
SCIENCE ITEMS

Guide to the Content and Layout of This Book

The *Science Items* book contains, in a ready-to-use form, the released TIMSS 1995 and TIMSS 2003 science assessment items that appeared in Book 5, *Science Concepts and Science Items*. Each item is presented on a separate page to facilitate printing.

The two books are designed to be used in tandem. The *Science Items* book is designed to facilitate the construction of sets of items tailored to the purpose of the user—most likely a classroom teacher. Users can select items for their own purpose based on their reading of the *Science Concepts and Science Items* book, print these and administer them to students. Student responses can be scored using the scoring instructions presented in the *Science Concepts and Science Items* book, and may be compared to the international benchmarks presented there.

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

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

Where did it snow?

- A. Town A
- B. Town B
- C. Town C
- D. Town D

Item Number: N1

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

- A. The Moon reflects the light from the Sun.
- B. The Moon rotates at a very high speed.
- C. The Moon is covered with a thin layer of ice.
- D. The Moon has many craters.

Item Number: O4

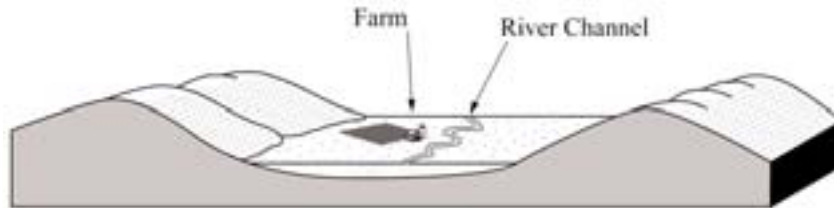
Sometimes mountains can still have snow on their tops when the snow on the lower parts of the mountains has melted. What makes this happen?

Item Number: O9

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

Item Number: Y1

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

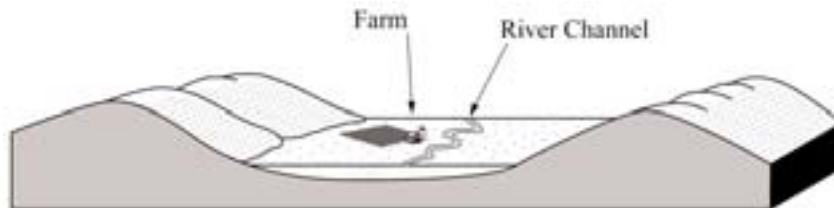


- a. Write down one reason why this plain is a good place for farming.

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

Item Number: Z1A

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



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

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

Item Number: Z1B

Which one of these refers only to living things?

A. clouds, fire, rivers

B. fire, rivers, trees

C. rivers, birds, trees

D. birds, trees, worms

E. trees, worms, clouds

Item Number: N2

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

- A. 29°C
- B. 37°C
- C. 100°C
- D. 212°C

Item Number: N3

This is a drawing of a bird's foot.



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

- A. a forest
- B. a meadow
- C. a cornfield
- D. a desert
- E. a lake

Item Number: N5

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

- A. It is fed by the mother hen.
- B. It doesn't need any food.
- C. It makes its own food.
- D. It uses food stored in the egg.
- E. It eats the egg shell.

Item Number: N6

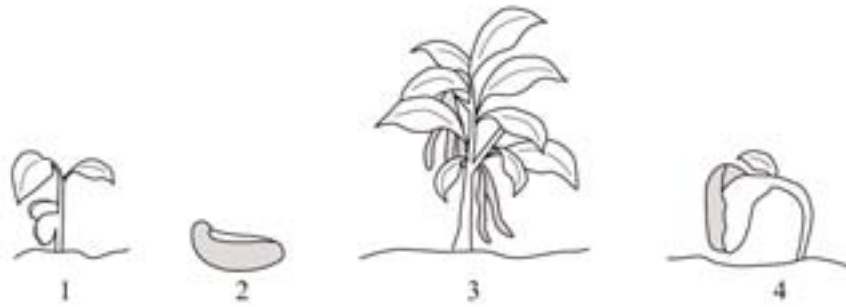
John kept some seeds on moist cotton in a dish. Mike put the same kind of seeds in a dish beside John's dish, and covered them with water. After two days, John's seeds sprouted, but Mike's did not.

Which is the most likely reason?

- A. Mike's seeds needed more air.
- B. Mike's seeds needed more light.
- C. Mike did not put the dish in a warm enough place.
- D. Mike should have used a different kind of seed.

Item Number: O2

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



In what order do these stages take place?

- A. 2, 1, 3, 4
- B. 2, 4, 1, 3
- C. 3, 2, 1, 4
- D. 4, 2, 3, 1
- E. 4, 3, 2, 1

Item Number: O3

Which animal produces milk for its young?

A. Chicken

B. Frog

C. Monkey

D. Snake

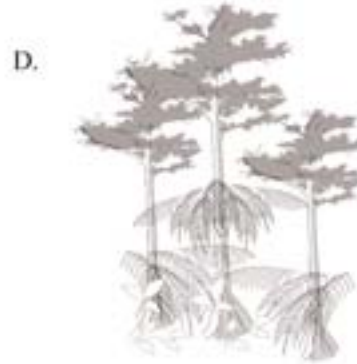
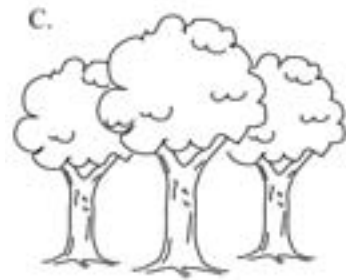
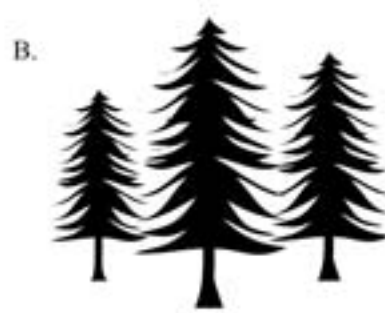
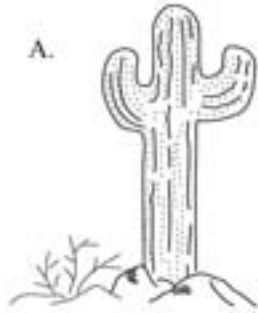
Item Number: O7

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



Item Number: P1

Which picture shows plants commonly found in a desert?



Item Number: P2

Birds are different from insects in that birds have

A. wings

B. legs

C. eyes

D. eggs

E. feathers

Item Number: P8

Seeds develop from which part of a plant?

A. Flower

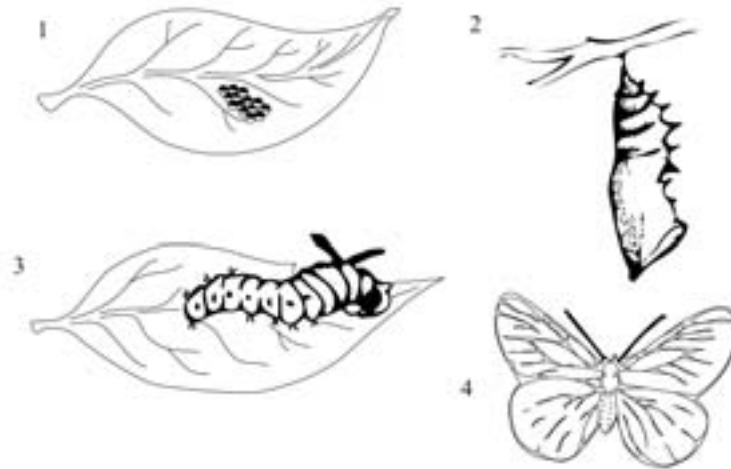
B. Leaf

C. Root

D. Stem

Item Number: P9

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



In what order did the changes take place?

- A. 1, 2, 3, 4
- B. 1, 3, 2, 4
- C. 1, 4, 3, 2
- D. 1, 4, 2, 3

Item Number: Q1

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

- A. They have a high water content.
- B. They are the best source of protein.
- C. They are rich in minerals and vitamins.
- D. They are the best source of carbohydrates.

Item Number: Q2

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

- A. cold
- B. frightened
- C. resting
- D. sleeping

Item Number: Q5

Which picture does NOT show an insect?

A.



Butterfly

B.



Grasshopper

C.



Spider

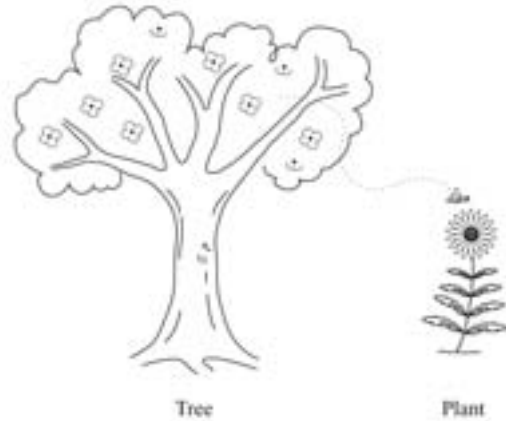
D.



Ant

Item Number: Q6

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



What will most likely happen?

- A. The offspring from the tree will look like the plant.
- B. The offspring from the plant will look like the tree.
- C. The offspring from the plant will look like the tree and the plant.
- D. Nothing will happen because no offspring will be produced.

Item Number: R3

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

- A. It protects the skin against dangerous rays from the sun.
- B. It makes the skin more tanned.
- C. It makes the skin smooth.
- D. It makes the skin feel cooler.

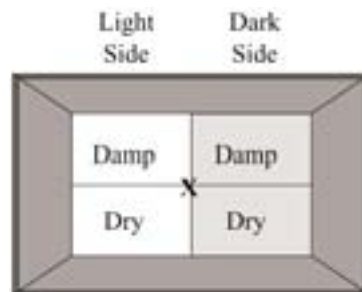
Item Number: R4

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

- A. Earthworm, snake, crayfish
- B. Spider, clam, dragonfly
- C. Crayfish, snake, horse
- D. Clam, fish, earthworm
- E. Horse, snake, fish

Item Number: R6

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



- A. Damp and light
- B. Dry and light
- C. Damp and dark
- D. Dry and dark

Item Number: R7

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

Item Number: W2

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

Item Number: W3

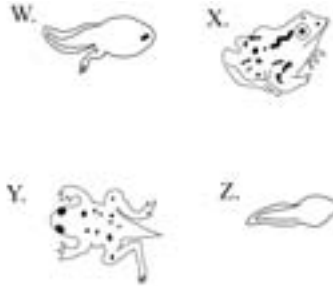
The human brain is inside the skull. Write down one advantage of the skull being thick and strong.

Item Number: W4

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

Item Number: X2

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



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

Item Number: X4

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

	Land Animal	Water Animal
Does have bones	A	B
Does not have bones	C	D

Item Number: X5

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

Item Number: Y2A

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

Item Number: Y2B

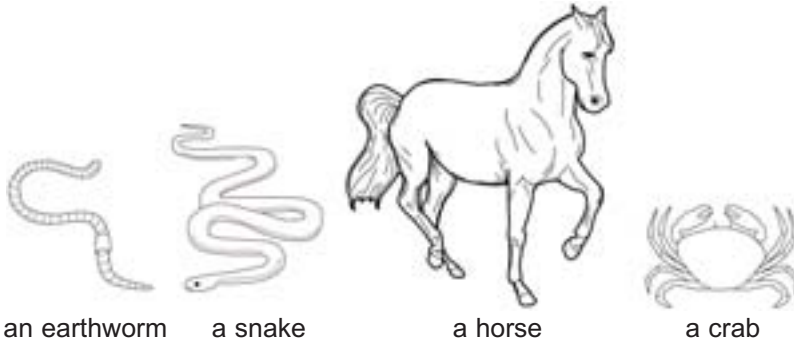
One way for animals to protect themselves is by escaping (running, flying, or swimming away). What are two other ways they protect themselves?

Item Number: Y3A

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

Item Number: Y3B

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



An animal that has a hard outside skeleton is

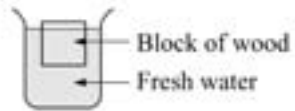
An animal without a backbone that has many segments to its body is

An animal that has hair and an inside skeleton is

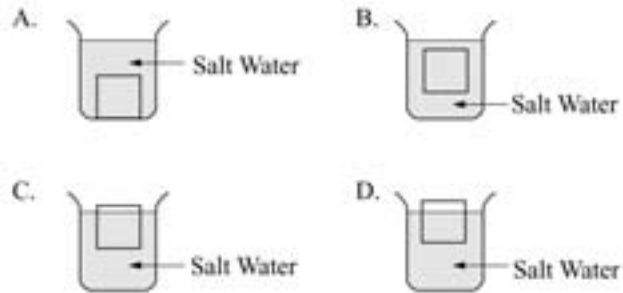
An animal that has a scaly skin and an inside skeleton is

Item Number: Z2

The picture shows a block of wood floating in fresh water.



If this block were placed in salt water from the ocean, which picture shows what would happen?



Item Number: N4

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



- A. From the food she has eaten
- B. From the exercise she did earlier
- C. From the ground she is walking on
- D. From the bicycle she is pushing

Item Number: N7

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

- A. a solution
- B. a pure compound
- C. a mixture
- D. an element

Item Number: N8

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

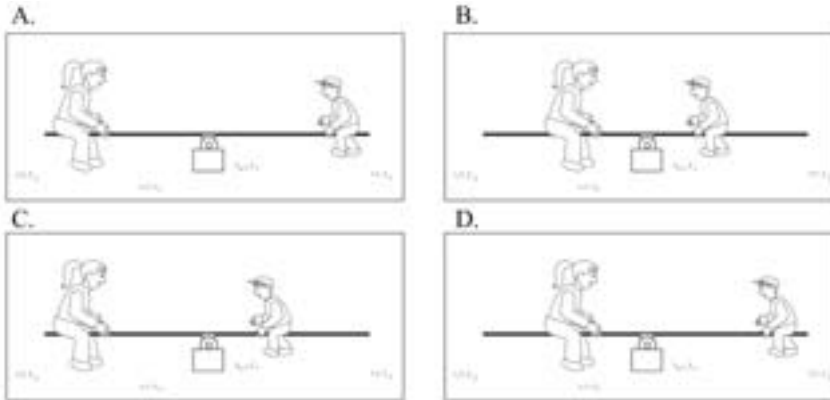


- A. X
- B. Y
- C. Z
- D. All three boxes have the same mass.

Item Number: N9

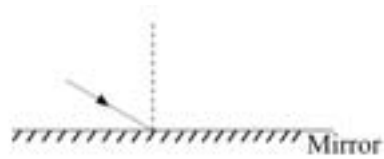
A girl wanted to play on a seesaw with her little brother.

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

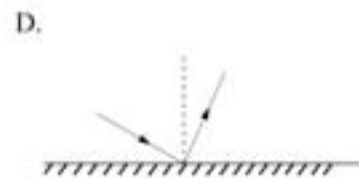
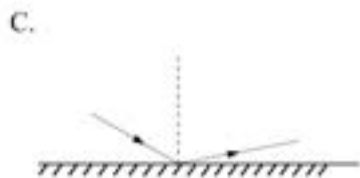
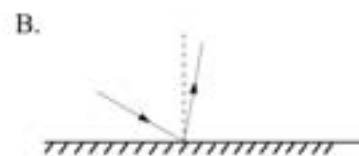
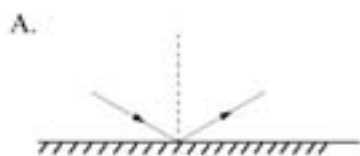


Item Number: O1

A beam of light strikes a mirror as shown.



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



Item Number: O5

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

- A. Pour water on the mixture
- B. Use a magnifying glass
- C. Use a magnet
- D. Heat the mixture

Item Number: O8

Which is NOT used as an energy source?

A. Flowing water

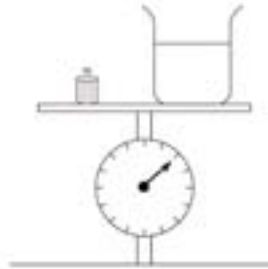
B. Iron ore

C. Sun

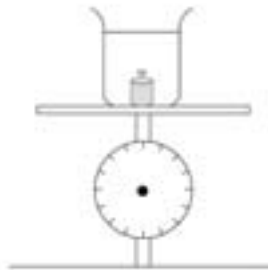
D. Oil

Item Number: P3

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



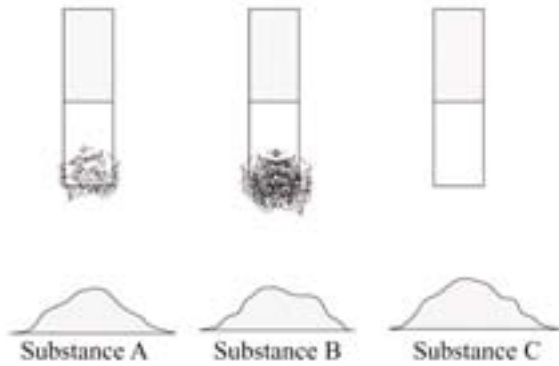
Then she moved the beaker and put the weight in it, as shown in the second picture.



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

Item Number: P4

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



- A. A only
- B. B only
- C. C only
- D. A and B only

Item Number: P5

Which travels fastest?

A. A train

B. An airplane

C. Sound

D. Light

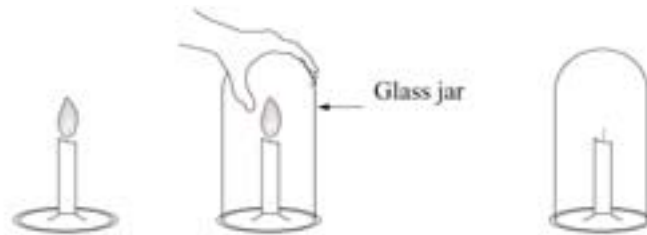
Item Number: P7

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

- A. An egg shell
- B. A plastic cup
- C. A paper plate
- D. An orange peel

Item Number: Q3

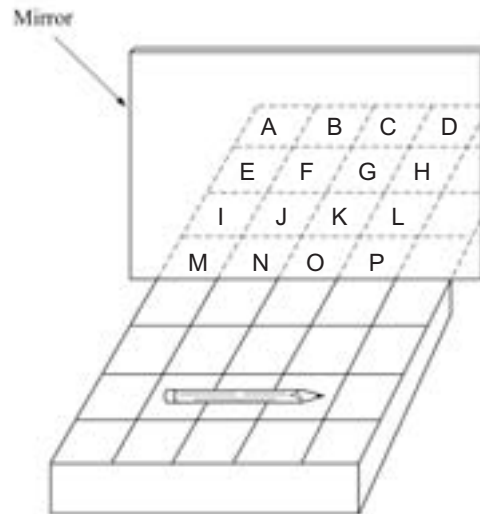
When a glass jar is placed over a lighted candle, the flame goes out.



Why does this happen?

Item Number: Q4

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



Item Number: Q8

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

- A. Gravity pushes it up.
- B. Air bubbles are released.
- C. Heat from the water makes it expand.
- D. Air pressure above the water pulls it up.

Item Number: Q9

A watering can is almost filled with water as shown.



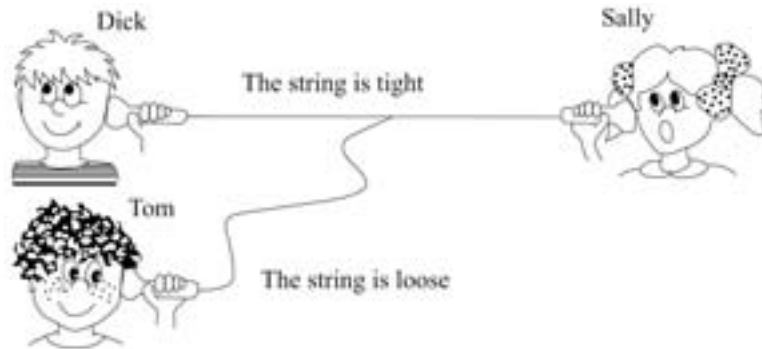
The watering can is tipped so that the water just begins to drip through the spout.

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



Item Number: R1

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



- A. Both of them can hear equally clearly.
- B. Neither of them can hear.
- C. Only Tom can hear clearly.
- D. Only Dick can hear clearly.
- E. Both of them hear equally faintly.

Item Number: R5

Which makes its own light?

- A. A mirror
- B. A candle flame
- C. A diamond ring
- D. A magnifying lens

Item Number: R8

One advantage of solar energy is that it

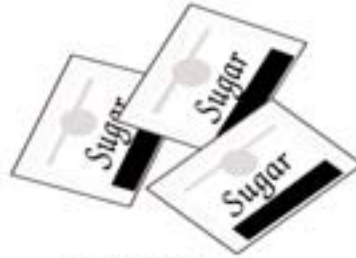
- A. does not pollute
- B. is not renewable
- C. is efficient in any climate
- D. is available at all times

Item Number: R9

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



Sugar Cubes



Loose Sugar

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

Give a reason for your answer.

Item Number: W1

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



Anna's soup



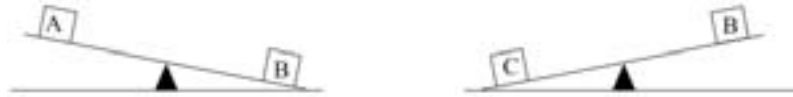
Uri's soup

Whose soup do you think would stay hot longer?

Give a reason for your answer.

Item Number: X1

The weights of three blocks were compared.



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

Explain your answer.

Item Number: Z3

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

Item Number: O6

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

- A. keep them in a warm, dark place
- B. keep one group in a light place and another in a dark place
- C. keep them in a warm, light place
- D. put them in a light or dark place that is cool

Item Number: P6

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

- A. "It is flat at one end and round at the other."
- B. "It smells like peppermint."
- C. "It has a bump on it."
- D. "I hope it is candy."

Item Number: Q7

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

- A. "One bulb looks brightest to me, so I already know the answer."
- B. "All the bulbs look bright to me, so there cannot be an answer."
- C. "It would help if we had a way to measure the brightness of a light bulb."
- D. "We can take a vote and each person will vote for the bulb he or she thinks is the brightest."

Item Number: R2

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

Item Number: W5A

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

Item Number: W5B

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

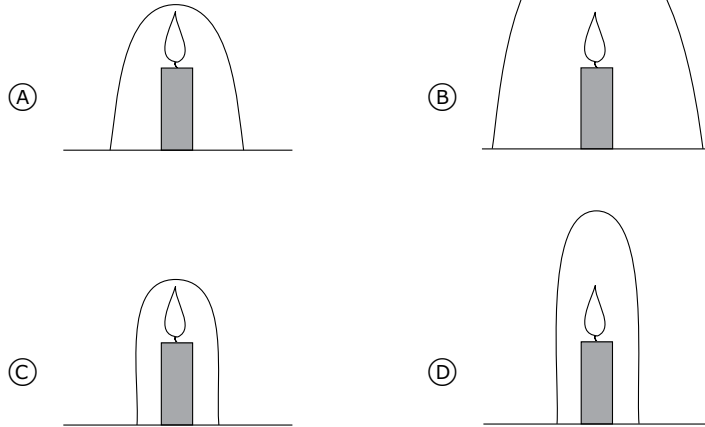
Item Number: X3

If you throw each one of these things away, which will decay fastest?

- (A) A glass bottle
- (B) A metal can
- (C) A plastic bottle
- (D) An apple core

Item Number: S011008

The pictures below show four identical burning candles. Each is covered by a glass container of a different size. Which candle flame will be the **last** to go out?



Item Number: S031061

Which of these activities will result in a different kind of material being formed?

- Ⓐ A nail is left outside and it rusts.
- Ⓑ A glass is dropped and it shatters into small pieces.
- Ⓒ A rubber band is stretched until it breaks.
- Ⓓ A pencil is sharpened to a point.

Item Number: S031420

A strong magnet will separate a mixture of

- Ⓐ clear glass and green glass.
- Ⓑ paper cups and plastic cups.
- Ⓒ iron nails and aluminum nails.
- Ⓓ sand and salt.

Item Number: S011006

Which of these things will dissolve in water?

- Ⓐ iron filings
- Ⓑ wood chips
- Ⓒ sand
- Ⓓ sugar

Item Number: S031035

Many objects are made of metals (like copper, iron and gold).
This is because metals have many useful properties.

A. Name one object that is made out of metal.

B. What property of the metal makes it useful for this object?

Item Number: S031406A

Many objects are made of metals (like copper, iron and gold).
This is because metals have many useful properties.

A. Name one object that is made out of metal.

B. What property of the metal makes it useful for this object?

Item Number: S031406B

Which statement is true for all objects?

- (A) All objects are shiny.
- (B) All objects are hard.
- (C) All objects are rough.
- (D) All objects have mass.

Item Number: S031409

The properties of three materials are compared in the table below.
One of the materials is wood, one is rock and one is iron.

Property	Material 1	Material 2	Material 3
Sinks in water?	Yes	No	Yes
Burns easily?	No	Yes	No
Attracted by a magnet?	Yes	No	No

Identify the three materials by filling in the spaces below.

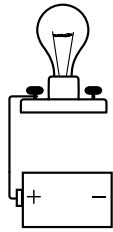
Wood is material number: _____

Rock is material number: _____

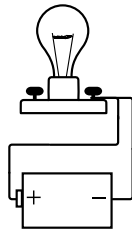
Iron is material number: _____

Item Number: S031053

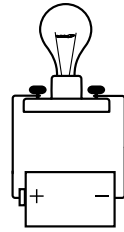
The pictures show a lightbulb connected to a battery.
Which bulb will light?



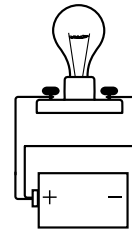
(A)



(B)

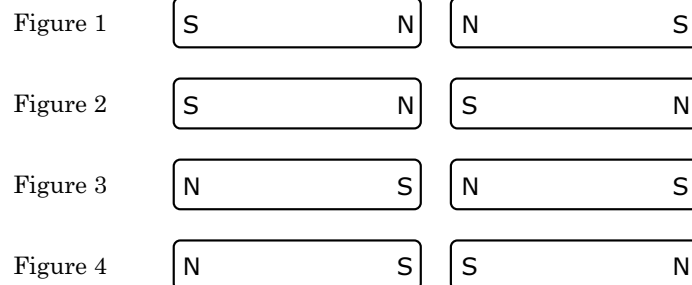


(C)



(D)

Item Number: S031038



Which of the figures above shows a situation where two magnets repel each other?

- (A) Figures 1 and 3
- (B) Figures 2 and 3
- (C) Figures 1 and 4
- (D) Figures 1, 2, 3, and 4

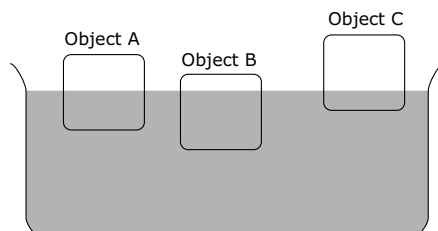
Item Number: S031306

A renewable energy source is a source that will not run out. Which is an example of the use of such a source?

- Ⓐ A coal furnace heating a house
- Ⓑ A windmill pumping water on a farm
- Ⓒ A kerosene lamp lighting a room
- Ⓓ A diesel truck traveling along a road

Item Number: S011011

The picture shows three solid objects of the same size floating in water.



Which object weighs the most?

- (A) Object A
- (B) Object B
- (C) Object C
- (D) They all weigh the same.

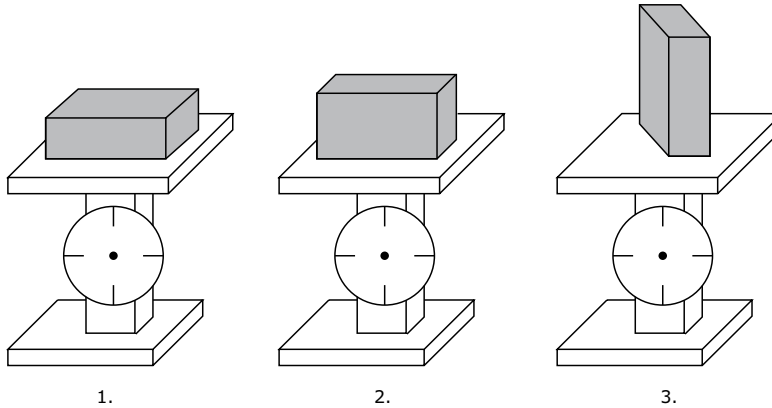
Item Number: S011001

Which of the following can make objects repel each other?

- Ⓐ gravity
- Ⓑ magnetism
- Ⓒ both gravity and magnetism
- Ⓓ neither gravity nor magnetism

Item Number: S031313

The same brick is put on a scale in three different ways.



What will the scale show?

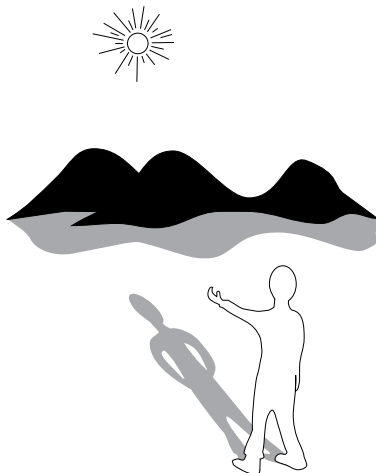
- (A) 1 will show the greatest weight.
- (B) 2 will show the greatest weight.
- (C) 3 will show the greatest weight.
- (D) All will show the same weight.

Item Number: S011009

Jessica gave some reasons why kettles and kitchen pans are often made of copper. Which reason is correct?

- Ⓐ Copper is a good conductor of heat.
- Ⓑ Copper is easy to melt.
- Ⓒ Copper is difficult to shape.
- Ⓓ Copper dissolves in hot water.

Item Number: S011014



There are two things wrong with the shadow of the man shown in the picture above.

Write down the two things that are wrong.

1.

2.

Item Number: S031072

Which pair together could cause a rainbow?

- Ⓐ Fog and clouds
- Ⓑ Rain and snow
- Ⓒ Clouds and ice
- Ⓓ Sunshine and rain

Item Number: S011029

When you make soap bubbles, what is inside the bubbles?

- Ⓐ Air
- Ⓑ Soap
- Ⓒ Water
- Ⓓ Nothing

Item Number: S011017

What happens to water when it boils?

- Ⓐ It changes color.
- Ⓑ It becomes heavier.
- Ⓒ It changes into water vapor.
- Ⓓ It stops bubbling.

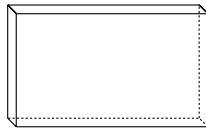
Item Number: S011030

Describe one difference between solids and liquids.

Item Number: S031370

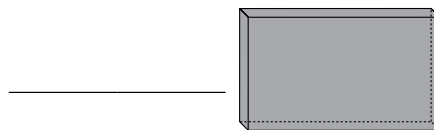
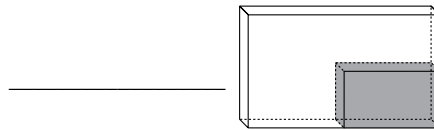
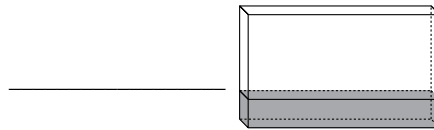


The figure **above** shows a box that contains a material that could be a solid, a liquid or a gas. The material is then put into a box four times as large.



Look at the figures **below**. They show how the different types of material will look when put into the larger box.

- A. Identify which figure shows a solid, which shows a liquid and which shows a gas. (Write the word *solid*, *liquid* or *gas* on the line next to each figure below. Use each word only once.)

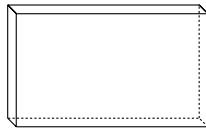


- B. Explain your answers.

Item Number: S031372A

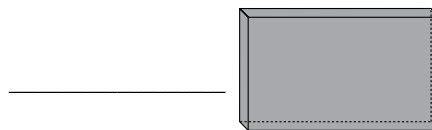
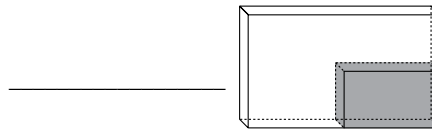
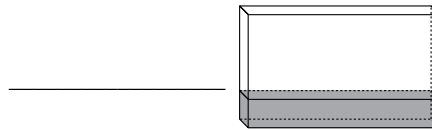


The figure **above** shows a box that contains a material that could be a solid, a liquid or a gas. The material is then put into a box four times as large.



Look at the figures **below**. They show how the different types of material will look when put into the larger box.

- A. Identify which figure shows a solid, which shows a liquid and which shows a gas. (Write the word *solid*, *liquid* or *gas* on the line next to each figure below. Use each word only once.)



- B. Explain your answers.

Item Number: S031372B

A closed glass bottle filled with water was left in the freezer overnight.
In the morning the glass was found broken.

Why did freezing the water cause the bottle to break?

Item Number: S031005