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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
ADVANCED SUBSIDIARY GCE**

F211

BIOLOGY

Cells, Exchange and Transport

TUESDAY 12 JANUARY 2010: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Electronic calculator

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **ALL** the questions.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.



Where you see this icon you will be awarded marks for the quality of written communication in your answer.

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Answer ALL the questions.

- 1 (a) State the maximum magnification that can be achieved by a light microscope and a transmission electron microscope.

Select your answers from the list below.

10x 40x 100x 400x 1500x
25 000x 50 000x 500 000x

light microscope _____x

transmission electron microscope _____x
[2]

- (b) Describe what is meant by the term resolution.

[2]

- (c) An electron micrograph of xylem tissue in a plant stem reveals that some vessels have spiral bands and others have pits.

- (i) State ONE function of xylem tissue.

[1]

- (ii) The spiral band in the xylem vessel contains a substance called lignin.

State the function of this spiral band of lignin AND explain why it is important that the xylem vessel becomes lignified in this way.

[3]

- (iii) Explain the function of the pits seen in some of the xylem vessels.

[2]

[Total: 10]

2 (a) (i) Explain what is meant by the term tissue.

[2]

(ii) Name ONE type of epithelial tissue found in the lungs.

[1]

(b) Explain why the lungs can be considered to be an organ.

[2]

(c) In the lungs, goblet cells secrete mucus. The mucus is then moved by cilia.

Name ONE cellular structure from the list below that is associated with each of the following functions. You must select a structure once only.

MITOCHONDRIA RIBOSOME GOLGI VESICLE

CENTRIOLE NUCLEUS CYTOSKELETON

(i) release of energy _____

(ii) movement of cilia _____

(iii) secrete mucus _____ [3]

[Total: 8]

3 (a) Complete the passage below.

Membranes have a variety of functions in cells. All membranes are _____ permeable.

This means that they allow the passage of certain substances by processes such as active transport or _____ through the membrane.

The cell surface membrane, also known as the _____ membrane, surrounds the cytoplasm. The cell surface membrane consists of a bilayer of _____. To stabilise the structure of the membrane and keep it fluid, molecules of _____ are also found in this bilayer.

[5]

(b) Membranes contain a variety of proteins. Some of these proteins are combined with carbohydrates to form glycoproteins.

Describe the functions of glycoproteins in the cell surface membrane.



In your answer you should use appropriate technical terms, spelt correctly.

- 4 Fig. 4.1 shows a potometer, a piece of apparatus used for estimating the rate of transpiration.

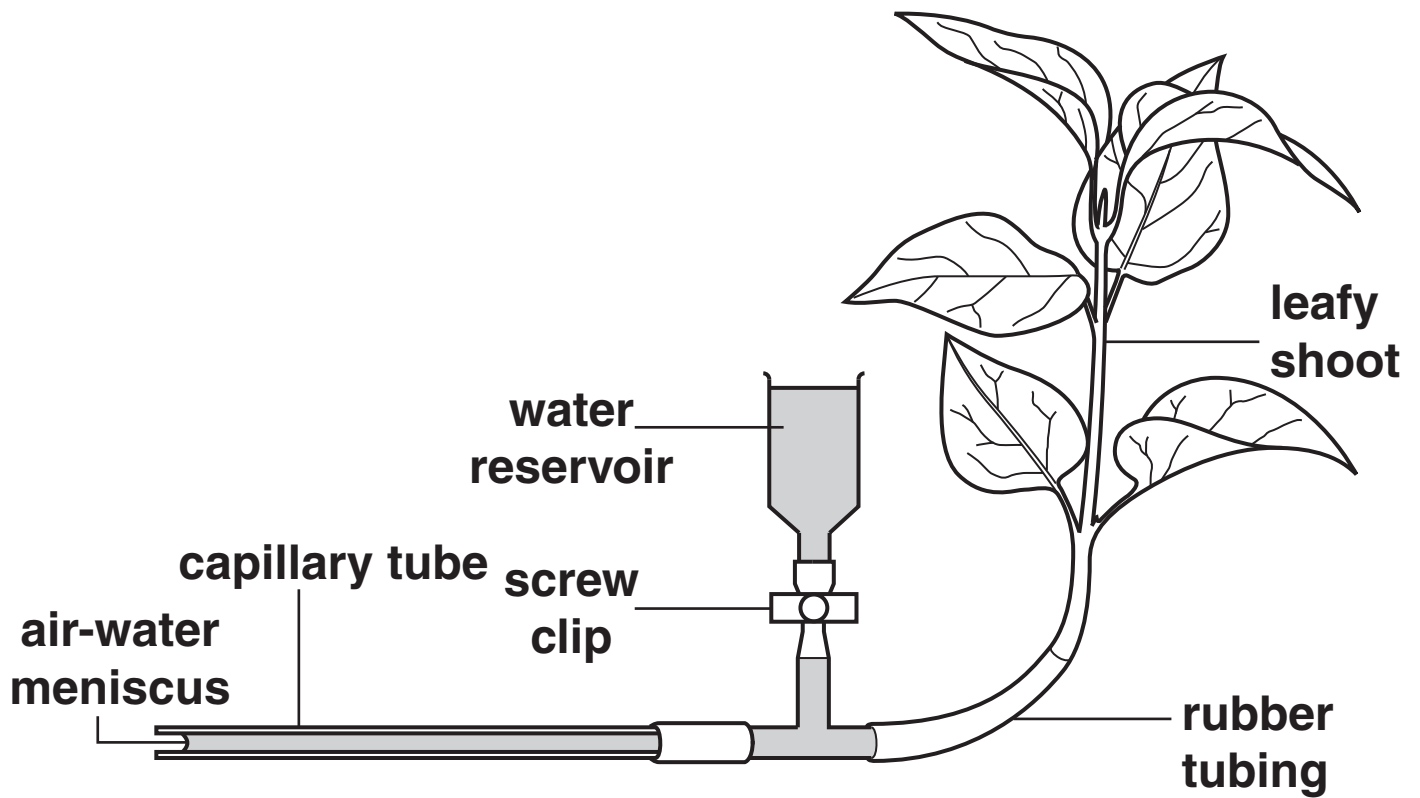


Fig. 4.1

- (a) State ONE essential component of the apparatus, not shown in Fig. 4.1, that must be added before any results can be recorded.

_____ [1]

(b) Describe THREE steps a student should take when SETTING UP the potometer to ensure that the apparatus works correctly.

1 _____

2 _____

3 _____

_____ [3]

- (c) A student used the apparatus shown in Fig. 4.1 to investigate how transpiration rates vary during the day. The student placed the potometer on a window ledge in the laboratory and estimated the rate of transpiration four times during the day.

The results are shown in Table 4.1.

Table 4.1

time of day	rate of transpiration (arbitrary units)			
	replicate 1	replicate 2	replicate 3	mean
10.00	32	29	31	30.7
12.00	37	35	38	36.7
14.00	23	26	25	24.7
16.00	25	27	24	

- (i) Calculate the mean value for the rate of transpiration at 16.00 hours.
Give your answer to ONE DECIMAL PLACE.

Answer = _____ [1]

- (ii) Explain why, for each time of the day, the student carried out three replicates to calculate a mean.

[2]

(iii) Suggest TWO possible reasons, other than light and temperature, why the rate of transpiration was LOWER in the afternoon than in the morning.

1 _____

2 _____

[2]

(iv) Explain why the potometer only gives an ESTIMATE of the rate of transpiration.

[2]

[Total: 11]

- 5 (a) (i) Fig. 5.1 represents a transverse section of an artery and a vein.

Draw a line to show the relative position of the endothelium of the VEIN.

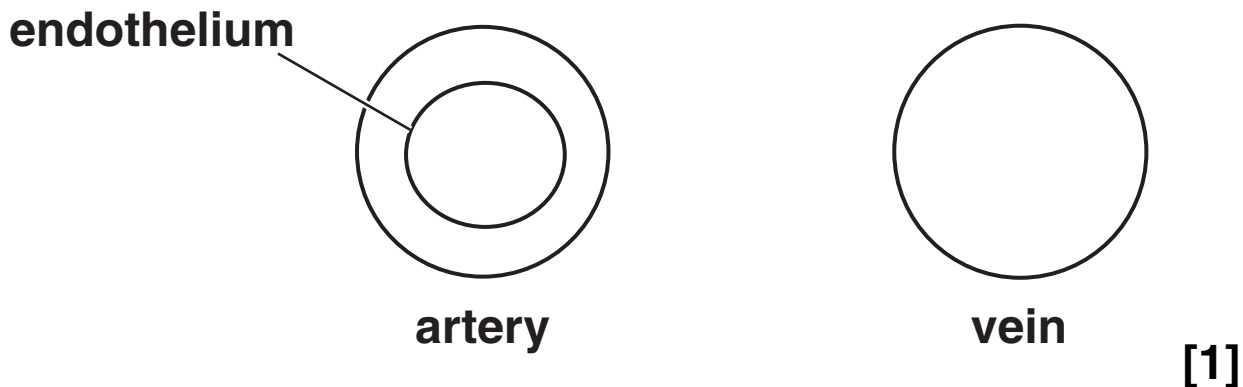


Fig. 5.1

- (ii) State TWO OTHER ways in which the wall of an artery is different from the wall of a vein.

1 _____

2 _____

_____ [2]

(b) (i) Blood in the arteries has a high hydrostatic pressure.

State how this hydrostatic pressure is generated in the heart.

_____ [1]

(ii) Explain why the hydrostatic pressure of the blood drops as blood moves away from the heart.

_____ [2]

(iii) Capillaries have walls that are one cell thick.

Fig. 5.2 shows how the hydrostatic pressure of the blood changes as it moves through a capillary.

Fig. 5.2 also shows the water potential of the blood, due largely to the plasma proteins, which tends to move water into the blood.

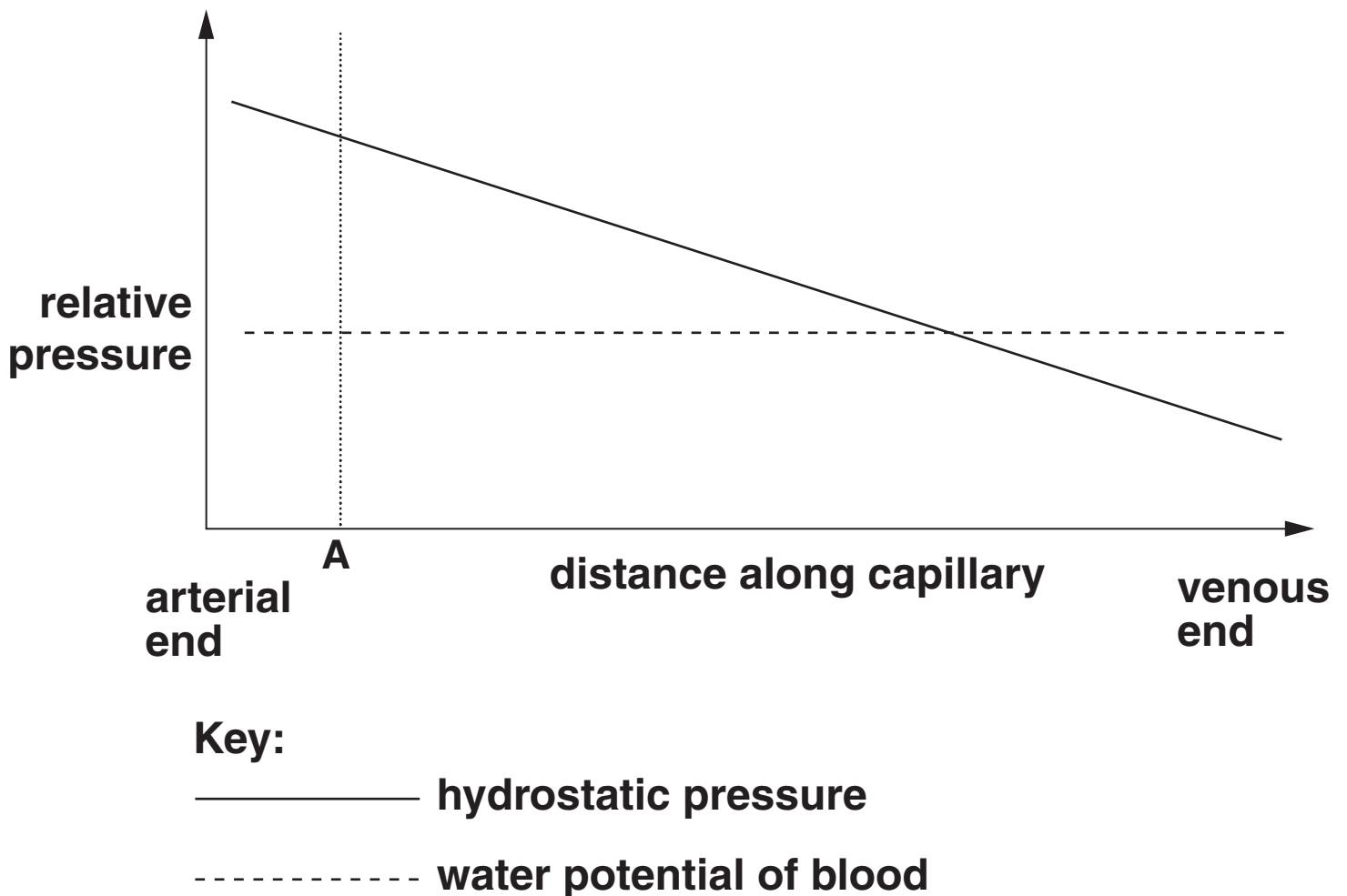


Fig. 5.2

Describe AND explain what happens to the blood plasma at point A along the capillary in Fig. 5.2.

[3]

(c) Carbon dioxide is produced in tissues as a waste product of respiration.

The majority of carbon dioxide is carried as hydrogencarbonate ions (HCO_3^-) in the plasma.

Fig. 5.3 shows the chemical pathway in which carbon dioxide is converted into HCO_3^- in a red blood cell.

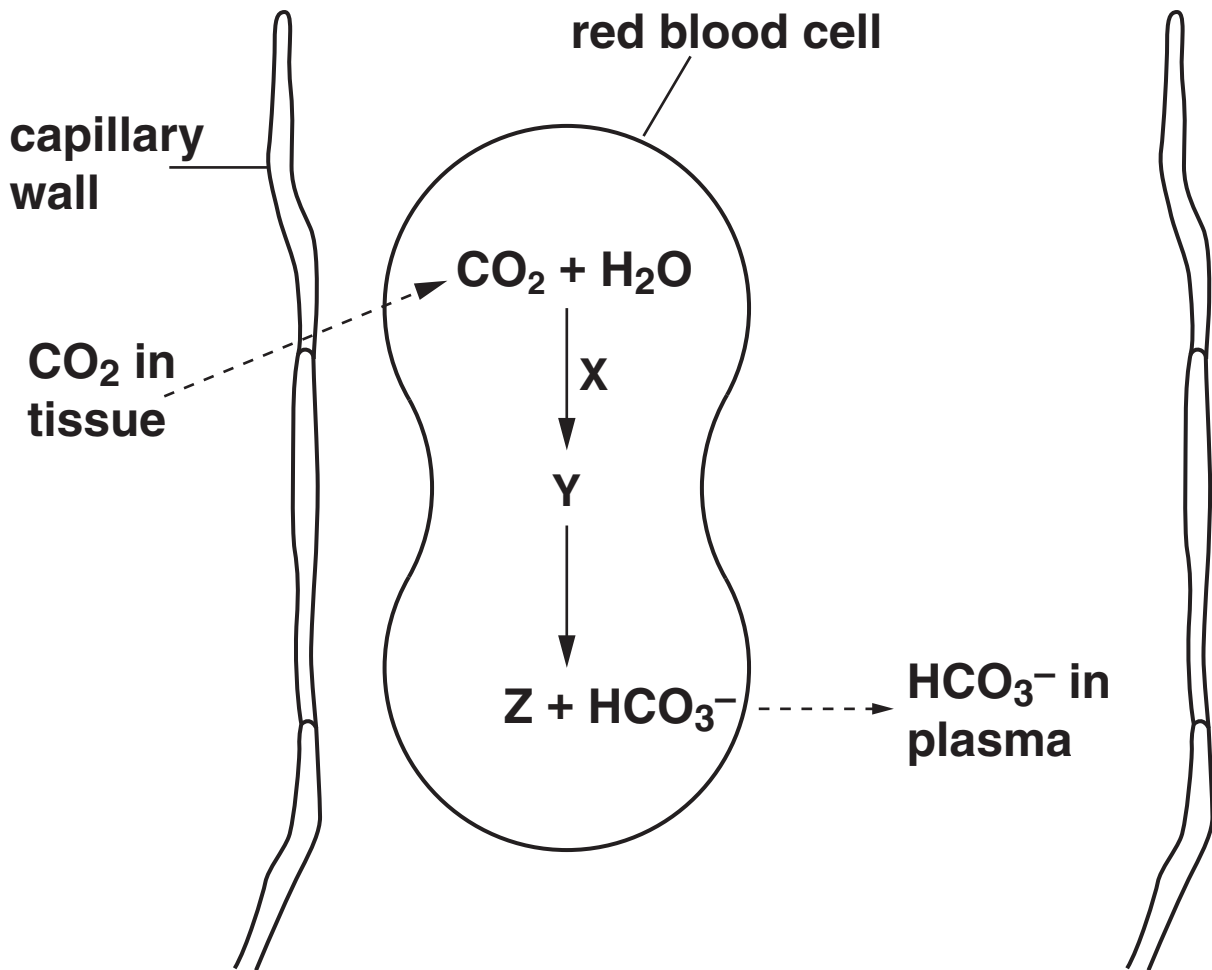


Fig. 5.3

Identify the following:

enzyme X _____

substance Y _____

ion Z _____ [3]

[Total: 12]

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QUESTION 6 STARTS ON PAGE 20

6 Fig. 6.1, opposite, is a diagram of a spirometer, a piece of apparatus used to measure some aspects of breathing, such as breathing rate and vital capacity.

(a) (i) Outline the mechanism of INSPIRATION.



In your answer you should use appropriate technical terms, spelt correctly.

[3]

(ii) A person breathes through the mouthpiece of a spirometer.

State what happens to the air chamber in Fig. 6.1 during INSPIRATION.

[1]

(iii) Chamber T contains a chemical that absorbs carbon dioxide.

Suggest a chemical that could be used in chamber T to absorb carbon dioxide.

[1]

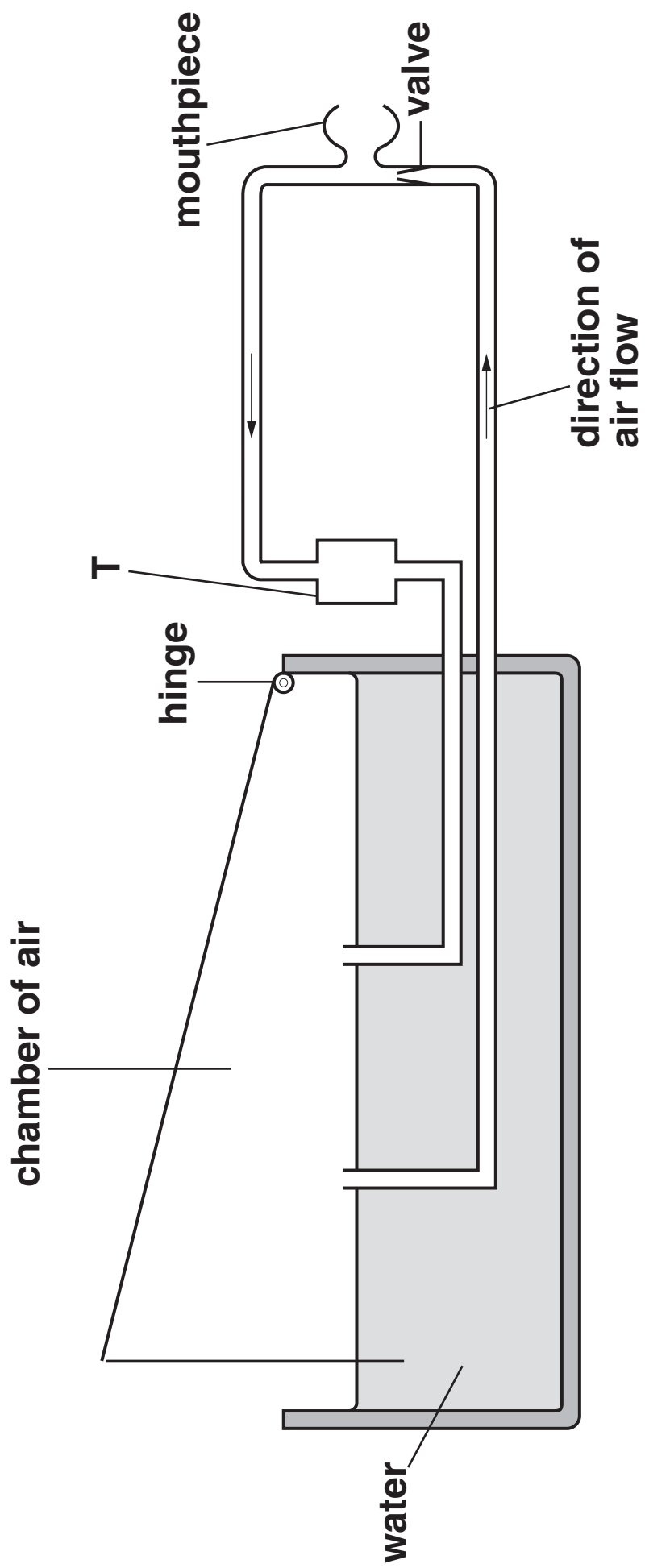


Fig. 6.1

(b) Explain why a person using the spirometer to measure their vital capacity should wear a nose clip.

[2]

(c) State TWO other precautions that should be taken when using a spirometer to measure vital capacity.

1 _____

2 _____

[2]

[Total: 9]

END OF QUESTION PAPER

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