SA2

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.

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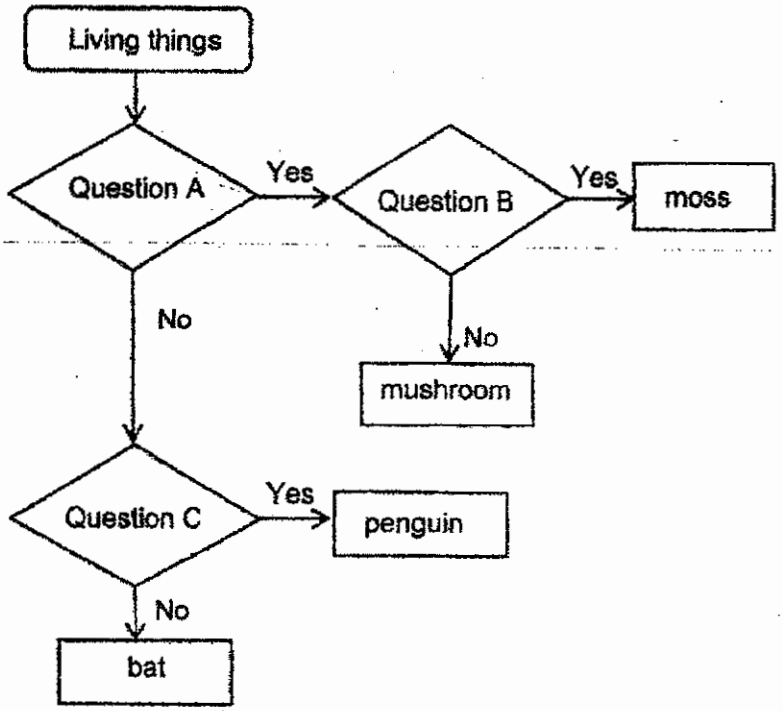
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For each question from 1 to 28, four options are given. One of them is the correct answer. Make your choice (1, 2, 3 or 4). Shade the correct oval on the Optical Answer Sheet (OAS).

[56 marks]

1 Study the flowchart below.



What can Questions A, B and C be?

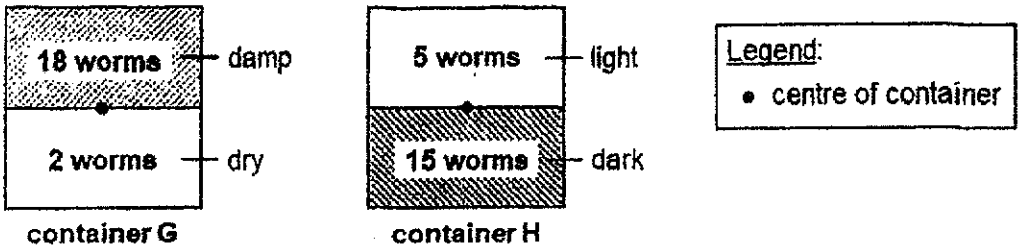
	A	B	C
(1)	Does it reproduce by seeds?	Does it need sunlight to grow?	Does it have feathers?
(2)	Does it reproduce by seeds?	Does it have a stalk?	Does it lay eggs?
(3)	Does it reproduce by spores?	Does it need sunlight to grow?	Does it have feathers?
(4)	Does it reproduce by spores?	Does it have a stalk?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

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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.

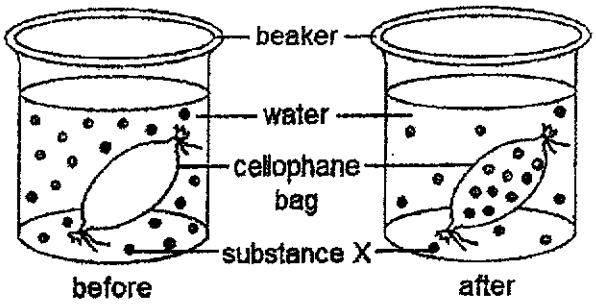
(1) A only

(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

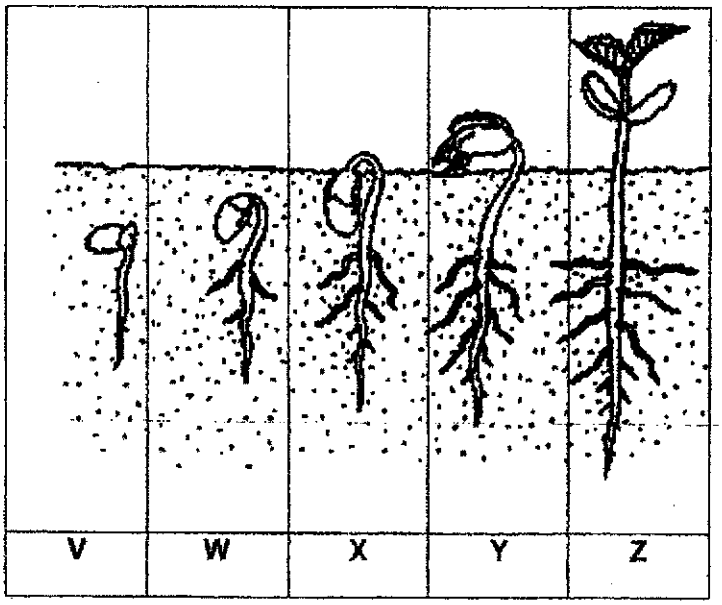
(4) cell membrane

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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

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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.

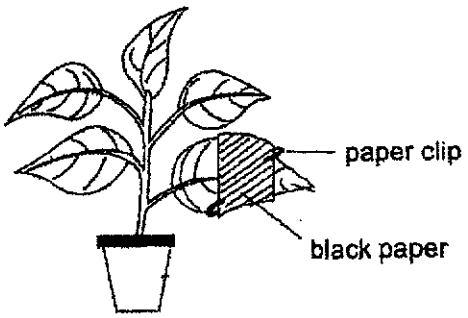


Diagram 1

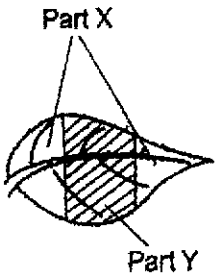
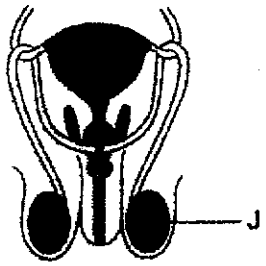


Diagram 2

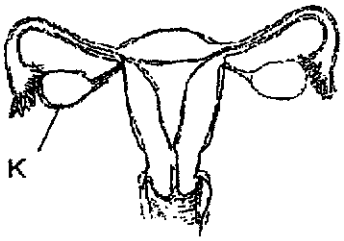
Which one of the following statements explains the observation of the leaf in diagram 2?

	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.

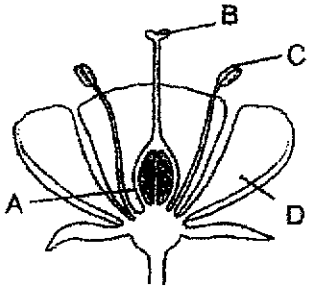
6 The diagrams below show the reproductive systems of humans and plants.



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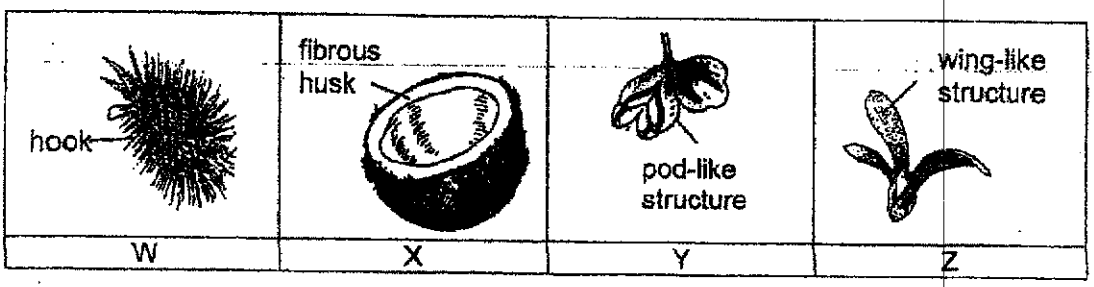
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7 Zhi Kai found two different types of plants, Q and R, growing in the same field near a river. He measured the distance of seedlings of each plant, Q and R, from their parent plants and recorded the results in the table below.

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.

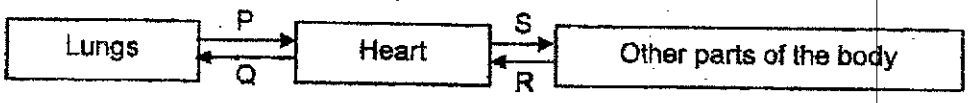


Which of the following are most likely the fruits of plants Q and R?

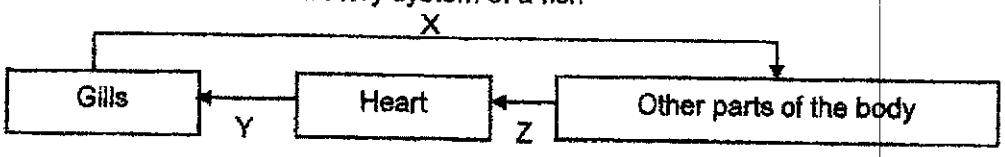
	Plant Q	Plant R
(1)	X	W
(2)	Y	Z
(3)	W	Y
(4)	X	Z

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

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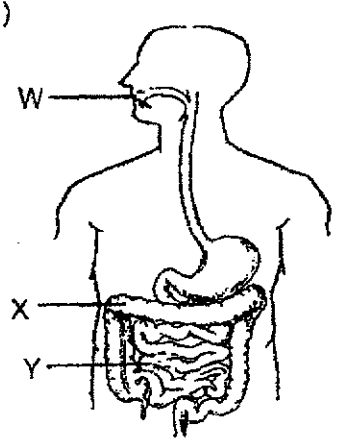
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9 Tristan described activities taking place in three parts of the digestive system as shown below.

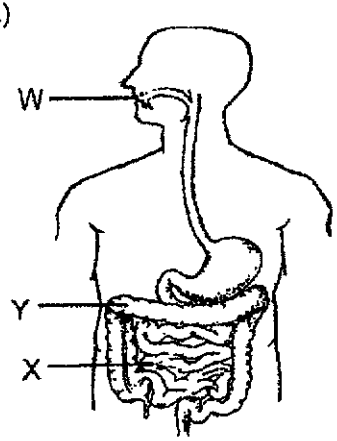
Part	Description
W	Food is digested partially.
X	Digested food passes through the walls of this part and is absorbed into the blood.
Y	Water is removed from undigested food.

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

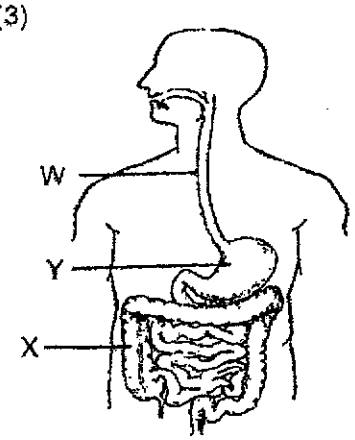
(1)



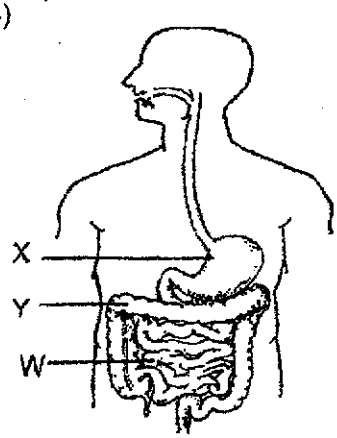
(2)



(3)



(4)

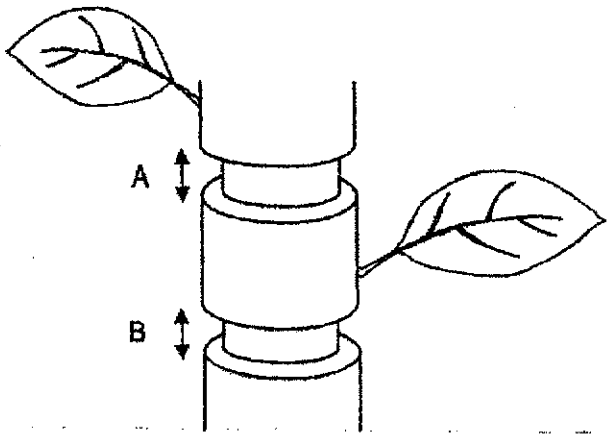


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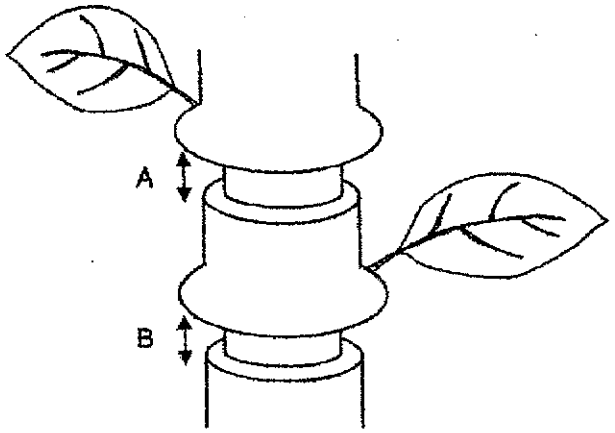
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10 Nicholas made two cuts, A and B, to remove tubes on the stem of a plant as shown below.



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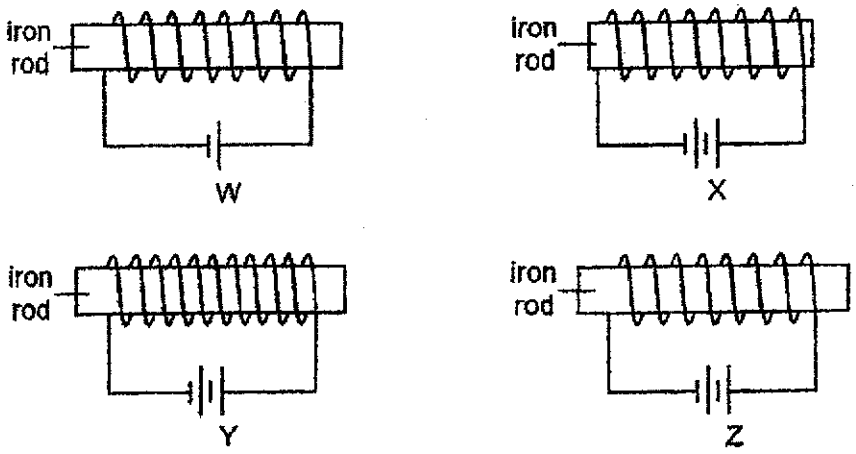
11 Mrs Chew wanted to test out two different types of carrier, X and Y. She placed 3 kg of grocery into each carrier and the results are as shown below.



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 Y 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?

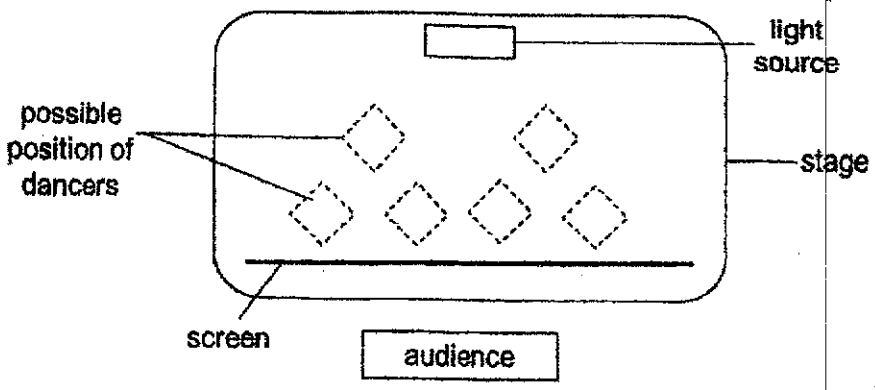
(1) W and X
(2) W and Z
(3) X and Y
(4) Y and Z

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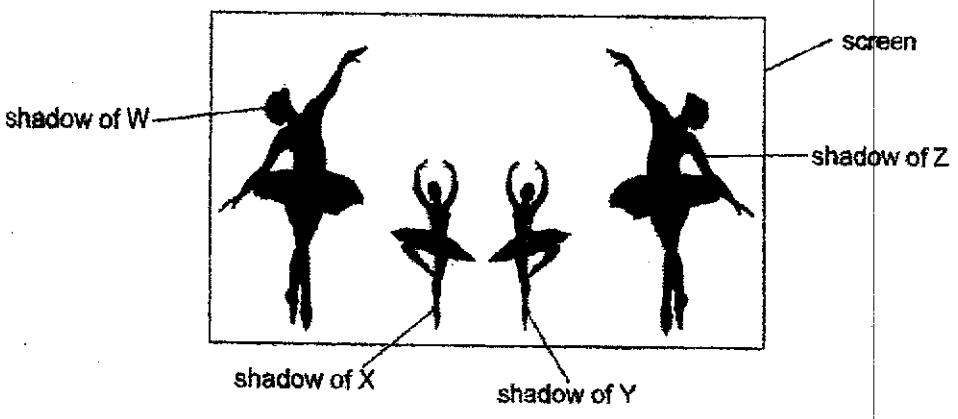
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13 The diagram below shows the top view of the stage for a shadow dance.

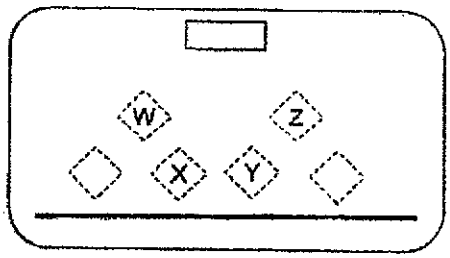


The audience saw the shadows of the dancers on the screen as shown below. The four dancers, W, X, Y and Z are of the same height.

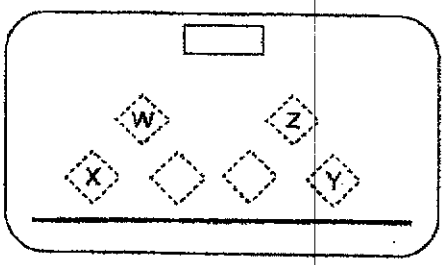


Which one of the following diagrams below shows the positions of dancers W, X, Y and Z on the stage?

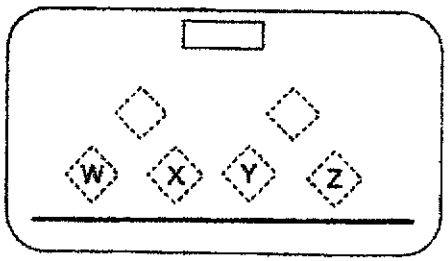
(1)



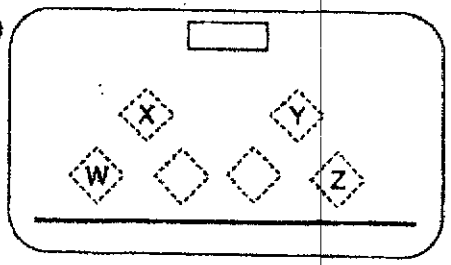
(2)



(3)



(4)

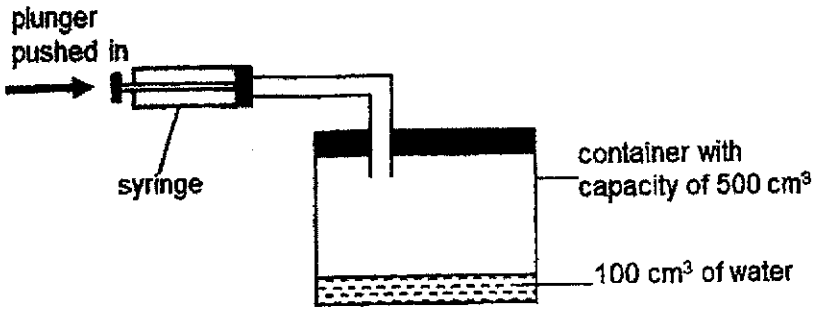


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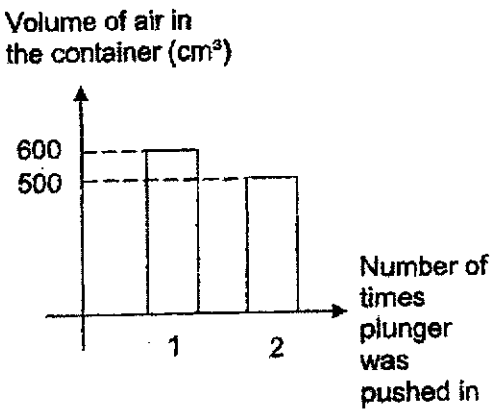
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14 Helen poured 100 cm^3 of water into a container and fitted a syringe through a tube to the container. When the plunger of the syringe is pushed in completely, 50cm^3 of air is pumped into the container.

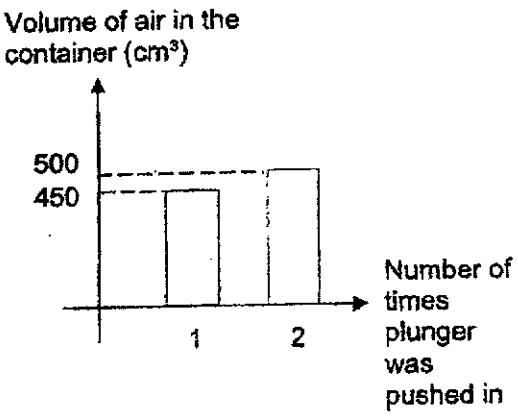


Which one of the following graphs below best represents the volume of air in the container when Helen pushed the plunger in completely twice?

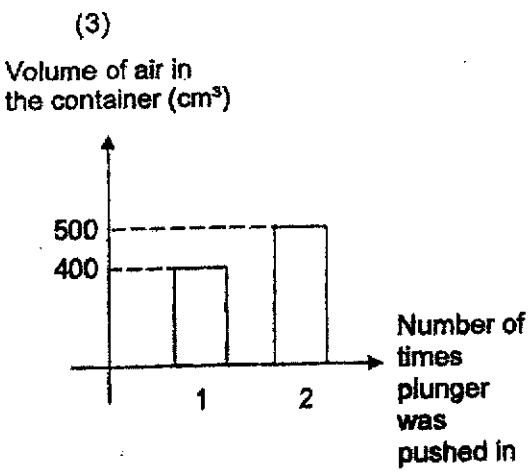
(1)



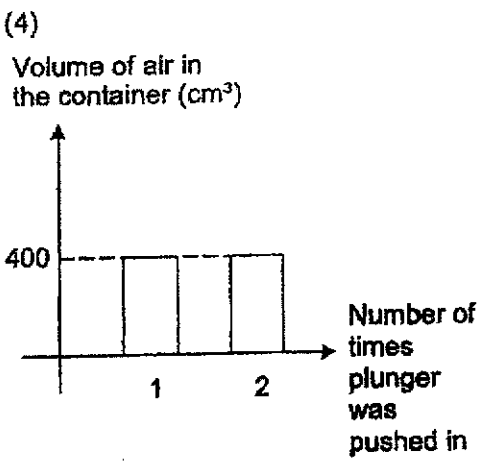
(2)



(3)



(4)

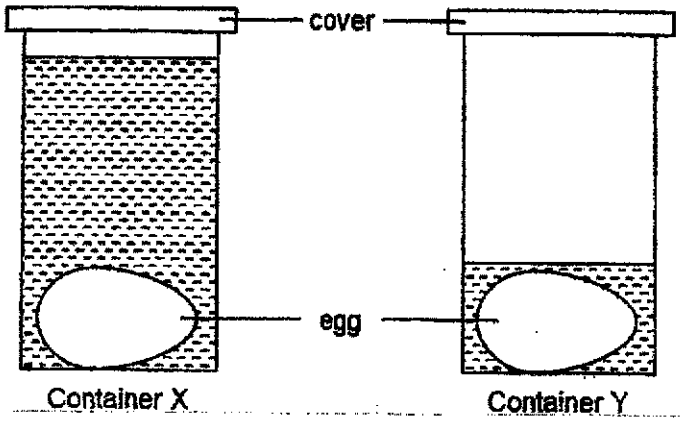


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15 Meng placed two similar eggs in two identical containers, X and Y. He then poured different amounts of water at 100 °C and covered the containers for 10 minutes as shown below.



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

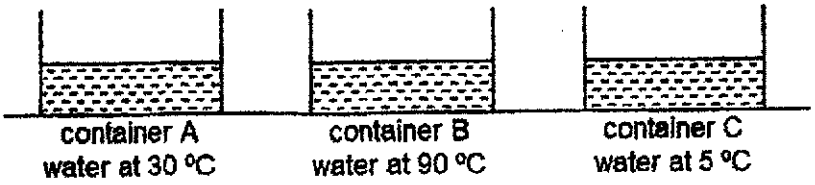
	Observation	Reason
(1)	The egg in container X is less cooked than in container Y.	The amount of water in container X is greater so there is less heat energy to cook the egg.
(2)	The egg in container Y is less cooked than in container X.	The water in container Y has less heat energy to cook the egg.
(3)	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.



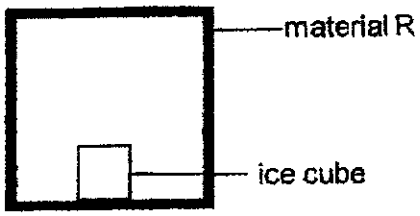
He poured half the water in container A into container B and after one minute, he recorded the first reading of temperature of water in container B.

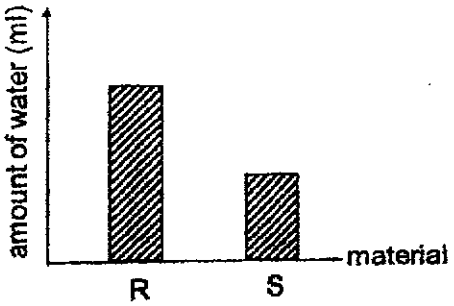
Then he poured half the water in container C into container B and after one minute, he recorded the second reading of temperature of water in container B.

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

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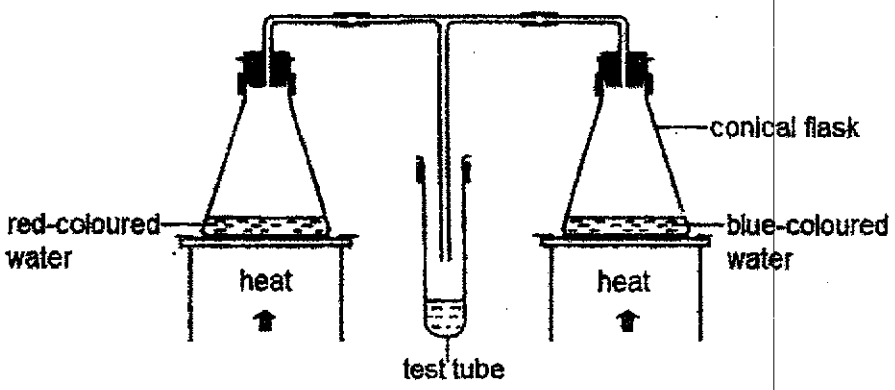
18 The table below shows the state of four substances, A, B, C and D at 22 °C and 78 °C.

	State of substance	
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?

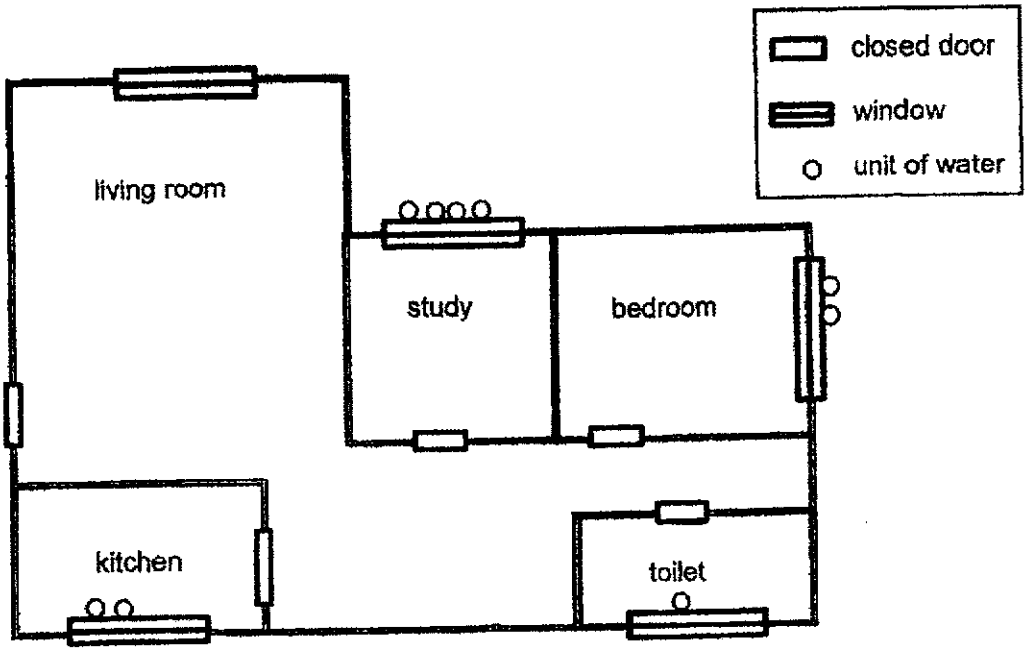
(1) Water
(2) Red-coloured water
(3) Blue-coloured water
(4) Purple-coloured water

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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?

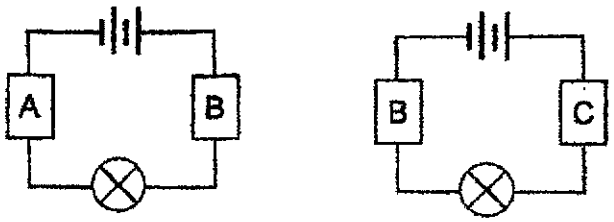
	Temperature of rooms				
	Highest ←				→ Lowest
(1)	kitchen	toilet	living room	bedroom	study
(2)	living room	toilet	kitchen	bedroom	study
(3)	toilet	kitchen	bedroom	study	living room
(4)	study	bedroom	living room	toilet	kitchen

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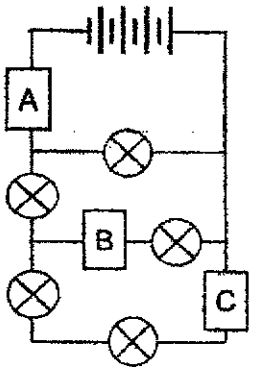
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21 Two circuits were set up as shown below with objects A, B and C.



bulb lighted up bulb did not light up

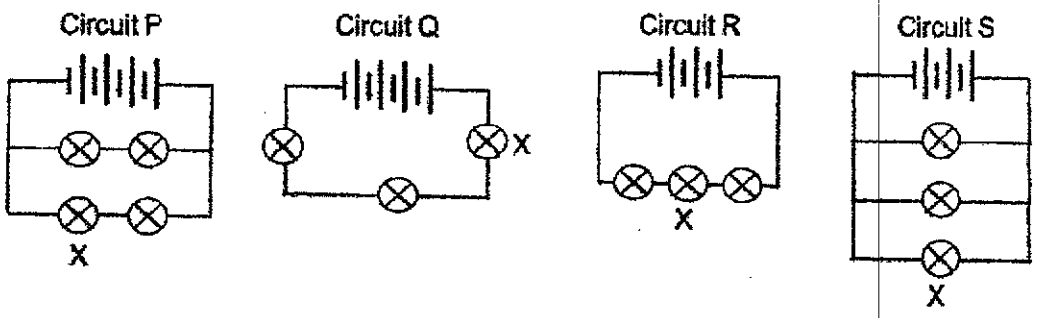
The objects, A, B and C were arranged to form a new circuit below.



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.



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

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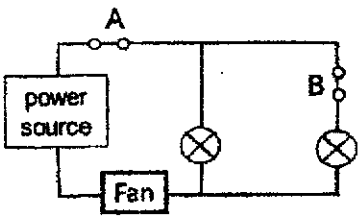
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23 Mr Bala engaged an electrician to install two light bulbs, a fan and two switches, A and B, in a bathroom. He had the following requirements as shown in the table below.

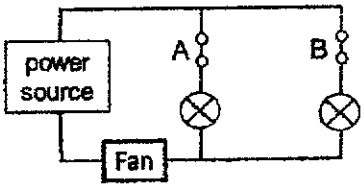
Switched on	Effect
Both A and B	Both light bulbs will light up Fan will turn on
A only	One light bulb will light up Fan will turn on
B only	One light bulb will light up Fan will turn on

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

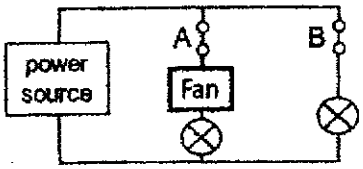
(1)



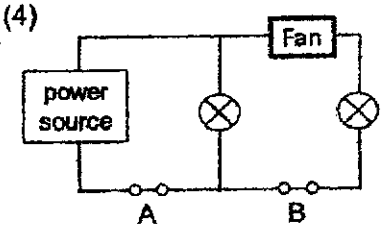
(2)



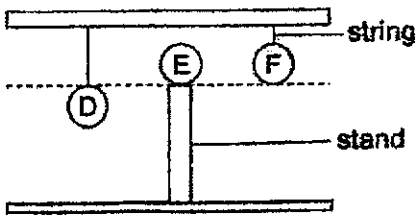
(3)



(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.

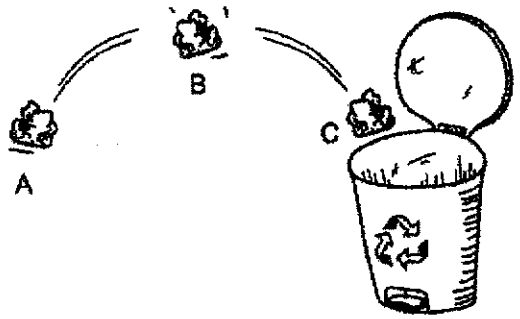
(4) Ball E has the same amount of gravitational potential energy as ball F.

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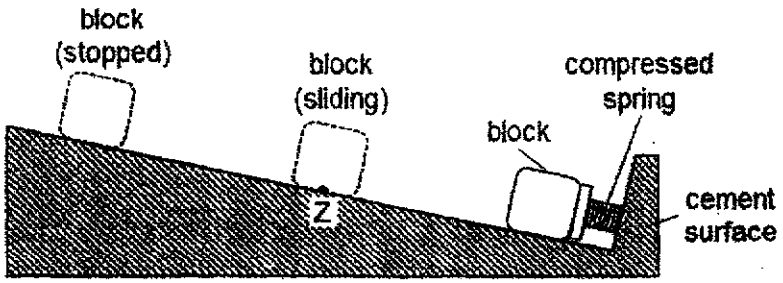
25 A piece of crushed paper was thrown into the bin. It moved from position A to B and to C before falling into the bin as shown below.



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?

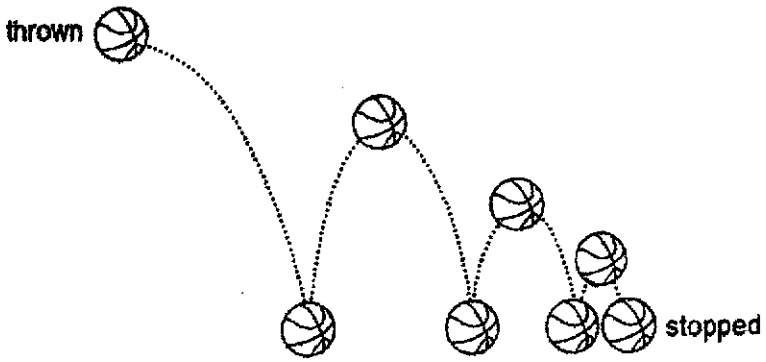
	Elastic spring force	Frictional force	Gravitational force
(1)	yes	yes	yes
(2)	yes	no	yes
(3)	no	yes	no
(4)	no	yes	yes

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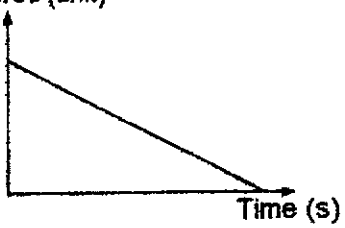
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27 A basketball was thrown and it bounced up and down repeatedly on the floor before coming to a complete stop as shown below.

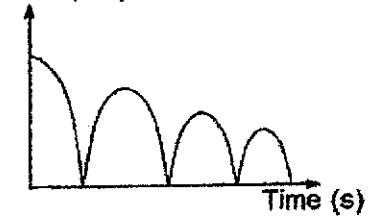


Which of the following graphs best represents the gravitational force acting on the basketball?

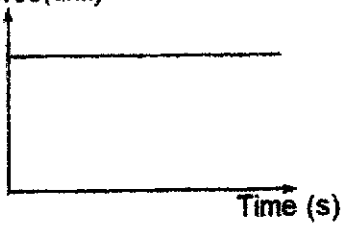
(1)



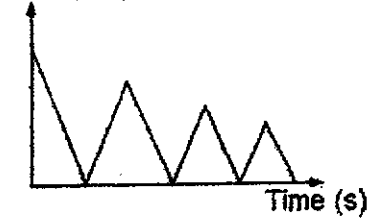
(2)



(3)



(4)

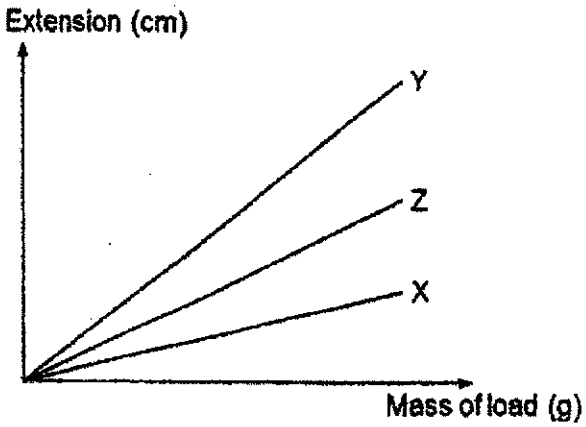


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28 Ewen hung three springs, X, Y and Z, of the same length. He added loads onto each spring and recorded his results in the graph as shown below.



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) 

End of Booklet A

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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: _____

Date : 24 August 2021

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

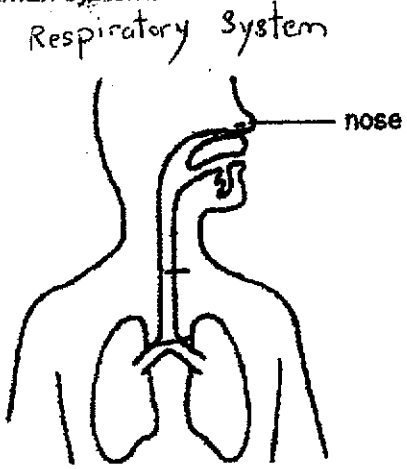
This booklet consists of 16 printed pages including this page.

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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

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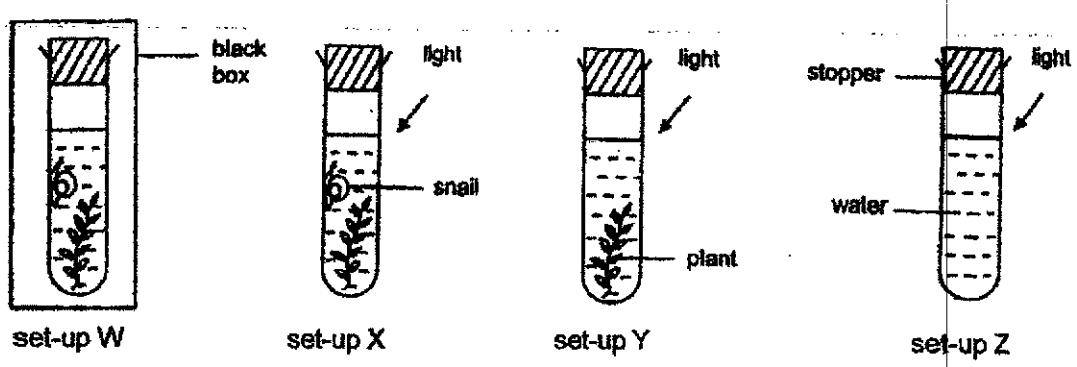
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30 Rui Han wanted to investigate the conditions needed for photosynthesis in plants.

(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

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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]

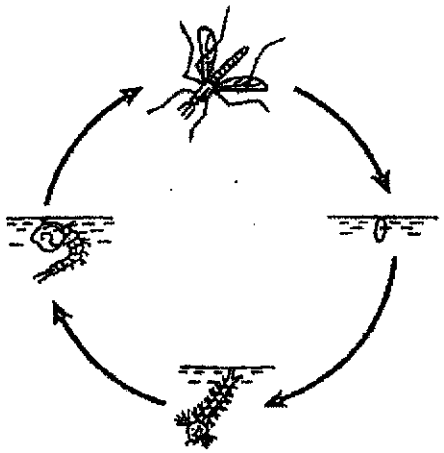
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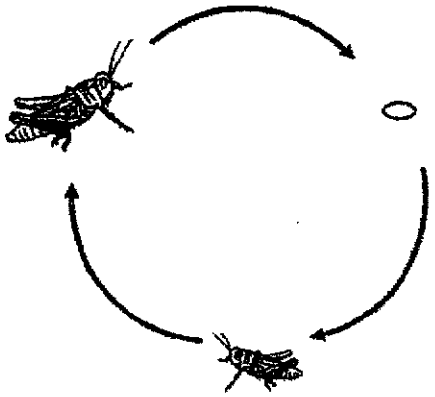
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32 The diagrams below show the life cycles of two insects.





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

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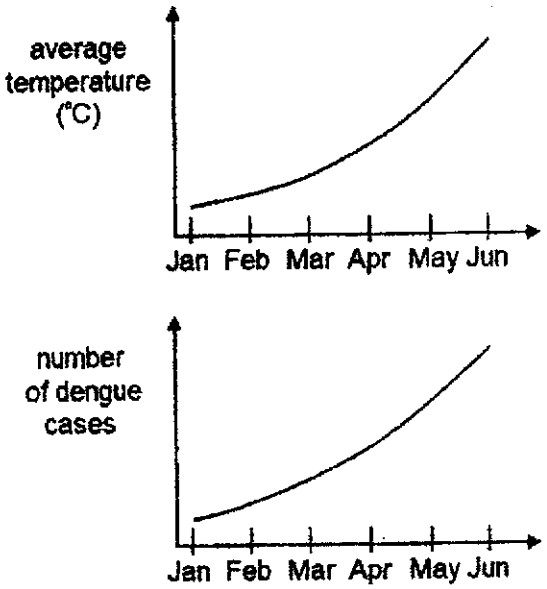
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Dengue fever is a disease caused by the dengue virus which is transmitted to humans through the bite of an Aedes mosquito. A group of scientists studied the effect of the surrounding temperature on the life cycle of the Aedes mosquito. Their results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

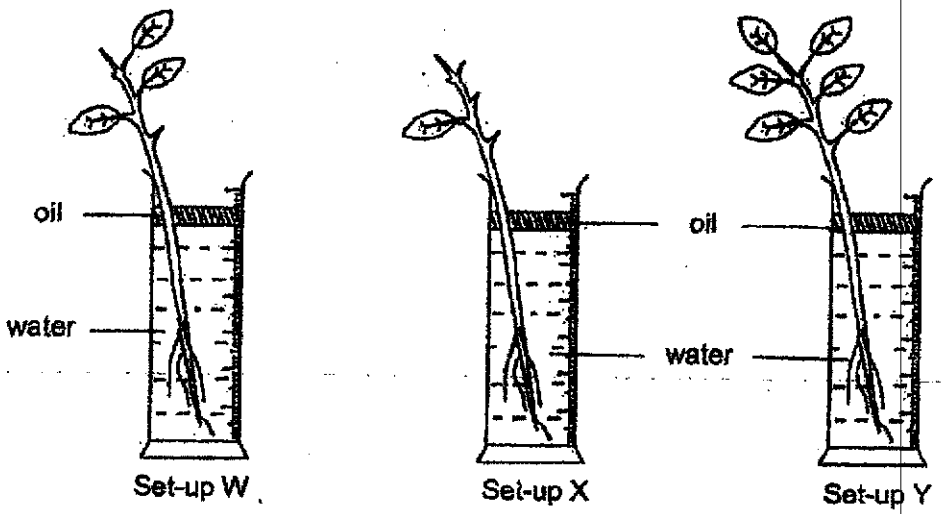
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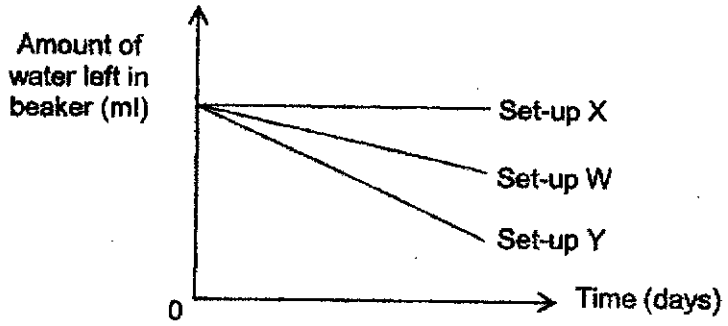
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33 Elise conducted an experiment using the same type of plants placed in three set-ups, W, X and Y. She removed some leaves from plants W and X. Equal amount of water was given to each plant and a layer of oil was added into each beaker.



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]

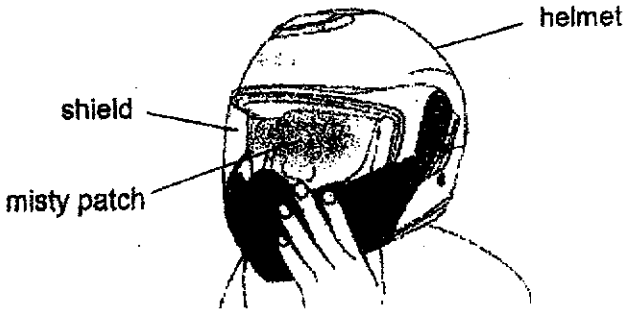
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34 During car races, drivers must wear a safety helmet to protect their head. The safety helmet has a transparent shield. Lewis observed that when he breathed out heavily, the inner shield had a misty patch and he could not see through it clearly as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

_____

_____

_____

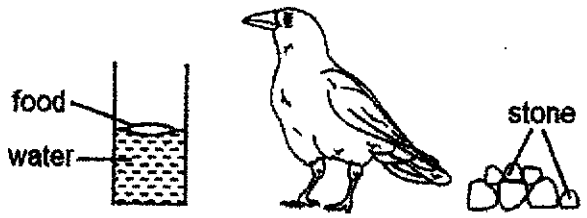
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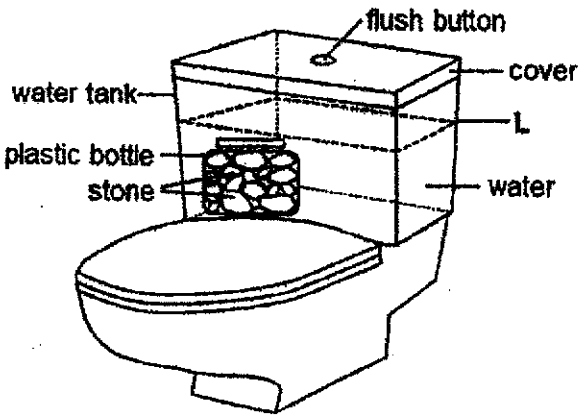
35 Mike dropped some food into a container filled with water at a level too low for his pet bird to reach as shown below.



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

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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.

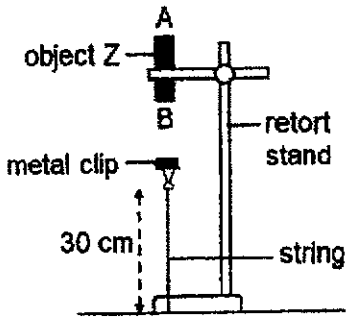


Figure 1

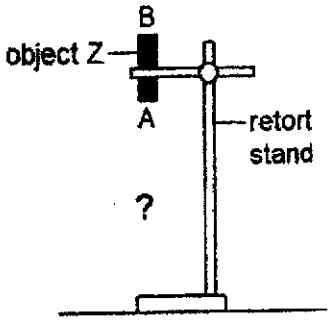


Figure 2

(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 clippcd remained in the air.

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

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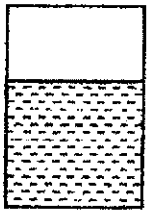
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37 (a) State what is temperature. [1]

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.



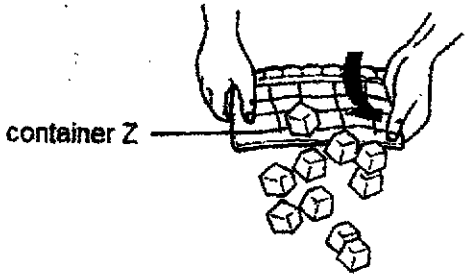
Container A
200 ml of water



Container B
800 ml of water

(b) Which container of water will freeze first? Explain your answer. [1]

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]

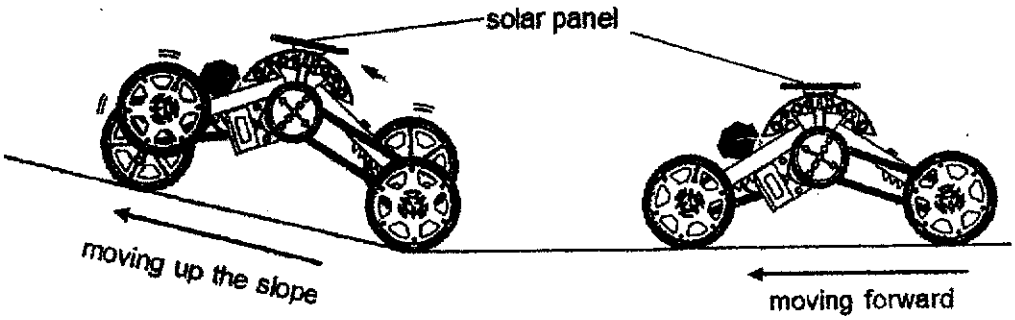
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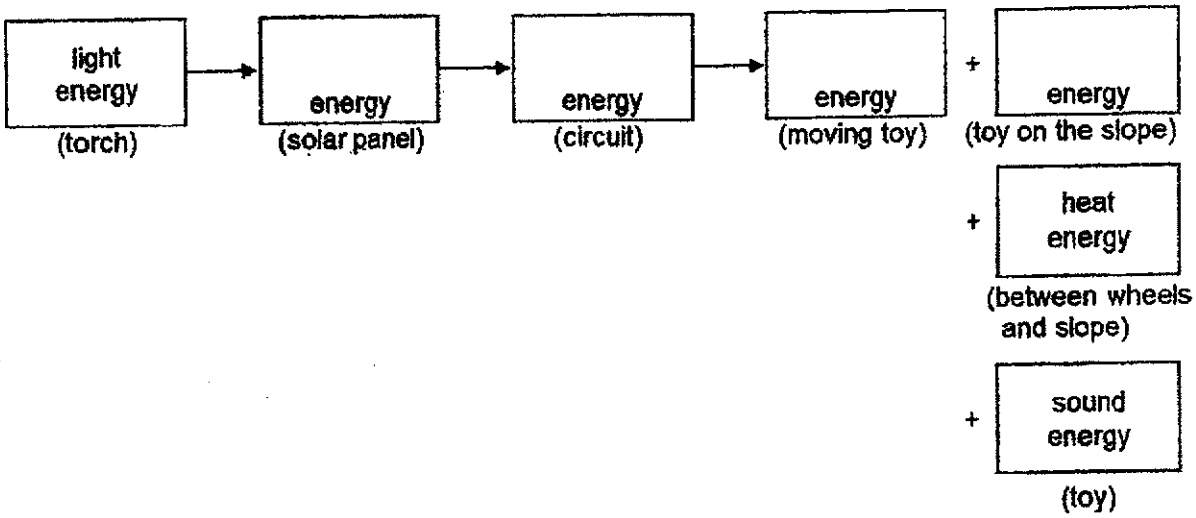
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38 When Adam shone a torch at the solar panel on top of his toy car, it moved forward from a flat surface and then up a slope.



(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]

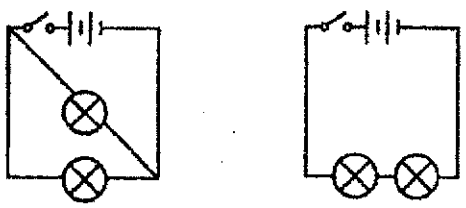
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39 Ivan set up two electric circuits, A and B, as shown below, to test a hypothesis. He compared the brightness of the bulbs in each circuit by using a light sensor and a datalogger.



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.

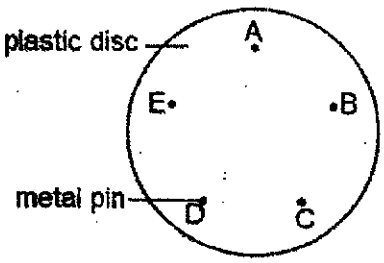


Figure 1

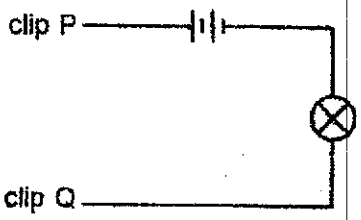


Figure 2

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.

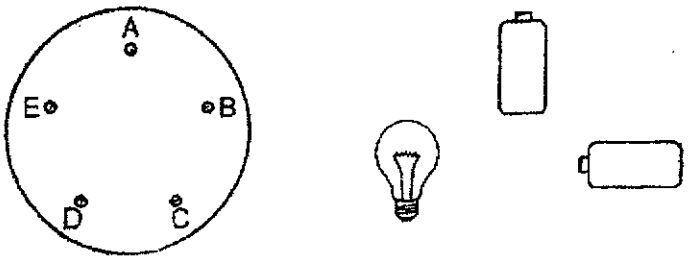
Pin connected to P	Pin connected to Q	Did the bulb light up?
A	C	yes
B	C	no
C	E	no
D	A	yes
E	D	no

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(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]

_____

_____

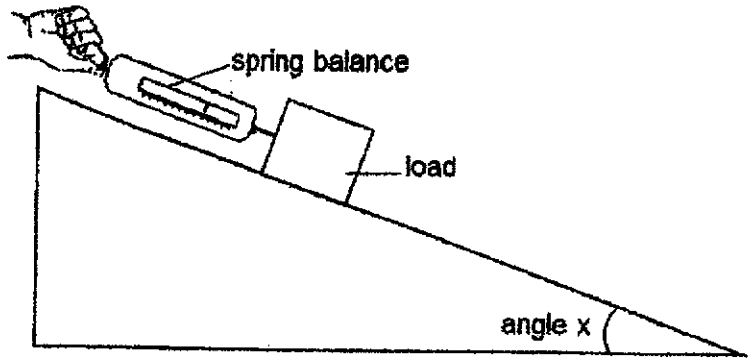
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40 The diagram below shows John pulling a load up a slope using a spring balance. He repeated the experiment for different values of angle x.



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]

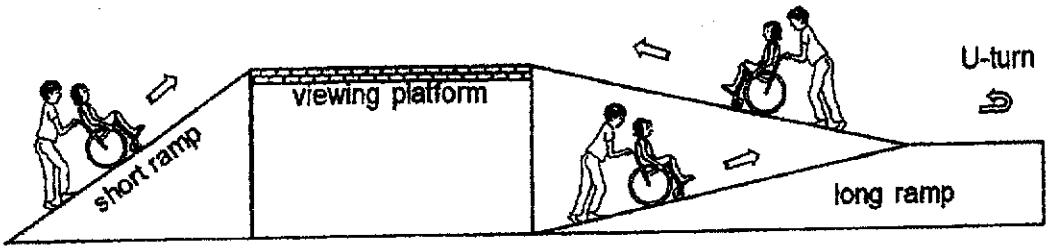
(b) State how the pulling force changes with the angle x. [1]

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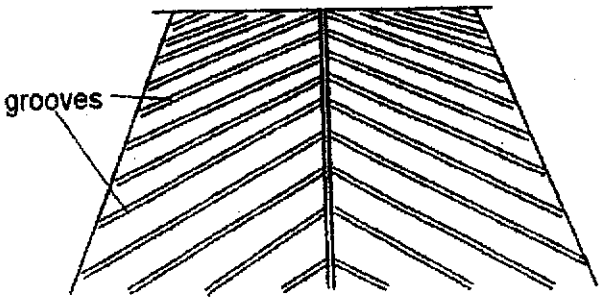
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The diagram below shows two ramps for wheelchair users to access the viewing platform in a park. Mr Ravi prefers to push his wife, in a wheelchair, up to the viewing platform using the long ramp.



(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

End of Booklet B

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ANSWER KEY

YEAR : 2021
LEVEL : PRIMARY 6
SCHOOL : MGS
SUBJECT : SCIENCE
TERM : PRELIMINARY

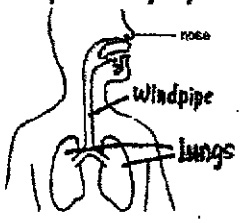
BOOKLET A

Q1	3	Q2	2	Q3	4	Q4	3	Q5	2
Q6	2	Q7	3	Q8	1	Q9	2	Q10	3
Q11	2	Q12	4	Q13	1	Q14	4	Q15	2
Q16	2	Q17	3	Q18	4	Q19	1	Q20	1
Q21	2	Q22	3	Q23	2	Q24	4	Q25	4
Q26	4	Q27	3	Q28	3				

BOOKLET B

Q29

a) Respiratory System



b) Take in oxygen and breathe out carbon dioxide and carry out gaseous exchange.

Q30

a) Water and carbon dioxide are taken in and in the presence of light and chlorophyll, to produce oxygen and food for the plant.

b) Amount of sunlight : W and X
Amount of carbon dioxide : X and Y

Q31

a) As the temperature increase from 5°c to 35°c , the amount of bacteria Z increases. As the temperature increases from 50°c to 95°c , the amount of bacteria Z decreases.

b) So that less bacteria can grow on the food and less people will get food poisoning.

c) At 95°c, some bacteria will still reproduce on the food so people who eat it can still get food poisoning.

Q32

a) There are four stages in the first life cycle, but there are only three stages in the second life cycle. In the second life cycle, the young of the insect looks like the adult but in the first life cycle the young does not look like adult.

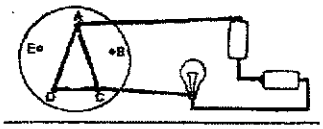
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	b) As the temperature increases, the number of days for one complete life cycle for the aedes mosquito shortens, so when the aedes mosquito complete one life cycle faster, it will be able to reproduce faster, so three will be more aedes mosquito to spread more dengue fever.
Q33	a) Set up X. Water is taken in by the roots of the plant to carry out life processes and so the amount of water should decrease, but the graph shows that there is no change in volume of water. b) Yes. There was only one changed variable, which is the number of leaves on the plant in this experiment.
Q34	a) Strong b) Liquid c) When Lewis breathed out heavily, the warm water vapour be breathed out touched the cooler inner surface of the shield, lost heat and condensed to form water droplets.
Q35	a) It would increase. The stones took up space in the container, causing the water level to rise. b) The plastic bottle filled with stones took up space in the water tank, thus it needed less water to fill the water tank up to level L, so less water was used.
Q36	a) Gravitational force and magnetic force. b) Object Z is a magnet and attracts the magnetic metal clip. c) The metal dip would still float in the air. d) Magnet Q has a weaker magnetic strength so a longer string would decrease the distance between the metal clip and magnet Q so that magnet could attract metal clip.
Q37	a) How hot or cold something is b) A. There was less water in container A, so there is less heat in that 200ml of water so less heat will have to be lost to freeze the water in A than in B. c) Flexible
Q38	light energy → potential energy → electrical energy → kinetic energy → potential energy a) b) Some electrical energy was converted to gravitational potential energy when the toy was moving up the slope. Less electrical energy was converted to less kinetic energy so the toy car moved slower. c) Apply oil onto the flat surface.
Q39	a) Light bulbs in circuits are brighter when they are connected in series. b) The arrangement of the bulbs.

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	c)  d) Yes. C and D are connected so when there were connected in a circuit it would become a closed circuit and electric current could flow through so the bulb would light up.
Q40	a) A push or a pull b) As angle X increases, the pulling force increases. c) On the long ramp, less force is needed for Mr Ravi to push his wife on the wheelchair, because the long ramp has smaller angle X. d) The groves increase the friction force between the wheels and the ramp and prevent the wheel chair from rolling down the slope.

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Methodist Girls' School (Primary)
P6 Science Preliminary Examination 2021

Booklet A: MCQ (28 x 2 = 56 marks)

MCQ	Ans	Explanation
1	(3)	Moss and mushroom reproduce by spores. Mushroom does not need sunlight to grow. A penguin has feathers but a bat does not.
2	(2)	The worms move to their preferred environment. A is wrong as the number of worms remained at 20. C is wrong as the worms in both containers survive at the end of the experiment.
3	(4)	The cellophone bag is similar to the cell membrane which controls the movement of substances entering and leaving the cell.
4*	(3)	Before its first leaves appear, a seedling does not need sunlight to make food as it obtains its food from the seed leaves.
5	(2)	Iodine will turn dark blue in the presence of starch. Excess sugar made by the leaves in the presence of sunlight will be stored as starch.
6	(2)	Part J and K contain the male and female reproductive cells respectively. Part C is the anther which contains the male reproductive cells and Part A is the ovary which contains the female reproductive cells.
7	(3)	More seedlings of plant R are found nearer to the parent plant so the likely method of dispersal is by splitting, and fruit Y has a pod-like structure which splits open when dry. Seedlings of plant Q are scattered at random distances from the parent plant and its method of dispersal is likely by animals. Fruit W has hook-like structures which attach itself to animals' fur.
8	(1)	Exchange of gases takes place in the lungs and oxygen is absorbed into the blood and carried to the heart and then to other parts of the human body. Exchange of gases takes place in the gills of the fish so blood vessel **X** carries blood rich in oxygen.
9	(2)	Food is digested partially in the mouth. Digested food passes through the walls of the small intestine and is absorbed into the blood. Water is removed from undigested food in the large intestine.
10	(3)	Water-carrying tubes were not removed as the plant did not die. Two swollen parts above each cut indicates the accumulation of food due to the removal of food-carrying tubes at both cuts.
11	(2)	Carrier X is stronger than Y due to its ability to withstand the mass of the objects without breaking.
12	(4)	In a fair test, there is only one changed variable. Y and Z have two batteries and iron rod of the same length but a different number of coils of wire. (Note: set-up X, shorter iron rod).
13	(1)	The dancers nearer the light source will cast bigger shadows as more light is blocked. The dancers nearer the screen and further from the light source will block less light and cast smaller shadows.
14*	(4)	The volume of air in the container is 400 cm^3 (500 - 100 = 400). When more air is pumped in, the mass of air increases but its volume remains unchanged at 400 cm^3 as air can be compressed to occupy the same amount of space in the container.
15	(2)	A greater volume of hot boiling water will contain more heat energy so the egg in container X will be more cooked.
16	(2)	1st reading: When water at 30 °C is mixed with water at 90 °C, final temperature of water is about 70 °C.

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		2nd reading: When water at 70 °C mixed with water at 5 °C, final temperature of water is about 40 °C.
17*	(3)	The ice in material S melted less as less water was collected. S is a poor conductor of heat. To keep food hot for the longest time, the container should be a poor conductor of heat so that less heat is lost (for hot food) to the surroundings. To keep the drinks cold, a poor conductor ensures less heat is gained (for cold drinks) from the surroundings.
18*	(4)	At 22 °C, substance D is in liquid state so its melting point is below that temperature. At 78 °C, substance D is in liquid state so its boiling point is above 78 °C.
19*	~~(4)~~ (1)	Water in the coloured water evaporated into warmer water vapour which came into contact with the cooler surface of the glass tube, lost heat and condensed to form water droplets which dripped into the test tube.
20*	(1)	The temperature in the kitchen is higher than the toilet so the condensation rate on the inner surface of the window is greater. No condensation takes place in the living room. The temperature in the study room is lower than the bedroom so condensation rate on the outer surface of the window is higher.
21	(2)	Object C is an electrical insulator so it does not allow electricity to pass through. Therefore bulbs in the same electrical pathway as Object C will not be able to light up.
22	(3)	Bulbs in parallel circuits will be the brightest. Bulb X in Circuit S will have more electric current passing through as compared to bulb X in Circuit P so it is brighter.
23	(2)	The fan must be positioned such that electrical current can pass through when either switch is closed. Each switch must be able to control both bulbs independently.
24	(4)	Balls of the same mass and height will have the same amount of gravitational potential energy.
25	(4)	From position A to B, the height of the crushed paper increases so gravitational potential energy will increase. From position B to C, the gravitational potential energy will decrease as it will be converted to kinetic energy so kinetic energy increases.
26	(4)	Gravitational force pulls the sliding block down/towards the centre of the earth all the time. At position Z, there was frictional force between the sliding block and the cement surface. There is no elastic spring force as the spring was not in contact with the block.
27*	(3)	Gravity pulls the basketball towards the centre of the earth. The amount of force is equal to the weight of the basketball.
28	(3)	From the graph, when the same amount of force is applied, the extension of Y is the most, followed by Z, and X has the least extension. Option 3 shows the correct extensions for th 3 springs.

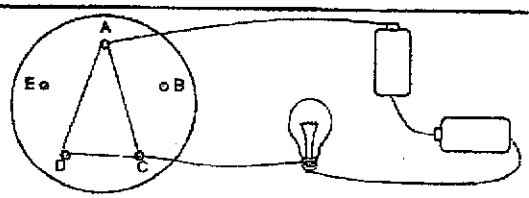
Booklet B: Open-ended (44 marks)

Qn	Mark	Answer
29a	1	Windpipe; Lung
29b	1	It takes in oxygen and gives out carbon dioxide OR It allows the exchange of gases.
30a	1	Photosynthesis is the process by which a plant takes in water and carbon dioxide and uses chlorophyll in the leaves to trap light energy to produce sugar and release oxygen.
30b	2	

Variable	Tubes to compare
Amount of sunlight	W and X
Amount of carbon dioxide	X and Y

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31a	1	Amount of bacteria Z increases from 5°C to 35°C and decreases after 35°C.
31b	2	At 5°C, the amount of bacteria Z reproduced/increased the least. This ensures that food is safe to be eaten / prevents food from turning bad easily.
31c*	1	At 95°C, bacteria Z is still present and it is able to reproduce when the food cool down to room temperature.
32a	2	The life cycle of a mosquito has 4 stages but the life cycle of a grasshopper has 3 stages. The young of a grasshopper looks like its adult but the young of a mosquito does not. Part of the life cycle of mosquito is spent in water but the life cycle of grasshopper is spent on land.
32b	2	As the temperature in Singapore increases, the mosquito becomes adults faster/ reproduces faster / life cycle of Aedes mosquito shortens so there will be more mosquitoes (to bite the humans), leading to a rise in dengue cases.
33a*	2	Set up X Water is taken in by the roots of the plant to carry out life processes and so the amount of water should decrease, but the graph shows that there is no change in volume of water.
33b	2	Yes, because there is only one changed variable which is the number of leaves.
34a	1	Strength / strong
34b	1	Liquid.
34c	2	When he breathes out, warmer water vapour from his breath comes into contact with the cooler (inner) surface of the shield and condenses to become water droplets / misty patch.
35a	1	The water level rose as the stones occupied space.
35b	1	The plastic bottle occupies space (initially taken up by water only)/ displaces water in the tank so less water is required to fill the tank to level L
36a	1	Gravity/Gravitational force and magnetic force (of attraction).
36b	1	Object Z is a magnet and attracts the magnetic metal clip.
36c	1	It remained in the air/ was attracted to object Z.
36d	2	Magnet Q has a weaker magnetic strength so a longer string would decrease the distance between the metal clip and magnet Q so that the magnet could attract the metal clip.
37a	1	Temperature is the measurement of how hot or cold something is.
37b*	1	A. It has less water so it has less heat energy to lose and reach 0 °C first.
37c	1	It is flexible / can bend easily.
38a	2	electrical → electrical → kinetic + (gravitational) potential
38b*	2	Some electrical energy was converted to (gravitational) potential energy when the toy was moving up the slope. Less electrical energy was converted to less kinetic energy so the toy car moved slower.
38c	1	Shine a brighter torch /more torches at the solar panel. OR Give the toy car a push. OR Add lubricant/water/oil on the flat surface.
39a*	1	The brightness of the bulbs in a circuit increases/ decreases/ remains the same when the bulbs are arranged in parallel/ series.
39b	1	The arrangement of the bulbs in the circuit.
39c	2	

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		Any 2 or 3 of the wires for connection on the plastic disc: AD, DC and/or AC.
39d	1	Yes. There is a closed circuit for electric current to flow through the bulb.
40a	1	A force is a push or a pull.
40b	1	When angle x increases, a greater pulling force is required. OR When angle x decreases, a smaller pulling force is required.
40c*	1	The long ramp has a smaller angle x than the short ramp so Mr Ravi will use less pushing force to push his wife and the wheelchair up the ramp.
40d	1	The grooves increase the frictional force between the wheels and the ramp and prevent the wheelchair from rolling down the slope / provide better grip for the wheels of the wheelchair.

*denotes poorly attempted questions

8

END

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