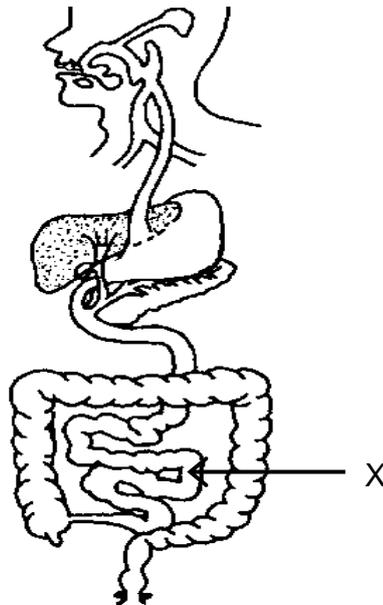


For each question from 1 to 30, four options are given. One of them is the correct answer. Make your choice (1, 2, 3 or 4). Shade the correct oval (1, 2, 3 or 4) on the Optical Answer Sheet.

(30 X 2 = 60 marks)

1 What is the function of X in the diagram of the human digestive system below?

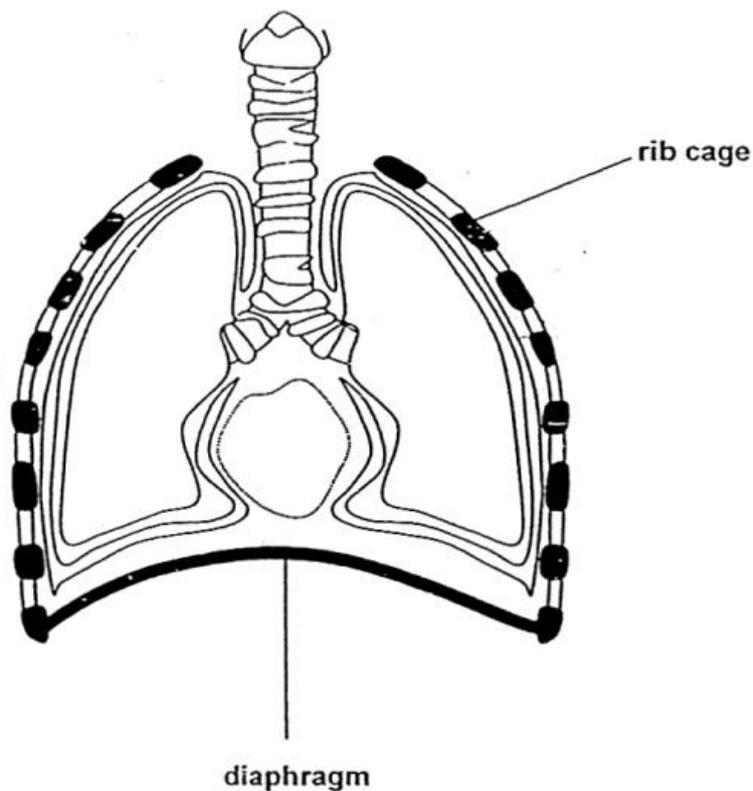


- | | |
|-------------------------|---------------------------|
| A: Digests food | C: Absorbs digested food |
| B: Absorbs excess water | D: Stores undigested food |
| 1) C only | 3) B and C only |
| 2) A and C only | 4) B and D only |

2 Which part of the plant cell is **incorrectly** matched to its function?

(1)	Nucleus	Controls all cellular activities
(2)	Cytoplasm	Cellular activities take place here
(3)	Chloroplast	Contains chlorophyll which traps light energy to make food
(4)	Cell membrane	Supports the cell and gives the cell a regular shape

3 The diagram below shows the human respiratory system.



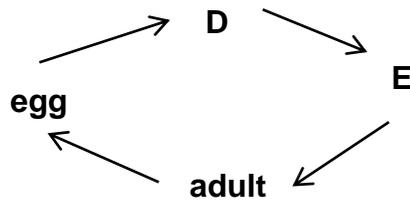
Which one of the following correctly describes the movements of the diaphragm and ribs during inhalation and exhalation?

	Diaphragm		Ribs	
	Inhalation	Exhalation	Inhalation	Exhalation
(1)	relaxes	contracts	down and inwards	up and outwards
(2)	relaxes	contracts	up and outwards	down and inwards
(3)	contracts	relaxes	down and inwards	up and outwards
(4)	contracts	relaxes	up and outwards	down and inwards

4 Penny wants to keep her coffee **hot** in a cup for a longer time. Which one of the following options is the **best** combination for her cup?

	Material	Colour	Conducting heat
(1)	Steel	Black	Good conductor
(2)	Aluminium	Silver	Good conductor
(3)	Styrofoam	White	Poor conductor
(4)	Paper	White	Poor conductor

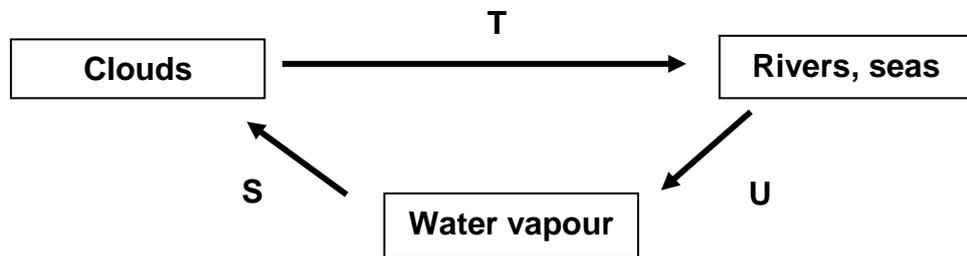
5 The diagram below shows the various stages in the life cycle of a butterfly.



Which pair of the following statements correctly describes what happens to the butterfly at Stage D and Stage E?

	Stage D	Stage E
(1)	It moults a number of times.	It does not eat at all.
(2)	It feeds on leaves.	It feeds on plant sap.
(3)	It feeds on plant sap.	It feeds on leaves.
(4)	It eats a lot.	It moults a number of times.

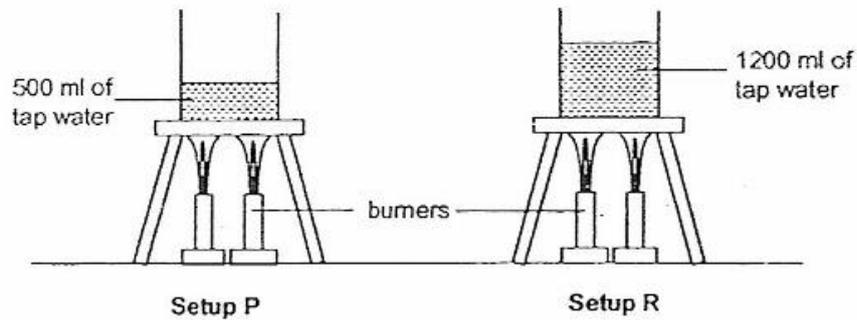
6 The diagram below shows the water cycle.



Which of the following **best** represents processes S, T and U?

	S	T	U
(1)	Evaporation	Rain	Condensation
(2)	Rain	Condensation	Evaporation
(3)	Evaporation	Condensation	Rain
(4)	Condensation	Rain	Evaporation

7 An experiment is set up as shown in the diagram below.



Which of the following statements is most likely to be **true**?

- A: The water in both setups will start to boil at the same time.
- B: The water in Setup P has more heat energy than the water in Setup R.
- C: The water in both setups is at the same temperature when they are boiling.
- D: The water in Setup R is at a higher temperature than the water in Setup P when they are boiling.

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

8 The table below shows the functions of four different adaptations of an animal.

Adaptation	Function
P	Stores fat to release energy when animal has no food.
Q	Helps the animal to blend into their environment.
R	Protects the animal from burns when it kneels on hot sand.
S	Prevents the animal from sinking into the sand.

Which one of the following correctly represents P, Q, R and S?

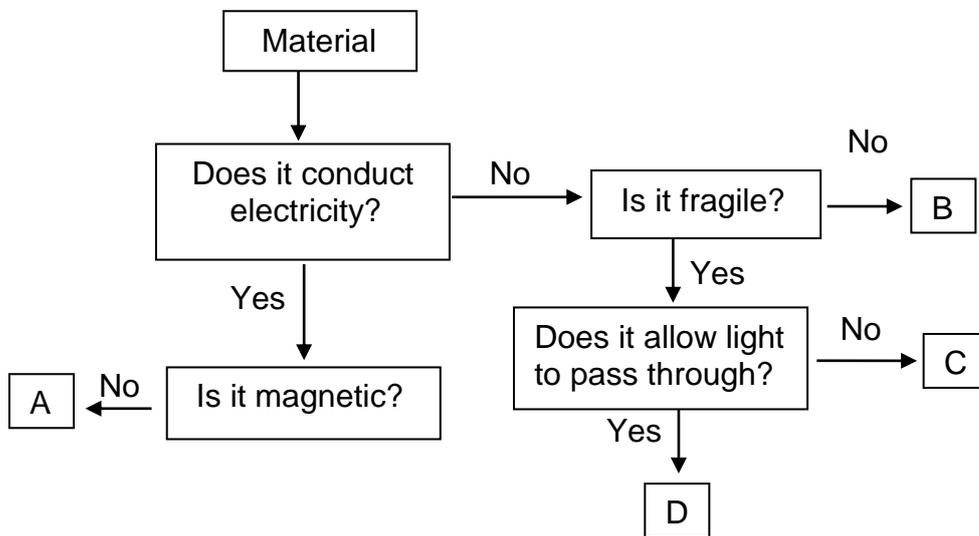
	P	Q	R	S
(1)	Blubber	Streamlined body	Thick body covering	Webbed feet
(2)	Hump	Body colouring	Thick skin on knees	Broad, flat feet
(3)	Stomach	Body shape	A hard shell	Soles covered with stiff hairs
(4)	Liver	Patterns on body	Stiff hairs on knees	Long legs

9 What are the functions of the stem of a plant?

- A: It absorbs water.
- B: It absorbs light for photosynthesis.
- C: It transports food to the other parts of the plant.
- D: It supports the branches and leaves of the plant.

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

10 Study the flowchart carefully.

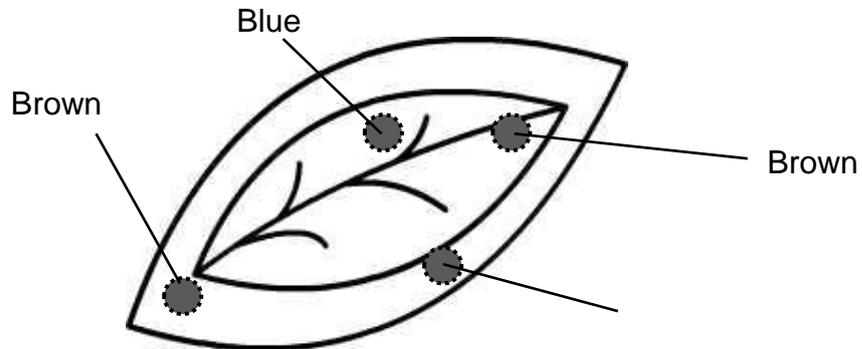


Which one of the following are possible materials for A, B, C and D?

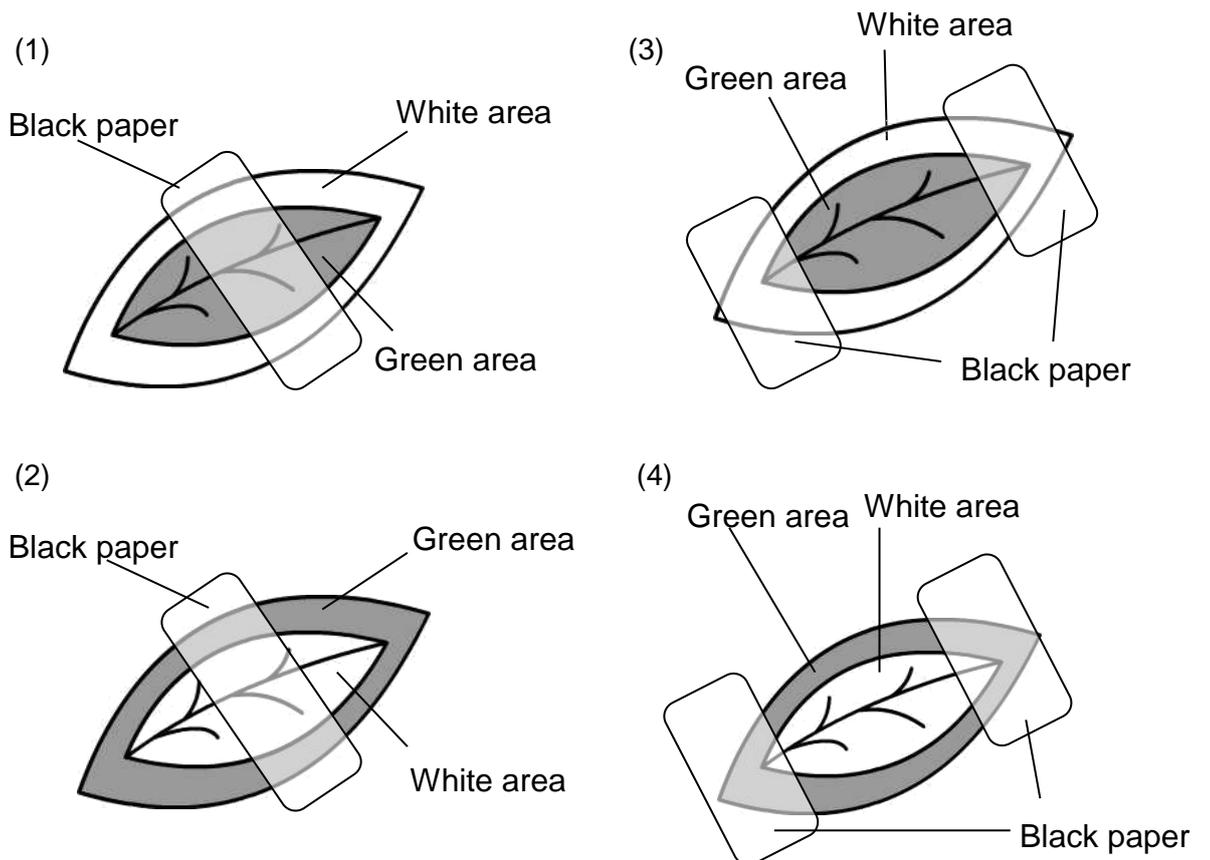
	A	B	C	D
(1)	Steel	Clay	Glass	Wood
(2)	Glass	Plastic	Wood	Ceramic
(3)	Copper	Ceramic	Metal	Plastic
(4)	Aluminum	Rubber	Ceramic	Glass

- 11 A plant was left in a dark cupboard for two days. At the end of two days, a leaf was covered partially with black paper and left in the sun. After several hours, the leaf was plucked off and different parts of the leaf were tested for starch.

The diagram below shows the results of the test.



Which of the following shows the leaf at the beginning of the experiment?



12 Which of the following possess the same form of energy?

A: A wound-up toy car

B: A kettle of boiling water

C: A stretched rubber band

D: A charged phone cell battery

(1) A, B and C only

(2) A, B and D only

(3) A, C and D only

(4) A, B, C and D

13 The table below shows the states of four substances, P, Q, R and S, at different temperatures.

State of substance at	Substances			
	P	Q	R	S
50°C	Solid	Liquid	Solid	Solid
85°C	Solid	Liquid	Solid	Liquid
120°C	Liquid	Liquid	Solid	Liquid

Which of the following statements is true?

(1) The boiling point of P is 120°C.

(2) Q has the lowest boiling point.

(3) R has the highest freezing point.

(4) The freezing point of S is between 50°C and 85°C.

14 Which of the following are needed for photosynthesis?

A: Water

B: Sugar

C: Light energy

D: Oxygen

E: Carbon dioxide

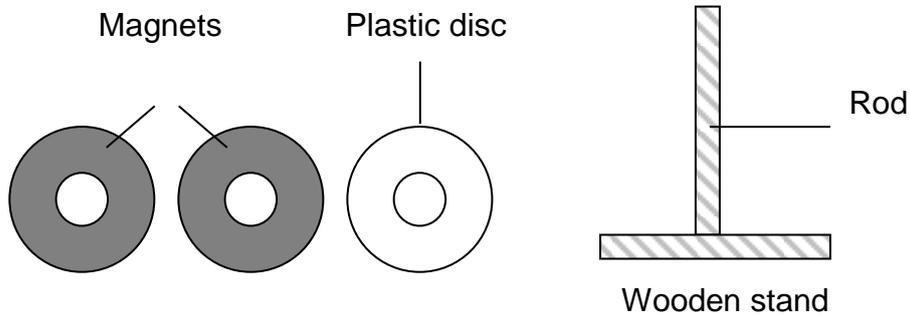
(1) A and E only

(2) A, B and D only

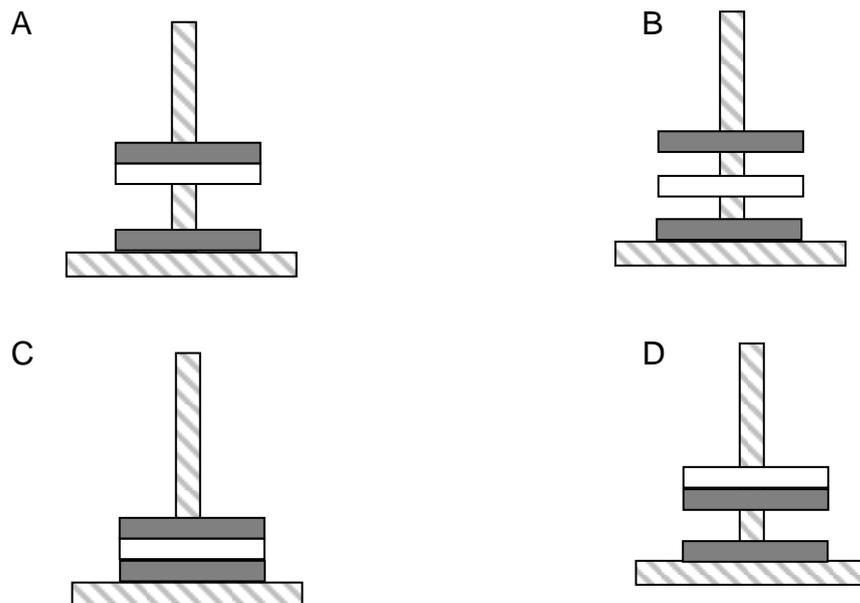
(3) A, C and E only

(3) B, D and E only

- 15 The diagram below shows 3 discs, each with a hole in the centre. Two of the discs are magnets and one is a light plastic disc. All 3 discs can pass through the rod of the wooden stand.

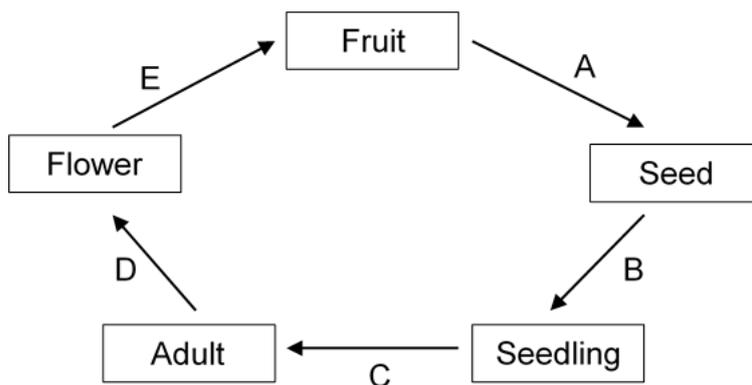


When the 3 discs are slotted through the rod, which of the following observations of the discs would be **least likely**? (only the side view of the discs and stand are shown)



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

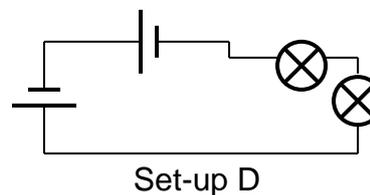
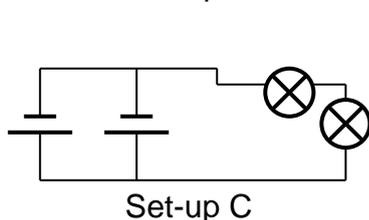
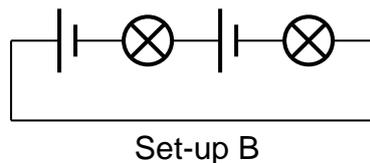
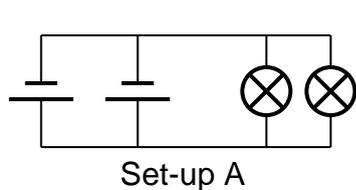
16 The diagram below shows the life cycle of a plant.



At which stages do the processes of fertilisation and germination take place?

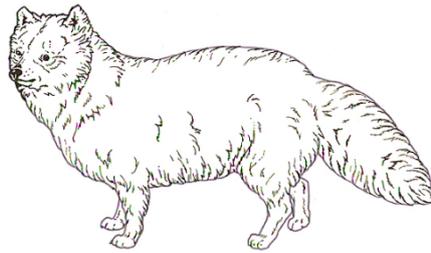
	Fertilisation	Germination
(1)	A	D
(2)	E	B
(3)	D	C
(4)	C	E

17 Jenny wanted to investigate if the arrangement of the bulbs in a circuit will affect the amount of current flowing through it. Which of the following experiment set-ups should she use?



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

18 The diagram below shows an Arctic fox.

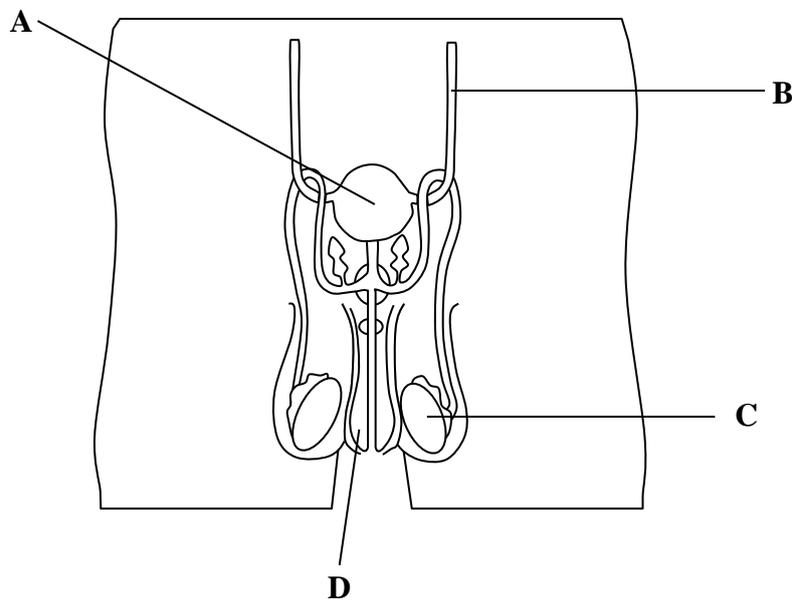


Which of the following helps the Arctic fox to survive in the cold temperature?

- A: Its fur coat thickens.
- B: It has a keen sense of hearing.
- C: Its footpads are densely furred.
- D: Its fur colour changes to white in winter.

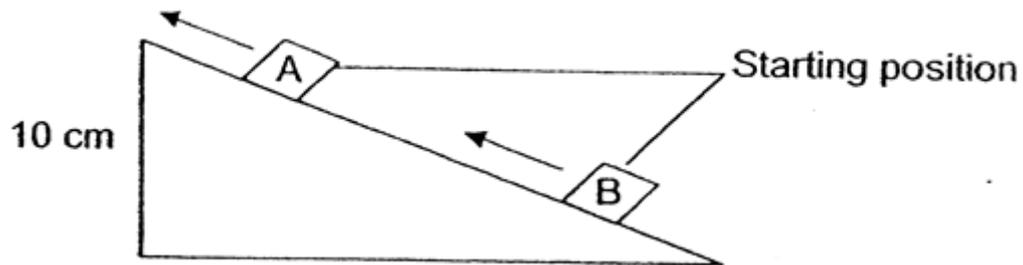
- (1) B only
- (2) A and C only
- (3) B, C and D only
- (4) A, B, C and D

19 Which parts shown below make up the human male reproductive system?



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

- 20 Two identical wooden blocks A and B, are being pulled up from different positions on a slope. Block A and B each moves up 4 cm from their starting position.

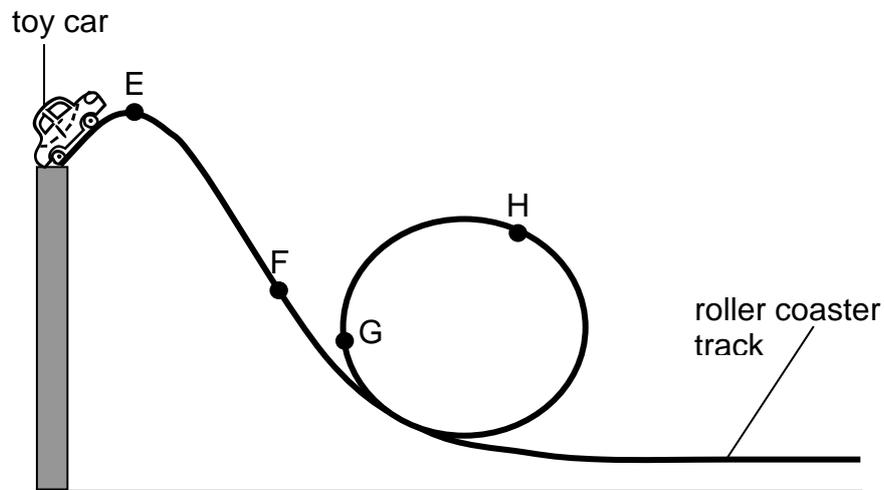


Which of the following statements are true about the wooden blocks?

- A: Block B needs more force to pull it up than Block A.
- B: Block A and B need the same amount of force to pull them up.
- C: Both blocks have the same amount of frictional force acting on them.
- D: Block A has a greater amount of gravitational force acting on it.

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

- 21 The picture below shows a path taken by a toy car on a toy roller coaster track.

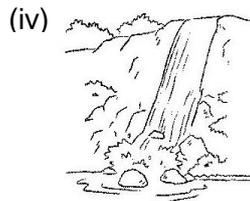
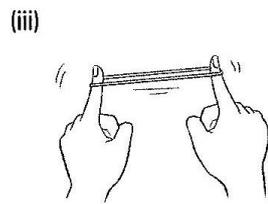
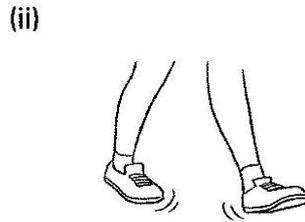
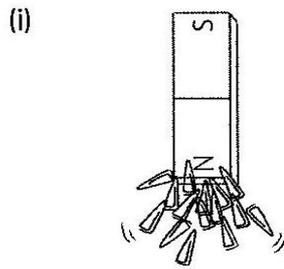


Arrange the amount of gravitational potential energy the toy car possessed at different positions, E, F, G and H in **descending** order (from the most gravitational potential energy to the least).

Which one of the following correctly shows the **correct** order?

- (1) E, F, G, H
- (2) E, F, H, G
- (3) E, H, F, G
- (4) E, G, H, F

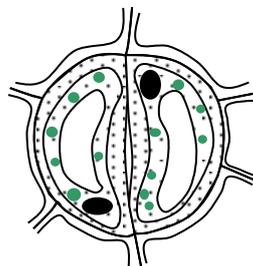
22 Forces are involved in the four situations shown below.



Which of the following correctly identifies the forces involved in each situation?

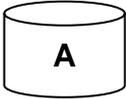
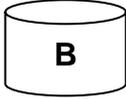
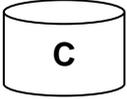
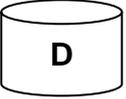
	(i)	(ii)	(iii)	(iv)
(1)	Magnetic	Frictional	Elastic	Gravitational
(2)	Frictional	Elastic	Gravitational	Magnetic
(3)	Elastic	Gravitational	Magnetic	Frictional
(4)	Gravitational	Magnetic	Frictional	Elastic

23 The diagram below shows the stoma of a leaf. Would the stomata of a leaf be opened or closed on a hot, dry day? Why?



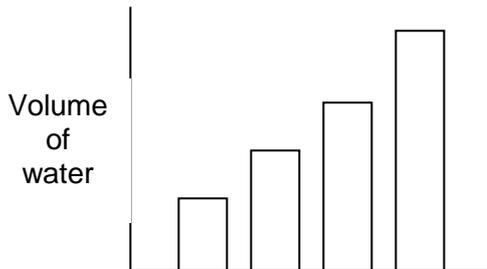
	Stomata	Reason
(1)	Closed	To prevent excessive water loss
(2)	Opened	To make as much food as possible
(3)	Closed	To prevent heat from entering the plant
(4)	Opened	To take in as much carbon dioxide as possible

24 Four identical containers A, B, C and D were filled with the same volume of water. They were left in four places under different conditions for 8 hours as shown in the table below.

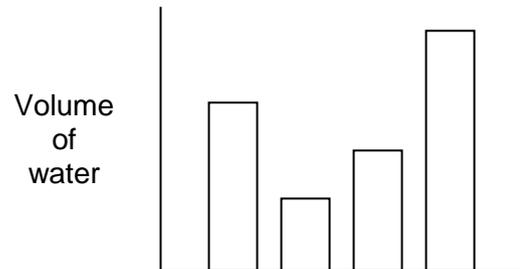
Conditions	Sunny Not windy	Sunny Windy	Cloudy Not windy	Cloudy Windy
Containers	 A	 B	 C	 D

Which of the following graphs shows the volume of water in A, B, C and D after 8 hours?

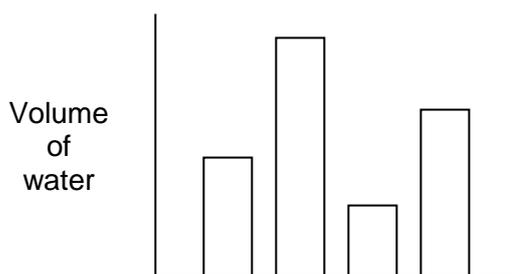
(1)



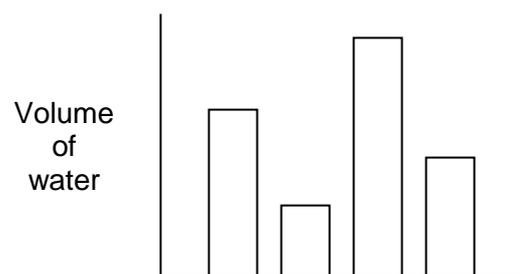
(3)



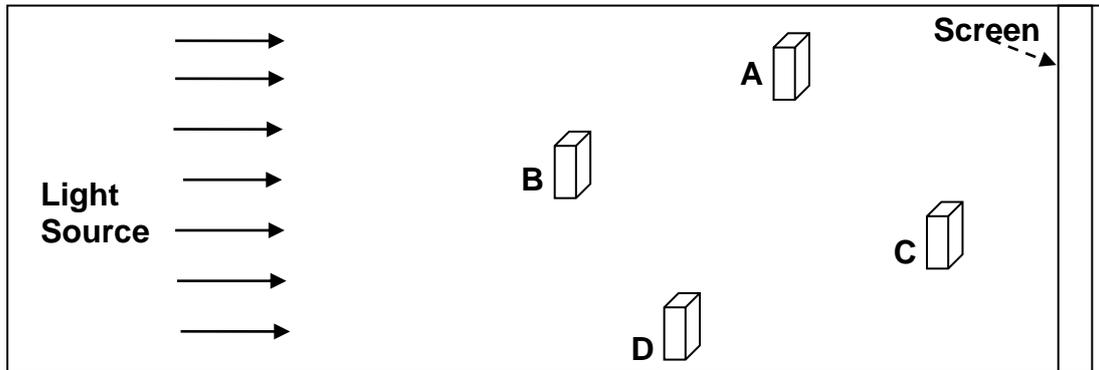
(2)



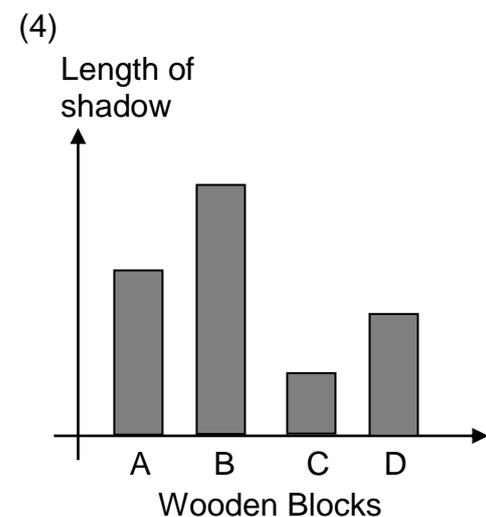
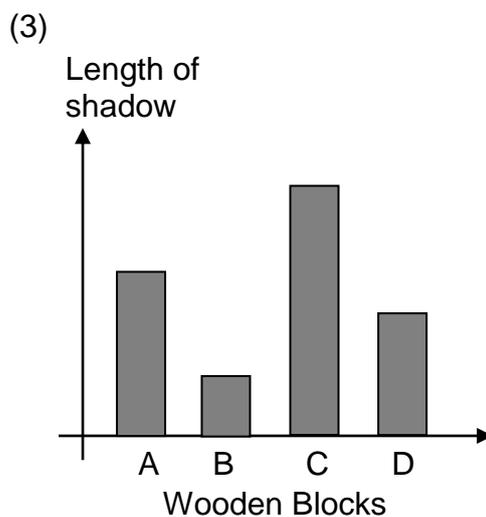
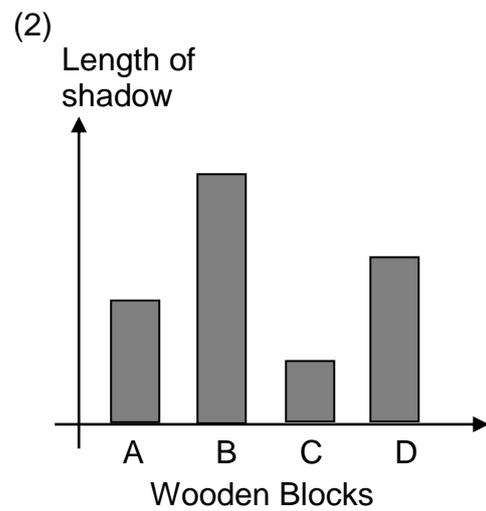
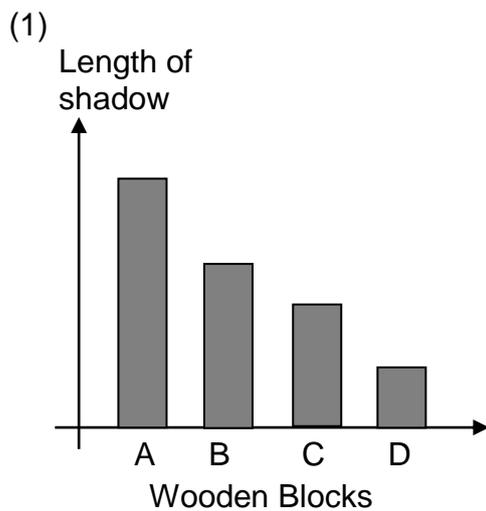
(4)



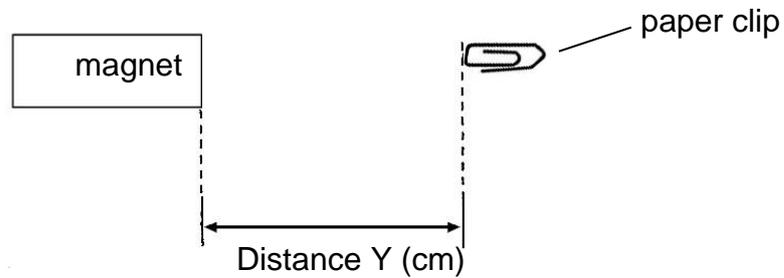
- 25 The diagram below shows four similar wooden blocks, A, B, C and D, placed at different positions in front of the screen. A light source was switched on and the shadows of A, B, C and D, were cast on the screen.



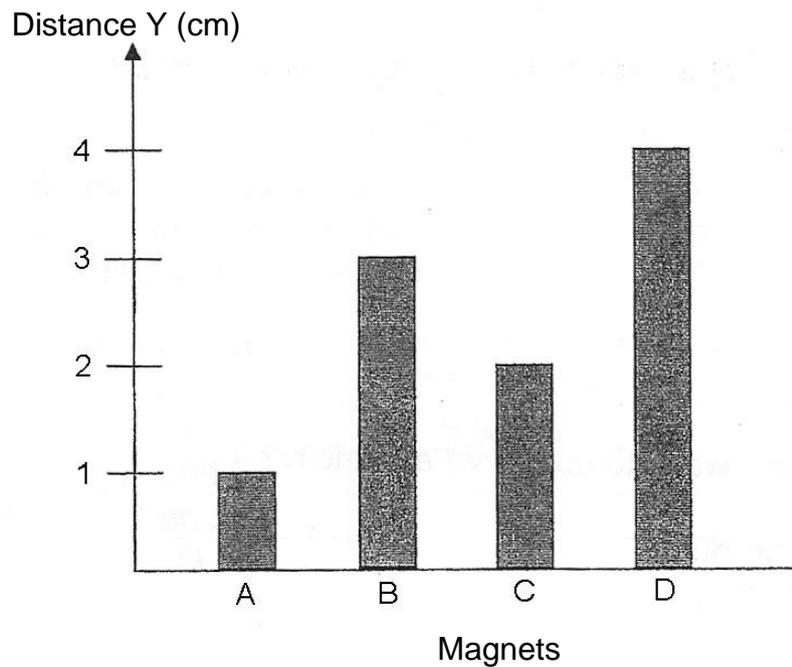
Which one of the following graphs shows the length of the shadows on the screen?



- 26 Gopal conducted an experiment to find out the strength of four magnets, A, B, C and D. For each magnet, he moved the paper clip away from the magnet until it reached Distance Y. Distance Y was the maximum distance just before the paper clip was attracted by the magnet as shown in the diagram below.



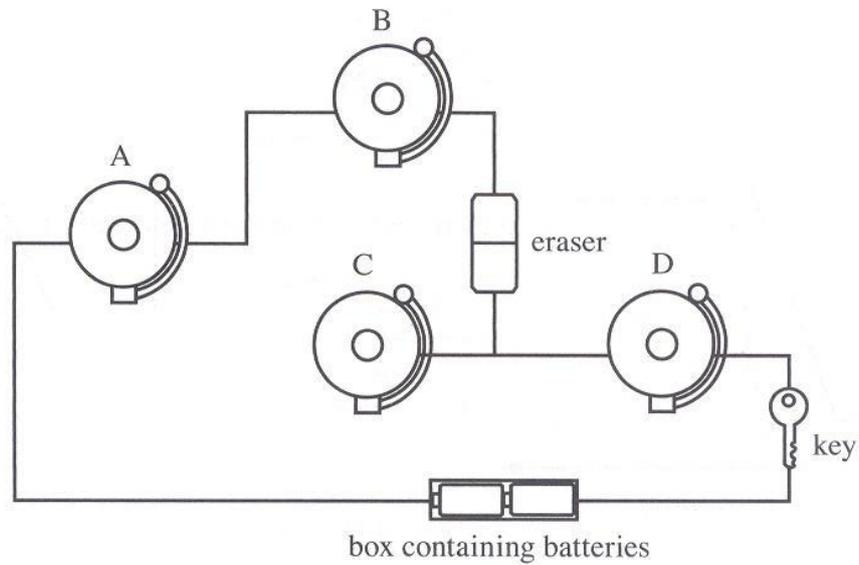
Then he recorded the results in the graph shown below.



Based on the graph above, arrange the strength of the magnet from the weakest to the strongest.

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

27 The diagram below shows a circuit connecting 4 bells, A, B, C and D.



Which of the bells will produce sound energy?

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

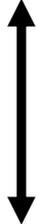
28 Nadiah wanted to find out how different factors affect germination. She listed the variables which she would use below.

- J: Light
- K: Water
- L: Number of green beans planted
- M: Temperature of the environment

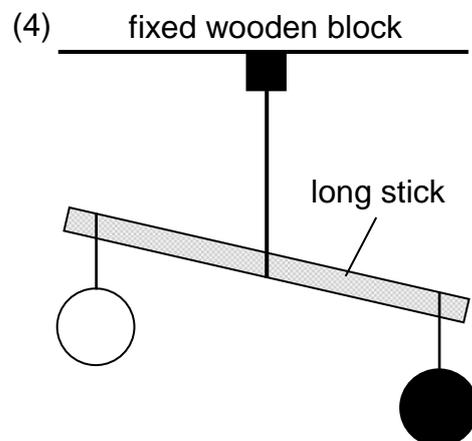
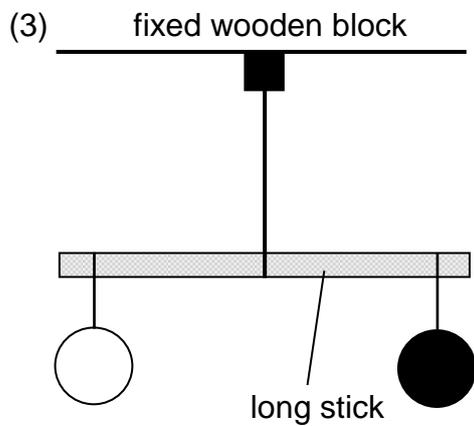
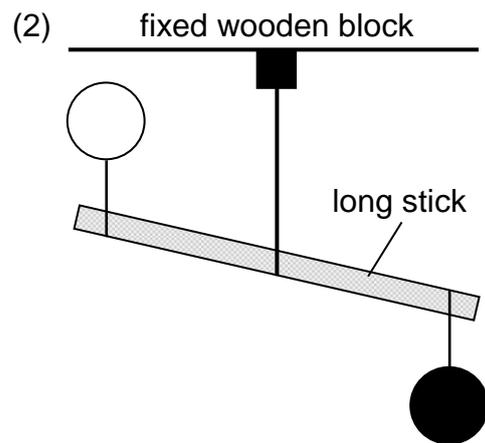
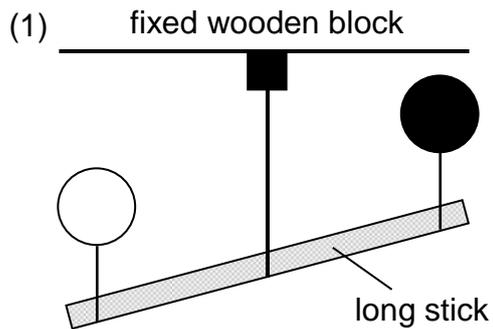
She made a list of the experiments which she would like to conduct in the table below. Which one of the following experiments will enable her to conduct the experiment correctly?

	Aim of experiment	Variables to be kept constant
(1)	To test if light affects germination	J, K and L only
(2)	To test if heat affects germination	J, K and M only
(3)	To test if moisture affects germination	J, L and M only
(4)	To test if overcrowding affects germination	K, L and M only

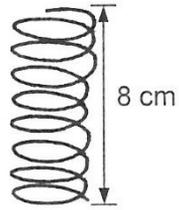
- 29 All gases have mass and take up space. The table below compares the masses of some gases.

Hydrogen	Lightest  Heaviest
Helium	
Nitrogen	
Air	
Oxygen	
Carbon dioxide	

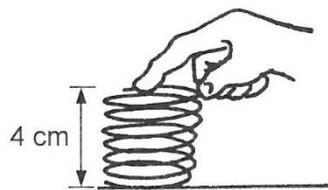
Some pupils tied balloons containing the same amount of each of the gases to a long stick to compare their masses as shown below. Which drawing correctly shows the result when helium and carbon dioxide were compared?



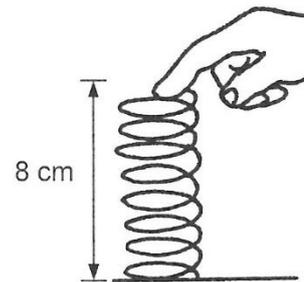
- 30 Diana measured a spring and noted that its original length was 8 cm. She then did a few experiments with the spring. In which of the experiments did the spring possess elastic potential energy?



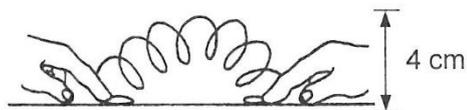
A:



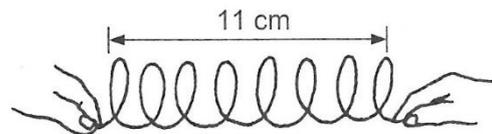
B:



C:



D:

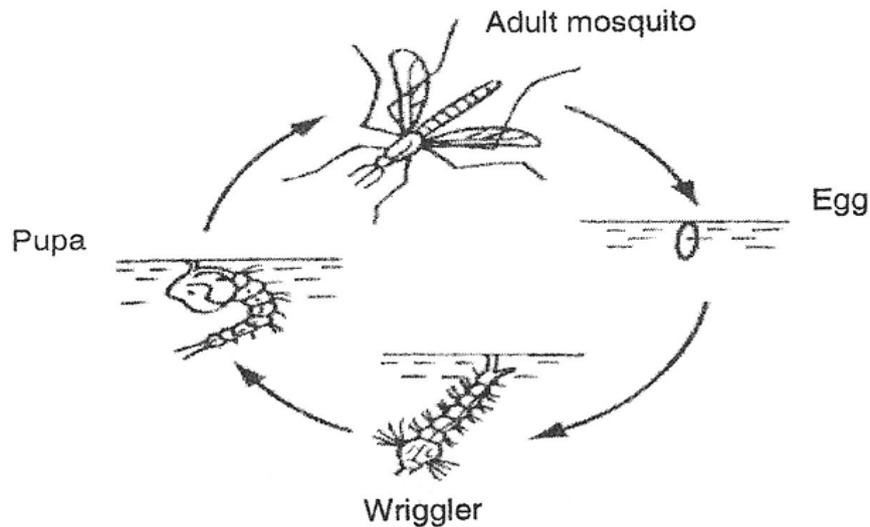


- (1) A and B only
- (2) C and D only
- (3) A, C and D only
- (4) A, B, C and D

END OF BOOKLET A

Read each question carefully and write your answers to questions 31 to 44 in the spaces provided. The number of marks for each question is shown in the brackets [] at the end of each question or part question.

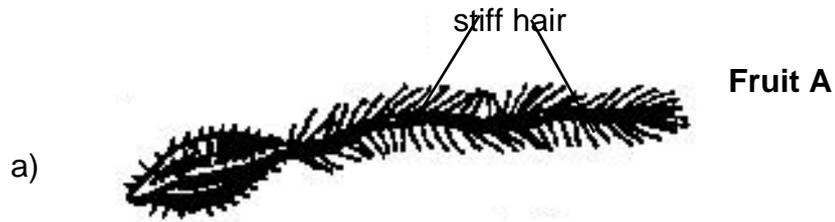
31 The diagram below shows the life cycle of a mosquito in a pond of stagnant water.



(a) How does the wriggler breathe in the water? [1m]

(b) Based on your answer in (a), explain how the spraying of oil into drains help to reduce the mosquito population. [2m]

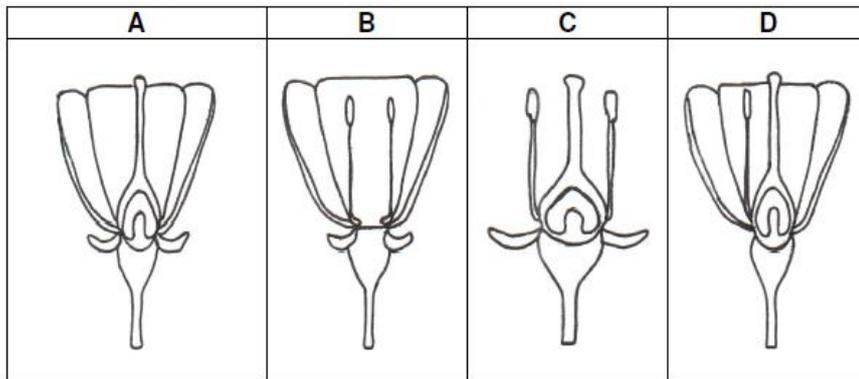
32 Look at the fruit below.



a)

b) Give a reason for your answer in (a). [1m]

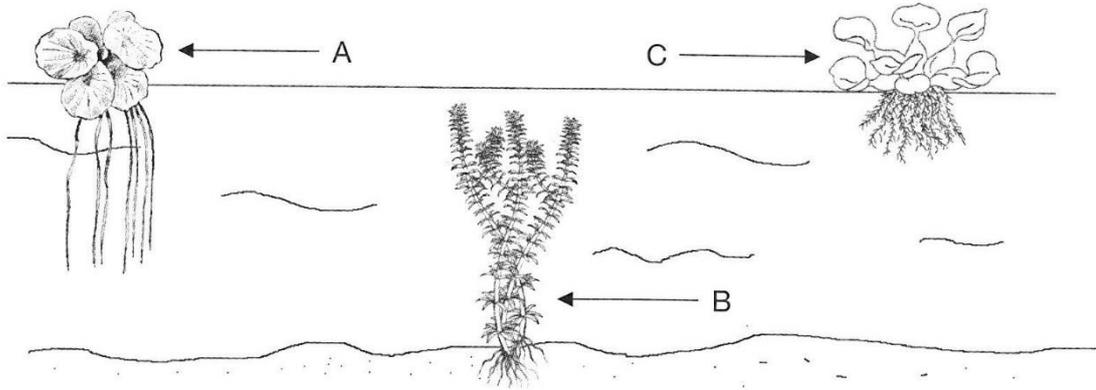
33 The diagrams below show four flowers from the same plant. Some parts of the flowers have been removed.



(a) Which of the above flower(s) cannot develop into a fruit? [1m]

(b) Explain your answer in (a). [2m]

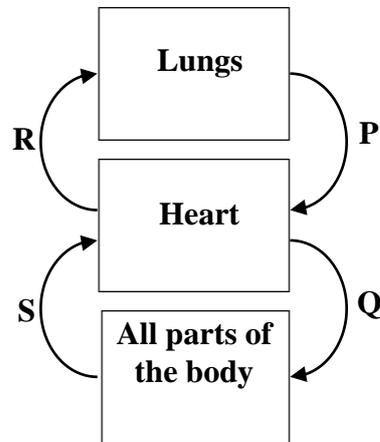
34 The picture below shows three aquatic plants, A, B and C, in a pond.



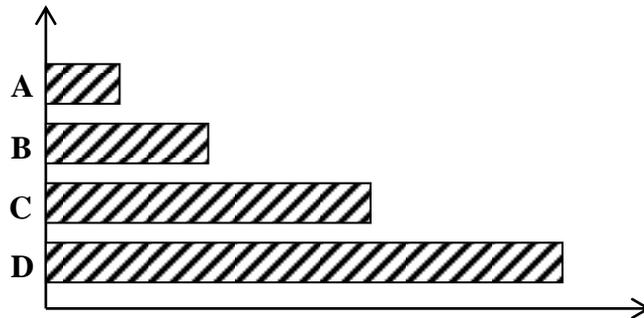
(a) Name an adaptation that enables aquatic Plant C to float on water. [1m]

(b) If the water in the pond becomes muddy, which plant will die first?
Explain your answer. [2m]

- 35 The diagram below is a simplified way of showing how our blood travels in the body.



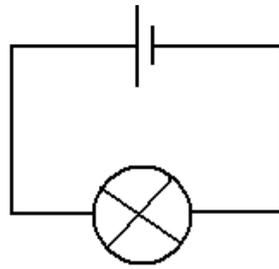
The following bar graph shows the concentration of oxygen in four blood samples taken from different blood vessels located in different parts of the circulatory system of a human being at the same time. The amount of blood taken for the four samples is the same.



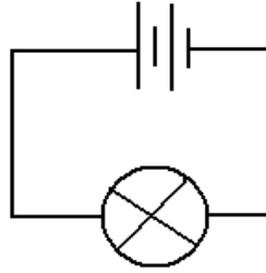
- (a) Which sample A, B, C or D, is most likely to have been taken from the blood vessel labelled P in the diagram below? Explain why. [2m]

- (b) Why is the amount of oxygen lower at S than at Q? [1m]

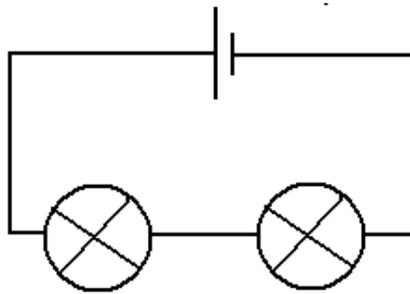
- 36 The diagram shows four circuit diagrams with different arrangements of similar batteries and bulbs. The bulbs in all four circuits light up.



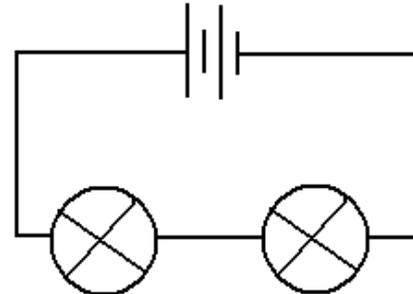
Circuit P



Circuit Q



Circuit R

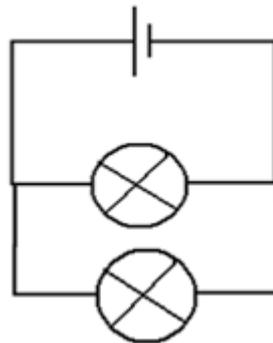


Circuit S

- (a) Indicate in the table below the circuits that have the brightest and the dimmest bulb(s). [1m]

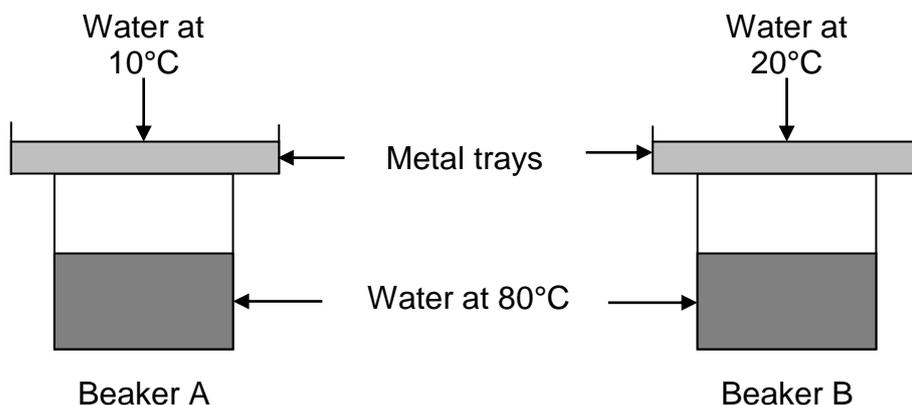
Brightness of the bulbs	
Brightest	Dimmest

- (b) A second Bulb X is added to the arrangement as shown below.



How would the brightness of the bulb P change with the new arrangement? [1m]

- 37 Mei Hui poured water at 80°C into two identical beakers, A and B, as shown below. She then covered Beakers A and B with a metal tray. She poured 100ml of water at 10°C into the metal tray on Beaker A and 100ml of water at 20°C into the metal tray on Beaker B. After 10 minutes, she counted the number of water droplets formed on the underside of both metal trays and recorded her findings in the table below.

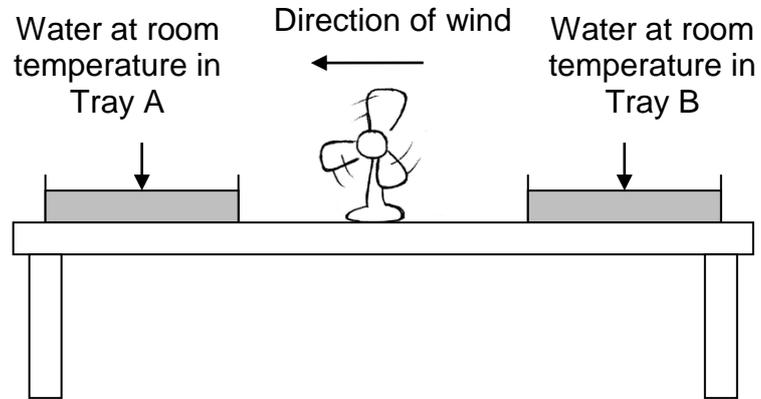


Temperature of the water in the metal tray	Number of water droplets formed on the underside of the metal tray
10°C	25
20°C	15

- (a) Based on the information above, what is the relationship between the temperature of the water in the metal tray and the rate of condensation taking place? [1m]

- (b) State the purpose of pouring water at 10°C and 20°C into the metal trays. [1m]

- (c) After one hour, Mei Hui removed both metal trays and placed them on a table as shown below.



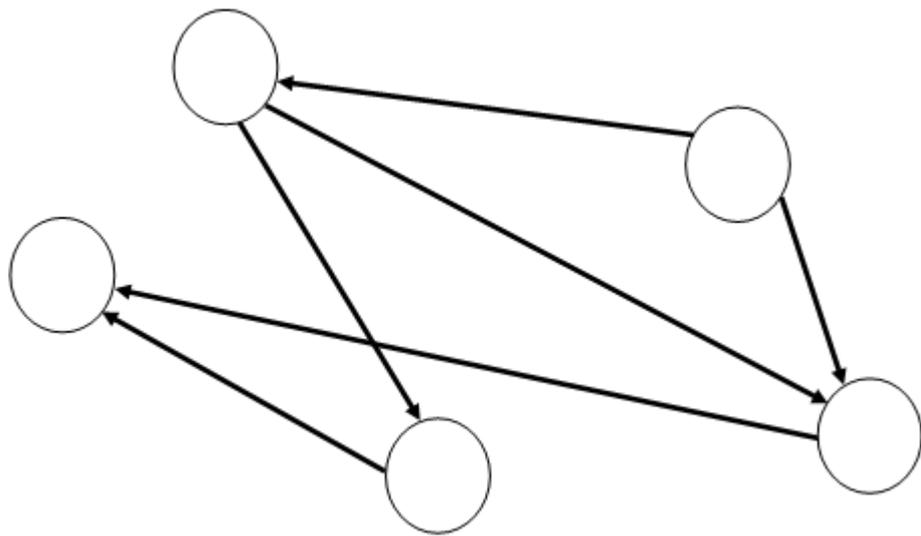
Mei Hui then measured the volume of the remaining water in Tray A and Tray B. What is the aim of her experiment? [1m]

- (d) State one other factor of evaporation not demonstrated in the experiment above. [1m]

38 A, B, C, D and E are five living things in a community. The following is information about these living things.

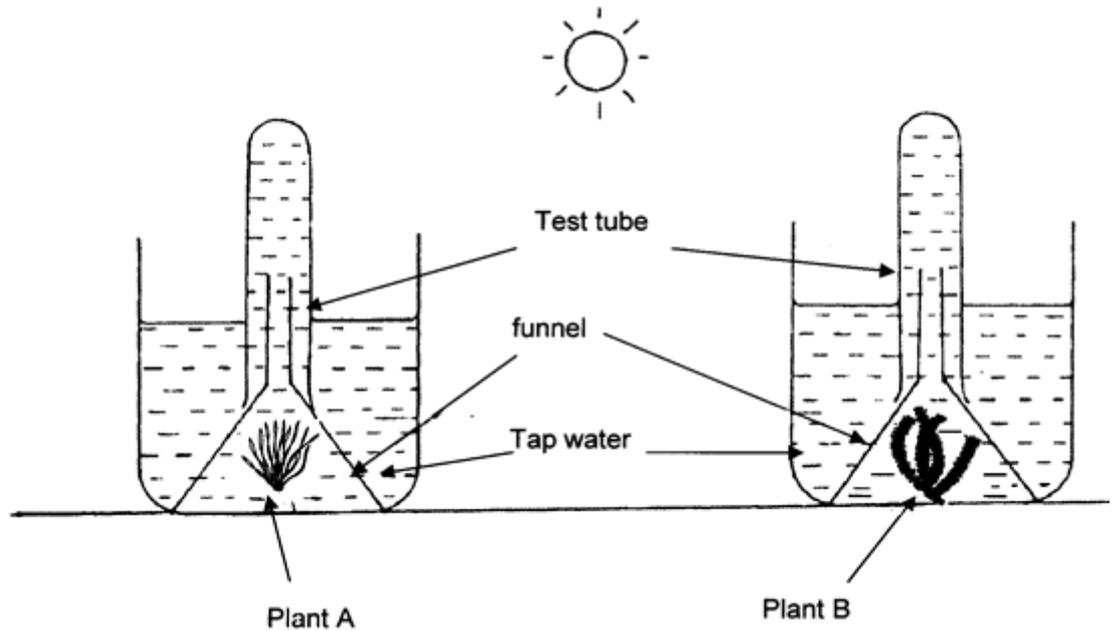
- A eats E and C.
- B is eaten by C and E.
- D is a food producer.
- D is eaten by B and C.

(a) Using the information provided above, complete the food web below.
Write the correct letter A, B, C, D and E in each circle. [2m]



(b) What will happen to E if there was a sudden increase in the population of C? [1m]

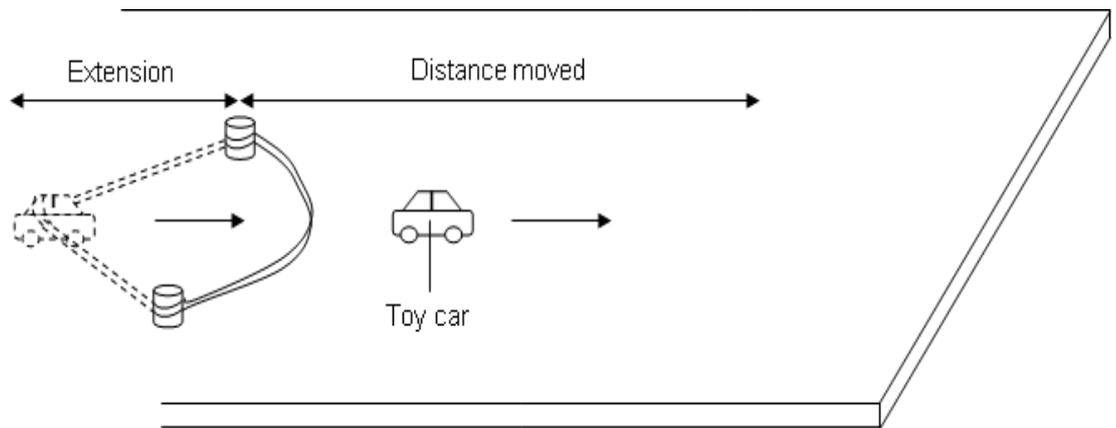
- 39 Aidil carried out an experiment as shown below. He placed different aquatic plants in the funnels in set-ups A and B to find out which aquatic plant has a faster rate of photosynthesis.



- (a) Besides counting the number of air bubbles produced by the plants, what other data could he collect to meet the aim of her experiment? [1m]

- (b) Aidil's father suggested that he should include another set-up without any plants in it. What would be the reason for including this set-up? [1m]

40 Ming Wei conducted an experiment as shown in the diagram below.



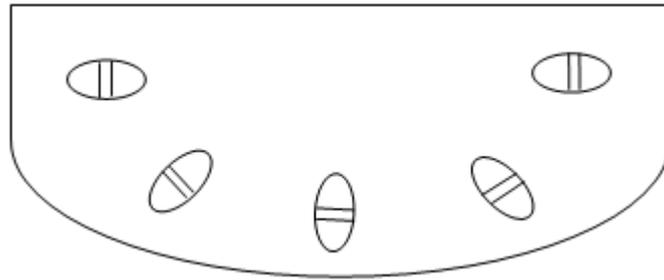
He pulled the elastic band backwards, together with a toy car to an extension of 2 cm. When he released the elastic band, the toy car moved a short distance forward. He recorded the distance moved by the toy car and he repeated the experiment by increasing the extension of the elastic band.

Extension of elastic band (cm)	Distance moved by toy car (cm)
2	3.5
4	8.5
6	12.0
8	17.5
10	21.5

(a) What can you conclude about the relationship between the extension of the elastic band and the distance moved by the toy car? [1m]

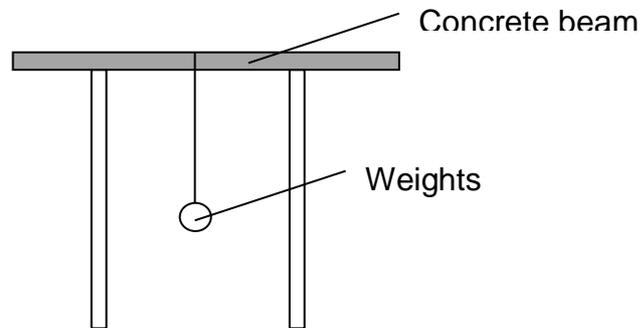
(b) Without changing the toy car, suggest another way to increase the distance moved by the toy car. [1m]

- 41 The diagram below is a cross-section of part of a stem showing the transportation tubes of a plant.



- (a) (i) _____ is the part of the stem that transports water from the roots to the leaves. [1m]
- (ii) _____ is the part of the stem that transports food to all parts of the plant. [1m]
- (b) What will happen to the plant if the tubes mentioned in (a) above are destroyed? Why? [2m]

- 42 Helen and Alwyn wanted to find out which mixture makes the strongest concrete beam. They made beams of the same size using different amounts of sand and cement.
One week later, they tested the beams to see how strong they were. They set up an experiment as shown in the diagram below.



From each beam, they hung weights, gradually increasing the weights until the beam broke. The table below shows their results.

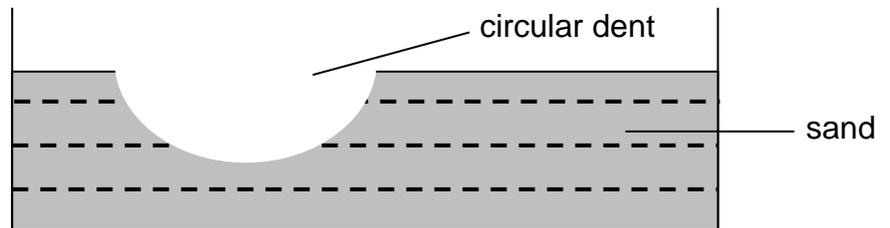
Amount of cement (cups)	Amount of sand (cups)	Mass at which beams broke (kg)
5	1	7.0
4	2	5.5
3	3	4.0
2	4	3.5

- (a) What effect does using more cement in the mixture have on the strength of the beam? [1m]

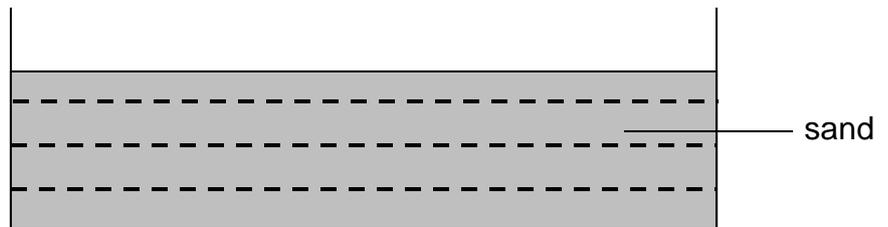
- (b) What range of mass (in kg) do you think will be needed to break the beam if 3 parts cement and 2 parts sand are used? [1m]

Between _____ kg and _____ kg.

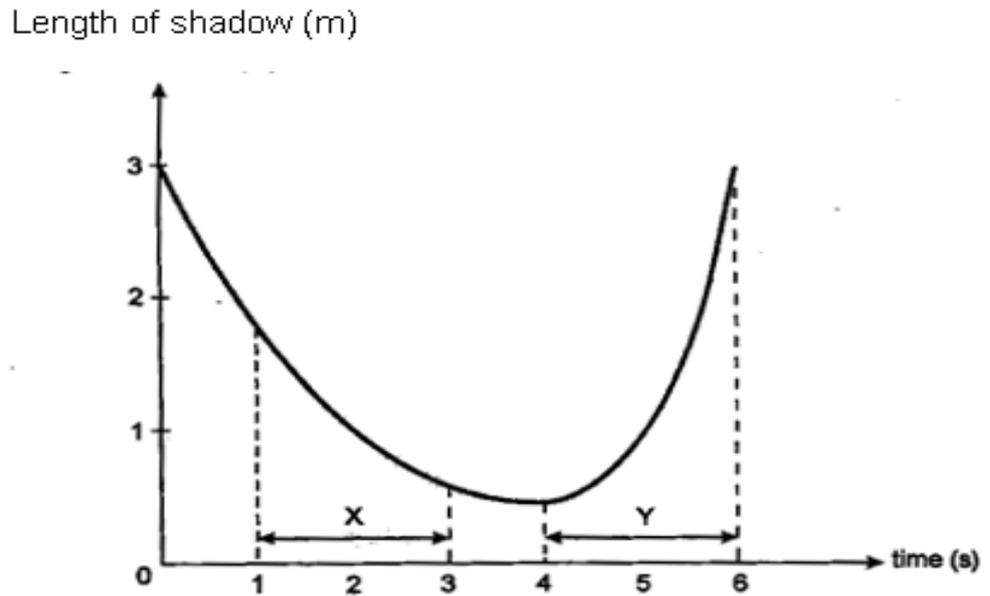
Alwyn dropped a weight of 6 kg from a height of 60 cm onto a container of sand. The weight created a circular dent in the container of sand as shown in the diagram below.



(c) Draw the circular dent if he dropped a weight of 4.5 kg onto the same container of sand. [1m]



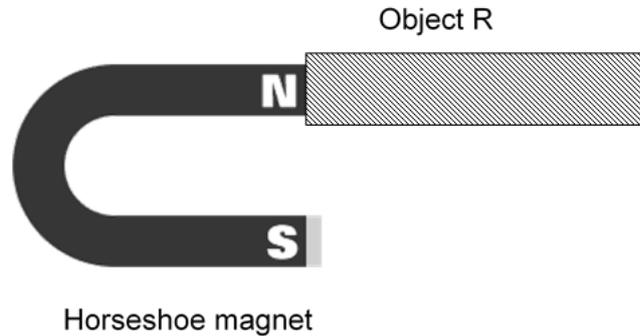
- 43 The graph below shows how the length of Diana's shadow changes over a period of time as she walks in a straight line near a street lamp at night.



- (a) Is Diana walking towards or away from the lamp during the Period Y shown in the graph? Give a reason for your answer. [2m]

- (b) From the graph, Kelvin concluded that Diana was walking at a slower speed during Period X compared to Period Y. Explain how Kelvin came to this conclusion. [1m]

- 44 Joanne wanted to find out if Object R is a magnet. She placed one end of Object R near the North-seeking pole of the horseshoe magnet.



She noticed that Object R was attracted to the North-seeking pole of the magnet and concluded that Object R is a magnet.

- (a) Do you agree with Joanne? Yes or no? Why? [2m]

- (b) Joanne observed that the horseshoe magnet was able to attract 10 nails. She then placed the magnet in a beaker of boiling water for 20 minutes. Next, she brought the horseshoe magnet near a box of nails. She observed that the magnet was able to attract only 4 nails after it was heated. What was Joanne trying to find out? [1m]

Tips

Here are some useful tips to help you tackle open-ended questions.

- ❖ Read and understand the question.
- ❖ Look for the key words and underline them.
- ❖ Think of the topic related to the question.
- ❖ Think of the concepts that help to answer the question.
- ❖ Apply the appropriate concepts to answer the question.
- ❖ Note the marks awarded to each question in order to estimate the amount of information required in the answer.

Let us try applying the tips to this question:

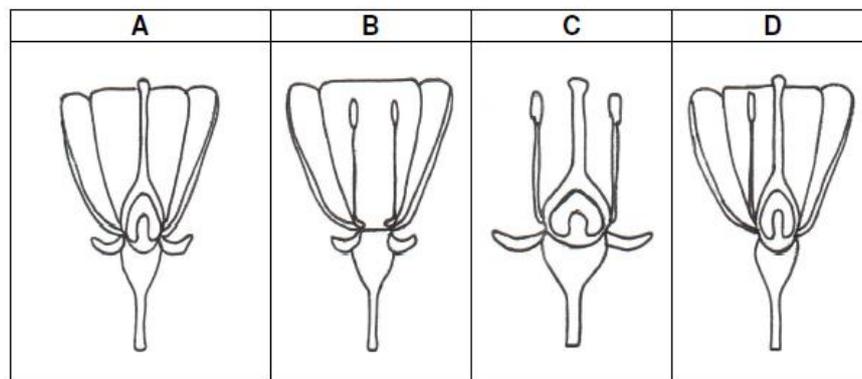
Concept:

It is important to know how fruits are developed. Basically, the process of **pollination** and **fertilization** must take place and it is important to know the function of the stigma and presence of ovary in a flower to fulfill these two functions before the fruit is developed. So in your answer, do emphasise on these two processes.

Analysing the pictures:

Flower A has its stigma and ovary intact. Though the anthers are not present, pollination

- Qn The diagrams below show four flowers from the same plant. Some parts of the flowers have been removed.



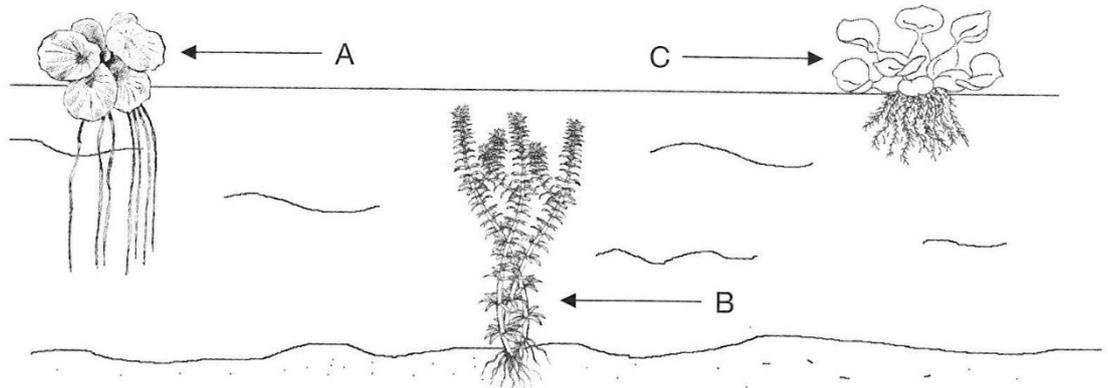
- (c) Which of the above flower(s) **cannot develop into a fruit?** [1m]

- (d) Explain your answer in (a). [2m]

can still take place if the pollen grains are made to land on the stigma via other means. Pollination and fertilization hence can take place and A will develop into a fruit. Flower C does not have petals but the stigma and ovary are intact. Petals help to attract pollinators but the absence of petals does not hinder pollination and fertilization.

Flower D has an intact anther, as well as a stigma and an ovary. Pollination and fertilization leading to fruit formation can take place.
Having done this thorough analysis, Flower B is the answer.

Qn The picture below shows three aquatic plants, A, B and C, in a pond.



(c) Name an **adaptation** that enables aquatic Plant C to float on water. [1m]

(d) If the water in the pond becomes muddy, which plant **will die first**? Explain your answer. [3m]

Concept :

You would need to know the adaptation of floating plants and the significance of being able to float.

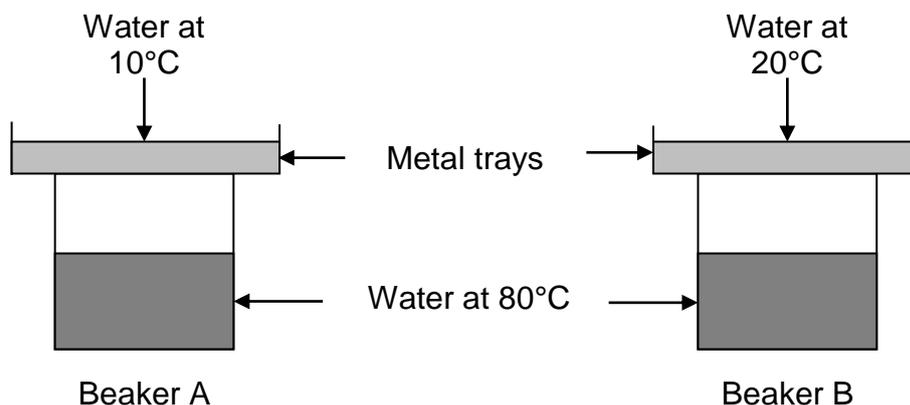
Recall:

Part (a) requires you to do a basic recall of 'swollen leaf stalks' that contain air (sacs) to enable the plant to float.

Application of knowledge of topics

Part (b) requires you to make a connection with the process of photosynthesis that requires light and the advantage that floating plants have over submerged plants. You would also need to infer that muddy waters prevent sunlight from reaching the deeper part of the pond and this will affect the submerged plant significantly.

Qn Mei Hui poured water at 80°C into two identical beakers, A and B, as shown below. She then covered Beakers A and B with a metal tray. She poured 100ml of water at 10°C into the metal tray on Beaker A and 100ml of water at 20°C into the metal tray on Beaker B. After 10 minutes, she counted the number of water droplets formed on the underside of both metal trays and recorded her findings in the table below.

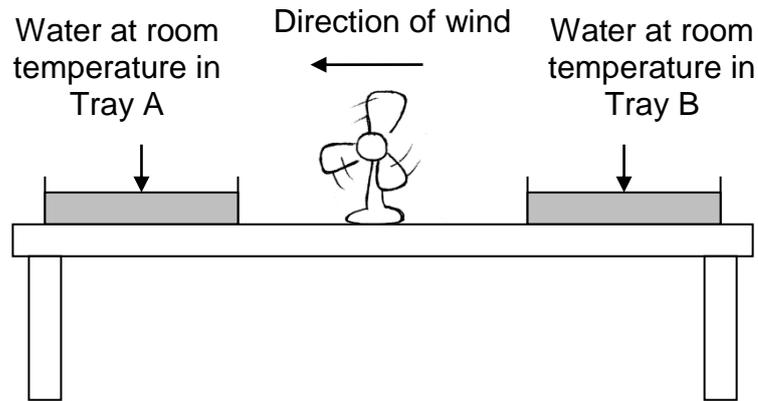


Temperature of the water in the metal tray	Number of water droplets formed on the underside of the metal tray
10°C	25
20°C	15

(a) Based on the information above, what is the relationship between the temperature of the water in the metal tray and the rate of condensation taking place? [1m]

(b) State the purpose of pouring water at 10°C and 20°C into the metal trays. [1m]

- (c) After one hour, Mei Hui removed both metal trays and placed them on a table as shown below.



Mei Hui then measured the volume of the remaining water in Tray A and Tray B. What is the **aim of her experiment?** [1m]

- (d) State one **other factor of evaporation not demonstrated** in the experiment above. [1m]

Concept :

This question focusses on the topic Water and Changes of States. More specifically, you would need to know the processes of condensation and evaporation very well.

Part (a) requires you to know the meaning of 'relationship' very well. Having understood that, you would need to analyse the data presented on the table. Is there a direct relationship between the temperature of water and the number of water droplets formed ie at a higher temperature, were there more droplets formed or otherwise? Knowing this will help you determine the relationship between the two variables.

Part (b) requires you to know the condition for condensation. Condensation happens when there is a cooler surface for water vapor to change state. So looking at the diagram of the set-up closely, focusing on the difference in the temperature of the water, you should be able to tell that the water with a lower temperature provides that cooler surface for condensation to happen.

For Part (c), look at the diagram of the experimental set-up closely. Identify the changed variable in the set-up and link it to what you want to 'measure' in the experiment. What process affects the change in the volume of water in this experiment? Once you have correctly identified the process to be 'evaporation' look carefully at the set-up again. The diagram of the fan (think 'wind') will give you a big clue. Next you would need to recall the factors that affect the rate of evaporation. These hints should help you answer (c). But be careful...it is not enough to write just 'wind' as an answer. Are you referring to 'presence of wind' or 'strength of wind'? It is important to be specific when you answer.

Part (d) is quite straightforward once you have done your analysis and identified all the factors that affect the rate of evaporation.