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

◯ **High** International Benchmark

550

Summary

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

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

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

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

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

Exhibit 1.12.1: High International Benchmark of Mathematics Achievement – Example Item 1

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

Benchmarking Participants

Country	Percent Correct	
Moscow City, Russian Fed.	75 (1.9)	▲
Quebec, Canada	58 (2.4)	
2 Dubai, UAE	52 (1.8)	
Madrid, Spain	46 (2.3)	▽
2 Ontario, Canada	39 (3.2)	▽
Abu Dhabi, UAE	28 (1.5)	▽

Content Domain: Number
Cognitive Domain: Applying
Description: Identifies an expression that represents a situation

There were 12 liters of water in the tank.

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

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

A $12 + (2 + 3)$

B $(12 + 3) + (12 + 3)$

C $(12 + 2) \times 3$

D $12 + (2 \times 3)$

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

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

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

IEA

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

Content Domain: Number

Cognitive Domain: Applying

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

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

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

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

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

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

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

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

IEA

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

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

Content Domain: Data
Cognitive Domain: Reasoning
Description: Represents data from a table in a pictograph

Animal Weights

Animal	Weight (kg)
Cheetah	50
Lion	100
Leopard	75

Make a pictograph of the weight of each animal.

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

Animal	Weight (kg)
Cheetah	(1 symbol)
Lion	(2 symbols)
Leopard	(1.5 symbols)

Key: = 50 kg

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

▲ Percent significantly higher than international average

▽ Percent significantly lower than international average

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

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