AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.3.2

Plant organ system

Past-paper questions

Tier	**Foundation**
Question groups	**25**
Available paper years	**2008–2023**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

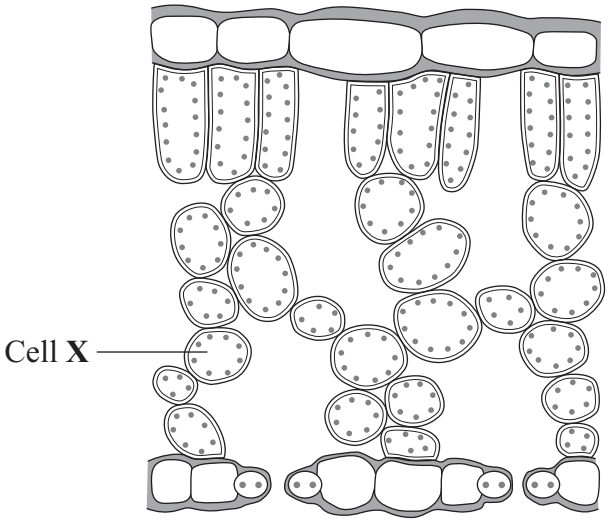
Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.2.3.2 Plant organ system

Question 01

January 2008 | BLY3F | Original Q4 | Legacy

4 (a) The diagram shows a section through a plant leaf.
Water evaporates from cell **X**.



(i) **On the diagram**, draw an arrow to show how water vapour from cell **X** gets out of the leaf.

(1 mark)

(ii) Name the process by which water vapour is lost from a leaf.

Draw a circle around **one** answer.

osmosis **transpiration** **wilting**

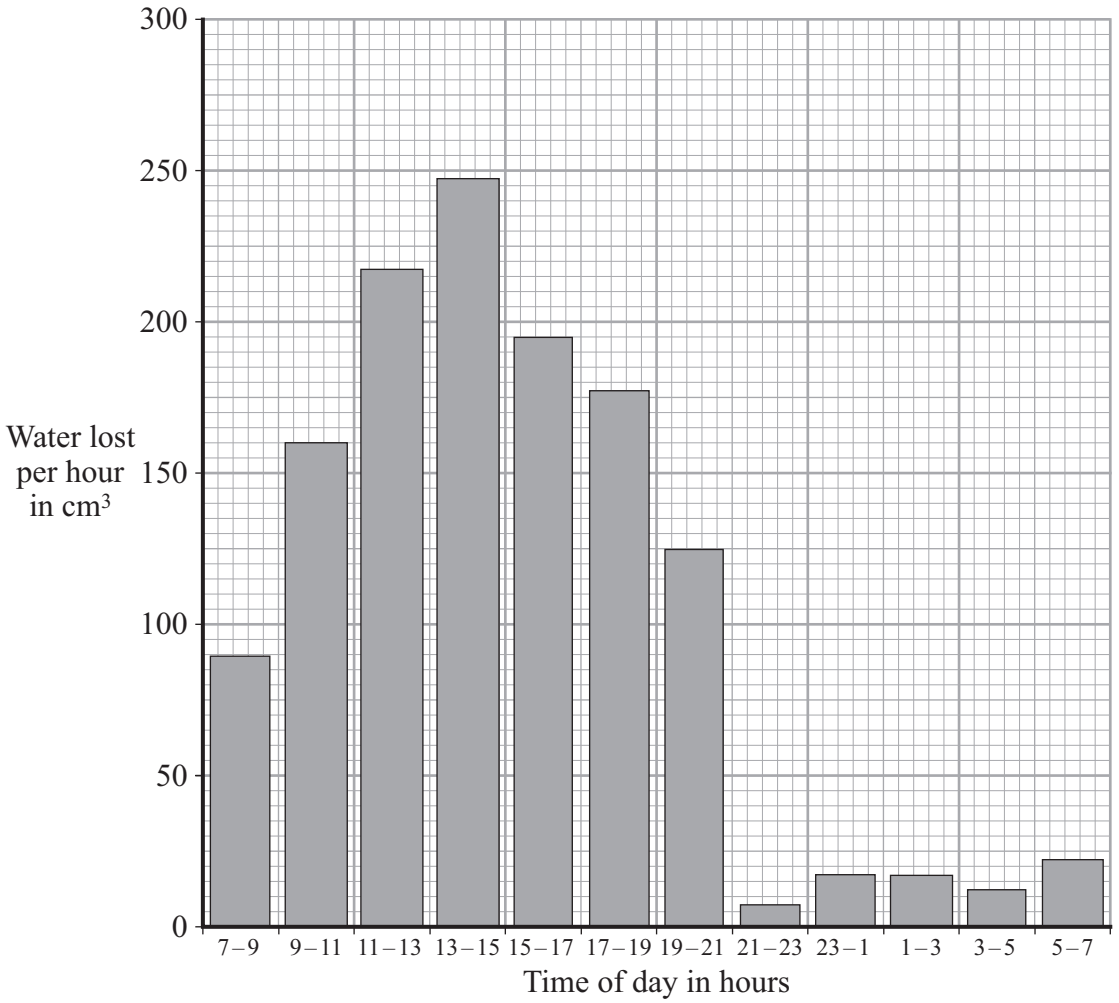
(1 mark)

4.2.3.2 Plant organ system

Question 01 · continued

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(b) The graph shows how much water was lost from a plant at different times of the day.



(i) During which 2-hour period was water lost most quickly?

.....

(1 mark)

(ii) Give **one** possible explanation why water was lost most quickly at this time.

.....

.....

.....

.....

(2 marks)

5

4.2.3.2 Plant organ system

Question 02

June 2008 | BLY3F | Original Q7 | Legacy

7 A group of students looked at stomata on four different species of plants, **A**, **B**, **C** and **D**. They estimated the number of stomata per cm^2 on the upper and lower surfaces of the leaves of the four species.

Their results are shown in the table.

Plant species	Estimated number of stomata per cm^2 of leaf surface	
	Upper surface of leaf	Lower surface of leaf
A	4000	28 000
B	0	800
C	8500	15 000
D	8000	26 000

7 (a) Which plant species probably lives in a dry region? ☐

Explain the reason for your answer.

.....

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.....

(3 marks)

7 (b) All four species have more stomata on the lower surface of their leaves than on the upper surface.

Suggest how this could help the plants to survive better.

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(2 marks)

5

4.2.3.2 Plant organ system

Question 03

June 2009 | BLY3F | Original Q2 | Legacy

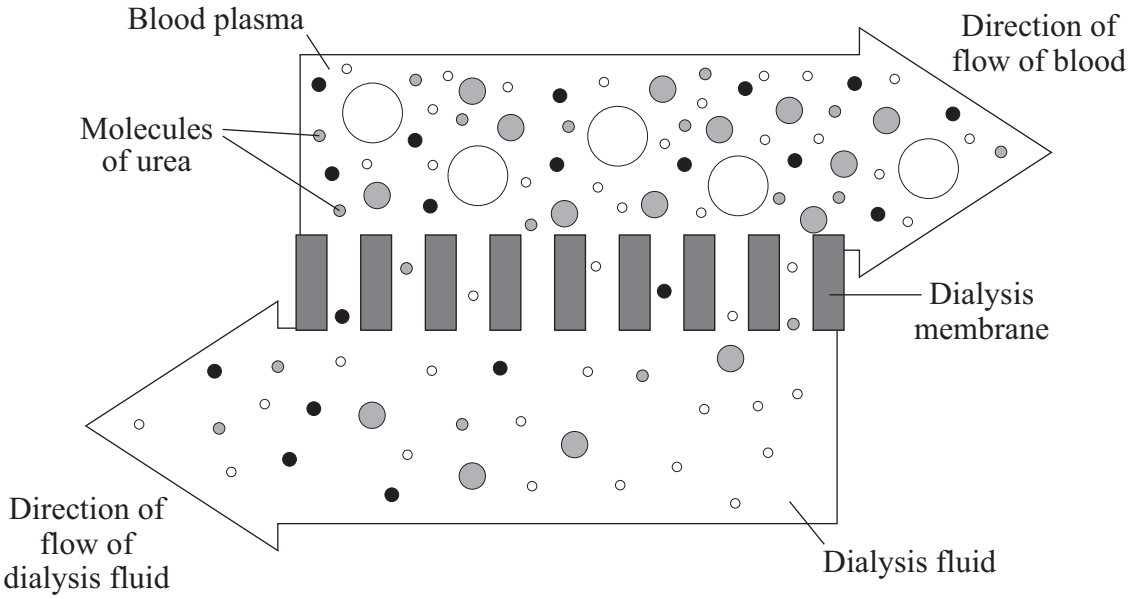
2 (a) Which **two** of the following substances are found in the urine of a healthy person?

Tick (✓) **two** boxes.

Glucose	☐
Mineral ions	☐
Proteins	☐
Water	☐

(2 marks)

2 (b) A person with kidney disease can be treated by dialysis.
The diagram shows how dialysis works.
The circles represent molecules of different substances.



Draw a ring around the correct word or phrase to complete each sentence.

2 (b) (i) During dialysis, urea moves out of the

blood cells
blood plasma
dialysis fluid

.

(1 mark)

4.2.3.2 Plant organ system

Question 03 · continued

for mark

2 (b) (ii) During dialysis, urea moves into the [blood cells / blood plasma / dialysis fluid] .

(1 mark)

2 (b) (iii) Urea moves by the process of [diffusion / digestion / transpiration] .

(1 mark)

2 (b) (iv) To allow the movement of urea, the dialysis membrane is [impermeable / partially permeable / thick] .

(1 mark)

2 (b) (v) The urea can pass through the membrane because

the urea molecules are [large / round / small] .

(1 mark)

2 (c) For most patients a kidney transplant is better than continued dialysis treatment.

Tick (✓) **one** box to complete the sentence.

One major problem with a kidney transplant is that

drug treatment is needed to suppress the immune system. ☐

hospital visits are needed three times a week. ☐

yearly costs are higher than for dialysis. ☐

(1 mark)

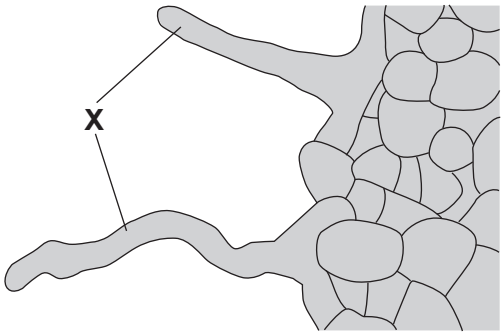
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4.2.3.2 Plant organ system

Question 04

June 2010 | BLY3F | Original Q1 | Legacy

1 The diagram shows part of a plant root. A large number of structures like the ones labelled **X** grow out of the surface of the root.



1 (a) (i) What is the name of structure **X**?

Draw a ring around **one** answer.

root hair **stoma** **villus**

(1 mark)

1 (a) (ii) Name **two** substances which structure **X** absorbs from the soil.

1 .....

2 .....

(2 marks)

4.2.3.2 Plant organ system

Question 04 · continued

1 (b) The substances in (a)(ii) are transported from the roots to the leaves.
Carbon dioxide also enters the leaves.

Draw a ring round the correct answer to complete each sentence.

1 (b) (i) Carbon dioxide enters leaves through

alveoli.

stomata.

villi.

(1 mark)

1 (b) (ii) Carbon dioxide enters leaf cells by

active transport.

diffusion.

reabsorption.

(1 mark)

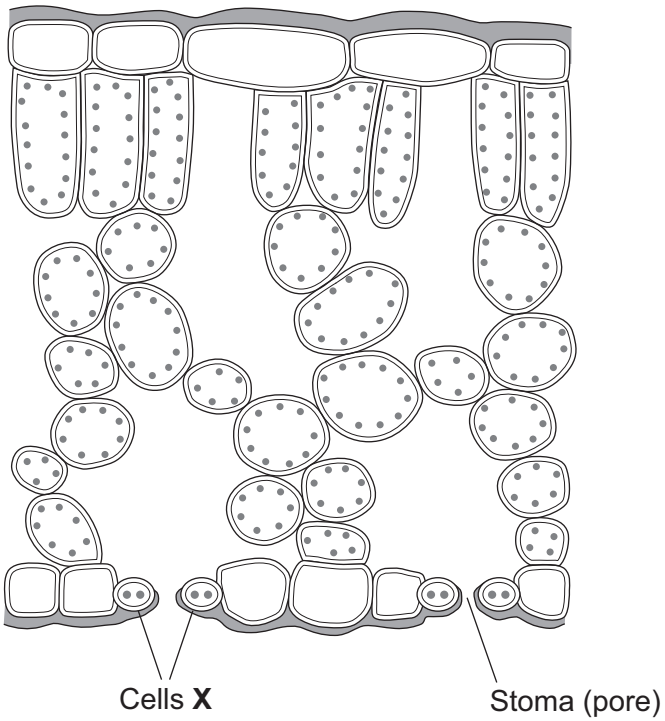
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4.2.3.2 Plant organ system

Question 05

June 2011 | BLY3F | Original Q2 | Legacy

2 The diagram shows a section through a plant leaf.



2 (a) The cells labelled **X** surround a stoma (pore).

Draw a ring around the correct answer to complete the sentence.

Cells **X** are called

- alveoli.
- guard cells.
- villi.

(1 mark)

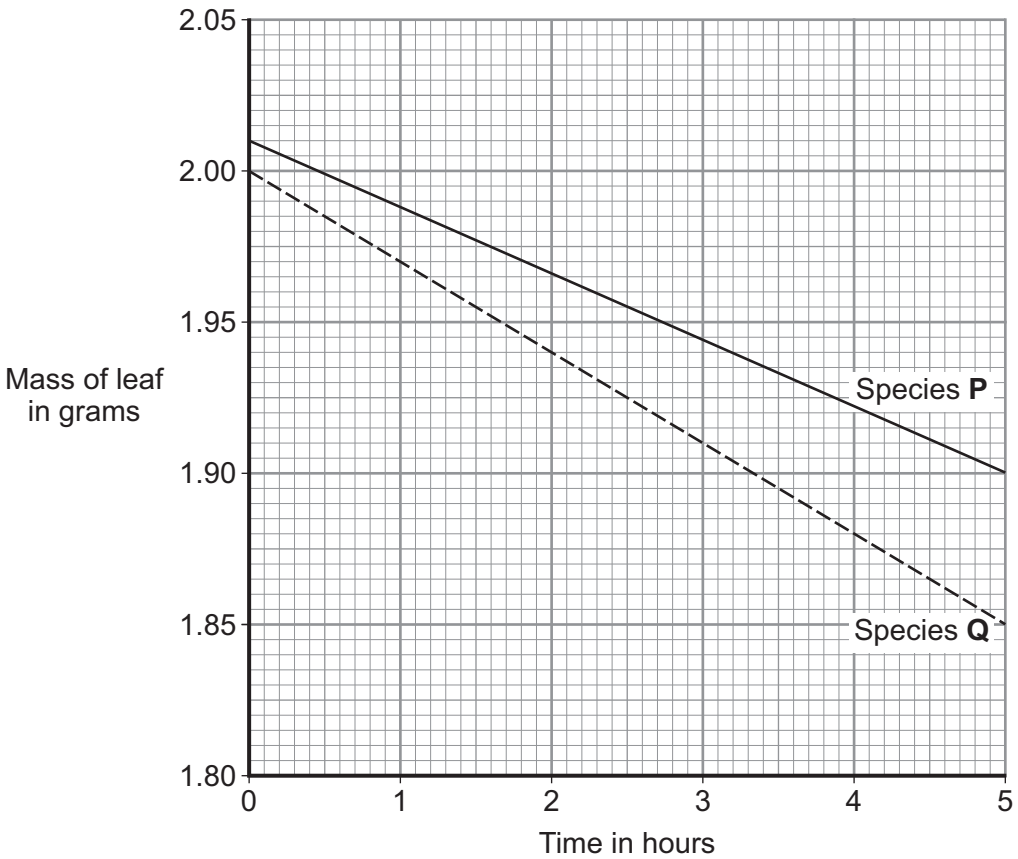
Question 2 continues on the next page

4.2.3.2 Plant organ system

Question 05 · continued

2 (b) Water vapour is lost from leaves. Water loss causes a leaf to lose mass.

The graph shows how the masses of leaves from two plant species, **P** and **Q**, changed over several hours. Both leaves were kept in the same conditions.



2 (b) (i) What was the mass of the leaf of species **Q** at 0 hours? ..... grams

(1 mark)

2 (b) (ii) What was the difference between the mass of the leaf of species **P** and the mass of the leaf of species **Q** after 5 hours?

..... grams

(1 mark)

2 (b) (iii) The leaf of species **Q** lost water at a faster rate than the leaf of species **P**.

Suggest **one** reason why.

.....

.....

(1 mark)

4.2.3.2 Plant organ system

Question 05 · continued

2 (b) (iv) Which weather conditions would cause the greatest rate of loss of mass for both species **P** and species **Q**?

Tick (✓) **one** box in the table.

Weather conditions		Tick (✓)
Still air or wind	**Temperature in °C**	
Wind	30	
Still air	30	
Wind	20	

(1 mark)

2 (c) Draw a ring around the correct answer to complete the sentence.

In very hot, dry conditions, the stomata close.

This is to prevent

anaerobic respiration.

breathing.

wilting.

(1 mark)

6

4.2.3.2 Plant organ system

Question 06

June 2011 | BLY3F | Original Q4 | Legacy

4 Muscles need energy during exercise.

Draw a ring around the correct answer in parts (a) and (b) to complete each sentence.

4 (a) (i) The substance stored in the muscles and used during exercise is

glycogen.

lactic acid.

protein.

(1 mark)

4 (a) (ii) The process that releases energy in muscles is

digestion.

respiration.

transpiration.

(1 mark)

4.2.3.2 Plant organ system

Question 06 · continued

June 2011 | BLY3F | Original Q4 | Legacy

4 (b) The table shows how much energy is used by two men of different masses when swimming at different speeds.

Speed of swimming in metres per minute	Energy used in kJ per hour	
	34 kg man	70 kg man
25	651	1155
50	1134	2103

4 (b) (i) When the 34 kg man swims at 50 metres per minute instead of at 25 metres per minute, the extra energy he uses each hour is

- 36 kJ.
- 483 kJ.
- 948 kJ.

(1 mark)

4 (b) (ii) When swimming at 50 metres per minute, each man's heart rate is faster than when swimming at 25 metres per minute.

A faster heart rate helps to supply the muscles with more

- carbon dioxide.
- glycogen.
- oxygen.

(1 mark)

4 (b) (iii) During the exercise the arteries supplying the muscles would

- constrict.
- dilate.
- pump harder.

(1 mark)

4 (c) When a person starts to swim, the breathing rate increases.

Give **one** way in which this increase helps the swimmer.

.....

.....

(1 mark)

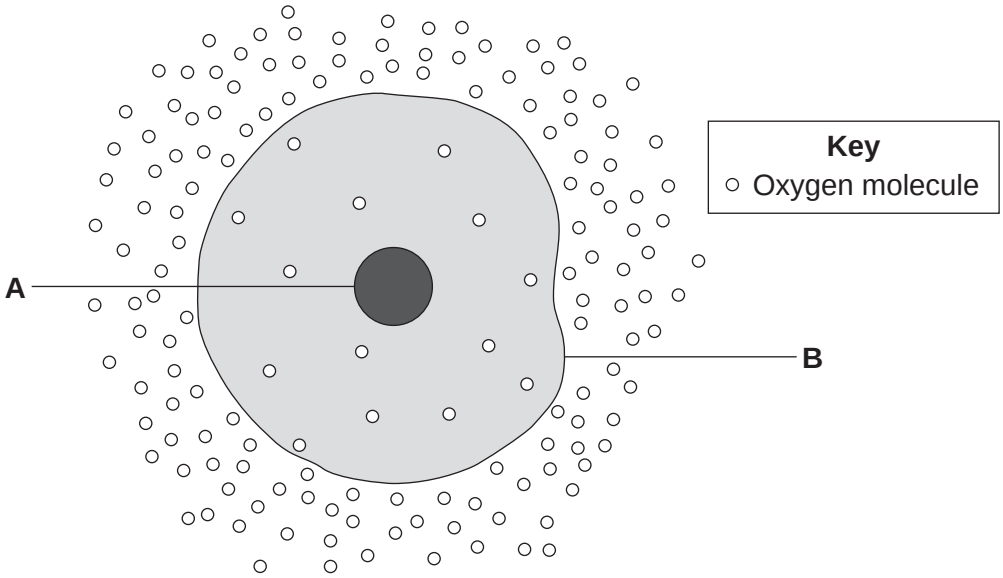
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4.2.3.2 Plant organ system

Question 07

January 2013 | BL2FP | Original Q1 | Legacy

1 The diagram shows a cell.



1 (a) (i) Use words from the box to name the structures labelled **A** and **B**.

cell membrane	chloroplast	cytoplasm	nucleus

A .....

B .....

(2 marks)

1 (a) (ii) The cell in the diagram is an animal cell.

How can you tell it is an animal cell and **not** a plant cell?

Give **two** reasons.

1 .....

.....

2 .....

.....

(2 marks)

4.2.3.2 Plant organ system

Question 07 · continued

1 (b) Oxygen will diffuse into the cell in the diagram.

Why?

Use information from the diagram.

.....

.....

(1 mark)

1 (c) The cell shown in the diagram is usually found with similar cells.

Draw a ring around the correct answer to complete the sentence.

Scientists call a group of similar cells

- an organ.
- a system.
- a tissue.

(1 mark)

6

4.2.3.2 Plant organ system

Question 08

June 2013 | BL1FP | Original Q4 | Legacy

4 There are two forms of peppered moth, dark and pale.
Birds eat the moths when the moths are resting on tree bark.

Pollution in the atmosphere may:
- kill lichens living on tree bark
- make the bark of trees go black.

4 (a) Draw a ring around the correct answer to complete the sentence.

Lichens are very sensitive to air pollution caused by

carbon dioxide.

nitrogen.

sulfur dioxide.

(1 mark)

4 (b) The photographs show the two forms of peppered moth, on tree bark.



Tree bark covered with lichens

Tree bark made black by pollution

4.2.3.2 Plant organ system

Question 08 · continued

4 (b) (i) The dark form of the peppered moth was produced by a change in the genetic material of a pale moth.

Use **one** word from the box to complete the sentence.

characteristic	**clone**	**mutation**

A change in genetic material is called a ..... .

(1 mark)

4 (b) (ii) In the 19th century, pollution made the bark of many trees go black.

Explain why:

- the population of the pale form of the moth in forests decreased
- the population of the dark form of the moth in forests increased.

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(3 marks)

Question 4 continues on the next page

4.2.3.2 Plant organ system

Question 08 · continued

4 (c) (i) The larvae (young) of the peppered moths eat the leaves of birch trees.

The diagram shows the food chain:

birch trees → peppered moth larvae → birds

Draw a pyramid of biomass for this food chain.

Label the pyramid.

(2 marks)

4 (c) (ii) Which **two** reasons explain the shape of the pyramid you drew in part **(c)(i)**?

Tick (✓) **two** boxes.

Some material is lost in waste from the birds ☐

The trees are much larger than peppered moth larvae ☐

Peppered moth larvae do not eat all the leaves from the trees ☐

The trees do not use all of the Sun's energy ☐

(2 marks)

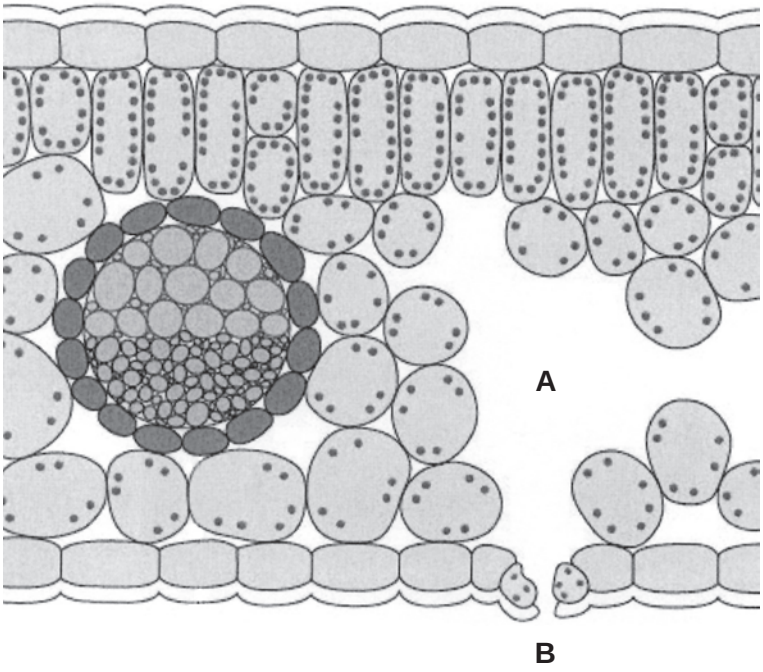
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4.2.3.2 Plant organ system

Question 09

June 2013 | BL2FP | Original Q7 | Legacy

7 The diagram shows a section through a plant leaf.



7 (a) Use words from the box to name **two** tissues in the leaf that transport substances around the plant.

epidermis	**mesophyll**	**phloem**	**xylem**

..... and .....

(1 mark)

7 (b) Gases *diffuse* between the leaf and the surrounding air.

7 (b) (i) What is *diffusion*?

.....

.....

.....

.....

(2 marks)

7 (b) (ii) Name **one** gas that will diffuse from point **A** to point **B** on the diagram on a sunny day.

.....

(1 mark)

4

4.2.3.2 Plant organ system

Question 10

June 2013 | BL3FP | Original Q2 | Legacy

2 Plants exchange substances with the environment.

2 (a) Use words from the box to complete each sentence.

alveoli	**phloem**	**root hairs**	**stomata**
storage organs	**villi**	**xylem**	

2 (a) (i) Most water enters a plant through ..... .

(1 mark)

2 (a) (ii) The water is transported up the stem to the leaves in the ..... .

(1 mark)

2 (a) (iii) Carbon dioxide enters leaves through ..... .

(1 mark)

2 (a) (iv) A leaf uses the carbon dioxide to produce sugars.

Sugars are transported to ..... through the ..... .

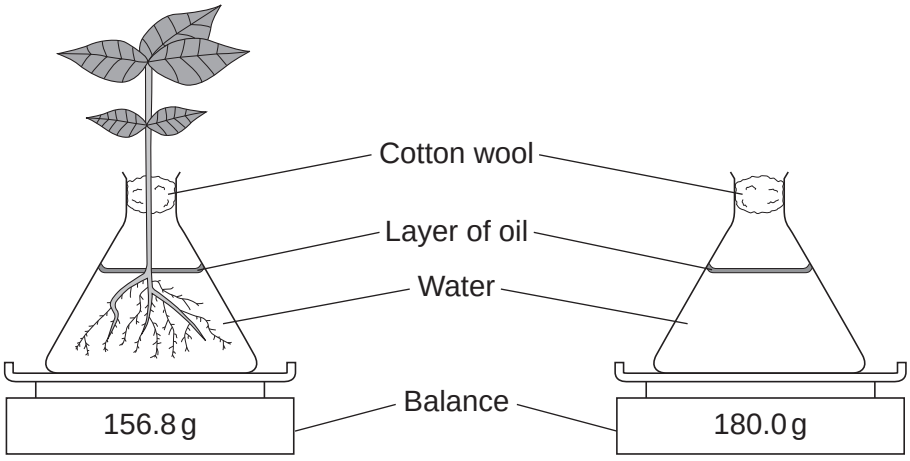
(2 marks)

4.2.3.2 Plant organ system

Question 10 · continued June 2013 | BL3FP | Original Q2 | Legacy

2 (b) A student set up the apparatus shown in the diagram.

At the start of the experiment both balances showed a mass of 180.0 g.



The diagram shows the reading on each balance 24 hours later.

2 (b) (i) Look at the mass shown on each balance.

Calculate the difference between the two masses.

.....

.....

Difference in mass = ... g

(1 mark)

2 (b) (ii) Suggest an explanation for the difference between the two masses.

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(2 marks)

8

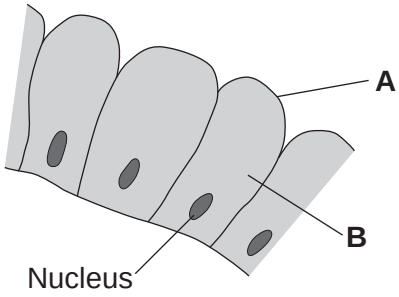
4.2.3.2 Plant organ system

Question 11

June 2014 | BL2FP | Original Q1 | Legacy

1 **Figure 1** shows some cells in the lining of the stomach.

Figure 1



1 (a) (i) Use words from the box to name structures **A** and **B**.

[2 marks]

cell membrane	**chloroplast**	**cytoplasm**	**vacuole**

A .....

B .....

1 (a) (ii) What is the function of the nucleus?

Tick (✓) **one** box.

[1 mark]

To control the activities of the cell ☐

To control movement of substances into and out of the cell ☐

To release energy in respiration ☐

4.2.3.2 Plant organ system

Question 11 · continued

June 2014 | BL2FP | Original Q1 | Legacy

1 (b) Draw **one** line from each part of the human body to its correct scientific name.

[3 marks]

Part of human body	Scientific name
Layer of cells lining the stomach	An organ
Stomach	An organism
Mouth, stomach, intestines, liver and pancreas	An organ system
	A tissue

6

4.2.3.2 Plant organ system

Question 12

June 2014 | BL3FP | Original Q4 | Legacy

4 Substances are transported through plants.

4 (a) Use the correct answer from the box to complete each sentence.

capillary	**guard cells**	**phloem**
stomata	**transpiration**	**xylem**

4 (a) (i) Water is transported from the roots to the stem of a plant

in the ..... .

[1 mark]

4 (a) (ii) Dissolved sugars are transported through the plant

in the ..... .

[1 mark]

4 (a) (iii) Movement of water through the plant is called the

..... stream.

[1 mark]

4 (a) (iv) Water vapour moves out of the plant through pores

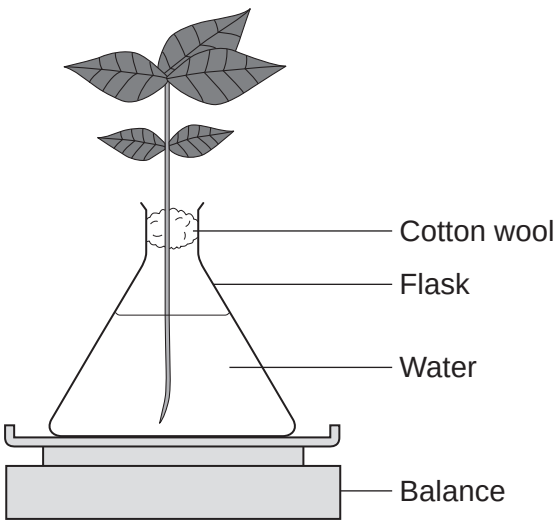
called ..... .

[1 mark]

4 (b) Students investigated the effect of different conditions on water loss from leaves.

The apparatus is shown in **Figure 6**.

Figure 6



4.2.3.2 Plant organ system

Question 12 · continued

The students set up four flasks, **A**, **B**, **C** and **D**.

The students:

- used the same size plant shoot in each flask
- recorded the mass of the flask and plant shoot at the start of each experiment
- left each flask and plant shoot in different conditions
- recorded the mass of each flask and plant shoot after 2 hours.

Table 2 shows the conditions that flasks **A**, **B**, **C** and **D** were left in for 2 hours.

Table 2

Flask	Temperature in °C	Fan or no fan
A	20	No fan
B	20	Fan
C	35	No fan
D	35	Fan

4 (b) (i) Suggest why the students used cotton wool in each flask.

[1 mark]

.....

.....

4 (b) (ii) The use of the same size of plant shoot made the investigation a fair test.

Explain why.

[2 marks]

.....

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.....

Question 4 continues on the next page

4.2.3.2 Plant organ system

Question 12 · continued

4 (b) (iii) **Table 3** shows the students' results.

Table 3

Flask	Conditions		Mass at the start in grams	Mass after 2 hours in grams	Mass of water lost in 2 hours in grams
	Temperature in °C	Fan or no fan			
A	20	No fan	150.0	148.1	1.9
B	20	Fan	152.0	148.5	3.5
C	35	No fan	149.0	145.9	3.1
D	35	Fan	150.0	145.5	

What mass of water was lost by the plant shoot in flask **D**?

[1 mark]

.....

.....

..... grams

4 (b) (iv) Suggest what conclusion can be made about the effect of temperature on water loss from the plant shoot.

[1 mark]

.....

.....

.....

4 (b) (v) Suggest what conclusion can be made about the effect of the fan on water loss from the plant shoot.

[1 mark]

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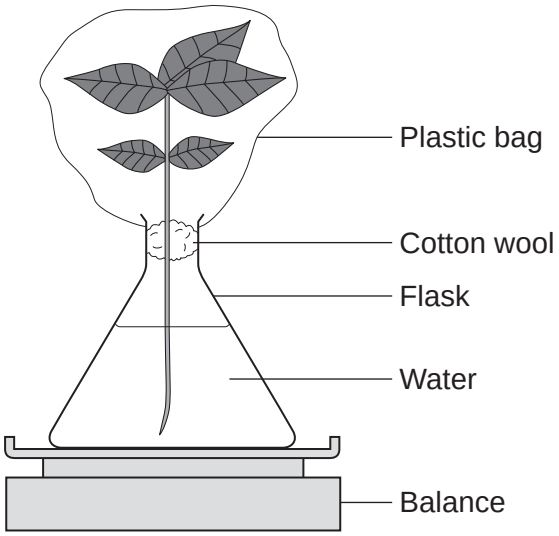
4.2.3.2 Plant organ system

Question 12 · continued

4 (c) The students carried out another experiment at 20 °C, with no fan.

The students used the apparatus in **Figure 7**.

Figure 7



In this experiment, the students:

- recorded the mass of the flask and plant shoot before tying the plastic bag around the plant shoot
- removed the bag after 2 hours and recorded the mass again.

4 (c) (i) What mass of water would be lost from the plant shoot in 2 hours?

Draw a ring around the correct answer.

[1 mark]

0.3 g **1.9 g** **3.9 g**

4 (c) (ii) Give a reason for your answer to part **(c)(i)**.

[1 mark]

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.....

.....

12

4.2.3.2 Plant organ system

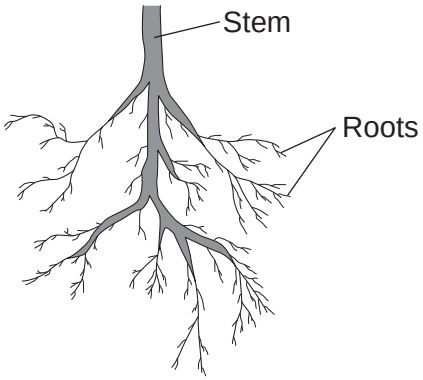
Question 13

June 2015 | BL3FP | Original Q5 | Legacy

5 Plants need different substances to survive.

Figure 4 shows the roots of a plant.

Figure 4



5 (a) (i) Mineral ions are absorbed through the roots.

Name **one** other substance absorbed through the roots.

[1 mark]

.....

5 (a) (ii) The plant in **Figure 4** has a higher concentration of mineral ions in the cells of its roots than the concentration of mineral ions in the soil.

Which **two** statements correctly describe the absorption of mineral ions into the plant's roots?

[2 marks]

Tick (✓) **two** boxes.

The mineral ions are absorbed by active transport. ☐

The mineral ions are absorbed by diffusion. ☐

The mineral ions are absorbed down the concentration gradient. ☐

The absorption of mineral ions needs energy. ☐

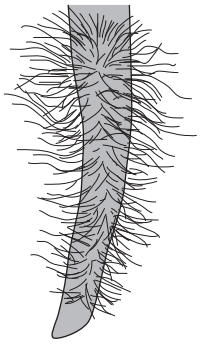
4.2.3.2 Plant organ system

Question 13 · continued

5 (a) (iii) The plant in **Figure 4** has roots adapted for absorption.

Figure 5 shows a magnified part of a root from **Figure 4**.

Figure 5



Describe how the root in **Figure 5** is adapted for absorption.

[2 marks]

.....

.....

.....

.....

5 (b) The leaves of plants have stomata.

What is the function of the stomata?

[1 mark]

.....

.....

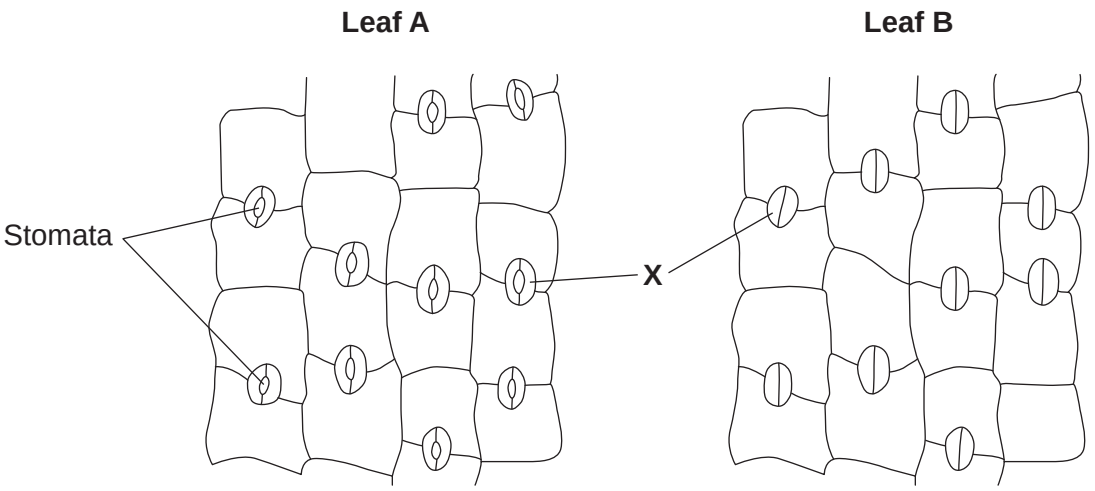
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4.2.3.2 Plant organ system

Question 13 · continued

5 (c) **Figure 6** shows the underside of two leaves, **A** and **B**, taken from a plant in a man's house.

Figure 6



5 (c) (i) In **Figure 6**, the cells labelled **X** control the size of the stomata.

What is the name of the cells labelled **X**?

[1 mark]

Tick (✓) **one** box.

Guard cells ☐

Phloem cells ☐

Xylem cells ☐

5 (c) (ii) Describe how the appearance of the stomata in leaf **B** is different from the appearance of the stomata in leaf **A**.

[1 mark]

.....

.....

5 (c) (iii) The man forgets to water the plant.

What might happen to the plant in the next few days if the stomata stay the same as shown in leaf **A** in **Figure 6**?

[1 mark]

.....

.....

9

4.2.3.2 Plant organ system

Question 14

June 2016 | BL3FP | Original Q8 | Legacy

8 (a) Carbon dioxide enters a plant through stomata on the leaves.

Name the cells that control the size of the stomata.

[1 mark]

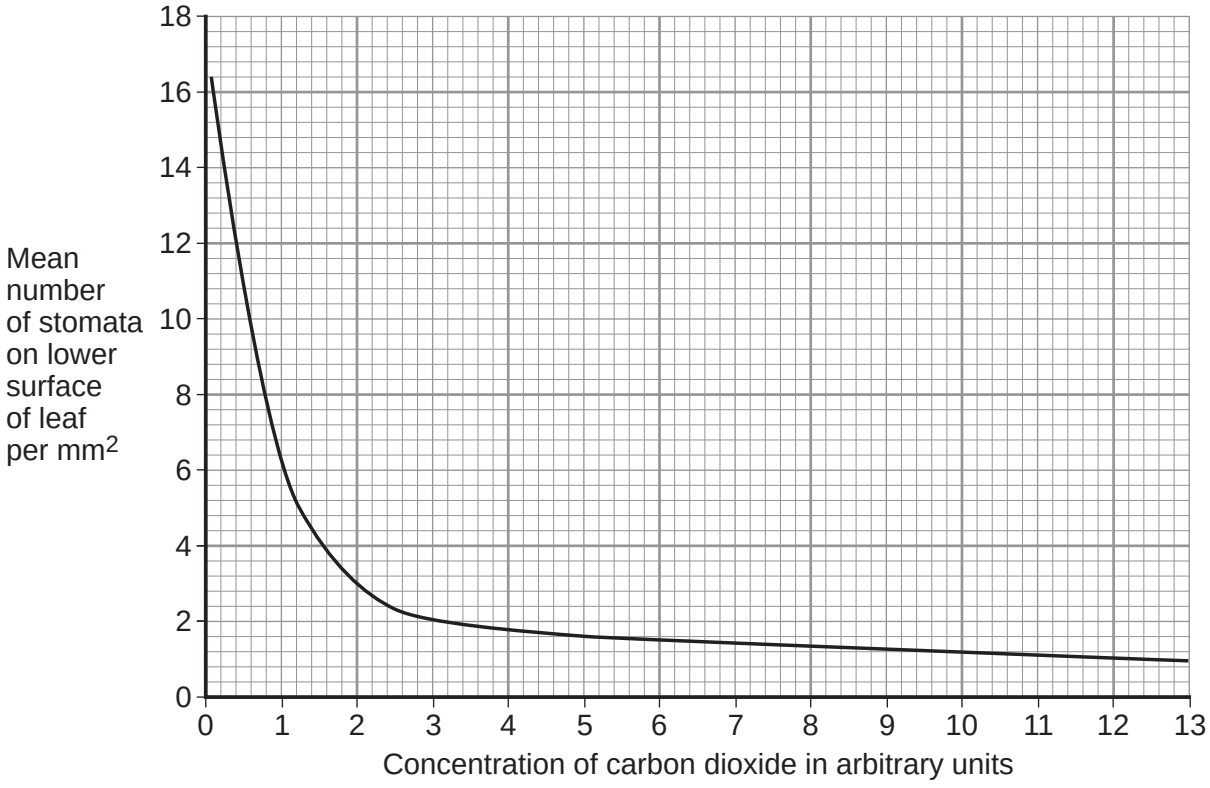
_____

8 (b) Scientists grew tomato plants in air containing different concentrations of carbon dioxide.

The scientists recorded the number of stomata found on the lower surface of the leaves of plants grown at each carbon dioxide concentration.

Figure 10 shows the results.

Figure 10



4.2.3.2 Plant organ system

Question 14 · continued

8 (b) (i) Describe the relationship between the mean number of stomata per mm^2 and carbon dioxide concentration.

[2 marks]

8 (b) (ii) Suggest a reason for the relationship you described in part **(b)(i)**.

[1 mark]

8 (c) (i) Suggest **one** disadvantage to a plant of having a large number of stomata per mm^2 on each leaf.

[1 mark]

8 (c) (ii) Suggest **one** environmental condition where a large number of stomata per mm^2 on each leaf would be a disadvantage.

[1 mark]

6

4.2.3.2 Plant organ system

Question 15

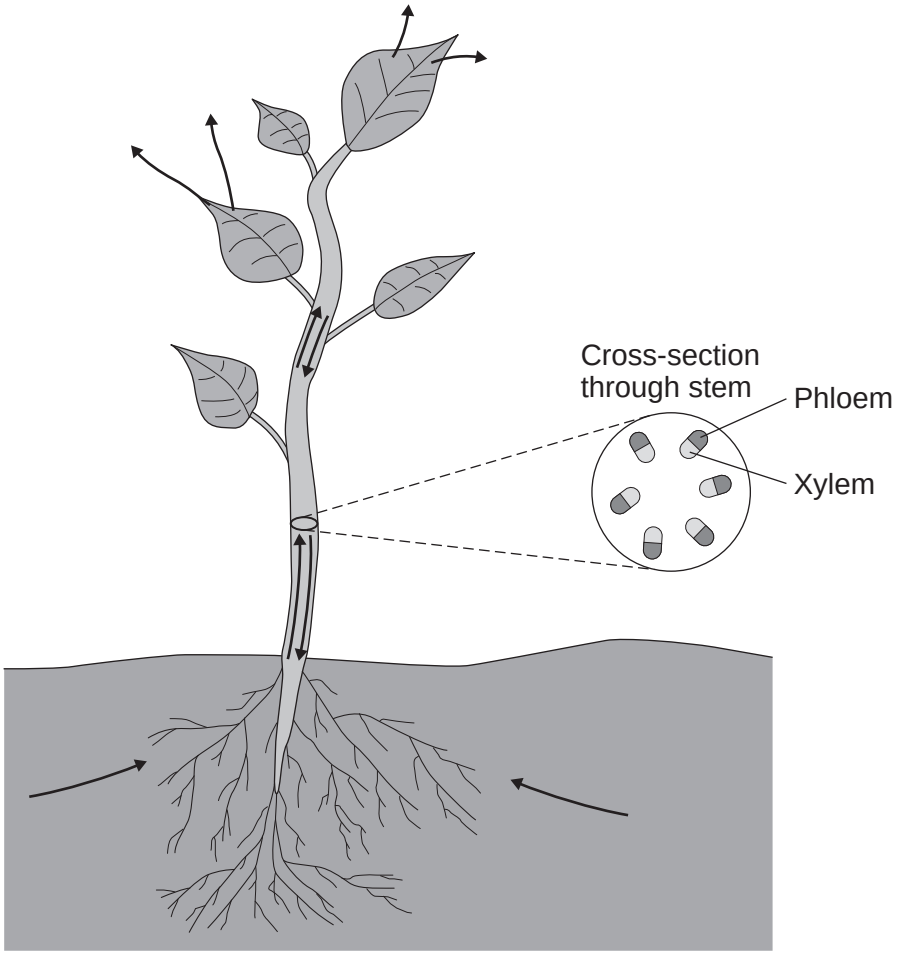
June 2016 | BL3FP | Original Q9 | Legacy

9 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Plants transport many substances between their leaves and roots.

Figure 11 shows the direction of movement of substances through a plant.

Figure 11



4.2.3.2 Plant organ system

Question 15 · continued

Describe how **ions**, **water** and **sugar** are obtained and transported through plants.

In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

[6 marks]

Extra space

6

4.2.3.2 Plant organ system

Question 16

June 2017 | BL2FP | Original Q1 | Legacy

1 Green plants make their own food.

1 (a) (i) What is the name of the process that plants use to make food?

[1 mark]

Draw a ring around the correct answer.

digestion **growth** **photosynthesis** **respiration**

1 (a) (ii) Plants need energy to make food.

Where does this energy come from?

[1 mark]

Draw a ring around the correct answer.

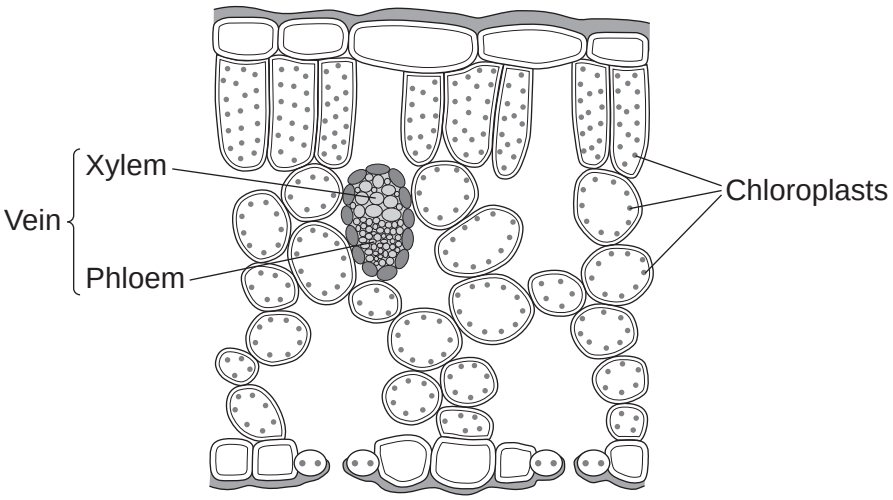
light **oxygen** **soil** **water**

1 (b) In plants, most of the food is made by the leaves.

Figure 1 shows a section through a plant leaf.

In the leaf, many of the cells contain chloroplasts.

Figure 1



1 (b) (i) Chloroplasts contain a green substance.

Name this green substance.

[1 mark]

_____

4.2.3.2 Plant organ system

Question 16 · continued

1 (b) (ii) How does this green substance help chloroplasts to make food?

[1 mark]

_____

_____

1 (b) (iii) What is the function of the vein shown in **Figure 1**?

[1 mark]

_____

_____

1 (b) (iv) Plants make glucose.

Name **two** substances a plant must take in to make glucose.

[2 marks]

1 _____

2 _____

7

4.2.3.2 Plant organ system

Question 17

June 2017 | BL3FP | Original Q2 | Legacy

2 Substances travel from the soil into plant roots by different processes.

2 (a) One of these processes is osmosis.

What is the definition of osmosis?

[1 mark]

Tick (✓) **one** box.

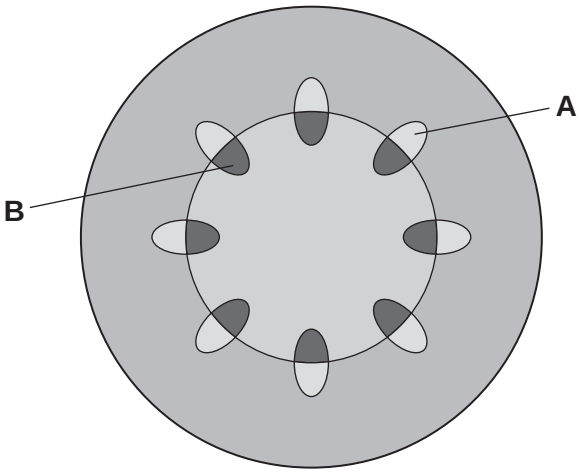
The movement of water from a concentrated solution to a more dilute solution through a partially permeable membrane. ☐

The movement of water from a dilute solution to a more concentrated solution through a partially permeable membrane. ☐

The movement of water through a partially permeable membrane using energy. ☐

2 (b) **Figure 2** shows a cross-section through a plant stem.

Figure 2



Parts **A** and **B** in **Figure 2** contain tubes that transport materials in plants.

A student collected fluid from parts **A** and **B**.

The fluid from **A** contained a lot of sugar.

The fluid from **B** contained a lot of mineral ions.

4.2.3.2 Plant organ system

Question 17 · continued

What are the names of parts **A** and **B** in **Figure 2**?

[2 marks]

Use the correct answers from the box.

guard cells	**phloem**	**stomata**	**storage organ**	**xylem**

A _____

B _____

2 (c) In plants water moves from the roots, up through the stem and out of the leaves.

What is the name of this movement of water?

[1 mark]

Complete the sentence.

The _____ stream.

Question 2 continues on the next page

4.2.3.2 Plant organ system

Question 17 · continued

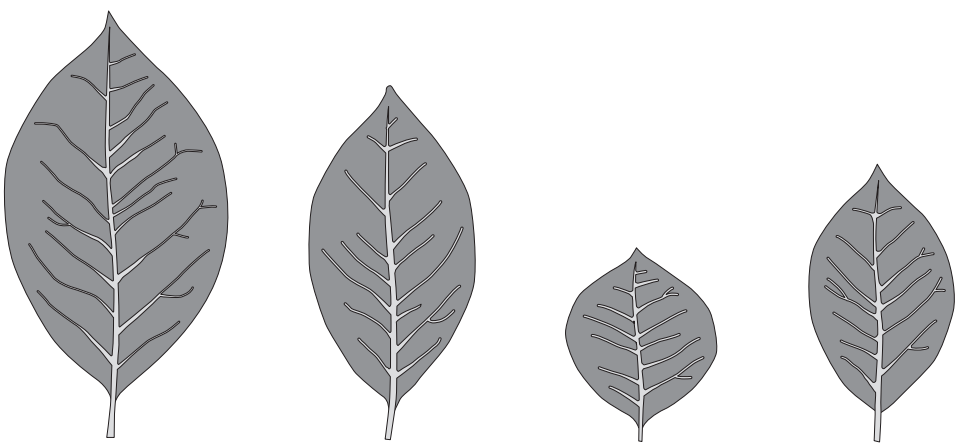
2 (d) The student investigated the rate of water loss from leaves.

The student:

- took four leaves, **A**, **B**, **C** and **D**, from the same plant
- measured the mass of each leaf
- kept the leaves in the same room for 3 hours
- measured the mass of each leaf again.

Figure 3 shows the four leaves she used.

Figure 3



2 (d) (i) How could the student calculate the mass of water lost for each leaf?

[1 mark]

Tick (✓) **one** box.

mass after ÷ mass before ☐

mass after × mass before ☐

mass before + mass after ☐

mass before – mass after ☐

4.2.3.2 Plant organ system

Question 17 · continued

2 (d) (ii) Suggest which leaf, **A**, **B**, **C** or **D**, lost the most water.

Give a reason for your answer.

[2 marks]

Leaf _____

Reason _____

_____

2 (d) (iii) The student changed the conditions in the room.

Suggest **two** conditions that would increase the rate of water loss from the leaves.

[2 marks]

1 _____

2 _____

9

4.2.3.2 Plant organ system

Question 18

June 2018 | 8461/1F | Original Q2

0 2 Plants are made up of cells, tissues and organs.

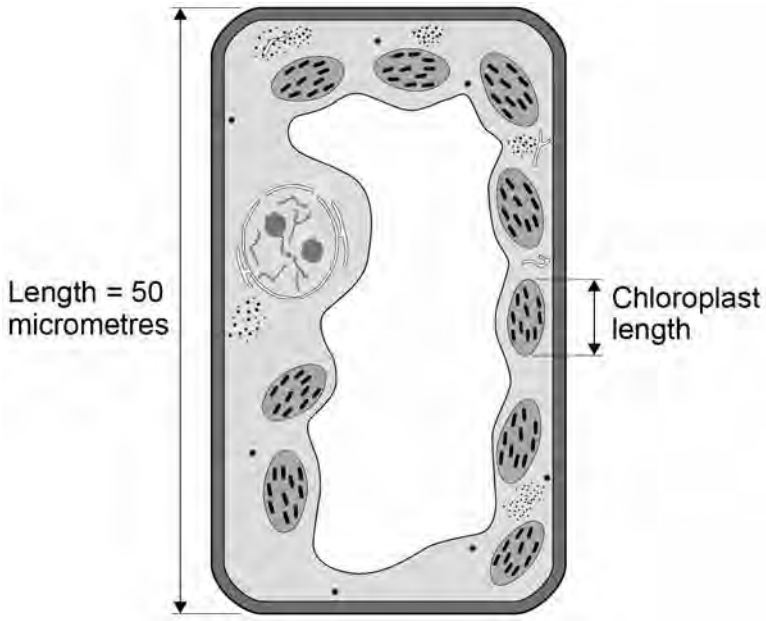
0 2 . 1 Draw **one** line from each level of organisation to the correct plant part.

[2 marks]

Level of organisation	Plant part
	Leaf
Organ	Root hair
	Spongy mesophyll
Tissue	Vacuole
	Xylem cell

Figure 3 shows a plant cell drawn to scale.

Figure 3



4.2.3.2 Plant organ system

Question 18 · continued

0 2 . 2 Where in a plant would the cell in **Figure 3** be found?

[1 mark]

Tick **one** box.

- Epidermis ☐
- Palisade mesophyll ☐
- Phloem ☐
- Xylem ☐

0 2 . 3 Calculate the length of the chloroplast labelled in **Figure 3**.

[2 marks]

Length = _____ micrometres

0 2 . 4 Cells in plant roots do **not** photosynthesise.

Give **one** reason why.

[1 mark]

4.2.3.2 Plant organ system

Question 18 · continued

0 2 . 5 As a plant grows, new root hair cells are formed from unspecialised cells.

How does an unspecialised cell become a new root hair cell?

[1 mark]

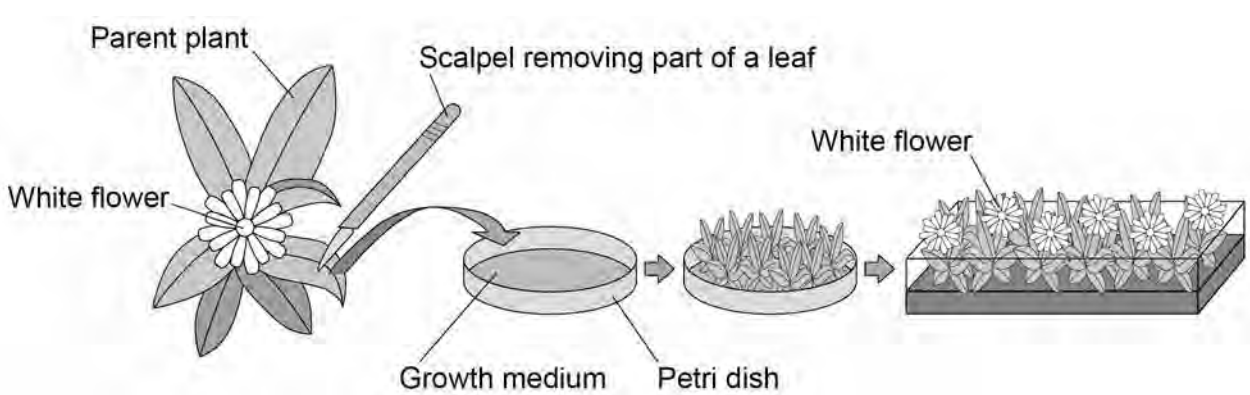
Tick **one** box.

- Differentiation ☐
- Metabolism ☐
- Transpiration ☐
- Transport ☐

Scientists can clone plants using tissue culture.

Figure 4 shows the process of tissue culture.

Figure 4



4.2.3.2 Plant organ system

Question 18 · continued

0 2 . 6 Why might scientists want to clone plants?

[1 mark]

Tick **one** box.

- To create new species of plants. ☐
- To introduce variation into plants. ☐
- To protect endangered plants from extinction. ☐
- To reduce disease resistance in plants. ☐

0 2 . 7 What is the advantage of cloning plants using tissue culture?

[1 mark]

Tick **one** box.

- No special equipment is needed. ☐
- Plants can be produced quickly. ☐
- The flowers are all different colours. ☐
- The offspring are all genetically different. ☐

0 2 . 8 The growth medium in **Figure 4** helps the plants to grow.

Name **one** substance in the growth medium.

[1 mark]

_____

_____

10

4.2.3.2 Plant organ system

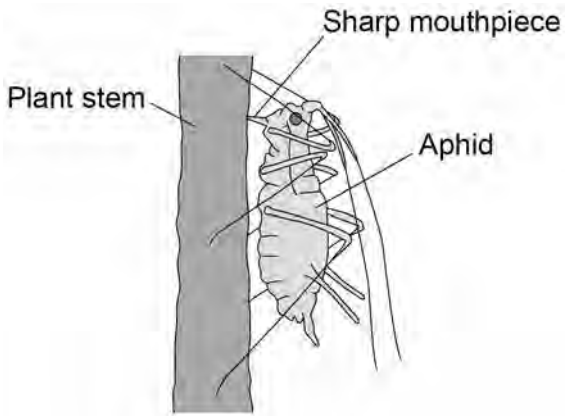
Question 19

June 2018 | 8461/1F | Original Q5

0 5 Aphids are small insects that carry pathogens.

Figure 7 shows an aphid feeding from a plant stem.

Figure 7



0 5 . 1 An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

After feeding, the mouthpiece of an aphid contains a high concentration of dissolved sugars.

Which part of the plant was the aphid feeding from?

[1 mark]

Tick **one** box.

- Palisade layer ☐
- Phloem ☐
- Stomata ☐
- Xylem ☐

4.2.3.2 Plant organ system

Question 19 · continued

June 2018 | 8461/1F | Original Q5

0 5 . 2 What is the process that transports dissolved sugars around a plant?

[1 mark]

Tick **one** box.

- Filtration ☐
- Respiration ☐
- Translocation ☐
- Transpiration ☐

0 5 . 3 Plants infected with aphids have stunted growth.

Explain **one** way the removal of dissolved sugars from the stem of the plant causes stunted growth.

[2 marks]

0 5 . 4 Most aphids do not have wings when they hatch. After several generations, some aphids hatch which have wings and can fly.

Explain the advantage to the aphid of being able to fly.

[2 marks]

4.2.3.2 Plant organ system

Question 19 · continued

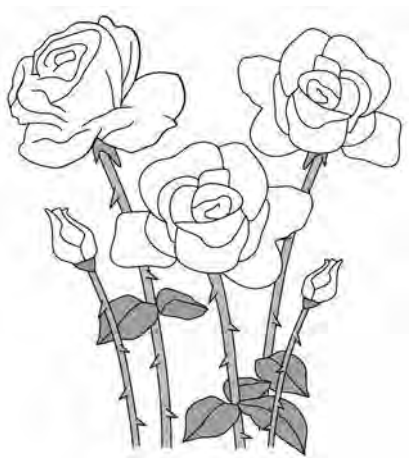
0 5 . 5 The leaves of some plants release oils onto their surface.

Suggest how the production of oil on the surface of a leaf may protect the plant from aphids.

[1 mark]

Figure 8 shows part of a rose plant.

Figure 8



0 5 . 6 Give **one** adaptation shown in **Figure 8** that helps the rose plant defend itself.

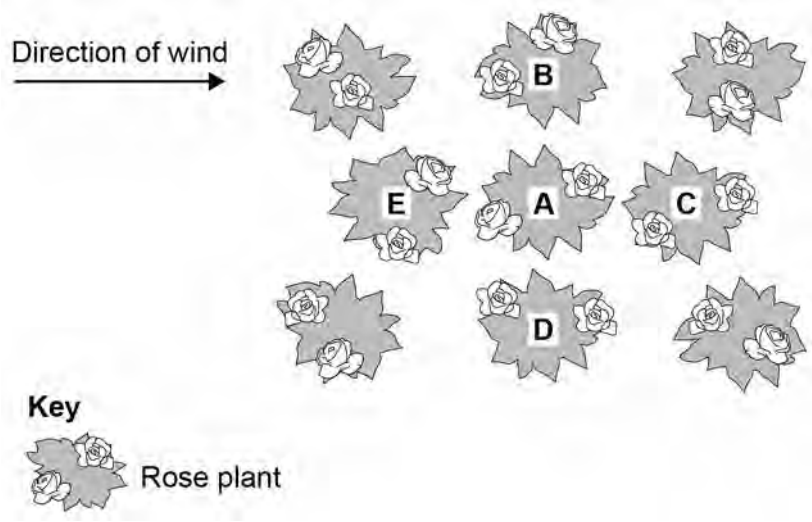
[1 mark]

4.2.3.2 Plant organ system

Question 19 · continued

Figure 9 shows a plan of a garden containing rose plants.

Figure 9



0 5 . 7 Plant **A** has the fungal disease rose black spot.

Which plant in **Figure 9** is the fungus likely to spread to first?

Give a reason for your answer.

[2 marks]

Plant _____

Reason _____

_____

_____

_____

0 5 . 8 Suggest **one** way the gardener could reduce the spread of rose black spot to the other plants in the garden.

[1 mark]

_____

_____

11

4.2.3.2 Plant organ system

Question 20

June 2019 | 8461/1F | Original Q3

0 3 This question is about leaves.

0 3 . 1 Complete the sentences.

Choose answers from the box.

[3 marks]

epidermis	**phloem**	**palisade mesophyll**
waxy cuticle	**xylem**	

The layer of cells lining the upper surface and lower surface of a leaf is the _____.

The part of the leaf where most photosynthesis occurs is the _____.

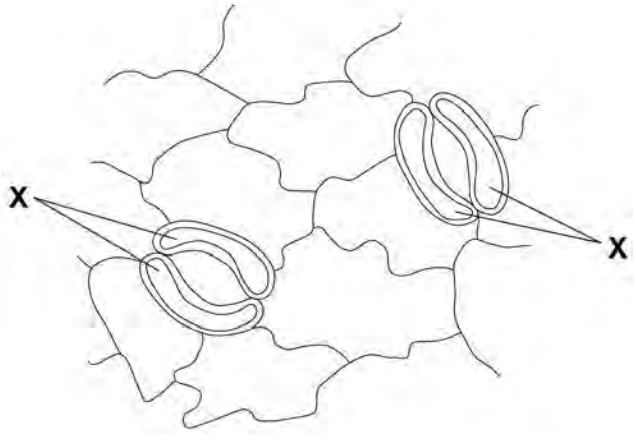
Water is transported to the leaf in the _____.

Water is lost through small openings on the lower surface of plant leaves.

These small openings are called stomata.

Figure 5 shows two stomata on the lower surface of a leaf.

Figure 5



4.2.3.2 Plant organ system

Question 20 · continued

June 2019 | 8461/1F | Original Q3

0 3 . 2 The cells labelled **X** control the width of the stomata.

What are the cells labelled **X**?

[1 mark]

Tick (✓) **one** box.

- Guard cells ☐
- Mesophyll cells ☐
- Root hair cells ☐
- Stem cells ☐

0 3 . 3 What is the function of the stomata?

[1 mark]

Tick (✓) **one** box.

- To allow light into the leaf ☐
- To let carbon dioxide into the leaf ☐
- To let sugars out of the leaf ☐
- To protect the leaf from pathogens ☐

0 3 . 4 How is water lost from a leaf?

[1 mark]

Tick (✓) **one** box.

- By evaporation ☐
- By respiration ☐
- By translocation ☐

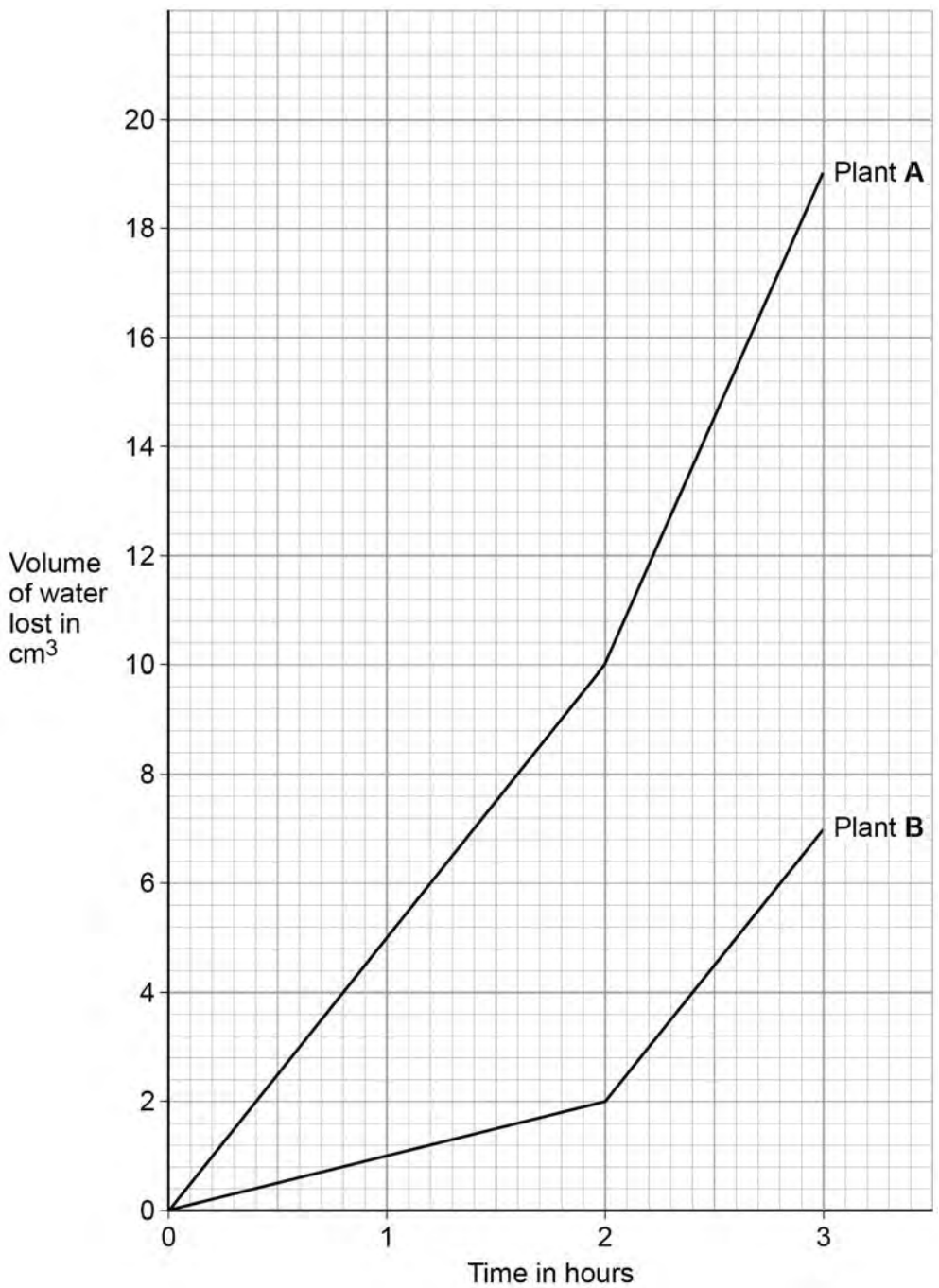
Question 20 · continued

A student investigated the volume of water lost from two plants.

The plants were different species.

Figure 6 shows the student's results.

Figure 6



4.2.3.2 Plant organ system

Question 20 · continued

0 3 . 5 Calculate the difference in the volume of water lost by plant **A** compared to plant **B** in the first hour.

[2 marks]

Difference in volume = _____ cm^3

0 3 . 6 What could cause plant **A** to lose water at a faster rate than plant **B**?

[1 mark]

Tick (✓) **one** box.

Plant **A** has fewer stomata per leaf. ☐

Plant **A** is smaller. ☐

Plant **A** has more leaves. ☐

Plant **A** has smaller leaves. ☐

0 3 . 7 After the first 2 hours, both plants were moved to a new room.

Suggest **one** reason why both plants lost water at a faster rate in the new room.

[1 mark]

Question 3 continues on the next page

4.2.3.2 Plant organ system

Question 20 · continued

0 3 . 8 Some plants have adaptations to stop them from being eaten by animals.

Figure 7 shows part of a holly plant.

Figure 7



Describe **one** way the holly plant is adapted to stop it being eaten by animals.

[1 mark]

11

4.2.3.2 Plant organ system

Question 21

November 2020 | 8461/1F | Original Q8

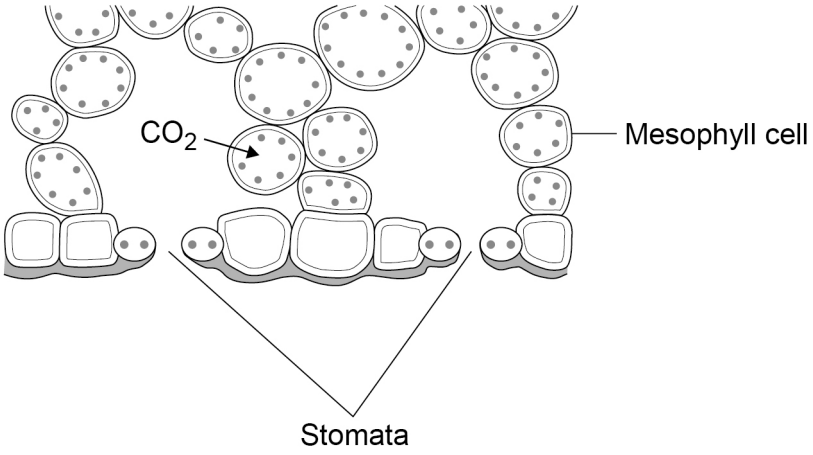
0 8 Diffusion is an important process in animals and plants.

0 8 . 1 What is meant by the term diffusion?

[2 marks]

0 8 . 2 **Figure 11** shows part of a leaf.

Figure 11



Molecules of carbon dioxide diffuse from the air into the mesophyll cells.

Which **two** changes will increase the rate at which carbon dioxide diffuses into the mesophyll cells?

[2 marks]

Tick (✓) **two** boxes.

- Decreased number of chloroplasts in the cells ☐
- Decreased surface area of cells in contact with the air ☐
- Increased carbon dioxide concentration in the air ☐
- Increased number of stomata that are open ☐
- Increased oxygen concentration in the air ☐

Question 8 continues on the next page

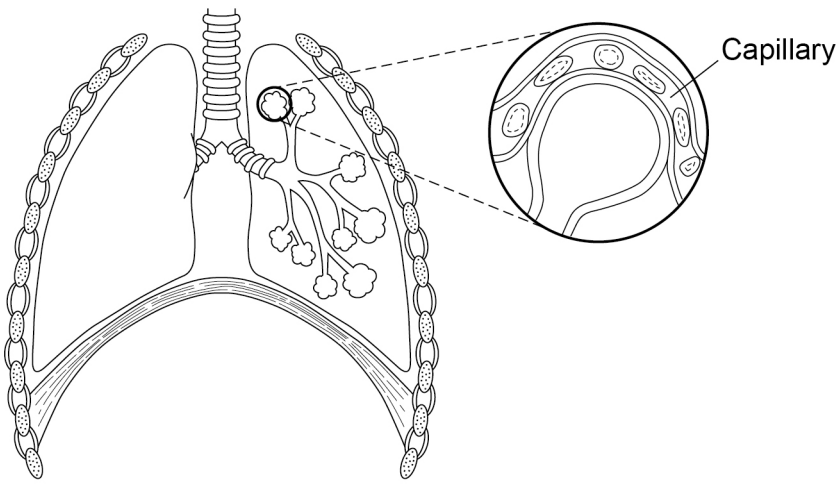
4.2.3.2 Plant organ system

Question 21 · continued

0 8 . 3 Diffusion also happens in the human lungs.

Figure 12 shows the human breathing system.

Figure 12



Explain how the human lungs are adapted for efficient exchange of gases by diffusion.

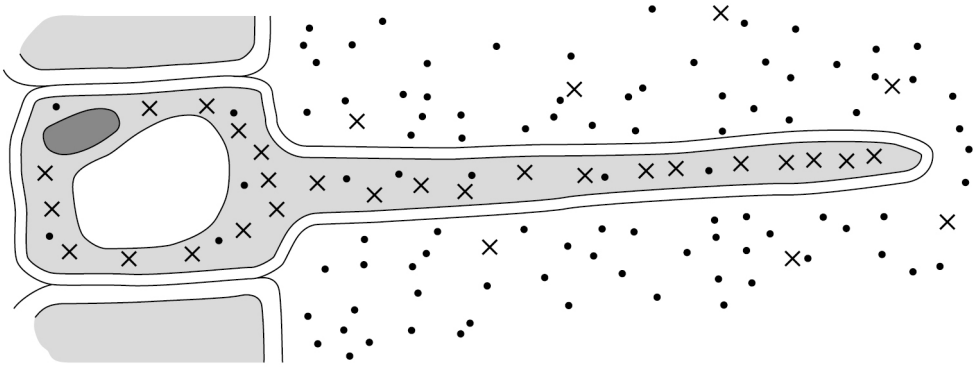
[6 marks]

4.2.3.2 Plant organ system

Question 21 · continued

Figure 13 shows a root hair cell.

Figure 13



Key

Water molecules

Nitrate ions

0 8 . 4 Name the process by which water molecules enter the root hair cell.

[1 mark]

0 8 . 5 Nitrate ions need a different method of transport into the root hair cell.

Explain how the nitrate ions in **Figure 13** are transported into the root hair cell.

Use information from **Figure 13** in your answer.

[3 marks]

Name of process _____

Explanation _____

14

4.2.3.2 Plant organ system

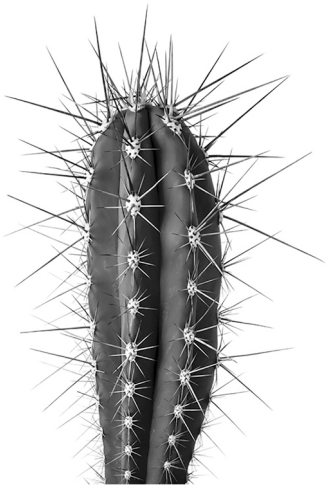
Question 22

November 2021 | 8461/1F | Original Q3

0 3 A cactus is a plant that lives in a dry environment.

Figure 6 shows part of a cactus plant.

Figure 6



0 3 . 1 Give **one** adaptation shown in **Figure 6** that helps to prevent the cactus from being eaten by animals.

[1 mark]

0 3 . 2 A plant may produce poisons that make animals unwell.

What is this type of defence mechanism?

[1 mark]

Tick (✓) **one** box.

Chemical ☐

Mechanical ☐

Physical ☐

0 3 . 3 Some desert plants only grow leaves after it has rained.

As soon as the soil dries out, the leaves fall off.

How could the leaves falling off the plant be an advantage to a plant that lives in a dry environment?

[1 mark]

Tick (✓) **one** box.

- The plant is less likely to reproduce. ☐
- The plant will not lose as much water. ☐
- The plant will photosynthesise faster. ☐

The stem of a cactus is green.

0 3 . 4 What causes the green colour in the stem?

[1 mark]

_____

0 3 . 5 What is the advantage to the cactus of having a green stem?

[1 mark]

_____

_____

Question 3 continues on the next page

4.2.3.2 Plant organ system

Question 22 · continued

The stem of a cactus contains many different tissues.

0 3 . 6 What name is given to a group of tissues working together?

[1 mark]

Tick (✓) **one** box.

Organ ☐

Organism ☐

Organ system ☐

0 3 . 7 Name **one** substance transported through the xylem in the stem of the cactus.

[1 mark]

_____

0 3 . 8 Name the tissue that transports dissolved sugars through the stem of the cactus.

[1 mark]

_____

8

4.2.3.2 Plant organ system

Question 23

June 2022 | 8461/1F | Original Q5

0 5 . 1 Plants take up water from the soil through their roots.

Some of the water is used for photosynthesis.

Complete the word equation for photosynthesis.

Choose answers from the box.

[2 marks]

fat	**glucose**	**nitrogen**	**oxygen**	**protein**

carbon dioxide + water → _____ + _____

0 5 . 2 Water and dissolved substances are transported through a plant.

Complete the sentences.

Choose answers from the box.

[3 marks]

epidermis	**guard cells**	**palisade cells**
phloem	**stomata**	**xylem**

Water moves from the roots to the leaves in the _____.

Water is lost from leaves through pores called _____.

Dissolved sugars are transported in the _____.

Question 5 continues on the next page

Question 23 · continued

Table 3 shows the rate of transpiration in four different plant species.

Table 3

Plant species	Rate of transpiration in arbitrary units
A	310
B	254
C	87
D	192

0 5 . 3 Calculate how many times greater the rate of transpiration of species **A** is than the rate of transpiration of species **B**.

Give your answer to 2 significant figures.

[3 marks]

Number of times greater (2 significant figures) = _____

Question 23 · continued

0 5 . 4 Which factor could cause species **A** to have a higher rate of transpiration than species **B**?

[1 mark]

Tick (✓) **one** box.

Each flower of species **A** has more petals. ☐

Each leaf of species **A** has more stomata. ☐

Each plant of species **A** has shorter roots. ☐

0 5 . 5 Which environmental change would cause an increase in the rate of transpiration?

[1 mark]

Tick (✓) **one** box.

Decreased light intensity ☐

Decreased wind speed ☐

Increased humidity ☐

Increased temperature ☐

0 5 . 6 Which plant species in **Table 3** is most likely to live in a dry desert?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Question 5 continues on the next page

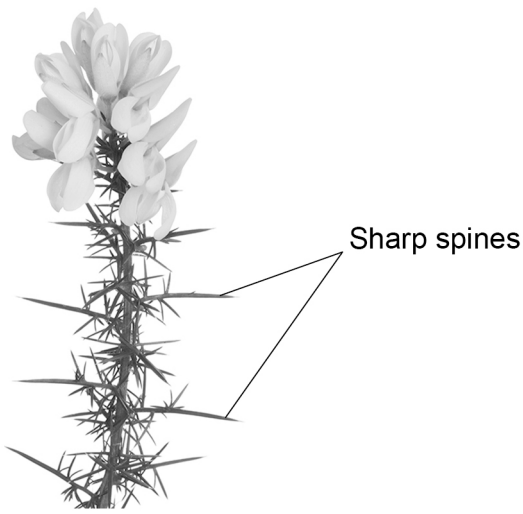
4.2.3.2 Plant organ system

Question 23 · continued

0 5 . 7 Some plants have adaptations that help them survive.

Figure 6 shows part of a gorse plant.

Figure 6



How will the sharp spines help the gorse plant survive?

[1 mark]

4.2.3.2 Plant organ system

Question 23 · continued

0 5 . 8 Animals also have adaptations to help them survive.

Figure 7 shows two insects.

Figure 7



Hornet **Hornet Moth**

Hornets are insects that sting other animals and cause pain.

Hornet moths do **not** sting other animals.

Explain why animals avoid eating the **hornet moth**.

[2 marks]

14

4.2.3.2 Plant organ system

Question 24

June 2023 | 8461/1F | Original Q1

0 1 Plants are made of cells, tissues and organs.

0 1 . 1 Which part of a plant is the largest?

[1 mark]

Tick (✓) **one** box.

A guard cell ☐

A leaf ☐

A root hair ☐

Students investigated the effect of concentration of salt solution on the mass of pieces of potato.

This is the method used.

1. Cut two pieces of potato to the same size.
2. Record the mass of each piece of potato.
3. Place one piece of potato into a beaker containing a dilute salt solution.
4. Place the other piece of potato into a beaker containing a concentrated salt solution.
5. After 20 minutes, remove each piece of potato from its solution.
6. Record the change in mass of each piece of potato.
7. Repeat steps 1 to 6 two more times.

Table 1 shows the results.

Table 1

Solution	**Change in mass of piece of potato in grams**			
	Test 1	**Test 2**	**Test 3**	**Mean**
Dilute salt solution	1.1	1.1	1.4	**X**
Concentrated salt solution	–7.2	–6.8	–32.4	–7.0

Question 24 · continued

0 1 . 2 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____ grams

There is an anomalous result for the concentrated salt solution in **Table 1**.

0 1 . 3 Draw a ring around the anomalous result in **Table 1**.

[1 mark]

0 1 . 4 What did the students do with the anomalous result when calculating the mean in **Table 1**?

[1 mark]

0 1 . 5 What name is given to a variable that is kept the same during an investigation?

[1 mark]

Tick (✓) **one** box.

- Control variable ☐
- Dependent variable ☐
- Independent variable ☐

Question 1 continues on the next page

4.2.3.2 Plant organ system

Question 24 · continued

0 1 . 6 One variable the students kept the same during the investigation was the size of the pieces of potato.

Which other variable did the students keep the same?

[1 mark]

Tick (✓) **one** box.

Change in mass of pieces of potato ☐

Concentration of salt solution ☐

Time in the salt solution ☐

0 1 . 7 The pieces of potato in the concentrated salt solution decreased in mass.

Complete the sentence.

Choose the answer from the box.

[1 mark]

excretion	**osmosis**	**respiration**

Water moved out of the potato by the process of _____.

4.2.3.2 Plant organ system

Question 24 · continued

0 1 . 8 The potato cells have a partially permeable membrane.

Which particles can pass through a partially permeable membrane?

[1 mark]

Tick (✓) **one** box.

No particles ☐

Some particles ☐

All particles ☐

0 1 . 9 How could the students improve their investigation?

[1 mark]

Tick (✓) **one** box.

Boil the pieces of potato at the start. ☐

Leave the skin on some pieces of potato. ☐

Use more concentrations of salt solution. ☐

10

4.2.3.2 Plant organ system

Question 25

June 2023 | 8461/1F | Original Q6

0 6 A root is a plant organ.

Plant roots contain many different types of tissue.

0 6 . 1 What is a tissue?

[1 mark]

0 6 . 2 Tissue in the tip of a plant root contains stem cells.

Stem cells can differentiate into any type of cell.

Name the type of tissue in plants that contains stem cells.

[1 mark]

In the past many drugs were extracted from plants.

0 6 . 3 Aspirin is a painkiller.

Which plant does aspirin originate from?

[1 mark]

Question 6 continues on the next page

Question 25 · continued

Scientists have extracted chemical **A** from the deadly nightshade plant.

Chemical **A** can be used as a painkiller.

Table 5 shows information about where chemical **A** is found.

Table 5

Part of deadly nightshade plant	Mass of chemical A in 100 g of plant tissue in grams
Roots	1.3
Leaves	1.2
Berries	0.7

0 6 . 4 The scientists usually extract chemical **A** from the berries of the deadly nightshade plant.

Suggest **one** reason why berries are used instead of leaves or roots.

[1 mark]

4.2.3.2 Plant organ system

Question 25 · continued

A deadly nightshade plant has chlorosis (yellow leaves).

The mass of chemical **A** found in the **leaves** of the plant is 60% of the mass shown in **Table 5**.

0 6 . 5 Calculate the mass of chemical **A** in 200 g of the **leaves** with chlorosis.

Give your answer in mg.

[4 marks]

Mass of chemical **A** = _____ mg

0 6 . 6 Suggest **one** reason why the leaves of the deadly nightshade plant have chlorosis.

[1 mark]

Question 6 continues on the next page

Question 25 · continued

Chemical **A** has **not** been tested in large-scale clinical trials in the UK.

0 6 . 7 It is important for drugs to be tested in clinical trials before the drugs are approved for use by the public.

Give **two** reasons why.

[2 marks]

1 _____

_____

2 _____

_____

There are many online reports making claims about the effects of chemical **A**.

Some of these reports are biased.

0 6 . 8 Suggest **one** reason why a report making claims about the effects of chemical **A** may be biased.

[1 mark]

_____

_____

4.2.3.2 Plant organ system

Question 25 · continued

0 6 . 9 How can scientists be sure that claims about new drugs are valid?

[1 mark]

Tick (✓) **one** box.

- Advertise the claims on social media. ☐
- Ask an international company to produce the drug. ☐
- Have the claims peer reviewed. ☐
- Publish the claims in a newspaper. ☐

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Turn over for the next question