

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 1995 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 knows facts and procedures. 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.

Guide to the Content and Layout of This Book

This book contains the released items from both TIMSS 1995 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.

1995 Content Domains:

- Whole numbers
- Fractions and proportionality
- Measurement, estimation, and number sense
- Data representation, analysis, and probability
- Geometry
- Patterns, relations, and functions

2003 Content Domains:

- Patterns and Relationships
- Data
- Geometry
- Measurement
- Number

1995 Cognitive Domains:

- Knowing
- Performing routine procedures
- Using complex procedures
- Solving problems

2003 Cognitive Domains:

- Knowing facts and procedures
- Using concepts
- Solving routine problems
- Reasoning

Take a look at *Which number is it*, the name given to the first 1995 item in this book. As specified in boxes at the top of the page, the content domain for this item is *whole numbers* and the cognitive domain is *using complex procedures*. Looking at *Symbolic linear equation of magazines*, the first item from TIMSS 2003 (page 73), the content domain (*patterns and relationships*) and the cognitive domain (*solving routine problems*) are also accompanied by the main topic (*equations and formulas*).

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. *Which number is it* provides an example of the letter code type—the correct answer is D.
- **Scoring guide.** This form is used to assist in scoring write-in responses. *Complete number sentence (S2)* further along in the *Whole Numbers* 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. fourth-grade student's response is provided for each scoring category. See Item M031249 on page 76.

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
Whole Numbers	Using Complex Procedures

Which number is it

When you subtract one of the numbers below from 900, the answer is greater than 300. Which number is it?

A. 823

B. 712

C. 667

D. 579

Overall Percent Correct

Korea	82	▲
Czech Republic	74	▲
Hong Kong	74	▲
Hungary	74	▲
Slovenia	72	▲
Japan	71	▲
Netherlands	70	▲
Austria	65	○
Ireland	62	○
Singapore	62	○
Latvia (LSS)	61	○
International average	57	
United States	57	○
Scotland	56	○
Thailand	54	○
Canada	53	○
Cyprus	52	○
Greece	52	○
Israel	52	○
Australia	51	○
England	48	▼
Iceland	47	○
New Zealand	47	○
Norway	43	▼
Portugal	40	▼
Iran, Islamic Rep.	39	▼
Kuwait	34	▼

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

Item Number: I3

Correct Response:	D
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Content Domain	Cognitive Domain
Whole Numbers	Performing Routine Procedures

What is 3 times 23

What is 3 times 23?

A. 323

B. 233

C. 69

D. 26

Overall Percent Correct

Netherlands	98	▲
Czech Republic	97	▲
Hungary	96	▲
Japan	96	▲
Hong Kong	95	▲
Latvia (LSS)	95	▲
Slovenia	95	▲
Austria	94	▲
Singapore	93	▲
United States	90	▲
England	89	○
Ireland	87	○
Australia	86	○
Greece	86	○
Korea	86	○
Canada	85	○
Scotland	85	○
International average	84	
Cyprus	82	○
Norway	82	○
Iceland	80	○
Israel	80	○
Portugal	80	○
New Zealand	78	○
Iran, Islamic Rep.	73	▼
Thailand	54	▼
Kuwait	12	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: I4

Correct Response:	C
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Content Domain	Cognitive Domain
Whole Numbers	Performing Routine Procedures

Subtraction of 4 digit numbers

Subtract:

$$\begin{array}{r} 6,000 \\ -2,369 \\ \hline \end{array}$$

A. 4,369

B. 3,742

C. 3,631

D. 3,531

Overall Percent Correct

Korea	93	▲
Austria	92	▲
Hungary	91	▲
Singapore	91	▲
Hong Kong	89	▲
Japan	89	▲
Netherlands	86	▲
Slovenia	86	▲
Czech Republic	83	▲
Greece	82	▲
Ireland	82	▲
Latvia (LSS)	80	▲
Cyprus	79	▲
Portugal	77	○
International average	71	
Israel	71	○
United States	71	○
Thailand	65	○
Iran, Islamic Rep.	62	○
Canada	61	▼
Norway	60	○
Scotland	55	▼
Australia	47	▼
Iceland	47	▼
Kuwait	46	▼
England	36	▼
New Zealand	30	▼

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

Item Number: I9

Correct Response:	C
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Content Domain	Cognitive Domain
Whole Numbers	Using Complex Procedures

What is the increase in product

25×18 is more than 24×18 . How much more?

- A. 1
- B. 18
- C. 24
- D. 25

Overall Percent Correct

Korea	80	▲
Singapore	73	▲
Hong Kong	63	▲
Netherlands	60	▲
Japan	59	▲
Austria	58	▲
Hungary	52	○
Ireland	51	○
Slovenia	51	○
Czech Republic	50	○
Israel	47	○
United States	46	○

International average 45

Latvia (LSS)	42	○
Australia	41	○
Canada	41	○
Cyprus	38	○
Norway	38	○
Portugal	38	○
England	37	○
Scotland	37	○
Iceland	33	▼
Thailand	33	▼
Greece	29	▼
New Zealand	28	▼
Iran, Islamic Rep.	26	▼
Kuwait	19	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: J4

Correct Response:

B

Content Domain	Cognitive Domain
Whole Numbers	Performing Routine Procedures

Number in box

Here is part of a wall chart that lists numbers from 1 to 100.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25					

Below is part of the same wall chart. What number should be in the box with the question mark inside?

43
53
?

- A. 34
- B. 44
- C. 54
- D. 64

Overall Percent Correct

Netherlands	92	▲
Korea	91	▲
Japan	90	▲
Australia	85	▲
Canada	84	▲
Hong Kong	84	▲
Singapore	84	▲
England	83	▲
Ireland	83	▲
United States	83	▲
Austria	81	○
Scotland	80	○
Hungary	77	○
Slovenia	77	○
Czech Republic	75	○
International average	73	
New Zealand	73	○
Cyprus	72	○
Israel	72	○
Norway	68	○
Latvia (LSS)	66	○
Portugal	62	▼
Iceland	60	▼
Greece	59	▼
Thailand	50	▼
Iran, Islamic Rep.	40	▼
Kuwait	38	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: J9

Correct Response:	D
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Content Domain	Cognitive Domain
Whole Numbers	Performing Routine Procedures

Addition of four digit numbers

Add:
$$\begin{array}{r} 6,971 \\ +5,291 \\ \hline \end{array}$$

A. 11,162

B. 12,162

C. 12,262

D. 1,211,162

Overall Percent Correct

Korea	96	▲
Singapore	94	▲
Cyprus	93	▲
Czech Republic	93	▲
Japan	93	▲
Ireland	92	▲
Austria	91	▲
Slovenia	91	▲
Thailand	91	▲
Hong Kong	90	▲
Netherlands	90	▲
Canada	87	○
Hungary	86	○
Portugal	86	○
United States	86	○
Israel	85	○
Latvia (LSS)	85	○
International average	84	
Greece	81	○
Iran, Islamic Rep.	80	○
Iceland	79	○
Australia	76	▼
Norway	76	○
Scotland	73	▼
Kuwait	72	▼
New Zealand	69	▼
England	60	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: K2

Correct Response:	C
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Content Domain	Cognitive Domain
Whole Numbers	Using Complex Procedures

Which pair different by 100

In which pair of numbers is the second number 100 more than the first number?

A. 199 and 209

B. 4,236 and 4,246

C. 9,635 and 9,735

D. 51,863 and 52,863

Overall Percent Correct

Korea	80	▲
Japan	73	▲
Hong Kong	70	▲
Austria	68	▲
Czech Republic	67	▲
Netherlands	65	▲
Slovenia	63	▲
Hungary	62	▲
Singapore	61	▲
Israel	56	○
Cyprus	53	○
Latvia (LSS)	52	○
International average	49	
Australia	45	○
United States	45	○
Ireland	44	○
Scotland	43	○
Canada	42	○
Greece	42	○
Thailand	36	▼
Norway	35	▼
England	34	▼
New Zealand	33	▼
Portugal	31	▼
Iceland	28	▼
Kuwait	24	▼
Iran, Islamic Rep.	21	▼

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

Item Number: L7

Correct Response:	C
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Content Domain	Cognitive Domain
Whole Numbers	Knowing

Which operation equivalent

\square stands for a number. $7 \times \square$ will always give the same answer as

- A. $\square \times 7$
- B. $\square + 7$
- C. $\square - 7$
- D. $7 + \square$
- E. $\square \div 7$

Overall Percent Correct

Japan	89	▲
Korea	82	▲
Israel	78	▲
Singapore	78	▲
Hong Kong	75	▲
United States	71	▲
Australia	69	○
Hungary	69	○
Cyprus	67	○
Netherlands	66	○
Austria	65	○
Norway	64	○

International average 63

England	61	○
Latvia (LSS)	61	○
Canada	60	○
Ireland	60	○
New Zealand	59	○
Scotland	58	○
Slovenia	57	○
Iran, Islamic Rep.	56	○
Thailand	55	○
Greece	54	○
Iceland	54	○
Portugal	51	▼
Czech Republic	41	▼
Kuwait	41	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M3

Correct Response:

A

Content Domain	Cognitive Domain
Whole Numbers	Solving Problems

What to do to correct mistake

John wanted to use his calculator to add 1,463 and 319. He entered $1,263 + 319$ by mistake. What could he do to correct his mistake?

A. Add 200.

B. Add 2.

C. Subtract 2.

D. Subtract 200.

Overall Percent Correct

Japan	88	▲
Korea	87	▲
Hungary	84	▲
Netherlands	84	▲
Czech Republic	82	▲
Hong Kong	82	▲
Singapore	81	▲
Slovenia	80	▲
Australia	78	▲
Latvia (LSS)	78	○
Israel	77	▲
Cyprus	73	○
Ireland	72	○
Canada	71	○
England	70	○
International average	70	
United States	69	○
Norway	68	○
Scotland	66	○
New Zealand	65	○
Austria	60	○
Greece	60	▼
Iceland	59	○
Thailand	53	▼
Portugal	48	▼
Iran, Islamic Rep.	43	▼
Kuwait	38	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M6

Correct Response:	A
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Content Domain	Cognitive Domain
Whole Numbers	Using Complex Procedures

Choose largest number

Which of these is the largest number?

A. 2,735

B. 2,537

C. 2,573

D. 2,753

Overall Percent Correct

Korea	97	▲
Austria	95	▲
Hong Kong	95	▲
Japan	94	▲
Czech Republic	93	▲
Netherlands	93	▲
Slovenia	92	▲
Australia	91	▲
Hungary	91	▲
Israel	91	○
Singapore	91	▲
United States	89	○
Canada	88	○
Ireland	88	○
Latvia (LSS)	88	○
Greece	87	○
Norway	87	○
International average	86	
Scotland	85	○
England	83	○
New Zealand	83	○
Cyprus	82	○
Thailand	81	○
Iceland	80	○
Portugal	80	○
Iran, Islamic Rep.	63	▼
Kuwait	47	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M8

Correct Response:	D
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Content Domain	Cognitive Domain
Whole Numbers	Performing Routine Procedures

Complete number sentence

Here is a number sentence.

$$2,000 + \quad + 30 + 9 = 2,739$$

What number goes where the \quad is to make this sentence true?

Answer: _____

Overall Percent Correct

Singapore	92	▲
Korea	91	▲
Japan	86	▲
Netherlands	83	▲
Hong Kong	82	▲
Slovenia	81	▲
Czech Republic	77	▲
Hungary	76	▲
Israel	71	▲
Canada	65	○
Latvia (LSS)	63	○
International average		63
Ireland	62	○
Australia	61	○
Austria	61	○
Cyprus	61	○
Portugal	60	○
Thailand	59	○
United States	58	○
Greece	52	▼
England	49	▼
New Zealand	49	▼
Scotland	47	▼
Iceland	45	▼
Norway	45	▼
Kuwait	27	▼
Iran, Islamic Rep.	26	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: S2

SCORING

Correct Response

- 700 or written out as "seven hundred."

Incorrect Response

- 7
- 43
- 70
- Gives other numbers made by digits in 2,739 such as 73, 30, 9, 39, 739, 2,739,...
- Other incorrect.

Content Domain	Cognitive Domain
Whole Numbers	Solving Problems

Make smallest whole number

What is the smallest whole number that you can make using the digits 4, 3, 9 and 1? Use each digit only once.

Answer: _____

Overall Percent Correct

Korea	92	▲
Singapore	72	▲
Australia	66	▲
Hong Kong	66	▲
Hungary	58	▲
Iran, Islamic Rep.	55	▲
Japan	53	▲
United States	50	▲
Canada	49	○
Ireland	49	○
International average	43	
Netherlands	43	○
Austria	41	○
Czech Republic	40	○
New Zealand	39	○
Scotland	39	○
Latvia (LSS)	38	○
England	35	▼
Cyprus	33	▼
Israel	33	▼
Greece	31	▼
Portugal	31	▼
Slovenia	30	▼
Norway	29	▼
Iceland	27	▼
Thailand	19	▼
Kuwait	10	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: T2

SCORING

Correct Response

- 1,349

Incorrect Response

- 1,3,4,9
- 1
- 4
- 17
- Any four-digit number with digits 4,3,9 and 1, other than 1,349
- 13 OR "1 and 3" OR "3 and 1"
- Other incorrect.

Content Domain	Cognitive Domain
Whole Numbers	Knowing

Addition/multiplication task

Addition Fact

$$4 + 4 + 4 + 4 + 4 = 20$$

Write this addition fact as a multiplication fact.

_____ × _____ = _____

Overall Percent Correct

Hong Kong	95	▲
Korea	94	▲
Japan	92	▲
Singapore	90	▲
Ireland	86	▲
Israel	86	▲
Slovenia	86	▲
Netherlands	85	▲
United States	84	▲
Cyprus	83	▲
Czech Republic	83	▲
Austria	82	○
Latvia (LSS)	81	○
Hungary	80	○
Greece	79	○
International average	77	
Canada	76	○
Iran, Islamic Rep.	73	○
Australia	71	▼
New Zealand	67	▼
Norway	66	▼
Scotland	66	▼
Portugal	65	▼
Thailand	65	▼
Iceland	63	▼
England	53	▼
Kuwait	42	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: U5

SCORING**Correct Response**

- $5 \times 4 = 20$
- $4 \times 5 = 20$
- Other correct

Incorrect Response

- $4 \times 4 = 16$
- $4 \times 4 = 20$
- $10 \times 2 = 20$ OR $2 \times 10 = 20$
- Other incorrect

Content Domain	Cognitive Domain
Whole Numbers	Knowing

Number larger than 56,821

Write the number that is 1,000 more than 56,821.

Answer: _____

Overall Percent Correct

Korea	85	▲
Singapore	83	▲
Japan	75	▲
Czech Republic	70	▲
Slovenia	70	▲
Hong Kong	60	▲
Austria	59	▲
United States	58	▲
Netherlands	55	○
Hungary	53	○
Ireland	53	○
Australia	51	○
Latvia (LSS)	50	○
International average	49	
Canada	47	○
Cyprus	45	○
Norway	45	○
Greece	41	▼
England	36	▼
Israel	36	▼
Scotland	35	▼
New Zealand	32	▼
Portugal	32	▼
Thailand	32	▼
Iceland	27	▼
Iran, Islamic Rep.	18	▼
Kuwait	13	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: V2

SCORING

Correct Response

- 57,821

Incorrect Response

- 66,821
- Any number except 66,821 where one or more digits in 56,821 have been increased by 1.
Example: 56,921, 66,932, 57,921
- Other incorrect.

Content Domain	Cognitive Domain
Whole Numbers	Performing Routine Procedures

What is 5 less than 203

What is 5 less than 203?

Answer: _____

Overall Percent Correct

Korea	89	▲
Austria	84	▲
Singapore	82	▲
Japan	81	▲
Slovenia	79	▲
Hungary	78	▲
Czech Republic	77	▲
Ireland	75	▲
Hong Kong	74	▲
Australia	71	▲
Netherlands	67	○
Scotland	67	▲
Norway	64	○
United States	64	○
International average	62	
England	61	○
Canada	60	○
Latvia (LSS)	59	○
Cyprus	57	○
Israel	56	○
New Zealand	51	▼
Iceland	50	▼
Greece	48	▼
Thailand	39	▼
Portugal	34	▼
Iran, Islamic Rep.	33	▼
Kuwait	10	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: V3

SCORING

Correct Response

- 198

Incorrect Response

- 98 OR 298
- 5
- 208
- Other incorrect

Content Domain	Cognitive Domain
Whole Numbers	Solving Problems

Game with cards: who won? Explain

In a game, Mysong and Naoki are making problems. They each have four cards like these.

The winner of the game is the person who can make the problem with the largest answer.

Mysong placed the cards like this.

4	3
+	2
	1

Naoki placed the cards like this.

3	1
+	2
	4

Who won this game? _____
 How do you know? _____

Write numbers in the squares below to show how you would place the cards to beat both Mysong and Naoki.

+	

Overall Percent Correct

Korea	63	▲
Slovenia	45	▲
Hungary	41	▲
Israel	41	▲
Canada	38	▲
Japan	36	▲
Portugal	32	▲
Singapore	29	▲
Cyprus	27	○
Greece	27	○
International average	24	
Austria	23	○
United States	23	○
Australia	22	○
Czech Republic	22	○
Netherlands	22	○
Hong Kong	21	○
Iceland	21	○
Ireland	20	○
Iran, Islamic Rep.	17	▼
New Zealand	13	▼
Scotland	12	▼
England	11	▼
Latvia (LSS)	11	▼
Norway	6	▼
Kuwait	1	▼
Thailand	0	▼

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

Item Number: V4A

SCORING

Scoring for Part a

Correct Response

- Mysong. 64 and 55 are shown (or 9, which is the difference between 64 and 55) with a correct verbal explanation.

Partially Correct

- Mysong. 64 and 55 are shown (or $43 - 31 > 24 - 21$) with an unsatisfactory explanation.
- Mysong. 64 and 55 are shown (or $43 - 31 > 24 - 21$) without any further explanation.
- Mysong. The response given is a verbal explanation. Either 64 or 55 is shown but not both.
- Mysong. The response gives no verbal or numeric explanation.
- Other responses containing Mysong. For example, "because Mysong had the largest answer."

Incorrect Response

- Neither Mysong nor Naoki win.
- Naoki. There may or may not be an explanation.
- Other incorrect, including "both won."

Content Domain	Cognitive Domain
Whole Numbers	Solving Problems

Game with cards: winning numbers

In a game, Mysong and Naoki are making problems. They each have four cards like these.



The winner of the game is the person who can make the problem with the largest answer.

Mysong placed the cards like this.

$$\begin{array}{r} 43 \\ + 21 \\ \hline \end{array}$$

Naoki placed the cards like this.

$$\begin{array}{r} 31 \\ + 24 \\ \hline \end{array}$$

Who won this game? _____
 How do you know? _____

Write numbers in the squares below to show how you would place the cards to beat both Mysong and Naoki.

$$\begin{array}{r} \square \square \\ + \square \square \\ \hline \end{array}$$

Overall Percent Correct

Hong Kong	82	▲
Japan	81	▲
Singapore	70	▲
Korea	66	▲
Netherlands	62	▲
Hungary	59	▲
Slovenia	57	▲
United States	57	▲
Canada	55	○
Australia	54	▲
Austria	53	○
Israel	53	○
England	50	○
Scotland	48	○
International average	48	
Greece	46	○
Ireland	46	○
Czech Republic	43	○
New Zealand	42	○
Norway	41	○
Latvia (LSS)	39	▼
Iceland	35	▼
Cyprus	34	▼
Portugal	29	▼
Iran, Islamic Rep.	18	▼
Thailand	18	▼
Kuwait	5	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: V4B

SCORING

Scoring for Part b

Correct Response

- One of the following: 42+31; 41+32; 31+42; or 32+41

Incorrect Response

- Combinations of the numbers 1, 2, 3 and 4. Every number is used only once.
- Combinations of the numbers 1, 2, 3 and 4. One or more numbers are used more than once.
- Combinations containing one or more numbers other than 1, 2, 3 and 4
- Other incorrect

Content Domain	Cognitive Domain
Fractions and Proportionality	Knowing

0.4 is the same as

0.4 is the same as
A. four
B. four tenths
C. four hundredths
D. one-fourth

Overall Percent Correct

Portugal	90	▲
Singapore	90	▲
Hong Kong	78	▲
Japan	73	▲
Korea	70	▲
Cyprus	61	▲
Ireland	55	▲
Iran, Islamic Rep.	54	▲
Australia	49	▲
United States	40	○
International average	39	
Canada	31	○
Hungary	31	○
Greece	29	▼
Netherlands	29	○
Scotland	28	▼
Thailand	26	▼
Austria	24	▼
Czech Republic	22	▼
Kuwait	22	▼
England	20	▼
New Zealand	20	▼
Israel	18	▼
Latvia (LSS)	17	▼
Slovenia	16	▼
Norway	14	▼
Iceland	9	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: 12

Correct Response:	B
--------------------------	----------

Content Domain	Cognitive Domain
Fractions and Proportionality	Using Complex Procedures

Sauce from 15 tomatoes

Mario uses 5 tomatoes to make half a liter of tomato sauce.
How much sauce can he make from 15 tomatoes?

A. A liter and a half

B. Two liters

C. Two liters and a half

D. Three liters

Overall Percent Correct

Hong Kong	73	▲
Korea	67	▲
Netherlands	67	▲
Czech Republic	64	▲
Slovenia	61	○
Hungary	60	○
Israel	60	○
Singapore	60	▲
Australia	59	○
Thailand	57	○
Ireland	56	○
Latvia (LSS)	53	○
International average 53		
Austria	51	○
Cyprus	51	○
England	51	○
Norway	51	○
Greece	50	○
New Zealand	48	○
Scotland	46	○
Japan	45	○
Iceland	44	○
Iran, Islamic Rep.	44	▼
United States	43	▼
Portugal	42	▼
Canada	41	▼
Kuwait	23	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼


Item Number: 15

Correct Response:	A
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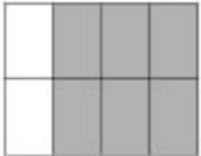
Content Domain	Cognitive Domain
Fractions and Proportionality	Using Complex Procedures

Which 2 figures represent same fraction

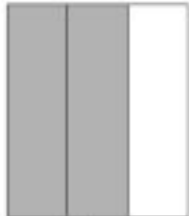
Each figure represents a fraction.



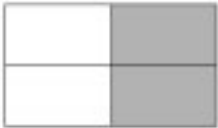
1



2



3



4

Which two figures represent the same fraction?

A. 1 and 2

B. 1 and 4

C. 2 and 3

D. 3 and 4

Overall Percent Correct

Singapore	72	▲
Austria	71	▲
Iceland	69	▲
Hong Kong	67	▲
Slovenia	64	▲
Netherlands	59	○
Japan	58	○
England	57	○
Korea	57	○
Cyprus	56	○
Norway	55	○
International average	54	
Israel	53	○
Latvia (LSS)	53	○
Canada	52	○
United States	52	○
Hungary	51	○
Ireland	51	○
Greece	50	○
New Zealand	50	○
Czech Republic	47	○
Scotland	46	○
Australia	44	▼
Thailand	43	○
Portugal	42	▼
Iran, Islamic Rep.	40	▼
Kuwait	38	▼

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

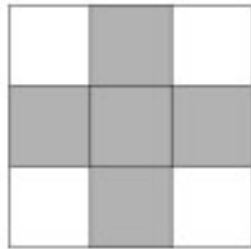
Item Number: 18

Correct Response:	A
--------------------------	----------

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Fraction of figure shaded

Part of the figure is shaded.



What fraction of the figure is shaded?

- A. $\frac{5}{4}$
- B. $\frac{4}{5}$
- C. $\frac{6}{9}$
- D. $\frac{5}{9}$

Overall Percent Correct

Hong Kong	96	▲
Singapore	94	▲
Korea	92	▲
Japan	89	▲
United States	80	▲
Canada	79	▲
Ireland	79	▲
Cyprus	75	▲
Thailand	75	▲
Australia	72	▲
Netherlands	70	▲
Iran, Islamic Rep.	68	○
Scotland	66	○
Israel	62	○

International average 61

Greece	58	○
Hungary	58	○
New Zealand	50	○
England	48	▼
Latvia (LSS)	48	▼
Slovenia	47	▼
Austria	45	▼
Czech Republic	43	▼
Norway	25	▼
Kuwait	21	▼
Iceland	20	▼
Portugal	16	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: J7

Correct Response:

D

Content Domain	Cognitive Domain
Fractions and Proportionality	Using Complex Procedures

How many marbles in two bags

There are 54 marbles, and they are put into 6 bags, so that the same number of marbles is in each bag. How many marbles would 2 bags contain?

- A. 108 marbles
- B. 18 marbles
- C. 15 marbles
- D. 12 marbles
- E. 9 marbles

Overall Percent Correct

Singapore	76	▲
Czech Republic	60	▲
Austria	59	▲
Korea	54	▲
Netherlands	51	▲
Japan	49	▲
Hong Kong	47	▲
Slovenia	47	○
Latvia (LSS)	45	○
Hungary	44	○
Ireland	44	○
Australia	38	○
International average	38	
United States	36	○
England	35	○
Israel	34	○
New Zealand	33	○
Scotland	33	○
Canada	29	▼
Portugal	26	▼
Thailand	25	▼
Cyprus	23	▼
Greece	23	▼
Kuwait	20	▼
Iceland	19	▼
Iran, Islamic Rep.	14	▼
Norway	12	▼

Country average vs. International average:

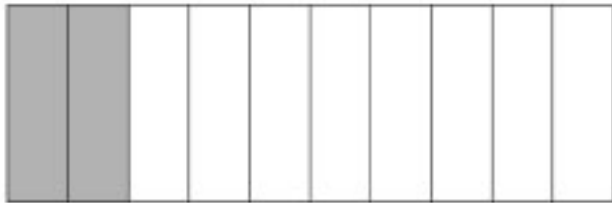
Higher	▲
Not different	○
Lower	▼

Item Number: K9

Correct Response:	B
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Content Domain	Cognitive Domain
Fractions and Proportionality	Knowing

Decimal representing shaded part of figure



Which number represents the shaded part of the figure?

- A. 2.8
- B. 0.5
- C. 0.2
- D. 0.02

Overall Percent Correct

Singapore	81	▲
Hong Kong	73	▲
Japan	71	▲
Portugal	71	▲
Korea	67	▲
Ireland	48	○
Cyprus	41	○
International average 40		
Australia	40	○
Canada	40	○
Iran, Islamic Rep.	35	○
Thailand	35	○
Austria	34	○
England	34	○
Scotland	34	○
Kuwait	32	○
Netherlands	32	○
United States	32	▼
Czech Republic	31	▼
Hungary	31	▼
Greece	30	▼
Latvia (LSS)	30	▼
Slovenia	29	▼
Israel	28	▼
New Zealand	25	▼
Iceland	23	▼
Norway	19	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Item Number: M5

Correct Response:	C
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Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Longest box on shelf

Julie put a box on a shelf that is 96.4 centimeters long. The box is 33.2 centimeters long. What is the longest box she could put on the rest of the shelf?
Show all your work.

Answer: _____

Overall Percent Correct

Singapore	61	▲
Korea	53	▲
Japan	40	▲
Czech Republic	38	▲
Slovenia	33	○
Hong Kong	32	○
Thailand	32	○
United States	32	▲
Austria	31	○
Ireland	29	○
Netherlands	28	○
Scotland	27	○
International average	26	
Canada	25	○
Israel	25	○
Australia	23	○
England	22	○
Greece	21	○
Norway	19	▼
Latvia (LSS)	18	▼
Cyprus	16	▼
Portugal	15	▼
Hungary	13	▼
New Zealand	13	▼
Iran, Islamic Rep.	9	▼
Iceland	6	▼
Kuwait	5	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: S3

SCORING

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

Correct Response

- 63.2. The calculation will be "96.4 - 33.2" or its equivalent.

Partially Correct

- 63.2. No acceptable description or calculation is shown.
- The calculation "96.4 - 33.2," or equivalent, is shown but the answer is incorrect.
- Other partial.

Incorrect Response

- Any incorrect numerical answers (answers not equal to 63.2). No acceptable description or calculation is shown.
- Other incorrect.

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

How many pupils in class

A teacher marks 10 of her pupils' tests every half hour. It takes her one and one-half hours to mark all her pupils' tests. How many pupils are in her class?

Answer: _____

Overall Percent Correct

Netherlands	73	▲
Japan	70	▲
Korea	69	▲
Singapore	63	▲
Ireland	58	▲
Czech Republic	57	▲
Israel	57	▲
Australia	56	▲
Hong Kong	55	▲
Austria	53	○
England	53	▲
Scotland	52	○
Slovenia	51	○
New Zealand	47	○
International average	46	
Latvia (LSS)	46	○
United States	45	○
Canada	44	○
Hungary	42	○
Cyprus	37	▼
Iceland	37	▼
Greece	31	▼
Norway	27	▼
Thailand	26	▼
Portugal	25	▼
Iran, Islamic Rep.	18	▼
Kuwait	11	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: S4

SCORING

Correct Response

- 30

Incorrect Response

- 10
- 15
- 20
- 21
- 25
- 40
- Other incorrect.

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Girl/boy ratio: is Juanita right

There are 10 girls and 20 boys in Juanita's class. Juanita said that there is one girl for every two boys. Her friend Amanda said that means $\frac{1}{2}$ of all the students in the class are girls.

How many students are there in Juanita's class?

Answer: _____

Is Juanita right? Answer: _____

Use words or pictures to explain why.

Is Amanda right? Answer: _____

Use words and pictures to explain why.

Overall Percent Correct

Korea	43	▲
Singapore	41	▲
Netherlands	38	▲
Australia	34	▲
England	30	▲
Japan	30	▲
Ireland	26	○
Scotland	26	○
Czech Republic	25	○
New Zealand	25	○
United States	25	○
Norway	24	○
Slovenia	24	○
Canada	22	○
International average	21	
Cyprus	21	○
Israel	19	○
Austria	13	▼
Greece	11	▼
Hong Kong	11	▼
Latvia (LSS)	9	▼
Portugal	9	▼
Iran, Islamic Rep.	7	▼
Kuwait	7	▼
Iceland	5	▼
Thailand	4	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: T4A

SCORING

Scoring for Part a

Correct Response

- YES. The response expresses verbally, symbolically or pictorially that 20 is twice as much as 10, or that 10 is half of 20.
- Other correct. (Includes satisfactory explanations when neither a "yes" or "no" answer is given).

Incorrect Response

- NO. An explanation is given but is not satisfactory.
- NO. No explanation is given.
- YES. An explanation is given but is not satisfactory.
- YES. No explanation is given.
- Other incorrect.

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Girl/boy ratio: is Amanda right

There are 10 girls and 20 boys in Juanita's class. Juanita said that there is one girl for every two boys. Her friend Amanda said that means $\frac{1}{2}$ of all the students in the class are girls.

How many students are there in Juanita's class?

Answer: _____

Is Juanita right? Answer: _____

Use words or pictures to explain why.

Is Amanda right? Answer: _____

Use words and pictures to explain why.

Overall Percent Correct

Singapore	37	▲
Korea	32	▲
Japan	30	▲
Ireland	25	▲
Netherlands	24	▲
Australia	21	▲
England	20	▲
Czech Republic	18	○
United States	17	○
Israel	16	○
Scotland	16	○
New Zealand	15	○
Norway	15	○

International average 15

Hong Kong	13	○
Canada	12	○
Cyprus	12	○
Slovenia	12	○
Greece	8	▼
Latvia (LSS)	6	▼
Austria	5	▼
Iceland	5	▼
Kuwait	4	▼
Thailand	4	▼
Portugal	3	▼
Iran, Islamic Rep.	1	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: T4B

SCORING

Scoring for Part b

Correct Response

- NO. The response expresses verbally, symbolically or pictorially that 10 is not half of 30.
- Other correct. (Includes satisfactory explanations when neither a "yes" or "no" answer is given).

Incorrect Response

- YES. An explanation is given but it is not satisfactory.
- YES. No explanation is given.
- NO. An explanation is given but it is not satisfactory.
- NO. No explanation is given.
- Other incorrect.

Content Domain	Cognitive Domain
Fractions and Proportionality	Knowing

Fraction larger than $2/7$

Write a fraction that is larger than $\frac{2}{7}$.

Answer: _____

Overall Percent Correct

Korea	90	▲
Hong Kong	84	▲
Japan	78	▲
Singapore	76	▲
Ireland	74	▲
Thailand	73	▲
Cyprus	69	▲
United States	68	▲
Israel	65	○
Hungary	63	○
Canada	62	○
Czech Republic	60	○
Australia	59	○
International average	57	
Greece	56	○
Austria	55	○
England	55	○
Scotland	54	○
New Zealand	51	○
Netherlands	50	▼
Latvia (LSS)	45	▼
Iran, Islamic Rep.	41	▼
Slovenia	39	▼
Norway	38	▼
Kuwait	30	▼
Portugal	28	▼
Iceland	27	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: U2

SCORING

Correct Response

- A fraction with numerator greater than 2 and denominator equal to 7
- A fraction with numerator equal to 2 and denominator less than 7
- $3/8$
- $1/2$. (Other fractions with numeric value equal $1/2$ should be scored as correct.)
- Other correct fraction.

Incorrect Response

- $1/7$
- $4/14$
- $2/8$
- Other incorrect

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Bicycle ride: how long, Maria

Maria and her sister Louisa leave home at the same time and ride their bicycles to school 9 kilometers away.

Maria rides at a rate of 3 kilometers in 10 minutes. How long will it take her to get to school?

Answer: _____ minutes

Louisa rides at a rate of 1 kilometer in 3 minutes. How long will it take her to get to school?

Answer: _____ minutes

Who arrives at school first?

Answer: _____

Overall Percent Correct

Netherlands	81	▲
Hong Kong	79	▲
Japan	76	▲
Korea	76	▲
Czech Republic	75	▲
Singapore	74	▲
Slovenia	68	▲
Australia	67	▲
Austria	67	○
Ireland	67	○
Hungary	63	○
United States	62	○

International average 61

Canada	61	○
Cyprus	61	○
Norway	61	○
England	60	○
Israel	60	○
Latvia (LSS)	60	○
New Zealand	60	○
Iceland	58	○
Scotland	57	○
Thailand	54	○
Greece	53	○
Portugal	46	▼
Iran, Islamic Rep.	24	▼
Kuwait	17	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: U3A

SCORING

Scoring for Part a

Correct Response

- 30

Incorrect Response

- 10
- Other incorrect.

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Bicycle ride: how long, Louisa

Maria and her sister Louisa leave home at the same time and ride their bicycles to school 9 kilometers away.

Maria rides at a rate of 3 kilometers in 10 minutes. How long will it take her to get to school?

Answer: _____ minutes

Louisa rides at a rate of 1 kilometer in 3 minutes. How long will it take her to get to school?

Answer: _____ minutes

Who arrives at school first?

Answer: _____

Overall Percent Correct

Hong Kong	70	▲
Singapore	69	▲
Korea	64	▲
Czech Republic	62	▲
Netherlands	62	▲
Austria	61	▲
Japan	61	▲
Slovenia	61	▲
Australia	49	○
Hungary	49	○
Ireland	47	○
Latvia (LSS)	47	○
Scotland	45	○

International average 45

United States	44	○
Israel	43	○
Norway	43	○
Canada	42	○
England	40	○
New Zealand	36	▼
Iceland	33	○
Thailand	32	▼
Cyprus	29	▼
Greece	29	▼
Portugal	25	▼
Iran, Islamic Rep.	11	▼
Kuwait	7	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: U3B

SCORING

Scoring for Part b

Correct Response

- 27

Incorrect Response

- Any other multiple of 3.
- Other incorrect.

Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Bicycle ride: who arrived first

Maria and her sister Louisa leave home at the same and ride their bicycles to school 9 kilometers away.

Maria rides at a rate of 3 kilometers in 10 minutes. How long will it take her to get to school?

Answer: _____ minutes

Louisa rides at a rate of 1 kilometer in 3 minutes. How long will it take her to get to school?

Answer: _____ minutes

Who arrives at school first?

Answer: _____

Overall Percent Correct

Netherlands	90	▲
Singapore	86	▲
Japan	85	▲
Czech Republic	84	▲
Ireland	83	▲
Slovenia	82	▲
United States	82	▲
Austria	81	▲
Hong Kong	81	▲
Scotland	80	▲
Australia	79	▲
Canada	79	▲
Hungary	79	▲
Korea	76	○
England	75	○
New Zealand	75	○
Norway	73	○

International average 73

Israel	71	○
Cyprus	70	○
Iceland	66	○
Latvia (LSS)	66	○
Thailand	66	○
Greece	63	▼
Portugal	62	▼
Iran, Islamic Rep.	33	▼
Kuwait	28	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: U3C

SCORING

Scoring for Part c

Correct Response

- Louisa
- Maria (or other responses), in cases where the response is consistent with (a) and (b).

Incorrect Response

- Inconsistent with part (a) or (b) or both.
- Other incorrect

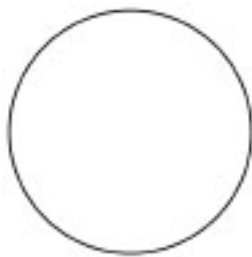
Content Domain	Cognitive Domain
Fractions and Proportionality	Solving Problems

Fractions of pie

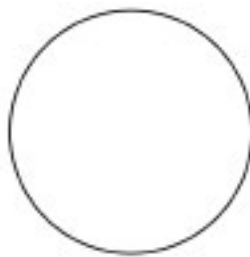
Sam said that $\frac{1}{3}$ of a pie is less than $\frac{1}{4}$ of the same pie.

Is Sam correct? _____

Use the circles below to show why this is so.



Shade in $\frac{1}{3}$
of this circle



Shade in $\frac{1}{4}$
of this circle

Overall Percent Correct

Singapore	58	▲
Netherlands	56	▲
Hong Kong	47	▲
Japan	41	▲
Korea	41	▲
Israel	39	▲
Hungary	33	○
Czech Republic	31	○
Ireland	30	○
Austria	27	○
United States	27	○

International average 26

Slovenia	26	○
Australia	24	○
Latvia (LSS)	24	○
Iceland	22	○
Canada	20	○
Cyprus	20	▼
England	20	▼
Scotland	20	▼
New Zealand	16	▼
Norway	16	▼
Greece	14	▼
Thailand	14	▼
Kuwait	6	▼
Portugal	6	▼
Iran, Islamic Rep.	3	▼

**Country average vs.
International average:**

Higher	▲
Not different	○
Lower	▼

Item Number: V1

SCORING

Note: The partition of circles has priority over shading. This is reflected in the scoring guide below.

Correct Response

- NO. Both circles are correctly partitioned.

Partially Correct

- NO. No partitioning is shown.
- NO. Only one of the circles correctly partitioned.
- NO. Other incorrect ways of partitioning.
- YES, or there is no conclusion stated. Both circles are correctly partitioned.
- Other partial.

Incorrect Response

- YES. No partitioning is shown.
- YES. The part representing $\frac{1}{3}$ is made consistently smaller than the part representing $\frac{1}{4}$.
- YES. Other responses where one or both of the circles partitioned into 3 and/or 4 parts.
- Other incorrect.

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Solving Problems

Choose largest mass

Which of these is largest?

A. 1 kilogram

B. 1 centigram

C. 1 milligram

D. 1 gram

Overall Percent Correct

Japan	94	▲
Netherlands	92	▲
Hungary	91	▲
Korea	90	▲
Austria	89	▲
Hong Kong	89	▲
Slovenia	89	▲
Czech Republic	81	▲
Portugal	79	▲
Latvia (LSS)	77	○
Singapore	76	○
Norway	74	○
Australia	73	○
Thailand	73	○
International average	72	
Greece	71	○
Iceland	71	○
Canada	68	○
Kuwait	67	○
England	62	▼
United States	61	▼
New Zealand	58	▼
Ireland	56	▼
Scotland	55	▼
Iran, Islamic Rep.	53	▼
Israel	50	▼
Cyprus	21	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: J6

Correct Response:	A
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Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Knowing

Which is best estimate of hours

Elena worked 57 hours in March, 62 hours in April, and 59 hours in May. Which of these is the BEST estimate of the total number of hours she worked for the three months?

A. $50 + 50 + 50$

B. $55 + 55 + 55$

C. $60 + 60 + 60$

D. $65 + 65 + 65$

Overall Percent Correct

Singapore	80	▲
Korea	78	▲
Japan	75	▲
Hong Kong	72	▲
United States	71	▲
Israel	66	▲
Netherlands	66	▲
Canada	65	▲
Austria	61	○
Czech Republic	61	▲
Hungary	60	▲
Australia	58	○
Ireland	58	○
International average	52	
Scotland	47	○
England	46	○
Slovenia	45	○
New Zealand	42	○
Norway	40	▼
Latvia (LSS)	39	▼
Cyprus	38	▼
Iceland	35	▼
Portugal	34	▼
Greece	32	▼
Thailand	28	▼
Iran, Islamic Rep.	23	▼
Kuwait	20	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼


Item Number: J8

Correct Response:	C
-------------------	---

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Using Complex Procedures

Estimate pencil length

About how long is this picture of a pencil?



A drawing of a pencil, oriented horizontally. The pencil is sharpened at the left end and has a small eraser at the right end. The drawing is a simple line drawing with shading to indicate the three-dimensional shape of the pencil.

A. 5 cm
 B. 10 cm
 C. 20 cm
 D. 30 cm

Overall Percent Correct

Czech Republic	91	▲
Hong Kong	91	▲
Singapore	91	▲
Austria	89	▲
Japan	88	▲
Cyprus	86	▲
Korea	85	▲
Latvia (LSS)	85	○
Slovenia	84	○
Thailand	84	○
Ireland	79	○
Norway	79	○
Hungary	78	○
Australia	77	○
Netherlands	77	○
International average	77	
Canada	72	○
New Zealand	71	○
Scotland	69	○
England	68	○
Iceland	68	○
Kuwait	67	▼
Iran, Islamic Rep.	66	▼
Israel	66	▼
Portugal	66	▼
Greece	63	○
United States	55	▼

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

Item Number: K5

Correct Response:	B
-------------------	----------

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Performing Routine Procedures

Length of rectangle

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

A. 5 centimeters

B. 6 centimeters

C. 12 centimeters

D. 16 centimeters

Overall Percent Correct

Singapore	46	▲
Korea	38	▲
Netherlands	35	▲
Japan	32	▲
England	29	○
Hong Kong	29	○
Cyprus	28	○
Latvia (LSS)	24	○
Scotland	24	○
International average	23	
Australia	23	○
Austria	23	○
Canada	23	○
New Zealand	23	○
United States	23	○
Kuwait	22	○
Ireland	20	○
Slovenia	20	○
Norway	19	○
Portugal	18	○
Israel	17	○
Czech Republic	16	▼
Greece	16	○
Iran, Islamic Rep.	16	▼
Hungary	15	▼
Thailand	15	▼
Iceland	12	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: K7

Correct Response:	B
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Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Solving Problems

Best estimate of clothespin mass

The weight (mass) of a clothespin is 9.2 g. Which of these is the best estimate of the total weight (mass) of 1,000 clothespins?

A. 900 g

B. 9,000 g

C. 90,000 g

D. 900,000 g

Overall Percent Correct

Czech Republic	74	▲
Hong Kong	71	▲
Hungary	71	▲
Netherlands	71	▲
Slovenia	71	▲
Korea	67	▲
Austria	65	▲
Israel	62	○
Singapore	59	○
Latvia (LSS)	57	○
International average	55	
Greece	55	○
Australia	53	○
Ireland	52	○
United States	52	○
Canada	50	○
Scotland	50	○
Thailand	50	○
Norway	49	○
England	47	○
Kuwait	45	▼
Cyprus	44	▼
Iceland	44	▼
Portugal	43	▼
New Zealand	42	▼
Iran, Islamic Rep.	38	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: L6

Correct Response:	B
-------------------	----------

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Solving Problems

Who had the longest pace

Four children measured the width of a room by counting how many paces it took them to cross it. The chart shows their measurements.

Name	Number of Paces
Stephen	10
Erlane	8
Ana	9
Carlos	7

Who had the longest pace?

- A. Stephen
- B. Erlane
- C. Ana
- D. Carlos

Overall Percent Correct

Korea	65	▲
Netherlands	61	▲
Austria	55	▲
Slovenia	54	▲
Latvia (LSS)	48	▲
Czech Republic	46	▲
Japan	45	▲
Hong Kong	42	▲
Ireland	39	○
Iceland	35	○
Norway	35	○
International average	32	
England	27	○
Hungary	27	○
Israel	27	○
Portugal	27	○
Greece	25	○
Singapore	25	▼
Scotland	23	▼
Australia	21	▼
Cyprus	21	▼
New Zealand	21	▼
Canada	19	▼
Thailand	15	▼
United States	10	▼
Iran, Islamic Rep.	8	▼
Kuwait	8	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: L8

Correct Response:	D
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Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Knowing

Substance measured in milliliters

Which of these would most likely be measured in milliliters?

A. The amount of liquid in a teaspoon

B. The weight (mass) of a pin

C. The amount of gasoline in a tank

D. The thickness of 10 sheets of paper

Overall Percent Correct

Japan	75	▲
Hong Kong	73	▲
Hungary	55	▲
Austria	51	▲
Australia	45	▲
Portugal	45	○
Singapore	45	▲
Slovenia	45	○
Ireland	44	○
Latvia (LSS)	42	○
United States	38	○
International average	38	
England	37	○
New Zealand	35	○
Scotland	35	○
Czech Republic	32	○
Canada	31	○
Korea	31	○
Iceland	29	○
Israel	28	○
Greece	27	▲
Netherlands	27	▼
Iran, Islamic Rep.	26	▼
Norway	24	▼
Thailand	22	▼
Cyprus	20	▼
Kuwait	15	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼


Item Number: M7

Correct Response:	A
-------------------	----------

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Using Complex Procedures


How many paper clip lengths

Here is a paper clip.



← Length →

About how many lengths of the paper clip is the same as the length of this line?



Answer: _____

Overall Percent Correct

Japan	68	▲
Korea	67	▲
Austria	65	▲
Netherlands	61	▲
Ireland	60	▲
Norway	60	▲
Australia	58	▲
England	58	▲
Hungary	57	▲
Scotland	57	▲
Czech Republic	56	▲
Canada	54	▲
United States	53	▲
Hong Kong	52	○
International average	48	
Singapore	47	○
Iceland	46	○
New Zealand	45	○
Slovenia	43	○
Cyprus	37	▼
Latvia (LSS)	37	▼
Greece	36	▼
Israel	35	▼
Thailand	33	▼
Portugal	29	▼
Iran, Islamic Rep.	19	▼
Kuwait	14	▼

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

Item Number: S5

SCORING

Correct Response

- 4.
- 5.
- Within the interval $4 < X < 5.5$.

Incorrect Response

- Less than 3.
- Within the interval $3 < X < 4$.
- Within the interval $5.5 < X < 6.5$.
- Within the interval $6.5 < X < 8$.
- Other incorrect.

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Performing Routine Procedures

When did Mr. Brown start walk

Mr. Brown goes for a walk and returns to where he started at 07:00. If his walk took 1 hour and 30 minutes, at what time did he start his walk?

Answer: _____

Overall Percent Correct

Korea	74	▲
Netherlands	72	▲
Austria	64	▲
Czech Republic	63	▲
Australia	62	▲
Japan	60	▲
Norway	60	▲
Latvia (LSS)	59	▲
Slovenia	59	▲
Ireland	57	▲
Scotland	54	▲
Hungary	53	○
Singapore	51	○
England	49	○
United States	49	○
International average	47	
Israel	46	○
Canada	45	○
New Zealand	45	○
Iceland	43	○
Cyprus	41	○
Hong Kong	32	▼
Greece	29	▼
Portugal	16	▼
Thailand	13	▼
Iran, Islamic Rep.	9	▼
Kuwait	6	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: T3

SCORING

Correct Response

- 05:30 OR 5:30
- The answer expressed informally.
Example: "half past five"

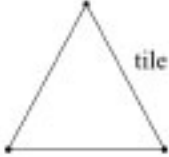
Incorrect Response

- 04:30, 4:30, or equivalent informal expression.
- 06:00, 6:00, or equivalent informal expression.
- 06:30, 6:30, or equivalent informal expression.
- 08:30, 8:30, or equivalent informal expression.
- Other incorrect.

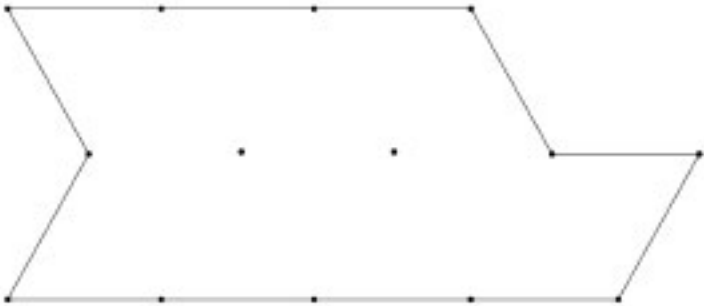
Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Solving Problems

Triangles in figure

The triangle represents one tile in the shape of a triangle.



How many tiles will it take to cover the figure below?



Number of tiles: _____

Use the figure above to show how you worked out your answer.

Overall Percent Correct

Japan	77	▲
Netherlands	76	▲
Korea	74	▲
Austria	73	▲
Hungary	69	▲
Singapore	66	▲
Hong Kong	63	▲
Czech Republic	60	▲
Slovenia	53	○
Norway	52	○
Scotland	52	○
International average	50	
Australia	49	○
Canada	49	○
Iceland	46	○
Israel	46	○
United States	46	○
Cyprus	44	○
Portugal	43	▼
Greece	41	▼
Iran, Islamic Rep.	41	▼
Latvia (LSS)	40	▼
England	38	▼
New Zealand	37	▼
Ireland	36	▼
Thailand	22	▼
Kuwait	15	▼

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

Item Number: U1

SCORING

Correct Response

- 14. Figure is correctly partitioned.

Partial Response

- 14. Partition includes errors.
- 14. Partition is not shown.
- The figure is correctly partitioned. Triangles are miscounted. (Count does not equal 14.)

Incorrect Response

- Neither partition nor number of triangles is correct.
- Other incorrect.

Content Domain	Cognitive Domain
Measurement, Estimation, and Number Sense	Knowing

Millimeters in a meter

How many millimeters are in a meter?

Answer: _____

Overall Percent Correct

Czech Republic	72	▲
Hong Kong	72	▲
Slovenia	70	▲
Austria	67	▲
Hungary	67	▲
Latvia (LSS)	65	▲
Japan	62	▲
Australia	57	▲
Netherlands	57	○
Portugal	54	○
Greece	53	○
Korea	52	○

International average 49

Ireland	46	○
England	44	○
New Zealand	43	○
Norway	43	○
Singapore	43	○
Canada	41	○
Cyprus	41	▼
Israel	41	○
Iran, Islamic Rep.	38	▼
Scotland	37	▼
Thailand	34	▼
Iceland	29	▼
United States	21	▼
Kuwait	17	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: V5

SCORING

Correct Response

- 1,000
- Thousand or "one thousand."

Incorrect Response

- 10
- 60
- 100
- 10,000
- Other incorrect

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

What % of time in play and homework

The figure shows how Mary spent her time one day.

A pie chart illustrating the distribution of Mary's time over a 24-hour period. The chart is divided into five segments: 'Sleeping & Resting' (40%), 'Going to School' (25%), 'Playing' (15%), 'Eating' (10%), and 'Homework' (10%).

What percent of time altogether did she spend playing and doing homework?

A. 10%

B. 15%

C. 20%

D. 25%

E. 30%

Overall Percent Correct

Korea	96	▲
Singapore	90	▲
Austria	88	▲
Netherlands	88	▲
Hong Kong	86	▲
Ireland	84	▲
Slovenia	82	○
Australia	81	▲
Norway	80	○
Czech Republic	78	○
United States	78	○
Canada	75	○
England	75	○
Iceland	75	○
International average	75	
Scotland	74	○
Thailand	74	○
Hungary	73	○
New Zealand	73	○
Latvia (LSS)	70	○
Portugal	70	○
Israel	68	○
Greece	65	○
Cyprus	63	▼
Kuwait	43	▼
Iran, Islamic Rep.	40	▼

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

Item Number: J3

Correct Response:	D
--------------------------	----------

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

Who won and by how many points

Kyle and Bob are playing a game. The object of the game is to get the highest total of points. This chart shows how many points they each scored.

Scorecard

Player	Kyle	Bob
Round 1	125	100
Round 2	125	125
Round 3	150	100
Round 4	50	150

Who won, and by how many points?

- A. Bob won by 25 points.
- B. Bob won by 100 points.
- C. Kyle won by 25 points.
- D. Kyle won by 175 points.

Overall Percent Correct

Singapore	71	▲
Czech Republic	70	▲
Netherlands	70	▲
Ireland	69	▲
Austria	66	▲
Japan	65	▲
Slovenia	63	▲
Hong Kong	62	▲
Israel	57	○
Australia	55	○
Korea	53	○
Scotland	53	○
United States	53	○
International average	50	
New Zealand	49	○
Canada	47	○
England	45	○
Latvia (LSS)	43	○
Greece	39	○
Norway	38	▼
Hungary	37	▼
Iceland	36	○
Portugal	34	▼
Thailand	28	▼
Cyprus	25	▼
Kuwait	10	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼



Item Number: K4


Correct Response:	A
-------------------	---

Content Domain	Cognitive Domain
Data Representation, Analysis and Probability	Knowing

Pictograph of trees

The graph shows 500 cedar trees and 150 hemlock trees.

Cedar	
Hemlock	

How many trees does each  represent?

Answer: _____

Overall Percent Correct

Japan	90	▲
Hong Kong	83	▲
Singapore	75	▲
United States	68	▲
Korea	63	▲
Netherlands	63	▲
Ireland	62	▲
Scotland	56	○
Iceland	54	○
Australia	51	○
Czech Republic	51	○
Israel	51	○
Cyprus	50	○
International average	49	
Canada	49	○
England	49	○
Thailand	48	○
Austria	45	○
New Zealand	45	○
Hungary	44	○
Slovenia	44	○
Norway	40	○
Latvia (LSS)	31	▼
Greece	25	▼
Portugal	22	▼
Iran, Islamic Rep.	16	▼
Kuwait	7	▼

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

Item Number: L1

SCORING

Correct Response

- 100.


Incorrect Response

- One of the following: 1, 5, 6, 6 1/2, 7, or 650.
- Other incorrect.


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

Chance of picking red marble


There is only one red marble in each of these bags.



10 Marbles



100 Marbles



1,000 Marbles

Without looking in the bags, you are to pick a marble out of one of the bags. Which bag would give you the greatest chance of picking the red marble?

- The bag with 10 marbles.
- The bag with 100 marbles.
- The bag with 1,000 marbles.
- All bags would give the same chance.

Overall Percent Correct

Netherlands	74	▲
Japan	70	▲
Hong Kong	69	▲
United States	68	▲
Canada	63	▲
Hungary	61	▲
Singapore	61	▲
Australia	59	▲
Norway	58	○
Czech Republic	56	○
England	55	○
New Zealand	55	○
Scotland	55	○
Austria	54	○
Ireland	52	○
Israel	51	○
International average		51
Slovenia	49	○
Iceland	47	○
Latvia (LSS)	42	○
Korea	39	▼
Thailand	39	▼
Cyprus	32	▼
Kuwait	31	▼
Greece	30	▼
Portugal	30	▼
Iran, Islamic Rep.	17	▼

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





Item Number: L2

Correct Response:	A
--------------------------	----------

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

Chance of hitting shaded region

Samantha drops a stone onto each of these targets. The stone has the best chance of landing on a shaded space in which target?

A.  B.  C.  D. 

Overall Percent Correct

Japan	89	▲
Netherlands	86	▲
Norway	86	▲
Israel	85	○
Greece	84	○
Hong Kong	84	▲
Korea	84	○
Slovenia	84	○
Canada	83	○
United States	83	▲
Czech Republic	82	○
Austria	81	○
Australia	80	○
Latvia (LSS)	79	○
England	78	○
Thailand	78	○
International average	78	
Hungary	76	○
Iceland	76	○
New Zealand	74	○
Scotland	73	○
Ireland	72	○
Iran, Islamic Rep.	70	○
Singapore	70	▼
Cyprus	68	▼
Portugal	62	▼
Kuwait	58	▼

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

Item Number: M1

Correct Response:	B
--------------------------	----------

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

How many raffle tickets

A team is selling raffle tickets. The table shows how many tickets they have sold so far.

Player's Name	Number of Tickets Sold
Carlos	4
Maria	7
Bill	3
Ted	7
Faye	6
Abby	9

They need to sell 60 tickets altogether. How many more tickets must they sell?

Answer: _____

Overall Percent Correct

Korea	83	▲
Austria	75	▲
Singapore	73	▲
Czech Republic	71	▲
Hungary	71	▲
Netherlands	69	▲
Japan	68	▲
Ireland	65	▲
Slovenia	65	▲
Latvia (LSS)	59	○
Hong Kong	57	○
Australia	56	○
Israel	56	○
International average	55	
Canada	54	○
Scotland	54	○
United States	53	○
Greece	51	○
Cyprus	50	○
England	49	○
Norway	48	○
Portugal	47	○
Iceland	45	▼
Thailand	44	▼
New Zealand	38	▼
Iran, Islamic Rep.	23	▼
Kuwait	8	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M2

SCORING

Correct Response

- 24

Incorrect Response

- 30
- 34
- 36
- Other incorrect.

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

Bar graphs of boys and girls

This table shows the ages of the girls and boys in a club.

Age	Number of Girls	Number of Boys
8	4	6
9	8	4
10	6	10

Use the information in the table to complete the graph for ages 9 and 10.

Overall Percent Correct

Korea	83	▲
Japan	78	▲
Hong Kong	75	▲
Singapore	74	▲
United States	55	▲
Australia	50	▲
England	49	▲
New Zealand	48	○
Canada	46	○
Scotland	45	○
Netherlands	42	○
International average	41	
Austria	39	○
Thailand	38	○
Israel	37	○
Iceland	36	○
Ireland	34	▼
Czech Republic	33	▼
Slovenia	32	▼
Hungary	31	▼
Latvia (LSS)	31	▼
Cyprus	30	▼
Greece	28	▼
Norway	26	▼
Portugal	13	▼
Kuwait	8	▼
Iran, Islamic Rep.	1	▼

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

Item Number: S1

SCORING

Correct Response

- All 4 bars correct for height, placement, and shading.
- All 4 bars of correct height; either bars misplaced or bars shaded incorrectly in no more than one set (i.e., for age 9 or age 10).

Partially Correct

- Placement, shading, and height all correct for one, two, or three bars. (At least one bar completely correct).
- All 4 bars of correct height, but two or more errors involving placement or shading.

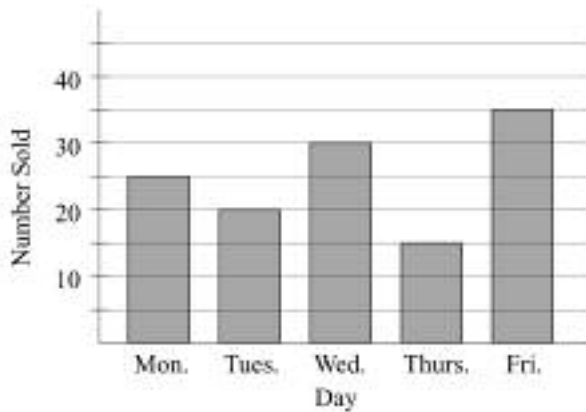
Incorrect Response

- Work is shown, but no bars are drawn. For example: only numbers are shown on the graph.
- Other incorrect.

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

Bar graph: cartons sold Monday

The graph shows the number of cartons of milk sold each day of a week at a school.



How many cartons of milk did the school sell on Monday?

Answer: _____

How many cartons of milk did the school sell that week?
Show your work.

Answer: _____

Overall Percent Correct

Korea	96	▲
Singapore	95	▲
Japan	94	▲
Netherlands	94	▲
Canada	93	▲
United States	90	▲
Australia	87	▲
Ireland	87	▲
Czech Republic	85	▲
Scotland	83	▲
Thailand	82	▲
Cyprus	79	○
Norway	79	○
Austria	78	○
Iceland	77	○
New Zealand	77	○
Israel	76	○
International average	75	
Hong Kong	74	○
Slovenia	73	○
Hungary	70	○
Latvia (LSS)	63	▼
Greece	62	▼
Portugal	57	▼
Kuwait	17	▼
Iran, Islamic Rep.	12	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: T1A

SCORING

Scoring for Part a

Correct Response

- 25

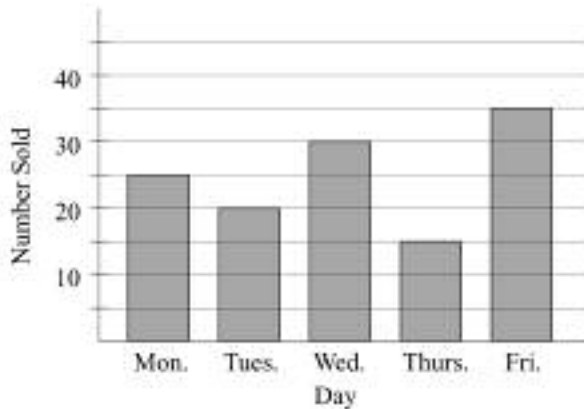
Incorrect Response

- 5
- Other incorrect.

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

Bar graph: cartons sold for week

The graph shows the number of cartons of milk sold each day of a week at a school.



How many cartons of milk did the school sell on Monday?

Answer: _____

How many cartons of milk did the school sell that week?
Show your work.

Answer: _____

Overall Percent Correct

Singapore	80	▲
Korea	73	▲
United States	57	▲
Netherlands	56	▲
Czech Republic	51	▲
Ireland	48	▲
Slovenia	48	▲
Canada	46	▲
Scotland	43	○
Israel	40	○
Austria	38	○
Hong Kong	38	○
International average	37	
Australia	34	○
Greece	33	○
Latvia (LSS)	33	○
Japan	32	○
New Zealand	30	○
Hungary	28	▼
Norway	28	▼
Portugal	26	▼
Thailand	23	▼
Iceland	20	▼
Cyprus	18	▼
Iran, Islamic Rep.	4	▼
Kuwait	3	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: T1B

SCORING

Scoring for Part b

Correct Response

- 125. Calculation is shown.
- 125. Verbal explanation of correct procedure.
- Other correct.

Partially Correct

- The addition task is shown, but a calculation error was made and answer is incorrect but is other than 115 or 135.
- 125. No work shown.
- Other partial.

Incorrect Response

- 115 OR 135. Note: If correct addition task is shown, score as partially correct.
- 25
- Other incorrect.

Content Domain	Cognitive Domain
Geometry	Using Complex Procedures

Map of city blocks

This map shows city blocks with a delivery truck at one corner.

The driver of the delivery truck starts at corner X. He goes 3 blocks east and 2 blocks north to get to the school. On what corner is the school located?

A. A
 B. B
 C. C
 D. D
 E. E

Overall Percent Correct

Japan	77	▲
Austria	70	▲
Czech Republic	68	▲
Korea	68	▲
Hong Kong	66	▲
England	64	▲
Latvia (LSS)	63	○
Netherlands	63	○
Slovenia	63	▲
United States	62	▲
Scotland	61	○
Norway	60	○
Australia	59	○
Canada	59	○
Hungary	59	○
Ireland	54	○
Israel	54	○
International average	54	
New Zealand	52	○
Iceland	48	○
Singapore	48	○
Cyprus	41	▼
Greece	36	▼
Portugal	34	▼
Kuwait	24	▼
Thailand	24	▼
Iran, Islamic Rep.	18	▼

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






Item Number: 11

Correct Response:	B
-------------------	----------

Content Domain	Cognitive Domain
Geometry	Knowing

Which figure made with straight sides

Which of these is made with straight sides only?

A.  B.  C.  D.  E. 

Overall Percent Correct

Japan	90	▲
Hong Kong	89	▲
Latvia (LSS)	88	▲
Netherlands	88	▲
Australia	86	▲
Slovenia	85	▲
Hungary	84	▲
Czech Republic	83	▲
Korea	83	▲
England	82	▲
Canada	81	▲
New Zealand	81	▲
Norway	81	▲
United States	75	○
Austria	74	○
Singapore	74	○
Scotland	73	○
International average	72	
Israel	72	○
Thailand	72	○
Ireland	71	○
Iceland	70	○
Cyprus	46	▼
Greece	41	▼
Portugal	41	▼
Kuwait	37	▼
Iran, Islamic Rep.	27	▼

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

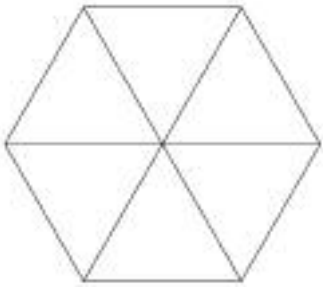
Item Number: 16

Correct Response:	D
-------------------	---

Content Domain	Cognitive Domain
Geometry	Knowing

Shapes in hexagon

Here is a hexagon.



The hexagon is divided into six

- A. triangles
- B. squares
- C. pentagons
- D. rectangles

Overall Percent Correct

Czech Republic	97	▲
Hong Kong	97	▲
Scotland	95	▲
Slovenia	95	▲
Australia	94	▲
Netherlands	94	▲
Canada	93	▲
New Zealand	93	○
Singapore	92	▲
England	91	○
Iceland	91	○
United States	91	○
Greece	90	○
Israel	90	○
Japan	90	○
Austria	89	○
Latvia (LSS)	89	○
International average	88	
Cyprus	88	○
Ireland	87	○
Portugal	84	○
Hungary	82	▼
Korea	81	▼
Norway	78	▼
Iran, Islamic Rep.	75	▼
Kuwait	75	▼
Thailand	71	▼

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

Item Number: J1

Correct Response:	A
-------------------	----------

Content Domain	Cognitive Domain
Geometry	Knowing

Which does not show symmetry

Which of these does NOT show a line of symmetry?

Item Number: J2

Overall Percent Correct

Singapore	93	▲
Scotland	90	▲
Hong Kong	89	▲
Korea	87	▲
England	84	▲
Australia	76	▲
Austria	74	▲
Czech Republic	74	▲
United States	74	▲
Canada	72	▲
Hungary	70	○
Israel	68	○
Iran, Islamic Rep.	66	○
Thailand	66	○
Cyprus	65	○
International average	64	
Slovenia	63	○
Ireland	62	○
Latvia (LSS)	62	○
New Zealand	58	○
Iceland	52	▼
Japan	52	▼
Greece	41	▼
Netherlands	40	▼
Portugal	37	▼
Norway	29	▼
Kuwait	21	▼

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

Correct Response:	C
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Content Domain	Cognitive Domain
Geometry	Knowing

Which number in square but not in triangle

Here is a figure.

Which number is in the square and the circle but is NOT in the triangle?

A. 2
B. 3
C. 4
D. 5

Overall Percent Correct

Czech Republic	87	▲
Hungary	83	▲
Canada	78	▲
Australia	76	▲
England	74	▲
United States	74	▲
Slovenia	72	○
Hong Kong	70	○
Netherlands	70	○
New Zealand	70	○
Ireland	69	○
Scotland	69	○
Austria	68	○
Israel	66	○
International average	65	
Singapore	64	○
Cyprus	60	○
Iceland	59	○
Iran, Islamic Rep.	59	○
Norway	59	○
Portugal	58	○
Japan	56	▼
Latvia (LSS)	56	○
Greece	54	○
Thailand	50	▼
Kuwait	49	▼
Korea	38	▼

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

Item Number: K1


Correct Response:	A
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Content Domain	Cognitive Domain
Geometry	Knowing


Rectangle divided into four parts

Which rectangle is NOT divided into 4 equal parts?


A.




B.



C.



D.



Item Number: K8

Overall Percent Correct

Korea	90	▲
Netherlands	89	▲
Japan	86	▲
Singapore	85	▲
Australia	84	▲
Austria	83	▲
Ireland	83	▲
United States	83	▲
Czech Republic	82	▲
Canada	78	○
Hong Kong	78	○
Hungary	78	○
Slovenia	78	○
Scotland	77	○
England	75	○
Iceland	75	○
Latvia (LSS)	75	○
International average 73		
Israel	72	○
Thailand	71	○
New Zealand	69	○
Cyprus	66	○
Norway	63	▼
Greece	52	▼
Portugal	49	▼
Iran, Islamic Rep.	38	▼
Kuwait	35	▼

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


Correct Response:	D
-------------------	---


Content Domain	Cognitive Domain
Geometry	Knowing


Objects on game board grid


This is a game board.

Which object is located at (2, D)?

A. The plane 

B. The truck 

C. The bus 

D. The boat 

Item Number: L3

Overall Percent Correct		
Netherlands	97	▲
United States	97	▲
Czech Republic	96	▲
Scotland	95	▲
Australia	94	▲
England	94	▲
Canada	93	○
Hong Kong	93	▲
Iceland	93	○
New Zealand	93	▲
Slovenia	93	○
Ireland	92	○
Singapore	92	▲
Korea	91	○
Austria	90	○
Hungary	88	○
Norway	88	○
International average 88		
Greece	86	○
Latvia (LSS)	85	○
Cyprus	83	○
Israel	80	○
Thailand	80	○
Iran, Islamic Rep.	70	▼
Portugal	69	▼
Kuwait	61	▼

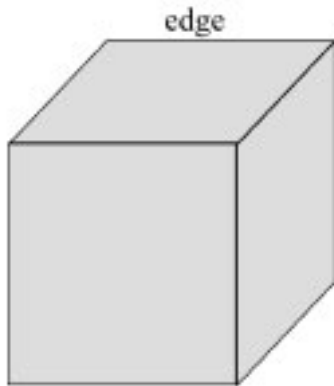
Country average vs. International average:	
Higher	▲
Not different	○
Lower	▼

Correct Response:	A
--------------------------	----------

Content Domain	Cognitive Domain
Geometry	Knowing

Edges of cube

This picture shows a cube with one edge marked. How many edges does the cube have altogether?



- A. 6
- B. 8
- C. 12
- D. 24

Overall Percent Correct

Hong Kong	72	▲
Portugal	62	▲
Slovenia	60	▲
Canada	59	▲
Japan	59	▲
Netherlands	55	▲
Australia	54	▲
Austria	50	○
Czech Republic	47	○
Scotland	44	○
Singapore	44	○
Ireland	43	○
Hungary	42	○
International average	40	
England	39	○
United States	35	○
Greece	33	○
Israel	32	○
Latvia (LSS)	32	○
New Zealand	32	○
Thailand	32	○
Korea	31	▼
Cyprus	25	▼
Iceland	25	▼
Iran, Islamic Rep.	17	▼
Kuwait	17	▼
Norway	8	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Item Number: L5

Correct Response:	C
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Content Domain	Cognitive Domain
Geometry	Solving Problems

Coordinates of dot on grid

On this grid, find the dot with the circle around it. We can describe where this dot is by saying it is at First Number 1, Second Number 3

Now find the dot with the triangle around it. Describe where the dot is on the grid in the same way. Fill in the numbers we would use:

First Number _____ Second Number _____

Overall Percent Correct

England	68	▲
Japan	61	▲
Australia	56	▲
Singapore	56	▲
United States	56	▲
Scotland	55	▲
Korea	52	▲
Canada	51	○
Netherlands	50	○
Israel	49	○
Iceland	47	○
Slovenia	46	○
Ireland	45	○
New Zealand	45	○
Hong Kong	43	○
Latvia (LSS)	42	○
International average	42	
Norway	41	○
Austria	37	○
Czech Republic	37	○
Greece	30	▼
Hungary	30	▼
Cyprus	22	▼
Thailand	19	▼
Portugal	17	▼
Iran, Islamic Rep.	14	▼
Kuwait	14	▼

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

Item Number: M4

SCORING

Correct Response

- 3 and 2, in this order.

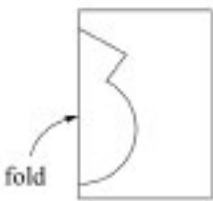
Incorrect Response

- 2 and 3, in this order.
- Other incorrect.

Content Domain	Cognitive Domain
Geometry	Knowing

Cut-out shape

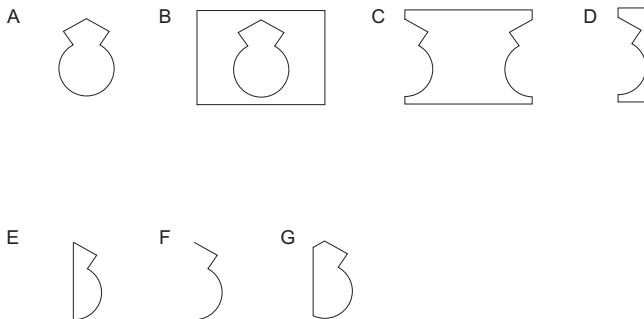
Craig folded a piece of paper in half and cut out a shape.



Draw a picture to show what the cut-out shape will look like when it is opened up and flattened out.

Item Number: T5

SCORING



Note: See the examples above. The accuracy in drawing is not important, nor is the size of the figure.

Correct Response

- The drawing of the cut-out shape corresponds to figure A.
- The drawing of the remaining piece of paper corresponds to figure B.
- Other correct.

Incorrect Response

- Drawing corresponds to figure C.
- Drawing corresponds to figure D.
- Drawings correspond to figures E or F or G.
- Other incorrect.

Overall Percent Correct

Japan	88	▲
Singapore	87	▲
Korea	84	▲
Hong Kong	81	▲
England	76	▲
Scotland	76	▲
Australia	72	▲
Netherlands	71	▲
Canada	68	▲
Slovenia	68	▲
Austria	66	▲
United States	66	▲
New Zealand	64	○
Czech Republic	63	○
Hungary	62	○
Latvia (LSS)	60	○
International average	59	
Iceland	57	○
Ireland	57	○
Israel	55	○
Thailand	46	▼
Norway	43	▼
Cyprus	35	▼
Greece	28	▼
Portugal	26	▼
Iran, Islamic Rep.	15	▼
Kuwait	7	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Solving Problems

Number sentence for pages

Tanya has read the first 78 pages in a book that is 130 pages long. Which number sentence could Tanya use to find the number of pages she must read to finish the book?

A. $130 + 78 = \square$

B. $\square - 78 = 130$

C. $130 \div 78 = \square$

D. $130 - 78 = \square$

Overall Percent Correct

Japan	88	▲
Korea	86	▲
Austria	83	▲
Czech Republic	78	▲
Hungary	78	▲
Hong Kong	75	▲
Netherlands	75	▲
Singapore	74	▲
Latvia (LSS)	72	▲
United States	71	▲
Slovenia	67	○
Canada	63	○
International average	62	
Israel	61	○
Ireland	60	○
Australia	59	○
Cyprus	57	○
Thailand	54	○
Greece	50	▼
Iceland	49	▼
Norway	49	▼
New Zealand	48	▼
Iran, Islamic Rep.	47	▼
Portugal	47	▼
Scotland	47	▼
England	43	▼
Kuwait	25	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: 17

Correct Response:	D
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Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Solving Problems

Operation to get B from A

What do you have to do to each number in Column A to get the number next to it in Column B?

Column A	Column B
10	2
15	3
25	5
50	10

- A. Add 8 to the number in Column A.
- B. Subtract 8 from the number in Column A.
- C. Multiply the number in Column A by 5.
- D. Divide the number in Column A by 5.

Overall Percent Correct

Korea	70	▲
Czech Republic	57	▲
Hungary	56	▲
Singapore	54	▲
Latvia (LSS)	53	▲
Japan	50	▲
Slovenia	47	○
Israel	45	○
Austria	41	○
Netherlands	41	○
International average	39	
Canada	38	○
Ireland	38	○
Australia	37	○
Thailand	37	○
England	35	○
Portugal	32	○
United States	32	○
Scotland	31	○
Norway	30	○
Cyprus	29	▼
Iran, Islamic Rep.	29	▼
New Zealand	27	▼
Greece	24	▼
Iceland	24	▼
Kuwait	20	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: J5

Correct Response: D

Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Knowing

Multiply by five

Which pair of numbers follows the rule “Multiply the first number by 5 to get the second number”?

A. $15 \rightarrow 3$

B. $6 \rightarrow 11$

C. $11 \rightarrow 6$

D. $3 \rightarrow 15$

Overall Percent Correct

Korea	80	▲
Japan	73	▲
Hong Kong	71	▲
Hungary	68	▲
Singapore	66	▲
United States	65	▲
Ireland	62	▲
Slovenia	61	○
Israel	59	○
Czech Republic	56	○
Australia	54	○
Latvia (LSS)	53	○
International average	53	
Canada	50	○
Iceland	50	○
Scotland	49	○
Cyprus	48	○
Austria	47	○
Norway	46	○
Thailand	44	○
England	42	▼
New Zealand	42	○
Greece	41	▼
Portugal	40	▼
Iran, Islamic Rep.	38	▼
Netherlands	36	▼
Kuwait	31	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: K3

Correct Response:	D
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Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Solving Problems

How many tiles in next figure

Here is the beginning of a pattern of tiles.




Figure 1

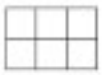


Figure 2

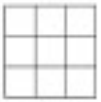


Figure 3

If the pattern continues, how many tiles will be in Figure 6?

A. 12

B. 15

C. 18

D. 21

Overall Percent Correct

Korea	87	▲
Japan	86	▲
Netherlands	83	▲
Hong Kong	76	▲
Singapore	75	▲
Czech Republic	72	▲
Latvia (LSS)	72	○
Slovenia	72	▲
Austria	68	○
Ireland	68	○
Australia	65	○
Hungary	65	○
International average	63	
Scotland	61	○
Canada	60	○
Thailand	59	○
United States	59	○
Cyprus	56	○
Israel	56	○
Portugal	56	○
England	54	▼
Iceland	52	○
Greece	50	○
New Zealand	49	▼
Norway	49	▼
Kuwait	41	▼
Iran, Islamic Rep.	39	▼

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

Item Number: K6

Correct Response:	C
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Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Knowing

Shapes in a pattern

These shapes are arranged in a pattern.

○△○○△△○○○△△△

Which set of shapes is arranged in the same pattern?

A. ★□★□★★□□★★□□

B. □★□□★□□□★□□□□

C. ★□★★ □□★★★□□□

D. □□★★□★□□★★□★

Overall Percent Correct

Korea	93	▲
Japan	91	▲
Austria	85	▲
Singapore	85	▲
Netherlands	84	▲
Hong Kong	82	▲
Latvia (LSS)	82	▲
Czech Republic	80	▲
Hungary	80	▲
United States	79	▲
Australia	78	○
Canada	78	○
England	75	○
Ireland	75	○
Slovenia	75	○
Scotland	73	○
International average	72	
New Zealand	71	○
Israel	69	○
Iceland	67	○
Norway	65	○
Portugal	58	▼
Thailand	55	▼
Iran, Islamic Rep.	54	▼
Cyprus	52	▼
Greece	51	▼
Kuwait	44	▼

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

Item Number: L4

Correct Response:	C
--------------------------	----------

Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Knowing

True statement of ages

Henry is older than Bill, and Bill is older than Peter. Which statement must be true?

A. Henry is older than Peter.

B. Henry is younger than Peter.

C. Henry is the same age as Peter.

D. We cannot tell who is oldest from the information.

Overall Percent Correct

Korea	86	▲
Hong Kong	74	▲
Japan	73	▲
United States	73	▲
Singapore	72	▲
Slovenia	72	○
Australia	70	▲
Canada	68	○
Israel	68	○
England	66	○
Ireland	66	○
Netherlands	66	○
Norway	66	○
Scotland	65	○
Hungary	64	○
New Zealand	64	○
International average	63	
Czech Republic	62	○
Iceland	61	○
Austria	57	○
Cyprus	56	○
Greece	54	○
Portugal	54	▼
Latvia (LSS)	50	▼
Thailand	47	▼
Kuwait	43	▼
Iran, Islamic Rep.	41	▼

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

Item Number: L9

Correct Response:	A
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Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Performing Routine Procedures

Make number sentence true

Here is a number sentence.

$$4 \times \square < 17$$

Which number could go in the \square to make the sentence true?

A. 4

B. 5

C. 12

D. 13

Overall Percent Correct

Korea	93	▲
Japan	89	▲
Singapore	87	▲
Slovenia	86	▲
Hong Kong	83	▲
Hungary	79	▲
Latvia (LSS)	79	○
Israel	77	○
Austria	74	○
Czech Republic	72	○
United States	71	○
Netherlands	70	○
International average	70	
Canada	69	○
Cyprus	67	○
Iceland	67	○
Greece	66	○
Australia	65	○
Ireland	65	○
Portugal	65	○
Norway	63	○
Iran, Islamic Rep.	62	○
Scotland	59	▼
New Zealand	57	▼
England	56	▼
Thailand	56	▼
Kuwait	43	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M9

Correct Response:	A
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Content Domain	Cognitive Domain
Patterns, Relations, and Functions	Knowing

Next number in pattern

These numbers are part of a pattern.

50 , 46 , 42 , 38 , 34 , ...

What do you have to do to get the next number?

Answer: _____

Overall Percent Correct

Hungary	79	▲
Singapore	79	▲
Netherlands	77	▲
Ireland	74	▲
Korea	74	▲
Australia	72	▲
Latvia (LSS)	70	▲
Slovenia	68	▲
Cyprus	67	▲
Czech Republic	65	▲
Hong Kong	65	▲
Austria	64	○
Scotland	63	○
United States	61	○
Japan	58	○
Canada	57	○
England	57	○
International average	57	
New Zealand	48	▼
Israel	46	▼
Norway	46	▼
Greece	42	▼
Portugal	30	▼
Iceland	27	▼
Iran, Islamic Rep.	22	▼
Kuwait	12	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: U4

SCORING

Correct Response

- "The number decreases by 4".
- 30 OR 30,26,22,. . .
- Other correct.

Incorrect Response

- Indicates an increase by 4.
- Focuses on the number 4. No indication of increase or decrease.
- Other incorrect, includes decreases by 4 that are wrong numbers in the pattern.

Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Equations and Formulas	Solving Routine Problems

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

Overall Percent Correct

Singapore	86	▲
Chinese Taipei	81	▲
Hong Kong, SAR	76	▲
Netherlands	72	▲
United States	72	▲
Japan	67	▲
Belgium (Flemish)	67	▲
Latvia	66	▲
Russian Federation	66	▲
England	66	▲
Cyprus	65	▲
Moldova, Republic of	64	▲
Lithuania	62	○
Hungary	61	○
Slovenia	60	○
Scotland	60	○
International average	58	
Australia	56	○
New Zealand	54	▼
Italy	50	▼
Armenia	46	▼
Philippines	38	▼
Norway	37	▼
Iran, Islamic Republic of	34	▼
Morocco	29	▼
Tunisia	20	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M012048

Correct Response:	B
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Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Equations and Formulas	Using Concepts

Rob sold some of his apples

Rob had 50 apples. He sold some and then had 20 left.
Which of these is a number sentence that shows this?

- (A) $\square - 20 = 50$
 (B) $20 - \square = 50$
 (C) $\square - 50 = 20$
 (D) $50 - \square = 20$

Overall Percent Correct

Chinese Taipei	89	▲
Japan	89	▲
Singapore	89	▲
Hong Kong, SAR	87	▲
Hungary	87	▲
Lithuania	87	▲
Russian Federation	87	▲
United States	84	▲
Cyprus	83	▲
Latvia	83	▲
Moldova, Republic of	81	▲
Belgium (Flemish)	81	▲
Slovenia	78	▲
England	78	▲
Netherlands	76	○
Australia	74	○
New Zealand	74	○
International average	73	
Scotland	72	○
Armenia	70	○
Italy	67	▼
Norway	59	▼
Iran, Islamic Republic of	54	▼
Philippines	52	▼
Morocco	33	▼
Tunisia	21	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031220

Correct Response:

D

Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Equations and Formulas	Using Concepts

The value of 37 times box plus 6

$37 \times \blacksquare = 703$.
What is the value of $37 \times \blacksquare + 6$?

Answer: _____

Overall Percent Correct

Hong Kong, SAR	48	▲
Russian Federation	35	▲
Belgium (Flemish)	29	▲
Netherlands	27	▲
Japan	26	▲
Chinese Taipei	24	▲
Lithuania	23	▲
Singapore	23	▲
Armenia	22	▲
Italy	21	○
Latvia	21	▲
Hungary	19	○
Cyprus	17	○
Moldova, Republic of	17	○
International average	17	
Australia	10	○
Scotland	10	▼
Slovenia	9	▼
England	9	▼
New Zealand	8	▼
Norway	8	▼
United States	7	▼
Tunisia	5	▼
Philippines	4	▼
Iran, Islamic Republic of	2	▼
Morocco	2	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031249

SCORING

Correct Response

- 709 or $703 + 6$

Incorrect Response

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

The value of 37 times box plus 6 (continued)

Item Number: M031249

Student Responses

Correct Response:

$$37 \times \blacksquare = 703.$$

What is the value of $37 \times \blacksquare + 6$?

Answer: 709

Incorrect Response:

$$37 \times \blacksquare = 703.$$

What is the value of $37 \times \blacksquare + 6$?

Answer: 7117

$$\begin{array}{r} 9 \\ 703 \\ \times 37 \\ \hline \end{array}$$

Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Patterns	Reasoning

Complete number pattern

Here is a number pattern.

100, 1, 99, 2, 98, , ,

What three numbers should go in the boxes?

Ⓐ 3, 97, 4
 Ⓑ 4, 97, 5
 Ⓒ 97, 3, 96
 Ⓓ 97, 4, 96

Overall Percent Correct

Singapore	94	▲
United States	91	▲
Australia	88	▲
England	88	▲
Chinese Taipei	85	▲
Hong Kong, SAR	83	▲
Japan	83	▲
Belgium (Flemish)	83	▲
New Zealand	82	▲
Lithuania	80	▲
Scotland	79	▲
Cyprus	77	▲
Latvia	73	○
Moldova, Republic of	73	○
Russian Federation	73	▲
Hungary	70	○
Netherlands	70	○
Slovenia	69	○
International average	69	
Italy	58	▼
Philippines	56	▼
Armenia	47	▼
Norway	46	▼
Morocco	28	▼
Iran, Islamic Republic of	27	▼
Tunisia	15	▼

Country average vs. International average:

Higher ▲
 Not different ○
 Lower ▼

Item Number: M011027

Correct Response:	A
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Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Patterns	Solving Routine Problems

The number to go in the center of the table

4	11	6
9		5
8	3	10

The rule for the table is that numbers in each row and column must add up to the same number. What number goes in the center of the table?

- (A) 1
- (B) 2
- (C) 7
- (D) 12

Overall Percent Correct

Hungary	77	▲
Chinese Taipei	75	▲
Japan	72	▲
Singapore	72	▲
Lithuania	70	▲
Hong Kong, SAR	69	▲
Cyprus	68	▲
Latvia	67	▲
Belgium (Flemish)	67	▲
Moldova, Republic of	66	▲
Russian Federation	66	○
England	65	○
Scotland	63	○
New Zealand	61	○
International average	61	
Netherlands	60	○
Australia	59	○
Slovenia	59	○
Italy	58	○
United States	58	▼
Armenia	51	▼
Iran, Islamic Republic of	49	▼
Norway	48	▼
Philippines	43	▼
Tunisia	42	▼
Morocco	41	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031023

Correct Response:

C

Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Patterns	Solving Routine Problems

The daily start times for a movie

The daily start times for showing a movie are listed below:

Show	Start Time
1st	2:00 p.m.
2nd	3:30 p.m.
3rd	5:00 p.m.
4th	?

If this pattern continues, what is the start time for the 4th show?

- (A) 5:30 p.m.
- (B) 6:00 p.m.
- (C) 6:30 p.m.
- (D) 7:00 p.m.

Overall Percent Correct

Japan	90	▲
Singapore	88	▲
Hong Kong, SAR	86	▲
England	85	▲
Netherlands	83	▲
United States	83	▲
Belgium (Flemish)	81	▲
Australia	77	▲
Chinese Taipei	74	▲
New Zealand	74	▲
Scotland	74	▲
Lithuania	73	▲
Russian Federation	73	▲
Cyprus	72	▲
Hungary	69	○
Italy	68	○
Latvia	68	○
International average	67	
Moldova, Republic of	65	○
Slovenia	60	▼
Philippines	48	▼
Armenia	47	▼
Norway	45	▼
Iran, Islamic Republic of	33	▼
Morocco	31	▼
Tunisia	28	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031051

Correct Response:

C

Content Domain	Main Topic	Cognitive Domain
PATTERNS AND RELATIONSHIPS	Relationships	Knowing Facts and Procedures

Output of the number machine

A number machine takes a number and operates on it.
 When the Input Number is 5, the Output Number is 9, as shown below.

When the Input Number is 7, which of these is the Output Number?

(A) 11
 (B) 13
 (C) 14
 (D) 25

Item Number: M031190

Overall Percent Correct

Belgium (Flemish)	72	▲
Hungary	71	▲
Singapore	69	▲
Japan	65	▲
Netherlands	65	▲
England	64	▲
Cyprus	62	▲
Italy	61	▲
Latvia	61	▲
Lithuania	61	▲
Hong Kong, SAR	55	▲
Moldova, Republic of	55	○
Russian Federation	55	○
Chinese Taipei	54	▲
International average	50	
Scotland	49	○
United States	48	○
New Zealand	45	▼
Australia	44	▼
Armenia	41	▼
Slovenia	36	▼
Norway	34	▼
Iran, Islamic Republic of	27	▼
Philippines	24	▼
Morocco	22	▼
Tunisia	18	▼

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

Correct Response:	B
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Content Domain	Main Topic	Cognitive Domain
DATA	Data Interpretation	Reasoning

Heights of four girls on graph

The graph shows the heights of four girls.

The names are missing from the graph. Debbie is the tallest. Amy is the shortest. Dawn is taller than Sarah. How tall is Sarah?

(A) 75 cm
 (B) 100 cm
 (C) 125 cm
 (D) 150 cm

Item Number: M012126

Overall Percent Correct

Singapore	84	▲
Latvia	83	▲
Belgium (Flemish)	82	▲
Hong Kong, SAR	81	▲
Russian Federation	81	▲
Chinese Taipei	78	▲
United States	78	▲
Japan	76	▲
Lithuania	76	▲
Netherlands	76	▲
Slovenia	76	▲
Australia	74	▲
Italy	74	▲
England	74	▲
Hungary	73	▲
New Zealand	70	○
Cyprus	68	○
International average	67	
Moldova, Republic of	66	○
Norway	63	○
Scotland	63	▼
Armenia	55	▼
Morocco	39	▼
Iran, Islamic Republic of	36	▼
Tunisia	32	▼
Philippines	31	▼

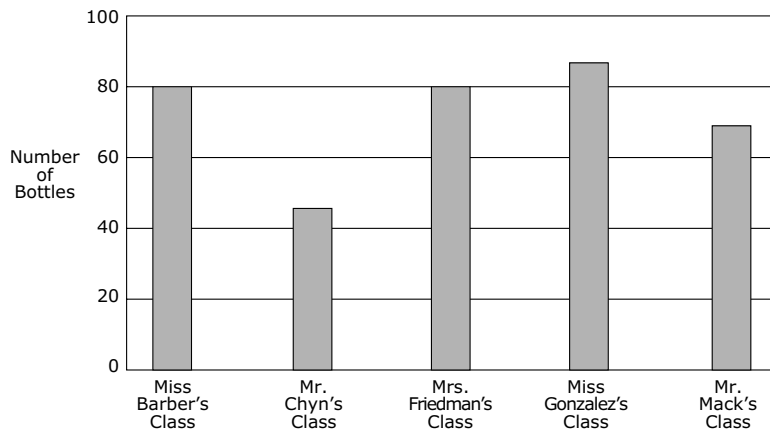
Country average vs. International average:	
Higher	▲
Not different	○
Lower	▼

Correct Response:	B
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Content Domain	Main Topic	Cognitive Domain
DATA	Data Representation	Solving Routine Problems

Bar graph: which shows 45 bottles

Central School had a bottle collection. Children in each class brought empty bottles to school. The principal made a bar graph of the number of bottles from five classes.



Which class collected 45 bottles?

- (A) Miss Barber's class
- (B) Mr. Chyn's class
- (C) Mrs. Friedman's class
- (D) Mr. Mack's class

Item Number: M011009

Overall Percent Correct

Hong Kong, SAR	98	▲
Singapore	98	▲
Chinese Taipei	97	▲
Japan	97	▲
United States	97	▲
England	96	▲
Australia	95	▲
Netherlands	95	▲
Belgium (Flemish)	95	▲
New Zealand	93	▲
Scotland	92	▲
Latvia	90	▲
Lithuania	90	▲
Cyprus	89	▲
Hungary	88	▲
Slovenia	87	▲
Russian Federation	84	○
Norway	83	○
International average	83	
Italy	82	○
Moldova, Republic of	76	▼
Philippines	65	▼
Armenia	53	▼
Morocco	50	▼
Iran, Islamic Republic of	48	▼
Tunisia	32	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

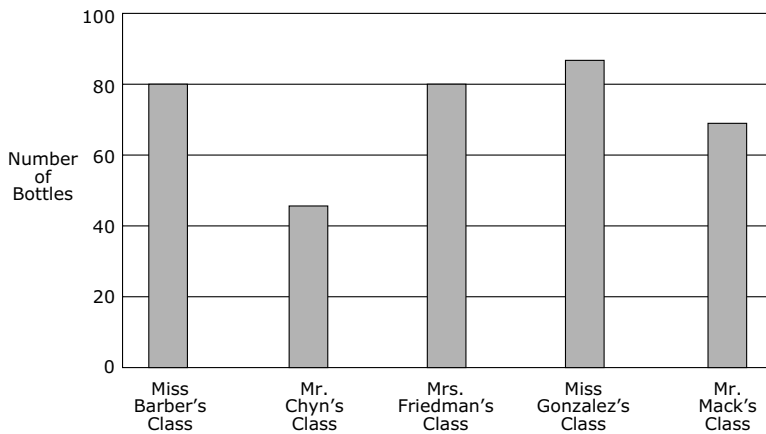
Correct Response:

B

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

Bar graph: which two show 80 bottles

Central School had a bottle collection. Children in each class brought empty bottles to school. The principal made a bar graph of the number of bottles from five classes.



Which two classes collected exactly 80 bottles?

- (A) Miss Barber's and Mrs. Friedman's classes
- (B) Miss Barber's and Mr. Mack's classes
- (C) Mrs. Friedman's and Miss Gonzalez's classes
- (D) Miss Gonzalez's and Mr. Mack's classes

Item Number: M011012

Overall Percent Correct

Hong Kong, SAR	98	▲
Singapore	97	▲
United States	96	▲
Netherlands	92	▲
Belgium (Flemish)	91	▲
Australia	89	▲
Chinese Taipei	88	▲
Slovenia	88	▲
Cyprus	85	▲
Japan	85	▲
Italy	84	▲
New Zealand	84	▲
England	84	▲
Scotland	81	○
Latvia	80	○
Russian Federation	80	○
Hungary	78	○
International average	78	
Norway	76	○
Lithuania	75	○
Moldova, Republic of	75	○
Philippines	64	▼
Armenia	50	▼
Iran, Islamic Republic of	48	▼
Morocco	48	▼
Tunisia	35	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Correct Response:

A

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

Highest temperature on chart

This chart shows temperature readings made at different times on four days.

TEMPERATURES					
	6 a.m.	9 a.m.	Noon	3 p.m.	8 p.m.
Monday	15°	17°	20°	21°	19°
Tuesday	15°	15°	15°	10°	9°
Wednesday	8°	10°	14°	13°	15°
Thursday	8°	11°	14°	17°	20°

When was the highest temperature recorded?

- (A) Noon on Monday
 (B) 3 p.m. on Monday
 (C) Noon on Tuesday
 (D) 3 p.m. on Wednesday

Overall Percent Correct

Japan	95	▲
Chinese Taipei	90	▲
Hong Kong, SAR	89	▲
Netherlands	89	▲
Hungary	86	▲
Singapore	85	▲
United States	85	▲
England	85	▲
Belgium (Flemish)	85	▲
Italy	82	▲
Lithuania	81	▲
Scotland	81	▲
Australia	80	▲
Russian Federation	80	▲
Latvia	79	▲
New Zealand	78	▲
Slovenia	76	○
International average	74	
Norway	73	○
Cyprus	70	○
Moldova, Republic of	65	▼
Armenia	53	▼
Philippines	50	▼
Iran, Islamic Republic of	42	▼
Morocco	34	▼
Tunisia	31	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M012078

Correct Response:

B

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

Colors of students' hair on the graph

In a class of 30 students, 10 have black hair, 15 have blonde hair, and the rest have brown hair. Complete the graph below to show the number of students with brown hair.

Hair Color	Number of Students
Black	10
Blonde	15
Brown	5

Overall Percent Correct		
Netherlands	93	▲
Belgium (Flemish)	93	▲
Chinese Taipei	92	▲
Hong Kong, SAR	92	▲
Japan	90	▲
Singapore	90	▲
Latvia	88	▲
Lithuania	87	▲
England	86	▲
Hungary	84	▲
Scotland	83	▲
Russian Federation	82	▲
United States	82	▲
Cyprus	80	▲
New Zealand	80	▲
Slovenia	79	▲
Australia	76	○
Norway	75	○
International average	73	
Italy	71	○
Moldova, Republic of	67	▼
Armenia	50	▼
Philippines	29	▼
Iran, Islamic Republic of	28	▼
Morocco	24	▼
Tunisia	21	▼

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

Item Number: M031264

SCORING

Correct Response

- Bar for brown hair drawn to the horizontal line at 5

Incorrect Response

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

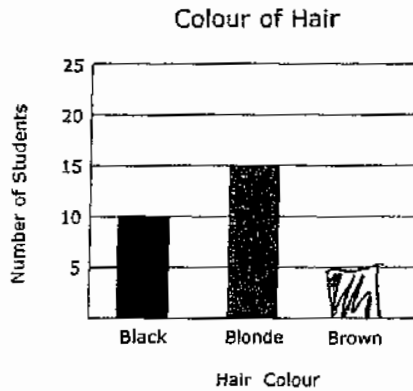
Colors of students' hair on the graph (continued)

Item Number: M031264

Student Responses

Correct Response:

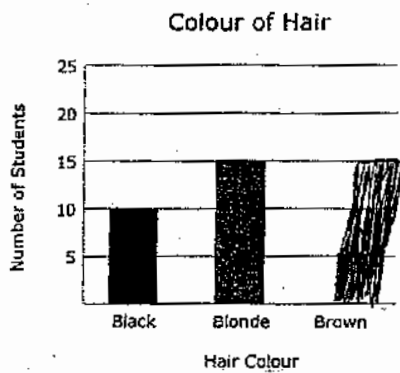
In a class of 30 students, 10 have black hair, 15 have blonde hair, and the rest have brown hair. Complete the bar graph below to show the number of students with brown hair.



Incorrect Response:

In a class of 30 students, 10 have black hair, 15 have blonde hair, and the rest have brown hair.

Complete the graph below to show the number of students with brown hair.



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

How many more pencils than rulers sold

A store owner decided to check how many pens, pencils, erasers, and rulers were sold on the day school opened. He made the tally chart below.

Pens	Pencils	Erasers	Rulers

How many more pencils than rulers were sold?

Answer: _____

Item Number: M031265

SCORING

Correct Response

- 2 more pencils than rulers

Incorrect Response

- 1 more pencil than rulers
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Japan	89	▲
England	73	▲
Belgium (Flemish)	72	▲
Netherlands	70	▲
United States	70	▲
Singapore	69	▲
Australia	66	▲
Scotland	62	▲
New Zealand	60	▲
Norway	55	▲
Latvia	46	▲
Cyprus	44	○
International average	39	
Hong Kong, SAR	36	○
Chinese Taipei	35	○
Lithuania	22	▼
Armenia	18	▼
Philippines	16	▼
Italy	10	▼
Moldova, Republic of	7	▼
Russian Federation	6	▼
Slovenia	5	▼
Tunisia	4	▼
Morocco	3	▼
Iran, Islamic Republic of	2	▼
Hungary	0	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

How many more pencils than rulers sold (continued)

Item Number: M031265

Student Responses

Correct Response:

A store owner decided to check how many pens, pencils, erasers, and rulers were sold on the day school opened. He made the tally chart below.

Pens	Pencils	Erasers	Rulers

How many more pencils than rulers were sold?

Answer: TWO

Incorrect Response:

A store owner decided to check how many pens, pencils, erasers, and rulers were sold on the day school opened. He made the tally chart below.

Pens	Pencils	Erasers	Rulers

How many more pencils than rulers were sold?

Answer:
$$\begin{array}{r} \text{pencils} \\ \hline \text{rulers} \\ 26 \overline{) 29} \end{array}$$

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

High and low temperatures for a week

Temperature for Week

The graph above shows the daily high and low temperatures for a week.

On which day is the difference between the high and low temperatures the greatest?

(A) Monday
 (B) Thursday
 (C) Friday
 (D) Saturday

Item Number: M031333

Overall Percent Correct

Japan	73	▲
Hong Kong, SAR	69	▲
Belgium (Flemish)	68	▲
Chinese Taipei	57	▲
Lithuania	56	▲
Netherlands	56	▲
England	53	▲
Latvia	48	○
Singapore	47	▲
Russian Federation	44	○
International average	42	
Hungary	41	○
Cyprus	40	○
Moldova, Republic of	39	○
Scotland	39	○
New Zealand	38	○
Slovenia	38	○
United States	38	▼
Italy	37	○
Australia	34	▼
Norway	32	▼
Philippines	30	▼
Morocco	25	▼
Armenia	22	▼
Iran, Islamic Republic of	16	▼
Tunisia	13	▼

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

Correct Response: A

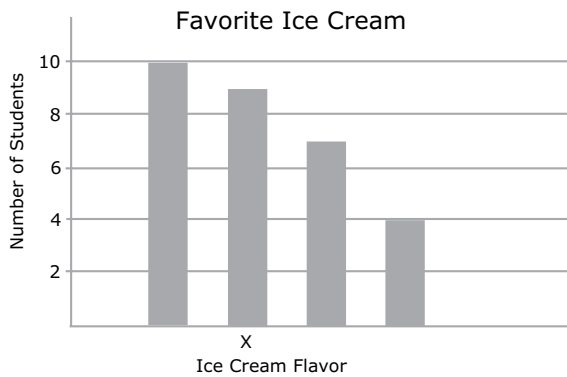
Content Domain	Main Topic	Cognitive Domain
DATA	Data Representation	Using Concepts

The favorite ice creams of 30 students

Favorite Ice Cream	Number of Students
Butterscotch	
Chocolate	### ##
Strawberry	###
Vanilla	###

A teacher asked 30 students in her class the flavor of their favorite ice cream. The table above shows how the teacher recorded the students' responses.

In the bar graph below, which ice cream flavor corresponds to the bar that is labeled X?



- (A) butterscotch
- (B) chocolate
- (C) strawberry
- (D) vanilla

Item Number: M031315

Overall Percent Correct

Japan	90	▲
Singapore	82	▲
England	75	▲
Netherlands	72	▲
United States	69	▲
Hong Kong, SAR	65	▲
Chinese Taipei	61	▲
Scotland	60	▲
New Zealand	59	▲
Belgium (Flemish)	58	▲
Australia	57	▲
Cyprus	53	▲
Latvia	50	○
International average	47	
Hungary	41	▼
Lithuania	37	▼
Norway	36	▼
Russian Federation	33	▼
Italy	30	▼
Moldova, Republic of	25	▼
Philippines	25	▼
Iran, Islamic Republic of	24	▼
Morocco	24	▼
Slovenia	22	▼
Armenia	19	▼
Tunisia	15	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Correct Response: C

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

Congruent figures

Figures that are the same size and shape are called congruent figures.

Which two figures are congruent?

(A) 1 and 2
 (B) 1 and 3
 (C) 1 and 4
 (D) 3 and 4

Overall Percent Correct

Latvia	96	▲
Lithuania	95	▲
Slovenia	94	▲
United States	94	▲
Japan	93	▲
Russian Federation	93	▲
Singapore	93	▲
Belgium (Flemish)	93	▲
Chinese Taipei	92	▲
Netherlands	92	▲
Hong Kong, SAR	90	▲
Italy	89	▲
England	89	▲
Scotland	88	○
Australia	87	○
Hungary	87	○
New Zealand	86	○
Norway	86	○
International average	85	
Cyprus	83	○
Moldova, Republic of	83	○
Iran, Islamic Republic of	69	▼
Armenia	68	▼
Morocco	67	▼
Philippines	60	▼
Tunisia	59	▼

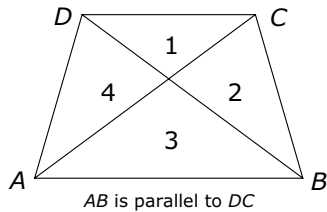
Country average vs. International average:	
Higher	▲
Not different	○
Lower	▼

Item Number: M011014

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Congruence and Similarity	Knowing Facts and Procedures

Shade in two triangles of different sizes



Two of the four triangles in the figure above are the same shape but different sizes. Shade in those two triangles.

Overall Percent Correct

Chinese Taipei	66	▲
Japan	63	▲
Singapore	62	▲
United States	57	▲
England	57	▲
Russian Federation	53	▲
Australia	52	▲
Hungary	51	▲
New Zealand	51	▲
Belgium (Flemish)	51	▲
Lithuania	50	▲
Scotland	50	▲
Cyprus	49	▲
Hong Kong, SAR	48	▲
Italy	46	○
Slovenia	45	○
International average	43	
Moldova, Republic of	39	○
Netherlands	39	○
Latvia	28	▼
Armenia	26	▼
Iran, Islamic Republic of	24	▼
Norway	23	▼
Philippines	17	▼
Morocco	13	▼
Tunisia	11	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Item Number: M031267

SCORING

Correct Response

- Triangles 1 and 3

Incorrect Response

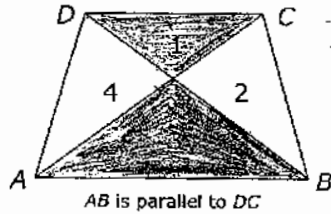
- Triangles 2 and 4
- Triangles 1 and 2; Triangles 3 and 4; Triangles 1 and 4; OR Triangles 2 and 3
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Shade in two triangles of different sizes (continued)

Item Number: M031267

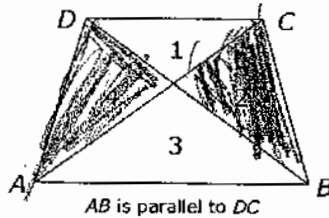
Student Responses

Correct Response:



Two of the four triangles in the figure above are the same shape but different sizes. Shade in those two triangles.

Incorrect Response:

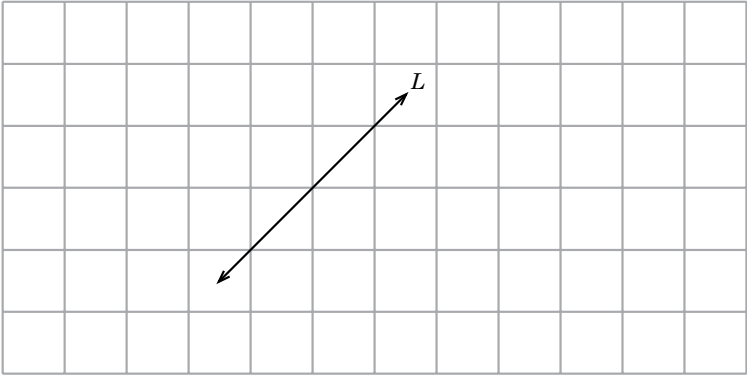


Two of the four triangles in the figure above are the same shape but different sizes. Shade in those two triangles.

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

Draw a line on the grid parallel to line L .

On the grid, draw a line parallel to line L .



Item Number: M031327

SCORING

Correct Response

- Line (or lines) parallel to L

Incorrect Response

- Line perpendicular to L shown
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	94	▲
Belgium (Flemish)	91	▲
Moldova, Republic of	74	▲
United States	72	▲
Italy	69	▲
Hong Kong, SAR	63	▲
Chinese Taipei	58	▲
Hungary	58	▲
England	56	○
Armenia	51	○
Iran, Islamic Republic of	50	○
International average	50	
Russian Federation	48	○
Australia	47	○
Japan	46	▼
Cyprus	43	▼
New Zealand	42	▼
Lithuania	40	▼
Morocco	36	▼
Norway	36	▼
Latvia	34	▼
Slovenia	34	▼
Philippines	33	▼
Netherlands	32	▼
Tunisia	29	▼
Scotland	22	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

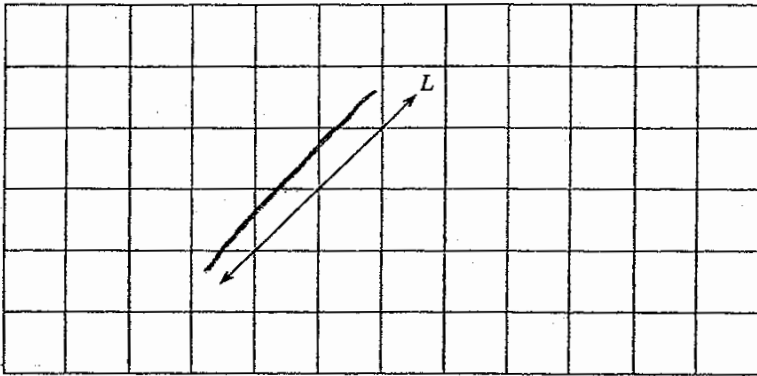
Draw a line on the grid parallel to line L (continued)

Item Number: M031327

Student Responses

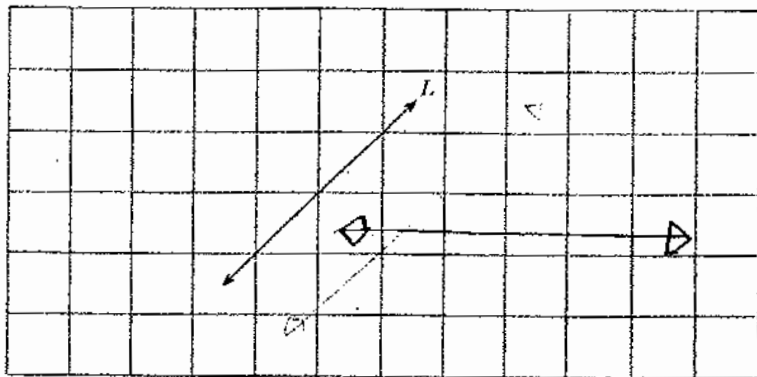
Correct Response:

On the grid, draw a line parallel to line L.



Incorrect Response:

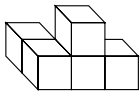
On the grid, draw a line parallel to line L.



Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Locations and Spatial Relationships	Reasoning

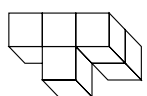
Rotated 3-dimensional figure

This figure will be turned to a different position.

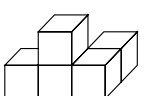


Which of these could be the figure after it is turned?

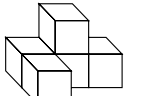
Ⓐ



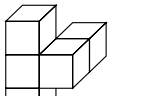
Ⓑ



Ⓒ



Ⓓ



Overall Percent Correct

Norway	60	▲
Latvia	59	▲
Chinese Taipei	57	▲
Singapore	54	▲
Belgium (Flemish)	52	▲
Slovenia	51	▲
Hungary	50	▲
Italy	49	▲
Japan	49	▲
Scotland	49	▲
England	46	○
New Zealand	45	○
Hong Kong, SAR	43	○
International average	43	
Australia	42	○
Russian Federation	41	○
Netherlands	40	○
Moldova, Republic of	39	○
United States	39	▼
Tunisia	35	▼
Armenia	34	▼
Lithuania	32	▼
Cyprus	31	▼
Iran, Islamic Republic of	26	▼
Philippines	23	▼
Morocco	20	▼

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

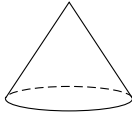
Item Number: M012069

Correct Response:	A
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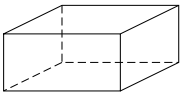
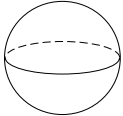
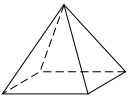
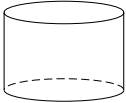
Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Knowing Facts and Procedures

Which has flat and curved surface

Here is a cone. Part of its surface is flat and part of its surface is curved.



Which of these solids also has both a flat surface and a curved surface?

(A)  (B)  (C)  (D) 

Overall Percent Correct

England	83	▲
Australia	81	▲
Scotland	81	▲
United States	74	▲
New Zealand	73	▲
Singapore	72	▲
Italy	71	▲
Slovenia	68	▲
Belgium (Flemish)	66	▲
Hungary	64	▲
Chinese Taipei	62	▲
Hong Kong, SAR	56	○
International average	55	
Netherlands	53	○
Moldova, Republic of	52	○
Armenia	49	▼
Japan	48	▼
Lithuania	46	▼
Cyprus	45	▼
Latvia	42	▼
Russian Federation	39	▼
Norway	35	▼
Iran, Islamic Republic of	31	▼
Tunisia	31	▼
Morocco	30	▼
Philippines	26	▼

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

Item Number: M011006

Correct Response:	D
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Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Knowing Facts and Procedures

Statements about triangle

All of the pupils in a class cut out paper shapes. The teacher picked one out and said, "This shape is a triangle." Which of these statements **MUST** be correct?

- (A) The shape has three sides.
- (B) The shape has a right angle.
- (C) The shape has equal sides.
- (D) The shape has equal angles.

Overall Percent Correct

Australia	79	▲
Latvia	82	▲
Netherlands	82	▲
Singapore	82	▲
Chinese Taipei	81	▲
Hong Kong, SAR	81	▲
Russian Federation	81	▲
Italy	79	▲
New Zealand	79	▲
United States	79	▲
England	79	▲
Moldova, Republic of	74	○
Belgium (Flemish)	74	▲
Lithuania	73	○
Scotland	72	○
Cyprus	71	○
International average	71	
Norway	70	○
Armenia	68	○
Japan	68	○
Slovenia	66	○
Iran, Islamic Republic of	61	▼
Hungary	58	▼
Philippines	48	▼
Morocco	47	▼
Tunisia	33	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M011022

Correct Response:


A

Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Knowing Facts and Procedures

Indicates geometric shapes in the picture

In the picture there are a number of geometric shapes, like circles, squares, rectangles, and triangles. For example, the sun looks like a circle.

Draw lines to three other different objects in the picture and write what shapes they look like.



Overall Percent Correct

Belgium (Flemish)	81	▲
Chinese Taipei	80	▲
New Zealand	74	▲
England	72	▲
Australia	71	▲
Hong Kong, SAR	70	▲
United States	70	▲
Italy	68	▲
Japan	68	▲
Moldova, Republic of	68	▲
Cyprus	67	▲
Latvia	67	▲
Netherlands	67	▲
Singapore	66	▲
Scotland	64	▲
Russian Federation	62	○
Hungary	60	○
Slovenia	60	○
International average	59	
Lithuania	57	○
Norway	45	▼
Armenia	35	▼
Iran, Islamic Republic of	30	▼
Philippines	26	▼
Tunisia	23	▼
Morocco	11	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031269

SCORING

Fully Correct Response

- Any three of square, rectangle, triangle, trapezoid, diamond/rhombus, kite correctly identified
- Any two of the above plus circle

Partially Correct Response

- Any two of the above correctly identified
- Any one of the above plus circle

Incorrect Response

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

Indicates geometric shapes in the picture (continued)

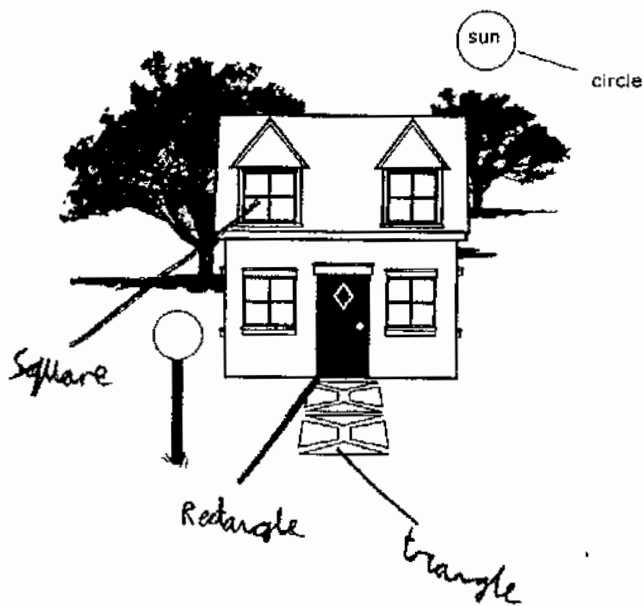
Item Number: M031269

Student Responses

Fully Correct Response:

In the picture there are a number of geometric shapes, such as circles, squares, rectangles, and triangles. For example, the sun looks like a circle.

Draw lines to three other different objects in the picture and write the name of the shape they look like.



Indicates geometric shapes in the picture (continued)

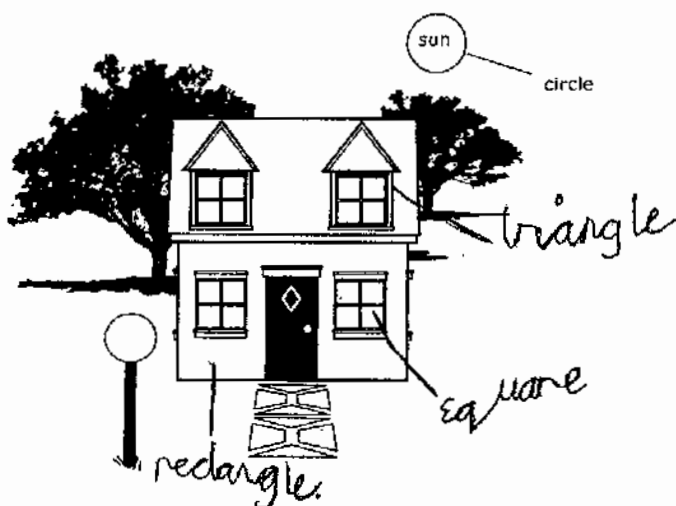
Item Number: M031269

Student Responses (continued)

Partially Correct Response:

In the picture there are a number of geometric shapes, such as circles, squares, rectangles, and triangles. For example, the sun looks like a circle.

Draw lines to three other different objects in the picture and write the name of the shape they look like.



Indicates geometric shapes in the picture (continued)

Item Number: M031269

Student Responses (continued)

Incorrect Response:

In the picture there are a number of geometric shapes, such as circles, squares, rectangles, and triangles. For example, the sun looks like a circle.

Draw lines to three other different objects in the picture and write the name of the shape they look like.



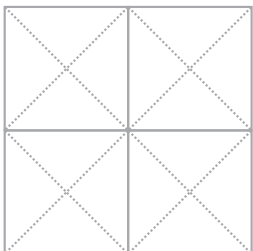
Content Domain	Main Topic	Cognitive Domain
A. GEOMETRY B. GEOMETRY C. NUMBER	Two- and Three-Dimensional Shapes Two- and Three-Dimensional Shapes Fractions and Decimals	Knowing Facts and Procedures Knowing Facts and Procedures Knowing Facts and Procedures

Geometry tiles: black triangle

- A. Use 2 of the triangle tiles to make one large black triangle. Then show what you did with your tiles by shading in your triangle below.

Shade in Your Triangle Here

- B. Use all 4 triangle tiles to make a black square. Then show what you did with your tiles by shading in your square below.

Shade in Your Square Here

- C. What fraction of the figure is shaded in part B above?

Answer: _____

Item Number: M031347A

SCORING**Correct Response****Incorrect Response**

- Used two triangle tiles but created two small black triangles
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Japan	78	▲
Latvia	64	▲
Lithuania	61	▲
Russian Federation	61	▲
Hong Kong, SAR	60	▲
Italy	59	▲
Chinese Taipei	57	▲
Netherlands	55	▲
Cyprus	54	▲
New Zealand	52	▲
England	52	▲
Belgium (Flemish)	52	▲
Australia	51	▲
Norway	50	○
Scotland	48	○
Slovenia	47	○
International average	45	
Singapore	44	○
United States	42	○
Hungary	41	○
Moldova, Republic of	38	▼
Armenia	15	▼
Tunisia	11	▼
Philippines	10	▼
Iran, Islamic Republic of	9	▼
Morocco	6	▼

**Country average vs.
International average:**

Higher	▲
Not different	○
Lower	▼

Geometry tiles: black triangle (continued)

Item Number: M031347A

Student Responses

Correct Response:

- A. Use 2 of the triangle tiles to make one large black triangle. Then show what you did with your tiles by shading in your triangle below.

Shade in Your Triangle Here



Incorrect Response:

- A. Use 2 of the triangle tiles to make one large black triangle. Then show what you did with your tiles by shading in your triangle below.

Shade in Your Triangle Here




Content Domain	Main Topic	Cognitive Domain
A. GEOMETRY B. GEOMETRY C. NUMBER	Two- and Three-Dimensional Shapes Two- and Three-Dimensional Shapes Fractions and Decimals	Knowing Facts and Procedures Knowing Facts and Procedures Knowing Facts and Procedures

Geometry tiles: black square

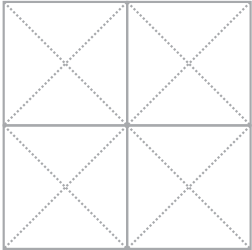
A. Use 2 of the triangle tiles to make one large black triangle. Then show what you did with your tiles by shading in your triangle below.

Shade in Your Triangle Here



B. Use all 4 triangle tiles to make a black square. Then show what you did with your tiles by shading in your square below.

Shade in Your Square Here



C. What fraction of the figure is shaded in part B above?

Answer: _____

Item Number: M031347B

SCORING**Correct Response****Incorrect Response**

- Used four triangle tiles but did not create a black square
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Japan	71	▲
Netherlands	60	▲
Lithuania	57	▲
Russian Federation	57	▲
Belgium (Flemish)	55	▲
Chinese Taipei	54	▲
England	54	▲
Australia	52	▲
New Zealand	52	▲
Italy	51	▲
Scotland	48	▲
Cyprus	47	▲
Norway	47	○
Hong Kong, SAR	46	▲
Hungary	45	○
Singapore	45	○
Slovenia	44	○
United States	42	○
International average	42	
Moldova, Republic of	37	○
Latvia	33	▼
Tunisia	15	▼
Iran, Islamic Republic of	13	▼
Armenia	10	▼
Philippines	7	▼
Morocco	5	▼

**Country average vs.
International average:**

Higher	▲
Not different	○
Lower	▼

Geometry tiles: black square (continued)

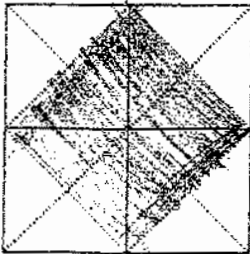
Item Number: M031347B

Student Responses

Correct Response:

- B. Use all 4 triangle tiles to make a black square. Then show what you did with your tiles by shading in your square below.

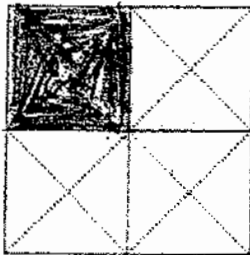
Shade in Your Square Here



Incorrect Response:

- B. Use all 4 triangle tiles to make a black square. Then show what you did with your tiles by shading in your square below.

Shade in Your Square Here




Content Domain	Main Topic	Cognitive Domain
A. GEOMETRY B. GEOMETRY C. NUMBER	Two- and Three-Dimensional Shapes Two- and Three-Dimensional Shapes Fractions and Decimals	Knowing Facts and Procedures Knowing Facts and Procedures Knowing Facts and Procedures

Geometry tiles: fraction shaded

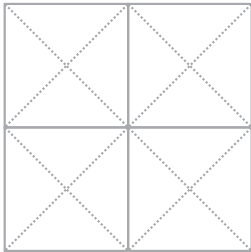
A. Use 2 of the triangle tiles to make one large black triangle. Then show what you did with your tiles by shading in your triangle below.

Shade in Your Triangle Here



B. Use all 4 triangle tiles to make a black square. Then show what you did with your tiles by shading in your square below.

Shade in Your Square Here



C. What fraction of the figure is shaded in part B above?

Answer: _____

Item Number: M031347C

SCORING**Correct Response**

- $\frac{1}{2}$ or equivalent
- Correct fraction based on incorrect figure in part

Incorrect Response

- $\frac{1}{4}$
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Overall Percent Correct

Singapore	73	▲
Hong Kong, SAR	70	▲
Chinese Taipei	61	▲
Japan	56	▲
England	49	▲
United States	48	▲
Cyprus	45	▲
Belgium (Flemish)	45	▲
Hungary	38	▲
Netherlands	38	▲
New Zealand	36	○
Australia	34	○

International average 33

Latvia	28	▼
Scotland	28	▼
Italy	26	▼
Lithuania	24	▼
Norway	23	▼
Russian Federation	21	▼
Slovenia	18	▼
Iran, Islamic Republic of	17	▼
Moldova, Republic of	17	▼
Philippines	14	▼
Armenia	5	▼
Tunisia	3	▼
Morocco	1	▼

**Country average vs.
International average:**

Higher	▲
Not different	○
Lower	▼

Geometry tiles: fraction shaded (continued)

Item Number: M031347C

Student Responses

Correct Response:

C. What fraction of the figure is shaded in part B above?

Answer: $\frac{1}{4}$

Incorrect Response:


C. What fraction of the figure is shaded in part B above?

Answer: The middle of it because I could see 7
square

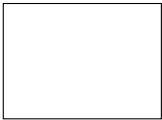
Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Solving Routine Problems

Draw line on rectangle/2 triangles


A. Draw 1 straight line on this rectangle to divide it into 2 triangles.



B. Draw 1 straight line on this rectangle to divide it into 2 rectangles.



C. Draw 2 straight lines on this rectangle to divide it into 1 rectangle and 2 triangles.



Item Number: M031272A

SCORING

Correct Response

- One diagonal drawn

Incorrect Response

- One horizontal or vertical line drawn
- Other incorrect (including crossed out/erased, stray marks, illegible or off task)

Overall Percent Correct

Hong Kong, SAR	95	▲
Chinese Taipei	93	▲
Japan	92	▲
Latvia	92	▲
Russian Federation	91	▲
Lithuania	90	▲
Moldova, Republic of	83	▲
Singapore	83	▲
Belgium (Flemish)	83	▲
Netherlands	82	▲
Cyprus	80	▲
New Zealand	80	▲
England	80	▲
Hungary	79	▲
Australia	79	○
Slovenia	79	○
Scotland	79	▲
International average	75	
Italy	74	○
United States	74	○
Norway	68	▼
Armenia	57	▼
Iran, Islamic Republic of	55	▼
Tunisia	50	▼
Morocco	40	▼
Philippines	21	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

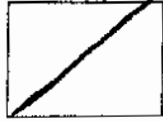
Draw line on rectangle/2 triangles (continued)

Item Number: M031272A

Student Responses

Correct Response:

A. Draw 1 straight line on this rectangle to make 2 triangles.



Incorrect Response:


A. Draw 1 straight line on this rectangle to make 2 triangles.



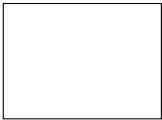
Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Solving Routine Problems

Draw line on rectangle/2 rectangles


A. Draw 1 straight line on this rectangle to divide it into 2 triangles.



B. Draw 1 straight line on this rectangle to divide it into 2 rectangles.



C. Draw 2 straight lines on this rectangle to divide it into 1 rectangle and 2 triangles.



Overall Percent Correct

Hong Kong, SAR	99	▲
Chinese Taipei	95	▲
Singapore	94	▲
Latvia	93	▲
Lithuania	92	▲
Russian Federation	92	▲
Australia	91	▲
Japan	91	▲
Belgium (Flemish)	91	▲
Hungary	89	▲
New Zealand	89	▲
Slovenia	89	▲
England	89	▲
Scotland	89	▲
United States	88	▲
Cyprus	86	▲
Italy	86	▲
Netherlands	85	○
Moldova, Republic of	84	○
International average	83	
Iran, Islamic Republic of	76	▼
Norway	74	▼
Armenia	58	▼
Tunisia	58	▼
Morocco	52	▼
Philippines	34	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031272B

SCORING

Correct Response

- One horizontal or vertical line drawn

Incorrect Response

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

Draw line on rectangle/2 rectangles (continued)

Item Number: M031272B

Student Responses

Correct Response:

B. Draw 1 straight line on this rectangle to make 2 rectangles.



Incorrect Response:


B. Draw 1 straight line on this rectangle to make 2 rectangles.



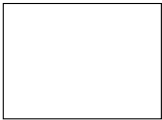
Content Domain	Main Topic	Cognitive Domain
GEOMETRY	Two- and Three-Dimensional Shapes	Solving Routine Problems

Draw line on rectangle/1 rectangle, 2 triangles


A. Draw 1 straight line on this rectangle to divide it into 2 triangles.



B. Draw 1 straight line on this rectangle to divide it into 2 rectangles.



C. Draw 2 straight lines on this rectangle to divide it into 1 rectangle and 2 triangles.



Overall Percent Correct

Hong Kong, SAR	85	▲
Chinese Taipei	84	▲
Japan	75	▲
Singapore	71	▲
Russian Federation	68	▲
Latvia	66	▲
Cyprus	59	▲
Lithuania	59	▲
Hungary	52	▲
Belgium (Flemish)	52	▲
Netherlands	50	○
Australia	47	○
International average	47	
Moldova, Republic of	45	○
England	45	○
New Zealand	44	○
Slovenia	44	○
Scotland	41	▼
Armenia	35	▼
United States	34	▼
Italy	33	▼
Norway	27	▼
Tunisia	20	▼
Morocco	16	▼
Iran, Islamic Republic of	15	▼
Philippines	11	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031272C

SCORING

Correct Response

- Two lines correctly drawn to show a smaller rectangle and two triangles

Incorrect Response

- Attempt made with two lines drawn but drawing does not show a line dividing the rectangle into 2 rectangles with a diagonal accurately drawn in one of them
- Other incorrect (including crossed out/erased, stray marks, illegible or off task)

Draw line on rectangle/1rectangle, 2 triangles (continued)

Item Number: M031272C

Student Responses

Correct Response:

C. Draw 2 straight lines on this rectangle to make 1 rectangle and 2 triangles.



Incorrect Response:

C. Draw 2 straight lines on this rectangle to make 1 rectangle and 2 triangles.



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

Weight of an adult

Which of these could be the weight (mass) of an adult?

Ⓐ 1 kg

Ⓑ 6 kg

Ⓒ 60 kg

Ⓓ 600 kg

Item Number: M011023

Overall Percent Correct

Chinese Taipei	91	▲
Singapore	90	▲
Japan	89	▲
Latvia	89	▲
Lithuania	88	▲
Netherlands	87	▲
Russian Federation	87	▲
Hungary	86	▲
Italy	82	▲
Hong Kong, SAR	81	▲
Moldova, Republic of	81	▲
Belgium (Flemish)	80	▲
Australia	79	▲
New Zealand	78	▲
Norway	78	▲
Armenia	76	▲
Cyprus	76	▲
International average	72	
Slovenia	61	▼
United States	54	▼
England	54	▼
Scotland	50	▼
Iran, Islamic Republic of	45	▼
Morocco	44	▼
Philippines	36	▼
Tunisia	32	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

C

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

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

Overall Percent Correct

Japan	91	▲
Netherlands	88	▲
Cyprus	83	▲
Lithuania	82	▲
Singapore	82	▲
Latvia	81	▲
England	80	▲
Belgium (Flemish)	80	▲
Hong Kong, SAR	78	▲
Italy	77	▲
Hungary	76	▲
Russian Federation	75	▲
Moldova, Republic of	74	▲
International average	69	
Chinese Taipei	68	○
Australia	67	○
New Zealand	67	○
Armenia	65	○
Norway	59	▼
Slovenia	59	▼
Scotland	55	▼
United States	54	▼
Iran, Islamic Republic of	50	▼
Morocco	47	▼
Tunisia	43	▼
Philippines	40	▼

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

Item Number: M012023

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Knowing Facts and Procedures

Which could equal 150 milliliters

Which of these could equal 150 milliliters?

Ⓐ The amount of water in a cup

Ⓑ The length of a kitten

Ⓒ The weight of an egg

Ⓓ The area of a coin

Overall Percent Correct

Chinese Taipei	87	▲
Hong Kong, SAR	86	▲
Lithuania	82	▲
Singapore	81	▲
Japan	75	▲
Hungary	74	▲
Russian Federation	72	▲
England	72	▲
Cyprus	71	▲
Latvia	69	▲
Belgium (Flemish)	69	▲
Italy	68	▲
Moldova, Republic of	68	▲
Slovenia	63	○
International average	61	
Australia	60	○
Scotland	60	○
Netherlands	59	○
New Zealand	55	▼
United States	48	▼
Armenia	41	▼
Norway	39	▼
Philippines	36	▼
Morocco	32	▼
Tunisia	28	▼
Iran, Islamic Republic of	25	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

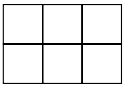
Item Number: M031338


Correct Response:	A
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Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Reasoning

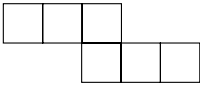
Which has largest area

Which of these figures has the largest area?

(A) 

(B) 

(C) 

(D) 

Overall Percent Correct

Australia	85	▲
Chinese Taipei	96	▲
Japan	94	▲
Hong Kong, SAR	91	▲
Singapore	88	▲
Latvia	86	▲
Scotland	86	▲
Belgium (Flemish)	84	▲
Netherlands	83	▲
Russian Federation	82	○
Moldova, Republic of	81	○
United States	81	▲
Hungary	80	○
Lithuania	80	○
Armenia	79	○
Cyprus	79	○
Italy	79	○
New Zealand	79	○
England	78	○
International average	78	
Slovenia	77	○
Iran, Islamic Republic of	72	▼
Morocco	65	▼
Norway	65	▼
Tunisia	46	▼
Philippines	43	▼

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

Item Number: M011005

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Attributes and Units	Solving Routine Problems

The length of the films

Simon wants to watch a film that is between $1\frac{1}{2}$ and 2 hours long.

Which of the following films should he choose?

- (A) a 59-minute film
- (B) a 102-minute film
- (C) a 121-minute film
- (D) a 150-minute film

Overall Percent Correct

Singapore	46	▲
England	42	▲
Hungary	41	▲
Netherlands	38	▲
Australia	37	▲
Hong Kong, SAR	37	▲
Russian Federation	37	▲
United States	34	▲
Belgium (Flemish)	33	○
Chinese Taipei	32	○
Lithuania	30	○
Slovenia	30	○
International average	30	
New Zealand	29	○
Norway	29	○
Scotland	28	○
Latvia	27	○
Italy	26	▼
Moldova, Republic of	26	○
Cyprus	25	▼
Japan	25	▼
Armenia	22	▼
Iran, Islamic Republic of	22	▼
Philippines	22	▼
Tunisia	17	▼
Morocco	16	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031008

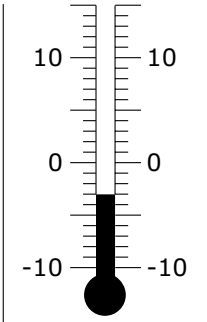
Correct Response:

B

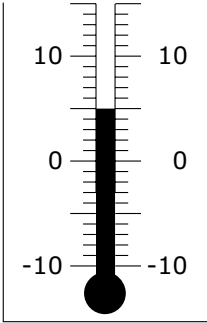
Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, techniques, and formulas	Knowing Facts and Procedures

How much did temperature rise

When Tracy left for school, the temperature was minus 3 degrees.



At recess, the temperature was 5 degrees.



How many degrees did the temperature rise?

Item Number: M011013

Overall Percent Correct

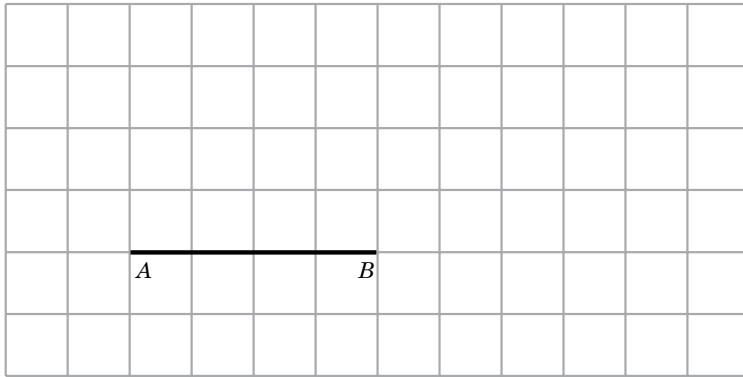
Netherlands	78	▲
England	76	▲
Belgium (Flemish)	76	▲
Hungary	74	▲
Japan	71	▲
Latvia	70	▲
Italy	66	▲
Norway	65	▲
Lithuania	63	▲
Russian Federation	63	▲
Chinese Taipei	60	○
Scotland	59	○
Hong Kong, SAR	58	○
International average	57	
Cyprus	55	○
Moldova, Republic of	55	○
Slovenia	54	○
Singapore	53	▼
United States	52	▼
Armenia	51	▼
New Zealand	49	▼
Australia	46	▼
Iran, Islamic Republic of	46	▼
Philippines	44	▼
Morocco	29	▼
Tunisia	27	▼

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

Correct Response: D

Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, techniques, and formulas	Knowing Facts and Procedures

Draw a triangle with AB as the base



Draw a triangle in the grid so that the line AB is the base of the triangle and the two new sides are the same length as each other.

Overall Percent Correct

Hong Kong, SAR	95	▲
Latvia	84	▲
Japan	80	▲
New Zealand	80	▲
Australia	77	▲
Italy	77	▲
Russian Federation	77	▲
Singapore	77	▲
Belgium (Flemish)	77	▲
Lithuania	74	▲
England	73	▲
Hungary	72	▲
Scotland	71	○
Chinese Taipei	70	○
Moldova, Republic of	67	○
International average	67	
Slovenia	64	○
United States	63	▼
Norway	58	▼
Cyprus	57	▼
Armenia	56	▼
Iran, Islamic Republic of	48	▼
Philippines	45	▼
Morocco	42	▼
Tunisia	28	▼
Netherlands	0	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Item Number: M031322

SCORING

Correct Response

- Triangle with two new sides equal (i.e. meeting on or within 2mm of the gridline that is the perpendicular bisector of AB)

Incorrect Response

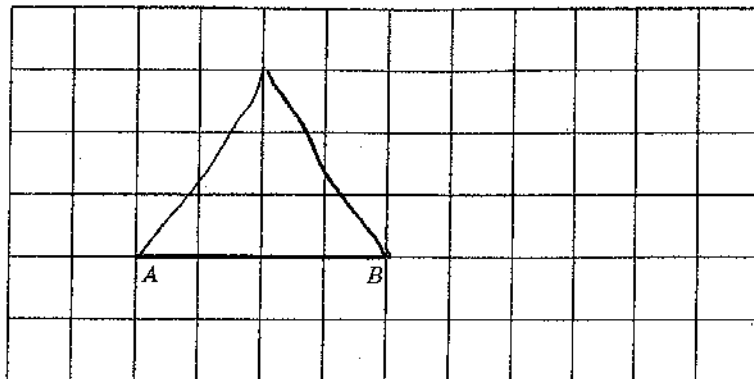
- Triangle with two new sides unequal
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Draw a triangle with AB as the base (continued)

Item Number: M031322

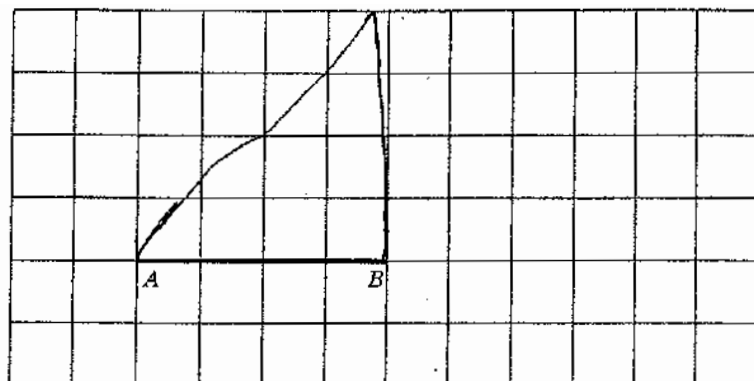
Student Responses

Correct Response:



Draw a triangle in the grid so that the line AB is the base of the triangle and the two new sides are the same length as each other.

Incorrect Response:



Draw a triangle in the grid so that the line AB is the base of the triangle and the two new sides are the same length as each other.

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

Distance on map

One centimeter on the map represents 8 kilometers on the land.

About how far apart are Oxford and Smithville on the land?

Ⓐ 4 km
 Ⓑ 16 km
 Ⓒ 35 km
 Ⓓ 50 km

Item Number: M012065

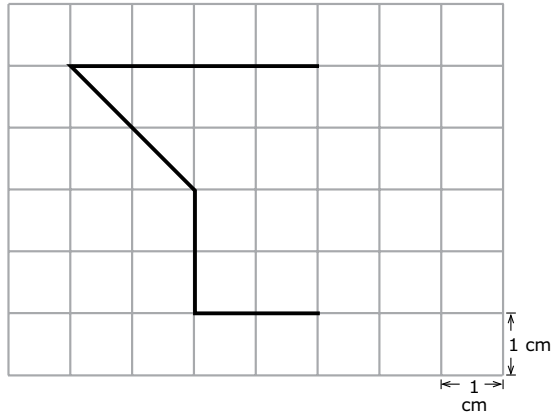
Overall Percent Correct		
Netherlands	69	▲
Singapore	62	▲
Japan	61	▲
Belgium (Flemish)	61	▲
Hong Kong, SAR	60	▲
Lithuania	59	▲
Latvia	57	▲
Hungary	55	▲
Russian Federation	52	▲
England	51	▲
Chinese Taipei	49	▲
Australia	46	○
New Zealand	45	○
International average	45	
Italy	44	○
Moldova, Republic of	44	○
United States	41	▼
Slovenia	38	▼
Cyprus	37	▼
Norway	36	▼
Scotland	35	▼
Armenia	33	▼
Morocco	26	▼
Iran, Islamic Republic of	21	▼
Tunisia	21	▼
Philippines	20	▼

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

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Reasoning

Complete the figure with an area of 13 cm²



The squares in the grid above have areas of 1 square centimeter. Draw lines to complete the figure so that it has an area of 13 square centimeters.

Overall Percent Correct

Japan	68	▲
Chinese Taipei	66	▲
Hong Kong, SAR	52	▲
Latvia	43	▲
Singapore	43	▲
Lithuania	40	▲
Netherlands	37	▲
Moldova, Republic of	35	▲
Cyprus	34	▲
Russian Federation	30	○
Australia	29	○
England	29	○
Scotland	29	○

International average		29
Belgium (Flemish)	28	○
Hungary	26	○
Armenia	25	○
United States	24	▼
Italy	22	▼
New Zealand	15	▼
Iran, Islamic Republic of	11	▼
Slovenia	11	▼
Norway	10	▼
Morocco	9	▼
Tunisia	9	▼
Philippines	5	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Item Number: M031298

SCORING

Correct Response

- Lines drawn to give area of 13 square cm

Incorrect Response

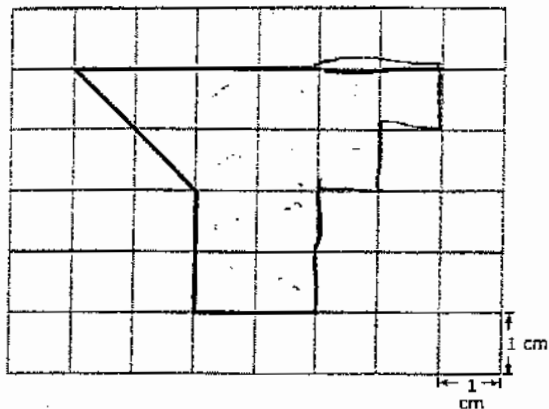
- Error due to counting half squares as full square centimeters
- One line drawn to close given figure
- Symmetrical figure drawn
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Complete the figure with an area of 13 cm² (continued)

Item Number: M031298

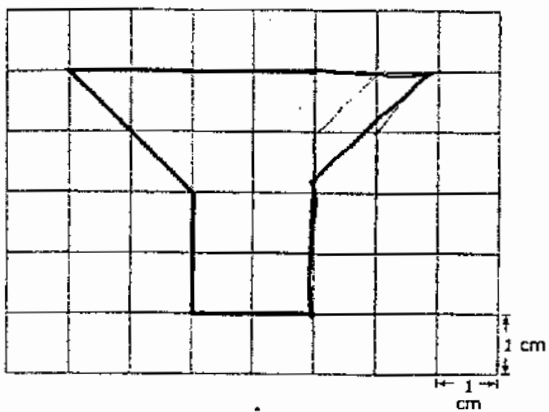
Student Responses

Correct Response:



The squares in the grid above have areas of 1 square centimeter. Draw lines to complete the figure so that it has an area of 13 square centimeters.

Incorrect Response:



The squares in the grid above have areas of 1 square centimeter. Draw lines to complete the figure so that it has an area of 13 square centimeters.

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

When is Mary’s trip

Here is a calendar for December.

DECEMBER						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Mary’s birthday is on Thursday, December 2. She is going on a trip exactly 3 weeks later. On what date will she go on the trip?

- (A) December 16th
- (B) December 21st
- (C) December 23rd
- (D) December 30th

Item Number: M011017

Overall Percent Correct

Japan	83	▲
England	82	▲
Belgium (Flemish)	81	▲
Netherlands	79	▲
Scotland	79	▲
Hong Kong, SAR	76	▲
Australia	75	▲
Chinese Taipei	75	▲
Singapore	75	▲
United States	75	▲
New Zealand	74	▲
Latvia	69	▲
Hungary	67	○
Russian Federation	67	○
Italy	66	○
Slovenia	66	○
Lithuania	65	○
Moldova, Republic of	64	○
International average	64	
Norway	62	○
Cyprus	61	○
Armenia	51	▼
Philippines	36	▼
Iran, Islamic Republic of	31	▼
Morocco	26	▼
Tunisia	25	▼

Country average vs. International average:

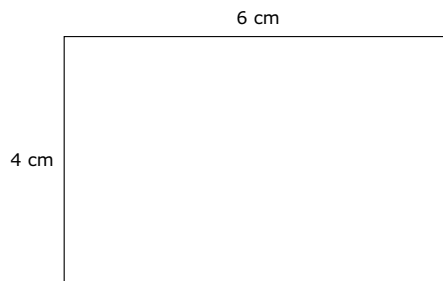
- Higher ▲
- Not different ○
- Lower ▼

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Solving Routine Problems

Perimeter of rectangle

Here is a rectangle with length 6 centimeters and width 4 centimeters. The distance right around its shape is called its perimeter.



Which of these gives the perimeter of the rectangle in centimeters?

- (A) $6 + 4$
- (B) 6×4
- (C) $6 \times 4 \times 2$
- (D) $6 + 4 + 6 + 4$

Overall Percent Correct

Singapore	93	▲
Latvia	77	▲
Lithuania	73	▲
Russian Federation	72	▲
Armenia	66	▲
United States	64	▲
Hong Kong, SAR	62	▲
Moldova, Republic of	62	▲
Belgium (Flemish)	61	▲
Australia	57	▲
Hungary	57	▲
Italy	57	▲
Cyprus	53	○
England	52	○
International average	51	
Chinese Taipei	42	▼
New Zealand	39	▼
Norway	39	▼
Philippines	39	▼
Scotland	36	▼
Netherlands	35	▼
Iran, Islamic Republic of	34	▼
Slovenia	33	▼
Japan	25	▼
Tunisia	25	▼
Morocco	21	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M011025

Correct Response:

D

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

Betty's average driving speed

The distance from one town to another is 180 km. If Betty has to drive the distance in 3 hours, what must her average speed be in kilometers per hour?

- (A) 180×3
- (B) $180 + 3$
- (C) $180 \div 3$
- (D) $180 - 3$

Overall Percent Correct

Hong Kong, SAR	83	▲
Latvia	80	▲
Russian Federation	74	▲
Chinese Taipei	73	▲
Japan	73	▲
Lithuania	65	▲
Netherlands	62	▲
Singapore	59	▲
Belgium (Flemish)	56	▲
Armenia	54	▲
Hungary	53	○
Moldova, Republic of	53	○
International average	48	
Cyprus	39	▼
Slovenia	37	▼
United States	37	▼
England	36	▼
Italy	34	▼
New Zealand	32	▼
Australia	31	▼
Norway	30	▼
Scotland	29	▼
Tunisia	28	▼
Morocco	27	▼
Iran, Islamic Republic of	26	▼
Philippines	25	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031097

Correct Response:

C

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

George practiced soccer 6 days a week

George practiced soccer six days a week.
 For 3 of the days he practiced for 45 minutes each day.
 For 3 of the days he practiced for 20 minutes each day.

In hours and minutes, what is the total amount of time George practiced on these six days?

(A) 2 hours 20 minutes
 (B) 2 hours 55 minutes
 (C) 3 hours 5 minutes
 (D) 3 hours 15 minutes

Overall Percent Correct

Singapore	64	▲
Chinese Taipei	61	▲
Russian Federation	57	▲
Japan	53	▲
Lithuania	53	▲
Hong Kong, SAR	50	▲
Latvia	49	▲
Hungary	44	▲
England	42	○
Belgium (Flemish)	41	○
International average	37	
United States	36	○
Moldova, Republic of	35	○
Armenia	34	○
Australia	33	○
Italy	33	○
Netherlands	33	○
Slovenia	32	○
Cyprus	31	▼
New Zealand	28	▼
Scotland	27	▼
Norway	24	▼
Morocco	17	▼
Philippines	15	▼
Iran, Islamic Republic of	13	▼
Tunisia	11	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031178

Correct Response:	D
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Content Domain	Main Topic	Cognitive Domain
MEASUREMENT	Tools, Techniques, and Formulas	Using Concepts

Volume of stack of cubes

Jasmine made a stack of cubes of the same size. The stack had 5 layers and each layer had 10 cubes. What is the volume of the stack?

(A) 5 cubes
 (B) 15 cubes
 (C) 30 cubes
 (D) 50 cubes

Item Number: M011010

Overall Percent Correct

Chinese Taipei	93	▲
Hong Kong, SAR	91	▲
Netherlands	85	▲
Singapore	85	▲
Russian Federation	82	▲
Lithuania	80	▲
Latvia	79	▲
Belgium (Flemish)	75	▲
Japan	73	▲
Moldova, Republic of	70	▲
Italy	67	○
United States	67	▲
England	65	○
Hungary	64	○
International average	63	
Australia	61	○
Cyprus	61	○
Scotland	60	○
New Zealand	56	▼
Armenia	53	▼
Slovenia	53	▼
Norway	46	▼
Iran, Islamic Republic of	36	▼
Morocco	29	▼
Tunisia	28	▼
Philippines	26	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

D

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

Sum of two numbers with decimals

What is the sum of 2.5 and 3.8?

- (A) 5.3
- (B) 6.3
- (C) 6.4
- (D) 9.5

Overall Percent Correct

Singapore	97	▲
Chinese Taipei	97	▲
Japan	96	▲
Belgium (Flemish)	91	▲
Lithuania	87	▲
Hong Kong, SAR	86	▲
Netherlands	85	▲
Italy	77	▲
England	73	▲
United States	72	▲
Russian Federation	72	○
Hungary	72	▲
Moldova, Republic of	69	○
Latvia	69	○
International average	67	
Armenia	67	○
Philippines	62	▼
Australia	58	▼
Scotland	55	▼
Cyprus	52	▼
New Zealand	49	▼
Slovenia	48	▼
Norway	45	▼
Morocco	42	▼
Iran, Islamic Republic of	37	▼
Tunisia	31	▼

**Country average vs.
International average:**

Higher	▲
Not different	○
Lower	▼

Item Number: M011008

Correct Response:

B

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

Subtraction with decimals

Subtract: 4.03
 -1.15

(A) 5.18
(B) 4.45
(C) 3.12
(D) 2.98
(E) 2.88

Item Number: M011015

Overall Percent Correct

Singapore	94	▲
Hong Kong, SAR	84	▲
Chinese Taipei	83	▲
Russian Federation	81	▲
Latvia	79	▲
Armenia	74	▲
Italy	74	▲
Lithuania	73	▲
Japan	72	▲
Moldova, Republic of	72	▲
United States	72	▲
Belgium (Flemish)	71	▲
Netherlands	69	▲
Cyprus	65	○
Hungary	63	○
International average	61	
Scotland	51	▼
Tunisia	47	▼
Slovenia	44	▼
England	43	▼
Morocco	41	▼
Philippines	40	▼
Iran, Islamic Republic of	38	▼
Norway	38	▼
Australia	35	▼
New Zealand	28	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

E

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

Fraction to decimal

Which of these means $\frac{7}{10}$?

(A) 70

(B) 7

(C) 0.7

(D) 0.07

Item Number: M011020

Overall Percent Correct

Singapore	95	▲
Hong Kong, SAR	78	▲
Chinese Taipei	74	▲
Belgium (Flemish)	73	▲
Cyprus	65	▲
United States	62	▲
Japan	60	▲
Italy	58	▲
Moldova, Republic of	52	▲
Philippines	49	▲
Lithuania	48	▲
England	46	○
International average	43	
Australia	42	○
Armenia	42	○
Russian Federation	39	○
New Zealand	37	▼
Netherlands	29	▼
Morocco	23	▼
Scotland	22	▼
Hungary	17	▼
Norway	17	▼
Iran, Islamic Republic of	16	▼
Tunisia	15	▼
Latvia	12	▼
Slovenia	8	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

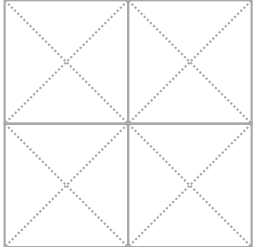
C

Content Domain	Main Topic	Cognitive Domain
A. NUMBER B. NUMBER	Fractions and Decimals Fractions and Decimals	Knowing Facts and Procedures Reasoning

Geometry Tiles: ½ black

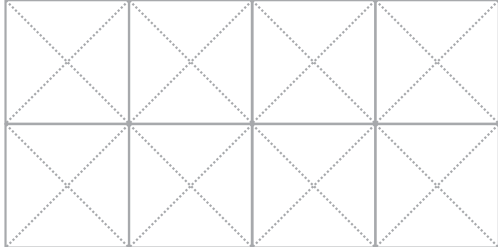
A. WITHOUT using any triangle tiles, place 4 tiles so that $\frac{1}{2}$ of a square shape is black. Then shade in the square below to show what you did with your tiles.

Shade in Here



B. Place 8 tiles so that $\frac{5}{8}$ of the rectangle shape is black. Then shade in the rectangle below to show what you did with your tiles.

Shade in Here



Item Number: M031348A

SCORING

Correct Response

- Draws a pattern made up of 2 black tiles and two white tiles. See examples below.



Incorrect Response

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

Overall Percent Correct

Singapore	56	▲
Belgium (Flemish)	51	▲
England	49	▲
United States	48	▲
Netherlands	46	▲
Japan	45	▲
New Zealand	44	▲
Hong Kong, SAR	43	▲
Australia	42	▲
Cyprus	39	▲
Hungary	39	○
Latvia	37	▲
Scotland	36	○
Lithuania	35	○
International average	33	
Chinese Taipei	32	○
Russian Federation	32	○
Norway	31	○
Italy	30	○
Moldova, Republic of	28	▼
Slovenia	24	▼
Philippines	16	▼
Armenia	11	▼
Iran, Islamic Republic of	7	▼
Morocco	4	▼
Tunisia	4	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

Geometry Tiles: $\frac{1}{2}$ black (continued)

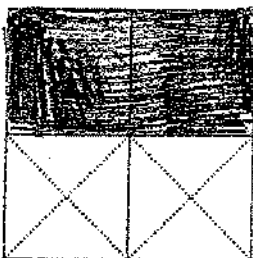
Item Number: M031348A

Student Responses

Correct Response:

- A. WITHOUT using any triangle tiles, place 4 tiles so that $\frac{1}{2}$ of a square shape is black. Then shade in the square below to show what you did with your tiles.

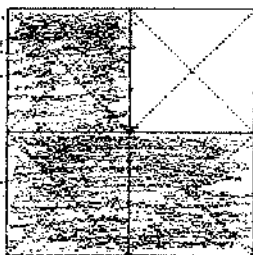
Shade in Here



Incorrect Response:

- A. WITHOUT using any triangle tiles, place 4 tiles so that $\frac{1}{2}$ of a square shape is black. Then shade in the square below to show what you did with your tiles.

Shade in Here

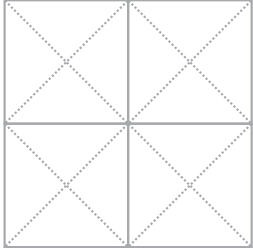


Content Domain	Main Topic	Cognitive Domain
A. NUMBER B. NUMBER	Fractions and Decimals Fractions and Decimals	Knowing Facts and Procedures Reasoning

Geometry Tiles: $\frac{5}{8}$ black

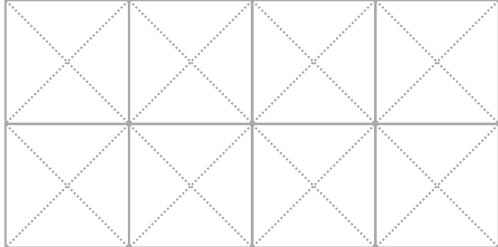
A. WITHOUT using any triangle tiles, place 4 tiles so that $\frac{1}{2}$ of a square shape is black. Then shade in the square below to show what you did with your tiles.

Shade in Here



B. Place 8 tiles so that $\frac{5}{8}$ of the rectangle shape is black. Then shade in the rectangle below to show what you did with your tiles.

Shade in Here



Overall Percent Correct

Japan	13	▲
Latvia	13	▲
England	13	▲
Belgium (Flemish)	13	▲
Australia	11	▲
Singapore	11	▲
New Zealand	10	▲
Russian Federation	10	○
Chinese Taipei	8	○
Cyprus	8	○
Lithuania	8	○
Netherlands	8	○
United States	8	○
Hong Kong, SAR	7	○
Scotland	7	○
International average	7	
Italy	6	○
Norway	5	○
Hungary	4	▼
Iran, Islamic Republic of	1	▼
Moldova, Republic of	1	▼
Philippines	1	▼
Slovenia	1	▼
Tunisia	1	▼
Armenia	0	▼
Morocco	0	▼

Country average vs. International average:

Higher ▲
Not different ○
Lower ▼

Item Number: M031348B

SCORING

Correct Response

- Any figure using 3 black, 1 white, and 4 triangle tiles:



Partially Correct Response

- $\frac{5}{8}$ of the figure shaded without using correct tiles

Incorrect Response

- $\frac{1}{2}$ of the figure shaded
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Geometry Tiles: $\frac{5}{8}$ black (continued)

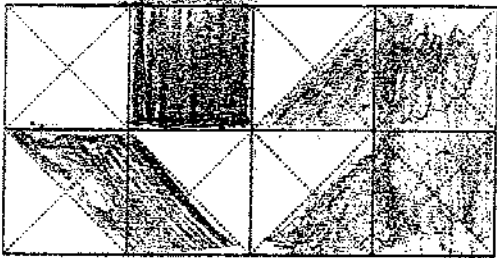
Item Number: M031348B

Student Responses

Correct Response:

B. Place 8 tiles so that $\frac{5}{8}$ of the rectangle shape is black. Then shade in the rectangle below to show what you did with your tiles.

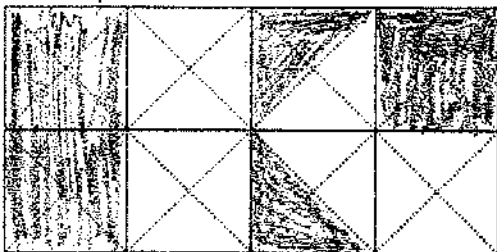
Shade in Here



Incorrect Response:

B. Place 8 tiles so that $\frac{5}{8}$ of the rectangle shape is black. Then shade in the rectangle below to show what you did with your tiles.

Shade in Here



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

Fraction of cake left

Janis, Maija, and their mother were eating a cake. Janis ate $\frac{1}{2}$ of the cake.
 Maija ate $\frac{1}{4}$ of the cake. Their mother ate $\frac{1}{4}$ of the cake.
 How much of the cake is left?

- (A) $\frac{3}{4}$
- (B) $\frac{1}{2}$
- (C) $\frac{1}{4}$
- (D) None

Overall Percent Correct

Singapore	83	▲
England	83	▲
Hong Kong, SAR	82	▲
New Zealand	74	▲
Lithuania	73	▲
Scotland	70	▲
Australia	68	▲
United States	65	▲
Belgium (Flemish)	65	▲
Netherlands	63	○
Russian Federation	63	○
Hungary	61	○
Moldova, Republic of	61	○
Italy	60	○
Latvia	60	○
International average	59	
Slovenia	58	○
Cyprus	54	▼
Chinese Taipei	51	▼
Norway	49	▼
Armenia	48	▼
Iran, Islamic Republic of	48	▼
Japan	47	▼
Morocco	32	▼
Philippines	32	▼
Tunisia	24	▼

Country average vs.
International average:

Higher ▲
 Not different ○
 Lower ▼

Item Number: M012119

Correct Response:

D

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

$\frac{1}{3}$ of 600 balls in a box

There are 600 balls in a box, and $\frac{1}{3}$ of the balls are red.

How many red balls are in the box?

Answer: _____ red balls

Overall Percent Correct

Lithuania	85	▲
Singapore	84	▲
Latvia	82	▲
Belgium (Flemish)	82	▲
Russian Federation	78	▲
Moldova, Republic of	68	▲
Cyprus	64	▲
Hong Kong, SAR	64	▲
Armenia	63	▲
Netherlands	63	▲
Hungary	62	▲
Japan	56	▲
Chinese Taipei	55	▲
International average	49	
Italy	43	▼
England	41	▼
Scotland	40	▼
United States	38	▼
New Zealand	34	▼
Slovenia	32	▼
Australia	30	▼
Tunisia	24	▼
Norway	19	▼
Philippines	14	▼
Iran, Islamic Republic of	9	▼
Morocco	7	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031065

SCORING

Correct Response

- 200

Incorrect Response

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

$\frac{1}{3}$ of 600 balls in a box (continued)

Item Number: M031065

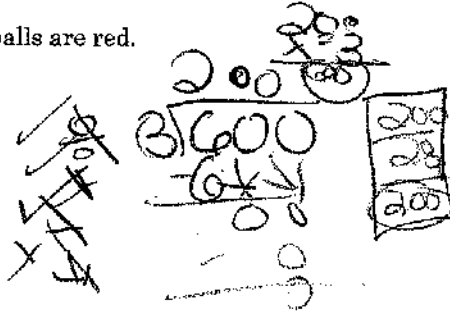
Student Responses

Correct Response:

There are 600 balls in a box, and $\frac{1}{3}$ of the balls are red.

How many red balls are in the box?

Answer: 200 red balls

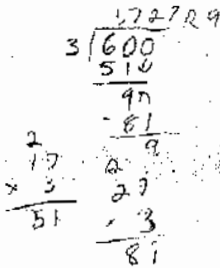


Incorrect Response:

There are 600 balls in a box, and $\frac{1}{3}$ of the balls are red.

How many red balls are in the box?

Answer: 1,72729 red balls



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

What fraction of cake John ate

A cake was cut into 8 pieces of equal size. John ate 3 pieces of the cake.
What fraction of the cake did John eat?

- (A) $\frac{1}{8}$
- (B) $\frac{3}{8}$
- (C) $\frac{3}{5}$
- (D) $\frac{8}{3}$

Overall Percent Correct

Chinese Taipei	97	▲
Hong Kong, SAR	93	▲
Singapore	89	▲
Belgium (Flemish)	89	▲
Japan	88	▲
United States	86	▲
Cyprus	85	▲
Netherlands	83	▲
England	80	▲
Australia	79	▲
New Zealand	77	▲
Lithuania	73	▲
Italy	72	○
Scotland	71	○
Latvia	69	○
International average	69	
Hungary	64	▼
Norway	62	▼
Iran, Islamic Republic of	58	▼
Russian Federation	58	▼
Armenia	53	▼
Philippines	52	▼
Moldova, Republic of	46	▼
Slovenia	42	▼
Tunisia	28	▼
Morocco	27	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031216

Correct Response:

B

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

Which figure has one-half black dots

In which figure are one-half of the dots black?

(A)

(B)

(C)

(D)

Overall Percent Correct

Belgium (Flemish)	97	▲
Netherlands	97	▲
Hungary	95	▲
Moldova, Republic of	91	▲
Russian Federation	90	▲
Hong Kong, SAR	90	▲
Lithuania	89	▲
Singapore	89	▲
Japan	88	▲
Italy	88	▲
Armenia	86	▲
Norway	85	▲
Australia	85	▲
Latvia	84	▲
England	84	▲
New Zealand	84	▲
United States	79	▲
Scotland	76	○
International average	75	
Iran, Islamic Republic of	66	▼
Cyprus	56	▼
Morocco	47	▼
Tunisia	46	▼
Chinese Taipei	42	▼
Philippines	37	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

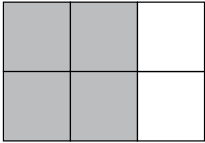
Item Number: M011001

Correct Response:	B
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Fractions and Decimals	Using Concepts

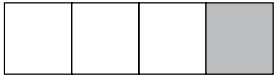
3 of 4 squares shaded

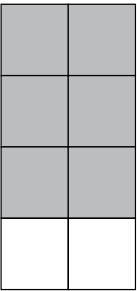
In this diagram, 2 out of every 3 squares are shaded.




Which diagram has 3 out of every 4 squares shaded?

(A) 

(B) 

(C) 

(D) 

Item Number: M011016

Overall Percent Correct

Singapore	77	▲
Belgium (Flemish)	74	▲
Japan	73	▲
Lithuania	71	▲
Hong Kong, SAR	70	▲
Italy	68	▲
Netherlands	65	▲
United States	63	▲
England	63	▲
Cyprus	60	▲
Moldova, Republic of	60	▲
Chinese Taipei	59	▲
Slovenia	56	○
International average	55	
Scotland	54	○
Australia	51	○
New Zealand	51	○
Norway	46	▼
Russian Federation	46	▼
Hungary	45	▼
Latvia	45	▼
Armenia	43	▼
Iran, Islamic Republic of	43	▼
Philippines	33	▼
Morocco	25	▼
Tunisia	22	▼

Country average vs. International average:

- Higher ▲
- Not different ○
- Lower ▼

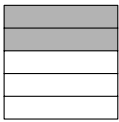
Correct Response: C

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

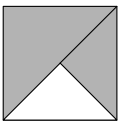
Figure showing fraction of shaded square

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

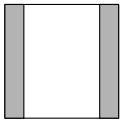
(A)



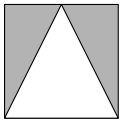
(B)



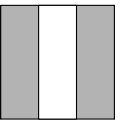
(C)



(D)



(E)



Overall Percent Correct

Singapore	93	▲
Hong Kong, SAR	86	▲
United States	82	▲
Chinese Taipei	81	▲
Belgium (Flemish)	79	▲
Japan	76	▲
Cyprus	75	▲
Netherlands	73	▲
England	67	▲
Australia	62	▲
Latvia	60	○
New Zealand	59	○
International average	57	
Hungary	56	○
Lithuania	56	○
Italy	55	○
Scotland	52	▼
Philippines	50	▼
Russian Federation	49	▼
Iran, Islamic Republic of	47	▼
Moldova, Republic of	43	▼
Slovenia	34	▼
Armenia	29	▼
Norway	29	▼
Morocco	13	▼
Tunisia	12	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M012044

Correct Response:	E
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Ratio, Proportions, and Percent	Solving Routine Problems

Maria collected soft drink bottles

For every soft drink bottle that Fred collected, Maria collected 3. Fred collected a total of 9 soft drink bottles. How many did Maria collect?

Ⓐ 3
 Ⓑ 12
 Ⓒ 13
 Ⓓ 27

Item Number: M031108

Overall Percent Correct

Chinese Taipei	74	▲
Hong Kong, SAR	74	▲
Lithuania	67	▲
Singapore	67	▲
Japan	65	▲
Netherlands	63	▲
England	60	▲
Belgium (Flemish)	59	▲
Cyprus	58	▲
United States	55	▲
Hungary	52	○
Russian Federation	52	○
International average	49	
Scotland	47	○
Armenia	46	○
Slovenia	46	○
Moldova, Republic of	43	○
Australia	42	▼
Italy	40	▼
New Zealand	40	▼
Norway	40	▼
Latvia	38	▼
Iran, Islamic Republic of	28	▼
Tunisia	21	▼
Morocco	20	▼
Philippines	20	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

D

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

Number rounded to 600

Which number would be rounded to 600 when rounded to the nearest hundred?

(A) 62
 (B) 160
 (C) 546
 (D) 586
 (E) 660

Overall Percent Correct

Singapore	87	▲
Chinese Taipei	86	▲
Netherlands	86	▲
Japan	85	▲
England	84	▲
Hungary	83	▲
Hong Kong, SAR	82	▲
United States	80	▲
Australia	78	▲
Scotland	78	▲
Belgium (Flemish)	78	▲
Moldova, Republic of	70	▲
New Zealand	70	▲
Cyprus	68	▲
International average	64	
Lithuania	61	○
Norway	59	○
Italy	53	▼
Morocco	52	▼
Latvia	50	▼
Armenia	46	▼
Russian Federation	45	▼
Slovenia	39	▼
Tunisia	38	▼
Philippines	20	▼
Iran, Islamic Republic of	11	▼

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

Item Number: M011019

Correct Response:	D
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

Which number is it

What number equals 3 ones + 5 tens + 4 hundreds + 60 thousands?

- (A) 6,453
- (B) 60,453
- (C) 64,530
- (D) 354,060
- (E) 604,530

Overall Percent Correct

Singapore	88	▲
Netherlands	85	▲
Japan	84	▲
Chinese Taipei	83	▲
Hungary	83	▲
Latvia	80	▲
Russian Federation	80	▲
United States	80	▲
Belgium (Flemish)	80	▲
Italy	72	▲
Cyprus	70	○
Lithuania	69	○
England	68	○
International average	68	
Iran, Islamic Republic of	63	○
Australia	62	▼
New Zealand	62	▼
Hong Kong, SAR	61	▼
Slovenia	61	▼
Norway	60	▼
Moldova, Republic of	59	▼
Morocco	53	▼
Scotland	52	▼
Tunisia	51	▼
Philippines	45	▼
Armenia	42	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M011021

Correct Response:

B

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

Express number in words

Which of these is a name for 9,740?

- (A) Nine thousand seventy-four
- (B) Nine thousand seven hundred forty
- (C) Nine thousand seventy-four hundred
- (D) Nine hundred seventy-four thousand

Overall Percent Correct

Chinese Taipei	98	▲
Hong Kong, SAR	98	▲
Singapore	97	▲
Japan	96	▲
England	95	▲
Belgium (Flemish)	95	▲
Netherlands	92	▲
Italy	91	▲
Lithuania	91	▲
United States	91	▲
Latvia	90	▲
Russian Federation	90	▲
Australia	89	○
Hungary	88	○
Moldova, Republic of	87	○
New Zealand	87	○
Scotland	87	○
International average	86	
Cyprus	85	○
Slovenia	81	▼
Norway	80	▼
Armenia	79	▼
Philippines	79	▼
Iran, Islamic Republic of	72	▼
Morocco	64	▼
Tunisia	50	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M011024

Correct Response:

B

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

Which number is equal

Which number is equal to eight tens plus nine tens?

(A) 17

(B) 170

(C) 1,700

(D) 17,000

Overall Percent Correct

Chinese Taipei	91	▲
Singapore	87	▲
Hungary	85	▲
Moldova, Republic of	84	▲
Hong Kong, SAR	80	▲
Netherlands	77	▲
Latvia	75	▲
Lithuania	73	▲
New Zealand	73	▲
England	73	▲
Armenia	72	▲
Russian Federation	72	▲
Belgium (Flemish)	70	▲
Japan	69	▲
Australia	67	○
Norway	65	○
United States	65	○
International average	65	
Scotland	64	○
Cyprus	54	▼
Slovenia	53	▼
Italy	51	▼
Iran, Islamic Republic of	34	▼
Morocco	29	▼
Philippines	28	▼
Tunisia	27	▼

Country average vs. International average:

Higher ▲

Not different ○

Lower ▼

Item Number: M011028

Correct Response:	B
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

15 times 9

$15 \times 9 =$

Answer: _____

Overall Percent Correct

Chinese Taipei	94	▲
Singapore	93	▲
Hong Kong, SAR	91	▲
Russian Federation	90	▲
Moldova, Republic of	88	▲
Lithuania	87	▲
Japan	86	▲
Latvia	86	▲
Netherlands	86	▲
Armenia	85	▲
Hungary	85	▲
Belgium (Flemish)	84	▲
Cyprus	76	▲
Italy	75	○
United States	73	○
International average	72	
Tunisia	68	○
Slovenia	67	○
Iran, Islamic Republic of	61	▼
Philippines	59	▼
England	59	▼
Scotland	54	▼
Australia	45	▼
New Zealand	41	▼
Morocco	36	▼
Norway	30	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031305

SCORING**Correct Response**

- 135

Incorrect Response

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

15 times 9 (continued)

Item Number: M031305

Student Responses**Correct Response:**

$$\begin{array}{r} 15 \\ \times 9 \\ \hline \end{array}$$

Answer: 135**Incorrect Response:**

$$15 \times 9 =$$

Answer: 55

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Knowing Facts and Procedures

204 divided by 4

204 ÷ 4 =

Answer: _____

Overall Percent Correct

Hong Kong, SAR	93	▲
Singapore	91	▲
Chinese Taipei	90	▲
Russian Federation	90	▲
Hungary	86	▲
Moldova, Republic of	85	▲
Japan	84	▲
Latvia	82	▲
Lithuania	82	▲
Belgium (Flemish)	77	▲
Cyprus	72	▲
Italy	71	▲
Armenia	70	▲
Netherlands	65	○
International average	63	
United States	55	▼
Tunisia	47	▼
Iran, Islamic Republic of	46	▼
England	46	▼
Scotland	42	▼
Slovenia	41	▼
Philippines	38	▼
Australia	33	▼
New Zealand	33	▼
Norway	27	▼
Morocco	17	▼

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

Item Number: M031306

SCORING

Correct Response

- 51

Incorrect Response

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

204 divided by 4 (continued)

Item Number: M031306

Student Responses**Correct Response:**

$204 \div 4 =$

Answer: 51

$$\begin{array}{r} 51 \\ 4 \overline{)204} \\ \underline{20} \\ 04 \\ \underline{04} \\ 0 \end{array}$$

Incorrect Response:

$204 \div 4 =$

Answer: 150 R4

$$\begin{array}{r} 150 \\ 4 \overline{)204} \\ \underline{4} \\ 20 \\ \underline{20} \\ 04 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Reasoning

The number Lia should add to 142 to get 369

Lia is practicing addition and subtraction problems. What number should Lia add to 142 to get 369?

Answer: _____

Overall Percent Correct

Singapore	88	▲
Hungary	86	▲
Russian Federation	85	▲
Chinese Taipei	83	▲
Lithuania	83	▲
Hong Kong, SAR	82	▲
Japan	81	▲
Latvia	79	▲
Belgium (Flemish)	72	▲
United States	71	▲
Netherlands	69	▲
Armenia	64	○
Cyprus	64	○
Moldova, Republic of	64	○
International average	62	
England	59	○
Italy	57	○
Slovenia	54	▼
Australia	52	▼
Scotland	51	▼
New Zealand	46	▼
Iran, Islamic Republic of	39	▼
Norway	37	▼
Tunisia	29	▼
Philippines	28	▼
Morocco	24	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031130

SCORING

Correct Response

- 227

Incorrect Response

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

The number Lia should add to 142 to get 369 (continued)

Item Number: M031130

Student Responses

Correct Response:

Lia is practicing addition and subtraction problems. What number should Lia add to 142 to get 369?

Answer: 227

$$\begin{array}{r} 369 \\ - 142 \\ \hline 227 \end{array}$$

Incorrect Response:

Lia is practicing addition and subtraction problems. What number should Lia add to 142 to get 369?

Answer: 225

$$\begin{array}{r} 369 \\ - 142 \\ \hline 225 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Reasoning

1279 plus 243 by mistake

Juanita wanted to use her calculator to add 1,379 and 243. She entered 1,279+ 243 by mistake. Which of these could she do to correct the mistake?

(A) Add 100
 (B) Add 1
 (C) Subtract 1
 (D) Subtract 100

Item Number: M031341

Overall Percent Correct

Hungary	89	▲
Netherlands	88	▲
Belgium (Flemish)	88	▲
Chinese Taipei	85	▲
Hong Kong, SAR	84	▲
Japan	83	▲
Russian Federation	83	▲
Singapore	83	▲
England	82	▲
Latvia	79	▲
Lithuania	77	▲
Slovenia	77	○
Australia	76	▲
United States	75	▲
Scotland	74	○
Cyprus	73	○
International average	72	
Italy	70	○
Norway	70	○
Moldova, Republic of	68	○
New Zealand	68	▼
Armenia	64	▼
Philippines	47	▼
Iran, Islamic Republic of	45	▼
Tunisia	39	▼
Morocco	38	▼

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

Correct Response: A

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Total number of boys and girls

In Toshi's class there are twice as many girls as boys. There are 8 boys in the class. What is the total number of boys and girls in the class?

(A) 12
 (B) 16
 (C) 20
 (D) 24

Item Number: M011002

Overall Percent Correct

Netherlands	82	▲
Singapore	81	▲
New Zealand	64	▲
Hungary	62	▲
Japan	62	▲
Belgium (Flemish)	62	▲
Australia	60	▲
Lithuania	60	▲
England	60	▲
Cyprus	56	▲
United States	54	▲
Latvia	53	○
Russian Federation	53	○
Italy	51	○
International average	51	
Hong Kong, SAR	50	○
Slovenia	50	○
Norway	49	○
Scotland	48	○
Moldova, Republic of	47	○
Armenia	40	▼
Chinese Taipei	29	▼
Morocco	24	▼
Tunisia	24	▼
Philippines	22	▼
Iran, Islamic Republic of	20	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

D

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Total number of pencils

There are 9 boxes of pencils. Each box has 125 pencils. What is the total number of pencils?

(A) 1,025
 (B) 1,100
 (C) 1,125
 (D) 1,220
 (E) 1,225

Overall Percent Correct

Singapore	91	▲
Chinese Taipei	83	▲
Russian Federation	79	▲
Hong Kong, SAR	77	▲
Cyprus	76	▲
United States	76	▲
Japan	74	▲
Hungary	73	▲
Lithuania	73	▲
Latvia	72	▲
Italy	70	▲
Moldova, Republic of	69	▲
Armenia	66	○
Netherlands	64	○
Belgium (Flemish)	63	○
International average	63	
England	55	▼
Scotland	51	▼
Slovenia	50	▼
Iran, Islamic Republic of	49	▼
Philippines	49	▼
Australia	48	▼
New Zealand	47	▼
Tunisia	45	▼
Morocco	37	▼
Norway	34	▼

Country average vs. International average:

Higher ▲
 Not different ○
 Lower ▼

Item Number: M011003

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

How long to wash windows

It takes Chris 4 minutes to wash a window. He wants to know how many minutes it will take him to wash 8 windows at this rate. He should

- (A) multiply 4×8
- (B) divide 8 by 4
- (C) subtract 4 from 8
- (D) add 8 and 4

Overall Percent Correct

Chinese Taipei	94	▲
Singapore	93	▲
Netherlands	92	▲
Hong Kong, SAR	91	▲
Japan	91	▲
Belgium (Flemish)	89	▲
Lithuania	88	▲
United States	88	▲
England	88	▲
Cyprus	85	▲
Hungary	84	▲
Latvia	83	▲
Russian Federation	83	▲
Australia	81	▲
Italy	79	○
Scotland	79	○
Moldova, Republic of	77	○
International average	77	
Armenia	73	▼
New Zealand	73	▼
Slovenia	69	▼
Norway	68	▼
Philippines	56	▼
Iran, Islamic Republic of	51	▼
Morocco	40	▼
Tunisia	40	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M011011

Correct Response:

A

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Estimate number of cabbages

Mark's garden has 84 rows of cabbages. There are 57 cabbages in each row. Which of these gives the BEST way to estimate how many cabbages there are altogether?

- (A) $100 \times 50 = 5,000$
- (B) $90 \times 60 = 5,400$
- (C) $80 \times 60 = 4,800$
- (D) $80 \times 50 = 4,000$

Overall Percent Correct

Singapore	84	▲
Hong Kong, SAR	71	▲
United States	70	▲
Netherlands	68	▲
Belgium (Flemish)	68	▲
Hungary	66	▲
Moldova, Republic of	62	▲
Chinese Taipei	61	▲
Japan	59	▲
Cyprus	55	▲
England	51	○
International average	50	
Australia	48	○
Lithuania	46	▼
Armenia	45	▼
Russian Federation	45	○
Slovenia	45	▼
Scotland	42	▼
Latvia	40	▼
New Zealand	36	▼
Philippines	35	▼
Italy	34	▼
Norway	32	▼
Tunisia	31	▼
Iran, Islamic Republic of	30	▼
Morocco	26	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M012117

Correct Response:

C

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Notebooks for 115 students

Each student needs 8 notebooks for school. How many notebooks are needed for 115 students?

Answer: _____

Overall Percent Correct

Singapore	86	▲
Chinese Taipei	85	▲
Hong Kong, SAR	80	▲
Russian Federation	76	▲
Latvia	72	▲
Hungary	69	▲
Cyprus	68	▲
Lithuania	67	▲
Japan	65	▲
Moldova, Republic of	65	▲
Belgium (Flemish)	63	▲
Armenia	58	▲
Netherlands	55	○
Italy	54	○
International average	52	
United States	51	○
Slovenia	44	▼
Iran, Islamic Republic of	38	▼
Tunisia	35	▼
England	30	▼
Australia	27	▼
New Zealand	27	▼
Philippines	26	▼
Scotland	24	▼
Morocco	17	▼
Norway	12	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031011

SCORING

Correct Response

- 920

Incorrect Response

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

Notebooks for 115 students (continued)

Item Number: M031011

Student Responses

Correct Response:

Each student needs 8 notebooks for school. How many notebooks are needed for 115 students?

Answer: 920

$$\begin{array}{r} 14 \\ 115 \\ \times 8 \\ \hline 920 \end{array} \text{ notebooks}$$

Incorrect Response:

Each student needs 8 notebooks for school. How many notebooks are needed for 115 students?

Answer: 2070 notebooks

$$\begin{array}{r} 115 \\ \times 18 \\ \hline 920 \\ + 1150 \\ \hline 2070 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

A 204 cm rope cut into 4/calculation

A piece of rope 204 cm long is cut into 4 equal pieces. Which of these gives the length of each piece in centimeters?

- (A) $204 + 4$
- (B) 204×4
- (C) $204 - 4$
- (D) $204 \div 4$

Overall Percent Correct

Hong Kong, SAR	94	▲
Singapore	94	▲
Chinese Taipei	90	▲
Latvia	90	▲
Belgium (Flemish)	90	▲
Lithuania	88	▲
Netherlands	88	▲
Japan	87	▲
Hungary	85	▲
Russian Federation	84	▲
Armenia	77	▲
England	76	▲
International average	73	
Italy	71	○
Moldova, Republic of	70	○
United States	70	○
Slovenia	69	○
Australia	66	▼
Scotland	65	▼
Cyprus	64	▼
Norway	64	▼
New Zealand	61	▼
Iran, Islamic Republic of	55	▼
Tunisia	46	▼
Morocco	40	▼
Philippines	29	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031310

Correct Response:

D

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Number tiles: largest number (+)

Using the number tiles, Joan and Herbert played a new game. They placed the numbers to make the largest answer.

A. Use the tiles $\boxed{1}$, $\boxed{5}$, and $\boxed{9}$. Write the numbers on the tiles in the boxes below to make the largest answer when you add.

B. Use the tiles $\boxed{2}$, $\boxed{3}$, and $\boxed{7}$. Write the numbers on the tiles in the boxes below to make the largest answer when you subtract.

C. Use the tiles $\boxed{1}$, $\boxed{4}$, and $\boxed{5}$. Write the numbers on the tiles in the boxes below to make the largest answer when you multiply.

Overall Percent Correct

Japan	74	▲
Singapore	71	▲
Hong Kong, SAR	69	▲
England	68	▲
Hungary	65	▲
Netherlands	65	▲
Chinese Taipei	64	▲
Cyprus	63	▲
Latvia	60	▲
Lithuania	60	▲
Scotland	60	▲
Belgium (Flemish)	57	○
United States	56	○
Australia	56	○
Iran, Islamic Republic of	54	○
New Zealand	53	○
International average	52	
Russian Federation	50	○
Norway	47	○
Italy	46	▼
Slovenia	45	▼
Morocco	35	▼
Moldova, Republic of	33	▼
Armenia	24	▼
Tunisia	23	▼
Philippines	11	▼

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

Number tiles: largest number (+) (continued)

Item Number: M031345A

SCORING

Correct Response

- $91 + 5$ or $95 + 1$

Incorrect Response

- Any other arrangement of digits 1, 5, and 9
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Number tiles: largest number (+) (continued)

Item Number: M031345A

Student Responses

Correct Response:

Using the number tiles, Joan and Herbert played a new game.
They placed the numbers to make the largest answer.

- A. Use the tiles $\boxed{1}$, $\boxed{5}$, and $\boxed{9}$. Write the numbers on the tiles in the boxes below to make the largest answer when you add.

$$\begin{array}{r}
 \boxed{9} \boxed{5} \\
 + \quad \quad \boxed{1} \\
 \hline
 96
 \end{array}$$

Incorrect Response:

Using the number tiles, Joan and Herbert played a new game.
They placed the numbers to make the largest answer.

- A. Use the tiles $\boxed{1}$, $\boxed{5}$, and $\boxed{9}$. Write the numbers on the tiles in the boxes below to make the largest answer when you add.

$$\begin{array}{r}
 \boxed{1} \boxed{9} \\
 + \quad \quad \boxed{5} \\
 \hline
 24
 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Number tiles: largest number (-)

Using the number tiles, Joan and Herbert played a new game. They placed the numbers to make the largest answer.

A. Use the tiles $\boxed{1}$, $\boxed{5}$, and $\boxed{9}$. Write the numbers on the tiles in the boxes below to make the largest answer when you add.

B. Use the tiles $\boxed{2}$, $\boxed{3}$, and $\boxed{7}$. Write the numbers on the tiles in the boxes below to make the largest answer when you subtract.

C. Use the tiles $\boxed{1}$, $\boxed{4}$, and $\boxed{5}$. Write the numbers on the tiles in the boxes below to make the largest answer when you multiply.

Overall Percent Correct		
Japan	73	▲
Singapore	69	▲
Hong Kong, SAR	67	▲
Hungary	64	▲
Netherlands	64	▲
Chinese Taipei	63	▲
Latvia	60	▲
England	59	▲
Lithuania	57	▲
Belgium (Flemish)	56	▲
Cyprus	55	▲
United States	53	○
Russian Federation	52	○
Australia	52	○
Scotland	52	○
New Zealand	51	○
International average	50	
Iran, Islamic Republic of	49	○
Norway	47	○
Italy	46	○
Slovenia	41	▼
Moldova, Republic of	39	▼
Armenia	23	▼
Morocco	21	▼
Tunisia	19	▼
Philippines	9	▼

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

Number tiles: largest number (-) (continued)

Item Number: M031345B

SCORING

Correct Response

- 73 - 2

Incorrect Response

- 72 - 3
- Any other arrangement of the digits 2, 3, and 7
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Number tiles: largest number (-) (continued)

Item Number: M031345B

Student Responses

Correct Response:

- B. Use the tiles $\boxed{2}$, $\boxed{3}$, and $\boxed{7}$. Write the numbers on the tiles in the boxes below to make the largest answer when you subtract.

$$\begin{array}{r} \boxed{7} \boxed{3} \\ - \quad \quad \boxed{2} \\ \hline 7 \quad 1 \end{array}$$

Incorrect Response:

- B. Use the tiles $\boxed{2}$, $\boxed{3}$, and $\boxed{7}$. Write the numbers on the tiles in the boxes below to make the largest answer when you subtract.

$$\begin{array}{r} \boxed{3} \boxed{7} \\ - \quad \quad \boxed{2} \\ \hline 35 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Solving Routine Problems

Number tiles: largest number (X)

Using the number tiles, Joan and Herbert played a new game. They placed the numbers to make the largest answer.

A. Use the tiles $\boxed{1}$, $\boxed{5}$, and $\boxed{9}$. Write the numbers on the tiles in the boxes below to make the largest answer when you add.

B. Use the tiles $\boxed{2}$, $\boxed{3}$, and $\boxed{7}$. Write the numbers on the tiles in the boxes below to make the largest answer when you subtract.

C. Use the tiles $\boxed{1}$, $\boxed{4}$, and $\boxed{5}$. Write the numbers on the tiles in the boxes below to make the largest answer when you multiply.

Overall Percent Correct		
Japan	35	▲
Singapore	26	▲
Hong Kong, SAR	24	▲
Cyprus	23	▲
Chinese Taipei	22	▲
Hungary	22	▲
England	19	○
Tunisia	18	○
Belgium (Flemish)	18	○
Latvia	17	○
Morocco	17	○
Australia	16	○
Lithuania	16	○
International average	16	
Italy	15	○
Scotland	15	○
Netherlands	14	○
Norway	14	○
United States	14	▼
Moldova, Republic of	13	○
New Zealand	13	○
Iran, Islamic Republic of	12	▼
Russian Federation	12	▼
Armenia	7	▼
Slovenia	5	▼
Philippines	3	▼

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

Number tiles: largest number (X) (continued)

Item Number: M031345C

SCORING

Correct Response

- 41×5

Incorrect Response

- 51×4
- Any other arrangement of the digits 1, 4, and 5
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Number tiles: largest number (X) (continued)

Item Number: M031345C

Student Responses

Correct Response:

- C. Use the tiles **1**, **4**, and **5**. Write the numbers on the tiles in the boxes below to make the largest answer when you multiply.

$$\begin{array}{r}
 \boxed{4} \boxed{1} \\
 \times \quad \boxed{5} \\
 \hline
 20 \ 5
 \end{array}$$

Incorrect Response:

- C. Use the tiles **1**, **4**, and **5**. Write the numbers on the tiles in the boxes below to make the largest answer when you multiply.

$$\begin{array}{r}
 \boxed{5} \boxed{4} \\
 \times \quad \boxed{1} \\
 \hline
 5 \ 4
 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Number represented by squares

Each small square (□) is equal to 1. There are 10 small squares in each strip. There are 100 small squares in each large square.

What number is shown?

(A) 16
 (B) 358
 (C) 538
 (D) 835

Item Number: M011004

Overall Percent Correct

Chinese Taipei	98	▲
Belgium (Flemish)	92	▲
Japan	89	▲
Singapore	89	▲
United States	89	▲
Australia	86	▲
Netherlands	86	▲
Hong Kong, SAR	85	▲
England	84	▲
New Zealand	82	▲
Lithuania	80	▲
Scotland	80	▲
Latvia	79	▲
Cyprus	78	○
Moldova, Republic of	78	○
Italy	77	○
Norway	76	○
Slovenia	75	○
International average	75	
Russian Federation	74	○
Hungary	68	▼
Philippines	57	▼
Iran, Islamic Republic of	56	▼
Armenia	39	▼
Morocco	38	▼
Tunisia	34	▼

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

Correct Response:	B
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Which has same value

Which of these has the same value as 342?

(A) $3,000 + 400 + 2$

(B) $300 + 40 + 2$

(C) $30 + 4 + 2$

(D) $3 + 4 + 2$

Item Number: M011007

Overall Percent Correct

Chinese Taipei	98	▲
Belgium (Flemish)	98	▲
Hong Kong, SAR	97	▲
Japan	97	▲
Latvia	97	▲
Netherlands	97	▲
Singapore	97	▲
Hungary	96	▲
Russian Federation	96	▲
Lithuania	94	▲
United States	92	▲
England	91	▲
Cyprus	89	○
Italy	89	○
Moldova, Republic of	89	○
Slovenia	89	○
Norway	88	○
Australia	87	○
Armenia	87	○
International average	87	
New Zealand	82	▼
Scotland	79	▼
Morocco	64	▼
Tunisia	64	▼
Philippines	62	▼
Iran, Islamic Republic of	56	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Correct Response:

B

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Digit in hundreds place

Which digit is in the hundreds place in 2,345?

- (A) 2
 (B) 3
 (C) 4
 (D) 5

Overall Percent Correct

Chinese Taipei	96	▲
Singapore	95	▲
Japan	94	▲
United States	92	▲
Netherlands	91	▲
Belgium (Flemish)	90	▲
England	87	▲
Australia	83	▲
Hungary	80	○
Lithuania	80	○
Moldova, Republic of	80	○
Latvia	79	○
Scotland	79	○
Cyprus	78	○
Italy	77	○
International average	77	
Russian Federation	75	○
Iran, Islamic Republic of	73	○
New Zealand	73	▼
Hong Kong, SAR	70	▼
Norway	69	▼
Armenia	59	▼
Philippines	59	▼
Morocco	57	▼
Slovenia	54	▼
Tunisia	44	▼

Country average vs.
International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M011018

Correct Response:

B

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Which is true

Which number sentence is true?

(A) $968 < 698$

(B) $968 < 689$

(C) $968 > 689$

(D) $968 = 689$

Overall Percent Correct

Chinese Taipei	90	▲
Singapore	84	▲
Russian Federation	82	▲
Belgium (Flemish)	81	▲
Hong Kong, SAR	80	▲
Hungary	80	▲
United States	80	▲
Japan	79	▲
Moldova, Republic of	78	▲
Slovenia	78	▲
Latvia	76	▲
Lithuania	76	▲
Italy	75	▲
Armenia	71	▲
Cyprus	68	○
International average	66	
Norway	65	○
New Zealand	62	▼
England	59	▼
Philippines	54	▼
Netherlands	53	▼
Iran, Islamic Republic of	47	▼
Australia	45	▼
Morocco	42	▼
Tunisia	28	▼
Scotland	28	▼

Country average vs. International average:

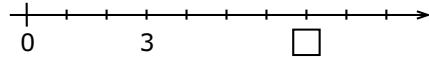
Higher	▲
Not different	○
Lower	▼

Item Number: M011026

Correct Response:	C
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Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Number going in the number line box



On the number line above, what number goes in the box?

Number in = _____

Overall Percent Correct

Japan	88	▲
Belgium (Flemish)	88	▲
Singapore	87	▲
Hungary	86	▲
Chinese Taipei	85	▲
Netherlands	85	▲
England	80	▲
Latvia	76	▲
Italy	74	▲
Hong Kong, SAR	72	▲
Lithuania	72	▲
Slovenia	71	▲
New Zealand	66	○
United States	66	○
International average	66	
Australia	64	○
Cyprus	60	▼
Russian Federation	60	▼
Scotland	60	▼
Moldova, Republic of	56	▼
Iran, Islamic Republic of	55	▼
Norway	54	▼
Armenia	45	▼
Philippines	36	▼
Morocco	30	▼
Tunisia	28	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Item Number: M031162

SCORING

Correct Response

- 7

Incorrect Response

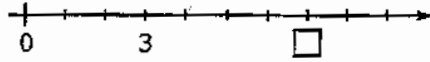
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Number going in the number line box (continued)

Item Number: M031162

Student Responses

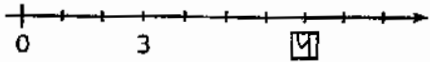
Correct Response:



On the number line above, what number goes in the box?

Number in = 7

Incorrect Response:



On the number line above, what number goes in the box?

Number in = 4

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Number tiles: get to 20 using 2,7,9

Get to 20 Number Game

Two children, Joan and Herbert, are learning to play a game “Get to 20.” Here are the rules for the game.

GET TO 20 RULES

Pick Tiles: Each player draws three number tiles.

Add Tiles: Each player places the three tiles to make an addition problem with the sum total closest to 20.

For example, here are four ways a player who draws $\boxed{1}$, $\boxed{4}$, and $\boxed{5}$ could place the tiles:

$$\begin{array}{r} \boxed{5} \boxed{1} \\ + \boxed{4} \\ \hline 55 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{4} \boxed{5} \\ + \boxed{1} \\ \hline 46 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{1} \boxed{5} \\ + \boxed{4} \\ \hline 19 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{1} \\ + \boxed{5} \\ + \boxed{4} \\ \hline 10 \end{array}$$

This player should choose to show the addition problem $\begin{array}{r} 15 \\ +4 \\ \hline 19 \end{array}$ because 19 is the total closest to 20.

Joan and Herbert played the game “Get to 20.”

Joan picked $\boxed{2}$, $\boxed{7}$, and $\boxed{9}$. Herbert picked $\boxed{1}$, $\boxed{3}$, and $\boxed{6}$.

- A. What is the addition problem that Joan could make with her number tiles that gives a total closest to 20? Be sure to include the total.
- B. What is the addition problem that Herbert could make with his number tiles that gives a total closest to 20? Be sure to include the total.
- C. Herbert said, “If I pick $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$, I can make 20 two different ways.”

Show two ways Herbert could make 20 with $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$.

First way:

Second way:

Overall Percent Correct

Chinese Taipei	69	▲
Japan	65	▲
Hong Kong, SAR	61	▲
Hungary	53	▲
Italy	53	▲
Lithuania	51	▲
Cyprus	50	▲
Singapore	49	▲
Russian Federation	47	○
Belgium (Flemish)	47	▲
Latvia	45	○
Moldova, Republic of	44	○
United States	43	○
New Zealand	41	○
International average	41	
Netherlands	40	○
Slovenia	40	○
England	40	○
Australia	38	○
Norway	36	○
Scotland	36	○
Tunisia	24	▼
Iran, Islamic Republic of	22	▼
Philippines	13	▼
Morocco	9	▼
Armenia	5	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Number tiles: get to 20 using 2,7,9 (continued)

Item Number: M031344A

SCORING

Correct Response

- $2 + 7 + 9 = 18$
- 18 without addition statement shown

Incorrect Response

- $2 + 7 + 9$ but 18 not shown
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Number tiles: get to 20 using 2,7,9 (continued)

Item Number: M031344A

Student Responses

Correct Response:

Joan and Herbert played the game "Get to 20."

Joan picked $\boxed{2}$, $\boxed{7}$, and $\boxed{9}$. Herbert picked $\boxed{1}$, $\boxed{3}$, and $\boxed{6}$.

- A. What is the addition problem that Joan could make with her number tiles that gives a total closest to 20? Be sure to include the total.

$$\begin{array}{r} 2 \quad 7 \\ 7 \quad 9 \\ + 2 \\ \hline 9 \quad 18 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 9 \\ + 2 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 9 \\ + 7 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 7 \\ + 2 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 2 \\ + 9 \\ \hline 11 \end{array}$$

Incorrect Response:

Joan and Herbert played the game "Get to 20."

Joan picked $\boxed{2}$, $\boxed{7}$, and $\boxed{9}$. Herbert picked $\boxed{1}$, $\boxed{3}$, and $\boxed{6}$.

- A. What is the addition problem that Joan could make with her number tiles that gives a total closest to 20? Be sure to include the total.

$$\begin{array}{r} 29 \\ + 7 \\ \hline 36 \end{array}$$

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Number tiles: get to 20 using 1,3,6

Get to 20 Number Game

Two children, Joan and Herbert, are learning to play a game "Get to 20." Here are the rules for the game.

GET TO 20 RULES

Pick Tiles: Each player draws three number tiles.

Add Tiles: Each player places the three tiles to make an addition problem with the sum total closest to 20.

For example, here are four ways a player who draws $\boxed{1}$, $\boxed{4}$, and $\boxed{5}$ could place the tiles:

$$\begin{array}{r} \boxed{5} \boxed{1} \\ + \boxed{4} \\ \hline 55 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{4} \boxed{5} \\ + \boxed{1} \\ \hline 46 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{1} \boxed{5} \\ + \boxed{4} \\ \hline 19 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{1} \\ + \boxed{5} \\ + \boxed{4} \\ \hline 10 \end{array}$$

This player should choose to show the addition problem $\begin{array}{r} 15 \\ +4 \\ \hline 19 \end{array}$ because 19 is the total closest to 20.

Joan and Herbert played the game "Get to 20."

Joan picked $\boxed{2}$, $\boxed{7}$, and $\boxed{9}$. Herbert picked $\boxed{1}$, $\boxed{3}$, and $\boxed{6}$.

- A. What is the addition problem that Joan could make with her number tiles that gives a total closest to 20? Be sure to include the total.
- B. What is the addition problem that Herbert could make with his number tiles that gives a total closest to 20? Be sure to include the total.
- C. Herbert said, "If I pick $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$, I can make 20 two different ways."

Show two ways Herbert could make 20 with $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$.

First way:

Second way:

Overall Percent Correct

Chinese Taipei	65	▲
Hungary	64	▲
Japan	61	▲
Singapore	57	▲
Belgium (Flemish)	57	▲
Latvia	55	▲
Hong Kong, SAR	51	▲
Lithuania	51	▲
England	50	▲
Cyprus	49	▲
Italy	49	▲
United States	48	▲
Russian Federation	46	○
Netherlands	43	○
New Zealand	43	○
Slovenia	41	○

International average	41	
Australia	39	○
Scotland	37	○
Moldova, Republic of	36	○
Norway	35	▼
Iran, Islamic Republic of	13	▼
Philippines	13	▼
Armenia	6	▼
Tunisia	6	▼
Morocco	4	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Number tiles: get to 20 using 1,3,6 (continued)

Item Number: M031344B

SCORING

Correct Response

- $13 + 6 = 19$ OR $16 + 3 = 19$
- 19 without addition statement shown

Incorrect Response

- $13 + 6$ OR $16 + 3$ but 19 not shown
- Other incorrect (including crossed out/erased, stray marks, illegible, or off task)

Number tiles: get to 20 using 1,3,6 (continued)

Item Number: M031344B

Student Responses

Correct Response:

- B. What is the addition problem that Herbert could make with his number tiles that gives a total closest to 20? Be sure to include the total.

Herbert will get 19

Incorrect Response:

- B. What is the addition problem that Herbert could make with his number tiles that gives a total closest to 20? Be sure to include the total.

all of them

Content Domain	Main Topic	Cognitive Domain
NUMBER	Whole Numbers	Using Concepts

Number tiles: get to 20 using 1,4,6

Get to 20 Number Game

Two children, Joan and Herbert, are learning to play a game "Get to 20." Here are the rules for the game.

GET TO 20 RULES

Pick Tiles: Each player draws three number tiles.

Add Tiles: Each player places the three tiles to make an addition problem with the sum total closest to 20.

For example, here are four ways a player who draws $\boxed{1}$, $\boxed{4}$, and $\boxed{5}$ could place the tiles:

$$\begin{array}{r} \boxed{5} \boxed{1} \\ + \boxed{4} \\ \hline 55 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{4} \boxed{5} \\ + \boxed{1} \\ \hline 46 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{1} \boxed{5} \\ + \boxed{4} \\ \hline 19 \end{array} \quad \text{or} \quad \begin{array}{r} \boxed{1} \\ + \boxed{5} \\ + \boxed{4} \\ \hline 10 \end{array}$$

This player should choose to show the addition problem $\begin{array}{r} 15 \\ +4 \\ \hline 19 \end{array}$ because 19 is the total closest to 20.

Joan and Herbert played the game "Get to 20."

Joan picked $\boxed{2}$, $\boxed{7}$, and $\boxed{9}$. Herbert picked $\boxed{1}$, $\boxed{3}$, and $\boxed{6}$.

- A. What is the addition problem that Joan could make with her number tiles that gives a total closest to 20? Be sure to include the total.
- B. What is the addition problem that Herbert could make with his number tiles that gives a total closest to 20? Be sure to include the total.
- C. Herbert said, "If I pick $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$, I can make 20 two different ways."

Show two ways Herbert could make 20 with $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$.

First way:

Second way:

Overall Percent Correct

Chinese Taipei	66	▲
Singapore	65	▲
Hungary	59	▲
England	59	▲
Japan	58	▲
United States	58	▲
Latvia	57	▲
Hong Kong, SAR	56	▲
Belgium (Flemish)	56	▲
Italy	55	▲
Cyprus	53	▲
New Zealand	53	▲
Russian Federation	53	▲
Netherlands	51	○
Scotland	51	▲
Lithuania	47	○
Slovenia	47	○
Australia	47	○
International average	44	
Norway	39	○
Moldova, Republic of	36	▼
Philippines	12	▼
Iran, Islamic Republic of	11	▼
Armenia	7	▼
Tunisia	4	▼
Morocco	0	▼

Country average vs. International average:

Higher	▲
Not different	○
Lower	▼

Number tiles: get to 20 using 1,4,6 (continued)

Item Number: M031344C

SCORING

Correct Response

- Both ways correct $16 + 4$ AND $14 + 6$

Partially Correct Response

- Only one way correct $16 + 4$ OR $14 + 6$

Incorrect Response

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

Number tiles: get to 20 using 1,4,6 (continued)

Item Number: M031344C

Student Responses

Correct Response:

- C. Herbert said, "If I pick $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$, I can make 20 two different ways."

Show two ways Herbert could make 20 with $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$.

First way:

$$\begin{array}{r} 11 \\ + 6 \\ \hline 20 \end{array}$$

Second way:

$$\begin{array}{r} 16 \\ + 4 \\ \hline 20 \end{array}$$

Partially Correct Response:

- C. Herbert said, "If I pick $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$, I can make 20 two different ways."

Show two ways Herbert could make 20 with $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$.

First way:

$$\begin{array}{r} 14 \\ + 6 \\ \hline 20 \end{array}$$

Second way:

Number tiles: get to 20 using 1,4,6 (continued)

Item Number: M031344C

Student Responses (continued)

Incorrect Response:

- C. Herbert said, "If I pick $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$, I can make 20 two different ways."

Show two ways Herbert could make 20 with $\boxed{1}$, $\boxed{4}$, and $\boxed{6}$.

First way:

$$\begin{array}{r} 5 \\ + 6 \\ \hline 20 \end{array}$$

Second way:

$$\begin{array}{r} 4 \\ + 16 \\ \hline 20 \end{array}$$

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