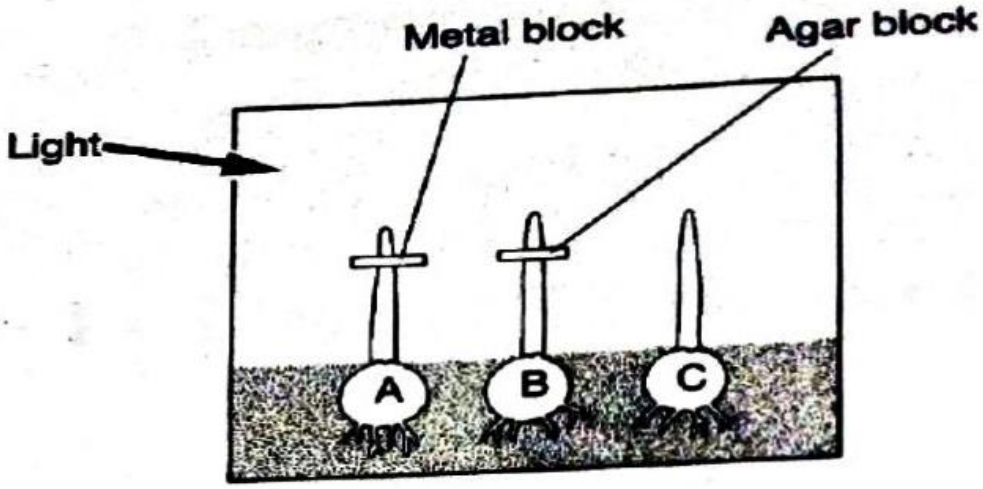
1 Pea seedlings were treated as follows;

Seedling A – Coleoptile tip was cut off, metal block placed, then tip Placed back.

Seedling B – Coleoptile tip was cut off, agar block placed then tip placed back.

Seedling C – Was left intact.

The seedlings A, B and C were placed in a dark box with small hole at one side as illustrated in the diagram below.

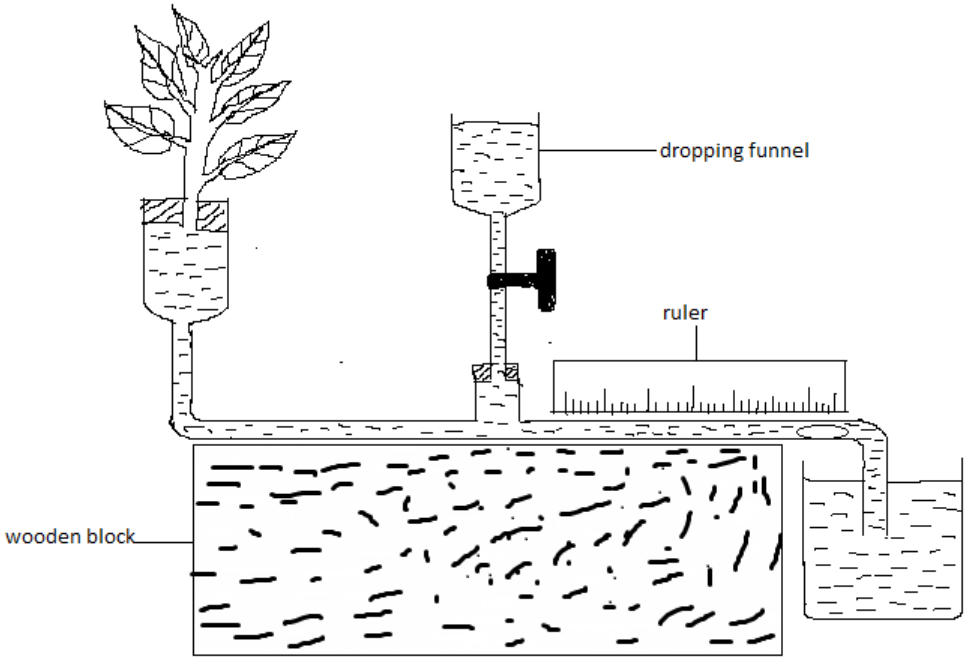


(a) State what was being investigated in the set up above. **(02 marks)**

(b) Using diagram illustrate how seedlings A, B and C appear after 48 hours?

(c) Explain the results in (b) above.

2. Study the diagram below and use it to answer the questions that follow



a). i). Name the apparatus and its use (2 marks)
Name of the apparatus
Use of the apparatus
ii). State the use of the dropping funnel (1 mark)
b). State three ways of ensuring that accurate results are obtained when using the above apparatus. (3 marks)
c). The apparatus was set under different environment conditions as in the table below, and the number of minutes taken for the bubble to run over 15 minutes in the tube was recorded.

	Environmental conditions			
	A	B	C	D
Time taken to run over 15cm in minutes	60	50	25	75
Rate of bubble movement in cm/minute				

i). Calculate the rate of bubble movement in conditions A, B, C and D and fill the table above. (Show your working). (8 marks)

(ii) Using the results in the table above match each of the sites of the experiments with the conditions represented by A, B, C and D in the table. (2 marks)

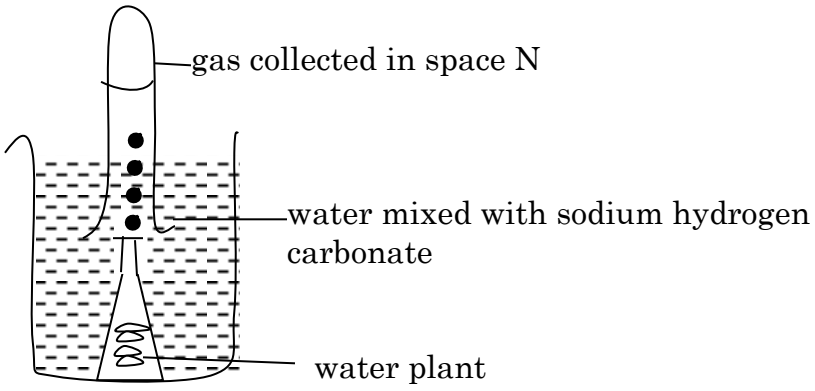
SITE

1. In the laboratory …….
2. In open, sunny place……...
3. In a dark, cool room……....
4. Under a tree …….

iii). Explain the effect on air bubble movement of smearing the lower surface of the leaves with Vaseline. (3 marks)

iv). Apart from temperature, state one other factor that can affect the movement of the air bubble. (1 mark)

3. Study the diagram below and answer the questions that follow.



(a). Name the gas which was collected in space N (1 mark)

(b) Briefly explain how the gas can be tested (2 marks)

c) What was the use of sodium hydrogen carbonate which was mixed with water? (1 mark)

d). Name the raw materials for photosynthesis and state their source in this

experimental set up (2 marks)

e). If the experiment set up was in darkness, what result would you expect?

(2 marks)

4. (a) Define the following terms

i. Osmoregulation (2 marks)

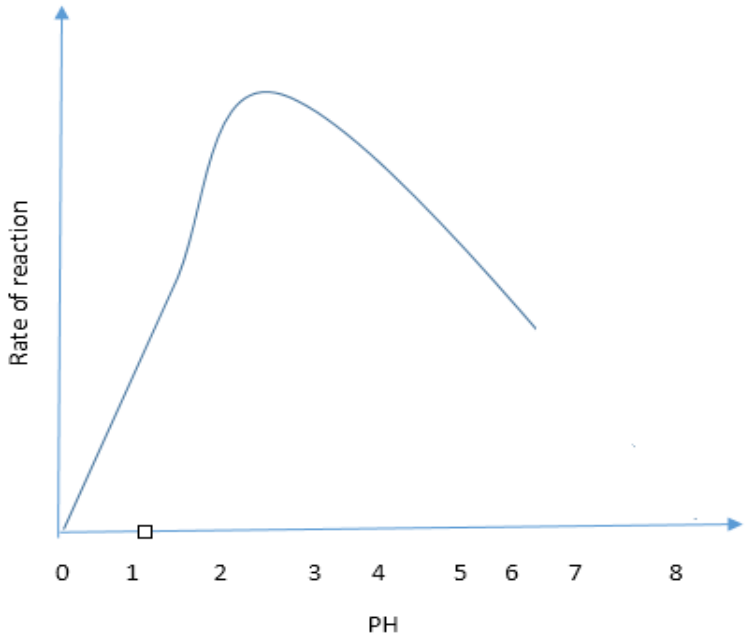
ii. Homeostasis (2 marks)

iii. Excretion (2 marks)

(b). How are excretion and osmoregulation carried out in the amoeba? (4 marks)

(c). Suggest why plants do not require excretory organs. (2 marks)

5. The graph below shows the results obtained during an investigation on the effect of pH on the enzyme activity.



(i) From the graph state the optimum pH for the enzyme

(ii) State the possible identity, substrate and location of the enzyme in the human gut. **(1½ marks)**

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Identity of the enzyme	Substrate	Location

(iii) Briefly explain why the rate of reaction eventually decreases with increasing pH above the optimum

(iv) Apart from pH, mention any other four factors that affect the rate of an enzyme catalyzed reaction. **(02 marks)**

6. To 100cm^3 of soil samples A, B, and C in large measuring cylinders, 100cm^3 of water was added. After stirring the mixture was left to settle for 10 minutes. The volume of the contents of the measuring cylinders was taken and recorded as shown in the table below.

Soil sample	Volume /cm3
A	175.0
B	185.0
C	150.0

a). What was the purpose of :
i. stirring? (1 mark)

ii. Leaving the mixture to settle for 10 minutes after stirring? (1 mark)

(b). (i). Calculate the volume of air in each soil sample A, B and C. (9 marks)

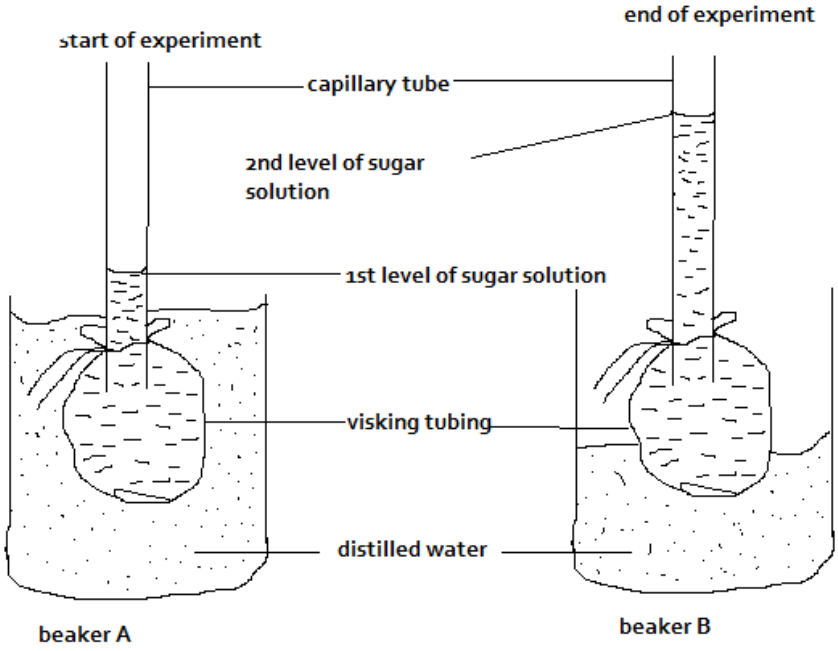
(c). Which soil sample is likely to be (½ mark)

(i). Clay

(ii). Sandy (½ mark)

7. What do you understand by the terms
i). Semi-permeable membrane (2 marks)
ii). Isotonic solutions (2 marks)

b). The figure below shows the results of an experiment to demonstrate a physiological process



i). What physiological process is being demonstrated in this experiment? (1 mark)

ii). What does the visking tubing represent? Give a reason for your answer (2 marks)

iii). Explain why the sugar solution rose up in the capillary tube. (2 marks)

c). State the importance of the physiological process being demonstrated to plants (1 mark)

SECTION C

8. a) Define the following terms: (06 marks)
   i) Parasitism
   ii) Commensalism
   iii) Symbiosis

   b) Describe the features and behavior that have made parasites very successful in their more of feeding. (05 marks)

9. c) a). Give reasons for excretion in plants not being a big challenge to the plants themselves.
   (9 marks)

   b). Tabulate four excretory organs in man, showing the main product for each and one particular excretory substance in each of the main product.
   (6 marks)