



**Rugby
School**

Sixth Form Entrance Examination

Specimen Paper

BIOLOGY

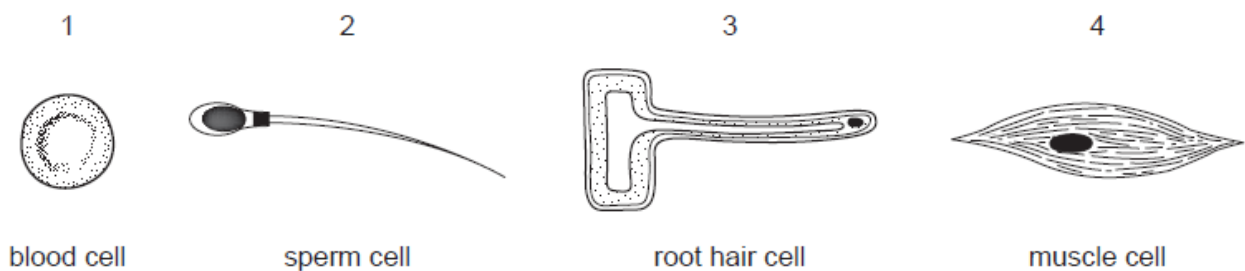
Time allowed: 60 minutes

SECTION A

Use the attached 'Multiple Choice Answer Sheet' at the back of this booklet to give your answer to the following 20 multiple questions. You may detach the sheet but remember to write your name and school in the space provided.

Indicate your answer by joining the dots under your chosen letter using a dark (HB) pencil. Ensure you have only one clear answer for each question.

Q1 The diagrams show four different cells (not drawn to scale).



Which cells provide a large surface area for absorption?

- A** 1 & 2 **B** 1 & 3 **C** 2 & 4 **D** 3 & 4

Q2 The table shows features that may be found in living cells.

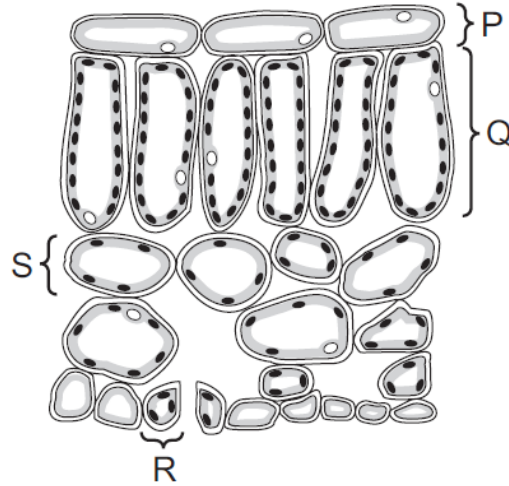
Which features are found in a liver cell?

	large central vacuole	chloroplasts	cellulose cell wall
A	✓	✓	✓
B	✓	✓	✗
C	✗	✗	✓
D	✗	✗	✗

Q3 Use the diagram of a section through a leaf to answer the question.

Which can perform the most photosynthesis?

- A P
- B Q
- C R
- D S



Q4 In the pancreas, there are groups of cells that make insulin.

What describes these cells?

- A an organ in an organism
- B an organ system in an organism
- C cells within a cell wall
- D tissue in an organ

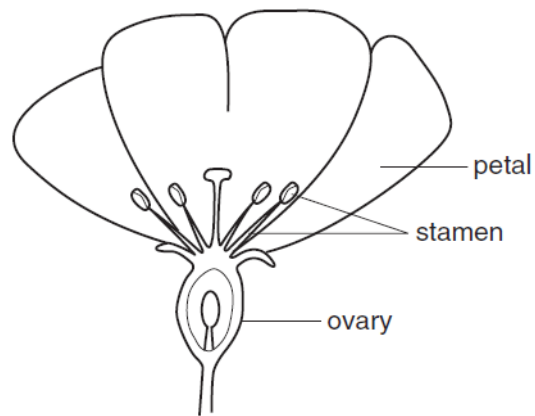
Q5 Which of these is digested by protease?

- A ■
- B ●
- C ■—■—■—■
- D ●—●—●—●

key

- amino acid
- glucose
- chemical bond

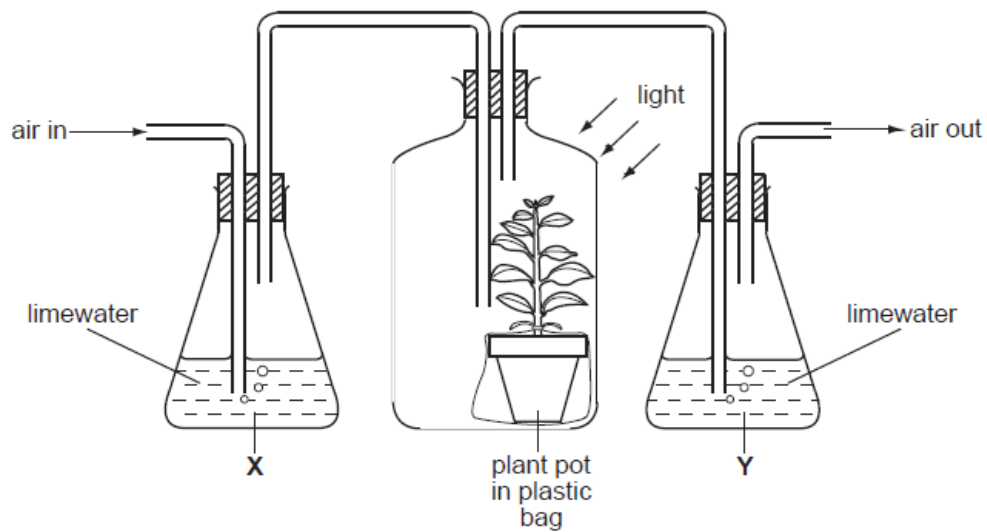
Q6 The diagram shows a half-flower.



Use the following key to identify the type of flower.

- | | | |
|---|---------------------------------|---------------|
| 1 | petals attached above the ovary | go to 2 |
| | petals attached below the ovary | go to 3 |
| 2 | stamens less than ten | type A |
| | stamens more than ten | type B |
| 3 | sepals absent | type C |
| | sepals present | type D |

Q7 The apparatus shown in the diagram is used to investigate the effect of a green plant on carbon dioxide in the air.



Limewater goes cloudy if carbon dioxide is bubbled through it.

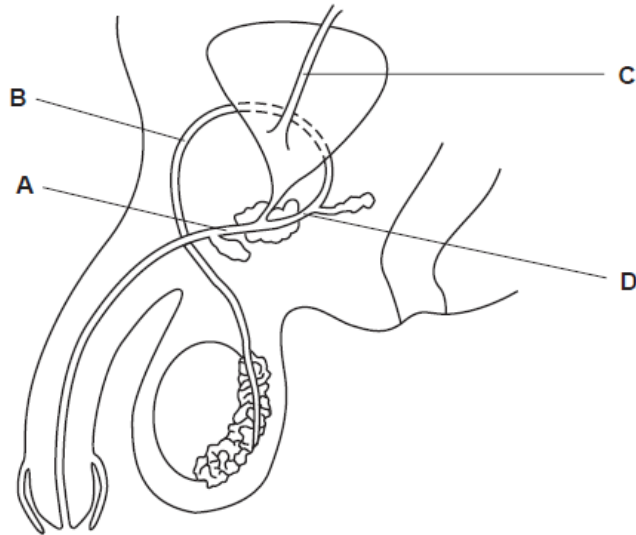
What happens to the limewater in X and in Y?

	X	Y
A	goes cloudy	goes cloudy
B	goes cloudy	stays clear
C	stays clear	goes cloudy
D	stays clear	stays clear

Q8 What crosses the placenta from fetal blood to maternal blood in larger quantities than from maternal blood to fetal blood?

- A** amino acids
- B** carbon dioxide
- C** glucose
- D** oxygen

Q9 The diagram shows reproductive organs of a human male.
Which tube carries both sperms and urine?



Q10 Which features of an animal's skin make it suitable as a gaseous exchange surface?

	features of skin	
	large area compared with body size	well supplied with blood vessels
A	✓	✓
B	✓	x
C	x	✓
D	x	x

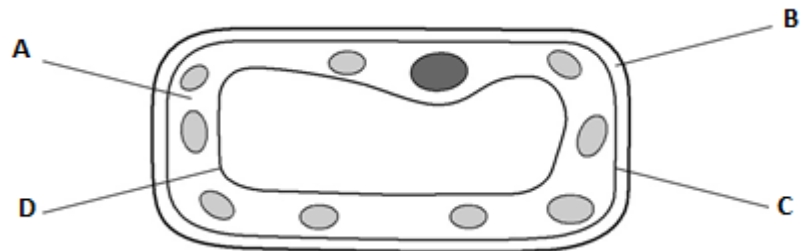
key

✓ = suitable

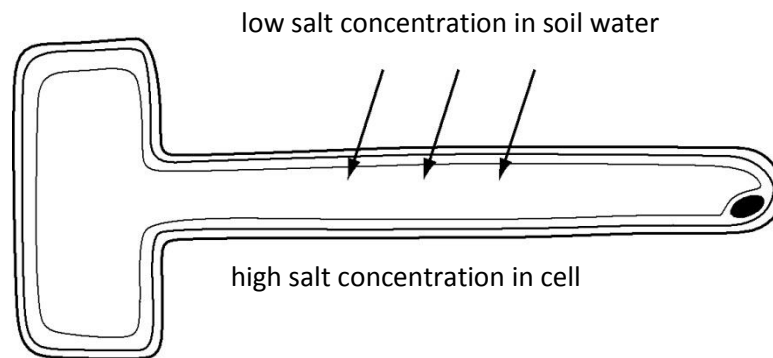
x = not suitable

Q11 The diagram shows a plant cell.

Which structure controls the passage of substances into and out of the cell?



Q12 The arrows represent the movement of salts into a root hair cell.



What describes the movement of the salts?

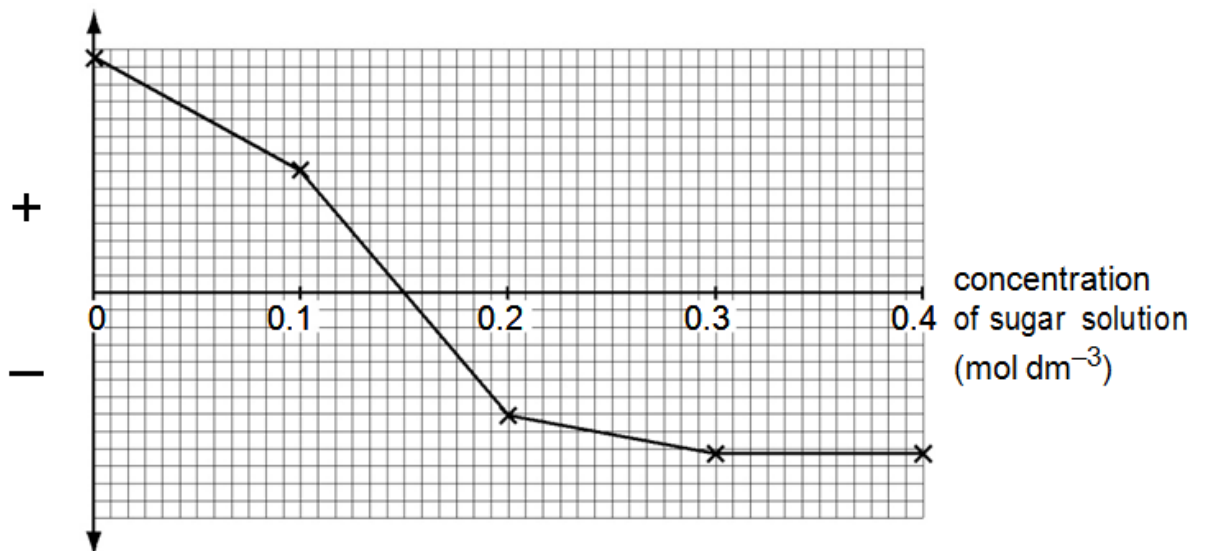
- A** active transport against the concentration gradient
- B** active transport down the concentration gradient
- C** diffusion against the concentration gradient
- D** diffusion down the concentration gradient

Q13 What is the function of each type of plant cell?

	PALLISADE CELLS	PHLOEM CELLS	ROOT HAIR CELLS
A	photosynthesis	sugar transport	ion uptake
B	photosynthesis	sugar transport	transpiration
C	transpiration	Photosynthesis	ion uptake
D	transpiration	Photosynthesis	sugar transport

Q14 Five pieces are cut from a potato, all of equal size and shape. The pieces are then placed in sugar solutions of different concentrations. After four hours, the change in length of each potato piece is measured.

The results are shown in the graph.



Which concentration of sugar solution has approximately the same water concentration as the potato?

- A** 0.00 mol dm⁻³
- B** 0.15 mol dm⁻³
- C** 0.30 mol dm⁻³
- D** 0.40 mol dm⁻³

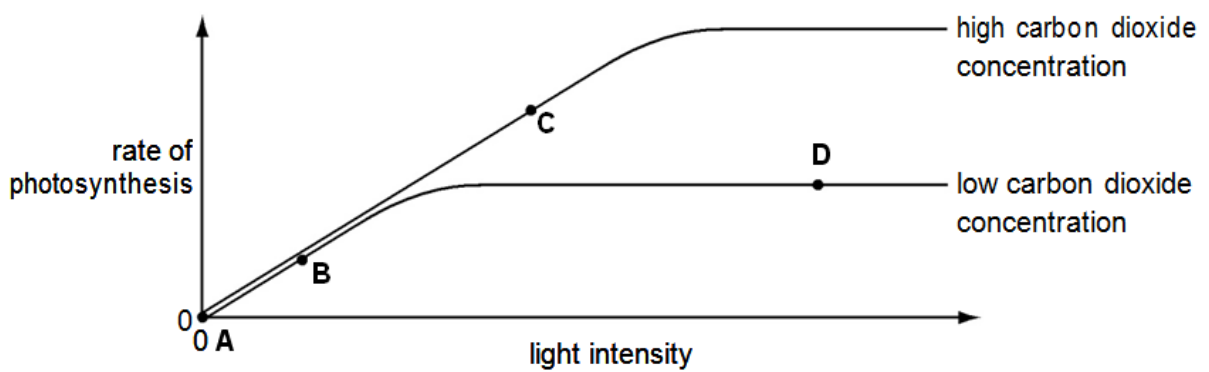
Q15 In which order do these events occur in human nutrition?

- A** digestion → ingestion → absorption → assimilation
- B** digestion → ingestion → assimilation → absorption
- C** ingestion → digestion → absorption → assimilation
- D** ingestion → digestion → assimilation → absorption

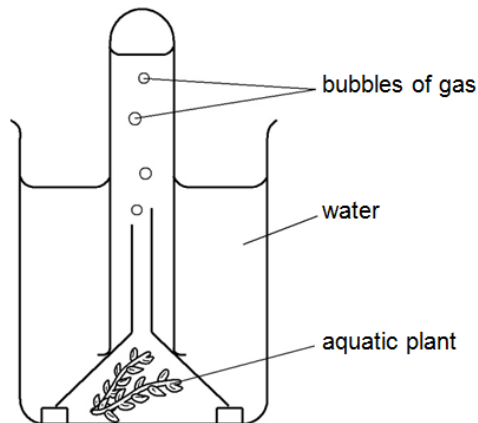
Q16 Which chemical test shows the presence of an enzyme in a biological washing powder?

- A** Benedict's
- B** Biuret
- C** ethanol emulsion
- D** iodine solution

Q17 The graph shows the rate of photosynthesis in a pea plant at different light intensities. At which point is carbon dioxide concentration a limiting factor?



Q18 The diagram shows an experiment to investigate the volume of gas produced by an aquatic plant under different conditions of light intensity and temperature.



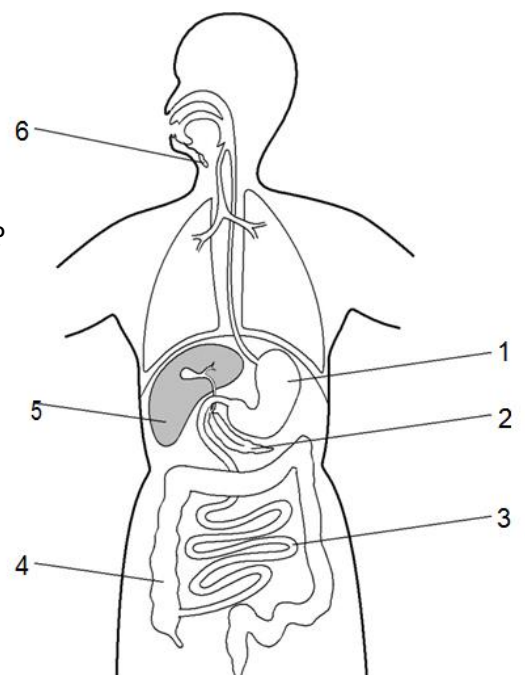
Which conditions result in the greatest production of gas by the plant?

	light intensity	temperature / °C
A	high	5
B	low	5
C	high	25
D	low	25

Q19 The diagram shows the human gut.

Which numbered structures secrete digestive enzymes?

- A** 1, 2, 3 & 4
- B** 1, 2, 3 & 6
- C** 2, 3, 4 & 5
- D** 2, 3, 5 & 6



Q20 The table shows some of the nutrients present in four foods.

food	iron / mg per 100 g of food	calcium / mg per 100 g of food	vitamin C / mg per 100 g of food	vitamin D / μ g per 100 g of food
1 bananas	0.4	7	10	0
2 fish	0.4	35	0	6.38
3 lentils	7.6	30	0	0
4 milk	0.1	120	0.5	0.002

Which two foods are best to help the healthy growth of bones and teeth of a child?

- A 1 and 2
- B 1 and 3
- C 2 and 3
- D 2 and 4

The END of Section A

Section B

Q1 In an experiment to investigate starch production by a plant, three similar plants, each with variegated (green and white) leaves were set up as shown in Fig. 2.1.

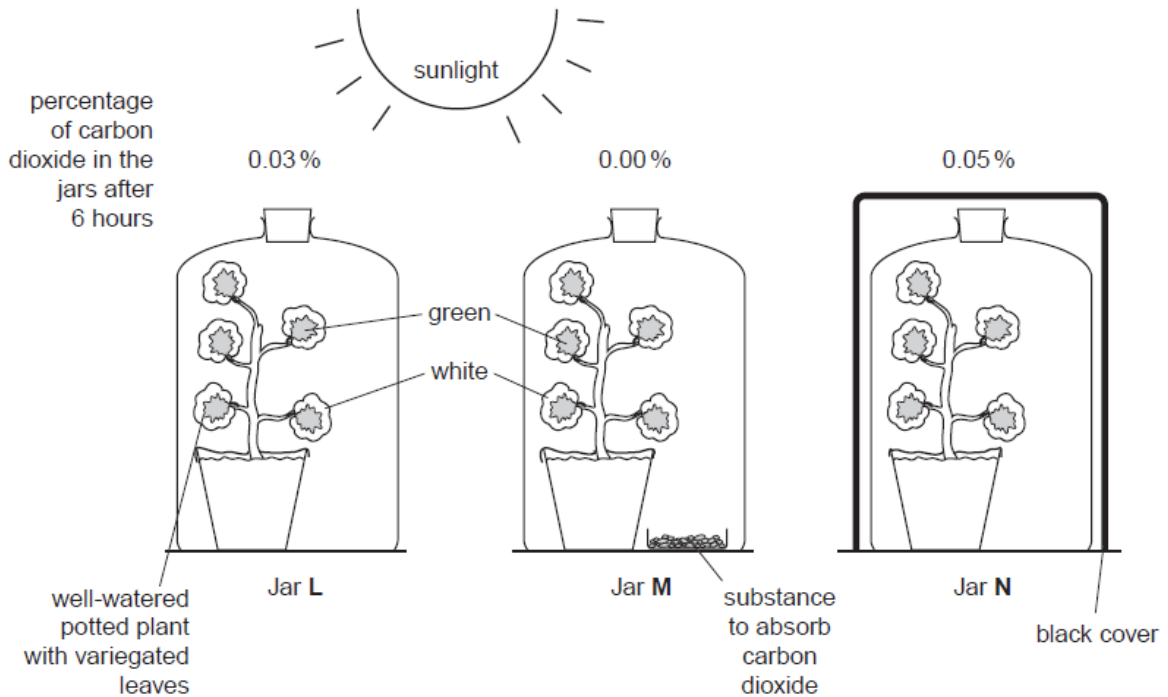


Fig. 2.1

(a) Name the process that produces starch in the leaves.

..... [1]

(b) At the start of the experiment, each jar contained atmospheric air. Name a gas, other than oxygen and carbon dioxide, which was present in the air inside the jars.

..... [1]

(c) Explain how the conditions in Jar L make it a control.

..... [1]

(d) Name the solution used to test for the presence of starch.

.....

[1]

(e) At the end of the experiment, a leaf was taken from each plant and tested for the presence of starch. On the outlines in the figure below, **clearly label** the **colours** of each leaf after the starch test. Do **not** colour in the leaves.

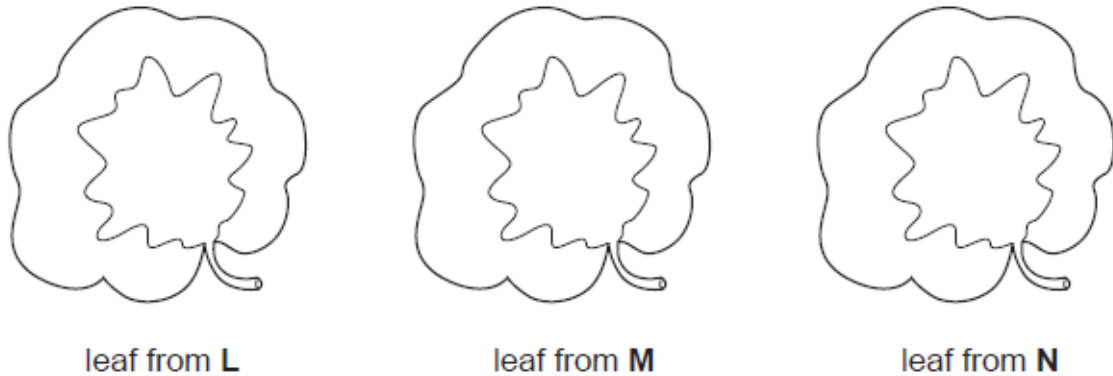


Fig. 2.2

[3]

(f) When the air was first trapped under the jars, it contained 0.04% carbon dioxide. For each of the jars, explain why this percentage has changed by the end of the experiment.

Jar L

.....

Jar M

.....

Jar N

.....

[6]

[Total: 13]

Q2 Fig. 3.1 shows an apparatus used to investigate the uptake of water by a cut stem of a fresh green plant.

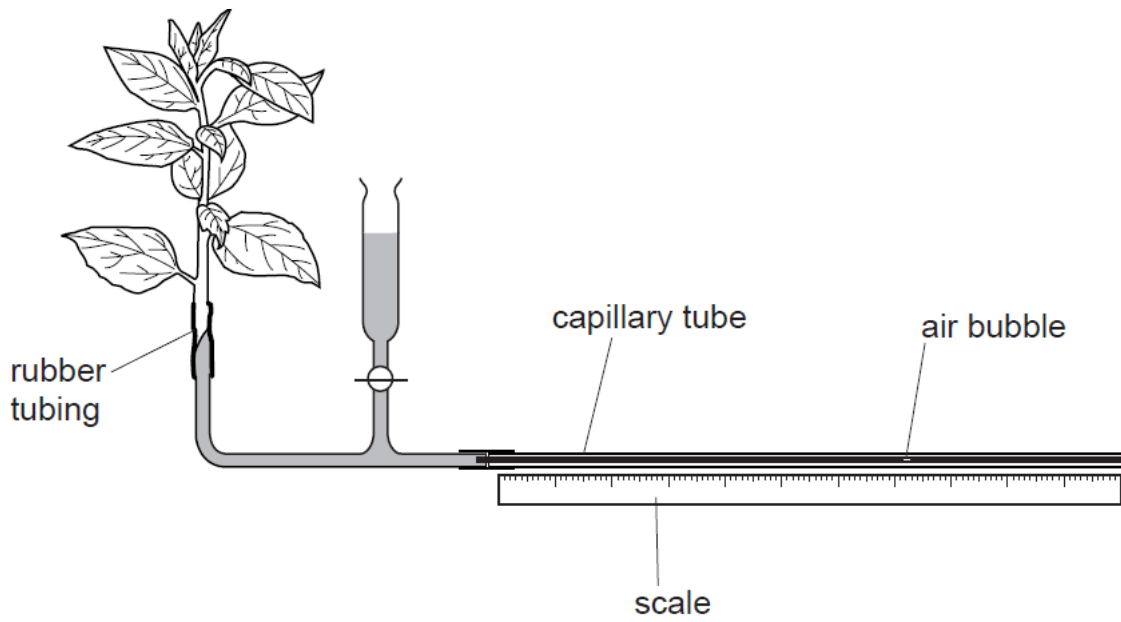


Fig. 3.1

(a) Draw an arrow on Fig. 1.1 to show the direction in which the air bubble moves when the plant takes up water.

[1]

(b) Explain why the air bubble moves along the tube.

.....

.....

.....

.....

.....

[2]

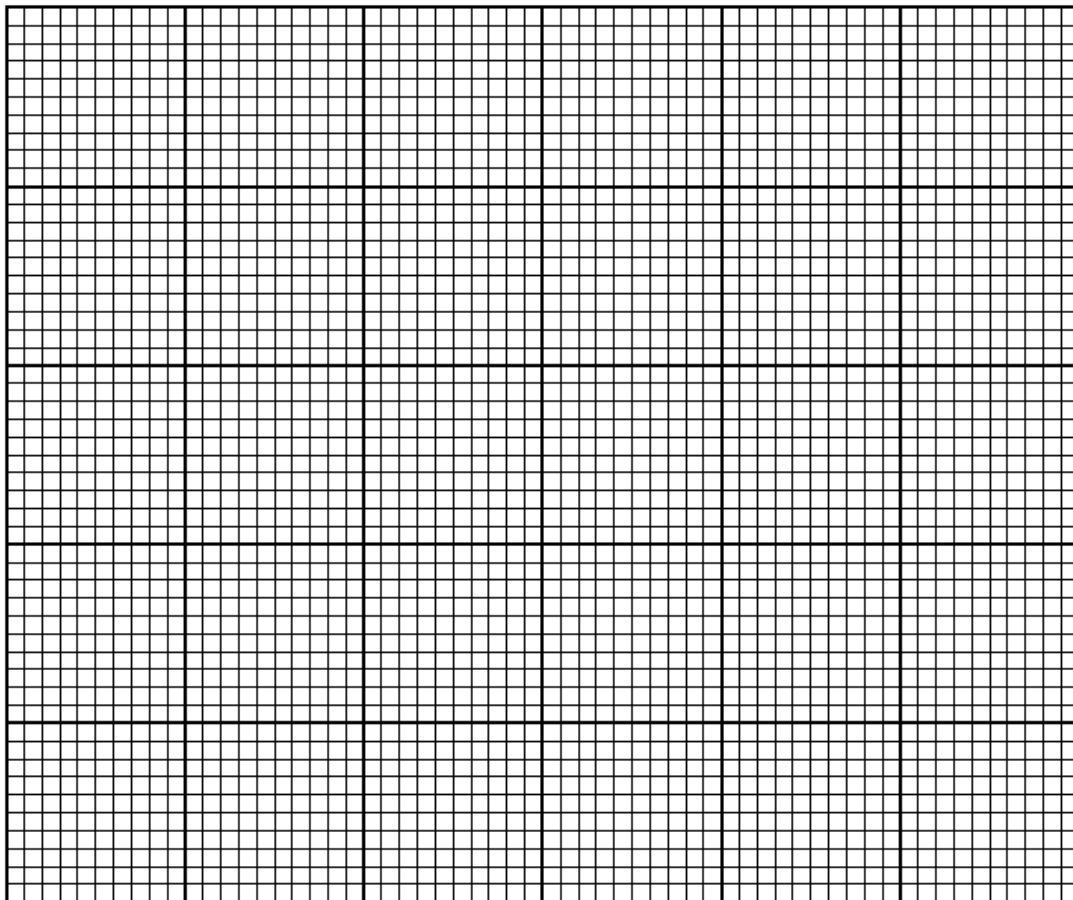
- (c) A student carried out an investigation using the apparatus shown in Fig. 3.1, on water uptake by the cut stem. The data collected is shown in Table 3.1.

Table 3.1

time of day	distance moved by bubble / mm per min
06.00	1
08.00	3
10.00	8
12.00 mid-day	16
14.00	14
15.00	11
18.00	2

Construct a line graph of the data on the grid below.

[5]



[Total: 8]

