


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

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

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

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

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



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

Content Domain: Number

Cognitive Domain: Reasoning

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

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

▲ 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.

A teacher wants to put 30 students in groups so that

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

Show two different ways the teacher could make the groups.

Way 1

Number of groups:

Number of students in each group:

Way 2

Number of groups:

Number of students in each group:

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

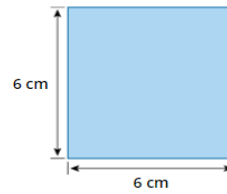
Exhibit 1.13.2: Advanced International Benchmark of Mathematics Achievement – Example Item 2

Content Domain: Measurement and Geometry
Cognitive Domain: Applying
Description: Determines the number of three different shapes that cover the area of a square (2 of 2 points)

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

▲ 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.



The square above can be made by putting together smaller shapes.
 Complete the table with the number of each shape that are needed to cover the whole square.

Shape	Number Needed to Cover the Square Above
6 cm by 2 cm	3
6 cm by 6 cm	2
3 cm by 3 cm	4

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

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

Content Domain: Measurement and Geometry



Cognitive Domain: Applying

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

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

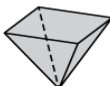

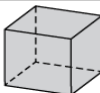

- ▲ Percent significantly higher than international average
- ▼ Percent significantly lower than international average

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

Justin makes each of the shapes shown below.

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

Three-dimensional shape	Number of triangles	Number of squares
	4	1
	<input style="width: 30px; height: 20px; border: 1px solid green;" type="text" value="4"/>	<input style="width: 30px; height: 20px; border: 1px solid green;" type="text" value="0"/>
	<input style="width: 30px; height: 20px; border: 1px solid green;" type="text" value="0"/>	<input style="width: 30px; height: 20px; border: 1px solid green;" type="text" value="6"/>
	<input style="width: 30px; height: 20px; border: 1px solid green;" type="text" value="2"/>	<input style="width: 30px; height: 20px; border: 1px solid green;" type="text" value="3"/>

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

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

Exhibit 1.13.4: Advanced International Benchmark of Mathematics Achievement – Example Item 4

Content Domain: Data
Cognitive Domain: Applying
Description: Determines the y-axis scale for a bar graph given the data in a table

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

- ▲ 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.

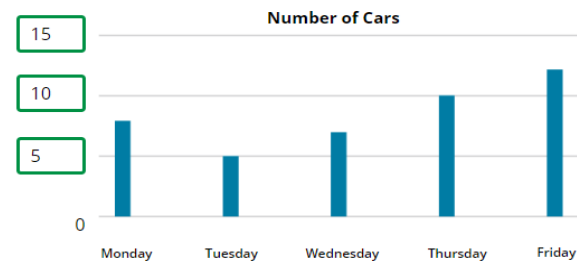
Skylar recorded the number of cars that traveled along her street each morning.

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

She started making a graph of her data.

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

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



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