CAMBRIDGE IGCSE BIOLOGY · 0610

BIOLOGY



EXAM QUESTION PACK

TOPIC 8: TRANSPORT IN PLANTS

SCORE	PERCENTAGE
/	%

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Transport in plants – 2023 November IGCSE 0610

1. Nov/2023 /Paper_ 0610/11/No.16
What is a description of transpiration?

A exchange of gases between the leaf and the atmosphere

B loss of water vapour from the leaves of a plant

C movement of water from the roots to the leaves

D movement of water through the cells of the leaf

2. Nov/2023 /Paper_ 0610/13/No.16
By which process is water vapour lost from a leaf?

A active transport

B diffusion

C osmosis

D photosynthesis

3. Nov/2023 /Paper_ 0610/13/No.17
The pathway taken by water through a plant is shown.

root hair cells → root cortex cells → Z → mesophyll cells

Which part of the pathway is Z?

A palisade cells

B phloem

C stomata

D xylem

4. Nov/2023 /Paper_ 0610/21/No.16
What is a description of transpiration?

A exchange of gases between the leaf and the atmosphere

B loss of water vapour from the leaves of a plant

C movement of water from the roots to the leaves

D movement of water through the cells of the leaf

5. Nov/2023 /Paper_ 0610/21/No.17

Parts of a plant are listed.

1 mesophyll cells

2 root cortex cells

3 root hair cells

4 xylem vessels

What is the pathway taken by water in the plant?

A $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$

B $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

C $3 \rightarrow 1 \rightarrow 4 \rightarrow 2$

D $3 \rightarrow 2 \rightarrow 4 \rightarrow 1$

6. Nov/2023 /Paper_ 0610/22/No.16

From which part of a leaf does **most** water evaporate during transpiration?

A the cuticle

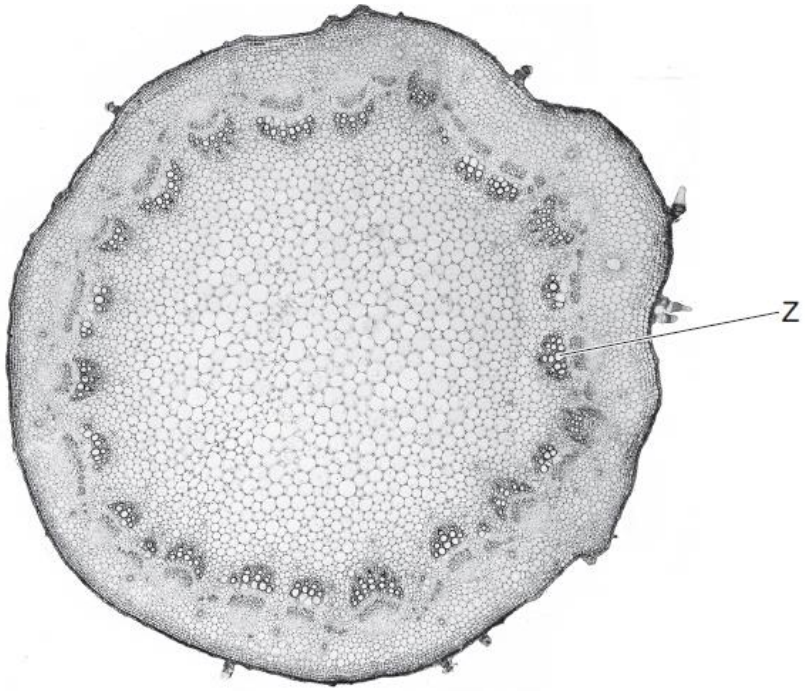
B the guard cells

C the spongy mesophyll cells

D the xylem vessels

7. Nov/2023 /Paper_ 0610/22/No.17

The photograph shows a cross-section through a sunflower stem.



What is the name and function of the tissue labelled Z?

	name of tissue	function of tissue
A	phloem	transport of mineral ions
B	phloem	transport of sucrose
C	xylem	transport of mineral ions
D	xylem	transport of sucrose

8. Nov/2023 /Paper_ 0610/23/No.16

By which process is water vapour lost from a leaf?

A active transport

B diffusion

C osmosis

D photosynthesis

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9. Nov/2023 /Paper_ 0610/23/No.17

The pathway taken by water through a plant is shown.

root hair cells → root cortex cells → Z → mesophyll cells

Which part of the pathway is Z?

A palisade cells

B phloem

C stomata

D xylem

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10. Nov/2023 /Paper_ 0610/31/No.3

(a) Complete the sentences about transpiration using words from the list.

Each word may be used **once** or not at all.

decomposition	**evaporation**	**mesophyll**
phloem	**root hair cells**	**stomata**

Transpiration is the loss of water vapour from leaves.

Water moves from the surface of ..... cells into the air spaces by

..... .

Then the water vapour diffuses out of the leaf through the ..... .

[3]

(b) A student investigated transpiration.

Fig. 3.1 is a diagram of the apparatus used in the investigation.

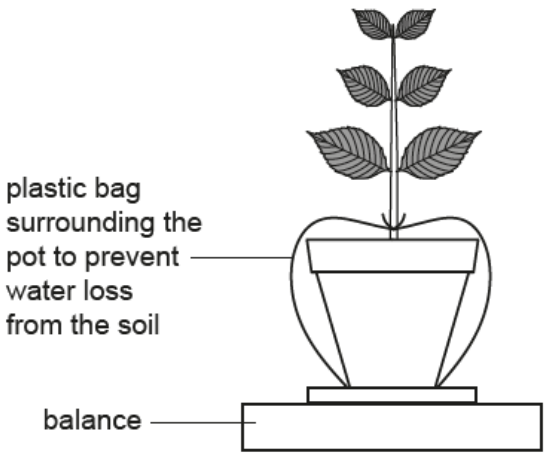


Fig. 3.1

- The student watered the plant before the investigation started.
- She measured the mass of water lost every five minutes.
- The mass of water lost represents the rate of transpiration.
- She took measurements in still air and with a fan moving air past the plant.
- She plotted her results on a graph as lines labelled **A** and **B**.

Fig. 3.2 shows the results.

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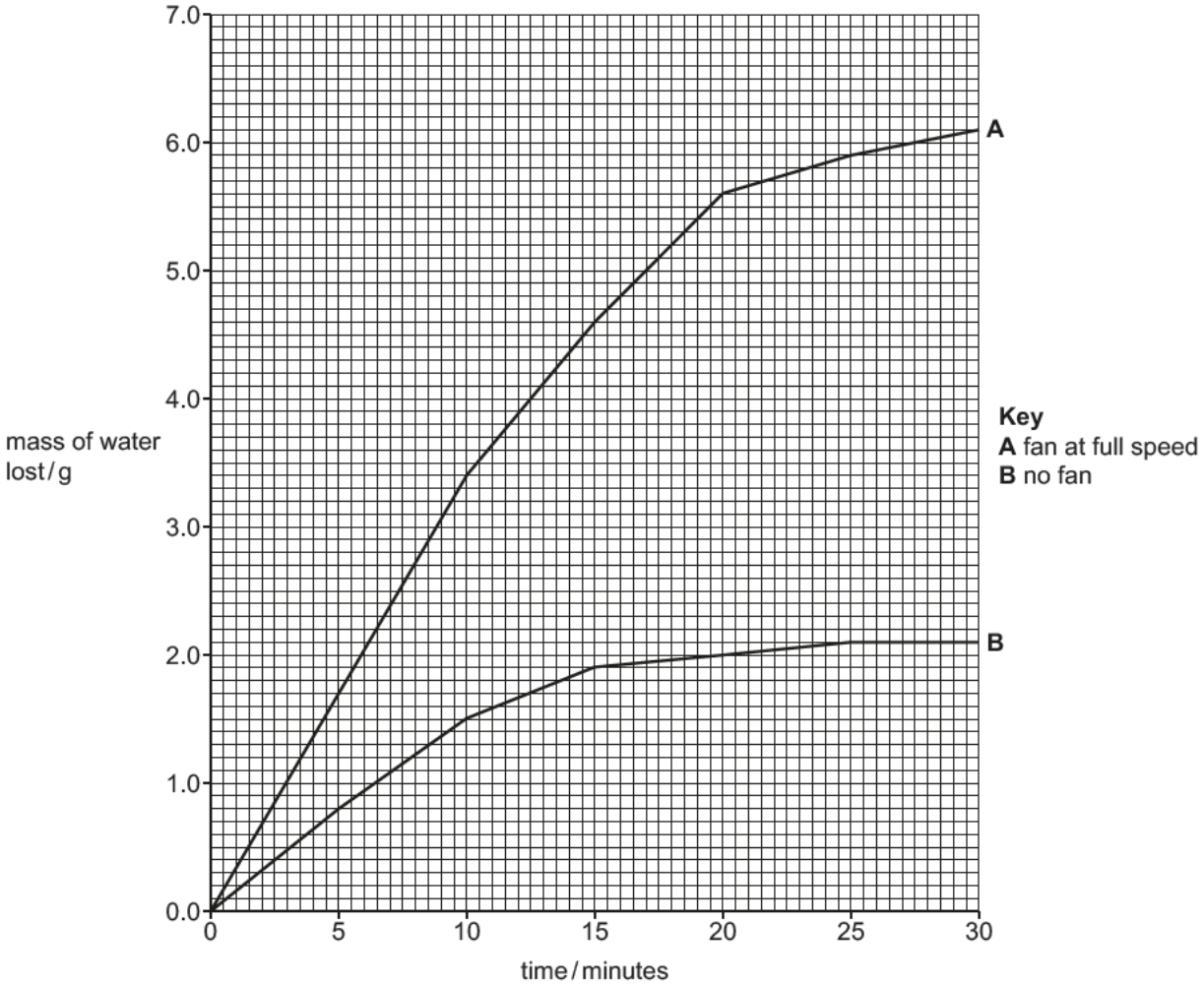


Fig. 3.2

(i) Calculate the difference in the mass of water lost between the results for **A** and the results for **B** at **30** minutes.

.....g [1]

(ii) Calculate the percentage increase in water loss shown for **A** between **10** minutes and **20** minutes.

Give your answer to the nearest whole number.

Space for working.

.....%
[3]

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(iii) The student repeated the investigation using the fan at **half-speed**.

Draw a line **on Fig. 3.2** to show the result you would expect when the fan is at half-speed.
[2]

(c) State **one** factor, other than wind speed, that affects the rate of transpiration.

..... [1]

[Total: 10]

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11. Nov/2023 /Paper_ 0610/32/No.6

(a) Fig. 6.1 is a diagram showing the pathway of water into a plant. The arrows show the direction of water movement.

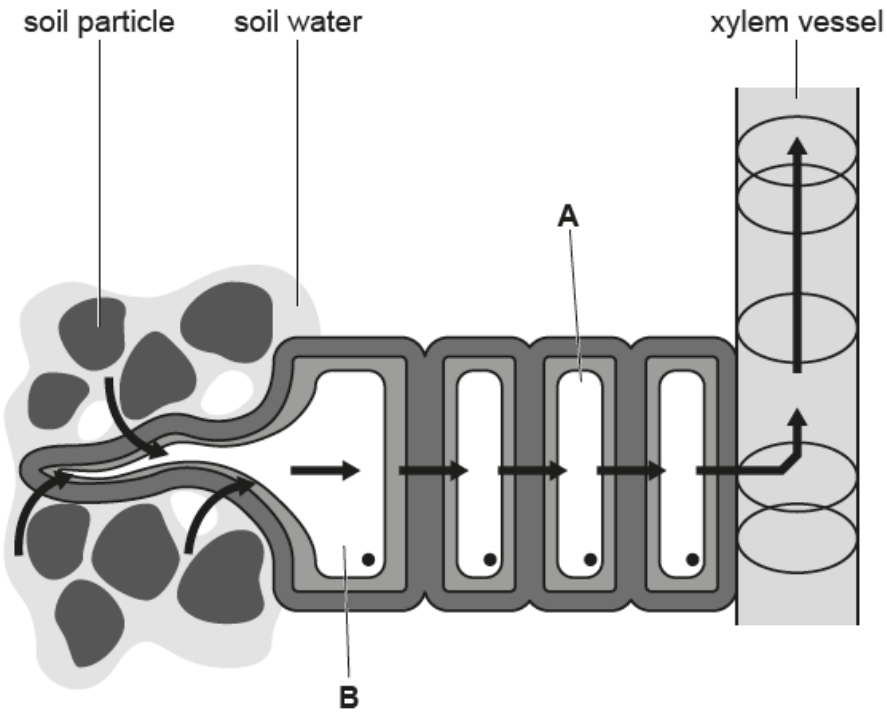


Fig. 6.1

(i) State the name of the cell labelled **A** in Fig. 6.1.

..... [1]

(ii) State the name of cell **B** and describe how it is adapted for absorption of water.

name .....

adaptation .....

.....

.....

[2]

(iii) State the name of the process by which cell **B** absorbs water.

..... [1]

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(b) State **two** uses of water in plants.

1 .....

2 .....

[2]

(c) State **two** environmental factors that will affect the rate of water loss from a plant.

1 .....

2 .....

[2]

[Total: 8]

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Transport in plants – 2023 June IGCSE Biology 0610

1. June/2023/Paper_0610/11/No.17

Which row shows the functions of xylem and phloem?

	transports amino acids	transports mineral ions	transports sucrose
A	phloem	xylem	phloem
B	xylem	xylem	phloem
C	xylem	phloem	xylem
D	phloem	phloem	xylem

2. June/2023/Paper_0610/11/No.18

What is the effect on a plant of **not** having any root hairs?

A The plant absorbs less water from the soil.

B The plant absorbs more water from the soil.

C The plant loses water to the soil.

D The plant loses mineral ions to the soil.

3. June/2023/Paper_0610/12/No.17

Which pathway is taken by water through a plant?

A root hair → root cortex → xylem → mesophyll → stomata

B root hair → xylem → mesophyll → root cortex → stomata

C stomata → root cortex → xylem → mesophyll → root hair

D stomata → root hair → root cortex → xylem → mesophyll

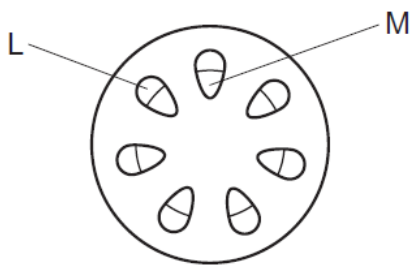
4. June/2023/Paper_0610/12/No.18

Which row shows the transpiration rate for the conditions described?

	wind speed	atmospheric temperature	transpiration rate
A	low	low	fast
B	high	high	slow
C	low	high	slow
D	low	low	slow

5. June/2023/Paper_0610/13/No.17

A stem was cut from a plant. The base of the stem was placed into a beaker containing water and a red stain for two hours. The diagram shows a cross-section of the plant stem.



In which tissue will the red stain be found and what is the name of the tissue?

	red stain located in	name of tissue
A	L	phloem
B	L	xylem
C	M	phloem
D	M	xylem

6. June/2023/Paper_0610/13/No.18

Which pair of processes causes transpiration in plant leaves?

	at the surface of mesophyll cells	through the stomata
A	absorption of water	evaporation of water
B	absorption of water	diffusion of water vapour
C	diffusion of water vapour	evaporation of water
D	evaporation of water	diffusion of water vapour

7. June/2023/Paper_0610/21/No.15

Which statement describes the effect of atmospheric humidity on the rate of transpiration?

A In high humidity, the transpiration rate is high because there is slow diffusion of water vapour through stomata.

B In high humidity, the transpiration rate is low because there is rapid diffusion of water vapour through stomata.

C In low humidity, the transpiration rate is high because there is rapid diffusion of water vapour through stomata.

D In low humidity, the transpiration rate is low because there is slow diffusion of water vapour through stomata.

8. June/2023/Paper_0610/21/No.16

Sucrose and amino acids move around a plant from sources to sinks.

Which row shows the sources and sinks?

	root cortex cells	xylem vessels	palisade mesophyll cells
A	source and sink	neither	source
B	sink	sink	source and sink
C	neither	source and sink	sink
D	source and sink	source	neither

9. June/2023/Paper_0610/22/No.15

Humidity and wind speed are two factors that affect the rate of transpiration.

How do these two factors affect the concentration gradient of water molecules between the inside of the leaf and the outside atmosphere?

	high humidity	high wind speed
A	lowers concentration gradient	raises concentration gradient
B	raises concentration gradient	raises concentration gradient
C	lowers concentration gradient	lowers concentration gradient
D	raises concentration gradient	lowers concentration gradient

10. June/2023/Paper_0610/23/No.15

Which combination of environmental factors will cause the largest increase in the transpiration rate in a plant?

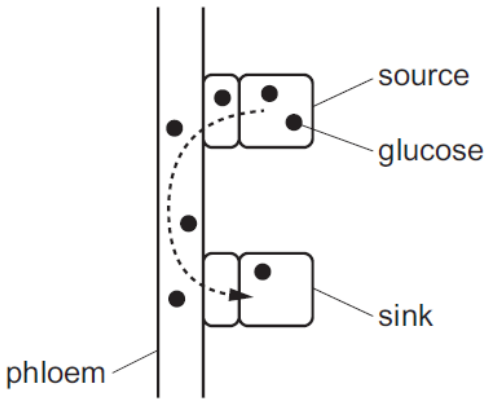
	wind speed	humidity	temperature	light intensity
A	high	high	low	low
B	high	low	high	high
C	low	high	low	high
D	low	low	high	low

11. June/2023/Paper_0610/23/No.16

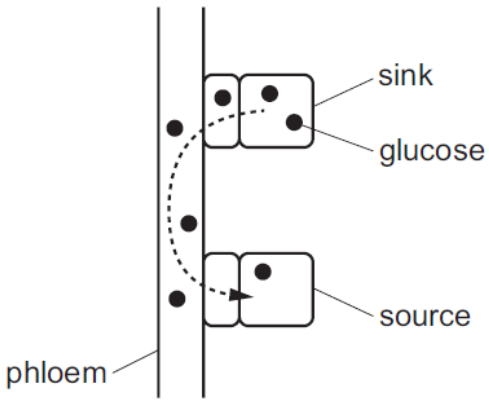
The diagrams represent the movement of substances between plant cells. The arrows indicate the direction the substance is moving in.

Which diagram of translocation is correctly labelled?

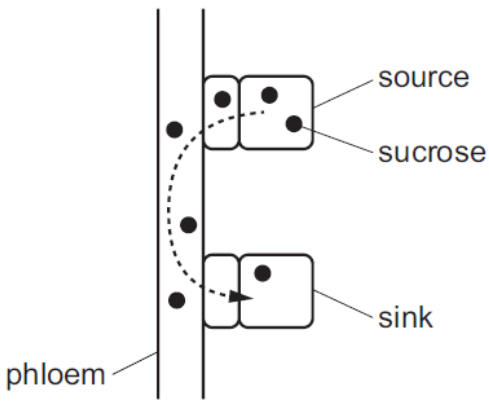
A



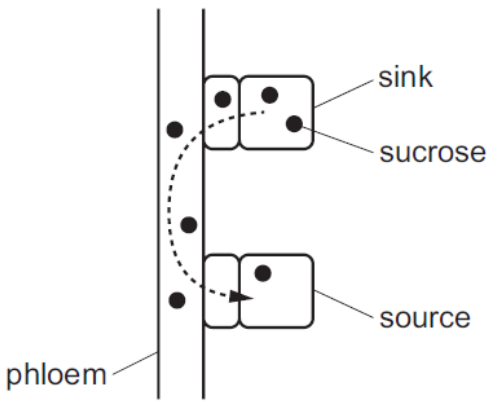
B



C



D



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12. June/2023/Paper_0610/31/No.4

(a) Fig. 4.1 is a diagram of a cross-section of a root.

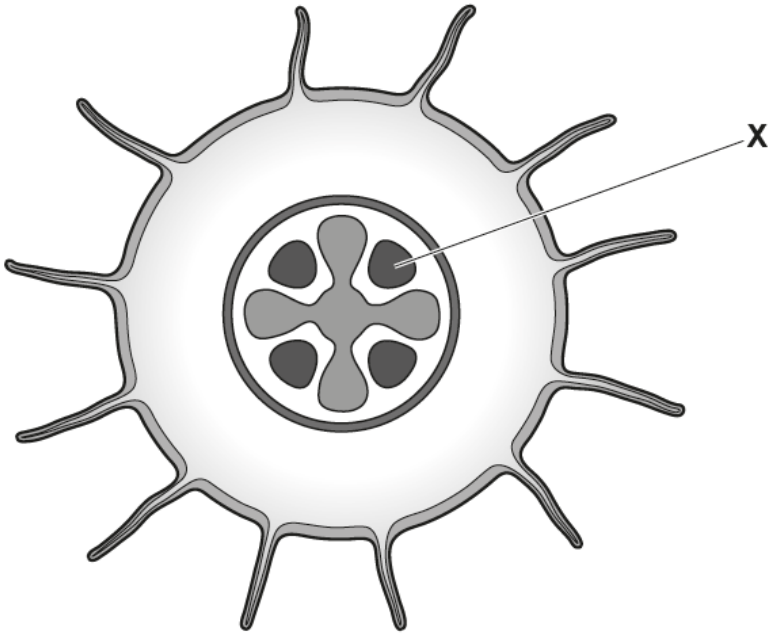


Fig. 4.1

(i) Circle **two** substances transported by the part labelled **X** in Fig. 4.1.

amino acids	**cellulose**	**fatty acids**	**glucose**
glycogen	**starch**	**sucrose**	

[2]

(ii) Label the part of the root in Fig. 4.1 that absorbs mineral ions from the soil with a label line and the correct name. [2]

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(b) Mineral ions are absorbed by active transport and are transported with water in the xylem.

(i) Describe what is meant by the term active transport.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State **one** function of xylem other than transport.

..... [1]

(c) Transpiration is the loss of water vapour from leaves.

State **two** environmental factors that affect the rate of transpiration.

1 .....

2 .....

[2]

[Total: 10]

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13. June/2023/Paper_0610/43/No.2

Transpiration is the loss of water vapour from the leaves of a plant.

(a) Complete the sentence describing transpiration.

Water evaporates from the surfaces of the ..... cells into the air spaces and then ..... out of the leaves, through the stomata, as water vapour.

[2]

(b) Explain how water moves upwards in the xylem.

.....

.....

.....

.....

.....

.....

..... [3]

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(c) A student investigated the effect of wind speed on the rate of transpiration in a small *Pachira aquatica* tree.

They measured the rate of transpiration when the plant was placed in different wind speeds in both the light and the dark. The tree was given an adequate supply of water.

The results of this investigation are shown in Fig. 2.1.

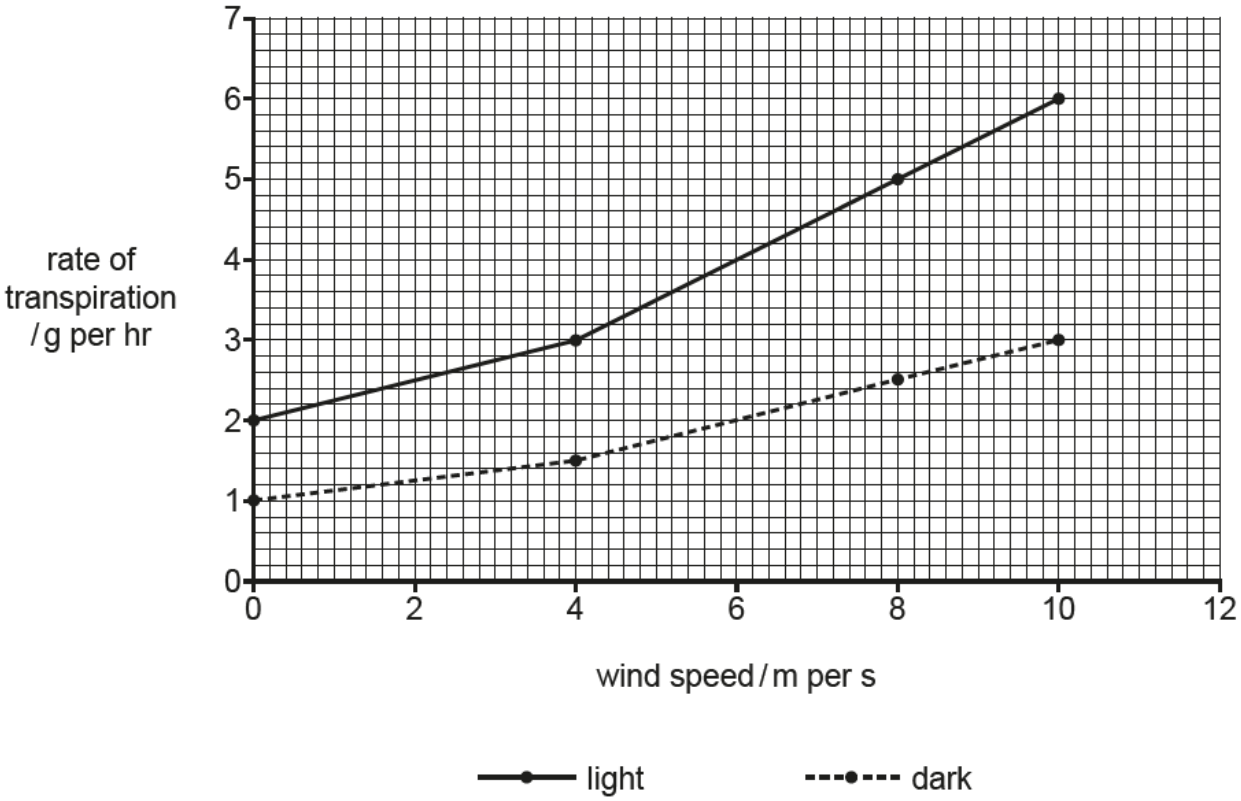


Fig. 2.1

(i) Describe and explain the results shown in Fig. 2.1.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

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(ii) The investigation was repeated in the light with the same species of tree in an environment where the humidity was higher.

Draw a line **on Fig. 2.1** to predict the results in the **light** with increased humidity. [1]

(iii) The investigation described in **2(c)** was repeated (different wind speeds in both the light and the dark).

However, the tree was **not** given an adequate supply of water during the investigation.

Predict the result and explain your prediction.

.....

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.....

.....

.....

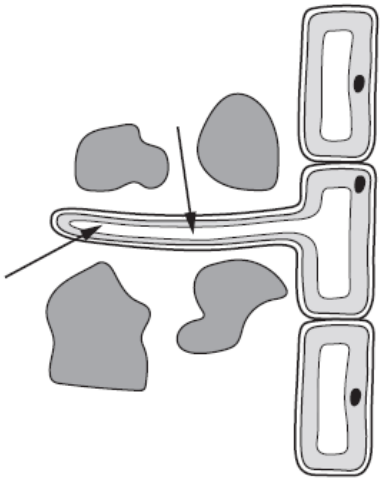
..... [4]

[Total: 14]

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14. March/2023/Paper_ 0610/12,22/No.17,15

The arrows show the movement of substances from the soil into a root hair cell.



Which substances move from the soil into the root hair cell?

A carbon dioxide and oxygen

B glucose and water

C mineral ions and glucose

D water and mineral ions

15. March/2023/Paper_ 0610/12/No.18

By which process does water escape from stomata in the leaves?

A active transport

B diffusion

C evaporation

D osmosis

16. March/2023/Paper_ 0610/22/No.16

By which process does water escape from stomata in the leaves?

A active transport

B diffusion

C evaporation

D osmosis

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(a) A student investigated the rate of water loss from leaves at two different temperatures.

The student measured the mass of one leaf at the same time every day for seven days.

The leaf was kept at 15 °C.

The student repeated this with a similar-sized leaf kept at 25 °C.

Fig. 2.1 shows some of the apparatus used.

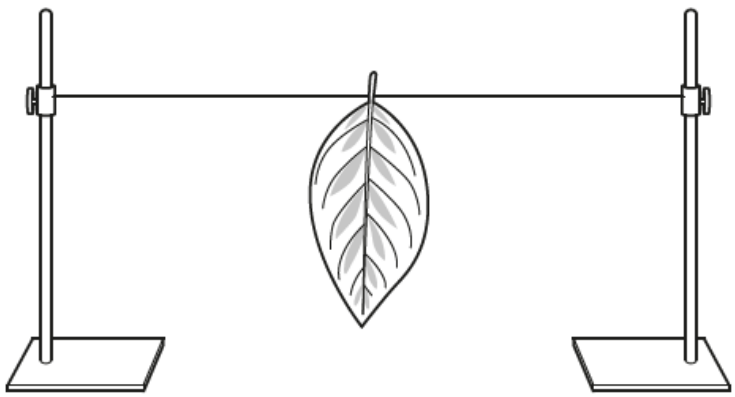


Fig. 2.1

The results are shown in Fig. 2.2.

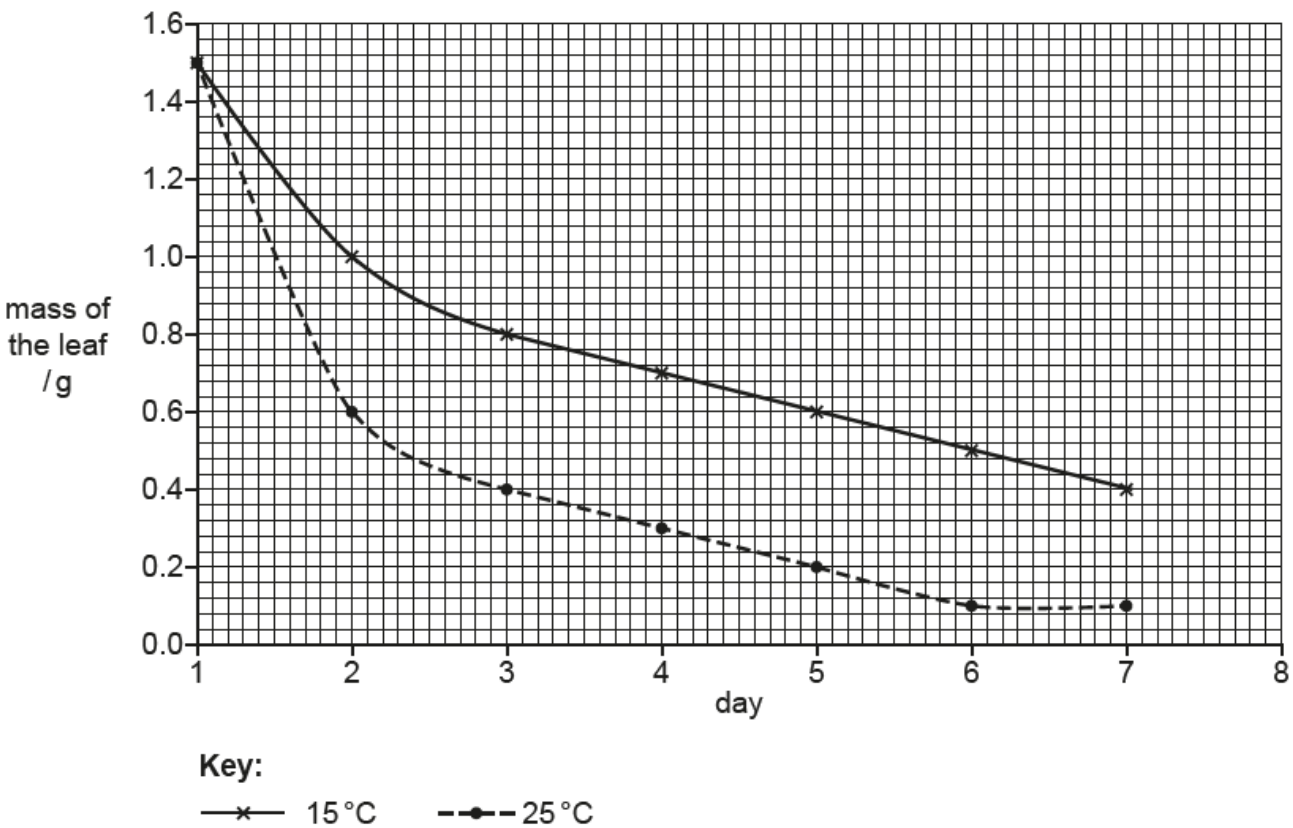


Fig. 2.2

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

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Complete the sentences to explain the process shown by the results in Fig. 2.2.

Water evaporates from the surfaces of the ..... cells in the leaf.

The water evaporates into the ..... spaces.

Water vapour moves out of the leaf through the ..... by diffusion.

This process is called ..... .

[4]

(iii) State the name of the vessels that transport water to the leaves from the roots.

..... [1]

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(b) Fig. 2.3 is a photomicrograph of the lower surface of a leaf.

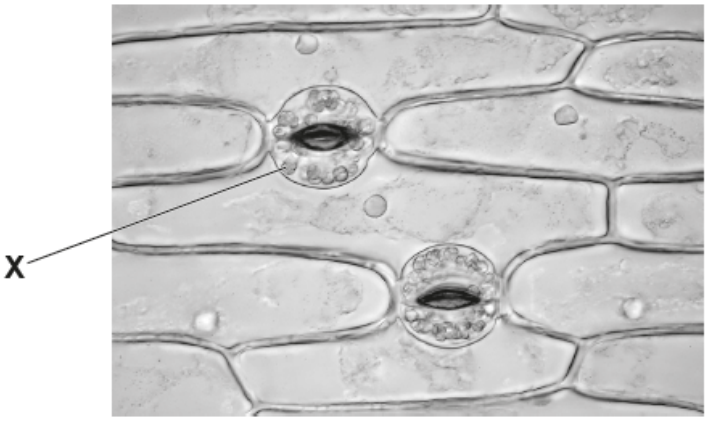


Fig. 2.3

(i) State the name of the cell labelled **X** in Fig. 2.3.

..... [1]

(ii) Identify **one** structure that identifies the cells in Fig. 2.3 as plant cells.

..... [1]

(c) Explain why leaves usually have a large surface area.

.....

.....

.....

.....

..... [2]

[Total: 12]

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18. March/2023/Paper_ 0610/42/No.4

(a) Fig. 4.1 is a photograph of a tree that has been girdled.

Girdling involves removing a complete circle of bark and phloem from around the tree.



Fig. 4.1

(i) Explain why the area above the girdle in Fig. 4.1 will become swollen.

Use the terms source and sink in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

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(ii) Explain why the leaves in girdled trees are still able to receive mineral ions from the roots.

.....

.....

.....

.....

..... [2]

(b) Explain why glucose made during photosynthesis is required for the absorption of mineral ions by the roots.

.....

.....

.....

.....

.....

.....

..... [3]

(c) State the balanced symbol equation for photosynthesis.

..... [2]

[Total: 11]

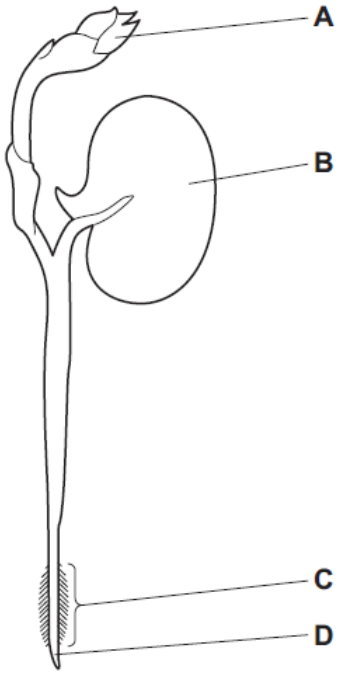
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Transport in plants – 2022 November IGCSE 0610 Biology

1. Nov/2022/Paper_11/No.17

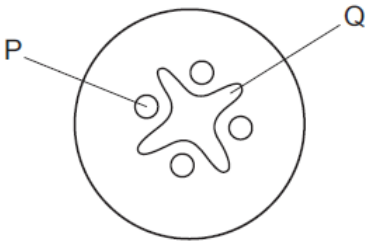
The diagram shows a bean seedling soon after it has germinated.

Where is most water absorbed?

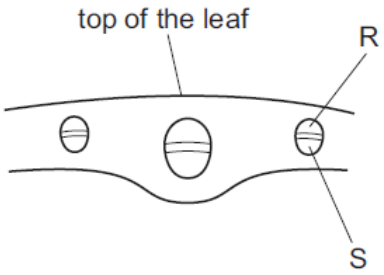


2. Nov/2022/Paper_12/No.7

The roots of a plant were placed in a solution of red dye. After 24 hours, a section of root and a section of leaf were cut from the plant.



root



leaf

In which tissues will the red dye be visible?

A P and R **B** P and S **C** Q and R **D** Q and S

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3. Nov/2022/Paper_12/No.18

Which process occurs during transpiration?

A evaporation of water from the xylem

B loss of water by osmosis from the guard cells

C movement of water vapour through the spongy mesophyll by active transport

D movement of water vapour through the stomata by diffusion

4. Nov/2022/Paper_13/No.18

Which process occurs during transpiration?

A evaporation of water from the xylem

B loss of water by osmosis from the guard cells

C movement of water vapour through the spongy mesophyll by active transport

D movement of water vapour through the stomata by diffusion

5. Nov/2022/Paper_33/No.5

Fig. 5.1 is a diagram of a cross-section of a leaf.

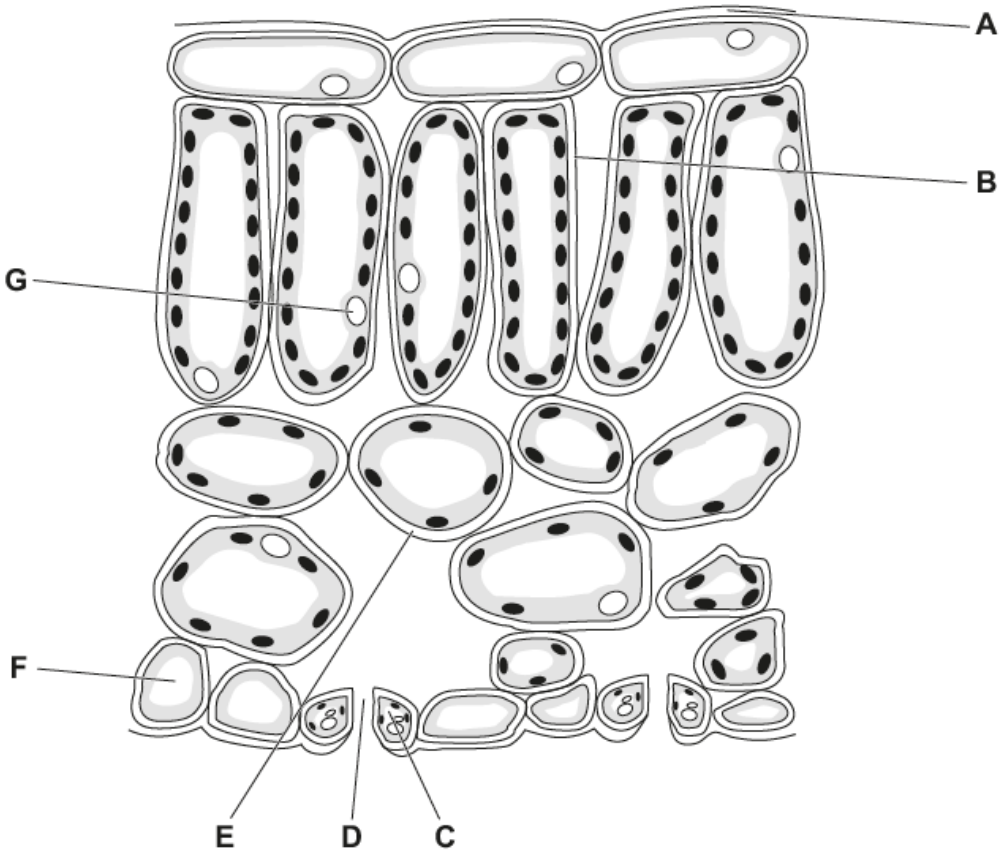


Fig. 5.1

(a) (i) State the letter in Fig. 5.1 which shows where water evaporates from during transpiration.

..... [1]

(ii) State the letter in Fig. 5.1 which shows where water vapour moves out of the leaf during transpiration.

..... [1]

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(b) Some students investigated the effect of temperature on the rate of transpiration.

The apparatus they used is shown in Fig. 5.2.

They measured the rate of movement of the air bubble in the capillary tube.

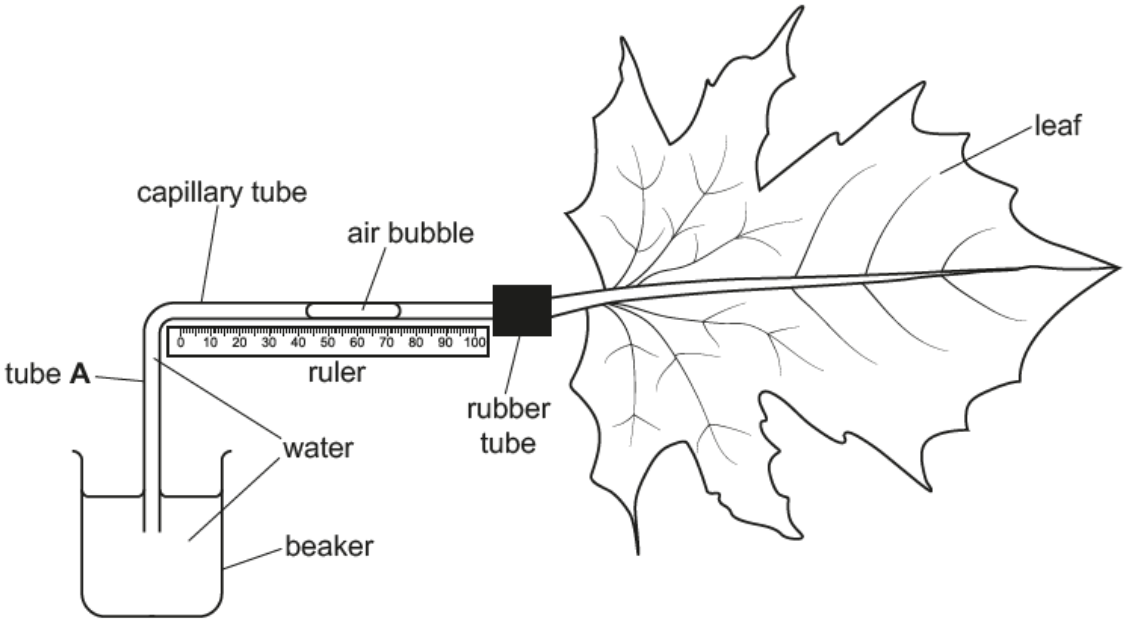


Fig. 5.2

(i) Water travels to the leaf along tube **A**.

State the name of the vessels in a plant stem that tube **A** represents.

..... [1]

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The distance moved by the air bubble in three minutes was measured at different environmental temperatures.

Table 5.1 shows the results.

Table 5.1

environmental temperature / °C	distance moved in three minutes / mm	rate of movement of the air bubble / mm per minute
15	2	0.67
20	8	2.67
25	18	6.00
30	23	

(ii) Using the information in Table 5.1, calculate the rate of movement of the air bubble when the environmental temperature is 30 °C.

Give your answer to **two** decimal places.

..... mm per minute
[2]

(iii) Describe the effect of an increase in environmental temperature on the rate of transpiration shown in Table 5.1.

.....

.....

..... [1]

c) Water is absorbed by plants.

(i) State the name of the cells where water enters a plant.

..... [1]

(ii) State the name of the process by which water moves into plant cells.

..... [1]

[Total: 8]

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6. Nov/2022/Paper_43/No.5(a_ b)

(a) Researchers investigated water pollution in the centre of a lake for 11 days.

Fig. 5.1 shows researchers collecting samples of aquatic organisms from the lake with a net which was placed at a specified water depth.



Fig. 5.1

Each day, the researchers collected 5 dm^3 of water from the lake. Fish and other large organisms were released back into the lake. The researchers extracted the chlorophyll from all the microorganisms that were collected in the sample of lake water.

They determined the concentration of chlorophyll by measuring the mass of chlorophyll extracted from each dm^3 of lake water.

Fig. 5.2 shows a researcher lowering a Secchi disc on a long string into a lake from a boat. A Secchi disc is a plastic disc which is divided into black and white sections. It is used to measure the transparency of water in lakes, rivers and oceans.

The researcher recorded the maximum water depth at which the Secchi disc was still visible.



Fig. 5.2

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The results of the investigation are shown in Fig. 5.3.

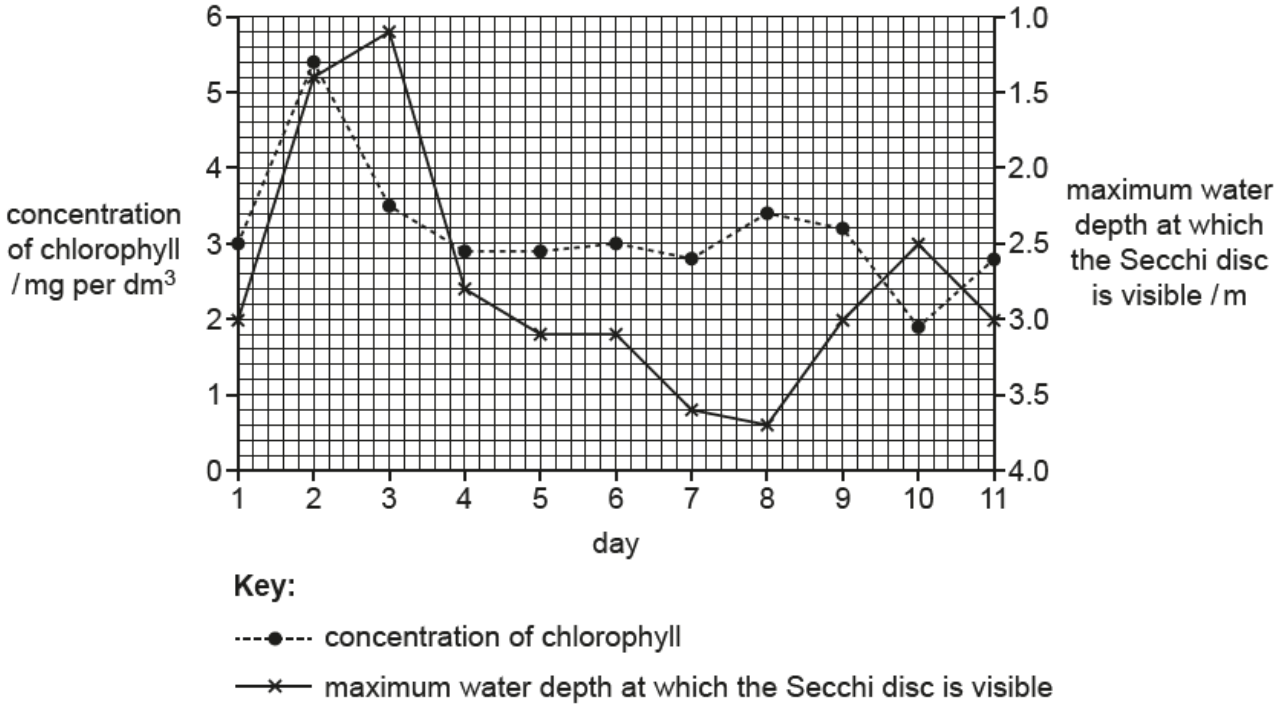


Fig. 5.3

(i) State the type of microorganism that contains chlorophyll.

..... [1]

(ii) The researchers collected 5 dm^3 of water from the lake each day. Using this information and the information in Fig. 5.3, calculate the total mass of chlorophyll in the sample on day 1.

Include the appropriate units with your answer.

.....
[2]

(iii) Suggest why the researchers determined the concentration of chlorophyll rather than counting the number of microorganisms in the sample.

.....

.....

..... [1]

(iv) Using the information in Fig. 5.3, identify the day when the water was the **most** transparent.

..... [1]

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(v) Explain why the transparency of the water is important for organisms that contain chlorophyll.

.....

.....

.....

.....

..... [2]

(b) (i) Heavy rainfall in nearby fields caused ions from fertilisers to wash into the lake on day 1 of the investigation.

State which ions can cause an increase in the number of organisms that contain chlorophyll in the lake.

..... [1]

(ii) Many of the organisms that contain chlorophyll died on day 2 of the investigation.

Explain the consequences of the death of these organisms to the lake ecosystem.

.....

.....

.....

.....

.....

.....

..... [3]

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Transport in plants – 2022 June IGCSE 0610

1. June/2022/Paper_ 11/No.13

Which tissues are found in vascular bundles?

A palisade mesophyll and phloem

B palisade mesophyll and spongy mesophyll

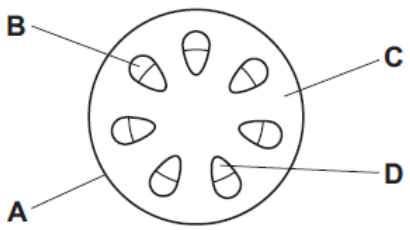
C phloem and xylem

D spongy mesophyll and xylem

2. June/2022/Paper_ 11/No.17

A non-woody plant stem is placed in water containing a red dye. It is left for one day and then a section of the stem is examined using a microscope.

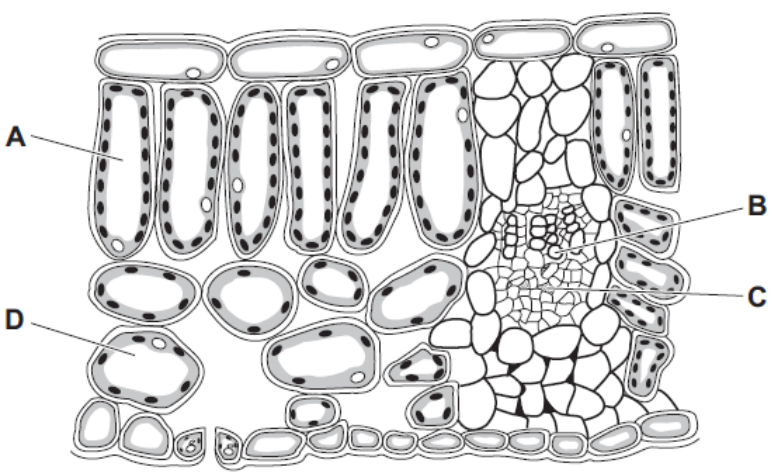
Which tissue is stained red?



3. June/2022/Paper_ 11/No.18

The diagram shows a cross-section through a leaf.

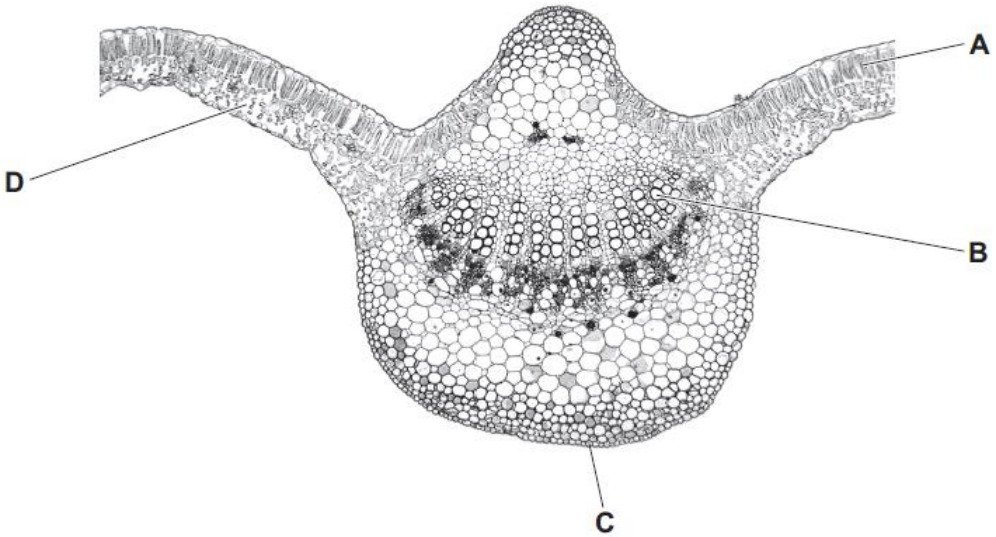
From which cell will most water evaporate during transpiration?



4. June/2022/Paper_ 13/No.17

The image shows a cross-section of part of a leaf.

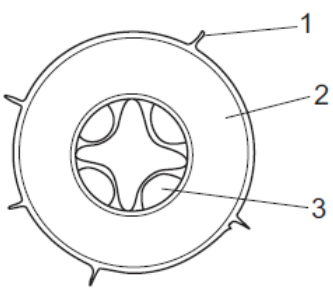
Which labelled structure is the xylem?



5. June/2022/Paper_ 13/No.18

The diagram shows a cross-section of a root.

Three regions of the root are numbered.



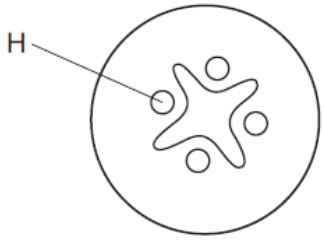
Which regions contain cells through which water must pass to reach the xylem?

A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 2 only

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6. June/2022/Paper_ 12/No.17

The diagram shows a cross-section of part of a plant.

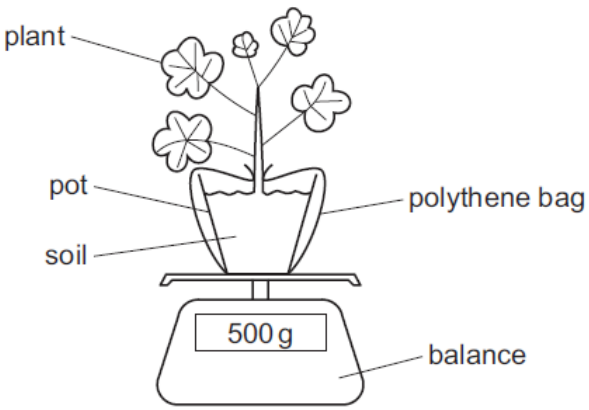


Which part of the plant is shown and what is the tissue labelled H?

	plant part	tissue H
A	root	phloem
B	root	xylem
C	stem	phloem
D	stem	xylem

7. June/2022/Paper_ 12/No.18

The apparatus shown can be used to investigate the effect of temperature and humidity on the rate of transpiration.



Which set of conditions would give the highest rate of transpiration and the greatest decrease in mass?

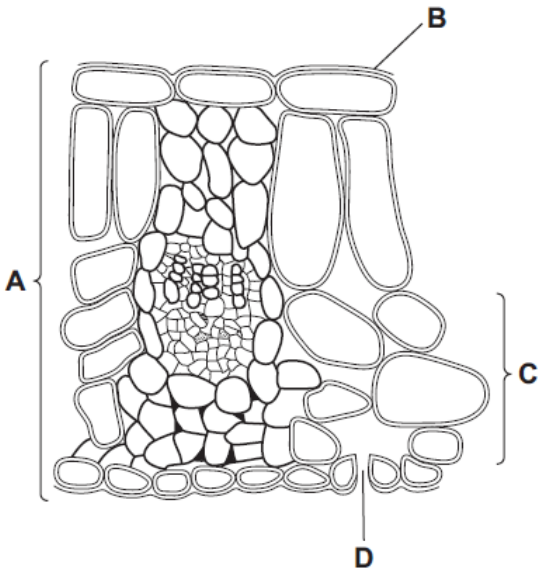
	temperature	humidity
A	cool	high
B	cool	low
C	warm	high
D	warm	low

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8. June/2022/Paper_ 21/No.4

The diagram shows a cross-section through a leaf.

Which label shows a tissue?



9. June/2022/Paper_ 21/No.5

Which statement describes the net movement of particles during diffusion?

A from higher to lower concentration down a concentration gradient

B from higher to lower concentration against a concentration gradient

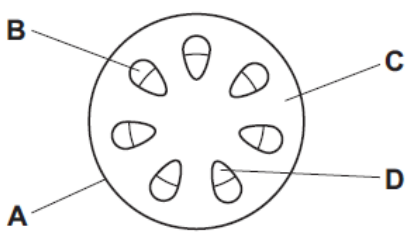
C from lower to higher concentration down a concentration gradient

D from lower to higher concentration against a concentration gradient

10. June/2022/Paper_ 21/No.15

A non-woody plant stem is placed in water containing a red dye. It is left for one day and then a section of the stem is examined using a microscope.

Which tissue is stained red?

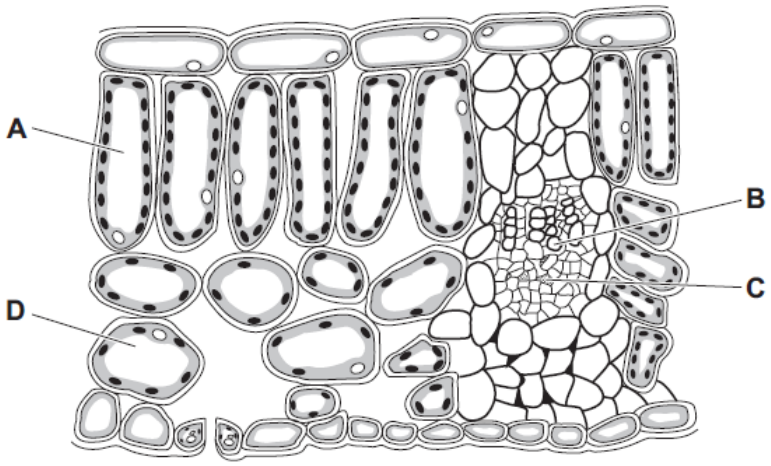


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11. June/2022/Paper_ 21/No.16

The diagram shows a cross-section through a leaf.

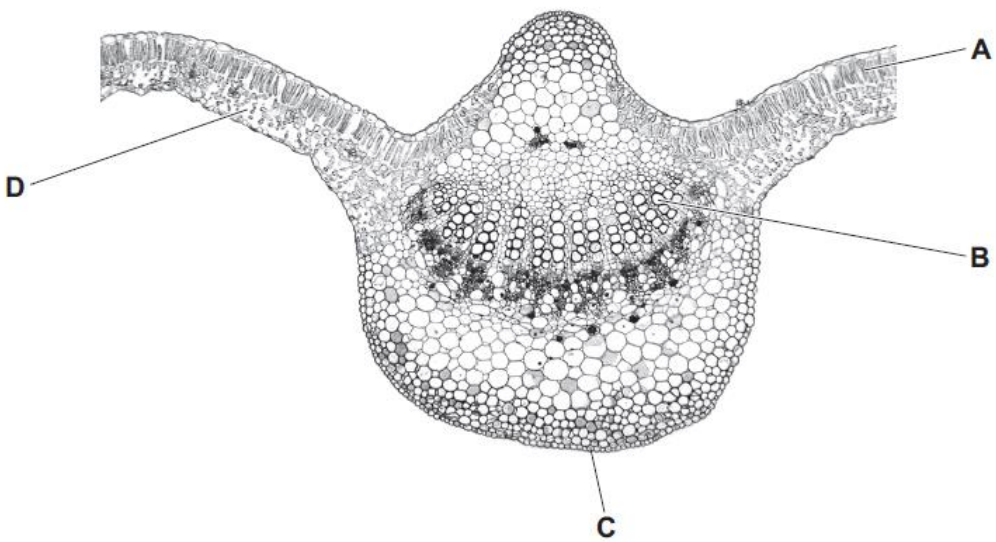
From which cell will most water evaporate during transpiration?



12. June/2022/Paper_ 23/No.15

The image shows a cross-section of part of a leaf.

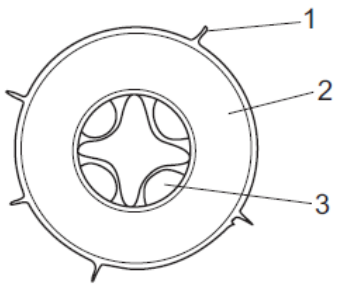
Which labelled structure is the xylem?



13. June/2022/Paper_ 23/No.16

The diagram shows a cross-section of a root.

Three regions of the root are numbered.



Which regions contain cells through which water must pass to reach the xylem?

A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 2 only

14. June/2022/Paper_ 32/No.1(a_ c)

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]

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(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.

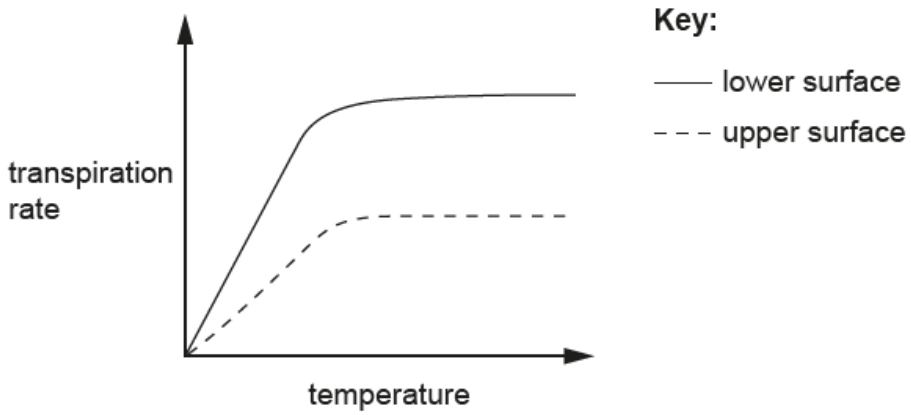


Fig. 1.2

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.

.....

.....

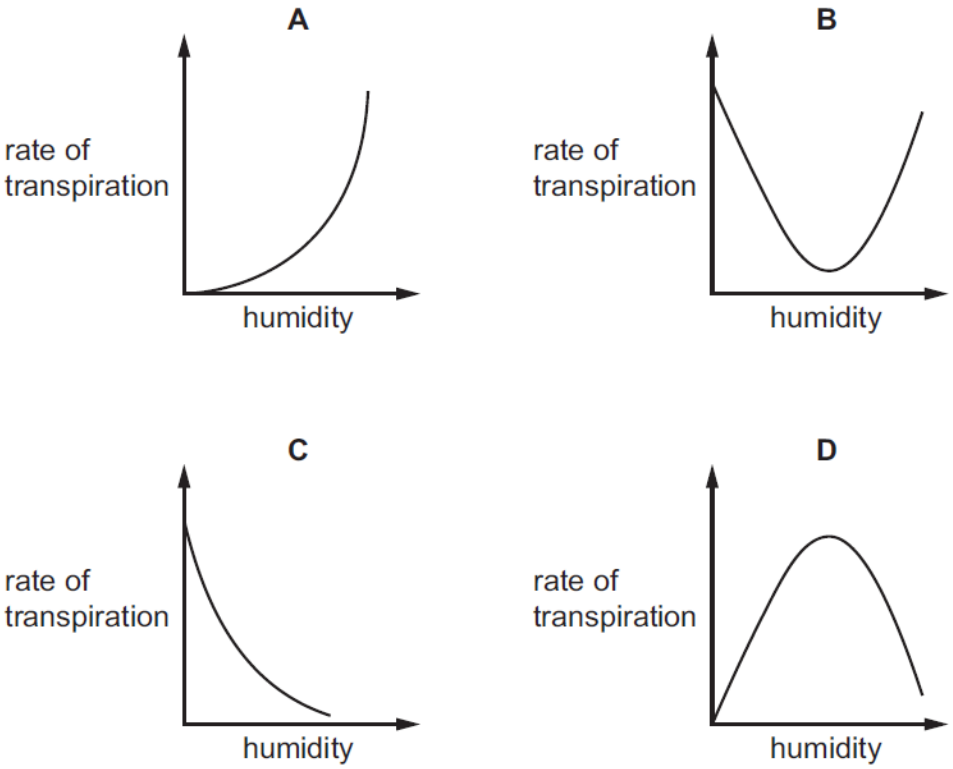
..... [1]

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Transport in plants – 2021 IGCSE 0610

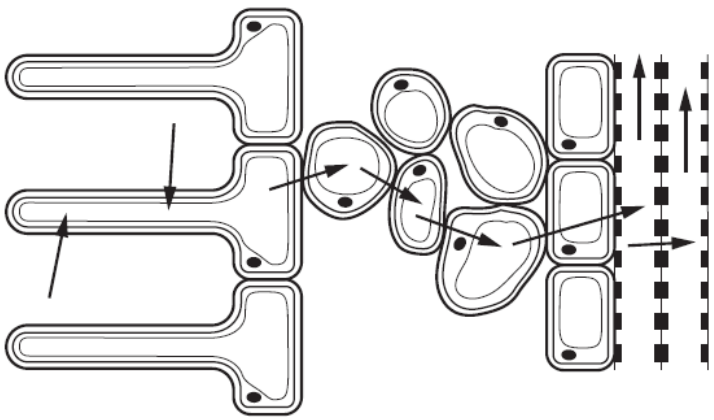
1. Nov/2021/Paper_11/No.18

Which graph shows the effect of increasing humidity on the rate of transpiration?



2. Nov/2021/Paper_12/No.4

The diagram shows some tissues in part of a plant root. The arrows represent the movement of water into and across the plant root tissues.



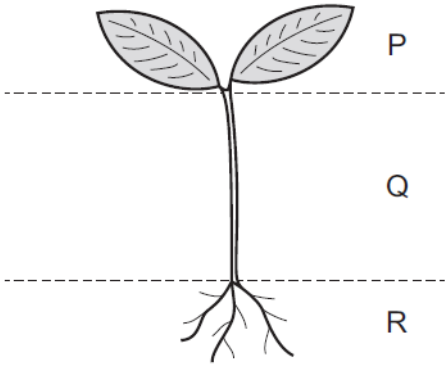
How many different tissues are shown?

A 2 **B** 4 **C** 5 **D** 7

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3. Nov/2021/Paper_12/No.17

The diagram shows a young plant.

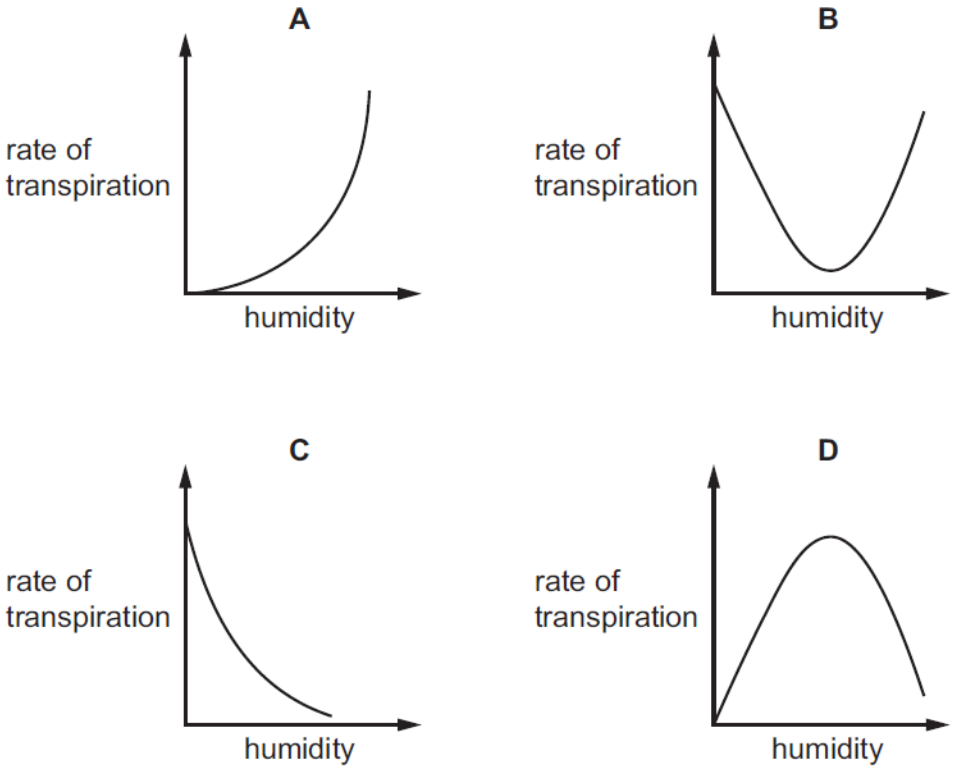


In which parts of the plant are xylem vessels found?

A P, Q and R **B** P and Q only **C** Q and R only **D** Q only

4. Nov/2021/Paper_12/No.18

Which graph shows the effect of increasing humidity on the rate of transpiration?

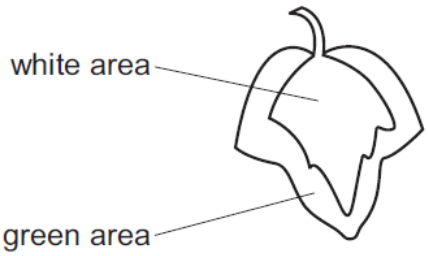


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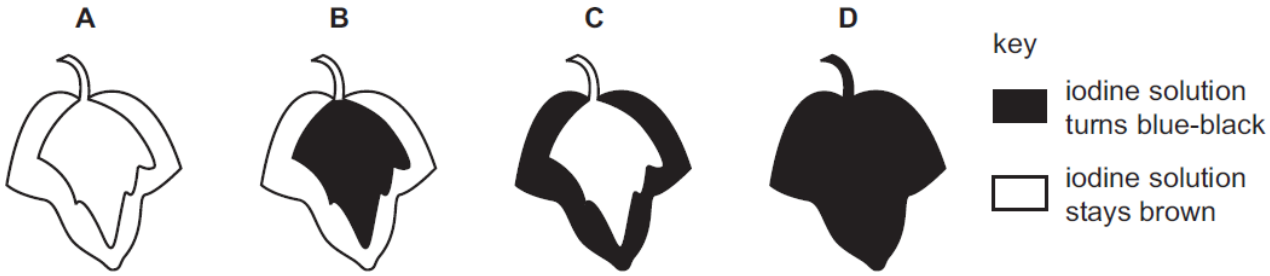
5. Nov/2021/Paper_13/No.9

In a photosynthesis experiment, a plant is left in bright sunlight for several hours. A leaf is then removed from the plant and tested for starch, using iodine solution.

The diagram shows the leaf from the plant that was used in the experiment.

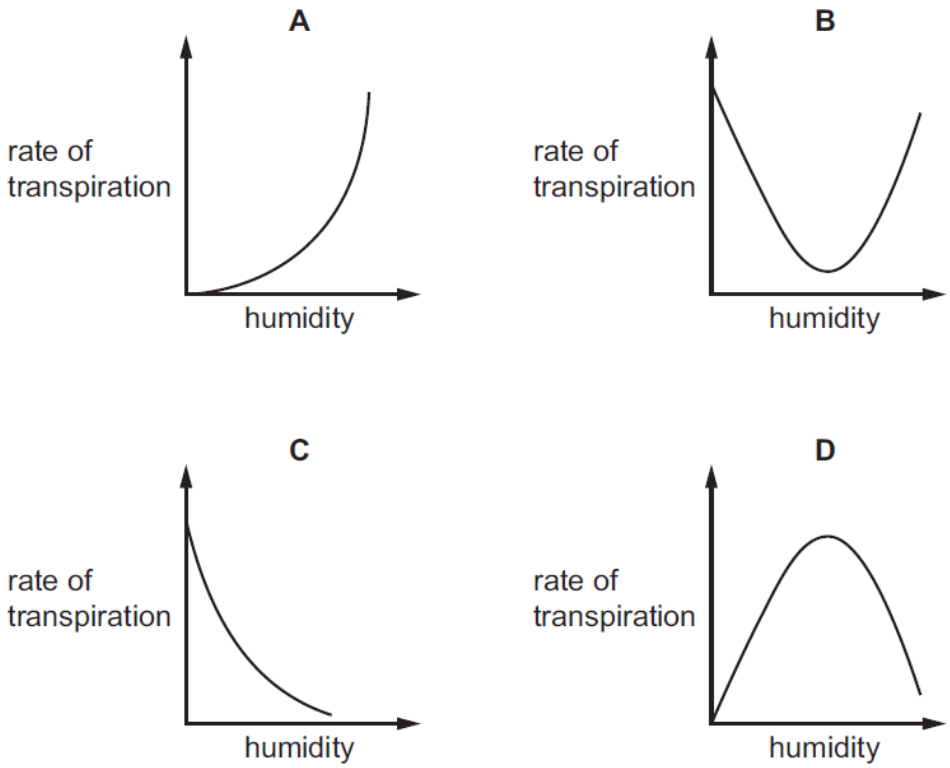


Which diagram shows the result of the experiment?



6. Nov/2021/Paper_13/No.18

Which graph shows the effect of increasing humidity on the rate of transpiration?



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7. Nov/2021/Paper_21/No.17

What holds the water molecules together during the transpiration pull in the xylem?

A active transport

B cohesion

C diffusion

D turgor pressure

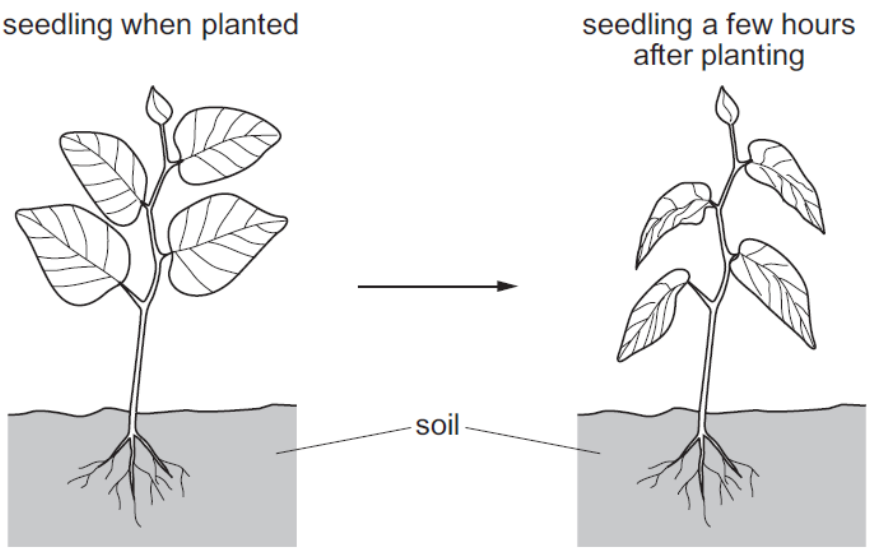
8. Nov/2021/Paper_22/No.3

Which row shows the structure on the outside of a plant cell and the location of the chloroplasts in the cell?

	structure on the outside of a plant cell	location of chloroplasts
A	cell membrane	in the cytoplasm
B	cell membrane	in the vacuole
C	cell wall	in the cytoplasm
D	cell wall	in the vacuole

9. Nov/2021/Paper_22/No.16

The diagram shows a newly planted seedling and the same seedling a few hours after being planted.



What is the correct explanation for the change in the appearance of the leaves?

A Transpiration is faster than water uptake by root hairs so cells have become flaccid.

B Transpiration is faster than water uptake by root hairs so cells have become turgid.

C Transpiration is slower than water uptake by root hairs so cells have become flaccid.

D Transpiration is slower than water uptake by root hairs so cells have become turgid.

10. Nov/2021/Paper_22/No.17

Translocation is the movement of sucrose and amino acids in the phloem tissue of a plant from source to sink.

Which organ can act as a source?

A flower

B growing shoot tip

C new developing root

D storage root

11. Nov/2021/Paper_23/No.17

In plants, how are amino acids moved between sources and sinks?

A by translocation through xylem vessels

B by transpiration through phloem tissues

C by translocation through phloem tissues

D by transpiration through xylem vessels

12. Nov/2021/Paper_32/No.5

(a) Define the term *transpiration* by completing the sentences.

Transpiration is the loss of water vapour from plant leaves by ..... of water at the surfaces of the mesophyll cells followed by ..... of water vapour through the ..... .

[3]

(b) A student investigated the volume of water lost in one hour by different species of plants at different temperatures.

Fig. 5.1 shows the results.

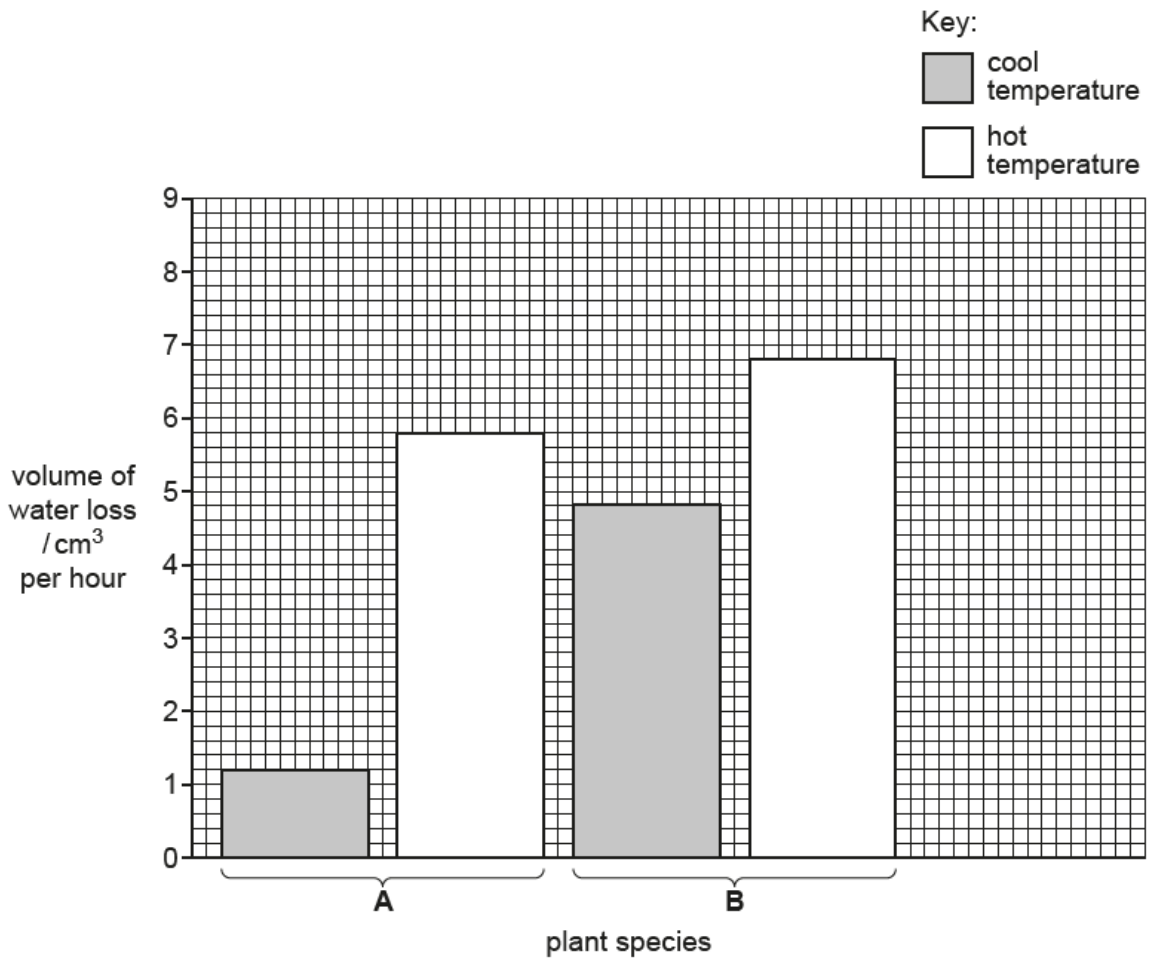


Fig. 5.1

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Compare the volume of water loss in species **A** and species **B**.

.....

.....

.....

.....

.....

.....

..... [3]

(c) The investigation was repeated with increased humidity.

The temperature was cool.

Draw **one** additional bar **on Fig. 5.1**, for species **B** only, to show the expected result. [1]

(d) State the name of the vessels that transport water through a plant.

..... [1]

[Total: 8]

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13. Nov/2021/Paper_33/No.3

(a) Fig. 3.1 shows a diagram of a cross-section through a leaf.

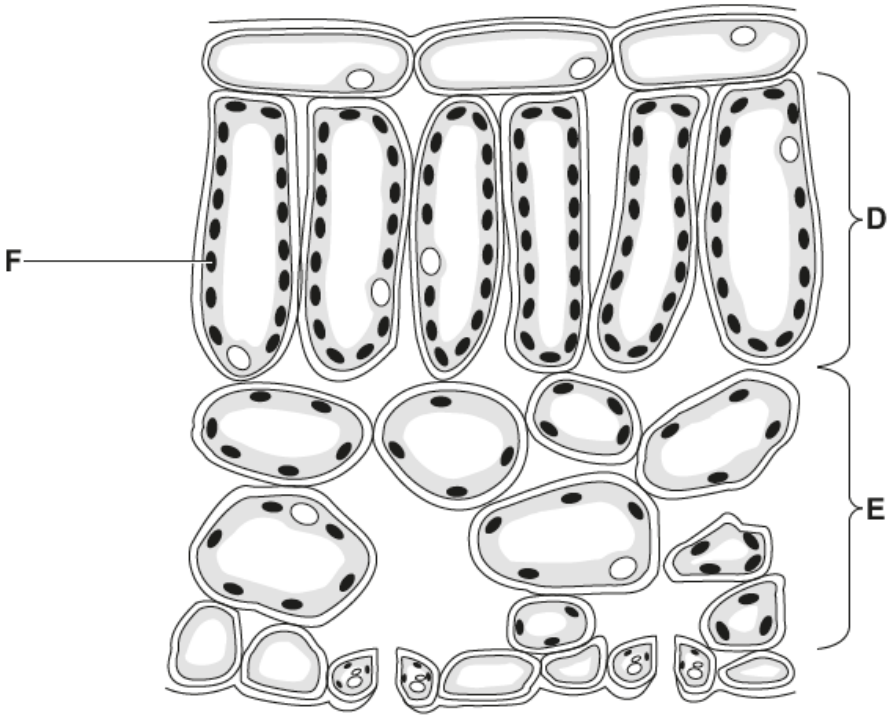


Fig. 3.1

(i) State the name of the tissues labelled **D** and **E**.

D .....

E .....

[2]

(ii) State the name of the cell structure labelled **F**.

..... [1]

(b) Plant cells photosynthesise.

State the word equation for photosynthesis.

..... [2]

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(c) A student investigated the effect of light on the rate of photosynthesis.

Fig. 3.2 shows the apparatus used.

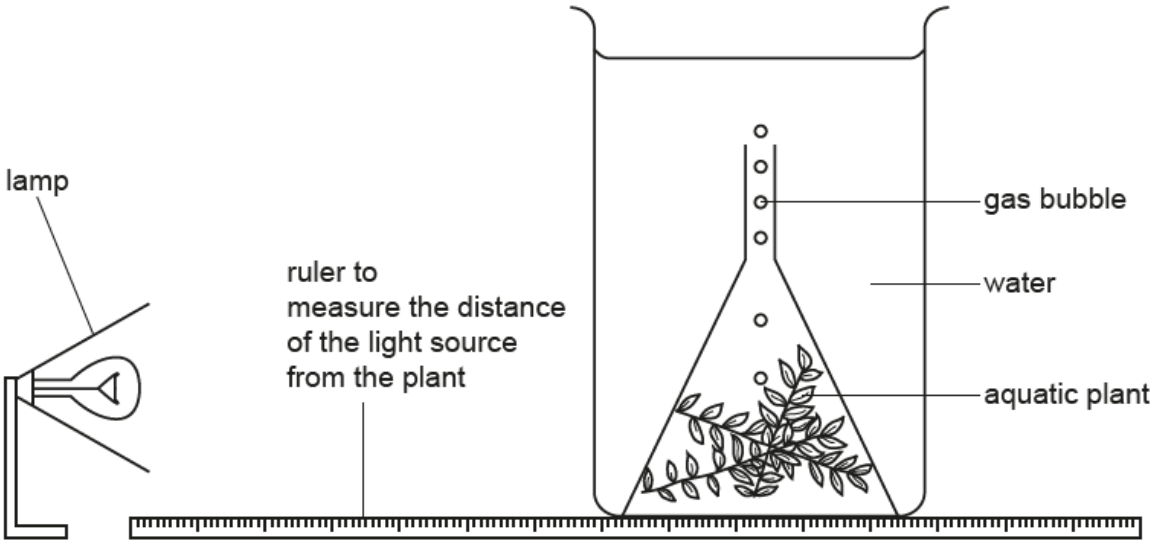


Fig. 3.2

A lamp was used as the only source of light. The lamp was placed 10 cm from the aquatic plant. The number of bubbles the aquatic plant produced in three minutes was counted and the rate of photosynthesis was calculated. This method was repeated at 10 cm intervals.

The results are shown in Table 3.1.

Table 3.1

distance of the lamp from the aquatic plant / cm	number of bubbles counted in three minutes	rate of photosynthesis / bubbles per minute
10	87	29
20	87	29
30	75	
40	48	16
50	24	8

(i) Use the information in Table 3.1 to calculate the rate of photosynthesis when the lamp was 30 cm from the aquatic plant.

..... bubbles per minute [1]

(ii) State the **two** distances between which the rate of photosynthesis halved.

..... cm and ..... cm [1]

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(iii) State **two** distances which have the same rate of photosynthesis.

..... cm and ..... cm [1]

(iv) Predict what would happen to the rate of photosynthesis if the lamp was switched off.

Give a reason for your answer.

prediction .....

.....

reason .....

.....

.....

[2]

[Total: 10]

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14. Nov/2021/Paper_43/No.6

The heart pumps blood around the body.

(a) Explain why the heart is an organ.

.....

.....

..... [1]

(b) Complete the sentences:

The ..... system includes the heart and blood vessels. Deoxygenated blood from the body is transported to the heart in the ..... .

During a heart beat the ventricles contract. The right ventricle pumps deoxygenated blood to the lungs. The right ventricle has a ..... muscular wall than the left ventricle.

Gas exchange in the lungs occurs by ..... . Oxygenated blood travels back to the heart where it enters the ..... of the heart.

The two sides of the heart are separated by the ..... . This structure prevents the mixing of oxygenated and deoxygenated blood. Oxygenated blood is then delivered to the rest of the body. Blood is supplied to the muscle of the heart in the ..... .

[7]

(c) Many people monitor their heart rate by counting their pulse.

State **one** other method of monitoring heart rate.

..... [1]

[Total: 9]

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Transport in plants – 2021 IGCSE 0610

1. March/2021/Paper_12/No.17

Which statement about a function of xylem tissue is correct?

A It carries glucose from the roots to the leaves.

B It helps to support stems and leaves.

C It is the only transport tissue in the plant.

D It carries water away from the leaves.

2. March/2021/Paper_12/No.18

What is part of the definition of transpiration?

A the loss of water vapour from plant leaves by evaporation of water at the surfaces of the mesophyll cells

B the movement of molecules into the cells of the organism where they are used

C the movement of particles through a cell membrane from a region of lower concentration to a region of higher concentration

D the transport of mineral ions from the roots into the stem and leaves

3. June/2021/Paper_11/No.18

A plant shoot is placed in a solution of dye.

The dye moves up the stem.

Under which conditions will the dye move most slowly?

	temperature	humidity
A	high	high
B	high	low
C	low	high
D	low	low

4. June/2021/Paper_12/No.17

Which sequence describes the pathway taken by water as it moves through a plant?

A root hair cell → xylem → root cortex cell → mesophyll

B mesophyll → xylem → root cortex cell → root hair cell

C root cortex cell → root hair cell → xylem → mesophyll

D root hair cell → root cortex cell → xylem → mesophyll

5. June/2021/Paper_12/No.18

A plant shoot is placed in a solution of dye.

The dye moves up the stem.

Under which conditions will the dye move most slowly?

	temperature	humidity
A	high	high
B	high	low
C	low	high
D	low	low

6. June/2021/Paper_13/No.18

A plant shoot is placed in a solution of dye.

The dye moves up the stem.

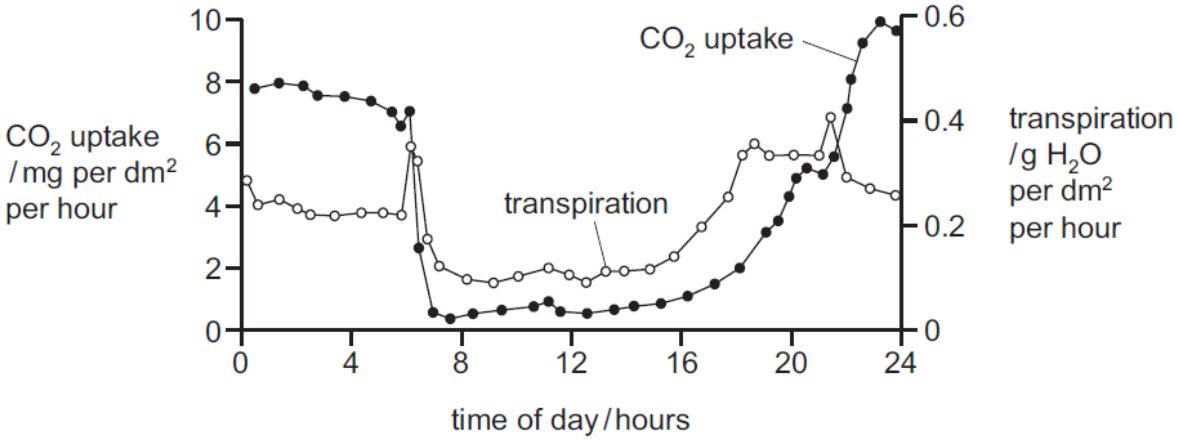
Under which conditions will the dye move most slowly?

	temperature	humidity
A	high	high
B	high	low
C	low	high
D	low	low

7. June/2021/Paper_21/No.14

The graph shows daily carbon dioxide uptake and transpiration by the plant *Agave americana*.

The plant is adapted to live in very dry conditions.



What can be concluded from this graph?

A More stomata are closed during dark periods.

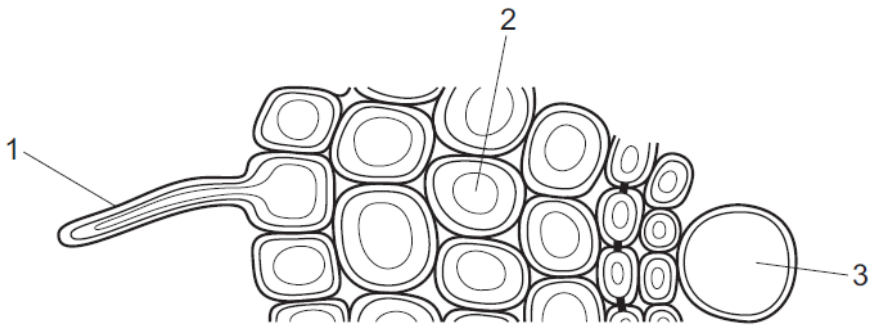
B More stomata are closed during light periods.

C There is no carbon dioxide uptake during dark periods.

D There is no water uptake during light periods.

8. June/2021/Paper_21/No.17

The diagram shows part of a cross-section of a root.



What are cells 1, 2 and 3?

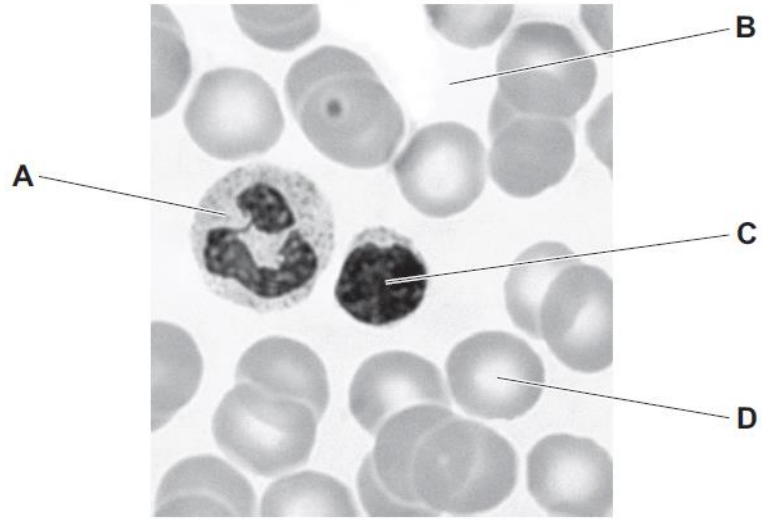
	1	2	3
A	root cortex cell	root hair cell	mesophyll cell
B	root hair cell	root cortex cell	xylem
C	root hair cell	root cortex cell	mesophyll cell
D	root cortex cell	root hair cell	xylem

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9. June/2021/Paper_21/No.20

The photomicrograph shows human blood.

Which blood component makes antibodies?



10. June/2021/Paper_22/No.17

Which sequence describes the pathway taken by water as it moves through a plant?

A root hair cell → xylem → root cortex cell → mesophyll

B mesophyll → xylem → root cortex cell → root hair cell

C root cortex cell → root hair cell → xylem → mesophyll

D root hair cell → root cortex cell → xylem → mesophyll

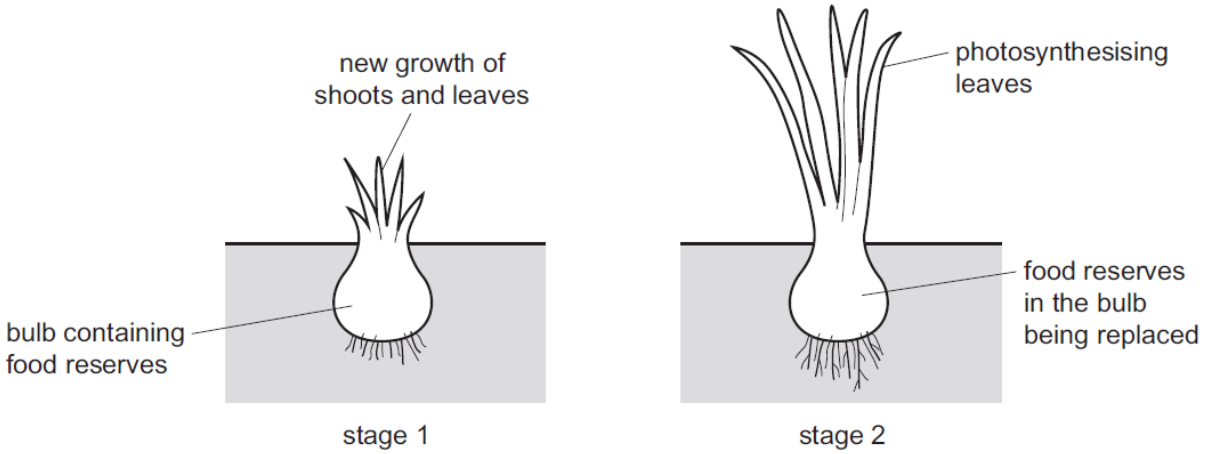
11. June/2021/Paper_22/No.18

The diagram shows a plant at different times of year.

stage 1 At the start of the growing season, the plant uses the food reserves stored in the bulb for the growth of shoots and leaves.

stage 2 Later in the season, the leaves of the plant photosynthesise and the food reserves in the bulb are replaced.

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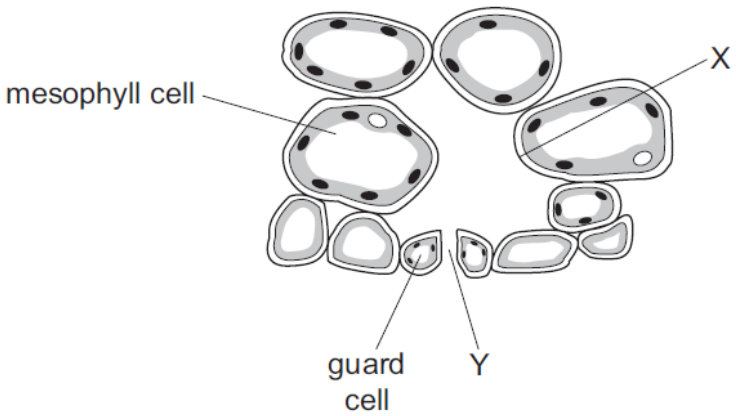


What is the role of the bulb during stage 1 and stage 2?

	stage 1	stage 2
A	sink	sink
B	sink	source
C	source	sink
D	source	source

12. June/2021/Paper_23/No.17

The diagram shows one of the stomata of a leaf, and some of the cells that are near it.



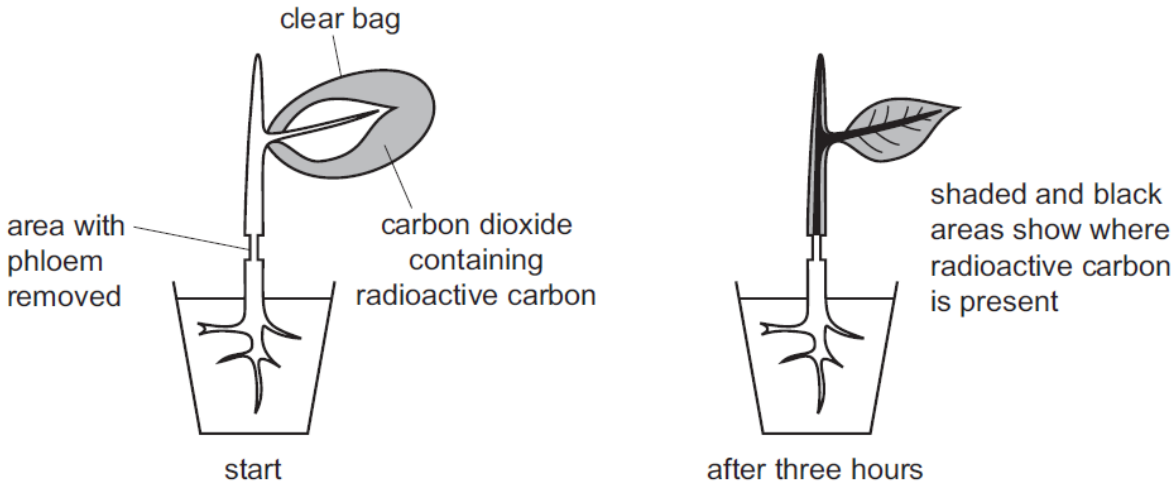
During transpiration, what describes the movement of water at X and at Y?

	movement of water at X	movement of water at Y
A	evaporation	diffusion
B	evaporation	osmosis
C	osmosis	diffusion
D	osmosis	osmosis

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13. June/2021/Paper_23/No.18

A ring of phloem tissue was removed from the stem of a plant, as shown in the first diagram. Carbon dioxide containing radioactive carbon was supplied to the leaf of the plant. The second diagram shows where radioactive carbon was present after three hours.



Which statements does the experiment support?

1 Translocation of sugar only occurs in one direction.

2 Translocation occurs in the phloem.

3 Translocation requires energy.

A 1 only **B** 1 and 2 **C** 2 only **D** 2 and 3

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14. June/2021/Paper_33/No.3

All living organisms need water. Most plants obtain water from the soil.

(a) (i) State the pathway taken by water as it enters and passes through a plant.

Use words from the list to fill in the spaces.

mesophyll cells **root cortex cells** **root hair cells** **xylem vessels**

enters ..... → ..... → ..... → .....

[2]

(ii) Some of the water that enters the plant is used for transpiration.

Define the term transpiration.

.....

.....

.....

.....

..... [3]

(iii) State **two** ways a plant uses water other than for transpiration.

1 .....

.....

2 .....

.....

[2]

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(b) Fig. 3.1 shows apparatus that can be used to measure water loss in a plant.

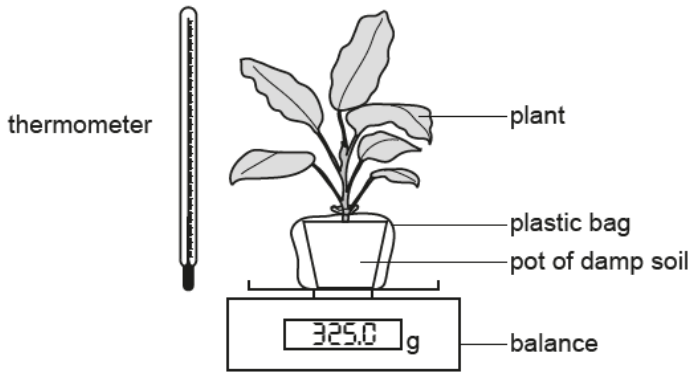


Fig. 3.1

Suggest a reason why the pot of damp soil was placed inside a sealed plastic bag.

.....

.....

..... [1]

(c) The apparatus shown in Fig. 3.1 was used in an investigation. The results of this investigation are shown in Fig. 3.2.

Readings were taken at hourly intervals during the day between 9:00 and 16:00.

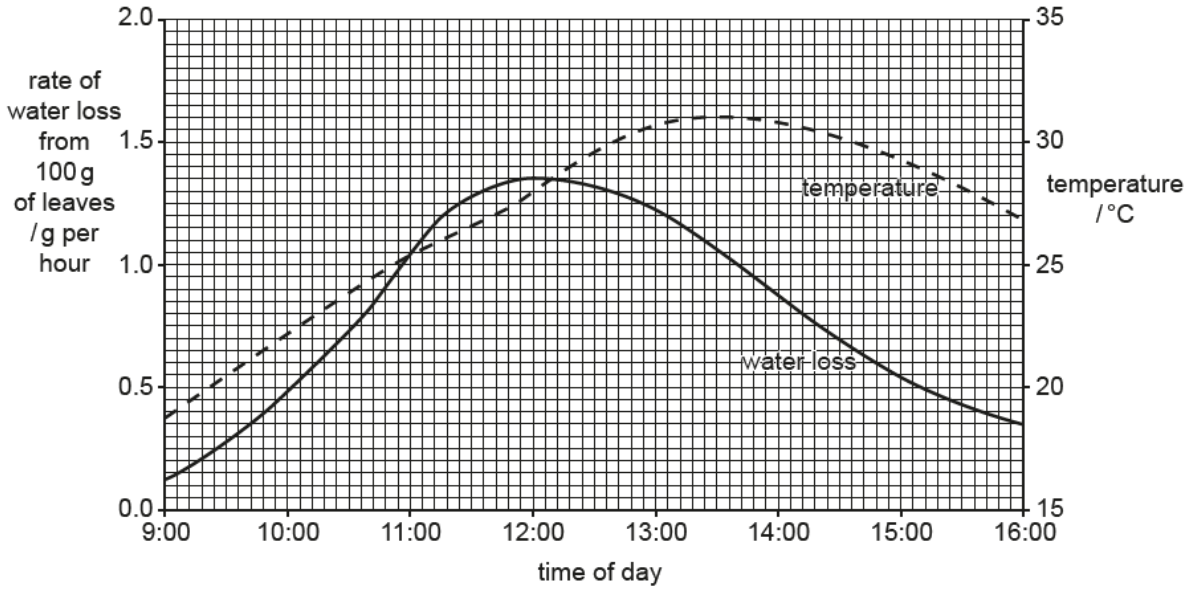


Fig. 3.2

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(i) Use the information in Fig. 3.2 to state:

the maximum rate of water loss from 100 g of leaves ..... g per hour

the time at which the temperature was highest .....

the maximum temperature reached during the investigation ..... °C
[3]

(ii) Describe the relationship between temperature and the rate of water loss from leaves shown in Fig. 3.2.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 14]

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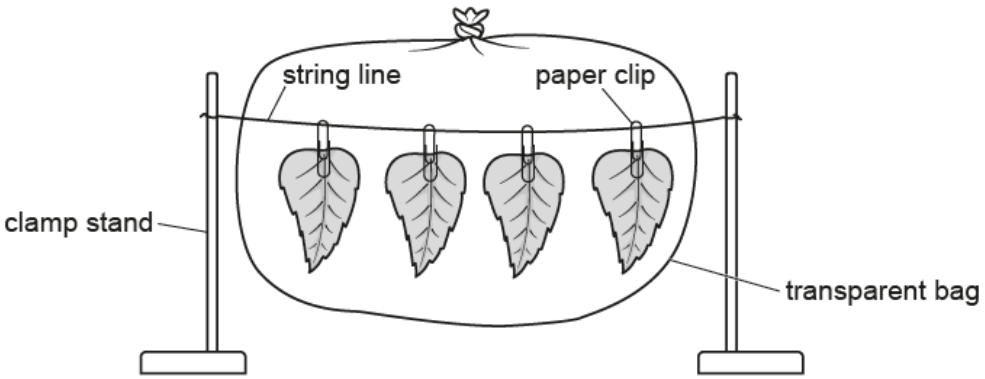
15. June/2021/Paper_42/No.6

(a) Some students set up the apparatus shown in Fig. 6.1 to compare transpiration in two sets of leaves.

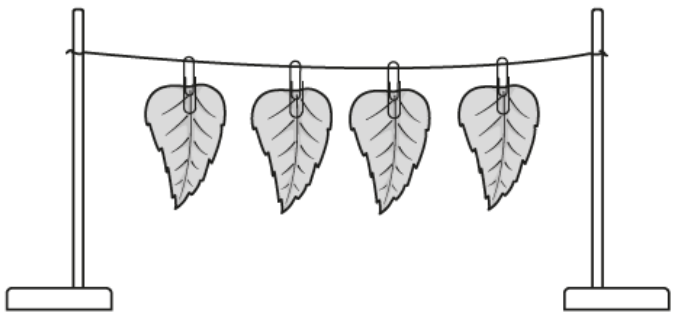
Set **A** was kept in a transparent bag and set **B** was left in the open air.

All other conditions were kept constant.

The mass of the leaves in each set was measured at the start of the investigation and after five hours.



set **A**



set **B**

Fig. 6.1

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(i) Predict the results for this investigation.

Explain the reason for your prediction.

prediction .....

.....

explanation .....

.....

.....

[3]

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(ii) Explain how transpiration occurred in the leaves shown in Fig. 6.1.

.....

.....

.....

.....

.....

.....

..... [3]

(iii) The students needed two additional pieces of apparatus to take measurements so that they could calculate the rate of transpiration from their results.

State the **two** additional pieces of apparatus the students needed to take the measurements.

1 .....

2 .....

[2]

(b) Fig. 6.2 shows the positions of the different tissues in part of a dicotyledonous leaf.

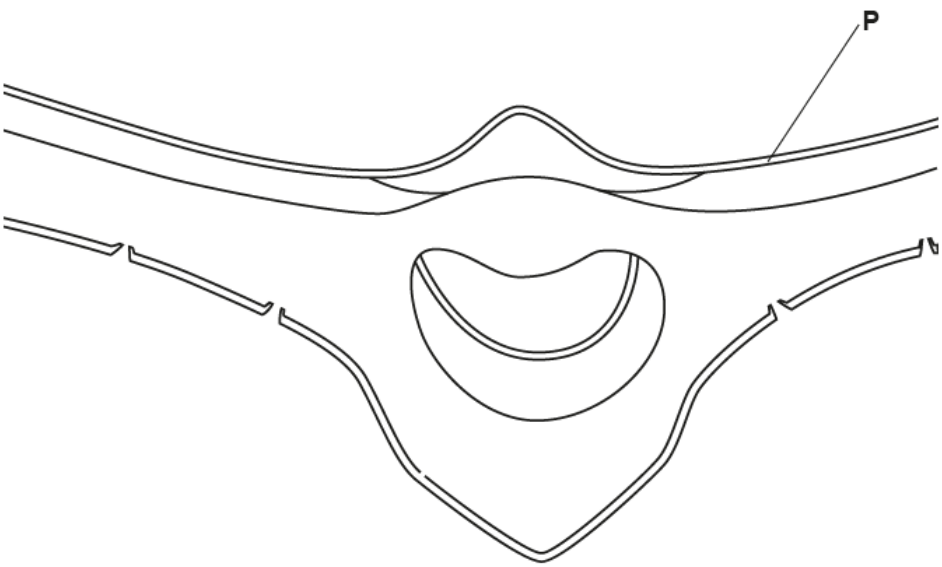


Fig. 6.2

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Identify the tissues described in Table 6.1 by:

- drawing label lines with the corresponding letter on Fig. 6.2 **and**
- stating the name of each tissue in Table 6.1.

The label, line and name of the tissue for letter **P** has been completed for you on Fig. 6.2 and in Table 6.1.

Table 6.1

letter	description	name of the tissue
P	a protective transparent layer that allows light to reach the inner tissues	upper epidermis
Q	conducts water from the stem	
R	contains many interconnected air spaces	
S	transports sucrose and amino acids	
T	traps the most light energy to synthesise carbohydrates	

[4]

[Total: 12]

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Transport in plants – 2020 IGCSE 0610

1. Nov/2020/Paper_11/No.17

In which order does water pass through these structures in a plant?

A mesophyll → root hair → xylem

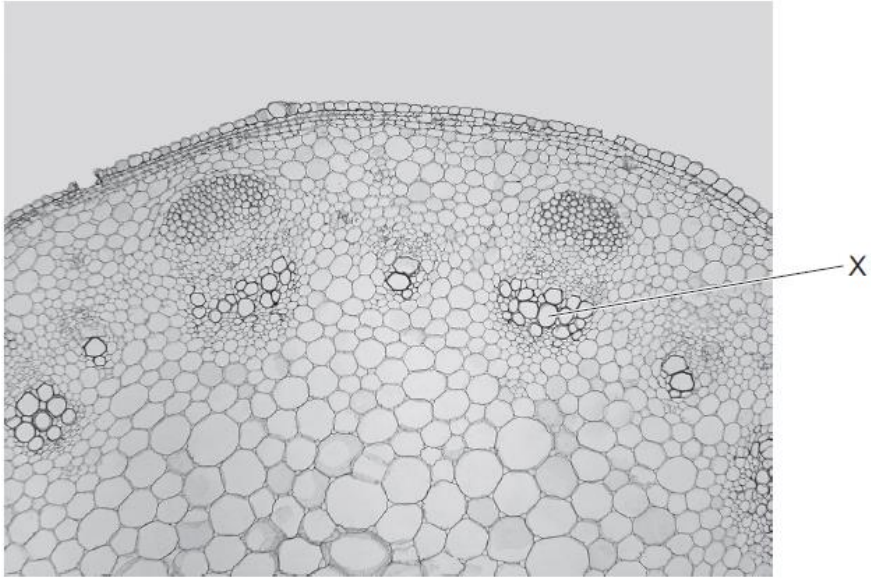
B mesophyll → xylem → root hair

C root hair → mesophyll → xylem

D root hair → xylem → mesophyll

2. Nov/2020/Paper_11/No.18

The photomicrograph shows a cross-section through a plant stem.



What is the name and function of the tissue labelled X?

	tissue	function
A	phloem	transports sugars
B	phloem	transports water and minerals
C	xylem	transports sugars
D	xylem	transports water and minerals

3. Nov/2020/Paper_12/No.5

Which type of cell transports oxygen?

A ciliated

B nerve

C palisade mesophyll

D red blood

4. Nov/2020/Paper_12/No.18

What is a function of phloem?

A transports minerals to the roots

B transports starch to the roots

C transports sugar to the roots

D transports water to the roots

5. Nov/2020/Paper_12/No.17

In which order does water pass through these structures in a plant?

A mesophyll → root hair → xylem

B mesophyll → xylem → root hair

C root hair → mesophyll → xylem

D root hair → xylem → mesophyll

6. Nov/2020/Paper_13/No.17

In which order does water pass through these structures in a plant?

A mesophyll → root hair → xylem

B mesophyll → xylem → root hair

C root hair → mesophyll → xylem

D root hair → xylem → mesophyll

7. Nov/2020/Paper_13/No.18

A decrease in which factor normally causes the transpiration rate to increase?

A humidity

B light intensity

C number of stomata

D temperature

8. Nov/2020/Paper_21/No.15

In which order does water pass through these structures in a plant?

A mesophyll → root hair → xylem

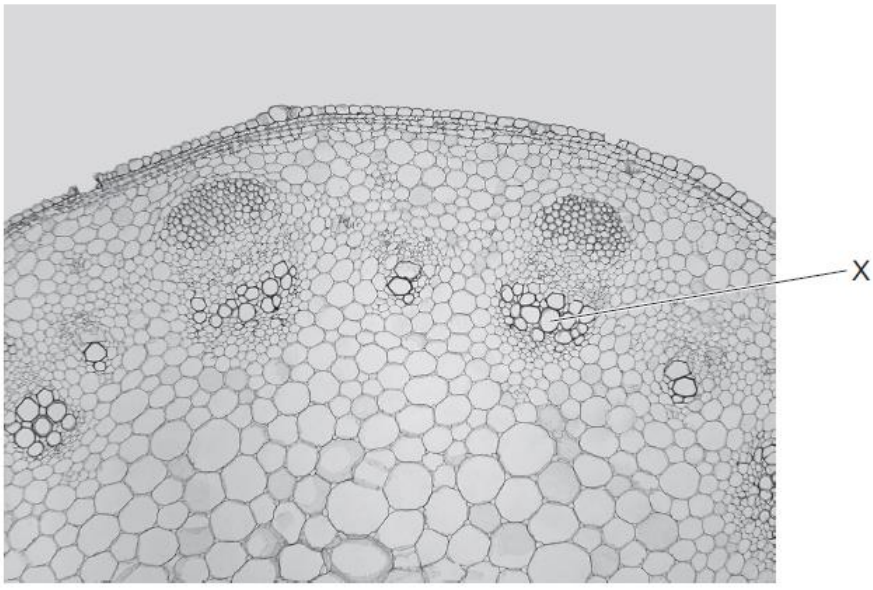
B mesophyll → xylem → root hair

C root hair → mesophyll → xylem

D root hair → xylem → mesophyll

9. Nov/2020/Paper_21/No.16

The photomicrograph shows a cross-section through a plant stem.



What is the name and function of the tissue labelled X?

	tissue	function
A	phloem	transports sugars
B	phloem	transports water and minerals
C	xylem	transports sugars
D	xylem	transports water and minerals

10. Nov/2020/Paper_22/No.15

In which order does water pass through these structures in a plant?

A mesophyll → root hair → xylem

B mesophyll → xylem → root hair

C root hair → mesophyll → xylem

D root hair → xylem → mesophyll

11. Nov/2020/Paper_22/No.16

What is a function of phloem?

A transports minerals to the roots

B transports starch to the roots

C transports sugar to the roots

D transports water to the roots

12. Nov/2020/Paper_23/No.15

In which order does water pass through these structures in a plant?

A mesophyll → root hair → xylem

B mesophyll → xylem → root hair

C root hair → mesophyll → xylem

D root hair → xylem → mesophyll

13. Nov/2020/Paper_23/No.16

A decrease in which factor normally causes the transpiration rate to increase?

A humidity

B light intensity

C number of stomata

D temperature

Transport in plants – 2020 IGCSE 0610

1. March/2020/Paper_12/No.17

When stems with white flowers are cut and placed in a blue stain the petals turn blue.

Which tissue in the stem does the stain travel through to reach the petals?

A epidermis

B mesophyll

C phloem

D xylem

2. March/2020/Paper_12/No.18

Which process releases water vapour into the atmosphere from the leaves of trees?

A active transport

B osmosis

C respiration

D transpiration

3. March/2020/Paper_22/No.17

When stems with white flowers are cut and placed in a blue stain the petals turn blue.

Which tissue in the stem does the stain travel through to reach the petals?

A epidermis

B mesophyll

C phloem

D xylem

4. March/2020/Paper_22/No.18

Which process releases water vapour into the atmosphere from the leaves of trees?

A active transport

B osmosis

C respiration

D transpiration

5. March/2020/Paper_32/No.6

(a) Complete the definition of the term transpiration.

Transpiration is the loss of water vapour from plant leaves by ..... of water at the surfaces of the ..... cells followed by diffusion of water vapour through the ..... .

[3]

(b) Fig. 6.1 is a graph showing how temperature affects water loss in a plant with many leaves.

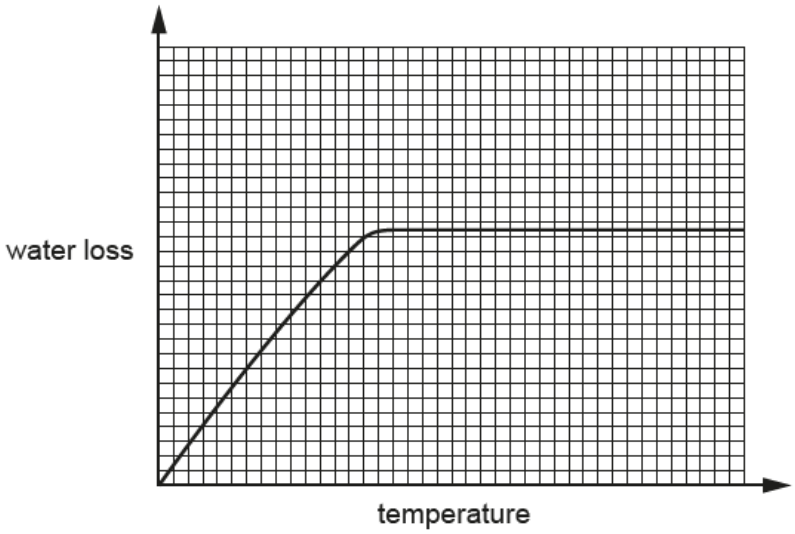


Fig. 6.1

(i) Half of the leaves were removed from the plant.

Predict the effect on water loss in this plant and sketch a line on Fig. 6.1 to show your prediction. [2]

(ii) Describe the effect of humidity on the rate of transpiration.

.....

.....

..... [1]

(c) Water is an important substance for plants.

(i) Describe **two** uses of water in plants.

1 .....

2 .....

[2]

(ii) State the name of the vessels that transport water in plants.

..... [1]

(iii) State the name of the cells where water enters a plant.

..... [1]

[Total: 10]

6. June/2020/Paper_11/No.13

After passing through the root hair cells of a plant, what is the next tissue through which water passes?

A cortex

B epidermis

C mesophyll

D xylem

7. June/2020/Paper_11/No.14

From which part of a leaf does most water evaporate during transpiration?

A the cuticle

B the guard cells

C the spongy mesophyll cells

D the xylem vessels

8. June/2020/Paper_12/No.13

After passing through the root hair cells of a plant, what is the next tissue through which water passes?

A cortex

B epidermis

C mesophyll

D xylem

9. June/2020/Paper_12/No.14

From which part of a leaf does most water evaporate during transpiration?

A the cuticle

B the guard cells

C the spongy mesophyll cells

D the xylem vessels

10. June/2020/Paper_13/No.13

After passing through the root hair cells of a plant, what is the next tissue through which water passes?

A cortex

B epidermis

C mesophyll

D xylem

11. June/2020/Paper_13/No.14

From which part of a leaf does most water evaporate during transpiration?

A the cuticle

B the guard cells

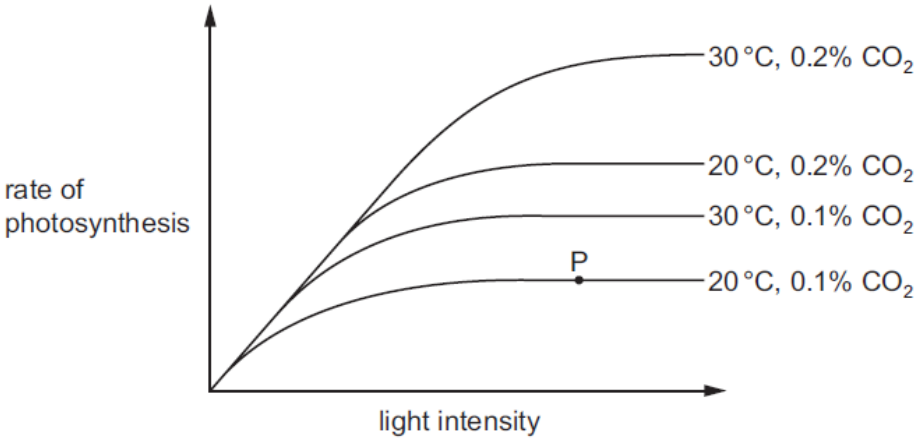
C the spongy mesophyll cells

D the xylem vessels

12. June/2020/Paper_21/No.11

The diagram shows how the rate of photosynthesis varies with light intensity.

The four curves show different conditions of temperature and carbon dioxide concentration.



What limits the rate of photosynthesis at point P?

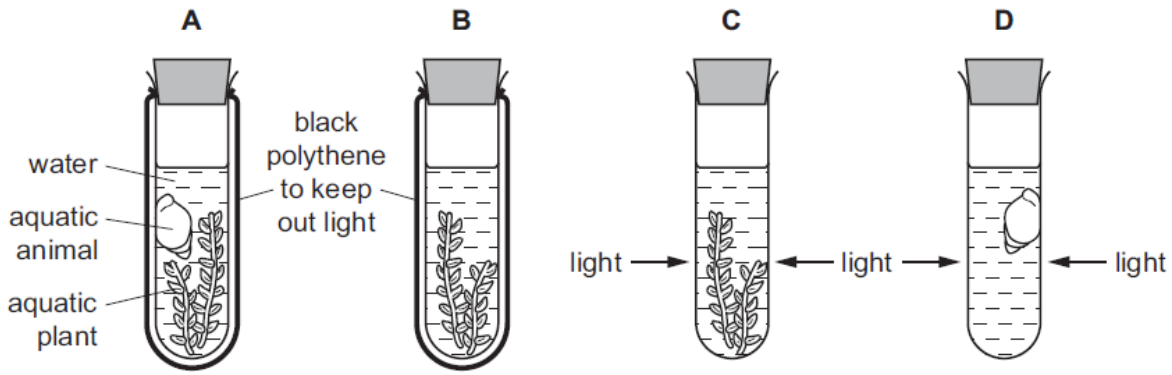
	light intensity	carbon dioxide concentration	temperature
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

key
✓ = yes
✗ = no

13. June/2020/Paper_21/No.12

Four test-tubes are set up as shown.

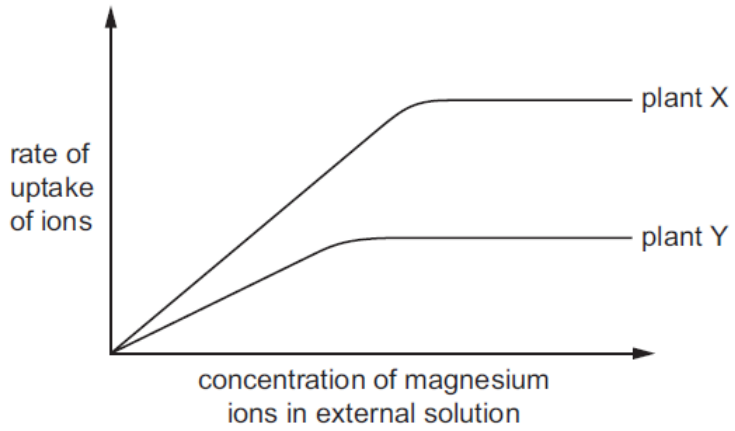
Which test-tube contains the least carbon dioxide after one hour?



14. June/2020/Paper_21/No.15

The graph shows the rate of uptake of magnesium ions by two similar plants, X and Y.

The roots of each plant were placed in a range of solutions. Each solution contained a different concentration of magnesium ions. All other conditions were kept constant.



What is a possible explanation for the difference in the results for the two plants?

A Plant Y has fewer protein molecules for magnesium ion transport in its cell membranes.

B Plant Y has a higher rate of respiration.

C Plant Y has more root hair cells.

D The root hair cells in plant Y have a lower water potential.

15. June/2020/Paper_21/No.16

What will increase the rate of transpiration in a plant?

A an increase in the humidity of the atmosphere surrounding the leaf

B an increase in the surface area of the cell surfaces inside the leaf

C a decrease in the number of stomata present on the surface of the leaf

D a decrease in the temperature of the atmosphere surrounding the leaf

16. June/2020/Paper_22/No.15

Which change increases the rate of water uptake by the roots of a plant?

A decrease in evaporation of water from mesophyll cells

B decrease in length of root hairs

C decrease in water potential of root hair cells

D decrease in water potential of soil water

17. June/2020/Paper_23/No.15

Samphire is a plant that grows in coastal areas. It has adaptations that enable it to live in areas with high salt concentration in the soil and strong winds.

Which adaptations would samphire possess to minimise water loss from root cells by osmosis and leaves by evaporation?

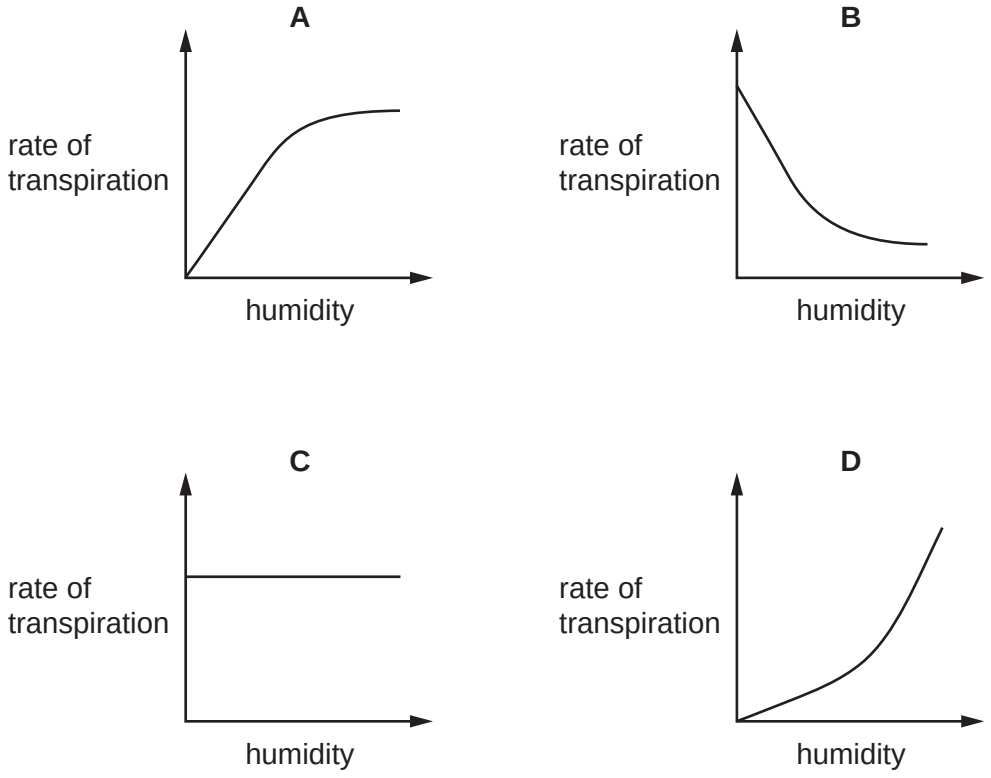
	salt concentration in root cells	leaf surface area
A	high	high
B	high	low
C	low	high
D	low	low

18. June/2020/Paper_23/No.16

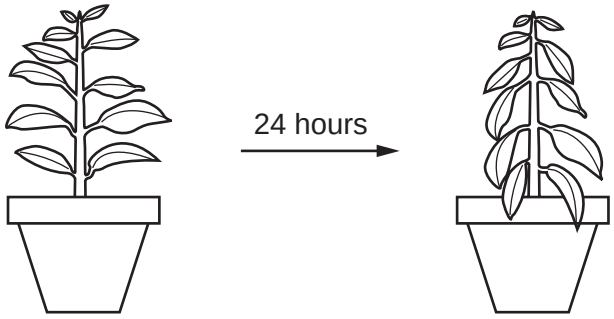
Which row correctly states the pair of conditions that will result in the highest rate of transpiration?

	temperature	humidity
A	high	low
B	high	high
C	low	high
D	low	low

1. Which graph shows most clearly what will happen to the rate of transpiration as humidity increases?



2. The diagram shows a potted plant and the same plant 24 hours later.



What causes the change in the appearance of the plant?

A Water loss is greater than water uptake.

B Water moves from the leaves to the stem.

C Water uptake is equal to water loss.

D Water uptake is greater than water loss.

3. Which process is an example of translocation?

A absorption of water by the roots and its movement through the xylem to the leaves

B loss of water from the leaves as it evaporates into the air

C movement of sucrose from the leaves through phloem to other parts of the plant

D the process by which plants use the food produced by photosynthesis to obtain energy

4. By which process is water lost from a leaf?

A active transport

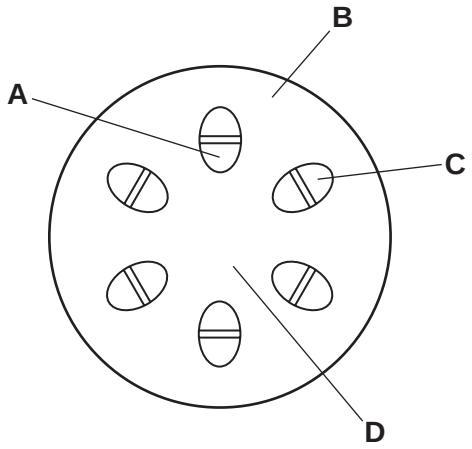
B diffusion

C osmosis

D photosynthesis

5. The lower end of a plant stem is placed in water coloured with red dye. After three hours, the stem is cut as shown in the diagram.

Which labelled region is stained red?



6. Which process is used to transport sucrose from the leaves of a plant to its flowers?

A diffusion

B osmosis

C translocation

D transpiration

7. What is transported in the phloem and what is the direction of transport?

A starch, up and down

B starch, up only

C sucrose, down and up

D sucrose, down only

8. In which order does water pass through the cells of a plant, as the water travels from the roots to a leaf?

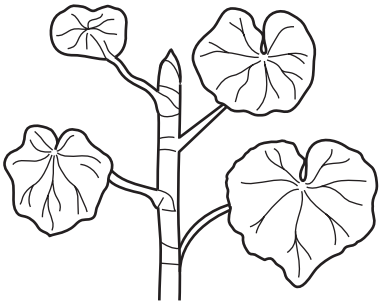
A mesophyll cells → root hair → root cortex → xylem

B root cortex → root hair → xylem → mesophyll cells

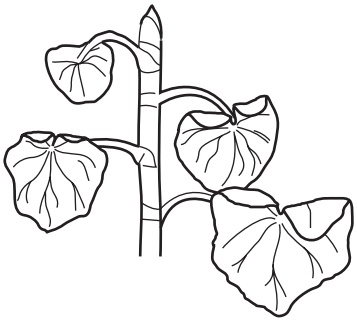
C root hair → mesophyll cells → root cortex → xylem

D root hair → root cortex → xylem → mesophyll cells

9. The diagram shows a plant shoot and the same shoot six hours later.



plant shoot



same shoot six hours later

Which change in environmental conditions could cause this change in the shoot?

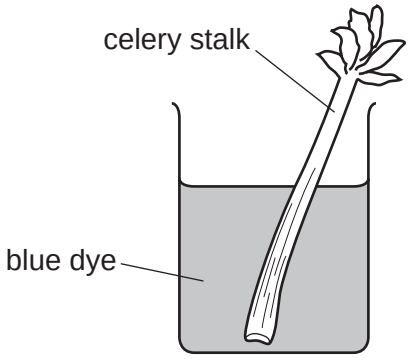
A a decrease in available water

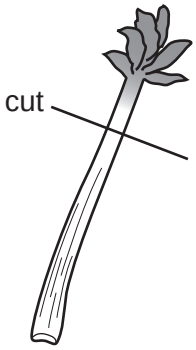
B a decrease in light intensity

C a decrease in wind speed

D an increase in humidity

10. A celery stalk is placed in a beaker of blue dye. Once the dye reaches the leaves, the stalk is taken out and cut in half.



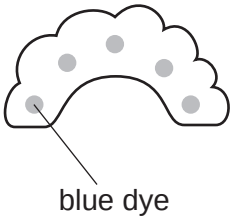


Which diagram shows the appearance of the cut end of the stalk?

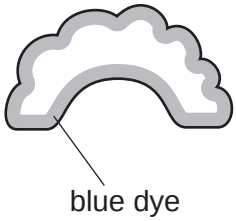
A



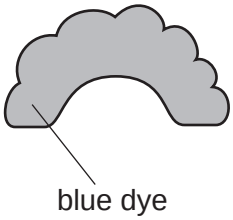
B



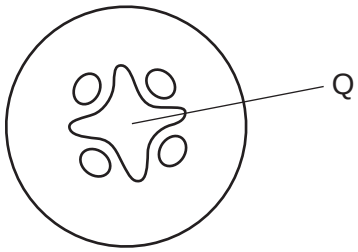
C



D



11. The diagram shows a cross-section through a plant root.



Q shows the part that is stained red when the root is placed in water containing a red dye.

What is found at Q?

A guard cells

B palisade cells

C phloem

D xylem

12. Which processes produce a continuous space for the flow of water in xylem vessels?

	break down of the cell walls between adjacent cells	removal of the cytoplasm in each cell
A	yes	yes
B	yes	no
C	no	yes
D	no	no

13. Some liquid is collected from the xylem in the stem of a plant.

What is present in the liquid?

A cellulose

B inorganic ions

C starch

D sugar

14. What is a function of phloem?

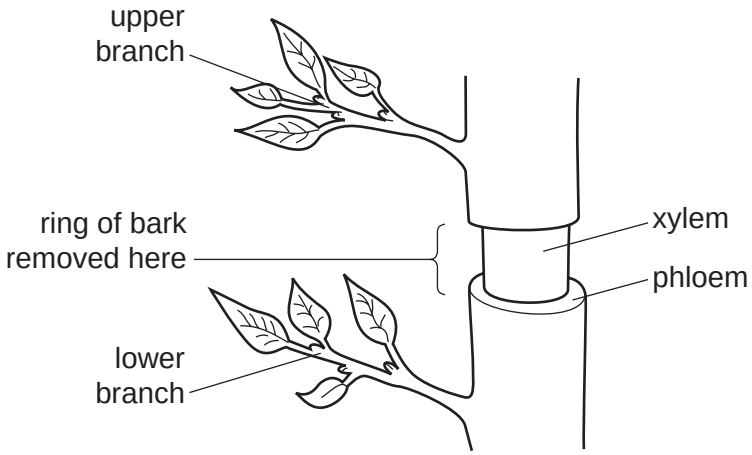
A translocation

B transpiration

C storage of food

D support

15. The diagram shows part of the trunk of a small tree with a ring of bark removed. Removing the ring of bark takes away phloem but leaves the xylem intact.



What effect will removing the bark have on the two branches?

	lower branch		upper branch	
	growth	leaves	growth	leaves
A	normal	normal	normal	wilted
B	normal	wilted	normal	normal
C	reduced	normal	normal	normal
D	reduced	wilted	reduced	wilted

16. The table shows some characteristics of four different plants.

The plants are growing in the same environmental conditions.

Which plant will have the highest rate of transpiration?

	number of leaves on plant	average surface area of one leaf / cm^2	average density of stomata on leaves / per mm^{-2}	average diameter of one stoma / μm
A	12	42	248	19
B	25	20	250	16
C	35	52	275	18
D	36	45	150	15

17. A decrease in which factor normally causes transpiration rate to increase?

A humidity

B light intensity

C stomatal opening

D temperature

18. What is the path of water through a plant?

A cortex cells → xylem → stomata → roots

B root hair → xylem → mesophyll cells → stomata

C roots → cortex cells → stomata → phloem

D roots → root hair → stomata → xylem

19. In which order does water pass through these tissues in a plant?

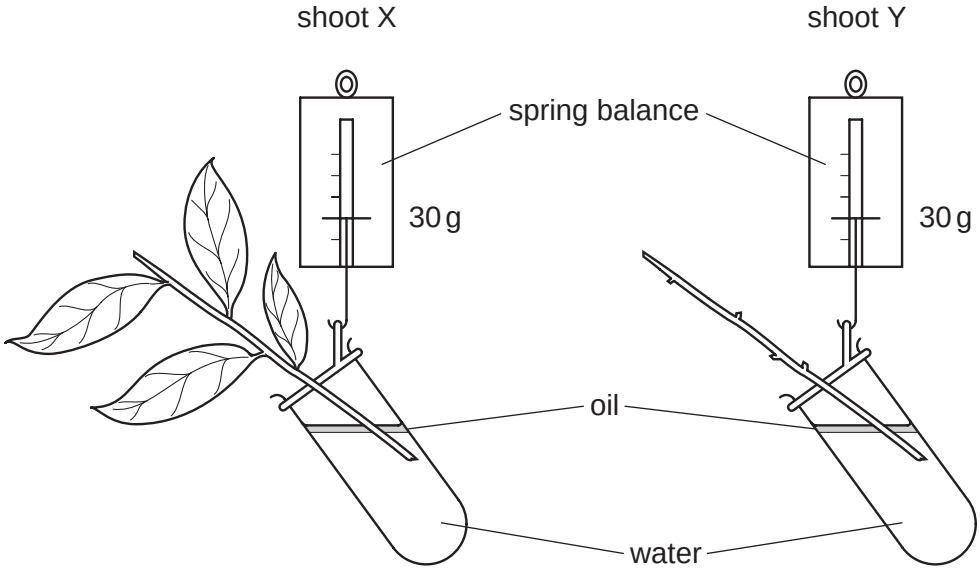
A mesophyll → xylem → root cortex

B root cortex → mesophyll → xylem

C root cortex → xylem → mesophyll

D xylem → mesophyll → root cortex

20. The diagram shows two shoots at the start of an experiment on transpiration.



What are the likely readings on the spring balances after three days?

	shoot X	shoot Y
A	30 g	30 g
B	30 g	25 g
C	25 g	30 g
D	25 g	25 g