Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Transport in plants

Time allowed: 1 hour 30 minutes

Subject code **0610**

Biology

Questions from Paper 3, Paper 4 and Paper 6

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

/ 89

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

Information

- This paper has 10 questions worth 89 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 **(a)** **(i)** Fig. 6.1 shows the outline of the young stem of a eudicotyledonous (dicotyledonous) plant.

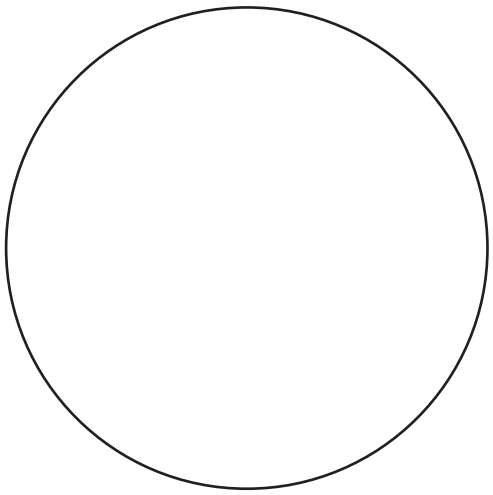


Fig. 6.1

On Fig. 6.1, draw and label the position of the phloem and xylem in the stem. [2]

(ii) Name a substance that is transported in the phloem.

.....

..... [1]

(b) Describe the pathway taken by water from the soil to a leaf.

.....

.....

.....

.....

.....

..... [3]

[Total: 6]

Xylem, phloem and water uptake Click for more variations

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2 **(a)** Fig. 9.1 shows a green plant.

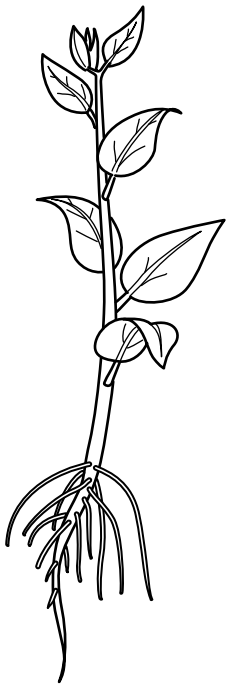


Fig. 9.1

Plants need to move substances around between their leaves, stems and roots. One of the processes they use is translocation.

Describe the process of translocation.

.....

.....

.....

.....

.....

.....

..... [3]

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(b) Fig. 9.2 shows the whole plant and sections through its root, stem and a leaf.

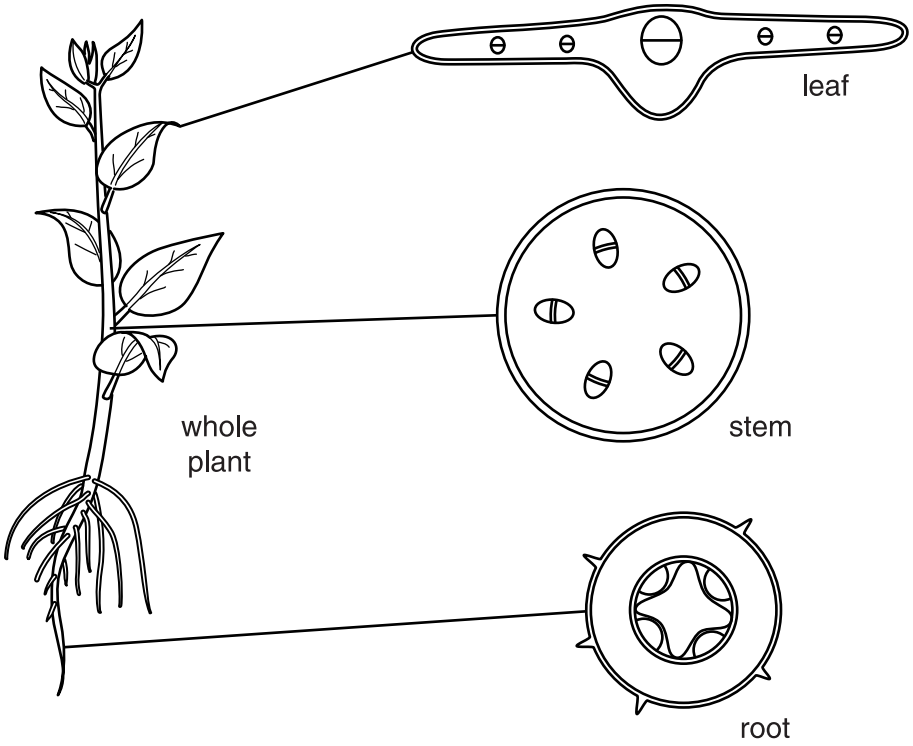


Fig. 9.2

On Fig. 9.2 use label lines and the letter **X** to identify one region of xylem in **each** section (root, stem and leaf). [3]

[Total: 6]

Translocation Click for more variations

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3 A student carried out an investigation into transpiration from leaves.

She chose leaves of a similar size from the same plant.

She weighed them and then placed them in different conditions.

As the leaves transpired they lost mass.

Table 3.1 shows the results.

Table 3.1

leaf	conditions	mass at start / g	mass at end / g	change in mass / g	% change in mass
H	hot and dry	6.3	2.1	4.2	66.7
J	cool and dry	6.4	4.6	1.8	
K	hot and humid	6.2	3.7		40.3
L	cool and humid	5.1	4.7	0.4	7.8

(a) Complete the table by calculating:

(i) the change in mass for leaf **K** ..... [1]

(ii) the percentage change in mass for leaf **J**.

Show your working. Write your answer to one decimal place.

..... [2]

(b) State which conditions caused the most transpiration in the leaves.

..... [1]

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(c) Fig. 3.1 shows four types of plant tissue involved in the transport of water through a plant.

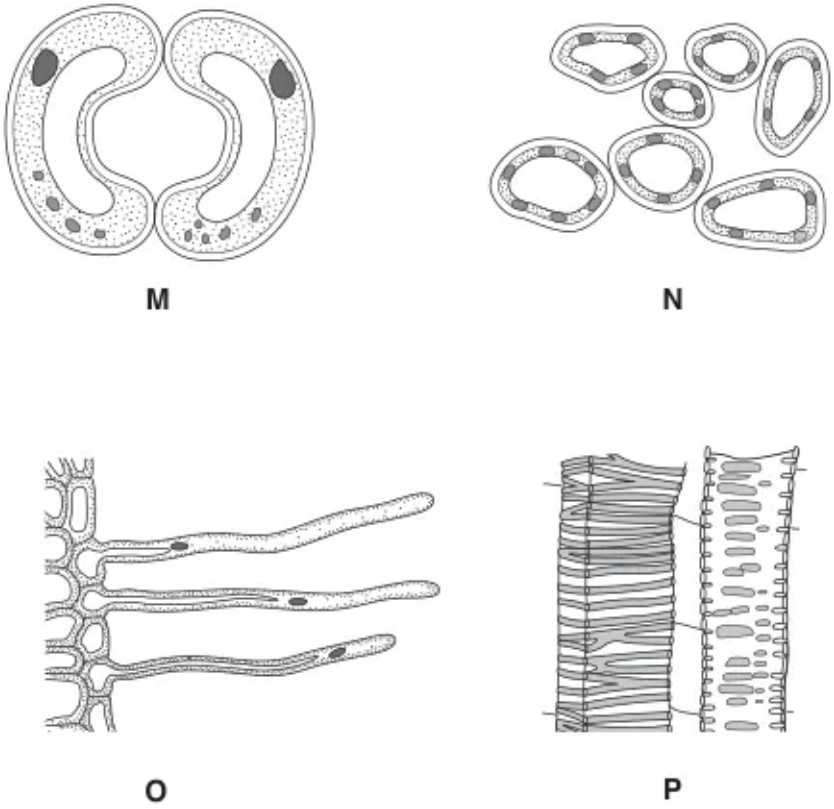


Fig. 3.1

(i) Describe how tissue **O** is adapted for its function.

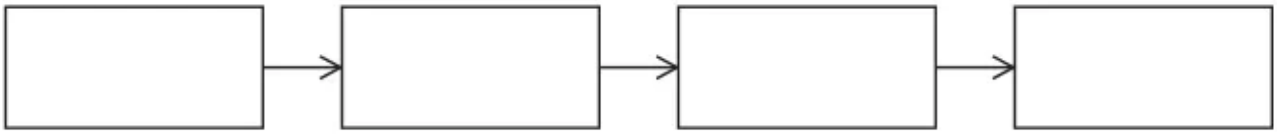
.....

.....

..... [1]

(ii) Complete the flow chart by placing the letters of the cells **M**, **N**, **O** and **P** in the correct order, starting with the absorption of water.

absorption of water → **transpiration from the leaf**



[3]

(d) State the name of:

(i) the type of tissue in which water is carried up the stem

..... [1]

(ii) another substance which is carried in the same tissue.

..... [1]

[Total: 10]

Measurements, tables, graphs and conclusions Click for more variations

4 Fig. 1.1 is a photograph of a plant.



Fig. 1.1

(a) (i) Draw **two** arrows on Fig. 1.1 to show the direction of movement of water into and out of the plant. [2]

(ii) State the name of the type of tissue that transports water in a plant.

..... [1]

(b) (i) Complete the definition of the term transpiration.

Transpiration is the loss of water vapour from plant leaves by

..... of water at the surfaces of .....

cells, followed by diffusion of water vapour through the ..... .

[3]

(ii) Fig. 1.2 is a graph showing the effect of temperature on the rate of transpiration from the upper and lower surfaces of leaves.

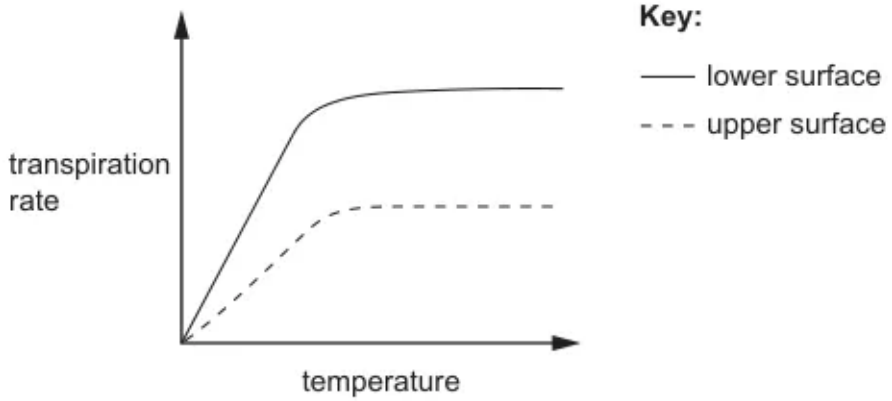


Fig. 1.2

State **two** conclusions for the data shown in Fig. 1.2.

1 .....

.....

.....

2 .....

.....

.....

[2]

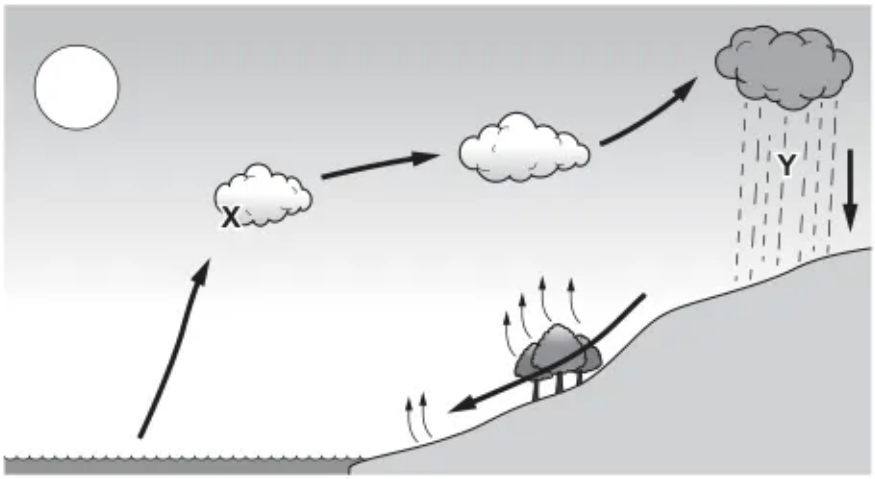
(c) State the effect of increasing humidity on the rate of transpiration.

.....

.....

..... [1]

(d) Fig. 1.3 is a diagram of the water cycle.



not to scale

Fig. 1.3

Identify processes **X** and **Y** in Fig. 1.3.

X .....

Y .....

[2]

[Total: 11]

Transpiration Click for more variations

5 **(a)** Define the term *transpiration*.

.....

.....

.....

.....

.....

.....

.....[3]

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(b) Fig. 2.1 shows four leaves from the same tree.

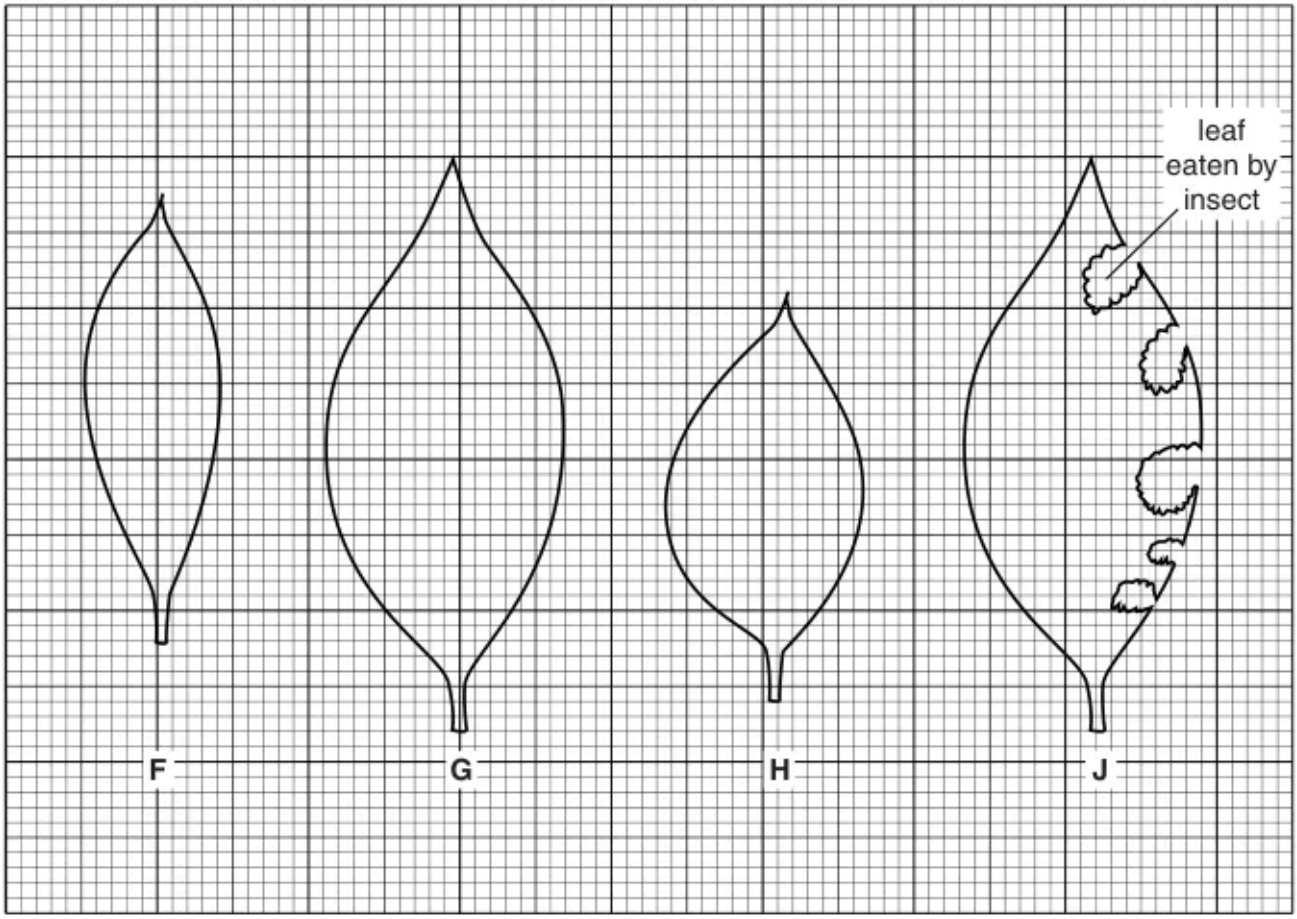


Fig. 2.1

Suggest which leaf will transpire most rapidly and give a reason for your answer.

leaf .....

reason .....

.....

.....

.....

.....

[3]

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(c) Fig. 2.2 shows a healthy plant during an investigation into transpiration.

It was kept in the same environment, apart from the light changing, during 24 hours.

The mass of the plant and pot was measured at the start, after 12 hours in the light and after a further 12 hours in the dark.

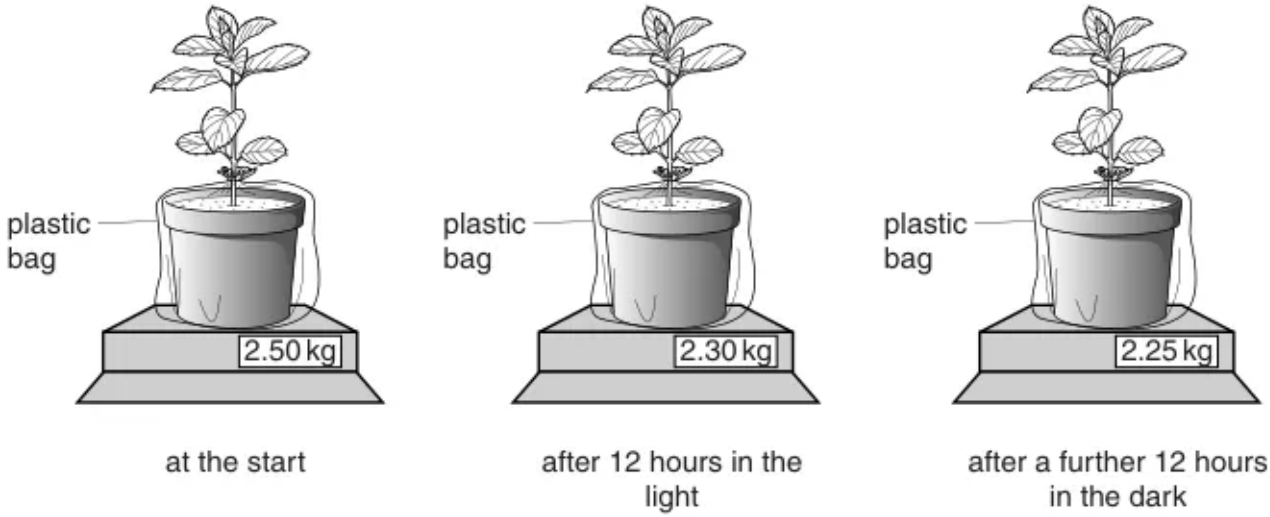


Fig. 2.2

(i) Describe the results of the investigation shown in Fig. 2.2.

.....

.....

.....

.....

.....[2]

(ii) Suggest **and** explain why the plant pot was enclosed in a plastic bag for this investigation.

.....

.....

.....

.....

.....[2]

STEM

(iii) State **two** environmental factors, other than light, that would change the rate of transpiration in the plant shown in Fig. 2.2.

1 .....

.....

2 .....

.....

[2]

[Total: 12]

Transpiration Click for more variations

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6 A student cut a section of a root and made an outline drawing of the distribution of tissues as shown in Fig. 3.1.

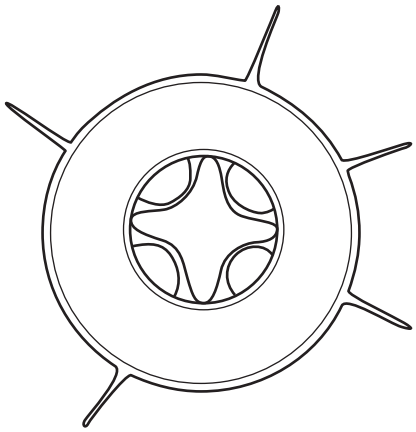


Fig. 3.1

(a) **(i)** Identify the position of the xylem tissue by drawing a label line and the letter **X** on Fig. 3.1. [1]

(ii) State why xylem is a tissue.

.....

.....

.....

.....[2]

(b) Water absorbed by the roots moves through the stem and enters the leaves. Most of this water is lost in transpiration.

Explain how the internal structure of leaves results in the loss of large quantities of water in transpiration.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 6]

Transpiration Click for more variations

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7 In plants, water moves up the stem in xylem vessels as a column of water molecules as a result of transpiration.

A celery stalk that still has its leaves attached can be used to investigate the movement of water in a plant, as shown in Fig. 2.1.

Fig. 2.2 shows dye in the xylem vessels of a celery stalk.



Fig. 2.1



not to scale

Fig. 2.2

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Plan an investigation to determine the effect of temperature on the rate of movement of a coloured dye through celery stalks.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

Planning investigations: variables, controls and safety Click for more variations

STEM | Exam Builder

8 Fig. 5.1 is a graph showing the effect of temperature on the rate of transpiration from the upper and lower surfaces of a leaf that is provided with a constant supply of water.

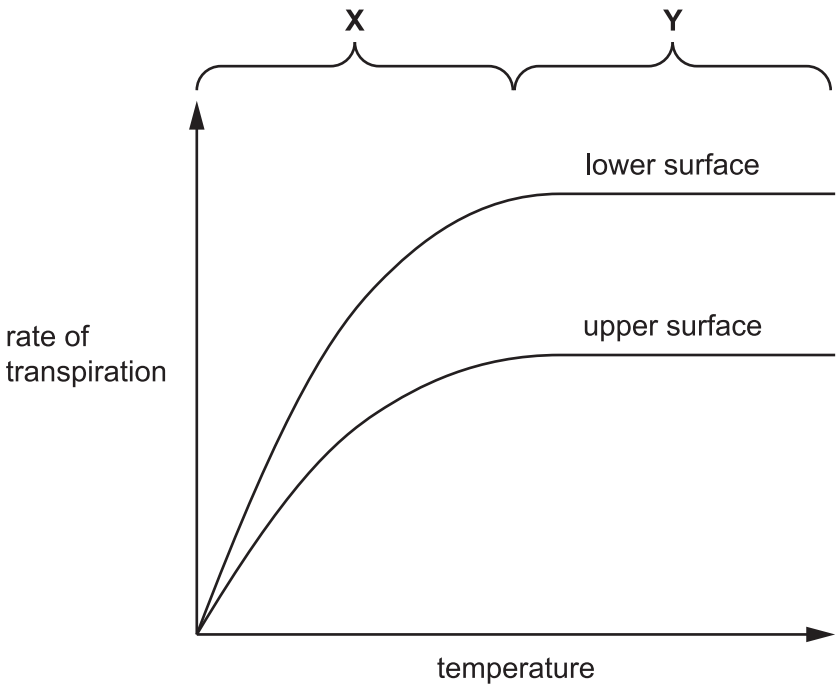


Fig. 5.1

(a) Describe the results shown in Fig. 5.1.

.....

.....

.....

.....

.....

.....

..... [3]

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(b) Explain reasons for the shape of the graph for the **upper** surface of the leaf at **X** and at **Y** in Fig. 5.1.

at **X** .....

.....

.....

.....

.....

at **Y** .....

.....

.....

.....

.....

[4]

(c) Suggest how the structure of the lower surface differs from the upper surface of the leaf used in this investigation.

.....

.....

..... [1]

[Total: 8]

Transpiration Click for more variations

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9 **(a)** Fig. 3.1 is a photomicrograph of some xylem vessels.

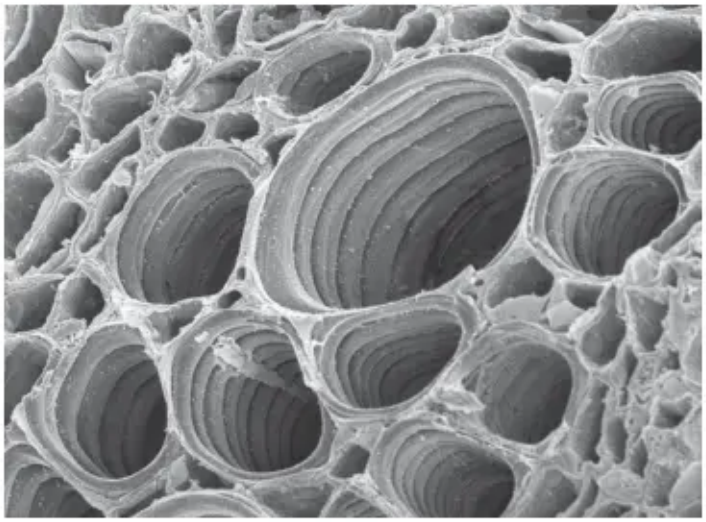


Fig. 3.1

(i) State **one** structural feature of xylem vessels and explain how this is related to the function of water transport.

feature .....

.....

explanation .....

.....

.....

.....

[2]

(ii) Explain the mechanism that is responsible for the movement of water in xylem vessels.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) State **one** role of xylem vessels **other than** transport.

..... [1]

(b) The rate of transpiration is affected by several factors including the temperature and the humidity of the air.

State **and** explain the effect of an increase in temperature on the rate of transpiration.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

Transpiration Click for more variations

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10 Fig. 4.1 shows a cross section of part of a stem of buttercup, *Ranunculus*.

Fig. 4.2 is an outline drawing of one vascular bundle from the stem of *Ranunculus*.

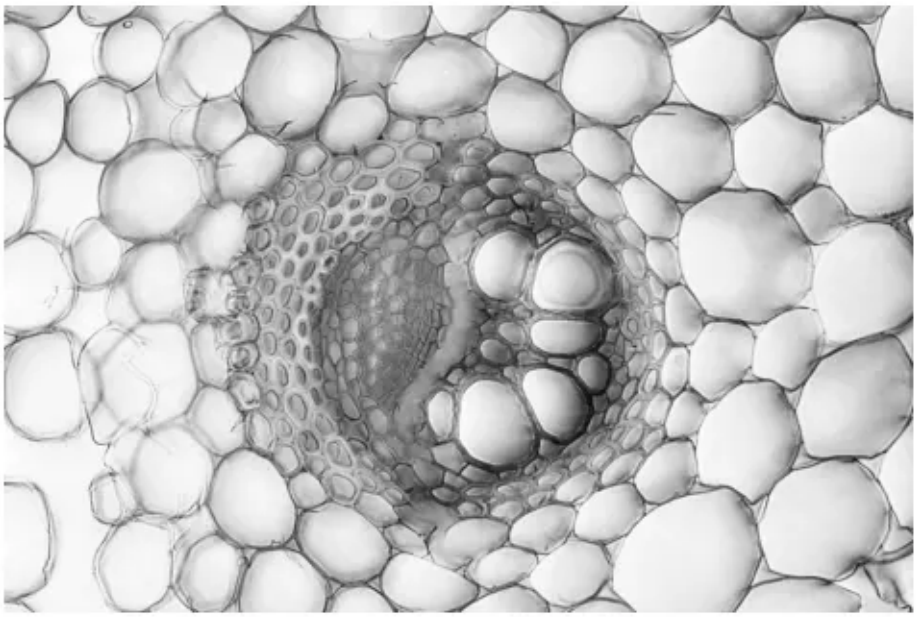


Fig. 4.1

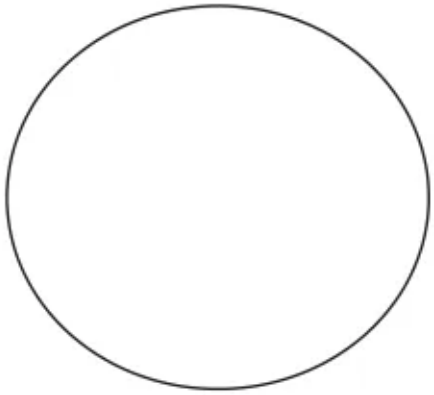


Fig. 4.2

(a) Draw **and** label the position of the xylem and the phloem in the outline of the vascular bundle in Fig. 4.2. [2]

(b) Name the carbohydrate that is transported in the phloem.

..... [1]

STEM

(c) Substances transported in the phloem are carried upwards in the stem at some times of the year and downwards at other times.

Explain why substances are transported in the phloem upwards at one time of the year **and** downwards at another.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) Define the term *transpiration*.

.....

.....

.....

.....

.....

..... [3]

(e) The rattan palm is a plant that climbs on rainforest trees to heights of about 40 metres.

Explain how water is moved to the tops of tall plants, such as the rattan palm.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 14]

Translocation Click for more variations