MATHEMATICS CONCEPTS & *MATHEMATICS ITEMS*

The *Mathematics Concepts and Mathematics Items* book contains the released TIMSS mathematics assessment items. These are the released items from the 1999 and 2003 assessments (as distinct from the secure items, which are kept confidential so that they may be used in subsequent cycles to monitor trends).

Guide to Using the *Mathematics Concepts and Mathematics Items* Materials

The materials contained in this book can be used in a number of ways as a tool to assist teachers in making a formative assessment of student knowledge and skills. Some of these ways include the following:

Teacher-designed formative assessments. A teacher might, for example, decide to examine how well his or her class can solve routine problems. In such a case, the first step would be to review the questions in *Mathematics Concepts and Mathematics Items*, selecting the ones of interest. Ready-to-use versions of these items can be found in the *Mathematics Items* book. Teachers can print these items or present them to students on an overhead. Student responses can be scored by referring to the appropriate page in *Mathematics Concepts and Mathematics Items*. Teachers can also compare the overall percentage of students responding correctly to the international benchmark for that item.

Feedback on teaching. To the extent that the items coincide with concepts taught, the teacher might follow the same process to gain rapid feedback on the success of the teaching episode.

Understanding misunderstandings. Again, a teacher might decide to examine the incorrect or partially correct responses of the class for insight into any general misunderstandings, with a view to re-teaching a particular topic or skill.

Identifying individual difficulties. In the same way, the teacher might use the items to identify particular difficulties experienced by individual students, as the basis for some remedial teaching or focused practice.

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Guide to the Content and Layout of This Book

This book contains the released items from both TIMSS 1999 and TIMSS 2003. Due to slight revisions in terminology and released information between cycles, the format for the items in each cycle differs slightly. Each item appears on a single page and is accompanied by a number of descriptors.

1999 Content Domains:
- Fractions and number sense
- Algebra
- Measurement
- Geometry
- Data representation, analysis, and probability

2003 Content Domains:
- Algebra
- Data
- Geometry
- Measurement
- Number

1999 Cognitive Domains:
- Knowing
- Using routine procedures
- Investigating and problem solving
- Mathematical reasoning
- Communicating

2003 Cognitive Domains:
- Knowing facts and procedures
- Using concepts
- Solving routine problems
- Reasoning

Take a look at *Calories in a portion of food from ratio*, the name given to the first 1999 item in this book. As specified in boxes at the top of the page, the content domain for this item is *fractions and number sense* and the cognitive domain is *investigating and solving problems*. Looking at *Value of -3x given value of x*, the first item from TIMSS 2003 (page 85), the content domain (*algebra*) and the cognitive domain (*knowing facts and procedures*) are also accompanied by the Main Topic (*algebraic expressions*).

International item numbers identify each item. This number appears just below the item box.

Correct answers are shown beneath each item. These correct answers take two forms:

- **Letter code**. This form is used for the correct response on multiple-choice items. *Calories in a portion of food from ratio* provides an example of the letter code type—the correct answer is A.

- **Scoring guide**. This form is used to assist in scoring write-in responses. *Division of fractions* (J12) further along in the *Fractions and number sense* domain (page 13), provides an example of the scoring guide approach, indicating the general nature of correct and incorrect responses. In some cases, partial credit may be awarded and these items will provide guidelines for fully correct, partially correct, and incorrect responses.

Sample student responses are provided for TIMSS 2003 extended response items. An example of an actual U.S. eighth-grade student's response is provided for each scoring category. See item M032557 on page 89.

International benchmarks are provided in a table next to each item. These consist of statistics on the percentage of students in each country who answered the question correctly. The countries are ordered in terms of this percentage. The international average is included as well, and this display also indicates which countries scored significantly higher, significantly lower, and not significantly different from this international average.

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Calories in portion of food from ratio

If there are 300 calories in 100 g of a certain food, how many calories are there in a 30 g portion of this food?

A. 90

B. 100

C. 900

D. 1000

E. 9000

Item Number: B08

Overall Percent Correct

Singapore	90	▲
Korea, Rep. of	86	▲
Hong Kong, SAR	84	▲
Chinese Taipei	84	▲
Slovak Republic	78	▲
Malaysia	78	▲
Belgium (Flemish)	78	▲
Czech Republic	76	▲
Russian Federation	76	▲
Thailand	75	▲
Slovenia	75	▲
Cyprus	74	▲
Macedonia, Rep. of	74	O
Italy	74	▲
Moldova	73	O
Canada	73	▲
Hungary	73	O
Romania	72	O
Australia	72	O
Netherlands	71	O
Latvia (LSS)	70	O
England	70	O
International Average	**69**	
Tunisia	69	O
New Zealand	69	O
Bulgaria	68	O
United States	68	O
Turkey	66	O
Israel	66	O
Iran, Islamic Rep.	66	O
Finland	65	▼
Japan	63	▼
Chile	62	▼
Jordan	56	▼
Indonesia	56	▼
Lithuania	54	▼
Morocco	53	▼
Philippines	42	▼
South Africa	37	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**A**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Figure showing equivalent fractions

Which picture shows that $\frac{2}{5}$ is equivalent to $\frac{4}{10}$?

A.

B.

C.

D.

Item Number: B09

Overall Percent Correct

Singapore	83	▲
Hong Kong, SAR	82	▲
Korea, Rep. of	81	▲
Japan	81	▲
Chinese Taipei	80	▲
Malaysia	76	▲
Belgium (Flemish)	74	▲
Canada	72	▲
Netherlands	69	▲
Slovenia	67	▲
Australia	65	▲
Finland	63	▲
United States	63	▲
Cyprus	62	O
Russian Federation	62	O
Thailand	61	O
England	60	O
Italy	60	O
Israel	59	O
Philippines	58	O
International Average	**58**	
New Zealand	58	O
Iran, Islamic Rep.	56	O
Moldova	54	O
Hungary	53	▼
Bulgaria	52	O
Slovak Republic	52	▼
Lithuania	51	▼
Jordan	49	▼
Latvia (LSS)	48	▼
Czech Republic	46	▼
Turkey	46	▼
Chile	46	▼
Indonesia	46	▼
Macedonia, Rep. of	45	▼
Romania	44	▼
Tunisia	33	▼
South Africa	29	▼
Morocco	23	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**A**

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

Smallest decimal fraction

Which of these is the smallest number?

A. 0.625

B. 0.25

C. 0.375

D. 0.5

E. 0.125

Item Number: B10

Overall Percent Correct

Singapore	86	▲
Hong Kong, SAR	83	▲
Korea, Rep. of	82	▲
Netherlands	74	▲
Japan	73	▲
Finland	70	▲
Chinese Taipei	69	▲
Belgium (Flemish)	67	▲
Lithuania	61	▲
Canada	61	▲
Slovak Republic	60	▲
Czech Republic	59	▲
Malaysia	59	▲
Slovenia	58	▲
Australia	58	▲
Hungary	55	▲
Russian Federation	53	O
United States	51	O
Latvia (LSS)	49	O
Bulgaria	46	O
International Average	**46**	
England	45	O
Thailand	45	O
New Zealand	43	O
Italy	37	▼
Tunisia	34	▼
Morocco	31	▼
Moldova	31	▼
Israel	29	▼
Romania	28	▼
Cyprus	27	▼
Jordan	26	▼
Macedonia, Rep. of	25	▼
Chile	14	▼
Iran, Islamic Rep.	10	▼
Philippines	10	▼
Indonesia	9	▼
Turkey	9	▼
South Africa	6	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**E**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Smallest simple fraction

Which of these fractions is smallest?

A. $\dfrac{1}{6}$

B. $\dfrac{2}{3}$

C. $\dfrac{1}{3}$

D. $\dfrac{1}{2}$

Item Number: D09

Overall Percent Correct

Hong Kong, SAR	93	▲
Singapore	90	▲
Japan	89	▲
Netherlands	87	▲
Finland	85	▲
Chinese Taipei	85	▲
Canada	83	▲
Korea, Rep. of	83	▲
Belgium (Flemish)	82	▲
Australia	80	▲
United States	76	▲
Slovenia	75	▲
New Zealand	75	▲
Israel	75	▲
Cyprus	73	▲
England	73	▲
Hungary	71	▲
Slovak Republic	67	O
Czech Republic	65	O
Malaysia	65	O
International Average	**62**	
Tunisia	61	O
Latvia (LSS)	61	O
Russian Federation	59	O
Bulgaria	59	O
Jordan	51	▼
Lithuania	50	▼
Romania	47	▼
Italy	46	▼
Macedonia, Rep. of	44	▼
Iran, Islamic Rep.	43	▼
Thailand	42	▼
Philippines	39	▼
Turkey	39	▼
Moldova	38	▼
Indonesia	38	▼
South Africa	28	▼
Morocco	25	▼
Chile	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

Estimate of point P on number line

What is the best estimate of the number corresponding to P?

A.   1.1

B.   1.2

C.   1.4

D.   1.5

Item Number: D12

Overall Percent Correct

Japan	93	▲
Singapore	91	▲
Finland	90	▲
Netherlands	90	▲
England	88	▲
Hong Kong, SAR	86	▲
Belgium (Flemish)	84	▲
Canada	84	▲
Australia	83	▲
Chinese Taipei	81	▲
United States	81	▲
Korea, Rep. of	81	▲
Slovak Republic	80	▲
Hungary	80	▲
New Zealand	80	▲
Malaysia	78	▲
Slovenia	78	▲
Latvia (LSS)	78	▲
Russian Federation	77	▲
Italy	68	O
International Average	**68**	
Czech Republic	65	O
Israel	64	O
Thailand	64	O
Bulgaria	63	O
Moldova	63	▼
Lithuania	61	▼
Turkey	59	▼
Chile	54	▼
Romania	53	▼
Jordan	53	▼
Philippines	51	▼
Macedonia, Rep. of	49	▼
Indonesia	46	▼
Cyprus	44	▼
Morocco	43	▼
Tunisia	40	▼
South Africa	38	▼
Iran, Islamic Rep.	32	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Average speed from distance and time

A runner ran 3000 m in exactly 8 minutes. What was his average speed in meters per second?

A. 3.75

B. 6.25

C. 16.0

D. 37.5

E. 62.5

Item Number: F07

Overall Percent Correct

Singapore	67	▲
Chinese Taipei	61	▲
Hong Kong, SAR	60	▲
Japan	50	▲
Malaysia	47	▲
Russian Federation	45	▲
Belgium (Flemish)	44	▲
Korea, Rep. of	43	▲
Slovak Republic	42	▲
Bulgaria	41	O
Slovenia	41	▲
Netherlands	40	O
Hungary	40	▲
Lithuania	34	O
International Average	**33**	
Romania	33	O
Canada	32	O
Czech Republic	32	O
Turkey	30	O
Finland	30	O
Australia	29	O
Latvia (LSS)	29	O
Moldova	29	O
United States	28	▼
Thailand	28	▼
Indonesia	27	▼
Israel	27	▼
Tunisia	26	▼
Macedonia, Rep. of	26	▼
New Zealand	25	▼
Italy	25	▼
Cyprus	23	▼
England	22	▼
Jordan	19	▼
Iran, Islamic Rep.	19	▼
Chile	17	▼
Morocco	16	▼
South Africa	16	▼
Philippines	15	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Number between two decimal fractions

Which of these numbers is between 0.07 and 0.08?

A. 0.00075

B. 0.0075

C. 0.075

D. 0.75

Item Number: F09

Overall Percent Correct

Singapore	87	▲
Netherlands	85	▲
Korea, Rep. of	84	▲
Belgium (Flemish)	84	▲
Japan	83	▲
Chinese Taipei	82	▲
Hong Kong, SAR	81	▲
Finland	80	▲
Canada	78	▲
Australia	76	▲
Slovenia	75	▲
Slovak Republic	74	▲
England	71	▲
Lithuania	71	▲
Czech Republic	70	▲
Malaysia	70	▲
United States	70	▲
Hungary	69	▲
Russian Federation	69	O
New Zealand	68	O
Bulgaria	67	O
Latvia (LSS)	66	O
International Average	**63**	
Italy	59	O
Israel	57	▼
Macedonia, Rep. of	56	▼
Moldova	56	▼
Thailand	54	▼
Cyprus	53	▼
Romania	52	▼
Tunisia	48	▼
Chile	42	▼
Indonesia	40	▼
Morocco	39	▼
Jordan	37	▼
Turkey	35	▼
Philippines	34	▼
South Africa	33	▼
Iran, Islamic Rep.	31	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	**C**

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

Fraction of circle shaded

What fraction of the circle is shaded?

A. Between 0 and $\frac{1}{4}$

B. Between $\frac{1}{4}$ and $\frac{1}{2}$

C. Between $\frac{1}{2}$ and $\frac{3}{4}$

D. Between $\frac{3}{4}$ and 1

Item Number: F12

Overall Percent Correct		
Netherlands	75	▲
Belgium (Flemish)	73	▲
England	72	▲
Hong Kong, SAR	72	▲
Singapore	71	▲
Canada	68	▲
Australia	68	▲
New Zealand	64	▲
United States	62	▲
Chinese Taipei	61	▲
Japan	61	▲
Slovenia	59	▲
Finland	57	▲
Hungary	56	▲
Israel	54	O
Bulgaria	53	O
Czech Republic	51	O
Malaysia	50	O
Cyprus	50	O
International Average	**50**	
Korea, Rep. of	50	O
Russian Federation	50	O
Slovak Republic	49	O
Italy	48	O
Latvia (LSS)	44	O
Tunisia	43	▼
Jordan	40	▼
Romania	40	▼
Thailand	39	▼
Indonesia	39	▼
Moldova	34	▼
Morocco	33	▼
Iran, Islamic Rep.	32	▼
Chile	32	▼
Philippines	31	▼
Lithuania	31	▼
Turkey	28	▼
Macedonia, Rep. of	27	▼
South Africa	26	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

Figure showing fraction of shaded square

Which shows $\frac{2}{3}$ of the square shaded?

A.   B.   C.   D.   E.

Item Number: H08

Overall Percent Correct

Singapore	96	▲
Belgium (Flemish)	94	▲
Hong Kong, SAR	94	▲
Netherlands	92	▲
Canada	91	▲
Japan	89	▲
Chinese Taipei	88	▲
Finland	87	▲
Korea, Rep. of	87	▲
Cyprus	87	▲
United States	86	▲
Malaysia	86	▲
Australia	85	▲
England	82	▲
New Zealand	80	▲
Hungary	78	▲
Slovenia	78	▲
Iran, Islamic Rep.	76	▲
Israel	73	O
Slovak Republic	72	O
Thailand	71	O
International Average	**68**	
Latvia (LSS)	66	O
Czech Republic	65	O
Italy	63	O
Russian Federation	61	O
Bulgaria	59	▼
Chile	57	▼
Jordan	54	▼
Turkey	53	▼
Macedonia, Rep. of	49	▼
Tunisia	48	▼
Philippines	46	▼
Lithuania	45	▼
Moldova	43	▼
Romania	41	▼
Indonesia	31	▼
South Africa	21	▼
Morocco	7	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**E**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Sum closest to 691 + 208

The sum 691 + 208 is closest to the sum

A. 600 + 200

B. 700 + 200

C. 700 + 300

D. 900 + 200

Item Number: H09

Overall Percent Correct

Singapore	97	▲
Belgium (Flemish)	96	▲
Japan	95	▲
Netherlands	95	▲
Hong Kong, SAR	93	▲
Canada	93	▲
United States	93	▲
Hungary	93	▲
Korea, Rep. of	93	▲
Slovenia	92	▲
England	92	▲
Czech Republic	91	▲
Australia	91	▲
Finland	91	▲
Slovak Republic	90	▲
Chinese Taipei	89	▲
New Zealand	88	▲
Malaysia	88	▲
Latvia (LSS)	87	▲
Bulgaria	86	▲
Cyprus	85	▲
Lithuania	84	O
Russian Federation	83	O
Israel	83	O
International Average	**80**	
Macedonia, Rep. of	79	O
Italy	77	O
Thailand	77	O
Turkey	74	▼
Romania	73	▼
Tunisia	67	▼
Jordan	66	▼
Moldova	66	▼
Chile	65	▼
Iran, Islamic Rep.	58	▼
Indonesia	54	▼
Philippines	53	▼
Morocco	43	▼
South Africa	37	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Division of fractions

Divide: $\dfrac{6}{55} \div \dfrac{3}{25} =$

Answer: _____

Item Number: J12

SCORING

Correct Response

• 10/11

• Other fractions or decimals equivalent to 10/11 *(e.g., 30/33, 150/165, .909, .91, etc.)*

Incorrect Response

• Any fraction with 2 as a numerator [Divides 6 by 3]

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	84	▲
Chinese Taipei	83	▲
Hong Kong, SAR	81	▲
Korea, Rep. of	80	▲
Japan	79	▲
Slovenia	74	▲
Russian Federation	72	▲
Bulgaria	72	▲
Slovak Republic	71	▲
Latvia (LSS)	68	▲
Hungary	66	▲
Romania	65	▲
Lithuania	64	▲
Italy	63	▲
Belgium (Flemish)	58	▲
Moldova	57	▲
Czech Republic	56	O
Malaysia	54	▲
International Average	**45**	
Turkey	41	O
Thailand	40	O
United States	37	▼
Iran, Islamic Rep.	34	▼
Canada	32	▼
Jordan	32	▼
Tunisia	29	▼
Chile	26	▼
Indonesia	24	▼
Macedonia, Rep. of	24	▼
Australia	23	▼
Israel	22	▼
Cyprus	21	▼
Finland	17	▼
Netherlands	12	▼
Philippines	11	▼
New Zealand	10	▼
South Africa	5	▼
England	4	▼
Morocco	4	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Division of decimals

Divide $0.003\overline{)15.45}$

A. 0.515

B. 5.15

C. 51.5

D. 515

E. 5150

Item Number: J14

Overall Percent Correct

Japan	70	▲
Slovak Republic	69	▲
Russian Federation	68	▲
Hong Kong, SAR	66	▲
Lithuania	65	▲
Chinese Taipei	64	▲
Hungary	63	▲
Korea, Rep. of	61	▲
Latvia (LSS)	54	▲
Slovenia	54	▲
Moldova	53	▲
Bulgaria	53	▲
Czech Republic	52	▲
Belgium (Flemish)	45	O
Singapore	45	O
Netherlands	44	O
Romania	40	O
International Average	**39**	
United States	39	O
Canada	39	O
Malaysia	39	O
Macedonia, Rep. of	38	O
Italy	36	O
Jordan	30	▼
Finland	29	▼
Cyprus	26	▼
Indonesia	24	▼
Israel	24	▼
Thailand	23	▼
New Zealand	21	▼
Tunisia	21	▼
Philippines	20	▼
Australia	20	▼
South Africa	19	▼
Chile	18	▼
England	16	▼
Turkey	15	▼
Iran, Islamic Rep.	14	▼
Morocco	14	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	E

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Distance between towns from map

On the map, 1 cm represents 10 km on the land.

On the land, about how far apart are the towns Melville and Folley?

A.   5 km

B.   30 km

C.   40 km

D.   50 km

Item Number: J18

Overall Percent Correct

Japan	85	▲
Belgium (Flemish)	83	▲
Singapore	82	▲
Malaysia	77	▲
Lithuania	75	▲
Chinese Taipei	70	▲
Slovenia	70	▲
Netherlands	70	▲
Latvia (LSS)	68	▲
Russian Federation	68	▲
Czech Republic	67	O
Canada	65	▲
Hungary	65	O
Moldova	64	O
Bulgaria	64	O
Australia	64	O
Italy	63	O
England	62	O
Finland	61	O
Cyprus	61	O
Slovak Republic	61	O
Korea, Rep. of	60	O
New Zealand	58	O
International Average	**57**	
Thailand	56	O
Tunisia	54	O
Romania	51	O
Jordan	46	▼
Indonesia	44	▼
Israel	44	▼
Macedonia, Rep. of	43	▼
United States	40	▼
Iran, Islamic Rep.	37	▼
Turkey	35	▼
Chile	30	▼
South Africa	26	▼
Morocco	25	▼
Philippines	24	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Length of building compared to car

The car is 3.5 m long. About how long is the building?

A.   18 m

B.   14 m

C.   10 m

D.   4 m

Item Number: L09

Overall Percent Correct		
Singapore	91	▲
Malaysia	90	▲
Czech Republic	89	▲
Slovak Republic	88	▲
Hungary	88	▲
Russian Federation	88	▲
Finland	87	▲
Chinese Taipei	87	▲
Korea, Rep. of	87	▲
Lithuania	87	▲
Latvia (LSS)	86	▲
Belgium (Flemish)	85	▲
Japan	84	▲
Hong Kong, SAR	83	▲
Australia	83	▲
Bulgaria	83	▲
Netherlands	82	▲
Slovenia	82	O
Canada	79	O
New Zealand	78	O
England	76	O
Romania	76	O
Moldova	75	O
International Average	**75**	
Thailand	73	O
Italy	73	O
United States	72	O
Cyprus	71	O
Tunisia	70	O
Macedonia, Rep. of	69	O
Turkey	68	▼
Israel	68	▼
Iran, Islamic Rep.	61	▼
Chile	60	▼
Indonesia	59	▼
Jordan	56	▼
Morocco	43	▼
Philippines	40	▼
South Africa	26	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

Two hundred six and nine-tenths

Which number is two hundred six and nine-tenths?

A. 206.09

B. 206.9

C. 206.910

D. 2006.9

Item Number: L10

Overall Percent Correct

Hungary	97	▲
Russian Federation	93	▲
Slovak Republic	90	▲
Belgium (Flemish)	87	▲
Iran, Islamic Rep.	83	▲
Moldova	81	▲
United States	80	▲
Netherlands	79	▲
Korea, Rep. of	78	▲
Canada	77	▲
Czech Republic	75	▲
Jordan	75	▲
Lithuania	73	O
Turkey	72	▲
Singapore	72	O
Chinese Taipei	72	▲
Bulgaria	71	O
Romania	71	O
Finland	70	O
Hong Kong, SAR	68	O
Australia	67	O
Italy	66	O
International Average	**65**	
Israel	62	O
Japan	62	O
Slovenia	61	O
Chile	60	O
Malaysia	56	▼
Latvia (LSS)	55	O
Cyprus	54	▼
England	53	▼
New Zealand	53	▼
Tunisia	43	▼
Macedonia, Rep. of	42	▼
Philippines	42	▼
Morocco	41	▼
Thailand	40	▼
South Africa	31	▼
Indonesia	23	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Subtraction with three fractions

What is the value of $\dfrac{4}{5} - \dfrac{1}{3} - \dfrac{1}{15}$?

A. $\dfrac{1}{5}$

B. $\dfrac{2}{5}$

C. $\dfrac{7}{15}$

D. $\dfrac{3}{4}$

E. $\dfrac{4}{5}$

Item Number: L18

Overall Percent Correct

Singapore	87	▲
Chinese Taipei	81	▲
Korea, Rep. of	81	▲
Belgium (Flemish)	78	▲
Hong Kong, SAR	77	▲
Japan	75	▲
Malaysia	71	▲
Russian Federation	64	▲
Slovenia	63	▲
Slovak Republic	62	O
Hungary	60	O
Lithuania	58	O
Canada	57	O
Czech Republic	55	O
Netherlands	55	O
United States	55	O
International Average	**52**	
Indonesia	51	O
Finland	51	O
Thailand	51	O
Latvia (LSS)	50	O
Romania	50	O
Bulgaria	48	O
Australia	48	O
Cyprus	47	O
Israel	44	▼
Turkey	44	▼
Moldova	43	O
Italy	43	▼
New Zealand	41	▼
Jordan	40	▼
Macedonia, Rep. of	37	▼
Iran, Islamic Rep.	36	▼
Tunisia	36	▼
Philippines	35	▼
England	34	▼
Chile	32	▼
South Africa	23	▼
Morocco	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Number of cars from rounded value

A company produced 17,175 cars in 1996. For a report, this number was rounded to the nearest hundred. Which was the number of cars given in the report?

A. 17,000

B. 17,100

C. 17,200

D. 17,270

Item Number: N11

Overall Percent Correct

Singapore	96	▲
Czech Republic	96	▲
Finland	94	▲
Slovenia	94	▲
Australia	94	▲
Belgium (Flemish)	93	▲
Hungary	93	▲
Slovak Republic	92	▲
Canada	92	▲
Netherlands	90	▲
United States	89	▲
Malaysia	89	▲
England	87	▲
New Zealand	86	▲
Bulgaria	86	▲
Hong Kong, SAR	86	▲
Chinese Taipei	82	▲
Korea, Rep. of	82	▲
Russian Federation	81	▲
Latvia (LSS)	80	O
Japan	79	▲
Lithuania	76	O
International Average	**74**	
Romania	72	O
Italy	72	O
Israel	72	O
Thailand	68	O
Macedonia, Rep. of	65	▼
Cyprus	64	▼
Indonesia	61	▼
Turkey	59	▼
Chile	58	▼
Jordan	55	▼
Philippines	51	▼
Moldova	49	▼
South Africa	38	▼
Tunisia	30	▼
Morocco	30	▼
Iran, Islamic Rep.	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

List of equivalent fractions

Overall Percent Correct

In which list of fractions are all of the fractions equivalent?

A. $\dfrac{1}{2}$, $\dfrac{2}{4}$, $\dfrac{4}{6}$

B. $\dfrac{2}{3}$, $\dfrac{4}{6}$, $\dfrac{8}{12}$

C. $\dfrac{2}{5}$, $\dfrac{4}{10}$, $\dfrac{8}{50}$

D. $\dfrac{3}{4}$, $\dfrac{4}{6}$, $\dfrac{6}{8}$

Item Number: N14

Korea, Rep. of	86	▲
Chinese Taipei	85	▲
Hong Kong, SAR	84	▲
Singapore	84	▲
Belgium (Flemish)	83	▲
Japan	82	▲
Netherlands	74	▲
Canada	72	▲
Russian Federation	71	▲
Hungary	70	O
Bulgaria	68	O
Malaysia	68	O
Slovak Republic	67	O
Latvia (LSS)	66	O
Lithuania	66	O
Slovenia	65	O
Cyprus	64	O
United States	63	O
Australia	63	O
Finland	61	O
International Average	**61**	
Czech Republic	60	O
Israel	59	O
Italy	57	O
Thailand	57	O
Jordan	55	O
Romania	55	O
New Zealand	51	▼
England	51	▼
Moldova	50	▼
Iran, Islamic Rep.	49	▼
Tunisia	49	▼
Indonesia	48	▼
Turkey	45	▼
Macedonia, Rep. of	44	▼
Philippines	42	▼
Chile	41	▼
South Africa	34	▼
Morocco	32	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Number of marbles in bag

Penny had a bag of marbles. She gave one-third of them to Rebecca, and then one-fourth of the remaining marbles to John. Penny then had 24 marbles left in the bag. How many marbles were in the bag to start with?

A. 36

B. 48

C. 60

D. 96

Item Number: N16

Overall Percent Correct

Country		
Singapore	81	▲
Japan	64	▲
Korea, Rep. of	64	▲
Chinese Taipei	60	▲
Hong Kong, SAR	60	▲
Netherlands	53	O
Finland	53	O
Belgium (Flemish)	52	O
New Zealand	49	O
Australia	48	O
Malaysia	47	O
England	46	O
Slovak Republic	45	O
Thailand	45	O
Canada	45	O
Hungary	45	O
Czech Republic	44	O
International Average	**44**	
Philippines	43	O
Bulgaria	43	O
Russian Federation	42	O
Israel	42	O
Moldova	41	O
Latvia (LSS)	41	O
United States	41	O
Slovenia	39	O
Romania	38	O
Turkey	38	O
Italy	38	O
Indonesia	37	O
Cyprus	36	O
Macedonia, Rep. of	35	▼
Morocco	34	▼
Jordan	33	▼
Tunisia	33	▼
Lithuania	32	▼
South Africa	31	▼
Iran, Islamic Rep.	31	▼
Chile	30	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Amount of paint left

A painter had 25 L of paint. He used 2.5 L of paint every hour. He finished the job in 5.5 hours. How much paint did he have left?

A. 10.25 L

B. 11.25 L

C. 12.75 L

D. 13.75 L

Item Number: N17

Overall Percent Correct

Singapore	65	▲
Chinese Taipei	63	▲
Hong Kong, SAR	56	▲
Malaysia	54	▲
Korea, Rep. of	53	▲
Netherlands	49	▲
Japan	47	▲
Czech Republic	43	O
Hungary	40	O
Bulgaria	39	O
Russian Federation	39	O
Lithuania	39	O
Belgium (Flemish)	39	O
Slovak Republic	39	O
Canada	36	O
Slovenia	36	O
International Average	**35**	
United States	35	O
Finland	34	O
Cyprus	33	O
Australia	32	O
Latvia (LSS)	31	O
Turkey	29	O
Romania	29	O
Moldova	29	O
New Zealand	29	O
Macedonia, Rep. of	28	O
Italy	27	O
England	27	O
Tunisia	26	▼
Israel	25	▼
Iran, Islamic Rep.	25	▼
Morocco	23	▼
Indonesia	22	▼
Chile	22	▼
Jordan	21	▼
Philippines	20	▼
South Africa	18	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼
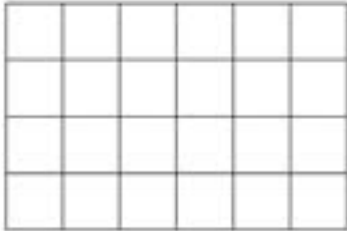
Correct Response:	B

Content Domain	Cognitive Domain
Fractions and Number Sense	Knowing

Shade in 3/8 of squares in grid

Shade in $\frac{3}{8}$ of the unit squares in the grid.

Item Number: N19

SCORING

Correct Response

• 9 squares are shaded (regardless of which squares)

• Other correct *(e.g., 6 full squares and 6 half squares shaded or other equivalent of nine squares)*

Incorrect Response

• 3 squares shaded

• 8 squares shaded

• 11 or 13 squares shaded

• 3 squares shaded and 8 more squares shaded (areas are shaded separately)

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	89	▲
Hong Kong, SAR	87	▲
Belgium (Flemish)	87	▲
Korea, Rep. of	81	▲
Chinese Taipei	80	▲
Japan	78	▲
Malaysia	73	▲
Canada	68	▲
Finland	65	▲
Hungary	63	▲
Netherlands	61	O
Australia	60	▲
Slovenia	55	O
Bulgaria	54	O
Cyprus	54	O
England	52	O
Slovak Republic	52	O
Russian Federation	52	O
United States	49	O
International Average	**49**	
Thailand	49	O
New Zealand	46	O
Italy	46	O
Latvia (LSS)	46	O
Moldova	44	O
Czech Republic	42	O
Israel	40	▼
Romania	39	▼
Macedonia, Rep. of	32	▼
Jordan	31	▼
Iran, Islamic Rep.	31	▼
Tunisia	28	▼
Turkey	26	▼
Lithuania	26	▼
Indonesia	21	▼
Chile	13	▼
Philippines	11	▼
Morocco	8	▼
South Africa	7	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Estimate of total cars in parking lot

There are 68 rows of cars in a parking lot. Each row has 92 cars. Which of these would give the closest estimate of the total number of cars in the parking lot?

A. 60 x 90 = 5400

B. 60 x 100 = 6000

C. 70 x 90 = 6300

D. 70 x 100 = 7000

Item Number: P13

Overall Percent Correct

Singapore	94	▲
Hong Kong, SAR	85	▲
Belgium (Flemish)	83	▲
Japan	82	▲
Korea, Rep. of	82	▲
Chinese Taipei	81	▲
Netherlands	81	▲
Finland	79	▲
United States	79	▲
Slovak Republic	78	▲
Hungary	78	▲
Canada	78	▲
Czech Republic	78	▲
Malaysia	78	▲
Australia	77	▲
Slovenia	76	▲
England	74	▲
New Zealand	67	O
Russian Federation	65	O
International Average	**65**	
Israel	63	O
Latvia (LSS)	62	O
Cyprus	60	O
Bulgaria	60	O
Thailand	58	O
Jordan	58	O
Lithuania	57	O
Romania	55	O
Macedonia, Rep. of	53	▼
Italy	52	▼
Moldova	52	▼
Turkey	50	▼
Chile	48	▼
Tunisia	48	▼
Iran, Islamic Rep.	48	▼
Indonesia	44	▼
Philippines	42	▼
South Africa	30	▼
Morocco	17	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Estimate of distance from explosion

Sound travels at approximately 330 meters per second. The sound of an explosion took 28 seconds to reach a person. Which of these is the closest estimate of how far away the person was from the explosion?

A. 12,000 m

B. 9,000 m

C. 8,000 m

D. 6,000 m

Item Number: P14

Overall Percent Correct

Singapore	83	▲
Japan	81	▲
Korea, Rep. of	78	▲
Hong Kong, SAR	78	▲
Chinese Taipei	77	▲
Slovak Republic	76	▲
Slovenia	71	▲
Czech Republic	71	▲
Malaysia	70	▲
Belgium (Flemish)	69	▲
Canada	64	▲
Netherlands	63	O
Finland	63	O
United States	63	▲
Australia	62	O
Lithuania	62	O
Hungary	61	O
Russian Federation	59	O
Thailand	59	O
International Average	**56**	
Bulgaria	55	O
Italy	52	O
Latvia (LSS)	52	O
Israel	51	O
Turkey	50	O
Cyprus	50	O
New Zealand	50	O
England	50	O
Macedonia, Rep. of	47	▼
Moldova	45	▼
Philippines	43	▼
Jordan	42	▼
Tunisia	42	▼
Indonesia	41	▼
Romania	40	▼
Iran, Islamic Rep.	38	▼
Chile	37	▼
South Africa	21	▼
Morocco	13	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Fraction of cherries in basket

Robin and Jim took cherries from a basket. Robin took $\frac{1}{3}$ of the cherries and Jim took $\frac{1}{6}$ of the cherries. What fraction of the cherries remained in the basket?

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{6}$

D. $\frac{1}{18}$

Item Number: P15

Overall Percent Correct

Singapore	85	▲
Hong Kong, SAR	75	▲
Chinese Taipei	68	▲
Belgium (Flemish)	62	▲
Japan	62	▲
Netherlands	61	▲
Cyprus	56	▲
Malaysia	55	▲
Korea, Rep. of	55	▲
Hungary	55	▲
Canada	53	▲
United States	52	O
Russian Federation	51	O
Australia	51	O
Slovenia	51	O
Latvia (LSS)	49	O
Finland	48	O
Slovak Republic	48	O
Romania	47	O
Lithuania	46	O
International Average	**45**	
Moldova	44	O
Czech Republic	43	O
Israel	43	O
New Zealand	43	O
Bulgaria	43	O
England	42	O
Macedonia, Rep. of	38	O
Jordan	34	▼
Indonesia	34	▼
Italy	32	▼
Iran, Islamic Rep.	32	▼
Turkey	32	▼
Tunisia	31	▼
Thailand	29	▼
Philippines	22	▼
Chile	22	▼
South Africa	18	▼
Morocco	14	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**A**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Write decimal as fraction

Write 0.48 as a fraction reduced to its lowest terms.

Answer: _____

Item Number: P17

SCORING

Correct Response

• 12/25

Incorrect Response

• 48/100 OR 24/50

• Any fraction other than 48/100 with 48 as numerator

• Any fraction with 48 as denominator

• 4/8 OR 2/4 OR 1/2

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	87	▲
Korea, Rep. of	78	▲
Hong Kong, SAR	74	▲
Chinese Taipei	71	▲
Japan	65	▲
Belgium (Flemish)	56	▲
Moldova	55	▲
Canada	50	▲
Slovenia	48	▲
United States	46	▲
Iran, Islamic Rep.	43	▲
Bulgaria	42	O
Australia	42	O
Slovak Republic	42	O
Russian Federation	42	O
Romania	41	O
Malaysia	40	O
Hungary	40	O
International Average	**36**	
Tunisia	34	O
Netherlands	31	O
Czech Republic	30	O
Latvia (LSS)	28	O
Italy	25	▼
Israel	24	▼
Turkey	24	▼
Thailand	24	▼
Lithuania	24	▼
New Zealand	23	▼
Cyprus	22	▼
Jordan	22	▼
Indonesia	22	▼
Finland	19	▼
England	18	▼
Macedonia, Rep. of	13	▼
Philippines	12	▼
Chile	11	▼
South Africa	4	▼
Morocco	3	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Subtraction of decimals to 0.001

Subtract: $4.722 - 1.935 =$

A. 2.787

B. 2.797

C. 2.887

D. 2.897

Item Number: R07

Overall Percent Correct

Malaysia	92	▲
Singapore	90	▲
Hungary	90	▲
Slovenia	90	▲
Korea, Rep. of	88	▲
Russian Federation	88	▲
Slovak Republic	87	▲
Japan	86	▲
Lithuania	86	▲
Czech Republic	85	O
Chinese Taipei	84	▲
Hong Kong, SAR	83	▲
Thailand	83	▲
Tunisia	82	O
Bulgaria	81	O
Moldova	80	O
Canada	80	O
Latvia (LSS)	79	O
Indonesia	78	O
Romania	77	O
United States	77	O
Italy	77	O
International Average	**77**	
Chile	75	O
Australia	74	O
Belgium (Flemish)	73	O
Finland	72	O
Cyprus	71	O
Macedonia, Rep. of	71	O
Iran, Islamic Rep.	71	O
Turkey	71	O
Netherlands	69	O
Philippines	69	▼
Jordan	65	▼
Israel	63	▼
Morocco	62	▼
New Zealand	61	▼
England	59	▼
South Africa	42	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response: A

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Average weight of salt crystals

The total weight of a pile of 500 salt crystals is 6.5 g. What is the average weight of a salt crystal?

A. 0.0078 g

B. 0.013 g

C. 0.0325 g

D. 0.078 g

Item Number: R08

Overall Percent Correct

Hong Kong, SAR	75	▲
Chinese Taipei	75	▲
Singapore	74	▲
Japan	73	▲
Korea, Rep. of	72	▲
Hungary	67	▲
Slovak Republic	66	▲
Russian Federation	65	▲
Malaysia	64	▲
Belgium (Flemish)	63	▲
Lithuania	57	O
Slovenia	57	O
Netherlands	57	O
Bulgaria	55	O
Moldova	54	O
Finland	54	O
International Average	**52**	
Romania	52	O
Czech Republic	50	O
Chile	49	O
Canada	49	O
Tunisia	48	O
Turkey	48	O
Latvia (LSS)	47	O
Macedonia, Rep. of	47	O
Australia	47	O
Indonesia	46	O
Italy	45	O
Thailand	44	▼
United States	44	▼
New Zealand	43	▼
Jordan	41	▼
England	40	▼
Israel	40	▼
Iran, Islamic Rep.	36	▼
Morocco	35	▼
South Africa	35	▼
Cyprus	31	▼
Philippines	29	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Routine Procedures

Subtraction of 4-digit whole numbers

Subtract:
$$\begin{array}{r} 7003 \\ -\,4078 \\ \hline \end{array}$$

A. 2035

B. 2925

C. 3005

D. 3925

Item Number: R13

Overall Percent Correct

Malaysia	94	▲
Singapore	92	▲
Chinese Taipei	90	▲
Hong Kong, SAR	90	▲
Korea, Rep. of	88	▲
Hungary	87	▲
Slovak Republic	86	▲
Japan	86	▲
Belgium (Flemish)	85	▲
Slovenia	83	▲
Canada	83	▲
Czech Republic	82	O
United States	81	▲
Lithuania	80	O
Tunisia	80	▲
Russian Federation	79	O
Moldova	79	O
Netherlands	79	O
Australia	77	O
Thailand	77	O
Finland	76	O
Bulgaria	76	O
International Average	**74**	
Latvia (LSS)	74	O
Iran, Islamic Rep.	73	O
Cyprus	70	O
Turkey	69	O
Jordan	69	O
Romania	68	O
Israel	67	O
Italy	67	O
Macedonia, Rep. of	65	▼
Chile	59	▼
Philippines	58	▼
New Zealand	58	▼
Indonesia	55	▼
Morocco	54	▼
England	51	▼
South Africa	37	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

How much money left if spent 5/8

Laura had \$240. She spent $\dfrac{5}{8}$ of it. How much money did she have left?

Answer: _____

Item Number: R14

SCORING

Note: There is no distinction made between responses with and without units.

Correct Response

• 90

Incorrect Response

• 150 [money spent]

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	78	▲
Hong Kong, SAR	66	▲
Malaysia	59	▲
Japan	50	▲
Korea, Rep. of	50	▲
Chinese Taipei	49	▲
Finland	48	▲
Netherlands	47	▲
Belgium (Flemish)	45	▲
Hungary	40	▲
Moldova	38	O
Australia	37	O
Slovenia	35	O
Slovak Republic	33	O
Cyprus	33	O
Canada	30	O
Czech Republic	30	O
International Average	**30**	
Bulgaria	27	O
Russian Federation	27	O
United States	25	▼
Italy	24	O
New Zealand	24	O
England	24	O
Latvia (LSS)	24	O
Israel	23	O
Tunisia	22	▼
Romania	21	▼
Thailand	21	▼
Iran, Islamic Rep.	20	▼
Lithuania	19	▼
Turkey	17	▼
Macedonia, Rep. of	14	▼
Jordan	14	▼
Indonesia	11	▼
Chile	6	▼
Philippines	4	▼
South Africa	3	▼
Morocco	1	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Money from total magazine sales

John sold 60 magazines and Mark sold 80 magazines. The magazines were all sold for the same price. The total amount of money received for the magazines was $700. How much money did Mark receive?

Answer: _____

Item Number: R15

SCORING

Note: There is no distinction made between responses with and without units.

Correct Response

• 400

Incorrect Response

• 500 [price per magazine x 100]

• 350 [700 ÷ 2]

• 300 [money John received]

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	84	▲
Chinese Taipei	75	▲
Hong Kong, SAR	72	▲
Korea, Rep. of	69	▲
Japan	67	▲
Malaysia	65	▲
Slovenia	60	▲
Belgium (Flemish)	60	▲
Hungary	58	▲
Moldova	54	▲
Czech Republic	54	O
Slovak Republic	54	O
Lithuania	54	▲
Netherlands	53	O
Russian Federation	52	O
Bulgaria	50	O
Latvia (LSS)	48	O
Finland	47	O
Canada	46	O
International Average	**44**	
Australia	44	O
Romania	43	O
United States	41	O
Cyprus	40	O
Tunisia	39	O
Thailand	38	O
Italy	36	O
New Zealand	33	▼
England	31	▼
Israel	30	▼
Macedonia, Rep. of	30	▼
Iran, Islamic Rep.	28	▼
Indonesia	27	▼
Turkey	26	▼
Jordan	23	▼
Chile	22	▼
Philippines	12	▼
South Africa	9	▼
Morocco	3	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Number/fraction of 2 types of boxes

A book publisher sent 140 copies of a certain book to a bookstore. The publisher packed the books in two types of boxes. One type of box held 8 copies of the book, and the other type of box held 12 copies of the book. The boxes were all full, and there were equal numbers of both types of boxes.

a) How many boxes holding 12 books were sent to the bookstore?

Answer: _____

b) What fraction of the books sent to the bookstore were packed in the smaller boxes?

Answer: _____

Item Number: T02A

SCORING

A: Scoring for Total Number of Boxes

Correct Response

• 7

Incorrect Response

• Incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	62	▲
Chinese Taipei	60	▲
Korea, Rep. of	59	▲
Japan	58	▲
Hong Kong, SAR	58	▲
Belgium (Flemish)	43	▲
Bulgaria	33	O
Malaysia	33	▲
Finland	32	O
Australia	32	▲
Netherlands	32	O
Hungary	31	▲
Canada	31	▲
Slovenia	31	O
Latvia (LSS)	29	O
Russian Federation	29	O
United States	26	O
International Average	**26**	
Slovak Republic	25	O
England	24	O
Moldova	24	O
New Zealand	24	O
Romania	22	O
Czech Republic	22	O
Lithuania	22	O
Thailand	19	▼
Israel	18	▼
Italy	18	▼
Cyprus	15	▼
Jordan	12	▼
Indonesia	10	▼
Turkey	9	▼
Tunisia	8	▼
Macedonia, Rep. of	8	▼
Iran, Islamic Rep.	7	▼
Chile	4	▼
Philippines	2	▼
South Africa	2	▼
Morocco	1	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Number/fraction of 2 types of boxes

A book publisher sent 140 copies of a certain book to a bookstore. The publisher packed the books in two types of boxes. One type of box held 8 copies of the book, and the other type of box held 12 copies of the book. The boxes were all full, and there were equal numbers of both types of boxes.

a) How many boxes holding 12 books were sent to the bookstore?

Answer: _____

b) What fraction of the books sent to the bookstore were packed in the smaller boxes?

Answer: _____

Item Number: T02B

Overall Percent Correct

Singapore	48	▲
Hong Kong, SAR	43	▲
Chinese Taipei	43	▲
Japan	32	▲
Korea, Rep. of	30	▲
Bulgaria	18	O
Malaysia	16	O
Russian Federation	15	O
Canada	14	O
Netherlands	13	O
Hungary	13	O
Australia	12	O
International Average	**12**	
Slovenia	11	O
United States	11	O
Slovak Republic	11	O
Romania	10	O
Belgium (Flemish)	10	O
Thailand	10	O
New Zealand	10	O
Moldova	10	O
England	9	O
Finland	8	▼
Czech Republic	8	▼
Latvia (LSS)	8	▼
Cyprus	7	▼
Italy	6	▼
Israel	5	▼
Lithuania	4	▼
Jordan	3	▼
Iran, Islamic Rep.	2	▼
Indonesia	2	▼
Macedonia, Rep. of	2	▼
Chile	2	▼
Turkey	2	▼
Tunisia	1	▼
Philippines	1	▼
South Africa	1	▼
Morocco	0	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

SCORING

B: Scoring for Fraction of Books in Smaller Boxes

Note: The term "equivalent" in the scoring guide below includes decimal fractions and percentages.

Correct Response
- 2/5
- Another fraction or percent equivalent to 2/5 *(e.g., 8/20, 14/35, 28/70, etc.)*
- Other correct

Incorrect Response
- 1/2
- 2/3 OR 8/12 OR 56/84 [fraction of boxes]
- Any integer
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Height of stack from paper thickness

A sheet of paper is 0.012 cm thick. Of the following, which would be the height of a stack of 400 sheets of this paper?

A. 0.048 cm

B. 0.48 cm

C. 4.8 cm

D. 48 cm

Item Number: T04

Overall Percent Correct

Japan	83	▲
Singapore	80	▲
Hong Kong, SAR	78	▲
Chinese Taipei	75	▲
Korea, Rep. of	75	▲
Belgium (Flemish)	75	▲
Netherlands	72	▲
Finland	72	▲
Czech Republic	70	▲
Slovak Republic	69	▲
Malaysia	67	▲
Canada	67	▲
Hungary	65	▲
Slovenia	62	▲
United States	62	▲
Australia	59	▲
Latvia (LSS)	59	O
Russian Federation	59	O
Lithuania	54	O
Bulgaria	54	O
New Zealand	54	O
International Average	**54**	
England	53	O
Moldova	49	O
Italy	48	O
Israel	47	▼
Romania	46	O
Thailand	45	▼
Cyprus	44	▼
Jordan	36	▼
Turkey	36	▼
Iran, Islamic Rep.	33	▼
Macedonia, Rep. of	33	▼
Indonesia	33	▼
Tunisia	31	▼
Chile	23	▼
Philippines	22	▼
Morocco	22	▼
South Africa	20	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**C**

Content Domain	Cognitive Domain
Fractions and Number Sense	Using Complex Procedures

Two possibilities for actual height

The height of a boy was reported as 140 cm. The height had been rounded to the nearest 10 cm. What are two possibilities for the boy's actual height?

Answer: _____ cm and _____ cm

Item Number: V01

SCORING

Correct Response

• One answer 140 and the other answer is in an acceptable range, $135 \le x < 140$ or $140 < x < 145$.

• Neither answer is 140 cm but both are in the acceptable range $135 \le x < 140$ and/or $140 < x < 145$.

Incorrect Response

• Both answers within the intervals $145 \le x \le 150$ and/or $130 \le x < 135$

• 130 AND 150

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Finland	85	▲
Czech Republic	82	▲
Slovak Republic	79	▲
Singapore	78	▲
Canada	72	▲
Australia	69	▲
Russian Federation	69	▲
Japan	69	▲
Korea, Rep. of	66	▲
Hungary	66	▲
Hong Kong, SAR	66	▲
Chinese Taipei	65	▲
Netherlands	64	▲
Belgium (Flemish)	61	▲
England	61	▲
Thailand	61	▲
New Zealand	58	▲
Lithuania	57	▲
United States	56	▲
International Average	**44**	
Israel	44	O
Moldova	43	O
Slovenia	41	O
Bulgaria	40	O
Latvia (LSS)	39	O
Malaysia	33	▼
Jordan	29	▼
Italy	25	▼
Indonesia	24	▼
Cyprus	21	▼
Romania	15	▼
Macedonia, Rep. of	13	▼
Philippines	9	▼
Chile	8	▼
Tunisia	7	▼
South Africa	6	▼
Iran, Islamic Rep.	5	▼
Turkey	4	▼
Morocco	3	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Fractions and Number Sense	Investigating and Solving Problems

Ratio of nitrate to total fertilizer

In making a garden fertilizer, a gardener mixes 2 kg of a nitrate, 3 kg of a phosphate, and 6 kg of potash. What is the ratio of nitrate to the total amount of fertilizer?

A. $\dfrac{11}{9}$

B. $\dfrac{2}{3}$

C. $\dfrac{2}{9}$

D. $\dfrac{2}{11}$

Item Number: V03

Overall Percent Correct

Country	Percent	
Singapore	87	▲
Korea, Rep. of	84	▲
Chinese Taipei	74	▲
Netherlands	74	▲
Hong Kong, SAR	74	▲
Finland	65	▲
Malaysia	62	▲
Japan	61	▲
Canada	55	▲
United States	55	▲
Belgium (Flemish)	54	▲
Slovenia	53	▲
Hungary	50	O
Australia	48	O
Italy	47	O
Russian Federation	46	O
International Average	**45**	
New Zealand	44	O
Thailand	44	O
Indonesia	43	O
England	42	O
Romania	40	O
Bulgaria	40	O
Cyprus	40	O
Israel	40	O
Slovak Republic	37	O
Jordan	36	▼
Latvia (LSS)	35	▼
Turkey	35	▼
Iran, Islamic Rep.	35	▼
Moldova	34	▼
Czech Republic	30	▼
Tunisia	29	▼
Macedonia, Rep. of	26	▼
Lithuania	23	▼
Chile	22	▼
Philippines	21	▼
Morocco	15	▼
South Africa	15	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Algebra	Knowing

Equation representing relationship

---

n is a number. When n is multiplied by 7, and 6 is then added, the result is 41. Which of these equations represents this relation?

A. $7n + 6 = 41$

B. $7n \pm 6 = 41$

C. $7n \times 6 = 41$

D. $7(n + 6) = 41$

Item Number: B12

Overall Percent Correct

Country		
Hong Kong, SAR	93	▲
Singapore	89	▲
Japan	86	▲
Korea, Rep. of	85	▲
Chinese Taipei	84	▲
Slovenia	83	▲
Canada	82	▲
Russian Federation	82	▲
Slovak Republic	81	▲
Belgium (Flemish)	81	▲
Netherlands	80	▲
Hungary	80	▲
United States	77	▲
Bulgaria	76	▲
Australia	72	▲
Czech Republic	72	▲
Latvia (LSS)	71	▲
Lithuania	71	O
Finland	68	O
Israel	68	O
Thailand	67	O
Romania	67	O
Cyprus	66	O
International Average	**65**	
Moldova	65	O
Macedonia, Rep. of	63	O
England	62	O
Italy	58	▼
New Zealand	58	▼
Tunisia	58	▼
Malaysia	57	▼
Jordan	46	▼
Iran, Islamic Rep.	46	▼
Turkey	41	▼
Chile	38	▼
Indonesia	37	▼
Morocco	35	▼
South Africa	21	▼
Philippines	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Algebra	Using Routine Procedures

Value of *x* from equivalent ratios

If the ratio 7 to 13 is the same as the ratio *x* to 52, what is the value of *x*?

A. 7

B. 13

C. 28

D. 364

Item Number: D08

Overall Percent Correct

Singapore	96	▲
Korea, Rep. of	93	▲
Chinese Taipei	90	▲
Hong Kong, SAR	88	▲
Malaysia	84	▲
Canada	84	▲
Japan	82	▲
Australia	80	▲
United States	78	▲
Slovenia	77	▲
Russian Federation	76	▲
Hungary	75	▲
Belgium (Flemish)	75	▲
Italy	74	O
New Zealand	73	O
England	73	O
Thailand	72	O
Netherlands	70	O
Cyprus	70	O
Czech Republic	70	O
International Average	**69**	
Slovak Republic	68	O
Bulgaria	68	O
Latvia (LSS)	66	O
Macedonia, Rep. of	66	O
Romania	64	O
Finland	63	▼
Jordan	61	▼
Israel	61	▼
Moldova	60	▼
Tunisia	60	▼
Indonesia	59	▼
Turkey	59	▼
Iran, Islamic Rep.	58	▼
Lithuania	58	▼
Chile	49	▼
Philippines	47	▼
South Africa	38	▼
Morocco	35	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Algebra	Knowing

Equation to determine cost of cards

The cost, C, of printing greeting cards consists of a fixed charge of 100 cents and a charge of 6 cents for each card printed. Which of these equations can be used to determine the cost of printing n cards?

A. $C = (100 + 6n)$ cents

B. $C = (106 + n)$ cents

C. $C = (6 + 100n)$ cents

D. $C = (106n)$ cents

E. $C = (600n)$ cents

Item Number: D10

Overall Percent Correct

Chinese Taipei	78	▲
Japan	75	▲
Hong Kong, SAR	74	▲
Korea, Rep. of	74	▲
Netherlands	74	▲
Thailand	69	▲
Singapore	64	▲
Bulgaria	62	▲
Belgium (Flemish)	60	▲
Canada	56	▲
Slovenia	55	O
Australia	55	O
United States	55	▲
Russian Federation	54	O
England	53	O
Indonesia	53	O
New Zealand	52	O
Macedonia, Rep. of	51	O
Philippines	51	O
Czech Republic	51	O
International Average	**50**	
Hungary	48	O
Finland	48	O
Slovak Republic	47	O
Cyprus	46	O
Jordan	46	O
Romania	45	O
Italy	42	▼
Israel	42	▼
Malaysia	42	▼
Lithuania	42	▼
Turkey	41	▼
Chile	37	▼
Moldova	33	▼
Iran, Islamic Rep.	30	▼
Latvia (LSS)	29	▼
South Africa	27	▼
Morocco	24	▼
Tunisia	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Algebra	Investigating and Solving Problems

Find 1/3 of number from relationship

If 4 times a number is 48, what is $\frac{1}{3}$ of the number?

A. 4

B. 8

C. 12

D. 16

Item Number: F11

Overall Percent Correct

Hong Kong, SAR	89	▲
Korea, Rep. of	85	▲
Chinese Taipei	83	▲
Singapore	82	▲
Japan	73	▲
Belgium (Flemish)	72	▲
Finland	68	▲
Bulgaria	66	▲
Hungary	63	▲
Russian Federation	63	▲
Australia	54	▲
Slovenia	54	▲
Malaysia	54	▲
Canada	53	▲
United States	50	O
Cyprus	49	O
International Average	**47**	
Latvia (LSS)	46	O
Israel	44	O
Turkey	44	O
New Zealand	43	O
Romania	41	O
Netherlands	41	O
Moldova	41	O
Czech Republic	40	O
England	40	▼
Slovak Republic	38	▼
Jordan	36	▼
Iran, Islamic Rep.	36	▼
Macedonia, Rep. of	34	▼
Thailand	31	▼
Italy	29	▼
South Africa	27	▼
Chile	23	▼
Indonesia	20	▼
Lithuania	19	▼
Philippines	19	▼
Morocco	15	▼
Tunisia	10	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response: A

Content Domain	Cognitive Domain
Algebra	Knowing

Equation from *x/y* table

Overall Percent Correct

The table shows a relation between x and y.

x	2	3	4	5
y	7	10	13	16

Which of these equations expresses this relation?

A. $y = x + 5$

B. $y = x \pm 5$

C. $y = \dfrac{1}{3}(x \pm 1)$

D. $y = 3x + 1$

Item Number: H10

Korea, Rep. of	84	▲
Hungary	80	▲
Japan	76	▲
Chinese Taipei	72	▲
Singapore	71	▲
Netherlands	71	▲
Australia	68	▲
Hong Kong, SAR	68	▲
Russian Federation	65	▲
Slovenia	60	▲
Belgium (Flemish)	60	▲
United States	57	▲
England	57	▲
Slovak Republic	57	O
Canada	55	▲
Czech Republic	53	O
New Zealand	52	O
Macedonia, Rep. of	51	O
Malaysia	51	O
Jordan	50	O
Latvia (LSS)	50	O
International Average	**49**	
Bulgaria	47	O
Tunisia	41	▼
Israel	41	▼
Italy	40	▼
Finland	39	▼
Indonesia	37	▼
Lithuania	36	▼
Romania	36	▼
Cyprus	36	▼
Thailand	33	▼
Turkey	32	▼
Iran, Islamic Rep.	31	▼
Moldova	31	▼
Philippines	22	▼
Chile	21	▼
Morocco	20	▼
South Africa	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	D

Content Domain	Cognitive Domain
Algebra	Knowing

Symbolic linear equation of magazines

☐ represents the number of magazines that Lina reads each week. Which of these represents the total number of magazines that Lina reads in 6 weeks?

A. $6 + \square$

B. $6 \times \square$

C. $\square + 6$

D. $(\square + \square) \times 6$

Item Number: H12

Overall Percent Correct

Country		
Singapore	95	▲
Belgium (Flemish)	88	▲
Chinese Taipei	87	▲
Netherlands	87	▲
Canada	86	▲
United States	86	▲
Malaysia	86	▲
Japan	85	▲
Australia	83	▲
Finland	82	▲
Hungary	81	▲
Slovenia	81	▲
Korea, Rep. of	81	▲
Czech Republic	80	▲
England	79	▲
Slovak Republic	79	▲
New Zealand	77	▲
Latvia (LSS)	77	▲
Russian Federation	77	O
Israel	77	▲
Cyprus	75	O
Tunisia	75	O
Bulgaria	73	O
Italy	72	O
International Average	**72**	
Romania	71	O
Lithuania	66	O
Hong Kong, SAR	64	▼
Jordan	64	▼
Thailand	63	▼
Moldova	63	▼
Indonesia	54	▼
Chile	54	▼
Iran, Islamic Rep.	51	▼
Turkey	51	▼
Macedonia, Rep. of	47	▼
Philippines	45	▼
Morocco	44	▼
South Africa	36	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Algebra	Using Routine Procedures

Missing number in table

The table represents a relation between x and y.

What is the missing number in the table?

A. 9

B. 10

C. 11

D. 12

E. 13

x	y
2	5
3	7
4	?
7	15

Item Number: J17

Overall Percent Correct

Netherlands	81	▲
Chinese Taipei	79	▲
Japan	78	▲
Korea, Rep. of	78	▲
Hong Kong, SAR	77	▲
Hungary	74	▲
Slovenia	73	▲
New Zealand	72	▲
Canada	71	O
Australia	70	O
Moldova	69	O
Israel	69	O
Slovak Republic	68	O
Thailand	68	O
Belgium (Flemish)	67	O
Finland	67	O
Singapore	67	O
Russian Federation	66	O
Italy	65	O
Tunisia	65	O
Lithuania	65	O
International Average	**65**	
Latvia (LSS)	65	O
Bulgaria	64	O
Cyprus	64	O
Romania	63	O
United States	63	O
Czech Republic	63	O
Macedonia, Rep. of	63	O
England	62	O
Jordan	61	O
Malaysia	58	O
Turkey	58	▼
Indonesia	57	▼
Iran, Islamic Rep.	53	▼
Philippines	48	▼
Chile	47	▼
South Africa	43	▼
Morocco	40	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**A**

Content Domain	Cognitive Domain
Algebra	Investigating and Solving Problems

Distance traveled by elevator

In a sequence of starts and stops, an elevator travels from the first floor to the fifth floor and then to the second floor. From there, the elevator travels to the fourth floor and then to the third floor. If the floors are 3 m apart, how far has the elevator traveled?

A. 18 m

B. 27 m

C. 30 m

D. 45 m

Item Number: L12

Overall Percent Correct

Korea, Rep. of	77	▲
Japan	74	▲
Chinese Taipei	72	▲
Hong Kong, SAR	72	▲
Finland	72	▲
Belgium (Flemish)	70	▲
Australia	69	▲
Singapore	69	▲
Czech Republic	66	▲
Malaysia	63	▲
Slovak Republic	62	O
Hungary	61	▲
Canada	60	▲
Lithuania	60	O
New Zealand	59	O
Russian Federation	59	O
Slovenia	58	O
Netherlands	58	O
England	57	O
Latvia (LSS)	55	O
United States	55	O
International Average	**53**	
Cyprus	52	O
Italy	51	O
Moldova	49	O
Macedonia, Rep. of	45	O
Tunisia	44	▼
Turkey	43	▼
Romania	42	▼
Jordan	39	▼
Chile	39	▼
Israel	39	▼
Iran, Islamic Rep.	38	▼
Thailand	38	▼
Indonesia	37	▼
South Africa	33	▼
Morocco	32	▼
Philippines	26	▼
Bulgaria	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Algebra	Communicating and Reasoning

Correct equation based on *x/y* table

The table represents a relation between x and y.

Which of the following equations could represent the same relation?

A. $y = 2x + 2$

B. $y = 2x - 1$

C. $y = 3x + 2$

D. $y = 3x + 1$

E. $y = 3x - 2$

x	y
1	1
2	4
3	7
4	10

Item Number: L14

Overall Percent Correct

Korea, Rep. of	80	▲
Hungary	75	▲
Chinese Taipei	75	▲
Singapore	74	▲
Hong Kong, SAR	74	▲
Japan	69	▲
Belgium (Flemish)	67	▲
Australia	64	▲
Netherlands	64	▲
Russian Federation	61	▲
Slovak Republic	56	▲
Slovenia	54	O
Canada	53	O
England	51	O
Czech Republic	50	O
United States	49	O
New Zealand	49	O
Macedonia, Rep. of	48	O
Jordan	48	O
Latvia (LSS)	45	O
International Average	**45**	
Bulgaria	44	O
Israel	41	O
Malaysia	41	O
Italy	39	O
Lithuania	36	O
Romania	35	O
Tunisia	33	▼
Moldova	33	▼
Finland	32	▼
Indonesia	27	▼
Thailand	24	▼
Cyprus	24	▼
Iran, Islamic Rep.	22	▼
Turkey	21	▼
South Africa	14	▼
Morocco	14	▼
Philippines	13	▼
Chile	12	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**E**

Content Domain	Cognitive Domain
Algebra	Using Routine Procedures

Values in proportionality table

The table shows some values of x and y, where x is proportional to y.

x	4	8	Q
y	9	P	45

What are the values of P and Q?

A. $P = 40$ and $Q = 13$

B. $P = 18$ and $Q = 17$

C. $P = 20$ and $Q = 18$

D. $P = 40$ and $Q = 18$

E. $P = 18$ and $Q = 20$

Item Number: L15

Overall Percent Correct

Chinese Taipei	69	▲
Japan	62	▲
Singapore	57	▲
Korea, Rep. of	54	▲
Hong Kong, SAR	51	▲
Belgium (Flemish)	49	▲
Netherlands	49	▲
Russian Federation	43	▲
Malaysia	43	▲
Slovak Republic	38	O
Canada	38	O
Hungary	38	O
Jordan	37	O
Slovenia	34	O
United States	34	O
Romania	34	O
International Average	**33**	
Australia	33	O
Bulgaria	32	O
Thailand	30	O
Indonesia	29	O
Italy	28	O
Czech Republic	28	O
England	28	O
Lithuania	26	O
Moldova	26	O
Cyprus	26	O
New Zealand	24	▼
Turkey	24	▼
Iran, Islamic Rep.	24	▼
Latvia (LSS)	23	▼
Macedonia, Rep. of	23	▼
South Africa	21	▼
Finland	21	▼
Philippines	21	▼
Israel	20	▼
Morocco	17	▼
Chile	15	▼
Tunisia	15	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**E**

Content Domain	Cognitive Domain
Algebra	Using Routine Procedures

Value of *x* in mathematical equation

Find the value of x if $12x - 10 = 6x + 32$

Answer: _____

Item Number: L17

SCORING

Correct Response

• 7

Incorrect Response

• $3\frac{2}{3}$ OR $2\frac{1}{3}$ OR $1\frac{2}{9}$ [uses incorrect operation: $32 - 10 = 22$, $12x + 6x = 18x$, or both]

• Any expression or equation, other than $x = 7$, containing x

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Japan	85	▲
Hong Kong, SAR	80	▲
Korea, Rep. of	80	▲
Slovak Republic	78	▲
Russian Federation	77	▲
Slovenia	76	▲
Singapore	75	▲
Hungary	74	▲
Chinese Taipei	73	▲
Romania	70	▲
Czech Republic	66	▲
Lithuania	62	▲
Latvia (LSS)	58	▲
Belgium (Flemish)	58	▲
Moldova	56	▲
Macedonia, Rep. of	54	O
Cyprus	51	O
Israel	51	O
Italy	46	O
International Average	**44**	
Malaysia	43	O
Bulgaria	34	▼
United States	34	▼
Canada	33	▼
Turkey	32	▼
Australia	31	▼
Thailand	29	▼
England	26	▼
Finland	24	▼
Iran, Islamic Rep.	23	▼
Netherlands	19	▼
New Zealand	19	▼
Jordan	18	▼
Indonesia	18	▼
Chile	12	▼
Morocco	7	▼
Philippines	6	▼
Tunisia	6	▼
South Africa	5	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Algebra	Using Routine Procedures

Value of expression substituting *x*=3

If $x = 3$, what is the value of $\dfrac{5x + 3}{4x - 3}$?

Answer: _____

Item Number: N13

SCORING

Correct Response

- 2
- 18/9, 2/1 or other fraction equivalent to 2
- Other correct

Incorrect Response

- Indicates the correct substitution of *x* = 3 in numerator and/or denominator but student did not correctly complete the solution.
- Indicates a wrong substitution such as 5*x* = 53 or 5*x* = 5 + 3 in the numerator; for example, any fractions with 56 or 11 as numerators, or 40 or 4 as denominators.
- A response containing the variable *x*
- Cancels or ignores *x*'s *(e.g., 8/1, 8, 7, etc.)*
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	83	▲
Chinese Taipei	81	▲
Hong Kong, SAR	81	▲
Hungary	80	▲
Russian Federation	79	▲
Slovenia	75	▲
Korea, Rep. of	75	▲
Slovak Republic	72	▲
Japan	69	▲
Lithuania	67	▲
Belgium (Flemish)	67	▲
Canada	67	▲
Bulgaria	65	▲
Latvia (LSS)	64	▲
Czech Republic	62	O
United States	61	▲
Australia	61	O
Romania	59	O
Moldova	57	O
International Average	**53**	
Macedonia, Rep. of	53	O
Israel	53	O
Netherlands	50	O
Malaysia	48	O
Cyprus	47	O
Thailand	47	O
Tunisia	47	▼
Italy	47	O
England	46	O
Finland	44	▼
New Zealand	42	▼
Jordan	40	▼
Turkey	35	▼
Indonesia	28	▼
Iran, Islamic Rep.	28	▼
Philippines	15	▼
Chile	14	▼
Morocco	12	▼
South Africa	9	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Algebra	Knowing

Expression equivalent to n x n x n

Which of these expressions is equivalent to n x n x n for all values of n?

A. $\dfrac{n}{3}$

B. $n + 3$

C. $3n$

D. n^3

Item Number: P09

Overall Percent Correct

Singapore	90	▲
Korea, Rep. of	86	▲
Hong Kong, SAR	85	▲
United States	85	▲
Japan	85	▲
Tunisia	84	▲
Chinese Taipei	83	▲
Czech Republic	81	▲
Belgium (Flemish)	80	O
Slovak Republic	80	▲
Indonesia	80	▲
Slovenia	80	▲
Thailand	80	▲
Hungary	79	▲
Latvia (LSS)	77	O
Australia	77	O
Russian Federation	76	O
Canada	75	O
Cyprus	74	O
Malaysia	74	O
Italy	72	O
Lithuania	71	O
International Average	**71**	
Iran, Islamic Rep.	71	O
Bulgaria	69	O
Israel	67	O
Chile	67	O
Romania	66	O
New Zealand	66	O
England	61	▼
Jordan	61	▼
Netherlands	55	▼
South Africa	55	▼
Moldova	53	▼
Finland	53	▼
Philippines	49	▼
Turkey	47	▼
Morocco	34	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Algebra	Knowing

Equivalent expression: *k+k+k+k+k*

For all numbers k,
$k + k + k + k + k$ can be written as

A. $k + 5$

B. $5k$

C. k^5

D. $5(k + 1)$

Item Number: P11

Overall Percent Correct

Slovak Republic	80	▲
Hong Kong, SAR	80	▲
Singapore	76	▲
Chinese Taipei	76	▲
Hungary	75	▲
Slovenia	72	▲
Czech Republic	70	▲
Korea, Rep. of	69	▲
Belgium (Flemish)	69	▲
Russian Federation	68	▲
Malaysia	67	▲
Latvia (LSS)	67	▲
Cyprus	65	O
Bulgaria	65	O
Romania	65	O
Macedonia, Rep. of	62	O
Japan	61	O
Turkey	59	O
Israel	58	O
International Average	**57**	
Netherlands	57	O
Italy	57	O
Finland	57	O
Canada	56	O
Moldova	55	O
Australia	54	O
New Zealand	54	O
Tunisia	53	O
Lithuania	52	O
Jordan	48	▼
England	48	▼
United States	46	▼
Indonesia	41	▼
South Africa	38	▼
Philippines	37	▼
Iran, Islamic Rep.	36	▼
Chile	35	▼
Thailand	33	▼
Morocco	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Algebra	Knowing

Expression when *a, b, c* are real

Which of the following is true when a, b, and c are different real numbers?

A. $a - b = b - a$

B. $a(b - c) = b(c - a)$

C. $b - c = c - b$

D. $ab = ba$

E. $ab - c = ab - b$

Item Number: R10

Overall Percent Correct

Russian Federation	72	▲
Korea, Rep. of	69	▲
Hong Kong, SAR	67	▲
Chinese Taipei	64	▲
Hungary	58	▲
Belgium (Flemish)	56	▲
Singapore	53	▲
Czech Republic	50	O
Japan	49	▲
Slovak Republic	48	▲
Bulgaria	47	▲
Canada	43	O
Latvia (LSS)	42	O
Romania	42	O
Australia	41	O
Slovenia	41	O
United States	40	O
Netherlands	40	O
International Average	**37**	
Tunisia	37	O
Moldova	36	O
Israel	35	O
Jordan	31	O
Macedonia, Rep. of	30	O
New Zealand	30	O
England	30	O
Lithuania	30	O
Thailand	29	▼
Cyprus	28	▼
Malaysia	26	▼
Italy	23	▼
Morocco	21	▼
Turkey	20	▼
Finland	19	▼
South Africa	19	▼
Iran, Islamic Rep.	18	▼
Indonesia	14	▼
Chile	11	▼
Philippines	8	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	D

Content Domain	Cognitive Domain
Algebra	Knowing

Operations on negative number

If k represents a negative number, which of these is a positive number?

A. k^2

B. k^3

C. $2k$

D. $\dfrac{k}{2}$

Item Number: R12

Overall Percent Correct

Chinese Taipei	84	▲
Russian Federation	81	▲
Hong Kong, SAR	79	▲
Korea, Rep. of	69	▲
Japan	69	▲
Slovenia	67	▲
Latvia (LSS)	67	▲
Hungary	67	▲
Slovak Republic	66	▲
Bulgaria	66	▲
Lithuania	64	▲
Belgium (Flemish)	63	▲
Singapore	63	▲
Romania	59	▲
Czech Republic	55	O
Moldova	49	O
Italy	49	O
Israel	48	O
International Average	**47**	
United States	46	O
Netherlands	42	O
Malaysia	42	O
Tunisia	41	O
Macedonia, Rep. of	40	O
Canada	39	O
Australia	34	▼
Turkey	33	▼
Thailand	32	▼
Indonesia	30	▼
Iran, Islamic Rep.	30	▼
Cyprus	29	▼
Morocco	29	▼
Jordan	28	▼
Chile	27	▼
England	27	▼
Finland	25	▼
Philippines	25	▼
New Zealand	20	▼
South Africa	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Algebra	Investigating and Solving Problems

Total club members: boys and girls

A club has 86 members, and there are 14 more girls than boys. How many boys and how many girls are members of the club?

Show your work.

Item Number: T01

SCORING

Correct Response

• 36 boys and 50 girls [Numerical method: *e.g., 86 ÷ 2 = 43; 43 − 7 = 36 boys; 43 + 7 = 50 girls*]

• 36 boys and 50 girls [Algebraic method: *e.g., b + (b + 14) = 86; 2b = 72; b = 36; g = 36 + 14 = 50*]

• Other fully satisfactory method including "guess and check" with justification that 36 + 50 = 86

Partial Response

• Either 36 boys or 50 girls, with or without another (incorrect) number

• 36 and 50 are given [Makes correct computations but reverses labels or does not include any mention of which is boys or girls]

• 36 boys and 50 girls, no method shown

• Gives an algebraic equation or system of equations that can lead to the correct solution

• Other partially correct

Incorrect Response

• 29 boys and 57 girls [Computes 86 ÷ 2 = 43; 43 − 14 = 29 and 43 + 14 = 57]

• One of the numbers is 72 [Computes 86 − 14]

• 29 boys and 43 girls [Computes 43 − 14 = 29]

• Gives an algebraic equation or system of equations that cannot lead to a correct solution

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	72	▲
Chinese Taipei	66	▲
Hong Kong, SAR	62	▲
Belgium (Flemish)	62	▲
Korea, Rep. of	61	▲
Slovak Republic	53	▲
Japan	53	▲
Hungary	46	▲
Czech Republic	46	▲
Canada	42	▲
Bulgaria	41	O
Russian Federation	40	O
Netherlands	38	O
Romania	38	O
Australia	37	O
Slovenia	37	O
England	34	O
Cyprus	34	O
International Average	**33**	
Finland	32	O
Latvia (LSS)	32	O
New Zealand	32	O
Malaysia	32	O
Israel	30	O
United States	29	▼
Moldova	26	▼
Italy	24	▼
Lithuania	23	▼
Turkey	20	▼
Thailand	20	▼
Macedonia, Rep. of	16	▼
Iran, Islamic Rep.	14	▼
Indonesia	14	▼
Jordan	13	▼
Tunisia	10	▼
Philippines	9	▼
Chile	8	▼
Morocco	5	▼
South Africa	4	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Algebra	Investigating and Solving Problems

Sequence of figures with circles

The figures show four sets consisting of circles.

Figure 1   Figure 2   Figure 3   Figure 4

a) Complete the table below. First, fill in how many circles make up Figure 4. Then, find the number of circles that would be needed for the 5th figure if the sequence of figures is extended.

Figure	Number of circles
1	1
2	3
3	6
4	
5	

b) The sequence of figures is extended to the 7th figure. How many circles would be needed for Figure 7?

Answer: _____

c) The 50th figure in the sequence contains 1275 circles. Determine the number of circles in the 51st figure. Without drawing the 51st figure, explain or show how you arrived at your answer.

Item Number: V04A

SCORING

A. Scoring for Number of Circles in Figures 4 and 5

Correct Response

• 10 AND 15

Incorrect Response

• 10 and any number other than 15

• 10 and no numerical response for 5th figure

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Korea, Rep. of	91	▲
Japan	91	▲
Singapore	89	▲
Chinese Taipei	87	▲
Hong Kong, SAR	87	▲
Netherlands	83	▲
England	81	▲
Belgium (Flemish)	81	▲
Canada	81	▲
Australia	81	▲
New Zealand	81	▲
Finland	80	▲
Czech Republic	79	▲
Hungary	77	▲
Slovenia	77	▲
Slovak Republic	77	▲
Malaysia	73	▲
United States	73	▲
Bulgaria	68	O
Russian Federation	67	O
Italy	66	O
International Average	**65**	
Lithuania	64	O
Cyprus	64	O
Moldova	64	O
Latvia (LSS)	63	O
Israel	63	O
Romania	57	O
Thailand	54	▼
Macedonia, Rep. of	51	▼
Indonesia	47	▼
Turkey	43	▼
Jordan	41	▼
Tunisia	39	▼
Iran, Islamic Rep.	36	▼
Chile	35	▼
Philippines	27	▼
Morocco	20	▼
South Africa	14	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Algebra	Investigating and Solving Problems

Sequence of figures with circles

The figures show four sets consisting of circles.

Figure 1   Figure 2   Figure 3   Figure 4

a) Complete the table below. First, fill in how many circles make up Figure 4. Then, find the number of circles that would be needed for the 5th figure if the sequence of figures is extended.

Figure	Number of circles
1	1
2	3
3	6
4	
5	

b) The sequence of figures is extended to the 7th figure. How many circles would be needed for Figure 7?

Answer: _____

c) The 50th figure in the sequence contains 1275 circles. Determine the number of circles in the 51st figure. Without drawing the 51st figure, explain or show how you arrived at your answer.

Item Number: V04B

SCORING

B. Scoring for Number of Circles in Figure 7

Correct Response

• 28

Incorrect Response

• 21

• 22

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Korea, Rep. of	86	▲
Japan	83	▲
Hong Kong, SAR	83	▲
Singapore	82	▲
Chinese Taipei	81	▲
Canada	72	▲
Australia	71	▲
Belgium (Flemish)	70	▲
England	68	▲
Netherlands	67	▲
Slovak Republic	67	▲
Hungary	66	▲
Slovenia	66	▲
Czech Republic	64	▲
New Zealand	64	▲
Malaysia	64	▲
Finland	62	▲
United States	62	▲
Russian Federation	54	O
International Average	**54**	
Bulgaria	54	O
Cyprus	53	O
Moldova	52	O
Italy	52	O
Israel	52	O
Latvia (LSS)	50	O
Lithuania	47	O
Romania	47	▼
Thailand	46	▼
Macedonia, Rep. of	41	▼
Indonesia	38	▼
Turkey	33	▼
Jordan	30	▼
Tunisia	29	▼
Iran, Islamic Rep.	24	▼
Chile	24	▼
Philippines	21	▼
Morocco	12	▼
South Africa	9	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Algebra	Communicating and Reasoning

Sequence of figures with circles

The figures show four sets consisting of circles.

Figure 1   Figure 2   Figure 3   Figure 4

a) Complete the table below. First, fill in how many circles make up Figure 4. Then, find the number of circles that would be needed for the 5th figure if the sequence of figures is extended.

Figure	Number of circles
1	1
2	3
3	6
4	
5	

b) The sequence of figures is extended to the 7th figure. How many circles would be needed for Figure 7?

Answer: _____

c) The 50th figure in the sequence contains 1275 circles. Determine the number of circles in the 51st figure. Without drawing the 51st figure, explain or show how you arrived at your answer.

Item Number: V04C

SCORING

C. Scoring for Explanation and Answer for 51st Figure

Correct Response

• 1326. Correct general expression $\frac{n(n+1)}{2}$, $\frac{51(52)}{2}$, or equivalent

• 1326 [Adds 1275 + 51]

• Other fully correct, including [(figure number)^2 – number of circles in previous figure]

Partial Response

• 1326 without showing how obtained

• Correct method but does not write 1326 as answer

• Other partially correct

Incorrect Response

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Country	%	
Korea, Rep. of	70	▲
Chinese Taipei	68	▲
Japan	66	▲
Singapore	65	▲
Hong Kong, SAR	57	▲
Netherlands	48	▲
Belgium (Flemish)	44	▲
Canada	43	▲
Australia	39	▲
Hungary	38	▲
Malaysia	37	▲
Slovenia	37	O
England	35	O
United States	34	▲
Czech Republic	34	O
Slovak Republic	31	O
New Zealand	31	O
International Average	**30**	
Finland	30	O
Israel	27	O
Russian Federation	27	O
Moldova	26	O
Bulgaria	26	O
Thailand	25	O
Italy	24	▼
Indonesia	24	▼
Latvia (LSS)	22	▼
Romania	19	▼
Lithuania	19	▼
Cyprus	15	▼
Macedonia, Rep. of	13	▼
Jordan	13	▼
Turkey	11	▼
Philippines	9	▼
Chile	8	▼
Tunisia	8	▼
Iran, Islamic Rep.	8	▼
South Africa	3	▼
Morocco	3	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Measurement	Knowing

Units to measure mass of egg

What units would be best to use to measure the weight (mass) of an egg?

A. centimeters

B. milliliters

C. grams

D. kilograms

Item Number: D11

Overall Percent Correct
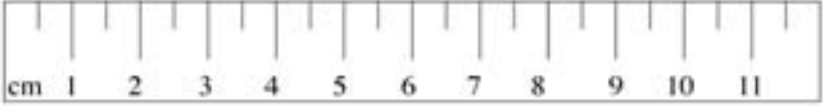
Japan	98	▲
Slovak Republic	96	▲
Hungary	96	▲
Czech Republic	95	▲
Korea, Rep. of	93	▲
Bulgaria	93	▲
Slovenia	93	▲
Singapore	93	▲
Belgium (Flemish)	92	▲
Russian Federation	92	▲
Australia	91	▲
Italy	90	▲
Netherlands	89	▲
Latvia (LSS)	89	▲
Malaysia	88	▲
Lithuania	88	▲
Finland	87	▲
Macedonia, Rep. of	87	▲
New Zealand	87	▲
Tunisia	86	▲
England	86	▲
Canada	85	▲
Romania	85	O
Moldova	82	O
Hong Kong, SAR	82	O
International Average	**81**	
Cyprus	79	O
Turkey	78	O
Israel	75	▼
Chinese Taipei	73	▼
Jordan	73	▼
Thailand	69	▼
Chile	69	▼
Iran, Islamic Rep.	68	▼
United States	68	▼
Morocco	55	▼
South Africa	48	▼
Philippines	47	▼
Indonesia	34	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Measurement	Knowing

Measurement accuracy of ruler

Using a centimeter ruler like this one, you can measure accurately to the nearest

A.   millimeter

B.   half-millimeter

C.   centimeter

D.   half-centimeter

Item Number: F10

Overall Percent Correct

Finland	81	▲
Belgium (Flemish)	80	▲
Slovenia	75	▲
Latvia (LSS)	75	▲
Russian Federation	74	▲
Czech Republic	74	▲
Netherlands	72	▲
Hungary	71	▲
Bulgaria	65	▲
Australia	63	▲
Korea, Rep. of	61	▲
Italy	61	▲
Slovak Republic	60	▲
Lithuania	59	▲
Hong Kong, SAR	57	▲
New Zealand	56	▲
Singapore	52	O
Canada	52	O
England	51	O
International Average	**49**	
Israel	48	O
Chinese Taipei	47	O
Romania	45	O
Macedonia, Rep. of	43	▼
United States	42	▼
Moldova	41	▼
Thailand	37	▼
Indonesia	35	▼
Japan	35	▼
Chile	33	▼
Malaysia	29	▼
Tunisia	29	▼
South Africa	27	▼
Cyprus	24	▼
Iran, Islamic Rep.	23	▼
Jordan	23	▼
Morocco	20	▼
Philippines	18	▼
Turkey	18	▼

**Country average vs.
International average:**

Higher	▲
Not different	O
Lower	▼

Correct Response: D

Content Domain	Cognitive Domain
Measurement	Investigating and Solving Problems

Area of path around garden

A rectangular garden that is next to a building has a path around the other three sides, as shown.

What is the area of the path?

A. 144 m^2

B. 64 m^2

C. 44 m^2

D. 16 m^2

Item Number: J10

Overall Percent Correct

Hong Kong, SAR	79	▲
Singapore	78	▲
Japan	74	▲
Chinese Taipei	73	▲
Korea, Rep. of	67	▲
Netherlands	57	▲
Australia	52	▲
Malaysia	52	▲
Slovak Republic	51	O
Canada	51	O
Belgium (Flemish)	51	▲
Finland	46	O
Hungary	46	O
Slovenia	46	O
Cyprus	45	O
Italy	45	O
Bulgaria	42	O
International Average	**42**	
Czech Republic	40	O
England	40	O
New Zealand	40	O
Tunisia	38	O
Russian Federation	38	O
Thailand	35	O
Moldova	34	O
United States	33	▼
Morocco	31	▼
Lithuania	31	▼
Macedonia, Rep. of	30	▼
Romania	29	▼
Jordan	29	▼
Israel	28	▼
Latvia (LSS)	28	▼
Iran, Islamic Rep.	26	▼
Indonesia	25	▼
Turkey	22	▼
Chile	18	▼
Philippines	15	▼
South Africa	15	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

Content Domain	Cognitive Domain
Measurement	Investigating and Solving Problems

Most paces to walk to end of hallway

Four girls measured the length of their paces. The chart shows their measurements.

Name	Length of Pace
Polly	80 cm
Maria	65 cm
Helen	75 cm
Susan	60 cm

Who would take the most paces in walking from one end of a hallway to the other?

A. Polly

B. Maria

C. Helen

D. Susan

Item Number: L13

Overall Percent Correct

Country		
Belgium (Flemish)	94	▲
Hungary	91	▲
Finland	90	▲
Netherlands	90	▲
Japan	86	▲
Lithuania	84	▲
Latvia (LSS)	81	▲
Chinese Taipei	81	▲
Czech Republic	81	▲
Slovak Republic	81	▲
Chile	81	▲
Australia	79	▲
Slovenia	79	▲
Russian Federation	77	▲
Canada	76	▲
Italy	75	▲
Jordan	75	▲
Hong Kong, SAR	75	▲
England	74	O
Korea, Rep. of	72	O
Cyprus	70	O
Romania	68	O
New Zealand	68	O
International Average	**67**	
Tunisia	67	O
Israel	67	O
Moldova	66	O
Bulgaria	65	O
Singapore	62	O
United States	57	▼
Macedonia, Rep. of	56	▼
Thailand	54	▼
Malaysia	50	▼
Iran, Islamic Rep.	48	▼
Turkey	45	▼
Indonesia	27	▼
South Africa	23	▼
Morocco	20	▼
Philippines	20	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	D

Content Domain	Cognitive Domain
Measurement	Knowing

Angle closest to 45 degrees

Which angle in the figure has a measure closest to 45°?

A. p

B. q

C. r

D. s

Item Number: N15

Overall Percent Correct

Japan	81	▲
Korea, Rep. of	81	▲
Chinese Taipei	79	▲
Slovak Republic	76	▲
Canada	73	▲
Finland	73	▲
Russian Federation	73	▲
Hong Kong, SAR	73	▲
Singapore	72	▲
Hungary	72	▲
Belgium (Flemish)	70	▲
Latvia (LSS)	70	▲
Australia	68	O
Thailand	64	O
Malaysia	63	O
Romania	62	O
Iran, Islamic Rep.	61	O
Czech Republic	61	O
Bulgaria	61	O
England	61	O
Slovenia	61	O
International Average	**60**	
Macedonia, Rep. of	60	O
Moldova	58	O
Lithuania	58	O
Cyprus	56	O
New Zealand	56	O
Tunisia	53	O
Netherlands	52	O
Indonesia	51	▼
Israel	51	▼
United States	51	▼
Italy	51	▼
Chile	48	▼
Turkey	45	▼
Jordan	45	▼
Morocco	39	▼
Philippines	32	▼
South Africa	32	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Measurement	Investigating and Solving Problems

Ratio of width/perimeter in rectangle

The rectangle below is twice as long as it is wide.

What is the ratio of the width of the rectangle to its perimeter?

A. $\dfrac{1}{2}$

B. $\dfrac{1}{3}$

C. $\dfrac{1}{4}$

D. $\dfrac{1}{6}$

Item Number: P08

Overall Percent Correct

Singapore	56	▲
Chinese Taipei	53	▲
Hong Kong, SAR	45	▲
Japan	44	▲
Italy	32	▲
Korea, Rep. of	30	▲
Belgium (Flemish)	29	▲
Romania	28	O
Russian Federation	26	O
Bulgaria	25	O
International Average	**22**	
Slovak Republic	21	O
Malaysia	21	O
Slovenia	21	O
Moldova	21	O
Jordan	20	O
Czech Republic	20	O
Latvia (LSS)	20	O
Lithuania	19	O
Australia	18	O
Turkey	18	O
South Africa	18	O
Tunisia	17	O
Indonesia	17	O
Cyprus	17	O
Hungary	16	O
New Zealand	16	O
Canada	16	▼
Israel	15	▼
Netherlands	15	O
Iran, Islamic Rep.	15	▼
Chile	14	▼
England	13	▼
Macedonia, Rep. of	13	▼
Morocco	12	▼
United States	11	▼
Finland	11	▼
Thailand	9	▼
Philippines	8	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

63

Content Domain	Cognitive Domain
Measurement	Using Complex Procedures

Length of string pulled straight

If the string in the diagram is pulled straight, which of these is closest to its length?

A.   5 cm

B.   6 cm

C.   7 cm

D.   8 cm

Item Number: P12

Overall Percent Correct

Hungary	59	▲
Japan	57	▲
Slovak Republic	57	▲
Netherlands	56	▲
Belgium (Flemish)	54	▲
Hong Kong, SAR	53	▲
Czech Republic	53	▲
Chinese Taipei	53	▲
Latvia (LSS)	53	▲
Singapore	52	▲
Australia	52	▲
Slovenia	52	▲
Finland	50	O
Korea, Rep. of	50	▲
Russian Federation	48	O
Malaysia	46	O
Canada	46	O
New Zealand	45	O
Lithuania	44	O
England	43	O
International Average	**41**	
Thailand	41	O
Moldova	40	O
Bulgaria	39	O
United States	39	O
Tunisia	38	O
Cyprus	36	O
Romania	36	O
Israel	34	O
Iran, Islamic Rep.	33	▼
Italy	32	▼
Macedonia, Rep. of	32	▼
Turkey	30	▼
Jordan	26	▼
Chile	25	▼
Indonesia	23	▼
Philippines	15	▼
South Africa	15	▼
Morocco	11	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Measurement	Investigating and Solving Problems

Area of rectangle inside parallelogram

The figure shows a shaded rectangle inside a parallelogram.

What is the area of the shaded rectangle?

Answer: _____

Item Number: T03

SCORING

Note: There is no distinction made between responses with or without units.

Correct Response
- 20

Incorrect Response
- 32 [4 x 8]
- 18 [perimeter]
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct
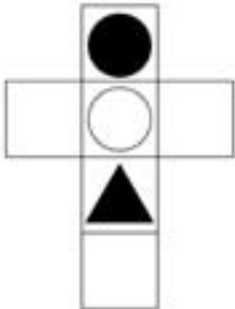
Singapore	83	▲
Japan	80	▲
Hong Kong, SAR	78	▲
Korea, Rep. of	78	▲
Chinese Taipei	75	▲
Belgium (Flemish)	65	▲
Canada	58	▲
Slovak Republic	57	▲
Finland	57	▲
Malaysia	56	▲
Netherlands	55	O
Australia	55	▲
Bulgaria	52	O
Slovenia	49	O
Russian Federation	49	O
Italy	48	O
England	48	O
Czech Republic	46	O
Hungary	45	O
Latvia (LSS)	44	O
International Average	**43**	
Romania	43	O
New Zealand	41	O
Cyprus	41	O
Moldova	38	O
Tunisia	38	▼
Lithuania	35	▼
United States	34	▼
Thailand	33	▼
Israel	28	▼
Jordan	26	▼
Iran, Islamic Rep.	25	▼
Macedonia, Rep. of	25	▼
Turkey	20	▼
Indonesia	20	▼
Morocco	8	▼
Chile	7	▼
Philippines	6	▼
South Africa	3	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Geometry	Using Complex Procedures

Cube from folded 2-dimensional net

Which of these cubes could be made by folding the figure above?

A.   B.   C.   D.

Item Number: B11

Overall Percent Correct

Japan	89	▲
Korea, Rep. of	85	▲
Hong Kong, SAR	84	▲
Singapore	83	▲
Chinese Taipei	83	▲
Netherlands	82	▲
Belgium (Flemish)	82	▲
Czech Republic	78	▲
Finland	77	▲
Australia	75	▲
Slovak Republic	74	▲
Canada	74	▲
Malaysia	71	▲
Latvia (LSS)	71	▲
New Zealand	70	▲
Slovenia	68	▲
Hungary	68	▲
United States	65	▲
England	64	O
Bulgaria	64	O
Lithuania	60	O
Russian Federation	60	O
International Average	**59**	
Italy	55	O
Thailand	53	O
Chile	48	▼
Israel	48	▼
Moldova	47	▼
Cyprus	45	▼
Romania	42	▼
Macedonia, Rep. of	39	▼
Indonesia	38	▼
Tunisia	37	▼
Turkey	34	▼
Jordan	34	▼
Iran, Islamic Rep.	28	▼
Philippines	24	▼
Morocco	21	▼
South Africa	15	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Geometry	Investigating and Solving Problems

Angles in symmetric polygon

The line *m* is a line of symmetry for figure *ABCDE*.

The measure of angle *BCD* is

A.   30°

B.   50°

C.   60°

D.   70°

E.   110°

Item Number: D07

Overall Percent Correct

Hong Kong, SAR	82	▲
Korea, Rep. of	82	▲
Singapore	82	▲
Japan	80	▲
Bulgaria	80	▲
Latvia (LSS)	79	▲
Russian Federation	79	▲
Tunisia	77	▲
Slovak Republic	77	▲
Chinese Taipei	74	▲
Czech Republic	73	▲
Canada	72	▲
Lithuania	71	▲
Moldova	71	▲
Cyprus	69	▲
Finland	69	▲
Slovenia	66	O
Romania	66	O
Italy	65	O
Macedonia, Rep. of	65	O
Belgium (Flemish)	65	O
Netherlands	64	O
Australia	62	O
International Average	**62**	
Malaysia	59	O
Israel	58	O
Thailand	58	O
Hungary	56	▼
New Zealand	54	▼
United States	52	▼
Iran, Islamic Rep.	50	▼
England	46	▼
Jordan	44	▼
Indonesia	43	▼
Morocco	36	▼
Chile	35	▼
Turkey	35	▼
Philippines	23	▼
South Africa	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Geometry	Knowing

NOT true for all rectangles

Of the following, which is NOT true for all rectangles?

A. The opposite sides are parallel.

B. The opposite sides are equal.

C. All angles are right angles.

D. The diagonals are equal.

E. The diagonals are perpendicular.

Item Number: J11

Overall Percent Correct

Japan	76	▲
Tunisia	75	▲
Belgium (Flemish)	74	▲
Korea, Rep. of	73	▲
Chinese Taipei	71	▲
Russian Federation	71	▲
Hungary	69	▲
Bulgaria	68	▲
Thailand	67	▲
Latvia (LSS)	64	▲
Slovak Republic	64	▲
Slovenia	62	O
Singapore	61	O
Australia	61	O
Romania	59	O
England	58	O
Italy	56	O
Lithuania	55	O
Canada	55	O
Cyprus	54	O
Macedonia, Rep. of	54	O
International Average	**54**	
New Zealand	53	O
Hong Kong, SAR	53	O
Moldova	53	O
Malaysia	52	O
Jordan	50	O
United States	46	▼
Iran, Islamic Rep.	46	O
Netherlands	42	O
Turkey	42	▼
Israel	39	▼
Finland	38	▼
Chile	36	▼
Indonesia	34	▼
Philippines	29	▼
Czech Republic	28	▼
Morocco	27	▼
South Africa	24	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**E**

Content Domain	Cognitive Domain
Geometry	Knowing

Two similar triangles

Two of the triangles below are similar.

I   II   III   IV

Which two triangles are similar?

A.   I and II

B.   I and III

C.   I and IV

D.   II and IV

E.   III and IV

Item Number: J15

Overall Percent Correct

Japan	84	▲
Korea, Rep. of	82	▲
Singapore	76	▲
Malaysia	74	▲
Chinese Taipei	74	▲
Bulgaria	74	▲
Russian Federation	71	▲
Slovak Republic	70	O
Lithuania	69	O
Thailand	69	▲
Macedonia, Rep. of	68	O
Moldova	68	O
Latvia (LSS)	68	O
Hungary	67	O
Belgium (Flemish)	66	O
Australia	66	O
Slovenia	66	O
Romania	66	O
Czech Republic	66	O
Canada	65	O
Italy	65	O
Hong Kong, SAR	65	O
Finland	63	O
Netherlands	62	O
United States	62	O
International Average	**62**	
Iran, Islamic Rep.	61	O
England	60	O
New Zealand	57	O
Cyprus	55	O
Jordan	53	▼
Turkey	52	▼
Tunisia	48	▼
Morocco	46	▼
Chile	46	▼
Indonesia	44	▼
Israel	42	▼
Philippines	41	▼
South Africa	29	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Geometry	Using Routine Procedures

Point on graph from coordinates

Which point on the graph could have coordinates (7,16)?

A. Point P

B. Point Q

C. Point R

D. Point S

Item Number: J16

Overall Percent Correct

Japan	84	▲
Korea, Rep. of	84	▲
Chinese Taipei	83	▲
Hong Kong, SAR	81	▲
Singapore	80	▲
Netherlands	78	▲
Malaysia	78	▲
Slovenia	76	▲
Slovak Republic	76	▲
England	75	▲
Australia	74	▲
Finland	72	▲
New Zealand	72	▲
Hungary	71	▲
Russian Federation	71	▲
Belgium (Flemish)	71	▲
Canada	67	▲
United States	67	▲
Lithuania	63	O
Italy	62	O
Czech Republic	58	O
International Average	**58**	
Jordan	57	O
Iran, Islamic Rep.	55	O
Bulgaria	53	O
Israel	51	O
Indonesia	50	▼
Moldova	48	▼
Romania	47	▼
Latvia (LSS)	46	▼
Macedonia, Rep. of	44	▼
Thailand	37	▼
Turkey	32	▼
Morocco	26	▼
Cyprus	24	▼
Philippines	23	▼
Chile	23	▼
South Africa	20	▼
Tunisia	10	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Geometry	Investigating and Solving Problems

Measure of angle in quadrilateral

In a quadrilateral, each of two angles has a measure of 115°. If the measure of a third angle is 70°, what is the measure of the remaining angle?

A. 60°

B. 70°

C. 130°

D. 140°

E. None of the above

Item Number: L16

Overall Percent Correct

Japan	73	▲
Belgium (Flemish)	70	▲
Singapore	67	▲
Chinese Taipei	61	▲
Hong Kong, SAR	60	▲
Korea, Rep. of	56	▲
Finland	53	▲
Slovenia	53	▲
Bulgaria	49	O
Malaysia	49	▲
Russian Federation	49	O
Slovak Republic	49	O
Romania	48	O
England	43	O
Italy	41	O
Moldova	40	O
Czech Republic	40	O
International Average	**40**	
Hungary	39	O
Netherlands	39	O
Latvia (LSS)	39	O
Tunisia	38	O
Australia	36	O
Macedonia, Rep. of	36	O
Canada	36	O
Lithuania	35	O
Jordan	35	O
Israel	35	O
Cyprus	30	O
Turkey	29	▼
New Zealand	27	▼
Morocco	26	▼
Iran, Islamic Rep.	23	▼
Chile	23	▼
Thailand	22	▼
Indonesia	22	▼
United States	19	▼
South Africa	15	▼
Philippines	13	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Geometry	Using Routine Procedures

Position of point on number line

Point P (not shown) on the number line is 5 units from point N and 2 units from point M.

```
        0           2   3           6
◄───────●───────────●───●───────────●───────────►
        O           L   M           N
```

Where is point P located?

A.   Between O and L

B.   Between L and M

C.   Between M and N

D.   To the right of N

Item Number: N12

Overall Percent Correct

Korea, Rep. of	67	▲
Netherlands	67	▲
Japan	66	▲
Belgium (Flemish)	65	▲
Hong Kong, SAR	63	▲
Russian Federation	60	▲
Chinese Taipei	56	▲
Hungary	51	▲
Finland	51	O
Canada	50	▲
Australia	50	O
Singapore	50	O
Slovak Republic	48	O
New Zealand	47	O
Slovenia	46	O
Thailand	46	O
Czech Republic	46	O
Tunisia	44	O
International Average	**42**	
United States	42	O
Malaysia	42	O
Bulgaria	40	O
Lithuania	39	O
Moldova	39	O
Cyprus	38	O
England	36	O
Italy	34	▼
Indonesia	34	▼
Latvia (LSS)	32	▼
Israel	32	▼
Macedonia, Rep. of	31	▼
Chile	31	▼
Romania	30	▼
Iran, Islamic Rep.	27	▼
Turkey	27	▼
Philippines	26	▼
South Africa	23	▼
Jordan	20	▼
Morocco	15	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Geometry	Using Routine Procedures

Length of side from similar triangle

The figure represents two similar triangles. The triangles are not drawn to scale.

In the actual triangle *ABC*, what is the length of side *BC*?

A.   3.5 cm

B.   4.5 cm

C.   5 cm

D.   5.5 cm

E.   8 cm

Item Number: P10

Overall Percent Correct

Country		
Korea, Rep. of	70	▲
Japan	68	▲
Singapore	64	▲
Hong Kong, SAR	56	▲
Chinese Taipei	52	▲
Belgium (Flemish)	50	▲
Netherlands	44	O
Hungary	43	O
Russian Federation	41	O
Finland	39	O
Australia	39	O
Romania	38	O
Slovak Republic	38	O
International Average	**37**	
United States	36	O
Moldova	36	O
Canada	35	O
New Zealand	34	O
Slovenia	34	O
England	34	O
Bulgaria	33	O
Czech Republic	32	O
Malaysia	32	O
Jordan	32	O
Lithuania	31	O
Cyprus	31	O
Latvia (LSS)	30	O
Thailand	30	▼
Italy	29	▼
Israel	29	O
Macedonia, Rep. of	27	▼
Philippines	27	▼
Indonesia	26	▼
Iran, Islamic Rep.	26	▼
Tunisia	24	▼
Chile	23	▼
South Africa	23	▼
Turkey	22	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response: B

Content Domain	Cognitive Domain
Geometry	Using Complex Procedures

Right triangles to cover rectangle

How many of the shaded right triangles shown above are needed to exactly cover the surface of the rectangle?

A.   Four

B.   Six

C.   Eight

D.   Ten

Item Number: R11

Overall Percent Correct

Japan	80	▲
Korea, Rep. of	76	▲
Hong Kong, SAR	75	▲
Singapore	72	▲
Belgium (Flemish)	68	▲
Netherlands	66	▲
Malaysia	60	▲
Chinese Taipei	60	▲
Hungary	59	▲
Slovenia	57	▲
Slovak Republic	57	▲
Australia	56	▲
Czech Republic	55	O
New Zealand	55	▲
Canada	50	O
Finland	49	O
Italy	49	O
England	48	O
Latvia (LSS)	48	O
United States	47	O
International Average	**46**	
Russian Federation	44	O
Lithuania	43	O
Iran, Islamic Rep.	42	O
Israel	41	O
Thailand	40	O
Cyprus	37	O
Moldova	37	▼
Romania	35	▼
Bulgaria	34	▼
Tunisia	33	▼
Turkey	30	▼
Macedonia, Rep. of	30	▼
Indonesia	29	▼
Chile	27	▼
Jordan	26	▼
Morocco	21	▼
Philippines	15	▼
South Africa	12	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Using Complex Procedures

Graph showing greatest increase

This graph shows the number of suits and coats sold each month.

According to the information in the graph, during which two-month period does the greatest increase in coat sales occur?

A.   December - January

B.   May - June

C.   June - July

D.   October - November

Item Number: B07

Overall Percent Correct

Japan	92	▲
Korea, Rep. of	90	▲
Singapore	85	▲
Hong Kong, SAR	83	▲
Netherlands	82	▲
Finland	81	▲
Chinese Taipei	79	▲
Slovenia	77	▲
Australia	76	▲
Canada	75	▲
England	74	▲
United States	73	▲
New Zealand	72	▲
Hungary	72	▲
Belgium (Flemish)	71	▲
Russian Federation	70	▲
Malaysia	68	▲
Slovak Republic	65	O
Lithuania	62	O
Latvia (LSS)	62	O
Israel	62	O
Italy	61	O
International Average	**60**	
Czech Republic	58	O
Bulgaria	55	O
Thailand	55	▼
Macedonia, Rep. of	52	▼
Turkey	42	▼
Indonesia	42	▼
Cyprus	40	▼
Chile	39	▼
Jordan	38	▼
Romania	36	▼
Philippines	36	▼
Tunisia	35	▼
Moldova	30	▼
South Africa	23	▼
Morocco	22	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Knowing

Likely result of fifth coin toss

If a fair coin is tossed, the probability that it will land heads up is $\frac{1}{2}$. In four successive tosses, a fair coin lands heads up each time. What is likely to happen when the coin is tossed a fifth time?

A. It is more likely to land tails up than heads up.

B. It is more likely to land heads up than tails up.

C. It is equally likely to land heads up or tails up.

D. More information is needed to answer the question.

Item Number: F08

Overall Percent Correct

Country		
Hungary	86	▲
England	81	▲
Netherlands	79	▲
Czech Republic	77	▲
Chinese Taipei	77	▲
Australia	76	▲
Latvia (LSS)	75	▲
Canada	75	▲
Belgium (Flemish)	74	▲
Finland	71	▲
New Zealand	71	▲
Bulgaria	70	▲
Slovenia	70	▲
Lithuania	70	▲
Italy	70	▲
Slovak Republic	70	▲
Korea, Rep. of	65	▲
Russian Federation	63	O
United States	62	▲
Cyprus	60	O
Japan	58	O
International Average	**57**	
Jordan	57	O
Chile	56	O
Hong Kong, SAR	55	O
Israel	55	O
Romania	53	O
Turkey	52	O
Macedonia, Rep. of	50	▼
Singapore	48	▼
Moldova	36	▼
South Africa	34	▼
Iran, Islamic Rep.	33	▼
Philippines	29	▼
Indonesia	28	▼
Tunisia	27	▼
Morocco	24	▼
Malaysia	24	▼
Thailand	20	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Using Complex Procedures

Barchart histogram of travel time

The graph shows the time of travel by pupils from home to school.

How many pupils must travel for MORE than 10 minutes?

A. 2

B. 5

C. 7

D. 8

E. 15

Item Number: H07

Overall Percent Correct

Korea, Rep. of	93	▲
Hong Kong, SAR	91	▲
Singapore	91	▲
Japan	84	▲
England	83	▲
Chinese Taipei	82	▲
Netherlands	82	▲
Belgium (Flemish)	82	▲
Australia	79	▲
New Zealand	79	▲
Finland	78	▲
Canada	78	▲
Slovenia	77	▲
United States	77	▲
Thailand	72	▲
Czech Republic	70	O
Hungary	69	O
Slovak Republic	65	O
International Average	**64**	
Latvia (LSS)	61	O
Moldova	60	O
Italy	59	O
Israel	59	▼
Russian Federation	59	O
Cyprus	58	▼
Lithuania	58	O
Indonesia	52	▼
Tunisia	51	▼
Philippines	51	▼
Jordan	50	▼
Turkey	49	▼
Romania	47	▼
Chile	46	▼
Malaysia	46	▼
Macedonia, Rep. of	45	▼
Iran, Islamic Rep.	38	▼
Morocco	36	▼
South Africa	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Investigating and Solving Problems

Defective bulbs from random sample

From a batch of 3,000 light bulbs, 100 were selected at random and tested. If 5 of the light bulbs in the sample were found to be defective, about how many defective light bulbs would be expected in the entire batch?

A. 15

B. 60

C. 150

D. 300

E. 600

Item Number: H11

Overall Percent Correct

Netherlands	86	▲
Hong Kong, SAR	85	▲
Chinese Taipei	83	▲
Singapore	83	▲
Korea, Rep. of	83	▲
Belgium (Flemish)	79	▲
Hungary	75	▲
Czech Republic	75	▲
Japan	73	▲
Slovenia	71	▲
Malaysia	71	▲
Slovak Republic	70	▲
Latvia (LSS)	70	▲
Finland	68	O
Canada	67	O
Russian Federation	65	O
Bulgaria	65	O
Cyprus	64	O
Australia	64	O
Thailand	64	O
International Average	**62**	
England	59	O
Tunisia	59	O
United States	58	O
Romania	56	O
Italy	56	O
New Zealand	56	O
Lithuania	56	O
Turkey	54	▼
Macedonia, Rep. of	54	▼
Moldova	53	▼
Israel	52	▼
Indonesia	49	▼
Iran, Islamic Rep.	47	▼
Chile	46	▼
Jordan	44	▼
Philippines	36	▼
Morocco	32	▼
South Africa	30	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Using Complex Procedures

Interpretation of pictograph of houses

The table shows the number of houses on two streets of a town, Konini Street and Rimu Street.

Street	Number of Houses
Konini	30
Rimu	21

The pictograph below represents the number of houses in each street.

Konini St.	⌂ ⌂ ⌂ ⌂ ⌂
Rimu St.	⌂ ⌂ ⌂ ⌂

How many houses does one ⌂ represent?

Answer: _____

Item Number: J13

SCORING

Correct Response

• 6 houses

Incorrect Response

• One house

• 5 houses

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	95	▲
Japan	93	▲
Hong Kong, SAR	93	▲
Korea, Rep. of	89	▲
Netherlands	88	▲
Chinese Taipei	88	▲
Canada	88	▲
Australia	86	▲
Finland	86	▲
Malaysia	85	▲
England	82	▲
United States	82	▲
New Zealand	82	▲
Slovenia	81	▲
Belgium (Flemish)	80	▲
Slovak Republic	79	▲
Latvia (LSS)	79	▲
Lithuania	78	O
Thailand	77	▲
Czech Republic	76	O
Italy	74	O
Russian Federation	73	O
International Average	**69**	
Cyprus	67	O
Romania	63	O
Turkey	62	▼
Hungary	61	O
Israel	61	O
Bulgaria	58	▼
Iran, Islamic Rep.	57	▼
Tunisia	55	▼
Macedonia, Rep. of	54	▼
Chile	53	▼
Moldova	52	▼
Jordan	42	▼
Philippines	36	▼
Indonesia	31	▼
Morocco	23	▼
South Africa	14	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Using Complex Procedures

Graph of humidity in room

The graph below shows the humidity in a room as recorded on a certain morning.

Humidity in Room

On the morning shown in the graph, how many times between 6 a.m. and 12 noon was the humidity exactly 20 percent?

A.   One

B.   Two

C.   Three

D.   Four

Item Number: L11

Overall Percent Correct

Finland	79	▲
Japan	76	▲
Netherlands	76	▲
Chinese Taipei	73	▲
Australia	72	▲
Belgium (Flemish)	72	▲
Hungary	69	▲
Korea, Rep. of	68	▲
Singapore	68	▲
Canada	68	▲
England	68	▲
Hong Kong, SAR	68	▲
Slovak Republic	66	▲
Latvia (LSS)	65	O
Bulgaria	64	O
Lithuania	64	O
United States	63	▲
Czech Republic	63	O
Russian Federation	63	O
New Zealand	62	O
Malaysia	61	O
Israel	60	O
Tunisia	58	O
International Average	**58**	
Cyprus	57	O
Iran, Islamic Rep.	51	▼
Turkey	49	▼
Slovenia	47	▼
Chile	46	▼
Thailand	44	▼
Jordan	43	▼
Macedonia, Rep. of	43	▼
Romania	41	▼
Moldova	39	▼
Philippines	34	▼
Morocco	31	▼
Indonesia	30	▼
South Africa	29	▼

Country average vs. International average:
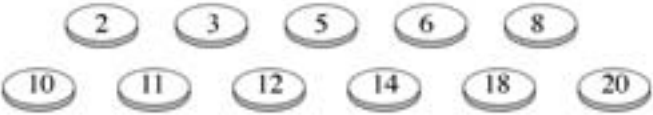
Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Investigating and Solving Problems

Probability of drawing chip

The eleven chips shown below are placed in a bag and mixed.

$$2 \quad 3 \quad 5 \quad 6 \quad 8$$
$$10 \quad 11 \quad 12 \quad 14 \quad 18 \quad 20$$

Chelsea draws one chip from the bag without looking. What is the probability that Chelsea draws a chip with a number that is a multiple of three?

A. $\dfrac{1}{11}$

B. $\dfrac{1}{3}$

C. $\dfrac{4}{11}$

D. $\dfrac{4}{7}$

Item Number: N18

Overall Percent Correct

Korea, Rep. of	92	▲
Belgium (Flemish)	82	▲
Japan	77	▲
United States	77	▲
Canada	74	▲
England	73	▲
Australia	73	▲
Chinese Taipei	71	▲
Finland	66	▲
Hong Kong, SAR	65	▲
Netherlands	64	▲
Singapore	64	▲
Italy	61	▲
New Zealand	60	▲
Hungary	53	O
Slovenia	51	O
Cyprus	51	O
Czech Republic	49	O
Israel	49	O
International Average	**48**	
Slovak Republic	48	O
Bulgaria	46	O
Turkey	43	O
Malaysia	42	O
Indonesia	39	▼
Jordan	38	▼
Russian Federation	35	▼
Iran, Islamic Rep.	33	▼
Romania	32	▼
Chile	31	▼
Thailand	27	▼
Latvia (LSS)	27	▼
Macedonia, Rep. of	25	▼
South Africa	23	▼
Philippines	23	▼
Morocco	22	▼
Moldova	22	▼
Tunisia	21	▼
Lithuania	11	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	C

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Using Complex Procedures

Day/time in table at shown temperature

This table shows temperatures at various times on four days.

TEMPERATURE

	6 a.m.	9 a.m.	Noon	3 p.m.	6 p.m.
Monday	15°	17°	24°	21°	16°
Tuesday	20°	16°	15°	10°	9°
Wednesday	8°	14°	16°	19°	15°
Thursday	8°	11°	19°	26°	20°

Thermometer

On which day and at what time was the temperature shown in the table the same as that shown on the thermometer?

A.   Monday, Noon

B.   Tuesday, 6 a.m.

C.   Wednesday, 3 p.m.

D.   Thursday, 3 p.m.

Item Number: P16

Overall Percent Correct

Japan	96	▲
Singapore	95	▲
Belgium (Flemish)	95	▲
Finland	93	▲
Korea, Rep. of	92	▲
England	92	▲
Chinese Taipei	91	▲
Slovenia	91	▲
Czech Republic	91	▲
Australia	91	▲
Slovak Republic	91	▲
Hong Kong, SAR	90	▲
Netherlands	90	▲
Canada	89	▲
United States	89	▲
New Zealand	88	▲
Hungary	87	▲
Cyprus	86	▲
Russian Federation	85	O
Malaysia	85	▲
Lithuania	84	O
Latvia (LSS)	83	O
Italy	81	O
International Average	**79**	
Israel	74	O
Bulgaria	72	O
Chile	67	▼
Moldova	66	▼
Romania	65	▼
Jordan	65	▼
Macedonia, Rep. of	65	▼
Iran, Islamic Rep.	59	▼
Philippines	54	▼
Indonesia	50	▼
South Africa	43	▼
Turkey	38	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**A**

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Using Complex Procedures

Time for pendulum to swing 20 times

The graph shows the time taken for a pendulum to swing backwards and forwards 20 times for different lengths of the string.

Swinging Pendulum

The length of a string is 90 cm. About how long would it take for the pendulum to swing backwards and forwards 20 times?

A. 35 seconds

B. 38 seconds

C. 42 seconds

D. 45 seconds

Item Number: R09

Overall Percent Correct

Korea, Rep. of	78	▲
Japan	78	▲
Hong Kong, SAR	71	▲
Singapore	71	▲
Netherlands	70	▲
Chinese Taipei	70	▲
England	68	▲
Belgium (Flemish)	68	▲
Finland	67	▲
Australia	67	▲
Canada	66	▲
Thailand	65	▲
Slovenia	63	▲
Malaysia	62	▲
Hungary	62	▲
Slovak Republic	59	O
United States	59	O
Russian Federation	58	O
New Zealand	58	O
Lithuania	57	O
Latvia (LSS)	55	O
Israel	55	O
International Average	**54**	
Czech Republic	53	O
Bulgaria	51	O
Italy	48	O
Cyprus	46	O
Tunisia	43	▼
Romania	41	▼
Indonesia	40	▼
Jordan	40	▼
Philippines	37	▼
Chile	36	▼
Moldova	36	▼
Macedonia, Rep. of	35	▼
Morocco	35	▼
Turkey	32	▼
Iran, Islamic Rep.	31	▼
South Africa	18	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Communicating and Reasoning

Cheaper magazine subscription

Chris plans to order 24 issues of a magazine. He reads the following advertisements for two magazines. *Ceds* are the units of currency in Chris' country.

Teen Life Magazine

24 issues
First four issues FREE
The rest
3 *ceds* each.

Teen News Magazine

24 issues
First six issues FREE
The rest
3.5 *ceds* each.

Which magazine is the least expensive for 24 issues? How much less expensive? Show your work.

Item Number: V02

SCORING

Note: There is no distinction made between responses with or without units.

Correct Response

• Teen Life. Calculations of both magazines are correct (60 ceds for Teen Life and 63 ceds for Teen News) and correct savings of 3 ceds

• Other correct (*e.g., Teen Life. Calculation of one magazine correct, the other not shown, and correct savings of 3 ceds*).

Partial Response

• Correct calculations (60 and 63 ceds), but incorrect or no magazine identified and/or no difference given

• Correct calculation for Teen News (63 ceds), but incorrect calculation for Teen Life

• Incorrect calculation for Teen News but correct calculation for Teen Life (60 ceds)

• Teen Life, 3 ceds. No work shown

• Other partially correct response (*e.g., correct calculations but incorrect difference*)

Incorrect Response

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	57	▲
Korea, Rep. of	52	▲
Chinese Taipei	50	▲
Belgium (Flemish)	42	▲
Japan	39	▲
Slovak Republic	36	▲
Slovenia	36	▲
Hungary	35	▲
Latvia (LSS)	35	▲
Hong Kong, SAR	34	▲
Czech Republic	34	▲
Canada	32	▲
Russian Federation	30	O
Australia	29	O
Finland	28	O
Italy	27	O
United States	26	O
Netherlands	25	O
Lithuania	25	O
International Average	**24**	
Bulgaria	22	O
Thailand	21	O
Cyprus	21	O
Romania	20	O
Malaysia	19	▼
Israel	19	▼
New Zealand	18	▼
Macedonia, Rep. of	17	▼
England	17	▼
Moldova	16	▼
Jordan	12	▼
Turkey	10	▼
Tunisia	9	▼
Iran, Islamic Rep.	9	▼
Chile	5	▼
Indonesia	5	▼
Philippines	3	▼
Morocco	2	▼
South Africa	1	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Knowing Facts and Procedures

Value of -3x given value of x

If $x = -3$, what is the value of $-3x$?

(A) -9

(B) -6

(C) -1

(D) 1

(E) 9

Item Number: M012042

Overall Percent Correct

Hong Kong, SAR	84	▲
Korea, Republic of	84	▲
Chinese Taipei	83	▲
Singapore	80	▲
Estonia	77	▲
Japan	74	▲
Russian Federation	73	▲
Hungary	69	▲
Israel	67	▲
Serbia and Montenegro	65	▲
United States	65	▲
Belgium (Flemish)	63	▲
Armenia	62	▲
Latvia	61	▲
Lithuania	60	▲
Slovak Republic	58	▲
Bulgaria	57	▲
Moldova, Republic of	54	▲
Netherlands	54	▲
Romania	51	O
Slovenia	51	O
Lebanon	49	O
International average	**48**	
Malaysia	48	O
Macedonia, Republic of	47	O
Iran, Islamic Republic of	44	O
Philippines	44	▼
Indonesia	43	▼
Jordan	41	▼
Bahrain	40	▼
Cyprus	38	▼
Australia	37	▼
Egypt	37	▼
England	37	▼
Italy	37	▼
New Zealand	35	▼
Botswana	30	▼
Sweden	28	▼
Tunisia	26	▼
Palestinian Nat'l Auth.	25	▼
Morocco	24	▼
Scotland	24	▼
South Africa	16	▼
Chile	15	▼
Saudi Arabia	11	▼
Norway	9	▼

Correct Response: E

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Knowing Facts and Procedures

Subtract fractions involving *x*

Subtract: $\dfrac{3x}{7} - \dfrac{x}{7} =$

(A) $\dfrac{2}{7}$

(B) 3

(C) $2x$

(D) $\dfrac{x}{7}$

(E) $\dfrac{2x}{7}$

Item Number: M022185

Overall Percent Correct

Korea, Republic of	86	▲
Hong Kong, SAR	83	▲
Singapore	81	▲
Japan	76	▲
Latvia	76	▲
Chinese Taipei	76	▲
Hungary	74	▲
Russian Federation	67	▲
Lebanon	67	▲
Romania	65	▲
Israel	65	▲
Estonia	65	▲
Serbia and Montenegro	64	▲
Slovak Republic	63	▲
Bulgaria	63	▲
Malaysia	61	▲
Armenia	60	▲
Belgium (Flemish)	60	▲
Cyprus	58	▲
Moldova, Republic of	58	▲
Lithuania	57	O
International average	**54**	
Jordan	54	O
Bahrain	49	▼
Philippines	49	▼
United States	49	▼
Italy	48	▼
Egypt	48	▼
Slovenia	47	▼
Tunisia	47	▼
Botswana	46	▼
Iran, Islamic Republic of	46	▼
Palestinian Nat'l Auth.	44	▼
Australia	44	▼
Indonesia	43	▼
Morocco	43	▼
New Zealand	42	▼
Scotland	41	▼
Norway	40	▼
Sweden	39	▼
Netherlands	39	▼
Saudi Arabia	37	▼
Macedonia, Republic of	37	▼
England	36	▼
Chile	27	▼
South Africa	27	▼

Correct Response:	E

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Knowing Facts and Procedures

Which equals 2*x* minus 3*y* plus 7*x* plus 5*y*

Which of these is equal to $2x - 3y + 7x + 5y$?

- (A) $5x + 2y$
- (B) $5x + 8y$
- (C) $9x + 2y$
- (D) $9x + 8y$

Item Number: M032036

Correct Response: C

Overall Percent Correct

Country		
Korea, Republic of	82	▲
Japan	82	▲
Chinese Taipei	79	▲
Singapore	79	▲
Slovak Republic	76	▲
Hong Kong, SAR	74	▲
Hungary	74	▲
Estonia	72	▲
Belgium (Flemish)	67	▲
Latvia	66	▲
Israel	65	▲
Serbia and Montenegro	62	▲
Russian Federation	62	▲
Bulgaria	58	▲
Romania	58	▲
Lebanon	55	O
Slovenia	55	O
Netherlands	54	O
Lithuania	53	O
Italy	53	O
Iran, Islamic Republic of	52	O
Malaysia	51	O
International average	**49**	
Scotland	48	O
United States	47	O
Moldova, Republic of	46	O
Sweden	45	O
Egypt	45	O
Australia	45	O
Macedonia, Republic of	41	▼
Norway	41	▼
Armenia	41	▼
Jordan	38	▼
Philippines	36	▼
Cyprus	35	▼
Palestinian Nat'l Auth.	33	▼
England	33	▼
New Zealand	33	▼
Morocco	32	▼
Bahrain	27	▼
Chile	25	▼
Botswana	25	▼
Tunisia	24	▼
South Africa	23	▼
Saudi Arabia	23	▼
Indonesia	22	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Reasoning

The value of *a* + 2 times (*b* plus *c*)

If $a + 2b = 5$ and $c = 3$, what is the value of $a + 2(b + c)$?

Answer: _____

Item Number: M032557

SCORING

Correct Response

• 11

Incorrect Response

• 8

• Other incorrect (including crossed out/erased, stray marks, illegible or off task).

Overall Percent Correct

Korea, Republic of	64	▲
Singapore	58	▲
Chinese Taipei	57	▲
Hong Kong, SAR	56	▲
Russian Federation	53	▲
Romania	40	▲
Hungary	38	▲
Israel	38	▲
Japan	37	▲
Estonia	35	▲
Latvia	34	▲
Serbia and Montenegro	34	▲
Armenia	33	▲
Moldova, Republic of	31	▲
Bulgaria	30	▲
Slovak Republic	28	▲
Belgium (Flemish)	28	▲
Lithuania	26	▲
Lebanon	25	O
International average	**22**	
Malaysia	20	O
Australia	20	O
United States	20	O
Cyprus	20	O
Macedonia, Republic of	18	▼
Scotland	18	O
Italy	16	▼
Netherlands	16	▼
England	15	▼
New Zealand	14	▼
Slovenia	13	▼
Sweden	10	▼
Egypt	10	▼
Jordan	9	▼
Indonesia	8	▼
Tunisia	5	▼
Palestinian Nat'l Auth.	5	▼
Philippines	5	▼
Morocco	4	▼
Iran, Islamic Republic of	3	▼
Chile	3	▼
Norway	3	▼
South Africa	3	▼
Botswana	2	▼
Bahrain	2	▼
Saudi Arabia	0	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

The value of *a* + 2 times (*b* plus *c*) (continued)

Item Number: M032557

Student Responses

Correct Response:

If $a + 2b = 5$ and $c = 3$, what is the value of $a + 2(b + c)$?

Answer: ___11___

Incorrect Response:

If $a + 2b = 5$ and $c = 3$, what is the value of $a + 2(b + c)$?

Answer: ___8___

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Solving Routine Problems

Three consecutive even numbers

Sam wanted to find three consecutive even numbers that add up to 84.
He wrote the equation $k + (k + 2) + (k + 4) = 84$.
What does the letter k represent?

Ⓐ   The least of the three even numbers

Ⓑ   The middle even number

Ⓒ   The greatest of the three even numbers

Ⓓ   The average of the three even numbers

Item Number: M022002

Correct Response: **A**

Overall Percent Correct

Hong Kong, SAR	57	▲
Chinese Taipei	50	▲
Singapore	48	▲
Korea, Republic of	46	▲
Romania	42	▲
Estonia	37	▲
Russian Federation	36	▲
Moldova, Republic of	34	▲
Japan	34	▲
Bulgaria	34	▲
Serbia and Montenegro	33	▲
Latvia	33	▲
Hungary	31	▲
Israel	31	▲
Armenia	30	▲
Belgium (Flemish)	30	▲
Slovak Republic	27	O
Netherlands	27	O
Philippines	25	O
Bahrain	25	O
International average	**24**	
United States	23	O
Macedonia, Republic of	22	O
Italy	21	O
Australia	20	O
Botswana	20	▼
South Africa	19	▼
Saudi Arabia	19	▼
Lithuania	19	▼
Cyprus	19	▼
Egypt	18	▼
Jordan	18	▼
Indonesia	16	▼
England	16	▼
Palestinian Nat'l Auth.	16	▼
New Zealand	16	▼
Iran, Islamic Republic of	15	▼
Sweden	15	▼
Morocco	15	▼
Slovenia	12	▼
Lebanon	12	▼
Chile	11	▼
Scotland	11	▼
Norway	11	▼
Malaysia	11	▼
Tunisia	6	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Using Concepts

Total number of books three boys have

Graham has twice as many books as Bob. Chan has six more books than Bob. If Bob has x books, which of the following represents the total number of books the three boys have?

Ⓐ $3x + 6$

Ⓑ $3x + 8$

Ⓒ $4x + 6$

Ⓓ $5x + 6$

Ⓔ $8x + 2$

Item Number: M022251

Correct Response:	**C**

Overall Percent Correct

Singapore	66	▲
Chinese Taipei	59	▲
Korea, Republic of	55	▲
Hong Kong, SAR	53	▲
Israel	41	▲
Hungary	41	▲
Slovak Republic	38	▲
Russian Federation	36	▲
Japan	35	▲
Romania	35	▲
Netherlands	35	▲
Estonia	34	▲
Cyprus	34	▲
Belgium (Flemish)	33	▲
Italy	33	O
Latvia	32	O
Lithuania	32	O
New Zealand	31	O
Serbia and Montenegro	31	O
Slovenia	31	O
International average	**29**	
Moldova, Republic of	29	O
Australia	28	O
Bulgaria	28	O
Sweden	28	O
Armenia	26	O
United States	26	▼
England	25	▼
Malaysia	25	▼
Scotland	25	▼
Tunisia	24	▼
Norway	23	▼
Iran, Islamic Republic of	23	▼
Morocco	22	▼
Macedonia, Republic of	22	▼
Egypt	21	▼
Jordan	20	▼
Lebanon	20	▼
Palestinian Nat'l Auth.	20	▼
Philippines	19	▼
Bahrain	18	▼
Chile	18	▼
Indonesia	18	▼
Saudi Arabia	15	▼
Botswana	13	▼
South Africa	12	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Algebraic Expressions	Using Concepts

Carla paid *x* zeds for 3 cartons of juice

Carla paid *x* zeds for 3 cartons of juice. What is the price in zeds of 1 carton of juice?

Ⓐ $\dfrac{x}{3}$

Ⓑ $\dfrac{3}{x}$

Ⓒ $3 + x$

Ⓓ $3x$

Item Number: M032044

Correct Response:	**A**

Overall Percent Correct

Singapore	85	▲
Hong Kong, SAR	81	▲
Chinese Taipei	74	▲
Belgium (Flemish)	67	▲
Netherlands	62	▲
Malaysia	59	▲
Russian Federation	58	▲
England	55	▲
Hungary	55	▲
Korea, Republic of	53	▲
Estonia	53	▲
Israel	53	▲
Slovak Republic	52	▲
Sweden	52	▲
Japan	51	▲
Lithuania	51	▲
Scotland	49	▲
Australia	49	O
United States	48	▲
Armenia	48	O
Lebanon	48	O
Latvia	46	O
Italy	45	O
International average	**45**	
New Zealand	43	O
Serbia and Montenegro	42	O
Romania	42	O
Bulgaria	42	O
Moldova, Republic of	41	O
Philippines	40	▼
Norway	40	▼
Slovenia	40	▼
Macedonia, Republic of	39	▼
Indonesia	39	▼
Tunisia	36	▼
Cyprus	36	▼
Egypt	35	▼
Jordan	34	▼
Chile	31	▼
Bahrain	30	▼
Palestinian Nat'l Auth.	30	▼
Botswana	29	▼
Morocco	28	▼
Ghana	28	▼
South Africa	23	▼
Saudi Arabia	22	▼
Iran, Islamic Republic of	21	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Knowing Facts and Procedures

Find *n* from proportionality equation

If $\dfrac{12}{n} = \dfrac{36}{21}$, then n equals

- Ⓐ   3
- Ⓑ   7
- Ⓒ   36
- Ⓓ   63

Item Number: M012040

Overall Percent Correct

Country		
Singapore	93	▲
Korea, Republic of	89	▲
Hong Kong, SAR	88	▲
Belgium (Flemish)	86	▲
Netherlands	85	▲
Chinese Taipei	83	▲
Malaysia	83	▲
United States	80	▲
Hungary	79	▲
Japan	79	▲
Scotland	79	▲
Australia	76	▲
England	74	▲
Slovak Republic	74	▲
Israel	72	▲
Slovenia	72	▲
Estonia	71	▲
Lebanon	71	▲
Russian Federation	71	▲
Latvia	70	▲
New Zealand	68	O
Iran, Islamic Republic of	66	O
Sweden	66	O
Cyprus	65	O
Italy	65	O
International average	**64**	
Lithuania	64	O
Tunisia	64	O
Serbia and Montenegro	63	O
Moldova, Republic of	61	O
Romania	61	O
Bulgaria	59	▼
Norway	59	▼
Egypt	58	▼
Indonesia	58	▼
Armenia	54	▼
Morocco	54	▼
Jordan	53	▼
Palestinian Nat'l Auth.	52	▼
Philippines	52	▼
Macedonia, Republic of	50	▼
Bahrain	44	▼
Chile	44	▼
Botswana	41	▼
Saudi Arabia	30	▼
Ghana	28	▼
South Africa	26	▼

Correct Response:	B

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Knowing Facts and Procedures

True expression for values of *L,K,M*

If $L = 4$ when $K = 6$ and $M = 24$, which of the following is true?

Ⓐ $\quad L = \dfrac{M}{K}$

Ⓑ $\quad L = \dfrac{K}{M}$

Ⓒ $\quad L = KM$

Ⓓ $\quad L = K + M$

Ⓔ $\quad L = M - K$

Item Number: M022196

Overall Percent Correct

Singapore	88	▲
Korea, Republic of	86	▲
Hong Kong, SAR	84	▲
Chinese Taipei	82	▲
Estonia	81	▲
Russian Federation	79	▲
Hungary	79	▲
Japan	77	▲
Belgium (Flemish)	76	▲
Slovak Republic	75	▲
Latvia	75	▲
Serbia and Montenegro	73	▲
Lithuania	73	▲
Sweden	70	▲
Lebanon	69	▲
Romania	67	▲
Armenia	66	▲
Slovenia	66	▲
Israel	64	▲
Moldova, Republic of	63	▲
Bulgaria	63	O
Tunisia	63	▲
United States	62	▲
Macedonia, Republic of	60	O
Netherlands	59	O
International average	**58**	
Morocco	57	O
Italy	57	O
England	54	O
Malaysia	54	O
Indonesia	54	O
Cyprus	52	▼
Australia	49	▼
Scotland	49	▼
New Zealand	49	▼
Jordan	44	▼
Norway	40	▼
Egypt	38	▼
Iran, Islamic Republic of	38	▼
Palestinian Nat'l Auth.	35	▼
Bahrain	35	▼
Botswana	28	▼
Philippines	25	▼
Saudi Arabia	22	▼
Chile	21	▼
South Africa	14	▼

Correct Response:	**A**

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

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Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Knowing Facts and Procedures

Solve equation for *x*

If $4(x + 5) = 80$, then $x =$

Answer: _____

Item Number: M022253

SCORING

Correct Response

• 15

Incorrect Response

• 25 [100 ÷ 4]

• 60 [80 – (4 x 5)]

• 71 [80 – 4 – 5]

• Any expression or equation, other than x = 15, containing x.

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Hong Kong, SAR	90	▲
Singapore	82	▲
Korea, Republic of	82	▲
Japan	80	▲
Chinese Taipei	80	▲
Estonia	72	▲
Hungary	70	▲
Russian Federation	66	▲
Slovak Republic	65	▲
Belgium (Flemish)	64	▲
Latvia	64	▲
Slovenia	64	▲
Armenia	61	▲
Serbia and Montenegro	61	▲
Romania	60	▲
Bulgaria	59	▲
United States	57	▲
Israel	57	▲
Cyprus	54	▲
Moldova, Republic of	53	▲
Lithuania	51	▲
Australia	50	▲
Malaysia	46	O
Netherlands	44	O
International average	**44**	
England	44	O
New Zealand	44	O
Macedonia, Republic of	37	▼
Italy	37	▼
Scotland	37	▼
Lebanon	31	▼
Sweden	28	▼
Tunisia	26	▼
Jordan	25	▼
Indonesia	25	▼
Egypt	23	▼
Philippines	22	▼
Bahrain	19	▼
Iran, Islamic Republic of	18	▼
Palestinian Nat'l Auth.	17	▼
Morocco	16	▼
Norway	11	▼
Chile	9	▼
Saudi Arabia	6	▼
South Africa	5	▼
Botswana	5	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Solve equation for *x* (continued)

Item Number: M022253

Student Responses

Correct Response:

If $4(x + 5) = 80$, then $x =$

Answer: _____15_____

Incorrect Response:

If $4(x + 5) = 80$, then $x =$

Answer: _____20_____

$4(x+5)=80$

$4x+20=80$

$4x+80-20=80-20$

$\dfrac{4x}{4} = \dfrac{60}{4}$

$x = 20$

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Knowing Facts and Procedures

If x plus 3y equals 11 and 2x plus 3y equals 13

If $x + 3y = 11$ and $2x + 3y = 13$, then $y =$

Ⓐ   3

Ⓑ   2

Ⓒ   −2

Ⓓ   −3

Item Number: M032728

Correct Response: **A**

Overall Percent Correct

Korea, Republic of	76	▲
Singapore	70	▲
Chinese Taipei	69	▲
Japan	61	▲
Hong Kong, SAR	59	▲
Scotland	55	▲
Belgium (Flemish)	53	▲
Latvia	51	▲
Estonia	50	▲
United States	49	▲
Serbia and Montenegro	49	▲
England	49	O
Romania	48	O
Hungary	47	O
Slovak Republic	46	O
New Zealand	45	O
Moldova, Republic of	45	O
Bulgaria	45	O
Russian Federation	44	O
Australia	44	O
Israel	44	O
Netherlands	43	O
Malaysia	43	O
International average	**42**	
Lebanon	40	O
Botswana	38	O
Lithuania	37	O
Jordan	37	▼
Tunisia	36	▼
Slovenia	36	O
Macedonia, Republic of	36	▼
Sweden	35	▼
Philippines	35	▼
Cyprus	34	▼
Egypt	34	▼
Iran, Islamic Republic of	34	▼
Indonesia	33	▼
Chile	31	▼
Palestinian Nat'l Auth.	31	▼
South Africa	31	▼
Norway	30	▼
Saudi Arabia	29	▼
Armenia	29	▼
Italy	28	▼
Bahrain	27	▼
Morocco	23	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Solving Routine Problems

If *x* minus *y* equals 5 and *x*/2 equals 3

If $x - y = 5$ and $\dfrac{x}{2} = 3$, what is the value of y?

Ⓐ   6

Ⓑ   1

Ⓒ   −1

Ⓓ   −7

Item Number: M032208

Correct Response: **B**

Overall Percent Correct

Singapore	82	▲
Korea, Republic of	79	▲
Hong Kong, SAR	78	▲
Chinese Taipei	77	▲
Australia	69	▲
Belgium (Flemish)	69	▲
New Zealand	67	▲
Hungary	67	▲
England	66	▲
United States	63	▲
Scotland	61	▲
Japan	61	▲
Malaysia	58	▲
Israel	58	▲
Estonia	58	▲
Serbia and Montenegro	58	▲
Romania	57	▲
Latvia	56	▲
Slovenia	55	O
Cyprus	55	▲
Norway	55	O
Sweden	53	O
Netherlands	53	O
Lithuania	53	O
Russian Federation	52	O
International average	**51**	
Lebanon	48	O
Slovak Republic	47	O
Moldova, Republic of	47	O
Italy	46	▼
Macedonia, Republic of	45	▼
Bulgaria	44	▼
Palestinian Nat'l Auth.	43	▼
Armenia	43	▼
Botswana	39	▼
Indonesia	38	▼
Bahrain	38	▼
Jordan	38	▼
Chile	37	▼
Egypt	36	▼
Philippines	33	▼
Tunisia	31	▼
Morocco	31	▼
South Africa	30	▼
Iran, Islamic Republic of	26	▼
Saudi Arabia	24	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Solving Routine Problems

If *a/b* equals 70

If $\dfrac{a}{b} = 70$, then $\dfrac{a}{2b} =$

Ⓐ 35

Ⓑ 68

Ⓒ 72

Ⓓ 140

Item Number: M032210

Correct Response: A

Overall Percent Correct

Chinese Taipei	70	▲
Singapore	69	▲
Korea, Republic of	69	▲
Hong Kong, SAR	68	▲
Estonia	61	▲
Russian Federation	60	▲
Hungary	58	▲
Serbia and Montenegro	57	▲
Japan	55	▲
Romania	53	▲
Latvia	53	▲
Belgium (Flemish)	52	▲
Lithuania	51	▲
Slovak Republic	47	▲
Bulgaria	46	▲
Israel	44	▲
Italy	44	O
Macedonia, Republic of	42	O
Moldova, Republic of	41	O
Indonesia	41	O
Armenia	41	O
International average	**40**	
Netherlands	40	O
Sweden	38	O
United States	38	O
England	38	O
Lebanon	37	O
Slovenia	37	O
Australia	37	O
Malaysia	36	O
New Zealand	32	▼
Scotland	30	▼
Cyprus	30	▼
Tunisia	30	▼
Philippines	27	▼
Iran, Islamic Republic of	27	▼
Egypt	26	▼
Botswana	25	▼
Morocco	24	▼
Jordan	23	▼
Norway	22	▼
Chile	22	▼
Palestinian Nat'l Auth.	21	▼
South Africa	17	▼
Saudi Arabia	15	▼
Bahrain	15	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Solving Routine Problems

7 oranges and 4 lemons cost 43 zeds

At a market, 7 oranges and 4 lemons cost 43 zeds, and 11 oranges and 12 lemons cost 79 zeds. Using x to represent the cost of an orange and y to represent the cost of a lemon, write two equations that could be used to find the values of x and y.

Equation 1: _____

Equation 2: _____

Item Number: M032545

SCORING

Correct Response

• 7x + 4y = 43 (or equivalent) and 11x + 12y = 79 (or equivalent).

Incorrect Response

• One equation correct and one incorrect/missing.

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Hong Kong, SAR	72	▲
Japan	67	▲
Chinese Taipei	62	▲
Armenia	61	▲
Singapore	60	▲
Korea, Republic of	57	▲
Estonia	46	▲
Serbia and Montenegro	43	▲
Israel	41	▲
Russian Federation	39	▲
Romania	38	▲
Jordan	37	▲
Hungary	34	▲
Bulgaria	33	▲
Moldova, Republic of	27	O
Egypt	27	O
Slovak Republic	25	O
Macedonia, Republic of	24	O
International average	**24**	
Belgium (Flemish)	22	O
Iran, Islamic Republic of	20	O
United States	20	▼
Latvia	20	▼
Scotland	20	▼
Lithuania	19	▼
England	18	▼
Bahrain	16	▼
Indonesia	16	▼
Malaysia	15	▼
Sweden	15	▼
Australia	15	▼
Italy	14	▼
New Zealand	12	▼
Cyprus	11	▼
Slovenia	9	▼
Morocco	9	▼
Netherlands	9	▼
Philippines	7	▼
Palestinian Nat'l Auth.	6	▼
Lebanon	6	▼
Botswana	5	▼
Saudi Arabia	4	▼
Norway	3	▼
Chile	3	▼
Ghana	2	▼
South Africa	2	▼
Tunisia	1	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

7 oranges and 4 lemons cost 43 zeds (continued)

Item Number: M032545

Student Responses

Correct Response:

At a market, 7 oranges and 4 lemons cost 43 zeds, and 11 oranges and 12 lemons cost 79 zeds. Using x to represent the cost of an orange and y to represent the cost of a lemon, write two equations that could be used to find the values of x and y.

Equation 1: $X = \dfrac{43 - 4y}{7}$

Equation 2: $Y = \dfrac{79 - 11x}{12}$

Incorrect Response:

At a market, 7 oranges and 4 lemons cost 43 zeds, and 11 oranges and 12 lemons cost 79 zeds. Using x to represent the cost of an orange and y to represent the cost of a lemon, write two equations that could be used to find the values of x and y.

Equation 1: $7x + 4y = z$

Equation 2: $11x + 12y = z$

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Using Concepts

Objects balanced on scale

The objects on the scale make it balance exactly. On the left pan there is a 1 kg weight (mass) and half a brick. On the right pan there is one brick.
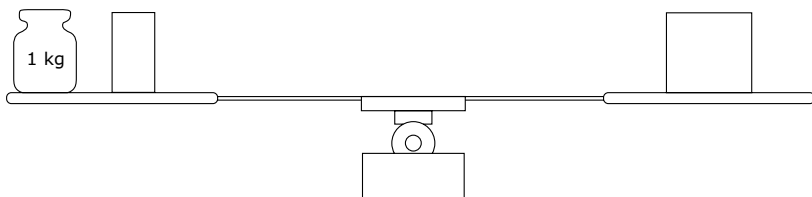
What is the weight (mass) of one brick?

Ⓐ   0.5 kg

Ⓑ   1 kg

Ⓒ   2 kg

Ⓓ   3 kg

Item Number: M012002

Correct Response:	**C**

Overall Percent Correct

Estonia	86	▲
Russian Federation	85	▲
Netherlands	83	▲
Japan	82	▲
Singapore	82	▲
Hong Kong, SAR	81	▲
Italy	79	▲
Belgium (Flemish)	78	▲
Korea, Republic of	78	▲
Slovak Republic	78	▲
Sweden	78	▲
Latvia	77	▲
Australia	76	▲
Chinese Taipei	76	▲
England	76	▲
Lithuania	76	▲
Hungary	75	▲
New Zealand	75	▲
Malaysia	74	▲
Scotland	74	▲
United States	74	▲
Bulgaria	73	▲
Slovenia	73	▲
Moldova, Republic of	68	▲
Israel	67	▲
Norway	66	O
Romania	66	O
Serbia and Montenegro	65	O
Cyprus	64	O
International average	**63**	
Iran, Islamic Republic of	63	O
Macedonia, Republic of	63	O
Jordan	52	▼
Armenia	51	▼
Tunisia	51	▼
Chile	50	▼
Morocco	49	▼
Palestinian Nat'l Auth.	45	▼
Bahrain	42	▼
Egypt	42	▼
Indonesia	41	▼
Lebanon	41	▼
Botswana	36	▼
Philippines	34	▼
Saudi Arabia	31	▼
South Africa	28	▼
Ghana	26	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Equations and Formulas	Using Concepts

If *y* equals 3*x* plus 2

If $y = 3x + 2$, which of these expresses x in terms of y?

Ⓐ $x = \dfrac{y-2}{3}$

Ⓑ $x = \dfrac{y+2}{3}$

Ⓒ $x = \dfrac{y}{3} - 2$

Ⓓ $x = \dfrac{y}{3} + 2$

Item Number: M032046

Correct Response: **A**

Overall Percent Correct

Singapore	61	▲
Hong Kong, SAR	60	▲
Korea, Republic of	52	▲
Chinese Taipei	48	▲
Japan	46	▲
Armenia	45	▲
Russian Federation	44	▲
Romania	44	▲
Serbia and Montenegro	43	▲
Moldova, Republic of	34	▲
Bulgaria	34	▲
Malaysia	31	▲
Belgium (Flemish)	31	▲
Indonesia	30	▲
Macedonia, Republic of	30	▲
Estonia	27	O
United States	26	O
International average	**25**	
Lebanon	24	O
Israel	24	O
Jordan	23	O
Philippines	22	▼
Egypt	21	▼
Lithuania	21	▼
Hungary	21	▼
Latvia	21	▼
Cyprus	20	▼
Italy	20	▼
England	20	▼
Slovak Republic	19	▼
Australia	18	▼
Netherlands	17	▼
Tunisia	17	▼
Iran, Islamic Republic of	16	▼
Palestinian Nat'l Auth.	15	▼
Bahrain	15	▼
Slovenia	15	▼
New Zealand	14	▼
Scotland	12	▼
Morocco	12	▼
Saudi Arabia	12	▼
Sweden	11	▼
Botswana	10	▼
South Africa	10	▼
Chile	9	▼
Norway	6	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Patterns	Reasoning

Number of matchsticks continuing pattern

Matchsticks are arranged as shown in the figures.

Figure 1   Figure 2   Figure 3

If the pattern is continued, how many matchsticks would be used to make Figure 10?

- (A) 30
- (B) 33
- (C) 36
- (D) 39
- (E) 42

Item Number: M012017

Overall Percent Correct

Korea, Republic of	78	▲
Singapore	73	▲
Chinese Taipei	71	▲
Japan	67	▲
Hong Kong, SAR	66	▲
Belgium (Flemish)	64	▲
New Zealand	63	▲
Australia	62	▲
Scotland	61	▲
Hungary	61	▲
Slovak Republic	60	▲
Netherlands	59	▲
Russian Federation	59	▲
Sweden	59	▲
Estonia	58	▲
Israel	58	▲
Malaysia	57	▲
United States	56	▲
Slovenia	56	▲
Lithuania	56	▲
Moldova, Republic of	55	▲
Italy	54	▲
Bulgaria	53	O
England	52	O
Romania	51	O
Serbia and Montenegro	51	O
Macedonia, Republic of	50	O
Latvia	49	O
Cyprus	49	O
International average	**48**	
Armenia	47	O
Norway	46	O
Chile	43	▼
Philippines	41	▼
Bahrain	37	▼
Iran, Islamic Republic of	34	▼
Jordan	33	▼
Lebanon	32	▼
Egypt	30	▼
Tunisia	29	▼
Indonesia	29	▼
Palestinian Nat'l Auth.	29	▼
Botswana	27	▼
Morocco	26	▼
South Africa	24	▼
Saudi Arabia	16	▼
Ghana	16	▼

Correct Response:	**B**

**Country average vs.
International average:**

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Patterns	Reasoning

Numbers in sequence increasing by 4

The numbers in the sequence 7, 11, 15, 19, 23, … increase by four. The numbers in the sequence 1, 10, 19, 28, 37, … increase by nine. The number 19 is in both sequences. If the two sequences are continued, what is the next number that is in BOTH the first and the second sequences?

Answer: _____

Item Number: M022008

SCORING

Correct

• 55

Incorrect Response

• 27 AND 46 [23 + 4 and 37 + 9]

• Either 27 OR 46

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Armenia	63	▲
Korea, Republic of	51	▲
Singapore	50	▲
Hungary	49	▲
Japan	46	▲
United States	45	▲
Italy	45	▲
Belgium (Flemish)	43	▲
Slovenia	41	▲
Australia	39	▲
Hong Kong, SAR	39	▲
Slovak Republic	39	▲
Chinese Taipei	39	▲
Bulgaria	38	▲
Estonia	38	▲
Netherlands	38	▲
Scotland	37	▲
Sweden	35	▲
Malaysia	35	▲
England	34	O
Tunisia	34	O
New Zealand	33	O
Lithuania	33	O
Russian Federation	32	O
Romania	32	O
Israel	31	O
Cyprus	31	O
Latvia	31	O
International average	**31**	
Moldova, Republic of	30	O
Iran, Islamic Republic of	25	▼
Macedonia, Republic of	24	▼
Chile	24	▼
Indonesia	23	▼
Serbia and Montenegro	23	▼
Bahrain	22	▼
Morocco	20	▼
Norway	20	▼
Palestinian Nat'l Auth.	19	▼
Botswana	18	▼
Lebanon	17	▼
Jordan	16	▼
Egypt	14	▼
Philippines	14	▼
Saudi Arabia	8	▼
South Africa	6	▼
Ghana	4	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Numbers in sequence increasing by 4 (continued)

Item Number: M022008

Student Responses

Correct Response:

The numbers in the sequence 7, 11, 15, 19, 23, … increase by four. The numbers in the sequence 1, 10, 19, 28, 37, … increase by nine. The number 19 is in both sequences. If the two sequences are continued, what is the next number that is in BOTH the first and the second sequences?

Answer: __55__

7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51, (55), 59, 63
67, 71

1, 10, 19, 28, 37, 46, (55)

Incorrect Response:

The numbers in the sequence 7, 11, 15, 19, 23, … increase by four. The numbers in the sequence 1, 10, 19, 28, 37, … increase by nine. The number 19 is in both sequences. If the two sequences are continued, what is the next number that is in BOTH the first and the second sequences?

Answer: __46__

39
46

Content Domain	Main Topic	Cognitive Domain
A. ALGEBRA	**Patterns**	**Solving Routine Problems**
B. ALGEBRA	Patterns	Solving Routine Problems
C. ALGEBRA	Patterns	Reasoning

Sequence of figures with triangles: fill table

The three figures below are divided into small congruent triangles.
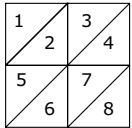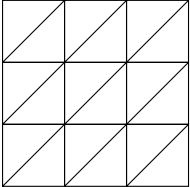
Figure 1   Figure 2   Figure 3

A. Complete the table below. First, fill in how many small triangles make up Figure 3. Then, find the number of small triangles that would be needed for the 4th figure if the sequence of figures is extended.

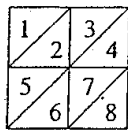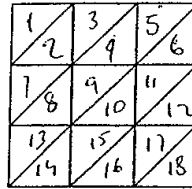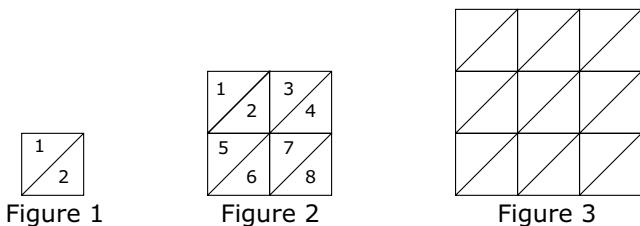| Figure	Number of Small Triangles
1	2
2	8
3	
4	

B. The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: _____

C. The sequence of figures is extended to the 50th figure. Explain a way to find the number of small triangles in the 50th figure that does not involve drawing it and counting the number of triangles.

Item Number: M022261A

SCORING

Correct Response

• 18 AND 32

Incorrect Response

• 18 and any number other than 32.

• 18 and no numerical response for the 4th figure.

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Country	Percent	
Korea, Republic of	78	▲
Singapore	74	▲
Japan	74	▲
Hong Kong, SAR	72	▲
Chinese Taipei	69	▲
Netherlands	59	▲
Australia	57	▲
England	57	▲
New Zealand	55	▲
Armenia	53	▲
Scotland	53	▲
Belgium (Flemish)	51	▲
Hungary	50	▲
United States	50	▲
Estonia	50	▲
Sweden	49	▲
Slovenia	42	▲
Malaysia	42	▲
Israel	42	▲
Russian Federation	41	▲
Slovak Republic	40	O
Latvia	38	O
Lithuania	38	O
International average	**36**	
Italy	35	O
Norway	34	O
Romania	31	O
Moldova, Republic of	31	▼
Serbia and Montenegro	31	▼
Cyprus	30	▼
Bulgaria	30	▼
Macedonia, Republic of	25	▼
Chile	23	▼
Jordan	21	▼
Indonesia	20	▼
Palestinian Nat'l Auth.	17	▼
Philippines	17	▼
Morocco	16	▼
Bahrain	16	▼
Iran, Islamic Republic of	15	▼
Egypt	15	▼
Lebanon	12	▼
Botswana	11	▼
South Africa	6	▼
Tunisia	5	▼
Saudi Arabia	4	▼
Ghana	3	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Sequence of figures with triangles: fill table (continued)

Item Number: M022261A

Student Responses

Correct Response:

The three figures below are divided into small congruent triangles.
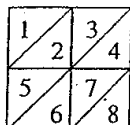
Figure 1   Figure 2   Figure 3
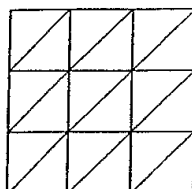
a) Complete the table below. First, fill in how many small triangles make up
   Figure 3. Then, find the number of small triangles that would be needed for
   the 4th figure if the sequence of figures is extended.

Figure	Number of small triangles
1	2
2	8
3	18
4	32

Incorrect Response:

The three figures below are divided into small congruent triangles.
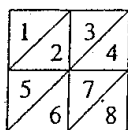
Figure 1   Figure 2   Figure 3
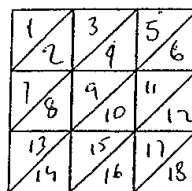
a) Complete the table below. First, fill in how many small triangles make up
   Figure 3. Then, find the number of small triangles that would be needed for
   the 4th figure if the sequence of figures is extended.

Figure	Number of small triangles
1	2
2	8
3	18
4	25

Content Domain	Main Topic	Cognitive Domain
A. ALGEBRA	Patterns	Solving Routine Problems
B. ALGEBRA	**Patterns**	**Solving Routine Problems**
C. ALGEBRA	Patterns	Reasoning

Sequence of figures with triangles: 7th figure

The three figures below are divided into small congruent triangles.
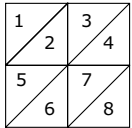
Figure 1   Figure 2   Figure 3

A. Complete the table below. First, fill in how many small triangles make up Figure 3. Then, find the number of small triangles that would be needed for the 4th figure if the sequence of figures is extended.

Figure	Number of Small Triangles
1	2
2	8
3	
4	

B. The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: _____

C. The sequence of figures is extended to the 50th figure. Explain a way to find the number of small triangles in the 50th figure that does not involve drawing it and counting the number of triangles.

Item Number: M022261B

SCORING

Correct Response

• 98

Incorrect Response

• 49 [Multiplies 7 x 7]

• 58 [Series is 2, 8, 18, 28, 38…7th term is 58]

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Korea, Republic of	60	▲
Singapore	56	▲
Chinese Taipei	56	▲
Hong Kong, SAR	56	▲
Japan	55	▲
Armenia	42	▲
Netherlands	40	▲
Australia	33	▲
Scotland	31	▲
Hungary	30	▲
United States	30	▲
New Zealand	29	▲
Belgium (Flemish)	28	▲
Sweden	26	▲
England	25	O
Malaysia	24	O
Estonia	24	O
Italy	24	O
Russian Federation	23	O
Slovenia	22	O
Slovak Republic	22	O
International average	**22**	
Moldova, Republic of	20	O
Israel	20	O
Lithuania	19	O
Romania	19	O
Latvia	19	O
Serbia and Montenegro	19	O
Cyprus	17	▼
Bulgaria	16	▼
Indonesia	15	▼
Norway	14	▼
Jordan	12	▼
Philippines	11	▼
Palestinian Nat'l Auth.	11	▼
Macedonia, Republic of	10	▼
Chile	9	▼
Egypt	9	▼
Bahrain	8	▼
Iran, Islamic Republic of	7	▼
Morocco	7	▼
Lebanon	6	▼
Botswana	5	▼
South Africa	4	▼
Tunisia	2	▼
Ghana	2	▼
Saudi Arabia	0	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Sequence of figures with triangles: 7th figure (continued)

Item Number: M022261B

Student Responses

Correct Response:

The three figures below are divided into small congruent triangles.
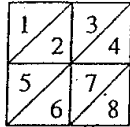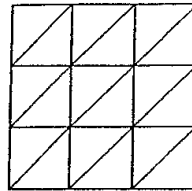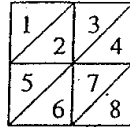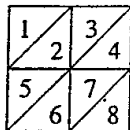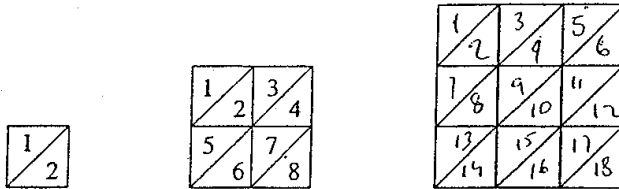

Figure 1   Figure 2   Figure 3

b) The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: _____ *98* _____

Incorrect Response:

The three figures below are divided into small congruent triangles.

Figure 1   Figure 2   Figure 3

b) The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

58

Answer: _____

Content Domain	Main Topic	Cognitive Domain
A. ALGEBRA	Patterns	Solving Routine Problems
B. ALGEBRA	Patterns	Solving Routine Problems
C. ALGEBRA	**Patterns**	**Reasoning**

Sequence of figures with triangles: 50th figure

The three figures below are divided into small congruent triangles.

Figure 1   Figure 2   Figure 3

A. Complete the table below. First, fill in how many small triangles make up Figure 3. Then, find the number of small triangles that would be needed for the 4th figure if the sequence of figures is extended.

Figure	Number of Small Triangles
1	2
2	8
3	
4	

B. The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: _____

C. The sequence of figures is extended to the 50th figure. Explain a way to find the number of small triangles in the 50th figure that does not involve drawing it and counting the number of triangles.

Item Number: M022261C

SCORING

Correct Response
- Correct general (i.e., literal) expression, e.g., $2n^2$, or equivalent expressed in words.
- 2×50^2 OR $2 \times 50 \times 50$ OR 100×50 OR $(50 + 50) \times 50$ OR equivalent expressed in words (disregard errors in computation).

Partial Response
- Derives answer (5000) without showing work.
- Other partially correct.

Incorrect Response
- 50×2 OR 100
- 50×50 OR 2,500
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Chinese Taipei	49	▲
Korea, Republic of	48	▲
Hong Kong, SAR	45	▲
Singapore	44	▲
Japan	44	▲
Netherlands	36	▲
Australia	26	▲
Hungary	24	▲
Scotland	22	▲
Belgium (Flemish)	21	▲
England	20	▲
United States	19	▲
Sweden	17	▲
New Zealand	16	O
Estonia	15	O
Slovak Republic	14	O
International average	**14**	
Italy	14	O
Latvia	13	O
Slovenia	13	O
Serbia and Montenegro	11	▼
Lithuania	11	▼
Romania	11	O
Malaysia	10	▼
Israel	10	▼
Cyprus	10	▼
Norway	9	▼
Russian Federation	9	▼
Armenia	8	▼
Indonesia	7	▼
Chile	6	▼
Jordan	5	▼
Egypt	5	▼
Palestinian Nat'l Auth.	5	▼
Macedonia, Republic of	4	▼
Philippines	4	▼
Bulgaria	4	▼
Bahrain	4	▼
Iran, Islamic Republic of	3	▼
Morocco	2	▼
Botswana	2	▼
South Africa	1	▼
Tunisia	1	▼
Lebanon	1	▼
Ghana	1	▼
Saudi Arabia	0	▼
Moldova, Republic of	0	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Sequence of figures with triangles/50th figure (continued)

Item Number: M022261C

Student Responses

Correct Response:

The three figures below are divided into small congruent triangles.

Figure 1   Figure 2   Figure 3
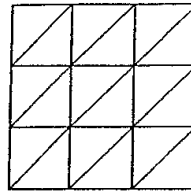
c) The sequence of figures is extended to the 50th figure. Explain a way to find
    the number of small triangles in the 50th figure that does not involve drawing
    it and counting the number of triangles.

> 5000 Multiply the figure by itself
> and then multiply the answer you
> get by two.

Partial Response:

The three figures below are divided into small congruent triangles.

Figure 1   Figure 2   Figure 3
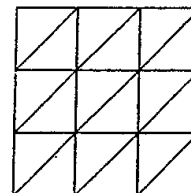
c) The sequence of figures is extended to the 50th figure. Explain a way to find
    the number of small triangles in the 50th figure that does not involve drawing
    it and counting the number of triangles.

> 5000

Sequence of figures with triangles/50th figure (continued)

Item Number: M022261C

Student Responses (continued)

Incorrect Response:

The three figures below are divided into small congruent triangles.

Figure 1   Figure 2   Figure 3

c) The sequence of figures is extended to the 50th figure. Explain a way to find
the number of small triangles in the 50th figure that does not involve drawing
it and counting the number of triangles.

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Patterns	Using Concepts

Geometry tiling: identify cell with letter

If the pattern on the grid below was continued, what letter would identify the orientation of the tile in the cell labeled **X**?
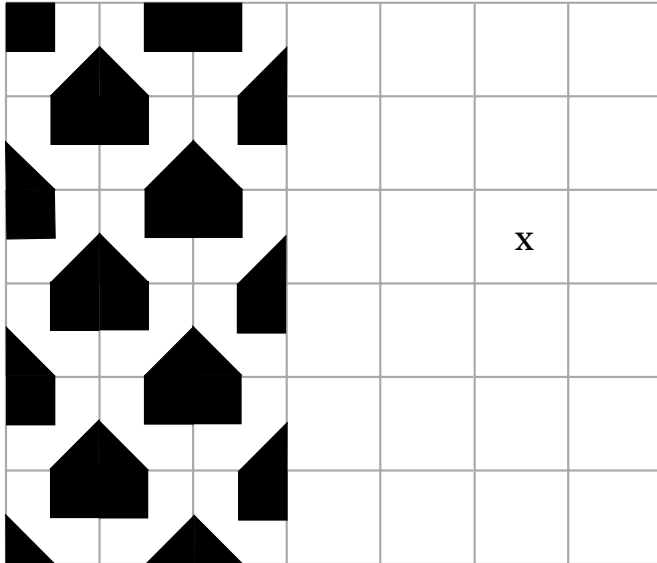
Answer: _____

Item Number: M032744

SCORING

Correct Response
- D (including drawing of tile D).

Incorrect Response
- A, B, or C (including drawings).
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Japan	73	▲
Korea, Republic of	66	▲
Singapore	62	▲
Sweden	57	▲
Hong Kong, SAR	57	▲
Netherlands	55	▲
Chinese Taipei	55	▲
Estonia	55	▲
Hungary	54	▲
Scotland	54	▲
Australia	53	▲
New Zealand	51	▲
Belgium (Flemish)	50	▲
United States	48	▲
England	47	▲
Slovak Republic	46	▲
Latvia	45	▲
Malaysia	44	▲
Slovenia	43	▲
Russian Federation	39	▲
Norway	36	O
Italy	34	O
Israel	34	O
International average	**32**	
Bulgaria	30	O
Romania	29	O
Lithuania	27	O
Cyprus	24	▼
Chile	23	▼
Bahrain	22	▼
Serbia and Montenegro	20	▼
Jordan	16	▼
Moldova, Republic of	15	▼
Philippines	14	▼
Iran, Islamic Republic of	13	▼
Macedonia, Republic of	13	▼
Indonesia	11	▼
Lebanon	10	▼
South Africa	8	▼
Saudi Arabia	8	▼
Morocco	7	▼
Egypt	7	▼
Botswana	7	▼
Armenia	6	▼
Palestinian Nat'l Auth.	3	▼
Tunisia	2	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Geometry tiling: identify cell with letter (continued)

Item Number: M032744

Student Responses

Correct Response:

If the pattern on the grid below was continued, what letter would identify the orientation of the tile in the cell labeled **X**?
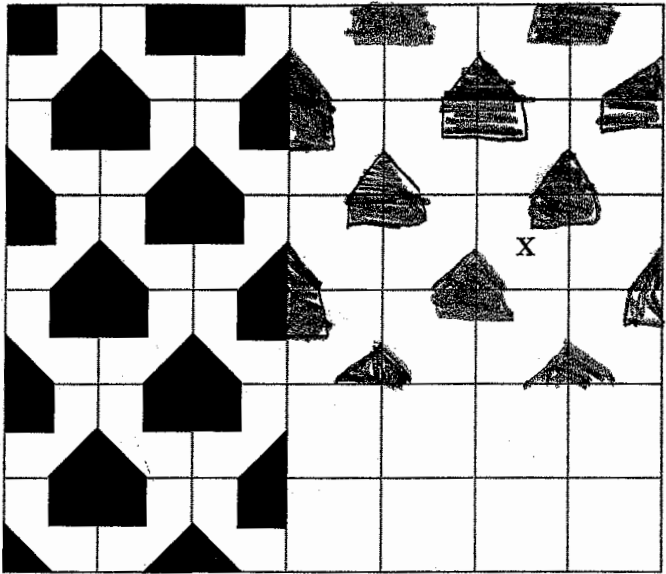
Answer: _____

Geometry tiling: identify cell with letter (continued)

Item Number: M032744

Student Responses (continued)

Incorrect Response:

If the pattern on the grid below was continued, what letter would identify the orientation of the tile in the cell labeled **X**?
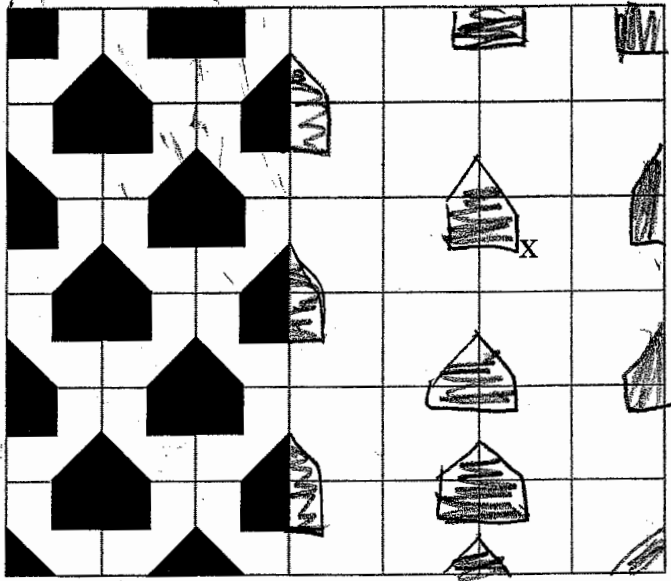
Answer: *Pentagon*

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Relationships	Reasoning

Sets of ordered pairs of numbers

(3, 6) , (6, 15) , (8, 21)

Which of these describes how to get the second number from the first number in every ordered pair above?

- Ⓐ Add 3
- Ⓑ Subtract 3
- Ⓒ Multiply by 2
- Ⓓ Multiply by 2 and then add 3
- Ⓔ Multiply by 3 and then subtract 3

Item Number: M012029

Correct Response: E

Overall Percent Correct

Country	%	
Korea, Republic of	85	▲
Japan	76	▲
Hungary	75	▲
Estonia	74	▲
Chinese Taipei	71	▲
Singapore	71	▲
Hong Kong, SAR	71	▲
Latvia	71	▲
Australia	70	▲
Russian Federation	69	▲
Scotland	69	▲
United States	68	▲
Netherlands	68	▲
New Zealand	67	▲
England	64	▲
Lithuania	64	▲
Belgium (Flemish)	62	▲
Serbia and Montenegro	58	▲
Israel	57	▲
Slovak Republic	56	▲
Bulgaria	54	O
Slovenia	53	O
Italy	51	O
Malaysia	51	O
International average	**50**	
Jordan	46	▼
Sweden	45	▼
Macedonia, Republic of	42	▼
Romania	42	▼
Norway	40	▼
Moldova, Republic of	39	▼
Bahrain	38	▼
Botswana	36	▼
Iran, Islamic Republic of	35	▼
Armenia	34	▼
Egypt	33	▼
Indonesia	33	▼
Palestinian Nat'l Auth.	33	▼
Philippines	31	▼
Saudi Arabia	26	▼
Cyprus	25	▼
Chile	24	▼
Ghana	23	▼
Lebanon	23	▼
South Africa	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
ALGEBRA	Relationships	Solving Routine Problems

Intersection point of distance/time graphs

The graph represents the distance and time of a hike taken by Joshua and Liam.
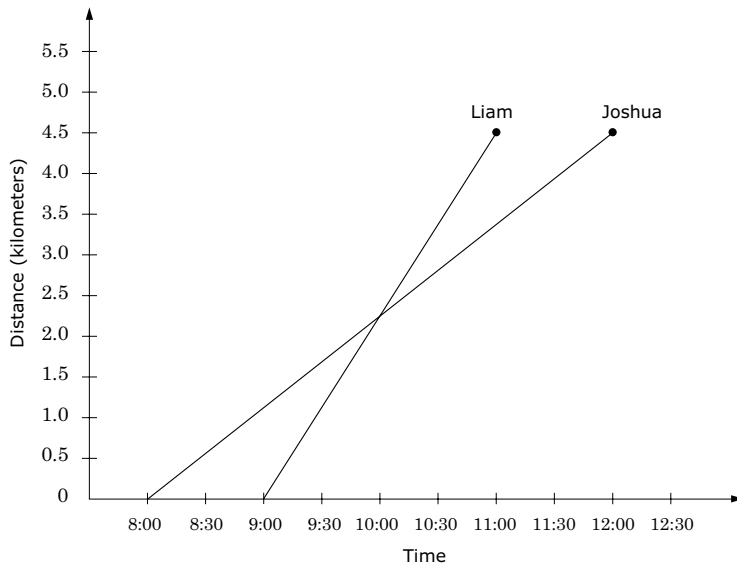
If they both started from the same place and walked in the same direction, at what time did they meet?

Ⓐ 8:00

Ⓑ 8:30

Ⓒ 9:00

Ⓓ 10:00

Ⓔ 11:00

Item Number: M012025

Correct Response:	**D**

Overall Percent Correct

Japan	96	▲
Hong Kong, SAR	90	▲
Korea, Republic of	89	▲
Estonia	88	▲
Singapore	87	▲
Hungary	84	▲
Lithuania	84	▲
Sweden	84	▲
Russian Federation	81	▲
Netherlands	81	▲
Chinese Taipei	81	▲
England	81	▲
United States	80	▲
Slovenia	79	▲
Latvia	78	▲
Italy	75	▲
Australia	75	▲
Belgium (Flemish)	73	▲
Scotland	73	▲
New Zealand	72	▲
Israel	72	▲
Slovak Republic	70	▲
Serbia and Montenegro	68	▲
Bulgaria	67	▲
Norway	64	O
International average	**62**	
Cyprus	58	O
Romania	58	O
Macedonia, Republic of	53	▼
Malaysia	53	▼
Jordan	52	▼
Armenia	52	▼
Chile	51	▼
Bahrain	50	▼
Egypt	47	▼
Moldova, Republic of	47	▼
Indonesia	46	▼
Lebanon	42	▼
Botswana	41	▼
Palestinian Nat'l Auth.	39	▼
Saudi Arabia	37	▼
Philippines	31	▼
Iran, Islamic Republic of	26	▼
Ghana	21	▼
South Africa	19	▼
Tunisia	14	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Data Interpretation	Reasoning

Test score frequency table

The table shows scores for a class on a 10-point test.

Test Score	Tally	Frequency
4	/	1
5	///	3
6	///// /	6
7	//	2
8	////	4
9	///	3
10	/	1

How many in the class had a score greater than 7?

Ⓐ 2

Ⓑ 8

Ⓒ 10

Ⓓ 12

Ⓔ 20

Item Number: M012037

Correct Response: B

Overall Percent Correct

Korea, Republic of	85	▲
Netherlands	77	▲
Slovenia	68	▲
Belgium (Flemish)	67	▲
Sweden	65	▲
United States	65	▲
Scotland	64	▲
Singapore	63	▲
Lithuania	61	▲
Israel	59	▲
New Zealand	59	▲
England	58	▲
Estonia	58	▲
Australia	56	▲
Hungary	56	▲
Serbia and Montenegro	56	▲
Norway	55	▲
Indonesia	53	▲
Latvia	53	▲
Russian Federation	52	O
Bahrain	51	O
Chinese Taipei	51	O
Macedonia, Republic of	51	O
Slovak Republic	49	O
Hong Kong, SAR	48	O
International average	**48**	
Malaysia	47	O
Romania	47	O
Jordan	46	O
Italy	45	O
Japan	44	▼
Cyprus	42	▼
Egypt	42	▼
Iran, Islamic Republic of	42	▼
Armenia	39	▼
Philippines	39	▼
Palestinian Nat'l Auth.	36	▼
Tunisia	35	▼
Bulgaria	34	▼
Botswana	33	▼
Chile	33	▼
Lebanon	31	▼
Moldova, Republic of	31	▼
Ghana	27	▼
Saudi Arabia	26	▼
South Africa	22	▼
Morocco	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Data interpretation	Reasoning

How many pencils sold from bar graph

The graph shows the number of pens, pencils, rulers, and erasers sold by a store in one week.
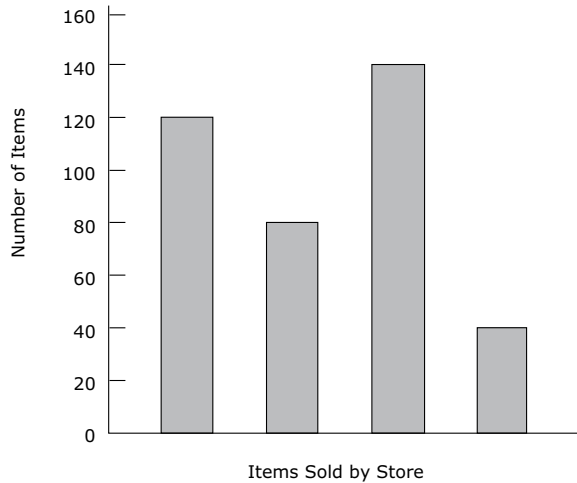
The names of the items are missing from the graph. Pens were the item most often sold, and fewer erasers than any other item were sold. More pencils than rulers were sold. How many pencils were sold?

Ⓐ   40

Ⓑ   80

Ⓒ   120

Ⓓ   140

Item Number: M022189

Correct Response:	**C**

Overall Percent Correct

Belgium (Flemish)	90	▲
Chinese Taipei	89	▲
Japan	88	▲
Hong Kong, SAR	88	▲
Korea, Republic of	87	▲
Malaysia	87	▲
Estonia	87	▲
Slovenia	86	▲
United States	86	▲
Sweden	86	▲
Netherlands	85	▲
Hungary	85	▲
Scotland	84	▲
Singapore	83	▲
Latvia	82	▲
Slovak Republic	80	▲
Russian Federation	80	▲
Italy	80	▲
Norway	78	▲
England	78	▲
New Zealand	78	▲
Lithuania	77	▲
Cyprus	76	▲
Australia	76	▲
Israel	70	O
International average	**67**	
Bulgaria	67	O
Bahrain	66	O
Serbia and Montenegro	63	▼
Moldova, Republic of	62	▼
Iran, Islamic Republic of	61	▼
Macedonia, Republic of	59	▼
Romania	59	▼
Jordan	59	▼
Morocco	53	▼
Armenia	51	▼
Chile	50	▼
Egypt	49	▼
Indonesia	49	▼
Palestinian Nat'l Auth.	48	▼
Saudi Arabia	45	▼
Lebanon	42	▼
Tunisia	40	▼
Botswana	37	▼
Philippines	32	▼
South Africa	28	▼
Ghana	24	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Data interpretation	Reasoning

Phone plans: least expensive plan for Betty

Betty talks for less than 2 hours per month. Which plan would be less expensive for her?

Less expensive plan _____

Explain your answer in terms of both the monthly fee and free minutes.

Item Number: M032762

SCORING

Correct Response

- Plan B with explanation that includes free minutes used and explicit reference to lower monthly fee for Plan B.

Partial Response

- Plan B with explicit reference to lower monthly fee and no reference to free minutes.

Incorrect Response

- Plan B with inadequate (only free minutes) or no explanation.
- Plan A with or without explanation.
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Japan	49	▲
England	45	▲
Australia	44	▲
Estonia	44	▲
Korea, Republic of	40	▲
Singapore	40	▲
Hungary	39	▲
Belgium (Flemish)	38	▲
Lithuania	37	▲
United States	37	▲
Scotland	36	▲
Israel	33	▲
New Zealand	30	▲
Netherlands	28	▲
Hong Kong, SAR	28	▲
Slovenia	27	▲
Sweden	27	▲
Malaysia	27	▲
Chinese Taipei	27	▲
Slovak Republic	26	▲
Italy	23	O
Latvia	22	O
International average	**21**	
Jordan	20	O
Bahrain	18	O
Norway	18	▼
Romania	16	▼
Russian Federation	15	▼
Egypt	14	▼
Cyprus	13	▼
Indonesia	12	▼
Serbia and Montenegro	12	▼
Chile	12	▼
Bulgaria	12	▼
Lebanon	11	▼
Philippines	11	▼
Macedonia, Republic of	10	▼
Saudi Arabia	8	▼
Morocco	7	▼
South Africa	6	▼
Palestinian Nat'l Auth.	5	▼
Iran, Islamic Republic of	4	▼
Tunisia	4	▼
Ghana	3	▼
Botswana	2	▼
Armenia	2	▼
Moldova, Republic of	1	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Phone plans: least expensive plan for Betty (continued)

Item Number: M032762

Student Responses

Correct Response:

Betty talks for less than 2 hours per month. Which plan would be less expensive for her?

Less expensive plan ____ B ____

Explain your answer in terms of both the monthly fee and free minutes.

She talks for under and hours and it pays the least zeds

Questions for Phone Plans continue.

Partial Response:

Betty talks for less than 2 hours per month. Which plan would be less expensive for her?

Less expensive plan ____ B ____

Explain your answer in terms of both the monthly fee and free minutes.

Plan A is cost a lot of money. Mounthly fee is 20 zeds.
Plan A is cost a less of money. Mounthly fee is 15 zeds.

Incorrect Response:

Betty talks for less than 2 hours per month. Which plan would be less expensive for her?

Less expensive plan ____ B ____

Explain your answer in terms of both the monthly fee and free minutes.

Since Betty calls for 2hrs which is 120 min She will pay less for plan B. Because she will use her free units.

Content Domain	Main Topic	Cognitive Domain
DATA	Data interpretation	Solving Routine Problems

Graph of cooling water

A beaker of water which has reached boiling point is allowed to cool. The temperature of the water is recorded at five minute intervals, and a temperature-time graph is drawn.

Cooling Curve
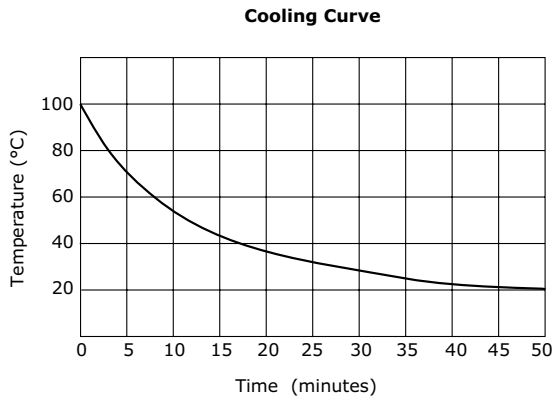
About how many minutes did it take for the water to cool the first 20 degrees?

Ⓐ   3

Ⓑ   8

Ⓒ   37

Ⓓ   50

Item Number: M022135

Correct Response: **A**

Overall Percent Correct

Belgium (Flemish)	70	▲
Sweden	62	▲
Australia	59	▲
Estonia	57	▲
Hungary	56	▲
Scotland	55	▲
England	55	▲
Norway	54	▲
Singapore	54	▲
Netherlands	53	▲
United States	52	▲
New Zealand	49	▲
Lithuania	49	▲
Latvia	47	▲
Chinese Taipei	45	▲
Lebanon	40	▲
Italy	40	▲
Slovenia	39	▲
Japan	39	▲
Russian Federation	38	▲
Israel	36	O
Indonesia	35	O
Armenia	35	O
Slovak Republic	34	O
Malaysia	33	O
International average	**33**	
Serbia and Montenegro	33	O
Bulgaria	32	O
Romania	30	O
Moldova, Republic of	28	▼
Hong Kong, SAR	26	▼
Chile	25	▼
Cyprus	21	▼
Jordan	18	▼
Iran, Islamic Republic of	18	▼
Macedonia, Republic of	17	▼
South Africa	14	▼
Palestinian Nat'l Auth.	14	▼
Ghana	13	▼
Botswana	12	▼
Korea, Republic of	11	▼
Bahrain	11	▼
Morocco	10	▼
Philippines	10	▼
Saudi Arabia	9	▼
Egypt	8	▼
Tunisia	4	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Data interpretation	Solving Routine Problems

Phone plans: cost of plans for Frank

Frank talks for 5 hours per month at the night rate. What would each plan cost him per month? Show your work.

Cost Per Month for Plan A: _____ zeds

Cost Per Month for Plan B: _____ zeds

Item Number: M032763

SCORING

Correct Response

• Plan A= 140 zeds and Plan B = 375 zeds, with work shown.

Partial Response

• 140 zeds and 375 zeds with no work shown.
• Plan A or plan B correct with work shown but not both.

Incorrect Response

• Incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Singapore	27	▲
Japan	19	▲
Chinese Taipei	18	▲
Hong Kong, SAR	15	▲
Korea, Republic of	15	▲
Netherlands	14	▲
Sweden	12	▲
Lithuania	11	▲
Belgium (Flemish)	11	▲
Estonia	10	▲
Hungary	10	▲
England	8	O
United States	8	▲
New Zealand	7	O
Scotland	7	O
Slovak Republic	7	O
Australia	7	O
Israel	6	O
Malaysia	6	O
International average	**6**	
Latvia	6	O
Slovenia	5	O
Russian Federation	5	O
Romania	5	O
Norway	5	O
Bulgaria	4	O
Serbia and Montenegro	3	▼
Italy	3	▼
Moldova, Republic of	2	▼
Jordan	1	▼
Cyprus	1	▼
Macedonia, Republic of	1	▼
Indonesia	1	▼
South Africa	1	▼
Armenia	1	▼
Palestinian Nat'l Auth.	1	▼
Philippines	1	▼
Chile	0	▼
Iran, Islamic Republic of	0	▼
Egypt	0	▼
Lebanon	0	▼
Bahrain	0	▼
Ghana	0	▼
Tunisia	0	▼
Morocco	0	▼
Botswana	0	▼
Saudi Arabia	0	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Phone plans: cost of plans for Frank (continued)

Item Number: M032763

Student Responses

Correct Response:

Frank talks for 5 hours per month at the night rate. What would each plan cost him per month? Show your work.

Cost Per Month for Plan A: ___ 140 ___ zeds

Cost Per Month for Plan B: ___ 375 ___ zeds

Plan A - 1zed - 180 mins free
Plan B - 2zed - 120 mins free

Plan A - 3 hours free
　120 zeds -
+ 　20
━━━━━━
　140 zed

Plan B - 2 hours free
　360 zeds
　 15
━━━━━
　375

Inorrect Response:

Frank talks for 5 hours per month at the night rate. What would each plan cost him per month? Show your work.

Cost Per Month for Plan A: ___ 140 ___ zeds

Cost Per Month for Plan B: ___ 255 ___ zeds

Content Domain	Main Topic	Cognitive Domain
DATA	Data interpretation	Solving Routine Problems

Phone plans: minutes talk by Darlene

Darlene signed up for the *Plan B*, and the cost of one month of service was 75 zeds. How many minutes did she talk that month? Show your work.

Minutes talked _____

Item Number: M032764

SCORING

Correct Response

• 150 with work shown.

Partial Response

• 150 with no work shown.
• Correct method but with calculation error.
• 12 30 with calculations leading to 30.

Incorrect Response

• Incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Singapore	28	▲
Korea, Republic of	22	▲
Hong Kong, SAR	21	▲
Chinese Taipei	20	▲
Japan	19	▲
Netherlands	17	▲
Belgium (Flemish)	13	▲
Sweden	12	▲
Estonia	11	▲
England	11	▲
Hungary	9	▲
Lithuania	9	▲
Australia	8	O
United States	8	▲
Slovak Republic	8	O
New Zealand	7	O
International average	**6**	
Latvia	6	O
Scotland	6	O
Slovenia	5	O
Israel	5	O
Romania	5	O
Norway	5	O
Russian Federation	4	▼
Malaysia	4	▼
Ghana	3	▼
Bulgaria	3	▼
Italy	3	▼
Moldova, Republic of	2	▼
Jordan	2	▼
Cyprus	2	▼
Serbia and Montenegro	2	▼
Macedonia, Republic of	1	▼
Indonesia	1	▼
South Africa	1	▼
Bahrain	1	▼
Lebanon	0	▼
Tunisia	0	▼
Iran, Islamic Republic of	0	▼
Chile	0	▼
Philippines	0	▼
Armenia	0	▼
Palestinian Nat'l Auth.	0	▼
Morocco	0	▼
Botswana	0	▼
Egypt	0	▼
Saudi Arabia	0	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Phone plans: minutes talk by Darlene (continued)

Item Number: M032764

Student Responses

Correct Response:

Darlene signed up for the *Plan B*, and the cost of one month of service was 75 zeds. How many minutes did she talk that month? Show your work.

Minutes talked ___150___

$$75 - 15 = 60$$
$$2 \overline{)60} = 30$$
$$120 + 30 = 150$$

Partial Response:

Darlene signed up for the *Plan B*, and the cost of one month of service was 75 zeds. How many minutes did she talk that month? Show your work.

Minutes talked ___1325___ minutes.

$$75 - 15 = 65$$
$$2 \overline{)65} = 32.5$$
$$32.5 + 120 = 1325$$

Incorrect Response:

Darlene signed up for the *Plan B*, and the cost of one month of service was 75 zeds. How many minutes did she talk that month? Show your work.

Minutes talked ___157.5___

$$75 \div 2 = 37.5$$
4

120 free talk time = 157.5

Content Domain	Main Topic	Cognitive Domain
DATA	Data Interpretation	Using Concepts

Comparison of two average scores

Joe had three test scores of 78, 76, and 74, while Mary had scores of 72, 82, and 74. How did Joe's average (mean) score compare with Mary's average (mean) score?

Ⓐ Joe's was 1 point higher.

Ⓑ Joe's was 1 point lower.

Ⓒ Both averages were the same.

Ⓓ Joe's was 2 points higher.

Ⓔ Joe's was 2 points lower.

Item Number: M012006

Correct Response:	**C**

Overall Percent Correct

Chinese Taipei	90	▲
Korea, Republic of	90	▲
Singapore	88	▲
Hong Kong, SAR	87	▲
Malaysia	84	▲
Japan	81	▲
Slovak Republic	78	▲
Lithuania	76	▲
Netherlands	76	▲
Latvia	75	▲
Tunisia	75	▲
Slovenia	74	▲
United States	74	▲
Bulgaria	73	▲
Israel	73	▲
Scotland	73	▲
Estonia	72	▲
Hungary	72	▲
Moldova, Republic of	72	O
Romania	72	▲
Serbia and Montenegro	72	▲
Russian Federation	70	O
Australia	69	O
Belgium (Flemish)	69	O
Italy	69	O
International average	**68**	
Macedonia, Republic of	68	O
Sweden	66	O
Armenia	65	O
Cyprus	65	O
Iran, Islamic Republic of	64	O
Morocco	64	O
Chile	62	▼
Norway	61	▼
Philippines	61	▼
Egypt	60	▼
England	60	▼
New Zealand	60	▼
Bahrain	58	▼
Indonesia	56	▼
Botswana	53	▼
Jordan	52	▼
Palestinian Nat'l Auth.	51	▼
Ghana	43	▼
South Africa	43	▼
Saudi Arabia	38	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Data Interpretation	Using Concepts

Pie graph of crop distribution

The graph shows the distribution of crops grown in a certain country.
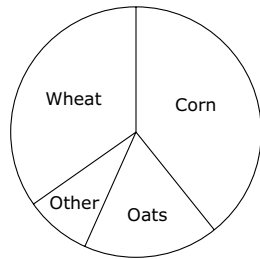
According to the information in the graph, which of these statements is true?

Ⓐ   More oats are grown than wheat.

Ⓑ   Corn is more than one-half of the country's crop.

Ⓒ   Oats are more than one-third of the country's crop.

Ⓓ   The total crop of oats and wheat is greater than the corn crop.

Item Number: M012014

Overall Percent Correct

Korea, Republic of	93	▲
Japan	92	▲
Netherlands	88	▲
Australia	86	▲
Belgium (Flemish)	86	▲
Sweden	85	▲
Hong Kong, SAR	85	▲
Chinese Taipei	84	▲
Latvia	84	▲
Singapore	83	▲
Slovak Republic	82	▲
England	82	▲
Estonia	82	▲
Slovenia	82	▲
Lithuania	82	▲
Hungary	81	▲
New Zealand	81	▲
United States	81	▲
Scotland	81	▲
Israel	79	▲
Norway	78	▲
Russian Federation	78	▲
Cyprus	76	▲
Italy	74	O
Romania	72	O
International average	**71**	
Tunisia	71	O
Bulgaria	70	O
Egypt	69	O
Moldova, Republic of	67	O
Morocco	67	O
Jordan	66	▼
Macedonia, Republic of	65	▼
Serbia and Montenegro	65	▼
Iran, Islamic Republic of	64	▼
Malaysia	63	▼
Bahrain	63	▼
Palestinian Nat'l Auth.	61	▼
Armenia	60	▼
Chile	57	▼
Saudi Arabia	52	▼
Botswana	51	▼
Philippines	50	▼
Lebanon	49	▼
Indonesia	45	▼
Ghana	41	▼
South Africa	33	▼

Correct Response:	D

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Uncertainty and Probability	Reasoning

Most likely sector on spinner

The figure below shows a spinner with 24 sectors. When someone spins the arrow, it is equally likely to stop on any sector.
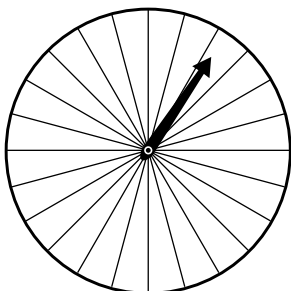
$\frac{1}{8}$ of the sectors are blue, $\frac{1}{24}$ are purple, $\frac{1}{2}$ are orange, and $\frac{1}{3}$ are red. If a person spins the arrow, on which color sector is the spinner LEAST likely to stop?

- Ⓐ blue
- Ⓑ purple
- Ⓒ orange
- Ⓓ red

Item Number: M022252

Correct Response:	**B**

Overall Percent Correct

Hong Kong, SAR	87	▲
Chinese Taipei	85	▲
Netherlands	85	▲
Japan	82	▲
Sweden	81	▲
Belgium (Flemish)	81	▲
England	79	▲
Singapore	79	▲
Korea, Republic of	79	▲
United States	78	▲
Australia	78	▲
Hungary	76	▲
Scotland	76	▲
Israel	74	▲
Slovenia	74	▲
Norway	73	▲
Estonia	73	▲
Latvia	71	▲
New Zealand	71	▲
Slovak Republic	69	▲
Cyprus	69	▲
Lithuania	67	▲
Serbia and Montenegro	66	▲
Malaysia	65	▲
Bulgaria	60	O
Russian Federation	60	O
International average	**60**	
Italy	58	O
Romania	57	O
Macedonia, Republic of	54	▼
Armenia	47	▼
Moldova, Republic of	46	▼
Jordan	46	▼
Philippines	43	▼
Iran, Islamic Republic of	43	▼
Egypt	43	▼
Lebanon	42	▼
Palestinian Nat'l Auth.	41	▼
Bahrain	40	▼
Morocco	39	▼
Chile	38	▼
Indonesia	37	▼
Botswana	34	▼
Saudi Arabia	34	▼
Ghana	34	▼
South Africa	34	▼
Tunisia	31	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Uncertainty and Probability	Reasoning

In a school there were 1200 students

In a school there were 1,200 students (boys and girls). A sample of 100 students was selected at random, and 45 boys were found in the sample. Which of these is most likely to be the number of boys in the school?

- (A) 450
- (B) 500
- (C) 540
- (D) 600

Item Number: M032271

Correct Response:	**C**

Overall Percent Correct

Hong Kong, SAR	81	▲
Singapore	80	▲
Netherlands	78	▲
Chinese Taipei	77	▲
Korea, Republic of	75	▲
Belgium (Flemish)	71	▲
Japan	66	▲
Estonia	61	▲
Sweden	61	▲
United States	60	▲
Hungary	56	▲
Australia	56	▲
New Zealand	55	▲
Lithuania	55	▲
Italy	55	▲
Scotland	53	▲
Russian Federation	52	▲
Latvia	50	O
Malaysia	49	O
England	49	O
Israel	47	O
International average	**47**	
Norway	46	O
Slovak Republic	45	O
Serbia and Montenegro	44	O
Moldova, Republic of	44	O
Slovenia	44	O
Bulgaria	43	O
Cyprus	43	▼
Lebanon	41	▼
Armenia	39	▼
Tunisia	39	▼
Jordan	39	▼
Romania	38	▼
Egypt	38	▼
Macedonia, Republic of	36	▼
Iran, Islamic Republic of	35	▼
Indonesia	34	▼
Chile	32	▼
Palestinian Nat'l Auth.	32	▼
Philippines	31	▼
Morocco	28	▼
Botswana	28	▼
Saudi Arabia	26	▼
Bahrain	23	▼
South Africa	23	▼
Ghana	23	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
DATA	Uncertainty and Probability	Solving Routine Problems

Number of students from probability

In an eighth-grade class of 30 students, the probability that a student chosen at random will be less than 13 years old is $\frac{1}{5}$. How many students in the class are less than 13 years old?

Ⓐ Two

Ⓑ Three

Ⓒ Four

Ⓓ Five

Ⓔ Six

Item Number: M022146

Correct Response: E

Overall Percent Correct

Korea, Republic of	89	▲
Singapore	87	▲
Chinese Taipei	86	▲
Japan	86	▲
Hong Kong, SAR	84	▲
Netherlands	82	▲
Belgium (Flemish)	79	▲
Sweden	71	▲
Malaysia	69	▲
Scotland	66	▲
England	63	▲
Armenia	62	▲
Australia	60	▲
Latvia	59	▲
United States	58	▲
Estonia	57	▲
Italy	56	▲
Hungary	55	▲
Israel	54	▲
New Zealand	54	O
Cyprus	53	O
Slovenia	53	O
Lithuania	52	O
Russian Federation	51	O
Norway	50	O
Bulgaria	50	O
International average	**50**	
Slovak Republic	50	O
Serbia and Montenegro	46	O
Indonesia	42	▼
Romania	39	▼
Iran, Islamic Republic of	37	▼
Jordan	33	▼
Egypt	33	▼
Botswana	32	▼
Macedonia, Republic of	32	▼
Philippines	32	▼
Moldova, Republic of	31	▼
Palestinian Nat'l Auth.	28	▼
Lebanon	28	▼
Ghana	28	▼
South Africa	26	▼
Bahrain	24	▼
Chile	23	▼
Tunisia	22	▼
Saudi Arabia	18	▼
Morocco	18	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Congruence and Similarity	Knowing Facts and Procedures

Draw a line to divide triangle ABC
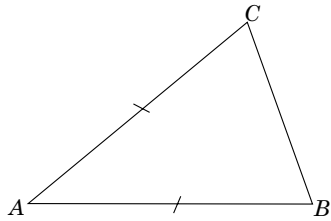
The triangle ABC has $AB = AC$.

Draw a line to divide triangle ABC into two congruent triangles.

Item Number: M032403

SCORING

Correct Response

• Line drawn from A to (approximate) midpoint of BC.

Incorrect Response

• Line drawn from C or B.

• Other incorrect (including crossed out/erased, stray marks, illegible or off task).

Overall Percent Correct

Singapore	88	▲
Japan	86	▲
Korea, Republic of	84	▲
Hong Kong, SAR	79	▲
Armenia	77	▲
Russian Federation	73	▲
Belgium (Flemish)	72	▲
Chinese Taipei	71	▲
Latvia	71	▲
Lithuania	70	▲
Estonia	69	▲
Israel	66	▲
Bahrain	65	▲
Romania	62	▲
Bulgaria	61	▲
Slovak Republic	60	▲
Netherlands	59	▲
Moldova, Republic of	56	O
Lebanon	55	O
Australia	55	O
United States	54	O
Slovenia	53	O
Tunisia	53	O
Hungary	53	O
Malaysia	52	O
International average	**52**	
Cyprus	51	O
England	48	O
New Zealand	48	O
Jordan	47	▼
Scotland	47	O
Italy	45	▼
Iran, Islamic Republic of	43	▼
Norway	42	▼
Morocco	41	▼
Serbia and Montenegro	40	▼
Egypt	40	▼
Saudi Arabia	39	▼
Palestinian Nat'l Auth.	36	▼
Macedonia, Republic of	35	▼
Indonesia	26	▼
Sweden	20	▼
Chile	19	▼
Botswana	14	▼
Philippines	11	▼
South Africa	7	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Draw a line to divide triangle ABC (continued)

Item Number: M032403

Student Responses
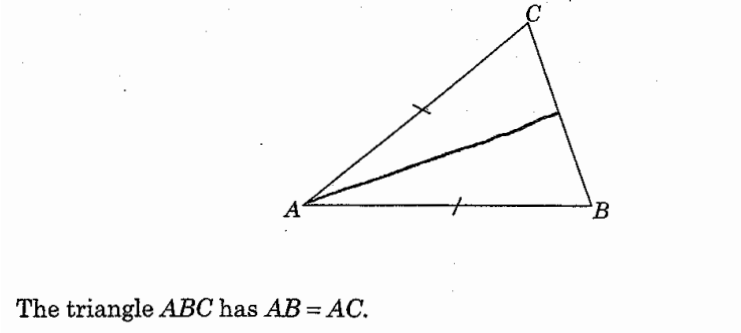
Correct:

The triangle ABC has $AB = AC$.

Draw a line to divide triangle ABC into two congruent triangles.

Incorrect:
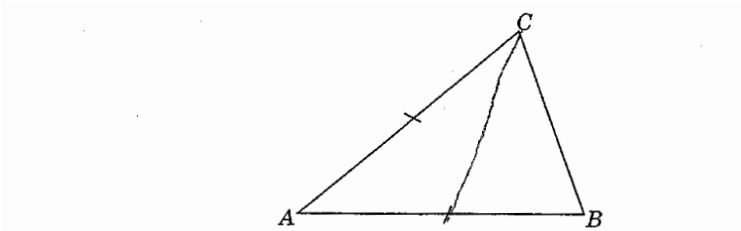
The triangle ABC has $AB = AC$.

Draw a line to divide triangle ABC into two congruent triangles.

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Congruence and Similarity	Reasoning

Property of congruent trapezoids

ABCD is a trapezoid.
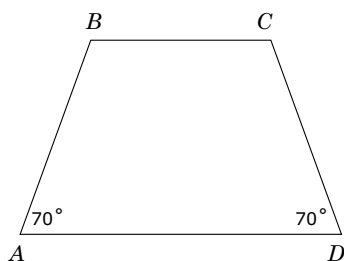
Another trapezoid, *GHIJ* (not shown), is congruent (the same size and shape) to *ABCD*. Angles *G* and *J* each measure 70°. Which of these could be true?

- (A) *GH* = *AB*
- (B) Angle *H* is a right angle.
- (C) All sides of *GHIJ* are the same length.
- (D) The perimeter of *GHIJ* is 3 times the perimeter of *ABCD*.
- (E) The area of *GHIJ* is less than the area of *ABCD*.

Item Number: M012015

Correct Response: **A**

Overall Percent Correct

Country	%	
Korea, Republic of	86	▲
Estonia	84	▲
Japan	83	▲
Hong Kong, SAR	81	▲
Singapore	81	▲
Chinese Taipei	79	▲
Latvia	77	▲
Russian Federation	77	▲
Lithuania	74	▲
Belgium (Flemish)	73	▲
Slovak Republic	73	▲
Netherlands	69	▲
United States	69	▲
Hungary	69	▲
Slovenia	68	▲
Romania	68	▲
Italy	67	▲
Bulgaria	67	▲
Australia	66	▲
Israel	66	▲
Scotland	64	O
Malaysia	64	O
Moldova, Republic of	63	O
Sweden	62	O
Morocco	62	O
Tunisia	62	O
New Zealand	61	O
Cyprus	61	O
International average	**60**	
Macedonia, Republic of	60	O
Armenia	59	O
Norway	58	O
England	57	O
Indonesia	56	O
Serbia and Montenegro	56	▼
Lebanon	55	▼
Bahrain	54	▼
Jordan	48	▼
Iran, Islamic Republic of	45	▼
Saudi Arabia	39	▼
Chile	39	▼
Palestinian Nat'l Auth.	37	▼
Egypt	35	▼
Botswana	34	▼
Philippines	30	▼
Ghana	25	▼
South Africa	24	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Congruence and Similarity	Using Concepts

False statement of congruent triangles

In square *EFGH*, which of these is FALSE?

- Ⓐ ΔEIF and ΔEIH are congruent.
- Ⓑ ΔGHI and ΔGHF are congruent.
- Ⓒ ΔEFH and ΔEGH are congruent.
- Ⓓ ΔEIF and ΔGIH are congruent.
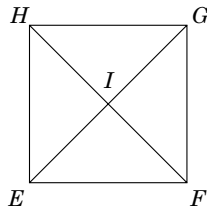
Item Number: M012005

Correct Response: **B**

Overall Percent Correct

Country		
Korea, Republic of	86	▲
Japan	85	▲
Chinese Taipei	82	▲
Estonia	82	▲
Hong Kong, SAR	79	▲
Latvia	78	▲
Bulgaria	74	▲
Russian Federation	74	▲
Lithuania	73	▲
Netherlands	72	▲
Singapore	72	▲
Cyprus	69	▲
Belgium (Flemish)	68	▲
Slovak Republic	68	▲
Romania	64	▲
Armenia	62	▲
Israel	62	▲
Sweden	62	▲
Slovenia	61	▲
Italy	58	O
Morocco	58	O
Bahrain	57	O
International average	**56**	
Moldova, Republic of	56	O
Indonesia	55	O
United States	55	O
Jordan	54	O
Iran, Islamic Republic of	53	O
Malaysia	50	▼
Tunisia	49	▼
Egypt	46	▼
Norway	46	▼
Hungary	45	▼
Lebanon	45	▼
Macedonia, Republic of	45	▼
Palestinian Nat'l Auth.	44	▼
Scotland	44	▼
Australia	43	▼
New Zealand	42	▼
Serbia and Montenegro	41	▼
Philippines	39	▼
England	35	▼
Saudi Arabia	35	▼
Chile	28	▼
South Africa	26	▼
Botswana	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Congruence and Similarity	Using Concepts

Identify similar triangles

Which of the following triangles is similar to the triangle shown above?

Item Number: M032261

Overall Percent Correct

Korea, Republic of	83	▲
Hong Kong, SAR	76	▲
Singapore	75	▲
Japan	70	▲
Chinese Taipei	68	▲
Russian Federation	61	▲
Netherlands	60	▲
Belgium (Flemish)	59	▲
Iran, Islamic Republic of	54	▲
Hungary	51	▲
Malaysia	51	▲
Lithuania	50	▲
Latvia	49	▲
Estonia	46	▲
United States	46	▲
Lebanon	46	O
Italy	44	O
England	43	O
International average	**42**	
Jordan	41	O
Philippines	41	O
Sweden	41	O
Australia	40	O
Romania	39	O
Serbia and Montenegro	38	O
Palestinian Nat'l Auth.	38	▼
Moldova, Republic of	38	O
New Zealand	37	▼
Slovak Republic	37	▼
Armenia	36	▼
Israel	36	▼
Macedonia, Republic of	36	▼
Cyprus	34	▼
Norway	34	▼
Egypt	34	▼
Indonesia	33	▼
Bulgaria	31	▼
Slovenia	30	▼
Scotland	29	▼
Bahrain	27	▼
Chile	25	▼
Ghana	23	▼
Botswana	23	▼
South Africa	21	▼
Morocco	21	▼
Tunisia	16	▼
Saudi Arabia	12	▼

Correct Response:	D

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Lines and Angles	Knowing Facts and Procedures

Sum of angles equal to 180 degrees

In this figure, *PQ* and *RS* are parallel.
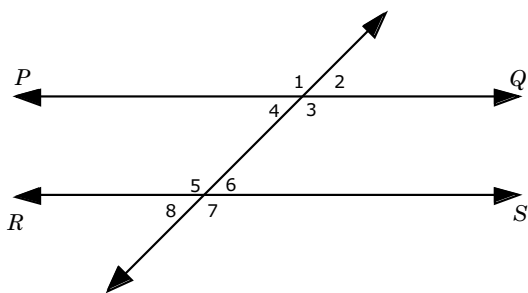
Of the following, which pair of angles has the sum of 180°?

- Ⓐ ∠ 5 and ∠ 7
- Ⓑ ∠ 3 and ∠ 6
- Ⓒ ∠ 1 and ∠ 5
- Ⓓ ∠ 1 and ∠ 7
- Ⓔ ∠ 2 and ∠ 8

Item Number: M022142

Correct Response:	**B**

Overall Percent Correct

Country	%	
Japan	83	▲
Korea, Republic of	81	▲
Hong Kong, SAR	79	▲
Singapore	72	▲
Chinese Taipei	67	▲
Estonia	63	▲
Belgium (Flemish)	62	▲
Latvia	56	▲
Russian Federation	54	▲
Australia	49	▲
Lithuania	49	▲
England	48	O
Israel	47	O
Bulgaria	47	O
Moldova, Republic of	47	O
Hungary	47	O
Slovak Republic	46	O
Bahrain	46	O
Netherlands	45	O
New Zealand	45	O
Serbia and Montenegro	43	O
International average	**43**	
Armenia	43	O
Cyprus	42	O
Scotland	41	O
Slovenia	41	O
Romania	41	O
Malaysia	41	O
Lebanon	38	▼
Egypt	37	▼
United States	37	▼
Italy	36	▼
Macedonia, Republic of	35	▼
Palestinian Nat'l Auth.	34	▼
Norway	34	▼
Sweden	32	▼
Indonesia	31	▼
Jordan	29	▼
Tunisia	28	▼
Morocco	28	▼
Philippines	26	▼
Iran, Islamic Republic of	25	▼
Chile	25	▼
South Africa	23	▼
Ghana	22	▼
Saudi Arabia	22	▼
Botswana	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Lines and Angles	Reasoning

Measure of angle in adjacent angles

In the figure, the measure of ∠*POR* is 110°, the measure of ∠*QOS* is 90°, and the measure of ∠*POS* is 140°.
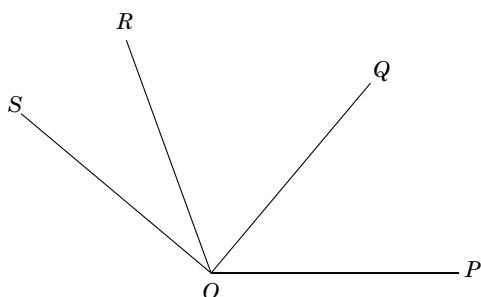
What is the measure of ∠*QOR*?

Answer: _____

Item Number: M022202

SCORING

Correct Response

• 60

Incorrect Response

• 30 OR 50 [140° − 110° or 140° − 90°]

• 55 [110 ÷ 2]

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Korea, Republic of	63	▲
Japan	60	▲
Singapore	58	▲
Hong Kong, SAR	57	▲
Chinese Taipei	49	▲
Hungary	44	▲
Norway	41	▲
Russian Federation	40	▲
Armenia	39	▲
Latvia	37	▲
Belgium (Flemish)	36	▲
Slovak Republic	36	▲
Estonia	36	▲
Serbia and Montenegro	35	▲
Romania	34	▲
Bulgaria	34	▲
Israel	32	▲
Moldova, Republic of	32	O
Malaysia	32	▲
Netherlands	28	O
New Zealand	28	O
International average	**28**	
Lithuania	27	O
Macedonia, Republic of	26	O
Australia	26	O
Lebanon	26	O
Italy	25	O
Slovenia	25	O
England	23	▼
United States	22	▼
Cyprus	21	▼
Sweden	20	▼
Tunisia	18	▼
Scotland	17	▼
Palestinian Nat'l Auth.	16	▼
Indonesia	16	▼
Bahrain	16	▼
Egypt	15	▼
Jordan	13	▼
Morocco	11	▼
Philippines	11	▼
Iran, Islamic Republic of	11	▼
Chile	10	▼
Botswana	9	▼
Saudi Arabia	6	▼
South Africa	4	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Measure of angle in adjacent angles (continued)

Item Number: M022202

Student Responses

Correct Response:

In the figure, the measure of ∠*POR* is 110°, the measure of ∠*QOS* is 90°, and the measure of ∠*POS* is 140°.
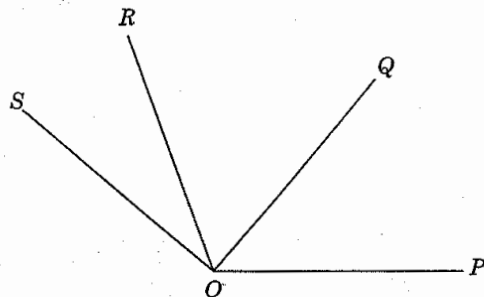
What is the measure of ∠*QOR*?

Answer: _____60°_____

Incorrect Response:

In the figure, the measure of ∠*POR* is 110°, the measure of ∠*QOS* is 90°, and the measure of ∠*POS* is 140°.
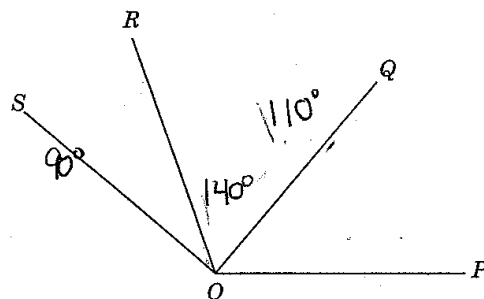
What is the measure of ∠*QOR*?

Answer: _____50°_____

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Lines and Angles	Solving Routine Problems

Sum of angles from intersecting lines

In the figure, PQ and RS are intersecting straight lines.
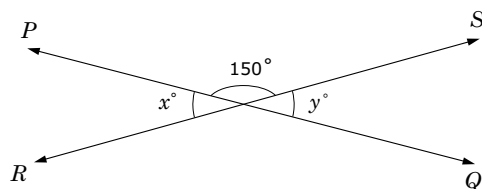
What is the value of $x + y$?

- (A) 15
- (B) 30
- (C) 60
- (D) 180
- (E) 300

Item Number: M012039

Overall Percent Correct

Country		
Korea, Republic of	84	▲
Singapore	84	▲
Hong Kong, SAR	83	▲
Chinese Taipei	82	▲
Japan	78	▲
Malaysia	69	▲
Estonia	67	▲
Latvia	66	▲
Russian Federation	64	▲
Belgium (Flemish)	59	▲
Serbia and Montenegro	59	▲
Israel	58	▲
Romania	58	▲
Slovenia	58	▲
Bulgaria	57	▲
Netherlands	57	▲
Lebanon	55	▲
Lithuania	54	O
Australia	52	O
Moldova, Republic of	52	O
Slovak Republic	52	O
England	50	O
International average	**50**	
Italy	50	O
Hungary	48	O
Iran, Islamic Republic of	48	O
United States	47	O
Cyprus	46	▼
New Zealand	46	O
Macedonia, Republic of	45	▼
Armenia	44	▼
Egypt	43	▼
Sweden	43	▼
Scotland	41	▼
Tunisia	41	▼
Jordan	40	▼
Palestinian Nat'l Auth.	40	▼
Indonesia	38	▼
Norway	34	▼
Bahrain	33	▼
Morocco	33	▼
Chile	32	▼
Philippines	27	▼
Botswana	26	▼
Saudi Arabia	26	▼
Ghana	21	▼
South Africa	16	▼

Correct Response:	C

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Locations and Spatial Relationships	Knowing Facts and Procedures

Point on a line defined by two points

A straight line passes through the points (2,3) and (4,7). Which of these points is also on the line?

Ⓐ (0,2)

Ⓑ (1,2)

Ⓒ (2,4)

Ⓓ (3,5)

Ⓔ (4,5)

Item Number: M022016

Correct Response: **D**

Overall Percent Correct

Netherlands	66	▲
England	62	▲
Scotland	56	▲
Korea, Republic of	56	▲
Singapore	56	▲
Chinese Taipei	54	▲
Sweden	53	▲
Australia	51	▲
United States	51	▲
Japan	50	▲
Norway	49	▲
Hong Kong, SAR	47	▲
Hungary	46	▲
Lithuania	44	▲
New Zealand	44	▲
Belgium (Flemish)	43	▲
Russian Federation	42	▲
Estonia	40	▲
Malaysia	38	O
Latvia	37	O
Cyprus	36	O
International average	**35**	
Slovenia	35	O
Israel	34	O
Serbia and Montenegro	31	O
Indonesia	31	▼
Slovak Republic	30	▼
Chile	29	▼
Egypt	28	▼
Morocco	28	▼
Romania	28	▼
Macedonia, Republic of	27	▼
Italy	26	▼
Jordan	26	▼
Moldova, Republic of	25	▼
Bulgaria	24	▼
Armenia	23	▼
Lebanon	23	▼
Botswana	22	▼
Philippines	22	▼
Palestinian Nat'l Auth.	21	▼
Bahrain	21	▼
Iran, Islamic Republic of	20	▼
Ghana	19	▼
Saudi Arabia	19	▼
South Africa	19	▼
Tunisia	8	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Locations and Spatial Relationships	Knowing Facts and Procedures

Which point could have coordinates (2, -4)
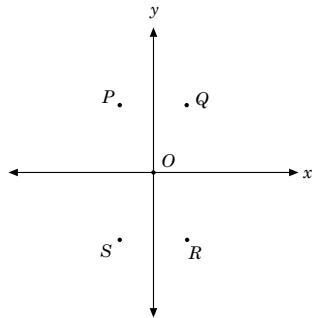
In the coordinate plane above, which point could have coordinates (2,–4)?

- Ⓐ *P*
- Ⓑ *Q*
- Ⓒ *R*
- Ⓓ *S*

Item Number: M032588

Correct Response: **C**

Overall Percent Correct
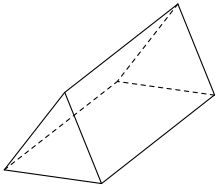
Chinese Taipei	87	▲
Japan	86	▲
Korea, Republic of	83	▲
Estonia	81	▲
Russian Federation	79	▲
Singapore	77	▲
Netherlands	75	▲
Hong Kong, SAR	74	▲
Hungary	74	▲
Lithuania	73	▲
Latvia	72	▲
United States	72	▲
Malaysia	71	▲
Iran, Islamic Republic of	69	▲
Belgium (Flemish)	68	▲
England	67	▲
Lebanon	66	▲
Scotland	65	▲
Israel	62	▲
Serbia and Montenegro	61	▲
Bulgaria	60	O
Romania	59	O
Slovenia	58	O
Macedonia, Republic of	58	O
New Zealand	58	O
Australia	58	O
Italy	57	O
International average	**56**	
Jordan	55	O
Armenia	53	O
Moldova, Republic of	53	O
Indonesia	53	O
Egypt	47	▼
Sweden	45	▼
Slovak Republic	43	▼
Norway	43	▼
Philippines	41	▼
Bahrain	38	▼
Palestinian Nat'l Auth.	34	▼
Saudi Arabia	32	▼
Morocco	31	▼
Cyprus	30	▼
Tunisia	28	▼
South Africa	28	▼
Botswana	26	▼
Chile	25	▼
Ghana	19	▼

Country average vs. International average:
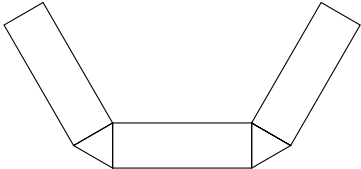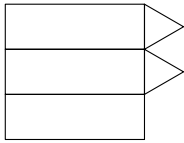
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Locations and Spatial Relationships	Using Concepts
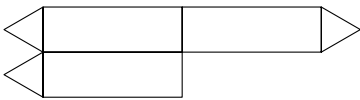
Which could be folded to make a 3-D figure
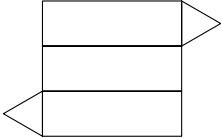
Which of these could be folded to make a shape like the 3-D figure above?

Ⓐ

Ⓑ

Ⓒ

Ⓓ

Item Number: M032489

Correct Response:	**D**

Overall Percent Correct

Japan	97	▲
Chinese Taipei	96	▲
Korea, Republic of	94	▲
Hong Kong, SAR	94	▲
Singapore	94	▲
Netherlands	89	▲
Malaysia	89	▲
New Zealand	88	▲
Estonia	87	▲
Belgium (Flemish)	87	▲
Australia	86	▲
England	86	▲
Scotland	86	▲
Hungary	85	▲
Lithuania	83	▲
Slovak Republic	81	▲
Serbia and Montenegro	77	▲
United States	76	▲
Sweden	76	▲
Slovenia	75	▲
Italy	73	▲
Latvia	72	O
Norway	71	O
Bulgaria	70	O
Russian Federation	69	O
Indonesia	68	O
International average	**68**	
Romania	68	O
Chile	67	O
Cyprus	63	▼
Macedonia, Republic of	63	▼
Israel	62	▼
Morocco	61	▼
Lebanon	59	▼
Tunisia	58	▼
Iran, Islamic Republic of	55	▼
Jordan	52	▼
Palestinian Nat'l Auth.	51	▼
Moldova, Republic of	49	▼
Bahrain	46	▼
Philippines	46	▼
Botswana	43	▼
Saudi Arabia	40	▼
Armenia	40	▼
Egypt	31	▼
South Africa	28	▼
Ghana	24	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Symmetry and Transformations	Reasoning

Center point of rotation of rectangle

Rectangle *PQRS* can be rotated (turned) onto rectangle *UVST*.
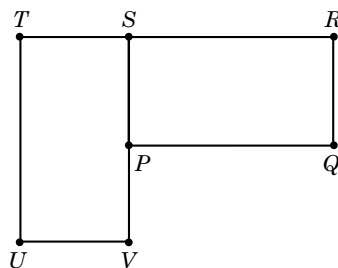
What point is the center of rotation?

Ⓐ *P*

Ⓑ *R*

Ⓒ *S*

Ⓓ *T*

Ⓔ *V*

Item Number: M022154

Correct Response: C

Overall Percent Correct

Japan	79	▲
Chinese Taipei	76	▲
Korea, Republic of	75	▲
Hong Kong, SAR	73	▲
Slovenia	71	▲
Estonia	71	▲
Netherlands	65	▲
Singapore	64	▲
Hungary	63	▲
England	63	▲
Belgium (Flemish)	62	▲
Latvia	61	▲
Sweden	60	▲
New Zealand	59	▲
Lithuania	58	▲
Italy	58	▲
Slovak Republic	54	▲
Australia	54	▲
Israel	54	▲
Malaysia	54	▲
Russian Federation	52	▲
Serbia and Montenegro	50	O
Norway	49	O
United States	49	O
International average	**47**	
Bulgaria	47	O
Moldova, Republic of	46	O
Romania	46	O
Scotland	45	O
Jordan	44	O
Armenia	40	▼
Cyprus	39	▼
Iran, Islamic Republic of	37	▼
Palestinian Nat'l Auth.	34	▼
Bahrain	34	▼
Lebanon	32	▼
Egypt	31	▼
Indonesia	29	▼
Tunisia	29	▼
Macedonia, Republic of	28	▼
Morocco	28	▼
Chile	28	▼
Philippines	25	▼
Botswana	23	▼
Saudi Arabia	18	▼
South Africa	18	▼
Ghana	13	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Symmetry and Transformations	Reasoning

Geometry tiling: produce a pattern using letters
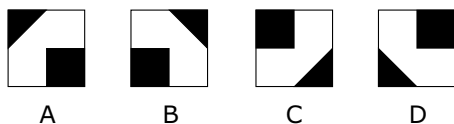
A   B   C   D

Continue to identify the tiles as shown above. On the grid below, write the letters A, B, C, or D to make a symmetrical pattern where *PQ* and *RS* would be lines of symmetry. Arrange the tiles to make a pattern.
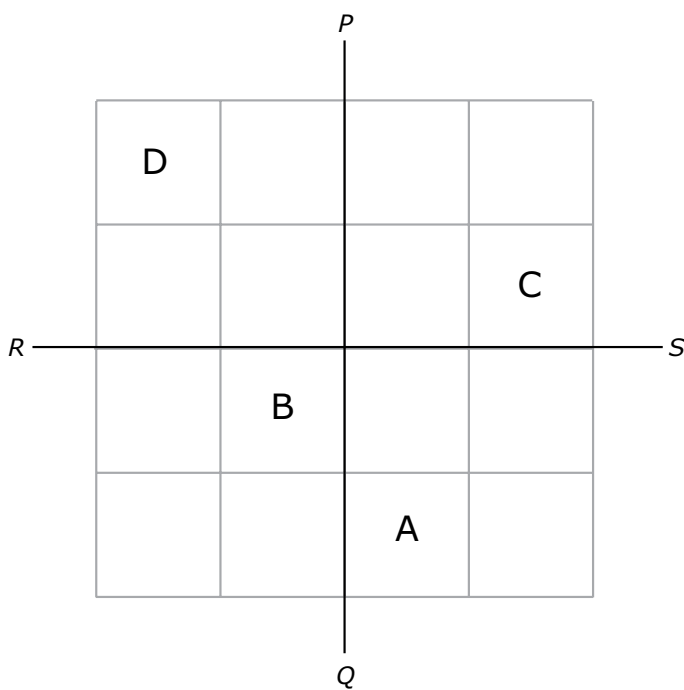
Item Number: M032745

SCORING

Correct Response

• All cells are correct with symmetrical geometric pattern about both axes, PQ and RS (letters or drawings).

Partial Response

• With respect to at least one of the original tiles the other three tiles are correct.

Incorrect Response

• Letters placed symmetrically with respect to both PQ and RS.

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Lithuania	16	▲
Japan	14	▲
Korea, Republic of	12	▲
Singapore	11	▲
Hong Kong, SAR	10	▲
Scotland	9	▲
England	9	▲
Chinese Taipei	9	▲
Netherlands	8	▲
Slovenia	8	▲
Estonia	7	▲
Australia	7	O
New Zealand	7	O
Belgium (Flemish)	7	▲
United States	6	O
Morocco	5	O
Russian Federation	5	O
Malaysia	5	O
International average	**4**	
Hungary	4	O
Slovak Republic	3	O
Latvia	3	O
Norway	3	O
Moldova, Republic of	3	O
Sweden	3	O
Indonesia	2	▼
Romania	2	▼
Israel	2	▼
Bulgaria	2	▼
Italy	1	▼
Armenia	1	▼
Lebanon	1	▼
Macedonia, Republic of	1	▼
South Africa	1	▼
Egypt	1	▼
Chile	1	▼
Philippines	1	▼
Iran, Islamic Republic of	1	▼
Botswana	1	▼
Jordan	1	▼
Bahrain	1	▼
Cyprus	0	▼
Serbia and Montenegro	0	▼
Tunisia	0	▼
Palestinian Nat'l Auth.	0	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Geometry tiling: produce a pattern using letters (continued)

Item Number: M032745

Student Responses

Correct Response:

A   B   C   D

Continue to identify the tiles as shown above. On the grid below, write the letters A, B, C, or D to make a symmetrical pattern where *PQ* and *RS* would be lines of symmetry. Arrange the tiles to make a pattern.
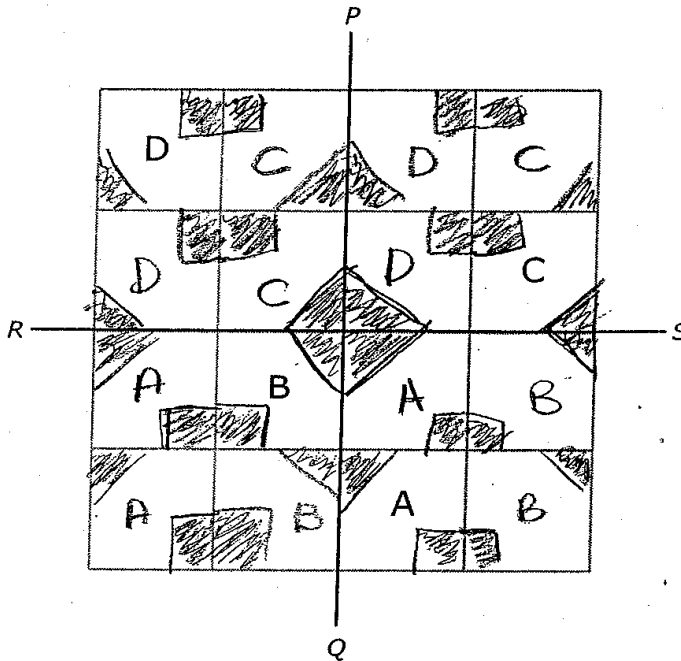
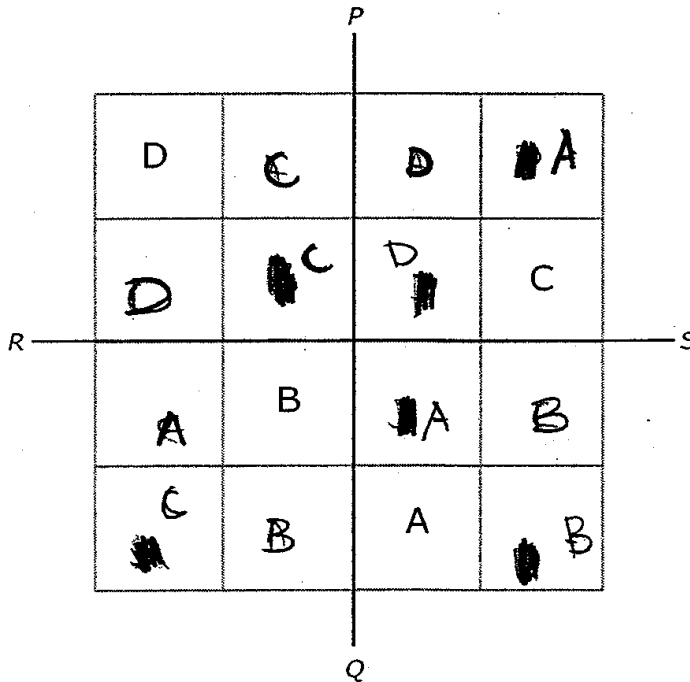## Geometry tiling: produce a pattern using letters (continued)

Item Number: M032745

Student Responses (Continued)

Partial Response:

A   B   C   D

Continue to identify the tiles as shown above. On the grid below, write the letters A, B, C, or D to make a symmetrical pattern where *PQ* and *RS* would be lines of symmetry. Arrange the tiles to make a pattern.

Geometry tiling: produce a pattern using letters (continued)

Item Number: M032745

Student Responses (Continued)

Incorrect Response:

A	B	C	D
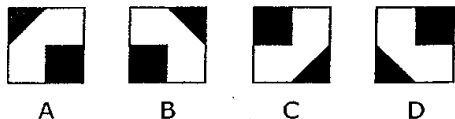
Continue to identify the tiles as shown above. On the grid below, write the letters A, B, C, or D to make a symmetrical pattern where *PQ* and *RS* would be lines of symmetry. Arrange the tiles to make a pattern.
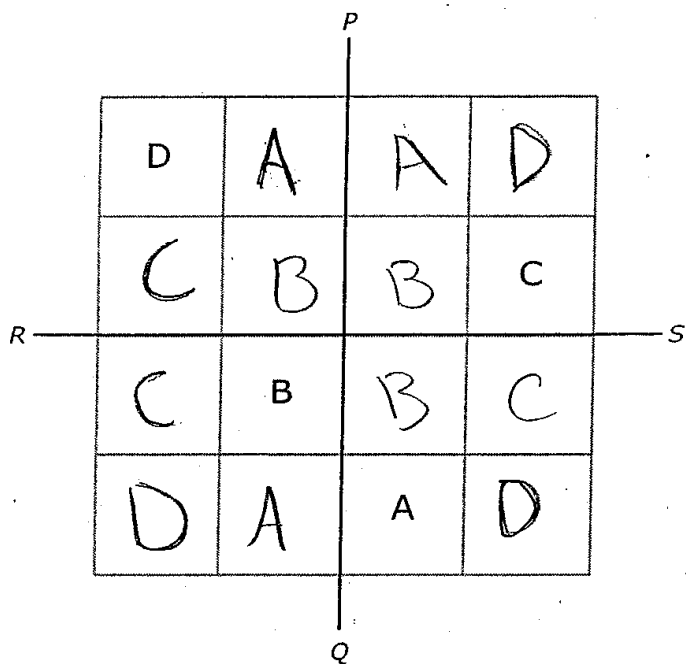
Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Symmetry and Transformations	Using Concepts

Geometry tiling: makes a symmetrical pattern

There are several ways of arranging the tiles so that they form patterns. The grid below has been shaded to show how tiles can be placed on some of the squares. The pattern can be continued so that *AB* and *CD* are lines of symmetry.
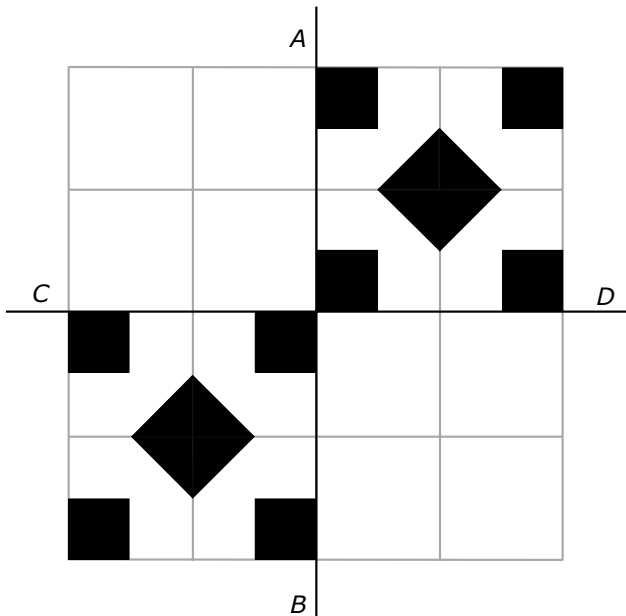
Shade in all the remaining squares on the grid so that the resulting pattern is symmetrical about line *AB*, and also is symmetrical about line *CD*.

Item Number: M032743

SCORING

Correct Response

- Both quadrants correctly shaded (pattern shaded or demarcated in some way making symmetrical pattern about both axes, AB and CD).

Incorrect Response

- One of the two quadrants correctly shaded.
- Incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Scotland	85	▲
Netherlands	82	▲
Korea, Republic of	82	▲
New Zealand	80	▲
England	80	▲
Singapore	77	▲
Australia	76	▲
Hong Kong, SAR	75	▲
Hungary	69	▲
Japan	68	▲
Chinese Taipei	68	▲
United States	67	▲
Belgium (Flemish)	65	▲
Lithuania	63	▲
Slovenia	60	▲
Latvia	60	▲
Jordan	59	▲
Malaysia	56	▲
Slovak Republic	54	O
Russian Federation	53	O
Cyprus	51	O
Estonia	50	O
Italy	50	O
International average	**49**	
Bulgaria	48	O
Norway	46	O
Sweden	46	O
Romania	44	O
Bahrain	43	▼
Israel	42	▼
Serbia and Montenegro	41	▼
Palestinian Nat'l Auth.	41	▼
Indonesia	39	▼
Morocco	38	▼
Iran, Islamic Republic of	34	▼
Saudi Arabia	34	▼
Philippines	34	▼
Egypt	31	▼
Tunisia	25	▼
Macedonia, Republic of	25	▼
Botswana	20	▼
Lebanon	18	▼
South Africa	17	▼
Armenia	13	▼
Chile	13	▼
Moldova, Republic of	1	▼

Country average vs. International average:

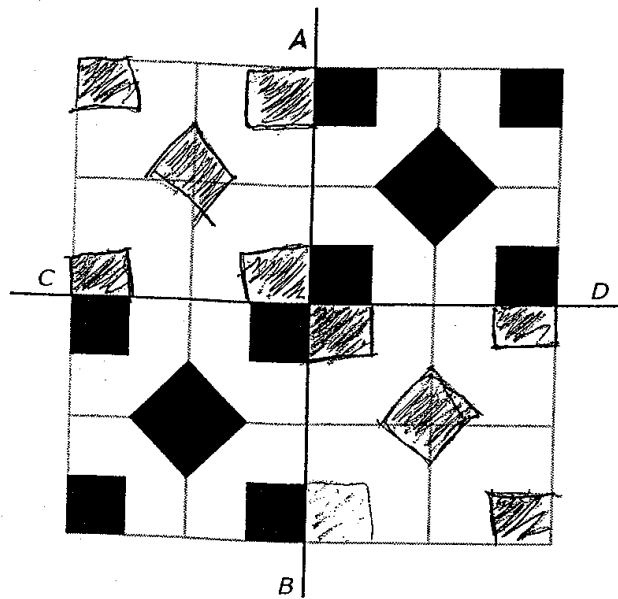|	
Higher	▲
Not different	O
Lower	▼

Geometry tiling: makes a symmetrical pattern (continued)

Item Number: M032743

Student Responses

Correct Response:

There are several ways of arranging the tiles so that they form patterns. The grid below has been shaded to show how tiles can be placed on some of the squares. The pattern can be continued so that *AB* and *CD* are lines of symmetry.


Shade in all the remaining squares on the grid so that the resulting pattern is symmetrical about line *AB*, and also is symmetrical about line *CD*.

Geometry tiling: makes a symmetrical pattern (continued)

Item Number: M032743

Student Responses (continued)

Incorrect Response:

There are several ways of arranging the tiles so that they form patterns. The grid below has been shaded to show how tiles can be placed on some of the squares. The pattern can be continued so that AB and CD are lines of symmetry.
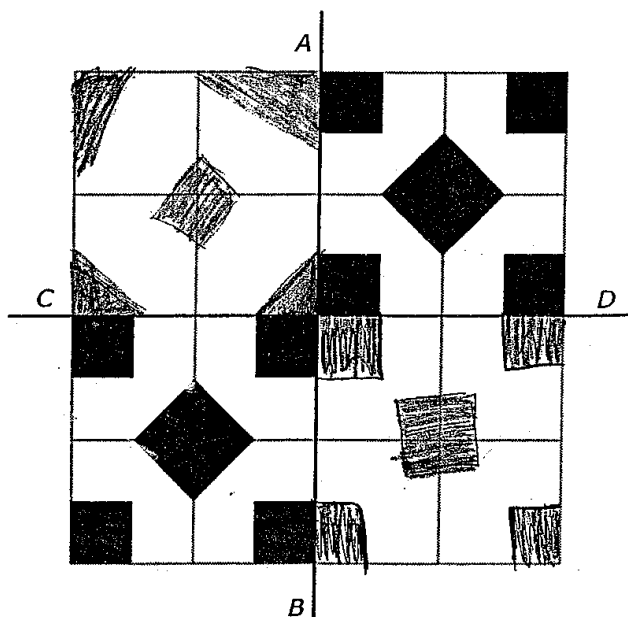
Shade in all the remaining squares on the grid so that the resulting pattern is symmetrical about line AB, and also is symmetrical about line CD.

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Solving Routine Problems

Angle in overlapping congruent triangles

In this figure, triangles ABC and DEF are congruent with $BC = EF$.
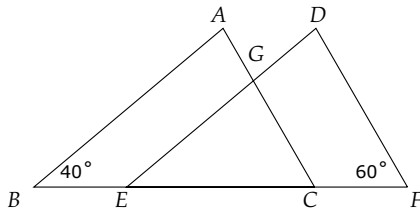
What is the measure of angle EGC ?

- Ⓐ 20°
- Ⓑ 40°
- Ⓒ 60°
- Ⓓ 80°
- Ⓔ 100°

Item Number: M012026

Correct Response:	**D**

Overall Percent Correct

Country	Percent	
Korea, Republic of	84	▲
Hong Kong, SAR	81	▲
Japan	80	▲
Singapore	79	▲
Chinese Taipei	73	▲
Estonia	67	▲
Belgium (Flemish)	66	▲
Latvia	63	▲
Bulgaria	60	▲
Israel	57	▲
Russian Federation	55	▲
Lebanon	55	▲
Scotland	54	▲
Slovak Republic	54	▲
Lithuania	51	▲
Hungary	50	O
Australia	47	O
England	47	O
Egypt	47	O
Malaysia	47	O
International average	**45**	
Armenia	45	O
Moldova, Republic of	45	O
Cyprus	44	O
Netherlands	44	O
Serbia and Montenegro	43	O
New Zealand	42	O
Jordan	42	O
Italy	42	O
Tunisia	41	▼
Bahrain	41	▼
Sweden	40	▼
Palestinian Nat'l Auth.	39	▼
Iran, Islamic Republic of	37	▼
Slovenia	37	▼
United States	36	▼
Macedonia, Republic of	33	▼
Norway	32	▼
Indonesia	31	▼
Morocco	31	▼
Chile	30	▼
Saudi Arabia	26	▼
South Africa	21	▼
Ghana	20	▼
Botswana	20	▼
Romania	18	▼
Philippines	15	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Solving Routine Problems

The angle by a regular hexagon
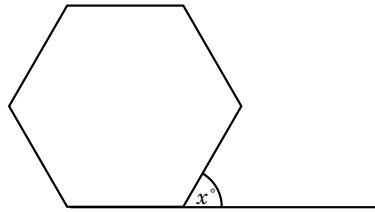
The figure above is a regular hexagon. What is the value of x?

Answer: _____

Item Number: M032693

SCORING

Correct Response
- 60 degrees

Incorrect Response
- 120 degrees
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Country		
Japan	73	▲
Chinese Taipei	70	▲
Korea, Republic of	68	▲
Hong Kong, SAR	64	▲
Singapore	62	▲
Hungary	59	▲
Slovenia	52	▲
Norway	50	▲
Serbia and Montenegro	46	▲
Romania	45	▲
Belgium (Flemish)	45	▲
Slovak Republic	43	▲
Armenia	42	▲
Russian Federation	42	▲
Netherlands	40	▲
Macedonia, Republic of	39	▲
Moldova, Republic of	39	▲
Estonia	37	O
Latvia	33	O
Malaysia	33	O
International average	**33**	
Italy	32	O
Bulgaria	32	O
Lithuania	31	O
England	30	O
Tunisia	29	▼
Lebanon	28	▼
New Zealand	27	▼
Australia	27	▼
Israel	26	▼
Sweden	24	▼
Iran, Islamic Republic of	24	▼
Jordan	23	▼
Palestinian Nat'l Auth.	23	▼
Egypt	23	▼
Scotland	23	▼
Bahrain	22	▼
Saudi Arabia	21	▼
United States	20	▼
Cyprus	19	▼
Indonesia	17	▼
Ghana	16	▼
Botswana	14	▼
Chile	9	▼
Morocco	9	▼
Philippines	6	▼
South Africa	5	▼

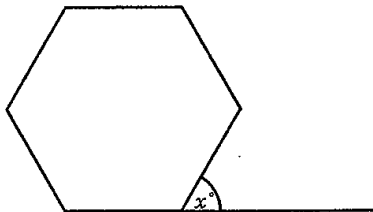| Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

The angle by a regular hexagon (continued)

Item Number: M032693
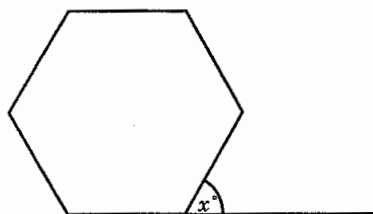
Student Responses

Correct Response:

The figure above is a regular hexagon. What is the value of x?
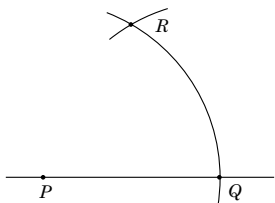
Answer: __60°__

Incorrect Response:

The figure above is a regular hexagon. What is the value of x?

Answer: __55°__

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Using Concepts

The size of angle *PRQ*

In the figure above, an arc of a circle with center *P* has been drawn to cut the line at *Q*. Then an arc with the same radius and center *Q* was drawn to cut the first arc at *R*. What would be the size of angle *PRQ*?

Ⓐ 30°

Ⓑ 45°

Ⓒ 60°

Ⓓ 75°

Item Number: M032689

Correct Response: C

Overall Percent Correct

Korea, Republic of	70	▲
Chinese Taipei	70	▲
Hungary	69	▲
Tunisia	66	▲
Japan	64	▲
Malaysia	62	▲
Hong Kong, SAR	59	▲
Norway	58	▲
Slovak Republic	58	▲
Lebanon	58	▲
Serbia and Montenegro	58	▲
Estonia	56	▲
Belgium (Flemish)	54	▲
Slovenia	52	▲
Russian Federation	51	O
Romania	51	O
Macedonia, Republic of	50	O
Singapore	49	▲
Bulgaria	48	O
Latvia	46	O
International average	**46**	
New Zealand	45	O
Moldova, Republic of	44	O
Netherlands	44	O
Saudi Arabia	43	O
Lithuania	43	O
Palestinian Nat'l Auth.	42	O
England	42	O
Italy	41	▼
Morocco	40	▼
Jordan	39	▼
Ghana	38	▼
Egypt	38	▼
Chile	37	▼
Australia	37	▼
Armenia	36	▼
Iran, Islamic Republic of	36	▼
Scotland	35	▼
Sweden	35	▼
Bahrain	35	▼
Israel	34	▼
United States	34	▼
Botswana	34	▼
Cyprus	34	▼
Indonesia	32	▼
South Africa	29	▼
Philippines	25	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Knowing Facts and Procedures

250 ml bottles filled by 400 liters

The number of 250 milliliter bottles that can be filled from 400 liters of water is

Ⓐ 16

Ⓑ 160

Ⓒ 1,600

Ⓓ 16,000

Item Number: M022005

Correct Response: C

Overall Percent Correct

Country		
Singapore	68	▲
Netherlands	59	▲
Belgium (Flemish)	55	▲
Sweden	54	▲
Malaysia	53	▲
Latvia	51	▲
Estonia	50	▲
Australia	49	▲
Lithuania	49	▲
Romania	48	▲
Hungary	48	▲
Hong Kong, SAR	47	▲
Russian Federation	46	▲
Slovak Republic	44	▲
Japan	44	▲
Moldova, Republic of	43	O
Italy	42	O
Norway	42	O
England	42	O
Armenia	42	O
New Zealand	41	O
Slovenia	41	O
Korea, Republic of	41	O
Chinese Taipei	41	O
Cyprus	41	O
Scotland	40	O
Bulgaria	39	O
International average	**39**	
Serbia and Montenegro	38	O
Israel	38	O
United States	33	▼
Philippines	32	▼
Indonesia	32	▼
South Africa	31	▼
Palestinian Nat'l Auth.	30	▼
Lebanon	30	▼
Chile	29	▼
Jordan	29	▼
Macedonia, Republic of	29	▼
Egypt	29	▼
Iran, Islamic Republic of	28	▼
Tunisia	27	▼
Bahrain	27	▼
Botswana	25	▼
Saudi Arabia	25	▼
Morocco	22	▼
Ghana	20	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Knowing Facts and Procedures

Which is least amount of time

Which of these is the LEAST amount of time?

Ⓐ 1 day

Ⓑ 20 hours

Ⓒ 1,800 minutes

Ⓓ 90,000 seconds

Item Number: M022188

Overall Percent Correct		
Chinese Taipei	66	▲
Korea, Republic of	63	▲
Hungary	63	▲
Singapore	60	▲
Belgium (Flemish)	59	▲
Japan	54	▲
Hong Kong, SAR	54	▲
Slovenia	54	▲
Slovak Republic	52	▲
Netherlands	52	▲
Latvia	51	▲
Armenia	50	▲
Serbia and Montenegro	49	▲
Estonia	48	▲
Macedonia, Republic of	48	▲
Russian Federation	47	▲
United States	47	▲
Malaysia	47	O
Moldova, Republic of	45	O
Italy	45	O
Bulgaria	44	O
Sweden	44	O
International average	**43**	O
Romania	43	O
Lithuania	42	O
Israel	41	O
Tunisia	41	O
Australia	41	O
Lebanon	40	O
Cyprus	39	▼
England	39	O
Norway	39	▼
Jordan	38	▼
Scotland	38	▼
Palestinian Nat'l Auth.	37	▼
New Zealand	36	▼
Egypt	36	▼
Chile	35	▼
Saudi Arabia	35	▼
Philippines	35	▼
Iran, Islamic Republic of	35	▼
South Africa	32	▼
Bahrain	32	▼
Morocco	32	▼
Ghana	27	▼
Indonesia	26	▼
Botswana	26	▼

Correct Response:	**B**

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Knowing Facts and Procedures

The unit used for a soccer field

Which of these units would usually be used for an area the size of a soccer field?

- (A) square centimeters
- (B) cubic centimeters
- (C) square meters
- (D) cubic meters

Item Number: M032699

Correct Response:	**C**

Overall Percent Correct

Estonia	90	▲
Sweden	89	▲
New Zealand	89	▲
Italy	88	▲
Singapore	88	▲
Hungary	88	▲
Australia	87	▲
Slovak Republic	87	▲
Chile	87	▲
Belgium (Flemish)	86	▲
Netherlands	86	▲
Latvia	86	▲
Romania	86	▲
Lithuania	84	▲
Serbia and Montenegro	84	▲
Bulgaria	84	▲
Russian Federation	83	▲
Hong Kong, SAR	82	▲
Chinese Taipei	82	▲
Japan	82	▲
England	82	▲
Moldova, Republic of	82	▲
Scotland	81	▲
Norway	80	▲
Malaysia	77	O
United States	76	O
Macedonia, Republic of	76	O
International average	**75**	
Korea, Republic of	74	O
Slovenia	74	O
Israel	73	O
Armenia	71	▼
Cyprus	69	▼
Tunisia	68	▼
Indonesia	66	▼
Bahrain	66	▼
Morocco	64	▼
Jordan	64	▼
Egypt	62	▼
Botswana	61	▼
Philippines	60	▼
Palestinian Nat'l Auth.	58	▼
Lebanon	56	▼
Saudi Arabia	55	▼
Iran, Islamic Republic of	52	▼
South Africa	52	▼
Ghana	35	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Knowing Facts and Procedures

Measure of the area of a triangle

Which of these could be the measure of the area of a triangle?

Ⓐ   2 cm

Ⓑ   3 m

Ⓒ   5 cm^2

Ⓓ   8 m^3

Item Number: M032732

Correct Response:	**C**

Overall Percent Correct

Japan	84	▲
Singapore	81	▲
Estonia	78	▲
Chinese Taipei	76	▲
Belgium (Flemish)	75	▲
Russian Federation	75	▲
Hong Kong, SAR	73	▲
Slovenia	71	▲
Sweden	70	▲
Netherlands	70	▲
Lithuania	70	▲
Korea, Republic of	69	▲
Hungary	68	▲
Slovak Republic	67	▲
Serbia and Montenegro	67	▲
Italy	67	▲
Malaysia	64	▲
Romania	62	▲
Latvia	61	▲
New Zealand	57	O
Moldova, Republic of	56	O
International average	**55**	O
Lebanon	55	O
Norway	54	O
Bulgaria	52	O
Macedonia, Republic of	52	O
Australia	52	O
Cyprus	52	O
England	51	O
Scotland	48	▼
Botswana	48	▼
United States	47	▼
Egypt	46	▼
Jordan	45	▼
Indonesia	44	▼
Armenia	44	▼
Israel	43	▼
Tunisia	43	▼
Palestinian Nat'l Auth.	42	▼
Bahrain	37	▼
Chile	36	▼
Ghana	34	▼
South Africa	34	▼
Saudi Arabia	32	▼
Morocco	30	▼
Philippines	27	▼
Iran, Islamic Republic of	22	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Knowing Facts and Procedures

Actual length of box from rounded measure

The length of a box is 9 cm to the nearest centimeter. Which of these could be the actual length of the box?

- (A) 10 cm
- (B) 9.9 cm
- (C) 9.6 cm
- (D) 8.6 cm

Item Number: M012003

Correct Response:	D

Overall Percent Correct

Korea, Republic of	90	▲
Hungary	89	▲
Netherlands	88	▲
Hong Kong, SAR	87	▲
Singapore	87	▲
Belgium (Flemish)	82	▲
Slovak Republic	81	▲
Chinese Taipei	80	▲
Sweden	80	▲
Scotland	76	▲
England	75	▲
Australia	73	▲
Russian Federation	73	▲
Latvia	70	▲
Estonia	67	▲
United States	67	▲
New Zealand	65	▲
Israel	64	▲
Japan	64	▲
Malaysia	62	▲
Norway	61	▲
Romania	58	▲
Serbia and Montenegro	55	▲
Slovenia	53	O
Italy	52	O
International average	**50**	
Armenia	45	▼
Macedonia, Republic of	42	▼
Moldova, Republic of	42	▼
Jordan	39	▼
Chile	38	▼
Cyprus	37	▼
Bahrain	33	▼
Palestinian Nat'l Auth.	33	▼
Egypt	30	▼
Indonesia	30	▼
Bulgaria	28	▼
Lebanon	23	▼
Philippines	23	▼
Lithuania	21	▼
Botswana	20	▼
Iran, Islamic Republic of	15	▼
Saudi Arabia	13	▼
South Africa	13	▼
Ghana	8	▼
Morocco	8	▼
Tunisia	7	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Knowing Facts and Procedures

Length of pipe from meter scale

Meters (m)

0   0.1   0.2   0.3   0.4   0.5   0.6   0.7   0.8   0.9   1.0

What is the length of the pipe being measured?

Ⓐ   0.085 m

Ⓑ   0.805 m

Ⓒ   0.85 m

Ⓓ   8.5 m

Item Number: M012038

Correct Response:	**C**

Overall Percent Correct

Singapore	95	▲
Hong Kong, SAR	94	▲
Japan	93	▲
Estonia	91	▲
Chinese Taipei	90	▲
Korea, Republic of	89	▲
Netherlands	89	▲
Belgium (Flemish)	87	▲
Hungary	86	▲
Malaysia	86	▲
Sweden	86	▲
Latvia	83	▲
Russian Federation	82	▲
Lithuania	81	▲
Scotland	81	▲
England	80	▲
New Zealand	79	▲
Slovak Republic	79	▲
Slovenia	79	▲
Australia	78	▲
Italy	74	▲
Norway	74	▲
United States	73	▲
Bulgaria	72	▲
Israel	72	▲
Serbia and Montenegro	72	▲
Macedonia, Republic of	70	O
International average	**67**	
Lebanon	64	O
Moldova, Republic of	64	O
Romania	64	O
Botswana	61	▼
Cyprus	61	▼
Chile	58	▼
Armenia	54	▼
Indonesia	54	▼
Morocco	50	▼
Tunisia	49	▼
Iran, Islamic Republic of	48	▼
Philippines	42	▼
South Africa	40	▼
Ghana	39	▼
Jordan	38	▼
Palestinian Nat'l Auth.	34	▼
Bahrain	32	▼
Egypt	31	▼
Saudi Arabia	27	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Knowing Facts and Procedures

Area of paved walkway around pool

A rectangular shaped swimming pool has a paved walkway around it as shown.
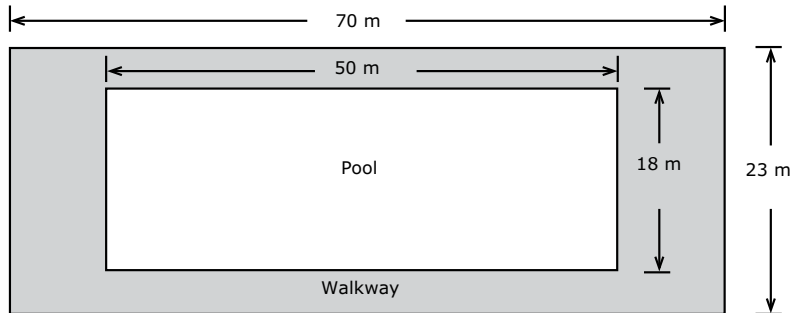
What is the area of the paved walkway?

- (A) 100 m^2
- (B) 161 m^2
- (C) 710 m^2
- (D) 1,610 m^2

Item Number: M022021

Correct Response: C

Overall Percent Correct

Country	Percent	
Singapore	86	▲
Hong Kong, SAR	82	▲
Korea, Republic of	77	▲
Chinese Taipei	77	▲
Japan	76	▲
Malaysia	60	▲
Netherlands	57	▲
Estonia	53	▲
Belgium (Flemish)	51	▲
Slovak Republic	50	▲
Sweden	48	▲
Australia	46	▲
Italy	45	▲
New Zealand	44	O
Lithuania	43	▲
Hungary	43	▲
England	40	O
Slovenia	40	O
United States	40	O
Cyprus	39	O
Scotland	39	O
International average	**38**	
Serbia and Montenegro	38	O
Latvia	38	O
Bulgaria	38	O
Russian Federation	38	O
Israel	37	O
Egypt	33	▼
Moldova, Republic of	33	▼
Norway	32	▼
Romania	30	▼
Iran, Islamic Republic of	28	▼
Armenia	28	▼
Jordan	26	▼
Indonesia	25	▼
Bahrain	23	▼
Palestinian Nat'l Auth.	22	▼
Macedonia, Republic of	20	▼
Lebanon	19	▼
Chile	19	▼
Tunisia	18	▼
Morocco	18	▼
Saudi Arabia	17	▼
Botswana	16	▼
Philippines	16	▼
South Africa	16	▼
Ghana	13	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Reasoning

Oranges are packed in boxes

Oranges are packed in boxes. The average diameter of the oranges is 6 cm, and the boxes are 60 cm long, 36 cm wide, and 24 cm deep.

Which of these is the BEST approximation of the number of oranges that can be packed in a box?

Ⓐ   30

Ⓑ   240

Ⓒ   360

Ⓓ   1,920

Item Number: M032647

Correct Response: **B**

Overall Percent Correct

Japan	62	▲
Netherlands	61	▲
Sweden	57	▲
Singapore	57	▲
Belgium (Flemish)	56	▲
Australia	56	▲
England	55	▲
Korea, Republic of	55	▲
Chinese Taipei	55	▲
Hungary	55	▲
Latvia	54	▲
Scotland	53	▲
Russian Federation	53	▲
Estonia	53	▲
Hong Kong, SAR	51	▲
Slovenia	51	▲
Slovak Republic	51	▲
New Zealand	51	▲
Lithuania	50	▲
United States	50	▲
Norway	48	▲
Bulgaria	46	O
Italy	45	O
International average	**44**	
Serbia and Montenegro	43	O
Cyprus	42	O
Moldova, Republic of	42	O
Macedonia, Republic of	41	O
Chile	40	▼
Israel	39	▼
Botswana	37	▼
Malaysia	37	▼
Romania	36	▼
Morocco	35	▼
Philippines	35	▼
Lebanon	34	▼
Bahrain	32	▼
Egypt	32	▼
Tunisia	31	▼
Indonesia	31	▼
Iran, Islamic Republic of	31	▼
South Africa	31	▼
Armenia	31	▼
Jordan	29	▼
Ghana	29	▼
Palestinian Nat'l Auth.	28	▼
Saudi Arabia	28	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Solving Routine Problems

Length of rectangle from width/perimeter

A thin wire 20 centimeters long is formed into a rectangle. If the width of this rectangle is 4 centimeters, what is its length?

Ⓐ   5 centimeters

Ⓑ   6 centimeters

Ⓒ   12 centimeters

Ⓓ   16 centimeters

Item Number: M012030

Correct Response: | **B**

Overall Percent Correct

Singapore	81	▲
Japan	65	▲
Chinese Taipei	62	▲
Hong Kong, SAR	62	▲
Korea, Republic of	62	▲
Netherlands	56	▲
Belgium (Flemish)	56	▲
Sweden	54	▲
Estonia	53	▲
Latvia	52	▲
Australia	50	▲
Russian Federation	47	▲
England	46	▲
Slovak Republic	45	▲
Serbia and Montenegro	45	▲
New Zealand	45	▲
Israel	44	▲
Bulgaria	43	▲
Romania	43	▲
Italy	42	▲
Malaysia	41	O
Norway	40	O
Moldova, Republic of	39	O
United States	39	O
Lithuania	38	O
International average	**37**	
Scotland	37	O
Hungary	37	O
Cyprus	36	O
Slovenia	33	▼
Armenia	31	▼
Iran, Islamic Republic of	28	▼
Macedonia, Republic of	27	▼
Chile	27	▼
Tunisia	26	▼
Lebanon	23	▼
Jordan	22	▼
Palestinian Nat'l Auth.	19	▼
Egypt	18	▼
Bahrain	18	▼
Botswana	17	▼
South Africa	16	▼
Saudi Arabia	14	▼
Morocco	14	▼
Philippines	14	▼
Indonesia	13	▼
Ghana	13	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Solving Routine Problems

Time when finish homework

Kris begins her homework at 6:40. If it takes Kris three-quarters of an hour to do her homework, at what time will she finish?

Answer: _____

Item Number: M022148

SCORING

Correct Response
- 7:25
- Other response equivalent to 7:25.

Incorrect Response
- 7:20
- 7:30
- 6:25
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Country		
Netherlands	91	▲
Belgium (Flemish)	85	▲
Hungary	84	▲
England	80	▲
Sweden	78	▲
Singapore	78	▲
Scotland	76	▲
Australia	72	▲
Norway	71	▲
New Zealand	68	▲
Hong Kong, SAR	67	▲
Slovenia	67	▲
Italy	65	▲
Romania	63	▲
Japan	63	▲
Israel	63	▲
Slovak Republic	59	▲
Chinese Taipei	59	▲
Estonia	58	▲
Cyprus	58	▲
Korea, Republic of	57	▲
United States	55	▲
Malaysia	51	▲
Latvia	46	O
International average	**45**	
Lebanon	45	O
Moldova, Republic of	42	O
Russian Federation	41	O
Serbia and Montenegro	36	▼
Bulgaria	36	▼
Armenia	35	▼
Lithuania	34	▼
Chile	29	▼
Tunisia	20	▼
Egypt	20	▼
Jordan	19	▼
Macedonia, Republic of	18	▼
Indonesia	18	▼
Palestinian Nat'l Auth.	16	▼
Morocco	15	▼
Iran, Islamic Republic of	15	▼
Bahrain	14	▼
Botswana	11	▼
Saudi Arabia	9	▼
South Africa	8	▼
Philippines	8	▼
Ghana	4	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Time when finish homework (continued)

Item Number: M022148

Student Responses

Correct Response:

Kris begins her homework at 6:40. If it takes Kris three-quarters of an hour to do her homework, at what time will she finish?

Answer: ___7:25___

Incorrect Response:

Kris begins her homework at 6:40. If it takes Kris three-quarters of an hour to do her homework, at what time will she finish?

Answer: ___7:20___

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Solving Routine Problems

5 squares: area of one square

The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm^2.
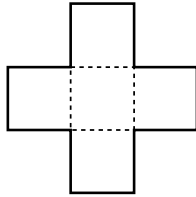
A. Find the area of one square.

Answer: _____ cm^2

B. Find the length of one side of one square.

Answer: _____ cm

C. Find the perimeter of the whole figure in centimeters.

Answer: _____ cm

Item Number: M022227A

SCORING

Correct Response

• 49

Incorrect Response

• 1

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Singapore	89	▲
Hong Kong, SAR	88	▲
Korea, Republic of	87	▲
Japan	86	▲
Armenia	84	▲
Chinese Taipei	83	▲
Estonia	69	▲
Netherlands	69	▲
Russian Federation	68	▲
Belgium (Flemish)	67	▲
Slovenia	66	▲
Scotland	63	▲
United States	60	▲
Malaysia	60	▲
Hungary	60	▲
Bulgaria	59	▲
Romania	58	▲
Tunisia	57	▲
Moldova, Republic of	57	▲
Italy	57	▲
Slovak Republic	57	▲
Lithuania	57	▲
Australia	56	O
International average	**51**	
Lebanon	49	O
Sweden	48	O
England	47	O
Serbia and Montenegro	47	▼
Israel	47	▼
Egypt	46	▼
New Zealand	45	▼
Jordan	45	▼
Cyprus	43	▼
Macedonia, Republic of	41	▼
Iran, Islamic Republic of	38	▼
Bahrain	37	▼
Indonesia	33	▼
Philippines	32	▼
Norway	32	▼
Morocco	31	▼
Palestinian Nat'l Auth.	30	▼
Botswana	28	▼
Chile	24	▼
Saudi Arabia	15	▼
Ghana	10	▼
South Africa	8	▼
Latvia		

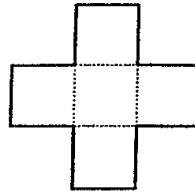| Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

5 squares: area of one square (continued)

Item Number: M022227A

Student Responses

Correct Response:

18. The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm².
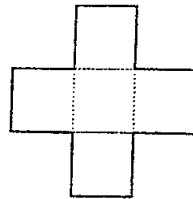
    a. Find the area of one square.

       Answer: _____49_____ cm²

Incorrect Response:

55. The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm².

    a. Find the area of one square.

       Answer: _____7_____ cm²

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Solving Routine Problems

5 squares: length of one side

The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm^2.
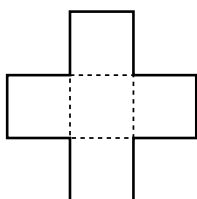
A. Find the area of one square.

Answer: _____ cm^2

B. Find the length of one side of one square.

Answer: _____ cm

C. Find the perimeter of the whole figure in centimeters.

Answer: _____ cm

Item Number: M022227B

SCORING

Correct Response

• 7 (or 49)

• Correct square root of incorrect answer to part a.

Incorrect Response

• 1 – only if the answer to part A is not 1.

• Indication of division of area of one square (as obtained in part a) by 4 (e.g., 12.25, 49/4, etc.).

• 24.5 or other indication of division by 2.

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Country	%	
Singapore	80	▲
Hong Kong, SAR	78	▲
Korea, Republic of	70	▲
Chinese Taipei	65	▲
Armenia	62	▲
Romania	45	▲
Russian Federation	43	▲
Italy	43	▲
Japan	42	▲
Estonia	39	▲
Netherlands	38	▲
Belgium (Flemish)	37	▲
Serbia and Montenegro	36	▲
Moldova, Republic of	35	▲
Hungary	35	▲
Malaysia	34	▲
Lithuania	33	▲
Bulgaria	32	O
United States	29	O
Slovak Republic	29	O
Slovenia	29	O
International average	**28**	
Scotland	27	O
Australia	26	O
England	23	O
Sweden	23	▼
New Zealand	23	▼
Cyprus	21	▼
Israel	20	▼
Macedonia, Republic of	20	▼
Egypt	20	▼
Lebanon	18	▼
Latvia	17	▼
Jordan	16	▼
Palestinian Nat'l Auth.	16	▼
Indonesia	15	▼
Bahrain	14	▼
Norway	11	▼
Iran, Islamic Republic of	11	▼
Philippines	10	▼
Tunisia	9	▼
Morocco	8	▼
Saudi Arabia	8	▼
Chile	6	▼
Botswana	4	▼
South Africa	3	▼
Ghana	2	▼

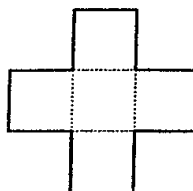| Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

5 squares: length of one side (continued)

Item Number: M022227B

Student Responses

Correct Response:

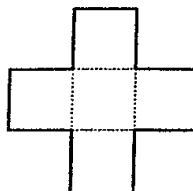18.   The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm².

b.   Find the length of one side of one square.

Answer: _____7_____ cm

Incorrect Response:

18.   The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm².

b.   Find the length of one side of one square.

Answer: _____15_____ cm

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Solving Routine Problems

5 squares: perimeter whole figure

The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm^2.
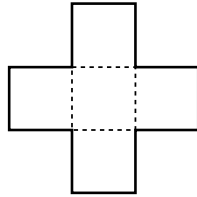
A. Find the area of one square.

Answer: _____ cm^2

B. Find the length of one side of one square.

Answer: _____ cm

C. Find the perimeter of the whole figure in centimeters.

Answer: _____ cm

Item Number: M022227C

SCORING

Correct Response

- 84
- 12, on condition 1 was the response for part b.
- Other responses consistent with answer to part b, using multiplication by 12 (e.g., 147, 294, etc.).

Incorrect Response

- An answer that is 4 times the response to part b.
- Indication of multiplication by 12 but multiplication is incorrect.
- 245 [Confusion between area and perimeter].
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Singapore	72	▲
Hong Kong, SAR	58	▲
Korea, Republic of	53	▲
Chinese Taipei	51	▲
Japan	47	▲
Armenia	42	▲
Malaysia	38	▲
Netherlands	38	▲
Australia	30	▲
Scotland	27	▲
England	27	▲
Estonia	26	▲
Belgium (Flemish)	25	▲
Hungary	24	▲
Slovenia	24	▲
Slovak Republic	24	▲
New Zealand	23	O
Russian Federation	23	O
United States	23	O
Italy	22	O
Lithuania	22	O
Sweden	21	O
International average	**20**	
Serbia and Montenegro	18	O
Latvia	17	O
Cyprus	17	O
Norway	16	O
Moldova, Republic of	16	O
Romania	16	▼
Bulgaria	14	▼
Israel	12	▼
Macedonia, Republic of	8	▼
Tunisia	7	▼
Indonesia	5	▼
Chile	5	▼
Egypt	5	▼
Jordan	5	▼
Bahrain	4	▼
Palestinian Nat'l Auth.	4	▼
Botswana	3	▼
Lebanon	3	▼
Morocco	2	▼
Iran, Islamic Republic of	2	▼
South Africa	2	▼
Philippines	2	▼
Saudi Arabia	2	▼
Ghana	1	▼

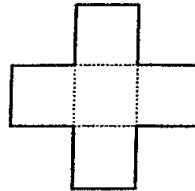| Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

5 squares: perimeter whole figure (continued)

Item Number: M022227C

Student Responses

Correct Response:

18. The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm².

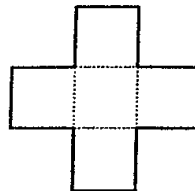c. Find the perimeter of the whole figure in centimeters.

Answer: _____84_____ cm

Incorrect Response:

18. The figure consists of 5 squares of equal area. The area of the whole figure is 245 cm².

c. Find the perimeter of the whole figure in centimeters.

Answer: _____49_____ cm

Content Domain	Main Topic	Cognitive Domain
A. MEASUREMENT B. MEASUREMENT	**Tools, Techniques, and Formulas** Tools, Techniques, and Formulas	**Solving Routine Problems** Reasoning

Car rally: average speed

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

A. What must the average speed be to travel the 160 km in this time?

Answer: _____

B. A driver took 1 hour to travel through a 40 km hilly section at the beginning of the course.

What must the average speed, in kilometers per hour, be for the remaining 120 km if the total time between checkpoints is to be 2.5 hours?

Answer: _____

Item Number: M032649A

SCORING

Correct Response

• 64 kph or 64 or equivalent.

Incorrect Response

• Incorrect (including crossed out/erased, stray marks, illegible or off task).

Overall Percent Correct

Singapore	78	▲
Hong Kong, SAR	76	▲
Netherlands	70	▲
Russian Federation	67	▲
Armenia	65	▲
Estonia	64	▲
Chinese Taipei	59	▲
Japan	59	▲
Hungary	59	▲
Lithuania	56	▲
United States	55	▲
Belgium (Flemish)	54	▲
Latvia	50	▲
Slovak Republic	49	▲
Sweden	45	▲
Korea, Republic of	43	▲
Scotland	43	▲
Italy	42	▲
Moldova, Republic of	38	O
England	37	O
Norway	37	O
Australia	36	O
Israel	36	O
New Zealand	35	O
International average	**35**	
Serbia and Montenegro	34	O
Slovenia	33	O
Malaysia	29	▼
Romania	29	▼
Bulgaria	28	▼
Tunisia	27	▼
Macedonia, Republic of	26	▼
Jordan	24	▼
Indonesia	22	▼
Botswana	21	▼
Palestinian Nat'l Auth.	18	▼
Cyprus	16	▼
Lebanon	15	▼
Chile	15	▼
Philippines	14	▼
Bahrain	12	▼
Iran, Islamic Republic of	8	▼
Egypt	7	▼
South Africa	7	▼
Morocco	6	▼
Saudi Arabia	2	▼
Ghana	2	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Car rally: average speed (continued)

Item Number: M032649A

Student Responses

Correct Response:

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

A. What must the average speed be to travel the 160 km in this time?

Answer: _64 Km_

Incorrect Response:

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

A. What must the average speed be to travel the 160 km in this time?

Answer: _32_

Content Domain	Main Topic	Cognitive Domain
A. MEASUREMENT **B. MEASUREMENT**	Tools, Techniques, and Formulas **Tools, Techniques, and Formulas**	Solving Routine Problems **Reasoning**

Car rally: average speed for one section

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

A. What must the average speed be to travel the 160 km in this time?

Answer: _____

B. A driver took 1 hour to travel through a 40 km hilly section at the beginning of the course.

What must the average speed, in kilometers per hour, be for the remaining 120 km if the total time between checkpoints is to be 2.5 hours?

Answer: _____

Item Number: M032649B

SCORING

Correct Response
- 80 kph or 80

Incorrect Response
- 5, 2, 120 or 48 shown.
- Other incorrect (including crossed out/erased, stray marks, illegible or off task).

Overall Percent Correct

Armenia	54	▲
Singapore	52	▲
Netherlands	50	▲
Hong Kong, SAR	47	▲
Chinese Taipei	39	▲
Estonia	35	▲
Russian Federation	34	▲
Hungary	33	▲
Japan	33	▲
Belgium (Flemish)	30	▲
Sweden	28	▲
Lithuania	27	▲
Korea, Republic of	27	▲
Latvia	24	▲
United States	24	▲
Scotland	23	▲
England	22	O
Australia	22	O
Slovak Republic	21	O
New Zealand	19	O
Norway	19	O
International average	**18**	
Israel	17	O
Moldova, Republic of	17	O
Bulgaria	17	O
Slovenia	16	O
Italy	15	O
Romania	13	▼
Serbia and Montenegro	10	▼
Macedonia, Republic of	8	▼
Malaysia	7	▼
Cyprus	6	▼
Jordan	6	▼
Iran, Islamic Republic of	5	▼
Tunisia	5	▼
Chile	5	▼
Egypt	4	▼
Botswana	4	▼
Bahrain	4	▼
Indonesia	4	▼
Palestinian Nat'l Auth.	4	▼
South Africa	3	▼
Lebanon	2	▼
Philippines	2	▼
Saudi Arabia	2	▼
Ghana	1	▼
Morocco	1	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Car rally: average speed for one section (continued)

Item Number: M032649B

Student Responses

Correct Response:

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

B. A driver took 1 hour to travel through a 40 km hilly section at the beginning of the course.

What must the average speed, in kilometers per hour, be for the remaining 120 km if the total time between checkpoints is to be 2.5 hours?

Answer: _80 Km_

Incorrect Response:

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

B. A driver took 1 hour to travel through a 40 km hilly section at the beginning of the course.

What must the average speed, in kilometers per hour, be for the remaining 120 km if the total time between checkpoints is to be 2.5 hours?
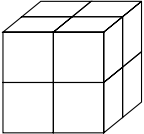
Answer: _3 Kilometers_

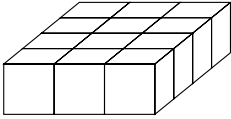| Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Using Concepts

Volumes of stacks of blocks

All the small blocks are the same size. Which stack of blocks has a different volume from the others?
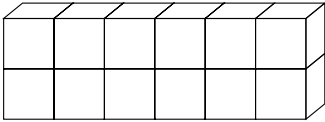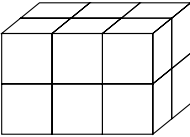
Ⓐ

Ⓑ

Ⓒ

Ⓓ

Item Number: M012013

Correct Response:	**A**

Overall Percent Correct

Korea, Republic of	88	▲
Singapore	86	▲
Hong Kong, SAR	83	▲
Japan	81	▲
Chinese Taipei	81	▲
Netherlands	78	▲
Australia	73	▲
Estonia	69	▲
Slovak Republic	68	▲
Belgium (Flemish)	67	▲
Scotland	67	▲
Lithuania	66	▲
Latvia	64	▲
Malaysia	62	▲
Slovenia	62	▲
New Zealand	60	▲
Hungary	58	▲
England	58	▲
Russian Federation	57	▲
Norway	56	▲
Italy	55	▲
United States	50	O
International average	**50**	
Sweden	50	O
Israel	49	O
Bulgaria	48	O
Moldova, Republic of	48	O
Romania	46	O
Serbia and Montenegro	45	▼
Armenia	42	▼
Cyprus	42	▼
Bahrain	41	▼
Philippines	35	▼
Lebanon	34	▼
Macedonia, Republic of	33	▼
Saudi Arabia	32	▼
Indonesia	32	▼
Palestinian Nat'l Auth.	30	▼
Jordan	29	▼
Chile	27	▼
Morocco	26	▼
Botswana	26	▼
Tunisia	26	▼
Iran, Islamic Republic of	26	▼
Egypt	24	▼
South Africa	22	▼
Ghana	20	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Using Concepts

The area of the rectangle *ABCD*
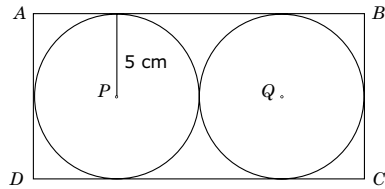
In the figure above, *ABCD* is a rectangle, and circles *P* and *Q* each have a radius of 5 cm. What is the area of the rectangle?

(A) 50 cm^2

(B) 60 cm^2

(C) 100 cm^2

(D) 200 cm^2

Item Number: M032678

Correct Response:	**D**

Overall Percent Correct

Country		
Singapore	82	▲
Hong Kong, SAR	82	▲
Korea, Republic of	75	▲
Chinese Taipei	74	▲
Japan	73	▲
Netherlands	65	▲
Belgium (Flemish)	61	▲
Estonia	53	▲
Russian Federation	51	▲
Italy	51	▲
Slovak Republic	51	▲
Hungary	48	▲
Malaysia	48	▲
Latvia	46	▲
Lithuania	45	▲
Sweden	45	▲
Scotland	44	▲
England	43	O
Serbia and Montenegro	43	O
Australia	42	O
New Zealand	41	O
Slovenia	41	O
Romania	39	O
International average	**39**	
United States	39	O
Bulgaria	38	O
Cyprus	37	O
Armenia	36	O
Lebanon	35	O
Norway	35	▼
Israel	34	▼
Moldova, Republic of	33	▼
Tunisia	30	▼
Macedonia, Republic of	30	▼
Iran, Islamic Republic of	27	▼
Jordan	25	▼
Indonesia	24	▼
Egypt	21	▼
Bahrain	20	▼
Morocco	19	▼
Palestinian Nat'l Auth.	18	▼
Chile	18	▼
Botswana	16	▼
Philippines	15	▼
Ghana	10	▼
South Africa	10	▼
Saudi Arabia	10	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Knowing Facts and Procedures

Pair of numbers bracketing 2.25

In which of these pairs of numbers is 2.25 larger than the first number but smaller than the second number?

Ⓐ   1 and 2

Ⓑ   2 and $\dfrac{5}{2}$

Ⓒ $\dfrac{5}{2}$ and $\dfrac{11}{4}$

Ⓓ $\dfrac{11}{4}$ and 3

Item Number: M012016

Overall Percent Correct		
Korea, Republic of	77	▲
Singapore	71	▲
Belgium (Flemish)	63	▲
Lithuania	61	▲
Hong Kong, SAR	61	▲
Chinese Taipei	60	▲
Russian Federation	58	▲
Hungary	58	▲
Estonia	57	▲
Israel	57	▲
Slovak Republic	55	▲
Japan	55	▲
Sweden	55	O
United States	54	▲
Serbia and Montenegro	54	O
Slovenia	53	O
Romania	52	O
Italy	52	O
Australia	52	O
Latvia	52	O
Philippines	52	O
Netherlands	51	O
Scotland	51	O
Norway	51	O
Cyprus	51	O
International average	**50**	
Bulgaria	50	O
Malaysia	50	O
England	50	O
Moldova, Republic of	48	O
New Zealand	47	O
Botswana	46	▼
Armenia	46	O
Saudi Arabia	46	▼
Lebanon	45	▼
Ghana	44	▼
Macedonia, Republic of	44	▼
Tunisia	43	▼
Morocco	41	▼
Egypt	40	▼
Bahrain	40	▼
South Africa	39	▼
Chile	39	▼
Palestinian Nat'l Auth.	39	▼
Jordan	38	▼
Iran, Islamic Republic of	38	▼

Correct Response:	**B**

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Knowing Facts and Procedures

Scoops of flour needed to fill bag

A scoop holds $\frac{1}{5}$ kg of flour. How many scoops of flour are needed to fill a bag with 6 kg of flour?

Answer: _____

Item Number: M022156

SCORING

Correct Response

• 30

Incorrect Response

• 30 kg [incorrect unit]

• 6/5 [6 x 1/5]

• 4 [4/5 more needed to complete 1 kg]

• 5 [5 scoops = 1 kg flour]

• 6 [from stem]

• Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Country	Percent	
Singapore	79	▲
Hong Kong, SAR	76	▲
Chinese Taipei	75	▲
Netherlands	74	▲
Korea, Republic of	68	▲
Japan	62	▲
Belgium (Flemish)	62	▲
Sweden	60	▲
Australia	53	▲
United States	52	▲
Scotland	51	▲
Estonia	51	▲
Latvia	51	▲
Hungary	51	▲
England	50	▲
Russian Federation	49	▲
Israel	48	▲
Malaysia	47	▲
New Zealand	46	▲
Slovenia	46	▲
Armenia	45	▲
Lithuania	43	▲
Slovak Republic	43	▲
Norway	39	O
Romania	39	O
Serbia and Montenegro	38	O
Bulgaria	38	O
International average	**38**	
Cyprus	37	O
Moldova, Republic of	37	O
Italy	34	O
Indonesia	26	▼
Macedonia, Republic of	22	▼
Iran, Islamic Republic of	20	▼
Tunisia	18	▼
Egypt	17	▼
Jordan	16	▼
Lebanon	15	▼
Chile	13	▼
Philippines	13	▼
Bahrain	11	▼
Botswana	11	▼
Palestinian Nat'l Auth.	10	▼
Morocco	8	▼
South Africa	7	▼
Saudi Arabia	7	▼
Ghana	6	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Scoops of flour needed to fill bag (continued)

Item Number: M022156

Student Responses

Correct Response:

A scoop holds $\frac{1}{5}$ kilograms of flour. How many scoops of flour are needed to fill a bag with 6 kilograms of flour?

Answer: 30 scoops

Incorrect Response:

A scoop holds $\frac{1}{5}$ kilograms of flour. How many scoops of flour are needed to fill a bag with 6 kilograms of flour?

$$\frac{1}{5} \times 6 = \frac{6}{30}$$

Answer: $\frac{6}{30}$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Knowing Facts and Procedures

Addition/multiplication with fractions

$$\frac{3}{5} + \left(\frac{3}{10} \times \frac{4}{15} \right) =$$

Ⓐ $\dfrac{3}{51}$

Ⓑ $\dfrac{1}{6}$

Ⓒ $\dfrac{6}{25}$

Ⓓ $\dfrac{11}{25}$

Ⓔ $\dfrac{17}{25}$

Item Number: M022199

Overall Percent Correct

Chinese Taipei	82	▲
Korea, Republic of	80	▲
Japan	75	▲
Singapore	72	▲
Hong Kong, SAR	69	▲
Egypt	58	▲
Romania	54	▲
Italy	53	▲
Belgium (Flemish)	53	▲
Slovenia	51	▲
Slovak Republic	51	▲
Hungary	50	▲
Estonia	50	▲
Malaysia	48	▲
Bulgaria	48	▲
Russian Federation	48	▲
Latvia	46	▲
Serbia and Montenegro	45	▲
Lithuania	44	▲
Armenia	42	O
International average	**40**	
Lebanon	40	O
Israel	40	O
Netherlands	40	O
Moldova, Republic of	39	O
Cyprus	36	▼
United States	36	▼
Jordan	35	▼
Iran, Islamic Republic of	34	▼
Bahrain	29	▼
Australia	28	▼
Indonesia	28	▼
England	28	▼
New Zealand	28	▼
Palestinian Nat'l Auth.	27	▼
Macedonia, Republic of	27	▼
Tunisia	26	▼
Scotland	26	▼
Morocco	25	▼
Botswana	24	▼
Sweden	22	▼
Philippines	22	▼
Chile	21	▼
Norway	21	▼
South Africa	18	▼
Saudi Arabia	16	▼

Correct Response:	**E**

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Reasoning

Number of men/women at meeting

Two-thirds of the people present at the beginning of a meeting are men. Nobody leaves but 10 more men and 10 more women arrive at the meeting. Which of the following statements is true?

Ⓐ   There would then be more men than women at the meeting.

Ⓑ   There would then be the same number of men as there are women at the meeting.

Ⓒ   There would then be more women than men at the meeting.

Ⓓ   From the information given, you cannot tell whether there would be more women or men.

Item Number: M022191

Correct Response:	**A**

Overall Percent Correct

Korea, Republic of	89	▲
Japan	87	▲
Netherlands	86	▲
Belgium (Flemish)	83	▲
Singapore	81	▲
Sweden	79	▲
Norway	77	▲
Chinese Taipei	77	▲
Malaysia	74	▲
Hong Kong, SAR	73	▲
Hungary	71	▲
Italy	70	▲
Slovenia	68	▲
Slovak Republic	68	▲
Estonia	67	▲
Scotland	67	▲
England	67	▲
Bulgaria	67	▲
Australia	66	▲
Israel	65	▲
Cyprus	64	▲
Serbia and Montenegro	63	▲
New Zealand	63	O
Latvia	62	O
Lithuania	60	O
International average	**59**	
Russian Federation	57	O
Moldova, Republic of	56	O
Iran, Islamic Republic of	56	O
United States	52	▼
Chile	51	▼
Jordan	51	▼
Indonesia	50	▼
Romania	48	▼
Bahrain	46	▼
Palestinian Nat'l Auth.	46	▼
Morocco	46	▼
Egypt	46	▼
Macedonia, Republic of	45	▼
Botswana	42	▼
Tunisia	40	▼
Armenia	40	▼
Saudi Arabia	37	▼
Ghana	31	▼
Philippines	27	▼
Lebanon	24	▼
South Africa	23	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Solving Routine Problems

Fraction of hour between two time points

What fraction of an hour has passed between 1:10 a.m. and 1:30 a.m.?

(A) $\dfrac{1}{5}$

(B) $\dfrac{1}{3}$

(C) $\dfrac{1}{2}$

(D) $\dfrac{2}{3}$

(E) $\dfrac{3}{4}$

Item Number: M012027

Correct Response: B

Overall Percent Correct

Singapore	85	▲
Hong Kong, SAR	80	▲
Korea, Republic of	77	▲
Chinese Taipei	77	▲
Sweden	73	▲
England	68	▲
Netherlands	67	▲
Japan	67	▲
Belgium (Flemish)	66	▲
Hungary	66	▲
Australia	65	▲
Slovak Republic	64	▲
Scotland	63	▲
United States	62	▲
Latvia	62	▲
Israel	61	▲
Malaysia	61	▲
New Zealand	60	▲
Slovenia	58	▲
Norway	57	▲
Bulgaria	56	▲
Cyprus	56	▲
Estonia	55	O
Russian Federation	53	O
International average	**52**	
Moldova, Republic of	52	O
Armenia	50	O
Lithuania	50	O
Serbia and Montenegro	48	O
Jordan	46	▼
Romania	43	▼
Palestinian Nat'l Auth.	43	▼
Egypt	43	▼
Italy	41	▼
Lebanon	40	▼
Philippines	40	▼
Macedonia, Republic of	40	▼
Bahrain	40	▼
Iran, Islamic Republic of	38	▼
Indonesia	38	▼
Saudi Arabia	30	▼
Botswana	29	▼
Chile	28	▼
South Africa	27	▼
Morocco	26	▼
Ghana	24	▼
Tunisia	20	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Solving Routine Problems

Fraction birthdays in first half of year

In a group of children, 16 have birthdays during the first half of the year, and 14 have birthdays during the second half of the year. What fraction of the group have birthdays during the first half of the year?

Ⓐ $\dfrac{14}{30}$

Ⓑ $\dfrac{14}{16}$

Ⓒ $\dfrac{16}{14}$

Ⓓ $\dfrac{16}{30}$

Ⓔ $\dfrac{30}{16}$

Item Number: M012041

Overall Percent Correct

Korea, Republic of	90	▲
Singapore	90	▲
Hong Kong, SAR	86	▲
Netherlands	82	▲
Chinese Taipei	79	▲
Belgium (Flemish)	76	▲
Sweden	76	▲
England	75	▲
Malaysia	75	▲
Israel	74	▲
United States	72	▲
Norway	71	▲
Australia	69	▲
New Zealand	69	▲
Scotland	69	▲
Japan	68	▲
Estonia	62	▲
Slovenia	60	▲
Cyprus	59	▲
Hungary	58	▲
Italy	57	▲
Latvia	57	▲
Lithuania	57	O
Russian Federation	55	O
Slovak Republic	54	O
International average	**52**	
Iran, Islamic Republic of	46	▼
Bulgaria	43	▼
Romania	41	▼
Botswana	40	▼
Moldova, Republic of	38	▼
Jordan	37	▼
Chile	36	▼
Indonesia	36	▼
Egypt	35	▼
Lebanon	33	▼
Macedonia, Republic of	31	▼
Palestinian Nat'l Auth.	31	▼
Serbia and Montenegro	31	▼
Tunisia	31	▼
Bahrain	30	▼
Philippines	28	▼
Armenia	27	▼
Morocco	21	▼
South Africa	21	▼
Ghana	20	▼
Saudi Arabia	15	▼

Correct Response:	D

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Solving Routine Problems

4/5 of books more than 2/3

A teacher and a doctor each have 45 books. If $\dfrac{4}{5}$ of the teacher's books and $\dfrac{2}{3}$ of the doctor's books are novels, how many more novels does the teacher have than the doctor?

(A)   2

(B)   3

(C)   6

(D)   30

(E)   36

Item Number: M022004

Overall Percent Correct

Singapore	85	▲
Korea, Republic of	80	▲
Hong Kong, SAR	78	▲
Chinese Taipei	78	▲
Malaysia	69	▲
Netherlands	68	▲
Japan	66	▲
Sweden	65	▲
Belgium (Flemish)	63	▲
Scotland	61	▲
Hungary	60	▲
England	57	▲
Latvia	57	▲
Slovenia	57	▲
Italy	56	▲
Estonia	54	▲
Romania	53	▲
Australia	53	▲
Slovak Republic	52	O
Israel	52	O
Cyprus	51	O
Lithuania	50	O
New Zealand	50	O
United States	50	O
Bulgaria	49	O
Serbia and Montenegro	48	O
International average	**48**	
Russian Federation	45	O
Moldova, Republic of	44	O
Norway	43	▼
Macedonia, Republic of	38	▼
Armenia	38	▼
Iran, Islamic Republic of	38	▼
Egypt	37	▼
Philippines	35	▼
Indonesia	35	▼
Palestinian Nat'l Auth.	34	▼
Botswana	33	▼
Jordan	33	▼
Chile	33	▼
Lebanon	28	▼
Bahrain	27	▼
South Africa	27	▼
Ghana	25	▼
Tunisia	25	▼
Morocco	24	▼
Saudi Arabia	24	▼

Correct Response:	**C**

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Solving Routine Problems

Time for Betty to run race

Alice ran a race in 49.86 seconds. Betty ran the same race in 52.30 seconds. How much longer did it take Betty to run the race than Alice?

- Ⓐ 2.44 seconds
- Ⓑ 2.54 seconds
- Ⓒ 3.56 seconds
- Ⓓ 3.76 seconds

Item Number: M022010

Correct Response: A

Overall Percent Correct

Singapore	88	▲
Korea, Republic of	87	▲
Malaysia	81	▲
Netherlands	81	▲
Hungary	80	▲
Chinese Taipei	80	▲
Japan	78	▲
Russian Federation	76	▲
Hong Kong, SAR	75	▲
Slovak Republic	74	▲
United States	74	▲
Slovenia	73	▲
Estonia	72	▲
Belgium (Flemish)	71	▲
Scotland	71	▲
Moldova, Republic of	69	▲
Serbia and Montenegro	68	▲
Latvia	67	▲
Bulgaria	66	▲
Lithuania	65	▲
Romania	64	O
Tunisia	63	O
Australia	63	O
Sweden	63	O
Italy	62	O
Botswana	61	O
Lebanon	61	O
International average	**61**	
Armenia	60	O
Macedonia, Republic of	59	O
Cyprus	59	O
Egypt	58	O
Israel	58	O
Indonesia	55	▼
England	54	▼
New Zealand	53	▼
Jordan	46	▼
Norway	46	▼
Philippines	45	▼
Morocco	45	▼
Bahrain	45	▼
Iran, Islamic Republic of	44	▼
Chile	42	▼
Palestinian Nat'l Auth.	37	▼
Ghana	32	▼
South Africa	29	▼
Saudi Arabia	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Solving Routine Problems

Fuel remaining in tank at end of trip

A car has a fuel tank that holds 45 L of fuel. The car consumes 8.5 L of fuel for each 100 km driven. A trip of 350 km was started with a full tank of fuel. How much remained in the tank at the end of the trip?

Ⓐ 15.25 L

Ⓑ 16.25 L

Ⓒ 24.75 L

Ⓓ 29.75 L

Item Number: M022127

Correct Response: **A**

Overall Percent Correct

Singapore	56	▲
Chinese Taipei	50	▲
Hong Kong, SAR	43	▲
Korea, Republic of	43	▲
Japan	38	▲
Netherlands	38	▲
Malaysia	34	▲
Moldova, Republic of	33	▲
Lithuania	32	▲
Hungary	32	▲
Estonia	31	▲
Romania	30	O
Belgium (Flemish)	30	▲
Russian Federation	29	O
Australia	28	O
Armenia	27	O
Latvia	26	O
International average	**26**	
Slovenia	26	O
Macedonia, Republic of	25	O
United States	25	O
Slovak Republic	24	O
New Zealand	24	O
Indonesia	23	O
Sweden	23	O
Jordan	23	O
Bulgaria	23	O
Cyprus	22	▼
Saudi Arabia	22	O
Israel	22	▼
Serbia and Montenegro	22	▼
Italy	21	▼
Egypt	21	▼
Botswana	20	▼
Chile	20	▼
Ghana	20	▼
England	20	▼
Scotland	19	▼
Morocco	19	▼
Tunisia	19	▼
South Africa	18	▼
Iran, Islamic Republic of	18	▼
Palestinian Nat'l Auth.	17	▼
Philippines	17	▼
Bahrain	16	▼
Norway	16	▼
Lebanon	12	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Solving Routine Problems

John and Cathy to divide a number by 100

John and Cathy were told to divide a number by 100. By mistake John multiplied the number by 100 and obtained an answer of 450.
Cathy correctly divided the number by 100. What was her answer?

Ⓐ   0.0045

Ⓑ   0.045

Ⓒ   0.45

Ⓓ   4.5

Item Number: M032079

Correct Response:	**B**

Overall Percent Correct

Singapore	58	▲
Belgium (Flemish)	58	▲
Estonia	56	▲
Japan	56	▲
Hong Kong, SAR	56	▲
Korea, Republic of	52	▲
Russian Federation	51	▲
Hungary	51	▲
Netherlands	51	▲
Chinese Taipei	46	▲
Slovak Republic	45	▲
Lithuania	43	▲
Israel	41	▲
Sweden	41	▲
Latvia	37	O
New Zealand	36	O
Australia	35	O
Scotland	35	O
International average	**34**	
Italy	34	O
England	34	O
Cyprus	33	O
Slovenia	32	O
United States	32	O
Moldova, Republic of	32	O
Serbia and Montenegro	32	O
Norway	31	O
Romania	29	▼
Armenia	28	▼
Egypt	27	▼
Malaysia	27	▼
Saudi Arabia	26	▼
Lebanon	26	▼
Macedonia, Republic of	23	▼
Bahrain	23	▼
Philippines	23	▼
Morocco	23	▼
Chile	23	▼
Iran, Islamic Republic of	22	▼
Ghana	22	▼
Bulgaria	22	▼
Indonesia	21	▼
Palestinian Nat'l Auth.	21	▼
South Africa	20	▼
Tunisia	18	▼
Botswana	16	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼
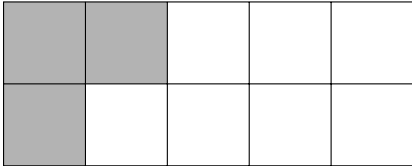
Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Using Concepts

Number of squares in shaded fraction

In the figure, how many MORE small squares need to be shaded so that $\frac{4}{5}$ of the small squares are shaded?

Ⓐ 5
Ⓑ 4
Ⓒ 3
Ⓓ 2
Ⓔ 1

Item Number: M012001

Correct Response: **A**

Overall Percent Correct

Singapore	88	▲
Hong Kong, SAR	87	▲
Belgium (Flemish)	84	▲
Korea, Republic of	82	▲
Netherlands	80	▲
Japan	79	▲
Chinese Taipei	78	▲
Sweden	71	▲
Malaysia	67	▲
Israel	67	▲
Hungary	66	▲
Australia	66	▲
Scotland	63	▲
Norway	62	▲
England	62	▲
United States	61	▲
New Zealand	60	▲
Slovenia	59	▲
Estonia	59	▲
Cyprus	56	▲
Latvia	56	▲
Russian Federation	52	O
Slovak Republic	52	O
Moldova, Republic of	50	O
Italy	50	O
International average	**49**	
Lithuania	47	O
Bulgaria	46	O
Romania	45	O
Armenia	42	▼
Serbia and Montenegro	42	▼
Iran, Islamic Republic of	41	▼
Macedonia, Republic of	37	▼
Jordan	32	▼
Egypt	30	▼
Palestinian Nat'l Auth.	29	▼
Tunisia	26	▼
Bahrain	25	▼
Philippines	23	▼
Lebanon	22	▼
Morocco	22	▼
Chile	21	▼
Indonesia	21	▼
Saudi Arabia	19	▼
South Africa	16	▼
Botswana	16	▼
Ghana	8	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Using Concepts

Fraction less than 4/9

Write a fraction that is less than $\dfrac{4}{9}$.

Answer: _____

Item Number: M022012

SCORING

Correct Response

- A fraction with numerator smaller than 4 and denominator equal to 9, includes 3/9 = 1/3 OR 1/3.
- A fraction with numerator equal to 4 and denominator greater than 9, includes 4/10 = 2/5 OR 2/5.
- 3/8
- Other correct fraction

Incorrect Response

- 5/9
- 2/3
- Any fraction equivalent to 4/9.
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Singapore	84	▲
Korea, Republic of	81	▲
Japan	81	▲
Hong Kong, SAR	79	▲
Chinese Taipei	77	▲
Israel	74	▲
Hungary	72	▲
Armenia	72	▲
Australia	71	▲
Sweden	70	▲
United States	69	▲
Netherlands	69	▲
England	68	▲
Slovak Republic	66	▲
New Zealand	64	▲
Norway	64	▲
Slovenia	64	▲
Estonia	63	▲
Belgium (Flemish)	62	▲
Russian Federation	62	▲
Scotland	60	▲
Cyprus	60	▲
International average	**54**	
Romania	54	O
Bulgaria	54	O
Serbia and Montenegro	52	O
Egypt	52	O
Latvia	52	O
Lithuania	50	O
Palestinian Nat'l Auth.	50	▼
Botswana	49	▼
Italy	48	▼
Jordan	48	▼
Tunisia	47	▼
Iran, Islamic Republic of	47	▼
Malaysia	43	▼
Bahrain	41	▼
Moldova, Republic of	40	▼
Saudi Arabia	39	▼
Chile	36	▼
Macedonia, Republic of	35	▼
South Africa	30	▼
Lebanon	28	▼
Indonesia	26	▼
Philippines	25	▼
Morocco	24	▼
Ghana	21	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Fraction less than 4/9 (continued)

Item Number: M022012

Student Responses

Correct Response:

Write a fraction that is less than $\frac{4}{9}$.

Answer: $\frac{4}{10}$

Incorrect Response:

Write a fraction that is less than $\frac{4}{9}$.

Answer: $2/3$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Using Concepts

Decimal rounded to nearest hundredth

Which of the following is 78.2437 rounded to the nearest hundredth?

- (A) 100
- (B) 80
- (C) 78.2
- (D) 78.24
- (E) 78.244

Item Number: M022144

Overall Percent Correct

Country		
Korea, Republic of	88	▲
Serbia and Montenegro	74	▲
Russian Federation	73	▲
Lithuania	72	▲
Hungary	72	▲
Slovak Republic	71	▲
Belgium (Flemish)	66	▲
United States	66	▲
Estonia	62	▲
Moldova, Republic of	55	▲
Sweden	55	▲
Singapore	54	▲
Italy	54	▲
Japan	54	▲
Latvia	54	▲
Netherlands	54	▲
Chinese Taipei	49	O
Slovenia	49	O
International average	**47**	
Australia	47	O
Cyprus	46	O
Lebanon	45	O
Malaysia	45	O
Palestinian Nat'l Auth.	44	O
Israel	43	O
New Zealand	41	▼
Egypt	41	▼
Scotland	41	▼
Jordan	40	▼
England	40	▼
Indonesia	39	▼
Philippines	38	▼
Bulgaria	38	▼
Iran, Islamic Republic of	37	▼
Morocco	37	▼
Saudi Arabia	36	▼
Romania	35	▼
Norway	33	▼
Bahrain	32	▼
Macedonia, Republic of	32	▼
Chile	30	▼
Armenia	29	▼
Ghana	29	▼
Hong Kong, SAR	29	▼
Botswana	28	▼
South Africa	22	▼

Correct Response:	**D**

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Using Concepts

Decimals ordered greatest to least

In which list are the numbers ordered from greatest to least?

Ⓐ   0.233, 0.3, 0.32, 0.332

Ⓑ   0.3, 0.32, 0.332, 0.233

Ⓒ   0.32, 0.233, 0.332, 0.3

Ⓓ   0.332, 0.32, 0.3, 0.233

Item Number: M022198

Correct Response:	**D**

Overall Percent Correct

Singapore	79	▲
Belgium (Flemish)	74	▲
Hong Kong, SAR	72	▲
Netherlands	66	▲
Chinese Taipei	63	▲
Estonia	62	▲
Malaysia	62	▲
Korea, Republic of	59	▲
Sweden	59	▲
Latvia	58	▲
Japan	53	▲
Australia	53	▲
Slovak Republic	52	▲
Lithuania	49	▲
Russian Federation	49	▲
Scotland	48	O
United States	48	▲
Slovenia	48	O
Italy	47	O
Hungary	47	O
Bulgaria	47	O
Egypt	46	O
Romania	46	O
Moldova, Republic of	44	O
England	44	O
International average	**44**	
Armenia	42	O
Lebanon	42	O
New Zealand	42	O
Cyprus	39	O
Israel	38	▼
Morocco	38	▼
Chile	35	▼
Norway	35	▼
Jordan	35	▼
Serbia and Montenegro	34	▼
Tunisia	33	▼
Macedonia, Republic of	32	▼
Indonesia	29	▼
Palestinian Nat'l Auth.	29	▼
Bahrain	27	▼
Philippines	25	▼
Saudi Arabia	23	▼
Ghana	20	▼
Iran, Islamic Republic of	18	▼
Botswana	18	▼
South Africa	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Using Concepts

The number closest to 10

Use the patterns in the previous table to answer the following questions.

A. Pat made a shape with a **total** of 64 tiles. How many were black and how many were red?

   Answer: _____ black tiles   _____ red tiles

B. Pat made a shape that used 49 **black** tiles.
   How many **red** tiles did Pat use in that shape?

   Answer: _____ red tiles

C. Next, Pat made a shape using 44 of the **red** tiles. How many black tiles would Pat need to complete the black part of the shape?

   Answer: _____ black tiles

Item Number: M032670

Overall Percent Correct

Netherlands	97	▲
Sweden	96	▲
Estonia	96	▲
Singapore	95	▲
Lithuania	95	▲
Belgium (Flemish)	94	▲
Korea, Republic of	94	▲
Malaysia	93	▲
Japan	92	▲
Serbia and Montenegro	91	▲
Norway	91	▲
Russian Federation	91	▲
Latvia	90	▲
Slovak Republic	90	▲
Italy	90	▲
Hong Kong, SAR	89	▲
Scotland	89	▲
Chinese Taipei	89	▲
Cyprus	88	▲
Hungary	88	▲
Australia	88	▲
United States	87	▲
Slovenia	87	▲
New Zealand	86	▲
Bulgaria	85	▲
England	82	▲
Moldova, Republic of	82	▲
Israel	81	▲
Romania	79	O
Macedonia, Republic of	78	O
International average	**76**	
Tunisia	76	O
Morocco	75	O
Indonesia	74	O
Iran, Islamic Republic of	69	▼
Chile	67	▼
Lebanon	67	▼
Armenia	66	▼
Jordan	55	▼
Palestinian Nat'l Auth.	50	▼
Bahrain	49	▼
Egypt	48	▼
Philippines	42	▼
Botswana	40	▼
Saudi Arabia	35	▼
South Africa	30	▼
Ghana	24	▼

Correct Response:	B

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Integers	Knowing Facts and Procedures

The value of 1 minus 5 times -2

Overall Percent Correct

What is the value of $1 - 5 \times (-2)$?

(A) 11

(B)   8

(C) −8

(D) −9

Item Number: M032612

Japan	74	▲
Singapore	70	▲
Hong Kong, SAR	67	▲
Chinese Taipei	66	▲
Netherlands	61	▲
Belgium (Flemish)	55	▲
Korea, Republic of	54	▲
Slovak Republic	52	▲
Estonia	52	▲
Israel	52	▲
Romania	49	▲
New Zealand	48	▲
Russian Federation	46	▲
Bulgaria	46	▲
Australia	45	▲
Armenia	44	▲
Latvia	42	▲
Hungary	42	▲
Lebanon	42	▲
Malaysia	39	O
Botswana	39	O
Lithuania	38	O
United States	38	O
Italy	37	O
Egypt	37	O
Slovenia	36	O
International average	**35**	
Serbia and Montenegro	33	O
Moldova, Republic of	33	O
Macedonia, Republic of	32	O
England	25	▼
Tunisia	24	▼
Cyprus	23	▼
Philippines	21	▼
Jordan	19	▼
Palestinian Nat'l Auth.	19	▼
Scotland	18	▼
South Africa	17	▼
Bahrain	15	▼
Indonesia	12	▼
Saudi Arabia	12	▼
Sweden	10	▼
Chile	10	▼
Iran, Islamic Republic of	10	▼
Morocco	6	▼
Norway	5	▼

Correct Response:	**A**

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Integers	Using Concepts

If n is a negative integer

If n is a negative integer, which of these is the largest number?

Ⓐ $3 + n$

Ⓑ $3 \times n$

Ⓒ $3 - n$

Ⓓ $3 \div n$

Item Number: M032643

Overall Percent Correct

Country		
Korea, Republic of	78	▲
Chinese Taipei	74	▲
Russian Federation	69	▲
Japan	68	▲
Hong Kong, SAR	67	▲
Singapore	58	▲
Hungary	53	▲
Estonia	51	▲
Latvia	49	▲
Belgium (Flemish)	48	▲
United States	48	▲
Israel	48	▲
Armenia	47	▲
Slovak Republic	46	▲
Serbia and Montenegro	46	▲
Netherlands	44	O
Bulgaria	42	O
Romania	41	O
Lebanon	41	O
Lithuania	40	O
Malaysia	40	O
International average	**40**	
Moldova, Republic of	39	O
Slovenia	38	O
Egypt	37	O
Australia	36	O
Cyprus	34	▼
Italy	32	▼
Iran, Islamic Republic of	32	▼
Philippines	32	▼
Macedonia, Republic of	32	▼
New Zealand	31	▼
Jordan	29	▼
Palestinian Nat'l Auth.	29	▼
Sweden	28	▼
Scotland	28	▼
Indonesia	27	▼
England	26	▼
South Africa	26	▼
Norway	25	▼
Morocco	25	▼
Saudi Arabia	25	▼
Bahrain	22	▼
Tunisia	22	▼
Botswana	22	▼
Chile	18	▼

Correct Response:	C

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Knowing Facts and Procedures

Percent decrease in travel time

When a new highway is built, the average time it takes a bus to travel from one town to another is reduced from 25 minutes to 20 minutes. What is the percent decrease in time taken to travel between the two towns?

- Ⓐ   4%
- Ⓑ   5%
- Ⓒ   20%
- Ⓓ   25%

Item Number: M022139

Correct Response: **C**

Overall Percent Correct

Country		
Singapore	70	▲
Netherlands	62	▲
Hong Kong, SAR	61	▲
Malaysia	48	▲
Sweden	47	▲
Australia	46	▲
Korea, Republic of	45	▲
Scotland	42	▲
England	42	▲
Hungary	40	▲
Chinese Taipei	40	▲
New Zealand	40	▲
Japan	39	▲
Slovak Republic	38	▲
Israel	38	▲
Slovenia	38	▲
Belgium (Flemish)	38	▲
Estonia	37	▲
Latvia	37	▲
United States	35	▲
Lithuania	34	O
Cyprus	34	O
Norway	34	O
Russian Federation	32	O
Serbia and Montenegro	32	O
International average	**31**	
Moldova, Republic of	29	O
Bulgaria	28	O
Romania	27	▼
Jordan	22	▼
South Africa	21	▼
Chile	21	▼
Armenia	20	▼
Italy	20	▼
Macedonia, Republic of	19	▼
Bahrain	19	▼
Indonesia	19	▼
Palestinian Nat'l Auth.	18	▼
Iran, Islamic Republic of	18	▼
Botswana	18	▼
Lebanon	17	▼
Egypt	17	▼
Philippines	17	▼
Saudi Arabia	17	▼
Morocco	15	▼
Ghana	15	▼
Tunisia	12	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Knowing Facts and Procedures

The ratio of the shaded area to the unshaded
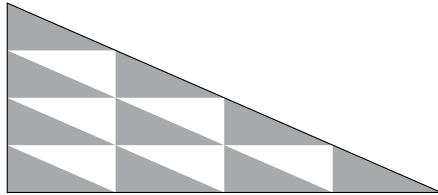
In the figure above, each of the smaller triangles has the same area. What is the ratio of the shaded area to the unshaded area?

Ⓐ 5:3

Ⓑ 8:5

Ⓒ 5:8

Ⓓ 3:5

Item Number: M032447

Correct Response:	**A**

Overall Percent Correct

Singapore	87	▲
Chinese Taipei	81	▲
Korea, Republic of	80	▲
Hong Kong, SAR	74	▲
Malaysia	72	▲
Japan	71	▲
Slovak Republic	56	▲
Australia	55	▲
Scotland	54	▲
Latvia	52	▲
England	52	▲
Hungary	52	▲
Netherlands	51	▲
United States	50	▲
Lithuania	50	▲
Slovenia	48	▲
Serbia and Montenegro	48	▲
Russian Federation	47	▲
Indonesia	45	O
Bulgaria	44	O
Belgium (Flemish)	43	O
Estonia	42	O
International average	**41**	
New Zealand	39	O
Israel	38	O
Cyprus	37	O
Romania	37	O
Philippines	37	O
Moldova, Republic of	37	O
Italy	35	▼
Macedonia, Republic of	35	▼
Sweden	31	▼
Armenia	28	▼
Palestinian Nat'l Auth.	27	▼
Iran, Islamic Republic of	26	▼
Egypt	26	▼
Saudi Arabia	26	▼
Norway	23	▼
Jordan	21	▼
Chile	20	▼
Bahrain	19	▼
Botswana	17	▼
South Africa	16	▼
Morocco	16	▼
Lebanon	16	▼
Tunisia	14	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Reasoning

A computer club had 40 members

A computer club had 40 members, and 60% of the members were girls. Later, 10 boys joined the club. What percent of the members now are girls? Show the calculations that led to your answer.

Answer: _____

Item Number: M032233

SCORING

Correct Response

• 48% with calculations shown.

Partial Response

• 24 girls
• Correct method but computational error.
• 48% with no calculations shown.

Incorrect Response

• 50%
• Other incorrect (including crossed out/erased, stray marks, illegible or off task).

Overall Percent Correct

Singapore	64	▲
Korea, Republic of	44	▲
Chinese Taipei	41	▲
Hong Kong, SAR	29	▲
Hungary	28	▲
Malaysia	23	▲
Belgium (Flemish)	21	▲
Sweden	21	▲
Slovak Republic	19	▲
Estonia	19	▲
Netherlands	18	▲
Lithuania	18	▲
Japan	16	▲
England	16	O
Scotland	14	O
United States	14	O
Australia	13	O
Slovenia	13	O
Israel	13	O
New Zealand	12	O
International average	**12**	
Latvia	9	O
Serbia and Montenegro	9	O
Armenia	8	O
Romania	7	▼
Russian Federation	6	▼
Italy	6	▼
Bulgaria	6	▼
Cyprus	4	▼
Norway	3	▼
Chile	3	▼
Indonesia	3	▼
Lebanon	3	▼
Philippines	2	▼
South Africa	2	▼
Iran, Islamic Republic of	2	▼
Jordan	2	▼
Palestinian Nat'l Auth.	2	▼
Egypt	2	▼
Morocco	1	▼
Botswana	1	▼
Tunisia	1	▼
Moldova, Republic of	1	▼
Macedonia, Republic of	1	▼
Bahrain	0	▼
Ghana	0	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

A computer club had 40 members (continued)

Item Number: M032233

Student Responses

Correct Response:

A computer club had 40 members, and 60% of the members were girls. Later, 10 boys joined the club. What percent of the members now are girls? Show the calculations that lead to your answer.

Answer: ___48%___

$$40 \cdot 60\% = 24$$

50 members
24 girls
26 boys

$$24\overline{)50} \quad \frac{48}{}$$

Partial Response:

A computer club had 40 members, and 60% of the members were girls. Later, 10 boys joined the club. What percent of the members now are girls? Show the calculations that lead to your answer.

Answer: ___48%___

24 girls
26 guys

Incorrect Response:

A computer club had 40 members, and 60% of the members were girls. Later, 10 boys joined the club. What percent of the members now are girls? Show the calculations that lead to your answer.

40 + 10 boys

Answer: ___50%___

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Solving Routine Problems

Laps run by Carol and Alice from ratio

Alice can run 4 laps around a track in the same time that Carol can run 3 laps. When Carol has run 12 laps, how many laps has Alice run?

Ⓐ   9

Ⓑ 11

Ⓒ 13

Ⓓ 16

Item Number: M012004

Correct Response: **D**

Overall Percent Correct

Country	%	
Singapore	75	▲
Belgium (Flemish)	69	▲
Japan	68	▲
Chinese Taipei	66	▲
Netherlands	66	▲
Sweden	62	▲
Hong Kong, SAR	61	▲
Slovak Republic	59	▲
Latvia	55	▲
Lithuania	55	▲
Russian Federation	54	▲
Israel	53	▲
Australia	52	O
Norway	52	▲
Estonia	51	▲
Korea, Republic of	51	▲
Iran, Islamic Republic of	48	O
United States	48	O
Ghana	47	O
International average	**47**	
Serbia and Montenegro	47	O
South Africa	47	O
Cyprus	46	O
Lebanon	46	O
New Zealand	46	O
Slovenia	46	O
England	45	O
Scotland	45	O
Hungary	43	▼
Malaysia	43	O
Palestinian Nat'l Auth.	43	▼
Armenia	42	▼
Philippines	42	▼
Tunisia	42	▼
Jordan	41	▼
Egypt	40	▼
Moldova, Republic of	40	▼
Botswana	39	▼
Romania	37	▼
Bulgaria	36	▼
Macedonia, Republic of	36	▼
Italy	35	▼
Saudi Arabia	35	▼
Indonesia	34	▼
Morocco	33	▼
Chile	32	▼
Bahrain	29	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Solving Routine Problems

A shop increased its prices by 20%

A shop increased its prices by 20%. What is the new price of an item which previously sold for 800 zeds?

(A) 640 zeds

(B) 900 zeds

(C) 960 zeds

(D) 1,000 zeds

Item Number: M032228

Correct Response: C

Overall Percent Correct

Country		
Singapore	87	▲
Hong Kong, SAR	86	▲
Netherlands	79	▲
Chinese Taipei	74	▲
Korea, Republic of	74	▲
Slovak Republic	73	▲
Hungary	72	▲
Belgium (Flemish)	72	▲
Sweden	70	▲
Estonia	65	▲
Japan	63	▲
Scotland	62	▲
Malaysia	62	▲
Russian Federation	61	▲
Lithuania	58	▲
Israel	58	▲
United States	57	▲
Australia	55	▲
Slovenia	55	▲
Romania	54	O
Latvia	54	O
England	52	O
Serbia and Montenegro	51	O
International average	**49**	
New Zealand	49	O
Italy	49	O
Norway	48	O
Bulgaria	47	O
Armenia	45	▼
Cyprus	45	▼
Moldova, Republic of	44	▼
Chile	41	▼
Tunisia	40	▼
Macedonia, Republic of	39	▼
Indonesia	34	▼
Botswana	32	▼
Philippines	31	▼
Lebanon	31	▼
Morocco	30	▼
Egypt	29	▼
Bahrain	27	▼
Palestinian Nat'l Auth.	26	▼
Jordan	25	▼
Iran, Islamic Republic of	24	▼
Saudi Arabia	22	▼
South Africa	19	▼
Ghana	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Solving Routine Problems

A machine uses 2.4 liters of gasoline

A machine uses 2.4 liters of gasoline for every 30 hours of operation. How many liters of gasoline will the machine use in 100 hours?

- Ⓐ 7.2
- Ⓑ 8.0
- Ⓒ 8.4
- Ⓓ 9.6

Item Number: M032533

Overall Percent Correct		
Singapore	89	▲
Netherlands	78	▲
Hong Kong, SAR	77	▲
Korea, Republic of	75	▲
Belgium (Flemish)	74	▲
Chinese Taipei	71	▲
Malaysia	68	▲
Japan	66	▲
Estonia	65	▲
Lithuania	64	▲
Slovak Republic	63	▲
Hungary	63	▲
Sweden	60	▲
Lebanon	55	▲
United States	55	▲
Russian Federation	54	▲
Israel	53	▲
England	50	O
Scotland	50	O
Latvia	50	O
Slovenia	50	O
Australia	49	O
Romania	48	O
International average	**47**	
Serbia and Montenegro	45	O
Italy	44	O
Norway	44	O
Moldova, Republic of	44	O
Cyprus	44	O
Bulgaria	43	O
New Zealand	42	O
Armenia	41	▼
Jordan	40	▼
Macedonia, Republic of	38	▼
Egypt	34	▼
Iran, Islamic Republic of	31	▼
Indonesia	31	▼
Palestinian Nat'l Auth.	31	▼
Tunisia	30	▼
Chile	29	▼
Philippines	27	▼
Morocco	27	▼
Botswana	23	▼
Bahrain	23	▼
Saudi Arabia	22	▼
South Africa	17	▼
Ghana	17	▼

Correct Response:	**B**

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Solving Routine Problems

Three brothers receive 45,000 zeds

Three brothers, Bob, Dan, and Mark, receive a gift of 45,000 zeds from their father. The money is shared between the brothers in proportion to the number of children each one has. Bob has 2 children, Dan has 3 children, and Mark has 4 children.

How many zeds does Mark get?

- (A) 5,000
- (B) 10,000
- (C) 15,000
- (D) 20,000

Item Number: M032727

Overall Percent Correct

Country	Percent	
Singapore	85	▲
Hong Kong, SAR	73	▲
Korea, Republic of	71	▲
Chinese Taipei	68	▲
Sweden	67	▲
Hungary	67	▲
Estonia	67	▲
Netherlands	66	▲
Slovak Republic	65	▲
Belgium (Flemish)	63	▲
Japan	60	▲
Malaysia	57	▲
England	55	▲
Australia	55	▲
Romania	53	▲
Israel	52	▲
Russian Federation	52	▲
New Zealand	50	O
Lithuania	49	O
Italy	48	O
Scotland	48	O
Serbia and Montenegro	48	O
United States	45	O
Norway	45	O
Slovenia	45	O
International average	**45**	
Cyprus	42	O
Chile	41	O
Moldova, Republic of	40	O
Latvia	37	▼
Bulgaria	37	▼
Macedonia, Republic of	36	▼
Iran, Islamic Republic of	35	▼
South Africa	32	▼
Ghana	32	▼
Philippines	29	▼
Jordan	29	▼
Armenia	28	▼
Palestinian Nat'l Auth.	28	▼
Indonesia	27	▼
Lebanon	26	▼
Tunisia	24	▼
Morocco	22	▼
Botswana	21	▼
Bahrain	21	▼
Egypt	20	▼
Saudi Arabia	18	▼

Correct Response:	D

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Using Concepts

3/25 of the people in the audience were children

At a play, $\dfrac{3}{25}$ of the people in the audience were children.

What percent of the audience was this?

(A)　12%

(B)　3%

(C)　0.3%

(D)　0.12%

Item Number: M032570

Correct Response: A

Overall Percent Correct

Singapore	96	▲
Hong Kong, SAR	90	▲
Belgium (Flemish)	87	▲
Malaysia	84	▲
Netherlands	79	▲
Chinese Taipei	77	▲
Korea, Republic of	76	▲
England	71	▲
United States	70	▲
Botswana	70	▲
New Zealand	67	▲
Australia	67	▲
Latvia	65	▲
Cyprus	64	▲
Scotland	63	▲
Israel	63	▲
Slovenia	61	▲
Sweden	61	▲
Japan	60	▲
Lithuania	59	O
Estonia	57	O
Slovak Republic	56	O
Hungary	55	O
International average	**55**	
Russian Federation	52	O
Indonesia	51	O
Bulgaria	50	O
Norway	50	▼
Romania	49	▼
Italy	47	▼
Serbia and Montenegro	45	▼
Egypt	44	▼
Armenia	42	▼
Macedonia, Republic of	42	▼
Philippines	42	▼
Moldova, Republic of	42	▼
Ghana	41	▼
Iran, Islamic Republic of	39	▼
Palestinian Nat'l Auth.	39	▼
Jordan	39	▼
Chile	39	▼
Bahrain	36	▼
Lebanon	34	▼
South Africa	33	▼
Tunisia	30	▼
Morocco	29	▼
Saudi Arabia	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

The closest to 11 squared plus 9 squared

Which of these is closest to $11^2 + 9^2$?

- Ⓐ 20 + 20
- Ⓑ 20 + 80
- Ⓒ 120 + 20
- Ⓓ 120 + 80

Item Number: M032609

Overall Percent Correct		
Hong Kong, SAR	88	▲
Latvia	88	▲
Hungary	85	▲
Russian Federation	84	▲
United States	82	▲
Slovak Republic	82	▲
Estonia	81	▲
Slovenia	81	▲
Lebanon	80	▲
Belgium (Flemish)	80	▲
Korea, Republic of	80	▲
Malaysia	80	▲
Chinese Taipei	80	▲
Romania	80	▲
Singapore	80	▲
Serbia and Montenegro	79	▲
Italy	79	▲
Lithuania	77	▲
Cyprus	74	▲
Australia	73	▲
Netherlands	69	▲
Macedonia, Republic of	68	▲
Bulgaria	67	▲
Indonesia	65	O
England	64	O
Armenia	64	O
Israel	63	O
International average	**61**	
Scotland	59	O
New Zealand	56	O
Tunisia	53	▼
Japan	50	▼
Jordan	49	▼
Palestinian Nat'l Auth.	48	▼
Morocco	47	▼
Philippines	45	▼
Egypt	44	▼
Iran, Islamic Republic of	44	▼
Chile	41	▼
Bahrain	37	▼
Sweden	36	▼
Ghana	28	▼
Botswana	26	▼
Saudi Arabia	22	▼
South Africa	20	▼
Moldova, Republic of	18	▼
Norway	13	▼

Correct Response:	**D**

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

Which equals 370 times 998 plus 370 times 2

Which of these is equal to $370 \times 998 + 370 \times 2$?

- (A) $370 \times 1,000$
- (B) 372×998
- (C) 740×998
- (D) $370 \times 998 \times 2$

Item Number: M032690

Overall Percent Correct

Country		
Singapore	70	▲
Hong Kong, SAR	69	▲
Chinese Taipei	68	▲
Hungary	61	▲
Netherlands	59	▲
Estonia	57	▲
Lebanon	53	▲
Israel	52	▲
Egypt	52	▲
Belgium (Flemish)	50	▲
Russian Federation	49	▲
Australia	49	▲
United States	48	▲
Lithuania	47	▲
Malaysia	47	▲
New Zealand	46	▲
Korea, Republic of	43	O
Romania	43	O
Botswana	41	O
Scotland	40	O
International average	**39**	
Armenia	38	O
Latvia	38	O
Slovak Republic	38	O
Japan	37	O
Bulgaria	37	O
Moldova, Republic of	37	O
Slovenia	36	O
Italy	35	O
Macedonia, Republic of	34	O
England	34	O
Palestinian Nat'l Auth.	33	▼
Tunisia	31	▼
Philippines	30	▼
Bahrain	28	▼
Cyprus	24	▼
Sweden	23	▼
Serbia and Montenegro	23	▼
Norway	22	▼
Saudi Arabia	22	▼
Morocco	21	▼
South Africa	21	▼
Chile	18	▼
Indonesia	18	▼
Jordan	17	▼
Iran, Islamic Republic of	14	▼

Correct Response: A

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Arrangements of 4-digit whole numbers

9	1	4	5

The four digits above are to be arranged from largest to smallest to form a four-digit number. The same four digits are then to be arranged from smallest to largest to form another four-digit number. What is the difference between the two resulting four-digit numbers?

Ⓐ 3,726

Ⓑ 4,726

Ⓒ 8,082

Ⓓ 8,182

Ⓔ 8,192

Item Number: M012028

Correct Response:	C

Overall Percent Correct

Korea, Republic of	92	▲
Singapore	88	▲
Chinese Taipei	87	▲
Hong Kong, SAR	86	▲
Japan	85	▲
Malaysia	79	▲
Latvia	77	▲
Slovenia	75	▲
Belgium (Flemish)	75	▲
Sweden	72	▲
Bulgaria	71	▲
Italy	71	▲
Russian Federation	70	▲
Romania	70	▲
United States	70	▲
Serbia and Montenegro	70	▲
Slovak Republic	69	▲
Estonia	68	▲
Australia	68	▲
Moldova, Republic of	67	▲
Scotland	66	▲
Israel	66	▲
Hungary	65	▲
Lithuania	65	▲
Macedonia, Republic of	64	▲
Netherlands	61	O
England	60	O
International average	**59**	
Armenia	57	O
New Zealand	56	O
Iran, Islamic Republic of	56	O
Cyprus	55	▼
Egypt	53	▼
Tunisia	52	▼
Jordan	50	▼
Chile	50	▼
Norway	45	▼
Palestinian Nat'l Auth.	41	▼
Lebanon	41	▼
Bahrain	41	▼
Indonesia	40	▼
Philippines	35	▼
Botswana	32	▼
Morocco	30	▼
Ghana	22	▼
South Africa	21	▼
Saudi Arabia	21	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Approximate number of magazines sold

About 7,000 copies of a magazine are sold each week. Approximately how many magazines are sold each year?

- Ⓐ   8,400
- Ⓑ   35,000
- Ⓒ   84,000
- Ⓓ   350,000
- Ⓔ   3,500,000

Item Number: M022194

Correct Response:	**D**

Overall Percent Correct

Country	Percent	
Korea, Republic of	74	▲
Singapore	74	▲
Chinese Taipei	71	▲
Netherlands	69	▲
Belgium (Flemish)	69	▲
Hong Kong, SAR	68	▲
Australia	67	▲
Hungary	66	▲
Japan	66	▲
Sweden	63	▲
New Zealand	62	▲
Estonia	62	▲
England	61	▲
Slovenia	60	▲
Slovak Republic	59	▲
United States	58	▲
Malaysia	58	▲
Russian Federation	58	▲
Scotland	58	▲
Norway	58	▲
Lithuania	57	▲
Latvia	57	▲
Bulgaria	56	▲
Israel	54	▲
Italy	53	▲
Serbia and Montenegro	50	O
International average	**49**	
Romania	47	O
Cyprus	47	O
Moldova, Republic of	44	O
Macedonia, Republic of	42	▼
Armenia	39	▼
Indonesia	38	▼
Tunisia	37	▼
Philippines	36	▼
Lebanon	36	▼
Chile	36	▼
Morocco	33	▼
Bahrain	31	▼
Iran, Islamic Republic of	29	▼
Jordan	28	▼
Egypt	23	▼
Saudi Arabia	23	▼
Palestinian Nat'l Auth.	21	▼
South Africa	20	▼
Botswana	19	▼
Ghana	18	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

The teachers plan to send 6 newsletters per year

The teachers at Parkway School plan to send 6 newsletters per year to each of the 620 families with children at the school. The newsletters each need 2 sheets of paper. The paper is sold in packs of 500 sheets.

What is the least number of packs of paper needed to print the school newsletter for the year?

Answer: _____

Item Number: M032652

SCORING

Correct Response
- 15

Incorrect Response
- 14 or 14.88
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Armenia	60	▲
Netherlands	57	▲
Singapore	57	▲
Hong Kong, SAR	53	▲
Belgium (Flemish)	46	▲
Japan	44	▲
Chinese Taipei	44	▲
Korea, Republic of	43	▲
United States	36	▲
Hungary	35	▲
Slovak Republic	33	▲
Scotland	32	▲
Estonia	32	▲
Sweden	30	▲
New Zealand	29	▲
Russian Federation	29	▲
Lithuania	29	▲
Australia	28	▲
England	27	O
Slovenia	24	O
Latvia	22	O
International average	**21**	
Italy	21	O
Bulgaria	20	O
Israel	20	O
Norway	20	O
Cyprus	18	▼
Romania	14	▼
Serbia and Montenegro	13	▼
Macedonia, Republic of	11	▼
Moldova, Republic of	10	▼
Malaysia	8	▼
Chile	8	▼
Tunisia	8	▼
Jordan	4	▼
Lebanon	4	▼
Philippines	3	▼
Indonesia	3	▼
South Africa	3	▼
Iran, Islamic Republic of	3	▼
Bahrain	3	▼
Egypt	3	▼
Palestinian Nat'l Auth.	2	▼
Morocco	1	▼
Botswana	0	▼
Ghana	0	▼
Saudi Arabia	0	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

The teachers plan to send 6 newsletters per year (continued)

Item Number: M032652

Student Responses

Correct Response:

The teachers at Parkway School plan to send 6 newsletters per year to each of the 620 families with children at the school. The newsletters each need 2 sheets of paper. The paper is sold in packs of 500 sheets.

What is the least number of packs of paper needed to print the school newsletter for the year?

Answer: _____ 15 _____

$$
\begin{array}{r}
620 \\
\times 12 \\
\hline
1240 \\
6200 \\
\hline
7440
\end{array}
$$

$$
500 \overline{)7440}
$$

Incorrect Response:

The teachers at Parkway School plan to send 6 newsletters per year to each of the 620 families with children at the school. The newsletters each need 2 sheets of paper. The paper is sold in packs of 500 sheets.

What is the least number of packs of paper needed to print the school newsletter for the year?

Answer: _____ 3 packs of 500 _____

$$
\begin{array}{r}
620 \\
\times 2 \\
\hline
1240
\end{array}
$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Garden with 14 rows of 20 plants each

A garden has 14 rows. Each row has 20 plants. The gardener then plants 6 more rows with 20 plants in each row.

How many plants are now there altogether?

Answer: _____

Item Number: M032671

SCORING

Correct Response

• 400 or equivalent.

Incorrect Response

• Incorrect (including crossed out/erased, stray marks, illegible, or off task).

Overall Percent Correct

Singapore	91	▲
Netherlands	88	▲
Hong Kong, SAR	87	▲
Belgium (Flemish)	86	▲
Korea, Republic of	85	▲
Estonia	85	▲
Chinese Taipei	83	▲
Sweden	82	▲
Malaysia	81	▲
United States	78	▲
Latvia	78	▲
Russian Federation	78	▲
New Zealand	77	▲
Australia	76	▲
England	75	▲
Hungary	72	▲
Israel	72	▲
Lithuania	72	▲
Scotland	71	▲
Italy	71	▲
Slovenia	67	▲
Moldova, Republic of	66	▲
Cyprus	66	▲
Romania	65	▲
Bulgaria	63	O
Slovak Republic	63	O
Japan	61	O
Chile	61	O
Serbia and Montenegro	61	O
International average	**61**	
Norway	60	O
Macedonia, Republic of	56	▼
Indonesia	49	▼
Tunisia	48	▼
Armenia	47	▼
Iran, Islamic Republic of	44	▼
Lebanon	43	▼
Jordan	43	▼
Bahrain	41	▼
Morocco	39	▼
Egypt	36	▼
Philippines	35	▼
Palestinian Nat'l Auth.	33	▼
Botswana	28	▼
Saudi Arabia	23	▼
South Africa	18	▼
Ghana	11	▼

Country average vs. International average:	
Higher	▲
Not different	O
Lower	▼

Garden with 14 rows of 20 plants each (continued)

Item Number: M032671

Student Responses

Correct Response:

A garden has 14 rows. Each row has 20 plants. The gardener then plants 6 more rows with 20 plants in each row.

How many plants are now there altogether?

Answer: _____ 400 _____

Incorrect Response:

A garden has 14 rows. Each row has 20 plants. The gardener then plants 6 more rows with 20 plants in each row.

How many plants are now there altogether?

Answer: _____ 40 _____

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Continued

Item Index 2003

Content Domain   Page

Number