RELEASED SCIENCE ITEMS

This book contains the released Trends in International Mathematics and Science Study (TIMSS) 1995 grade 4 science assessment items. This is not a complete set of all TIMSS 1995 assessment items because some items are kept confidential so that they may be used in subsequent cycles of TIMSS to measure trends.

How Can This Set of Released Items Be Used?

In teacher-designed assessments. The items in this book present different ways of measuring students' understanding in various content and cognitive domains. A teacher may use these items to create an assessment according to the needs of the class after reviewing the items and selecting items of interest.

For feedback on student understanding. Student responses can be scored according to the scoring information provided in the book. Items that coincide with concepts taught in class allow the teacher to gain feedback on the students' understanding of assessed concepts. For example, a teacher might decide to examine the incorrect or partially correct responses of the class. The teacher might use the items to identify particular difficulties or misconceptions experienced by individual students, which can serve as the basis for some remedial teaching or focused practice.

To benchmark student performance. The teacher might also compare the percent of students in the class who responded correctly to an item with the percent of students who responded correctly to the same item in other education systems or in the United States.

Guide to the Content and Layout of This Book

This book contains the released items from TIMSS 1995. 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:

- Earth science
- Life science
- Physical science
- Environmental issues and the nature of science

1995 Cognitive Domains:

- Understanding simple information
- Understanding complex information
- Theorizing, analyzing and solving problems
- Using tools, routine procedures and science processes
- Investigating the natural world

Take a look at *Temperature/precipitation table*, the name given to the first item in this book. As specified in boxes at the top of the page, the content domain for this item is *earth science* and the cognitive domain is *using tools, routine procedures and science processes*.

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.

- **Scoring guide**. This form is used to assist in scoring write-in 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 some extended response items.

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
Earth Science	Using Tools, Routine Procedures, and Science Processes

Temperature/precipitation table

Overall Percent Correct

This table shows the temperature and precipitation (rain or snow) in four different towns on the same day.

	Town A	Town B	Town C	Town D
Lowest Temperature	13°C	-9°C	22°C	-12°C
Highest Temperature	25°C	-1°C	30°C	-4°C
Precipitation (rain or snow)	0 cm	5 cm	2.5 cm	0 cm

Where did it snow?

A. Town A

B. Town B

C. Town C

D. Town D

Japan	69	▲
Hong Kong	63	▲
Czech Republic	60	▲
Netherlands	60	▲
Korea	56	▲
Slovenia	55	▲
United States	54	▲
Austria	52	O
Hungary	49	O
Latvia (LSS)	48	O
Canada	47	O
Australia	46	O
Israel	44	O
Norway	44	O
International average	**44**	
Singapore	41	O
New Zealand	39	O
Ireland	38	O
Iceland	36	O
Cyprus	32	▼
England	32	▼
Iran, Islamic Rep.	31	▼
Scotland	31	▼
Greece	30	▼
Kuwait	27	▼
Thailand	27	▼
Portugal	26	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: N1

Correct Response:	B

3

Content Domain	Cognitive Domain
Earth Science	Understanding Simple Information

Moon shining at night

The Moon produces no light, and yet it shines at night. Why is this?

A. The Moon reflects the light from the Sun.

B. The Moon rotates at a very high speed.

C. The Moon is covered with a thin layer of ice.

D. The Moon has many craters.

Overall Percent Correct

Hong Kong	87	▲
Singapore	86	▲
Norway	85	▲
Netherlands	81	▲
Austria	79	▲
Hungary	78	▲
Portugal	77	O
Czech Republic	76	O
Korea	76	O
United States	75	O
England	72	O
Slovenia	72	O
Australia	70	O
International average	**70**	
Ireland	69	O
Canada	68	O
Greece	67	O
Iceland	64	O
New Zealand	64	O
Thailand	64	O
Scotland	63	O
Latvia (LSS)	62	O
Japan	58	▼
Kuwait	58	▼
Iran, Islamic Rep.	56	▼
Cyprus	54	▼
Israel	52	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: O4

Correct Response:	A

Content Domain	Cognitive Domain
Earth Science	Theorizing, Analyzing, and Solving Problems

Snow on mountain

Sometimes mountains can still have snow on their tops when the snow on the lower parts of the mountains has melted. What makes this happen?

Item Number: O9

Overall Percent Correct

Japan	73	▲
Korea	70	▲
Hungary	67	▲
Norway	64	▲
Czech Republic	60	▲
Canada	54	O
England	54	▲
United States	53	O
Netherlands	52	O
Iceland	50	O
Scotland	48	O
Latvia (LSS)	47	O
Slovenia	47	O
Hong Kong	46	O
Israel	46	O
International average	**46**	
Iran, Islamic Rep.	42	O
Ireland	41	O
New Zealand	41	O
Australia	37	▼
Portugal	33	▼
Singapore	33	▼
Austria	30	▼
Cyprus	29	▼
Greece	28	▼
Thailand	24	▼
Kuwait	22	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

SCORING

Correct Response

- Mentions that it is colder on the mountain tops or warmer farther down.
  Example: The air is colder higher up.

- Mentions that more snow is falling high up in the mountains.

- Other correct.

Incorrect Response

- Mentions that there is sunshine lower down or there is more sunshine lower down.

- Refers to sun or heat melting the snow.
  Examples: The sun is warm.
  Sun shines and the snow melts.

- Refers to the mountain being very high.

- Refers to the wind blowing more on the mountain top.

- Merely repeats information in stem.

- Other incorrect.

Content Domain	Cognitive Domain
Earth Science	Theorizing, Analyzing, and Solving Problems

Size of sun and moon

> The Sun is bigger than the Moon, but they appear to be about the same size when you look at them from the Earth. Why is this?

Overall Percent Correct

Korea	46	▲
Australia	44	▲
Japan	43	▲
Norway	43	▲
Austria	40	▲
Czech Republic	38	▲
Iceland	38	O
Netherlands	38	▲
Canada	36	▲
Scotland	36	O
England	35	O
New Zealand	34	O
Hungary	33	O
Ireland	33	O
United States	33	O
International average	**31**	
Hong Kong	30	O
Latvia (LSS)	30	O
Slovenia	29	O
Singapore	27	O
Israel	25	O
Thailand	18	▼
Kuwait	16	▼
Portugal	15	▼
Greece	12	▼
Iran, Islamic Rep.	12	▼
Cyprus	9	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Y1

SCORING

Correct Response

- Mentions that the sun is farther away than the moon. Comparative language is used.
  Example: The moon is closer to the Earth.

- Other correct responses comparing apparent sizes.

Incorrect Response

- Includes some reference to the light.
  Examples: The sun shines on the moon.
  The moon shines only in the night.

- States that the sun is closer than the moon.

- Refers to distance, but response is general, not specified.
  Examples: We are so far away from the sun.
  The distance is so long.

- Refers to the sun being higher up than the moon.

- Other acceptable but incomplete or slightly erroneous responses.

- Repeats the information in the stem.
  Example: The sun is bigger than the moon.

- Other incorrect:
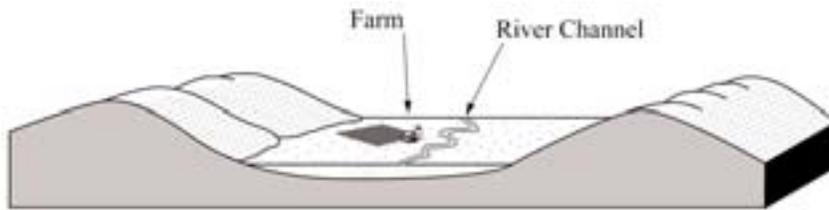 *Examples: Because you are in the same place.*
  Because the sun is rotating.

Content Domain	Cognitive Domain
Earth Science	Theorizing, Analyzing, and Solving Problems

River on the plain: good place for farming

The diagram shows a river flowing through a wide plain. The plain is covered with several layers of soil and sediment.

Farm   River Channel

a. Write down one reason why this plain is a good place for farming.

b. Write down one reason why this plain is NOT a good place for farming.

Overall Percent Correct

Korea	91	▲
United States	83	▲
Singapore	78	▲
Australia	76	▲
Japan	75	▲
England	74	▲
Scotland	72	▲
Ireland	70	▲
Hungary	69	▲
New Zealand	69	O
Thailand	69	O
Canada	68	O
Hong Kong	65	O
International average	**62**	
Greece	62	O
Netherlands	62	O
Israel	59	O
Slovenia	59	O
Cyprus	56	O
Norway	56	O
Czech Republic	54	▼
Latvia (LSS)	52	▼
Austria	51	▼
Portugal	49	▼
Iran, Islamic Rep.	40	▼
Iceland	38	▼
Kuwait	23	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Z1A

SCORING

Part a: Scoring for reason plain is a good place for farming.

Correct Response

- Mentions that the soil is fertile (good), abundant.

- Mentions that there is a river (for irrigation, water for animals).

- Mentions that there is plenty of space or flat areas for farm land.

- Other correct:
  Example: The goats can find grass in the mountains.

Incorrect Response

- Does not address the issue of farming.
  Examples: It is silent, a peaceful place to live.
          You can swim in the river.

- Merely repeats information in stem.

- Other incorrect.

Content Domain	Cognitive Domain
Earth Science	Theorizing, Analyzing, and Solving Problems

River on the plain: bad place for farming

The diagram shows a river flowing through a wide plain. The plain is covered with several layers of soil and sediment.

a. Write down one reason why this plain is a good place for farming.

b. Write down one reason why this plain is NOT a good place for farming.

Item Number: Z1B

Overall Percent Correct

Netherlands	45	▲
England	40	▲
Ireland	36	▲
Slovenia	36	▲
Hungary	35	▲
Korea	32	▲
New Zealand	32	▲
United States	28	▲
Scotland	27	O
Israel	26	O
Canada	25	O
Thailand	25	O
Australia	23	O
International average	**23**	
Czech Republic	22	O
Austria	20	O
Latvia (LSS)	20	O
Singapore	19	O
Norway	16	▼
Greece	13	▼
Iceland	12	▼
Japan	12	▼
Portugal	11	▼
Iran, Islamic Rep.	10	▼
Cyprus	9	▼
Hong Kong	9	▼
Kuwait	7	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

SCORING

Part b: Scoring for reason plain is not a good place for farming.

Correct Response

• Mentions the possibility of flooding, or that the soil will be too wet.

• Mentions the possibility of wind or water erosion.

• Other correct:
 Examples: They might not get a lot of sunlight.
  The farmer would have to climb the hills to sell or trade his meat, vegetables, or fruit.
  It might be in the rain shadow of one of the mountains or hills.

Incorrect Response

• Mentions that it is an undesirable place to live: boring/lonesome/ugly...
 Example: Too far from the city.

• Does not address the issue of farming.
 Example: The river is dangerous [for children].

• Refers to problems due to surrounding mountains.
 Examples: Avalanches (snow or rocks) from the mountains.
   Goats get lost in the mountains.

• Refers to sediment, soil, being rocky and negative.

• Merely repeats information in stem.

• Other incorrect.

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Which are living things

Which one of these refers only to living things?

A. clouds, fire, rivers

B. fire, rivers, trees

C. rivers, birds, trees

D. birds, trees, worms

E. trees, worms, clouds

Overall Percent Correct

Japan	94	▲
Korea	91	▲
Netherlands	88	▲
Austria	86	▲
Ireland	85	▲
Czech Republic	84	▲
Slovenia	84	▲
England	79	O
Scotland	79	O
Israel	78	O
Singapore	78	O
Hong Kong	77	O
Thailand	77	O
Australia	76	O
International average	**74**	
United States	74	O
Canada	73	O
Hungary	71	O
Portugal	70	O
Iceland	68	O
New Zealand	66	O
Greece	65	▼
Latvia (LSS)	65	O
Norway	61	▼
Cyprus	60	▼
Kuwait	60	▼
Iran, Islamic Rep.	47	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: N2

Correct Response:	D

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Body temperature

Your temperature is taken when you are NOT sick. Which temperature is CLOSEST to what the thermometer would show?

A. 29°C

B. 37°C

C. 100°C

D. 212°C

Overall Percent Correct

Japan	74	▲
Singapore	71	▲
Netherlands	70	▲
United States	62	▲
Czech Republic	60	▲
Slovenia	59	▲
Austria	58	▲
Hong Kong	58	▲
Korea	58	▲
Iceland	57	▲
Kuwait	57	▲
Norway	54	O
Latvia (LSS)	50	O
International average	**48**	
Israel	44	O
Australia	43	O
Greece	42	O
Hungary	42	O
Portugal	40	O
Canada	37	▼
Cyprus	33	▼
New Zealand	32	▼
Scotland	32	▼
England	31	▼
Thailand	28	▼
Ireland	27	▼
Iran, Islamic Rep.	17	▼

Country average vs. International average:

Higher ▲
Not different O
Lower ▼

Item Number: N3

Correct Response: B

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Where does bird live

This is a drawing of a bird's foot.

Where would you be MOST likely to find such a bird?

A. a forest

B. a meadow

C. a cornfield

D. a desert

E. a lake

Item Number: N5

Overall Percent Correct

Korea	88	▲
Czech Republic	83	▲
Netherlands	83	▲
Greece	82	▲
Iceland	81	▲
Austria	80	▲
Norway	80	▲
Latvia (LSS)	77	O
Australia	76	O
Hungary	76	O
Ireland	76	O
Canada	75	O
Israel	73	O
England	71	O
Japan	71	O
Slovenia	71	O
International average	**71**	
Cyprus	69	O
Scotland	68	O
United States	68	O
New Zealand	67	O
Kuwait	63	▼
Iran, Islamic Rep.	57	▼
Singapore	57	▼
Hong Kong	56	▼
Portugal	56	▼
Thailand	29	▼

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

Correct Response:	E

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Where does baby chick get food

A baby chick grows inside an egg for 21 days before it hatches. Where does the baby chick get its food before it hatches?

A. It is fed by the mother hen.

B. It doesn't need any food.

C. It makes its own food.

D. It uses food stored in the egg.

E. It eats the egg shell.

Overall Percent Correct

Korea	72	▲
Japan	67	▲
Austria	62	▲
Slovenia	60	▲
Netherlands	55	▲
New Zealand	50	O
Iceland	48	O
Greece	47	O
Australia	44	O
United States	44	O
International average	**43**	
Canada	41	O
Latvia (LSS)	41	O
England	40	O
Singapore	40	O
Hungary	39	O
Ireland	37	O
Norway	37	O
Scotland	36	O
Thailand	36	O
Hong Kong	35	▼
Czech Republic	34	▼
Kuwait	34	▼
Iran, Islamic Rep.	33	▼
Israel	29	▼
Portugal	28	▼
Cyprus	27	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: N6

Correct Response:	D

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Why did seeds not sprout

John kept some seeds on moist cotton in a dish. Mike put the same kind of seeds in a dish beside John's dish, and covered them with water. After two days, John's seeds sprouted, but Mike's did not.

Which is the most likely reason?

A. Mike's seeds needed more air.

B. Mike's seeds needed more light.

C. Mike did not put the dish in a warm enough place.

D. Mike should have used a different kind of seed.

Item Number: O2

Overall Percent Correct

Korea	61	▲
Netherlands	58	▲
Israel	53	▲
Czech Republic	50	O
Hungary	48	O
New Zealand	46	O
United States	46	O
Australia	45	O
Canada	45	O
Singapore	45	O
Latvia (LSS)	44	O
England	43	O
Iceland	43	O
Ireland	43	O
Norway	42	O
International average	**41**	
Austria	40	O
Scotland	39	O
Portugal	38	O
Slovenia	38	O
Japan	37	O
Hong Kong	36	O
Cyprus	31	▼
Thailand	25	▼
Iran, Islamic Rep.	23	▼
Greece	22	▼
Kuwait	22	▼

Country average vs. International average:

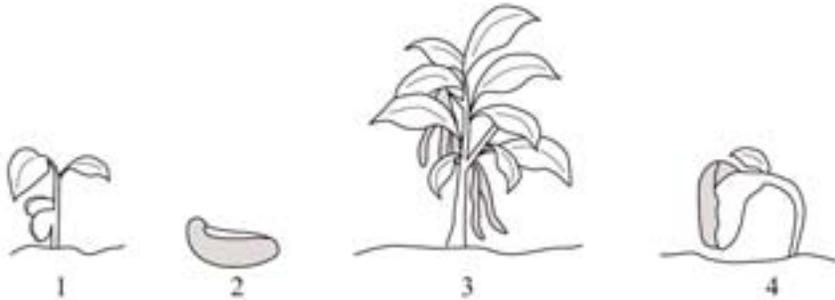|	
Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Stages of plant growth

The pictures show a bean plant at different stages of growth. (The pictures are not drawn on the same scale.)

In what order do these stages take place?

A. 2, 1, 3, 4

B. 2, 4, 1, 3

C. 3, 2, 1, 4

D. 4, 2, 3, 1

E. 4, 3, 2, 1

Item Number: O3

Overall Percent Correct

Korea	97	▲
Japan	92	▲
Singapore	92	▲
Hong Kong	86	▲
United States	81	▲
Netherlands	79	▲
Australia	78	▲
Thailand	78	▲
Slovenia	77	▲
Czech Republic	76	O
New Zealand	74	O
Canada	72	O
England	70	O
Austria	69	O
International average	**69**	
Scotland	65	O
Ireland	64	O
Israel	64	O
Hungary	61	O
Cyprus	60	▼
Iceland	60	O
Greece	55	▼
Latvia (LSS)	52	▼
Norway	52	▼
Portugal	52	▼
Kuwait	47	▼
Iran, Islamic Rep.	33	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Which animal produces milk

Which animal produces milk for its young?

A. Chicken

B. Frog

C. Monkey

D. Snake

Overall Percent Correct

Korea	96	▲
Japan	94	▲
Czech Republic	92	▲
Hungary	91	▲
Thailand	85	▲
Iran, Islamic Rep.	83	▲
Slovenia	83	▲
Netherlands	82	O
Hong Kong	81	▲
Portugal	77	O
Singapore	77	O
Australia	76	O
International average	**75**	
Latvia (LSS)	74	O
Greece	73	O
New Zealand	73	O
England	72	O
United States	71	O
Canada	70	O
Ireland	69	O
Norway	69	O
Cyprus	68	O
Scotland	66	▼
Israel	63	▼
Austria	60	▼
Kuwait	58	▼
Iceland	56	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: O7

Correct Response:	C

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Adult stage of caterpillar

When this caterpillar becomes an adult, what will it look like?

Item Number: P1

Overall Percent Correct

Canada	98	▲
Hong Kong	97	▲
Netherlands	97	▲
Norway	97	▲
United States	97	▲
Australia	96	▲
Czech Republic	96	▲
England	96	▲
Japan	95	▲
New Zealand	95	▲
Austria	94	▲
Ireland	94	▲
Scotland	94	▲
Singapore	94	▲
Korea	90	O
Slovenia	87	O
Hungary	85	O
International average	**85**	
Israel	81	O
Thailand	76	O
Iceland	71	▼
Iran, Islamic Rep.	69	▼
Greece	67	▼
Cyprus	64	▼
Latvia (LSS)	63	▼
Portugal	59	▼
Kuwait	45	▼

Country average vs. International average:

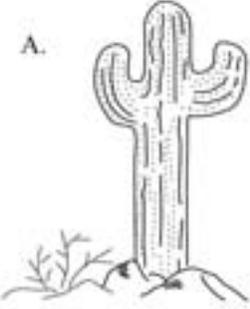|	
Higher	▲
Not different	O
Lower	▼

Correct Response:	**B**

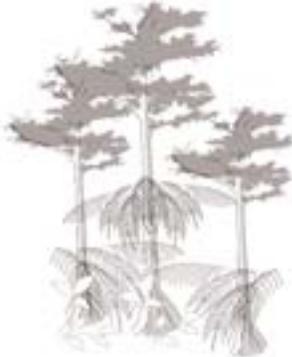| Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Plants found in very dry places

Which picture shows plants commonly found in a desert?

A.

B.

C.

D.

Item Number: P2

Overall Percent Correct

Hong Kong	97	▲
Canada	96	▲
Korea	96	▲
Austria	95	▲
Norway	95	▲
United States	95	▲
Japan	94	▲
Netherlands	94	▲
Australia	92	O
Czech Republic	91	O
England	91	O
Latvia (LSS)	91	O
Scotland	91	O
Iceland	89	O
Ireland	89	O
New Zealand	89	O
Slovenia	89	O
International average	**88**	
Greece	86	O
Cyprus	84	O
Thailand	83	O
Hungary	82	O
Israel	80	▼
Portugal	78	▼
Kuwait	76	▼
Singapore	76	▼
Iran, Islamic Rep.	56	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Birds different from insects

Birds are different from insects in that birds have

A. wings

B. legs

C. eyes

D. eggs

E. feathers

Overall Percent Correct

Hungary	95	▲
Czech Republic	77	▲
Japan	77	▲
Australia	76	▲
Canada	73	▲
Singapore	73	▲
Austria	71	▲
New Zealand	69	▲
United States	69	▲
Scotland	67	O
Korea	65	O
Norway	64	O
England	63	O
Ireland	63	O
International average	**60**	
Greece	59	O
Kuwait	58	O
Thailand	58	O
Netherlands	57	O
Iceland	55	O
Latvia (LSS)	46	▼
Portugal	43	▼
Slovenia	42	▼
Hong Kong	41	▼
Israel	41	▼
Iran, Islamic Rep.	29	▼
Cyprus	28	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: P8

Correct Response:	E

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Seeds in plants

Seeds develop from which part of a plant?

A. Flower

B. Leaf

C. Root

D. Stem

Item Number: P9

Overall Percent Correct

Czech Republic	79	▲
Austria	71	▲
Thailand	69	▲
Japan	68	▲
Slovenia	68	▲
Latvia (LSS)	66	▲
Hungary	65	▲
Singapore	64	▲
Hong Kong	62	▲
Korea	55	▲
Netherlands	46	O
International average	**46**	
Israel	45	O
Cyprus	44	O
Australia	38	O
Greece	37	O
United States	37	▼
England	35	▼
Canada	33	▼
New Zealand	33	▼
Norway	33	▼
Iceland	29	▼
Scotland	26	▼
Iran, Islamic Rep.	23	▼
Ireland	22	▼
Kuwait	22	▼
Portugal	20	▼

Country average vs. International average:

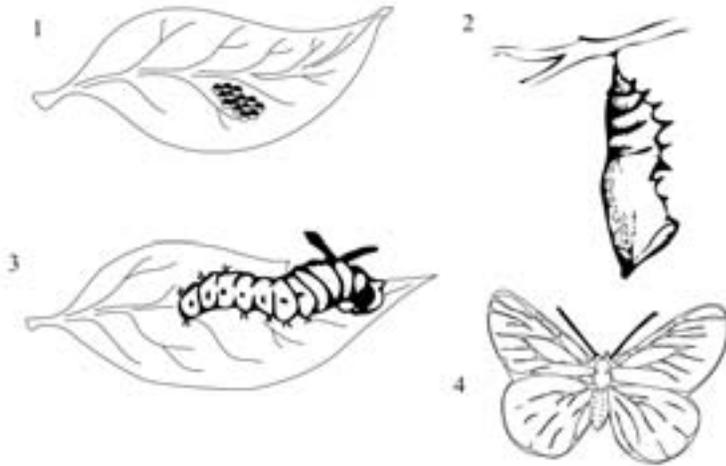|	
Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Changes in butterfly eggs

A butterfly sitting on a leaf laid some small eggs. The pictures show the changes that took place to the eggs.

In what order did the changes take place?

A. 1, 2, 3, 4

B. 1, 3, 2, 4

C. 1, 4, 3, 2

D. 1, 4, 2, 3

Item Number: Q1

Overall Percent Correct

Japan	92	▲
Netherlands	86	▲
Korea	85	▲
Hong Kong	82	▲
Australia	81	▲
United States	80	▲
Canada	79	▲
Czech Republic	79	▲
New Zealand	76	▲
England	73	O
Singapore	73	▲
Scotland	72	O
Austria	70	O
Hungary	67	O
Norway	67	O
Ireland	65	O
International average	**64**	
Greece	57	O
Slovenia	56	O
Latvia (LSS)	54	▼
Cyprus	53	▼
Israel	51	▼
Iceland	49	▼
Portugal	44	▼
Thailand	33	▼
Kuwait	31	▼
Iran, Islamic Rep.	19	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Why eat fruits and vegetables

What is the BEST reason for including fruits and leafy vegetables in a healthy diet?

A. They have a high water content.

B. They are the best source of protein.

C. They are rich in minerals and vitamins.

D. They are the best source of carbohydrates.

Overall Percent Correct

Netherlands	93	▲
Austria	92	▲
Czech Republic	83	▲
Hungary	82	▲
Slovenia	80	▲
Korea	79	▲
Norway	77	▲
Hong Kong	74	▲
Latvia (LSS)	73	O
Israel	72	O
Singapore	72	▲
International average	**65**	
Iceland	65	O
Japan	64	O
Ireland	62	O
United States	62	O
Scotland	59	O
Canada	58	O
England	58	O
Australia	57	O
Portugal	57	O
New Zealand	55	▼
Greece	46	▼
Kuwait	45	▼
Thailand	45	▼
Cyprus	44	▼
Iran, Islamic Rep.	39	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Q2

Correct Response:	C

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Animal breathes faster

When an animal breathes faster and its heart beats faster, the animal is MOST likely

A. cold

B. frightened

C. resting

D. sleeping

Item Number: Q5

Overall Percent Correct

Hong Kong	87	▲
United States	80	▲
Cyprus	79	O
Slovenia	79	O
Australia	78	O
Austria	77	O
England	77	O
Latvia (LSS)	77	O
Singapore	77	O
Canada	75	O
Czech Republic	75	O
Greece	75	O
Netherlands	75	O
New Zealand	74	O
Norway	74	O
Japan	73	O
Korea	73	O
Scotland	73	O
International average	**73**	
Ireland	72	O
Iceland	71	O
Iran, Islamic Rep.	71	O
Israel	69	O
Hungary	68	O
Portugal	59	▼
Thailand	58	▼
Kuwait	52	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Which is not an insect

Which picture does NOT show an insect?

A. Butterfly

B. Grasshopper

C. Spider

D. Ant

Overall Percent Correct

Country		
Korea	81	▲
Japan	77	▲
Singapore	67	▲
Australia	63	▲
United States	62	▲
Hong Kong	61	▲
Canada	59	▲
New Zealand	53	▲
Netherlands	45	O
Scotland	44	O
Austria	43	O
England	43	O
International average	**43**	
Ireland	40	O
Greece	39	O
Slovenia	39	O
Kuwait	38	O
Cyprus	37	O
Norway	34	O
Czech Republic	32	▼
Hungary	31	▼
Portugal	26	▼
Iran, Islamic Rep.	22	▼
Israel	21	▼
Iceland	20	▼
Latvia (LSS)	19	▼
Thailand	10	▼

Country average vs. International average:

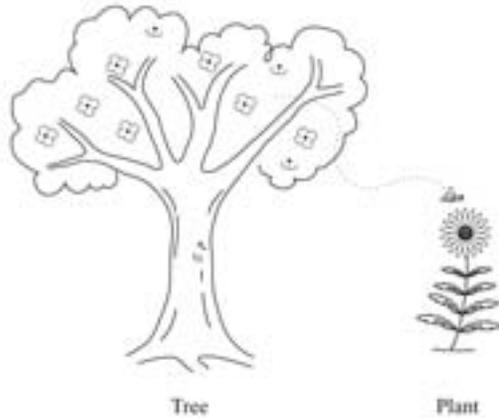|	
Higher	▲
Not different	O
Lower	▼

Item Number: Q6

Correct Response:	C

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Insect carries pollen

The picture shows how an insect can carry pollen from the flowers of a tree to the flowers of a small plant.

Tree   Plant

What will most likely happen?

A. The offspring from the tree will look like the plant.

B. The offspring from the plant will look like the tree.

C. The offspring from the plant will look like the tree and the plant.

D. Nothing will happen because no offspring will be produced.

Item Number: R3

Overall Percent Correct

Czech Republic	79	▲
Slovenia	79	▲
Hungary	76	▲
Austria	72	▲
Ireland	72	▲
England	67	▲
New Zealand	66	▲
Australia	62	O
Norway	62	O
Scotland	60	O
United States	60	O
Canada	59	O
Israel	57	O
Latvia (LSS)	57	O
Netherlands	57	O
Portugal	57	O
International average	**55**	
Greece	55	O
Iceland	54	O
Iran, Islamic Rep.	48	O
Singapore	41	▼
Cyprus	40	▼
Korea	36	▼
Hong Kong	35	▼
Kuwait	34	▼
Thailand	27	▼
Japan	22	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	D

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Why use sunscreen

What is the MOST important reason for people to use a sun-screen when they are outside in sunlight?

A. It protects the skin against dangerous rays from the sun.

B. It makes the skin more tanned.

C. It makes the skin smooth.

D. It makes the skin feel cooler.

Item Number: R4

Overall Percent Correct

Country	Percent	
Australia	93	▲
Ireland	90	▲
Czech Republic	89	▲
England	87	▲
Canada	85	▲
Hong Kong	85	▲
Norway	85	▲
Slovenia	85	▲
Austria	83	O
Israel	83	O
Korea	83	▲
Netherlands	83	O
United States	83	▲
New Zealand	81	O
Scotland	80	O
Portugal	77	O
Cyprus	76	O
International average	**76**	
Iceland	74	O
Singapore	74	O
Hungary	69	O
Greece	68	O
Thailand	63	▼
Japan	61	▼
Kuwait	53	▼
Latvia (LSS)	51	▼
Iran, Islamic Rep.	28	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	A

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Which animal has backbone

Which one of these groups contains only animals with a backbone (vertebrates)?

A. Earthworm, snake, crayfish

B. Spider, clam, dragonfly

C. Crayfish, snake, horse

D. Clam, fish, earthworm

E. Horse, snake, fish

Item Number: R6

Overall Percent Correct

Country	Percent	
Thailand	74	▲
Hungary	64	▲
Czech Republic	63	▲
Greece	61	▲
United States	55	▲
Kuwait	54	▲
Australia	53	O
Korea	51	O
Canada	50	O
Cyprus	50	O
New Zealand	50	O
England	47	O
Ireland	47	O
Japan	47	O
Netherlands	47	O
International average	**45**	
Singapore	42	O
Slovenia	41	O
Iceland	40	O
Portugal	40	O
Scotland	40	O
Norway	33	▼
Austria	31	▼
Iran, Islamic Rep.	31	▼
Latvia (LSS)	30	▼
Hong Kong	22	▼
Israel	19	▼

Country average vs. International average:

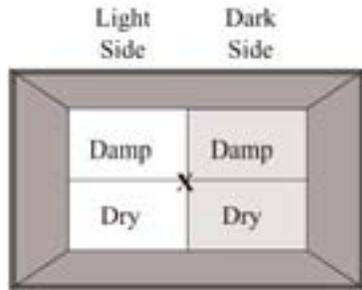|	
Higher	▲
Not different	O
Lower	▼

Correct Response:	E

Content Domain	Cognitive Domain
Life Science	Using Tools, Routine Procedures, and Science Processes

Worm in box

Here is a picture of the inside of a box. If you put a worm on the X on the bottom of the box, to which corner would you expect it to go?

A. Damp and light

B. Dry and light

C. Damp and dark

D. Dry and dark

Overall Percent Correct

Korea	92	▲
Japan	79	▲
Austria	73	▲
Netherlands	73	▲
Australia	68	▲
England	68	▲
Czech Republic	66	▲
Slovenia	63	O
Canada	62	O
New Zealand	62	O
Israel	60	O
Scotland	60	O
United States	59	O
Latvia (LSS)	58	O
Hong Kong	56	O
International average	**56**	
Hungary	55	O
Ireland	54	O
Iceland	53	O
Norway	53	O
Singapore	48	▼
Portugal	37	▼
Cyprus	35	▼
Greece	30	▼
Iran, Islamic Rep.	28	▼
Kuwait	26	▼
Thailand	26	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: R7

Correct Response:	C

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Function of the heart

> Write down one thing your heart does that helps the other parts of your body.

Overall Percent Correct

Australia	69	▲
United States	64	▲
England	61	▲
Singapore	59	▲
Austria	57	▲
New Zealand	53	▲
Scotland	53	▲
Norway	51	▲
Canada	49	▲
Ireland	49	▲
Slovenia	49	▲
International average	**40**	
Japan	39	O
Israel	37	O
Netherlands	36	O
Czech Republic	35	O
Greece	34	O
Korea	34	O
Iceland	33	O
Latvia (LSS)	33	O
Hungary	30	▼
Portugal	27	▼
Iran, Islamic Rep.	23	▼
Cyprus	18	▼
Hong Kong	14	▼
Thailand	13	▼
Kuwait	12	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: W2

SCORING

Correct Response

• Explanation includes pumping blood in a circulating system out to the body and back to the heart.

• Explanation includes pumping blood to all parts of the body.
  Examples: It pumps blood and gives air to your lungs.
  It pumps blood to the other parts of your body.
  It pumps your blood.
  It pumps your blood around your body.

• Other correct.

Incorrect Response

• Refers to heart keeping us alive or similar expression.
  Examples: Your heart gives you energy.
  Your heart gives you the strength to grow.
  It helps me breathe.

• Refers to heart keeping the beat.

• Other incorrect.

Content Domain	Cognitive Domain
Life Science	Theorizing, Analyzing, and Solving Problems

Thirst on a hot day

Write down the reason why we get thirsty on a hot day and have to drink a lot.

Item Number: W3

SCORING

Correct Response

- Refers to perspiration and its cooling effect and the need to replace lost water.

- Refers to perspiration and only to replacement of lost water.
  Example: Because when we are hot, our body opens the pores on our skin and we lose a lot of salt and liquid.

- Refers to perspiration and only its cooling effect.

- Refers to perspiration only.
  Examples: We are sweating.
  Your body gives away much water.
  We are sweating and get drier.

- Other acceptable.

Incorrect Response

- Refers to body temperature (being too hot) but does not answer why we get thirsty.
  Example: You cool down by drinking something cold.

- Refers only to drying of the body.
  Examples: Your throat/mouth gets dry.
  You get drier.
  The heat dries everything.

- Refers to getting more energy by drinking more water.
  Example: You get exhausted.

- Merely repeats the information in the stem.
  Examples: Because it is hot.
  You need water.

- Other incorrect:
  Example: You lose salt.

Overall Percent Correct

Slovenia	44	▲
Korea	43	▲
Singapore	43	▲
Hong Kong	41	▲
Japan	37	▲
Israel	36	▲
Austria	35	O
Canada	33	▲
Czech Republic	33	O
Scotland	32	O
Norway	30	O
United States	29	O
Australia	28	O
England	28	O
Netherlands	28	O
International average	**27**	
Greece	25	O
Ireland	22	O
Latvia (LSS)	21	O
New Zealand	21	▼
Cyprus	19	▼
Hungary	17	▼
Iran, Islamic Rep.	15	▼
Portugal	14	▼
Iceland	13	▼
Thailand	13	▼
Kuwait	12	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

29

Content Domain	Cognitive Domain
Life Science	Theorizing, Analyzing, and Solving Problems

Human skull

The human brain is inside the skull. Write down one advantage of the skull being thick and strong.

Overall Percent Correct

Korea	80	▲
Japan	71	▲
Hong Kong	70	▲
Australia	66	▲
Singapore	66	▲
Austria	65	▲
Netherlands	60	▲
United States	58	▲
Scotland	56	O
England	55	O
New Zealand	53	O
Czech Republic	52	O
Greece	52	O
Israel	52	O
International average	**51**	
Ireland	49	O
Canada	48	O
Hungary	48	O
Thailand	47	O
Slovenia	46	O
Norway	43	▼
Latvia (LSS)	41	▼
Cyprus	38	▼
Iceland	38	▼
Iran, Islamic Rep.	33	▼
Portugal	24	▼
Kuwait	13	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: W4

SCORING

Correct Response

• Refers to protection against concussion and injuries of the brain.
  Example: It protects the brain. [or thoughts, memory....]

• Refers to protection of the "head."
  Examples: It does not break as easily.
  *   The head can withstand more.*

• Explanation includes other correct "advantages."

Incorrect Response

• Repeats information given in the stem.
  Examples: The skull is so hard.
  *   Its so thick it makes it strong.*

• Other incorrect.

Content Domain	Cognitive Domain
Life Science	Theorizing, Analyzing, and Solving Problems

Animals and plants

Write down one reason why animals could NOT live in a world without plants.

Overall Percent Correct

Japan	91	▲
Korea	88	▲
Netherlands	88	▲
Australia	87	▲
Slovenia	87	▲
England	85	▲
Singapore	85	▲
Israel	84	▲
Austria	83	▲
United States	83	▲
Ireland	80	O
Czech Republic	79	O
Norway	79	O
Canada	78	O
Latvia (LSS)	77	O
New Zealand	77	O
Scotland	77	O
International average	**77**	
Hungary	74	O
Hong Kong	71	▼
Cyprus	70	▼
Greece	70	▼
Iceland	70	▼
Portugal	68	▼
Iran, Islamic Rep.	60	▼
Thailand	57	▼
Kuwait	44	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: X2

SCORING

Correct Response

• Shows some understanding of food chain.
Example: Some animals need plants to eat and others depend on eating the animals.

• Mentions that plants are generally needed for food.
Example: Animals eat plants.

• Refers to plants "producing oxygen" or "cleaning the air".
Examples: If there were no plants, animals couldn't breathe.
Plants give them air.

• Some combination of the above.

• Other acceptable:
Example: Plants give animals shelter and a home.

Incorrect Response

• Merely repeats information from the stem.
Example: Plants are needed.

• Other incorrect.

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Stages in frog's growth

The pictures show different stages in a frog's growth.

Write the letters in the boxes to show the pictures in the order of the frog's growth.

Overall Percent Correct

Japan	97	▲
Netherlands	97	▲
Austria	95	▲
Hong Kong	95	▲
Singapore	95	▲
Australia	94	▲
Korea	94	▲
United States	94	▲
Canada	92	▲
England	91	▲
Czech Republic	90	▲
Ireland	89	▲
Slovenia	89	▲
Hungary	87	▲
Scotland	87	O
New Zealand	85	O
Norway	84	O
International average	**83**	
Greece	79	O
Israel	79	O
Latvia (LSS)	77	O
Thailand	75	▼
Cyprus	71	▼
Iceland	71	▼
Kuwait	64	▼
Portugal	62	▼
Iran, Islamic Rep.	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: X4

SCORING

Correct Response

• ZWYX.

Incorrect Response

• Any other order.

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

In which group do fish belong

This chart shows four groups of animals. In which group do fish belong?

Overall Percent Correct

Japan	88	▲
Korea	82	▲
Singapore	79	▲
Slovenia	76	▲
Czech Republic	71	▲
Australia	69	▲
Hungary	65	O
England	63	O
Hong Kong	63	O
Greece	61	O
Ireland	61	O
New Zealand	61	O
Norway	61	O
United States	59	O
International average	**59**	
Canada	57	O
Cyprus	57	O
Latvia (LSS)	56	O
Scotland	56	O
Iceland	53	O
Thailand	52	O
Kuwait	47	▼
Netherlands	47	▼
Austria	44	▼
Israel	43	▼
Iran, Islamic Rep.	36	▼
Portugal	27	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: X5

Correct Response:	**B**

33

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Changes in children's bodies: one change

Write down two changes that occur in children's bodies as they become adults.

Item Number: Y2A

SCORING

Note: Each of the two ways must be scored separately.

If the ways described are essentially the same, the second should be scored as incorrect.

Correct Response

• Refers to growth such as increases in height, weight, strength....
Example: They get bigger.

• Refers to sexual maturation. Explanation may include secondary sexual features such as voice, hair....

• Refers to appearance.
*Examples: Their nails grow.
Their hair might darken*.

• Other acceptable:
Example: They lose teeth.

Incorrect Response

• Refers to emotional or intellectual changes.
*Examples: They don't cry.
Their minds expand in intelligence*.

• Refers to social changes.
*Examples: They can decide more themselves.
They wear fashion clothes*.

• Refers to changes associated with aging such as losing hair.

• Repeats information in the question, such as referring to children becoming adults.
Example: They get older.

• Other incorrect.
Example: Bones.

Overall Percent Correct

Korea	91	▲
Japan	90	▲
Netherlands	86	▲
Austria	79	▲
Norway	76	▲
Australia	75	▲
United States	74	▲
Ireland	73	▲
Canada	70	▲
England	70	▲
Scotland	70	O
Hong Kong	67	O
Singapore	67	O
Israel	66	O
Greece	65	O
Iceland	64	O
New Zealand	64	O
International average	**64**	
Hungary	58	O
Slovenia	55	▼
Portugal	54	▼
Czech Republic	53	▼
Latvia (LSS)	53	▼
Cyprus	52	▼
Kuwait	37	▼
Thailand	37	▼
Iran, Islamic Rep.	17	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

34

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Changes in children's bodies: two changes

Write down two changes that occur in children's bodies as they become adults.

Item Number: Y2B

SCORING

Note: Each of the two ways must be scored separately.

If the ways described are essentially the same, the second should be scored as incorrect.

Correct Response

- Refers to growth such as increases in height, weight, strength....
  Example: They get bigger.

- Refers to sexual maturation. Explanation may include secondary sexual features such as voice, hair....

- Refers to appearance.
  Examples: Their nails grow.
  Their hair might darken.

- Other acceptable:
  Example: They lose teeth.

Incorrect Response

- Refers to emotional or intellectual changes.
  Examples: They don't cry.
  Their minds expand in intelligence.

- Refers to social changes.
  Examples: They can decide more themselves.
  They wear fashion clothes.

- Refers to changes associated with aging such as losing hair.

- Repeats information in the question, such as referring to children becoming adults.
  Example: They get older.

- Other incorrect.
  Example: Bones.

Overall Percent Correct

Korea	60	▲
Netherlands	60	▲
Austria	59	▲
Norway	53	▲
United States	53	▲
Hong Kong	51	▲
Singapore	51	▲
Australia	50	▲
Hungary	49	▲
Canada	48	▲
Ireland	46	O
Scotland	43	O
England	42	O
Israel	42	O
International average	**39**	
Iceland	38	O
New Zealand	37	O
Greece	33	O
Czech Republic	32	▼
Cyprus	28	▼
Slovenia	25	▼
Thailand	23	▼
Japan	22	▼
Portugal	22	▼
Kuwait	21	▼
Latvia (LSS)	18	▼
Iran, Islamic Rep.	10	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

35

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Ways animals protect themselves: one way

One way for animals to protect themselves is by escaping (running, flying, or swimming away). What are two other ways they protect themselves?

Overall Percent Correct

Japan	92	▲
Netherlands	83	▲
Korea	80	▲
United States	77	▲
Australia	75	▲
Canada	72	▲
Singapore	69	▲
England	67	▲
Ireland	67	▲
Slovenia	67	▲
Israel	66	O
Norway	65	O
New Zealand	64	O
Scotland	64	O
Czech Republic	62	O
Austria	61	O
Greece	61	O
Hong Kong	61	O
International average	**60**	
Latvia (LSS)	60	O
Iceland	48	▼
Portugal	47	▼
Hungary	43	▼
Cyprus	38	▼
Iran, Islamic Rep.	35	▼
Kuwait	28	▼
Thailand	20	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Y3A

SCORING

Note: Each of the two ways must be scored separately.

If the ways described are essentially the same, the second should be scored as incorrect.

Correct Response

- Response includes general action such as defense, attack, fight.
  Example: It can fight the animal.

- Response includes specific examples of offensive actions such as biting, scratching, goring, frightening, making noise.

- Response includes specific examples of defensive actions such as camouflage or hiding, blending in, staying still, acting dead, etc.

- Response includes structural features of the animal used in defense such as spines, shell, smell, being poisonous, and tasting bad.

- Other acceptable:
  Example: Use their special weapons.

Incorrect Response

- Response repeats information in the question or adds other ways of escaping.
  Examples: Flying away
      Jumping away
      Climbing trees.

- Other incorrect.

36

Content Domain	Cognitive Domain
Life Science	Understanding Complex Information

Ways animals protect themselves: two ways

> One way for animals to protect themselves is by escaping (running, flying, or swimming away). What are two other ways they protect themselves?

Overall Percent Correct

Country		
United States	64	▲
Australia	63	▲
Netherlands	61	▲
Canada	56	▲
Ireland	53	▲
Israel	52	▲
Singapore	52	▲
New Zealand	51	▲
Norway	50	▲
Korea	49	▲
Hong Kong	47	O
Scotland	47	O
England	46	O
Czech Republic	44	O
International average	**42**	
Austria	41	O
Slovenia	41	O
Hungary	37	O
Iceland	36	O
Greece	35	O
Latvia (LSS)	35	O
Japan	31	▼
Iran, Islamic Rep.	25	▼
Cyprus	23	▼
Kuwait	15	▼
Portugal	14	▼
Thailand	11	▼

Item Number: Y3B

SCORING

Note: Each of the two ways must be scored separately.

If the ways described are essentially the same, the second should be scored as incorrect.

Correct Response

• Response includes general action such as defense, attack, fight.
Example: It can fight the animal.

• Response includes specific examples of offensive actions such as biting, scratching, goring, frightening, making noise.

• Response includes specific examples of defensive actions such as camouflage or hiding, blending in, staying still, acting dead, etc.

• Response includes structural features of the animal used in defense such as spines, shell, smell, being poisonous, and tasting bad.

• Other acceptable:
Example: Use their special weapons.

Incorrect Response

• Response repeats information in the question or adds other ways of escaping.
Examples: Flying away
Jumping away
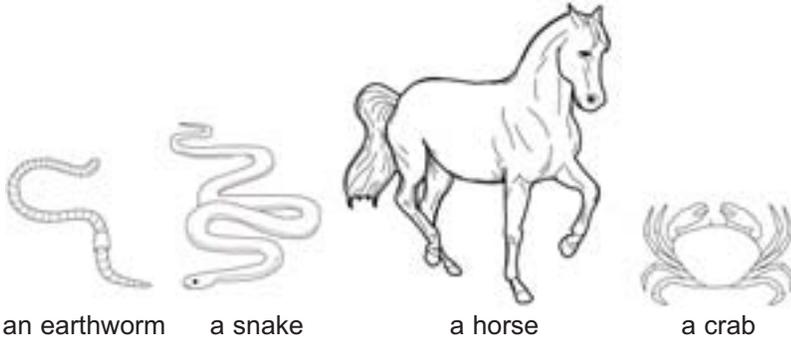*Climbing trees.*

• Other incorrect.

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

37

Content Domain	Cognitive Domain
Life Science	Understanding Simple Information

Structural features of animals

Use the pictures to answer the questions. (Use each animal once only.)

| an earthworm | a snake | a horse | a crab |

An animal that has a hard outside skeleton is

_____

An animal without a backbone that has many segments to its body is

_____

An animal that has hair and an inside skeleton is

_____

An animal that has a scaly skin and an inside skeleton is

_____

Overall Percent Correct

Hong Kong	94	▲
Korea	85	▲
Japan	83	▲
Australia	79	▲
United States	78	▲
Singapore	76	▲
Hungary	74	▲
England	72	▲
Austria	71	▲
Czech Republic	71	▲
Scotland	71	▲
Canada	69	▲
New Zealand	67	O
Slovenia	67	O
Greece	63	O
International average	**62**	
Cyprus	62	O
Ireland	60	O
Netherlands	57	O
Norway	57	O
Latvia (LSS)	49	▼
Israel	45	▼
Portugal	41	▼
Iceland	40	▼
Kuwait	38	▼
Iran, Islamic Rep.	27	▼
Thailand	24	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Z2

SCORING

Correct Response

- Crab - Earthworm - Horse - Snake in this order.
- One or more general terms are used, in the correct order, for the above organisms. (Crustacean, Reptile, etc.)

Incorrect Response

- No correct answers.
- Only crab and horse are correct.
- Any other two or three are correct.
- Only crab is correct.
  Only horse is correct.
  Only earthworm is correct.
  Only snake is correct.
- Other incorrect.
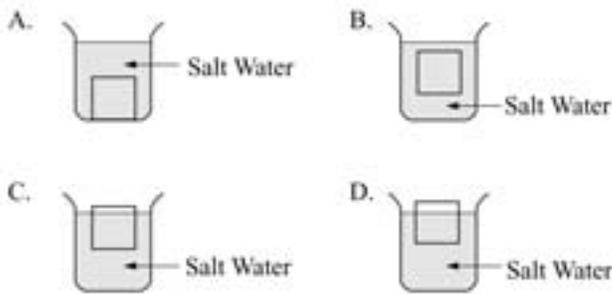
Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Block floating in water

The picture shows a block of wood floating in fresh water.
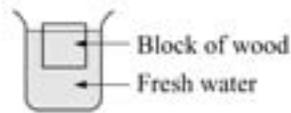
If this block were placed in salt water from the ocean, which picture shows what would happen?

Item Number: N4

Overall Percent Correct

Country		
Korea	54	▲
Slovenia	46	▲
Hong Kong	44	▲
Austria	43	O
Norway	41	O
Singapore	40	▲
Israel	38	O
Cyprus	37	O
Japan	37	O
Canada	36	O
Czech Republic	35	O
Ireland	34	O
New Zealand	34	O
International average	**34**	
Kuwait	33	O
Australia	32	O
Greece	32	O
Netherlands	31	O
Scotland	31	O
United States	31	O
England	29	O
Iceland	29	O
Latvia (LSS)	26	O
Hungary	24	▼
Thailand	24	▼
Iran, Islamic Rep.	20	▼
Portugal	20	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Physical Science	Understanding Simple Information

Girl's source of energy

Keisha is pushing her bicycle up a hill. Where does Keisha get the energy to push her bicycle?

A. From the food she has eaten

B. From the exercise she did earlier

C. From the ground she is walking on

D. From the bicycle she is pushing

Item Number: N7

Overall Percent Correct

Country		
Iceland	70	▲
Netherlands	70	▲
Austria	66	▲
Korea	65	▲
Singapore	64	▲
Canada	63	▲
Japan	63	▲
England	61	▲
Norway	61	O
United States	60	▲
Australia	59	O
Czech Republic	54	O
Hong Kong	54	O
International average	**52**	
Ireland	52	O
Israel	52	O
Scotland	51	O
New Zealand	50	O
Iran, Islamic Rep.	47	O
Slovenia	46	O
Latvia (LSS)	44	O
Portugal	44	O
Hungary	42	▼
Kuwait	32	▼
Greece	31	▼
Cyprus	29	▼
Thailand	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response: A

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Powder with white/black specks

A powder made up of both white specks and black specks is likely to be

A. a solution

B. a pure compound

C. a mixture

D. an element

Overall Percent Correct

Netherlands	85	▲
Korea	83	▲
Ireland	78	▲
Austria	77	▲
Hungary	77	▲
Australia	75	▲
England	75	▲
Canada	73	▲
Singapore	71	▲
United States	71	▲
Scotland	70	▲
New Zealand	67	O
Latvia (LSS)	61	O
Portugal	61	O
Slovenia	61	O
International average	**61**	
Israel	55	O
Czech Republic	54	▼
Cyprus	53	O
Norway	52	O
Hong Kong	48	▼
Kuwait	47	▼
Greece	42	▼
Japan	42	▼
Iran, Islamic Rep.	36	▼
Iceland	35	▼
Thailand	30	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: N8

Correct Response:	C

Content Domain	Cognitive Domain
Physical Science	Using Tools, Routine Procedures, and Science Processes

Which box has least mass

Which of the boxes X, Y, or Z has the LEAST mass?

A. X

B. Y

C. Z

D. All three boxes have the same mass.

Overall Percent Correct

Japan	87	▲
Korea	81	▲
Hong Kong	80	▲
Netherlands	78	▲
New Zealand	72	▲
Canada	70	O
Czech Republic	70	O
Iceland	70	O
Norway	70	O
Singapore	69	▲
Hungary	66	O
Australia	65	O
Scotland	65	O
Thailand	64	O
International average	**63**	
United States	62	O
Ireland	61	O
Slovenia	61	O
Cyprus	54	O
England	54	O
Greece	52	▼
Latvia (LSS)	52	O
Austria	49	▼
Israel	49	▼
Portugal	45	▼
Iran, Islamic Rep.	42	▼
Kuwait	38	▼

Country average vs. International average:

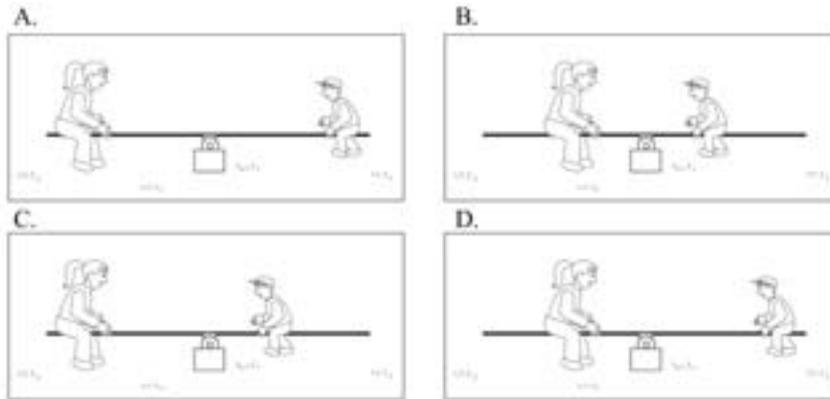|	
Higher	▲
Not different	O
Lower	▼

Item Number: N9

Correct Response:	A

Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

Balance on seesaw

Overall Percent Correct

Korea	84	▲
Norway	64	▲
Japan	63	▲
Czech Republic	59	▲
Austria	56	O
Slovenia	54	O
Australia	53	O
Singapore	53	▲
Canada	52	O
Netherlands	51	O
Latvia (LSS)	48	O
New Zealand	48	O
International average	**46**	
Iceland	45	O
Hong Kong	44	O
United States	44	O
Hungary	40	O
Ireland	39	O
Thailand	39	O
England	38	O
Portugal	37	O
Israel	35	▼
Scotland	34	▼
Cyprus	32	▼
Greece	32	O
Iran, Islamic Rep.	22	▼
Kuwait	18	▼

A girl wanted to play on a seesaw with her little brother.

Which picture shows the best way for the girl, who weighed 50 kg (kilograms), to balance her brother, who weighed 25 kg?

A.

B.

C.

D.

Country average vs. International average:

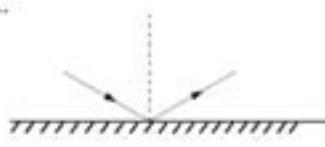|	
Higher	▲
Not different	O
Lower	▼

Item Number: O1

Correct Response:	D

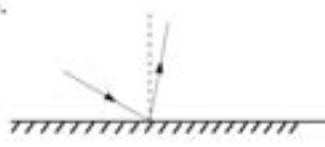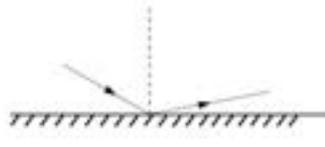| Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

What would reflection look like
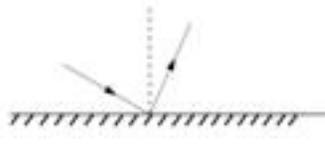
A beam of light strikes a mirror as shown.

Mirror
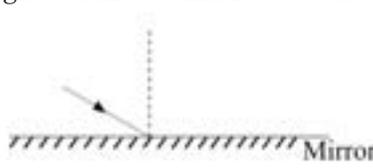
Which picture best shows what the reflected light would look like?

A.

B.

C.

D.

Overall Percent Correct

Korea	90	▲
Canada	63	O
England	63	O
Singapore	63	O
Czech Republic	62	O
Hong Kong	62	O
Hungary	60	O
Cyprus	59	O
Japan	59	O
Israel	58	O
Thailand	58	O
New Zealand	57	O
Scotland	57	O
United States	57	O
International average	**56**	
Australia	56	O
Slovenia	56	O
Ireland	55	O
Austria	53	O
Greece	52	O
Iceland	51	O
Netherlands	51	O
Portugal	50	O
Norway	46	O
Iran, Islamic Rep.	44	▼
Latvia (LSS)	44	▼
Kuwait	42	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: O5

Correct Response:	A

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Mixture of iron and sand

In a box there is a mixture of iron filings and sand. Which is the easiest way to separate the iron filings from the sand?

A. Pour water on the mixture

B. Use a magnifying glass

C. Use a magnet

D. Heat the mixture

Overall Percent Correct

Korea	96	▲
Japan	89	▲
Iran, Islamic Rep.	73	▲
Singapore	67	▲
Israel	64	O
Latvia (LSS)	60	O
Czech Republic	59	O
Hungary	59	O
Netherlands	59	O
Norway	59	O
Austria	56	O
International average	**55**	
Australia	54	O
England	53	O
United States	53	O
Portugal	52	O
Greece	50	O
Scotland	49	O
Hong Kong	48	O
Slovenia	47	O
New Zealand	46	O
Thailand	45	▼
Canada	43	▼
Cyprus	43	▼
Ireland	42	▼
Iceland	41	▼
Kuwait	35	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: O8

Correct Response:	C

Content Domain	Cognitive Domain
Physical Science	Understanding Simple Information

What is not energy source

Which is NOT used as an energy source?

A. Flowing water

B. Iron ore

C. Sun

D. Oil

Item Number: P3

Overall Percent Correct

Austria	47	▲
Japan	46	▲
Ireland	40	O
Scotland	40	O
Slovenia	40	O
Canada	39	O
Hungary	38	O
Netherlands	38	O
United States	38	O
Iceland	37	O
England	36	O
Israel	36	O
International average	**35**	
Greece	34	O
Hong Kong	34	O
Portugal	34	O
Australia	33	O
Cyprus	32	O
Iran, Islamic Rep.	32	O
New Zealand	32	O
Norway	32	O
Czech Republic	31	O
Korea	31	O
Kuwait	27	O
Latvia (LSS)	27	O
Thailand	27	O
Singapore	20	▼

Country average vs. International average:

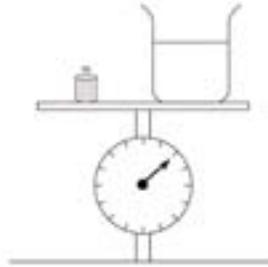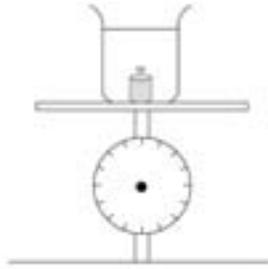|	
Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

Beaker on scale

Elizabeth put a weight and a beaker of water on a scale, as shown in the first picture.

Then she moved the beaker and put the weight in it, as shown in the second picture.

What will the scale show now? Draw an arrow on the second picture to show your answer.

Overall Percent Correct

Japan	58	▲
Korea	48	▲
Slovenia	48	▲
Singapore	47	▲
Latvia (LSS)	45	▲
Czech Republic	43	▲
Austria	40	O
Hungary	39	O
Australia	38	O
Netherlands	37	O
Iceland	36	O
International average	**34**	
Hong Kong	33	O
Greece	32	O
New Zealand	32	O
Israel	31	O
Ireland	30	O
Portugal	30	O
Scotland	30	O
Canada	28	O
Cyprus	28	O
Norway	28	O
England	27	O
Iran, Islamic Rep.	27	O
Thailand	22	▼
United States	21	▼
Kuwait	10	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: P4

SCORING

Correct Response

• The arrow or line is in the same position as in the first diagram or is described in words. Allow about 0.5 mm tolerance on each side.

Incorrect Response

• The arrow is pointing to a greater weight, that is the arrow is pointing downward somewhere between its original position and vertically down.
OR the student states that it "Weighs more" or similar expression.

• The arrow is pointing to a lesser weight than in the original picture, that is the arrow is pointing upward, between the original position and vertically up.
OR the student states that it "Weighs less" or similar expression.

• Other incorrect.

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Magnet and coffee

Each of the three magnets shown has been dipped into the substance below it. Which of the substances could be coffee?
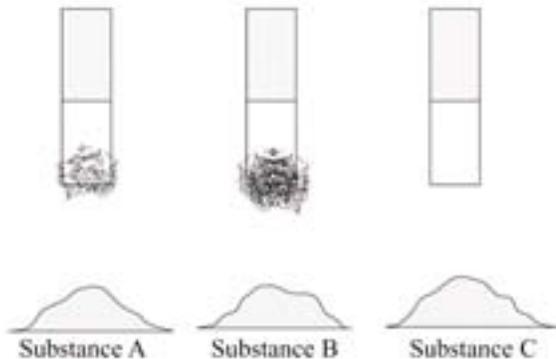
A. A only

B. B only

C. C only

D. A and B only

Overall Percent Correct

Country		
Korea	84	▲
Japan	83	▲
Singapore	70	▲
Czech Republic	66	▲
Hungary	64	▲
England	59	▲
Hong Kong	59	▲
Scotland	57	O
Australia	56	O
Netherlands	53	O
United States	53	O
New Zealand	52	O
Slovenia	52	O
Austria	51	O
Canada	51	O
Ireland	50	O
International average	**50**	
Cyprus	42	O
Norway	40	▼
Israel	38	▼
Latvia (LSS)	38	▼
Portugal	34	▼
Iceland	33	▼
Iran, Islamic Rep.	32	▼
Thailand	29	▼
Greece	25	▼
Kuwait	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: P5

Correct Response:	C

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

What travels fastest

Which travels fastest?

A. A train

B. An airplane

C. Sound

D. Light

Item Number: P7

Overall Percent Correct

Korea	64	▲
Australia	59	▲
Japan	58	▲
New Zealand	56	▲
Czech Republic	53	▲
England	50	▲
Slovenia	50	O
Hungary	49	O
Norway	48	O
Canada	44	O
Hong Kong	44	O
Austria	43	O
Israel	43	O
United States	43	O
International average	**41**	
Latvia (LSS)	41	O
Ireland	39	O
Singapore	38	O
Iceland	37	O
Iran, Islamic Rep.	34	O
Scotland	34	O
Portugal	33	▼
Greece	29	▼
Netherlands	27	▼
Cyprus	23	▼
Thailand	22	▼
Kuwait	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	D

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Which doesn't change in wet ground

Some things were buried in wet ground. Several years later they were dug up. Which thing is MOST likely to have stayed the same?

A. An egg shell

B. A plastic cup

C. A paper plate

D. An orange peel

Overall Percent Correct

Hungary	76	▲
Japan	76	▲
Korea	74	▲
Slovenia	67	▲
Austria	66	▲
Australia	63	▲
Latvia (LSS)	62	O
Canada	60	O
Czech Republic	60	O
England	60	O
Netherlands	59	O
Thailand	57	O
New Zealand	54	O
International average	**54**	
Scotland	51	O
United States	51	O
Greece	50	O
Norway	50	O
Israel	49	O
Cyprus	48	O
Ireland	41	▼
Hong Kong	40	▼
Singapore	40	▼
Iceland	39	▼
Portugal	38	▼
Iran, Islamic Rep.	37	▼
Kuwait	29	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Q3

Correct Response:	**B**

Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

Glass over candle

> When a glass jar is placed over a lighted candle, the flame goes out.
>
>
>
> Why does this happen?

Item Number: Q4

SCORING

Correct Response

- Refers to the need for oxygen.
  Examples: Fire does not get enough oxygen.
  The oxygen will be used up.

- Refers to the need for air.
  Example: Fire does not get enough air.

- Refers to the need for air, using non-scientific language.
  Examples: The fire will be "strangulated."
  The fire cannot breathe.

- Other acceptable.

Incorrect Response

- Refers to its getting too hot.

- States that the gas (smoke, vapor, carbon dioxide...) is trapped inside the jar.
  Example: The smoke cannot come out.

- Refers to the properties of the glass.
  Example: The glass makes it cold.

- Repeats the information in the stem.
  Example: The glass is placed over it.

- Other incorrect:
  Example: You put it on too fast and the wind makes it go out.

Overall Percent Correct

Slovenia	94	▲
Czech Republic	85	▲
Austria	83	▲
Singapore	78	▲
Hungary	77	▲
Norway	75	▲
Korea	74	▲
Netherlands	74	▲
Australia	69	O
Hong Kong	68	O
England	66	O
New Zealand	66	O
Scotland	66	O
International average	**64**	
Portugal	63	O
Iceland	62	O
Ireland	62	O
Latvia (LSS)	62	O
United States	62	O
Canada	61	O
Israel	60	O
Cyprus	56	O
Greece	50	▼
Japan	48	▼
Kuwait	39	▼
Thailand	37	▼
Iran, Islamic Rep.	33	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

51

Content Domain	Cognitive Domain
Physical Science	Using Tools, Routine Procedures, and Science Processes

Pencil in the mirror

The picture shows a pencil that is lying on a shelf in front of a mirror. Draw a picture of the pencil as you would see it in the mirror. Use the patterns of lines on the shelf to help you.
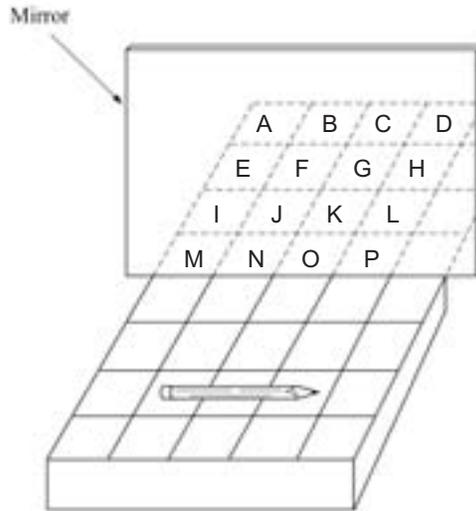
Overall Percent Correct

Singapore	66	▲
Netherlands	64	▲
Japan	62	▲
England	61	▲
Hong Kong	60	▲
Korea	59	▲
Hungary	58	▲
Scotland	58	▲
Australia	56	▲
Czech Republic	56	O
Slovenia	55	O
Austria	53	O
Canada	53	O
Iceland	50	O
International average	**47**	
Latvia (LSS)	47	O
New Zealand	44	O
United States	43	O
Norway	42	O
Ireland	38	▼
Thailand	38	O
Israel	37	▼
Portugal	37	▼
Greece	29	▼
Cyprus	24	▼
Kuwait	20	▼
Iran, Islamic Rep.	17	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Q8

SCORING

Note: In the scoring guide below, the letters refer to squares which are covered by the image of the pencil. Pencil on the borderline should be accepted as correct.

Correct Response

• FGH; pencil point to the right.

• FGH; point not shown.

• FG or GH (point to the right either shown or not shown) OR any other in the row E,F,G,H as long as the point is not clearly turned to the left.

Incorrect Response

• FGH, FG or GH, pencil point clearly turned to the left OR other in the row E,F,G,H.

• Lists all or some part of the row: ABCD.

• Lists all or some part of JKL; pencil point to the right may or may not be shown.

• Lists all or some of the row MNOP, point to the right may or may not be shown.

• Other incorrect.

Content Domain	Cognitive Domain
Physical Science	Using Tools, Routine Procedures, and Science Processes

Why does liquid in thermometer rise

Ken put a thermometer in a glass filled with hot water. Why does the liquid inside the thermometer rise?

A. Gravity pushes it up.

B. Air bubbles are released.

C. Heat from the water makes it expand.

D. Air pressure above the water pulls it up.

Overall Percent Correct

Country	Percent	
Hong Kong	74	▲
Australia	72	▲
England	72	▲
Singapore	70	▲
United States	69	▲
Canada	66	▲
Austria	65	O
Netherlands	63	O
Japan	60	O
Scotland	60	O
Ireland	59	O
New Zealand	59	O
Czech Republic	58	O
International average	**56**	
Greece	56	O
Norway	56	O
Korea	54	O
Hungary	49	O
Kuwait	49	O
Cyprus	48	O
Iceland	48	O
Israel	47	O
Thailand	47	O
Latvia (LSS)	43	▼
Portugal	42	▼
Slovenia	40	▼
Iran, Islamic Rep.	34	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Q9

Correct Response:	C

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Tipped watering can

A watering can is almost filled with water as shown.

The watering can is tipped so that the water just begins to drip through the spout.

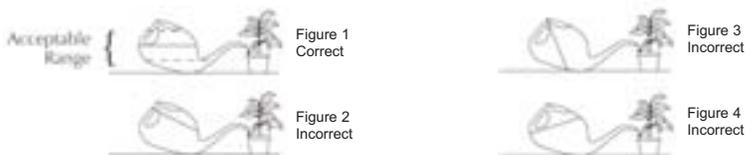Draw a line to show where the surface of the water in the can is now.

Item Number: R1

SCORING

Figure 1 Correct
Figure 2 Incorrect
Figure 3 Incorrect
Figure 4 Incorrect

Note: For wrong answers, the focus is on the angle of the water surface. The exact level (amount of water) is not important. See illustration above.

Correct Response

• Approximately* horizontal level of water within allowable range (see Figure 1).

Incorrect Response

• Approximately* horizontal level of water. Higher or lower level of water than allowable range.

• Water level is approximately* parallel to the bottom of the can (see Figure 2).

• Water level clearly steeper than the bottom of the can (see Figure 3).

• Water level is inclined in the opposite direction of the bottom of the can (see Figure 4).

• Other incorrect:
  Examples: Water in the spout only.
  Water only in the flower pot.

*By "approximately" it is meant within 10 degrees. 10°

Overall Percent Correct

Country		
Singapore	32	▲
Latvia (LSS)	30	O
England	29	▲
Czech Republic	28	O
Hong Kong	28	O
Netherlands	28	O
Japan	27	O
Hungary	26	O
Korea	26	O
Austria	25	O
Slovenia	25	O
Canada	22	O
International average	**21**	
Norway	21	O
United States	21	O
Australia	20	O
Portugal	20	O
Ireland	19	O
Greece	17	O
Iceland	17	O
New Zealand	17	O
Scotland	15	▼
Thailand	15	O
Cyprus	13	▼
Israel	13	▼
Iran, Islamic Rep.	10	▼
Kuwait	8	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Physical Science	Understanding Complex Information

Sound through string

The picture shows Dick and his friends playing with a string-telephone. Sally is speaking. Dick and Tom are trying to listen. Which of them can hear her speak?
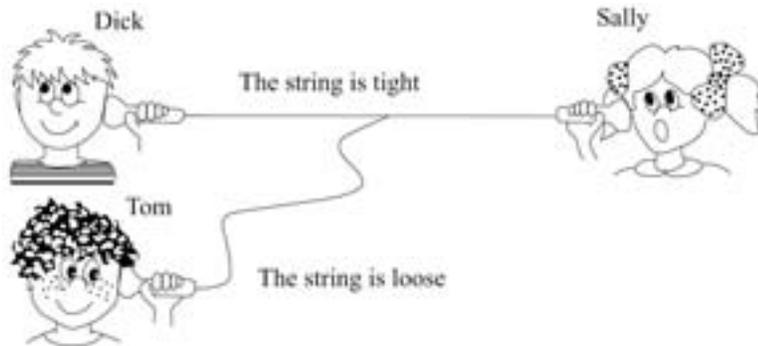
A. Both of them can hear equally clearly.

B. Neither of them can hear.

C. Only Tom can hear clearly.

D. Only Dick can hear clearly.

E. Both of them hear equally faintly.

Item Number: R5

Overall Percent Correct

Japan	86	▲
Korea	82	▲
Singapore	80	▲
United States	72	▲
Netherlands	71	▲
Canada	70	▲
England	69	▲
Cyprus	67	▲
Ireland	66	O
Hong Kong	65	O
Israel	64	O
Thailand	64	O
Austria	62	O
Scotland	61	O
Australia	60	O
Portugal	60	O
International average	**59**	
Greece	55	O
Norway	55	O
Slovenia	52	O
Czech Republic	51	O
New Zealand	47	▼
Iceland	44	▼
Latvia (LSS)	34	▼
Kuwait	32	▼
Hungary	29	▼
Iran, Islamic Rep.	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	**D**

Content Domain	Cognitive Domain
Physical Science	Understanding Simple Information

Which produces light

Which makes its own light?

A. A mirror

B. A candle flame

C. A diamond ring

D. A magnifying lens

Item Number: R8

Overall Percent Correct

Country		
Austria	83	▲
Hungary	72	▲
Czech Republic	69	▲
Netherlands	67	▲
Israel	63	▲
Cyprus	57	O
Portugal	57	O
Canada	56	O
Iceland	56	O
Slovenia	56	O
United States	55	O
Greece	54	O
Latvia (LSS)	53	O
International average	**52**	
Australia	52	O
England	50	O
New Zealand	48	O
Singapore	48	O
Ireland	47	O
Scotland	47	O
Hong Kong	45	▼
Iran, Islamic Rep.	39	▼
Norway	39	▼
Kuwait	37	▼
Japan	31	▼
Thailand	25	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Physical Science	Understanding Simple Information

Advantage of solar energy

One advantage of solar energy is that it

A. does not pollute

B. is not renewable

C. is efficient in any climate

D. is available at all times

Overall Percent Correct

Japan	80	▲
Austria	62	▲
Australia	57	▲
Israel	55	▲
Slovenia	55	▲
Canada	53	O
Czech Republic	52	O
Hong Kong	52	O
Iceland	51	O
Korea	48	O
Ireland	47	O
United States	47	O
New Zealand	44	O
International average	**44**	
Hungary	43	O
Portugal	42	O
England	38	O
Netherlands	38	O
Scotland	38	O
Latvia (LSS)	36	O
Singapore	36	▼
Norway	34	O
Greece	33	▼
Iran, Islamic Rep.	31	▼
Cyprus	27	▼
Thailand	18	▼
Kuwait	14	▼

Country average vs. International average:

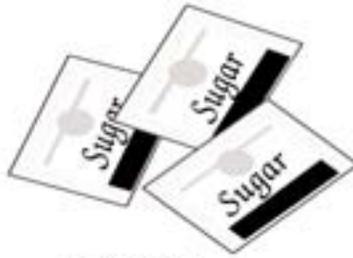|	
Higher	▲
Not different	O
Lower	▼

Item Number: R9

Correct Response:	A

Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

Dissolve sugar

The picture shows two forms of sugar — solid cubes and packets of loose crystals. One cube has the same mass of sugar as one packet.

Sugar Cubes

Loose Sugar

Which of the two forms of sugar will dissolve faster in water? _____

Give a reason for your answer.

Item Number: W1

SCORING

Correct Response

• Loose sugar: explanation refers to size.
  Examples: Because it is already in smaller pieces.
  Because it is smaller/thinner.
  Because it has thousands of individual crystals.

• Loose sugar: explanation refers to compactness of particles.
  Examples: Because cubes are kept together.
  Because cubes are harder.

• Loose sugar. Other acceptable explanations.

Partially Correct

• Loose sugar. No explanation.

• Loose sugar. Explanation is inadequate.
  Examples: Loose sugar is already loose and ready to dissolve.
  Loose sugar isn't in cubes.
  The cubes will take longer to dissolve.

• Other partially correct.

Incorrect Response

• Cubes. No explanation.

• Cubes. Response indicates that loose sugar is already dissolved.
  Examples: Because only cubes need to dissolve.
  Because a sugar cube is not already loose.

• Cubes. Refers to packaging.
  Example: Because the cubes are not in a package.

• Cubes. Other explanations.
  Example: Because the cubes are thicker.

• Other incorrect.

Overall Percent Correct

Country		
Korea	75	▲
Japan	72	▲
Netherlands	70	▲
Austria	47	▲
Canada	46	▲
Singapore	45	▲
Czech Republic	44	▲
Ireland	43	O
United States	43	▲
Australia	42	O
England	42	O
Hong Kong	40	O
Scotland	40	O
New Zealand	37	O
International average	**37**	
Latvia (LSS)	33	O
Israel	32	O
Slovenia	32	O
Thailand	30	O
Hungary	29	▼
Cyprus	27	▼
Portugal	22	▼
Greece	20	▼
Norway	18	▼
Kuwait	16	▼
Iceland	8	▼
Iran, Islamic Rep.	5	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

Two bowls of soup

Anna and Uri had identical bowls of soup, both at the same temperature. Anna put a cover on her bowl.

Anna's soup   Uri's soup

Whose soup do you think would stay hot longer?
_____

Give a reason for your answer.

Item Number: X1

Overall Percent Correct

Korea	80	▲
Australia	67	▲
United States	67	▲
Netherlands	61	▲
Canada	60	▲
Singapore	60	▲
England	59	▲
Ireland	57	▲
Israel	56	O
New Zealand	56	▲
Japan	55	▲
Scotland	49	O
International average	**46**	
Slovenia	45	O
Austria	44	O
Norway	44	O
Cyprus	39	▼
Czech Republic	39	▼
Hungary	39	▼
Greece	36	▼
Hong Kong	33	▼
Latvia (LSS)	28	▼
Iran, Islamic Rep.	25	▼
Portugal	25	▼
Iceland	22	▼
Kuwait	16	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

SCORING

Correct Response

- Anna's soup. Mentions that heat or hot air does not escape Anna's soup or cold air does not enter it OR that heat (vapor, steam, smoke, etc.) disappears from Uri's soup or cold air enters it (or some combination).

- Anna's soup. Other correct explanations.

Partially Correct

- Anna's soup. Explanation refers to the cover.
  Example: The soup with the cover.

- Anna's soup. Incomplete or incorrect explanation.

- Anna's soup. No explanation.

- Other partially correct.

Incorrect Response

- Uri's soup. Explanation is inadequate.

- Uri's soup. No explanation.

- Other incorrect.

Content Domain	Cognitive Domain
Physical Science	Theorizing, Analyzing, and Solving Problems

Weights of three blocks

The weights of three blocks were compared.

Which one of the three blocks weighs the most?
(A, B, or C): _____

Explain your answer.

Overall Percent Correct

Korea	74	▲
Japan	70	▲
Hong Kong	61	▲
Singapore	57	▲
Australia	47	▲
Netherlands	47	▲
Scotland	44	▲
United States	42	▲
Ireland	39	O
Canada	37	O
Iceland	37	O
International average	**37**	
England	36	O
Norway	36	O
Slovenia	36	O
New Zealand	35	O
Czech Republic	34	O
Austria	32	O
Hungary	31	O
Greece	28	▼
Israel	28	▼
Cyprus	26	▼
Latvia (LSS)	25	▼
Portugal	20	▼
Thailand	16	▼
Kuwait	11	▼
Iran, Islamic Rep.	4	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Z3

SCORING

Correct Response

• C. Because B is heavier than A and C is heavier than B, or any equivalent expression.

Partially Correct

• C. Explanation is inadequate.
  Examples: Because B is higher up.
  C. Because it can be seen from the figure(s).
  C. Because it could lift up B.

• C. No explanation.

• The wrong block is chosen but the explanation is correct.

• Other partially correct.

Incorrect Response

• B. With or without explanation.

• A. With or without explanation.

• B and C. (Based on each of the two figures considered separately.)

• All the blocks weigh the same.

• Other incorrect.

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Understanding Complex Information

How computers help

Write down one example of how computers help people do their work.

Item Number: O6

SCORING

Correct Response

- Refers to writing OR editing text.
  Example: With a computer you can write faster and neater.

- Refers to doing calculations OR doing them faster.

- Refers to computer storing or retrieving information (promptly).
  Example: It helps keep files.

- Refers to using computers for instruction.
  Examples: They teach you math.
  Computers help people understand things like math, science, or any subject at all.

- Refers to any combination of two or more responses like those listed above.

- Other Correct:
  Examples: The computer does no mistakes.
  It works faster.

Incorrect Response

- Playing games such as Nintendo.

- Vague references to "everything" or some similar expression.

- Merely repeats information in stem.

- Other incorrect.

Overall Percent Correct

Country		
United States	81	▲
Korea	79	▲
Australia	78	▲
Ireland	77	▲
Slovenia	76	▲
England	74	▲
Singapore	74	▲
Israel	72	▲
New Zealand	72	▲
Canada	71	▲
Netherlands	71	▲
Scotland	71	▲
Norway	68	O
Czech Republic	67	O
Hong Kong	65	O
Hungary	62	O
Iceland	61	O
International average	**60**	
Austria	60	O
Japan	48	▼
Thailand	47	▼
Greece	38	▼
Portugal	35	▼
Latvia (LSS)	33	▼
Cyprus	32	▼
Iran, Islamic Rep.	27	▼
Kuwait	27	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

61

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Investigating the Natural World

Growing seeds in light or dark

To find out whether seeds grow better in the light or dark, you could put some seeds on pieces of damp paper and

A. keep them in a warm, dark place

B. keep one group in a light place and another in a dark place

C. keep them in a warm, light place

D. put them in a light or dark place that is cool

Item Number: P6

Overall Percent Correct

Korea	66	▲
Singapore	62	▲
United States	61	▲
Australia	49	▲
Canada	43	O
England	43	O
Czech Republic	40	O
Iceland	40	O
Thailand	40	O
New Zealand	39	O
International average	**36**	
Hong Kong	36	O
Netherlands	36	O
Scotland	36	O
Slovenia	36	O
Austria	35	O
Greece	30	O
Norway	30	O
Ireland	29	O
Cyprus	27	▼
Israel	26	▼
Kuwait	25	▼
Portugal	25	▼
Latvia (LSS)	23	▼
Hungary	19	▼
Iran, Islamic Rep.	14	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Correct Response:	B

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Understanding Complex Information

Observations of objects in bag

Four children can feel and smell an object inside a bag, but they cannot see it. Which of the following is NOT an observation about the object?

A. "It is flat at one end and round at the other."

B. "It smells like peppermint."

C. "It has a bump on it."

D. "I hope it is candy."

Overall Percent Correct

Country		
Korea	59	▲
United States	58	▲
Australia	57	▲
Japan	56	▲
Canada	54	O
Norway	54	▲
England	53	▲
Netherlands	53	O
Ireland	51	O
New Zealand	50	O
Scotland	50	O
Czech Republic	47	O
Hong Kong	47	O
Hungary	44	O
Singapore	44	O
International average	**43**	
Austria	42	O
Israel	40	O
Slovenia	38	O
Thailand	37	O
Latvia (LSS)	33	▼
Portugal	32	▼
Cyprus	29	▼
Greece	28	▼
Iceland	27	▼
Iran, Islamic Rep.	21	▼
Kuwait	18	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: Q7

Correct Response:	D

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Using Tools, Routine Procedures, and Science Processes

Which bulb is brightest

Some children were trying to find out which of three light bulbs was brightest. Which one of these gives the best START toward finding the answer?

A. "One bulb looks brightest to me, so I already know the answer."

B. "All the bulbs look bright to me, so there cannot be an answer."

C. "It would help if we had a way to measure the brightness of a light bulb."

D. "We can take a vote and each person will vote for the bulb he or she thinks is the brightest."

Overall Percent Correct

Korea	61	▲
Hong Kong	60	▲
Israel	59	▲
Japan	59	▲
United States	54	▲
Australia	52	▲
Czech Republic	51	O
Netherlands	49	O
England	48	O
Iceland	48	O
New Zealand	46	O
Canada	45	O
Ireland	45	O
International average	**43**	
Norway	42	O
Greece	41	O
Cyprus	40	O
Singapore	38	O
Slovenia	37	O
Thailand	37	O
Scotland	36	O
Hungary	35	▼
Latvia (LSS)	35	O
Kuwait	32	▼
Austria	27	▼
Iran, Islamic Rep.	24	▼
Portugal	24	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Item Number: R2

Correct Response:	C

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Understanding Complex Information

Reducing air pollution: one way

Write down two different things that people can do to help reduce air pollution.

Item Number: W5A

SCORING

Note: Each of the two things must be scored separately. If the two things described are essentially the same, the second should be scored as incorrect.

Merely mentioning causes of pollution does not receive credit.

Correct Response

• Refers to transportation and suggests a personal choice such as reduced use of airplanes, cars and motor boats or more walking, biking, public transportation, horseback riding, sailboats.....

• Suggests manufacturing changes.
Examples: Make cars, buses, etc. less polluting.

• Refers to reducing use of fossil fuels: less burning of coal or oil.

• Refers to reducing industrial pollution.
Example: Filter industrial waste.

• Student suggests planting or not cutting down trees/forest.

• Refers to specific individual efforts.
*Examples: Stop smoking.
          Stop using spray cans.*

• Other correct.

Incorrect Response

• Student's response is vague and general.
*Examples: Stop pollution
          Do the right things
          Clean everything
          Recycle
          Don't litter*

• Other incorrect.

Overall Percent Correct

Slovenia	69	▲
Australia	68	▲
Korea	67	▲
Netherlands	66	▲
Austria	62	▲
United States	59	▲
Japan	57	▲
Czech Republic	55	▲
Latvia (LSS)	54	O
England	52	O
Hungary	52	O
Iceland	50	O
Norway	50	O
Scotland	49	O
Thailand	49	O
International average	**48**	
Canada	46	O
Ireland	46	O
Singapore	44	O
New Zealand	41	O
Hong Kong	39	▼
Israel	38	▼
Cyprus	36	▼
Greece	33	▼
Portugal	24	▼
Iran, Islamic Rep.	18	▼
Kuwait	18	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Understanding Complex Information

Reducing air pollution: two ways

> Write down two different things that people can do to help reduce air pollution.

Item Number: W5B

SCORING

Note: Each of the two things must be scored separately. If the two things described are essentially the same, the second should be scored as incorrect.

Merely mentioning causes of pollution does not receive credit.

Correct Response

• Refers to transportation and suggests a personal choice such as reduced use of airplanes, cars and motor boats or more walking, biking, public transportation, horseback riding, sailboats.....

• Suggests manufacturing changes.
  Examples: Make cars, buses, etc. less polluting.

• Refers to reducing use of fossil fuels: less burning of coal or oil.

• Refers to reducing industrial pollution.
  Example: Filter industrial waste.

• Student suggests planting or not cutting down trees/forest.

• Refers to specific individual efforts.
  Examples: Stop smoking.
  *   Stop using spray cans.*

• Other correct.

Incorrect Response

• Student's response is vague and general.
  Examples: Stop pollution
  *   Do the right things*
  *   Clean everything*
  *   Recycle*
  *   Don't litter*

• Other incorrect.

Overall Percent Correct

Country	%	
Netherlands	56	▲
Australia	52	▲
Korea	49	▲
United States	48	▲
Slovenia	47	▲
Austria	46	▲
Japan	44	▲
Norway	41	O
Czech Republic	38	O
Singapore	37	O
Thailand	36	O
England	35	O
Hong Kong	35	O
Scotland	35	O
International average	**34**	
Canada	33	O
Ireland	33	O
Iceland	32	O
New Zealand	31	O
Latvia (LSS)	29	O
Israel	28	O
Cyprus	25	▼
Greece	24	▼
Hungary	23	▼
Kuwait	11	▼
Portugal	10	▼
Iran, Islamic Rep.	8	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

Content Domain	Cognitive Domain
Environmental Issues and the Nature of Science	Understanding Complex Information

Oil Spills

> Write as completely as possible why large oil spills in rivers and seas are harmful to the environment.

Item Number: X3

SCORING

Correct Response

Includes at least one the following elements with an explanation/elaboration:
  •Oil kills living things (plants, birds,...)
  •Water gets polluted
  •Air and/or beaches get polluted
  Examples: Because of oil in the water, the birds get oil in their feathers and then they cool down and die.
  Large oil spills are harmful because it goes on plants and animals.
  Animals may breathe in the odor and then plants and animals will die. Plants and animals are a big part of our wildlife. If plants die, so would we, because plants give us oxygen.

• Includes any combination of two or more of the elements above.
  Example: Because it can kill animals and pollute rivers.

• Combinations of other acceptable consequences.

Partially Correct

• Oil kills plants/birds, fishes, seals, crabs, or other organisms.
  Example: Fish get killed.

• The water gets polluted (poisoned, covered by oil film).

• Mentions that the air gets polluted.

• Mentions that the beaches get polluted.

• Other acceptable but incomplete.

Incorrect Response

• Refers to the source of the oil spill such as tank ships and motor boats.

• Vaguely refers to otherwise correct elements, but without specification.
  Examples: Oil is dangerous.
       Pollution.

• Mentions that oil can cause a fire.

• Other incorrect.

Overall Percent Correct

Korea	64	▲
Japan	53	▲
United States	46	▲
New Zealand	38	▲
Australia	37	▲
Israel	36	▲
Canada	30	O
Ireland	30	O
Austria	29	O
Portugal	29	O
England	28	O
International average	**27**	
Hungary	26	O
Greece	25	O
Latvia (LSS)	24	O
Scotland	23	O
Czech Republic	22	O
Norway	21	O
Singapore	21	▼
Slovenia	21	▼
Iceland	20	▼
Netherlands	20	▼
Cyprus	18	▼
Thailand	14	▼
Kuwait	11	▼
Hong Kong	9	▼
Iran, Islamic Rep.	7	▼

Country average vs. International average:

Higher	▲
Not different	O
Lower	▼

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