



AI TONG SCHOOL
2021 PRELIMINARY EXAMINATION
PRIMARY SIX SCIENCE
(BOOKLET A)
24 AUGUST 2021

Total time for booklets A and B : 1 h 45 min

INSTRUCTIONS

Do not turn over this page until you are told to do so.

Follow all instructions carefully.

Answer all questions.

Name : _____ ()

Class : Primary 6 _____

Parent's Signature : _____

Booklet A	56
Booklet B	44
Total	100

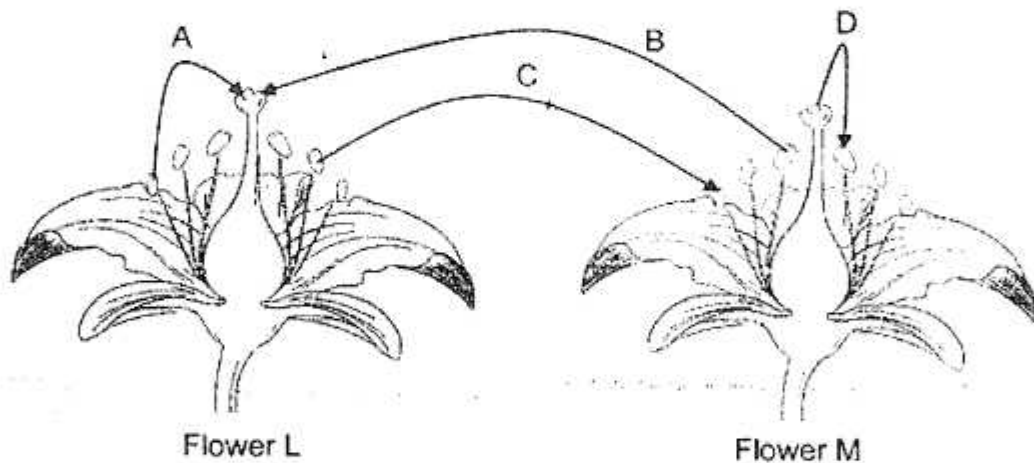
Section A (28 x 2 marks)

For each question from 1 to 28, four options are given. One of them is the correct answer. Make your choice and shade the correct oval (1, 2, 3 or 4) on the Optical Answer Sheet.

1. Which one of the following characteristics is used to distinguish birds from other animals?

- (1) Method of breathing
- (2) Method of reproduction
- (3) Type of body coverings
- (4) Number of stages in their life cycle

2. The diagram below shows two flowers, L and M, from the same plant.



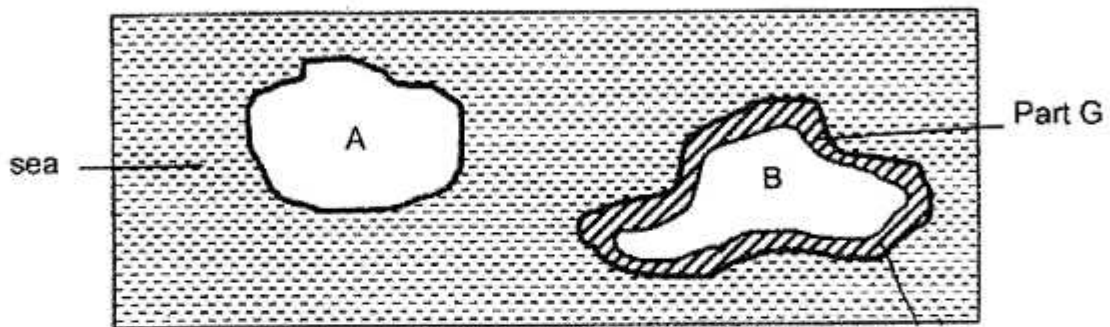
Which of the following correctly represents the process of pollination?

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

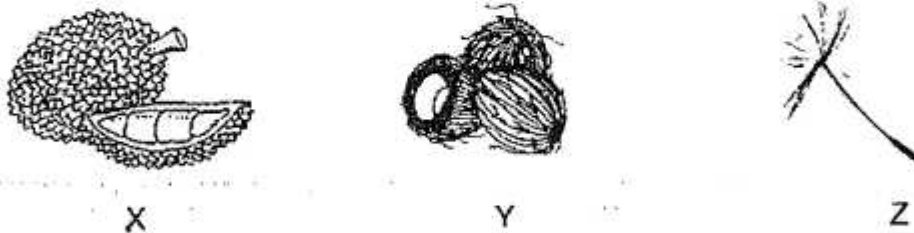
3. Which one of the following statements about all life cycles of living things is true?

- (1) All life cycles have 4 stages.
- (2) All life cycles come to an end.
- (3) All life cycles begin with a seed.
- (4) All life cycles take different amount of time to complete.

4. The diagram below shows two islands, A and B. Island A has plants but no animals while island B has no plants and animals.



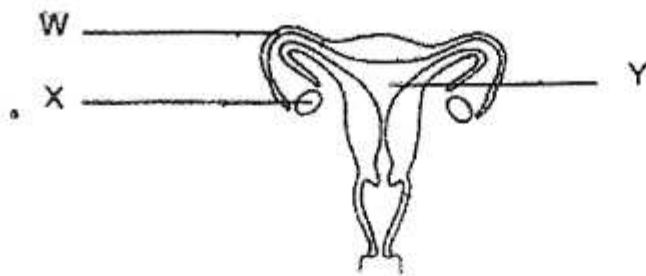
The diagram below shows three fruits, X, Y and Z, found on island A.



One year later, island B started to have plants growing in part G of the island.
Which of the following plant(s) is/are most likely to be found on part G of Island B?

- (1) Plant of fruit X only
- (2) Plant of fruit Y only
- (3) Plants of fruits Y and Z only
- (4) Plants of fruits X, Y and Z

5. The diagram below shows the female human reproductive system.



Which of the following statement (s) is/are correct ?

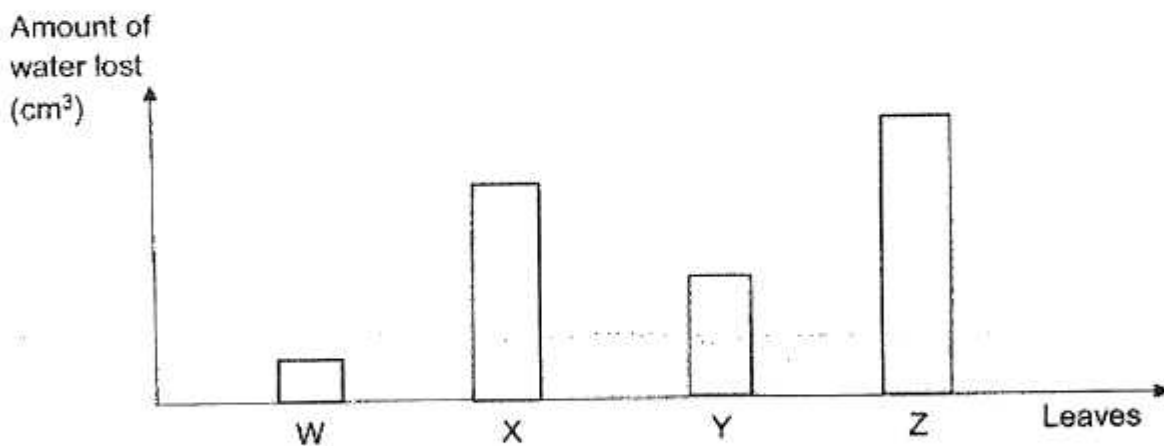
- A Eggs are produced in W.
 - B The fertilised egg will develop in Y.
 - C X releases the eggs needed for fertilisation to take place.
- (1) A only
(2) B only
(3) A and C only
(4) B and C only

6. Su Ling set up an experiment using four similar leaves, W, X, Y and Z, from the same plant. The leaves have stomata which are found on both the upper and the lower surfaces and water is lost through them.

Su Ling applied oil on some parts of the leaves as shown in the table below.

Leaves	Coated with oil	
	Upper surface of leaf	Lower surface of leaf
W	Yes	Yes
X	Yes	No
Y	No	Yes
Z	No	No

Su Ling placed the plant under the sun for eight hours and measured the amount of water lost through the leaves during this period. The results are shown in the graph below.



Based on the results shown in the graph above, what can Su Ling conclude about the stomata on the leaves ?

- (1) There are equal number of stomata on both surfaces of the leaf.
- (2) The number of stomata on a leaf does not affect the amount of water lost.
- (3) There are more stomata on the upper surface than the lower surface of the leaf.
- (4) There are more stomata on the lower surface than the upper surface of the leaf.

7. Four boys made the following statements about the transport of substances in plants and humans.

Andy Food is transported by food-carrying tubes in plants and digested food is transported by blood vessels in humans.

Brian Minerals are transported in the blood of the human and in food-carrying tubes in plants.

Cody The water-carrying tubes in plants and blood vessels in human only transport water.

Dean The transport of substances in plants and humans only takes place in one direction.

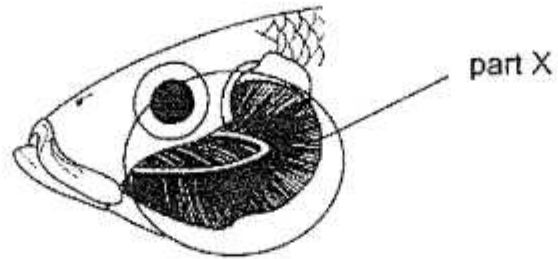
Which boy(s) is/are correct ?

- (1) Andy only
- (2) Andy and Brian only
- (3) Brian and Cody only
- (4) Brian, Cody and Dean only

8. Our different body systems are made up of different body parts. Which of the following parts have been correctly classified?

	Respiratory System	Circulatory System	Digestive System
(1)	Nose	Blood vessels	Womb
(2)	Windpipe	Heart	Large intestine
(3)	Mouth	Lungs	Stomach
(4)	Blood vessels	Blood	Gullet

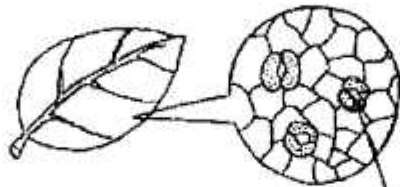
9. The diagram below shows part X of a fish.



Which of the following perform (s) a function similar to part X ?



A



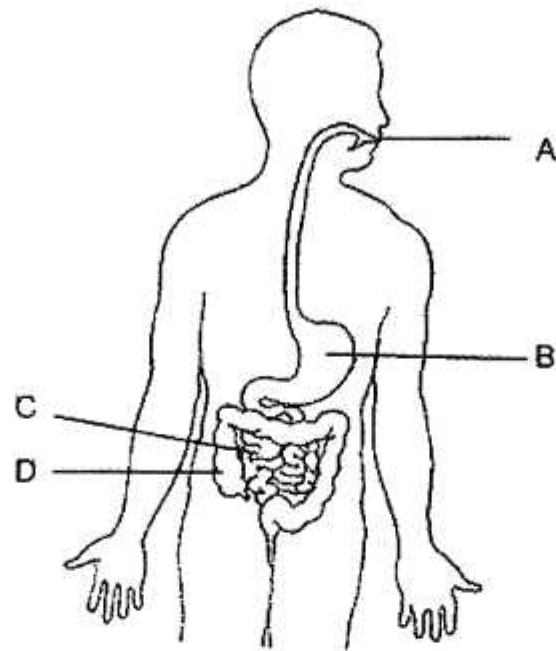
B



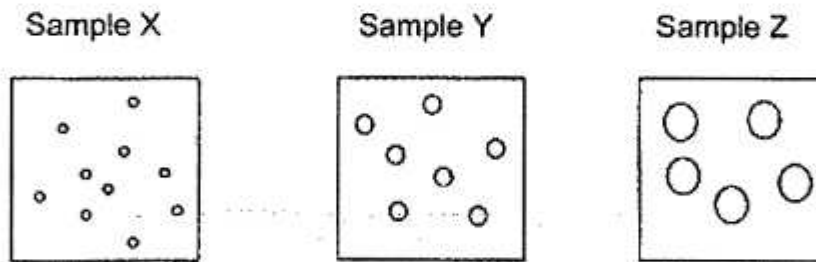
C

- (1) A only
- (2) C only
- (3) B and C only
- (4) A and C only

10. The diagram below shows the human digestive system.



Samples X, Y and Z are the same food taken from different parts of the digestive system. They show different degrees of digestion that have taken place.

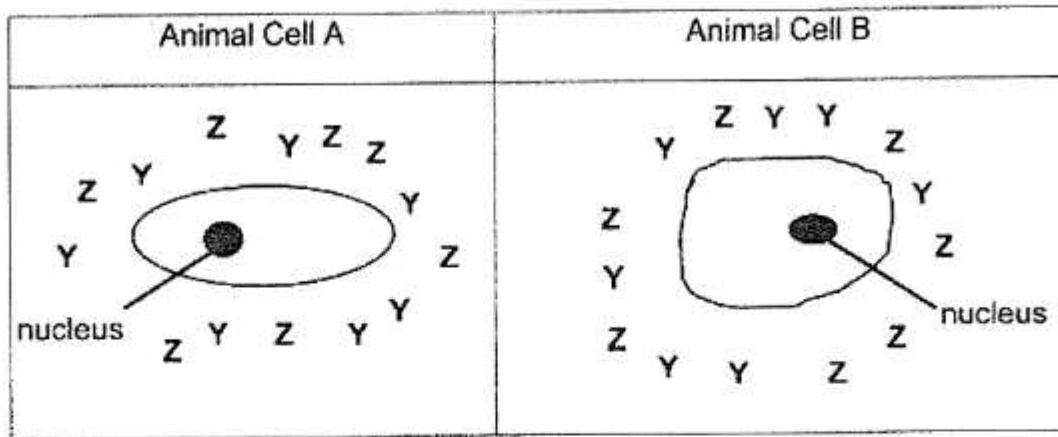


From which part of the digestive system could samples X, Y and Z be taken from?

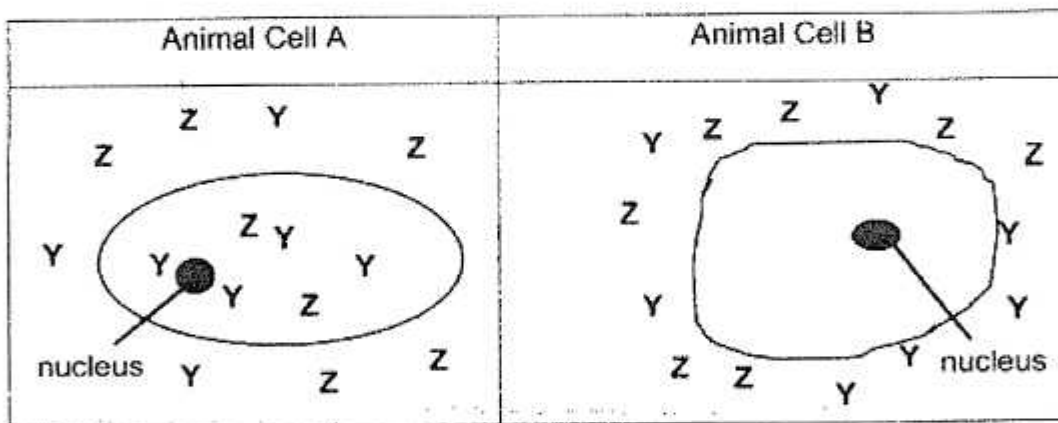
	Sample X	Sample Y	Sample Z
(1)	A	B	C
(2)	B	C	D
(3)	C	B	A
(4)	C	D	B

11. Ariel placed two animal cells A and B in two beakers of water with the same amount of dissolved substances, Y and Z, respectively.

Before the experiment



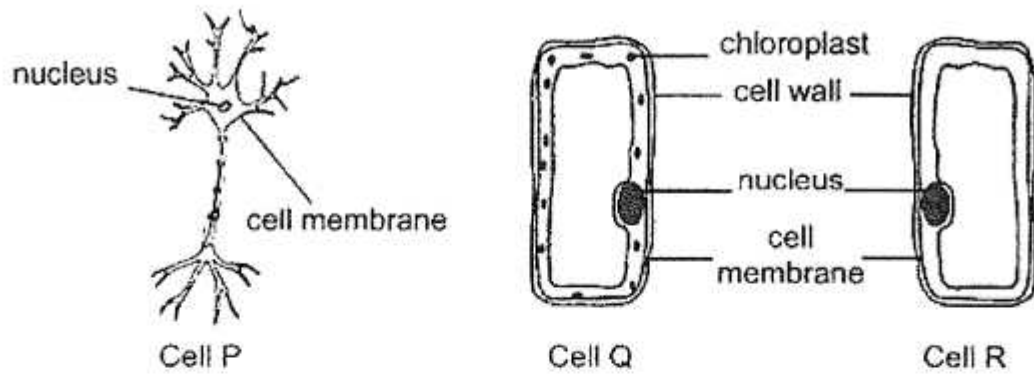
After the experiment



At the end of the experiment, both cells became bigger. Which one of the following correctly explains Ariel's observations ?

- (1) Cytoplasm of cell A allowed Y and Z to enter.
- (2) Cell membrane of cell B allowed water to enter.
- (3) Cell wall of cell B prevented Y and Z from entering.
- (4) Nucleus of cell A controlled the movement of Y and Z.

12. Fay observed three different cells, P, Q and R, under a microscope. She drew the cells and labelled parts of the cells.



Based on her observations, she made a few statements.

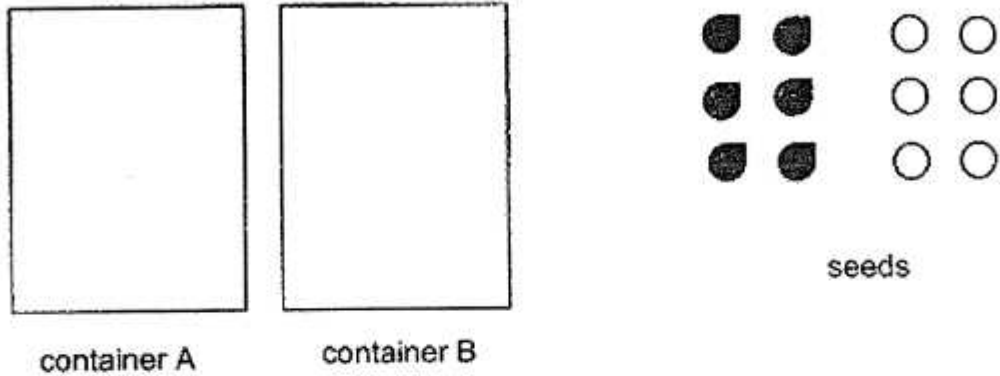
- A Cell P is most likely from an animal as it does not have a cell wall.
- B Cell R is not a plant cell as there is no chloroplast present.
- C Each nucleus of Cell P, Q and R contains genetic information.
- D Cells P and R need oxygen, food and water to survive but Cell Q does not as it can make its own food.

Which of the above statements is/are wrong ?

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

13. Melvin had two different containers, A and B to germinate two different types of seeds at the same location. He wanted to find out which water sample P or Q would result in seeds germinating faster.

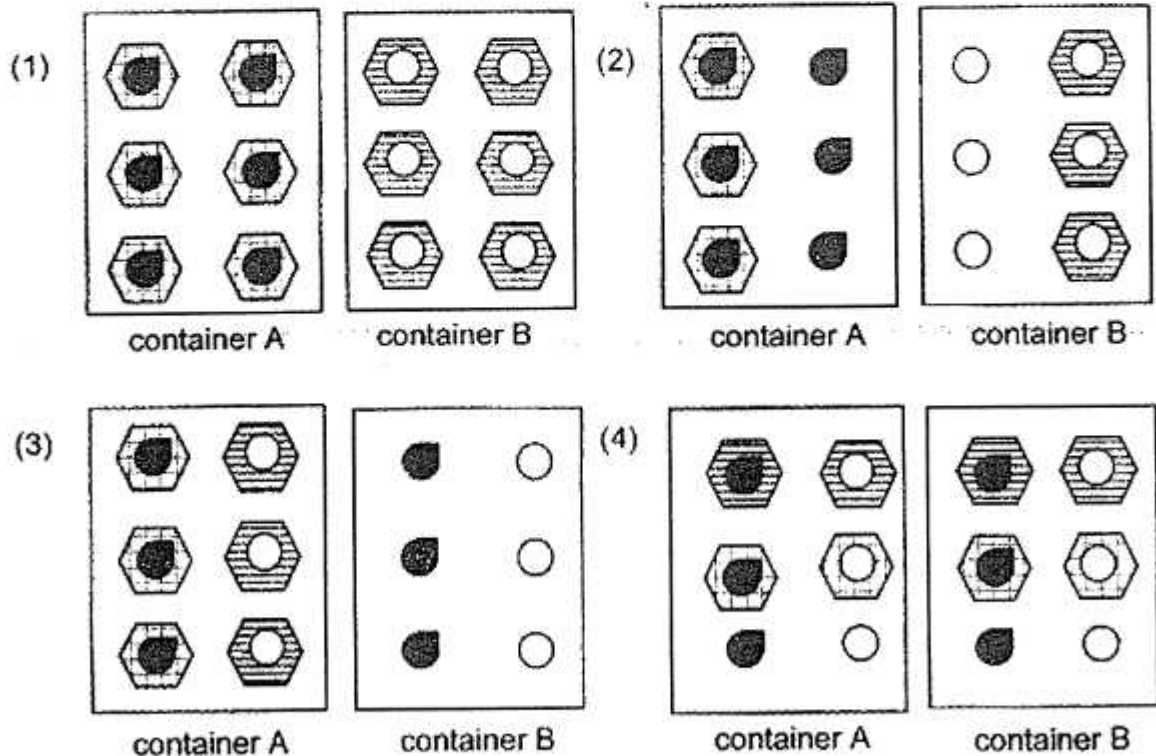
The containers and seeds are shown below.



He poured 5ml of water samples P and Q onto cotton wool as shown below



Which of the arrangements should he choose to carry out his experiment?



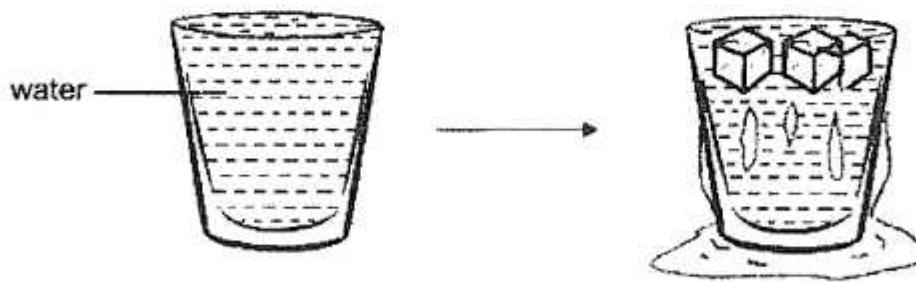
14. Amin studied the characteristics of four animals, L, M, N and O, and recorded them in the table below.

Animal	Does it lay eggs ?	Does it have a three-stage life cycle?	Does it live both on land and in water?
L	Yes	No	No
M	No	Yes	No
N	Yes	No	No
O	Yes	Yes	Yes

Which of the following correctly represents the four animals, L, M, N and O ?

	L	M	N	O
(1)	frog	mosquito	rabbit	butterfly
(2)	mosquito	rabbit	butterfly	frog
(3)	butterfly	mosquito	frog	rabbit
(4)	rabbit	butterfly	mosquito	frog

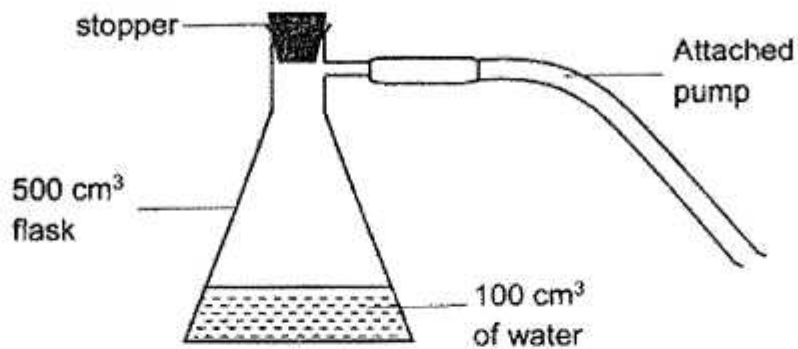
15. Sam filled a glass with water to the brim. When he placed some ice cubes into the glass of water as shown below, he observed that the water overflowed.



Which of the following best explain Sam's observation?

- (1) Ice takes up space.
- (2) Ice has a definite shape.
- (3) Water has no definite volume.
- (4) Water exists in three different states.

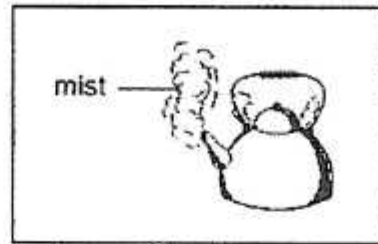
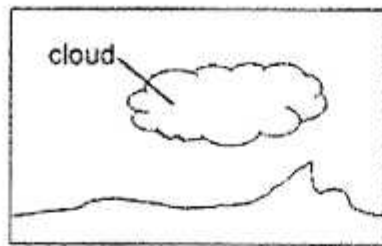
16. Kylie poured 100 cm^3 of water into a 500 cm^3 flask and sealed it as shown in the diagram below. She then used the attached pump to draw out 150 cm^3 of air from the container.



Which of the following statements is/are true of the set-up at the end of her activity?

- A The water level will increase.
 - B 250 cm^3 of air is left in the flask.
 - C Some water took the space of the air that was drawn out.
 - D The volume of air inside the flask remains the same as before.
- (1) B only
(2) D only
(3) A and B only
(4) B and C only

17. Study the two diagrams below carefully.

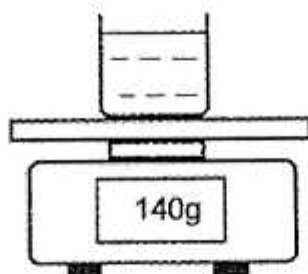


How are the clouds in the sky and the mist formed around the spout of a kettle of boiling water similar?

- A Both are made of water vapour.
- B Both are made of water droplets.
- C Both are formed by the evaporation of water.
- D Both are formed because of a change in state when heat was lost to surrounding air.

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

18. Muthu conducted an experiment by placing two glass beakers each containing 100 ml of water on a balance in the science room. The set-up is shown below.



He measured the volume of water remaining in each beaker after 15 minutes. His results are shown below.

Beaker	Temperature ($^{\circ}\text{C}$)	Volume of water remaining (ml)	Reading on the balance (g)
1	<i>J</i>	97	137
2	2	99.5	<i>K</i>

Which are the possible values of *J* and *K* ?

	<i>J</i>	<i>K</i>
(1)	10	139
(2)	95	139
(3)	10	145
(4)	95	145

19. Substance *W* is a solid at 90°C and a gas at 500°C .

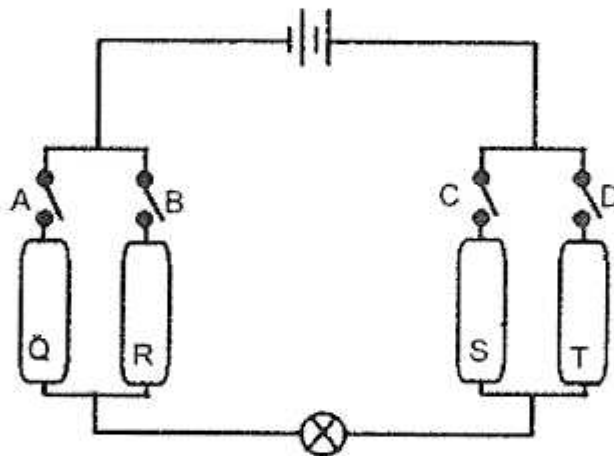
Which of the following is possible ?

	Melting point of <i>W</i> ($^{\circ}\text{C}$)	Boiling point of <i>W</i> ($^{\circ}\text{C}$)
(1)	80	480
(2)	80	510
(3)	150	480
(4)	150	510

20. Max has two batteries, two bulbs and some wires to light up a lantern. Which of the following ways of connecting the components will give him the brightest lantern ?

	Number of batteries in series	Arrangement of bulbs
(1)	1	Series
(2)	2	Series
(3)	1	Parallel
(4)	2	Parallel

21. Jane set up the following circuit. She wanted to find out which of the rods, Q, R, S and /or T are conductors of electricity.



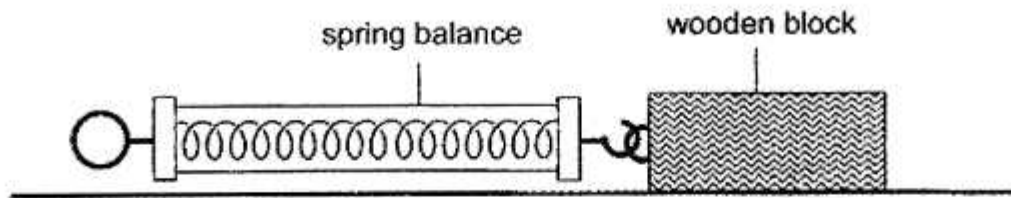
The table below shows what happened to the bulb when she closed different pairs of switches.

Switches closed	Result
A and C	Bulb does not light up
A and D	Bulb lights up

Which pair of switches must she close next ?

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

22. A spring balance is used to pull a wooden block over a surface.

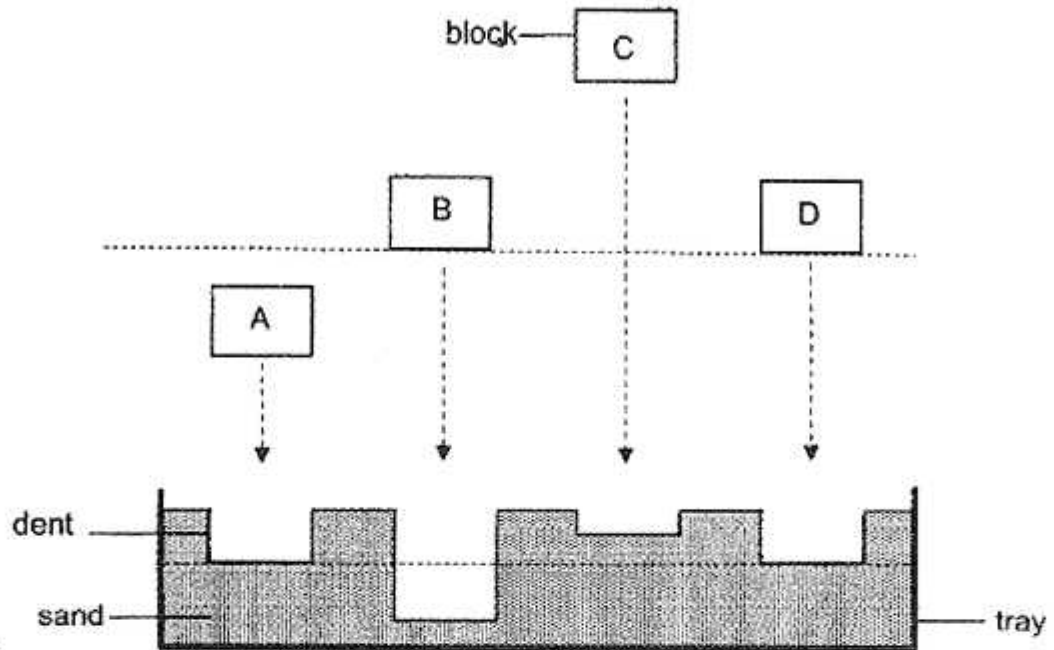


Which of the following will affect the amount of force needed to pull the wooden block ?

- A mass of the wooden block
- B type of surfaces in contact
- C the length of the spring in the spring balance
- D the size of exposed surface area of the wood block

- (1) A and B only
- (2) B and C only
- (3) A, C and D only
- (4) All of the above.

23. Sindy dropped four blocks, A, B, C and D, of the same size but made of different materials, into a tray of sand from the different heights as shown below.

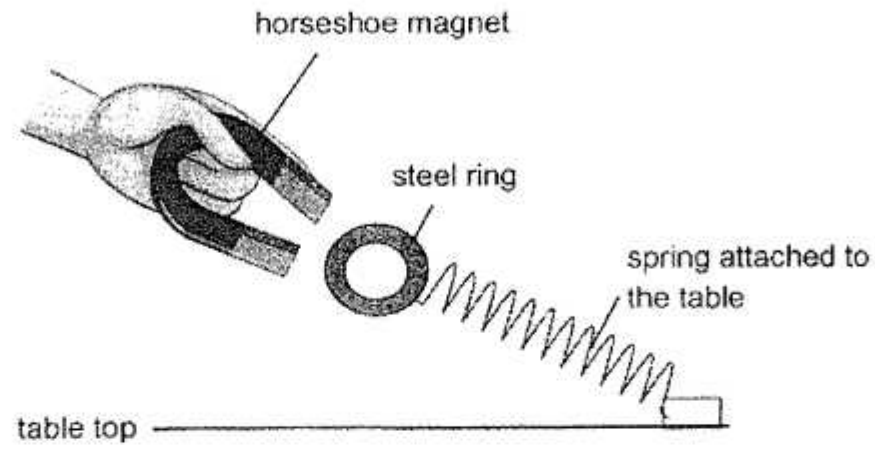


Sindy observed the dents made by the four blocks.

Based on Sindy's results above, arrange the possible weight of the four blocks from the lightest to the heaviest.

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

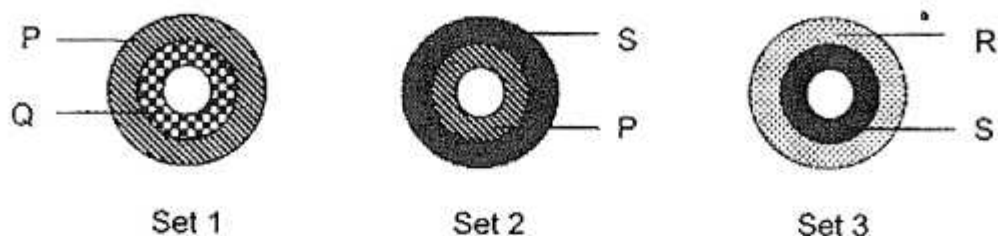
24. Study the experiment below.



What are the direction of forces acting on the steel ring ?

	Elastic spring force	Gravitational force	Magnetic force
(1)			
(2)			
(3)			
(4)			

25. Four different types of metals, P, Q, R and S, were used to make three sets of rings as shown below. All the sets of rings were similar in size.



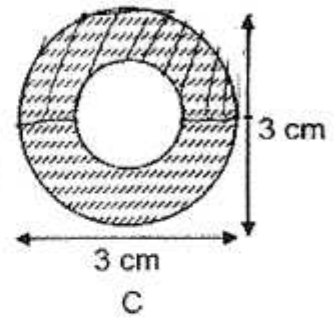
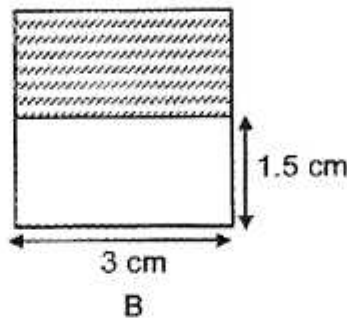
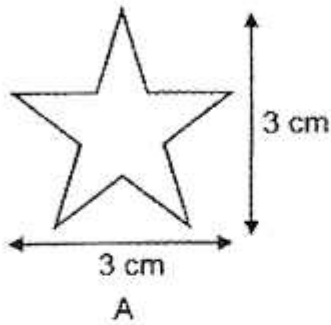
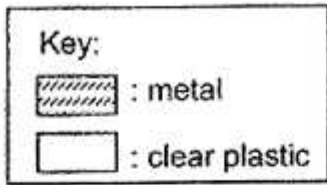
At 25°C, the inner ring of each set fits exactly into the outer ring. After heating the 3 sets of rings to about 60°C, the observations were recorded in the table below.

Observations at 60°C		
Set 1	Set 2	Set 3
Ring Q fell out of Ring P.	Ring P fell out of Ring S	Ring S could not be pulled out of Ring R.

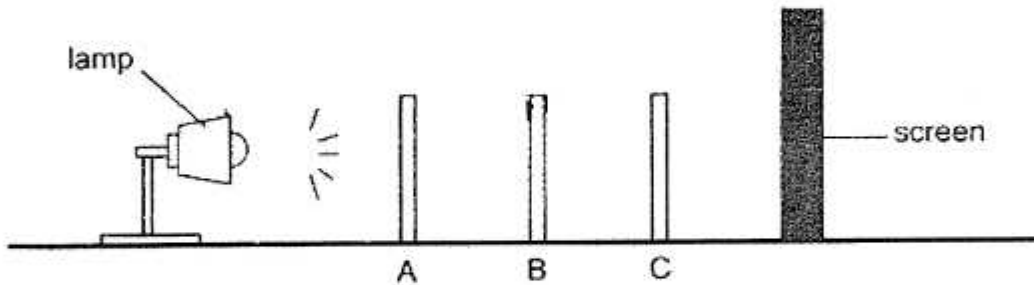
Based on the observations above, which one of the following is true about the metals ?

- (1) Metal Q expanded the most.
- (2) Metal R expanded the least.
- (3) Metal P expanded more than Metals S and R.
- (4) Metal S expanded more than Metals P and Q.

26. The diagrams below show three objects, A, B and C, made out of clear plastic and/or metal. They are of the same height and width.



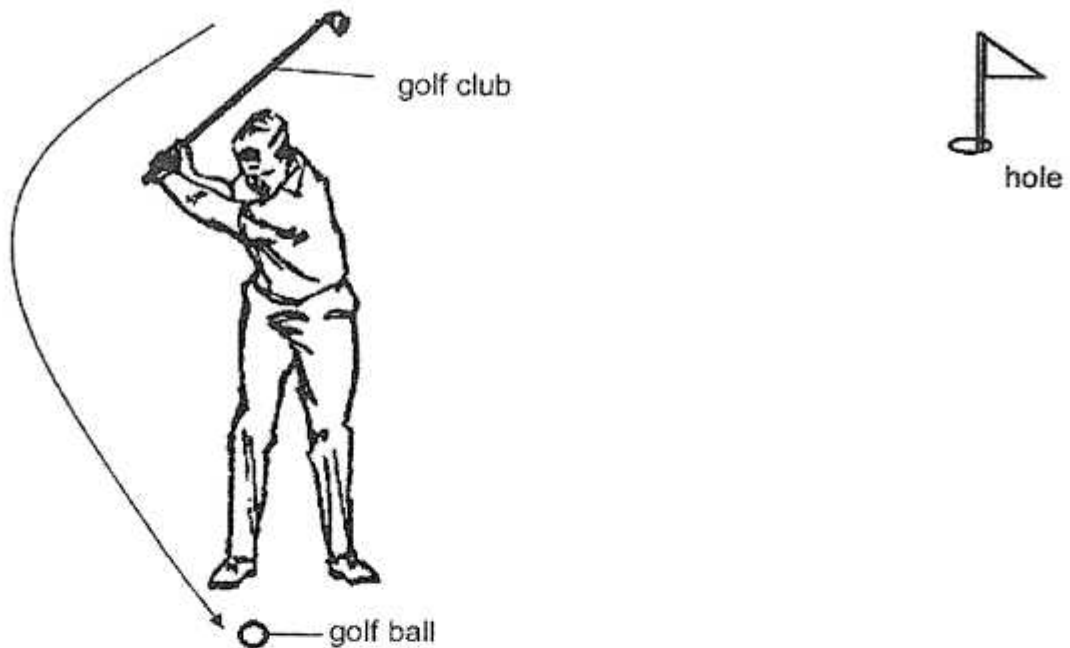
The three objects were arranged between a lamp and a screen as shown below.



Which one of the following shadows will most likely be cast on the screen ?



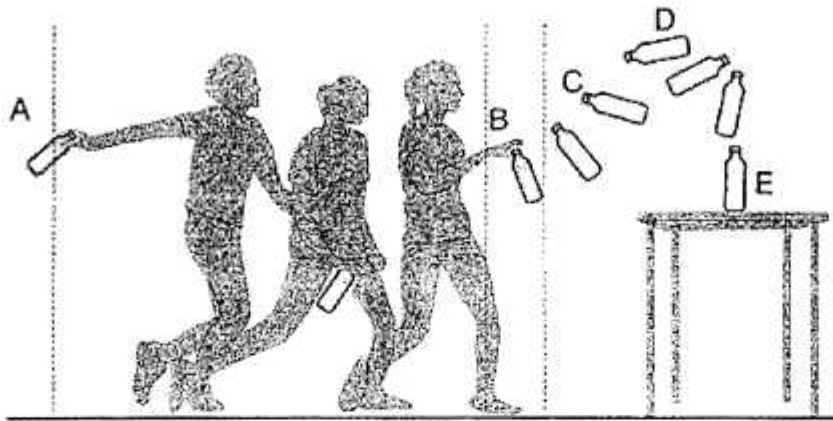
- 27. Mr Tham is about to swing his golf club down to hit the golf ball into the hole.



Which of the following shows the conversion of energy that will take place as he swings the golf club down to hit the golf ball into the hole ?

- (1) Kinetic energy of golf club \rightarrow gravitational potential energy of golf ball \rightarrow kinetic energy of golf ball \rightarrow sound energy of golf ball when it is hit
- (2) Kinetic energy of golf club \rightarrow sound energy of golf club when it hits the golf ball + gravitational potential energy of golf ball
- (3) Gravitational potential energy of golf club \rightarrow kinetic energy of golf club \rightarrow sound energy of golf club when it hits the golf ball + kinetic energy of golf ball
- (4) Gravitational potential energy of golf club \rightarrow sound energy of golf club when it hits the golf ball + heat energy \rightarrow kinetic energy of golf ball

- 28 Sasha swung a water bottle containing some water from point A and released it at point B. The bottle passed points C and D and finally to point E.



Which of the following statement is correct?

- (1) There is no gravitational force acting on the bottle at E.
- (2) Gravitational force acting on the bottle is greatest at D.
- (3) The amount of kinetic energy of the bottle is less at C than D.
- (4) The amount of potential energy of the bottle decreases from D to E.

End of Booklet A



AI TONG SCHOOL

2021 PRELIMINARY EXAMINATION PRIMARY SIX SCIENCE

(BOOKLET B)

24 AUGUST 2021

Total time for booklets A and B : 1 h 45 min

INSTRUCTIONS

Do not turn over this page until you are told to do so.

Follow all instructions carefully.

Answer all questions.

Write your answers in this booklet.

Name : _____ ()

Class : Primary _____

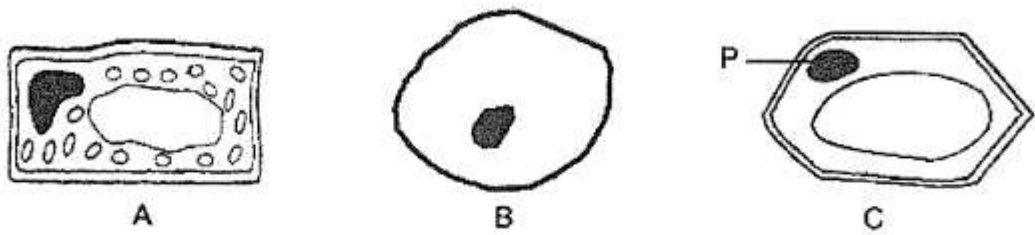
Parent's Signature : _____

Booklet B	44
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Section B: 44 marks

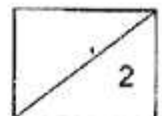
Read the questions carefully and write down your answers in the spaces provided.

29. The diagrams below show three cells.

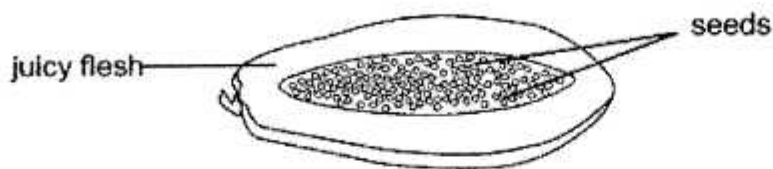


(a) Which cell(s) is/are unable to produce oxygen? Explain your answer. [1]

(b) When part P of cell C was removed, the cell died after some time. Explain why the cell died. [1]



30. The diagram below shows a fruit of plant P that was cut into half. It has small and hard seeds which are surrounded by juicy flesh.



- (a) Based on the diagram, state the method of dispersal of seeds for this fruit. [1]

- (b) Explain how having small and hard seeds help in the dispersal of seeds. [1]

The fruit of plant Y has a hard shell and its seeds are a source of food for some animals.



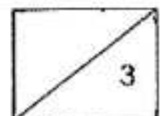
animal S



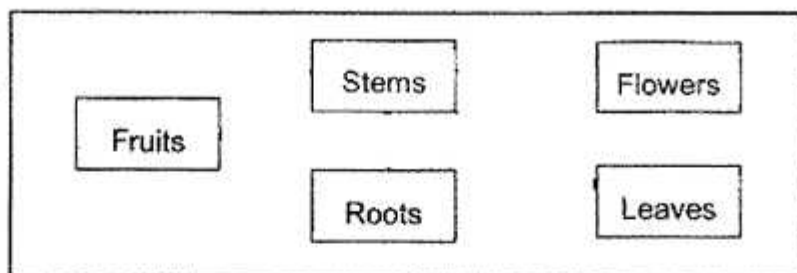
fruit of plant Y

Animal S has the habit of burying each seed separately in a different place. Sometimes, animal S forgets where it has buried all the seeds.

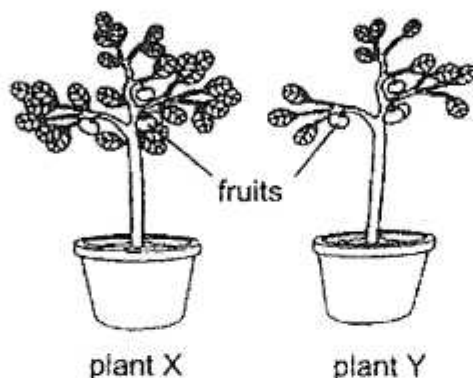
- (c) State one advantage for plant Y when animal S buries each seed in a different place. [1]



31(a) Draw arrows (→) in the diagram below to show the transport of water in plants. [1]



Kelly wanted to carry out an experiment. She chose two similar plants, X and Y, and removed some leaves from plant Y. Both plants have the same number of fruits. The plants were placed next to an open window and watered daily.



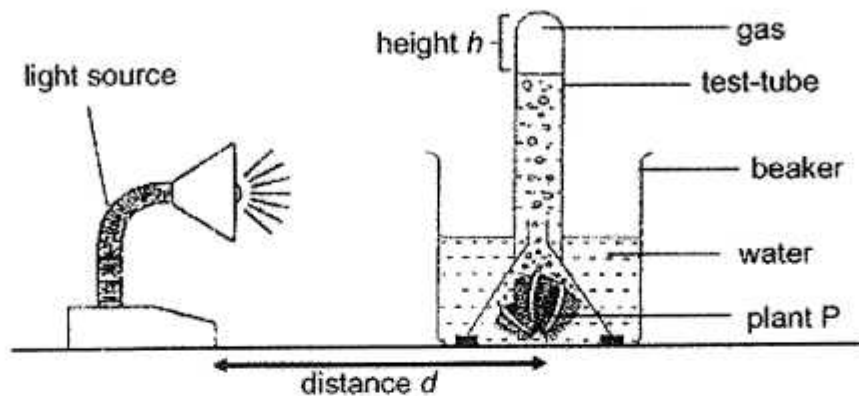
She recorded the total mass of the fruits on plant X and plant Y at the start of the experiment and after one week. The total mass of the fruits on each plant is shown in the table below.

Plant	Total mass of fruits (g)	
	Start of the Experiment	After One Week
X	12	22
Y	12	17

(b) What is the aim of her experiment? [1]

(c) At the end of one week, the total mass of the fruits from plants X and Y were different. Explain why. [1]

32. Maddy carried out an experiment in a dark room. She shone a light source at plant P for 30 minutes. She measured the height (h) of the gas collected in the test-tube after 30 minutes. She repeated the experiment by changing the distance of light from plant P (d) in the set-up.



The table below shows the results of her experiment.

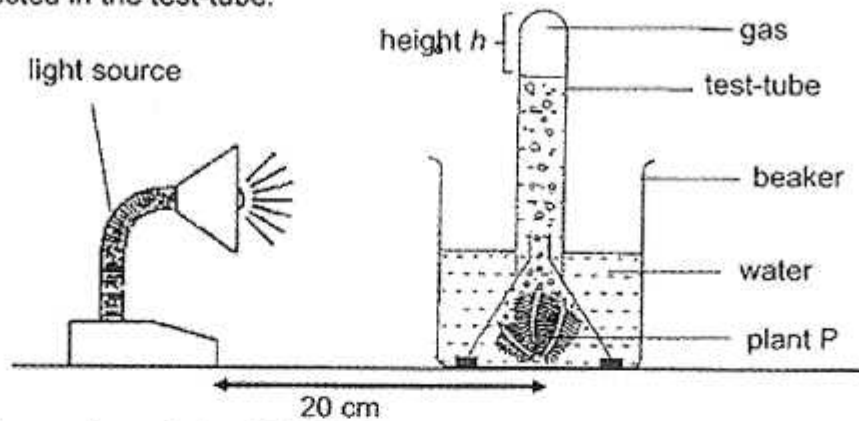
Distance of light from plant P d (cm)	Height of gas collected h (cm)
30	0.8
25	1.5
20	2.2
15	2.8
10	3.3

- (a) Based on the results, state the relationship between distance of light from plant P and the height of gas collected in the test-tube. [1]

- (b) Explain your answer in part (a). [1]

Question continues on the next page.

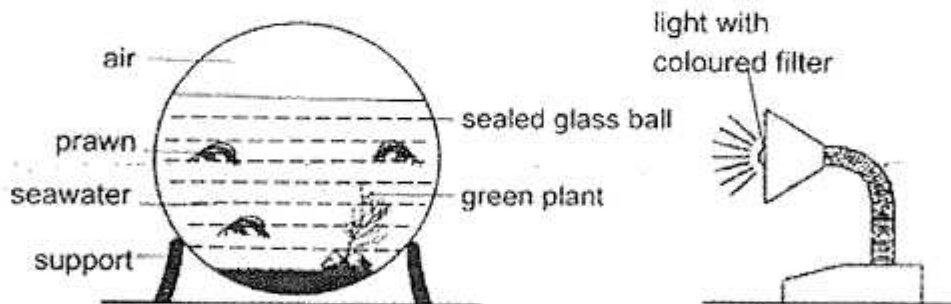
Maddy repeated her experiment with different coloured filter lights, A, B and C. She fixed the distance between the set-up and the light source at 20 cm and observed the height (h) of gas collected in the test-tube.



Maddy's results are shown in the table below.

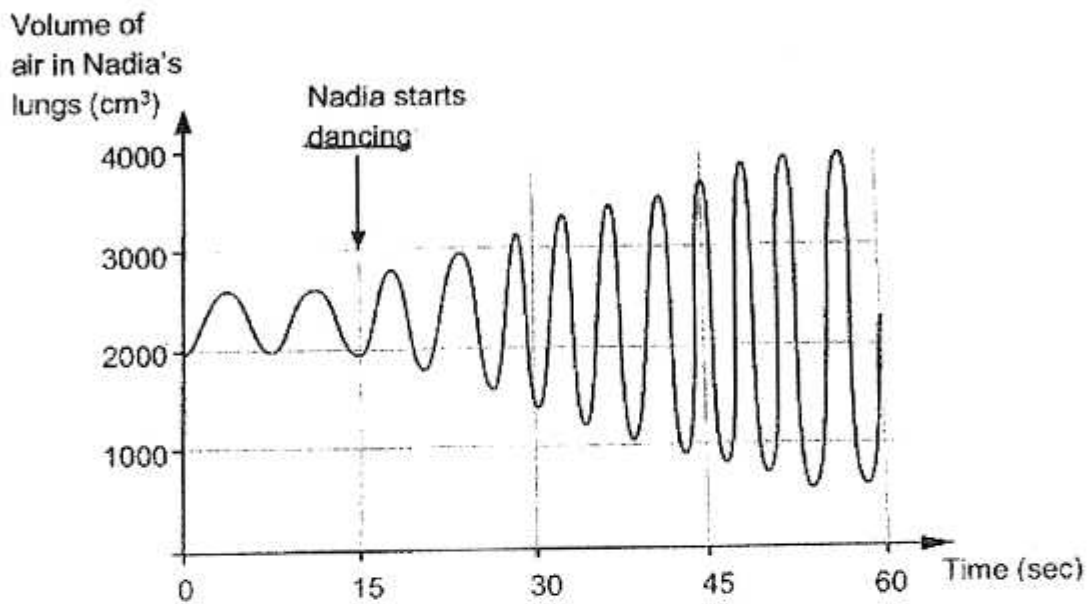
Coloured filter	Distance of light from plant P (cm)	Height of gas collected h (cm)
A	20	1.8
B	20	3.5
C	20	0.6

Maddy has an ecosphere. It is a sealed glass ball containing sea water, green plant and some prawns. As there is no air pump attached, Maddy decides to shine light with coloured filter on her ecosphere.



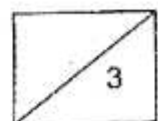
- (c) Which coloured filter, A, B or C is the most suitable to ensure that organisms in the ecosphere continue to survive for the longest period of time? Explain your answer. [2]

33. Nadia is a dancer. As she dances, her breathing changes. The graph below shows how the volume of air in her lungs changes when she dances.



- (a) Based on the graph, state how Nadia's breathing changes when she dances. [1]

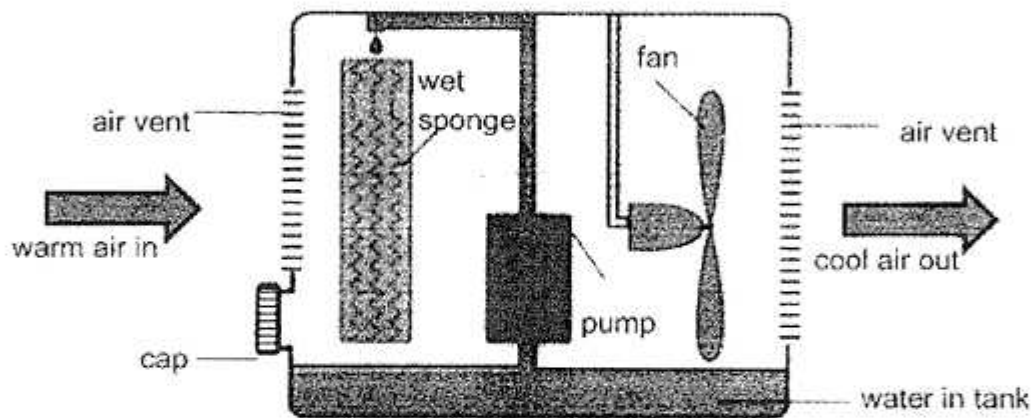
- (b) Nadia's muscle cells produce carbon dioxide as she dances. How is carbon dioxide removed from her body? [2]



34. Mr Tan bought an air cooler.



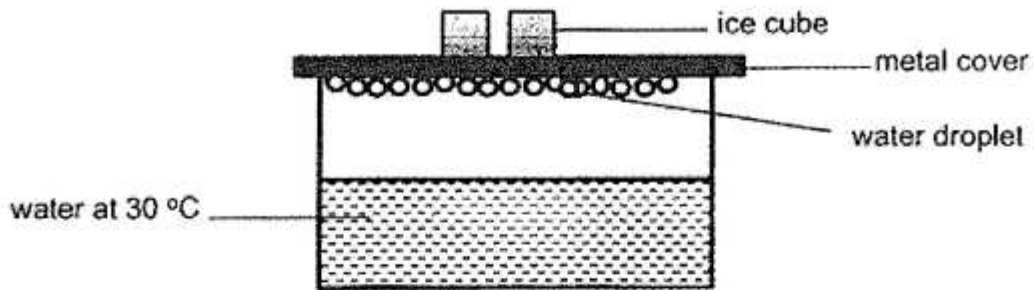
The diagram below shows how the air cooler looks like inside. The pump inside would draw water from the tank which is filled with water. The water would drip onto the wet sponge. When the cooler is turned on, air passes through the wet sponge and cool air would be blown out of the air vent.



(a) Explain how the wet sponge helps to produce cool air. [2]

(b) Without changing the location and speed of the fan, how can Mr Tan [1]

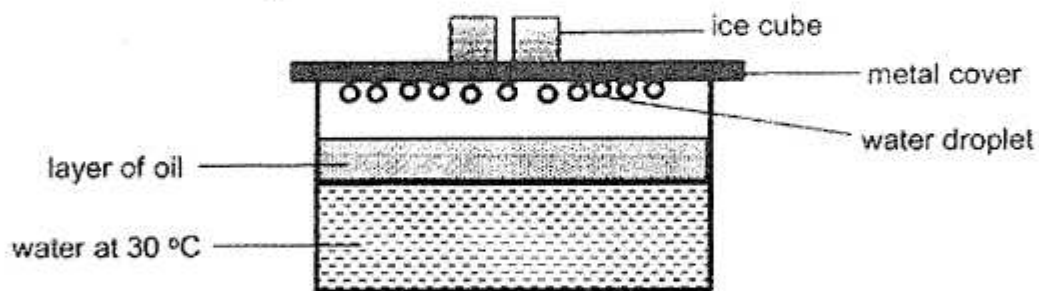
35. Sonia set up an experiment below.



Set-up A

- (a) Water droplets were observed to be formed faster on the underside of the metal cover when ice cubes were added to set-up A. Explain why. [1]

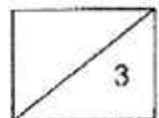
Sonia poured oil into a similar set-up B as shown below.



Set-up B

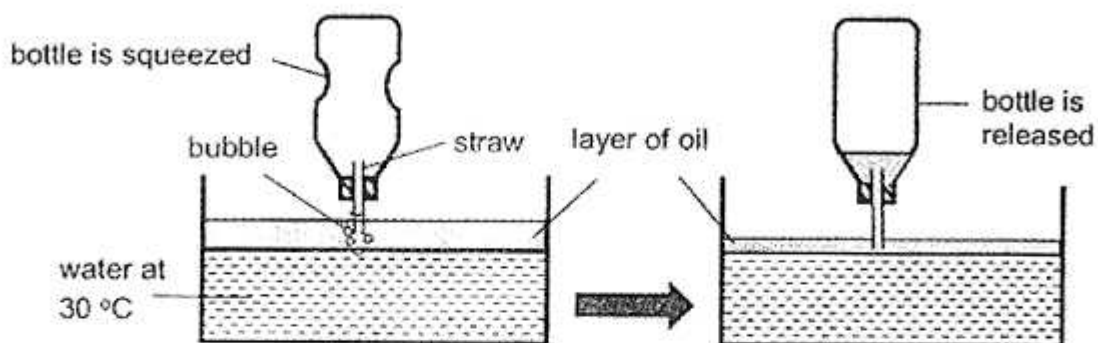
- (b) Explain why less water droplets are formed on the underside of the metal cover in Set-up B. [2]

Question continues on the next page.

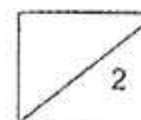


- After the experiment, Sonia wanted to remove the layer of oil from set-up B. She made a gadget with a plastic squeeze bottle and a straw to suck up the oil.

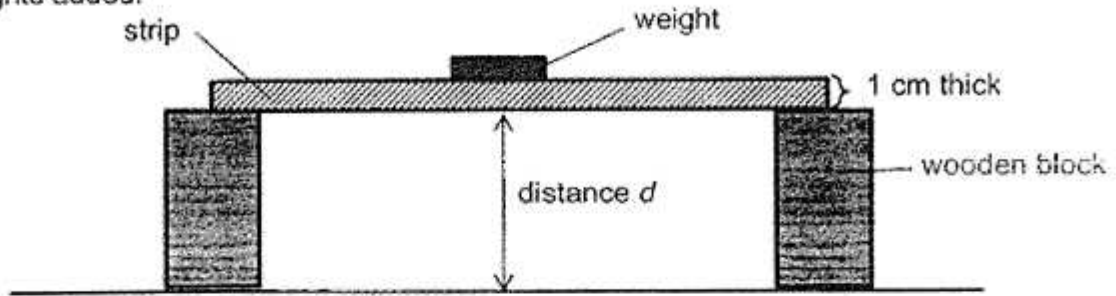
Sonia squeezed the plastic bottle and then she released it again.



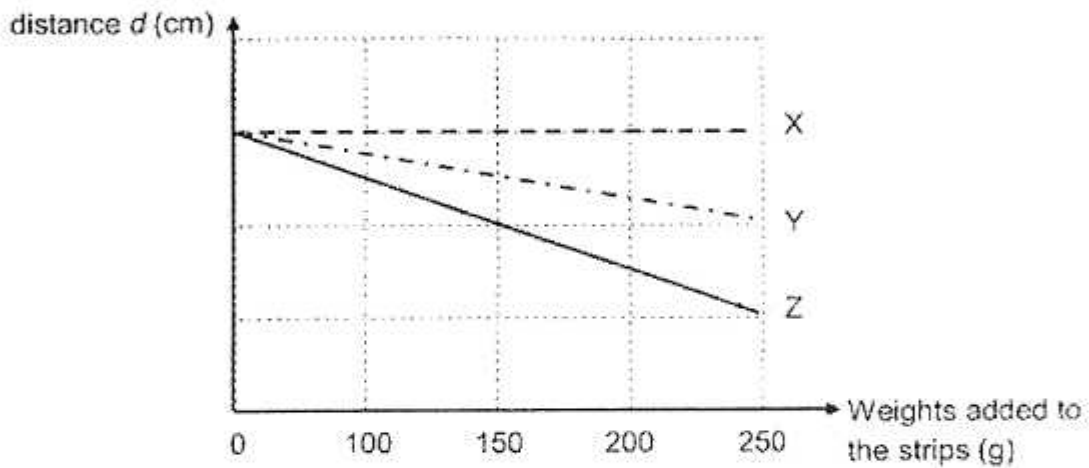
- (c) Explain how squeezing and releasing the bottle helped Sonia to remove some oil. [2]



36. Henry set up an experiment as shown below with three strips, X, Y and Z, which are made of different materials. The strips are of the same length and same thickness of 1cm. He added different weights to the strips and measured the distance d for each weights added.



He recorded his results in a graph shown below.

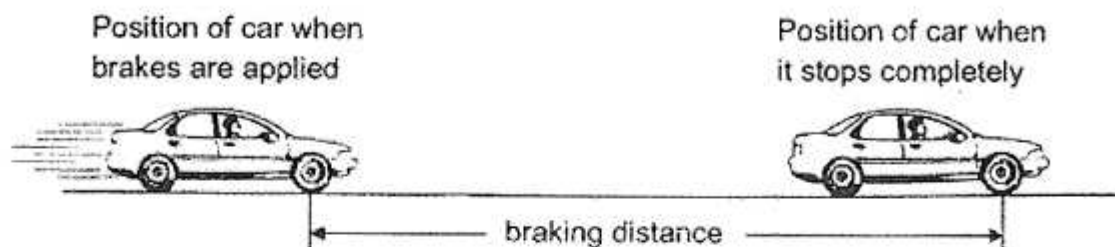


- (a) State a physical property of the strips that is tested using this experiment set-up [1]

- (b) Based on Henry's results, which material is most suitable to make a food tray to be used in a food court? Explain your choice. [1]

- (c) Henry repeated the experiment with thicker strips of X, Y and A. How would distance d be affected with the different amount of weights added on the strips? [1]

37. The diagram below shows the braking distance of a car. The braking distance is the distance travelled by a car from the point when the brakes are applied to when the car comes to a complete stop.

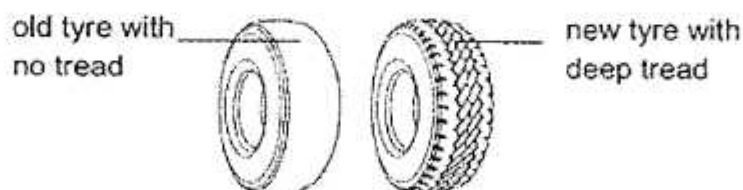


The table below shows the braking distance of the car on different types of road surface.

Type of road surface	Braking distance (m)	
	Dry road	Wet road
A	20	22
B	17	20
C	16	19

- (a) Explain why the braking distance are greater for all the three types of road surfaces on a rainy day. [1]

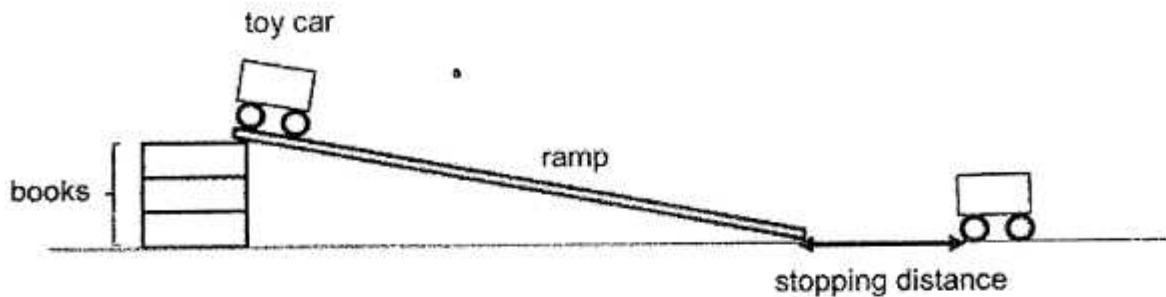
- (b) The diagram below shows two tyres



Explain what has happened to the tread in the old tyre. [1]

Question continues on the next page.

Yasmin carried out an investigation to find out if the height from which a toy car is released on the ramp affects the stopping distance of the toy car.



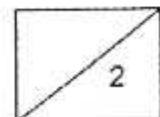
When she released the toy car at the top of the ramp, it travelled down to the bottom of the ramp. She measured how far the toy car moved. That is the stopping distance.

Yasmin repeated the investigation by changing the height of the ramp each time. She recorded her results in the table below.

Number of books used	Stopping distance of toy car (cm)
1	10
2	16
3	25
4	32

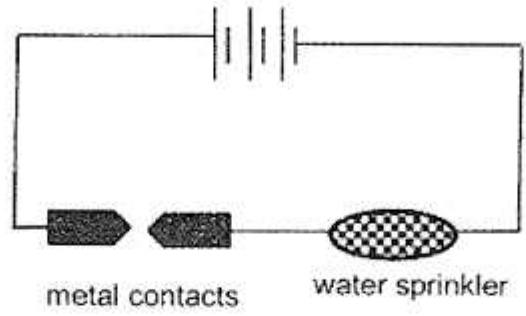
- (c) State two variables to be kept constant for this investigation. [1]

- (d) Suggest one improvement to the investigation to obtain more reliable results. Explain why this is necessary. [1]



38. The diagram below shows a fire sprinkler system. When a fire breaks out, the system will be activated. It will be switched on and water from the water sprinkler will be released to put out the fire.

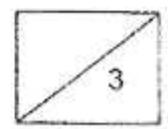
This system will only be switched on when the temperature of the surrounding air is higher than 60°C .



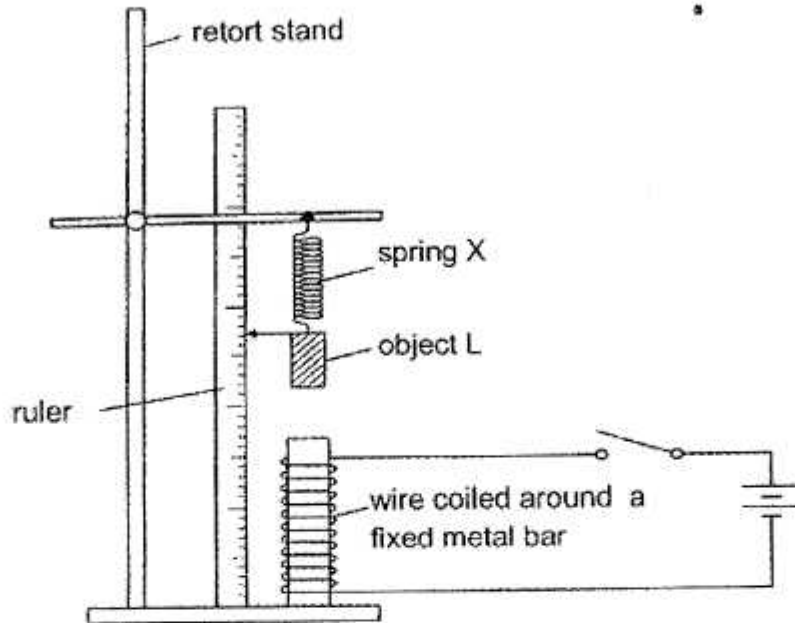
(a) Explain how the water sprinkler is switched on when a fire breaks out. [1]

(b) What would happen to the water sprinkler system when the temperature of the surrounding air is cooled down to below 60°C ? Explain your answer. [1]

(c) Suggest one change to the set-up so that the water sprinkler will be switched on when the temperature of the surrounding air reaches 55°C instead of 60°C . [1]



39. Raju carried out an investigation with object L as shown in the set-up shown below.



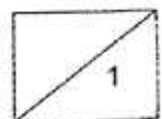
The table below shows the length of spring X when the switch was closed.

Length of the spring X when the switch was opened (cm)	Length of the spring X when the switch was closed (cm)
10	7.5

(a) State what object L is.

[1]

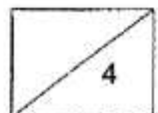
Question continues on the next page.



- (b) Explain why the length of spring X changed when the switch was closed. [2]

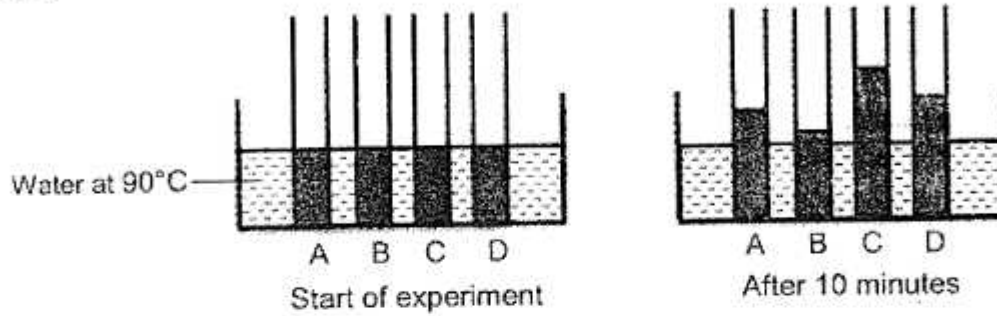
- (c) Raju repeated the investigation by replacing spring X with a stiffer spring Y of the same size and length. What is the most likely length of spring Y when the switch is closed? [1]

- (d) Give a reason for your answer in part (c). [1]



40. Kang Wei placed equal amount of different liquids A, B, C and D, into identical glass tubes. He then placed the glass tubes into a basin of hot water at 90°C as shown in the diagram below.

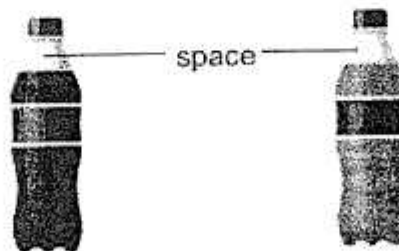
After ten minutes, Kang Wei observed that the liquids in each tube rose to different levels.



- (a) Explain why Kang Wei had to place equal amount of liquids in each glass tube at the start of his investigation. [1]

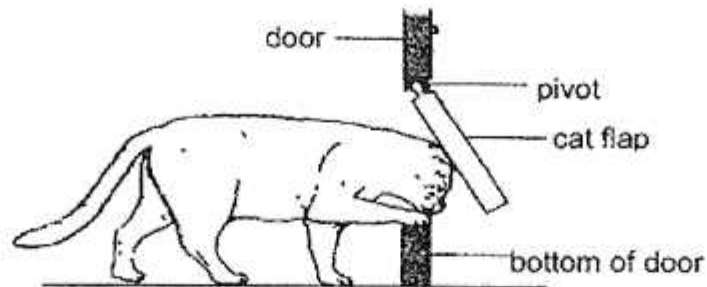
- (b) Based on the results above, what can Kang Wei conclude about his investigation? [1]

The diagram below shows some bottled drinks.

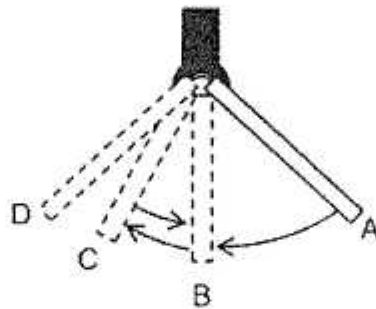


- (c) The drinks are not filled completely during packaging. Explain why this is important on a hot day. [1]

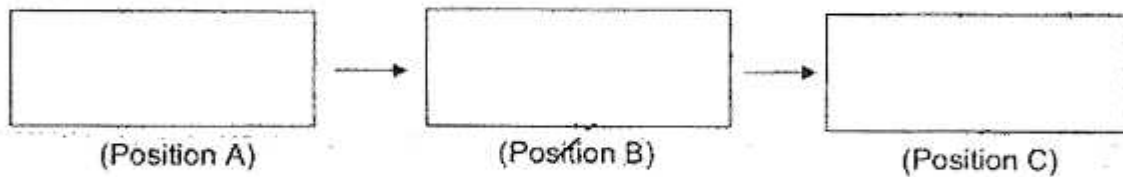
41. Mr Chin made a cat flap to allow his pet cat to go in and out of his house freely as shown in the diagram below. The cat uses its head to push the flap open.



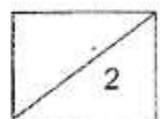
When the cat has gone through the cat flap, the flap swings from position A to position B, then to position C, before returning to position B.



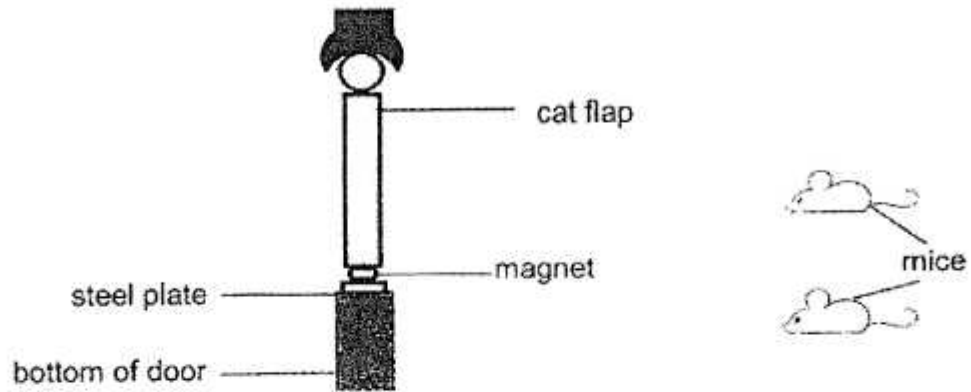
- (a) State the energy changes that occurred as the door flap swings from position A to position B to position C. [1]



- (b) Explain, in terms of energy conversion, why flap was not able to reach position D after the first swing. [1]



- (c) Mr Chin realised that the cat flap also allowed mice to enter his house. He decided to add a piece of magnet to the bottom of the cat flap and a piece of steel plate on the door as shown in the diagram below.



Explain, in terms of forces, why Mr Chin's cat is still able to move in and out of the house freely but not the mice. [1]

End of Booklet B

