# TIMSS ·USA·

**4**

# *RELEASED SCIENCE ITEMS*

This book contains the released Trends in International Mathematics and Science Study (TIMSS) 2011 grade 4 science assessment items. This is not a complete set of all TIMSS 2011 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.

This book contains TIMSS 2011 released items for grade 4. Each item appears on a single page, on which is provided information about the item's classification and about international student performance on the item. The items appear in the content domain order, as shown in the index on the next page.

## Information about item classification

Take a look at the first item on page 1. Across the top are three boxes which identify the item's **content domain** (the subject matter in science that the item assesses), its **main topic** (the specific topic assessed within that subject matter), and its **cognitive domain** (the cognitive or thinking process assessed). For this item, the content domain is life science, the main topic is life cycles, reproduction and heredity, and the cognitive domain is applying.

Below the row of boxes and above a boxed-in area of the page is the **item label**. For this item, it is *How tadpoles get in the pond*. Below the boxed-in area is the item number, which is more commonly used to identify each item than the item label. Within the boxed-in area is the item as it appeared in student test booklets.

**Correct answers** are shown beneath each item. The correct answer for multiple-choice items is simply a letter code. For example, in the item *S031001* on page 1, the letter code D is the correct answer. The correct answers for write-in or open-ended items are explained in a scoring guide. For example, *Manuel's temperature rise* in the Life Science domain (page 10), provides an example

of a scoring guide, 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 some of the constructed-response items for each scoring category.

## Information about international student performance

In the table along the right-hand side of the page are the **percent correct** statistics for the item. These consist of statistics on the percentage of students in each education system who could answer the question correctly. The lists of education systems are ordered in terms of this percentage. The international average is included as well.

To the right of some of the percent correct statistics are **special symbols** that indicate when an education system scored significantly higher or significantly lower than the international average. Thus, on the item *How tadpoles get in the pond* as an example, an estimated 86 percent of U.S. students could correctly answer this item, a percentage that was measurably higher than the international average, after taking into account the standard of error associated with the percent correct statistic for the United States and for the international average.

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Life Cycles, Reproduction, and Heredity | Applying |

Item label: How tadpoles get in the pond   *Come girini ottengono nello stagno*
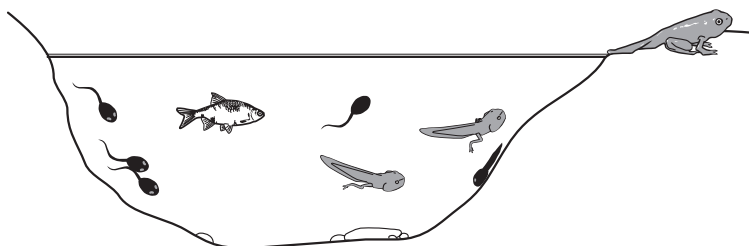


Melissa found some tadpoles and fish in a pond as shown above. How did the tadpoles get there?

A.   They hatched from eggs laid by fish in the pond.

B.   They formed from mud at the bottom of the pond.

C.   They were made from materials dissolved in pond water.

D.   They developed from eggs laid by frogs in the pond.

*Item Number: S031001*

| **Correct Response:** | **D** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 97 ⬢ |
| Japan | 95 ⬢ |
| Netherlands | 93 ⬢ |
| Singapore | 93 ⬢ |
| Slovenia | 92 ⬢ |
| Poland | 91 ⬢ |
| *Chinese Taipei-CHN* | 90 ⬢ |
| Finland | 90 ⬢ |
| *Hong Kong-CHN* | 90 ⬢ |
| Germany | 90 ⬢ |
| Austria | 89 ⬢ |
| *Northern Ireland-GBR* | 89 ⬢ |
| Ireland | 88 ⬢ |
| *Belgium (Flemish)-BEL* | 88 ⬢ |
| *England-GBR* | 87 ⬢ |
| Denmark | 87 ⬢ |
| Czech Republic | 87 ⬢ |
| Australia | 86 ⬢ |
| Sweden | 86 ⬢ |
| Italy | 86 ⬢ |
| **United States** | **86** ⬢ |
| Russian Federation | 85 ⬢ |
| Norway | 85 ⬢ |
| Croatia | 84 ⬢ |
| Thailand | 82 ⬢ |
| Portugal | 82 ⬢ |
| Lithuania | 82 ⬢ |
| New Zealand | 81 ⬢ |
| Spain | 80 ⬢ |
| Hungary | 80 |
| Serbia | 77 |
| Slovak Republic | 77 |
| International average | 76 |
| Romania | 76 |
| Malta | 75 |
| Iran, Islamic Rep of. | 75 |
| Chile | 72 ⬇ |
| Turkey | 68 ⬇ |
| United Arab Emirates | 65 ⬇ |
| Bahrain | 65 ⬇ |
| Kazakhstan | 65 ⬇ |
| Azerbaijan | 63 ⬇ |
| Oman | 63 ⬇ |
| Georgia | 59 ⬇ |
| Qatar | 57 ⬇ |
| Saudi Arabia | 54 ⬇ |
| Armenia | 52 ⬇ |
| Kuwait | 43 ⬇ |
| Tunisia | 38 ⬇ |
| Morocco | 33 ⬇ |
| Yemen | 21 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 87 ⬢ |
| *North Carolina-USA* | 87 ⬢ |
| *Florida-USA* | 86 ⬢ |
| *Alberta-CAN* | 86 ⬢ |
| *Ontario-CAN* | 84 ⬢ |
| *Dubai-UAE* | 73 ⬇ |
| *Abu Dhabi-UAE* | 59 ⬇ |

⬢ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

Item label: Birds/bats/butterflies share

What do birds, bats and butterflies have in common?

A.  feathers

B.  hair

C.  internal skeleton

D.  wings

*Item Number: S031230*

**Correct Response:** D

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 99 ⌂ |
| **United States** | **96** ⌂ |
| Croatia | 95 ⌂ |
| Singapore | 95 ⌂ |
| Finland | 95 ⌂ |
| Sweden | 95 ⌂ |
| Ireland | 95 ⌂ |
| Austria | 94 ⌂ |
| *England-GBR* | 94 ⌂ |
| Norway | 93 ⌂ |
| Germany | 93 ⌂ |
| New Zealand | 93 ⌂ |
| Portugal | 92 ⌂ |
| Russian Federation | 92 ⌂ |
| Australia | 92 ⌂ |
| Slovenia | 91 ⌂ |
| Netherlands | 91 ⌂ |
| *Northern Ireland-GBR* | 91 ⌂ |
| Denmark | 91 ⌂ |
| Serbia | 91 ⌂ |
| Czech Republic | 90 ⌂ |
| Poland | 90 ⌂ |
| Slovak Republic | 89 ⌂ |
| Italy | 89 ⌂ |
| Lithuania | 89 ⌂ |
| *Belgium (Flemish)-BEL* | 88 ⌂ |
| Spain | 87 ⌂ |
| Japan | 87 ⌂ |
| Thailand | 86 |
| Georgia | 86 |
| Hungary | 84 |
| Chile | 84 |
| International average | 83 |
| Armenia | 83 |
| *Chinese Taipei-CHN* | 83 |
| Romania | 83 |
| Malta | 82 |
| *Hong Kong-CHN* | 79 |
| Kazakhstan | 79 ▼ |
| Turkey | 79 ▼ |
| Bahrain | 75 ▼ |
| Azerbaijan | 75 ▼ |
| United Arab Emirates | 74 ▼ |
| Saudi Arabia | 70 ▼ |
| Iran, Islamic Rep. of | 62 ▼ |
| Qatar | 62 ▼ |
| Tunisia | 61 ▼ |
| Oman | 61 ▼ |
| Kuwait | 54 ▼ |
| Morocco | 47 ▼ |
| Yemen | 31 ▼ |
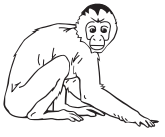
**Benchmarking education system**

| | |
|---|---|
| *Florida-USA* | 97 ⌂ |
| *Alberta-CAN* | 96 ⌂ |
| *North Carolina-USA* | 95 ⌂ |
| *Ontario-CAN* | 93 ⌂ |
| *Quebec-CAN* | 92 ⌂ |
| *Dubai-UAE* | 79 ▼ |
| *Abu Dhabi-UAE* | 70 ▼ |

⌂ Percent higher than International average
▼ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

## Item label: Main features of four animals



Monkey    Crocodile

Grasshopper    Octopus

Answer the following questions using the animals shown above. Write the name for the correct animal in the spaces below.

A. Which animal has an internal skeleton and produces milk for its young?

_____

B. Which animal has an external skeleton and three pairs of legs?

_____

C. Which animal has a soft body and no skeleton?

_____

*Item Number: S031233*

### SCORING

**Correct Response**
- Identifies all 3 animals in the correct order: monkey, grasshopper, octopus

**Incorrect Response**
- Identifies one animal correctly.
- Identifies two animals correctly.
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)

### Overall Percent Correct

| Education system | Percent correct | |
|:---|---:|:---:|
| Korea, Rep. of | 88 | ⬡ |
| Singapore | 83 | ⬡ |
| Hungary | 80 | ⬡ |
| Italy | 79 | ⬡ |
| Denmark | 76 | ⬡ |
| Slovak Republic | 75 | ⬡ |
| Portugal | 74 | ⬡ |
| Russian Federation | 72 | ⬡ |
| Japan | 70 | ⬡ |
| Australia | 70 | ⬡ |
| **United States** | **69** | ⬡ |
| *Chinese Taipei-CHN* | 69 | ⬡ |
| *Hong Kong-CHN* | 69 | ⬡ |
| *England-GBR* | 67 | ⬡ |
| *Belgium (Flemish)-BEL* | 66 | ⬡ |
| Germany | 66 | ⬡ |
| *Northern Ireland-GBR* | 66 | ⬡ |
| Sweden | 65 | ⬡ |
| Croatia | 65 | ⬡ |
| Thailand | 64 | |
| Spain | 64 | ⬡ |
| Poland | 64 | ⬡ |
| Finland | 64 | ⬡ |
| Norway | 63 | ⬡ |
| Czech Republic | 63 | |
| Austria | 63 | ⬡ |
| Lithuania | 63 | ⬡ |
| Netherlands | 60 | |
| Chile | 60 | |
| New Zealand | 59 | |
| Slovenia | 58 | |
| International average | 58 | |
| Ireland | 58 | |
| Kazakhstan | 57 | |
| Malta | 54 | |
| Romania | 53 | |
| Turkey | 53 | ⬢ |
| Serbia | 51 | ⬢ |
| Iran, Islamic Rep. of | 50 | ⬢ |
| Bahrain | 49 | ⬢ |
| Azerbaijan | 47 | ⬢ |
| United Arab Emirates | 45 | ⬢ |
| Georgia | 44 | ⬢ |
| Armenia | 38 | ⬢ |
| Qatar | 38 | ⬢ |
| Saudi Arabia | 33 | ⬢ |
| Oman | 31 | ⬢ |
| Kuwait | 29 | ⬢ |
| Tunisia | 26 | ⬢ |
| Morocco | 16 | ⬢ |
| Yemen | 14 | ⬢ |

### Benchmarking education system

| | | |
|:---|---:|:---:|
| *North Carolina-USA* | 74 | ⬡ |
| *Florida-USA* | 72 | ⬡ |
| *Quebec-CAN* | 68 | ⬡ |
| *Alberta-CAN* | 66 | ⬡ |
| *Ontario-CAN* | 63 | ⬡ |
| *Dubai-UAE* | 48 | ⬢ |
| *Abu Dhabi-UAE* | 41 | ⬢ |

⬡ Percent higher than International average
⬢ Percent lower than International average

Item label: Main features of four animals (continued)

*S031233:*

## Student Responses

### Correct Response:

A. Which animal has an internal skeleton and produces milk for its young?

_monkey_

B. Which animal has an external skeleton and three pairs of legs?

_grasshopper_

C. Which animal has a soft body and no skeleton?

_octopus_

### Incorrect Response:

A. Which animal has an internal skeleton and produces milk for its young?

_Crocodile_

B. Which animal has an external skeleton and three pairs of legs?

_Grasshopper_

C. Which animal has a soft body and no skeleton?

_monkey_

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Interactions with the Environment | Knowing |

Item label: Bird's foot structure

A bird that lives on a pond is most likely to have which of these foot structures?



A.          B.          C.          D.

*Item Number: S031236*

| Correct Response: | **D** |
|---|---|
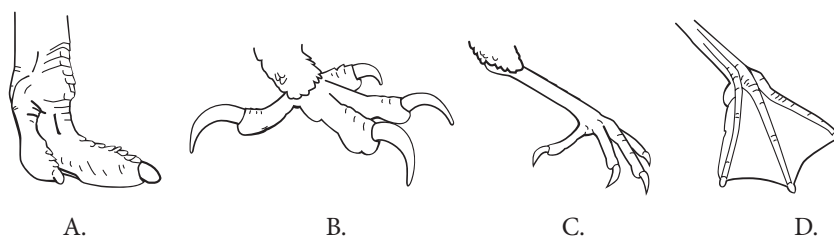
### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Netherlands | 92 ⬆ |
| Slovak Republic | 91 ⬆ |
| Hungary | 89 ⬆ |
| Czech Republic | 89 ⬆ |
| Norway | 89 ⬆ |
| Denmark | 87 ⬆ |
| Germany | 87 ⬆ |
| Russian Federation | 86 ⬆ |
| *Northern Ireland-GBR* | 86 ⬆ |
| Poland | 86 ⬆ |
| *Belgium (Flemish)-BEL* | 86 ⬆ |
| Lithuania | 86 ⬆ |
| Austria | 86 ⬆ |
| Australia | 85 ⬆ |
| New Zealand | 84 ⬆ |
| **United States** | **84** ⬆ |
| Sweden | 83 ⬆ |
| *England-GBR* | 83 ⬆ |
| Slovenia | 82 ⬆ |
| Romania | 82 ⬆ |
| Korea, Rep. of | 81 ⬆ |
| Finland | 81 ⬆ |
| Italy | 81 ⬆ |
| Ireland | 80 ⬆ |
| *Chinese Taipei-CHN* | 80 ⬆ |
| Portugal | 79 ⬆ |
| Chile | 76 ⬆ |
| Croatia | 75 |
| Singapore | 75 ⬆ |
| Armenia | 73 |
| Azerbaijan | 72 |
| International average | 72 |
| Japan | 71 |
| Serbia | 69 |
| Iran, Islamic Rep. of | 69 |
| Tunisia | 69 |
| Spain | 66 ⬇ |
| Malta | 59 ⬇ |
| Georgia | 57 ⬇ |
| Saudi Arabia | 56 ⬇ |
| United Arab Emirates | 55 ⬇ |
| Thailand | 55 ⬇ |
| Oman | 54 ⬇ |
| *Hong Kong-CHN* | 50 ⬇ |
| Kazakhstan | 48 ⬇ |
| Qatar | 46 ⬇ |
| Turkey | 44 ⬇ |
| Bahrain | 43 ⬇ |
| Kuwait | 41 ⬇ |
| Morocco | 33 ⬇ |
| Yemen | 16 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 85 ⬇ |
| *North Carolina-USA* | 84 ⬇ |
| *Ontario-CAN* | 82 ⬇ |
| *Florida-USA* | 78 ⬇ |
| *Quebec-CAN* | 69 |
| *Dubai-UAE* | 65 ⬇ |
| *Abu Dhabi-UAE* | 53 ⬇ |

⬆ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Life Cycles, Reproduction, and Heredity | Knowing |

## Item label: Animal with young and adult forms

Which of these animals has a young form that looks the most like the adult form?

A.   moth

B.   human

C.   frog

D.   butterfly

*Item Number: S031254*

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *Chinese Taipei-CHN* | 86 ⬠ |
| Japan | 83 ⬠ |
| Korea, Rep. of | 79 ⬠ |
| Hungary | 78 ⬠ |
| Italy | 78 ⬠ |
| Singapore | 76 ⬠ |
| Russian Federation | 74 ⬠ |
| Kazakhstan | 72 ⬠ |
| Slovenia | 72 ⬠ |
| Slovak Republic | 71 ⬠ |
| *Hong Kong-CHN* | 68 ⬠ |
| Romania | 68 ⬠ |
| Czech Republic | 67 ⬠ |
| Portugal | 67 ⬠ |
| Finland | 65 ⬠ |
| Iran, Islamic Rep. of | 62 ⬠ |
| Denmark | 57 |
| *Belgium (Flemish)-BEL* | 57 |
| Georgia | 56 |
| Norway | 56 |
| Spain | 55 |
| International average | 54 |
| Ireland | 54 |
| Australia | 54 |
| *England-GBR* | 52 |
| Turkey | 52 |
| Austria | 50 ⬇ |
| Sweden | 50 |
| **United States** | **50** ⬇ |
| New Zealand | 49 ⬇ |
| Azerbaijan | 49 ⬇ |
| Saudi Arabia | 48 ⬇ |
| Chile | 47 ⬇ |
| Malta | 46 ⬇ |
| Poland | 45 ⬇ |
| Serbia | 45 ⬇ |
| Netherlands | 44 ⬇ |
| Germany | 44 ⬇ |
| United Arab Emirates | 43 ⬇ |
| Qatar | 42 ⬇ |
| Armenia | 42 ⬇ |
| *Northern Ireland-GBR* | 41 ⬇ |
| Morocco | 39 ⬇ |
| Bahrain | 39 ⬇ |
| Croatia | 38 ⬇ |
| Thailand | 35 ⬇ |
| Yemen | 32 ⬇ |
| Oman | 31 ⬇ |
| Kuwait | 31 ⬇ |
| Tunisia | 28 ⬇ |
| Lithuania | — |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 55 |
| *Quebec-CAN* | 54 |
| *Ontario-CAN* | 52 |
| *North Carolina-USA* | 51 |
| *Florida-USA* | 47 ⬇ |
| *Abu Dhabi-UAE* | 42 ⬇ |
| *Dubai-UAE* | 41 ⬇ |

⬠ Percent higher than International average
⬇ Percent lower than International average
— Not applicable

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Life Cycles, Reproduction, and Heredity | Reasoning |

## Item label: Only female Siberian tigers left

Some animals are very rare. For example, there are very few Siberian tigers. If the only Siberian tigers left are female, what will most likely happen?

A. The females will find another type of male animal to mate with and produce more Siberian tigers.

B. The females will mate with each other and produce more Siberian tigers.

C. The females will only be able to produce female Siberian tigers.

D. The females will not be able to produce more Siberian tigers, and they will die out.

*Item Number: S031266*

| **Correct Response:** | **D** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 88 ⬆ |
| Slovak Republic | 76 ⬆ |
| Russian Federation | 75 ⬆ |
| Hungary | 74 ⬆ |
| Singapore | 74 ⬆ |
| *Hong Kong-CHN* | 72 ⬆ |
| Sweden | 72 ⬆ |
| Finland | 71 ⬆ |
| Denmark | 69 ⬆ |
| Croatia | 67 ⬆ |
| *Chinese Taipei-CHN* | 67 ⬆ |
| Spain | 67 ⬆ |
| Slovenia | 65 ⬆ |
| Netherlands | 64 ⬆ |
| **United States** | **64** ⬆ |
| *England-GBR* | 63 ⬆ |
| Czech Republic | 62 ⬆ |
| Norway | 62 ⬆ |
| Poland | 61 ⬆ |
| Lithuania | 60 ⬆ |
| Australia | 60 ⬆ |
| Germany | 59 ⬆ |
| Romania | 58 |
| Thailand | 58 ⬆ |
| Serbia | 58 ⬆ |
| Austria | 56 |
| Italy | 56 |
| Japan | 56 |
| *Northern Ireland-GBR* | 56 |
| Ireland | 55 |
| Chile | 54 |
| International average | 53 |
| New Zealand | 52 |
| Portugal | 51 |
| Turkey | 49 ⬇ |
| Kazakhstan | 47 ⬇ |
| *Belgium (Flemish)-BEL* | 47 ⬇ |
| Malta | 46 ⬇ |
| Georgia | 39 ⬇ |
| Armenia | 36 ⬇ |
| Azerbaijan | 36 ⬇ |
| Bahrain | 34 ⬇ |
| United Arab Emirates | 32 ⬇ |
| Saudi Arabia | 32 ⬇ |
| Kuwait | 28 ⬇ |
| Qatar | 28 ⬇ |
| Iran, Islamic Rep. of | 28 ⬇ |
| Oman | 24 ⬇ |
| Morocco | 22 ⬇ |
| Yemen | 20 ⬇ |
| Tunisia | 20 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 70 ⬆ |
| *Quebec-CAN* | 65 ⬆ |
| *Alberta-CAN* | 58 |
| *Florida-USA* | 58 |
| *Ontario-CAN* | 52 |
| *Dubai-UAE* | 37 ⬇ |
| *Abu Dhabi-UAE* | 29 ⬇ |

⬆ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **LIFE SCIENCE** | Interactions with the Environment | Knowing |

## Item label: Why birds sit on their eggs

Most birds sit on their eggs until they hatch. Which of these is the most important reason why birds sit on their eggs?

A.    to keep the eggs inside the nest

B.    to keep the eggs warm

C.    to protect the eggs from the wind

D.    to protect the eggs from the rain

*Item Number: S031281*

| Correct Response: | **B** |
|:---:|:---:|

### Overall Percent Correct

| Education system | Percent correct |
|---|:---:|
| Netherlands | 96 ⬤ |
| Finland | 96 ⬤ |
| Austria | 95 ⬤ |
| Czech Republic | 94 ⬤ |
| *Belgium (Flemish)-BEL* | 94 ⬤ |
| **United States** | **94** ⬤ |
| Sweden | 93 ⬤ |
| Denmark | 93 ⬤ |
| Singapore | 93 ⬤ |
| Germany | 92 ⬤ |
| Slovenia | 92 ⬤ |
| Australia | 92 ⬤ |
| Ireland | 92 ⬤ |
| Norway | 91 ⬤ |
| Croatia | 91 ⬤ |
| Slovak Republic | 91 ⬤ |
| *Northern Ireland-GBR* | 91 ⬤ |
| Hungary | 89 ⬤ |
| Spain | 89 ⬤ |
| Russian Federation | 89 ⬤ |
| *England-GBR* | 89 ⬤ |
| Poland | 88 ⬤ |
| Japan | 87 ⬤ |
| New Zealand | 87 ⬤ |
| Italy | 87 ⬤ |
| Serbia | 87 ⬤ |
| *Chinese Taipei-CHN* | 86 ⬤ |
| Portugal | 85 ⬤ |
| Korea, Rep. of | 85 ⬤ |
| Romania | 84 ⬤ |
| *Hong Kong-CHN* | 84 ⬤ |
| Lithuania | 83 |
| Malta | 81 |
| Chile | 80 |
| Azerbaijan | 80 |
| International average | 79 |
| Georgia | 79 |
| Turkey | 77 |
| Kazakhstan | 70 ⬇ |
| Thailand | 69 ⬇ |
| Iran, Islamic Rep. of | 67 ⬇ |
| Armenia | 66 ⬇ |
| United Arab Emirates | 64 ⬇ |
| Bahrain | 59 ⬇ |
| Qatar | 57 ⬇ |
| Saudi Arabia | 54 ⬇ |
| Tunisia | 46 ⬇ |
| Oman | 43 ⬇ |
| Kuwait | 40 ⬇ |
| Morocco | 31 ⬇ |
| Yemen | 31 ⬇ |

### Benchmarking education system
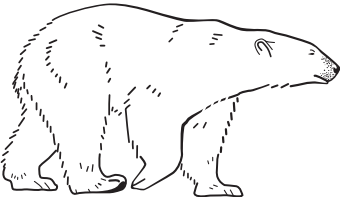
| | |
|---|:---:|
| *North Carolina-USA* | 95 ⬤ |
| *Alberta-CAN* | 93 ⬤ |
| *Florida-USA* | 91 ⬤ |
| *Quebec-CAN* | 91 ⬤ |
| *Ontario-CAN* | 90 ⬤ |
| *Dubai-UAE* | 73 ⬇ |
| *Abu Dhabi-UAE* | 58 ⬇ |

⬤ Percent higher than International average
⬇ Percent lower than International average
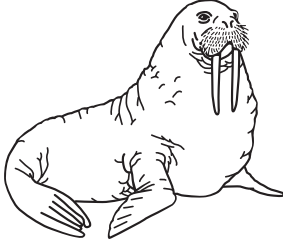
| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Interactions with the Environment | Applying |

## Item label: What walrus has to keep it warm

polar bear                 walrus

Polar bears and walruses look very different, but both can survive in the extreme cold. A polar bear has a thick coat of fur that helps keep it warm. The walrus has no fur.

What does the walrus have that helps it keep warm?

A.  fat layers

B.  tusks

C.  whiskers

D.  flippers

*Item Number: S031291*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Finland | 98 ⌂ |
| Russian Federation | 97 ⌂ |
| Czech Republic | 95 ⌂ |
| Italy | 95 ⌂ |
| Austria | 94 ⌂ |
| Germany | 94 ⌂ |
| Sweden | 94 ⌂ |
| Netherlands | 93 ⌂ |
| Lithuania | 93 ⌂ |
| Chile | 93 ⌂ |
| Poland | 92 ⌂ |
| Denmark | 92 ⌂ |
| *Northern Ireland-GBR* | 92 ⌂ |
| **United States** | **91** ⌂ |
| Hungary | 91 ⌂ |
| Spain | 90 ⌂ |
| Slovak Republic | 90 ⌂ |
| Korea, Rep. of | 90 ⌂ |
| Australia | 90 ⌂ |
| *England-GBR* | 89 ⌂ |
| *Hong Kong-CHN* | 89 ⌂ |
| Ireland | 88 ⌂ |
| Croatia | 88 ⌂ |
| New Zealand | 88 ⌂ |
| Georgia | 88 ⌂ |
| Portugal | 87 ⌂ |
| Azerbaijan | 87 ⌂ |
| *Belgium (Flemish)-BEL* | 87 ⌂ |
| Serbia | 86 ⌂ |
| Kazakhstan | 86 ⌂ |
| Singapore | 86 ⌂ |
| *Chinese Taipei-CHN* | 85 ⌂ |
| Japan | 85 ⌂ |
| Slovenia | 84 |
| Romania | 83 |
| International average | 81 |
| Thailand | 80 |
| Norway | 79 |
| Iran, Islamic Rep. of | 72 ▽ |
| Armenia | 71 ▽ |
| Turkey | 70 ▽ |
| Malta | 70 ▽ |
| Bahrain | 70 ▽ |
| United Arab Emirates | 63 ▽ |
| Saudi Arabia | 59 ▽ |
| Qatar | 58 ▽ |
| Tunisia | 47 ▽ |
| Oman | 44 ▽ |
| Kuwait | 44 ▽ |
| Morocco | 27 ▽ |
| Yemen | 25 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 94 ⌂ |
| *Florida-USA* | 94 ⌂ |
| *North Carolina-USA* | 93 ⌂ |
| *Alberta-CAN* | 92 ⌂ |
| *Ontario-CAN* | 90 ⌂ |
| *Dubai-UAE* | 70 ▽ |
| *Abu Dhabi-UAE* | 59 ▽ |

⌂ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Human Health | Applying |

## Item label: Manuel's temperature rise

The normal temperature of the human body is about 98.6 degrees Fahrenheit.
Manuel takes his temperature one morning after waking up.
His body temperature is 104 degrees Fahrenheit.

Write down one thing that could have caused his temperature to be higher than normal.

*Item Number: S031325*

### SCORING

**Correct Response**

• Refers to Manuel being sick, having a fever, or similar.

Examples:

He was ill.

He had an infection.

He was running a fever.

**Incorrect Response**

• Refers only to getting cold, wet, or similar. [Reflects misconception about cause of illness.]

Example: He was out in the cold the night before.

• Refers only to a factor affecting external temperature.

Example: The weather was too hot.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Norway | 64 △ |
| *Hong Kong-CHN* | 63 △ |
| *Belgium (Flemish)-BEL* | 62 △ |
| Denmark | 61 △ |
| Italy | 60 △ |
| Sweden | 59 △ |
| Croatia | 58 △ |
| Hungary | 57 △ |
| Finland | 57 △ |
| *Chinese Taipei-CHN* | 57 △ |
| Slovak Republic | 55 △ |
| Czech Republic | 55 △ |
| Russian Federation | 54 △ |
| **United States** | **52** △ |
| Netherlands | 52 △ |
| Lithuania | 52 △ |
| Slovenia | 50 △ |
| Singapore | 50 △ |
| Portugal | 48 △ |
| Japan | 47 △ |
| Poland | 45 △ |
| Serbia | 45 △ |
| Spain | 41 |
| Kazakhstan | 40 |
| Romania | 39 |
| Turkey | 39 |
| International average | 39 |
| Ireland | 38 |
| Austria | 37 |
| Korea, Rep. of | 36 |
| Azerbaijan | 35 |
| Georgia | 33 ▽ |
| Australia | 32 ▽ |
| Chile | 32 ▽ |
| Armenia | 31 ▽ |
| *Northern Ireland-GBR* | 30 ▽ |
| Bahrain | 28 ▽ |
| *England-GBR* | 25 ▽ |
| New Zealand | 25 ▽ |
| Germany | 24 ▽ |
| United Arab Emirates | 24 ▽ |
| Thailand | 22 ▽ |
| Saudi Arabia | 21 ▽ |
| Malta | 20 ▽ |
| Tunisia | 20 ▽ |
| Iran, Islamic Rep. of | 18 ▽ |
| Qatar | 16 ▽ |
| Oman | 16 ▽ |
| Yemen | 8 ▽ |
| Kuwait | 7 ▽ |
| Morocco | 5 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 51 △ |
| *North Carolina-USA* | 50 △ |
| *Quebec-CAN* | 46 △ |
| *Ontario-CAN* | 37 |
| *Alberta-CAN* | 37 |
| *Dubai-UAE* | 32 ▽ |
| *Abu Dhabi-UAE* | 21 ▽ |

△ Percent higher than International average
▽ Percent lower than International average

Item label: Manuel's temperature rise (continued)

*S031325:*

## Student Responses

### Correct Response:

Write down one thing that could have caused his temperature to be higher than normal.

*He might have caught a fever.*

### Incorrect Response:

Write down one thing that could have caused his temperature to be higher than normal.

*It could be that he ate alot and he didn't soposto. He could on the rain. Or maybe he didn't dake of himself.*

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Human Health | Knowing |

## Item label: Best source of calcium

Calcium is a mineral that helps make your bones and teeth strong. Which of these foods is the best source of calcium?

A.    candy

B.    rice

C.    cheese

D.    meat

*Item Number: S031340*

| **Correct Response:** | **C** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Finland | 83 ⬤ |
| Singapore | 77 ⬤ |
| Thailand | 71 ⬤ |
| Japan | 70 ⬤ |
| Ireland | 70 ⬤ |
| Portugal | 65 ⬤ |
| Turkey | 65 ⬤ |
| Spain | 65 ⬤ |
| *Northern Ireland-GBR* | 64 ⬤ |
| Romania | 63 ⬤ |
| Denmark | 62 ⬤ |
| Italy | 62 ⬤ |
| Czech Republic | 60 ⬤ |
| Chile | 58 ⬤ |
| Slovak Republic | 58 ⬤ |
| *Hong Kong-CHN* | 55 ⬤ |
| *England-GBR* | 55 ⬤ |
| *Chinese Taipei-CHN* | 53 ⬤ |
| Australia | 53 ⬤ |
| Korea, Rep. of | 53 ⬤ |
| Azerbaijan | 52 ⬤ |
| New Zealand | 51 |
| International average | 47 |
| **United States** | **47** |
| *Belgium (Flemish)-BEL* | 46 |
| Netherlands | 45 |
| Hungary | 44 |
| Poland | 44 |
| Lithuania | 42 ⬇ |
| Saudi Arabia | 41 ⬇ |
| Malta | 39 ⬇ |
| Serbia | 37 ⬇ |
| Bahrain | 37 ⬇ |
| Oman | 36 ⬇ |
| Armenia | 36 ⬇ |
| Georgia | 35 ⬇ |
| Qatar | 35 ⬇ |
| Sweden | 34 ⬇ |
| Tunisia | 34 ⬇ |
| Russian Federation | 34 ⬇ |
| Kuwait | 34 ⬇ |
| United Arab Emirates | 31 ⬇ |
| Kazakhstan | 30 ⬇ |
| Croatia | 29 ⬇ |
| Morocco | 29 ⬇ |
| Norway | 29 ⬇ |
| Yemen | 28 ⬇ |
| Iran, Islamic Rep. of | 27 ⬇ |
| Austria | 27 ⬇ |
| Germany | 25 ⬇ |
| Slovenia | 23 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Ontario-CAN* | 69 ⬤ |
| *Quebec-CAN* | 66 ⬤ |
| *Alberta-CAN* | 60 ⬤ |
| *North Carolina-USA* | 52 |
| *Florida-USA* | 43 |
| *Dubai-UAE* | 39 ⬇ |
| *Abu Dhabi-UAE* | 31 ⬇ |

⬤ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Ecosystems | Knowing |

Item label: Which animal is a predator

A predator is an animal that feeds on other animals.
Which of these is a predator?

A. deer

B. wolf

C. cow

D. goat

*Item Number: S031356*

| **Correct Response:** | **B** |
|---|---|

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 99 ⬣ |
| Finland | 98 ⬣ |
| Netherlands | 98 ⬣ |
| Russian Federation | 98 ⬣ |
| Poland | 97 ⬣ |
| Lithuania | 97 ⬣ |
| Kazakhstan | 96 ⬣ |
| Croatia | 96 ⬣ |
| Italy | 96 ⬣ |
| Czech Republic | 96 ⬣ |
| Austria | 96 ⬣ |
| Hungary | 95 ⬣ |
| Georgia | 95 ⬣ |
| *Belgium (Flemish)-BEL* | 95 ⬣ |
| Azerbaijan | 95 ⬣ |
| Germany | 94 ⬣ |
| Slovak Republic | 93 ⬣ |
| Armenia | 93 ⬣ |
| Iran, Islamic Rep. of | 93 ⬣ |
| Spain | 92 ⬣ |
| Serbia | 92 ⬣ |
| Slovenia | 91 ⬣ |
| *Northern Ireland-GBR* | 91 |
| Thailand | 91 |
| **United States** | **90** ⬣ |
| *Hong Kong-CHN* | 90 ⬣ |
| Denmark | 90 |
| Romania | 89 |
| Sweden | 89 |
| Chile | 89 |
| Singapore | 88 |
| Norway | 88 |
| Portugal | 88 |
| International average | 88 |
| *England-GBR* | 87 |
| Australia | 87 |
| Turkey | 86 |
| New Zealand | 86 |
| Ireland | 86 |
| *Chinese Taipei-CHN* | 83 ⬇ |
| Bahrain | 83 ⬇ |
| Japan | 83 ⬇ |
| Saudi Arabia | 83 ⬇ |
| Tunisia | 81 ⬇ |
| Kuwait | 74 ⬇ |
| United Arab Emirates | 74 ⬇ |
| Oman | 73 ⬇ |
| Morocco | 62 ⬇ |
| Qatar | 61 ⬇ |
| Malta | 58 ⬇ |
| Yemen | 54 ⬇ |

### Benchmarking education system
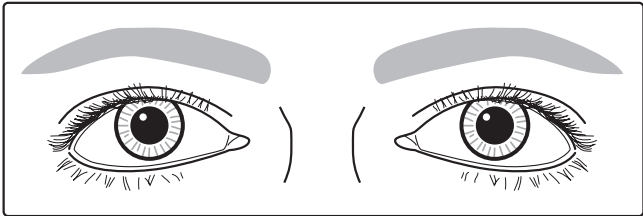
| | |
|---|---|
| *Quebec-CAN* | 94 ⬣ |
| *Florida-USA* | 93 ⬣ |
| *Alberta-CAN* | 91 ⬣ |
| *North Carolina-USA* | 89 |
| *Ontario-CAN* | 87 |
| *Abu Dhabi-UAE* | 75 ⬇ |
| *Dubai-UAE* | 70 ⬇ |

⬣ Percent higher than International average
⬇ Percent lower than International average
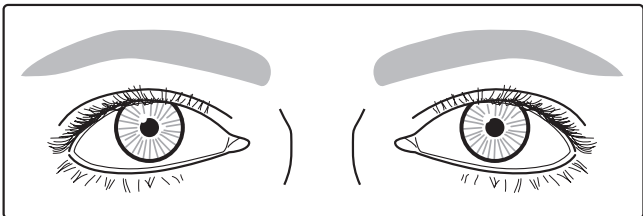
| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **LIFE SCIENCE** | Interactions with the Environment | Reasoning |

## Item label: Eyes in different outside conditions

Picture 1



Picture 2



Picture 1 and Picture 2 show the same eyes in different outside conditions. What outside condition is different between Picture 1 and Picture 2?

A.    Light is brighter in Picture 1.

B.    Light is brighter in Picture 2.

C.    Temperature is higher in Picture 1.

D.    Temperature is higher in Picture 2.

*Item Number: S031361*

| Correct Response: | **B** |
|:---:|:---:|

### Overall Percent Correct

| Education system | Percent correct |
|---|:---:|
| Finland | 77 ⬤ |
| *Chinese Taipei-CHN* | 74 ⬤ |
| *Hong Kong-CHN* | 74 ⬤ |
| Netherlands | 69 ⬤ |
| Singapore | 68 ⬤ |
| Germany | 68 ⬤ |
| Portugal | 68 ⬤ |
| Sweden | 68 ⬤ |
| **United States** | **66** ⬤ |
| Denmark | 65 ⬤ |
| *England-GBR* | 65 ⬤ |
| Slovenia | 65 ⬤ |
| Korea, Rep. of | 62 ⬤ |
| Australia | 62 ⬤ |
| Hungary | 62 ⬤ |
| Spain | 61 ⬤ |
| *Belgium (Flemish)-BEL* | 61 ⬤ |
| Ireland | 60 |
| Italy | 60 |
| Chile | 60 |
| Slovak Republic | 60 |
| New Zealand | 59 |
| Austria | 59 |
| Turkey | 59 |
| Japan | 59 |
| Russian Federation | 58 |
| Czech Republic | 57 |
| Romania | 57 |
| *Northern Ireland-GBR* | 56 |
| International average | 56 |
| Croatia | 54 |
| Qatar | 53 |
| Serbia | 52 |
| Poland | 51 ⬇ |
| United Arab Emirates | 51 ⬇ |
| Norway | 51 |
| Malta | 51 ⬇ |
| Saudi Arabia | 51 ⬇ |
| Kazakhstan | 50 ⬇ |
| Armenia | 49 ⬇ |
| Thailand | 49 ⬇ |
| Lithuania | 47 ⬇ |
| Bahrain | 46 ⬇ |
| Iran, Islamic Rep. of | 46 ⬇ |
| Azerbaijan | 43 ⬇ |
| Oman | 42 ⬇ |
| Kuwait | 40 ⬇ |
| Georgia | 35 ⬇ |
| Yemen | 32 ⬇ |
| Morocco | 32 ⬇ |
| Tunisia | 30 ⬇ |

### Benchmarking education system

| | |
|---|:---:|
| *North Carolina-USA* | 70 ⬤ |
| *Florida-USA* | 70 ⬤ |
| *Alberta-CAN* | 65 ⬤ |
| *Ontario-CAN* | 60 |
| *Dubai-UAE* | 56 |
| *Quebec-CAN* | 54 |
| *Abu Dhabi-UAE* | 50 ⬇ |

⬤ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **LIFE SCIENCE** | Ecosystems | Applying |

## Item label: Animal extinction-DERIVED

Describe two human activities that can lead to the extinction of animals.

Activity 1:

Activity 2:

*Item Number: S031390Z*

### SCORING

Note: Each of the two responses are scored separately. However, if the two responses are essentially the same, the second response should be scored as "Incorrect Response".

**Correct Response**

• Mentions tree felling or other land development activities (leading to loss of habitat/homes).

Example: Cutting down trees.

• Mentions hunting or killing animals (for food, pelts, etc.).

Example: Shooting animals and eating them.

• Mentions polluting the environment (or similar).

Example: Causing air pollution.

• Other correct

**Incorrect Response**

• Mentions a human activity but connection to extinction of animals is unclear.

Example: Smoking

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

### Overall Percent Correct

| Education system | Percent correct |
|:---|:---:|
| Korea, Rep. of | 54 ⬢ |
| Russian Federation | 44 ⬢ |
| Italy | 44 ⬢ |
| Poland | 41 ⬢ |
| Netherlands | 41 ⬢ |
| Sweden | 40 ⬢ |
| Thailand | 40 ⬢ |
| Romania | 38 ⬢ |
| *Chinese Taipei-CHN* | 38 ⬢ |
| Denmark | 38 ⬢ |
| Austria | 38 ⬢ |
| Finland | 38 ⬢ |
| Slovak Republic | 37 ⬢ |
| Serbia | 36 ⬢ |
| Hungary | 36 ⬢ |
| Kazakhstan | 34 ⬢ |
| Czech Republic | 33 ⬢ |
| Germany | 33 ⬢ |
| Georgia | 33 |
| Ireland | 32 |
| Croatia | 31 |
| *England-GBR* | 30 |
| Singapore | 29 |
| Spain | 29 |
| **United States** | **29** |
| Iran, Islamic Rep. of | 28 |
| Slovenia | 28 |
| International average | 28 |
| Lithuania | 27 |
| *Belgium (Flemish)-BEL* | 27 |
| Australia | 26 |
| *Northern Ireland-GBR* | 26 |
| Portugal | 25 |
| Bahrain | 23 ⬇ |
| New Zealand | 23 ⬇ |
| Armenia | 23 ⬇ |
| Saudi Arabia | 23 ⬇ |
| Turkey | 22 ⬇ |
| *Hong Kong-CHN* | 20 ⬇ |
| Azerbaijan | 19 ⬇ |
| Kuwait | 19 ⬇ |
| Chile | 19 ⬇ |
| Malta | 16 ⬇ |
| Japan | 16 ⬇ |
| United Arab Emirates | 14 ⬇ |
| Norway | 13 ⬇ |
| Qatar | 12 ⬇ |
| Tunisia | 11 ⬇ |
| Oman | 10 ⬇ |
| Morocco | 6 ⬇ |
| Yemen | 1 ⬇ |

**Benchmarking education system**

| | |
|:---|:---:|
| *Alberta-CAN* | 38 ⬢ |
| *Ontario-CAN* | 36 ⬢ |
| *Florida-USA* | 29 |
| *Quebec-CAN* | 28 |
| *North Carolina-USA* | 24 |
| *Dubai-UAE* | 17 ⬇ |
| *Abu Dhabi-UAE* | 14 ⬇ |

⬢ Percent higher than International average
⬇ Percent lower than International average

Item label: Animal extinction (continued)

*S031390Z:*

## Student Responses

### Correct Response:

Activity 1: hunting

Activity 2: tearing down forests

### Incorrect Response:

Activity 1: Leave toys in water

Activity 2: play with matches in woods

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Knowing |

## Item label: Living-nonliving things in a pond

The picture below shows a pond.



In the spaces provided below, list three living things and three non-living things shown in this picture.

**Living things**
1.

2.

3.

**Non-living things**
1.

2.

3.

*Item Number: S041003*

### SCORING

**Correct Response**

- Acceptable lists of living things: fish, frog, turtle, dragonfly (insect, butterfly, fly), water lily (plants, flowering plant, water plant), trees, grasses, molluscs (snails)

- Acceptable lists of non-living things: sun, clouds, water, rocks, pebbles (stones), sand, soil (dirt, earth), mud, air

**Incorrect Response**

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 88 ⬦ |
| Serbia | 75 ⬦ |
| Hungary | 70 ⬦ |
| Kazakhstan | 69 ⬦ |
| Italy | 67 ⬦ |
| Finland | 66 ⬦ |
| Spain | 66 ⬦ |
| Slovak Republic | 66 ⬦ |
| Croatia | 65 ⬦ |
| Chile | 64 ⬦ |
| Turkey | 62 ⬦ |
| Thailand | 61 ⬦ |
| Russian Federation | 60 ⬦ |
| Slovenia | 58 ⬦ |
| **United States** | **58** ⬦ |
| Czech Republic | 55 ⬦ |
| Oman | 55 ⬦ |
| Bahrain | 55 ⬦ |
| Lithuania | 54 ⬦ |
| Netherlands | 52 ⬦ |
| Australia | 49 |
| Sweden | 48 |
| International average | 47 |
| United Arab Emirates | 47 |
| Azerbaijan | 47 |
| Iran, Islamic Rep. of | 47 |
| Korea, Rep. of | 46 |
| Portugal | 46 |
| *England-GBR* | 46 |
| Romania | 45 |
| Denmark | 45 |
| Malta | 44 |
| Norway | 43 |
| New Zealand | 42 ⬇ |
| Ireland | 41 ⬇ |
| Saudi Arabia | 40 ⬇ |
| Qatar | 40 ⬇ |
| Germany | 40 ⬇ |
| *Hong Kong-CHN* | 39 ⬇ |
| Japan | 39 ⬇ |
| *Belgium (Flemish)-BEL* | 38 ⬇ |
| *Northern Ireland-GBR* | 34 ⬇ |
| Austria | 31 ⬇ |
| Armenia | 30 ⬇ |
| Poland | 21 ⬇ |
| Morocco | 20 ⬇ |
| Georgia | 19 ⬇ |
| Kuwait | 19 ⬇ |
| *Chinese Taipei-CHN* | 17 ⬇ |
| Tunisia | 15 ⬇ |
| Yemen | 13 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 63 ⬦ |
| *Ontario-CAN* | 56 ⬦ |
| *Florida-USA* | 56 ⬦ |
| *Quebec-CAN* | 52 ⬦ |
| *Dubai-UAE* | 52 ⬦ |
| *North Carolina-USA* | 42 |
| *Abu Dhabi-UAE* | 41 ⬇ |

⬦ Percent higher than International average
⬇ Percent lower than International average

Item label: Living-nonliving things in a pond (continued)
*S041003:*

## Student Responses

### Correct Response:

| Living things | Non-living things |
|---|---|
| 1. frogs | 1. oceans |
| 2. fish | 2. rocks |
| 3. turtles | 3. clouds |

### Incorrect Response:

| Living things | Non-living things |
|---|---|
| 1. frog | 1. rode |
| 2. frog | 2. tree |
| 3. fly | 3. flower |

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

## Item label: Use of tiger canines

The diagrams show a tiger skull and a rat skull.
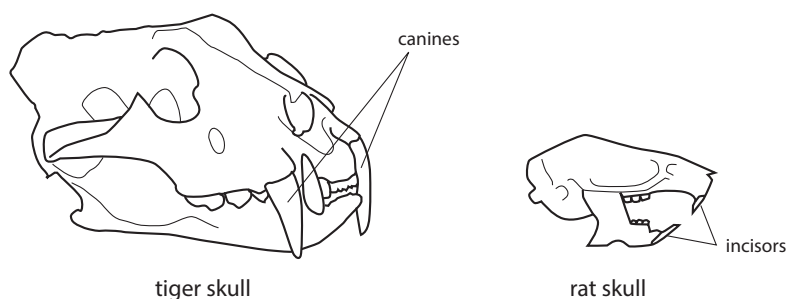


canines

tiger skull

incisors

rat skull

A tiger has very large teeth called canines. A rat has very large teeth called incisors. A tiger and a rat eat different types of food.

A. What does a tiger use its canines for?

*Item Number: S041013A*

### SCORING

**Correct Response**

• States that the tiger uses its canines for piercing (stabbing, holding, ripping, killing, tearing) prey.

Examples:

A tiger uses its canines to hold onto its prey and kill it.

The tiger stabs its prey with the canines and rips the meat.

**Incorrect Response**

• States that the tiger uses its canines for chewing (crushing, grinding) food.

Example: A tiger uses its canines for chewing its prey.

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

Examples:

To eat his prey.

To devour its prey.

The tiger uses them for meat.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Denmark | 62 ⌃ |
| Kazakhstan | 55 ⌃ |
| Russian Federation | 51 ⌃ |
| Hungary | 50 ⌃ |
| Ireland | 50 ⌃ |
| *England-GBR* | 48 ⌃ |
| Slovenia | 47 ⌃ |
| Italy | 47 ⌃ |
| Austria | 45 ⌃ |
| Sweden | 45 ⌃ |
| *Northern Ireland-GBR* | 44 ⌃ |
| Czech Republic | 43 ⌃ |
| Germany | 42 ⌃ |
| *Belgium (Flemish)-BEL* | 42 ⌃ |
| Finland | 40 ⌃ |
| Australia | 40 ⌃ |
| Slovak Republic | 40 ⌃ |
| **United States** | **38** ⌃ |
| Netherlands | 38 ⌃ |
| Romania | 37 ⌃ |
| Singapore | 37 ⌃ |
| Norway | 37 |
| New Zealand | 36 ⌃ |
| Poland | 35 |
| Lithuania | 33 |
| International average | 31 |
| Tunisia | 30 |
| Croatia | 28 |
| Spain | 27 ⌄ |
| Azerbaijan | 26 ⌄ |
| Serbia | 26 ⌄ |
| Malta | 24 ⌄ |
| Chile | 24 ⌄ |
| Korea, Rep. of | 24 ⌄ |
| Armenia | 23 ⌄ |
| Portugal | 23 ⌄ |
| Japan | 23 ⌄ |
| United Arab Emirates | 22 ⌄ |
| Bahrain | 20 ⌄ |
| Iran, Islamic Rep. of | 19 ⌄ |
| Saudi Arabia | 19 ⌄ |
| *Hong Kong-CHN* | 18 ⌄ |
| Georgia | 18 ⌄ |
| Qatar | 17 ⌄ |
| *Chinese Taipei-CHN* | 16 ⌄ |
| Turkey | 16 ⌄ |
| Thailand | 15 ⌄ |
| Oman | 13 ⌄ |
| Kuwait | 6 ⌄ |
| Yemen | 5 ⌄ |
| Morocco | 3 ⌄ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 44 ⌃ |
| *North Carolina-USA* | 40 ⌃ |
| *Ontario-CAN* | 37 ⌃ |
| *Florida-USA* | 37 ⌃ |
| *Dubai-UAE* | 32 |
| *Quebec-CAN* | 22 ⌄ |
| *Abu Dhabi-UAE* | 17 ⌄ |

⌃ Percent higher than International average
⌄ Percent lower than International average

Item label: Use of tiger canines (continued)
*S041013A:*

## Student Responses

### Correct Response:

It uses the canines for killing the other animals.

### Incorrect Response:

for biting the hard bones in the food

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

## Item label: Use of rat incisors

The diagrams show a tiger skull and a rat skull.
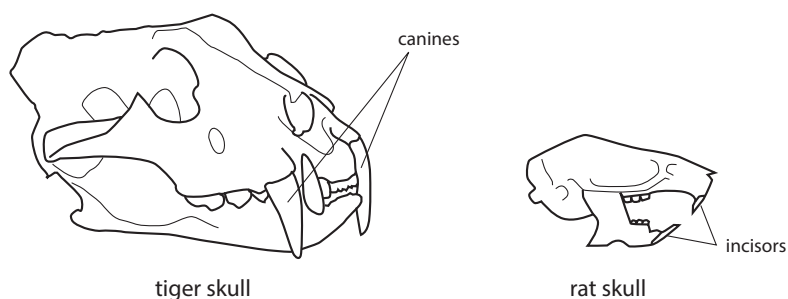


canines

incisors

tiger skull

rat skull

A tiger has very large teeth called canines. A rat has very large teeth called incisors. A tiger and a rat eat different types of food.

B.  What does a rat use its incisors for?

*Item Number: S041013B*

### SCORING

**Correct Response**

• States that the rat uses its incisors for gnawing (nibbling) food or killing prey.

Examples:

The rat uses them to gnaw nuts, grains, meat, and vegetable matter.

The rat uses its incisors for biting hard stuff.

**Incorrect Response**

• States that the rat uses its incisors for chewing (crushing, grinding, cutting, chopping, munching) food.

Examples:

Rats use their incisors for chewing softer things.

Rats use them to grind food.

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

Example: It uses them for vegetables.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Finland | 54 ⬢ |
| Denmark | 52 ⬢ |
| Sweden | 48 ⬢ |
| Thailand | 47 ⬢ |
| Lithuania | 45 ⬢ |
| Norway | 43 ⬢ |
| Japan | 41 ⬢ |
| Kazakhstan | 40 ⬢ |
| Portugal | 39 ⬢ |
| Russian Federation | 38 ⬢ |
| Romania | 34 ⬢ |
| *Chinese Taipei-CHN* | 33 ⬢ |
| Korea, Rep. of | 33 ⬢ |
| Serbia | 30 ⬢ |
| Hungary | 29 ⬢ |
| Italy | 29 ⬢ |
| Czech Republic | 27 |
| Slovenia | 26 |
| Austria | 24 |
| International average | 23 |
| *Northern Ireland-GBR* | 23 |
| Netherlands | 21 |
| Slovak Republic | 21 |
| Armenia | 21 |
| Ireland | 21 |
| Poland | 20 |
| Georgia | 20 |
| Chile | 19 ⬇ |
| *England-GBR* | 19 |
| Turkey | 19 ⬇ |
| Croatia | 19 ⬇ |
| Germany | 18 ⬇ |
| Spain | 18 ⬇ |
| Bahrain | 17 ⬇ |
| Iran, Islamic Rep. of | 17 ⬇ |
| New Zealand | 16 ⬇ |
| Australia | 15 ⬇ |
| *Belgium (Flemish)-BEL* | 15 ⬇ |
| Tunisia | 14 ⬇ |
| Azerbaijan | 14 ⬇ |
| Singapore | 13 ⬇ |
| **United States** | **13** ⬇ |
| Malta | 12 ⬇ |
| United Arab Emirates | 4 ⬇ |
| Oman | 4 ⬇ |
| Qatar | 4 ⬇ |
| *Hong Kong-CHN* | 2 ⬇ |
| Saudi Arabia | 2 ⬇ |
| Kuwait | 1 ⬇ |
| Morocco | 1 ⬇ |
| Yemen | # ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 15 ⬇ |
| *Quebec-CAN* | 15 ⬇ |
| *North Carolina-USA* | 13 ⬇ |
| *Florida-USA* | 13 ⬇ |
| *Ontario-CAN* | 12 ⬇ |
| *Dubai-UAE* | 6 ⬇ |
| *Abu Dhabi-UAE* | 3 ⬇ |

⬢ Percent higher than International average
⬇ Percent lower than International average
# Rounds to zero

Item label: Use of rat incisors (continued)

*S041013B:*

## Student Responses

### Correct Response:

Rats uses there incisors for nawing on hard vegtobels.

### Incorrect Response:

The rat uses it's incisors for chopping up it's food

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

## Item label: One function of fruit

Some plants produce fruit such as apples.

What is one function of a fruit?

A.   to protect seeds

B.   to produce food for seeds

C.   to stop seeds from dispersing

D.   to store water for seed germination

*Item Number: S041014*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 61 ⬠ |
| Romania | 45 ⬠ |
| Korea, Rep. of | 44 ⬠ |
| Slovak Republic | 41 ⬠ |
| Italy | 41 ⬠ |
| **United States** | **41** ⬠ |
| *Chinese Taipei-CHN* | 40 ⬠ |
| Azerbaijan | 39 ⬠ |
| Slovenia | 38 ⬠ |
| Poland | 35 ⬠ |
| Russian Federation | 35 |
| Finland | 34 |
| Spain | 34 |
| Portugal | 34 |
| Morocco | 34 |
| Kazakhstan | 33 |
| United Arab Emirates | 33 |
| Serbia | 33 |
| Bahrain | 32 |
| Ireland | 32 |
| *Hong Kong-CHN* | 32 |
| Chile | 32 |
| Croatia | 32 |
| Iran, Islamic Rep. of | 32 |
| Czech Republic | 32 |
| Norway | 31 |
| Germany | 31 |
| International average | 31 |
| *Northern Ireland-GBR* | 31 |
| Malta | 30 |
| *England-GBR* | 30 |
| Denmark | 29 |
| Saudi Arabia | 29 |
| Lithuania | 28 |
| Qatar | 28 |
| Austria | 27 ⬡ |
| Turkey | 26 ⬡ |
| Australia | 26 ⬡ |
| Japan | 26 ⬡ |
| Oman | 26 ⬡ |
| Armenia | 25 ⬡ |
| Kuwait | 25 ⬡ |
| Netherlands | 25 ⬡ |
| Hungary | 25 ⬡ |
| New Zealand | 25 ⬡ |
| Thailand | 24 ⬡ |
| *Belgium (Flemish)-BEL* | 24 ⬡ |
| Sweden | 22 ⬡ |
| Georgia | 20 ⬡ |
| Tunisia | 15 ⬡ |
| Yemen | 14 ⬡ |

### Benchmarking education system

| | |
|---|---|
| *Dubai-UAE* | 35 ⬠ |
| *Florida-USA* | 33 |
| *Abu Dhabi-UAE* | 32 |
| *North Carolina-USA* | 32 |
| *Ontario-CAN* | 30 |
| *Alberta-CAN* | 27 |
| *Quebec-CAN* | 22 ⬡ |

⬠ Percent higher than International average
⬡ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **LIFE SCIENCE** | Ecosystems | Reasoning |

## Item label: Better way to travel around town
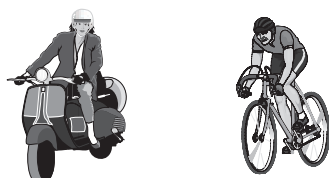


The pictures above show two ways of traveling around town.

A. Which way of traveling is better for the environment?

(Check one box.)

☐ Bicycle

☐ Motorbike

B. Explain your answer.

*Item Number: S041039*

### SCORING

**Correct Response**

- Bicycle with an explanation that relates to air or noise pollution. (If the explanation includes inaccurate information such as destroying the ozone layer, still credit the response).

Examples:

It does not produce fumes like a motorbike does.

A motorbike gives out fumes which go up into the air and pollute it. Whereas a bike does not.

The motorbike gives off fumes which destroy the ozone layer and so the bicycle is better for the environment.

**Incorrect Response**

- Bicycle with a general explanation.

Example: My answer is a bicycle because it does not use gas.

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

Examples:

A bicycle because it gives you exercise.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 83 ⬥ |
| Croatia | 78 ⬥ |
| Portugal | 75 ⬥ |
| Slovenia | 73 ⬥ |
| Finland | 70 ⬥ |
| Italy | 70 ⬥ |
| Sweden | 68 ⬥ |
| Hungary | 68 ⬥ |
| Russian Federation | 67 ⬥ |
| *Chinese Taipei-CHN* | 67 ⬥ |
| Spain | 64 ⬥ |
| Czech Republic | 64 ⬥ |
| Chile | 63 ⬥ |
| Serbia | 62 ⬥ |
| Germany | 62 ⬥ |
| Iran, Islamic Rep. of | 61 ⬥ |
| Slovak Republic | 60 ⬥ |
| Austria | 60 ⬥ |
| Singapore | 54 ⬥ |
| Poland | 54 ⬥ |
| Netherlands | 53 ⬥ |
| *Belgium (Flemish)-BEL* | 53 ⬥ |
| Romania | 51 |
| Lithuania | 50 |
| Norway | 49 |
| International average | 48 |
| *England-GBR* | 47 |
| *Hong Kong-CHN* | 45 |
| Japan | 45 |
| Denmark | 44 |
| **United States** | **43** ⬦ |
| *Northern Ireland-GBR* | 43 ⬦ |
| New Zealand | 42 ⬦ |
| Australia | 42 ⬦ |
| Ireland | 41 ⬦ |
| Kazakhstan | 40 ⬦ |
| Bahrain | 39 ⬦ |
| Turkey | 38 ⬦ |
| Thailand | 36 ⬦ |
| Tunisia | 35 ⬦ |
| United Arab Emirates | 31 ⬦ |
| Malta | 30 ⬦ |
| Qatar | 29 ⬦ |
| Armenia | 29 ⬦ |
| Saudi Arabia | 28 ⬦ |
| Georgia | 28 ⬦ |
| Morocco | 24 ⬦ |
| Kuwait | 20 ⬦ |
| Oman | 18 ⬦ |
| Azerbaijan | 12 ⬦ |
| Yemen | 4 ⬦ |

**Benchmarking education system**

| | |
|---|---|
| *Alberta-CAN* | 54 ⬥ |
| *Ontario-CAN* | 51 |
| *Florida-USA* | 46 |
| *Quebec-CAN* | 45 |
| *Dubai-UAE* | 40 ⬦ |
| *North Carolina-USA* | 36 ⬦ |
| *Abu Dhabi-UAE* | 31 ⬦ |

⬥ Percent higher than International average
⬦ Percent lower than International average

Item label: Better way to travel around town (continued)

*S041039:*

## Student Responses

### Correct Response:

A. Which way of traveling is better for the environment?

(Check one box.)

☑ Bicycle

☐ Motorbike

B. Explain your answer.

Because the motorciclye
send oil up to the atmoupher
and the ozone layer.

### Incorrect Response:

A. Which way of traveling is better for the environment?

(Check one box.)

☑ Bicycle

☐ Motorbike

B. Explain your answer.

A bicyde is better because
you aren't using gas or
stuff that comes from the
eorth. On a bicycle you
just use your muscles.

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

## Item label: Group of animals contains reptiles

Which group of animals contains ONLY reptiles?

A.   lizard, frog, snake

B.   turtle, lizard, crocodile

C.   octopus, snail, turtle

D.   crab, earthworm, snake

*Item Number: S041163*

| **Correct Response:** | **B** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *Chinese Taipei-CHN* | 70 △ |
| Lithuania | 56 △ |
| Singapore | 56 △ |
| **United States** | **55** △ |
| Australia | 53 △ |
| Oman | 52 △ |
| Slovenia | 51 △ |
| Ireland | 51 △ |
| Slovak Republic | 50 △ |
| Bahrain | 49 △ |
| Czech Republic | 48 △ |
| Thailand | 48 △ |
| Saudi Arabia | 48 △ |
| Iran, Islamic Rep. of | 47 △ |
| Germany | 47 △ |
| *Northern Ireland-GBR* | 47 △ |
| *Hong Kong-CHN* | 46 △ |
| *England-GBR* | 46 △ |
| Kuwait | 45 △ |
| Italy | 45 △ |
| Russian Federation | 45 △ |
| *Belgium (Flemish)-BEL* | 45 △ |
| New Zealand | 44 △ |
| United Arab Emirates | 44 △ |
| Netherlands | 44 |
| Chile | 44 |
| Austria | 41 |
| Qatar | 40 |
| Azerbaijan | 40 |
| International average | 40 |
| Spain | 39 |
| Romania | 36 |
| Morocco | 36 ▽ |
| Hungary | 35 ▽ |
| Kazakhstan | 34 ▽ |
| Poland | 33 ▽ |
| Malta | 30 ▽ |
| Yemen | 30 ▽ |
| Norway | 29 ▽ |
| Croatia | 28 ▽ |
| Portugal | 27 ▽ |
| Armenia | 27 ▽ |
| Sweden | 25 ▽ |
| Korea, Rep. of | 25 ▽ |
| Tunisia | 25 ▽ |
| Georgia | 24 ▽ |
| Denmark | 23 ▽ |
| Finland | 21 ▽ |
| Turkey | 20 ▽ |
| Serbia | 18 ▽ |
| Japan | 14 ▽ |

**Benchmarking education system**

| | |
|---|---|
| *Florida-USA* | 56 △ |
| *Quebec-CAN* | 56 △ |
| *Ontario-CAN* | 53 △ |
| *North Carolina-USA* | 51 △ |
| *Alberta-CAN* | 45 △ |
| *Abu Dhabi-UAE* | 44 △ |
| *Dubai-UAE* | 38 |

△ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Interactions with the Environment | Applying |

## Item label: Migration of birds

How does migration increase the survival of birds?

*Item Number: S041174*

### SCORING

**Correct Response**

• Refers to finding food and/or reproduction.

Examples:

Move from one region to another for feeding or breeding.

Some of the birds find food or a place to build their nest.

• Refers to moving to a warmer place without mention of food or reproduction.

Examples:

Birds living in a country with winter will die in the cold. They will migrate to a place where it is summer or spring.

It provides warm weather for the birds.

**Incorrect Response**

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Austria | 81 ⬥ |
| Croatia | 73 ⬥ |
| Finland | 72 ⬥ |
| Slovak Republic | 70 ⬥ |
| Singapore | 70 ⬥ |
| Russian Federation | 67 ⬥ |
| Sweden | 64 ⬥ |
| Czech Republic | 63 ⬥ |
| Slovenia | 56 ⬥ |
| Hungary | 55 ⬥ |
| Italy | 52 ⬥ |
| Kazakhstan | 51 ⬥ |
| Serbia | 47 ⬥ |
| **United States** | **47** ⬥ |
| Portugal | 47 ⬥ |
| Romania | 46 ⬥ |
| Turkey | 45 ⬥ |
| Denmark | 45 ⬥ |
| Lithuania | 45 ⬥ |
| Armenia | 41 |
| Korea, Rep. of | 40 |
| Japan | 38 |
| International average | 37 |
| Poland | 36 |
| *Northern Ireland-GBR* | 35 |
| Bahrain | 35 |
| Iran, Islamic Rep. of | 35 |
| Azerbaijan | 33 ▽ |
| Georgia | 33 |
| Saudi Arabia | 33 |
| Ireland | 31 ▽ |
| Norway | 31 ▽ |
| *Chinese Taipei-CHN* | 27 ▽ |
| Thailand | 27 ▽ |
| Germany | 24 ▽ |
| Netherlands | 24 ▽ |
| New Zealand | 23 ▽ |
| Oman | 19 ▽ |
| *England-GBR* | 19 ▽ |
| Chile | 19 ▽ |
| *Belgium (Flemish)-BEL* | 19 ▽ |
| United Arab Emirates | 19 ▽ |
| Australia | 19 ▽ |
| Spain | 18 ▽ |
| Qatar | 18 ▽ |
| Morocco | 17 ▽ |
| Tunisia | 16 ▽ |
| Kuwait | 12 ▽ |
| *Hong Kong-CHN* | 9 ▽ |
| Malta | 8 ▽ |
| Yemen | 3 ▽ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 43 ⬥ |
| *Ontario-CAN* | 42 ⬥ |
| *Florida-USA* | 42 |
| *Alberta-CAN* | 40 |
| *Quebec-CAN* | 37 |
| *Dubai-UAE* | 19 ▽ |
| *Abu Dhabi-UAE* | 15 ▽ |

⬥ Percent higher than International average
▽ Percent lower than International average

Item label: Migration of birds (continued)

*S041174:*

## Student Responses

### Correct Response:

It increases the survival of birds because when they get to cold they can die but if they migrate they will stay warm and live longer.

### Incorrect Response:

The more the migrate the healtheir they get.

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Ecosystems | Knowing |

## Item label: What plants use energy for

Plants use energy directly from the Sun.

What do they use the energy from the Sun for?

A.    to make food

B.    to disperse seeds

C.    to fertilize the soil

D.    to prevent insect damage

*Item Number: S041178*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 93 ⬧ |
| Singapore | 88 ⬧ |
| *Hong Kong-CHN* | 87 ⬧ |
| *Chinese Taipei-CHN* | 85 ⬧ |
| Japan | 85 ⬧ |
| Saudi Arabia | 79 ⬧ |
| Bahrain | 78 ⬧ |
| Spain | 75 ⬧ |
| Turkey | 73 ⬧ |
| Thailand | 72 ⬧ |
| Finland | 71 ⬧ |
| Iran, Islamic Rep. of | 71 ⬧ |
| Czech Republic | 70 ⬧ |
| Serbia | 69 ⬧ |
| Hungary | 68 ⬧ |
| Oman | 68 ⬧ |
| Croatia | 68 ⬧ |
| Kuwait | 67 ⬧ |
| United Arab Emirates | 66 ⬧ |
| Italy | 63 ⬧ |
| Russian Federation | 61 ⬧ |
| **United States** | **60** ⬧ |
| Qatar | 56 |
| Romania | 55 |
| International average | 51 |
| Lithuania | 49 |
| Portugal | 48 |
| *England-GBR* | 46 ▽ |
| Kazakhstan | 45 ▽ |
| Chile | 44 ▽ |
| Azerbaijan | 44 ▽ |
| Netherlands | 42 ▽ |
| Slovenia | 42 ▽ |
| *Belgium (Flemish)-BEL* | 40 ▽ |
| Malta | 35 ▽ |
| Slovak Republic | 35 ▽ |
| Armenia | 34 ▽ |
| Georgia | 32 ▽ |
| Poland | 31 ▽ |
| Ireland | 30 ▽ |
| Germany | 30 ▽ |
| New Zealand | 29 ▽ |
| Australia | 29 ▽ |
| *Northern Ireland-GBR* | 29 ▽ |
| Yemen | 28 ▽ |
| Austria | 28 ▽ |
| Morocco | 23 ▽ |
| Tunisia | 21 ▽ |
| Sweden | 14 ▽ |
| Norway | 9 ▽ |
| Denmark | 8 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Dubai-UAE* | 70 ⬧ |
| *Florida-USA* | 64 ⬧ |
| *Ontario-CAN* | 59 ⬧ |
| *Abu Dhabi-UAE* | 58 ⬧ |
| *North Carolina-USA* | 46 |
| *Alberta-CAN* | 42 ▽ |
| *Quebec-CAN* | 24 ▽ |

⬧ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Ecosystems | Applying |

## Item label: Correct predator-prey relationship

The diagram below shows a food chain.



green algae     krill          fish          seal          killer whale

Which predator–prey relationship is correct?

A.   fish (predator)–seal (prey)

B.   green algae (predator)–krill (prey)

C.   fish (predator)–krill (prey)

D.   seal (predator)–killer whale (prey)

*Item Number: S041180*

| **Correct Response:** | **C** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 87 ⬆ |
| Russian Federation | 83 ⬆ |
| Czech Republic | 81 ⬆ |
| Japan | 77 ⬆ |
| *Hong Kong-CHN* | 75 ⬆ |
| Finland | 75 ⬆ |
| *Chinese Taipei-CHN* | 74 ⬆ |
| Italy | 73 ⬆ |
| Germany | 72 ⬆ |
| Lithuania | 71 ⬆ |
| Netherlands | 71 ⬆ |
| Hungary | 69 ⬆ |
| Thailand | 68 ⬆ |
| Croatia | 67 ⬆ |
| Portugal | 67 ⬆ |
| Serbia | 66 ⬆ |
| **United States** | **66** ⬆ |
| Slovak Republic | 66 ⬆ |
| Austria | 66 ⬆ |
| Poland | 66 ⬆ |
| Singapore | 64 ⬆ |
| Sweden | 62 ⬆ |
| *England-GBR* | 62 ⬆ |
| *Belgium (Flemish)-BEL* | 61 |
| Romania | 61 |
| Spain | 60 |
| Slovenia | 60 |
| Chile | 60 |
| International average | 57 |
| Australia | 57 |
| Ireland | 53 |
| *Northern Ireland-GBR* | 52 ⬇ |
| New Zealand | 51 ⬇ |
| Turkey | 50 ⬇ |
| Denmark | 49 ⬇ |
| Bahrain | 48 ⬇ |
| Kazakhstan | 48 ⬇ |
| Saudi Arabia | 47 ⬇ |
| Azerbaijan | 42 ⬇ |
| Tunisia | 42 ⬇ |
| United Arab Emirates | 41 ⬇ |
| Oman | 39 ⬇ |
| Iran, Islamic Rep. of | 38 ⬇ |
| Malta | 38 ⬇ |
| Qatar | 38 ⬇ |
| Georgia | 37 ⬇ |
| Armenia | 34 ⬇ |
| Kuwait | 32 ⬇ |
| Norway | 31 ⬇ |
| Morocco | 27 ⬇ |
| Yemen | 26 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 70 ⬆ |
| *Florida-USA* | 68 ⬆ |
| *Quebec-CAN* | 65 ⬆ |
| *Alberta-CAN* | 63 ⬆ |
| *Ontario-CAN* | 58 |
| *Dubai-UAE* | 47 ⬇ |
| *Abu Dhabi-UAE* | 41 ⬇ |

⬆ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Human Health | Applying |

## Item label: Influenza passing between people

> How can influenza be passed from person to person?

*Item Number: S041181*

### SCORING

**Correct Response**

- Mentions coughing or sneezing.

Example: If you sneeze on your friend the germs can be passed on.

- Mentions touching the same object, using the same utensils, or having physical contact with a person who has influenza.

Example: Influenza can be passed by sharing food and drinks.

- Other correct

Example: It is passed in the air.

**Incorrect Response**

- Mentions being near someone with influenza but does not mention coughing, sneezing, or any direct contact.

Example: It can be passed by going near to someone with influenza.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Sweden | 84 ⌃ |
| Lithuania | 81 ⌃ |
| Japan | 78 ⌃ |
| Slovak Republic | 76 ⌃ |
| *Northern Ireland-GBR* | 75 ⌃ |
| Russian Federation | 75 ⌃ |
| Croatia | 74 ⌃ |
| Finland | 73 ⌃ |
| Czech Republic | 73 ⌃ |
| *England-GBR* | 73 ⌃ |
| Hungary | 73 ⌃ |
| Serbia | 72 ⌃ |
| Netherlands | 72 ⌃ |
| *Belgium (Flemish)-BEL* | 70 ⌃ |
| Austria | 69 ⌃ |
| Kazakhstan | 69 ⌃ |
| Denmark | 69 ⌃ |
| New Zealand | 68 ⌃ |
| Germany | 67 ⌃ |
| Georgia | 67 ⌃ |
| *Chinese Taipei-CHN* | 67 ⌃ |
| Korea, Rep. of | 67 ⌃ |
| Romania | 66 ⌃ |
| Thailand | 64 ⌃ |
| Spain | 60 |
| Slovenia | 60 |
| Norway | 60 |
| *Hong Kong-CHN* | 60 |
| Azerbaijan | 59 |
| International average | 58 |
| Singapore | 58 |
| Portugal | 57 |
| Iran, Islamic Rep. of | 55 |
| Armenia | 55 |
| Chile | 54 ⌄ |
| **United States** | **54** ⌄ |
| Turkey | 54 ⌄ |
| Ireland | 52 ⌄ |
| Poland | 51 ⌄ |
| Bahrain | 48 ⌄ |
| Australia | 47 ⌄ |
| Saudi Arabia | 40 ⌄ |
| Italy | 39 ⌄ |
| United Arab Emirates | 38 ⌄ |
| Qatar | 38 ⌄ |
| Malta | 35 ⌄ |
| Oman | 33 ⌄ |
| Tunisia | 32 ⌄ |
| Morocco | 30 ⌄ |
| Kuwait | 26 ⌄ |
| Yemen | 5 ⌄ |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 72 ⌃ |
| *Alberta-CAN* | 53 ⌄ |
| *Florida-USA* | 52 ⌄ |
| *Ontario-CAN* | 48 ⌄ |
| *North Carolina-USA* | 48 ⌄ |
| *Dubai-UAE* | 40 ⌄ |
| *Abu Dhabi-UAE* | 34 ⌄ |

⌃ Percent higher than International average
⌄ Percent lower than International average

Item label: Influenza passing between people (continued)

*S041181:*

## Student Responses

### Correct Response:

If the person who has influenza coughs on someone, that person will get influenza.

### Incorrect Response:

By going near other people and passing it on.

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Human Health | Applying |

## Item label: One thing to avoid flu

Marcie is playing a board game with a friend who has the flu.

Write down one thing Marcie can do to avoid catching the flu from her friend.

*Item Number: S041182*

### SCORING

**Correct Response**

• States one acceptable reason.

Examples:

Marcie can wash her hands.

Marcie can cover her nose and mouth with a mask.

Marcie can tell her friend to wear a mask.

Marcie can wear gloves.

Marcie should not touch her face.

**Incorrect Response**

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

Examples:

Don't sit near her.

Get a flu shot.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Japan | 93 ⬆ |
| Korea, Rep. of | 78 ⬆ |
| Russian Federation | 77 ⬆ |
| *Chinese Taipei-CHN* | 75 ⬆ |
| Singapore | 67 ⬆ |
| Kazakhstan | 66 ⬆ |
| Finland | 61 ⬆ |
| **United States** | **61** ⬆ |
| Portugal | 57 ⬆ |
| *Hong Kong-CHN* | 55 ⬆ |
| Ireland | 54 ⬆ |
| Lithuania | 53 ⬆ |
| Chile | 53 ⬆ |
| Georgia | 49 ⬆ |
| Norway | 48 ⬆ |
| Iran, Islamic Rep. of | 48 ⬆ |
| Thailand | 47 |
| *England-GBR* | 46 |
| Australia | 46 ⬆ |
| Denmark | 44 |
| Croatia | 44 |
| Spain | 43 |
| Sweden | 43 |
| Serbia | 42 |
| International average | 42 |
| Netherlands | 41 |
| New Zealand | 40 |
| *Northern Ireland-GBR* | 40 |
| Hungary | 39 |
| Romania | 38 |
| Slovenia | 38 |
| Germany | 37 ⬇ |
| Azerbaijan | 36 |
| Turkey | 35 ⬇ |
| Slovak Republic | 35 ⬇ |
| Austria | 35 ⬇ |
| Armenia | 35 ⬇ |
| Czech Republic | 33 ⬇ |
| Poland | 31 ⬇ |
| Saudi Arabia | 29 ⬇ |
| Bahrain | 27 ⬇ |
| United Arab Emirates | 25 ⬇ |
| *Belgium (Flemish)-BEL* | 24 ⬇ |
| Italy | 23 ⬇ |
| Oman | 20 ⬇ |
| Malta | 19 ⬇ |
| Tunisia | 18 ⬇ |
| Qatar | 17 ⬇ |
| Kuwait | 9 ⬇ |
| Yemen | 3 ⬇ |
| Morocco | # ⬇ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 58 ⬆ |
| *Florida-USA* | 57 ⬆ |
| *Quebec-CAN* | 55 ⬆ |
| *Ontario-CAN* | 52 ⬆ |
| *Alberta-CAN* | 52 ⬆ |
| *Dubai-UAE* | 30 ⬇ |
| *Abu Dhabi-UAE* | 22 ⬇ |

⬆ Percent higher than International average
⬇ Percent lower than International average
# Rounds to zero

Item label: One thing to avoid flu (continued)

*S041182:*

## Student Responses

### Correct Response:

She can tell her firends to cover their mouth when the cough.

### Incorrect Response:

dont touch you

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Knowing |

## Item label: Flowering plant parts

The diagram shows a flowering plant. Four of its parts are numbered.
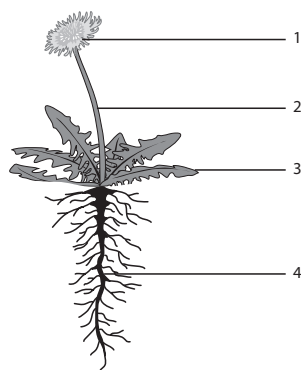


In the table below, write the name of each part, and state its function.

| Part Number | Name of Part | Function of Part |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |

*Item Number: S041224*

### SCORING

**Correct Response**

• Identifies 4 parts of the plant and states a correct function for each.

1: Flower (bud). Example: It produces seeds.

1: Seeds. Example: They reproduce the plant when the seed germinates.

1: Petals. Example: They attract pollinators.

2: Stem (stalk). Example: It transports water and food.

3: Leaf. Example: It makes food for the plant.

4: Root. Example: It transports water into the plant.

• Identifies 4 parts of the plant and states 3 correct functions.

**Partially Correct Response**

• Identifies 4 parts and 1 or 2 correct functions OR 3 parts and 1 or 2 or 3 correct functions OR 2 parts and 1 or 2 functions.

**Incorrect Response**

• Identifies 4 parts, but no correct functions

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 80 ⌃ |
| Korea, Rep. of | 42 ⌃ |
| Thailand | 40 ⌃ |
| Czech Republic | 39 ⌃ |
| Bahrain | 37 ⌃ |
| Italy | 36 ⌃ |
| Romania | 35 ⌃ |
| Hungary | 34 ⌃ |
| Croatia | 33 ⌃ |
| Finland | 32 ⌃ |
| Portugal | 31 ⌃ |
| Iran, Islamic Rep. of | 28 ⌃ |
| Kazakhstan | 27 ⌃ |
| *Chinese Taipei-CHN* | 26 ⌃ |
| Austria | 25 ⌃ |
| Slovak Republic | 25 ⌃ |
| **United States** | **24** ⌃ |
| Serbia | 23 |
| United Arab Emirates | 22 |
| Lithuania | 21 |
| *England-GBR* | 21 |
| International average | 21 |
| Russian Federation | 20 |
| Japan | 20 |
| Oman | 19 |
| Sweden | 18 |
| Kuwait | 18 |
| Saudi Arabia | 16 |
| *Hong Kong-CHN* | 16 ⌄ |
| Spain | 16 ⌄ |
| Slovenia | 15 ⌄ |
| Denmark | 15 ⌄ |
| Azerbaijan | 15 ⌄ |
| Qatar | 13 ⌄ |
| Chile | 13 ⌄ |
| Poland | 13 ⌄ |
| Morocco | 12 ⌄ |
| Turkey | 11 ⌄ |
| Ireland | 10 ⌄ |
| Georgia | 10 ⌄ |
| Germany | 10 ⌄ |
| Australia | 10 ⌄ |
| Armenia | 10 ⌄ |
| *Northern Ireland-GBR* | 9 ⌄ |
| Netherlands | 8 ⌄ |
| *Belgium (Flemish)-BEL* | 6 ⌄ |
| Malta | 6 ⌄ |
| New Zealand | 6 ⌄ |
| Norway | 4 ⌄ |
| Tunisia | 2 ⌄ |
| Yemen | 1 ⌄ |

**Benchmarking education system**

| | |
|---|---|
| *Dubai-UAE* | 31 ⌃ |
| *Florida-USA* | 24 |
| *Ontario-CAN* | 22 |
| *Alberta-CAN* | 21 |
| *Abu Dhabi-UAE* | 17 |
| *North Carolina-USA* | 13 ⌄ |
| *Quebec-CAN* | 8 ⌄ |

⌃ Percent higher than International average
⌄ Percent lower than International average

Item label: Flowering plant parts (continued)
*S041224:*

# Student Responses

## Correct Response:

The diagram shows a flowering plant. Four of its parts are numbered.

flower 1
stem 2
leaves 3
root 4
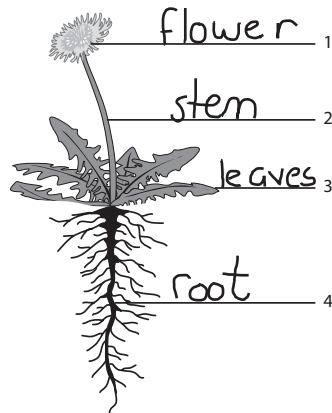
In the table below, write the name of each part, and state its function.

| Part Number | Name of Part | Function of Part |
|---|---|---|
| 1 | flower | The Flowers job is to spread seeds |
| 2 | stem | The stems job is to carry nutrients to the flower. |
| 3 | leaves | The leaves job is to feed the plant. |
| 4 | roots | The roots job is to soak up nutrients from the ground. |

Item label: Flowering plant parts (continued)

*S041224:*

## Student Responses

### Partially Correct Response:

The diagram shows a flowering plant. Four of its parts are numbered.
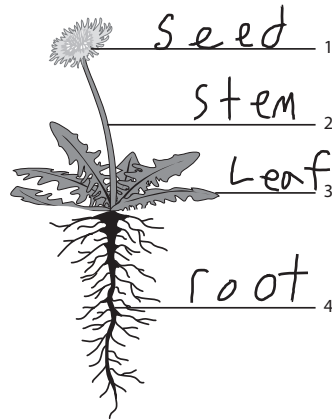


In the table below, write the name of each part, and state its function.

| Part Number | Name of Part | Function of Part |
|---|---|---|
| 1 | Seed | to spread |
| 2 | stem | to hold the flower |
| 3 | Leaf | for nutreins |
| 4 | root | for growth |

Item label: Flowering plant parts (continued)

*S041224:*

## Student Responses

### Incorrect Response:
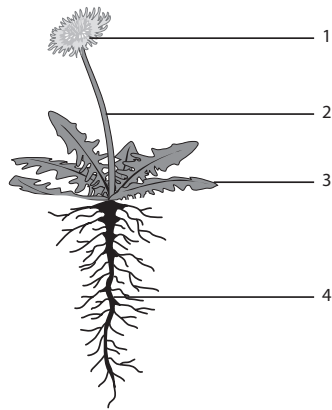
The diagram shows a flowering plant. Four of its parts are numbered.



In the table below, write the name of each part, and state its function.

| Part Number | Name of Part | Function of Part |
|---|---|---|
| 1 | Seeds | Start oul gbwing |
| 2 | Stamp | Part that come fBm roots. |
| 3 | Leaves | Something that glows with the flower. |
| 4 | roots | Part that is in the Soil |

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Interactions with the Environment | Applying |

## Item label: Hedgehog rolling into ball

A hedgehog is a small spiny animal. When it is frightened it rolls into a ball.



How does this behavior help the hedgehog?

A.    The hedgehog can roll away quickly.

B.    The hedgehog looks larger rolled up.

C.    The hedgehog is harder to see in a ball.

D.    The hedgehog's soft body parts are covered.

*Item Number: S051032*

| **Correct Response:** | **D** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Russian Federation | 76 ⏶ |
| Denmark | 74 ⏶ |
| Poland | 73 ⏶ |
| Slovenia | 73 ⏶ |
| Finland | 72 ⏶ |
| Czech Republic | 71 ⏶ |
| Hungary | 69 ⏶ |
| Spain | 68 ⏶ |
| Germany | 66 ⏶ |
| Croatia | 66 ⏶ |
| Slovak Republic | 65 ⏶ |
| Serbia | 65 ⏶ |
| Lithuania | 64 ⏶ |
| Austria | 61 ⏶ |
| Kazakhstan | 59 ⏶ |
| *Northern Ireland-GBR* | 58 ⏶ |
| Korea, Rep. of | 58 ⏶ |
| *England-GBR* | 58 ⏶ |
| Japan | 57 ⏶ |
| Turkey | 56 ⏶ |
| Azerbaijan | 56 ⏶ |
| Netherlands | 54 ⏶ |
| Sweden | 54 |
| Ireland | 51 |
| New Zealand | 51 |
| *Hong Kong-CHN* | 51 |
| **United States** | **50** |
| International average | 50 |
| Singapore | 50 |
| Portugal | 50 |
| Australia | 49 |
| Italy | 49 |
| *Chinese Taipei-CHN* | 48 |
| Romania | 47 |
| Iran, Islamic Rep. of | 45 |
| Georgia | 45 ⏷ |
| *Belgium (Flemish)-BEL* | 43 ⏷ |
| Thailand | 43 ⏷ |
| Norway | 43 ⏷ |
| Malta | 37 ⏷ |
| Chile | 34 ⏷ |
| Armenia | 34 ⏷ |
| Bahrain | 30 ⏷ |
| Saudi Arabia | 30 ⏷ |
| Qatar | 27 ⏷ |
| United Arab Emirates | 27 ⏷ |
| Morocco | 24 ⏷ |
| Tunisia | 23 ⏷ |
| Yemen | 22 ⏷ |
| Kuwait | 19 ⏷ |
| Oman | 18 ⏷ |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 59 ⏶ |
| *Alberta-CAN* | 54 |
| *Florida-USA* | 53 |
| *North Carolina-USA* | 49 |
| *Ontario-CAN* | 47 |
| *Dubai-UAE* | 35 ⏷ |
| *Abu Dhabi-UAE* | 26 ⏷ |

⏶ Percent higher than International average
⏷ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Interactions with the Environment | Applying |

## Item label: Why desert animals active at night

Why are many desert animals more active at night?

A. It is drier at night.

B. It is cooler at night.

C. There is less danger at night.

D. There is less wind at night.

*Item Number: S051033*

| **Correct Response:** | **B** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *Chinese Taipei-CHN* | 71 ⬡ |
| **United States** | **68** ⬡ |
| Netherlands | 67 ⬡ |
| Portugal | 64 ⬡ |
| Romania | 64 ⬡ |
| Sweden | 63 ⬡ |
| *Hong Kong-CHN* | 63 ⬡ |
| Finland | 62 ⬡ |
| Russian Federation | 61 ⬡ |
| Germany | 61 ⬡ |
| Singapore | 60 ⬡ |
| Kazakhstan | 59 ⬡ |
| Australia | 59 ⬡ |
| Ireland | 59 ⬡ |
| Hungary | 58 ⬡ |
| *England-GBR* | 56 ⬡ |
| Austria | 55 ⬡ |
| *Northern Ireland-GBR* | 55 ⬡ |
| Slovak Republic | 53 ⬡ |
| Italy | 53 |
| Korea, Rep. of | 53 |
| Malta | 52 |
| Armenia | 52 |
| Spain | 51 |
| New Zealand | 50 |
| Bahrain | 50 |
| Georgia | 49 |
| Chile | 49 |
| International average | 49 |
| Azerbaijan | 48 |
| Poland | 47 |
| Lithuania | 46 |
| United Arab Emirates | 45 ⬢ |
| Qatar | 43 ⬢ |
| *Belgium (Flemish)-BEL* | 42 ⬢ |
| Denmark | 40 ⬢ |
| Oman | 39 ⬢ |
| Czech Republic | 38 ⬢ |
| Japan | 38 ⬢ |
| Saudi Arabia | 37 ⬢ |
| Croatia | 36 ⬢ |
| Morocco | 35 ⬢ |
| Norway | 34 ⬢ |
| Slovenia | 32 ⬢ |
| Kuwait | 32 ⬢ |
| Turkey | 32 ⬢ |
| Iran, Islamic Rep. of | 32 ⬢ |
| Serbia | 31 ⬢ |
| Yemen | 31 ⬢ |
| Thailand | 30 ⬢ |
| Tunisia | 30 ⬢ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 76 ⬡ |
| *North Carolina-USA* | 68 ⬡ |
| *Quebec-CAN* | 63 ⬡ |
| *Ontario-CAN* | 60 ⬡ |
| *Alberta-CAN* | 59 ⬡ |
| *Dubai-UAE* | 51 |
| *Abu Dhabi-UAE* | 42 ⬢ |

⬡ Percent higher than International average
⬢ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Applying |

Item label: Animals with backbones- DERIVED

Quali animali indicati di seguito hanno una spina dorsale ? Riempire un ovale per ogni animale . Uno è stato fatto per voi

Which animals shown below have a backbone?

Fill in one oval for **each** animal. One has been done for you.

| Animal | | Has a Backbone | |
|---|---|---|---|
| | | Yes | No |
| heron | | ● | B |
| spider | | A | B |
| crab | | A | B |
| fish | | A | B |
| lion | | A | B |

*Item Number: S051049Z*

**SCORING**

**Correct Response**

• Fill in the ovals in the order: B, B, A, A

**Incorrect Response**

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

**Overall Percent Correct**

| Education system | Percent correct | |
|---|---|---|
| Japan | 65 | ⬥ |
| Italy | 59 | ⬥ |
| Russian Federation | 56 | ⬥ |
| Czech Republic | 55 | ⬥ |
| Croatia | 55 | ⬥ |
| Sweden | 53 | ⬥ |
| Hungary | 53 | ⬥ |
| Spain | 51 | ⬥ |
| Slovak Republic | 50 | ⬥ |
| Finland | 49 | ⬥ |
| Bahrain | 49 | ⬥ |
| Romania | 49 | ⬥ |
| Chile | 48 | ⬥ |
| Germany | 47 | ⬥ |
| Saudi Arabia | 47 | ⬥ |
| Austria | 45 | |
| Australia | 45 | ⬥ |
| Norway | 43 | |
| Korea, Rep. of | 43 | |
| Thailand | 42 | |
| Poland | 42 | |
| Slovenia | 42 | |
| Kazakhstan | 41 | |
| Portugal | 41 | |
| International average | 41 | |
| Iran, Islamic Rep. of | 41 | |
| Serbia | 40 | |
| Georgia | 40 | |
| Denmark | 39 | |
| **United States** | **39** | |
| *Hong Kong-CHN* | 38 | |
| New Zealand | 38 | |
| *England-GBR* | 37 | |
| Lithuania | 37 | |
| Malta | 37 | |
| Singapore | 37 | ⬦ |
| Ireland | 37 | ⬦ |
| *Northern Ireland-GBR* | 36 | |
| Azerbaijan | 35 | ⬦ |
| Armenia | 35 | ⬦ |
| Oman | 33 | ⬦ |
| Turkey | 32 | ⬦ |
| United Arab Emirates | 32 | ⬦ |
| *Chinese Taipei-CHN* | 31 | ⬦ |
| Netherlands | 31 | ⬦ |
| Kuwait | 30 | ⬦ |
| *Belgium (Flemish)-BEL* | 28 | ⬦ |
| Morocco | 28 | ⬦ |
| Qatar | 24 | ⬦ |
| Tunisia | 22 | ⬦ |
| Yemen | 17 | ⬦ |

**Benchmarking education system**

| | | |
|---|---|---|
| *Quebec-CAN* | 47 | ⬥ |
| *Alberta-CAN* | 43 | |
| *Ontario-CAN* | 38 | |
| *Florida-USA* | 37 | |
| *Abu Dhabi-UAE* | 35 | ⬦ |
| *North Carolina-USA* | 31 | ⬦ |
| *Dubai-UAE* | 30 | ⬦ |

⬥ Percent higher than International average
⬦ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **LIFE SCIENCE** | Characteristics and Life Processes of Living Things | Knowing |

## Item label: Write body part beside function

The table shows three functions carried out by parts of the human body.

Write the name of the body part beside its function. The first one has been done for you.

| Function | Body Part |
|---|---|
| Supports the body | Skeleton |
| Pumps blood through the body | |
| Used for thinking | |

*Item Number: S051057*

### SCORING

**Correct Response**

- Completes the table as shown.

| Function | Body Part |
|---|---|
| Supports the body | Skeleton |
| Pumps blood through the body | Heart |
| Used for thinking | Brain |

**Incorrect Response**

- Identifies the heart only.
- Identifies the brain only.
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task), including the following response: Mind

### Overall Percent Correct

| Education system | Percent correct | |
|---|---|---|
| Finland | 91 | ⬤ |
| Sweden | 83 | ⬤ |
| Czech Republic | 81 | ⬤ |
| *England-GBR* | 80 | ⬤ |
| Norway | 80 | ⬤ |
| *Northern Ireland-GBR* | 78 | ⬤ |
| Spain | 75 | ⬤ |
| Hungary | 74 | ⬤ |
| Slovenia | 73 | ⬤ |
| Slovak Republic | 73 | ⬤ |
| Denmark | 72 | ⬤ |
| Ireland | 70 | ⬤ |
| New Zealand | 70 | ⬤ |
| Austria | 69 | ⬤ |
| Australia | 69 | ⬤ |
| Portugal | 69 | ⬤ |
| Germany | 68 | ⬤ |
| Turkey | 67 | ⬤ |
| Singapore | 66 | ⬤ |
| **United States** | **65** | ⬤ |
| Croatia | 64 | ⬤ |
| Romania | 64 | ⬤ |
| Netherlands | 60 | ⬤ |
| Russian Federation | 58 | ⬤ |
| Italy | 56 | ⬤ |
| *Belgium (Flemish)-BEL* | 54 | ⬤ |
| *Hong Kong-CHN* | 54 | |
| Chile | 50 | |
| Malta | 50 | |
| International average | 50 | |
| Serbia | 49 | |
| Azerbaijan | 46 | |
| Poland | 45 | ⬇ |
| Kazakhstan | 37 | ⬇ |
| United Arab Emirates | 37 | ⬇ |
| Qatar | 35 | ⬇ |
| Lithuania | 35 | ⬇ |
| Georgia | 29 | ⬇ |
| Iran, Islamic Rep. of | 29 | ⬇ |
| Japan | 26 | ⬇ |
| Thailand | 26 | ⬇ |
| Bahrain | 24 | ⬇ |
| Korea, Rep. of | 23 | ⬇ |
| Armenia | 21 | ⬇ |
| *Chinese Taipei-CHN* | 15 | ⬇ |
| Tunisia | 10 | ⬇ |
| Kuwait | 9 | ⬇ |
| Oman | 8 | ⬇ |
| Saudi Arabia | 7 | ⬇ |
| Morocco | 4 | ⬇ |
| Yemen | 2 | ⬇ |

### Benchmarking education system

| | | |
|---|---|---|
| *Ontario-CAN* | 70 | ⬤ |
| *Alberta-CAN* | 70 | ⬤ |
| *Florida-USA* | 66 | ⬤ |
| *Quebec-CAN* | 63 | ⬤ |
| *North Carolina-USA* | 62 | ⬤ |
| *Dubai-UAE* | 54 | ⬤ |
| *Abu Dhabi-UAE* | 30 | ⬇ |

⬤ Percent higher than International average
⬇ Percent lower than International average

Item label: Write body parts beside function (continued)

*S051057:*

# Student Responses

### Correct Response:

| Function | Body Part |
|---|---|
| Supports the body | Skeleton |
| Pumps blood through the body | Heart |
| Used for thinking | Brian |

### Incorrect Response:

| Function | Body Part |
|---|---|
| Supports the body | Skeleton |
| Pumps blood through the body | Lungs |
| Used for thinking | brain |

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **LIFE SCIENCE** | Human Health | Knowing |

## Item label: Calcium important for growth

Harry grows two centimeters in one month.

Why is eating food that contains calcium important for Harry's growth?

*Item Number: S051173*

### SCORING

**Correct Response**

• Refers to calcium being needed to make (strong) bones.

Examples:

He needs the calcium for his bones.

His bones are growing and he needs calcium to make them.

**Incorrect Response**

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Japan | 49 ⬤ |
| Denmark | 46 ⬤ |
| Finland | 42 ⬤ |
| Kazakhstan | 40 ⬤ |
| *England-GBR* | 38 ⬤ |
| Czech Republic | 37 ⬤ |
| Russian Federation | 35 ⬤ |
| Spain | 35 ⬤ |
| Portugal | 31 ⬤ |
| *Northern Ireland-GBR* | 30 ⬤ |
| Lithuania | 30 ⬤ |
| Slovak Republic | 28 ⬤ |
| Chile | 28 ⬤ |
| Ireland | 27 ⬤ |
| *Hong Kong-CHN* | 27 ⬤ |
| Singapore | 25 ⬤ |
| Poland | 24 |
| Italy | 24 |
| Romania | 22 |
| Korea, Rep. of | 21 |
| Sweden | 21 |
| Australia | 21 |
| New Zealand | 21 |
| International ave | 20 |
| Hungary | 19 |
| Thailand | 19 |
| **United States** | **18** |
| Germany | 18 |
| *Chinese Taipei-CHN* | 17 |
| Azerbaijan | 16 ▽ |
| Saudi Arabia | 15 ▽ |
| Austria | 14 ▽ |
| Armenia | 13 ▽ |
| Bahrain | 13 ▽ |
| Turkey | 13 ▽ |
| *Belgium (Flemish)-BEL* | 12 ▽ |
| Norway | 11 ▽ |
| United Arab Emirates | 11 ▽ |
| Serbia | 11 ▽ |
| Croatia | 10 ▽ |
| Slovenia | 10 ▽ |
| Malta | 10 ▽ |
| Qatar | 9 ▽ |
| Netherlands | 9 ▽ |
| Iran, Islamic Rep. of | 8 ▽ |
| Georgia | 8 ▽ |
| Oman | 7 ▽ |
| Tunisia | 5 ▽ |
| Morocco | 5 ▽ |
| Kuwait | 4 ▽ |
| Yemen | 2 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 32 ⬤ |
| *Ontario-CAN* | 29 ⬤ |
| *North Carolina-USA* | 22 |
| *Quebec-CAN* | 21 |
| *Florida-USA* | 16 |
| *Dubai-UAE* | 11 ▽ |
| *Abu Dhabi-UAE* | 11 ▽ |

⬤ Percent higher than International average
▽ Percent lower than International average

Item label: Calcium important for growth (continued)

*S051173:*

## Student Responses

### Correct Response:

Calcium makes your bones stronger

### Incorrect Response:

because it is Healthy

for you

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Reasoning |

## Item label: Maria's experiment with salt/water

Maria designed an experiment using salt and water. The results of her experiment are shown in the table.

| Amount of Salt Dissolved | Water Volume | Water Temperature | Was Mixture Stirred? |
|---|---|---|---|
| 15 grams | 50 ml | 25°C | Yes |
| 30 grams | 100 ml | 25°C | Yes |
| 45 grams | 150 ml | 25°C | Yes |
| 60 grams | 200 ml | 25°C | Yes |

What was Maria studying in her experiment?

A. How much salt will dissolve in different volumes of water.

B. How much salt will dissolve at different temperatures.

C. If stirring increases how fast salt will dissolve.

D. If stirring decreases how fast salt will dissolve.

*Item Number: S031068*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 84 ⬧ |
| Singapore | 75 ⬧ |
| Japan | 68 ⬧ |
| *Hong Kong-CHN* | 64 ⬧ |
| **United States** | **64** ⬧ |
| *England-GBR* | 63 ⬧ |
| *Chinese Taipei-CHN* | 63 ⬧ |
| Finland | 59 ⬧ |
| Denmark | 59 ⬧ |
| Czech Republic | 59 ⬧ |
| Russian Federation | 58 ⬧ |
| Australia | 58 ⬧ |
| Italy | 56 ⬧ |
| Germany | 55 ⬧ |
| *Northern Ireland-GBR* | 55 ⬧ |
| Hungary | 55 ⬧ |
| Croatia | 54 ⬧ |
| Serbia | 54 |
| Austria | 54 ⬧ |
| *Belgium (Flemish)-BEL* | 53 |
| Slovak Republic | 53 |
| Lithuania | 52 |
| Ireland | 52 |
| Sweden | 52 |
| Portugal | 52 |
| Slovenia | 52 |
| New Zealand | 51 |
| Turkey | 50 |
| International average | 49 |
| Netherlands | 48 |
| Romania | 48 |
| Malta | 47 |
| Norway | 46 |
| Chile | 45 ⬦ |
| Bahrain | 45 |
| Azerbaijan | 44 |
| United Arab Emirates | 44 ⬦ |
| Spain | 44 ⬦ |
| Kazakhstan | 43 ⬦ |
| Poland | 41 ⬦ |
| Oman | 39 ⬦ |
| Thailand | 38 ⬦ |
| Qatar | 37 ⬦ |
| Saudi Arabia | 36 ⬦ |
| Iran, Islamic Rep. of | 36 ⬦ |
| Kuwait | 33 ⬦ |
| Morocco | 32 ⬦ |
| Georgia | 27 ⬦ |
| Armenia | 26 ⬦ |
| Yemen | 20 ⬦ |
| Tunisia | 16 ⬦ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 72 ⬧ |
| *North Carolina-USA* | 71 ⬧ |
| *Alberta-CAN* | 59 ⬧ |
| *Ontario-CAN* | 59 ⬧ |
| *Dubai-UAE* | 52 |
| *Quebec-CAN* | 49 |
| *Abu Dhabi-UAE* | 41 ⬦ |

⬧ Percent higher than International average
⬦ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Reasoning |

## Item label: Two carts holding magnets



The figure shows two carts, each holding a magnet. The carts are moved close together and then let go.

Describe what will happen to the carts.

(You may draw a picture to help explain your answer.)

*Item Number: S031076*

### SCORING

**Correct Response**

• Refers to carts repelling, moving apart from each other, or NOT being attracted to each other (or similar). [May draw diagram to indicate this.]

Examples:

The magnets repel because two north poles pull apart.

They will push each other away.

The carts will spread apart.

The two carts will not stick together.

**Incorrect Response**

• Refers only to the two carts being attracted WITHOUT any mention of turning so N-S poles are attracted.

Example: They will stick together.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 90 △ |
| Korea, Rep. of | 88 △ |
| Japan | 87 △ |
| *Chinese Taipei-CHN* | 77 △ |
| **United States** | **58** △ |
| *England-GBR* | 53 △ |
| Iran, Islamic Rep. of | 51 △ |
| Romania | 50 △ |
| *Hong Kong-CHN* | 49 △ |
| Russian Federation | 48 △ |
| Slovenia | 48 △ |
| Austria | 48 △ |
| Germany | 43 △ |
| Ireland | 42 △ |
| Denmark | 42 △ |
| Malta | 40 |
| Hungary | 40 |
| Kuwait | 40 |
| Finland | 38 |
| Slovak Republic | 37 |
| Portugal | 37 |
| International average | 36 |
| Sweden | 36 |
| Serbia | 36 |
| Thailand | 36 |
| Australia | 35 |
| Netherlands | 34 |
| New Zealand | 33 |
| Czech Republic | 32 |
| Bahrain | 32 |
| United Arab Emirates | 31 ▽ |
| Qatar | 30 ▽ |
| Kazakhstan | 27 ▽ |
| *Northern Ireland-GBR* | 27 ▽ |
| Saudi Arabia | 27 ▽ |
| Lithuania | 27 ▽ |
| Spain | 26 ▽ |
| Turkey | 26 ▽ |
| Azerbaijan | 25 ▽ |
| Chile | 23 ▽ |
| Georgia | 23 ▽ |
| Poland | 22 ▽ |
| Oman | 22 ▽ |
| Norway | 21 ▽ |
| *Belgium (Flemish)-BEL* | 19 ▽ |
| Italy | 18 ▽ |
| Croatia | 17 ▽ |
| Armenia | 11 ▽ |
| Yemen | 2 ▽ |
| Tunisia | 2 ▽ |
| Morocco | 1 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 64 △ |
| *North Carolina-USA* | 55 △ |
| *Florida-USA* | 54 △ |
| *Ontario-CAN* | 50 △ |
| *Dubai-UAE* | 33 ▽ |
| *Quebec-CAN* | 32 |
| *Abu Dhabi-UAE* | 31 |

△ Percent higher than International average
▽ Percent lower than International average

Item label: Two carts holding magnets (continued)
*S031076:*

## Student Responses

### Correct Response:

The carts will not stay together
because the sides facing each other
are negatives you need them like this;
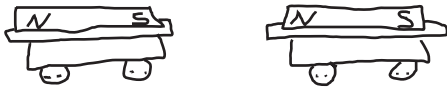


### Incorrect Response:

The magnetic pull will pull
the magnets together

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

## Item label: Object in circuit for bulb to glow

The following picture shows a lightbulb connected to a battery in an electrical circuit. Which of the following objects connected to Points 1 and 2 will allow the bulb to glow?
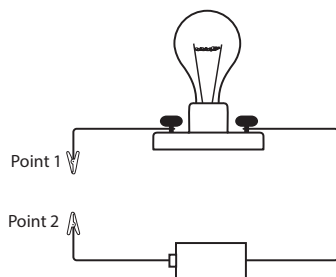


A. iron nail

B. plastic spoon

C. rubber band

D. wooden stick

*Item Number: S031077*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Japan | 94 ⬖ |
| *Chinese Taipei-CHN* | 94 ⬖ |
| Singapore | 94 ⬖ |
| Austria | 89 ⬖ |
| Germany | 88 ⬖ |
| Slovak Republic | 87 ⬖ |
| Finland | 86 ⬖ |
| **United States** | **84** ⬖ |
| *Hong Kong-CHN* | 84 ⬖ |
| *England-GBR* | 84 ⬖ |
| Korea, Rep. of | 83 ⬖ |
| Iran, Islamic Rep. of | 82 ⬖ |
| Sweden | 79 ⬖ |
| Portugal | 79 ⬖ |
| *Belgium (Flemish)-BEL* | 78 ⬖ |
| Czech Republic | 77 ⬖ |
| Slovenia | 76 ⬖ |
| Ireland | 76 ⬖ |
| Serbia | 76 ⬖ |
| *Northern Ireland-GBR* | 75 |
| Denmark | 75 |
| Malta | 75 |
| Romania | 74 |
| Poland | 74 |
| Lithuania | 74 |
| New Zealand | 74 |
| Australia | 74 |
| Hungary | 73 |
| Croatia | 73 |
| Russian Federation | 72 |
| International average | 71 |
| Spain | 71 |
| Oman | 68 |
| Thailand | 68 |
| Norway | 67 |
| Turkey | 63 ⬇ |
| Kazakhstan | 62 ⬇ |
| Italy | 62 ⬇ |
| Netherlands | 62 ⬇ |
| Qatar | 61 ⬇ |
| United Arab Emirates | 61 ⬇ |
| Armenia | 60 ⬇ |
| Chile | 59 ⬇ |
| Azerbaijan | 57 ⬇ |
| Bahrain | 57 ⬇ |
| Georgia | 56 ⬇ |
| Saudi Arabia | 53 ⬇ |
| Tunisia | 46 ⬇ |
| Morocco | 43 ⬇ |
| Yemen | 36 ⬇ |
| Kuwait | 34 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 91 ⬖ |
| *Florida-USA* | 80 ⬖ |
| *Alberta-CAN* | 78 ⬖ |
| *Ontario-CAN* | 76 ⬖ |
| *Quebec-CAN* | 71 |
| *Dubai-UAE* | 69 |
| *Abu Dhabi-UAE* | 58 ⬇ |

⬖ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Knowing |

Item label: Two uses of electricity-DERIVED

Name two things electricity can be used for in daily life.

Use 1:

Use 2:

*Item Number: S031197Z*

### SCORING

Note: Each of the two responses are scored separately. However, if the two responses are essentially the same, the second response should be scored as "Incorrect Response".

**Correct Response**

• Refers to providing light.

• Refers to supplying heat.

• Refers to an electrical household appliance or device.

• Refers to transportation.

• Other correct

**Incorrect Response**

• Response too vague.  [Connection to light, heat or other use not clear.]

Examples

It helps us.

To read and write.

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

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 91 ⬖ |
| Finland | 82 ⬖ |
| *Northern Ireland-GBR* | 78 ⬖ |
| Sweden | 77 ⬖ |
| Ireland | 76 ⬖ |
| Thailand | 75 ⬖ |
| *England-GBR* | 75 ⬖ |
| Singapore | 74 ⬖ |
| *Belgium (Flemish)-BEL* | 72 ⬖ |
| Australia | 71 ⬖ |
| Japan | 71 ⬖ |
| Slovenia | 70 ⬖ |
| Slovak Republic | 70 ⬖ |
| Denmark | 70 ⬖ |
| Lithuania | 69 ⬖ |
| **United States** | **68** ⬖ |
| Bahrain | 68 ⬖ |
| Netherlands | 67 ⬖ |
| Austria | 66 ⬖ |
| *Chinese Taipei-CHN* | 66 ⬖ |
| New Zealand | 65 ⬖ |
| Italy | 64 ⬖ |
| Hungary | 64 ⬖ |
| Germany | 63 ⬖ |
| Czech Republic | 63 ⬖ |
| Norway | 61 |
| Poland | 60 |
| Saudi Arabia | 58 |
| *Hong Kong-CHN* | 58 |
| Portugal | 57 |
| International average | 57 |
| Russian Federation | 56 |
| Spain | 56 |
| Kazakhstan | 54 |
| Malta | 52 ⬙ |
| United Arab Emirates | 51 ⬙ |
| Iran, Islamic Rep. of | 50 ⬙ |
| Croatia | 48 ⬙ |
| Romania | 44 ⬙ |
| Chile | 44 ⬙ |
| Qatar | 41 ⬙ |
| Azerbaijan | 41 ⬙ |
| Oman | 40 ⬙ |
| Georgia | 39 ⬙ |
| Kuwait | 37 ⬙ |
| Serbia | 36 ⬙ |
| Tunisia | 29 ⬙ |
| Armenia | 26 ⬙ |
| Turkey | 20 ⬙ |
| Yemen | 12 ⬙ |
| Morocco | 8 ⬙ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 70 ⬖ |
| *Ontario-CAN* | 70 ⬖ |
| *Alberta-CAN* | 69 ⬖ |
| *North Carolina-USA* | 66 ⬖ |
| *Quebec-CAN* | 59 |
| *Dubai-UAE* | 56 |
| *Abu Dhabi-UAE* | 50 ⬙ |

⬖ Percent higher than International average
⬙ Percent lower than International average

Item label: Two uses of electricity (continued)

*S031197Z:*

## Student Responses

**Correct Response:**

Use 1: It can help you when you need to cook.

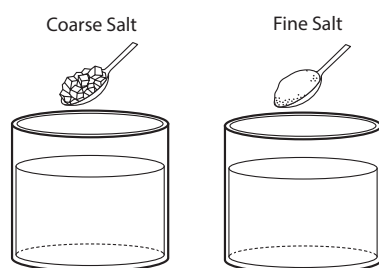Use 2: it can help you to turn on the light.

**Incorrect Response:**

Use 1: excperiments

Use 2: light

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Applying |

## Item label: Coarse & fine salt added to water

Coarse salt and fine salt are added to water and then stirred as shown in the picture.



Coarse Salt          Fine Salt

A. Which statement is true?

(Check one box.)

☐ Coarse salt will dissolve faster.

☐ Fine salt will dissolve faster.

☐ They both will dissolve in the same amount of time.

B. Explain your answer.

*Item Number: S031204*

### SCORING

**Correct Response**

• FINE with an explanation based on smaller particles dissolving faster (or similar).

Examples:

The fine salt has the smallest size of crystals, so they will dissolve faster.

The coarse salt is in big blocks that do not dissolve very well.

The fine salt is already partly broken down.

**Incorrect Response**

• FINE with no explanation or an incorrect explanation. [May include a true statement that does not answer the question.]

Example: The fine salt is lighter.

• COARSE with or without explanation.

• BOTH with or without explanation.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 79 ⌂ |
| Japan | 60 ⌂ |
| *Chinese Taipei-CHN* | 58 ⌂ |
| **United States** | **56** ⌂ |
| Singapore | 54 ⌂ |
| Slovenia | 52 ⌂ |
| Serbia | 52 ⌂ |
| Italy | 51 ⌂ |
| Finland | 50 ⌂ |
| Germany | 47 ⌂ |
| Australia | 47 ⌂ |
| Denmark | 46 ⌂ |
| Turkey | 45 ⌂ |
| *England-GBR* | 45 ⌂ |
| Netherlands | 44 ⌂ |
| Croatia | 44 ⌂ |
| Sweden | 44 ⌂ |
| Portugal | 44 ⌂ |
| New Zealand | 42 ⌂ |
| Austria | 42 ⌂ |
| Chile | 42 ⌂ |
| Slovak Republic | 41 |
| Kazakhstan | 39 |
| *Belgium (Flemish)-BEL* | 38 |
| Romania | 38 |
| Thailand | 38 |
| Ireland | 38 |
| *Hong Kong-CHN* | 38 |
| Lithuania | 38 |
| Czech Republic | 37 |
| International average | 37 |
| Hungary | 37 |
| *Northern Ireland-GBR* | 35 |
| Russian Federation | 33 |
| Poland | 33 |
| Saudi Arabia | 30 ▽ |
| Spain | 28 ▽ |
| Norway | 26 ▽ |
| Iran, Islamic Rep. of | 24 ▽ |
| Oman | 23 ▽ |
| Armenia | 22 ▽ |
| Qatar | 22 ▽ |
| Georgia | 22 ▽ |
| Bahrain | 22 ▽ |
| United Arab Emirates | 21 ▽ |
| Tunisia | 20 ▽ |
| Azerbaijan | 19 ▽ |
| Kuwait | 17 ▽ |
| Malta | 12 ▽ |
| Yemen | 10 ▽ |
| Morocco | 5 ▽ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 60 ⌂ |
| *Ontario-CAN* | 59 ⌂ |
| *Alberta-CAN* | 55 ⌂ |
| *Florida-USA* | 51 ⌂ |
| *Quebec-CAN* | 49 ⌂ |
| *Dubai-UAE* | 30 ▽ |
| *Abu Dhabi-UAE* | 16 ▽ |

⌂ Percent higher than International average
▽ Percent lower than International average

Item label: Coarse & fine salt added to water (continued)
*S031204:*

## Student Responses

### Correct Response:

A.  Which statement is true?

(Check one box.)

☐  Coarse salt will dissolve faster.

☑  Fine salt will dissolve faster.

☐  They both will dissolve in the same amount of time.

B.  Explain your answer.  Because fine salt is smaller than coarse salt so fine will disolve quicker.

### Incorrect Response:

A.  Which statement is true?

(Check one box.)

☐  Coarse salt will dissolve faster.

☐  Fine salt will dissolve faster.

☑ They both will dissolve in the same amount of time.

B.  Explain your answer.

there both salt

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

Item label: Metal spoon and wooden spoon

A metal spoon and a wooden spoon are used to stir a pot of hot soup.
After a few minutes, the metal spoon feels hotter than the wooden spoon.
What explains this?

A.  Metal is always hotter than wood.

B.  Metal conducts heat better than wood.

C.  Metal conducts electricity better than wood.

D.  Metal heats up the water hotter than the wood.

*Un cucchiaio di metallo e un cucchiaio di legno vengono utilizzate per mescolare una pentola di minestra calda. Dopo alcuni minuti , il cucchiaio di metallo sente più caldo del cucchiaio di legno . Come si spiega questo ?*

*Item Number: S031273*

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

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 96 ⬥ |
| Singapore | 89 ⬥ |
| Japan | 87 ⬥ |
| *Hong Kong-CHN* | 86 ⬥ |
| Finland | 82 ⬥ |
| *England-GBR* | 72 ⬥ |
| **United States** | **70** ⬥ |
| Serbia | 68 ⬥ |
| Hungary | 68 ⬥ |
| Sweden | 66 ⬥ |
| Italy | 65 ⬥ |
| Australia | 65 ⬥ |
| Ireland | 65 ⬥ |
| *Northern Ireland-GBR* | 64 ⬥ |
| Russian Federation | 63 ⬥ |
| Spain | 63 ⬥ |
| Germany | 62 ⬥ |
| Austria | 61 ⬥ |
| *Chinese Taipei-CHN* | 61 ⬥ |
| Slovenia | 58 |
| Denmark | 58 |
| International average | 56 |
| Poland | 55 |
| Portugal | 54 |
| Georgia | 54 |
| Romania | 54 |
| Thailand | 53 |
| Azerbaijan | 52 |
| Netherlands | 51 |
| *Belgium (Flemish)-BEL* | 51 ⬇ |
| Turkey | 50 ⬇ |
| Kazakhstan | 49 ⬇ |
| Qatar | 49 ⬇ |
| Chile | 49 ⬇ |
| Lithuania | 47 ⬇ |
| New Zealand | 47 ⬇ |
| Tunisia | 47 ⬇ |
| Croatia | 46 ⬇ |
| Norway | 46 ⬇ |
| Czech Republic | 46 ⬇ |
| United Arab Emirates | 44 ⬇ |
| Bahrain | 42 ⬇ |
| Saudi Arabia | 42 ⬇ |
| Slovak Republic | 42 ⬇ |
| Iran, Islamic Rep. of | 42 ⬇ |
| Malta | 40 ⬇ |
| Oman | 36 ⬇ |
| Kuwait | 34 ⬇ |
| Morocco | 34 ⬇ |
| Armenia | 33 ⬇ |
| Yemen | 29 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 71 ⬥ |
| *North Carolina-USA* | 70 ⬥ |
| *Alberta-CAN* | 67 ⬥ |
| *Ontario-CAN* | 60 |
| *Quebec-CAN* | 51 ⬇ |
| *Dubai-UAE* | 49 ⬇ |
| *Abu Dhabi-UAE* | 42 ⬇ |

⬥ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

## Item label: Boiled egg in cold water

A hot, boiled egg is put into a cup of cold water. What happens to the temperature of the water and the egg?

A.    The water gets colder and the egg gets warmer.

B.    The water gets warmer and the egg gets colder.

C.    The water temperature stays the same and the egg gets colder.

D.    Both the water and the egg get warmer.

*Item Number: S031298*

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 73 ⌂ |
| Korea, Rep. of | 67 ⌂ |
| Romania | 54 ⌂ |
| Azerbaijan | 52 ⌂ |
| Turkey | 51 ⌂ |
| Japan | 51 ⌂ |
| *Hong Kong-CHN* | 43 ⌂ |
| Slovak Republic | 43 ⌂ |
| *Chinese Taipei-CHN* | 43 ⌂ |
| Portugal | 41 ⌂ |
| Serbia | 39 |
| Russian Federation | 39 ⌂ |
| Georgia | 38 |
| Lithuania | 37 |
| Morocco | 37 |
| **United States** | **35** |
| Saudi Arabia | 35 |
| Italy | 34 |
| Croatia | 34 |
| International average | 34 |
| Armenia | 34 |
| Kuwait | 34 |
| Thailand | 33 |
| Finland | 32 |
| Qatar | 31 |
| Bahrain | 30 |
| Poland | 30 ▼ |
| *England-GBR* | 30 |
| United Arab Emirates | 30 ▼ |
| Chile | 30 ▼ |
| Norway | 29 |
| Ireland | 29 |
| Iran, Islamic Rep. of | 29 ▼ |
| Denmark | 29 ▼ |
| Germany | 28 ▼ |
| Czech Republic | 28 ▼ |
| Hungary | 27 ▼ |
| Malta | 27 ▼ |
| Austria | 27 ▼ |
| *Northern Ireland-GBR* | 27 ▼ |
| Slovenia | 27 ▼ |
| Yemen | 26 ▼ |
| Oman | 26 ▼ |
| Australia | 26 ▼ |
| New Zealand | 26 ▼ |
| Sweden | 26 ▼ |
| Tunisia | 25 ▼ |
| *Belgium (Flemish)-BEL* | 24 ▼ |
| Spain | 23 ▼ |
| Kazakhstan | 21 ▼ |
| Netherlands | 14 ▼ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 33 |
| *Alberta-CAN* | 32 |
| *Dubai-UAE* | 31 |
| *North Carolina-USA* | 30 |
| *Abu Dhabi-UAE* | 27 ▼ |
| *Ontario-CAN* | 25 ▼ |
| *Quebec-CAN* | 15 ▼ |

⌂ Percent higher than International average
▼ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Knowing |

## Item label: Sunlight made up of colors

Name one thing you have seen that shows that sunlight is made up of different colors.

*Item Number: S031299*

### SCORING

**Correct Response**

• Refers to a prism (or equivalent).

Example: Light shining into broken glass.

• Refers to a rainbow.

• Refers to sunset or sunrise (or similar).

Example: When the sun goes down.

• Other correct

Examples:

Soap bubbles.

Oil slicks.

**Incorrect Response**

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

Example: Day and night.

Day and night.

Glass

Mirror

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 68 ⬠ |
| Serbia | 63 ⬠ |
| Romania | 62 ⬠ |
| Portugal | 54 ⬠ |
| Denmark | 53 ⬠ |
| Ireland | 52 ⬠ |
| **United States** | **51** ⬠ |
| *Hong Kong-CHN* | 50 ⬠ |
| Croatia | 50 ⬠ |
| Finland | 49 ⬠ |
| Russian Federation | 47 ⬠ |
| Spain | 45 ⬠ |
| Lithuania | 45 ⬠ |
| *Belgium (Flemish)-BEL* | 45 ⬠ |
| Korea, Rep. of | 43 ⬠ |
| Italy | 43 ⬠ |
| Sweden | 42 |
| Germany | 42 ⬠ |
| Netherlands | 41 |
| Australia | 41 |
| *Northern Ireland-GBR* | 40 |
| Czech Republic | 39 |
| Slovak Republic | 39 |
| Bahrain | 39 |
| *England-GBR* | 39 |
| International average | 38 |
| New Zealand | 37 |
| Kazakhstan | 37 |
| Hungary | 37 |
| Chile | 37 |
| *Chinese Taipei-CHN* | 36 |
| Iran, Islamic Rep. of | 35 |
| Turkey | 34 |
| Azerbaijan | 33 |
| Austria | 33 ⬇ |
| Slovenia | 33 |
| Norway | 32 |
| Oman | 31 ⬇ |
| Saudi Arabia | 31 ⬇ |
| Georgia | 30 ⬇ |
| Japan | 29 ⬇ |
| Malta | 29 ⬇ |
| United Arab Emirates | 28 ⬇ |
| Qatar | 25 ⬇ |
| Thailand | 22 ⬇ |
| Poland | 22 ⬇ |
| Tunisia | 19 ⬇ |
| Armenia | 17 ⬇ |
| Kuwait | 16 ⬇ |
| Morocco | 13 ⬇ |
| Yemen | 5 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 58 ⬠ |
| *Alberta-CAN* | 58 ⬠ |
| *North Carolina-USA* | 54 ⬠ |
| *Ontario-CAN* | 51 ⬠ |
| *Quebec-CAN* | 33 ⬇ |
| *Dubai-UAE* | 31 ⬇ |
| *Abu Dhabi-UAE* | 25 ⬇ |

⬠ Percent higher than International average
⬇ Percent lower than International average

Item label: Sunlight made up of colors (continued)

*S031299:*

## Student Responses

### Correct Response:

prisem

### Incorrect Response:

Reflection

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Forces and Motion | Knowing |

## Item label: Force that causes object to fall

What causes an object to fall to the ground when you let it drop from your hand?

A.  magnetism

B.  gravity

C.  air resistance

D.  the push from your hand

*Item Number: S031311*

| Correct Response: | **B** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Finland | 85 ⬙ |
| Slovak Republic | 83 ⬙ |
| **United States** | **81** ⬙ |
| *Hong Kong-CHN* | 80 ⬙ |
| *England-GBR* | 80 ⬙ |
| Australia | 79 ⬙ |
| Korea, Rep. of | 79 ⬙ |
| *Chinese Taipei-CHN* | 78 ⬙ |
| Denmark | 78 ⬙ |
| Netherlands | 73 ⬙ |
| *Northern Ireland-GBR* | 71 ⬙ |
| Ireland | 71 ⬙ |
| Sweden | 71 ⬙ |
| Turkey | 70 ⬙ |
| Spain | 70 ⬙ |
| Japan | 70 ⬙ |
| Singapore | 68 ⬙ |
| New Zealand | 66 ⬙ |
| *Belgium (Flemish)-BEL* | 66 ⬙ |
| Norway | 65 |
| Germany | 65 |
| Bahrain | 65 |
| Poland | 63 |
| Romania | 63 |
| Saudi Arabia | 63 |
| Austria | 62 |
| Serbia | 62 |
| Hungary | 62 |
| Russian Federation | 61 |
| International average | 61 |
| Italy | 60 |
| Georgia | 60 |
| Thailand | 59 |
| Kuwait | 58 |
| Chile | 57 |
| Slovenia | 56 |
| United Arab Emirates | 56 ⬘ |
| Iran, Islamic Rep. of | 56 |
| Portugal | 56 ⬘ |
| Czech Republic | 51 ⬘ |
| Croatia | 50 ⬘ |
| Malta | 49 ⬘ |
| Oman | 46 ⬘ |
| Qatar | 45 ⬘ |
| Azerbaijan | 45 ⬘ |
| Kazakhstan | 43 ⬘ |
| Yemen | 34 ⬘ |
| Tunisia | 34 ⬘ |
| Lithuania | 31 ⬘ |
| Armenia | 28 ⬘ |
| Morocco | 23 ⬘ |

### Benchmarking education system

| | |
|---|---|
| *Ontario-CAN* | 81 ⬙ |
| *Alberta-CAN* | 80 ⬙ |
| *Florida-USA* | 79 ⬙ |
| *North Carolina-USA* | 76 ⬙ |
| *Quebec-CAN* | 63 |
| *Dubai-UAE* | 60 |
| *Abu Dhabi-UAE* | 52 ⬘ |

⬙ Percent higher than International average
⬘ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Applying |

Item label: Heat to change state of water

During freezing, melting, and boiling, water changes from one state to another state.

Heat needs to be supplied for which of these to take place?

A.  boiling only

B.  melting only

C.  melting and freezing but not boiling

D.  melting and boiling but not freezing

*Item Number: S031371*

| **Correct Response:** | **D** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Germany | 73 ⌂ |
| Austria | 68 ⌂ |
| Slovenia | 67 ⌂ |
| Singapore | 66 ⌂ |
| Russian Federation | 66 ⌂ |
| Korea, Rep. of | 64 ⌂ |
| Croatia | 62 ⌂ |
| **United States** | **61** ⌂ |
| Finland | 60 ⌂ |
| Lithuania | 59 ⌂ |
| Chile | 58 ⌂ |
| Sweden | 57 ⌂ |
| Norway | 54 ⌂ |
| *England-GBR* | 53 ⌂ |
| Hungary | 51 ⌂ |
| *Northern Ireland-GBR* | 50 |
| Serbia | 50 |
| Italy | 50 |
| Ireland | 50 |
| *Hong Kong-CHN* | 50 |
| Kazakhstan | 49 |
| *Belgium (Flemish)-BEL* | 49 |
| Poland | 48 |
| Malta | 48 |
| International average | 47 |
| New Zealand | 47 |
| Australia | 46 |
| Bahrain | 45 |
| Thailand | 44 |
| Japan | 44 |
| *Chinese Taipei-CHN* | 44 |
| Slovak Republic | 43 |
| United Arab Emirates | 43 ▽ |
| Iran, Islamic Rep. of | 42 ▽ |
| Saudi Arabia | 41 ▽ |
| Tunisia | 41 ▽ |
| Qatar | 40 ▽ |
| Turkey | 40 ▽ |
| Denmark | 39 ▽ |
| Romania | 38 ▽ |
| Spain | 37 ▽ |
| Armenia | 37 ▽ |
| Kuwait | 35 ▽ |
| Oman | 35 ▽ |
| Czech Republic | 35 ▽ |
| Portugal | 34 ▽ |
| Azerbaijan | 34 ▽ |
| Netherlands | 33 ▽ |
| Georgia | 27 ▽ |
| Yemen | 27 ▽ |
| Morocco | 25 ▽ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 69 ⌂ |
| *Florida-USA* | 65 ⌂ |
| *Alberta-CAN* | 59 ⌂ |
| *Ontario-CAN* | 54 ⌂ |
| *Dubai-UAE* | 46 |
| *Abu Dhabi-UAE* | 42 ▽ |
| *Quebec-CAN* | 37 ▽ |

⌂ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Knowing |

Item label: Which is a mixture

Which of these is a mixture?

A.    salt water

B.    sugar

C.    water vapor

D.    salt

*Item Number: S031410*

| **Correct Response:** | **A** |
|---|---|

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Turkey | 88 △ |
| Korea, Rep. of | 82 △ |
| Georgia | 79 △ |
| **United States** | **79** △ |
| Portugal | 78 △ |
| Finland | 77 △ |
| *Chinese Taipei-CHN* | 76 △ |
| Azerbaijan | 76 △ |
| Hungary | 75 △ |
| Romania | 75 △ |
| Austria | 75 △ |
| Denmark | 75 △ |
| Singapore | 75 △ |
| Bahrain | 73 △ |
| Russian Federation | 73 △ |
| Armenia | 72 △ |
| Spain | 72 △ |
| Saudi Arabia | 71 △ |
| Germany | 71 △ |
| United Arab Emirates | 69 △ |
| *England-GBR* | 69 |
| *Northern Ireland-GBR* | 69 |
| *Belgium (Flemish)-BEL* | 68 △ |
| Ireland | 67 |
| Chile | 67 |
| Sweden | 66 |
| Lithuania | 65 |
| Norway | 65 |
| Oman | 65 |
| New Zealand | 65 |
| International average | 64 |
| Australia | 64 |
| Netherlands | 64 |
| Japan | 61 |
| *Hong Kong-CHN* | 60 ▽ |
| Italy | 59 ▽ |
| Qatar | 58 ▽ |
| Serbia | 57 ▽ |
| Iran, Islamic Rep. of | 57 ▽ |
| Kazakhstan | 54 ▽ |
| Malta | 53 ▽ |
| Poland | 52 ▽ |
| Slovak Republic | 52 ▽ |
| Kuwait | 51 ▽ |
| Slovenia | 48 ▽ |
| Czech Republic | 47 ▽ |
| Morocco | 42 ▽ |
| Croatia | 40 ▽ |
| Thailand | 37 ▽ |
| Tunisia | 35 ▽ |
| Yemen | 34 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 77 △ |
| *North Carolina-USA* | 76 △ |
| *Dubai-UAE* | 74 △ |
| *Alberta-CAN* | 73 △ |
| *Ontario-CAN* | 70 △ |
| *Quebec-CAN* | 65 |
| *Abu Dhabi-UAE* | 65 |

△ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Applying |

Item label: Position of piece of ice in water
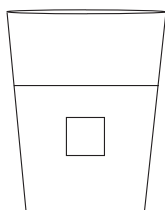
A piece of ice is placed in a glass of water. Which picture best shows the position of the ice in the water?
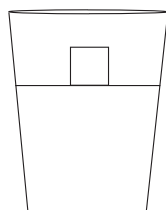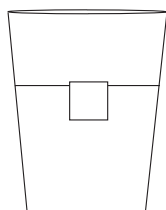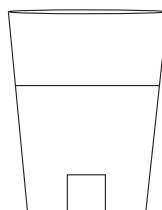
A.　　　　B.　　　　C.　　　　D.

*Item Number: S031418*

| **Correct Response:** | **B** |
|---|---|

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Japan | 83 ⬦ |
| Singapore | 76 ⬦ |
| Korea, Rep. of | 75 ⬦ |
| Finland | 74 ⬦ |
| Denmark | 73 ⬦ |
| **United States** | **61** ⬦ |
| Sweden | 60 ⬦ |
| *Hong Kong-CHN* | 59 ⬦ |
| *Chinese Taipei-CHN* | 59 ⬦ |
| Australia | 58 ⬦ |
| Norway | 55 ⬦ |
| *Northern Ireland-GBR* | 55 ⬦ |
| Netherlands | 53 ⬦ |
| *Belgium (Flemish)-BEL* | 52 ⬦ |
| Czech Republic | 52 ⬦ |
| New Zealand | 51 ⬦ |
| *England-GBR* | 51 ⬦ |
| Croatia | 51 ⬦ |
| Slovenia | 51 ⬦ |
| Ireland | 50 ⬦ |
| Thailand | 49 ⬦ |
| Portugal | 49 |
| Russian Federation | 48 ⬦ |
| Chile | 46 |
| Lithuania | 46 |
| Austria | 45 |
| Slovak Republic | 44 |
| International average | 44 |
| Spain | 43 |
| Malta | 43 |
| Germany | 41 |
| Poland | 40 |
| Hungary | 39 ⬇ |
| Italy | 37 ⬇ |
| Bahrain | 37 ⬇ |
| Qatar | 33 ⬇ |
| United Arab Emirates | 31 ⬇ |
| Romania | 29 ⬇ |
| Serbia | 28 ⬇ |
| Kuwait | 28 ⬇ |
| Iran, Islamic Rep. of | 26 ⬇ |
| Saudi Arabia | 26 ⬇ |
| Azerbaijan | 25 ⬇ |
| Kazakhstan | 22 ⬇ |
| Oman | 22 ⬇ |
| Turkey | 21 ⬇ |
| Georgia | 21 ⬇ |
| Yemen | 18 ⬇ |
| Armenia | 18 ⬇ |
| Morocco | 14 ⬇ |
| Tunisia | 12 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 69 ⬦ |
| *North Carolina-USA* | 68 ⬦ |
| *Quebec-CAN* | 64 ⬦ |
| *Alberta-CAN* | 62 ⬦ |
| *Ontario-CAN* | 57 ⬦ |
| *Dubai-UAE* | 38 ⬇ |
| *Abu Dhabi-UAE* | 28 ⬇ |

⬦ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Knowing |

Item label: Materials that will burn

Some of the materials below will burn and some will not.
Put an X in the box next to the materials that will burn.

(You may put an X in more than one box.)

☐ water

☐ wood

☐ sand

☐ gasoline

☐ air

*Item Number: S031421*

### SCORING

**Correct Response**

• Wood AND Gasoline (no incorrect materials are checked).

**Incorrect Response**

• Wood AND Air (no other materials are checked)

• Gasoline AND Air (no other materials are checked)

• Water OR Sand (even if correct materials are also checked)

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Germany | 87 ⌂ |
| Russian Federation | 87 ⌂ |
| Czech Republic | 86 ⌂ |
| Croatia | 81 ⌂ |
| Finland | 81 ⌂ |
| Hungary | 80 ⌂ |
| Austria | 80 ⌂ |
| Lithuania | 78 ⌂ |
| Serbia | 77 ⌂ |
| Romania | 76 ⌂ |
| Slovak Republic | 74 ⌂ |
| Denmark | 73 ⌂ |
| Netherlands | 73 ⌂ |
| Kazakhstan | 73 ⌂ |
| Turkey | 72 ⌂ |
| Poland | 71 ⌂ |
| Azerbaijan | 69 ⌂ |
| Japan | 68 ⌂ |
| Portugal | 67 ⌂ |
| Italy | 66 ⌂ |
| *Northern Ireland-GBR* | 64 |
| Armenia | 64 |
| Slovenia | 64 |
| *Belgium (Flemish)-BEL* | 63 |
| Norway | 62 |
| Ireland | 62 |
| Georgia | 61 |
| International average | 61 |
| *England-GBR* | 60 |
| Sweden | 60 |
| Australia | 57 |
| **United States** | **56** ▽ |
| Spain | 55 ▽ |
| Chile | 55 ▽ |
| *Chinese Taipei-CHN* | 54 ▽ |
| Saudi Arabia | 52 ▽ |
| Korea, Rep. of | 52 ▽ |
| New Zealand | 51 ▽ |
| Bahrain | 51 ▽ |
| Singapore | 51 ▽ |
| Iran, Islamic Rep. of | 50 ▽ |
| Malta | 50 ▽ |
| United Arab Emirates | 47 ▽ |
| *Hong Kong-CHN* | 45 ▽ |
| Tunisia | 43 ▽ |
| Oman | 40 ▽ |
| Thailand | 36 ▽ |
| Qatar | 35 ▽ |
| Kuwait | 30 ▽ |
| Morocco | 23 ▽ |
| Yemen | 17 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 60 |
| *North Carolina-USA* | 59 |
| *Alberta-CAN* | 58 |
| *Florida-USA* | 57 |
| *Ontario-CAN* | 54 ▽ |
| *Dubai-UAE* | 50 ▽ |
| *Abu Dhabi-UAE* | 45 ▽ |

⌂ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Reasoning |

## Item label: Styrofoam-brick-apple weigh more

Jack's teacher places three objects on a table, as shown below. She puts them in order according to their volume.
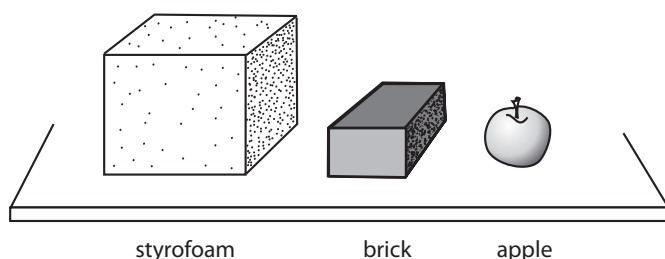


styrofoam          brick          apple

Jack thinks that objects with more volume weigh more.

A. Do you agree with him?

(Check one box.)

☐ Yes

☐ No

B. Explain your answer.

*Item Number: S041048*

### SCORING

**Correct Response**

• No with an explanation based on weight and/or denseness of material.

Examples:

Styrofoam is much larger than the other two objects and it probably does not weigh as much.

The brick has a smaller volume but it probably weighs more than the styrofoam.

The styrofoam is the least dense but it has more volume than the other two.

**Incorrect Response**

• No with an incorrect or no explanation.

• Yes with an explanation based on objects with more volume weighing more.

Examples:

The styrofoam is bigger so it has to weigh more.

It has to have volume to weigh more.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *Chinese Taipei-CHN* | 74 ⬡ |
| Austria | 74 ⬡ |
| Serbia | 72 ⬡ |
| Russian Federation | 71 ⬡ |
| Finland | 71 ⬡ |
| Korea, Rep. of | 68 ⬡ |
| Hungary | 68 ⬡ |
| Norway | 62 ⬡ |
| Portugal | 61 ⬡ |
| Poland | 58 ⬡ |
| Sweden | 56 ⬡ |
| Italy | 56 ⬡ |
| Czech Republic | 55 ⬡ |
| Lithuania | 54 ⬡ |
| Slovak Republic | 53 ⬡ |
| Singapore | 52 ⬡ |
| Germany | 51 ⬡ |
| *Hong Kong-CHN* | 49 ⬡ |
| Croatia | 47 ⬡ |
| **United States** | **46** ⬡ |
| Denmark | 46 |
| Japan | 45 |
| *Belgium (Flemish)-BEL* | 45 |
| Kazakhstan | 45 |
| Slovenia | 43 |
| Australia | 43 |
| Spain | 42 |
| International average | 42 |
| Chile | 41 |
| Netherlands | 40 |
| *Northern Ireland-GBR* | 40 |
| Ireland | 39 |
| *England-GBR* | 39 |
| New Zealand | 39 |
| Romania | 38 |
| Turkey | 36 ▽ |
| Saudi Arabia | 35 ▽ |
| Thailand | 30 ▽ |
| Iran, Islamic Rep. of | 24 ▽ |
| Kuwait | 23 ▽ |
| Oman | 21 ▽ |
| United Arab Emirates | 19 ▽ |
| Azerbaijan | 19 ▽ |
| Georgia | 19 ▽ |
| Bahrain | 19 ▽ |
| Malta | 19 ▽ |
| Armenia | 18 ▽ |
| Tunisia | 15 ▽ |
| Qatar | 12 ▽ |
| Yemen | 3 ▽ |
| Morocco | # ▽ |

**Benchmarking education system**

| | |
|---|---|
| *Alberta-CAN* | 52 ⬡ |
| *Ontario-CAN* | 51 ⬡ |
| *Quebec-CAN* | 51 ⬡ |
| *North Carolina-USA* | 49 ⬡ |
| *Florida-USA* | 40 |
| *Dubai-UAE* | 24 ▽ |
| *Abu Dhabi-UAE* | 18 ▽ |

⬡ Percent higher than International average

▽ Percent lower than International average

# Rounds to zero

Item label: Styrofoam-brick-apple weigh more (continued)
*S041048:*

## Student Responses

### Correct Response:

Jack thinks that objects with more volume weigh more.

A.  Do you agree with him?

(Check one box.)

☐  Yes

☑  No

B.  Explain your answer.

*No Because a brick is heavier than a styrofoam cube*

### Incorrect Response:

Jack thinks that objects with more volume weigh more.

A.  Do you agree with him?

(Check one box.)

☑  Yes

☐  No

B.  Explain your answer.

I said yes because it is true that objects with more volume weigh

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Reasoning |

Item label: Properties of two materials

The table below shows the properties of two materials.

| Properties of Material 1 | Properties of Material 2 |
|---|---|
| Conducts heat quickly | Conducts heat slowly |
| Solid | Solid |
| Does not dissolve in water | Dissolves in water |
| Attracted by magnets | Not attracted by magnets |

Which statement about materials 1 and 2 is **most** likely to be correct?

A.  Material 1 is glass, and material 2 is clay.

B.  Material 1 is copper, and material 2 is wood.

C.  Material 1 is iron, and material 2 is sugar.

D.  Material 1 is cork, and material 2 is gold.

*Item Number: S041049*

| **Correct Response:** | **C** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *Chinese Taipei-CHN* | 81 ⬀ |
| Singapore | 78 ⬀ |
| Japan | 74 ⬀ |
| Korea, Rep. of | 69 ⬀ |
| Russian Federation | 67 ⬀ |
| Finland | 66 ⬀ |
| *Hong Kong-CHN* | 66 ⬀ |
| Netherlands | 62 ⬀ |
| Portugal | 60 ⬀ |
| Croatia | 59 ⬀ |
| Slovak Republic | 59 ⬀ |
| Hungary | 58 ⬀ |
| Serbia | 58 ⬀ |
| Turkey | 53 ⬀ |
| Czech Republic | 51 |
| Slovenia | 51 |
| Kazakhstan | 50 |
| Sweden | 50 |
| **United States** | **50** |
| Germany | 50 |
| Austria | 50 |
| *Belgium (Flemish)-BEL* | 49 |
| Poland | 49 |
| Lithuania | 49 |
| Italy | 48 |
| International average | 47 |
| *England-GBR* | 47 |
| Romania | 46 |
| Denmark | 46 |
| Spain | 44 |
| Australia | 43 ⬂ |
| Azerbaijan | 42 ⬂ |
| Iran, Islamic Rep. of | 41 ⬂ |
| New Zealand | 40 ⬂ |
| Ireland | 40 ⬂ |
| Saudi Arabia | 39 ⬂ |
| *Northern Ireland-GBR* | 39 ⬂ |
| United Arab Emirates | 37 ⬂ |
| Chile | 37 ⬂ |
| Bahrain | 37 ⬂ |
| Thailand | 36 ⬂ |
| Norway | 36 ⬂ |
| Qatar | 34 ⬂ |
| Malta | 33 ⬂ |
| Oman | 32 ⬂ |
| Kuwait | 32 ⬂ |
| Georgia | 30 ⬂ |
| Armenia | 29 ⬂ |
| Tunisia | 26 ⬂ |
| Yemen | 25 ⬂ |
| Morocco | 24 ⬂ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 51 |
| *North Carolina-USA* | 46 |
| *Ontario-CAN* | 44 |
| *Alberta-CAN* | 44 |
| *Dubai-UAE* | 44 ⬂ |
| *Quebec-CAN* | 42 |
| *Abu Dhabi-UAE* | 35 ⬂ |

⬀ Percent higher than International average
⬂ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Applying |

## Item label: Identifies gas

Diagram 1 shows a container X that is filled with a material that could be a solid, liquid, or gas. The container has been sealed with a glass sheet. Container X is placed upside down on an empty container Y, as shown in Diagram 2.



Diagram 1      Diagram 2

glass sheet — container X

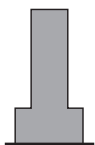glass sheet — container X
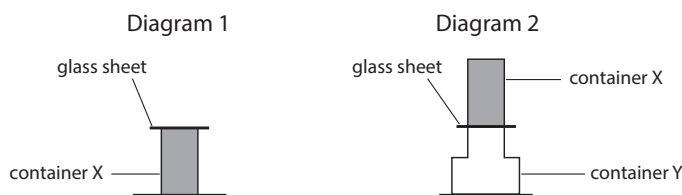
container Y

The glass sheet is removed.

A. Which of the diagrams below shows what you would see if the material in container X is a gas?

(Check one box.)
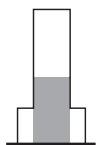
☐ Diagram 3     ☐ Diagram 4     ☐ Diagram 5
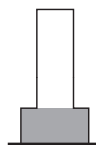


B. Explain your answer.

*Item Number: S041060*

### SCORING

**Correct Response**

- Diagram 3 and explains that gases expand (or increase in volume) OR that they fill a container (rise up/spread out to take the shape of a container) OR have no definite shape.

Examples:

Gas does not have a definite volume or shape.

Gas would fill the space.

**Incorrect Response**

- Diagram 3 with an incorrect or no explanation.

Example: Diagram 3: It looks like a gas.

- Diagram 4 with or without an explanation.
- Diagram 5 with or without an explanation.
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Russian Federation | 41 △ |
| Finland | 37 △ |
| Italy | 33 △ |
| Singapore | 30 △ |
| *England-GBR* | 30 △ |
| **United States** | **29** △ |
| Korea, Rep. of | 28 △ |
| Romania | 26 △ |
| *Northern Ireland-GBR* | 26 △ |
| Australia | 24 △ |
| Austria | 24 △ |
| Sweden | 24 △ |
| Kazakhstan | 24 △ |
| *Chinese Taipei-CHN* | 22 △ |
| Netherlands | 22 △ |
| Turkey | 21 △ |
| Portugal | 21 |
| Czech Republic | 21 |
| Hungary | 21 |
| Slovenia | 20 |
| New Zealand | 20 |
| Ireland | 19 |
| Poland | 18 |
| International average | 18 |
| *Hong Kong-CHN* | 18 |
| Denmark | 17 |
| Serbia | 16 |
| Spain | 16 |
| Chile | 16 |
| Japan | 16 |
| Germany | 16 |
| Slovak Republic | 15 ▽ |
| United Arab Emirates | 14 ▽ |
| Oman | 14 ▽ |
| Iran, Islamic Rep. of | 14 ▽ |
| Malta | 14 ▽ |
| Croatia | 13 ▽ |
| *Belgium (Flemish)-BEL* | 13 ▽ |
| Norway | 11 ▽ |
| Qatar | 11 ▽ |
| Bahrain | 10 ▽ |
| Morocco | 10 ▽ |
| Azerbaijan | 9 ▽ |
| Thailand | 7 ▽ |
| Armenia | 6 ▽ |
| Saudi Arabia | 6 ▽ |
| Tunisia | 6 ▽ |
| Kuwait | 5 ▽ |
| Georgia | 4 ▽ |
| Yemen | # ▽ |
| Lithuania | — |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 29 △ |
| *North Carolina-USA* | 21 |
| *Dubai-UAE* | 20 △ |
| *Alberta-CAN* | 19 |
| *Ontario-CAN* | 17 |
| *Quebec-CAN* | 16 |
| *Abu Dhabi-UAE* | 11 ▽ |

△ Percent higher than International average
▽ Percent lower than International average
— Not applicable
# Rounds to zero

Item label: Identifies gas (continued)

*S041060:*

# Student Responses

### Correct Response:

A. Which of the diagrams below shows what you would see if the material in container X is a gas?

(Check one box.)

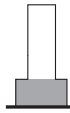☒ Diagram 3          ☐ Diagram 4          ☐ Diagram 5

B. Explain your answer.

a gas is a air which takes any form in a container

### Incorrect Response:

A. Which of the diagrams below shows what you would see if the material in container X is a gas?

(Check one box.)

☐ Diagram 3          ☐ Diagram 4          ☒ Diagram 5
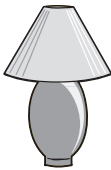
B. Explain your answer.

Because, diagram 5 is a gas, and gas just fills up

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Knowing |

## Item label: Type of energy that runs objects

lamp     computer     iron

What type of energy runs the objects shown above?

*Item Number: S041067*

### SCORING

**Correct Response**

• States that electrical energy runs the objects shown in the diagram.

Examples:

They run by electrical energy.

They all plug into electricity.

**Incorrect Response**

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Finland | 85 ⬡ |
| Japan | 85 ⬡ |
| Korea, Rep. of | 83 ⬡ |
| *Northern Ireland-GBR* | 80 ⬡ |
| *England-GBR* | 78 ⬡ |
| Russian Federation | 78 ⬡ |
| *Chinese Taipei-CHN* | 76 ⬡ |
| Lithuania | 76 ⬡ |
| *Belgium (Flemish)-BEL* | 75 ⬡ |
| Hungary | 75 ⬡ |
| Romania | 74 ⬡ |
| Portugal | 73 ⬡ |
| Netherlands | 73 ⬡ |
| Thailand | 72 ⬡ |
| Spain | 69 ⬡ |
| Poland | 68 ⬡ |
| Austria | 68 ⬡ |
| Sweden | 67 ⬡ |
| Denmark | 67 ⬡ |
| Croatia | 64 ⬡ |
| *Hong Kong-CHN* | 64 ⬡ |
| Serbia | 64 |
| Slovenia | 63 |
| Kazakhstan | 63 |
| Ireland | 62 |
| Germany | 62 |
| Singapore | 62 |
| Australia | 62 |
| **United States** | **61** |
| Turkey | 61 |
| Czech Republic | 60 |
| Slovak Republic | 60 |
| International average | 59 |
| Georgia | 59 |
| Italy | 58 |
| Norway | 55 |
| Bahrain | 55 ⬢ |
| Chile | 52 ⬢ |
| Saudi Arabia | 51 ⬢ |
| Azerbaijan | 48 ⬢ |
| Tunisia | 45 ⬢ |
| Iran, Islamic Rep. of | 45 ⬢ |
| New Zealand | 43 ⬢ |
| Armenia | 43 ⬢ |
| United Arab Emirates | 40 ⬢ |
| Malta | 38 ⬢ |
| Qatar | 32 ⬢ |
| Kuwait | 21 ⬢ |
| Oman | 20 ⬢ |
| Morocco | 16 ⬢ |
| Yemen | 12 ⬢ |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 73 ⬡ |
| *Florida-USA* | 63 |
| *Ontario-CAN* | 60 |
| *North Carolina-USA* | 60 |
| *Alberta-CAN* | 60 |
| *Dubai-UAE* | 44 ⬢ |
| *Abu Dhabi-UAE* | 39 ⬢ |

⬡ Percent higher than International average
⬢ Percent lower than International average

Item label: Type of energy that runs objects (continued)
*S041067:*

## Student Responses

**Correct Response:**

electrictY

**Incorrect Response:**

the computer

| Content Domain | Main Topic | Cognitive Domain |
| --- | --- | --- |
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

## Item label: Shadow along which line

A spotlight shines on a girl on a stage.
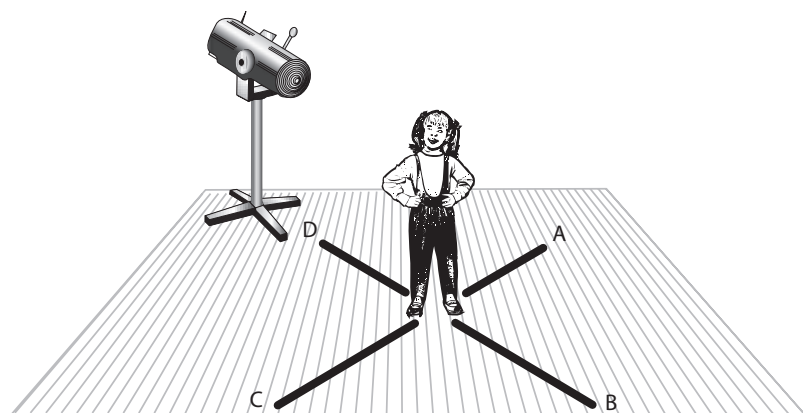


Her shadow would be seen along which line?

A.   A

B.   B

C.   C

D.   D

*Item Number: S041069*

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

### Overall Percent Correct

| Education system | Percent correct |
| --- | --- |
| Singapore | 87 △ |
| *Chinese Taipei-CHN* | 83 △ |
| Japan | 79 △ |
| Korea, Rep. of | 77 △ |
| *Hong Kong-CHN* | 74 △ |
| Finland | 70 △ |
| Slovak Republic | 69 △ |
| Lithuania | 69 △ |
| Slovenia | 68 △ |
| Hungary | 67 △ |
| Russian Federation | 67 △ |
| Czech Republic | 63 |
| **United States** | **62** △ |
| Germany | 62 |
| *Belgium (Flemish)-BEL* | 62 △ |
| Austria | 61 |
| Kazakhstan | 61 |
| Portugal | 61 |
| Netherlands | 60 |
| Serbia | 60 |
| Romania | 60 |
| Croatia | 59 |
| Sweden | 58 |
| *England-GBR* | 58 |
| Thailand | 58 |
| Australia | 57 |
| International average | 57 |
| *Northern Ireland-GBR* | 57 |
| New Zealand | 56 |
| Denmark | 56 |
| Ireland | 56 |
| Qatar | 55 |
| Spain | 54 |
| Chile | 53 ▽ |
| Italy | 52 ▽ |
| Saudi Arabia | 52 ▽ |
| Bahrain | 52 ▽ |
| Norway | 51 ▽ |
| Iran, Islamic Rep. of | 50 ▽ |
| Poland | 49 ▽ |
| Georgia | 49 ▽ |
| United Arab Emirates | 48 ▽ |
| Azerbaijan | 47 ▽ |
| Malta | 47 ▽ |
| Turkey | 47 ▽ |
| Morocco | 43 ▽ |
| Oman | 42 ▽ |
| Kuwait | 41 ▽ |
| Armenia | 38 ▽ |
| Tunisia | 33 ▽ |
| Yemen | 30 ▽ |

### Benchmarking education system

| | |
| --- | --- |
| *Alberta-CAN* | 65 △ |
| *Ontario-CAN* | 57 |
| *North Carolina-USA* | 56 |
| *Florida-USA* | 54 |
| *Dubai-UAE* | 51 ▽ |
| *Quebec-CAN* | 49 ▽ |
| *Abu Dhabi-UAE* | 49 ▽ |

△ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Forces and Motion | Knowing |

Item label: Force causing boat to sail

The picture shows a boat sailing.



Which force causes the boat to move?

A. gravity

B. wind

C. friction

D. magnetism

*Item Number: S041117*

| **Correct Response:** | **B** |
|---|---|

**Overall Percent Correct**

| Education system | Percent correct |
|---|---|
| *Chinese Taipei-CHN* | 99 ⬠ |
| Czech Republic | 98 ⬠ |
| Slovenia | 98 ⬠ |
| Austria | 98 ⬠ |
| Croatia | 98 ⬠ |
| Poland | 97 ⬠ |
| Germany | 97 ⬠ |
| Finland | 97 ⬠ |
| Italy | 96 ⬠ |
| Portugal | 96 ⬠ |
| Russian Federation | 96 ⬠ |
| Sweden | 95 ⬠ |
| Australia | 95 ⬠ |
| Serbia | 95 ⬠ |
| *Northern Ireland-GBR* | 95 ⬠ |
| Denmark | 94 ⬠ |
| Netherlands | 94 ⬠ |
| Slovak Republic | 94 ⬠ |
| Norway | 93 ⬠ |
| New Zealand | 93 ⬠ |
| Ireland | 93 ⬠ |
| Lithuania | 93 ⬠ |
| Hungary | 93 ⬠ |
| Japan | 93 ⬠ |
| **United States** | **93** ⬠ |
| Spain | 92 ⬠ |
| Singapore | 92 ⬠ |
| Korea, Rep. of | 91 |
| Romania | 91 |
| *England-GBR* | 91 |
| *Belgium (Flemish)-BEL* | 90 |
| International average | 90 |
| *Hong Kong-CHN* | 90 |
| Malta | 88 |
| Bahrain | 88 |
| Turkey | 87 ⬟ |
| Kazakhstan | 87 |
| Azerbaijan | 87 |
| Chile | 86 ⬟ |
| United Arab Emirates | 85 ⬟ |
| Iran, Islamic Rep. of | 84 ⬟ |
| Tunisia | 83 ⬟ |
| Georgia | 83 ⬟ |
| Qatar | 81 ⬟ |
| Saudi Arabia | 81 ⬟ |
| Oman | 80 ⬟ |
| Thailand | 79 ⬟ |
| Armenia | 75 ⬟ |
| Kuwait | 74 ⬟ |
| Morocco | 71 ⬟ |
| Yemen | 60 ⬟ |

**Benchmarking education system**

| | |
|---|---|
| *Alberta-CAN* | 95 ⬠ |
| *Florida-USA* | 94 ⬠ |
| *Ontario-CAN* | 94 ⬠ |
| *North Carolina-USA* | 94 ⬠ |
| *Quebec-CAN* | 93 ⬠ |
| *Dubai-UAE* | 87 ⬟ |
| *Abu Dhabi-UAE* | 86 ⬟ |

⬠ Percent higher than International average
⬟ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Knowing |

## Item label: Objects that produce light

Which two objects produce their own light?

A. candle and moon

B. moon and mirror

C. Sun and candle

D. mirror and Sun

*Item Number: S041120*

| **Correct Response:** | **C** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Czech Republic | 86 ⌃ |
| Singapore | 81 ⌃ |
| Slovak Republic | 70 ⌃ |
| Georgia | 65 ⌃ |
| Slovenia | 64 ⌃ |
| Croatia | 62 ⌃ |
| Lithuania | 59 ⌃ |
| Finland | 59 ⌃ |
| Azerbaijan | 58 ⌃ |
| Iran, Islamic Rep. of | 57 ⌃ |
| Portugal | 56 ⌃ |
| Romania | 56 ⌃ |
| Italy | 56 ⌃ |
| Oman | 55 ⌃ |
| Russian Federation | 55 ⌃ |
| Spain | 54 |
| United Arab Emirates | 54 ⌃ |
| Qatar | 53 |
| Serbia | 53 |
| Bahrain | 52 |
| **United States** | **51** |
| Sweden | 51 |
| Saudi Arabia | 50 |
| Austria | 50 |
| International average | 50 |
| Germany | 49 |
| Kuwait | 48 |
| Turkey | 48 |
| Armenia | 48 |
| Poland | 47 |
| Malta | 46 |
| Chile | 46 |
| Kazakhstan | 46 |
| New Zealand | 45 ⌄ |
| Australia | 45 ⌄ |
| Ireland | 45 ⌄ |
| Yemen | 44 ⌄ |
| Hungary | 44 ⌄ |
| *Belgium (Flemish)-BEL* | 43 ⌄ |
| *England-GBR* | 42 ⌄ |
| Netherlands | 41 ⌄ |
| Tunisia | 41 ⌄ |
| *Chinese Taipei-CHN* | 40 ⌄ |
| Denmark | 40 ⌄ |
| *Northern Ireland-GBR* | 39 ⌄ |
| Korea, Rep. of | 38 ⌄ |
| Thailand | 36 ⌄ |
| Morocco | 36 ⌄ |
| Japan | 35 ⌄ |
| Norway | 32 ⌄ |
| *Hong Kong-CHN* | 28 ⌄ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 57 ⌃ |
| *Abu Dhabi-UAE* | 56 ⌃ |
| *Florida-USA* | 53 |
| *Dubai-UAE* | 51 |
| *North Carolina-USA* | 45 |
| *Ontario-CAN* | 45 ⌄ |
| *Quebec-CAN* | 39 ⌄ |

⌃ Percent higher than International average
⌄ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Knowing |

## Item label: Describes condensation

Which of the following describes condensation?

A.  a liquid changing to a solid

B.  a solid changing to a liquid

C.  a solid changing to a gas

D.  a gas changing to a liquid

*Item Number: S041187*

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *England-GBR* | 42 ⬧ |
| Korea, Rep. of | 41 ⬧ |
| United Arab Emirates | 41 ⬧ |
| Lithuania | 40 ⬧ |
| Kuwait | 39 ⬧ |
| Portugal | 38 ⬧ |
| Poland | 36 ⬧ |
| Singapore | 35 ⬧ |
| Bahrain | 34 ⬧ |
| Russian Federation | 33 ⬧ |
| New Zealand | 33 ⬧ |
| Kazakhstan | 32 |
| Azerbaijan | 32 |
| Qatar | 32 ⬧ |
| **United States** | **32** ⬧ |
| Australia | 32 ⬧ |
| Czech Republic | 31 |
| Ireland | 31 |
| *Northern Ireland-GBR* | 30 |
| Hungary | 30 |
| Malta | 29 |
| Oman | 29 |
| Saudi Arabia | 29 |
| Serbia | 28 |
| Chile | 28 |
| Sweden | 28 |
| International average | 28 |
| Romania | 27 |
| Yemen | 27 |
| Italy | 27 |
| Netherlands | 26 |
| Armenia | 26 |
| Georgia | 25 |
| Slovak Republic | 25 |
| Morocco | 24 ▼ |
| Turkey | 24 ▼ |
| Denmark | 23 ▼ |
| Slovenia | 23 ▼ |
| *Belgium (Flemish)-BEL* | 22 ▼ |
| Germany | 21 ▼ |
| Spain | 20 ▼ |
| Finland | 20 ▼ |
| Norway | 19 ▼ |
| Croatia | 18 ▼ |
| Tunisia | 18 ▼ |
| Austria | 18 ▼ |
| Japan | 16 ▼ |
| Thailand | 16 ▼ |
| *Chinese Taipei-CHN* | 12 ▼ |
| *Hong Kong-CHN* | — |
| Iran, Islamic Rep. of | — |

### Benchmarking education system

| | |
|---|---|
| *Dubai-UAE* | 42 ⬧ |
| *Abu Dhabi-UAE* | 37 ⬧ |
| *Quebec-CAN* | 35 ⬧ |
| *Florida-USA* | 33 ⬧ |
| *North Carolina-USA* | 30 |
| *Ontario-CAN* | 23 ▼ |
| *Alberta-CAN* | 22 ▼ |

⬧ Percent higher than International average
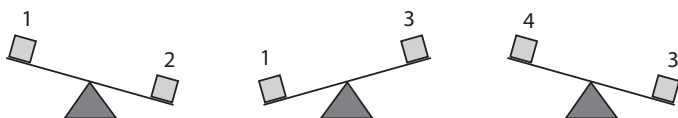▼ Percent lower than International average
— Not applicable

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Forces and Motion | Reasoning |

## Item label: A balance and four cubes

Stephanie has a balance and four cubes (1, 2, 3, 4). The cubes are made of different materials.

She puts two cubes at a time on the balance and observes the following results.



What can she know about the weight of cube 2?

A.   It is heavier than cubes 1, 3, and 4.

B.   It is heavier than cube 1 but lighter than cubes 3 and 4.

C.   It is heavier than cube 3 but lighter than cubes 1 and 4.

D.   It is heavier than cube 4 but lighter than cubes 1 and 3.

*Item Number: S041305*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 74 ⬘ |
| *Chinese Taipei-CHN* | 70 ⬘ |
| Korea, Rep. of | 70 ⬘ |
| *Hong Kong-CHN* | 68 ⬘ |
| Japan | 66 ⬘ |
| Portugal | 57 ⬘ |
| Ireland | 54 ⬘ |
| Finland | 53 ⬘ |
| Netherlands | 52 ⬘ |
| Australia | 50 ⬘ |
| Norway | 50 ⬘ |
| **United States** | **50** ⬘ |
| *Northern Ireland-GBR* | 49 |
| Russian Federation | 49 ⬘ |
| *Belgium (Flemish)-BEL* | 49 ⬘ |
| Serbia | 49 |
| Kazakhstan | 49 |
| Germany | 49 |
| *England-GBR* | 48 |
| New Zealand | 47 |
| Lithuania | 47 |
| Austria | 46 |
| Croatia | 45 |
| Italy | 45 |
| International average | 44 |
| Romania | 44 |
| Sweden | 44 |
| Denmark | 44 |
| Turkey | 44 |
| Spain | 44 |
| Slovak Republic | 43 |
| Malta | 43 |
| Slovenia | 41 |
| Hungary | 40 ⬙ |
| Bahrain | 40 ⬙ |
| Czech Republic | 39 ⬙ |
| Qatar | 39 ⬙ |
| Thailand | 39 ⬙ |
| United Arab Emirates | 37 ⬙ |
| Chile | 36 ⬙ |
| Iran, Islamic Rep. of | 36 ⬙ |
| Azerbaijan | 35 ⬙ |
| Saudi Arabia | 35 ⬙ |
| Poland | 33 ⬙ |
| Georgia | 31 ⬙ |
| Oman | 31 ⬙ |
| Armenia | 30 ⬙ |
| Kuwait | 27 ⬙ |
| Morocco | 23 ⬙ |
| Yemen | 19 ⬙ |
| Tunisia | 18 ⬙ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 50 |
| *North Carolina-USA* | 49 |
| *Quebec-CAN* | 48 |
| *Ontario-CAN* | 48 |
| *Alberta-CAN* | 48 |
| *Dubai-UAE* | 40 |
| *Abu Dhabi-UAE* | 36 ⬙ |

⬘ Percent higher than International average
⬙ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

## Item label: Thermometer reading hottest water

Four different thermometers were used to measure the temperature of water in four different beakers.

Which thermometer reading belongs to the hottest water?
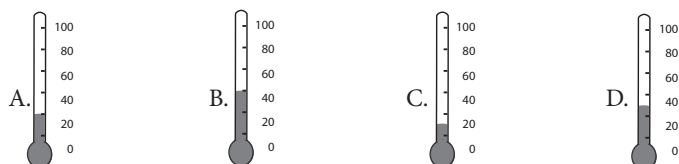


*Item Number: S041311*

| **Correct Response:** | **B** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| *Belgium (Flemish)-BEL* | 98 ⌂ |
| Netherlands | 98 ⌂ |
| *Chinese Taipei-CHN* | 98 ⌂ |
| Russian Federation | 97 ⌂ |
| Slovak Republic | 97 ⌂ |
| Korea, Rep. of | 97 ⌂ |
| Hungary | 97 ⌂ |
| Ireland | 97 ⌂ |
| Japan | 97 ⌂ |
| Singapore | 97 ⌂ |
| Austria | 97 ⌂ |
| Sweden | 96 ⌂ |
| Serbia | 96 ⌂ |
| Lithuania | 96 ⌂ |
| Finland | 96 ⌂ |
| Croatia | 96 ⌂ |
| Slovenia | 96 ⌂ |
| Italy | 95 ⌂ |
| *Hong Kong-CHN* | 95 ⌂ |
| Poland | 95 ⌂ |
| *Northern Ireland-GBR* | 95 ⌂ |
| Germany | 95 ⌂ |
| Portugal | 94 ⌂ |
| **United States** | **94** ⌂ |
| Chile | 94 ⌂ |
| Denmark | 94 ⌂ |
| New Zealand | 93 ⌂ |
| Georgia | 93 |
| Australia | 93 |
| *England-GBR* | 93 |
| Czech Republic | 92 |
| Spain | 92 |
| Norway | 91 |
| Kazakhstan | 91 |
| International average | 91 |
| Romania | 91 |
| Saudi Arabia | 89 |
| Malta | 89 |
| Turkey | 89 ▼ |
| Bahrain | 89 |
| United Arab Emirates | 87 ▼ |
| Thailand | 87 ▼ |
| Armenia | 85 ▼ |
| Azerbaijan | 81 ▼ |
| Qatar | 81 ▼ |
| Oman | 80 ▼ |
| Iran, Islamic Rep. of | 79 ▼ |
| Kuwait | 79 ▼ |
| Morocco | 77 ▼ |
| Tunisia | 76 ▼ |
| Yemen | 62 ▼ |

### Benchmarking education system

| | |
|---|---|
| *Ontario-CAN* | 94 ⌂ |
| *North Carolina-USA* | 94 |
| *Alberta-CAN* | 93 |
| *Quebec-CAN* | 93 |
| *Florida-USA* | 92 |
| *Dubai-UAE* | 87 ▼ |
| *Abu Dhabi-UAE* | 85 ▼ |

⌂ Percent higher than International average
▼ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Forces and Motion | Reasoning |

## Item label: Children on seesaw

Nick rides on a seesaw with his sister Kate and then with his brother Leon. Nick is the same weight as Kate, but Leon is twice the weight of Nick.



Nick     Kate     Leon

Which figure shows where the children should sit so that Nick can balance first with Kate and then with Leon?
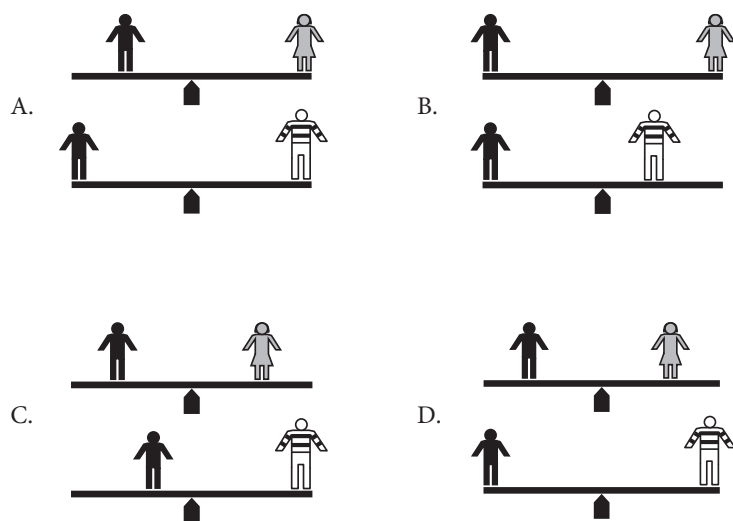


*Item Number: S051071*

| **Correct Response:** | **B** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 81 ⬆ |
| Finland | 68 ⬆ |
| Japan | 66 ⬆ |
| Sweden | 63 ⬆ |
| Netherlands | 63 ⬆ |
| Czech Republic | 61 ⬆ |
| Germany | 61 ⬆ |
| Denmark | 60 ⬆ |
| Lithuania | 56 ⬆ |
| Slovenia | 54 ⬆ |
| Austria | 53 ⬆ |
| Russian Federation | 52 ⬆ |
| Norway | 52 ⬆ |
| Serbia | 51 ⬆ |
| Hungary | 51 ⬆ |
| Singapore | 51 ⬆ |
| Slovak Republic | 50 ⬆ |
| *England-GBR* | 50 ⬆ |
| New Zealand | 49 ⬆ |
| *Belgium (Flemish)-BEL* | 48 |
| *Hong Kong-CHN* | 48 |
| Australia | 47 |
| Croatia | 47 |
| **United States** | **46** |
| *Chinese Taipei-CHN* | 46 |
| Romania | 45 |
| International average | 44 |
| Italy | 42 |
| Kazakhstan | 42 |
| *Northern Ireland-GBR* | 40 |
| Ireland | 40 |
| Spain | 40 |
| Poland | 39 ⬇ |
| Portugal | 38 ⬇ |
| Azerbaijan | 38 ⬇ |
| Chile | 37 ⬇ |
| Turkey | 37 ⬇ |
| Saudi Arabia | 36 ⬇ |
| Malta | 35 ⬇ |
| Thailand | 34 ⬇ |
| Georgia | 34 ⬇ |
| Iran, Islamic Rep. of | 31 ⬇ |
| United Arab Emirates | 30 ⬇ |
| Qatar | 30 ⬇ |
| Oman | 27 ⬇ |
| Bahrain | 27 ⬇ |
| Armenia | 25 ⬇ |
| Morocco | 21 ⬇ |
| Kuwait | 21 ⬇ |
| Tunisia | 20 ⬇ |
| Yemen | 16 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 52 ⬆ |
| *Quebec-CAN* | 51 ⬆ |
| *Florida-USA* | 49 |
| *Ontario-CAN* | 45 |
| *North Carolina-USA* | 41 |
| *Dubai-UAE* | 32 ⬇ |
| *Abu Dhabi-UAE* | 28 ⬇ |

⬆ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

## Item label: Will the bulb light

Gerry connects a battery, a light bulb, and some wire as shown below.
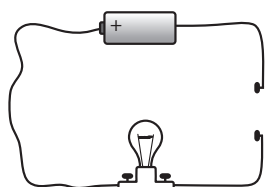


A.  Will the bulb light?

(Check one box.)

☐   Yes

☐   No

B.  Explain your answer.

*Item Number: S051074*

### SCORING

**Correct Response**

• No with an explanation that the bulb does not light because the circuit is incomplete.

Examples:

No – There is a gap in the wires.

No – The two wires on the right have to be connected.

**Incorrect Response**

• Yes with an explanation that the bulb would light up if he were to join the wires together.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Japan | 72 ⬦ |
| *Chinese Taipei-CHN* | 68 ⬦ |
| *England-GBR* | 59 ⬦ |
| Slovenia | 56 ⬦ |
| Singapore | 51 ⬦ |
| Germany | 42 ⬦ |
| **United States** | **42** ⬦ |
| Bahrain | 40 ⬦ |
| Slovak Republic | 40 ⬦ |
| Turkey | 36 ⬦ |
| Korea, Rep. of | 35 ⬦ |
| Oman | 34 ⬦ |
| Kuwait | 34 ⬦ |
| *Northern Ireland-GBR* | 33 |
| Iran, Islamic Rep. of | 33 ⬦ |
| Saudi Arabia | 32 |
| Finland | 32 ⬦ |
| Qatar | 30 |
| Lithuania | 30 |
| Malta | 30 |
| Austria | 29 |
| International average | 27 |
| United Arab Emirates | 27 |
| Denmark | 27 |
| Sweden | 26 |
| Czech Republic | 26 |
| Romania | 25 |
| Serbia | 25 |
| Russian Federation | 25 |
| Netherlands | 24 |
| Ireland | 22 ⬇ |
| *Hong Kong-CHN* | 22 ⬇ |
| Thailand | 20 ⬇ |
| New Zealand | 20 ⬇ |
| Kazakhstan | 20 ⬇ |
| Portugal | 19 ⬇ |
| Australia | 18 ⬇ |
| Armenia | 17 ⬇ |
| Spain | 15 ⬇ |
| Croatia | 14 ⬇ |
| Poland | 14 ⬇ |
| *Belgium (Flemish)-BEL* | 14 ⬇ |
| Hungary | 13 ⬇ |
| Azerbaijan | 13 ⬇ |
| Georgia | 12 ⬇ |
| Chile | 11 ⬇ |
| Tunisia | 11 ⬇ |
| Italy | 10 ⬇ |
| Morocco | 10 ⬇ |
| Norway | 7 ⬇ |
| Yemen | 5 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *North Carolina-USA* | 43 ⬦ |
| *Dubai-UAE* | 30 |
| *Abu Dhabi-UAE* | 28 |
| *Florida-USA* | 24 |
| *Alberta-CAN* | 21 ⬇ |
| *Quebec-CAN* | 15 ⬇ |
| *Ontario-CAN* | 12 ⬇ |

⬦ Percent higher than International average
⬇ Percent lower than International average

Item label: Will the bulb light (continued)
*S051074:*

## Student Responses

### Correct Response:

Gerry connects a battery, a light bulb, and some wire as shown below.

A.  Will the bulb light?

(Check one box.)

☐  Yes

☑  No
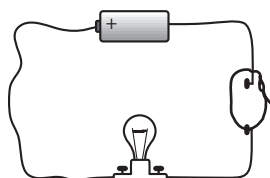
B.  Explain your answer.

*It is open here. It cann't canect.*

### Incorrect Response:

Gerry connects a battery, a light bulb, and some wire as shown below.

A.  Will the bulb light?

(Check one box.)

☒  Yes

☐  No
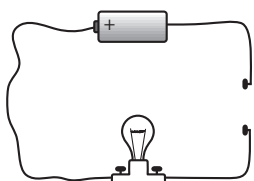
B.  Explain your answer.

*yes becaue it forms a closed cuirst.*

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Classification and Properties of Matter | Knowing |

## Item label: Temperature of ice, steam, water

Water, ice, and steam all have different temperatures.

What is the order from coldest to hottest?

A.   ice, water, steam

B.   ice, steam, water

C.   steam, ice, water

D.   steam, water, ice

*Item Number: S051086*

| **Correct Response:** | **A** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| **United States** | 90 ⬆ |
| Netherlands | 88 ⬆ |
| Singapore | 87 ⬆ |
| Croatia | 87 ⬆ |
| Czech Republic | 86 ⬆ |
| *Hong Kong-CHN* | 86 ⬆ |
| Italy | 84 ⬆ |
| Russian Federation | 84 ⬆ |
| Serbia | 84 ⬆ |
| *Belgium (Flemish)-BEL* | 84 ⬆ |
| Australia | 83 ⬆ |
| Slovak Republic | 83 ⬆ |
| Denmark | 83 ⬆ |
| Finland | 82 ⬆ |
| Spain | 81 ⬆ |
| Hungary | 81 ⬆ |
| Slovenia | 80 ⬆ |
| Chile | 80 ⬆ |
| *England-GBR* | 80 ⬆ |
| *Chinese Taipei-CHN* | 80 ⬆ |
| Korea, Rep. of | 80 ⬆ |
| Austria | 79 ⬆ |
| *Northern Ireland-GBR* | 79 ⬆ |
| Germany | 79 ⬆ |
| Sweden | 79 ⬆ |
| New Zealand | 78 ⬆ |
| Ireland | 76 |
| Norway | 75 |
| Kazakhstan | 73 |
| International average | 73 |
| Japan | 72 |
| Turkey | 71 |
| Romania | 71 |
| Bahrain | 71 |
| Lithuania | 70 |
| Malta | 70 |
| United Arab Emirates | 69 ⬇ |
| Saudi Arabia | 67 ⬇ |
| Azerbaijan | 65 ⬇ |
| Poland | 63 ⬇ |
| Georgia | 62 ⬇ |
| Iran, Islamic Rep. of | 61 ⬇ |
| Qatar | 61 ⬇ |
| Armenia | 59 ⬇ |
| Oman | 56 ⬇ |
| Kuwait | 55 ⬇ |
| Thailand | 55 ⬇ |
| Tunisia | 41 ⬇ |
| Morocco | 37 ⬇ |
| Yemen | 29 ⬇ |
| Portugal | — |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 94 ⬆ |
| *North Carolina-USA* | 90 ⬆ |
| *Alberta-CAN* | 86 ⬆ |
| *Ontario-CAN* | 85 ⬆ |
| *Dubai-UAE* | 73 |
| *Quebec-CAN* | 72 |
| *Abu Dhabi-UAE* | 70 |

⬆ Percent higher than International average
⬇ Percent lower than International average
— Not applicable

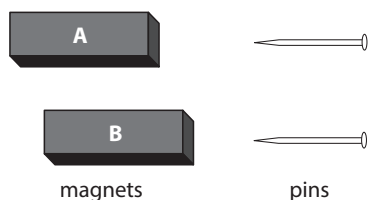| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Reasoning |

## Item label: Two magnets and two metal pins

Betty has two magnets (A and B) and two metal pins that are the same.

She slides Magnet A along a table until a pin is attracted to the magnet.
She slides Magnet B along a table until a pin is attracted to the magnet.



magnets          pins

She finds that Magnet A attracts the pin from 15cm and Magnet B attracts the pin from 10cm.

Steven says that both magnets are equally strong.

A.  Do you agree?

(Check one box.)

☐   Yes

☐   No

B.  Explain your answer.

*Item Number: S051119*

### SCORING

**Correct Response**

• No with an explanation that a stronger magnet (i.e., Magnet A) can attract the pin from a further distance.

Examples:

No – Magnet A attracted the pin from a further distance than Magnet B, so it is stronger.

No – Magnet B had to be closer to the pin so it is weaker.

• No with an explanation that refers to different distances only.

Example: No – The magnets attract from different lengths.

**Incorrect Response**

• Incorrect (including crossed out, erased, stray marks, illegible, or off task), including responses that refer to the strength of the magnet only.

Example: No – Magnet A is stronger.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 66 ⬣ |
| Japan | 50 ⬣ |
| *Chinese Taipei-CHN* | 47 ⬣ |
| Finland | 41 ⬣ |
| Sweden | 37 ⬣ |
| **United States** | **37** ⬣ |
| *England-GBR* | 35 ⬣ |
| Portugal | 35 ⬣ |
| *Belgium (Flemish)-BEL* | 35 ⬣ |
| Slovenia | 32 ⬣ |
| Norway | 32 |
| *Hong Kong-CHN* | 31 ⬣ |
| *Northern Ireland-GBR* | 30 |
| Netherlands | 30 |
| Serbia | 29 |
| Turkey | 29 |
| Denmark | 28 |
| Czech Republic | 28 |
| Germany | 28 |
| Ireland | 28 |
| Spain | 27 |
| Australia | 27 |
| Korea, Rep. of | 27 |
| Russian Federation | 27 |
| Kazakhstan | 27 |
| Poland | 26 |
| International average | 26 |
| Georgia | 26 |
| Iran, Islamic Rep. of | 26 |
| Bahrain | 26 |
| New Zealand | 25 |
| Malta | 25 |
| Lithuania | 24 |
| Romania | 23 |
| Thailand | 23 ⬣ |
| Italy | 23 |
| Hungary | 23 ⬣ |
| Saudi Arabia | 22 ⬣ |
| Austria | 21 ⬣ |
| Slovak Republic | 20 ⬣ |
| Chile | 20 ⬣ |
| Tunisia | 19 ⬣ |
| United Arab Emirates | 19 ⬣ |
| Qatar | 17 ⬣ |
| Croatia | 17 ⬣ |
| Kuwait | 15 ⬣ |
| Armenia | 14 ⬣ |
| Azerbaijan | 12 ⬣ |
| Oman | 6 ⬣ |
| Morocco | 5 ⬣ |
| Yemen | 1 ⬣ |

### Benchmarking education system

| | |
|---|---|
| *Ontario-CAN* | 39 ⬣ |
| *Florida-USA* | 38 ⬣ |
| *Alberta-CAN* | 34 ⬣ |
| *North Carolina-USA* | 34 ⬣ |
| *Quebec-CAN* | 31 ⬣ |
| *Dubai-UAE* | 22 |
| *Abu Dhabi-UAE* | 17 ⬣ |

⬣ Percent higher than International average
⬣ Percent lower than International average

Item label: Two magnets and two metal pins (continued)
*S051119:*

## Student Responses

### Correct Response:

A. Do you agree?

(Check one box.)

☐ Yes

☑ No

B. Explain your answer.

Magnet A attracts the pin from 15 cm, while magnet B attracts the pin from 10 cm, thus magnet A is stronger.

### Incorrect Response:

A. Do you agree?

(Check one box.)

☐ Yes

☑ No

B. Explain your answer.

Because magnets B is not stronger than magnets A.

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **PHYSICAL SCIENCE** | Sources and Effects of Energy | Applying |

Item label: Sun reflection in a lake

Alice watches a sunrise from across a calm lake. She sees a sun in the sky and a sun in the lake as shown below.
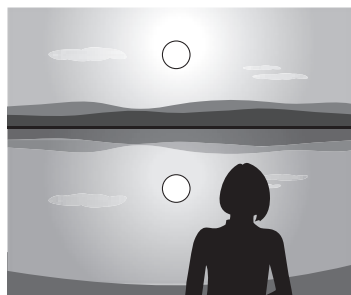


Why does Alice see a sun in the lake?

A.    The sunlight warms that part of the lake.

B.    The sky spreads sunlight over the lake.

C.    The sunlight reflects off the lake water.

D.    Clouds reflect sunlight into the lake.

*Item Number: S051179*

| **Correct Response:** | **C** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct | |
|---|---|---|
| *Chinese Taipei-CHN* | 95 | ⬤ |
| Korea, Rep. of | 93 | ⬤ |
| Poland | 93 | ⬤ |
| Czech Republic | 93 | ⬤ |
| Austria | 93 | ⬤ |
| *Northern Ireland-GBR* | 92 | ⬤ |
| Italy | 92 | ⬤ |
| Spain | 92 | ⬤ |
| Finland | 92 | ⬤ |
| Germany | 91 | ⬤ |
| Japan | 91 | ⬤ |
| Ireland | 91 | ⬤ |
| **United States** | **90** | ⬤ |
| Singapore | 90 | ⬤ |
| Hungary | 90 | ⬤ |
| *England-GBR* | 88 | ⬤ |
| Netherlands | 88 | ⬤ |
| Portugal | 87 | ⬤ |
| *Belgium (Flemish)-BEL* | 87 | ⬤ |
| Chile | 86 | ⬤ |
| Russian Federation | 85 | ⬤ |
| Sweden | 85 | ⬤ |
| Romania | 84 | ⬤ |
| Slovak Republic | 84 | ⬤ |
| Australia | 84 | ⬤ |
| New Zealand | 84 | ⬤ |
| Lithuania | 79 | |
| Malta | 77 | |
| Thailand | 76 | |
| International average | 76 | |
| *Hong Kong-CHN* | 73 | |
| Denmark | 73 | |
| Bahrain | 72 | |
| Slovenia | 70 | ▽ |
| Turkey | 70 | ▽ |
| Saudi Arabia | 70 | ▽ |
| Azerbaijan | 66 | ▽ |
| United Arab Emirates | 66 | ▽ |
| Kazakhstan | 64 | ▽ |
| Norway | 63 | ▽ |
| Croatia | 62 | ▽ |
| Serbia | 61 | ▽ |
| Qatar | 59 | ▽ |
| Kuwait | 58 | ▽ |
| Georgia | 52 | ▽ |
| Iran, Islamic Rep. of | 52 | ▽ |
| Oman | 52 | ▽ |
| Tunisia | 43 | ▽ |
| Yemen | 36 | ▽ |
| Morocco | 34 | ▽ |
| Armenia | 30 | ▽ |

### Benchmarking education system

| | | |
|---|---|---|
| *Florida-USA* | 94 | ⬤ |
| *Alberta-CAN* | 93 | ⬤ |
| *North Carolina-USA* | 89 | ⬤ |
| *Ontario-CAN* | 87 | ⬤ |
| *Quebec-CAN* | 76 | |
| *Dubai-UAE* | 72 | |
| *Abu Dhabi-UAE* | 62 | ▽ |

⬤ Percent higher than International average
▽ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth in the Solar System | Reasoning |

## Item label: Label Earth, Moon, and Sun

The figure below shows Earth, the Moon, and the Sun. Each body is labeled by a number. The arrows show the direction each body is moving.
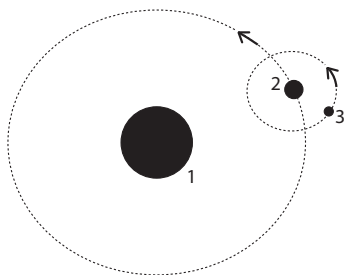


Fill in the correct number next to each body (1, 2 or 3).

Earth is body number: _____

The Moon is body number: _____

The Sun is body number: _____

*Item Number: S031044*

### SCORING

**Correct Response**

- Earth = 2
  Moon = 3
  Sun = 1

**Incorrect Response**

- Only the Sun is correct (3 – 2 – 1)
- Other incorrect (including crossed out, erased, stray marks, illegible, or off task)

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Portugal | 78 ⬡ |
| Russian Federation | 74 ⬡ |
| Korea, Rep. of | 73 ⬡ |
| Slovak Republic | 66 ⬡ |
| **United States** | **65** ⬡ |
| Finland | 65 ⬡ |
| Sweden | 64 ⬡ |
| *England-GBR* | 63 ⬡ |
| Norway | 60 ⬡ |
| Spain | 59 ⬡ |
| Chile | 59 ⬡ |
| *Hong Kong-CHN* | 58 ⬡ |
| United Arab Emirates | 55 ⬡ |
| Australia | 54 ⬡ |
| Lithuania | 54 ⬡ |
| Japan | 53 ⬡ |
| Austria | 53 |
| Czech Republic | 52 |
| Denmark | 52 |
| *Chinese Taipei-CHN* | 52 |
| Kuwait | 51 |
| Bahrain | 51 |
| Hungary | 51 |
| Malta | 50 |
| Ireland | 50 |
| Kazakhstan | 49 |
| Netherlands | 49 |
| Poland | 49 |
| International average | 49 |
| Slovenia | 48 |
| Thailand | 48 |
| Singapore | 48 |
| Qatar | 47 |
| Romania | 47 |
| Germany | 44 |
| Italy | 44 ⬢ |
| New Zealand | 44 ⬢ |
| Croatia | 43 ⬢ |
| Iran, Islamic Rep. of | 42 ⬢ |
| Georgia | 40 ⬢ |
| Saudi Arabia | 39 ⬢ |
| *Belgium (Flemish)-BEL* | 39 ⬢ |
| Azerbaijan | 39 ⬢ |
| Serbia | 39 ⬢ |
| Turkey | 38 ⬢ |
| *Northern Ireland-GBR* | 35 ⬢ |
| Oman | 30 ⬢ |
| Armenia | 27 ⬢ |
| Tunisia | 17 ⬢ |
| Morocco | 16 ⬢ |
| Yemen | 15 ⬢ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 68 ⬡ |
| *North Carolina-USA* | 63 ⬡ |
| *Quebec-CAN* | 59 ⬡ |
| *Dubai-UAE* | 58 ⬡ |
| *Abu Dhabi-UAE* | 54 ⬡ |
| *Alberta-CAN* | 48 |
| *Ontario-CAN* | 46 |

⬡ Percent higher than International average
⬢ Percent lower than International average

Item label: Label Earth, Moon, and Sun (continued)

*S031044:*

## Student Responses

### Correct Response:

Earth is body number: _____2_____

The Moon is body number: _____3_____

The Sun is body number: _____1_____

### Incorrect Response:

Earth is body number: _____1_____

The Moon is body number: _____3_____

The Sun is body number: _____2_____

| Content Domain | Main Topic | Cognitive Domain |
| --- | --- | --- |
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Knowing |

## Item label: Two ways to use air-DERIVED

Air is important for many things. What are two ways we use air?

1.

2.

*Item Number: S031088Z*

### SCORING

Note: Each of the two responses are scored separately. However, if the two responses are essentially the same, the second response should be scored as "Incorrect Response".

**Correct Response**

• States that air (oxygen) is needed for breathing.

Example: Humans breathe air.

• States that air (oxygen) is needed for fire, burning (or similar).

Example: Air is used in fire.

• States that air is used to inflate things (e.g., balloons, balls, tires, blow bubbles, etc.).

Example: To blow up balloons.

• States an effect due to air movement or pressure (or similar).

Example: Air is needed for airplanes to fly.

• Other correct

**Incorrect Response**

• Response too vague.

Example: To stay alive.

• Refers only to plants needing air (or similar)

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

### Overall Percent Correct

| Education system | Percent correct |
| --- | --- |
| Korea, Rep. of | 34 ⌃ |
| Sweden | 28 ⌃ |
| *Chinese Taipei-CHN* | 28 ⌃ |
| Kazakhstan | 27 ⌃ |
| Singapore | 26 ⌃ |
| Russian Federation | 26 ⌃ |
| Finland | 26 ⌃ |
| Serbia | 24 ⌃ |
| Romania | 23 ⌃ |
| Portugal | 22 ⌃ |
| Japan | 22 ⌃ |
| New Zealand | 21 ⌃ |
| Lithuania | 21 ⌃ |
| **United States** | **21** ⌃ |
| Tunisia | 21 ⌃ |
| Netherlands | 20 ⌃ |
| Ireland | 20 |
| *Hong Kong-CHN* | 19 |
| Poland | 19 |
| Denmark | 19 |
| Slovak Republic | 18 |
| Bahrain | 18 |
| Italy | 18 |
| International average | 16 |
| Hungary | 16 |
| Czech Republic | 16 |
| Spain | 16 |
| Saudi Arabia | 15 |
| Slovenia | 15 |
| *Belgium (Flemish)-BEL* | 15 |
| United Arab Emirates | 15 |
| Austria | 14 |
| Norway | 14 |
| Australia | 13 ⌄ |
| Oman | 12 ⌄ |
| Turkey | 11 ⌄ |
| Chile | 11 ⌄ |
| Qatar | 11 ⌄ |
| Germany | 10 ⌄ |
| Malta | 10 ⌄ |
| *Northern Ireland-GBR* | 9 ⌄ |
| *England-GBR* | 9 ⌄ |
| Croatia | 9 ⌄ |
| Thailand | 9 ⌄ |
| Kuwait | 8 ⌄ |
| Georgia | 7 ⌄ |
| Iran, Islamic Rep. of | 7 ⌄ |
| Azerbaijan | 6 ⌄ |
| Armenia | 5 ⌄ |
| Yemen | 5 ⌄ |
| Morocco | 2 ⌄ |

### Benchmarking education system

| | |
| --- | --- |
| *Alberta-CAN* | 19 |
| *Florida-USA* | 18 |
| *Ontario-CAN* | 15 |
| *North Carolina-USA* | 15 |
| *Abu Dhabi-UAE* | 15 |
| *Dubai-UAE* | 13 ⌄ |
| *Quebec-CAN* | 9 ⌄ |

⌃ Percent higher than International average
⌄ Percent lower than International average

Item label: Two ways to use air (continued)
*S031088Z:*

## Student Responses

### Correct Response:

1. To blow up stuf,

2. To breath.

### Incorrect Response:

1. to breath

2. to help plants grow

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth in the Solar System | Applying |

Item label: Explanation for day and night

What is the correct explanation for why we have day and night on Earth?

A.    The Sun orbits around the Earth.

B.    Earth orbits around the Sun.

C.    Earth turns on its axis.

D.    The Sun turns on its axis.

*Item Number: S031275*

| **Correct Response:** | **C** |
|---|---|

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Slovak Republic | 58 ⌃ |
| Czech Republic | 58 ⌃ |
| Russian Federation | 54 ⌃ |
| Lithuania | 52 ⌃ |
| Chile | 52 ⌃ |
| Azerbaijan | 47 ⌃ |
| Germany | 46 ⌃ |
| Bahrain | 46 ⌃ |
| Slovenia | 46 ⌃ |
| Saudi Arabia | 45 ⌃ |
| Armenia | 44 ⌃ |
| Austria | 44 ⌃ |
| Portugal | 44 ⌃ |
| *Hong Kong-CHN* | 43 ⌃ |
| Qatar | 42 ⌃ |
| Poland | 40 ⌃ |
| Hungary | 39 ⌃ |
| Finland | 39 |
| Turkey | 39 ⌃ |
| Serbia | 37 |
| Georgia | 37 |
| *England-GBR* | 37 |
| Croatia | 37 |
| *Chinese Taipei-CHN* | 36 |
| United Arab Emirates | 36 |
| Kazakhstan | 35 |
| International average | 35 |
| Spain | 34 |
| Romania | 32 |
| **United States** | **32** |
| *Belgium (Flemish)-BEL* | 32 |
| Sweden | 30 |
| Australia | 30 ⌄ |
| Singapore | 29 ⌄ |
| Kuwait | 29 ⌄ |
| Japan | 28 ⌄ |
| Denmark | 27 ⌄ |
| Thailand | 25 ⌄ |
| Netherlands | 25 ⌄ |
| Iran, Islamic Rep. of | 24 ⌄ |
| Italy | 23 ⌄ |
| Malta | 23 ⌄ |
| Oman | 23 ⌄ |
| New Zealand | 22 ⌄ |
| Yemen | 21 ⌄ |
| Korea, Rep. of | 20 ⌄ |
| Ireland | 20 ⌄ |
| Morocco | 19 ⌄ |
| Tunisia | 18 ⌄ |
| *Northern Ireland-GBR* | 16 ⌄ |
| Norway | 14 ⌄ |

### Benchmarking education system

| | |
|---|---|
| *Dubai-UAE* | 38 |
| *Florida-USA* | 38 |
| *Abu Dhabi-UAE* | 37 |
| *Quebec-CAN* | 27 ⌄ |
| *North Carolina-USA* | 25 ⌄ |
| *Alberta-CAN* | 22 ⌄ |
| *Ontario-CAN* | 21 ⌄ |

⌃ Percent higher than International average
⌄ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Knowing |

Item label: Best soil for plants to grow in

Plants grow best in soils that are rich in which of the following?

A. grains of sand

B. lumps of clay

C. layers of gravel

D. decaying plants and animals

*Item Number: S031376*

| **Correct Response:** | **D** |
|---|---|

**Overall Percent Correct**

| Education system | Percent correct | |
|---|---|---|
| Thailand | 75 | ⬙ |
| Czech Republic | 73 | ⬙ |
| Korea, Rep. of | 67 | ⬙ |
| Finland | 63 | ⬙ |
| Croatia | 61 | ⬙ |
| Slovak Republic | 60 | ⬙ |
| Russian Federation | 60 | ⬙ |
| Serbia | 59 | ⬙ |
| Italy | 58 | ⬙ |
| *Chinese Taipei-CHN* | 57 | ⬙ |
| Sweden | 56 | ⬙ |
| Azerbaijan | 55 | ⬙ |
| Hungary | 54 | ⬙ |
| Denmark | 53 | ⬙ |
| Kazakhstan | 52 | ⬙ |
| Portugal | 49 | ⬙ |
| **United States** | **48** | ⬙ |
| Armenia | 46 | ⬙ |
| *Hong Kong-CHN* | 46 | ⬙ |
| New Zealand | 46 | ⬙ |
| Slovenia | 46 | ⬙ |
| Romania | 46 | ⬙ |
| *England-GBR* | 46 | ⬙ |
| International average | 40 | |
| Norway | 40 | |
| Australia | 39 | |
| Malta | 37 | |
| Poland | 35 | ⬗ |
| *Northern Ireland-GBR* | 35 | ⬗ |
| Spain | 34 | ⬗ |
| Ireland | 34 | ⬗ |
| Chile | 32 | ⬗ |
| Austria | 31 | ⬗ |
| Japan | 29 | ⬗ |
| Bahrain | 28 | ⬗ |
| Germany | 28 | ⬗ |
| Oman | 28 | ⬗ |
| Lithuania | 28 | ⬗ |
| Qatar | 27 | ⬗ |
| United Arab Emirates | 26 | ⬗ |
| Turkey | 26 | ⬗ |
| Tunisia | 25 | ⬗ |
| Georgia | 24 | ⬗ |
| Yemen | 23 | ⬗ |
| Morocco | 21 | ⬗ |
| Singapore | 20 | ⬗ |
| Netherlands | 20 | ⬗ |
| *Belgium (Flemish)-BEL* | 20 | ⬗ |
| Saudi Arabia | 19 | ⬗ |
| Kuwait | 16 | ⬗ |
| Iran, Islamic Rep. of | 14 | ⬗ |

**Benchmarking education system**

| | | |
|---|---|---|
| *Alberta-CAN* | 64 | ⬙ |
| *North Carolina-USA* | 58 | ⬙ |
| *Ontario-CAN* | 55 | ⬙ |
| *Quebec-CAN* | 52 | ⬙ |
| *Florida-USA* | 49 | ⬙ |
| *Dubai-UAE* | 31 | ⬗ |
| *Abu Dhabi-UAE* | 24 | ⬗ |

⬙ Percent higher than International average
⬗ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Knowing |

## Item label: Soil change due to natural causes

Which of these soil changes is due only to natural causes?

A.  Loss of minerals due to farming.

B.  Deserts forming due to tree cutting.

C.  Flooding due to dam construction.

D.  Minerals washing out due to heavy rain.

*Item Number: S031389*

| **Correct Response:** | **D** |
|:---:|:---:|

### Overall Percent Correct

| Education system | Percent correct |
|:---|:---:|
| Korea, Rep. of | 63 ⬥ |
| Finland | 61 ⬥ |
| Russian Federation | 60 ⬥ |
| Japan | 55 ⬥ |
| **United States** | **54** ⬥ |
| Kazakhstan | 53 ⬥ |
| Azerbaijan | 52 ⬥ |
| Slovak Republic | 51 ⬥ |
| Hungary | 51 ⬥ |
| Croatia | 48 ⬥ |
| Turkey | 48 ⬥ |
| *Chinese Taipei-CHN* | 48 ⬥ |
| Slovenia | 47 ⬥ |
| Poland | 45 ⬥ |
| Lithuania | 44 ⬥ |
| Australia | 44 ⬥ |
| *Hong Kong-CHN* | 44 ⬥ |
| Italy | 43 ⬥ |
| Czech Republic | 41 |
| Sweden | 41 |
| Portugal | 40 |
| Singapore | 40 |
| *England-GBR* | 39 |
| International average | 39 |
| Romania | 39 |
| *Northern Ireland-GBR* | 38 |
| Ireland | 37 |
| *Belgium (Flemish)-BEL* | 37 |
| New Zealand | 36 |
| United Arab Emirates | 36 |
| Austria | 36 |
| Denmark | 35 |
| Georgia | 35 |
| Serbia | 34 ⬇ |
| Saudi Arabia | 34 ⬇ |
| Netherlands | 33 ⬇ |
| Oman | 32 ⬇ |
| Iran, Islamic Rep. of | 31 ⬇ |
| Thailand | 30 ⬇ |
| Spain | 30 ⬇ |
| Bahrain | 29 ⬇ |
| Armenia | 29 ⬇ |
| Chile | 28 ⬇ |
| Norway | 28 ⬇ |
| Malta | 27 ⬇ |
| Germany | 26 ⬇ |
| Qatar | 26 ⬇ |
| Kuwait | 22 ⬇ |
| Morocco | 21 ⬇ |
| Yemen | 19 ⬇ |
| Tunisia | 19 ⬇ |

### Benchmarking education system

| | |
|:---|:---:|
| *North Carolina-USA* | 51 ⬥ |
| *Florida-USA* | 48 ⬥ |
| *Ontario-CAN* | 43 ⬥ |
| *Alberta-CAN* | 43 |
| *Dubai-UAE* | 39 |
| *Abu Dhabi-UAE* | 34 ⬇ |
| *Quebec-CAN* | 29 ⬇ |

⬥ Percent higher than International average
⬇ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Knowing |

## Item label: Ways to avoid wasting water-DERIVED

There is a shortage of fresh water in many parts of the world.
Describe two things people can do to avoid wasting water.

1.

2.

*Item Number: S031391Z*

### SCORING

Note: Each of the two responses are scored separately. However, if the two responses are essentially the same, the second response should be scored as "Incorrect Response".

**Correct Response**

• Mentions that faucets should not be left running (or similar).

Example: Don't leave the water running.

• Mentions recycling, reusing or purifying water (or similar).

Example: Screen out dirt so you can drink the water.

• Mentions a specific practical method to conserve or minimize the use of water.

Example: Have short showers.

• Other correct

**Incorrect Response**

• Gives a general/vague statement about not using or drinking (much) water. [No specific method given.]

Example: Stop using water.

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 70 ⏶ |
| Singapore | 52 ⏶ |
| *Chinese Taipei-CHN* | 51 ⏶ |
| Portugal | 50 ⏶ |
| Australia | 42 ⏶ |
| **United States** | **41** ⏶ |
| Ireland | 41 ⏶ |
| Hungary | 41 ⏶ |
| Spain | 41 ⏶ |
| *Belgium (Flemish)-BEL* | 36 ⏶ |
| Netherlands | 35 ⏶ |
| Bahrain | 34 ⏶ |
| Iran, Islamic Rep. of | 33 ⏶ |
| Poland | 33 ⏶ |
| Italy | 33 ⏶ |
| *Hong Kong-CHN* | 33 ⏶ |
| Germany | 32 ⏶ |
| *Northern Ireland-GBR* | 31 |
| *England-GBR* | 31 |
| Austria | 30 |
| Denmark | 29 |
| Finland | 29 |
| Japan | 28 |
| Sweden | 28 |
| Slovak Republic | 28 |
| Kazakhstan | 28 |
| Chile | 27 |
| International average | 27 |
| Saudi Arabia | 26 |
| Croatia | 25 |
| Malta | 24 |
| Norway | 24 |
| New Zealand | 23 ⏷ |
| Czech Republic | 21 ⏷ |
| Serbia | 20 ⏷ |
| Turkey | 20 ⏷ |
| Slovenia | 18 ⏷ |
| Romania | 18 ⏷ |
| Russian Federation | 17 ⏷ |
| United Arab Emirates | 16 ⏷ |
| Qatar | 15 ⏷ |
| Thailand | 15 ⏷ |
| Oman | 14 ⏷ |
| Tunisia | 14 ⏷ |
| Kuwait | 12 ⏷ |
| Lithuania | 12 ⏷ |
| Armenia | 9 ⏷ |
| Azerbaijan | 6 ⏷ |
| Morocco | 4 ⏷ |
| Georgia | 2 ⏷ |
| Yemen | 1 ⏷ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 44 ⏶ |
| *Quebec-CAN* | 44 ⏶ |
| *Alberta-CAN* | 42 ⏶ |
| *North Carolina-USA* | 42 ⏶ |
| *Ontario-CAN* | 31 |
| *Dubai-UAE* | 27 |
| *Abu Dhabi-UAE* | 13 ⏷ |

⏶ Percent higher than International average
⏷ Percent lower than International average

Item label: Ways to avoid wasting water (continued)

*S031391Z:*

## Student Responses

### Correct Response:

1. Not leaving the facet on,

2. Not taking a 2 hour Shower,

### Incorrect Response:

1. by braking

2. and Spelling it

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Knowing |

## Item label: Drinking water comes from

Water that has its salt removed before it can be used as drinking water is most likely to have come from

A.    underground

B.    a river

C.    a lake

D.    a sea

*Item Number: S041092*

| **Correct Response:** | **D** |
|---|---|

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 88 ⬥ |
| Japan | 83 ⬥ |
| Russian Federation | 82 ⬥ |
| *Chinese Taipei-CHN* | 76 ⬥ |
| Czech Republic | 75 ⬥ |
| Finland | 74 ⬥ |
| Sweden | 74 ⬥ |
| *Hong Kong-CHN* | 73 ⬥ |
| Serbia | 73 ⬥ |
| Slovenia | 72 ⬥ |
| Hungary | 71 ⬥ |
| Singapore | 71 ⬥ |
| Austria | 68 ⬥ |
| Slovak Republic | 68 ⬥ |
| Croatia | 67 ⬥ |
| Netherlands | 66 ⬥ |
| **United States** | **65** ⬥ |
| *Northern Ireland-GBR* | 65 ⬥ |
| Norway | 64 ⬥ |
| *England-GBR* | 63 ⬥ |
| Spain | 62 ⬥ |
| Ireland | 61 ⬥ |
| Denmark | 61 |
| Malta | 60 |
| Germany | 58 |
| Australia | 57 |
| International average | 57 |
| *Belgium (Flemish)-BEL* | 57 |
| New Zealand | 56 |
| Portugal | 55 |
| Chile | 55 |
| Saudi Arabia | 54 |
| Bahrain | 54 |
| Iran, Islamic Rep. of | 50 ⬦ |
| United Arab Emirates | 50 ⬦ |
| Georgia | 48 ⬦ |
| Qatar | 48 ⬦ |
| Oman | 48 ⬦ |
| Turkey | 45 ⬦ |
| Italy | 44 ⬦ |
| Poland | 43 ⬦ |
| Lithuania | 42 ⬦ |
| Thailand | 42 ⬦ |
| Kuwait | 41 ⬦ |
| Romania | 38 ⬦ |
| Morocco | 32 ⬦ |
| Kazakhstan | 31 ⬦ |
| Yemen | 30 ⬦ |
| Tunisia | 30 ⬦ |
| Armenia | 28 ⬦ |
| Azerbaijan | 21 ⬦ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 70 ⬥ |
| *North Carolina-USA* | 69 ⬥ |
| *Alberta-CAN* | 65 ⬥ |
| *Quebec-CAN* | 62 ⬥ |
| *Ontario-CAN* | 59 |
| *Dubai-UAE* | 52 ⬦ |
| *Abu Dhabi-UAE* | 51 ⬦ |

⬥ Percent higher than International average
⬦ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **EARTH SCIENCE** | Earth's Processes, Cycles, and History | Knowing |

Item label: Reason for direction river flows

The direction water flows in a river depends on

A.    the length of the river

B.    the slope of the land

C.    the type of rock over which the water flows

D.    the location of the North Pole

*Item Number: S041100*

| **Correct Response:** | **B** |
|:---:|:---:|

**Overall Percent Correct**

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 81 ⌂ |
| *Chinese Taipei-CHN* | 77 ⌂ |
| Japan | 70 ⌂ |
| *Hong Kong-CHN* | 67 ⌂ |
| Finland | 65 ⌂ |
| Sweden | 62 ⌂ |
| Singapore | 58 ⌂ |
| Russian Federation | 57 ⌂ |
| Slovak Republic | 57 ⌂ |
| Australia | 57 ⌂ |
| Netherlands | 57 ⌂ |
| Romania | 56 ⌂ |
| Czech Republic | 56 ⌂ |
| Serbia | 55 ⌂ |
| Italy | 55 ⌂ |
| Ireland | 54 ⌂ |
| **United States** | **53** ⌂ |
| *England-GBR* | 53 ⌂ |
| Germany | 51 ⌂ |
| New Zealand | 51 ⌂ |
| Croatia | 51 ⌂ |
| *Northern Ireland-GBR* | 51 |
| Hungary | 51 ⌂ |
| Austria | 49 |
| Norway | 48 |
| Spain | 47 |
| Kazakhstan | 47 |
| Georgia | 46 |
| International average | 45 |
| Poland | 44 |
| Denmark | 44 |
| *Belgium (Flemish)-BEL* | 44 |
| Portugal | 39 ▼ |
| Armenia | 38 ▼ |
| Turkey | 35 ▼ |
| Lithuania | 35 ▼ |
| Iran, Islamic Rep. of | 34 ▼ |
| Slovenia | 34 ▼ |
| Saudi Arabia | 30 ▼ |
| Thailand | 29 ▼ |
| United Arab Emirates | 28 ▼ |
| Bahrain | 27 ▼ |
| Malta | 26 ▼ |
| Chile | 25 ▼ |
| Kuwait | 25 ▼ |
| Azerbaijan | 25 ▼ |
| Qatar | 24 ▼ |
| Yemen | 24 ▼ |
| Oman | 24 ▼ |
| Tunisia | 22 ▼ |
| Morocco | 20 ▼ |

**Benchmarking education system**

| | |
|---|---|
| *Alberta-CAN* | 58 ⌂ |
| *North Carolina-USA* | 54 ⌂ |
| *Florida-USA* | 50 |
| *Ontario-CAN* | 47 |
| *Quebec-CAN* | 45 |
| *Dubai-UAE* | 35 ▼ |
| *Abu Dhabi-UAE* | 24 ▼ |

⌂ Percent higher than International average
▼ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth in the Solar System | Knowing |

## Item label: Energy received from the sun

Write down one form of energy Earth receives from the Sun.

*Item Number: S041110*

### SCORING

**Correct Response**

• Refers to light (sunlight).

Example: Light energy.

• Refers to heat.

Example: It provides heat.

• Refers to solar energy.

Example: Solar energy.

**Incorrect Response**

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

Examples:

Energy from the sun.

Sun.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Singapore | 82 ⬖ |
| Korea, Rep. of | 79 ⬖ |
| Slovak Republic | 75 ⬖ |
| *Hong Kong-CHN* | 73 ⬖ |
| Russian Federation | 73 ⬖ |
| *Northern Ireland-GBR* | 69 ⬖ |
| Netherlands | 69 ⬖ |
| Italy | 68 ⬖ |
| Romania | 68 ⬖ |
| Ireland | 68 ⬖ |
| *England-GBR* | 66 ⬖ |
| Austria | 64 ⬖ |
| Australia | 63 ⬖ |
| **United States** | **63** ⬖ |
| Kazakhstan | 62 ⬖ |
| Portugal | 62 ⬖ |
| Croatia | 62 ⬖ |
| Serbia | 61 ⬖ |
| *Chinese Taipei-CHN* | 61 ⬖ |
| Denmark | 61 ⬖ |
| Japan | 59 ⬖ |
| Czech Republic | 59 ⬖ |
| Georgia | 59 |
| *Belgium (Flemish)-BEL* | 59 ⬖ |
| Norway | 57 |
| New Zealand | 56 |
| Turkey | 55 |
| Finland | 55 |
| International average | 54 |
| Hungary | 54 |
| Iran, Islamic Rep. of | 54 |
| Slovenia | 53 |
| Chile | 53 |
| Lithuania | 53 |
| Thailand | 52 |
| Spain | 51 |
| Germany | 48 ⬗ |
| Bahrain | 47 ⬗ |
| Saudi Arabia | 47 ⬗ |
| United Arab Emirates | 46 ⬗ |
| Poland | 45 ⬗ |
| Sweden | 44 ⬗ |
| Qatar | 40 ⬗ |
| Malta | 38 ⬗ |
| Azerbaijan | 37 ⬗ |
| Armenia | 35 ⬗ |
| Kuwait | 29 ⬗ |
| Tunisia | 29 ⬗ |
| Oman | 24 ⬗ |
| Yemen | 12 ⬗ |
| Morocco | 9 ⬗ |

### Benchmarking education system

| | |
|---|---|
| *Florida-USA* | 67 ⬖ |
| *Alberta-CAN* | 64 ⬖ |
| *North Carolina-USA* | 62 ⬖ |
| *Ontario-CAN* | 60 ⬖ |
| *Quebec-CAN* | 57 |
| *Dubai-UAE* | 56 |
| *Abu Dhabi-UAE* | 44 ⬗ |

⬖ Percent higher than International average
⬗ Percent lower than International average

Item label: Energy received from the sun (continued)
*S041110:*

## Student Responses

**Correct Response:**

light

**Incorrect Response:**

The sun gives light so people can see on earth

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Applying |

## Item label: Advantage to farming by a river

The picture below shows a river flowing across a plain.



Farming is carried out on the plain and near the river.

There are advantages and disadvantages to farming along a river.

A. Describe one **advantage**.

*Item Number: S041201A*

### SCORING

**Correct Response**

- Refers to the availability of water (for crops and/or animals) OR presence of fertile soil OR ability to grow better crops.

Examples:

Lots of water for irrigation.

They can water their crops easily.

You would be able to get water for animals.

**Incorrect Response**

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

Examples:

Having enough water for washing.

You can catch fish.

The crops will grow.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 83 ⬆ |
| Finland | 70 ⬆ |
| Singapore | 62 ⬆ |
| Portugal | 61 ⬆ |
| *Chinese Taipei-CHN* | 61 ⬆ |
| Czech Republic | 59 ⬆ |
| Italy | 57 ⬆ |
| Thailand | 57 ⬆ |
| Germany | 55 ⬆ |
| Russian Federation | 54 ⬆ |
| *Hong Kong-CHN* | 54 ⬆ |
| Austria | 54 ⬆ |
| Romania | 53 ⬆ |
| Sweden | 53 ⬆ |
| *England-GBR* | 52 ⬆ |
| *Northern Ireland-GBR* | 52 ⬆ |
| Denmark | 51 ⬆ |
| Netherlands | 51 ⬆ |
| Ireland | 51 ⬆ |
| Lithuania | 50 ⬆ |
| **United States** | **49** ⬆ |
| Iran, Islamic Rep. of | 48 ⬆ |
| *Belgium (Flemish)-BEL* | 44 |
| Poland | 44 |
| Australia | 44 |
| Croatia | 43 |
| Kazakhstan | 43 |
| International average | 42 |
| Norway | 41 |
| Slovenia | 39 |
| Slovak Republic | 38 |
| New Zealand | 38 ⬇ |
| Serbia | 38 |
| Hungary | 37 ⬇ |
| Turkey | 36 ⬇ |
| Spain | 35 ⬇ |
| Chile | 35 ⬇ |
| Georgia | 35 ⬇ |
| Japan | 33 ⬇ |
| Bahrain | 29 ⬇ |
| Azerbaijan | 28 ⬇ |
| United Arab Emirates | 27 ⬇ |
| Malta | 26 ⬇ |
| Saudi Arabia | 25 ⬇ |
| Qatar | 23 ⬇ |
| Armenia | 22 ⬇ |
| Tunisia | 16 ⬇ |
| Kuwait | 13 ⬇ |
| Oman | 13 ⬇ |
| Morocco | 13 ⬇ |
| Yemen | 3 ⬇ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 59 ⬆ |
| *Ontario-CAN* | 54 ⬆ |
| *Quebec-CAN* | 43 |
| *Florida-USA* | 38 |
| *Dubai-UAE* | 37 ⬇ |
| *North Carolina-USA* | 35 ⬇ |
| *Abu Dhabi-UAE* | 19 ⬇ |

⬆ Percent higher than International average
⬇ Percent lower than International average

Item label: Advantage to farming by a river (continued)

*S041201A:*

## Student Responses

### Correct Response:

*The river is helping the plants grow*

### Incorrect Response:

*The farm*

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Applying |

## Item label: Disadvantage to farming by a river

The picture below shows a river flowing across a plain.



Farming is carried out on the plain and near the river.

There are advantages and disadvantages to farming along a river.

B. Describe one **disadvantage**.

*Item Number: S041201B*

### SCORING

**Correct Response**

- Refers to the river flooding/overflowing OR the river being polluted/carrying pollutants OR animals falling into the river.

Examples:

The river could flood.

Pollutions can flow from the fields down into the river.

The water may be poisoned.

**Incorrect Response**

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

Examples:

In the winter the water freezes over and you go skating and fall in.

Something will fall into the water.

The river is dangerous.

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Korea, Rep. of | 64 △ |
| Czech Republic | 60 △ |
| Italy | 55 △ |
| Finland | 55 △ |
| Slovak Republic | 55 △ |
| Romania | 53 △ |
| Thailand | 52 △ |
| *Chinese Taipei-CHN* | 52 △ |
| Netherlands | 52 △ |
| Slovenia | 51 △ |
| Singapore | 49 △ |
| Austria | 47 △ |
| Ireland | 46 △ |
| Germany | 46 △ |
| *Hong Kong-CHN* | 45 △ |
| Denmark | 44 △ |
| Poland | 44 △ |
| Portugal | 44 △ |
| Hungary | 43 △ |
| *Northern Ireland-GBR* | 43 △ |
| *England-GBR* | 43 △ |
| Russian Federation | 42 △ |
| *Belgium (Flemish)-BEL* | 39 △ |
| New Zealand | 38 |
| Australia | 36 |
| **United States** | **35** |
| Lithuania | 34 |
| International average | 34 |
| Sweden | 33 |
| Turkey | 32 |
| Georgia | 29 |
| Japan | 26 ▽ |
| Kazakhstan | 25 ▽ |
| Azerbaijan | 25 ▽ |
| Norway | 25 ▽ |
| Spain | 24 ▽ |
| Serbia | 24 ▽ |
| Chile | 23 ▽ |
| Croatia | 22 ▽ |
| Iran, Islamic Rep. of | 22 ▽ |
| Malta | 16 ▽ |
| Bahrain | 15 ▽ |
| Armenia | 15 ▽ |
| United Arab Emirates | 14 ▽ |
| Qatar | 13 ▽ |
| Saudi Arabia | 11 ▽ |
| Oman | 7 ▽ |
| Tunisia | 7 ▽ |
| Morocco | 6 ▽ |
| Kuwait | 5 ▽ |
| Yemen | 1 ▽ |

### Benchmarking education system

| | |
|---|---|
| *Alberta-CAN* | 42 △ |
| *Ontario-CAN* | 36 |
| *Quebec-CAN* | 35 |
| *North Carolina-USA* | 25 ▽ |
| *Florida-USA* | 24 ▽ |
| *Dubai-UAE* | 21 ▽ |
| *Abu Dhabi-UAE* | 9 ▽ |

△ Percent higher than International average
▽ Percent lower than International average

Item label: Disadvantage to farming by a river (continued)

*S041201B:*

## Student Responses

### Correct Response:

*The river might be dirty*

### Incorrect Response:

*The moutian's*

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth in the Solar System | Knowing |

Item label: How often Earth rotates on axis

How often does Earth rotate on its axis?

A.　once every 12 hours

B.　once every 24 hours

C.　once every month

D.　once every year

*Item Number: S041208*

| **Correct Response:** | **B** |
|---|---|

## Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Slovak Republic | 70 ⏶ |
| Portugal | 69 ⏶ |
| Bahrain | 69 ⏶ |
| Slovenia | 67 ⏶ |
| Lithuania | 67 ⏶ |
| Spain | 66 ⏶ |
| Turkey | 65 ⏶ |
| Saudi Arabia | 65 ⏶ |
| Georgia | 64 ⏶ |
| Kazakhstan | 63 ⏶ |
| Iran, Islamic Rep. of | 63 ⏶ |
| Azerbaijan | 59 ⏶ |
| Romania | 59 ⏶ |
| Qatar | 59 ⏶ |
| United Arab Emirates | 59 ⏶ |
| Japan | 58 ⏶ |
| Chile | 58 ⏶ |
| Austria | 57 ⏶ |
| Russian Federation | 57 |
| Hungary | 55 |
| Germany | 54 |
| Thailand | 54 |
| Italy | 53 |
| International average | 53 |
| Oman | 53 |
| *Belgium (Flemish)-BEL* | 53 |
| **United States** | **52** |
| Netherlands | 52 |
| Korea, Rep. of | 52 |
| Czech Republic | 51 |
| Serbia | 51 |
| Croatia | 50 |
| Poland | 49 |
| *England-GBR* | 49 |
| Denmark | 48 ⏷ |
| Norway | 47 ⏷ |
| *Chinese Taipei-CHN* | 47 ⏷ |
| *Hong Kong-CHN* | 46 ⏷ |
| Finland | 45 ⏷ |
| Singapore | 45 ⏷ |
| New Zealand | 44 ⏷ |
| Australia | 44 ⏷ |
| Armenia | 44 ⏷ |
| Malta | 43 ⏷ |
| Sweden | 42 ⏷ |
| Ireland | 42 ⏷ |
| *Northern Ireland-GBR* | 42 ⏷ |
| Morocco | 39 ⏷ |
| Kuwait | 37 ⏷ |
| Yemen | 37 ⏷ |
| Tunisia | 36 ⏷ |

### Benchmarking education system

| | |
|---|---|
| *Dubai-UAE* | 59 ⏶ |
| *Abu Dhabi-UAE* | 57 |
| *Florida-USA* | 55 |
| *Quebec-CAN* | 51 |
| *North Carolina-USA* | 46 ⏷ |
| *Alberta-CAN* | 44 ⏷ |
| *Ontario-CAN* | 41 ⏷ |

⏶ Percent higher than International average
⏷ Percent lower than International average

| Content Domain | Main Topic | Cognitive Domain |
|---|---|---|
| **EARTH SCIENCE** | Earth's Structure, Physical Characteristics, and Resources | Knowing |

## Item label: Which made from waterfall energy

A river flowing over a waterfall has a lot of energy.
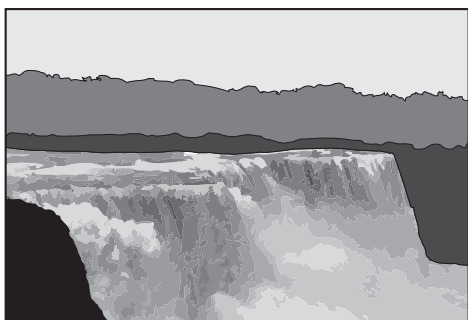


Which of the following is made from waterfall energy?

A.   hot water

B.   solar power

C.   electricity

D.   drinking water

*Item Number: S051100*

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

### Overall Percent Correct

| Education system | Percent correct |
|---|---|
| Austria | 72 ⬡ |
| Serbia | 68 ⬡ |
| Germany | 63 ⬡ |
| Finland | 59 ⬡ |
| Romania | 56 ⬡ |
| Croatia | 54 ⬡ |
| Iran, Islamic Rep. of | 52 ⬡ |
| Norway | 51 ⬡ |
| Sweden | 50 ⬡ |
| Azerbaijan | 49 ⬡ |
| Korea, Rep. of | 47 ⬡ |
| Italy | 42 ⬡ |
| *Hong Kong-CHN* | 41 ⬡ |
| Czech Republic | 41 ⬡ |
| Russian Federation | 34 |
| Portugal | 33 |
| Thailand | 33 |
| International average | 31 |
| Hungary | 31 |
| Netherlands | 31 |
| Slovenia | 31 |
| Kazakhstan | 30 |
| Georgia | 29 |
| Denmark | 29 |
| Armenia | 29 |
| Poland | 28 |
| Lithuania | 28 |
| *Belgium (Flemish)-BEL* | 28 |
| Spain | 28 |
| Japan | 26 ⬡ |
| Turkey | 25 ⬡ |
| Slovak Republic | 24 ⬡ |
| New Zealand | 24 ⬡ |
| Ireland | 24 ⬡ |
| *Chinese Taipei-CHN* | 21 ⬡ |
| Chile | 19 ⬡ |
| Qatar | 19 ⬡ |
| **United States** | **19** ⬡ |
| Singapore | 17 ⬡ |
| United Arab Emirates | 16 ⬡ |
| Yemen | 15 ⬡ |
| Morocco | 15 ⬡ |
| Bahrain | 14 ⬡ |
| Tunisia | 14 ⬡ |
| *England-GBR* | 13 ⬡ |
| Oman | 13 ⬡ |
| *Northern Ireland-GBR* | 12 ⬡ |
| Australia | 12 ⬡ |
| Saudi Arabia | 12 ⬡ |
| Malta | 10 ⬡ |
| Kuwait | — |

### Benchmarking education system

| | |
|---|---|
| *Quebec-CAN* | 42 ⬡ |
| *Ontario-CAN* | 28 |
| *Alberta-CAN* | 25 ⬡ |
| *North Carolina-USA* | 21 ⬡ |
| *Dubai-UAE* | 19 ⬡ |
| *Florida-USA* | 17 ⬡ |
| *Abu Dhabi-UAE* | 12 ⬡ |

⬡ Percent higher than International average
⬡ Percent lower than International average
— Not applicable

| Content Domain | Main Topic | Cognitive Domain |
|:---:|:---:|:---:|
| **EARTH SCIENCE** | Earth's Processes, Cycles, and History | Knowing |

Item label: How long ago was plant alive?

The leaf shape in the rock comes from a plant that lived long ago.

leaf shape

rock
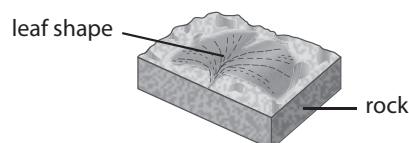
About how long ago was the plant alive?

A.   one year

B.   one hundred years

C.   one thousand years

D.   one million years

*Item Number: S051156*

| **Correct Response:** | **D** |
|:---:|:---:|

### Overall Percent Correct

| Education system | Percent correct |
|:---|:---:|
| Korea, Rep. of | 64 ⬥ |
| Germany | 42 ⬥ |
| Slovak Republic | 42 ⬥ |
| Czech Republic | 40 ⬥ |
| Austria | 40 ⬥ |
| Italy | 40 ⬥ |
| Japan | 39 ⬥ |
| Georgia | 36 ⬥ |
| *Chinese Taipei-CHN* | 35 ⬥ |
| Norway | 35 ⬥ |
| Sweden | 35 ⬥ |
| Spain | 34 ⬥ |
| *Hong Kong-CHN* | 34 ⬥ |
| **United States** | **33** ⬥ |
| Slovenia | 32 ⬥ |
| Singapore | 32 ⬥ |
| Finland | 31 |
| Hungary | 31 |
| Denmark | 31 |
| Kuwait | 30 |
| Poland | 30 |
| Russian Federation | 29 |
| Azerbaijan | 28 |
| International average | 28 |
| *England-GBR* | 27 |
| Romania | 26 |
| Australia | 26 |
| Ireland | 25 |
| New Zealand | 25 |
| Malta | 25 |
| United Arab Emirates | 24 ⬦ |
| Croatia | 23 ⬦ |
| Kazakhstan | 23 ⬦ |
| Qatar | 23 ⬦ |
| Chile | 22 ⬦ |
| Serbia | 22 ⬦ |
| Iran, Islamic Rep. of | 21 ⬦ |
| Portugal | 21 ⬦ |
| Armenia | 21 ⬦ |
| Thailand | 21 ⬦ |
| Turkey | 20 ⬦ |
| *Northern Ireland-GBR* | 20 ⬦ |
| Oman | 20 ⬦ |
| Saudi Arabia | 19 ⬦ |
| Tunisia | 19 ⬦ |
| Yemen | 18 ⬦ |
| Morocco | 17 ⬦ |
| *Belgium (Flemish)-BEL* | 17 ⬦ |
| Bahrain | 16 ⬦ |
| Lithuania | 16 ⬦ |
| Netherlands | 15 ⬦ |

### Benchmarking education system

| | |
|:---|:---:|
| *Alberta-CAN* | 43 ⬥ |
| *Florida-USA* | 36 ⬥ |
| *Quebec-CAN* | 32 |
| *Ontario-CAN* | 31 ⬥ |
| *North Carolina-USA* | 29 |
| *Dubai-UAE* | 28 |
| *Abu Dhabi-UAE* | 22 ⬦ |

⬥ Percent higher than International average
⬦ Percent lower than International average