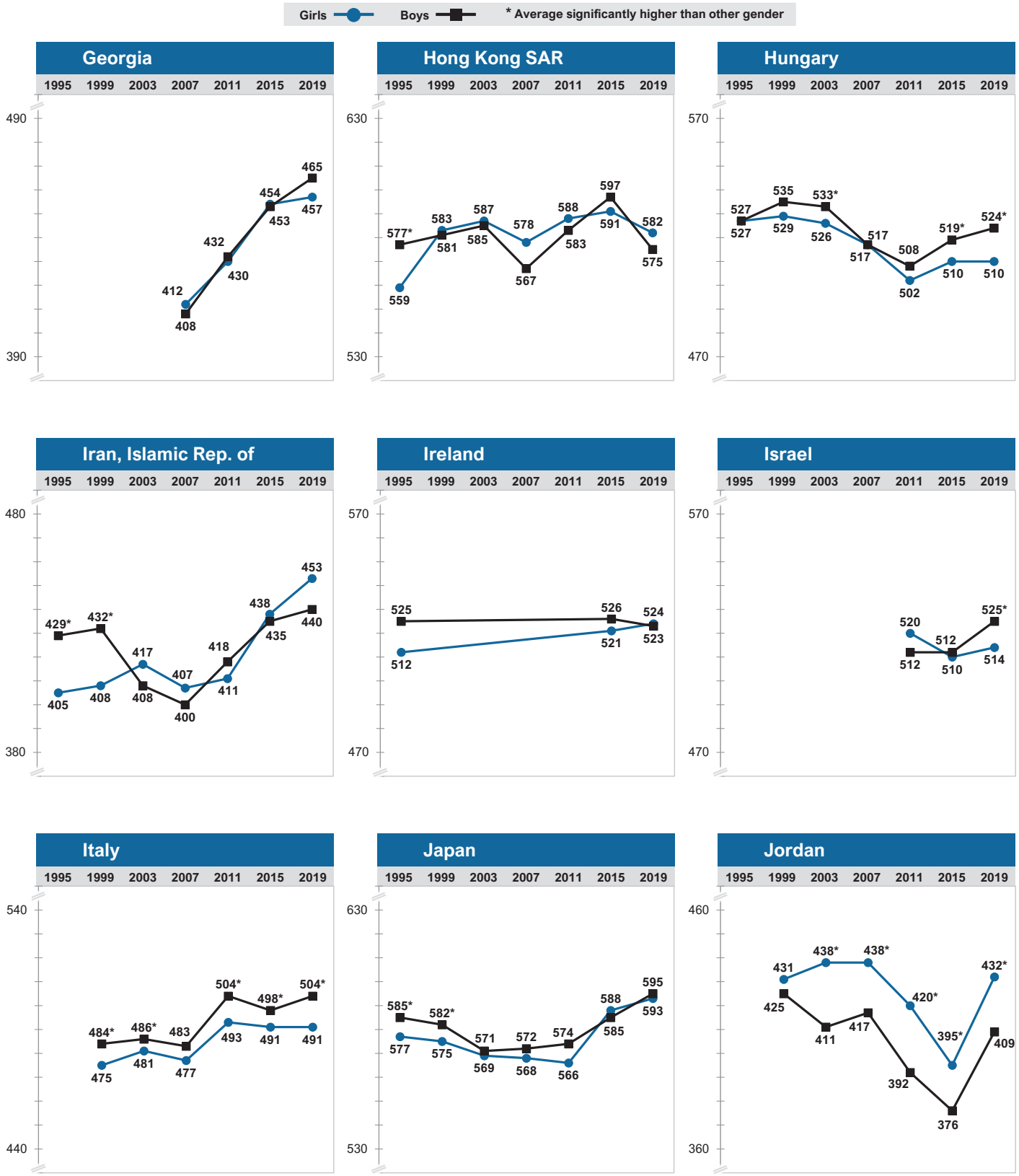
See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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

Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

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



See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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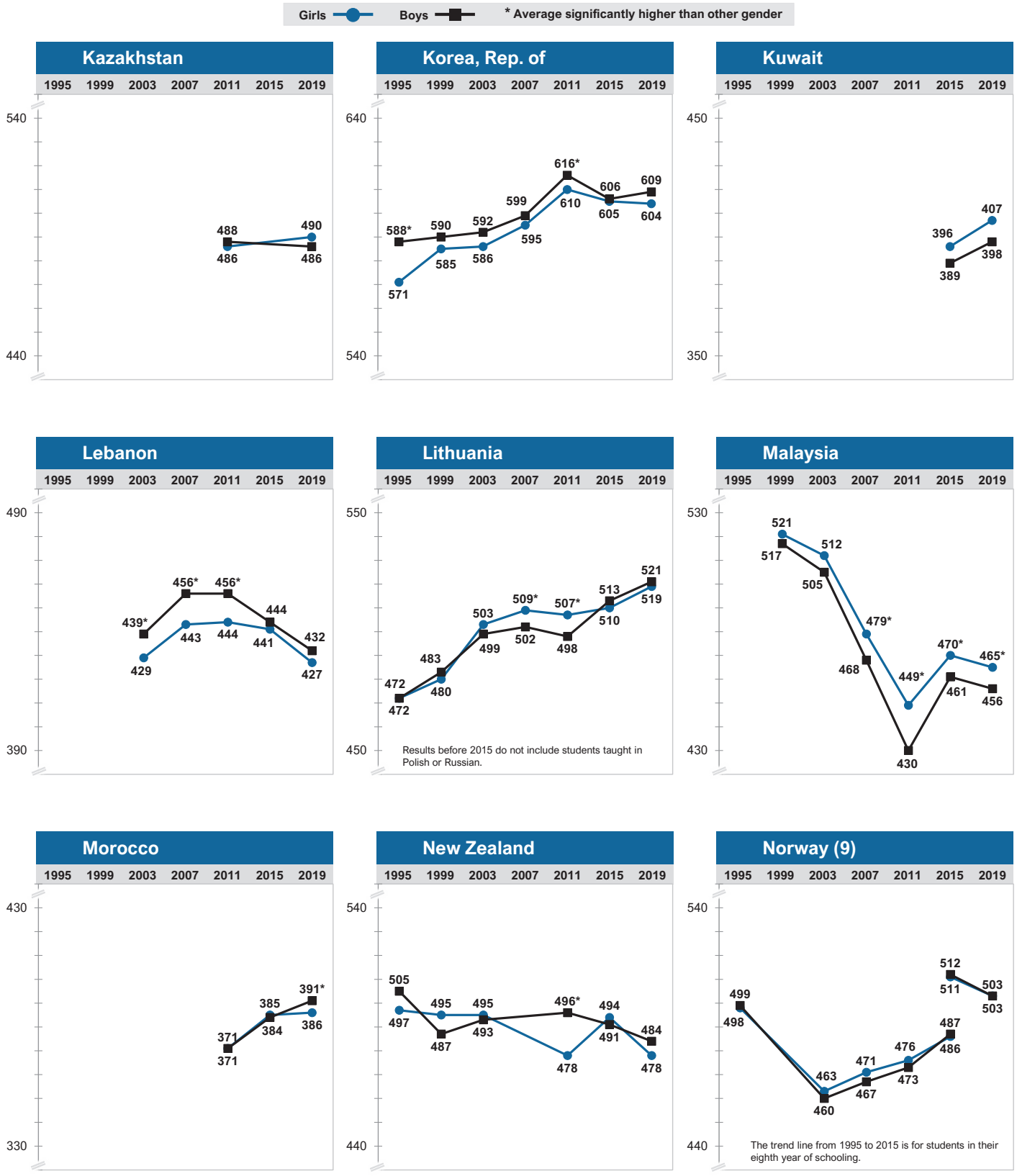
Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

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



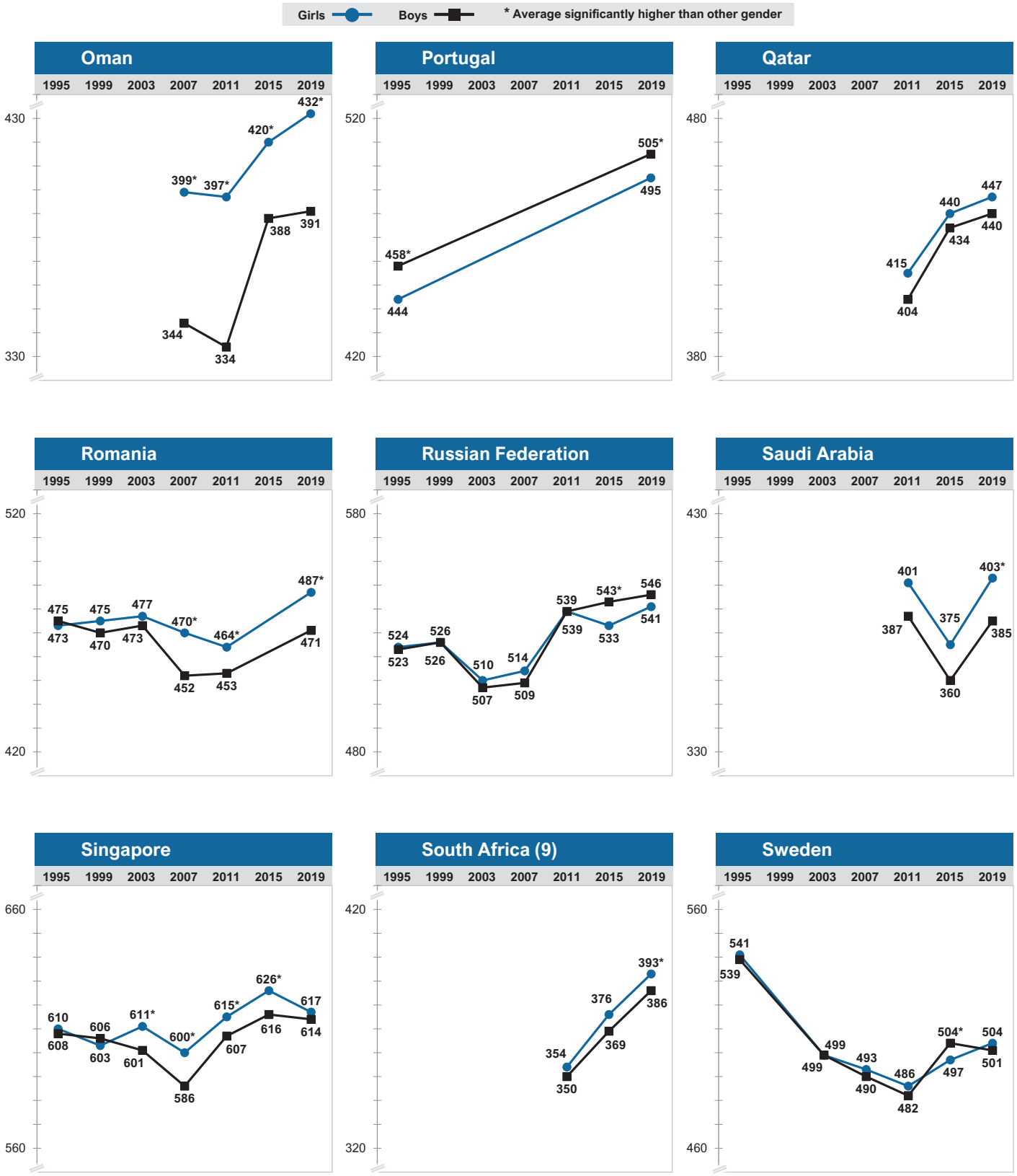
See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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

Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

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



See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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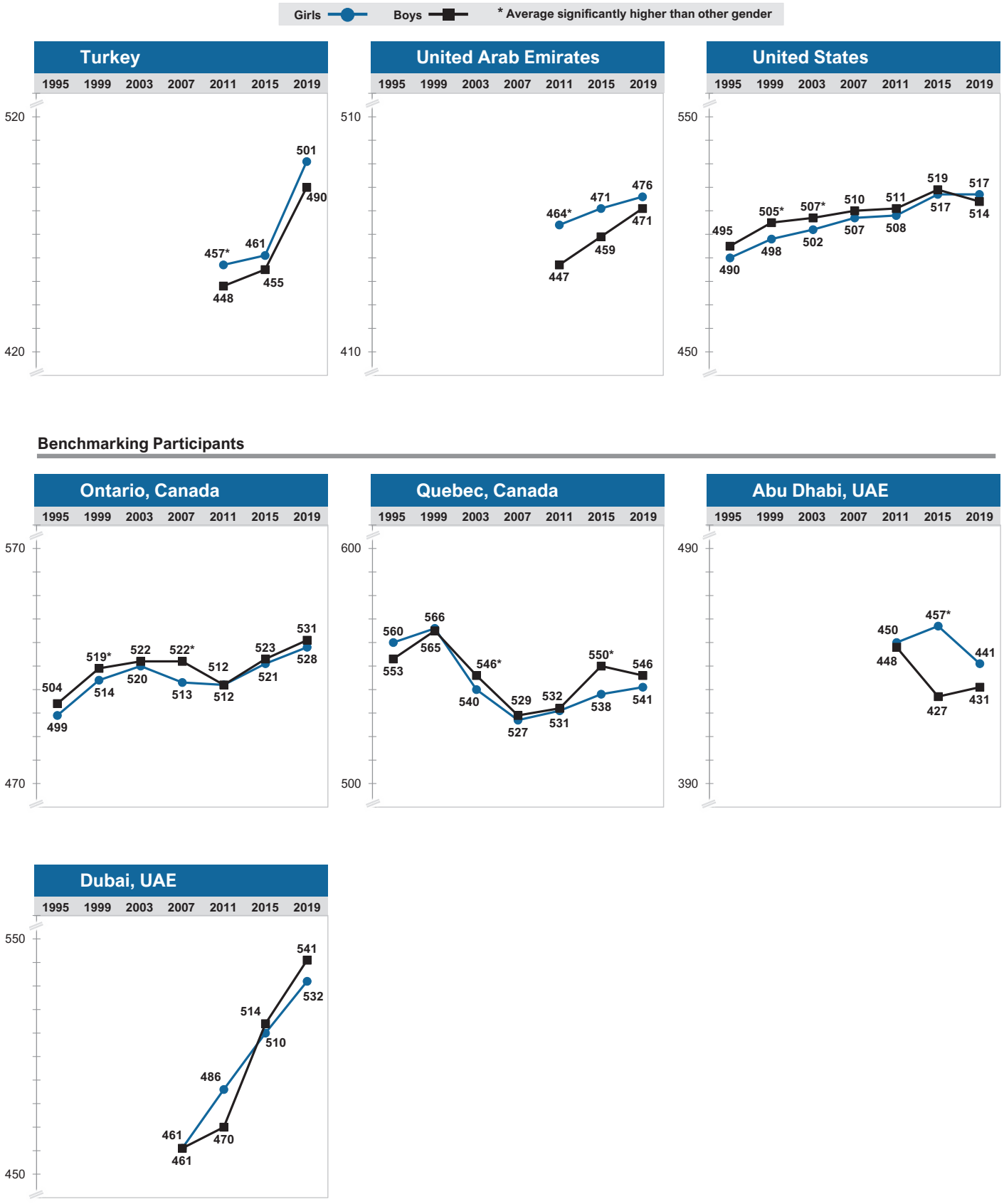
Exhibit 3.6: Trend Plots of Average Mathematics Achievement Across Assessment Years by Gender

(Continued)

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



See Appendix A for country participation in previous TIMSS assessments.
The scale interval is 10 points for each country, but a different part of the scale is shown according to each country's average achievement.

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

TIMSS 2019 International Benchmarks

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

Exhibit 3.7 summarizes what eighth grade students who reached each of the TIMSS International Benchmarks in 2019 could do in mathematics. The progression in mathematics achievement is evident from benchmark to benchmark, from demonstrating some knowledge of whole numbers and basic graphs at the Low International Benchmark to applying and reasoning in a variety of complex situations at the Advanced International Benchmark. As much as possible, each description references achievement in the four content areas covered in the assessment at the eighth grade: number, algebra, geometry, and data and probability. The following tables show the target percentages for the content and cognitive domains.

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

Content Domain	Percentage
Number	30%
Algebra	30%
Geometry	20%
Data and Probability	20%

Cognitive Domain	Percentage
Knowing	35%
Applying	40%
Reasoning	25%

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

Exhibit 3.7: Summary of TIMSS 2019 International Benchmarks of Mathematics Achievement

Advanced International Benchmark	
625	*Students can apply and reason in a variety of problem situations, solve linear equations, and make generalizations.* They can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can understand linear functions and algebraic expressions. Students can use their knowledge of geometric figures to solve a wide range of problems involving angles, area, and surface area. They can calculate means and medians, and understand how changing data points can impact the mean. Students can interpret a wide variety of data displays to draw and justify conclusions, and solve multistep problems. They can solve problems involving expected values.
High International Benchmark	
550	*Students can apply their understanding and knowledge in a variety of relatively complex situations.* They can solve problems with fractions, decimals, ratios, and proportions. Students at this level show basic procedural knowledge related to algebraic expressions and equations. They can solve a variety of problems with angles, including problems involving triangles, parallel lines, rectangles, and congruent and similar figures. Students can interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities.
Intermediate International Benchmark	
475	*Students can apply basic mathematical knowledge in a variety of situations.* They can solve problems involving whole numbers, negative numbers, fractions, decimals, and ratios. Students have some basic knowledge about properties of two-dimensional shapes. They can read and interpret data in graphs and have some rudimentary knowledge of probability.
Low International Benchmark	
400	*Students have some knowledge of whole numbers and basic graphs.*

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

Percentages of Students Reaching International Benchmarks

Exhibit 3.8 presents the percentage of students reaching each TIMSS 2019 International Benchmark. The results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark, which is indicated in the bar graph with black dots. Because students who reached the Advanced Benchmark also reached the other benchmarks, the percentages illustrated in the exhibit and shown in the columns to the right are cumulative.

The five high-performing East Asian countries had the highest percentages of students reaching the Advanced International Benchmark. Half the eighth grade students reached the Advanced International Benchmark in Singapore (51%) and Chinese Taipei (49%), as well as 45 percent in Korea, 37 percent in Japan, and 32 percent in Hong Kong SAR. Eight countries had 10 to 16 percent, but most countries had fewer than 10 percent of their eighth grade students reaching the Advanced International Benchmark.

As a point of reference, Exhibit 3.8 provides the international median percentage of students reaching each benchmark at the bottom of the four right-hand columns. By definition, half the countries have a percentage in that column above the median and half below the median. The median percentages of students reaching the International Benchmarks were as follows: Advanced—5 percent, High—25 percent, Intermediate—56 percent, and Low—87 percent. Japan had 99 percent of its students reach the Low Benchmark, Singapore and Chinese Taipei had 98 percent, and Korea had 97 percent.

Not only are Singapore, Chinese Taipei, Korea, and Japan educating high percentages of their students to an advanced level, they are educating almost all of their students to a level of minimal proficiency.

Exhibit 3.8: Percentages of Students Reaching International Benchmarks of Mathematics Achievement

Country	Percentages of Students Reaching International Benchmarks (● Advanced ○ High ● Intermediate ○ Low)	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[2] Singapore		51 (2.2)	79 (2.0)	92 (1.1)	98 (0.4)
Chinese Taipei		49 (1.3)	75 (0.9)	90 (0.6)	98 (0.3)
Korea, Rep. of		45 (1.3)	74 (0.9)	90 (0.8)	97 (0.4)
Japan		37 (1.4)	71 (1.1)	92 (0.6)	99 (0.2)
† Hong Kong SAR		32 (1.9)	66 (1.8)	87 (1.4)	96 (0.9)
[2] Russian Federation		16 (1.5)	48 (2.4)	80 (2.0)	96 (0.7)
[3] Israel		15 (1.7)	40 (2.2)	67 (1.8)	87 (1.0)
† United States		14 (1.2)	38 (1.9)	66 (1.9)	87 (1.4)
Turkey		12 (0.9)	32 (1.6)	56 (1.6)	80 (1.4)
Australia		11 (1.4)	36 (1.8)	68 (1.5)	90 (0.8)
Hungary		11 (1.1)	36 (1.4)	68 (1.4)	90 (0.9)
England		11 (1.5)	35 (2.3)	69 (2.2)	90 (1.6)
Lithuania		10 (1.1)	37 (1.7)	71 (1.2)	93 (0.7)
Ireland		7 (0.8)	38 (1.6)	76 (1.3)	94 (0.8)
United Arab Emirates		7 (0.4)	24 (0.7)	50 (0.9)	75 (0.7)
Romania		6 (0.9)	25 (1.6)	52 (1.9)	78 (1.5)
Cyprus		6 (0.5)	29 (1.1)	63 (1.1)	88 (0.8)
† New Zealand		6 (0.5)	22 (1.1)	53 (1.6)	82 (1.4)
Bahrain		5 (0.4)	25 (0.8)	55 (0.9)	79 (0.8)
† Norway (9)		5 (0.6)	29 (1.2)	65 (1.5)	90 (0.8)
[2] Sweden		5 (0.6)	28 (1.3)	64 (1.3)	90 (0.9)
Finland		5 (0.5)	29 (1.2)	69 (1.4)	93 (0.9)
[2] Kazakhstan		5 (0.7)	23 (1.6)	55 (1.8)	85 (1.2)
Portugal		5 (0.6)	25 (1.5)	63 (1.7)	91 (1.1)
Malaysia		4 (0.3)	17 (0.7)	42 (1.6)	74 (1.7)
Ψ Qatar		3 (0.7)	14 (1.5)	37 (1.9)	65 (1.5)
Italy		3 (0.5)	24 (1.4)	62 (1.7)	91 (0.9)
Iran, Islamic Rep. of		3 (0.7)	14 (1.4)	37 (1.6)	68 (1.4)
[1] Georgia		3 (0.8)	17 (1.6)	44 (2.0)	75 (1.8)
France		2 (0.3)	17 (1.2)	55 (1.5)	88 (0.8)
Ψ Oman		1 (0.2)	7 (0.6)	27 (1.0)	54 (1.2)
[2] Ψ Egypt		1 (0.3)	7 (1.1)	27 (2.0)	55 (2.3)
Ψ Chile		1 (0.2)	7 (0.8)	33 (1.5)	70 (1.7)
Ж South Africa (9)		1 (0.1)	3 (0.3)	13 (0.7)	41 (1.3)
Ψ Jordan		0 (0.2)	6 (0.7)	28 (1.7)	60 (2.1)
Ψ Kuwait		0 (0.1)	5 (0.9)	21 (1.9)	50 (2.3)
Lebanon		0 (0.2)	5 (0.6)	27 (1.7)	64 (1.7)
[2] Ψ Saudi Arabia		0 (0.1)	2 (0.3)	15 (0.8)	47 (1.6)
Ψ Morocco		0 (0.1)	2 (0.4)	12 (0.9)	41 (1.2)
International Median	0 25 50 75 100	**5**	**25**	**56**	**87**
Benchmarking Participants					
Moscow City, Russian Fed.		28 (2.0)	62 (2.0)	88 (1.2)	98 (0.3)
[2] Dubai, UAE		17 (1.0)	48 (1.1)	76 (0.9)	92 (0.6)
Ontario, Canada		11 (1.7)	41 (2.2)	76 (1.6)	95 (0.8)
‡ Quebec, Canada		11 (1.5)	47 (2.3)	85 (1.6)	98 (0.6)
Ψ Western Cape, RSA (9)		3 (0.7)	13 (1.7)	32 (2.1)	64 (1.8)
Ψ Abu Dhabi, UAE		3 (0.3)	15 (0.7)	37 (1.3)	61 (1.5)
Ψ Gauteng, RSA (9)	0 25 50 75 100	1 (0.2)	6 (0.7)	23 (1.5)	58 (1.6)

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Trends in Percentages of Students Reaching International Benchmarks

Exhibit 3.9 shows the changes in percentages of students reaching the benchmarks for countries that have comparable data from previous assessments. The trends paint a positive picture of improvement across all four benchmarks. Of the 33 countries participating in both 2015 and 2019, 9 increased and none decreased at the Advanced International Benchmark, 7 increased and 3 decreased at the High Benchmark, 10 increased and 6 decreased at the Intermediate Benchmark, and 10 increased and 4 decreased at the Low Benchmark.

The longer-term trends also show considerable improvement across the percentages of students reaching all four of the benchmarks. Between 2007 and 2019, the 23 countries participating in those two assessments had 15 increases and only 1 decrease at the Advanced level, 16 increases and 2 decreases at the High level, 15 increases and 3 decreases at the Intermediate level, and 12 increases and 3 decreases at the Low level. Between 1995 and 2019, the 18 countries participating in both assessments had 13 increases and 2 decreases at the Advanced level, 9 increases and 4 decreases at the High level, 6 increases and 5 decreases at the Intermediate level, and 5 increases and 5 decreases at the Low level.

Exhibit 3.9: Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years

Country	Advanced International Benchmark (625)							High International Benchmark (550)						
	Percent of Students							Percent of Students						
	2019	2015	2011	2007	2003	1999	1995	2019	2015	2011	2007	2003	1999	1995
Singapore	51	54	48	40 ▲	44 ▲	42 ▲	40 ▲	79	81	78	70 ▲	77	77	84 ▽
Chinese Taipei	49	44 ▲	49	45	38 ▲	37 ▲		75	72 ▲	73	71 ▲	66 ▲	67 ▲	
Korea, Rep. of	45	43	47	40 ▲	35 ▲	32 ▲	31 ▲	74	75	77 ▽	71 ▲	70 ▲	70 ▲	67 ▲
Japan	37	34	27 ▲	26 ▲	24 ▲	29 ▲	29 ▲	71	67 ▲	61 ▲	61 ▲	62 ▲	66 ▲	67 ▲
Hong Kong SAR	32	37	34	31	31	28	23 ▲	66	75 ▽	71	64	73 ▽	70	65
Russian Federation	16	14	14	8 ▲	6 ▲	12	9 ▲	48	46	47	33 ▲	30 ▲	39 ▲	38 ▲
Israel	15	13	12					40	38	40				
United States	14	10 ▲	7 ▲	6 ▲	7 ▲	7 ▲	4 ▲	38	37	30 ▲	31 ▲	29 ▲	30 ▲	26 ▲
Turkey	12	6 ▲	7 ▲					32	20 ▲	20 ▲				
Australia	11	7 ▲	9	6 ▲	7 ▲		7 ▲	36	30 ▲	29 ▲	24 ▲	29 ▲		33
Hungary	11	12	8 ▲	10	11	13	10	36	37	32 ▲	36	41	43 ▽	40
England	11	10	8	8	5 ▲	6 ▲	6 ▲	35	36	32	35	26 ▲	25 ▲	27 ▲
Lithuania	10	6 ▲	5 ▲	6 ▲	5 ▲	3 ▲	2 ▲	37	33	29 ▲	30 ▲	28 ▲	18 ▲	17 ▲
Ireland	7	7					8	38	38					37
United Arab Emirates	7	5 ▲	2 ▲					24	20 ▲	14 ▲				
Romania	6		5	4 ▲	4 ▲	4	4 ▲	25		19 ▲	20 ▲	21	20	21
Cyprus	6			2 ▲	1 ▲	2 ▲	3 ▲	29			17 ▲	13 ▲	19 ▲	19 ▲
New Zealand	6	6	5		5	6	6	22	27 ▽	24		24	26	28 ▽
Bahrain	5	2 ▲	1 ▲	0 ▲	0 ▲			25	12 ▲	8 ▲	3 ▲	2 ▲		
Norway (9)	5	5						29	30					
Sweden	5	3 ▲	1 ▲	2 ▲	3 ▲		12 ▽	28	26	16 ▲	20 ▲	24		46 ▽
Finland	5		4					29		30				
Kazakhstan	5		3					23		23				
Portugal	5						1 ▲	25						7 ▲
Malaysia	4	3 ▲	2 ▲	2 ▲	6	10 ▽		17	18	12 ▲	18	30 ▽	36 ▽	
Qatar	3	3	2					14	14	10 ▲				
Italy	3	3	3	3	3	4		24	24	24	17 ▲	19 ▲	21	
Iran, Islamic Rep. of	3	2	2	1 ▲	0 ▲	1 ▲	0 ▲	14	12	8 ▲	5 ▲	3 ▲	6 ▲	4 ▲
Georgia	3	2	3	1 ▲				17	15	13	7 ▲			
France	2						6 ▽	17						38 ▽
Oman	1	1	0 ▲	0 ▲				7	6	4 ▲	2 ▲			
Egypt	1	0		1	1			7	5		5	6		
Chile	1	1	1		0	1		7	7	5 ▲		3 ▲	4 ▲	
South Africa (9)	1	1	1					3	3	3				
Jordan	0	0	0	1 ▽	1	3 ▽		6	3 ▲	6	11 ▽	8	12 ▽	
Kuwait	0	1						5	5					
Lebanon	0	0	1	1	0			5	8 ▽	9 ▽	10 ▽	4		
Saudi Arabia	0	0	1					2	2	5 ▽				
Morocco	0	0	0					2	2	2				
Benchmarking Participants														
Dubai, UAE	17	10 ▲	5 ▲	3 ▲				48	36 ▲	23 ▲	17 ▲			
Ontario, Canada	11	6 ▲	4 ▲	6 ▲	6 ▲	6 ▲	3 ▲	41	37	31 ▲	33 ▲	34 ▲	32 ▲	26 ▲
Quebec, Canada	11	9	6 ▲	8	8	18 ▽	14	47	47	40 ▲	37 ▲	45	60 ▽	54
Abu Dhabi, UAE	3	3	2 ▲					15	14	12				

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

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

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

Exhibit 3.9: Percentages of Students Reaching International Benchmarks of Mathematics Achievement Across Assessment Years

(Continued)

Country	Intermediate International Benchmark (475) Percent of Students							Low International Benchmark (400) Percent of Students						
	2019	2015	2011	2007	2003	1999	1995	2019	2015	2011	2007	2003	1999	1995
Singapore	92	94	92	88 ▲	93	94	98 ▽	98	99	99	97	99	99	100 ▽
Chinese Taipei	90	88 ▲	88 ▲	86 ▲	85 ▲	85 ▲		98	97 ▲	96 ▲	95 ▲	96 ▲	95 ▲	
Korea, Rep. of	90	93 ▽	93 ▽	90	90	91	89	97	99 ▽	99 ▽	98	98	99 ▽	97
Japan	92	89 ▲	87 ▲	87 ▲	88 ▲	90 ▲	91	99	98 ▲	97 ▲	97 ▲	98 ▲	98	98
Hong Kong SAR	87	92 ▽	89	85	93 ▽	92 ▽	88	96	98	97	94	98 ▽	98 ▽	96
Russian Federation	80	78	78	68 ▲	66 ▲	73 ▲	73 ▲	96	95	95	91 ▲	92 ▲	93 ▲	93 ▲
Israel	67	65	68					87	84	87				
United States	66	70	68	67	64	62	61	87	91 ▽	92 ▽	92 ▽	90	87	86
Turkey	56	42 ▲	40 ▲					80	70 ▲	67 ▲				
Australia	68	64	63	61 ▲	65		68	90	89	89	89	90		90
Hungary	68	67	65	69	75 ▽	75 ▽	74 ▽	90	88	88	91	95 ▽	93 ▽	94 ▽
England	69	69	65	69	61 ▲	60 ▲	61 ▲	90	93	88	90	90	88	87
Lithuania	71	68	64 ▲	65 ▲	63 ▲	53 ▲	50 ▲	93	92	90 ▲	90 ▲	90 ▲	85 ▲	81 ▲
Ireland	76	76					73	94	94					91
United Arab Emirates	50	46 ▲	42 ▲					75	73	73				
Romania	52		44 ▲	46 ▲	52	51	52	78		71 ▲	73 ▲	79	79	79
Cyprus	63			48 ▲	45 ▲	53 ▲	51 ▲	88			78 ▲	77 ▲	82 ▲	77 ▲
New Zealand	53	58 ▽	57		59 ▽	57	64 ▽	82	85	84		88 ▽	84	89 ▽
Bahrain	55	39 ▲	26 ▲	19 ▲	17 ▲			79	75 ▲	53 ▲	49 ▲	51 ▲		
Norway (9)	65	70 ▽						90	94 ▽					
Sweden	64	65	57 ▲	60 ▲	64		81 ▽	90	91	89	90	91		96 ▽
Finland	69		73					93		96 ▽				
Kazakhstan	55		57					85		85				
Portugal	63						35 ▲	91						79 ▲
Malaysia	42	45	36	50 ▽	66 ▽	70 ▽		74	76	65 ▲	82 ▽	93 ▽	93 ▽	
Qatar	37	36	29 ▲					65	63	54 ▲				
Italy	62	62	64	54 ▲	56 ▲	53 ▲		91	89	90	85 ▲	86 ▲	82 ▲	
Iran, Islamic Rep. of	37	34	26 ▲	20 ▲	20 ▲	26 ▲	24 ▲	68	63 ▲	55 ▲	51 ▲	55 ▲	61 ▲	59 ▲
Georgia	44	42	36 ▲	26 ▲				75	72	62 ▲	56 ▲			
France	55						81 ▽	88						97 ▽
Oman	27	23 ▲	16 ▲	14 ▲				54	52	39 ▲	41 ▲			
Egypt	27	21 ▲		21 ▲	24			55	47 ▲		47 ▲	52		
Chile	33	28 ▲	23 ▲		15 ▲	16 ▲		70	63 ▲	57 ▲		41 ▲	46 ▲	
South Africa (9)	13	13	9 ▲					41	34 ▲	24 ▲				
Jordan	28	18 ▲	26	35 ▽	30	33 ▽		60	45 ▲	55 ▲	61	60	61	
Kuwait	21	18						50	45					
Lebanon	27	35 ▽	38 ▽	36 ▽	27			64	71 ▽	73 ▽	74 ▽	68		
Saudi Arabia	15	11 ▲	20 ▽					47	34 ▲	47				
Morocco	12	14 ▽	12					41	41	36 ▲				
Benchmarking Participants														
Dubai, UAE	76	67 ▲	53 ▲	47 ▲				92	88 ▲	79 ▲	74 ▲			
Ontario, Canada	76	75	71 ▲	74	75	72	65 ▲	95	95	94	95	97	96	91 ▲
Quebec, Canada	85	86	82	78 ▲	88	93 ▽	90	98	98	98	97	99 ▽	99	99
Abu Dhabi, UAE	37	37	39					61	65	71 ▽				

▲ 2019 percent significantly higher

▽ 2019 percent significantly lower

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

Low Benchmark: Full Description

Exhibit 3.10 presents the description of eighth grade students' achievement at the Low International Benchmark. The few eighth grade items in TIMSS 2019 at the Low level indicated that students had some understanding of whole numbers and basic graphs.

Exhibit 3.10: Description of the TIMSS 2019 Low International Benchmark (400) of Mathematics Achievement

Low International Benchmark

400

Summary

Students have some knowledge of whole numbers and basic graphs.

No items at the eighth grade anchored at the Low level in TIMSS 2019. However, TIMSS 2015 indicated that students at this level have an elementary understanding of whole numbers. They could match tables to bar graphs and pictographs.

Intermediate Benchmark: Full Description and Example Items

Exhibit 3.11 provides the description of student achievement at the Intermediate International Benchmark. At this level, students could apply basic mathematical knowledge in a variety of situations.

Exhibit 3.11.1 presents an item from the number domain. As shown in this item, students reaching the Intermediate Benchmark demonstrated familiarity with negative numbers. The international average was 59 percent. The highest performance on the item was in Finland—85 percent of the students responded correctly.

Exhibit 3.11.2 presents a geometry item. Fifty-six percent of the eighth grade students, on average, were able to use the properties of angles to determine the size of a fourth angle in a quadrilateral when given the values of the other three angles. The Singaporean students had the highest achievement, with 90 percent correct.

Exhibit 3.11.3 shows a multi-part item from the data and probability domain. Eighty-three percent of the students in Singapore were able to compute and compare three unit prices based on advertisements. The international average was 56 percent.

Exhibit 3.11: Description of the TIMSS 2019 Intermediate International Benchmark (475) of Mathematics Achievement

Intermediate International Benchmark

475

Summary

Students can apply basic mathematical knowledge in a variety of situations. They can solve problems involving whole numbers, negative numbers, fractions, decimals, and ratios. Students have some basic knowledge about properties of two-dimensional shapes. They can read and interpret data in graphs and have some rudimentary knowledge of probability.

Students at this level can solve problems involving whole numbers, negative numbers, fractions, decimals, and ratios.

Students have some basic knowledge about properties of two-dimensional shapes.

Students can read and interpret data presented in tables, bar graphs, and line graphs. They have some rudimentary knowledge of probability.

Exhibit 3.11.1: Intermediate International Benchmark of Mathematics Achievement – Example Item 1

Country	Percent Full Credit	
Finland	85 (1.5)	▲
† Norway (9)	82 (2.0)	▲
Chinese Taipei	82 (1.5)	▲
England	82 (1.6)	▲
Japan	81 (1.6)	▲
2 Singapore	80 (2.0)	▲
Ireland	80 (1.7)	▲
† Hong Kong SAR	80 (2.0)	▲
2 Sweden	80 (2.1)	▲
Korea, Rep. of	80 (1.9)	▲
Australia	79 (1.8)	▲
Hungary	76 (2.4)	▲
† United States	70 (1.7)	▲
† New Zealand	69 (2.5)	▲
Lithuania	68 (2.3)	▲
3 Israel	67 (1.9)	▲
Cyprus	65 (1.9)	▲
France	63 (2.3)	▲
2 Russian Federation	61 (3.1)	
Portugal	61 (2.8)	
International Average	**59 (0.3)**	
Italy	57 (2.5)	
Romania	55 (2.4)	
United Arab Emirates	53 (1.2)	▽
Turkey	52 (1.9)	▽
Bahrain	51 (2.2)	▽
Qatar	47 (2.4)	▽
Chile	46 (2.4)	▽
2 Kazakhstan	45 (2.7)	▽
1 Georgia	44 (2.6)	▽
Malaysia	43 (1.6)	▽
2 Egypt	41 (2.3)	▽
Kuwait	39 (2.2)	▽
Jordan	37 (2.2)	▽
Oman	36 (2.0)	▽
Lebanon	36 (2.2)	▽
Iran, Islamic Rep. of	35 (2.3)	▽
2 Saudi Arabia	33 (2.0)	▽
South Africa (9)	25 (1.1)	▽
Morocco	22 (1.4)	▽
Benchmarking Participants		
‡ Quebec, Canada	82 (2.6)	▲
Moscow City, Russian Fed.	75 (1.9)	▲
Ontario, Canada	71 (2.0)	▲
2 Dubai, UAE	70 (1.8)	▲
Abu Dhabi, UAE	44 (2.0)	▽
Western Cape, RSA (9)	40 (2.4)	▽
Gauteng, RSA (9)	30 (1.7)	▽

Content Domain: Number

Cognitive Domain: Knowing

Description: Solves a word problem involving subtraction of negative numbers

On Thursday, the lowest temperature in City X was 6 °C and the lowest temperature in City Y was −3 °C. What was the difference between the lowest temperatures in the cities?

Answer: 9 °C

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

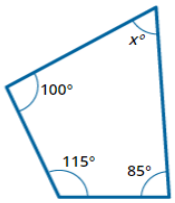
Exhibit 3.11.2: Intermediate International Benchmark of Mathematics Achievement – Example Item 2

Country	Percent Full Credit	
[2] Singapore	90 (1.0)	▲
Japan	89 (1.1)	▲
Korea, Rep. of	86 (2.0)	▲
Chinese Taipei	83 (1.5)	▲
† Hong Kong SAR	81 (2.2)	▲
Ireland	78 (1.9)	▲
Hungary	71 (3.0)	▲
England	70 (2.5)	▲
Lithuania	69 (2.2)	▲
[2] Russian Federation	65 (2.8)	▲
Cyprus	63 (2.0)	▲
† Norway (9)	62 (2.1)	▲
Australia	61 (2.0)	▲
Turkey	61 (2.5)	▲
[2] Kazakhstan	60 (2.7)	
Romania	59 (2.3)	
Finland	58 (2.2)	
Portugal	57 (3.0)	
International Average	**56 (0.4)**	
Italy	55 (2.6)	
[1] Georgia	54 (2.7)	
Bahrain	54 (2.5)	
[2] Sweden	52 (2.1)	
Malaysia	52 (2.1)	
Lebanon	51 (2.9)	
Iran, Islamic Rep. of	51 (2.0)	▽
[2] Egypt	49 (2.7)	▽
Qatar	48 (2.3)	▽
† New Zealand	47 (2.4)	▽
United Arab Emirates	46 (1.2)	▽
[3] Israel	46 (2.5)	▽
Oman	42 (2.1)	▽
Jordan	41 (2.5)	▽
† United States	39 (1.9)	▽
France	36 (2.4)	▽
Kuwait	32 (3.3)	▽
[2] Saudi Arabia	30 (2.2)	▽
South Africa (9)	27 (1.2)	▽
Chile	26 (1.9)	▽
Morocco	26 (1.7)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	75 (2.2)	▲
‡ Quebec, Canada	74 (2.5)	▲
[2] Dubai, UAE	63 (2.3)	▲
Ontario, Canada	58 (3.2)	
Western Cape, RSA (9)	44 (2.5)	▽
Abu Dhabi, UAE	38 (2.1)	▽
Gauteng, RSA (9)	37 (2.0)	▽

Content Domain: Geometry

Cognitive Domain: Applying

Description: Determines the value of an angle in an irregular quadrilateral given the values of the other angles



What is the value of x?

$x =$ 60

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Exhibit 3.11.3: Intermediate International Benchmark of Mathematics Achievement – Example Item 3

Country	Percent Full Credit	
[2] Singapore	83 (1.3)	▲
Chinese Taipei	81 (1.4)	▲
Japan	81 (1.5)	▲
Korea, Rep. of	80 (2.0)	▲
Ireland	77 (2.5)	▲
† Hong Kong SAR	74 (2.7)	▲
Lithuania	70 (2.5)	▲
Australia	69 (1.8)	▲
[2] Russian Federation	66 (2.7)	▲
Cyprus	66 (2.5)	▲
[2] Kazakhstan	66 (2.7)	▲
Finland	65 (2.2)	▲
France	65 (2.2)	▲
Portugal	65 (2.7)	▲
Italy	64 (2.2)	▲
† United States	63 (1.9)	▲
† New Zealand	61 (2.1)	▲
Hungary	61 (2.4)	
Romania	61 (2.9)	
[3] Israel	59 (2.4)	
England	59 (2.8)	
Malaysia	57 (1.4)	
International Average	**56 (0.4)**	
† Norway (9)	56 (2.6)	
[2] Sweden	55 (2.5)	
Turkey	53 (2.4)	
Lebanon	48 (2.4)	▽
[1] Georgia	44 (2.6)	▽
United Arab Emirates	43 (1.0)	▽
Bahrain	43 (1.9)	▽
Iran, Islamic Rep. of	42 (2.2)	▽
Oman	37 (1.7)	▽
Chile	37 (2.3)	▽
[2] Egypt	35 (1.7)	▽
Jordan	35 (1.8)	▽
Qatar	33 (2.2)	▽
South Africa (9)	32 (1.5)	▽
Morocco	29 (1.7)	▽
Kuwait	21 (1.8)	▽
[2] Saudi Arabia	- -	
Benchmarking Participants		
Moscow City, Russian Fed.	77 (1.9)	▲
‡ Quebec, Canada	72 (2.6)	▲
Ontario, Canada	66 (2.4)	▲
[2] Dubai, UAE	63 (2.2)	▲
Western Cape, RSA (9)	53 (2.1)	
Gauteng, RSA (9)	40 (2.1)	▽
Abu Dhabi, UAE	36 (1.9)	▽

Content Domain: Data and Probability

Cognitive Domain: Applying

Description: Finds and compares the unit prices of four objects

Socks on Sale!
Advertisements

SALE Store Q 6 pairs of socks 24.30 zeds	**SALE** Store R 2 pairs of socks 8.40 zeds
SALE Store S 4 pairs of socks 16.40 zeds	**SALE** Store T 3 pairs of socks 12 zeds

Chen has seen these advertisements for socks and wants to pay the lowest price per pair of socks. Complete the table below to show Chen the price per pair of socks in each store. Store Q has been done for you.

Store	Price Per Pair
Q	4.05 zeds
R	4.2 zeds
S	4.1 zeds
T	4.0 zeds

From which store should Chen buy her socks in order to pay the lowest price per pair?

Store: T

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

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

High Benchmark: Full Description and Example Items

Exhibit 3.12 presents the description of achievement at the High International Benchmark. Eighth grade students reaching this benchmark could apply their mathematics understanding in a variety of relatively complex situations.

Exhibit 3.12.1 provides an example from the number domain. Fifty-four percent of the eighth grade students, on average, were able to use a ratio to solve a problem. With 87 percent correct, Singapore had the highest percentage correct.

Exhibit 3.12.2 provides an example from the algebra domain. In this item, students were asked to solve a problem by evaluating a formula with exponents. The international average was 35 percent. Seventy-three percent of the Singaporean eighth grade students answered correctly.

Exhibit 3.12.3 shows a reasoning item from the geometry domain. On average, 41 percent of eighth grade students were able to visualize two different cylinders. The highest achievement was in Japan, with 79 percent of the students answering this item correctly.

Exhibit 3.12.4 shows a data interpretation item from the data and probability domain. Eighty-three percent of the Japanese eighth grade students were able to match different types of data to the appropriate graphic displays. The international average was 47 percent.

Exhibit 3.12.5 shows another example item from the data and probability domain, involving outcomes and probabilities. Eighth grade students in Korea posted the highest percentage correct—70 percent. The international average was 43 percent.

Exhibit 3.12: Description of the TIMSS 2019 High International Benchmark (550) of Mathematics Achievement

High International Benchmark

550

Summary

Students can apply their understanding and knowledge in a variety of relatively complex situations. They can solve problems with fractions, decimals, ratios, and proportions. Students at this level show basic procedural knowledge related to algebraic expressions and equations. They can solve a variety of problems with angles, including problems involving triangles, parallel lines, rectangles, and congruent and similar figures. Students can interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities.

Students can solve problems with fractions, decimals, ratios, and proportions.

Students at this level show basic procedural knowledge related to algebraic expressions. They can simplify expressions with integers. They can evaluate a variety of expressions and formulas, including those with exponents. They can identify algebraic expressions that represent real world situations. Students can identify the solutions of linear equations, a pair of simultaneous linear equations in two variables, and identify the values that satisfy two inequalities. They can determine a specific term of a numerical or geometric pattern.

Students can solve a variety of problems with angles, including problems involving triangles, parallel lines, rectangles, and congruent and similar figures. They can identify points in the Cartesian plane to draw lines and shapes. They can visualize rectangular solids.

Students can interpret data from pie charts, line graphs, and bar graphs to solve problems and provide explanations. They can calculate means. They can solve simple problems involving outcomes and probabilities.

Exhibit 3.12.1: High International Benchmark of Mathematics Achievement – Example Item 1

Country	Percent Correct	
[2] Singapore	87 (1.4)	▲
Japan	82 (1.6)	▲
Korea, Rep. of	81 (1.9)	▲
Chinese Taipei	80 (1.7)	▲
† Hong Kong SAR	72 (2.1)	▲
[3] Israel	70 (2.0)	▲
Ireland	68 (2.3)	▲
England	67 (2.4)	▲
Australia	67 (2.0)	▲
Hungary	66 (2.1)	▲
Lithuania	61 (2.1)	▲
† United States	61 (1.7)	▲
[2] Russian Federation	60 (2.5)	▲
† New Zealand	57 (2.2)	
International Average	**54 (0.3)**	
[2] Kazakhstan	54 (2.5)	
Qatar	53 (2.2)	
Finland	52 (2.0)	
† Norway (9)	52 (2.3)	
Cyprus	52 (2.4)	
United Arab Emirates	52 (1.1)	
Romania	52 (2.3)	
Iran, Islamic Rep. of	51 (2.1)	
[1] Georgia	51 (2.8)	
[2] Sweden	50 (2.6)	
Malaysia	49 (1.9)	▽
France	49 (2.3)	▽
Chile	47 (3.3)	▽
Bahrain	46 (2.1)	▽
Italy	46 (2.5)	▽
Jordan	43 (2.1)	▽
[2] Egypt	43 (1.9)	▽
Portugal	43 (2.3)	▽
Kuwait	40 (2.3)	▽
[2] Saudi Arabia	40 (1.9)	▽
South Africa (9)	38 (1.3)	▽
Turkey	35 (1.9)	▽
Morocco	33 (1.4)	▽
Oman	33 (1.8)	▽
Lebanon	29 (2.1)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	67 (2.3)	▲
[2] Dubai, UAE	66 (2.1)	▲
Ontario, Canada	63 (2.3)	▲
Western Cape, RSA (9)	49 (2.2)	▽
Abu Dhabi, UAE	46 (1.8)	▽
‡ Quebec, Canada	43 (2.4)	▽
Gauteng, RSA (9)	41 (1.7)	▽

Content Domain: Number

Cognitive Domain: Applying

Description: In a word problem dividing a quantity by a given ratio, determines the quantity of one of the parts

A piece of string was 45 cm long. Then, it was divided into two pieces in a ratio of 4:5.

What is the length of the shorter piece of string in cm?

A) 5

B) 20

C) 25

D) 36

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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Exhibit 3.12.2: High International Benchmark of Mathematics Achievement – Example Item 2

Country	Percent Full Credit	
[2] Singapore	73 (2.1)	▲
Chinese Taipei	66 (2.0)	▲
† Hong Kong SAR	66 (2.3)	▲
[2] Russian Federation	60 (2.6)	▲
Korea, Rep. of	55 (2.3)	▲
Ireland	48 (2.4)	▲
Lithuania	48 (2.4)	▲
[2] Kazakhstan	47 (2.7)	▲
[3] Israel	46 (2.4)	▲
Japan	44 (1.9)	▲
† United States	43 (2.3)	▲
Hungary	43 (2.5)	▲
Romania	41 (2.3)	▲
England	40 (2.9)	
Cyprus	39 (1.9)	▲
Australia	37 (2.1)	
United Arab Emirates	36 (1.2)	
International Average	**35 (0.3)**	
Italy	35 (2.7)	
[1] Georgia	34 (2.6)	
Portugal	34 (2.3)	
Turkey	32 (2.2)	
Bahrain	31 (1.7)	
Oman	28 (1.7)	▽
Qatar	28 (2.1)	▽
Lebanon	27 (2.0)	▽
[2] Egypt	27 (2.0)	▽
Finland	25 (1.8)	▽
France	23 (2.0)	▽
† Norway (9)	23 (1.9)	▽
Iran, Islamic Rep. of	22 (1.5)	▽
[2] Sweden	22 (2.0)	▽
Malaysia	22 (1.5)	▽
Jordan	21 (1.8)	▽
† New Zealand	19 (1.5)	▽
South Africa (9)	17 (1.1)	▽
[2] Saudi Arabia	15 (1.6)	▽
Chile	14 (1.5)	▽
Kuwait	12 (1.8)	▽
Morocco	6 (1.0)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	73 (2.1)	▲
[2] Dubai, UAE	52 (2.5)	▲
‡ Quebec, Canada	44 (3.1)	▲
Ontario, Canada	44 (3.2)	▲
Western Cape, RSA (9)	28 (2.5)	▽
Abu Dhabi, UAE	28 (1.3)	▽
Gauteng, RSA (9)	20 (2.0)	▽

Content Domain: Algebra

Cognitive Domain: Applying

Description: Solves a word problem involving evaluating a formula with exponents

The stopping distance (d) meters depends on the speed (v) meters per second of the car when the brakes are applied. A formula for calculating this distance is:

$$d = \frac{2v + v^2}{20}$$

What is the stopping distance when $v = 20$?

$d =$ 22 m

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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Exhibit 3.12.3: High International Benchmark of Mathematics Achievement – Example Item 3

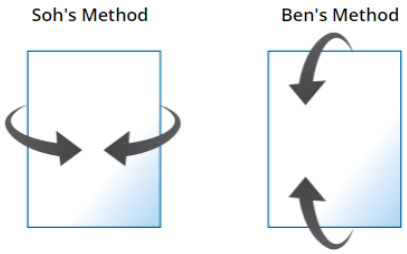
Country	Percent Full Credit	
Japan	79 (1.7)	▲
[2] Singapore	70 (1.7)	▲
† Hong Kong SAR	66 (2.5)	▲
Korea, Rep. of	64 (2.5)	▲
Italy	59 (2.7)	▲
Lithuania	58 (2.6)	▲
Hungary	57 (2.4)	▲
Chinese Taipei	53 (2.2)	▲
[2] Russian Federation	52 (2.5)	▲
† United States	51 (2.3)	▲
[3] Israel	49 (2.2)	▲
England	48 (2.5)	▲
Portugal	48 (2.7)	▲
Turkey	47 (2.0)	▲
Finland	44 (2.0)	
Malaysia	42 (1.9)	
France	42 (2.0)	
International Average	**41 (0.3)**	
† Norway (9)	41 (2.5)	
Bahrain	40 (2.0)	
Cyprus	40 (2.2)	
[2] Kazakhstan	39 (2.3)	
Chile	39 (2.2)	
Romania	39 (2.4)	
United Arab Emirates	38 (1.1)	▽
[2] Sweden	38 (2.5)	
Ireland	35 (2.2)	▽
Qatar	33 (2.1)	▽
Iran, Islamic Rep. of	32 (2.0)	▽
Oman	28 (1.8)	▽
Australia	28 (1.7)	▽
[1] Georgia	27 (2.3)	▽
Jordan	27 (2.1)	▽
Kuwait	26 (2.1)	▽
[2] Egypt	23 (1.8)	▽
Morocco	22 (1.4)	▽
† New Zealand	21 (1.4)	▽
South Africa (9)	21 (0.9)	▽
Lebanon	20 (2.1)	▽
[2] Saudi Arabia	10 (1.2)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	64 (1.9)	▲
Ontario, Canada	60 (2.9)	▲
[2] Dubai, UAE	49 (2.9)	▲
‡ Quebec, Canada	46 (3.0)	
Abu Dhabi, UAE	35 (1.5)	▽
Western Cape, RSA (9)	27 (1.9)	▽
Gauteng, RSA (9)	27 (1.7)	▽

Content Domain: Geometry

Cognitive Domain: Reasoning

Description: Compares properties of two open cylinders made by rolling the same rectangle in different directions

Soh and Ben have identical rectangular pieces of paper. They use different ways to roll their papers into cylinders so that the opposite sides of the paper touch as shown below.



Compare the properties of the two cylinders.

Use the drop-down menus.

Height

Soh's cylinder [>] Ben's cylinder

Diameter

Soh's cylinder [<] Ben's cylinder

Surface Area (with open ends)

Soh's cylinder [=] Ben's cylinder

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Exhibit 3.12.4: High International Benchmark of Mathematics Achievement – Example Item 4

Country	Percent Full Credit	
Japan	83 (1.2)	▲
[2] Singapore	76 (1.8)	▲
Chinese Taipei	68 (1.8)	▲
Korea, Rep. of	67 (2.2)	▲
Ireland	64 (2.2)	▲
Australia	64 (2.1)	▲
Portugal	63 (2.8)	▲
England	61 (2.7)	▲
† Hong Kong SAR	61 (2.5)	▲
Hungary	58 (2.6)	▲
Lithuania	58 (2.2)	▲
† Norway (9)	58 (2.8)	▲
Turkey	58 (1.9)	▲
France	54 (2.3)	▲
Finland	54 (2.0)	▲
[2] Russian Federation	54 (2.9)	▲
† New Zealand	53 (2.4)	▲
† United States	53 (2.2)	▲
[3] Israel	52 (2.0)	▲
Italy	51 (2.5)	
Cyprus	50 (2.6)	
International Average	**47 (0.3)**	
Bahrain	45 (1.8)	
[2] Sweden	45 (2.3)	
Malaysia	43 (1.8)	▽
United Arab Emirates	40 (0.9)	▽
Romania	38 (2.5)	▽
Chile	37 (2.2)	▽
Oman	37 (2.0)	▽
Qatar	34 (2.5)	▽
Kuwait	33 (2.8)	▽
[2] Kazakhstan	31 (2.0)	▽
[2] Saudi Arabia	29 (2.0)	▽
Jordan	26 (2.2)	▽
South Africa (9)	25 (1.1)	▽
Iran, Islamic Rep. of	25 (1.9)	▽
Lebanon	22 (2.1)	▽
Morocco	21 (1.3)	▽
[1] Georgia	20 (1.8)	▽
[2] Egypt	18 (1.4)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	69 (2.5)	▲
Ontario, Canada	66 (2.3)	▲
‡ Quebec, Canada	65 (2.5)	▲
[2] Dubai, UAE	59 (1.8)	▲
Western Cape, RSA (9)	39 (2.0)	▽
Gauteng, RSA (9)	33 (1.6)	▽
Abu Dhabi, UAE	31 (1.4)	▽

Content Domain: Data and Probability

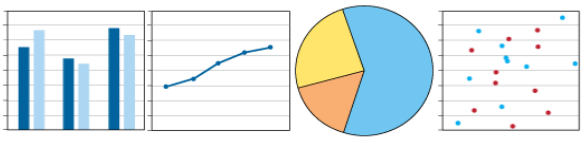
Cognitive Domain: Applying

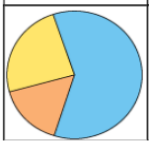
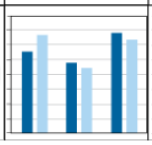
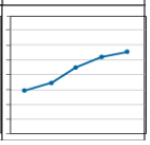
Description: Identifies an appropriate graph for three different types of data

Lee wants to make three graphs to show information about his town.
The titles of his graphs are shown in the table below.

Which type of graph is best for each?

Drag one type of graph to each title.



Job Types of Workers in Town	The Number of Girls and Boys Born Each Year	Town Population Over Time
		

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Exhibit 3.12.5: High International Benchmark of Mathematics Achievement – Example Item 5

Country	Percent Correct	
Korea, Rep. of	70 (2.0)	▲
[2] Singapore	69 (1.9)	▲
Japan	65 (1.8)	▲
Chinese Taipei	63 (2.1)	▲
Ireland	57 (2.4)	▲
Australia	56 (2.0)	▲
Turkey	55 (2.2)	▲
Bahrain	52 (2.1)	▲
† United States	52 (2.2)	▲
England	50 (2.2)	▲
† Hong Kong SAR	49 (2.9)	▲
Finland	49 (2.1)	▲
Italy	48 (2.5)	▲
† New Zealand	48 (2.3)	▲
† Norway (9)	48 (2.8)	
Lithuania	46 (2.7)	
[3] Israel	46 (2.7)	
Iran, Islamic Rep. of	45 (2.8)	
International Average	**43 (0.4)**	
Hungary	43 (2.3)	
[2] Russian Federation	42 (2.6)	
[2] Sweden	42 (2.7)	
Cyprus	41 (2.4)	
Portugal	41 (2.6)	
[2] Kazakhstan	39 (2.7)	
France	38 (2.4)	▽
United Arab Emirates	38 (1.0)	▽
Chile	36 (1.9)	▽
Malaysia	35 (1.4)	▽
Jordan	34 (2.0)	▽
Oman	34 (1.6)	▽
Qatar	32 (2.3)	▽
Romania	30 (2.4)	▽
Kuwait	30 (2.0)	▽
[2] Egypt	27 (1.8)	▽
[2] Saudi Arabia	27 (1.9)	▽
[1] Georgia	27 (2.2)	▽
Morocco	26 (1.8)	▽
South Africa (9)	25 (1.2)	▽
Lebanon	22 (1.8)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	53 (2.3)	▲
Ontario, Canada	50 (3.0)	▲
‡ Quebec, Canada	50 (2.4)	▲
[2] Dubai, UAE	48 (2.1)	▲
Western Cape, RSA (9)	35 (1.9)	▽
Abu Dhabi, UAE	34 (1.5)	▽
Gauteng, RSA (9)	28 (1.5)	▽

Content Domain: Data and Probability

Cognitive Domain: Applying

Description: Estimates the number of objects in a given probability sample

A bag contains 24 marbles, some white and some black.

A marble is chosen at random, its color is noted, and the marble is placed back into the bag. This is done 120 times, and a white marble appears 70 times.

How many white marbles are likely to be in the bag?

A) 7

B) 10

C) 12

D) 14

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Advanced Benchmark: Full Description and Example Items

Exhibit 3.13 presents the description of eighth grade performance at the Advanced International Benchmark. Students could apply and reason to solve a variety of problems as well as solve linear equations and make generalizations.

Exhibit 3.13.1 shows a multistep problem involving fractions from the number domain. This problem was relatively difficult for eighth grade students, with an international average of 18 percent. The top performances were in Chinese Taipei and Korea, where just over half the students answered correctly (52–53%).

Exhibit 3.13.2 involved students constructing a linear equation to solve a problem about perimeter. The international average was 26 percent. Almost three-fourths (74%) of the Singaporean students successfully completed this task.

Exhibit 3.13.3 shows a reasoning item from the geometry domain, which was based on properties of supplementary angles. Seventy-seven percent of eighth grade students answered correctly in both Japan and Korea. The international average was 26 percent.

Exhibit 3.13.4 presents an item from the data and probability domain that required students to interpret the change in a mean, using decimals and rounding. The international average was 36 percent. The highest percentage correct—71 percent—was in Korea.

Exhibit 3.13: Description of the TIMSS 2019 Advanced International Benchmark (625) of Mathematics Achievement

Advanced International Benchmark

625

Summary

Students can apply and reason in a variety of problem situations, solve linear equations, and make generalizations. They can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can understand linear functions and algebraic expressions. Students can use their knowledge of geometric figures to solve a wide range of problems involving angles, area, and surface area. They can calculate means and medians, and understand how changing data points can impact the mean. Students can interpret a wide variety of data displays to draw and justify conclusions, and solve multistep problems. They can solve problems involving expected values.

Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can reason with different representations of numbers in abstract and multistep problems.

Students can construct and solve linear equations in one or two variables. They can identify properties of linear functions from tables, graphs, and equations, including slopes and y-intercepts. Students can express generalizations either algebraically or in words, such as expressing the n^{th} term in number patterns. They can simplify algebraic expressions.

Students can use their knowledge of geometric figures to solve a wide range of problems. They can solve a variety of problems about area and surface area, and use the Pythagorean theorem to find the side length of a triangle. Students can use their knowledge of the relationships between geometric figures, parallel lines, and angles to solve problems on the coordinate plane.

Students can calculate means and medians, and understand how changing data points can impact the mean. Students can interpret a wide variety of data displays to draw and justify conclusions, and solve multi-step problems. They can solve problems involving expected values.

Exhibit 3.13.1: Advanced International Benchmark of Mathematics Achievement – Example Item 1

Country	Percent Full Credit	
Chinese Taipei	53 (2.0)	▲
Korea, Rep. of	52 (2.3)	▲
Japan	47 (2.1)	▲
[2] Singapore	46 (2.1)	▲
Bahrain	30 (1.6)	▲
Cyprus	28 (2.3)	▲
[2] Russian Federation	26 (2.5)	▲
† Hong Kong SAR	24 (2.8)	▲
Ireland	23 (2.1)	▲
Hungary	22 (1.9)	▲
[3] Israel	22 (2.2)	
England	22 (2.8)	
Australia	21 (1.8)	
[2] Kazakhstan	19 (1.9)	
International Average	**18 (0.3)**	
Turkey	18 (1.8)	
Iran, Islamic Rep. of	17 (1.9)	
† United States	17 (1.4)	
Romania	17 (1.8)	
† New Zealand	16 (1.1)	
Lithuania	16 (1.8)	
United Arab Emirates	14 (1.0)	▽
Portugal	14 (1.8)	▽
[2] Sweden	13 (1.8)	▽
Finland	13 (1.4)	▽
† Norway (9)	10 (1.4)	▽
France	10 (1.4)	▽
[2] Egypt	10 (1.3)	▽
Qatar	8 (1.4)	▽
Malaysia	8 (0.9)	▽
Italy	7 (1.2)	▽
Chile	6 (1.0)	▽
Jordan	6 (1.1)	▽
Kuwait	6 (1.3)	▽
Oman	6 (0.8)	▽
South Africa (9)	5 (0.5)	▽
Lebanon	5 (1.2)	▽
Morocco	4 (0.7)	▽
[2] Saudi Arabia	4 (0.9)	▽
[1] Georgia	- -	
Benchmarking Participants		
Moscow City, Russian Fed.	37 (2.9)	▲
[2] Dubai, UAE	25 (2.2)	▲
Ontario, Canada	20 (2.4)	
‡ Quebec, Canada	18 (1.9)	
Western Cape, RSA (9)	12 (1.7)	▽
Abu Dhabi, UAE	10 (1.1)	▽
Gauteng, RSA (9)	7 (1.1)	▽

Content Domain: Number

Cognitive Domain: Reasoning

Description: Solves a multistep problem involving addition and subtraction of fractions

In the square below:

- The numbers in each row add to 1,
- The numbers in each column add to 1, and
- The numbers in both diagonals add to 1.

$\frac{8}{15}$		$\frac{2}{5}$
$\frac{1}{5}$	X	

What is the value of X?

$X = \frac{5}{15}$

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

Exhibit 3.13.2: Advanced International Benchmark of Mathematics Achievement – Example Item 2

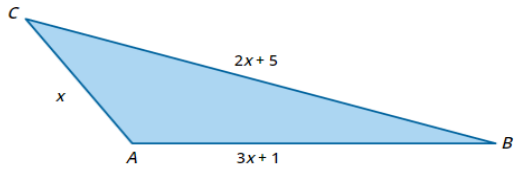
Country	Percent Full Credit	
[2] Singapore	74 (2.1)	▲
Chinese Taipei	66 (1.8)	▲
† Hong Kong SAR	61 (2.4)	▲
Korea, Rep. of	59 (2.8)	▲
[3] Israel	46 (2.7)	▲
Japan	42 (2.1)	▲
Cyprus	41 (2.3)	▲
[2] Russian Federation	40 (3.0)	▲
Romania	36 (2.8)	▲
Lithuania	34 (2.4)	▲
[2] Sweden	34 (2.2)	▲
Hungary	33 (2.6)	▲
[2] Kazakhstan	30 (2.2)	
Australia	29 (1.8)	
International Average	**26 (0.3)**	
[1] Georgia	26 (2.7)	
United Arab Emirates	25 (0.9)	
Bahrain	25 (1.7)	
† United States	24 (1.8)	
Turkey	23 (2.1)	
Ireland	23 (1.7)	
England	22 (2.5)	
Finland	21 (1.7)	▽
† Norway (9)	18 (1.7)	▽
Portugal	18 (1.8)	▽
† New Zealand	17 (1.4)	▽
[2] Egypt	17 (1.9)	▽
Iran, Islamic Rep. of	16 (1.9)	▽
Oman	15 (1.2)	▽
Italy	15 (1.9)	▽
France	14 (1.8)	▽
Lebanon	14 (1.9)	▽
Jordan	13 (1.3)	▽
Malaysia	12 (0.9)	▽
Qatar	12 (1.5)	▽
Kuwait	8 (1.7)	▽
Morocco	6 (1.1)	▽
Chile	5 (1.0)	▽
South Africa (9)	5 (0.5)	▽
[2] Saudi Arabia	3 (0.6)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	51 (2.5)	▲
‡ Quebec, Canada	46 (3.2)	▲
[2] Dubai, UAE	40 (1.9)	▲
Ontario, Canada	26 (2.4)	
Abu Dhabi, UAE	15 (1.2)	▽
Western Cape, RSA (9)	13 (1.9)	▽
Gauteng, RSA (9)	7 (1.2)	▽

Content Domain: Algebra

Cognitive Domain: Applying

Description: Constructs a linear equation for the perimeter of a triangle and solves for the length of one side

The perimeter of triangle *ABC* is 21 cm.



What is the value of x?

$x =$ 2.5 cm

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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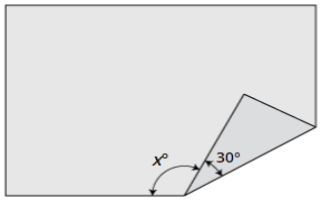
Exhibit 3.13.3: Advanced International Benchmark of Mathematics Achievement – Example Item 3

Country	Percent Correct	
Japan	77 (1.7)	▲
Korea, Rep. of	77 (1.8)	▲
[2] Singapore	76 (1.9)	▲
Chinese Taipei	64 (2.1)	▲
† Hong Kong SAR	56 (2.7)	▲
[2] Russian Federation	34 (2.4)	▲
Hungary	32 (2.1)	▲
[2] Kazakhstan	32 (2.6)	▲
Romania	29 (2.5)	
Lithuania	28 (2.1)	
† Norway (9)	28 (2.3)	
Australia	28 (1.6)	
England	26 (2.3)	
International Average	**26 (0.3)**	
Cyprus	26 (2.0)	
Portugal	26 (2.4)	
Bahrain	25 (1.3)	
Italy	25 (2.1)	
Finland	23 (1.7)	▽
Ireland	22 (2.0)	▽
[3] Israel	21 (1.9)	▽
† New Zealand	20 (1.9)	▽
Iran, Islamic Rep. of	20 (2.0)	▽
[2] Sweden	20 (2.0)	▽
Turkey	19 (1.7)	▽
United Arab Emirates	17 (0.8)	▽
Morocco	17 (1.4)	▽
Malaysia	16 (1.4)	▽
Lebanon	16 (1.6)	▽
France	16 (1.6)	▽
† United States	15 (1.4)	▽
Chile	14 (1.0)	▽
[1] Georgia	13 (2.2)	▽
[2] Egypt	13 (1.4)	▽
Qatar	13 (1.5)	▽
Oman	12 (1.0)	▽
[2] Saudi Arabia	11 (1.4)	▽
Jordan	11 (1.3)	▽
Kuwait	7 (1.5)	▽
South Africa (9)	6 (0.5)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	41 (2.0)	▲
‡ Quebec, Canada	39 (2.8)	▲
[2] Dubai, UAE	27 (2.0)	
Ontario, Canada	25 (2.9)	
Abu Dhabi, UAE	13 (1.0)	▽
Western Cape, RSA (9)	9 (1.2)	▽
Gauteng, RSA (9)	8 (1.1)	▽

Content Domain: Geometry

Cognitive Domain: Reasoning

Description: Uses properties of supplementary angles to solve for an angle



A rectangular piece of paper is folded at one corner, as shown above.
What is the value of x?

Answer: 120

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 3.13.4: Advanced International Benchmark of Mathematics Achievement – Example Item 4

Country	Percent Correct	
Korea, Rep. of	71 (1.9)	▲
Japan	70 (1.9)	▲
Chinese Taipei	69 (1.8)	▲
2 Singapore	66 (2.1)	▲
† Hong Kong SAR	64 (2.4)	▲
† Norway (9)	52 (2.6)	▲
3 Israel	47 (2.3)	▲
Finland	47 (2.0)	▲
2 Sweden	47 (2.4)	▲
Lithuania	46 (2.7)	▲
2 Russian Federation	44 (3.1)	▲
Australia	43 (1.9)	▲
Ireland	42 (2.4)	▲
† United States	41 (1.6)	▲
Hungary	38 (2.7)	
France	38 (2.1)	
Portugal	37 (2.4)	
Turkey	37 (2.1)	
Italy	37 (2.1)	
International Average	**36 (0.3)**	
Cyprus	36 (2.1)	
† New Zealand	35 (1.8)	
England	35 (2.6)	
2 Kazakhstan	32 (2.1)	▽
United Arab Emirates	30 (1.0)	▽
Bahrain	28 (2.0)	▽
Chile	27 (2.6)	▽
Malaysia	26 (1.4)	▽
Qatar	25 (2.1)	▽
Iran, Islamic Rep. of	24 (2.0)	▽
1 Georgia	24 (2.3)	▽
Romania	23 (2.1)	▽
Morocco	21 (1.3)	▽
2 Egypt	20 (1.6)	▽
Oman	20 (1.3)	▽
Kuwait	19 (1.9)	▽
2 Saudi Arabia	18 (1.2)	▽
Jordan	17 (1.8)	▽
Lebanon	11 (1.5)	▽
South Africa (9)	10 (0.7)	▽
Benchmarking Participants		
Moscow City, Russian Fed.	53 (2.3)	▲
‡ Quebec, Canada	51 (2.6)	▲
2 Dubai, UAE	40 (2.3)	
Ontario, Canada	39 (2.6)	
Abu Dhabi, UAE	25 (1.5)	▽
Western Cape, RSA (9)	18 (1.6)	▽
Gauteng, RSA (9)	13 (1.2)	▽

Content Domain: Data and Probability

Cognitive Domain: Applying

Description: Determines the change in a mean given changes in individual scores

A relay team for a 400 m race has 4 runners. They took 12 seconds, 13 seconds, 11 seconds, and 13 seconds, respectively, to complete their legs of the race.

In the next race, 2 of the runners each improved their times by 2 seconds, and the other 2 had the same times as before. By how many seconds did the team's mean running time improve?

A 0 sec.

B 1 sec.

C 2 sec.

D 4 sec.

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Average Achievement in Mathematics Content and Cognitive Domains

TIMSS 2019 Mathematics Content and Cognitive Domains

TIMSS 2019 assessed four content areas in mathematics at the eighth grade: number, algebra, geometry, and data and probability.

The 30 percent of the eighth grade assessment devoted to number consisted of integers (10%); fractions and decimals (10%); and ratio, proportion, and percent (10%). Building on the number content domain at the fourth grade, eighth grade students were asked to compute and solve problems involving more advanced whole number concepts and procedures as well as integers, fractions, and decimals.

Thirty percent of the assessment also was devoted to algebra, which included expressions, operations, and equations (20%) and relationships and functions (10%). Students were asked to solve real world problems using algebraic models and explain relationships involving algebraic concepts. For example, when given one quantity in a formula involving two quantities, they were asked to find the other quantity. They also were given problems involving linear equations and functions.

Twenty percent of the assessment was devoted to geometry. Extending the understanding of shapes and measures assessed at the fourth grade, eighth grade students were asked to analyze the properties of a variety of two- and three-dimensional figures and calculate perimeters, areas, and volumes. They were asked to solve problems and provide explanations based on geometric relationships, such as congruence, similarity, and the Pythagorean theorem.

The remaining 20 percent of the assessment was devoted to the data and probability content domain, which consisted of two topic areas: data (15%) and probability (5%). Students were asked to read and extract the important meaning from a variety of visual displays, demonstrate familiarity with the statistics underlying data distributions, and organize and represent data. There also were some questions related to basic probability concepts.

Eighth grade students also needed to draw on a range of cognitive skills across the content domains described above. These skills were categorized into three broad cognitive domains—knowing, applying, and reasoning. Thirty-five percent of the eighth grade assessment was devoted to the knowing cognitive domain, 40 percent to applying, and 25 percent to reasoning. The knowing domain covers the facts, concepts, and procedures students need to know, while the second domain, applying, focuses on students' ability to apply knowledge and conceptual understanding to solve problems or answer questions. The reasoning domain goes beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multistep problems.

Average Achievement in Content Domains

Exhibit 3.14 shows countries' average mathematics achievement in each of the four content domains relative to their overall average achievement (presented from highest to lowest overall average achievement). Based on students' relative strengths and weaknesses at the eighth grade, the TIMSS 2019 countries appear to be placing relatively more instructional emphasis on the algebra content domain and less on the number and data and probability domains. Of the 36 participating countries for which content domain scores were estimated, 7 had a relative strength in number and 14 had a relative weakness; 19 had a relative strength in algebra and 14 had a relative weakness; 14 had a relative strength in geometry, and 17 had relative weakness; and 10 had a relative strength in data and probability, and 21 had a relative weakness. All countries had at least one relative strength or relative weakness compared with their overall achievement.

Exhibit 3.14: Average Achievement in Mathematics Content Domains

Country	Overall Mathematics Average Scale Score	Number (63 Items) Average Scale Score	Number (63 Items) Difference from Overall Mathematics Score	Algebra (61 Items) Average Scale Score	Algebra (61 Items) Difference from Overall Mathematics Score	Geometry (43 Items) Average Scale Score	Geometry (43 Items) Difference from Overall Mathematics Score	Data and Probability (39 Items) Average Scale Score	Data and Probability (39 Items) Difference from Overall Mathematics Score
[2] Singapore	616 (4.0)	611 (4.1)	-5 (1.0) ▽	619 (4.6)	3 (1.3) ▲	619 (3.9)	3 (0.8) ▲	620 (4.9)	4 (2.1) ▲
Chinese Taipei	612 (2.7)	613 (2.7)	1 (1.0)	618 (2.6)	6 (1.4) ▲	623 (2.7)	11 (1.3) ▲	593 (2.5)	-19 (1.6) ▽
Korea, Rep. of	607 (2.8)	605 (2.6)	-2 (1.5)	609 (3.5)	2 (1.1) ▲	617 (2.9)	10 (1.0) ▲	598 (2.6)	-9 (1.7) ▽
Japan	594 (2.7)	578 (3.5)	-16 (1.4) ▽	602 (3.2)	8 (1.3) ▲	610 (3.4)	16 (1.9) ▲	594 (2.5)	0 (0.7)
† Hong Kong SAR	578 (4.1)	570 (4.2)	-9 (1.5) ▽	584 (3.9)	5 (1.5) ▲	596 (4.6)	18 (1.6) ▲	563 (5.6)	-16 (3.5) ▽
[2] Russian Federation	543 (4.5)	541 (4.6)	-2 (1.0) ▽	560 (5.0)	16 (1.1) ▲	540 (5.2)	-3 (1.2) ▽	517 (4.7)	-26 (2.1) ▽
Ireland	524 (2.6)	541 (3.0)	17 (2.1) ▲	505 (2.8)	-18 (1.1) ▽	506 (2.8)	-18 (0.9) ▽	541 (3.4)	17 (2.0) ▲
Lithuania	520 (2.9)	514 (3.0)	-6 (1.4) ▽	518 (2.9)	-2 (1.1) ▽	529 (3.0)	9 (1.2) ▲	522 (3.1)	2 (1.5)
[3] Israel	519 (4.3)	519 (4.2)	0 (1.3)	528 (5.0)	9 (1.2) ▲	506 (4.8)	-13 (1.8) ▽	511 (4.9)	-8 (2.3) ▽
Australia	517 (3.8)	522 (3.9)	4 (0.7) ▲	501 (4.1)	-16 (1.1) ▽	513 (4.0)	-4 (1.0) ▽	533 (3.9)	15 (1.4) ▲
Hungary	517 (2.9)	515 (3.1)	-1 (1.4)	509 (3.0)	-8 (1.0) ▽	521 (3.3)	5 (1.9) ▲	521 (3.2)	4 (2.2)
† United States	515 (4.8)	520 (4.5)	4 (0.7) ▲	520 (5.4)	4 (0.9) ▲	499 (4.8)	-16 (1.1) ▽	509 (5.4)	-6 (1.8) ▽
England	515 (5.3)	519 (5.4)	4 (2.1) ▲	504 (5.8)	-11 (1.6) ▽	509 (5.3)	-6 (1.5) ▽	523 (6.2)	9 (1.9) ▲
Finland	509 (2.6)	515 (2.6)	6 (0.9) ▲	489 (2.9)	-20 (1.2) ▽	511 (3.2)	2 (2.0)	514 (3.6)	5 (1.7) ▲
† Norway (9)	503 (2.4)	507 (2.3)	5 (1.0) ▲	477 (3.0)	-26 (1.7) ▽	502 (2.3)	-1 (1.0)	518 (3.0)	15 (1.3) ▲
[2] Sweden	503 (2.5)	502 (2.4)	-1 (1.3)	496 (2.9)	-7 (1.9) ▽	495 (3.1)	-7 (1.4) ▽	513 (3.7)	11 (2.2) ▲
Cyprus	501 (1.6)	499 (2.2)	-2 (1.8)	515 (2.6)	14 (1.7) ▲	490 (2.3)	-11 (1.5) ▽	493 (2.7)	-8 (2.0) ▽
Portugal	500 (3.2)	492 (3.3)	-8 (1.7) ▽	499 (3.3)	-2 (1.2)	509 (3.3)	9 (1.2) ▲	498 (3.2)	-3 (1.6)
Italy	497 (2.7)	495 (2.4)	-3 (1.4)	491 (2.7)	-7 (2.3) ▽	510 (3.7)	12 (2.4) ▲	494 (3.3)	-4 (2.0)
Turkey	496 (4.3)	493 (4.3)	-2 (1.7)	493 (4.6)	-3 (1.2) ▽	490 (4.2)	-6 (1.4) ▽	502 (4.3)	7 (1.1) ▲
[2] Kazakhstan	488 (3.3)	482 (3.4)	-5 (1.4) ▽	504 (3.7)	16 (1.2) ▲	486 (3.8)	-2 (1.6)	463 (3.3)	-25 (1.5) ▽
France	483 (2.5)	477 (2.6)	-6 (1.2) ▽	468 (2.8)	-15 (1.5) ▽	493 (2.7)	11 (1.6) ▲	496 (2.6)	13 (1.4) ▲
† New Zealand	482 (3.4)	483 (3.6)	2 (1.7)	464 (3.5)	-17 (1.8) ▽	477 (3.4)	-5 (1.6) ▽	496 (3.7)	14 (1.6) ▲
Bahrain	481 (1.7)	473 (2.2)	-8 (1.7) ▽	485 (2.1)	4 (1.5) ▲	493 (2.3)	12 (1.9) ▲	465 (2.0)	-16 (1.3) ▽
Romania	479 (4.3)	478 (4.5)	-1 (1.3)	490 (4.6)	11 (1.7) ▲	472 (4.7)	-7 (1.6) ▽	458 (4.5)	-21 (1.8) ▽
United Arab Emirates	473 (1.9)	474 (1.9)	1 (0.7)	486 (2.1)	12 (0.8) ▲	462 (2.1)	-12 (1.0) ▽	451 (2.1)	-22 (1.0) ▽
[1] Georgia	461 (4.3)	466 (4.7)	5 (1.7) ▲	473 (4.3)	12 (2.2) ▲	449 (4.4)	-12 (2.8) ▽	429 (5.1)	-32 (3.9) ▽
Malaysia	461 (3.2)	458 (3.1)	-3 (1.1) ▽	456 (3.3)	-4 (1.6) ▽	466 (3.7)	6 (2.6) ▲	457 (3.5)	-4 (1.2) ▽
Iran, Islamic Rep. of	446 (3.7)	442 (4.2)	-4 (1.6) ▽	450 (3.8)	4 (1.2) ▲	442 (4.4)	-5 (1.7) ▽	435 (4.0)	-11 (1.5) ▽
Ψ Qatar	443 (4.0)	441 (4.0)	-2 (1.0)	454 (4.0)	10 (1.5) ▲	435 (4.0)	-8 (1.2) ▽	423 (4.7)	-20 (1.9) ▽
Ψ Chile	441 (2.8)	442 (3.2)	1 (1.4)	439 (3.1)	-2 (1.8)	434 (4.3)	-6 (3.2)	434 (3.2)	-6 (1.3) ▽
Lebanon	429 (2.9)	432 (2.7)	2 (1.3)	452 (3.0)	23 (1.3) ▲	422 (3.2)	-7 (2.1) ▽	383 (3.5)	-46 (2.4) ▽
Ψ Jordan	420 (4.3)	408 (4.5)	-12 (1.3) ▽	442 (4.8)	22 (1.2) ▲	413 (4.6)	-7 (3.0) ▽	396 (4.2)	-24 (1.8) ▽
[2] Ψ Egypt	413 (5.2)	414 (5.4)	1 (2.2)	413 (6.0)	0 (2.0)	417 (5.3)	4 (1.3) ▲	380 (5.4)	-33 (1.4) ▽
Ψ Oman	411 (2.8)	392 (3.0)	-19 (1.5) ▽	427 (3.0)	16 (1.4) ▲	418 (3.2)	7 (1.1) ▲	393 (2.9)	-17 (1.4) ▽
Ψ Kuwait	403 (5.0)	- -	- -	- -	- -	- -	- -	- -	- -
[2] Ψ Saudi Arabia	394 (2.5)	- -	- -	- -	- -	- -	- -	- -	- -
Ж South Africa (9)	389 (2.3)	- -	- -	- -	- -	- -	- -	- -	- -
Ψ Morocco	388 (2.3)	377 (2.7)	-11 (1.3) ▽	370 (3.1)	-18 (1.6) ▽	413 (2.2)	25 (1.4) ▲	372 (2.4)	-16 (1.3) ▽
Benchmarking Participants									
Moscow City, Russian Fed.	575 (4.2)	574 (4.5)	-1 (1.5)	592 (4.2)	17 (1.1) ▲	565 (4.4)	-10 (1.1) ▽	564 (4.2)	-11 (1.6) ▽
‡ Quebec, Canada	543 (3.7)	544 (3.9)	1 (1.3)	531 (4.0)	-12 (1.7) ▽	549 (4.4)	6 (2.3) ▲	554 (4.5)	11 (2.8) ▲
[2] Dubai, UAE	537 (2.0)	537 (2.1)	0 (0.8)	547 (2.4)	10 (1.5) ▲	527 (2.6)	-10 (1.7) ▽	525 (2.7)	-11 (1.6) ▽
Ontario, Canada	530 (4.3)	530 (4.3)	1 (1.8)	515 (4.4)	-15 (1.2) ▽	536 (4.8)	6 (2.2) ▲	542 (5.2)	12 (2.5) ▲
Ψ Western Cape, RSA (9)	441 (4.4)	445 (5.2)	3 (3.2)	451 (4.9)	10 (2.3) ▲	427 (5.3)	-14 (3.4) ▽	426 (5.1)	-16 (2.5) ▽
Ψ Abu Dhabi, UAE	436 (2.9)	439 (3.0)	3 (1.8)	448 (3.2)	12 (1.0) ▲	420 (3.4)	-16 (1.5) ▽	411 (3.1)	-25 (1.2) ▽
Ψ Gauteng, RSA (9)	421 (3.0)	421 (3.2)	0 (1.4)	431 (3.7)	11 (1.7) ▲	407 (3.6)	-14 (2.2) ▽	406 (3.5)	-15 (1.9) ▽

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

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

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

Trends in Average Achievement in Content Domains

Exhibit 3.15 presents trends in average achievement for the four mathematics content domains. The results are very positive, showing more increases than decreases in all four content areas, especially geometry. Thirty TIMSS 2019 countries also participated in TIMSS 2015 and had comparable data for the content domains. In the number content area, 8 showed improvement and 6 showed declines; in algebra, 8 showed improvement and 3 showed declines; in geometry, 12 showed improvement and 2 showed declines; and in data and probability, 8 showed improvement and 5 showed declines.

TIMSS began providing scaled results in the content domains in 2007, with 23 countries having trends between 2007 and 2019. Compared with 2007, there was considerable improvement in TIMSS 2019 across the content domains in these countries—13 had higher average achievement in number, 13 in algebra, 18 in geometry, and 10 in data and probability. Only several of the countries had lower average achievement—2 in number, 1 in algebra, 2 in geometry, and 3 in data and probability.

Exhibit 3.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

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

Country	Number				Algebra				Geometry				Data and Probability			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007		2015	2011	2007
Australia																
2019	522 (3.9)	10 ▲	9	18 ▲	501 (4.1)	11 ▲	12	27 ▲	513 (4.0)	13 ▲	14 ▲	25 ▲	533 (3.9)	14 ▲	-2	7
2015	511 (3.2)		-1	8	491 (3.4)		2	16 ▲	500 (3.1)		1	12 ▲	519 (3.1)		-16 ▽	-7
2011	513 (5.5)			9	489 (5.3)			15 ▲	499 (5.3)			11	534 (6.0)			8
2007	504 (4.0)				474 (4.2)				488 (4.0)				526 (4.4)			
Bahrain																
2019	473 (2.2)	37 ▲	76 ▲	91 ▲	485 (2.1)	2	61 ▲	88 ▲	493 (2.3)	44 ▲	95 ▲	90 ▲	465 (2.0)	12 ▲	58 ▲	66 ▲
2015	436 (2.0)		39 ▲	54 ▲	483 (2.1)		58 ▲	86 ▲	449 (2.5)		51 ▲	46 ▲	453 (2.2)		46 ▲	53 ▲
Ψ 2011	397 (1.7)			15 ▲	424 (1.7)			28 ▲	398 (2.5)			-5	407 (2.5)			8 ▲
2007	381 (2.5)				397 (1.7)				403 (2.9)				400 (2.6)			
Chile																
Ψ 2019	442 (3.2)	15 ▲	29 ▲		439 (3.1)	25 ▲	36 ▲		434 (4.3)	7	15 ▲		434 (3.2)	5	9 ▲	
Ψ 2015	427 (3.3)		15 ▲		413 (3.4)		11 ▲		428 (3.4)		9		429 (3.8)		4	
2011	413 (2.9)				403 (3.6)				419 (3.0)				426 (3.0)			
Chinese Taipei																
2019	613 (2.7)	23 ▲	16 ▲	27 ▲	618 (2.6)	5	-10 ▽	-11	623 (2.7)	16 ▲	-2	18 ▲	593 (2.5)	5	9 ▲	15 ▲
2015	590 (2.4)		-8	4	613 (2.8)		-15 ▽	-16 ▽	607 (2.6)		-18 ▽	2	588 (2.5)		4	9
2011	598 (3.2)			12 ▲	628 (3.8)			-1	625 (3.7)			20 ▲	584 (2.9)			5
2007	586 (4.3)				629 (5.9)				605 (5.7)				579 (4.6)			
Cyprus																
2019	499 (2.2)			36 ▲	515 (2.6)			44 ▲	490 (2.3)			35 ▲	493 (2.7)			38 ▲
2007	464 (2.2)				471 (2.3)				455 (3.1)				456 (2.1)			
Egypt																
2 Ψ 2019	414 (5.4)	20 ▲		28 ▲	413 (6.0)	-7		8	417 (5.3)	24 ▲		20 ▲	380 (5.4)	42 ▲		22 ▲
Ψ 2015	393 (3.7)			8	420 (4.3)			15 ▲	393 (4.1)			-4	338 (4.4)			-20 ▽
2007	386 (3.6)				405 (3.5)				397 (3.7)				358 (3.9)			
England																
2019	519 (5.4)	-8	7	8	504 (5.8)	11	14	7	509 (5.3)	-6	11	-5	523 (6.2)	-18 ▽	-20 ▽	-29 ▽
2015	528 (4.5)		15 ▲	17 ▲	492 (4.7)		3	-4	514 (4.1)		16 ▲	1	541 (4.7)		-2	-11
‡ 2011	512 (5.9)			1	489 (5.8)			-7	498 (5.9)			-15 ▽	543 (7.0)			-9
† 2007	511 (5.4)				496 (5.1)				513 (5.2)				552 (6.2)			
Finland																
2019	515 (2.6)		-12 ▽		489 (2.9)		-3		511 (3.2)		9 ▲		514 (3.6)		-28 ▽	
2011	527 (2.4)				492 (2.9)				502 (2.9)				542 (3.1)			
Georgia																
1 2019	466 (4.7)	9	31 ▲	50 ▲	473 (4.3)	5	23 ▲	57 ▲	449 (4.4)	8	43 ▲	47 ▲	429 (5.1)	8	38 ▲	79 ▲
1 2 2015	457 (3.4)		22 ▲	40 ▲	469 (3.8)		18 ▲	52 ▲	441 (3.9)		34 ▲	39 ▲	421 (3.7)		30 ▲	71 ▲
1 2011	435 (3.5)			19 ▲	450 (3.9)			34 ▲	406 (4.3)			5	392 (4.5)			42 ▲
1 2007	416 (5.9)				416 (7.6)				402 (7.1)				350 (5.1)			
Hong Kong SAR																
† 2019	570 (4.2)	-25 ▽	-18 ▽	-5	584 (3.9)	-9	1	9	596 (4.6)	-6	-1	16 ▲	563 (5.6)	-34 ▽	-19 ▽	2
2015	594 (4.9)		6	19 ▲	593 (4.7)		10	18 ▲	602 (5.1)		4	22 ▲	597 (5.9)		16 ▲	37 ▲
2011	588 (3.7)			13	583 (4.0)			8	597 (4.4)			18 ▲	581 (4.1)			21 ▲
† 2007	575 (6.0)				575 (6.1)				580 (6.1)				560 (5.9)			
Hungary																
2019	515 (3.1)	-2	6	-5	509 (3.0)	6	12 ▲	1	521 (3.3)	3	20 ▲	11 ▲	521 (3.2)	2	4	-6
2015	518 (4.0)		8	-3	503 (4.1)		6	-5	518 (4.2)		17 ▲	8	519 (3.9)		2	-8
2011	510 (3.8)			-11	496 (4.0)			-11 ▽	501 (4.1)			-9	517 (4.2)			-10
2007	520 (3.8)				508 (3.8)				510 (4.0)				527 (3.9)			
Iran, Islamic Rep. of																
2019	442 (4.2)	10	40 ▲	54 ▲	450 (3.8)	13 ▲	28 ▲	46 ▲	442 (4.4)	-6	4	27 ▲	435 (4.0)	18 ▲	42 ▲	39 ▲
Ψ 2015	432 (4.7)		30 ▲	44 ▲	437 (5.1)		15 ▲	33 ▲	448 (4.7)		10	33 ▲	417 (5.0)		24 ▲	21 ▲
Ψ 2011	402 (5.0)			14 ▲	422 (4.4)			18 ▲	437 (4.7)			23 ▲	393 (4.9)			-3
2007	388 (4.4)				405 (4.2)				414 (4.7)				396 (3.8)			
Ireland																
2019	541 (3.0)	-4			505 (2.8)	4			506 (2.8)	3			541 (3.4)	7		
2015	544 (3.3)				501 (2.8)				503 (3.1)				534 (3.8)			
Israel																
3 2019	519 (4.2)	1	1		528 (5.0)	11	7		506 (4.8)	19 ▲	10		511 (4.9)	8	-4	
3 2015	518 (4.0)		0		517 (4.7)		-4		487 (4.6)		-9		503 (4.9)		-12	
3 2011	518 (4.1)				521 (4.7)				496 (4.4)				515 (4.7)			

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in content domains using current methodology began with TIMSS 2007.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Exhibit 3.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

Country	Number				Algebra				Geometry				Data and Probability			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007		2015	2011	2007
Italy																
2019	495 (2.4)	1	-1	14 ▲	491 (2.7)	10 ▲	0	31 ▲	510 (3.7)	6	-2	19 ▲	494 (3.3)	-2	-5	9
2 2015	494 (2.7)		-2	14 ▲	481 (3.0)		-10 ▽	21 ▲	504 (3.5)		-8	13 ▲	496 (2.7)		-3	12 ▲
2011	496 (2.8)			16 ▲	491 (2.6)			30 ▲	512 (3.5)			21 ▲	499 (3.1)			15 ▲
2007	480 (3.1)				460 (3.7)				491 (3.6)				485 (3.6)			
Japan																
2019	578 (3.5)	6	21 ▲	20 ▲	602 (3.2)	6	32 ▲	35 ▲	610 (3.4)	12 ▲	24 ▲	26 ▲	594 (2.5)	5	15 ▲	3
2015	572 (2.4)		15 ▲	14 ▲	596 (2.8)		26 ▲	29 ▲	598 (2.6)		12 ▲	14 ▲	589 (2.3)		10 ▲	-2
2011	557 (3.0)			-2	570 (3.1)			3	586 (3.6)			2	579 (3.1)			-11 ▽
2007	558 (2.4)				567 (2.9)				584 (2.5)				591 (2.7)			
Jordan																
Ψ 2019	408 (4.5)	28 ▲	18 ▲	-4	442 (4.8)	24 ▲	10	-3	413 (4.6)	32 ▲	6	-16 ▽	396 (4.2)	50 ▲	17 ▲	-10
Ж 2015	380 (3.2)		-10 ▽	-32 ▽	418 (3.5)		-14 ▽	-28 ▽	381 (3.4)		-26 ▽	-48 ▽	346 (4.0)		-33 ▽	-60 ▽
Ψ 2011	390 (3.8)			-22 ▽	432 (3.9)			-14 ▽	407 (3.7)			-22 ▽	379 (3.9)			-27 ▽
2007	412 (4.8)				445 (4.3)				429 (4.2)				406 (4.3)			
Kazakhstan																
2 2019	482 (3.4)		3		504 (3.7)		-2		486 (3.8)		-5		463 (3.3)		18 ▲	
2011	479 (4.1)				506 (4.5)				491 (4.5)				444 (4.4)			
Korea, Rep. of																
2019	605 (2.6)	4	-13 ▽	13 ▲	609 (3.5)	-3	-7	1	617 (2.9)	5	5	17 ▲	598 (2.6)	-3	-18 ▽	-4
2015	601 (2.4)		-17 ▽	9 ▲	612 (2.9)		-4	4	612 (3.4)		0	12 ▲	600 (2.4)		-15 ▽	-1
2011	618 (2.7)			25 ▲	617 (3.3)			9	612 (2.8)			12 ▲	616 (2.6)			14 ▲
2007	592 (2.5)				608 (3.3)				600 (2.7)				602 (2.6)			
Lebanon																
2019	432 (2.7)	-8	-20 ▽	-21 ▽	452 (3.0)	-14 ▽	-19 ▽	-16 ▽	422 (3.2)	-21 ▽	-25 ▽	-33 ▽	383 (3.5)	-12 ▽	-10	-5
2015	440 (4.1)		-11 ▽	-13 ▽	466 (4.0)		-5	-2	444 (4.0)		-4	-12 ▽	395 (4.6)		2	7
2011	451 (3.8)			-1	471 (3.8)			3	447 (3.8)			-8	393 (5.2)			5
2007	453 (3.9)				468 (3.6)				455 (4.2)				388 (5.3)			
Lithuania																
2019	514 (3.0)	3	13 ▲	7	518 (2.9)	21 ▲	26 ▲	31 ▲	529 (3.0)	15 ▲	30 ▲	20 ▲	522 (3.1)	1	7	-3
2 2015	511 (2.8)		10 ▲	4	497 (3.3)		5	10 ▲	515 (3.1)		15 ▲	6	521 (2.7)		6	-4
1 2011	501 (2.5)			-6	492 (2.8)			5	500 (3.2)			-9 ▽	515 (2.8)			-10 ▽
1 2007	507 (2.8)				487 (2.9)				509 (3.1)				526 (2.9)			
Malaysia																
2019	458 (3.1)	-14 ▽	7	-36 ▽	456 (3.3)	-11 ▽	26 ▲	1	466 (3.7)	11 ▲	34 ▲	-8	457 (3.5)	5	27 ▲	-2
2015	472 (3.6)		21 ▲	-22 ▽	467 (3.4)		37 ▲	11	455 (3.9)		23 ▲	-19 ▽	451 (3.8)		22 ▲	-7
2011	451 (5.8)			-43 ▽	430 (5.2)			-26 ▽	432 (6.4)			-42 ▽	429 (5.4)			-30 ▽
2007	494 (5.5)				455 (4.9)				474 (6.3)				459 (5.0)			
Morocco																
Ψ 2019	377 (2.7)	-5	-2		370 (3.1)	-2	14 ▲		413 (2.2)	3	23 ▲		372 (2.4)	19 ▲	40 ▲	
Ж 2015	382 (2.1)		3		372 (2.3)		16 ▲		410 (3.0)		20 ▲		353 (2.9)		21 ▲	
Ж 2011	379 (2.5)				357 (2.6)				390 (2.5)				332 (1.9)			
New Zealand																
† 2019	483 (3.6)	-16 ▽	-9		464 (3.5)	-11 ▽	-8		477 (3.4)	-11 ▽	-6		496 (3.7)	-13 ▽	-18 ▽	
† 2015	500 (3.5)		7		475 (3.5)		3		488 (3.2)		5		509 (3.7)		-5	
2011	492 (6.0)				472 (5.6)				483 (5.6)				513 (6.9)			
Norway (9)																
† 2019	507 (2.3)	-21 ▽			477 (3.0)	6			502 (2.3)	4			518 (3.0)	-24 ▽		
2015	529 (2.6)				471 (2.7)				498 (2.5)				542 (3.2)			
Oman																
Ψ 2019	392 (3.0)	3	42 ▲	38 ▲	427 (3.0)	0	43 ▲	43 ▲	418 (3.2)	3	41 ▲	41 ▲	393 (2.9)	17 ▲	51 ▲	29 ▲
Ψ 2015	389 (2.6)		38 ▲	35 ▲	426 (2.7)		43 ▲	43 ▲	415 (2.8)		38 ▲	38 ▲	376 (3.0)		34 ▲	11 ▲
Ψ 2011	351 (2.9)			-4	383 (2.7)			0	377 (2.6)			0	342 (3.0)			-23 ▽
2007	354 (3.1)				384 (3.5)				377 (3.5)				365 (4.0)			
Qatar																
Ψ 2019	441 (4.0)	6	33 ▲		454 (4.0)	1	29 ▲		435 (4.0)	2	48 ▲		423 (4.7)	6	34 ▲	
Ψ 2015	435 (2.9)		27 ▲		452 (2.6)		27 ▲		433 (3.0)		45 ▲		417 (3.9)		27 ▲	
Ψ 2011	408 (3.6)				425 (2.8)				387 (3.4)				390 (3.6)			
Romania																
2019	478 (4.5)		30 ▲	23 ▲	490 (4.6)		13 ▲	10	472 (4.7)		19 ▲	9	458 (4.5)		29 ▲	42 ▲
2011	448 (4.2)			-7	477 (4.3)			-3	453 (4.5)			-10	429 (4.0)			13 ▲
2007	455 (3.9)				480 (5.0)				463 (4.4)				415 (4.6)			

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

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

Exhibit 3.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years◊

(Continued)

Country	Number				Algebra				Geometry				Data and Probability			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007		2015	2011	2007
Russian Federation																
2 2019	541 (4.6)	8	7	32 ▲	560 (5.0)	2	4	35 ▲	540 (5.2)	5	7	30 ▲	517 (4.7)	10	6	34 ▲
2015	533 (4.5)		-1	23 ▲	558 (5.2)		2	33 ▲	536 (5.6)		3	25 ▲	507 (5.0)		-4	24 ▲
2 2011	534 (3.4)			25 ▲	556 (3.8)			31 ▲	533 (4.0)			23 ▲	511 (4.0)			28 ▲
2007	510 (4.1)				525 (4.6)				510 (4.8)				483 (4.5)			
Singapore																
2 2019	611 (4.1)	-18 ▽	0	6	619 (4.6)	-4	4	28 ▲	619 (3.9)	2	10	29 ▲	620 (4.9)	3	13 ▲	31 ▲
2 2015	629 (3.2)		18 ▲	24 ▲	623 (3.4)		8	31 ▲	617 (3.5)		8	27 ▲	617 (3.4)		10	28 ▲
2 2011	611 (3.7)			6	614 (4.1)			23 ▲	609 (4.0)			19 ▲	607 (4.4)			18 ▲
2007	605 (3.8)				591 (4.0)				590 (4.1)				589 (5.2)			
Sweden																
2 2019	502 (2.4)	-11 ▽	-2	-3	496 (2.9)	14 ▲	37 ▲	37 ▲	495 (3.1)	17 ▲	39 ▲	23 ▲	513 (3.7)	1	9	-13 ▽
2015	513 (2.9)		9 ▲	7 ▲	482 (3.2)		23 ▲	23 ▲	478 (3.4)		22 ▲	5	512 (3.7)		8	-14 ▽
2011	504 (1.8)			-2	459 (2.2)			0	456 (2.3)			-17 ▽	504 (2.8)			-22 ▽
2007	505 (1.9)				459 (2.7)				472 (2.8)				526 (3.9)			
Turkey																
2019	493 (4.3)	46 ▲	58 ▲		493 (4.6)	34 ▲	38 ▲		490 (4.2)	27 ▲	35 ▲		502 (4.3)	36 ▲	35 ▲	
2015	447 (4.6)		13 ▲		459 (4.6)		4		463 (4.9)		8		467 (5.2)		-1	
2011	435 (4.0)				455 (4.3)				454 (4.4)				467 (4.0)			
United Arab Emirates																
2019	474 (1.9)	11 ▲	15 ▲		486 (2.1)	1	18 ▲		462 (2.1)	14 ▲	31 ▲		451 (2.1)	2	11 ▲	
2015	464 (1.9)		5		485 (2.0)		17 ▲		447 (2.4)		17 ▲		449 (2.5)		9 ▲	
2011	459 (2.3)				468 (2.2)				431 (2.4)				440 (2.4)			
United States																
† 2019	520 (4.5)	0	6	6	520 (5.4)	-5	8	13 ▲	499 (4.8)	-1	14 ▲	19 ▲	509 (5.4)	-13	-18 ▽	-23 ▽
† 2015	520 (3.1)		6	6	525 (3.1)		13 ▲	18 ▲	500 (3.2)		15 ▲	20 ▲	522 (3.5)		-5	-11 ▽
2 2011	514 (3.0)			0	512 (2.6)			5	485 (2.7)			5	527 (3.3)			-5
2 † 2007	514 (2.9)				507 (3.1)				480 (2.9)				533 (3.4)			
Benchmarking Participants																
Ontario, Canada																
2019	530 (4.3)	1	12 ▲	2	515 (4.4)	7	18 ▲	19 ▲	536 (4.8)	12 ▲	24 ▲	25 ▲	542 (5.2)	10	11	-6
2015	530 (3.0)		11 ▲	2	507 (3.0)		11 ▲	11 ▲	524 (3.5)		12 ▲	13 ▲	531 (3.9)		0	-16 ▽
2 2011	519 (2.8)			-9	497 (2.4)			1	512 (2.8)			1	531 (4.2)			-17 ▽
2 2007	528 (4.2)				496 (3.9)				510 (4.5)				547 (5.1)			
Quebec, Canada																
‡ 2019	544 (3.9)	-13 ▽	1	6	531 (4.0)	0	15 ▲	19 ▲	549 (4.4)	9	21 ▲	22 ▲	554 (4.5)	8	6	14 ▲
≡ 2015	557 (4.3)		14 ▲	19 ▲	530 (4.4)		15 ▲	18 ▲	540 (4.3)		12 ▲	13 ▲	546 (5.0)		-2	6
2011	543 (2.4)			5	516 (2.9)			4	529 (2.6)			1	549 (3.0)			8
3 2007	537 (3.7)				512 (3.6)				527 (3.5)				540 (3.8)			
Abu Dhabi, UAE																
Ψ 2019	439 (3.0)	-3	-13 ▽		448 (3.2)	-14 ▽	-11 ▽		420 (3.4)	-6	-5		411 (3.1)	-15 ▽	-24 ▽	
2015	443 (4.4)		-10		462 (4.5)		3		425 (5.4)		1		426 (5.5)		-8	
2011	452 (4.0)				459 (3.9)				424 (4.5)				434 (4.3)			
Dubai, UAE																
2 2019	537 (2.1)	28 ▲	57 ▲	78 ▲	547 (2.4)	19 ▲	58 ▲	71 ▲	527 (2.6)	31 ▲	74 ▲	82 ▲	525 (2.7)	22 ▲	58 ▲	81 ▲
2015	509 (2.5)		29 ▲	50 ▲	528 (2.7)		40 ▲	53 ▲	496 (2.6)		44 ▲	51 ▲	504 (3.0)		36 ▲	59 ▲
2011	479 (2.4)			21 ▲	489 (2.4)			13 ▲	453 (3.1)			7	468 (2.9)			23 ▲
‡ 2007	458 (3.3)				476 (2.6)				445 (3.6)				444 (3.5)			

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

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

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

Average Achievement in Content Domains by Gender

Exhibit 3.16 shows the differences in average achievement between girls and boys in the four mathematics content domains. Boys had a substantial advantage in number (as they did at fourth grade) and girls did in algebra. In the number content domain, girls had higher average achievement than boys in only 4 countries, and boys had higher average achievement in 14 countries. In algebra, girls had higher average achievement than boys in 16 countries, and in no country did boys have higher average achievement. In geometry, girls had higher average achievement than boys in 7 countries, and boys had higher average achievement in 3 countries. In data and probability, girls had higher average achievement than boys in 7 countries, and boys had higher average achievement in 9 countries.

Exhibit 3.16: Average Achievement in Mathematics Content Domains by Gender

Country	Number (63 Items)		Algebra (61 Items)		Geometry (43 Items)		Data and Probability (39 Items)	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Australia	515 (3.7)	528 (5.7) ▲	502 (4.1)	501 (5.9)	510 (3.9)	517 (5.8)	532 (3.8)	534 (5.7)
Bahrain	482 (3.1) ▲	464 (2.9)	497 (3.0) ▲	473 (2.8)	503 (3.2) ▲	484 (2.7)	482 (3.1) ▲	449 (3.0)
Ψ Chile	435 (4.2)	448 (3.9) ▲	436 (3.8)	441 (4.3)	431 (5.5)	438 (5.0)	426 (4.4)	442 (4.8) ▲
Chinese Taipei	612 (3.3)	614 (3.5)	623 (3.0) ▲	613 (3.4)	623 (3.2)	623 (3.7)	593 (3.7)	594 (3.4)
Cyprus	495 (3.1)	504 (3.1)	523 (3.7) ▲	507 (2.7)	494 (4.3)	486 (2.8)	494 (3.9)	493 (3.3)
2 Ψ Egypt	419 (5.7)	407 (8.0)	422 (6.3) ▲	401 (8.7)	422 (5.4)	411 (8.2)	390 (5.8) ▲	368 (8.2)
England	513 (5.6)	526 (7.4)	507 (6.5)	500 (7.8)	510 (5.8)	507 (7.2)	523 (6.6)	523 (8.3)
Finland	512 (2.8)	517 (3.1)	495 (3.2) ▲	483 (3.6)	517 (3.7) ▲	504 (3.8)	517 (3.6)	511 (4.4)
France	468 (2.7)	485 (3.3) ▲	468 (3.3)	468 (3.0)	490 (3.4)	496 (3.7)	490 (2.9)	500 (3.5) ▲
1 Georgia	459 (4.5)	473 (6.1) ▲	472 (5.2)	474 (5.5)	447 (4.6)	450 (5.7)	424 (5.7)	435 (6.2)
† Hong Kong SAR	570 (5.0)	569 (5.5)	588 (4.8)	580 (5.3)	602 (5.6)	591 (6.0)	571 (6.4) ▲	555 (7.0)
Hungary	506 (3.8)	525 (3.9) ▲	506 (3.4)	512 (3.8)	514 (3.8)	529 (3.8) ▲	511 (3.4)	531 (4.0) ▲
Iran, Islamic Rep. of	444 (5.5)	440 (6.2)	465 (5.1) ▲	437 (5.8)	450 (5.5) ▲	434 (6.3)	438 (5.1)	433 (6.6)
Ireland	538 (3.4)	544 (4.0)	510 (3.1) ▲	501 (3.7)	504 (3.5)	508 (3.6)	541 (3.6)	540 (4.6)
3 Israel	511 (4.3)	527 (5.2) ▲	526 (5.0)	530 (6.5)	500 (5.1)	513 (5.9) ▲	503 (4.9)	520 (5.9) ▲
Italy	485 (2.7)	505 (3.0) ▲	488 (2.9)	494 (3.6)	506 (4.0)	513 (4.7)	487 (4.0)	501 (4.5) ▲
Japan	573 (3.7)	583 (4.0) ▲	605 (2.9)	600 (4.1)	609 (3.4)	611 (4.0)	592 (2.7)	597 (3.0)
Ψ Jordan	416 (4.0) ▲	401 (6.8)	460 (4.2) ▲	425 (7.1)	425 (5.3) ▲	402 (6.6)	408 (4.0) ▲	385 (6.3)
2 Kazakhstan	483 (4.2)	481 (3.8)	508 (4.2) ▲	499 (4.2)	489 (4.9)	483 (4.1)	462 (4.1)	463 (4.0)
Korea, Rep. of	602 (3.3)	608 (3.2)	611 (4.2)	608 (4.0)	613 (3.9)	621 (3.3)	594 (3.5)	601 (3.0)
Ψ Kuwait	- -	- -	- -	- -	- -	- -	- -	- -
Lebanon	427 (3.2)	436 (3.2) ▲	453 (3.7)	451 (3.6)	420 (3.7)	424 (3.7)	378 (4.5)	388 (4.1) ▲
Lithuania	512 (3.0)	517 (3.7)	520 (3.2)	516 (3.5)	530 (3.8)	529 (4.0)	518 (3.3)	526 (3.9) ▲
Malaysia	460 (3.0)	455 (4.0)	461 (3.0) ▲	451 (4.5)	470 (3.6)	462 (4.8)	464 (3.7) ▲	449 (4.6)
Ψ Morocco	374 (2.8)	381 (3.1) ▲	373 (3.3)	367 (4.5)	407 (2.6)	419 (2.8) ▲	370 (3.7)	375 (2.9)
† New Zealand	477 (3.8)	489 (5.1) ▲	464 (4.1)	464 (5.2)	474 (4.1)	479 (5.1)	492 (3.9)	499 (5.5)
† Norway (9)	503 (2.9)	512 (3.1) ▲	481 (3.5)	474 (3.6)	505 (2.7)	499 (3.2)	518 (3.4)	518 (3.6)
Ψ Oman	411 (3.3) ▲	375 (4.7)	452 (3.3) ▲	403 (4.8)	435 (3.9) ▲	402 (5.1)	418 (3.4) ▲	370 (4.5)
Portugal	483 (3.6)	502 (4.2) ▲	500 (3.8)	498 (4.5)	506 (3.6)	512 (4.2)	487 (3.3)	508 (3.9) ▲
Ψ Qatar	442 (5.1)	440 (5.4)	462 (4.9) ▲	446 (5.4)	440 (5.7)	430 (5.7)	425 (5.9)	422 (6.0)
Romania	484 (4.7) ▲	472 (5.0)	503 (5.2) ▲	477 (5.0)	480 (5.4) ▲	464 (5.5)	464 (5.0) ▲	451 (4.8)
2 Russian Federation	535 (5.0)	547 (5.1) ▲	563 (5.4)	557 (5.3)	538 (5.5)	543 (5.7)	509 (5.2)	525 (5.2) ▲
2 Ψ Saudi Arabia	- -	- -	- -	- -	- -	- -	- -	- -
2 Singapore	611 (4.5)	611 (4.8)	623 (5.1)	615 (5.3)	620 (4.7)	618 (4.4)	623 (5.4)	618 (5.3)
Ж South Africa (9)	- -	- -	- -	- -	- -	- -	- -	- -
2 Sweden	500 (2.8)	504 (3.2)	499 (3.7)	492 (3.2)	500 (4.0)	491 (3.6)	514 (4.8)	512 (4.0)
Turkey	496 (4.7)	490 (5.8)	503 (5.0) ▲	482 (6.3)	496 (4.6) ▲	483 (5.7)	506 (4.7)	498 (5.8)
United Arab Emirates	473 (3.4)	475 (3.3)	493 (3.6) ▲	480 (3.5)	465 (3.7)	459 (3.8)	455 (3.8)	447 (3.6)
† United States	518 (3.7)	522 (5.7)	528 (4.5) ▲	512 (6.8)	500 (4.1)	499 (6.1)	510 (4.4)	509 (7.0)
International Average	**493 (0.7)**	**497 (0.8) ▲**	**503 (0.7) ▲**	**493 (0.8)**	**499 (0.7) ▲**	**495 (0.8)**	**490 (0.7)**	**489 (0.8)**
Benchmarking Participants								
Ontario, Canada	527 (4.3)	533 (4.9)	515 (4.7)	515 (4.7)	535 (5.0)	537 (5.8)	540 (5.2)	543 (6.0)
‡ Quebec, Canada	540 (4.4)	548 (4.7)	529 (4.9)	532 (4.5)	548 (5.0)	550 (4.8)	553 (4.7)	556 (5.7)
Moscow City, Russian Fed.	562 (4.8)	585 (5.1) ▲	588 (4.3)	597 (4.8) ▲	558 (5.3)	572 (5.2) ▲	551 (4.7)	577 (4.8) ▲
Ψ Gauteng, RSA (9)	422 (3.6)	419 (3.6)	437 (4.3) ▲	424 (3.7)	407 (4.0)	406 (3.9)	408 (3.9)	403 (3.7)
Ψ Western Cape, RSA (9)	438 (6.1)	453 (6.0) ▲	449 (5.7)	454 (5.9)	420 (6.0)	435 (6.1) ▲	421 (5.7)	431 (6.0)
Ψ Abu Dhabi, UAE	441 (5.3)	438 (4.6)	457 (5.6) ▲	440 (4.6)	426 (5.8)	414 (5.1)	418 (5.9)	404 (4.9)
2 Dubai, UAE	529 (4.9)	544 (5.9)	546 (5.2)	548 (6.0)	522 (5.3)	532 (6.4)	521 (5.4)	530 (6.5)

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 eighth grade mathematics items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

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

Average Achievement in Cognitive Domains

Exhibit 3.17 shows countries' average achievement in the knowing, applying, and reasoning cognitive domains relative to their overall average achievement (from highest to lowest overall average achievement). Interestingly, fewer countries had a relative strength in the knowing and applying cognitive domains than they did in the reasoning domain. More countries had a weakness in the knowing domain than in the applying and reasoning domains. Eight countries had a relative strength in the knowing cognitive domain, and 17 had a relative weakness. Six countries had a relative strength in the applying cognitive domain, and 14 had a relative weakness. Sixteen countries had a relative strength in the reasoning cognitive domain, and 9 had a relative weakness. Kazakhstan was the only country with no relative strengths or weaknesses in the cognitive domains.

Exhibit 3.17: Average Achievement in Mathematics Cognitive Domains

Country	Overall Mathematics Average Scale Score	Knowing (64 Items)		Applying (96 Items)		Reasoning (46 Items)	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
[2] Singapore	616 (4.0)	614 (4.3)	-1 (1.4)	614 (3.8)	-2 (0.7) ▽	620 (4.5)	4 (1.0) ▲
Chinese Taipei	612 (2.7)	616 (3.0)	3 (1.5) ▲	610 (2.6)	-3 (1.8)	616 (2.7)	4 (1.9)
Korea, Rep. of	607 (2.8)	614 (3.2)	7 (1.2) ▲	604 (2.7)	-3 (1.2) ▽	609 (3.0)	2 (2.4)
Japan	594 (2.7)	589 (3.1)	-5 (1.2) ▽	596 (2.8)	2 (1.2)	599 (3.2)	5 (1.7) ▲
† Hong Kong SAR	578 (4.1)	580 (4.0)	2 (1.6)	575 (4.0)	-3 (1.1) ▽	582 (4.4)	4 (1.9)
[2] Russian Federation	543 (4.5)	550 (5.2)	6 (2.0) ▲	543 (4.5)	-1 (1.0)	536 (4.8)	-7 (1.7) ▽
Ireland	524 (2.6)	530 (2.8)	7 (1.5) ▲	526 (2.7)	3 (0.9) ▲	508 (3.4)	-16 (1.8) ▽
Lithuania	520 (2.9)	518 (2.8)	-2 (1.1)	524 (3.1)	3 (1.2) ▲	514 (3.6)	-7 (1.5) ▽
[3] Israel	519 (4.3)	516 (4.8)	-3 (1.2) ▽	519 (4.2)	0 (0.8)	525 (4.7)	6 (1.9) ▲
Australia	517 (3.8)	511 (4.0)	-7 (1.2) ▽	521 (3.8)	4 (0.7) ▲	515 (3.9)	-3 (0.8) ▽
Hungary	517 (2.9)	516 (3.1)	-1 (1.0)	517 (3.0)	0 (1.1)	512 (3.0)	-4 (1.3) ▽
† United States	515 (4.8)	522 (5.2)	6 (1.4) ▲	515 (4.9)	0 (0.8)	507 (4.6)	-8 (1.0) ▽
England	515 (5.3)	510 (5.5)	-5 (2.1) ▽	518 (5.3)	3 (1.1) ▲	512 (5.7)	-3 (1.8)
Finland	509 (2.6)	505 (2.5)	-4 (1.1) ▽	510 (2.7)	2 (0.9)	506 (2.9)	-3 (1.5)
† Norway (9)	503 (2.4)	499 (2.3)	-4 (1.6) ▽	504 (2.7)	1 (1.3)	496 (2.8)	-7 (1.9) ▽
[2] Sweden	503 (2.5)	496 (2.6)	-7 (1.6) ▽	501 (2.6)	-1 (1.0)	514 (2.9)	11 (1.3) ▲
Cyprus	501 (1.6)	509 (2.0)	8 (1.6) ▲	496 (1.7)	-5 (1.3) ▽	505 (2.1)	4 (1.3) ▲
Portugal	500 (3.2)	498 (3.5)	-2 (2.0)	497 (3.3)	-4 (1.2) ▽	508 (3.3)	7 (2.2) ▲
Italy	497 (2.7)	492 (2.8)	-5 (2.1) ▽	497 (2.4)	-1 (1.5)	505 (3.6)	7 (1.8) ▲
Turkey	496 (4.3)	494 (5.0)	-1 (1.8)	491 (4.0)	-4 (1.6) ▽	504 (4.1)	8 (1.8) ▲
[2] Kazakhstan	488 (3.3)	488 (3.7)	1 (1.4)	486 (3.2)	-1 (0.8)	487 (3.4)	0 (1.0)
France	483 (2.5)	473 (2.8)	-9 (1.6) ▽	485 (2.6)	2 (1.6)	489 (2.7)	6 (1.5) ▲
† New Zealand	482 (3.4)	468 (3.5)	-14 (2.0) ▽	486 (3.1)	5 (1.1) ▲	486 (3.4)	5 (0.9) ▲
Bahrain	481 (1.7)	471 (1.7)	-10 (0.8) ▽	479 (1.7)	-2 (0.9) ▽	489 (2.1)	8 (1.3) ▲
Romania	479 (4.3)	482 (5.0)	3 (2.0)	475 (4.1)	-4 (1.1) ▽	481 (4.5)	2 (1.4)
United Arab Emirates	473 (1.9)	478 (1.9)	5 (0.8) ▲	466 (1.8)	-8 (0.7) ▽	479 (1.9)	6 (0.9) ▲
[1] Georgia	461 (4.3)	- -	- -	- -	- -	- -	- -
Malaysia	461 (3.2)	451 (3.8)	-9 (1.5) ▽	464 (3.1)	3 (0.9) ▲	462 (3.1)	1 (1.1)
Iran, Islamic Rep. of	446 (3.7)	441 (4.2)	-6 (1.1) ▽	443 (3.5)	-4 (1.1) ▽	457 (4.0)	11 (1.6) ▲
Ψ Qatar	443 (4.0)	443 (4.6)	-1 (1.8)	438 (4.1)	-6 (0.9) ▽	448 (3.8)	4 (1.3) ▲
Ψ Chile	441 (2.8)	434 (3.0)	-7 (1.3) ▽	438 (2.9)	-3 (1.5)	451 (3.2)	10 (2.0) ▲
Lebanon	429 (2.9)	456 (2.9)	26 (1.5) ▲	412 (3.5)	-18 (1.7) ▽	407 (3.7)	-22 (2.4) ▽
Ψ Jordan	420 (4.3)	414 (5.0)	-7 (1.8) ▽	415 (4.0)	-5 (1.1) ▽	431 (4.4)	11 (1.5) ▲
[2] Ψ Egypt	413 (5.2)	416 (5.8)	3 (1.6)	405 (5.3)	-7 (1.6) ▽	411 (5.6)	-2 (1.4)
Ψ Oman	411 (2.8)	406 (2.8)	-4 (1.1) ▽	409 (2.5)	-2 (1.0)	412 (2.8)	1 (1.0)
Ψ Kuwait	403 (5.0)	- -	- -	- -	- -	- -	- -
[2] Ψ Saudi Arabia	394 (2.5)	- -	- -	- -	- -	- -	- -
Ж South Africa (9)	389 (2.3)	- -	- -	- -	- -	- -	- -
Ψ Morocco	388 (2.3)	382 (2.9)	-6 (1.6) ▽	389 (2.4)	0 (1.3)	381 (2.9)	-7 (2.2) ▽
Benchmarking Participants							
Moscow City, Russian Fed.	575 (4.2)	589 (4.2)	14 (1.6) ▲	574 (4.3)	-1 (1.4)	568 (4.2)	-8 (1.4) ▽
‡ Quebec, Canada	543 (3.7)	546 (3.8)	2 (1.9)	544 (4.1)	1 (1.5)	538 (3.8)	-5 (1.0) ▽
[2] Dubai, UAE	537 (2.0)	540 (2.2)	3 (1.1) ▲	532 (2.2)	-4 (1.0) ▽	541 (2.1)	5 (1.1) ▲
Ontario, Canada	530 (4.3)	518 (4.2)	-12 (1.9) ▽	531 (4.5)	1 (1.3)	540 (4.6)	11 (2.3) ▲
Ψ Western Cape, RSA (9)	441 (4.4)	432 (5.9)	-9 (2.3) ▽	442 (4.1)	1 (1.7)	444 (4.8)	3 (2.4)
Ψ Abu Dhabi, UAE	436 (2.9)	440 (3.2)	5 (1.5) ▲	428 (2.9)	-8 (1.3) ▽	441 (2.8)	6 (0.8) ▲
Ψ Gauteng, RSA (9)	421 (3.0)	411 (3.6)	-9 (1.2) ▽	423 (3.3)	2 (2.1)	427 (3.4)	6 (2.5) ▲

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

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

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

Trends in Average Achievement in Cognitive Domains

Exhibit 3.18 presents differences in average achievement for the three cognitive domains across four assessment cycles back to 2007, when TIMSS first began providing scaled results in the cognitive domains. Trends for countries with comparable data between assessment cycles show more countries have had increases than decreases in average achievement in each of the cognitive domains. Twenty-nine countries had comparable data in the TIMSS 2015 and TIMSS 2019 assessments for the cognitive domains. The recent trends in the knowing cognitive domain showed increases in 9 countries and decreases in 4 countries. In the applying domain, 9 countries showed increases and 3 showed decreases. In the reasoning domain, 13 showed increases and 3 showed decreases.

Between 2007 and 2019, in the knowing, applying, and reasoning domains, there were increases in average achievement in 14 countries, 14 countries, and 16 countries, respectively. There were decreases in average achievement in only 1 country in knowing and reasoning, and 2 countries in applying.

Exhibit 3.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

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

Country	Knowing				Applying				Reasoning			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Australia												
2019	511 (4.0)	6	7	21 ▲	521 (3.8)	19 ▲	15 ▲	23 ▲	515 (3.9)	3	9	12 ▲
2015	504 (3.1)		0	15 ▲	502 (3.0)		-4	4	512 (3.1)		6	9
2011	504 (5.2)			14 ▲	506 (4.9)			8	506 (5.2)			3
2007	490 (3.9)				498 (3.8)				503 (4.0)			
Bahrain												
2019	471 (1.7)	8 ▲	60 ▲	82 ▲	479 (1.7)	34 ▲	79 ▲	79 ▲	489 (2.1)	38 ▲	75 ▲	83 ▲
2015	463 (2.3)		52 ▲	74 ▲	445 (1.7)		45 ▲	45 ▲	452 (2.2)		37 ▲	46 ▲
Ψ 2011	411 (2.4)			23 ▲	400 (2.4)			0	415 (2.1)			9 ▲
2007	389 (1.8)				400 (2.4)				406 (2.4)			
Chile												
Ψ 2019	434 (3.0)	11 ▲	28 ▲		438 (2.9)	11 ▲	13 ▲		451 (3.2)	19 ▲	29 ▲	
Ψ 2015	423 (3.4)		17 ▲		427 (3.3)		2		432 (3.3)		10 ▲	
2011	405 (2.9)				425 (2.6)				422 (2.9)			
Chinese Taipei												
2019	616 (3.0)	18 ▲	5	12 ▲	610 (2.6)	8 ▲	-5	13 ▲	616 (2.7)	14 ▲	7	14 ▲
2015	598 (2.9)		-13 ▽	-6	602 (2.5)		-12 ▽	5	602 (2.5)		-7	0
2011	611 (3.6)			7	614 (3.4)			17 ▲	609 (3.4)			7
2007	604 (5.0)				597 (4.8)				602 (4.4)			
Cyprus												
2019	509 (2.0)			45 ▲	496 (1.7)			31 ▲	505 (2.1)			47 ▲
2007	464 (1.8)				465 (2.0)				458 (2.6)			
Egypt												
2 Ψ 2019	416 (5.8)	17 ▲		31 ▲	405 (5.3)	21 ▲		14 ▲	411 (5.6)	32 ▲		25 ▲
Ψ 2015	399 (4.3)			14 ▲	385 (3.9)			-6	379 (4.3)			-7
2007	385 (3.7)				391 (3.9)				386 (3.7)			
England												
2019	510 (5.5)	-3	9	3	518 (5.3)	-1	10	4	512 (5.7)	-10	2	-6
2015	513 (4.1)		12	5	519 (4.1)		11	6	522 (4.4)		12	4
‡ 2011	501 (5.5)			-6	508 (5.6)			-5	510 (5.6)			-8
† 2007	508 (4.7)				514 (5.1)				518 (5.1)			
Finland												
2019	505 (2.5)		-3		510 (2.7)		-10 ▽		506 (2.9)		-5	
2011	508 (2.4)				520 (2.5)				512 (2.7)			
Hong Kong SAR												
† 2019	580 (4.0)	-20 ▽	-11	-3	575 (4.0)	-20 ▽	-12 ▽	3	582 (4.4)	-9	2	15 ▲
2015	600 (5.1)		9	17 ▲	595 (4.5)		8	23 ▲	591 (5.1)		11	24 ▲
2011	591 (4.1)			8	587 (3.8)			15 ▲	580 (4.0)			13
† 2007	583 (6.0)				572 (6.2)				567 (6.1)			
Hungary												
2019	516 (3.1)	5	9	-6	517 (3.0)	1	12 ▲	3	512 (3.0)	-3	10 ▲	-2
2015	511 (3.9)		4	-10	516 (3.8)		11 ▲	3	515 (3.9)		13 ▲	0
2011	507 (3.9)			-15 ▽	505 (3.6)			-9	502 (3.8)			-13 ▽
2007	522 (3.7)				513 (3.5)				515 (3.7)			
Iran, Islamic Rep. of												
2019	441 (4.2)	5	30 ▲	43 ▲	443 (3.5)	8	31 ▲	43 ▲	457 (4.0)	21 ▲	29 ▲	40 ▲
Ψ 2015	435 (4.9)		25 ▲	38 ▲	434 (4.4)		23 ▲	35 ▲	436 (4.7)		8	19 ▲
Ψ 2011	410 (4.4)			13 ▲	411 (4.6)			12	428 (4.3)			11
2007	397 (4.3)				399 (4.4)				417 (3.9)			
Ireland												
2019	530 (2.8)	3			526 (2.7)	6			508 (3.4)	-13 ▽		
2015	527 (3.0)				520 (3.0)				521 (3.1)			
Israel												
3 2019	516 (4.8)	5	0		519 (4.2)	7	6		525 (4.7)	15 ▲	5	
3 2015	511 (4.2)		-5		512 (4.0)		-1		510 (4.4)		-10	
3 2011	516 (4.2)				513 (4.4)				520 (4.2)			

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

◊ Trend reporting in cognitive domains using current methodology began with TIMSS 2007.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 3.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

Country	Knowing				Applying				Reasoning			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Italy												
2019	492 (2.8)	4	-2	19 ▲	497 (2.4)	2	-6	14 ▲	505 (3.6)	5	8	22 ▲
2 2015	489 (2.7)		-5	15 ▲	495 (2.6)		-8 ▽	13 ▲	500 (2.8)		4	18 ▲
2011	494 (2.7)			20 ▲	503 (2.3)			20 ▲	496 (2.6)			14 ▲
2007	474 (3.4)				482 (3.0)				482 (3.4)			
Japan												
2019	589 (3.1)	11 ▲	31 ▲	20 ▲	596 (2.8)	5	22 ▲	28 ▲	599 (3.2)	8 ▲	20 ▲	22 ▲
2015	578 (2.6)		20 ▲	9 ▲	592 (2.3)		17 ▲	23 ▲	591 (2.6)		12 ▲	14 ▲
2011	558 (2.8)			-11 ▽	574 (2.5)			6	579 (3.0)			2
2007	569 (2.9)				568 (2.3)				577 (2.6)			
Jordan												
Ψ 2019	414 (5.0)	23 ▲	9	-12	415 (4.0)	37 ▲	18 ▲	-6	431 (4.4)	51 ▲	16 ▲	-3
Ж 2015	391 (3.2)		-14 ▽	-35 ▽	378 (3.2)		-19 ▽	-43 ▽	380 (3.3)		-36 ▽	-55 ▽
Ψ 2011	405 (4.2)			-20 ▽	397 (3.7)			-24 ▽	416 (4.0)			-19 ▽
2007	425 (4.5)				421 (4.5)				434 (4.1)			
Kazakhstan												
2 2019	488 (3.7)		-1		486 (3.2)		2		487 (3.4)		5	
2011	489 (4.4)				484 (4.3)				482 (4.9)			
Korea, Rep. of												
2019	614 (3.2)	7	-2	6	604 (2.7)	-2	-12 ▽	4	609 (3.0)	1	-3	17 ▲
2015	607 (2.8)		-9 ▽	-1	606 (2.8)		-10 ▽	6	608 (2.7)		-5	15 ▲
2011	616 (3.1)			8	617 (2.8)			16 ▲	612 (2.6)			20 ▲
2007	608 (3.1)				600 (2.8)				592 (2.5)			
Lebanon												
2019	456 (2.9)	0	-8	-1	412 (3.5)	-27 ▽	-24 ▽	-35 ▽	407 (3.7)	1	-19 ▽	-16 ▽
2015	456 (3.8)		-8	-1	439 (3.9)		3	-8	406 (4.5)		-20 ▽	-17 ▽
2011	464 (3.9)			7	436 (4.1)			-11	426 (4.6)			3
2007	457 (4.2)				447 (4.5)				423 (4.7)			
Lithuania												
2019	518 (2.8)	16 ▲	17 ▲	9 ▲	524 (3.1)	4	16 ▲	13 ▲	514 (3.6)	13 ▲	21 ▲	27 ▲
2 2015	502 (3.1)		0	-7	520 (2.6)		12 ▲	9 ▲	501 (3.0)		9 ▲	14 ▲
1 2011	502 (2.6)			-8 ▽	508 (2.4)			-3	493 (2.6)			6
1 2007	509 (2.7)				511 (2.5)				487 (2.8)			
Malaysia												
2019	451 (3.8)	-21 ▽	7	-22 ▽	464 (3.1)	0	25 ▲	-13 ▽	462 (3.1)	9	35 ▲	-4
2015	472 (3.8)		28 ▲	-1	463 (3.6)		24 ▲	-14 ▽	453 (3.7)		27 ▲	-13 ▽
2011	444 (5.8)			-29 ▽	439 (5.3)			-38 ▽	426 (5.6)			-40 ▽
2007	473 (5.4)				477 (5.2)				466 (4.6)			
Morocco												
Ψ 2019	382 (2.9)	0	19 ▲		389 (2.4)	3	11 ▲		381 (2.9)	7	24 ▲	
Ж 2015	382 (2.4)		19 ▲		385 (2.2)		7 ▲		374 (2.8)		17 ▲	
Ж 2011	363 (2.3)				378 (2.0)				357 (2.8)			
New Zealand												
† 2019	468 (3.5)	-20 ▽	-13 ▽		486 (3.1)	-7	-5		486 (3.4)	-12 ▽	-7	
† 2015	488 (3.4)		7		493 (3.3)		2		499 (3.5)		5	
2011	481 (5.7)				491 (5.2)				494 (5.5)			
Norway (9)												
† 2019	499 (2.3)	-1			504 (2.7)	-13 ▽			496 (2.8)	-20 ▽		
2015	500 (2.3)				516 (2.3)				516 (2.5)			
Oman												
Ψ 2019	406 (2.8)	5	42 ▲	41 ▲	409 (2.5)	8 ▲	49 ▲	44 ▲	412 (2.8)	10 ▲	43 ▲	23 ▲
Ψ 2015	401 (3.1)		37 ▲	36 ▲	401 (2.5)		41 ▲	36 ▲	402 (3.1)		33 ▲	14 ▲
Ψ 2011	365 (3.0)			-1	360 (3.0)			-5	369 (3.0)			-20 ▽
2007	366 (3.6)				365 (3.1)				389 (3.1)			
Qatar												
Ψ 2019	443 (4.6)	3	25 ▲		438 (4.1)	3	41 ▲		448 (3.8)	16 ▲	41 ▲	
Ψ 2015	440 (3.1)		22 ▲		435 (2.9)		39 ▲		431 (2.8)		25 ▲	
Ψ 2011	418 (3.0)				396 (3.4)				406 (3.6)			
Romania												
2019	482 (5.0)		22 ▲	18 ▲	475 (4.1)		22 ▲	14 ▲	481 (4.5)		25 ▲	36 ▲
2011	460 (4.5)			-4	454 (4.0)			-7	455 (4.2)			11
2007	464 (4.5)				461 (4.2)				445 (4.9)			

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

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

Exhibit 3.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years◊

(Continued)

Country	Knowing				Applying				Reasoning			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Russian Federation												
2 2019	550 (5.2)	7	1	29 ▲	543 (4.5)	2	5	33 ▲	536 (4.8)	9	5	37 ▲
2015	543 (5.6)		-5	22 ▲	541 (4.6)		3	31 ▲	528 (5.0)		-4	28 ▲
2 2011	548 (3.8)			28 ▲	538 (3.6)			28 ▲	531 (3.8)			32 ▲
2007	521 (4.5)				510 (3.9)				499 (4.0)			
Singapore												
2 2019	614 (4.3)	-19 ▽	-3	22 ▲	614 (3.8)	-5	1	17 ▲	620 (4.5)	4	16 ▲	31 ▲
2 2015	633 (3.4)		16 ▲	41 ▲	619 (3.2)		7	22 ▲	616 (3.7)		12 ▲	27 ▲
2 2011	617 (3.9)			25 ▲	613 (4.0)			16 ▲	604 (4.3)			15 ▲
2007	592 (3.7)				597 (3.9)				589 (4.5)			
Sweden												
2 2019	496 (2.6)	12 ▲	18 ▲	16 ▲	501 (2.6)	-6	12 ▲	6	514 (2.9)	4	36 ▲	21 ▲
2015	484 (2.8)		7	4	507 (2.8)		17 ▲	12 ▲	509 (3.5)		32 ▲	17 ▲
2011	478 (2.0)			-2	489 (2.2)			-6	478 (2.4)			-15 ▽
2007	480 (2.2)				495 (2.2)				493 (2.8)			
Turkey												
2019	494 (5.0)	47 ▲	54 ▲		491 (4.0)	32 ▲	33 ▲		504 (4.1)	32 ▲	39 ▲	
2015	447 (4.9)		7		460 (4.3)		1		472 (4.8)		7	
2011	441 (4.2)				459 (4.0)				465 (3.7)			
United Arab Emirates												
2019	478 (1.9)	3	11 ▲		466 (1.8)	8 ▲	24 ▲		479 (1.9)	18 ▲	30 ▲	
2015	476 (2.2)		9 ▲		457 (2.1)		16 ▲		461 (2.2)		12 ▲	
2011	467 (2.2)				442 (2.3)				449 (2.2)			
United States												
† 2019	522 (5.2)	-6	3	5	515 (4.9)	0	12 ▲	13 ▲	507 (4.6)	-7	4	1
† 2015	528 (3.5)		9 ▲	11 ▲	515 (3.2)		12 ▲	13 ▲	514 (3.1)		11 ▲	8
2 2011	519 (2.7)			2	503 (2.9)			1	503 (2.7)			-3
2 † 2007	517 (2.9)				502 (3.1)				506 (2.8)			
Benchmarking Participants												
Ontario, Canada												
2019	518 (4.2)	5	15 ▲	9	531 (4.5)	8	21 ▲	13 ▲	540 (4.6)	6	16 ▲	15 ▲
2015	513 (3.0)		10 ▲	4	522 (2.8)		12 ▲	4	534 (3.1)		10 ▲	9
2 2011	503 (2.6)			-6	510 (2.3)			-8	524 (2.7)			-1
2 2007	509 (3.6)				518 (4.0)				526 (3.8)			
Quebec, Canada												
‡ 2019	546 (3.8)	5	18 ▲	21 ▲	544 (4.1)	-2	9	15 ▲	538 (3.8)	0	9	9
≡ 2015	541 (4.2)		13 ▲	16 ▲	546 (4.0)		11 ▲	17 ▲	538 (4.2)		9	10
2011	528 (2.9)			4	536 (2.7)			6	529 (2.7)			1
3 2007	524 (3.1)				529 (3.3)				528 (3.5)			
Abu Dhabi, UAE												
Ψ 2019	440 (3.2)	-13 ▽	-19 ▽		428 (2.9)	-6	-6		441 (2.8)	1	-1	
2015	453 (4.8)		-6		434 (4.7)		-1		440 (4.7)		-2	
2011	459 (3.8)				434 (4.3)				442 (4.2)			
Dubai, UAE												
2 2019	540 (2.2)	19 ▲	52 ▲	75 ▲	532 (2.2)	27 ▲	67 ▲	78 ▲	541 (2.1)	32 ▲	72 ▲	82 ▲
2015	521 (2.3)		33 ▲	56 ▲	505 (2.5)		40 ▲	51 ▲	509 (2.8)		40 ▲	50 ▲
2011	488 (2.4)			23 ▲	465 (2.5)			11 ▲	470 (2.7)			10 ▲
‡ 2007	465 (2.6)				454 (3.2)				460 (3.0)			

▲ Average from more recent year significantly higher

▽ Average from more recent year significantly lower

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

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

Exhibit 3.19 shows the differences between girls' and boys' average achievement in the cognitive domains of knowing, applying, and reasoning. In the knowing domain, girls had higher average achievement than boys in 8 countries, and boys had higher achievement than girls in 5 countries. In the applying domain, girls had higher average achievement than boys in 5 countries, and boys had higher average achievement than girls in 8 countries. In reasoning, girls had higher average achievement than boys in 8 countries compared with 3 countries where boys had higher average achievement.

Exhibit 3.19: Average Achievement in Mathematics Cognitive Domains by Gender

Country	Knowing (64 Items)		Applying (96 Items)		Reasoning (46 Items)	
	Girls	Boys	Girls	Boys	Girls	Boys
Australia	509 (3.7)	513 (5.8)	519 (3.6)	524 (5.6)	512 (4.0)	517 (5.7)
Bahrain	484 (2.8) ▲	459 (2.2)	489 (2.7) ▲	469 (2.2)	501 (2.9) ▲	478 (2.5)
Ψ Chile	428 (3.8)	439 (4.1) ▲	433 (3.9)	442 (3.9)	447 (3.9)	454 (4.4)
Chinese Taipei	619 (3.4)	613 (3.7)	611 (3.0)	609 (3.2)	616 (3.0)	616 (3.2)
Cyprus	510 (3.5)	507 (2.9)	497 (2.3)	495 (2.3)	509 (3.4) ▲	501 (2.5)
2 Ψ Egypt	426 (5.8) ▲	404 (8.9)	411 (5.6)	399 (7.7)	421 (6.0) ▲	399 (8.6)
England	507 (6.1)	514 (7.3)	519 (5.7)	517 (7.2)	512 (6.1)	512 (7.8)
Finland	506 (2.8)	504 (3.0)	513 (2.9)	508 (3.3)	509 (3.2)	504 (3.5)
France	470 (2.7)	476 (3.6)	480 (2.7)	490 (3.6) ▲	487 (2.5)	491 (3.3)
1 Georgia	- -	- -	- -	- -	- -	- -
† Hong Kong SAR	584 (5.0)	577 (5.3)	580 (5.1)	572 (5.4)	584 (5.7)	580 (5.8)
Hungary	509 (3.5)	523 (3.8) ▲	509 (3.4)	524 (3.6) ▲	504 (3.5)	521 (3.6) ▲
Iran, Islamic Rep. of	452 (5.7) ▲	431 (6.5)	446 (4.7)	440 (5.1)	466 (5.2) ▲	450 (6.0)
Ireland	533 (3.4)	528 (3.6)	527 (2.9)	526 (3.6)	507 (3.5)	509 (4.3)
3 Israel	511 (5.3)	521 (5.6) ▲	513 (4.2)	525 (5.2) ▲	520 (4.6)	530 (6.4)
Italy	487 (2.9)	497 (3.9) ▲	490 (2.9)	504 (3.0) ▲	500 (4.4)	510 (4.1) ▲
Japan	589 (3.6)	589 (3.5)	594 (3.0)	598 (3.2)	598 (3.3)	600 (3.6)
Ψ Jordan	428 (4.5) ▲	400 (7.6)	425 (3.7) ▲	406 (6.1)	446 (4.0) ▲	418 (6.8)
2 Kazakhstan	492 (4.4)	485 (4.3)	488 (3.6)	485 (3.7)	490 (4.1)	484 (4.1)
Korea, Rep. of	612 (4.2)	616 (3.5)	602 (3.5)	606 (2.9)	606 (3.3)	612 (3.7)
Ψ Kuwait	- -	- -	- -	- -	- -	- -
Lebanon	453 (3.7)	458 (3.1)	407 (4.5)	417 (3.6) ▲	408 (4.1)	406 (4.8)
Lithuania	518 (2.9)	519 (3.8)	523 (3.3)	525 (3.6)	513 (3.9)	514 (4.2)
Malaysia	457 (4.2) ▲	446 (4.8)	468 (3.1) ▲	459 (4.2)	462 (3.7)	461 (3.7)
Ψ Morocco	382 (2.9)	382 (3.5)	384 (2.5)	394 (2.9) ▲	381 (3.6)	382 (3.1)
† New Zealand	462 (3.7)	473 (5.2)	483 (3.5)	489 (4.6)	483 (3.4)	489 (5.0)
† Norway (9)	500 (2.8)	499 (2.9)	504 (2.8)	503 (3.4)	496 (3.2)	497 (3.3)
Ψ Oman	432 (3.5) ▲	382 (4.8)	427 (3.1) ▲	392 (3.8)	436 (3.4) ▲	390 (4.2)
Portugal	493 (3.7)	504 (4.3) ▲	492 (3.6)	501 (4.3) ▲	501 (3.8)	514 (3.8) ▲
Ψ Qatar	444 (5.5)	442 (6.1)	442 (5.4)	433 (5.7)	453 (4.8)	442 (5.1)
Romania	490 (5.5) ▲	474 (6.2)	482 (4.6) ▲	468 (4.6)	490 (5.2) ▲	470 (4.8)
2 Russian Federation	549 (5.6)	550 (5.6)	538 (4.8)	547 (4.8) ▲	533 (5.4)	540 (5.1)
2 Ψ Saudi Arabia	- -	- -	- -	- -	- -	- -
2 Singapore	618 (5.0)	611 (4.8)	616 (4.4)	613 (4.2)	622 (5.0)	619 (5.1)
Ж South Africa (9)	- -	- -	- -	- -	- -	- -
2 Sweden	497 (3.6)	495 (2.9)	501 (3.3)	501 (3.1)	516 (3.7)	511 (3.3)
Turkey	503 (5.2) ▲	485 (6.7)	494 (4.4)	488 (5.4)	511 (4.6) ▲	497 (5.4)
United Arab Emirates	483 (3.6)	474 (3.5)	468 (3.4)	464 (3.4)	482 (3.4)	476 (3.4)
† United States	525 (4.4)	519 (6.6)	517 (4.1)	513 (6.3)	508 (3.9)	507 (5.8)
International Average	**499 (0.7) ▲**	**494 (0.8)**	**497 (0.6)**	**496 (0.8)**	**501 (0.7) ▲**	**497 (0.8)**
Benchmarking Participants						
Ontario, Canada	518 (4.1)	518 (5.0)	529 (4.5)	532 (4.9)	538 (4.9)	543 (4.9)
‡ Quebec, Canada	543 (4.3)	548 (4.2)	543 (4.6)	546 (4.5)	533 (4.5)	543 (4.3) ▲
Moscow City, Russian Fed.	582 (4.3)	596 (5.0) ▲	564 (4.4)	583 (5.0) ▲	558 (4.2)	576 (5.2) ▲
Ψ Gauteng, RSA (9)	417 (4.1) ▲	405 (3.9)	424 (3.6)	420 (3.7)	429 (3.7)	424 (3.7)
Ψ Western Cape, RSA (9)	429 (6.3)	437 (7.2)	436 (4.8)	449 (5.1) ▲	439 (5.2)	451 (5.9) ▲
Ψ Abu Dhabi, UAE	448 (5.8)	434 (4.4)	433 (5.5)	424 (4.4)	447 (5.2)	436 (4.2)
2 Dubai, UAE	537 (5.0)	543 (6.3)	527 (5.0)	538 (6.1)	537 (4.9)	546 (5.9)

▲ Average significantly higher than other gender

Numbers of items are based on the TIMSS 2019 eighth grade mathematics items included in scaling.
Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.
Ж Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.
See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

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