AI TONG SCHOOL

2013 CONTINUAL ASSESSMENT (2)

PRIMARY FOUR SCIENCE

DURATION : 1hr 45 min

DATE: 27 August 2013

INSTRUCTIONS

Do not open the booklet until you are told to do so.
Follow all instructions.
Answer all questions.

Name : _____( )

Class : Primary 4 _____

Parent's Signature : _____

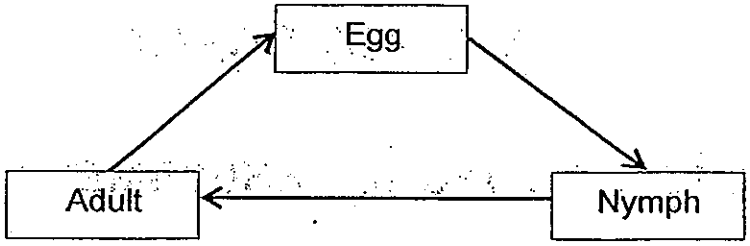
Date : _____

Section A	60
Section B	40
Total	100

Section A (30 x 2 marks)

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.

1. The diagram below shows the life cycle of an animal.



Which of the following animals have the same life cycle as that shown above?

A Housefly

B Dragonfly

C Grasshopper

D Mealworm beetle

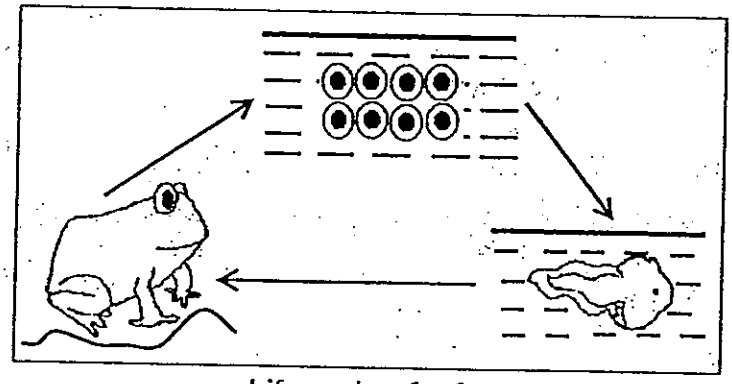
(1) A and D only

(2) B and D only

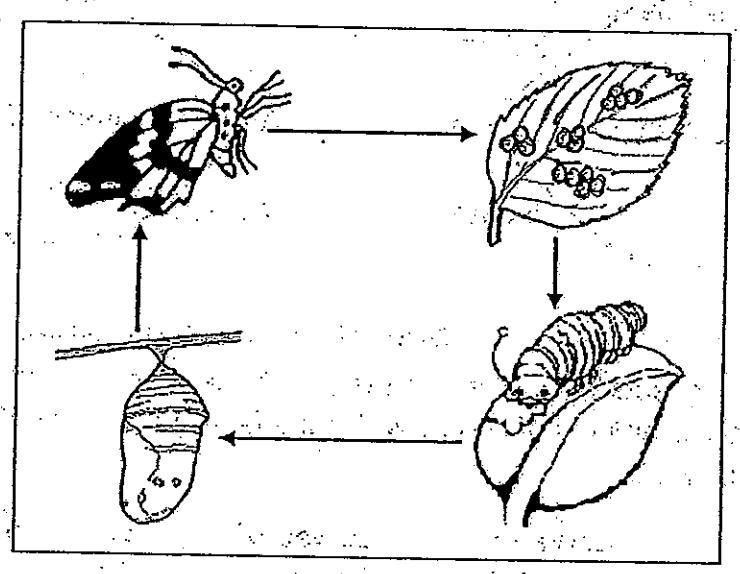
(3) B and C only

(4) C and D only

2. The diagrams below show the life cycle of a frog and a butterfly.



Life cycle of a frog



Life cycle of a butterfly

Based on the above diagrams only, which of the following statements are **incorrect** about the life cycles of both organisms?

A The adults lay eggs.

B The adults have 6 legs.

C The young live in water.

D The young do not resemble the adults.

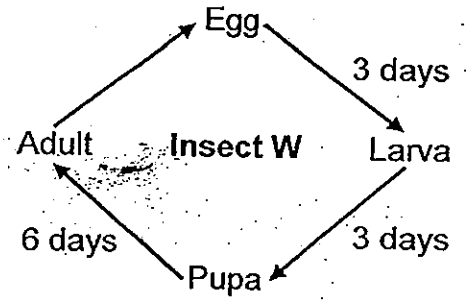
(1) A and C only

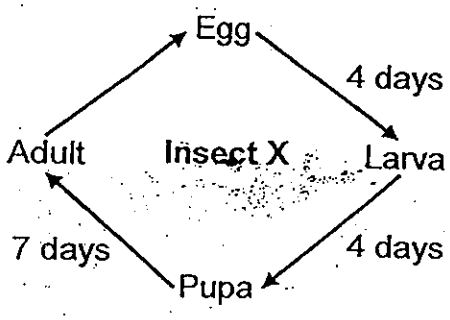
(2) A and D only

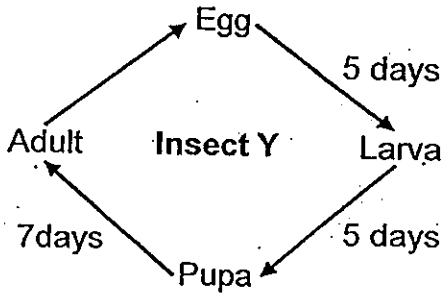
(3) B and C only

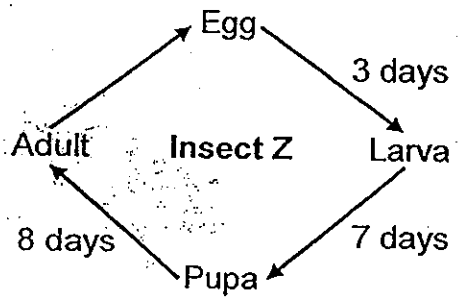
(4) B, C and D only

3. The diagrams below show the life cycles of 4 different types of insects.









The larvae of insects W, X, Y and Z feed on the leaves of Plant A. The table below shows the amount of leaves which the larvae of insects W, X, Y and Z feed on per day.

	Larvae of insect W	Larvae of insect X	Larvae of insect Y	Larvae of insect Z
Amount of leaves eaten by the larvae per day (grams)	200g	200g	100g	100g

From the information given above, which one of these insects is likely to be the most destructive to Plant A?

(1) Insect W

(2) Insect X

(3) Insect Y

(4) Insect Z

4. Selina planted 6 seeds in 5 identical pots, P, Q, R, S and T. She left each pot at different locations with different temperatures. Every day, she would give each pot of plant the same amount of water. After one week, she measured and recorded the average height of the seedlings in each pot in the table below.

	Pot				
	P	Q	R	S	T
Average temperature of location (^{0}C)	6	15	22	35	50
No. of seeds germinated	2	3	4	6	0
Average height of seedling (cm)	1	7	10	19	0

Based on the information given above, which one of the following statements is correct?

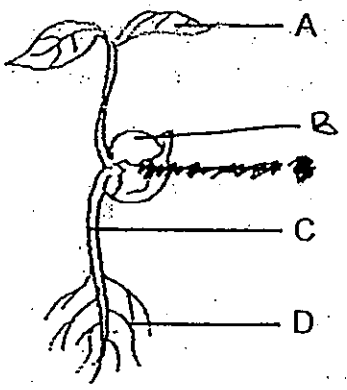
(1) The amount of water affects the rate of germination.

(2) Seeds cannot germinate if the temperature is above 50^{0}C.

(3) The greater the amount of light the seed receives, the taller the seedling.

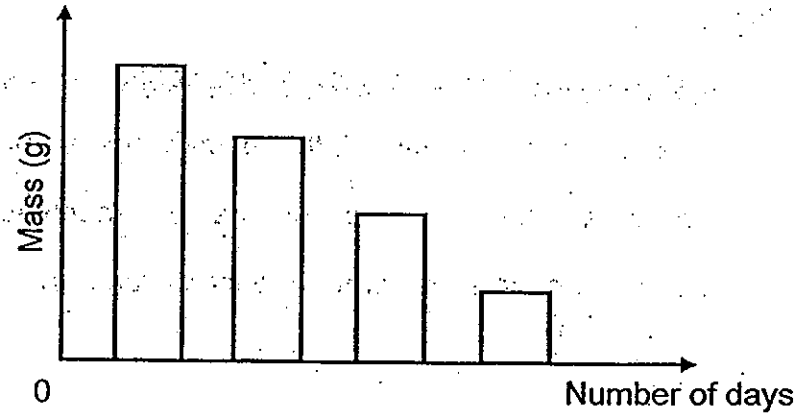
(4) Seeds germinate best when the temperature of the surroundings is above 35^{0}C.

5. The diagram below shows Plant X with its parts labelled A, B, C and D.



Plant X

Alicia plotted a graph to show the change in mass of a part of Plant X as it grows healthily from a seedling into an adult.



Which part of Plant X does the above graph show?

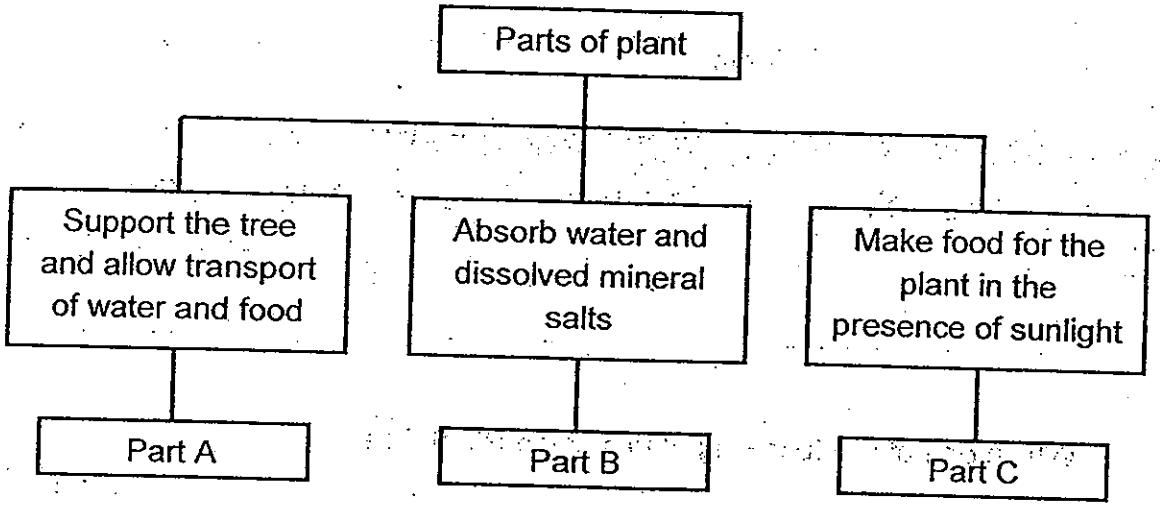
(1) A

(2) B

(3) C

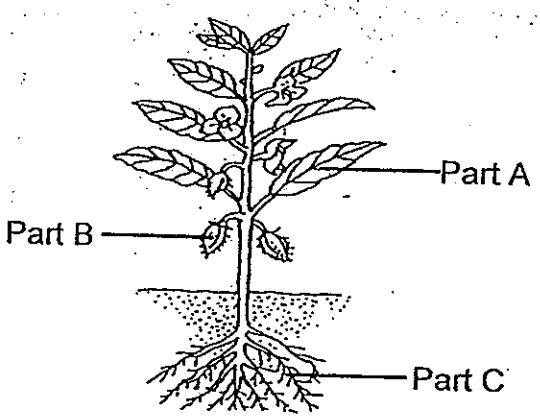
(4) D

6. Study the chart carefully. The plant parts are grouped according to their functions.

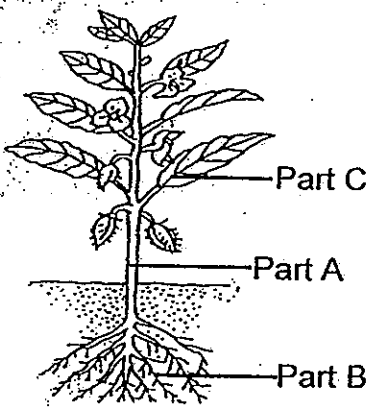


Which of the following represents Plant parts A, B and C correctly?

(1)



(2)



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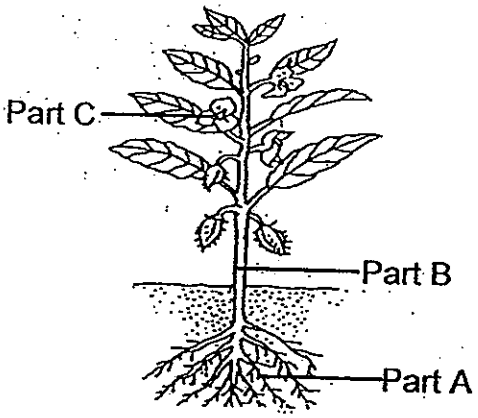

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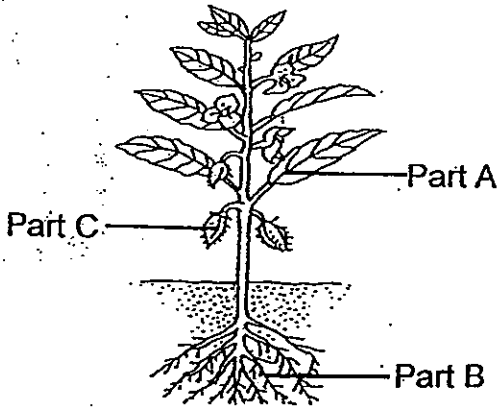
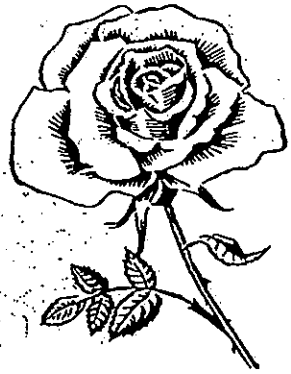


7. The classification table below shows how plants D, E, F and G are classified.

Plants			
Weak Stem		Strong stem	
Flowers that grow singly	Flowers that grow in clusters	Flowers that grow singly	Flowers that grow in clusters
D	E	F	G

Which one of the following plants could Plant F be?

(1)



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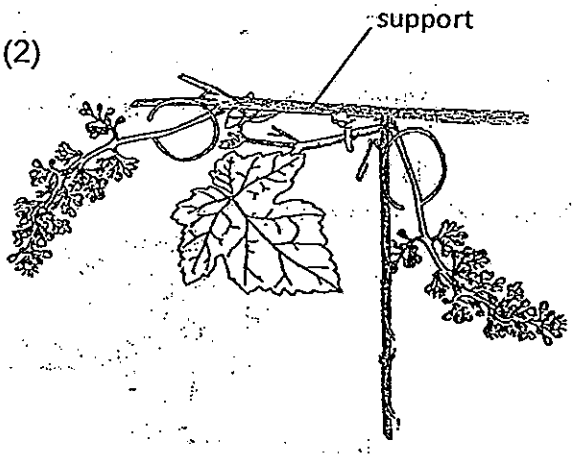

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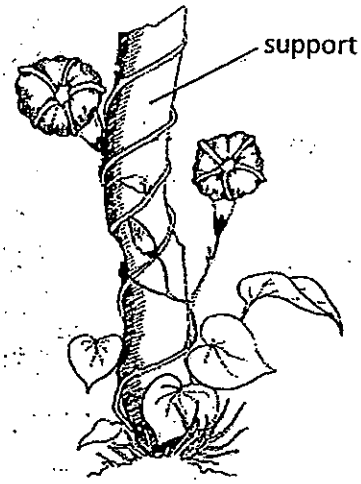
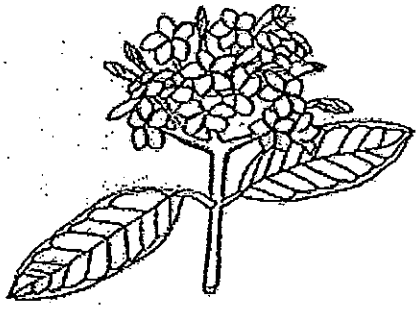


(4)



8. Four students each made a statement about the skeletal system.

Alan: It supports the body.

Bob: It gives the body shape.

Calvin: It helps different parts of the body move.

Dylan: It does not protect the delicate organs in our body.

Which of the above students have made the correct statements?

(1) Bob and Dylan only

(2) Alan and Calvin only

(3) Calvin and Dylan only

(4) Alan, Bob and Calvin only

9. Saliva contains substance A which helps to digest starch. Leonard wants to conduct an experiment to find out the effect of the amount of saliva on starch. Iodine solution is added to test for the presence of starch. The table below shows the variables for the different set-ups he had for his experiment.

Dish	Amount of saliva (ml)	Amount of starch solution (ml)	Amount of iodine solution (ml)	Duration of experiment (min)
W	2	20	1	20
X	2	10	1	20
Y	4	10	1	20
Z	4	20	2	40

Which two dishes should Leonard use to ensure a fair test?

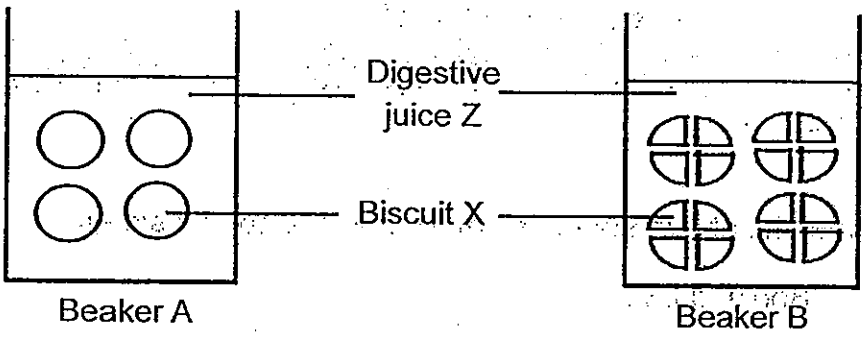
(1) W and X only

(2) W and Y only

(3) X and Y only

(4) Y and Z only

10. Penny carried out an experiment as shown in the diagram below. She set up 2 beakers, A and B, containing the same amount of biscuit X but each biscuit was cut into pieces of different sizes. She then poured the same amount of digestive juices Z into each beaker and recorded the time taken for the biscuits to be digested.



Which one of the following statements best describes the aim of Penny's experiment?

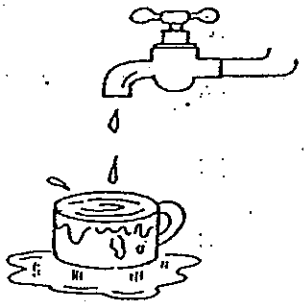
(1) To find out if the type of food particles affects the rate of digestion.

(2) To find out if the size of food particles affects the rate of digestion.

(3) To find out if the amount of digestive juice affects the rate of digestion.

(4) To find out if the type of digestive juice affects the size of food particles.

11. Kate placed a cup under a dripping tap. An hour later, a puddle of water was seen around the cup.



What conclusion can Kate make from this observation?

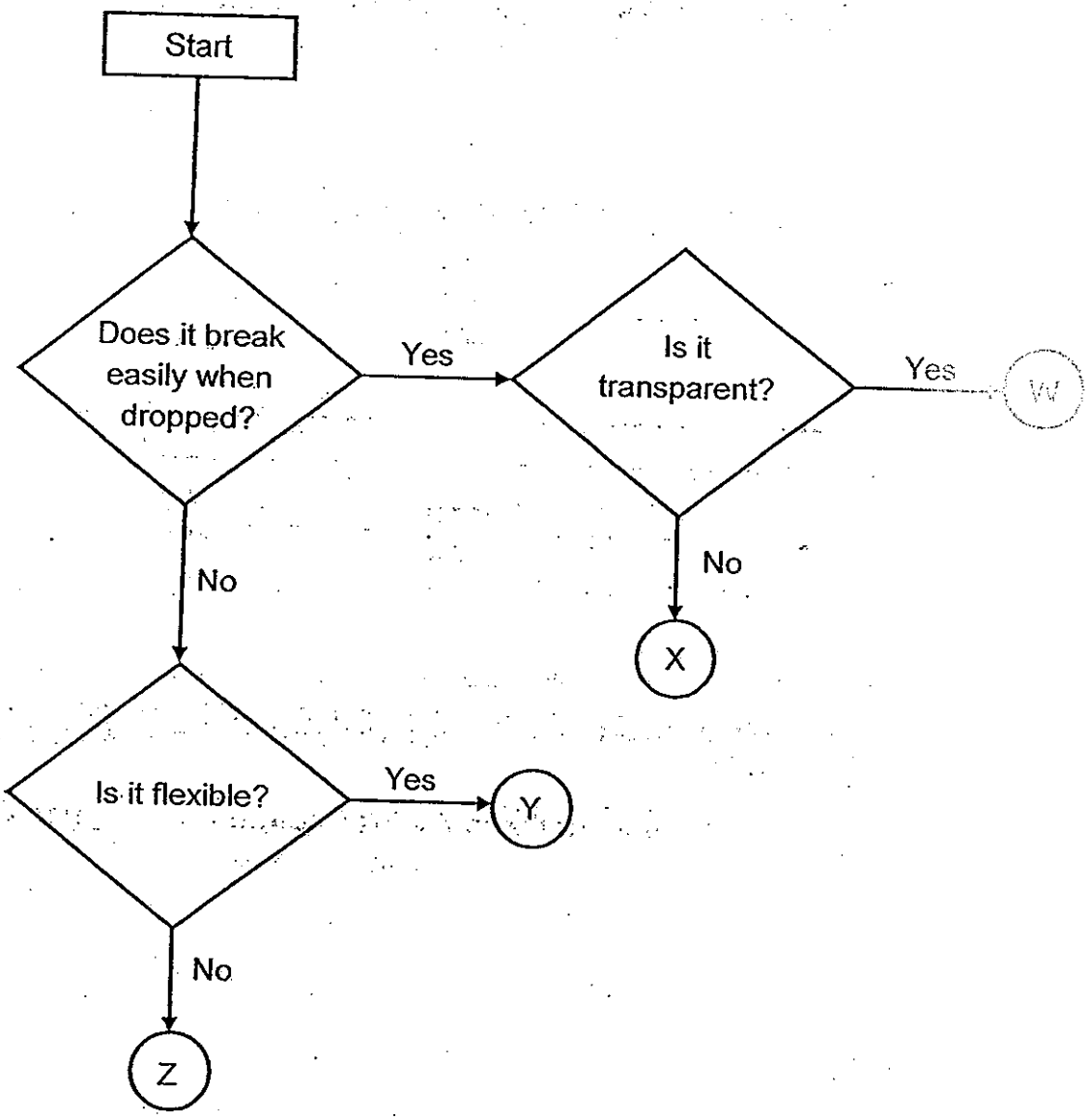
(1) Water occupies space.

(2) Water can be compressed.

(3) Water has a definite shape.

(4) Water does not have a definite volume.

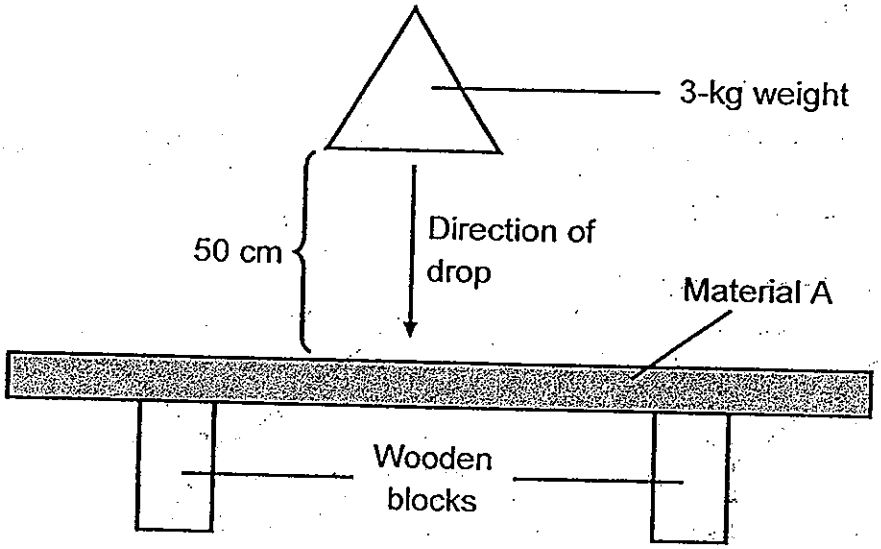
12. The flowchart below shows the characteristics of objects W, X, Y and Z.



Which of the following could objects W and Z be?

	W	Z
(1)	Plastic bag	Coin
(2)	Window panes	Cotton T-shirt
(3)	Window panes	Wooden toothpick
(4)	Plastic bag	Rubber band

13. June carried out an experiment as shown in the diagram below. She repeatedly dropped a 3-kg weight from a height of 50cm onto material A until it broke.



June recorded the number of times the 3-kg weight was dropped before the material broke in the table below. She then repeated the experiment using materials B, C and D.

Material	Number of times the 3-kg weight was dropped before material broke
A	10
B	5
C	25
D	27

Based on the results above, which of the following statements is true?

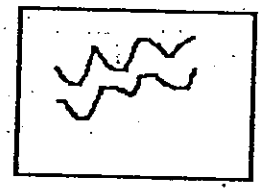
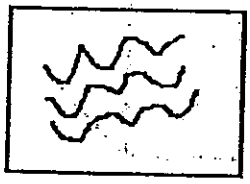
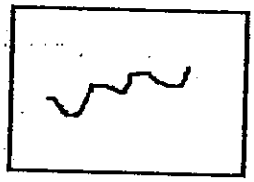
(1) Material C is weaker than material B.

(2) Material A is stronger than material B.

(3) Material D will break first if a heavy load was placed on it.

(4) Material B is the best material to choose to make into a table top.

14. Wei Liang conducted an experiment to study the hardness of three different materials A, B and C. He used the sharp ends of an iron rod and a wooden rod to scratch each of these materials. He recorded his observations in the table below.

Rod used to scratch material	Observations of scratch marks on the material		
	A	B	C
Iron			
Wood			

Based on the table above, which one of the following statements is true about the hardness of materials A, B and C?

(1) Material A is harder than Material C.

(2) Material B is harder than Material A.

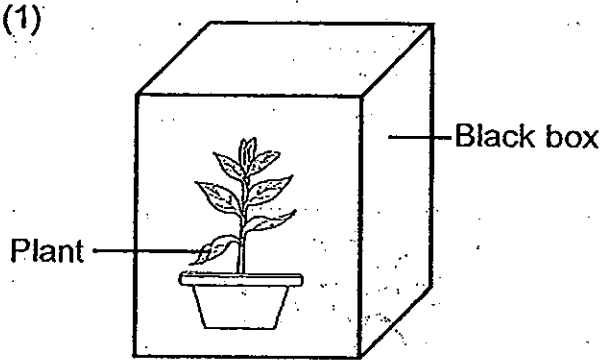
(3) Materials A and C are harder than wood.

(4) Materials A, B and C are harder than iron.

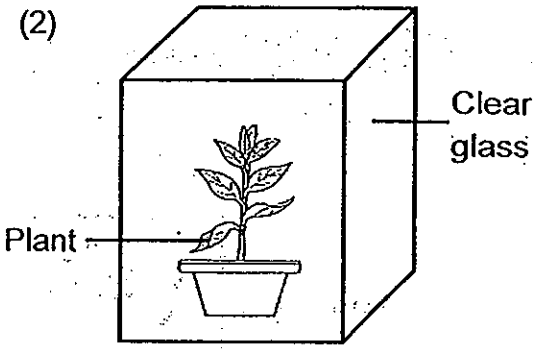
15. Jenny set up an experiment using 4 similar plants as shown below. She wanted to find out if plants respond to sunlight.

Which one of the following set-ups would be the most suitable for her experiment?

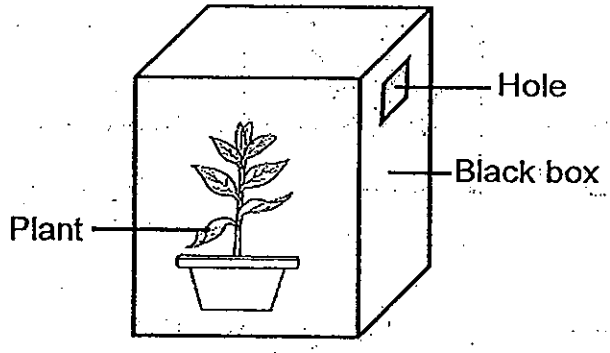
(1)



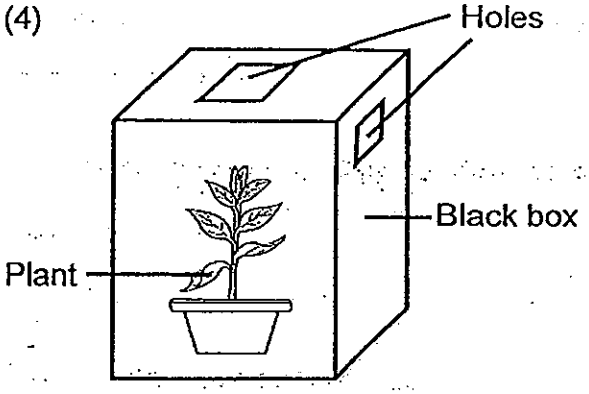
(2)



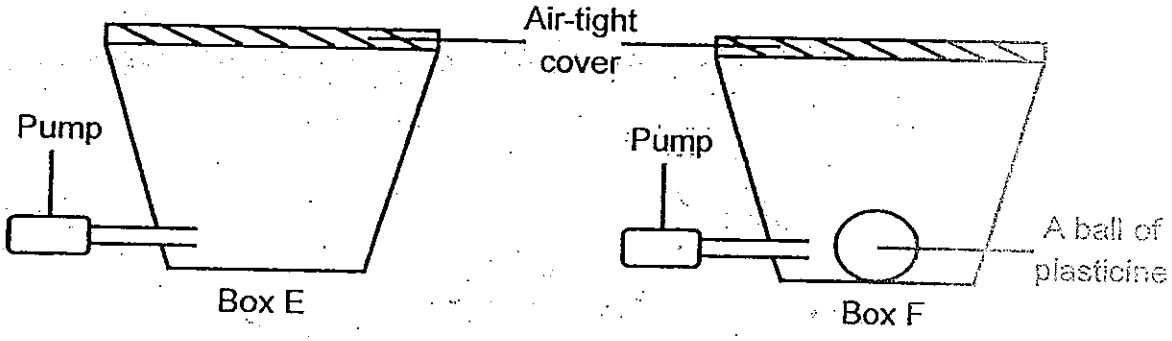
(3)



(4)



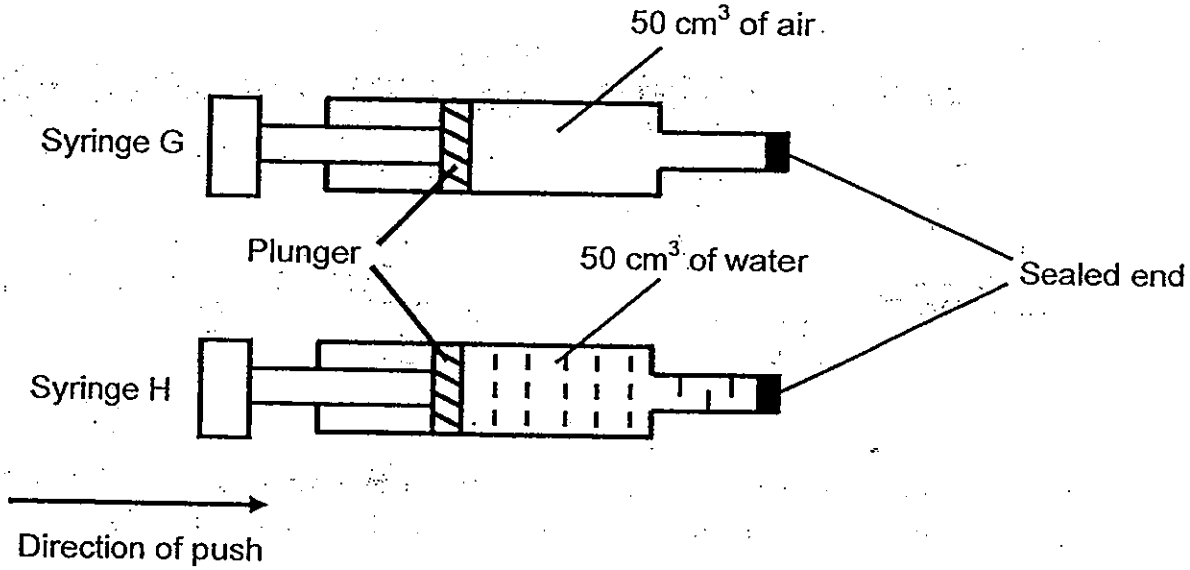
16. Two boxes, E and F, attached to a pump, have the same capacity of 1500 cm^3 each. A ball of plasticine of volume 400 cm^3 was placed inside box F. Both boxes are then sealed with an air-tight cover.



An additional 500 cm^3 of air was pumped into box E and 300 cm^3 of air was pumped into box F. Which one of the following shows the final volume of air in each box?

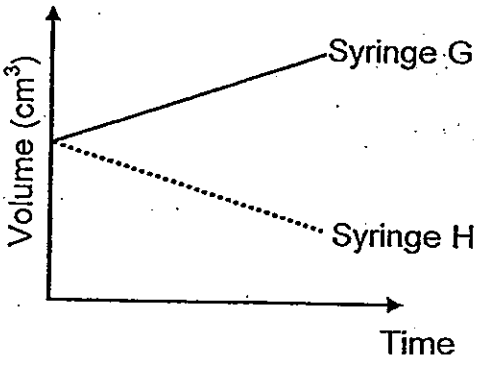
	Box E	Box F
(1)	1500 cm^3	1100 cm^3
(2)	1500 cm^3	1500 cm^3
(3)	2000 cm^3	1900 cm^3
(4)	2000 cm^3	1400 cm^3

17. The diagram below shows two syringes, G and H. Syringe G contains 50 cm^3 of air while syringe H contains 50 cm^3 of water. The ends of both syringes are sealed and the plungers are then pushed in.



Which one of the following graphs correctly shows the volume of air in syringe G and volume of water in syringe H as the plunger was pushed in?

(1)



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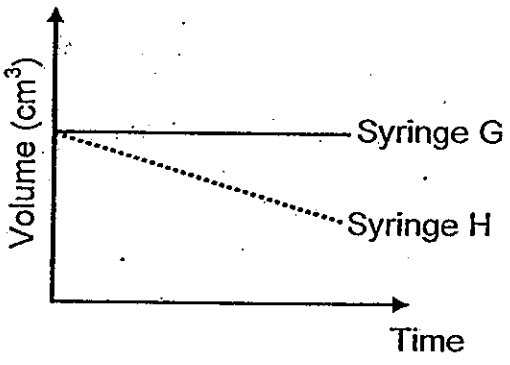

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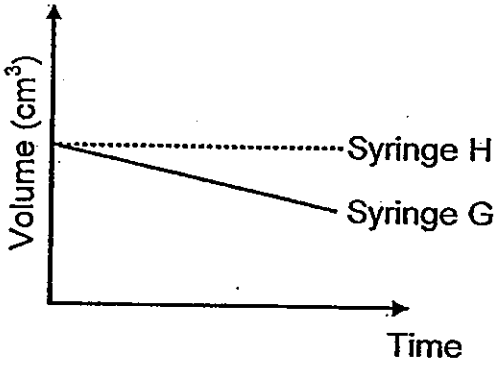

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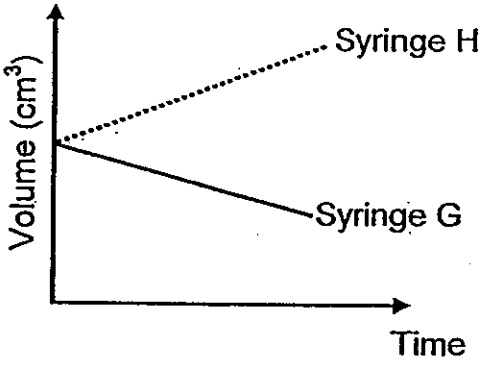
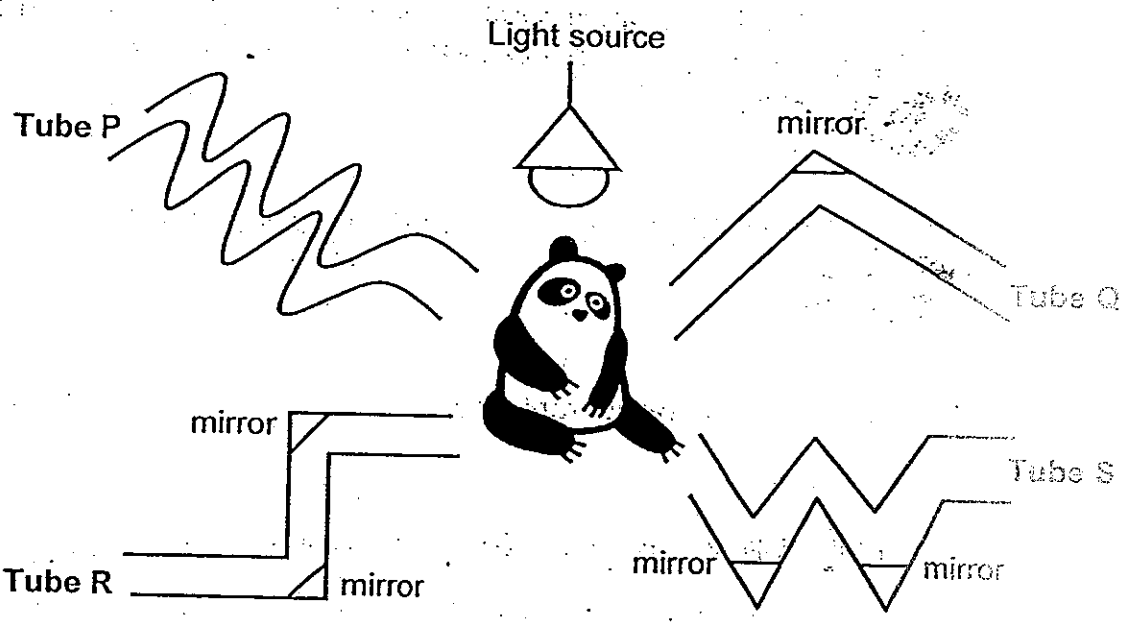


18. Xin Yi did an experiment to try to view a toy panda through tubes P, Q, R and S.



Which tubes enable Xin Yi to see parts of the toy panda clearly?

(1) P and Q only

(2) P and R only

(3) Q and R only

(4) R and S only

19. Which of the following statements about light are true?

A Light is matter.

B Light travels in a straight line.

C Shadows are formed when light is blocked by an object.

D We can see an object because it is reflected from our eyes.

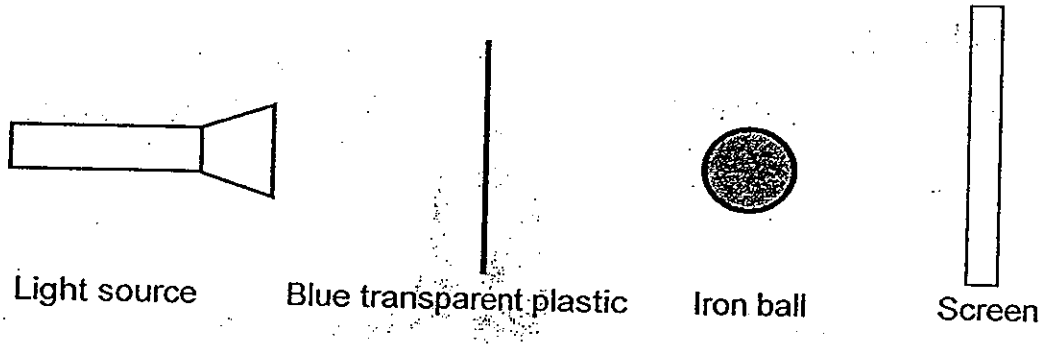
(1) A and C only

(2) B and C only

(3) B, C and D only

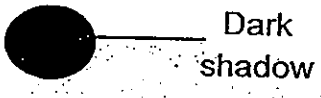
(4) A, B and C only

20. Rasi set up an experiment as shown below. She placed a piece of blue transparent plastic in front of an iron ball. She then shone a light on both objects such that a shadow was cast on the screen.

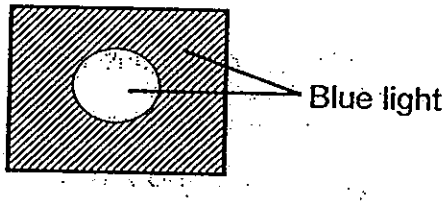


Which one of the following is most likely what she saw on the screen?

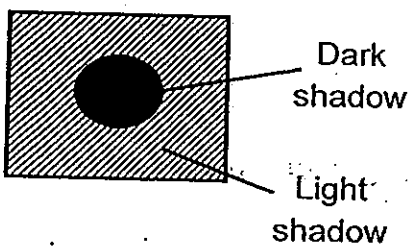
(1)



(2)



(3)



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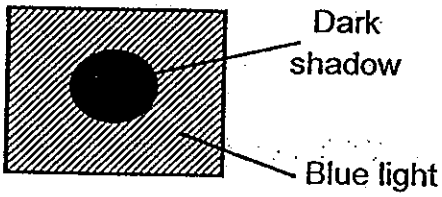
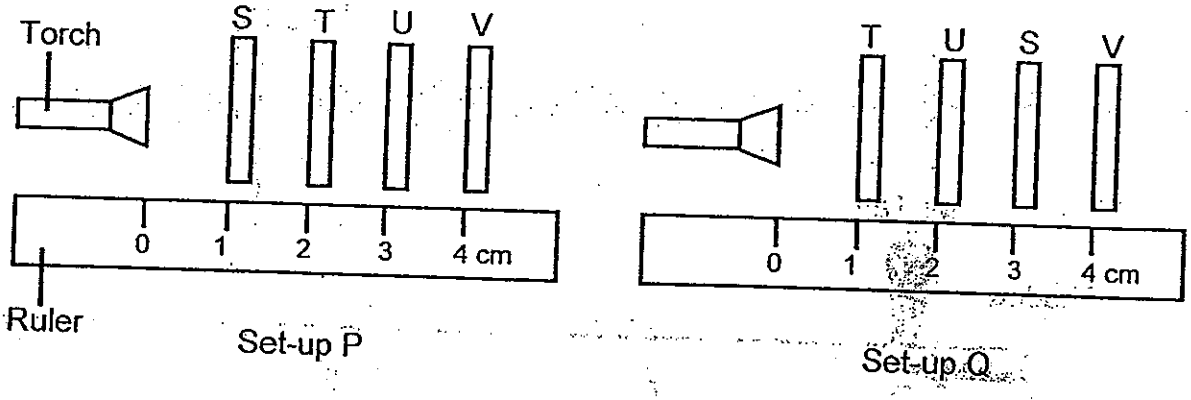
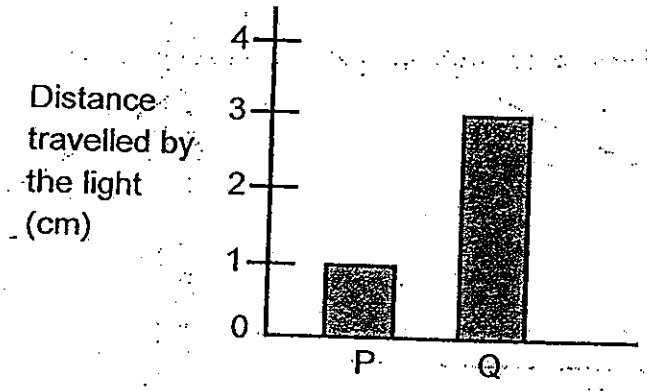


21. Ahmad conducted an experiment to investigate the degree of transparency of four different materials, S, T, U and V. The sheets were arranged in two set-ups P and Q as shown.



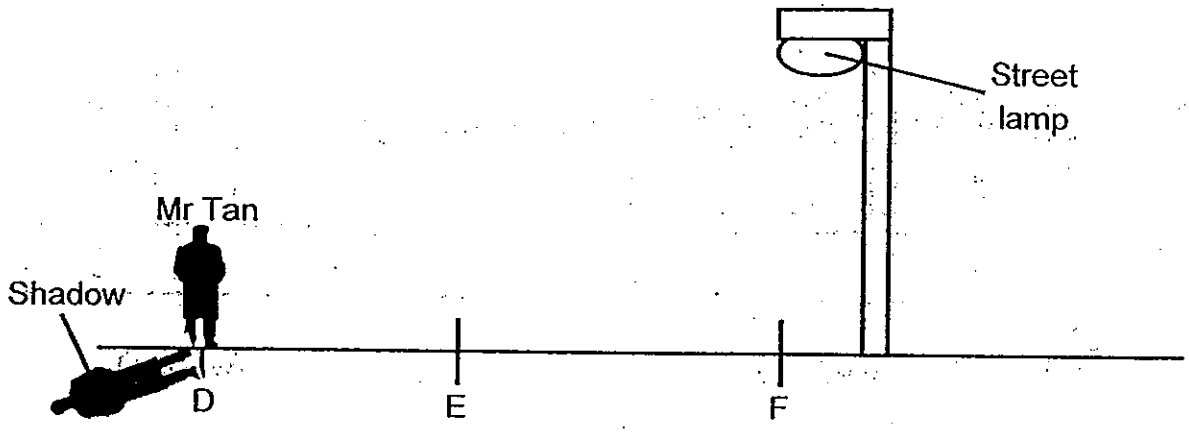
The distance travelled by the light for each set-up was measured and the results are shown in the bar graph below.



Which of the following best describes the degree of transparency of materials S, T, U and V?

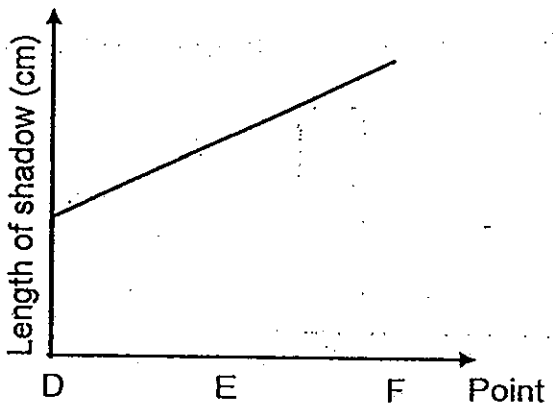
	Does it allow light to pass through?			
	S	**T**	**U**	**V**
(1)	Not sure	No	Yes	No
(2)	No	Yes	Yes	Yes
(3)	Yes	Yes	Not sure	No
(4)	No	Yes	Yes	Not sure

22. Mr Tan was walking along a street at night. He stood at point D and observed that his shadow was cast behind him. He then noticed that the length of his shadow changed as he walked towards the street lamp.

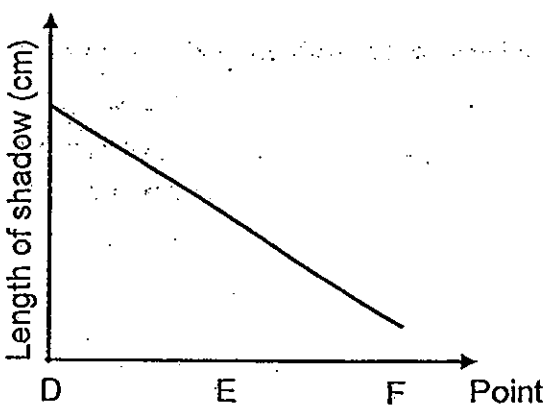


Which one of the following graphs shows the correct changes in the length of the shadow as Mr Tan walked from Point D to Point F?

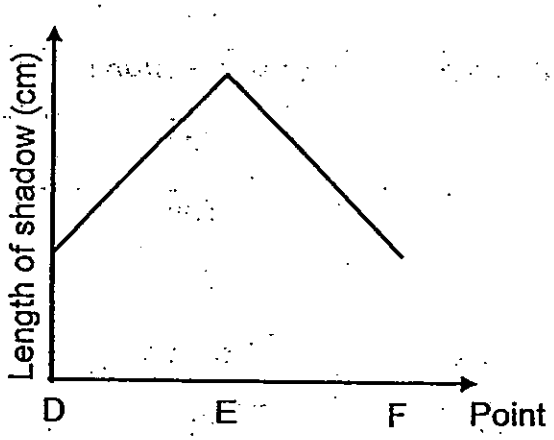
(1)



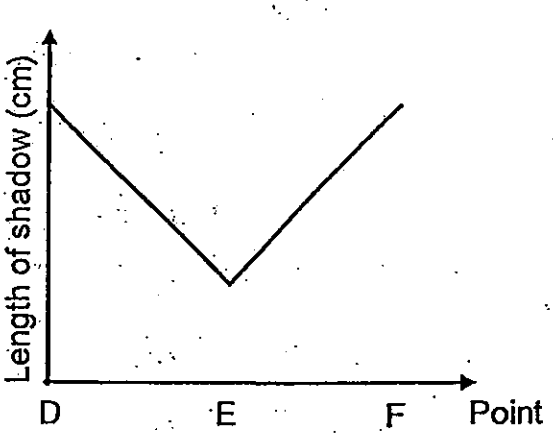
(2)



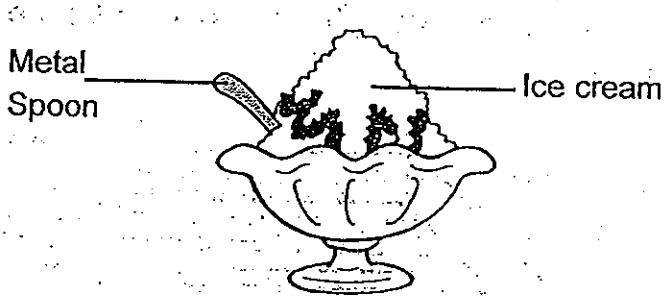
(3)



(4)



23. Sathish placed a metal spoon into a bowl of ice cream and the spoon became colder after some time.



Which one of the following statements explains why the spoon became cold?

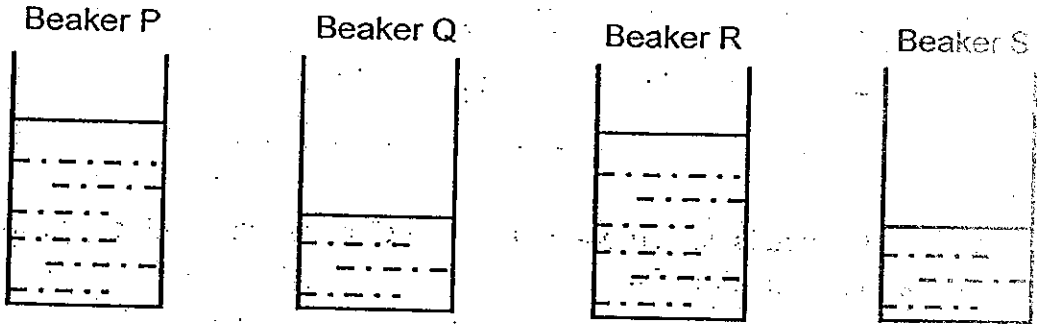
(1) The spoon lost heat to the ice cream.

(2) The spoon lost heat to the surroundings.

(3) The ice cream transferred coldness to the spoon.

(4) The ice cream transferred coldness to the surroundings.

24. The diagram below shows 4 beakers of water, P, Q, R and S, at different temperature and volume.



Which one of the following statements is true?

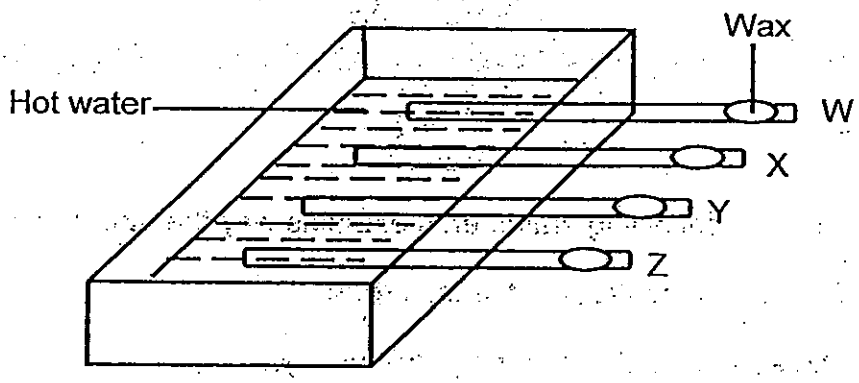
(1) Beaker P has the most heat energy.

(2) Beaker R has more heat energy than beaker Q.

(3) Beaker S has more heat energy than beaker R.

(4) Beaker P and Beaker S have the same amount of heat energy.

25. Sammy set up an experiment as shown in the diagram below. He attached four rods of the same length and thickness but made of different materials, W, X, Y and Z, to a container of hot water. The ends of the rods are coated with the same amount of wax.



Sammy then recorded the time taken for the wax to melt completely.

Material	Time taken for wax to melt completely (min)
W	13
X	15
Y	18
Z	10

Based on the results, which one of the following materials is the most suitable for making an ice cooler box?

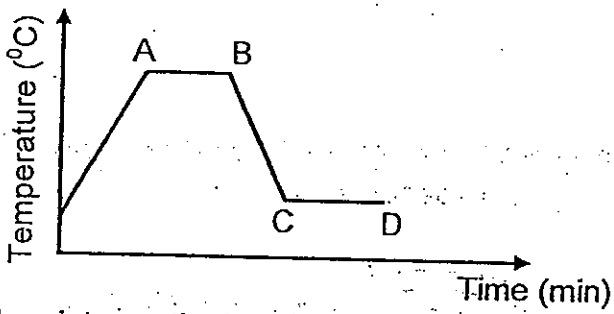
(1) W

(2) X

(3) Y

(4) Z

26. Fatimah heated a beaker of water over a short period of time. She measured and recorded the temperature of water in the beaker. The graph below shows the changes in temperature of water over time.



At which point was the heat source removed?

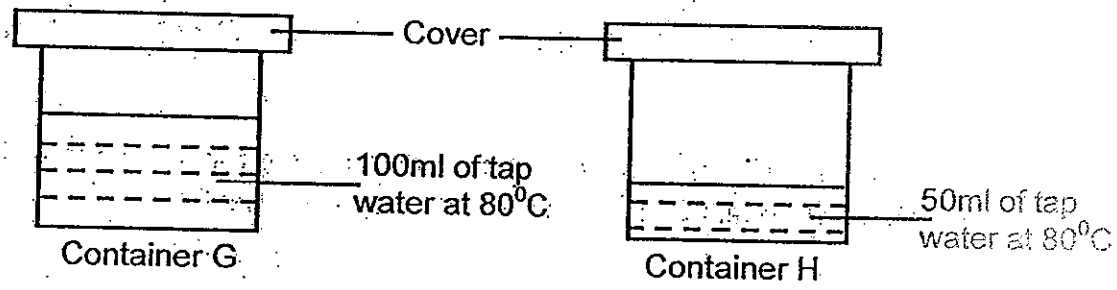
(1) Point A

(2) Point B

(3) Point C

(4) Point D

27. The diagram below shows two similar containers, G and H. Containers G and H are of the same size and are made of the same material, W, which is a good conductor of heat. The containers are filled with different amount of water and are left in a living room. The temperature of water in both containers is then recorded after 30 minutes.



Which of the following statements correctly describes the change of temperature in water for containers G and H?

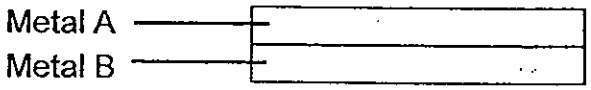
(1) Water in container G cools down faster than water in container H.

(2) Water in container H cools down faster than water in container G.

(3) The temperature of water in containers G and H remains unchanged.

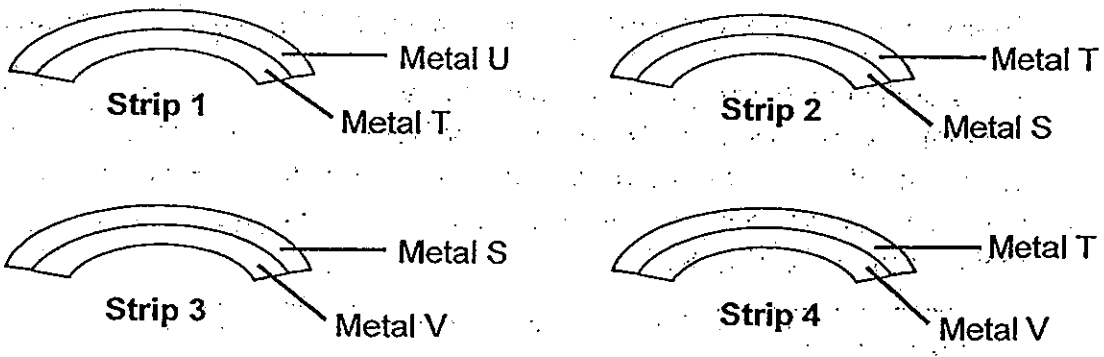
(4) The drop in temperature of water in containers G and H would be the same.

28. A bimetallic strip is formed when two different metals are joined together as shown in the diagram below.



When the bimetallic strip is heated, it will bend like this as shown below. This is because when heated, metal A expands more than metal B.

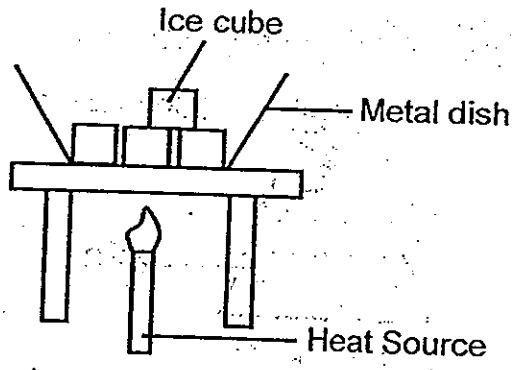
Four metals, S, T, U and V, each of equal length were used in different combinations to form 4 bimetallic strips. The diagrams below show how each strip bent when heated.



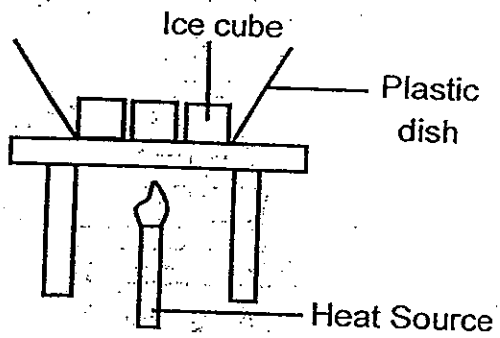
Based on the information given above, which of the following shows the expansion of metals S, T, U and V in the correct order?

Expands least → Expands most				
(1)	T	U	V	S
(2)	U	T	S	V
(3)	V	S	T	U
(4)	S	V	U	T

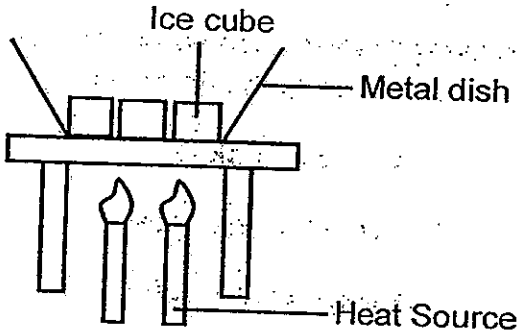
29. Sharon was given four different set-ups, P, Q, R and S, as shown below. She wanted to conduct an experiment to find out if the number of heat sources affects the rate of heat conductivity of a dish. Some ice cubes were placed in the dish and was heated for 5 minutes. The time taken for all the ice cubes to melt completely was recorded.



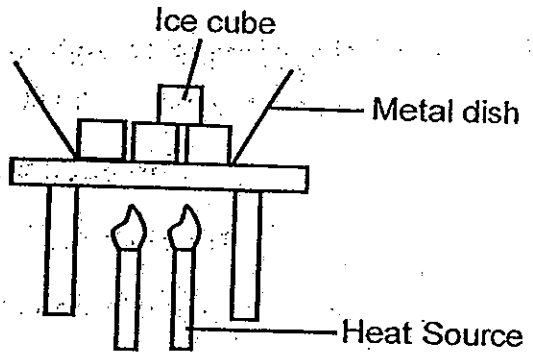
Set-up P



Set-up Q



Set-up R



Set-up S

Which two set-ups should Sharon use in her experiment to ensure that it is a fair test?

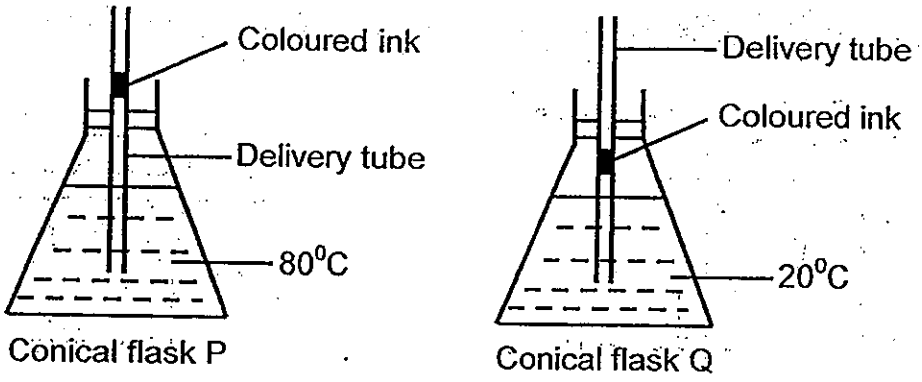
(1) P and S

(2) P and R

(3) Q and S

(4) Q and R

30. Amreet set up an experiment as shown in the diagram below. He measured the temperature of the water in conical flasks, P and Q, and recorded it as 80^0C and 20^0C respectively. He observed that the coloured ink drop was at different heights in each delivery tube at the start of the experiment.



Amreet then placed the two conical flasks, P and Q, into a basin of water at 50^0C.

Which one of the following best describes Amreet's observation on the coloured ink in both the conical flasks after it was placed in the basin of water?

	Conical flask P	**Conical flask Q**
(1)	The coloured ink rises.	The coloured ink rises.
(2)	The coloured ink falls.	The coloured ink rises.
(3)	The coloured ink rises.	The coloured ink falls.
(4)	The coloured ink falls.	The coloured ink falls.

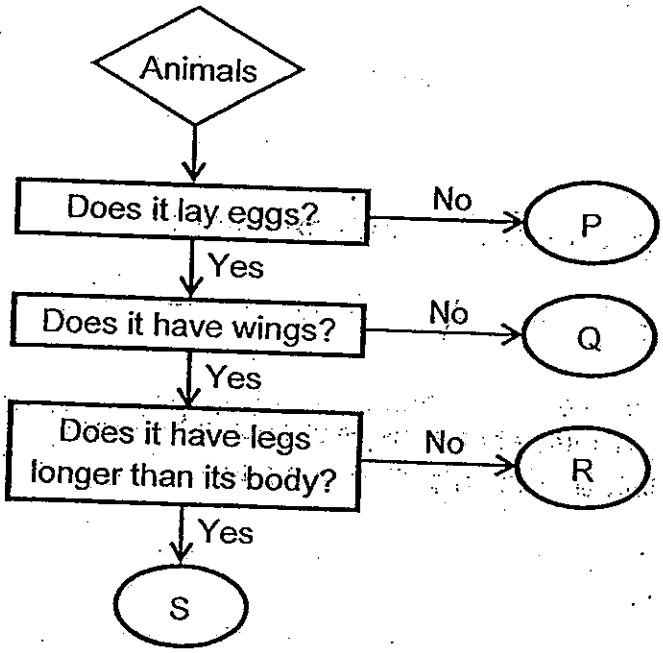
Name: _____ ( )

Class: P4 ( )

Section B: 40 marks

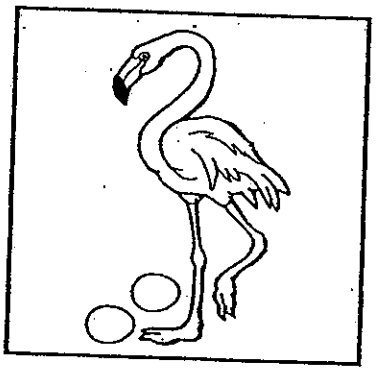
Read the questions carefully and write down your answers in the spaces provided.

31. The flow chart below shows the characteristics of 4 animals P, Q, R and S.

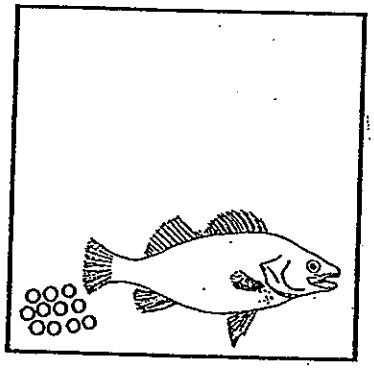


(a) Which animal, P, Q, R or S, best represents the animals as shown below?

[2]



Animal _____



Animal _____

(b) Based on the flow chart, state one physical difference between animals Q and R.

[1]

_____

_____

3

32. Julia wanted to find out if the amount of water given to a plant daily affects the growth of the plant. She placed two similar plants, A and B, under the sun and watered each plant with different amounts of water daily. She then observed the growth of the plants after 5 days and recorded the results.

	Plant A	**Plant B**
Amount of water given daily (ml)	20	5
Increase in height of plant growth after 5 days (cm)	14	6

(a) State the changed variable in Julia's experiment. [1]

_____

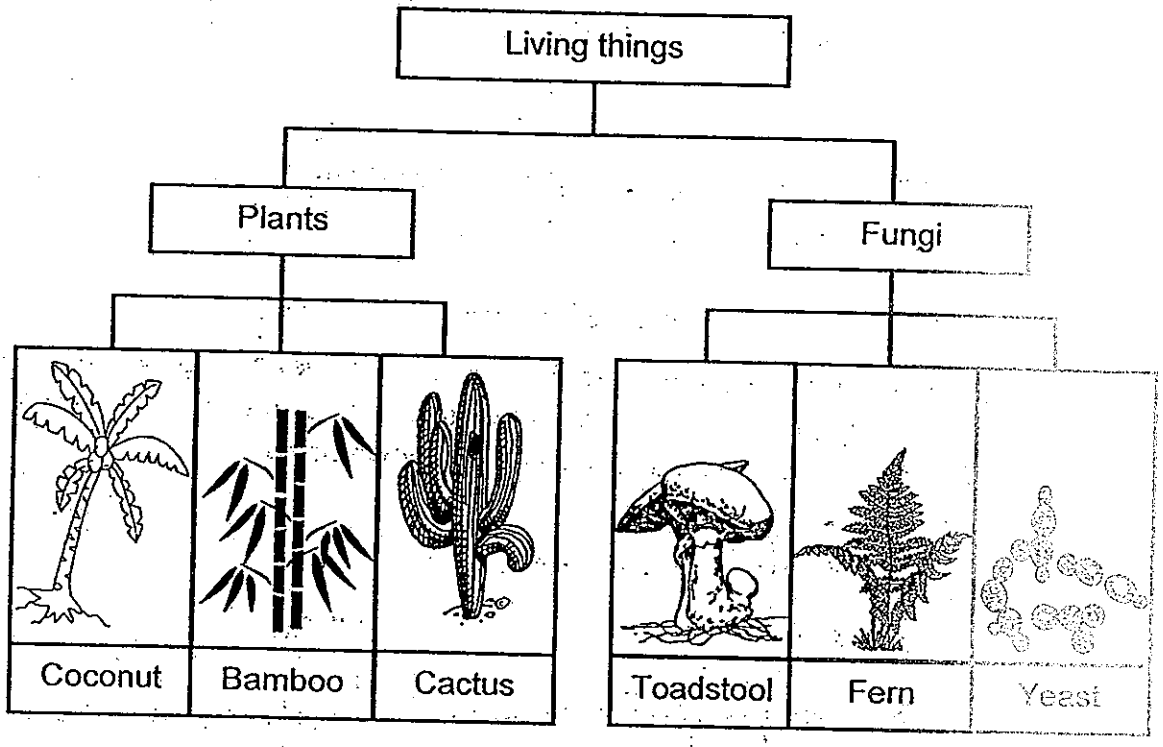
(b) Based on the results, what is the relationship between the amount of water given daily and the growth of the plant? [1]

_____

_____

2

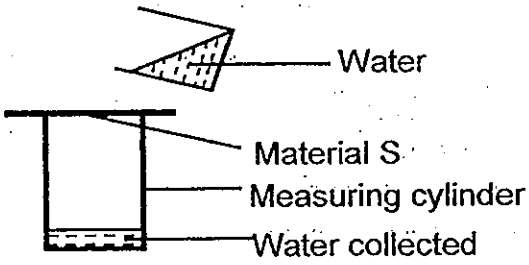
33. Study the classification chart below.



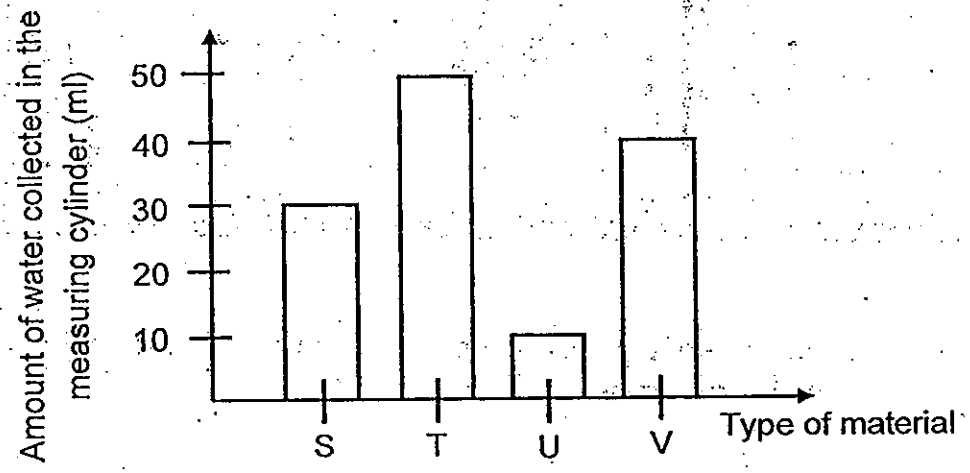
(a) Which one of the organisms above has been classified wrongly? Explain your answer. [2]

(b) How does the toadstool obtain its food? [1]

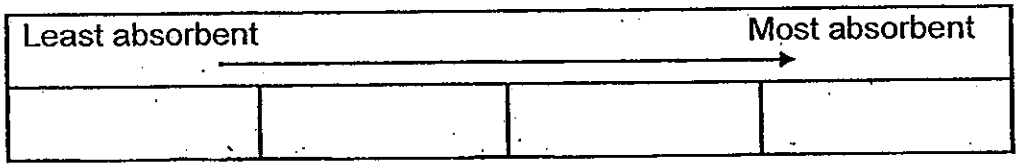
34. Isaac conducted an investigation to find out how much water a material can absorb. He put a sheet of material S over a measuring cylinder. He then gently poured 200ml of water over material S without spilling any water.



Isaac recorded the amount of water collected in the measuring cylinder. He repeated the experiment using different materials T, U and V, one piece at a time. With his results, he plotted a graph as shown below.



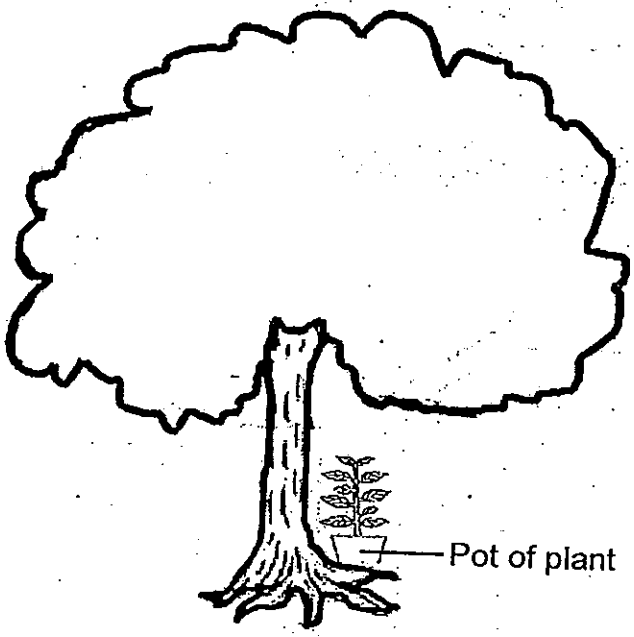
(a) Arrange materials S, T, U, V, according to its absorbency. [1]



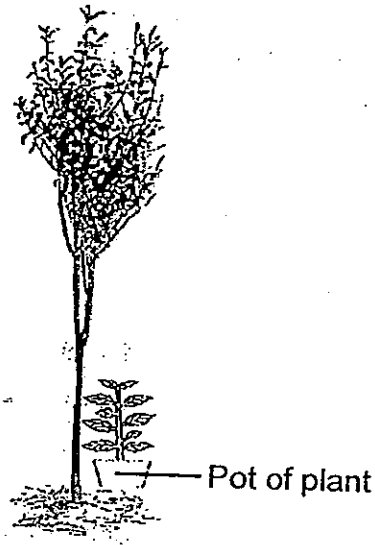
(b) Which one of the materials, S, T, U, V, is most suitable to be made into a mop to clean up wet spills most effectively? Explain your answer. [2]

3

35. Two similar pots of plants were placed under 2 different trees of different sizes as shown below.



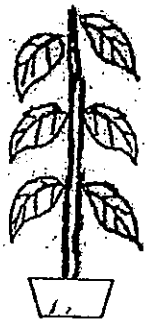
Tree A



Tree B

Both plants were given the same amount of water every day. After 3 weeks, it was observed that one of the plants had wilted while the other plant continued to grow healthily.

Healthy plant with green leaves

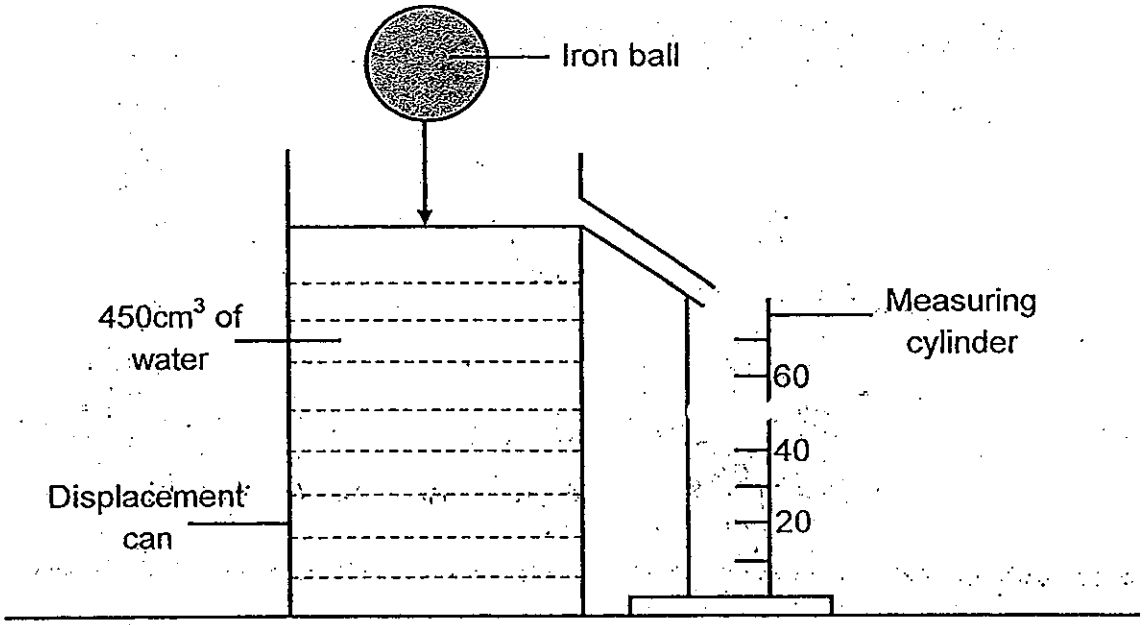


Wilted plant with yellow leaves

Under which tree was the wilted plant with yellow leaves placed? Explain your answer. [2]

2

36. Rasyidah filled a displacement can with 450cm^3 of water as shown in the diagram below. She then gently lowered a 50cm^3 iron ball to the bottom of the displacement can. She observed that some water overflowed from the displacement can into the measuring cylinder.



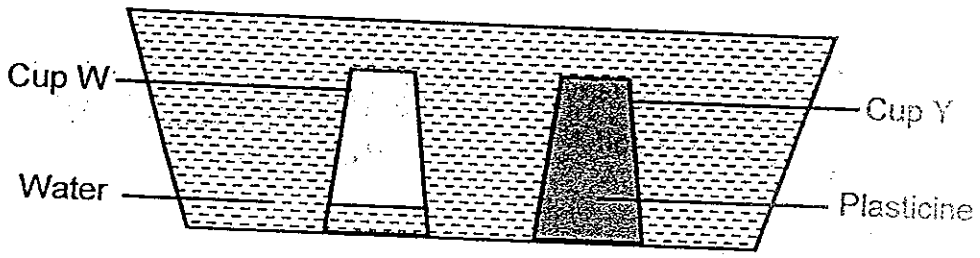
(a) Draw on the measuring cylinder, the amount of water collected. [1]

(b) Rasyidah then repeated the experiment using a 50cm^3 rubber ball. She realised that the amount of water collected in the measuring cylinder is the same as the amount of water collected in (a). She then concluded that the iron ball has the same mass as the rubber ball.

Do you agree with her conclusion? Explain your answer. [2]

3

37. Yuki set up an experiment as shown in the diagram below. She inverted an empty cup W and pushed it into a container of water. She then inverted another cup Y, filled with plasticine, and pushed it into the same container of water.



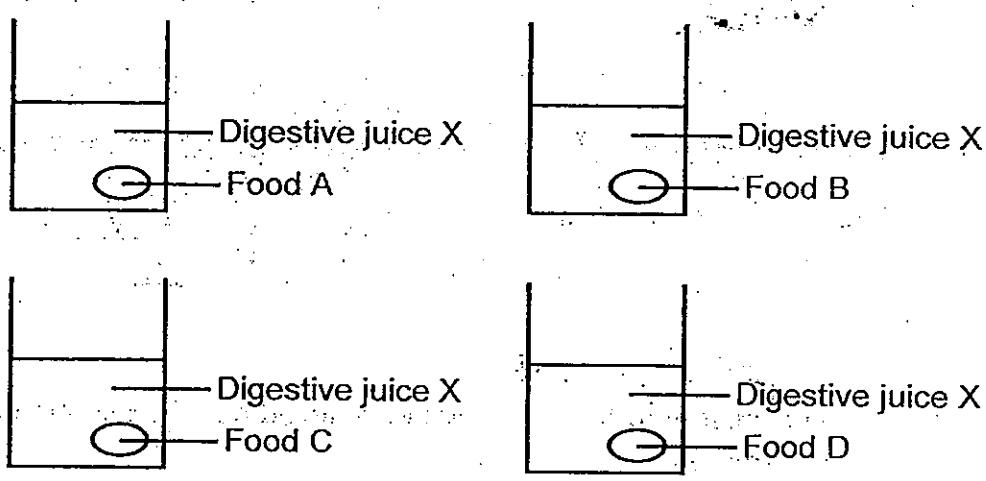
(a) Yuki observed that some water entered cup W. Explain her observation.

[2]

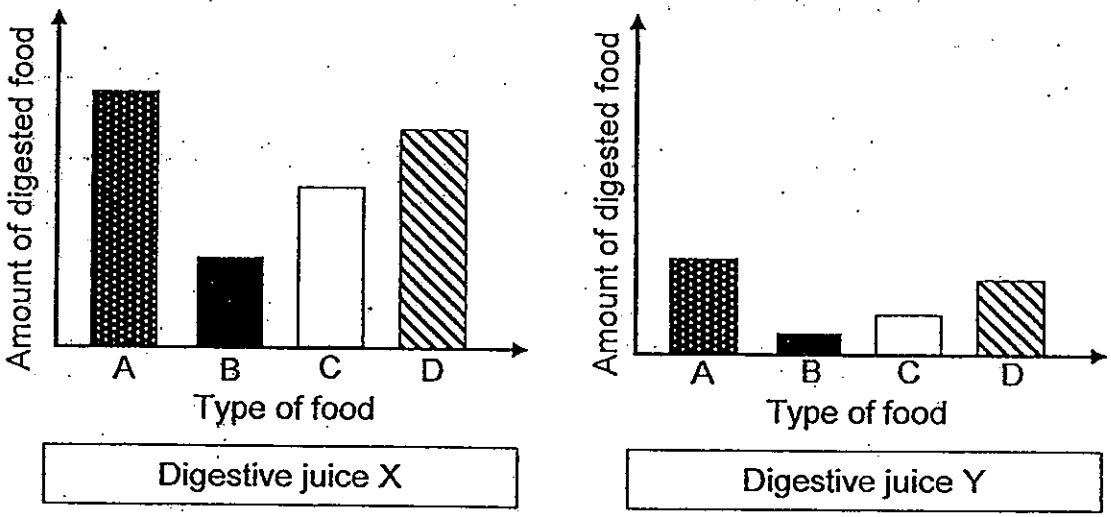
(b) Do you think any water can enter plastic cup Y which is filled with plasticine? Explain your answer.

[1]

38. Fahmi placed equal amount of food A, B, C and D in digestive juice X for 3 hours. The set-up is shown below.



After 3 hours, he recorded the amount of digested food in each set-up. He then repeated the experiment using digestive juice Y. The results of the 2 experiments are shown in the graphs below.

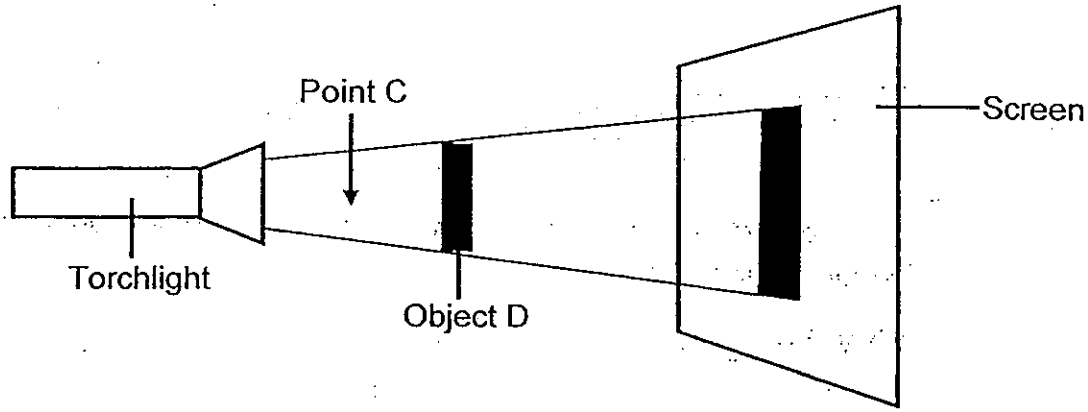


(a) Based on the information given in the graph above, which type of food is the least easily digested? Explain your answer. [1]

(b) Which digestive juice, X or Y, has a faster rate of digestion for food A? Explain your answer. [1]

(c) Fahmi's brother accidentally swallowed the seed of an apple. The next day, he passed out the seeds in his waste. Explain why the seed passed out looked exactly the same as before. [1]

39. Wilson placed a torchlight in front of object D and a dark shadow was cast on the screen as shown in the diagram below.

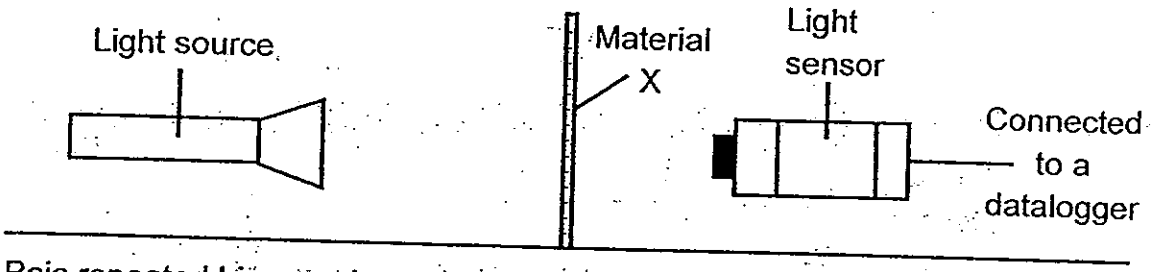


(a) From the observation above, what can Wilson infer about the property of object D? [1]

(b) Without removing object D, Wilson then placed a large piece of clear glass at point C as shown above. He predicted that a dark shadow will still be formed on the screen. Do you agree with Wilson? Explain your answer. [1]

(c) Wilson decided to change object D to object B, which is made of frosted glass. What will the difference between the shadows cast by object B and object D be? Explain your answer. [2]

40. Raja carried out an investigation as shown in the diagram below. He placed a sheet of material X between a light source and a light sensor. The amount of light that passed through material X was detected and recorded.



Raja repeated his experiment with different number of sheets of material X. He then recorded the amount of light detected in the table below.

Number of sheets	Amount of light detected by the light sensor (units)
1	4050
5	2820
7	780
9	0
11	0

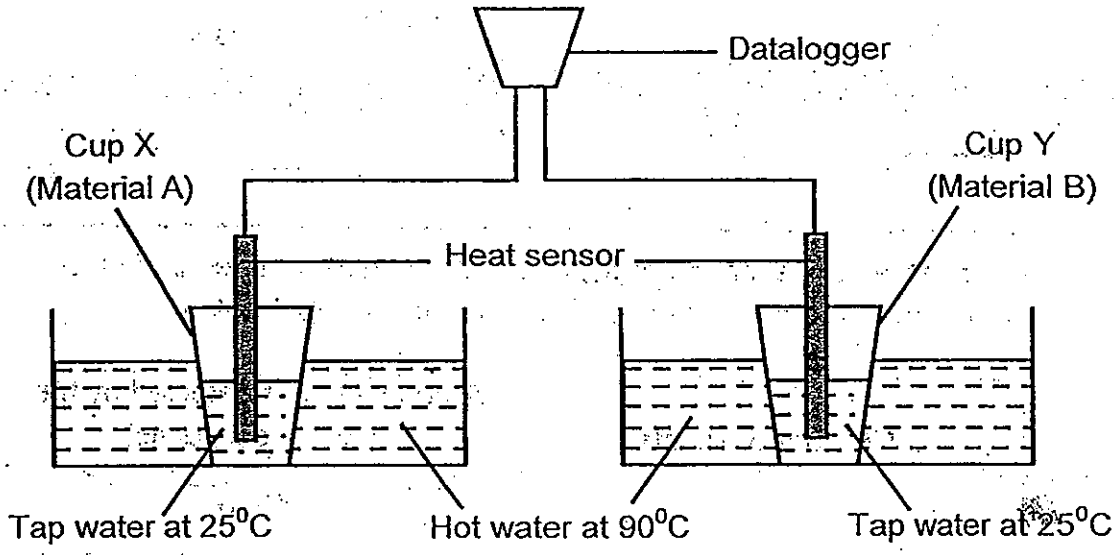
(a) What was the aim of Raja's experiment? [1]

(b) What conclusion can Raja make from the results shown in the table? [1]

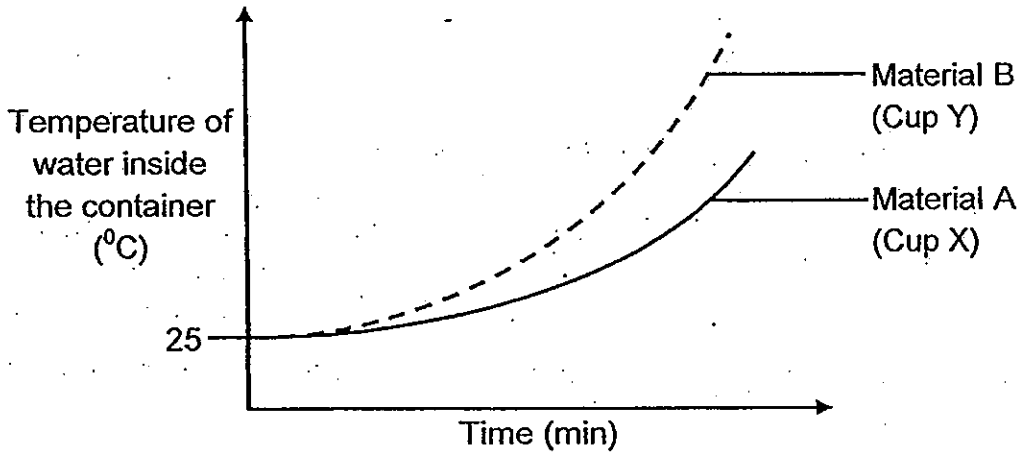
(c) State what Raja can do to confirm that the maximum number of sheets that is needed to completely block light from passing through material X is 9 sheets. [1]

3

41. Jun Jie conducted an experiment using two cups X and Y made of different materials A and B respectively. He filled both cups with the same volume of tap water at a temperature of 25^{0}C and placed them each into a basin of hot water at 90^{0}C.



Jun Jie then used a datalogger to measure and record the temperature of water inside cups X and Y for ten minutes. The results were plotted in the graph as shown below.



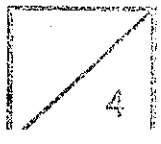
(a) Which material, A or B, is a better conductor of heat? Explain your answer. [1]

1

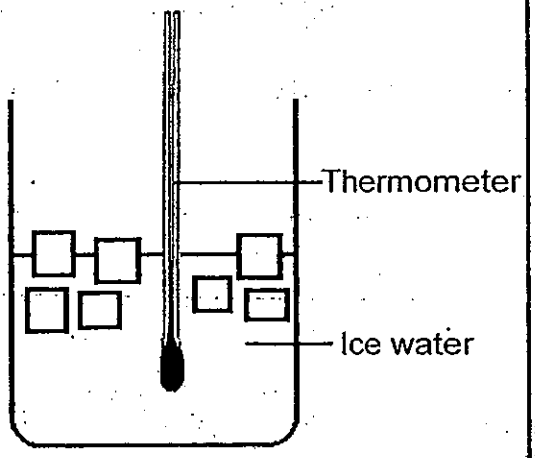
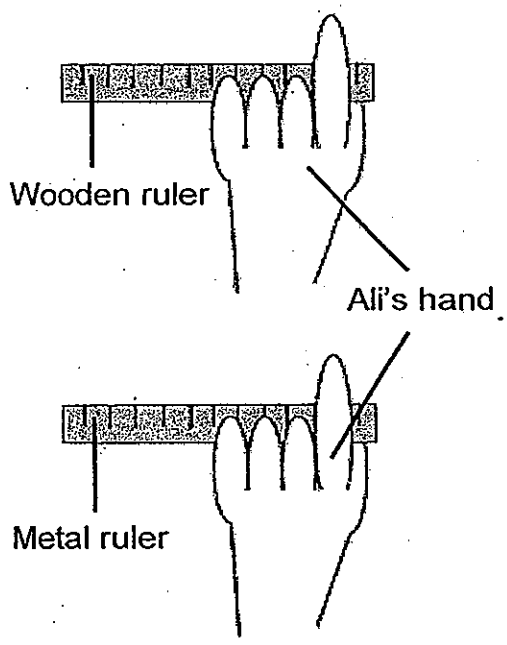
(b) Describe the heat transfer which causes the temperature change in the water inside cup X. [1]

(c) When will the heat transfer between the water in the cups and the hot water stop? [1]

(d) If Jun Jie wants to keep his drink cold for the longest time, which cup would he choose to use? Explain your choice. [2]

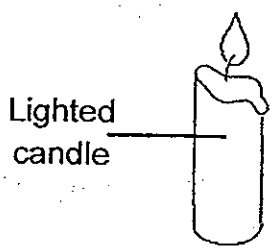


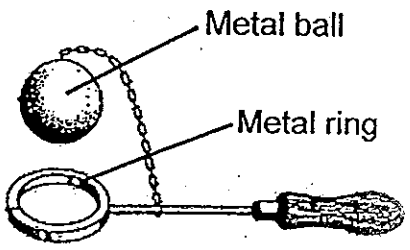
42. Explain the observations for each of the following experiments.

	Description and observation	Question
a)	 When the thermometer was placed into a beaker of ice water, the alcohol level in the thermometer drops.	(a) Explain why the alcohol level in the thermometer drops when placed in the beaker of ice water. [2]
b)	 Ali's hand felt colder when he touched the metal ruler compared to the wooden ruler.	(b) Explain why Ali's hand felt colder when he touched the metal ruler. [2]

4

43. You are given a lighted candle, a metal ball and a metal ring as shown below.





Describe what you would do to show that metal expands when heated. [2]

End of Paper

ANSWER SHEET

EXAM PAPER 2013
SCHOOL : AI TONG

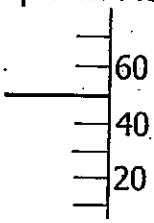
SUBJECT : PRIMARY 4 SCIENCE

TERM : CA2

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
3	3	2	2	2	2	1	4	3	2	1	3	2	3	3	1	3

Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
3	2	4	4	2	1	2	3	2	2	3	1	2

Q31a) Animal S, Animal Q
Q31b) Animal R has a pair of wings but animal Q does not have a pair of wings.
Q32a) The amount of water given daily
Q32b) As the amount of water given daily increase, the growth of the plant increases.
Q33a) Fern. Fern is a plant as it has leaves to make its own food.
Q33b) Toadstool feeds on decaying matter/dead matters/living things/animals and plants dead or alive.
Q34a) T, V, S, U
Q34b) Material U. The amount of water collected in the measuring cylinder is the least. Material U is the most absorbent. It is able to absorb the most amount of water of the wet spill most effectively.
Q35) Tree A has more leaves/thicker canopy which blocked the sunlight from reaching plotted plant. Plotted plant did not receive enough sunlight to make food/grow healthily.
Q36a)



Q36b) No, I do not agree. The amount of water displaced/collected in the measuring cylinder is the volume of the rubber ball/iron ball, not the mass.
Q37a) There is air (trapped) in the (inverted plastic) cup which takes up space. Since air can be compressed, some water compressed the air and entered the cup.
Q37b) No water will enter plastic cup Y. Plasticine takes up space and cannot be compressed.
Q38a) Type B. The amount of digested food is the least.
Q38b) Digestive juice X. The amount of digested food A in digestive juice X is more.
Q38c) The seed cannot be digested.
Q39a) Object D is opaque.
Q39b) Yes, I agree. The clear glass is transparent so object D will still block light, casting a dark shadow.
Q39c) The shadow cast for object B will be lighter than object D. It is because frosted glass blocked some light while object D blocked all light from reaching the screen.
Q40a) Raja wants to find out if the number of sheets of material X will affect the amount of light detected by the light sensor.
Q40b) He can conclude that increasing the number of material X will decrease the amount of light passing through.
Q40c) Conduct the experiment using 8 sheets of material X.
Q41a) Material B. The temperature of water in cup Y at the end of the experiment is higher than that of cup X.
Q41b) The hot water loses heat to the tap water as the heat travels from a hotter region to a colder region.
Q41c) When both water in the cups and hot water in the basin reach the same temperature.
Q41d) Cup X. The temperature of water in cup X at the end of the experiment is lower than that of cup Y. Cup X is made of a material which is a poorer conductor of heat. Less heat would be transferred to the cold drink thus heat transfer from the surroundings to the cold drink is slower.
Q42a) The alcohol lost heat to the ice and contracted.
Q42b) Ali's hand lost more heat to the metal ruler as the metal ruler is a better conductor of heat.
Q43) Heat the metal ball.
Put the metal ball through the ring
If the ball cannot go through the metal ring, it means it has expanded.