METHODIST GIRLS' SCHOOL
Founded in 1887

PRELIMINARY EXAMINATION 2021
PRIMARY 6
SCIENCE

BOOKLET A

Total Time for Booklets A and B: 1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES
Do not turn over this page until you are told to do so.
Follow all instructions carefully.
Answer all questions.
Shade your answers in the Optical Answer Sheet (OAS) provided.

Name: _____ ( )

Class: Primary 6._____

Date : 24 August 2021

This booklet consists of 20 printed pages including this page.

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

[56 marks]

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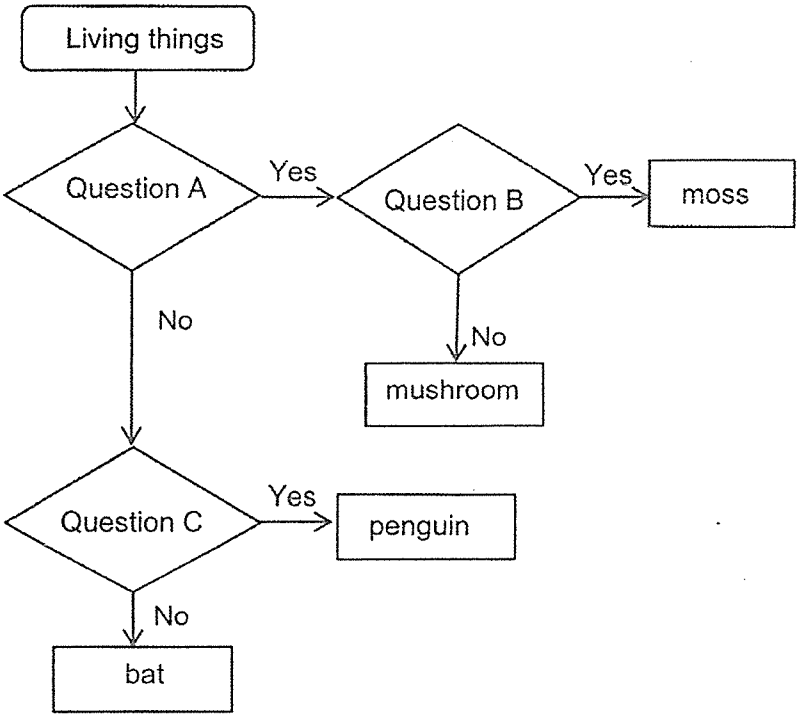
1 Study the flowchart below.

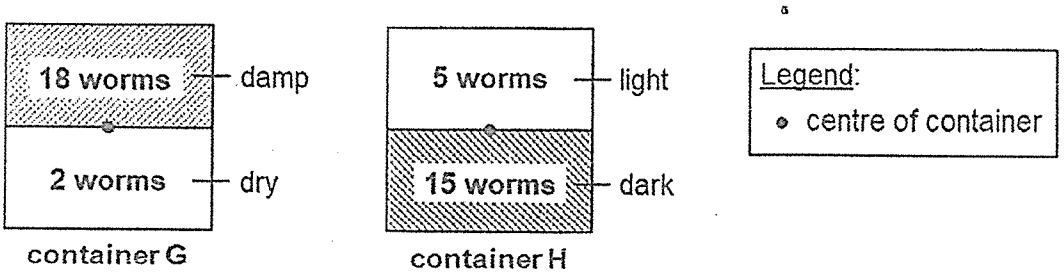


What can Questions A, B and C be?

	A	B	C
(1)	Does it reproduce by seeds?	Does it need sunlight to grow?	Does it have feathers?
(2)	Does it reproduce by seeds?	Does it have a stalk?	Does it lay eggs?
(3)	Does it reproduce by spores?	Does it need sunlight to grow?	Does it have feathers?
(4)	Does it reproduce by spores?	Does it have a stalk?	Does it have a beak?

(Go on to the next page)

2 Rosnah placed 20 worms in the centre of containers G and H. The containers were divided into sections with different conditions. After five days, she counted the number of worms in different sections of both containers. The results are as shown in the diagram below.



Which of the following characteristics of living things did the experiment show?

A Living things can reproduce.

B Living things can move by themselves.

C Living things need air, food and water to survive.

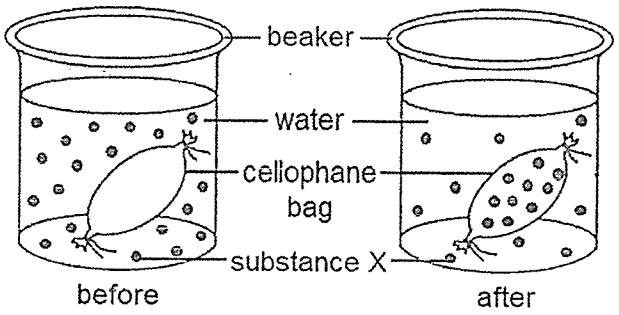
(1) A only

(2) B only

(3) A and C only

(4) B and C only

3 Gerald placed a cellophane bag, filled with water, into a container of water mixed with substance X. After one hour, he observed that some substance X had entered the cellophane bag.



Which cell part has a similar function as the cellophane bag?

(1) nucleus

(2) cell wall

(3) chloroplast

(4) cell membrane

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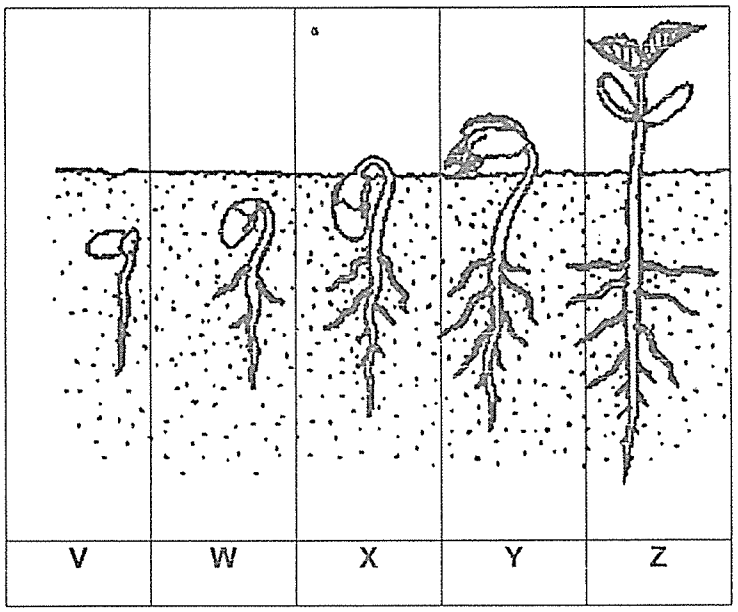
4 The diagram below shows the growth of a seedling.



Which of the following statements are correct?

A The seedling is able to make its own food at Z.
B The seedling needs sunlight to make food at V.
C The seedling gets its food from the seed coat at W.
D The seed leaves provide food for the seedling at X and Y.

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

(Go on to the next page)

5 A plant was placed in the dark for 48 hours, after which one of the leaves was covered with black paper. The plant was then placed under the sun for 10 hours as shown in diagram 1. The leaf was tested for starch by adding iodine solution to parts X and Y of the leaf as shown in diagram 2.

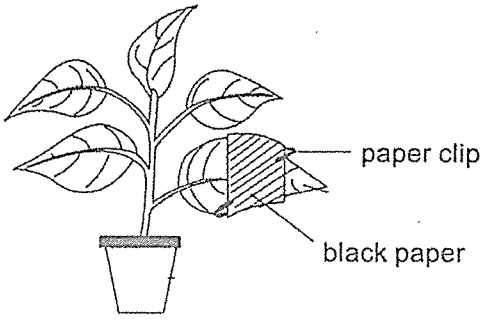


Diagram 1

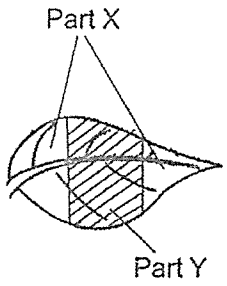
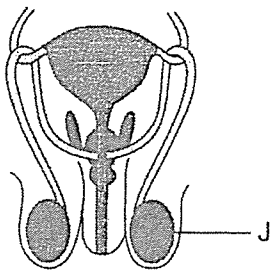


Diagram 2

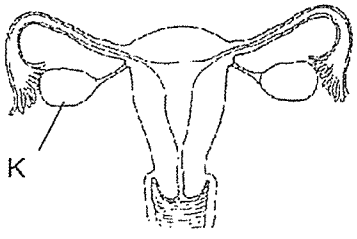
Which one of the following statements explains the observation of the leaf in diagram 2?

	Observation	Reason
(1)	Iodine on part X remains brown in colour.	Part X did not contain chlorophyll.
(2)	Iodine on part X turns dark blue in colour.	Part X of the leaf was able to make food.
(3)	Iodine on part Y remains brown in colour.	Part Y of the leaf was able to make food.
(4)	Iodine on part Y turns dark blue in colour.	Part Y did not receive any sunlight.

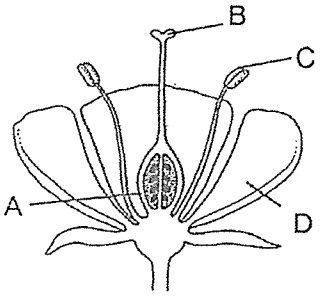
6 The diagrams below show the reproductive systems of humans and plants.



System 1



System 2



System 3

Which parts of System 3 have similar functions to parts J and K of Systems 1 and 2?

	Part J	Part K
(1)	C	B
(2)	C	A
(3)	A	D
(4)	B	C

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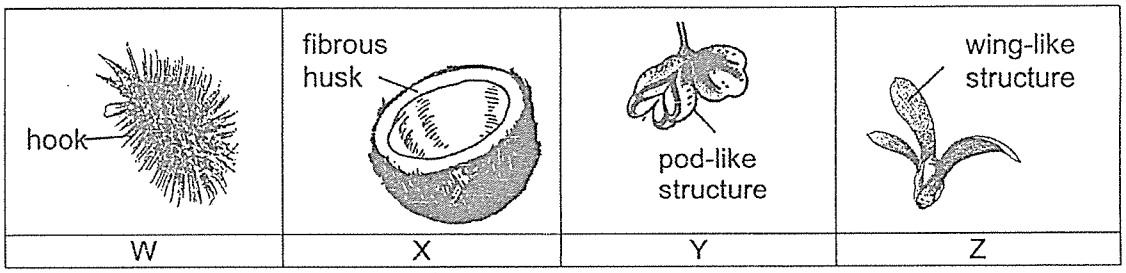
7 Zhi Kai found two different types of plants, Q and R, growing in the same field near a river. He measured the distance of seedlings of each plant, Q and R, from their parent plants and recorded the results in the table below.

Distance from parent plant (m)	Number of seedlings of plant Q	Number of seedlings of plant R
0 to 5	3	19
5 to 10	9	2
10 to 15	4	0
15 to 20	8	0

He also found four different fruits, W, X, Y and Z, in the same field, as shown below.

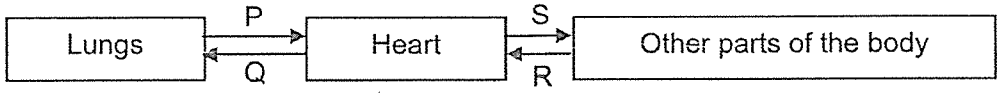


Which of the following are most likely the fruits of plants Q and R?

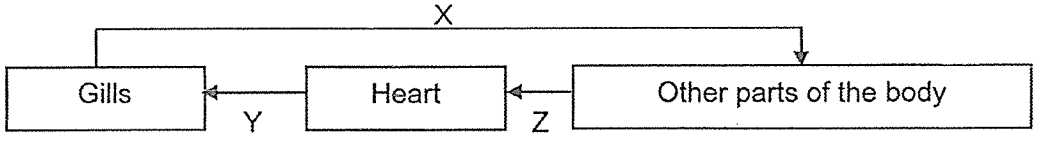
	Plant Q	Plant R
(1)	X	W
(2)	Y	Z
(3)	W	Y
(4)	X	Z

8 The diagrams below show the circulatory system of a human and a fish. The arrows show the direction of blood flow in their blood vessels.

Circulatory system of a human



Circulatory system of a fish



Which letters represent the blood vessels which carry blood rich in oxygen?

(1) P, S and X only

(2) P, S, Y and Z only

(3) Q, R, X and Y only

(4) Q, R, Y and Z only

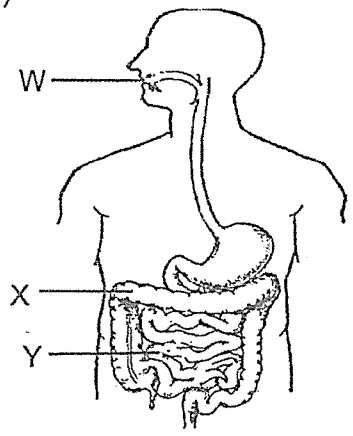
(Go on to the next page)

9 Tristan described activities taking place in three parts of the digestive system as shown below.

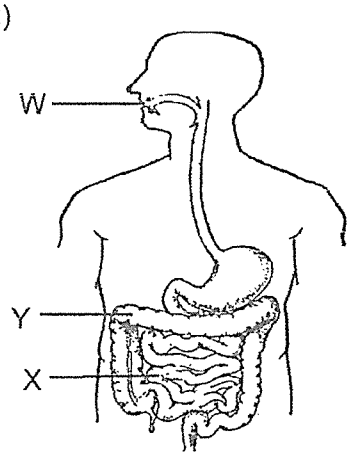
Part	Description
W	Food is digested partially.
X	Digested food passes through the walls of this part and is absorbed into the blood.
Y	Water is removed from undigested food.

Which one of the diagrams below correctly identifies parts W, X and Y?

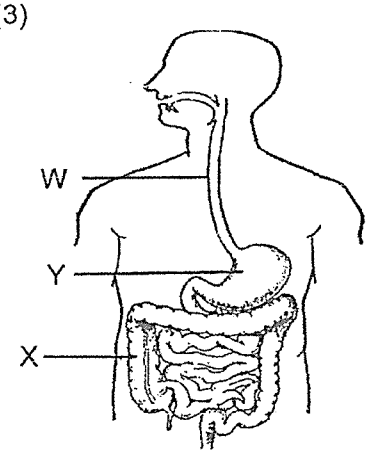
(1)



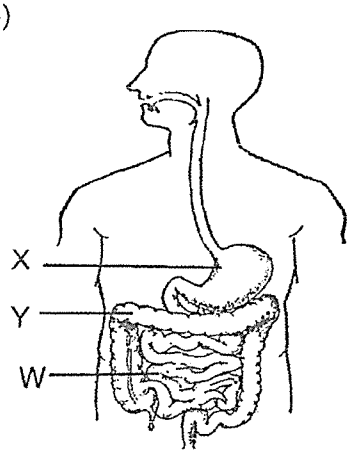
(2)



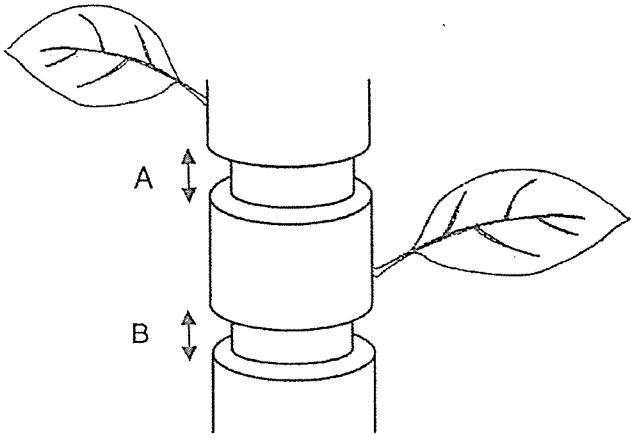
(3)



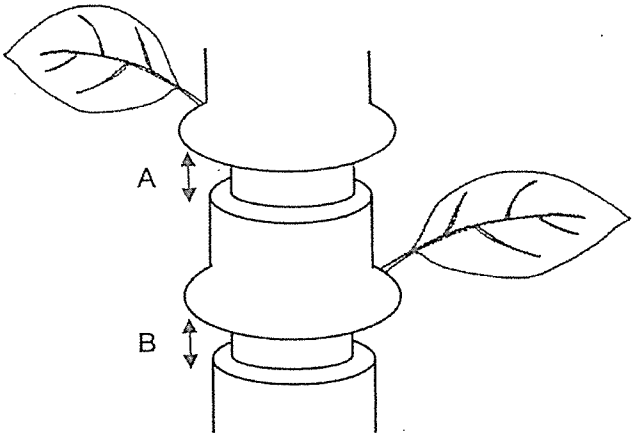
(4)



10 Nicholas made two cuts, A and B, to remove tubes on the stem of a plant as shown below.



The plant was placed outdoors and watered daily. After a few days, he observed that the plant was still alive and the parts above A and B were swollen as shown below.



Which of the following statements is correct?

(1) Food-carrying tubes were removed at A only.

(2) Water-carrying tubes were removed at B only.

(3) Food-carrying tubes were removed at A and B.

(4) Both food and water-carrying tubes were removed at A and B.

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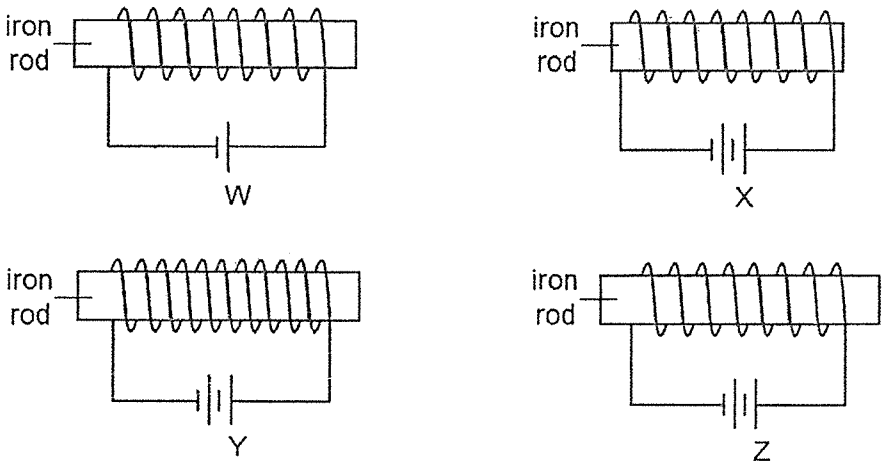
11 Mrs Chew wanted to test out two different types of carrier, X and Y. She placed 3 kg of grocery into each carrier and the results are as shown below.

Which one of the following is true about the carriers?

(1) Carrier X is lighter than carrier Y.
(2) Carrier X is stronger than carrier Y.
(3) Carrier X is more absorbent than Y.
(4) Carrier Y is more flexible than carrier X.

12 Roy prepared four set-ups, W, X, Y and Z to test the strengths of electromagnets.



Which set-ups should he use to investigate how the number of coils of wire affects the strength of an electromagnet?

(1) W and X
(2) W and Z
(3) X and Y
(4) Y and Z

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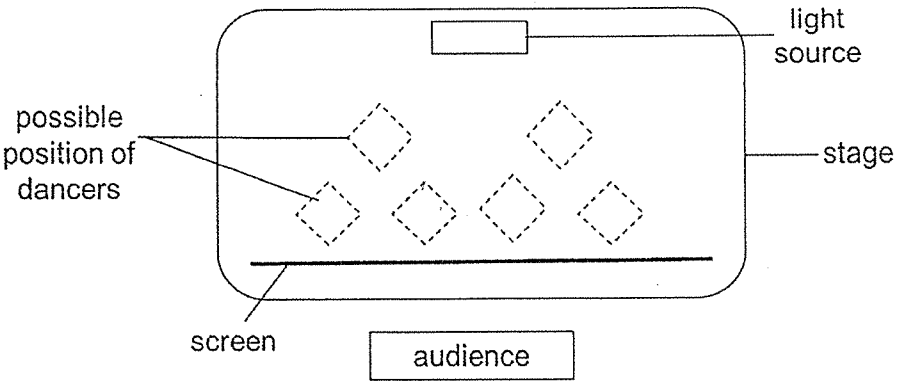
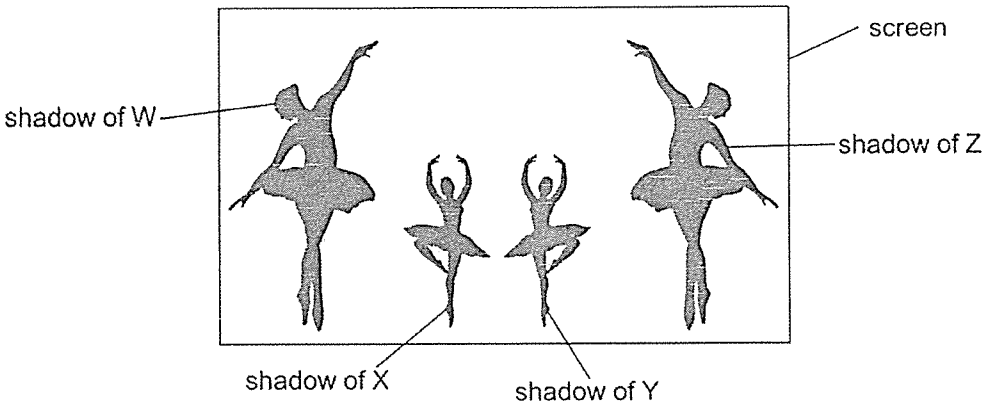
13 The diagram below shows the top view of the stage for a shadow dance.

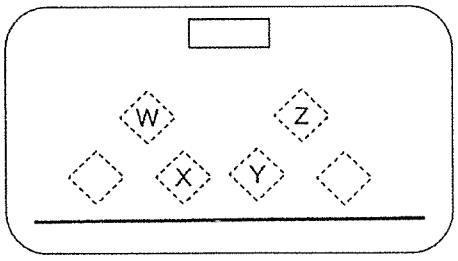


The audience saw the shadows of the dancers on the screen as shown below. The four dancers, W, X, Y and Z are of the same height.

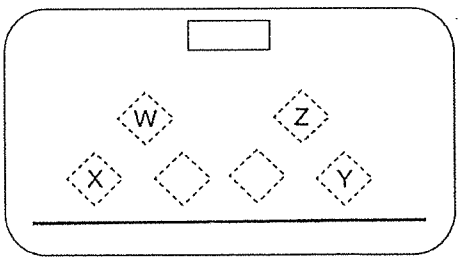


Which one of the following diagrams below shows the positions of dancers W, X, Y and Z on the stage?

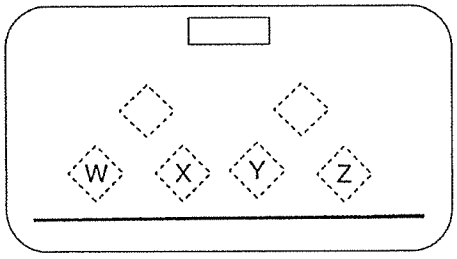
(1)



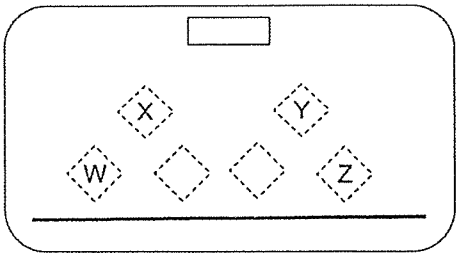
(2)



(3)



(4)



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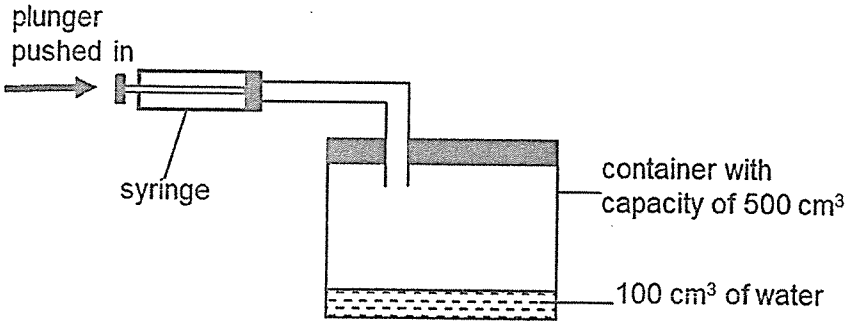
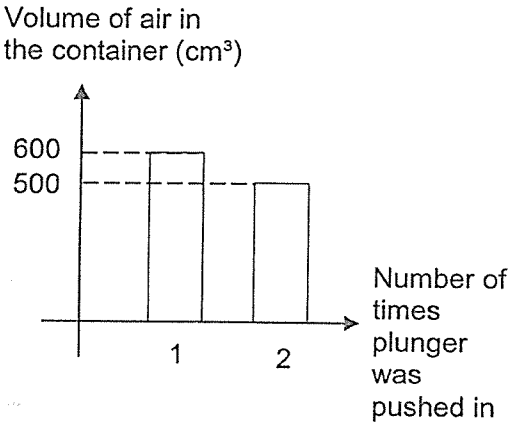
14 Helen poured 100 cm^3 of water into a container and fitted a syringe through a tube to the container. When the plunger of the syringe is pushed in completely, 50cm^3 of air is pumped into the container.

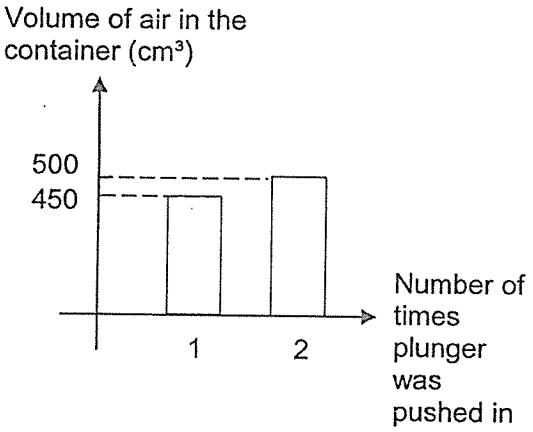


Which one of the following graphs below best represents the volume of air in the container when Helen pushed the plunger in completely twice?

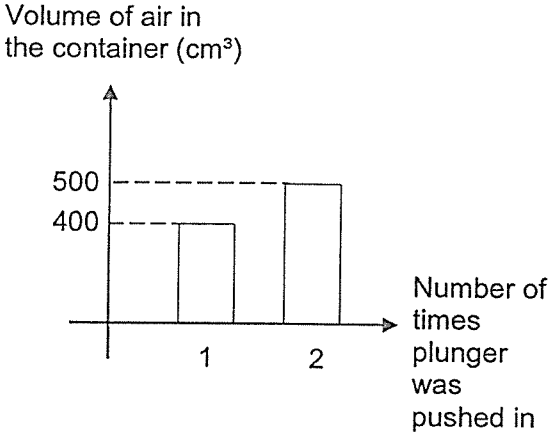
(1)



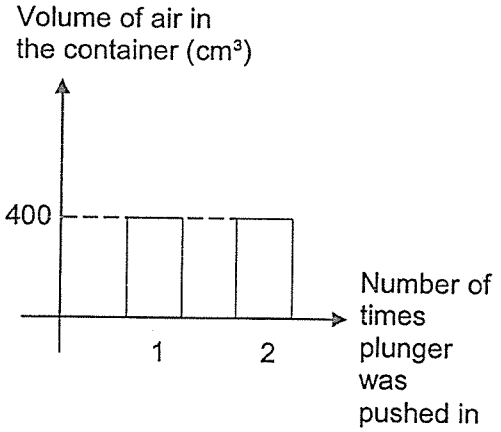
(2)



(3)



(4)



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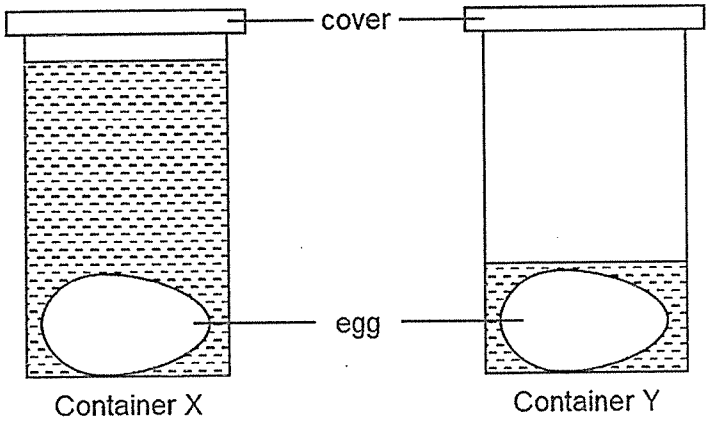
15 Meng placed two similar eggs in two identical containers, X and Y. He then poured different amounts of water at 100 °C and covered the containers for 10 minutes as shown below.



Which one of the following explains Meng's observation of the eggs in containers X and Y at the end of 10 minutes?

	Observation	Reason
(1)	The egg in container X is less cooked than in container Y.	The amount of water in container X is greater so there is less heat energy to cook the egg.
(2)	The egg in container Y is less cooked than in container X.	The water in container Y has less heat energy to cook the egg.
(3)	Both eggs are not equally cooked.	The water in both containers are of the same temperature to cook the eggs.
(4)	Both eggs are equally cooked.	The water in both containers have the same amount of heat energy to cook the eggs.

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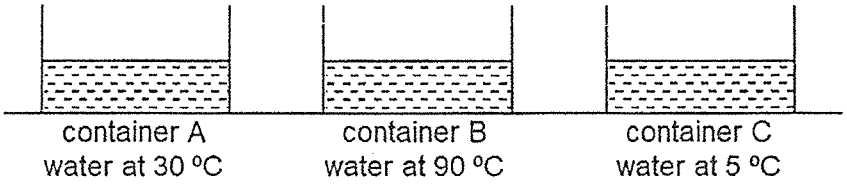
16 Ali poured an equal amount of water at different temperatures into three identical containers, A, B and C.



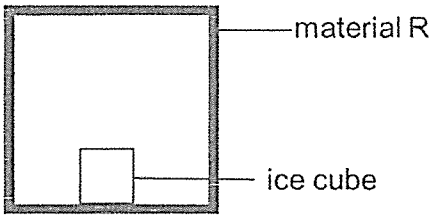
He poured half the water in container A into container B and after one minute, he recorded the first reading of temperature of water in container B.

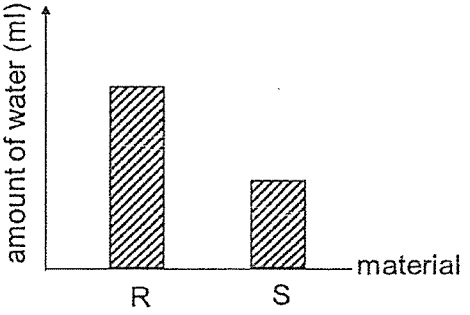
Then he poured half the water in container C into container B and after one minute, he recorded the second reading of temperature of water in container B.

What were the likely readings he recorded?

	First reading (°C)	Second reading (°C)
(1)	90	30
(2)	70	40
(3)	20	50
(4)	30	5

17 Rani placed an ice cube into a box made of material R. After 20 minutes, she measured the amount of water collected in the box. She repeated the experiment with a box made of material S. Her results are shown in the graph below.





Rani wanted to pack hot food and cold drinks for a picnic using two containers. Which material of the containers would help to keep the food hot and the drinks cold for the longest time?

	Material of containers for carrying	
	hot food	cold drinks
(1)	R	S
(2)	R	R
(3)	S	S
(4)	S	R

(Go on to the next page)

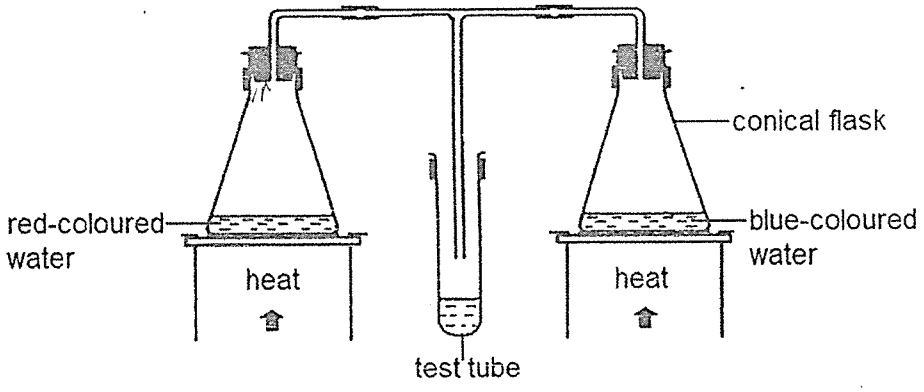
18 The table below shows the state of four substances, A, B, C and D at 22 °C and 78 °C.

Substance	State of substance	
	At 22 °C	At 78 °C
A	liquid	gas
B	solid	solid
C	solid	liquid
D	liquid	liquid

Which substance is likely to have a melting point of 15 °C and a boiling point of 90 °C?

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

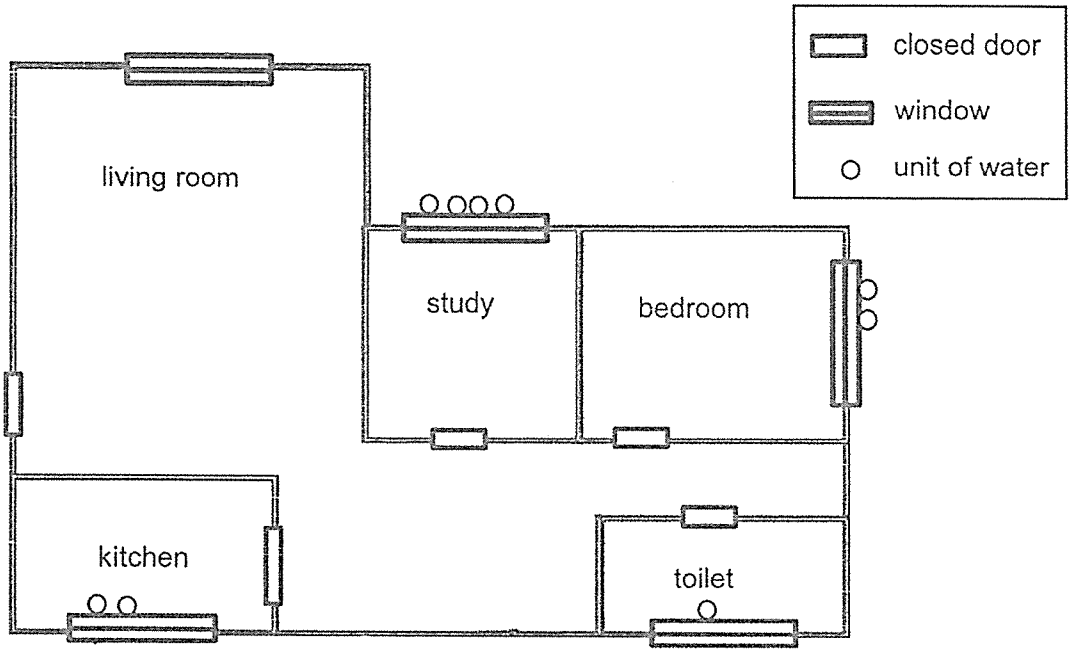
19 Two conical flasks were heated as shown below.



After 30 minutes, some liquid was collected in the test tube. What would be collected in the test tube?

(1) Water
(2) Red-coloured water
(3) Blue-coloured water
(4) Purple-coloured water

20 The diagram below shows the floor plan of a house. The temperature in each room is different as the air-con unit in each room is set at a different temperature. All the windows are made of the same material. After a period of time, water droplets are observed on the inner or outer window surfaces as shown below.



Floor plan of a house

Based on the information above, which of the following correctly shows the rooms arranged from the highest to the lowest temperature?

	Temperature of rooms				
	Highest ←				→ **Lowest**
(1)	kitchen	toilet	living room	bedroom	study
(2)	living room	toilet	kitchen	bedroom	study
(3)	toilet	kitchen	bedroom	study	living room
(4)	study	bedroom	living room	toilet	kitchen

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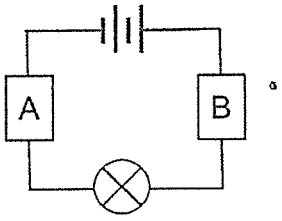
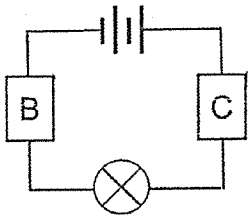
21 Two circuits were set up as shown below with objects A, B and C.

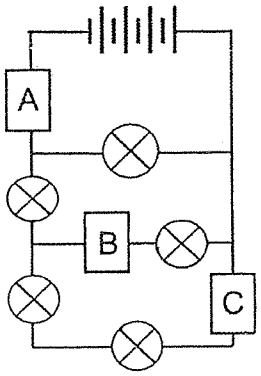


bulb lighted up



bulb did not light up

The objects, A, B and C were arranged to form a new circuit below.

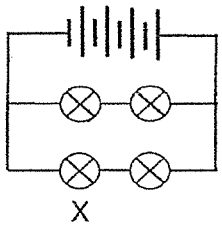


How many bulb(s) would be lighted up in the new circuit?

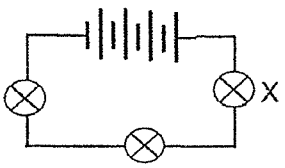
(1) 1
(2) 3
(3) 4
(4) 5

22 Four circuits, P, Q, R and S were set up as shown below.

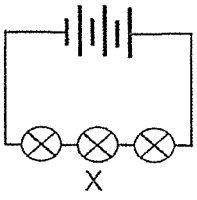
Circuit P



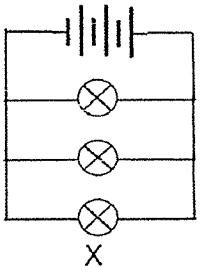
Circuit Q



Circuit R



Circuit S



Which one of the following arrangements shows the increasing brightness of bulb X correctly?

	Dimmest ⟵ ⟶ Brightest			
(1)	P	S	R	Q
(2)	Q	R	S	P
(3)	R	Q	P	S
(4)	S	P	Q	R

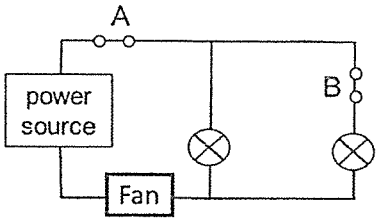
(Go on to the next page)

23 Mr Bala engaged an electrician to install two light bulbs, a fan and two switches, A and B, in a bathroom. He had the following requirements as shown in the table below.

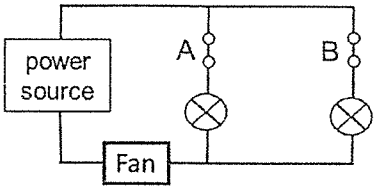
Switched on	Effect
Both A and B	Both light bulbs will light up Fan will turn on
A only	One light bulb will light up Fan will turn on
B only	One light bulb will light up Fan will turn on

Which one of the circuits did the electrician set up for Mr Bala's bathroom?

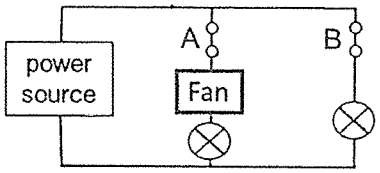
(1)



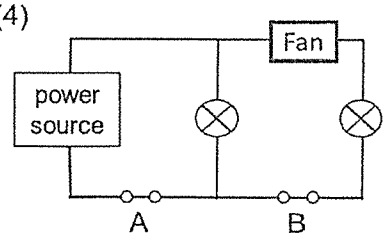
(2)



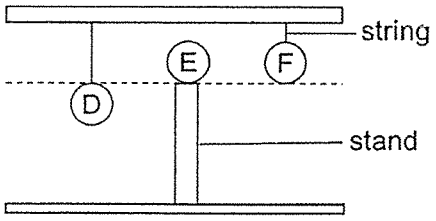
(3)



(4)



24 The diagram below shows 3 balls, D, E and F of equal mass supported by strings or a stand.



Which one of the following statements is true?

(1) Ball D has more gravitational potential energy than ball F.

(2) Ball F has more gravitational potential energy than ball E.

(3) All three balls have the same amount of gravitational potential energy.

(4) Ball E has the same amount of gravitational potential energy as ball F.

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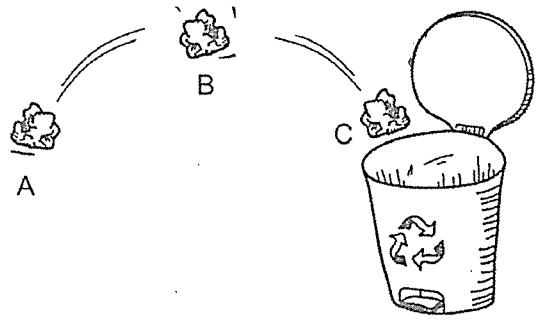
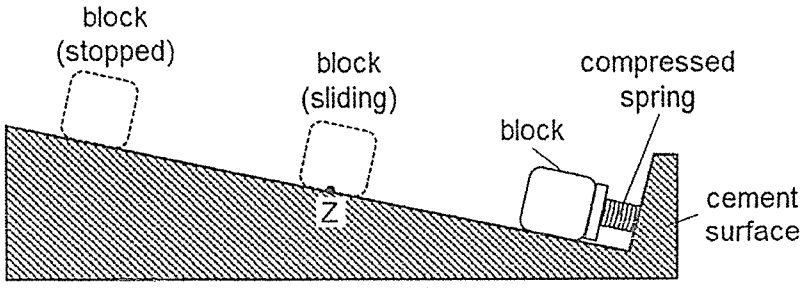
25 A piece of crushed paper was thrown into the bin. It moved from position A to B and to C before falling into the bin as shown below.



Which of the following is correct?

	Potential energy of the crushed paper from A to B	Kinetic energy of the crushed paper from B to C
(1)	decrease	decrease
(2)	decrease	increase
(3)	increase	decrease
(4)	increase	increase

26 A compressed spring was used to push a block on cement surface as shown below. When the spring was released, the block would slide along the surface before stopping.

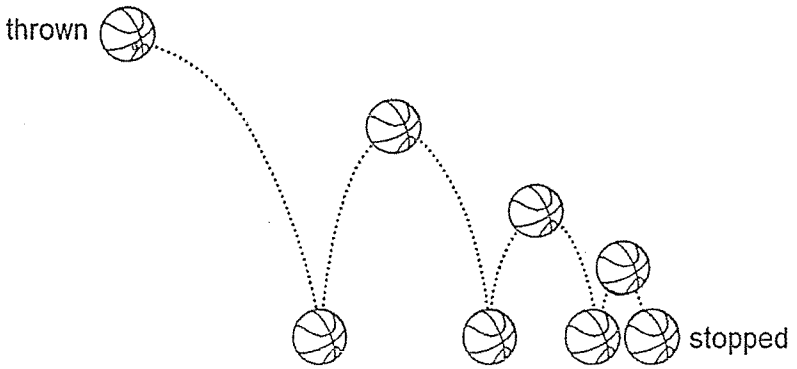


Which of the following shows the forces acting on the sliding block at position Z?

	Elastic spring force	Frictional force	Gravitational force
(1)	yes	yes	yes
(2)	yes	no	yes
(3)	no	yes	no
(4)	no	yes	yes

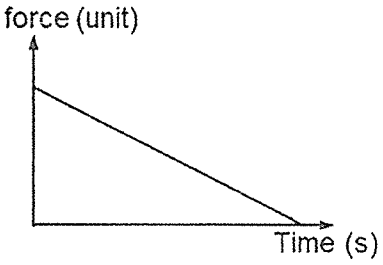
(Go on to the next page)

27 A basketball was thrown and it bounced up and down repeatedly on the floor before coming to a complete stop as shown below.

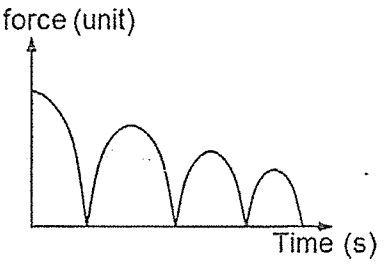


Which of the following graphs best represents the gravitational force acting on the basketball?

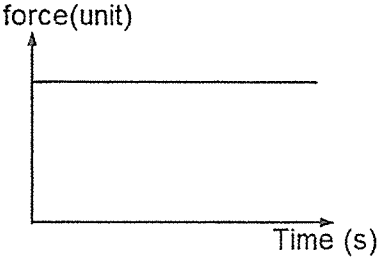
(1)



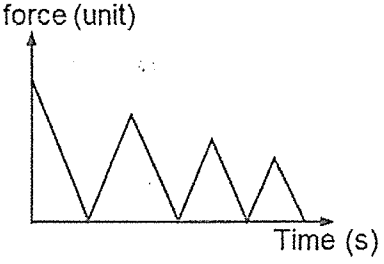
(2)



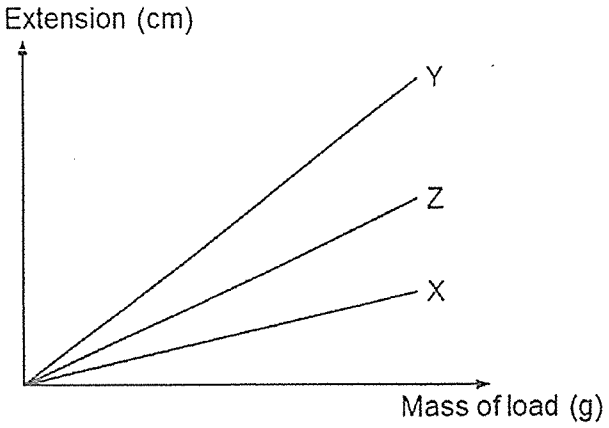
(3)



(4)



28 Ewen hung three springs, X, Y and Z, of the same length. He added loads onto each spring and recorded his results in the graph as shown below.



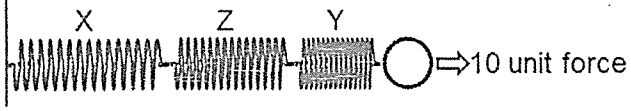
The springs are joined and fixed to a wall and 10 unit force is used to stretch them as shown.

Which of the following shows Ewen's observation?

(1) 

(2) 

(3) 

(4) 

METHODIST GIRLS' SCHOOL

Founded in 1887

PRELIMINARY EXAMINATION 2021
PRIMARY 6
SCIENCE

BOOKLET B

Total Time for Booklets A and B: 1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES
Do not turn over this page until you are told to do so.
Follow all instructions carefully.
Answer all questions.

Name: _____ ( )

Class: Primary 6._____

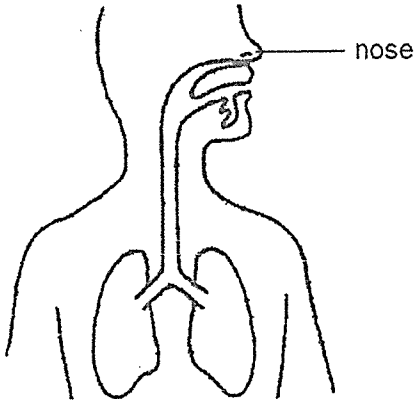
Date : 24 August 2021

Booklet A	56
Booklet B	44
Total	100
Parent's Signature	

This booklet consists of 16 printed pages including this page.

For questions 29 to 40, write your answers in this booklet. The number of marks available is shown in brackets [ ] at the end of each question or part question. [44 marks]

29 The diagram below shows a human system.



(a) Other than the nose, label the other two organs of the human system. [1]

(b) State the function of the human system. [1]

_____

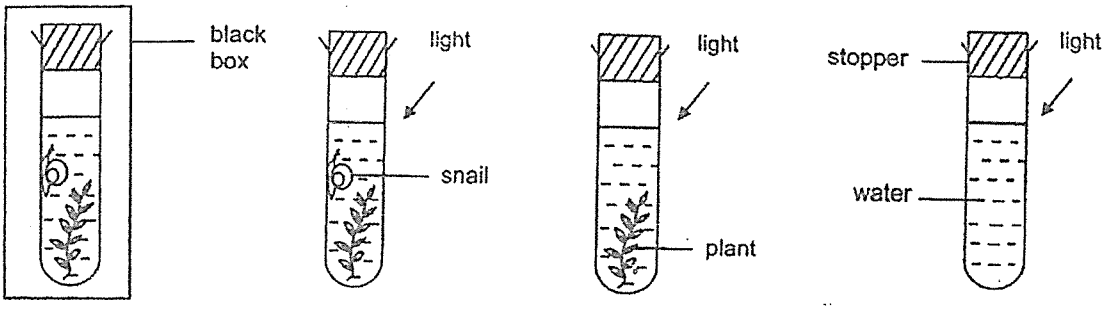
_____

2

30 Rui Han wanted to investigate the conditions needed for photosynthesis in plants.

(a) Describe the process of photosynthesis. [1]

Rui Han prepared four set-ups, W, X, Y and Z, for his investigation as shown below.



(b) Which set-ups must be compared to conclude the effect of each variable on the rate of photosynthesis? [2]

Variable	Set-ups to compare
Amount of sunlight	
Amount of carbon dioxide	

3

31 A group of scientists conducted an experiment to find out how quickly bacteria Z can reproduce when it is kept at different temperatures. They found out that 100 units of bacteria Z can cause food poisoning and tabulated their results below.

Temperature (°C)	Amount of bacteria Z (units)	
	At the start of experiment	At the end of experiment
5	15	19
20	15	100
35	15	375
50	15	300
65	15	110
80	15	40
95	15	7

(a) How does the amount of bacteria Z change with temperature? [1]

(b) Based on the results, suggest why the temperature of a refrigerator is usually kept at 5°C. Explain your answer. [2]

(c) Some food containing bacteria Z was cooked at 95°C and then left at room temperature for a day. Based on the results, explain why the food is still unsafe to eat. [1]

4

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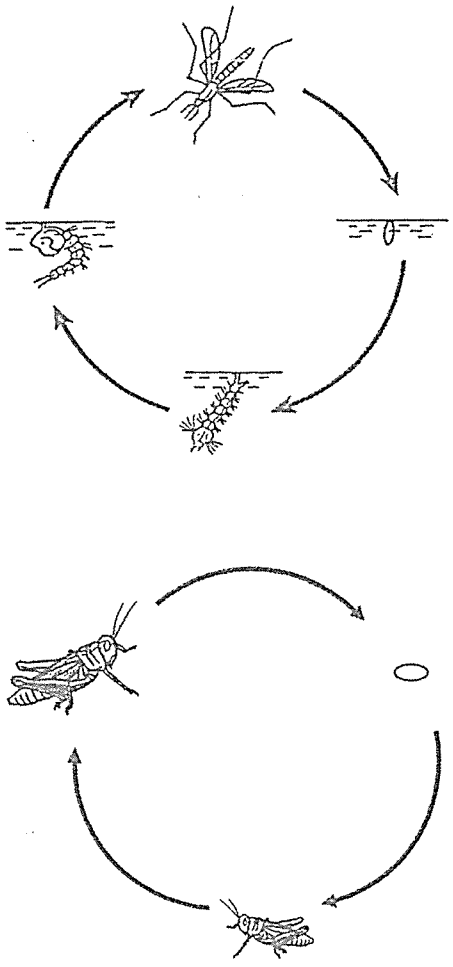
32 The diagrams below show the life cycles of two insects.



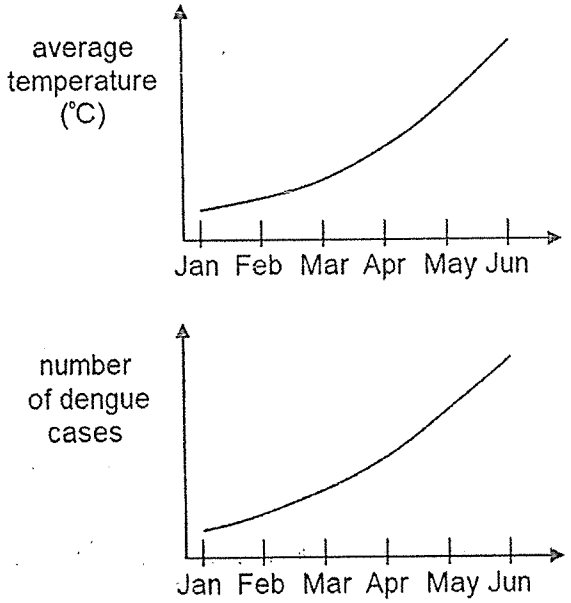
(a) State two differences between the life cycles of the two insects. [2]

(Go on to the next page)

Dengue fever is a disease caused by the dengue virus which is transmitted to humans through the bite of an Aedes mosquito. A group of scientists studied the effect of the surrounding temperature on the life cycle of the Aedes mosquito. Their results are shown below.

Temperature (°C)	Number of days for one complete life cycle
28	18
30	16
32	14
34	12

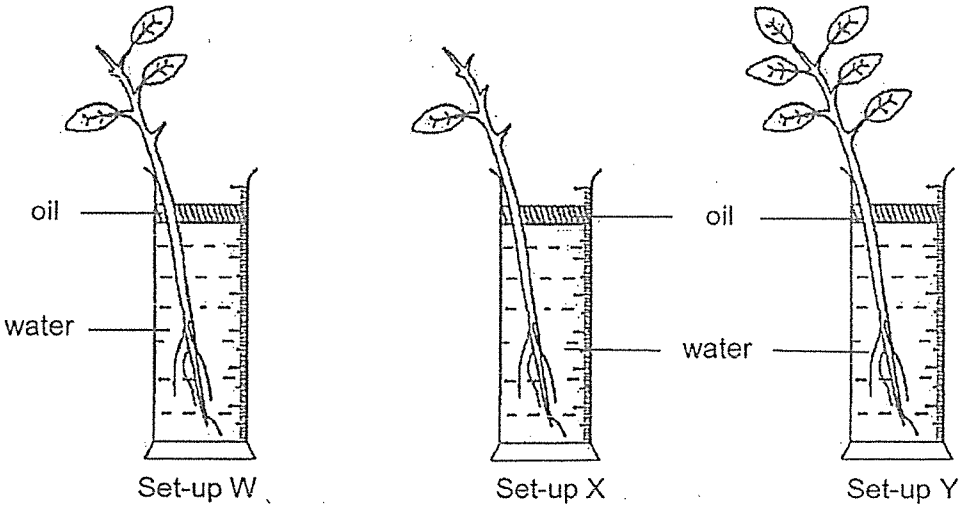
They studied Singapore's average daily temperature and the number of dengue cases from January to June and plotted two graphs as shown below.



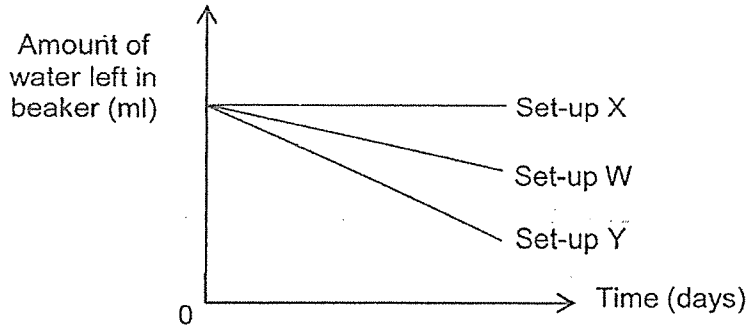
(b) Based on the information above, explain how the change in temperature affected the number of dengue cases among humans. [2]

4

33 Elise conducted an experiment using the same type of plants placed in three set-ups, W, X and Y. She removed some leaves from plants W and X. Equal amount of water was given to each plant and a layer of oil was added into each beaker.



She left the set-ups in a brightly-lit room and measured the amount of water left in each beaker over the next five days. Her results are shown in the graph below.

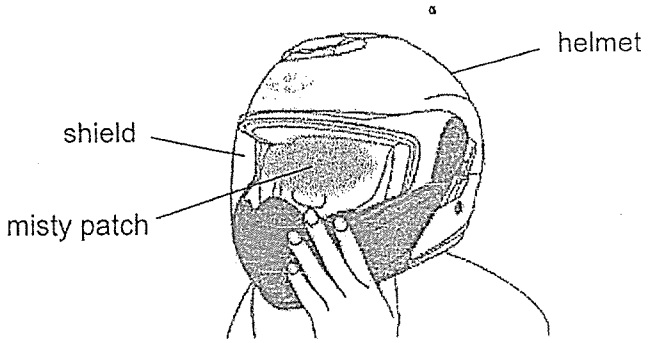


(a) Elise made a mistake when drawing the graph. Which line was drawn incorrectly? Explain why. [2]

(b) Did Elise conduct a fair experiment? Explain your answer. [1]

3

34 During car races, drivers must wear a safety helmet to protect their head. The safety helmet has a transparent shield. Lewis observed that when he breathed out heavily, the inner shield had a misty patch and he could not see through it clearly as shown below.



(a) State a physical property of the helmet that protects Lewis' head from injury. [1]

_____

(b) What is the state of matter of the misty patch? [1]

_____

(c) Explain how the misty patch formed on the shield. [2]

_____

_____

_____

4

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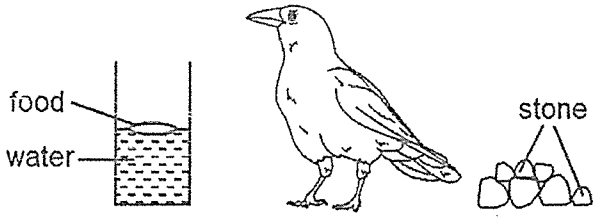
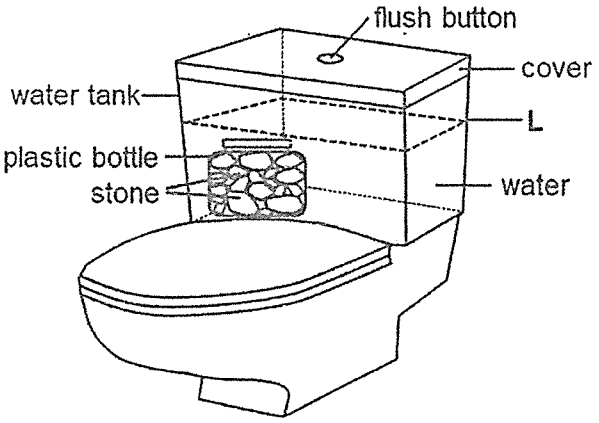
35 Mike dropped some food into a container filled with water at a level too low for his pet bird to reach as shown below.



The bird picked up some stones and dropped them into the container.

(a) What would happen to the water level in the container when the bird dropped in the stones? Explain your answer. [1]

A water tank used for flushing a toilet bowl requires three litres of water to fill the tank to level L. Mike added a plastic bottle filled with stones into the water tank as shown in the diagram below.



He then observed that only two litres of water were required to fill the tank to level L.

(b) Based on the information given, explain how Mike's action had helped him to conserve water. [1]

2

(Go on to the next page)

36 Mandy clamped object Z to a retort stand and tied a metal clip to the retort stand with a string of length 30 cm. When she held up the metal clip near object Z and let go, the metal clip remained in the air as shown in Figure 1.

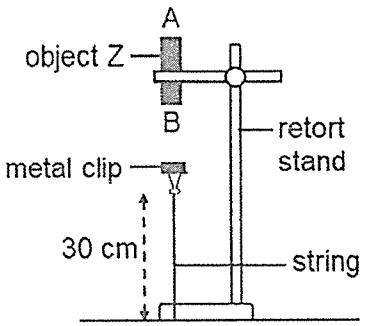


Figure 1

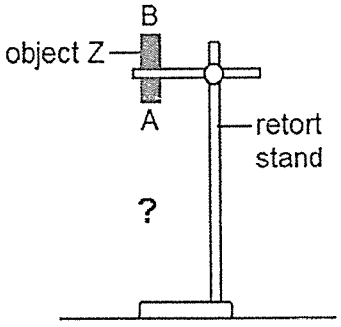


Figure 2

(a) State the main forces acting on the metal clip in Figure 1. [1]

(b) Explain why the metal clip did not drop. [1]

Mandy repeated the experiment with object Z flipped over as shown in Figure 2.

(c) What would she observe of the paper clip? [1]

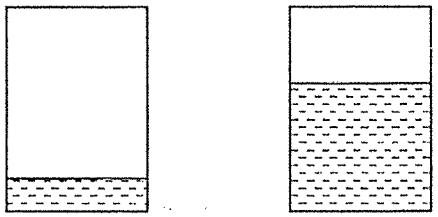
Mandy changed object Z to magnet Q and found that the metal clip dropped. However, when she used a longer string of length 35 cm, the metal clipped remained in the air.

(d) Give a reason why using a longer string of 35 cm will prevent the metal clip from dropping. [2]

5

37 (a) State what is temperature. [1]

Linda wanted to make some ice using two identical containers, A and B. She poured in different amount of water at the same temperature into both containers and put them into the freezer as shown below.

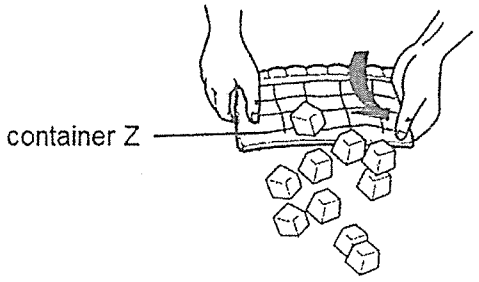


Container A
200 ml of water

Container B
800 ml of water

(b) Which container of water will freeze first? Explain your answer.

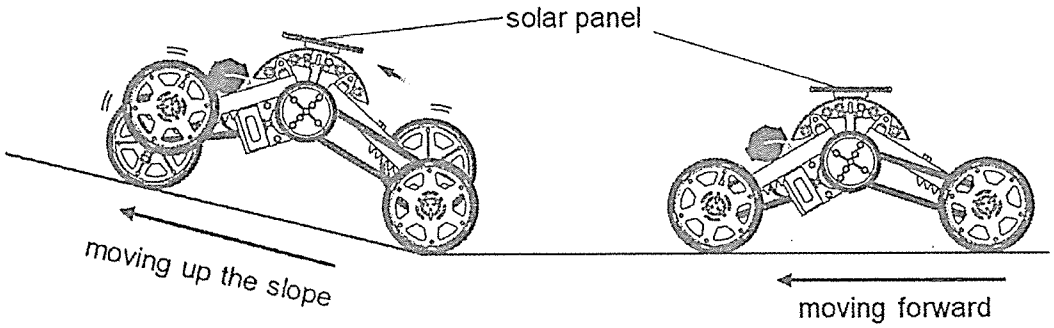
Linda used container Z that is waterproof to make ice. After the water froze completely in container Z, she twisted container Z to remove the ice as shown below.



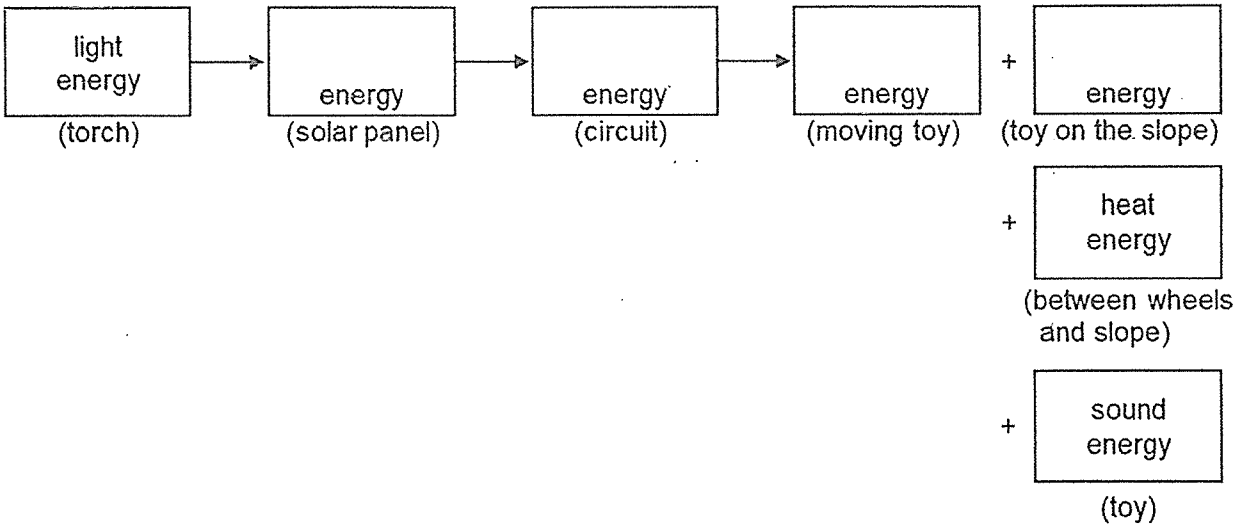
(c) Based on the diagram above, state another physical property of container Z that allowed the ice to be removed easily from it. [1]

3

38 When Adam shone a torch at the solar panel on top of his toy car, it moved forward from a flat surface and then up a slope.



(a) Fill in the boxes below to show the energy conversion as the toy car moved forward up the slope. [2]



(b) Adam observed that the toy car moved slower when moving up the slope. Explain, in terms of energy conversion, why the toy car moved slower. [2]

_____

_____

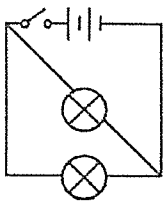
_____

(c) Without changing the toy car and the surface it was moving on, suggest a way to make the toy car move faster on the flat surface. [1]

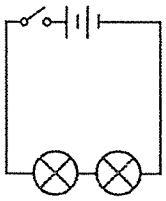
_____

5

39 Ivan set up two electric circuits, A and B, as shown below, to test a hypothesis. He compared the brightness of the bulbs in each circuit by using a light sensor and a datalogger.



Circuit A



Circuit B

(a) State a possible hypothesis that Ivan was testing. [1]

(b) State the variable that was changed. [1]

Figure 1 below shows a plastic disc fixed with five metal pins A, B, C, D and E. Figure 2 shows a circuit tester with clips P and Q attached to the wires.

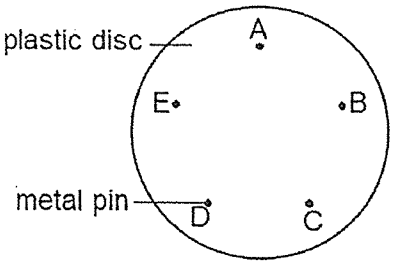


Figure 1

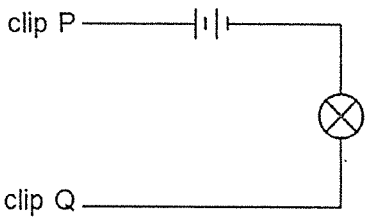
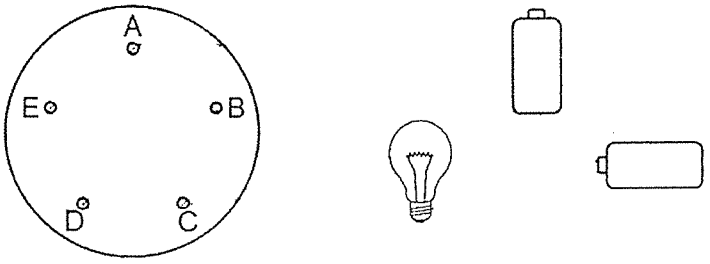


Figure 2

Ivan connected some of the pins on the plastic disc with wires. He then connected clips P and Q to different pairs of pins in turn and recorded his results in the table below.

Pin connected to P	Pin connected to Q	Did the bulb light up?
A	C	yes
B	C	no
C	E	no
D	A	yes
E	D	no

(c) Draw on the diagram below to show the connection of wires on the plastic disc and clips P and Q of the circuit tester when connected to pins A and C. [2]



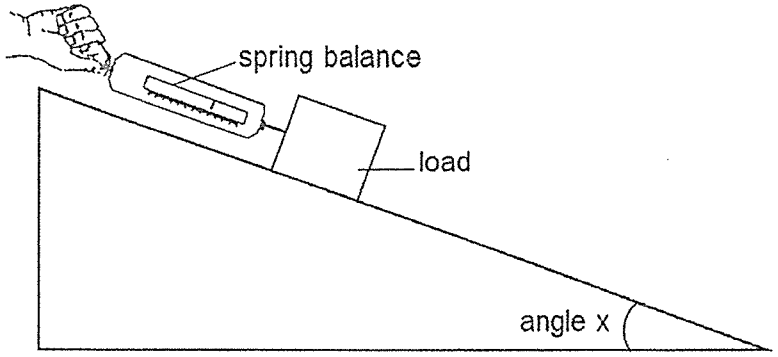
(d) Would the bulb light up when clips P and Q were connected to pins C and D? Explain your answer. [1]

_____

_____

5

40 The diagram below shows John pulling a load up a slope using a spring balance. He repeated the experiment for different values of angle x.



The table below shows the results of the experiment.

Set-up	Angle x (degree)	Pulling force (unit)
A	80	9
B	60	7
C	40	5
D	20	3
E	0	1

(a) What is a force? [1]

_____

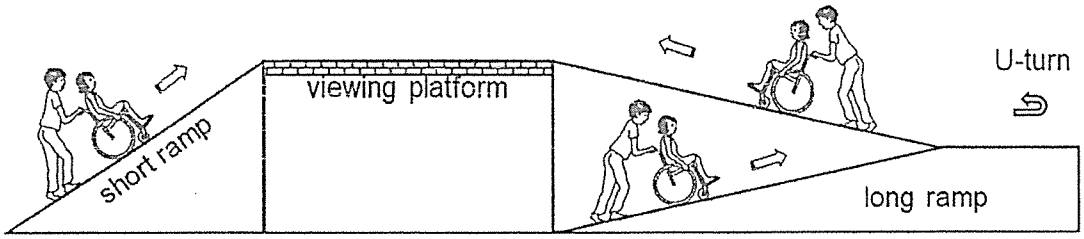
(b) State how the pulling force changes with the angle x. [1]

_____

_____

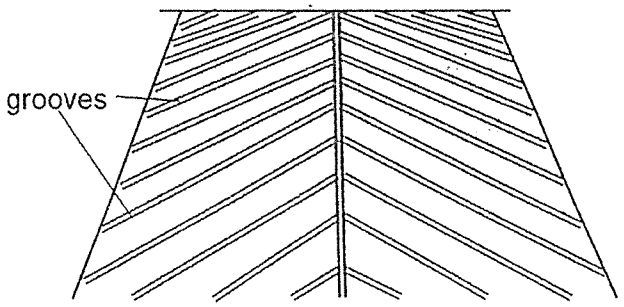
(Go on to the next page)

The diagram below shows two ramps for wheelchair users to access the viewing platform in a park. Mr Ravi prefers to push his wife, in a wheelchair, up to the viewing platform using the long ramp.



(c) Based on the results in John's experiment, explain why it is an advantage for Mr Ravi to use the long ramp instead of the short ramp. [1]

Mr Ravi notices that there are rows of grooves on the surface of the ramp.



(d) How do these grooves ensure the safety of wheelchair users on the ramp? [1]

4