AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.1.1.2

Animal and plant cells

Past-paper questions

Tier	**Foundation**
Question groups	**11**
Available paper years	**2018–2025**

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.

4.1.1.2 Animal and plant cells

Question 01

June 2018 | 8464/B/1F | Original Q6

0 6 This question is about cell structures.

0 6 . 1 Draw **one** line from each cell structure to the type of cell where the structure is found.

[2 marks]

Cell Structure	Type of cell where the structure is found
Nucleus	Prokaryotic cells
Permanent vacuole	Plant cells only
Plasmid	Eukaryotic cells

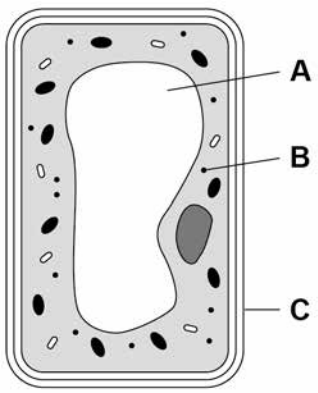
Question 6 continues on the next page

4.1.1.2 Animal and plant cells

Question 01 · continued

0 6 . 2 **Figure 11** shows a plant cell.

Figure 11



What are the names of structures **A**, **B** and **C**?

[1 mark]

Tick **one** box.

Structure A	Structure B	Structure C	
Chloroplast	Vacuole	Cell wall	☐
Nucleus	Chloroplast	Cell membrane	☐
Vacuole	Mitochondrion	Cell membrane	☐
Vacuole	Ribosome	Cell wall	☐

4.1.1.2 Animal and plant cells

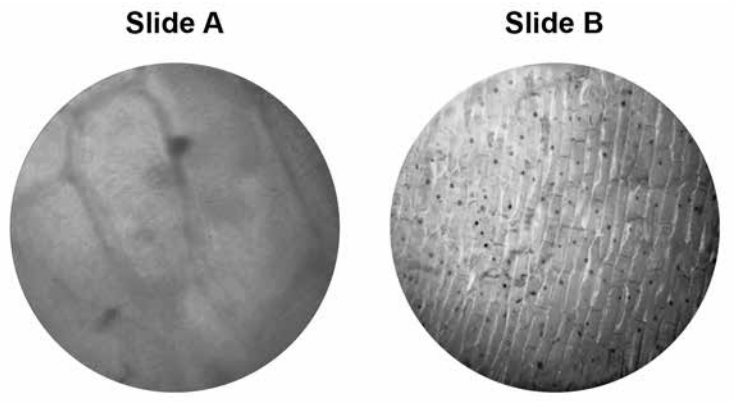
Question 01 · continued

June 2018 | 8464/B/1F | Original Q6

A student observed slides of onion cells using a microscope.

Figure 12 shows two of the slides the student observed.

Figure 12



The cells on the slides are **not** clear to see.

0 6 . 3 Describe how the student should adjust the microscope to see the cells on **Slide A** more clearly.

[1 mark]

0 6 . 4 Describe how the student should adjust the microscope to see the cells on **Slide B** more clearly.

[2 marks]

Question 6 continues on the next page

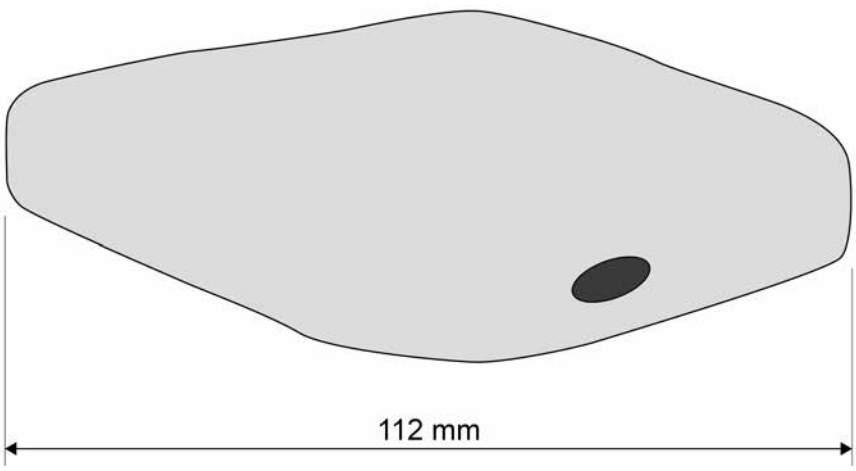
4.1.1.2 Animal and plant cells

Question 01 · continued

0 6 . 5 The student made the necessary adjustments to get a clear image.

Figure 13 shows the student's drawing of one of the cells.

Figure 13



The real length of the cell was 280 micrometres (µm).

Calculate the magnification of the drawing.

[3 marks]

Magnification = × _____

9

4.1.1.2 Animal and plant cells

Question 02

0 4 Water is lost from the leaves of a plant through stomata.

0 4 . 1 What is the process by which water is lost from the leaves of a plant?

[1 mark]

Tick (✓) **one** box.

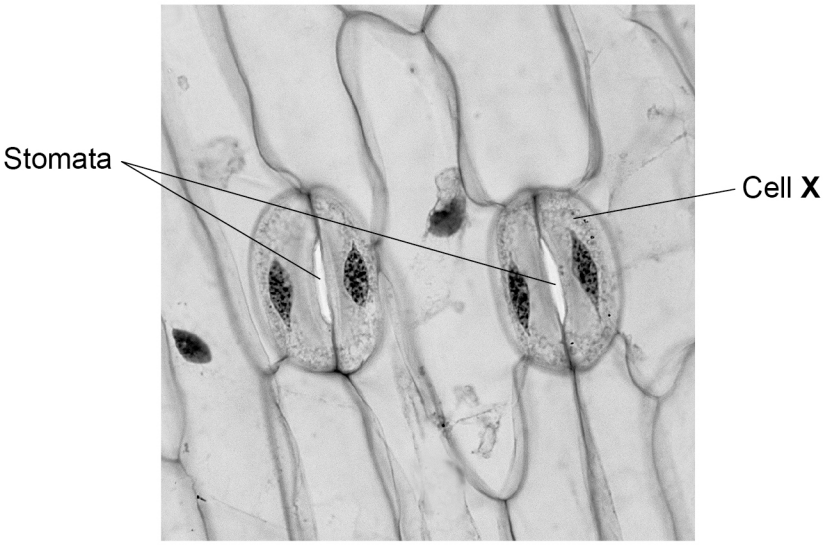
Osmosis ☐

Photosynthesis ☐

Transpiration ☐

Figure 7 shows stomata on the lower surface of a leaf.

Figure 7



4.1.1.2 Animal and plant cells

Question 02 · continued

0 4 . 2 What is the name of cell **X**?

[1 mark]

Tick (✓) **one** box.

- Epidermal cell ☐
- Guard cell ☐
- Palisade cell ☐
- Xylem cell ☐

0 4 . 3 The length of cell **X** is 25 mm when viewed at a magnification of ×800

Calculate the real length of cell **X**.

Give your answer in micrometres (μm).

1 mm = 1000 μm

Use the equation:

$$\text{real length of cell} = \frac{\text{size of image}}{\text{magnification}}$$

[3 marks]

Real length of cell **X** = _____ μm

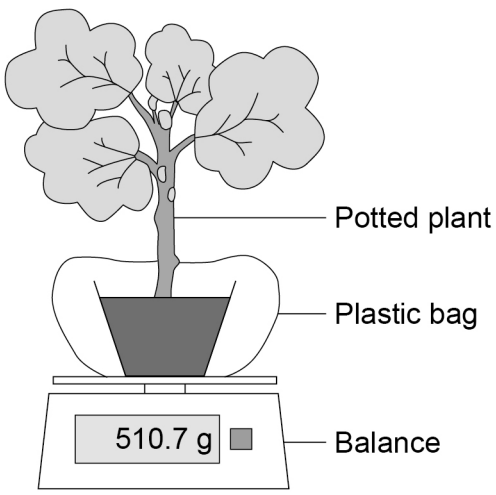
Question 4 continues on the next page

Question 02 · continued

A student measured the mass of water lost from some similar plants.
The plants were at different temperatures.

Figure 8 shows the apparatus used.

Figure 8



This is the method used.

1. Seal a plastic bag around the pot of a potted plant.
2. Place the potted plant with the bag on a balance in a room at 20 °C
3. Record the mass.
4. After 3 hours record the mass again.
5. Calculate the mass of water lost from the plant.
6. Repeat steps 1–5 at 25 °C and at 30 °C with other similar plants.

0 4 . 4 What was the independent variable in this investigation?

[1 mark]

Tick (✓) **one** box.

Initial mass of the plant ☐

Length of time the plant was left ☐

Mass of water lost ☐

Temperature of the room ☐

4.1.1.2 Animal and plant cells

Question 02 · continued

0 4 . 5 Suggest why the student sealed a plastic bag around the pot.

[1 mark]

Question 4 continues on the next page

Question 02 · continued

Table 1 shows the student's results.

Table 1

Temperature in °C	Mass at the start in g	Mass after 3 hours in g	Mass of water lost in 3 hours in g
20	510.7	508.6	2.1
25	510.4	507.1	3.3
30	**X**	506.3	4.9

0 4 . 6 What is the resolution of the balance used in this investigation?

[1 mark]

Tick **one** box.

0.1 g ☐ 1.0 g ☐ 100 g ☐ 500 g ☐

0 4 . 7 Calculate value **X** in **Table 1**.

[1 mark]

X = _____ g

0 4 . 8 Give **one** conclusion that can be made from the results in **Table 1**.

[1 mark]

0 4 . 9 Give **two** factors that might affect the rate of water loss from the leaves.

Do **not** refer to temperature in your answer.

[2 marks]

1 _____

2 _____

12

4.1.1.2 Animal and plant cells

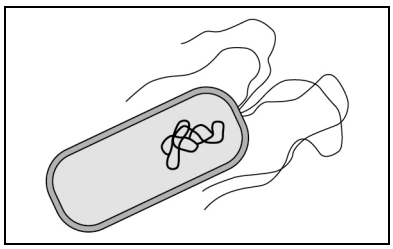
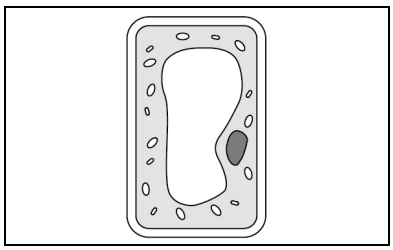
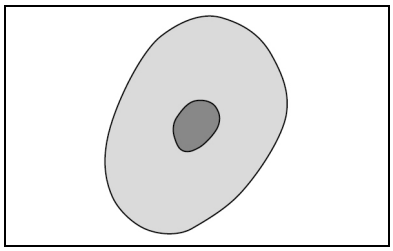
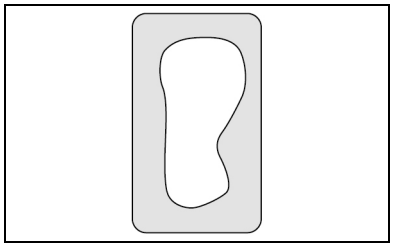
Question 03

November 2021 | 8464/B/1F | Original Q1

0 1 Cells are the building blocks of life.

0 1 . 1 Draw **one** line from each type of organism to the diagram of one of its cells.

[3 marks]

Type of organism	Diagram of one cell
Animal	
Bacterium	
Plant	
	

4.1.1.2 Animal and plant cells

Question 03 · continued

0 1 . 2 Cells contain structures. These structures have different functions.

Draw **one** line from each function to the correct structure.

[3 marks]

Function	Structure
Contains genetic information	Cell membrane
Controls what enters and leaves a cell	Cell wall
Where photosynthesis happens	Chloroplast
	Nucleus

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 03 · continued

0 1 . 3 Chemicals are produced in cells.

Complete the sentences.

Choose answers from the box.

[4 marks]

cellulose	**DNA**	**glycogen**	**starch**	**urea**

A chemical excreted by animals is _____ .

A chemical stored in animal cells is _____ .

A chemical stored in plant cells is _____ .

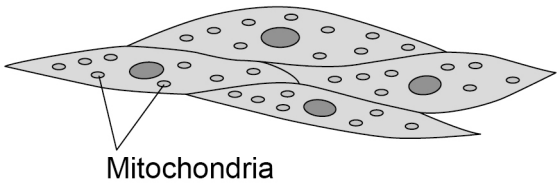
A chemical that strengthens plant cell walls is _____ .

4.1.1.2 Animal and plant cells

Question 03 · continued

Figure 1 shows a diagram of muscle cells.

Figure 1



0 1 . 4 Give **one** function of muscle cells.

[1 mark]

0 1 . 5 Explain how muscle cells are adapted for their function.

Use **Figure 1**.

[2 marks]

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 03 · continued

0 1 . 6 One muscle cell was 0.05 mm wide.

When viewed using a microscope the image of the muscle cell was 2 mm wide.

Calculate the magnification used to view the cell.

Use the equation:

$$\text{magnification} = \frac{\text{width of image}}{\text{width of real cell}}$$

[2 marks]

Magnification = × _____

15

4.1.1.2 Animal and plant cells

Question 04

November 2021 | 8464/B/1F | Original Q3

0 3 Anaerobic respiration in yeast is called fermentation.

The equation for fermentation is:

glucose → ethanol + carbon dioxide

0 3 . 1 How does the equation show that fermentation is an **anaerobic** reaction?

[1 mark]

Fermentation in yeast is used in the manufacture of beer, wine and bread.

0 3 . 2 Why is fermentation used when making beer and wine?

[1 mark]

0 3 . 3 Explain why fermentation is used when making bread.

[2 marks]

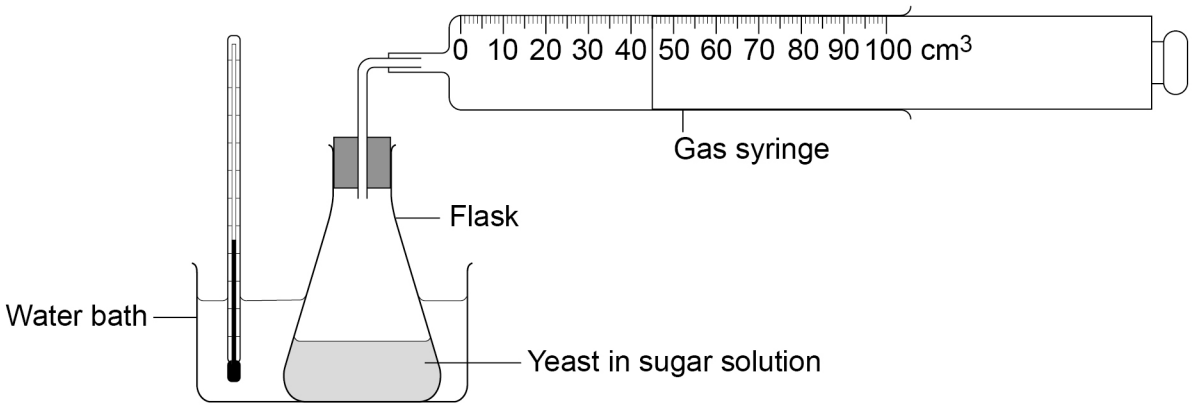
4.1.1.2 Animal and plant cells

Question 04 · continued

A student investigated fermentation in yeast.

Figure 3 shows the apparatus.

Figure 3



This is the method used.

1. Mix yeast with sugar solution in a flask.
2. Put the flask in a water bath at 35 °C.
3. After 10 minutes attach a gas syringe to the flask.
4. Record the volume of carbon dioxide collected every 5 minutes for 1 hour.

0 3 . 4 What volume of carbon dioxide has been collected in the gas syringe in **Figure 3**?

[1 mark]

Volume of carbon dioxide = _____ cm^3

0 3 . 5 Why did the student wait 10 minutes before attaching the gas syringe?

[1 mark]

Tick (✓) **one** box.

To allow time for the mixture to reach 35 °C ☐

To allow time for the sugar to dissolve ☐

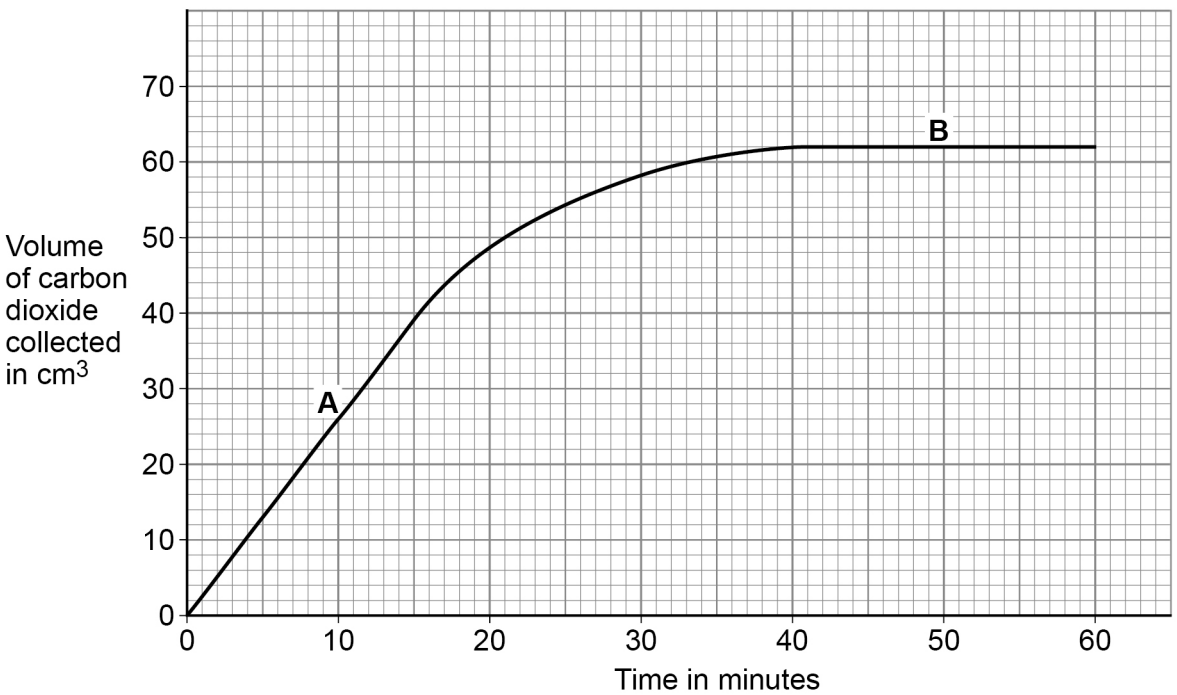
To allow time to draw a results table ☐

4.1.1.2 Animal and plant cells

Question 04 · continued

Figure 4 shows the results.

Figure 4



4.1.1.2 Animal and plant cells

Question 04 · continued

0 3 . 6 **A** and **B** are different parts of the graph in **Figure 4**.

Draw **one** line from each part of the graph to the description of the reaction.

[2 marks]

Part of the graph	Description of the reaction
	Carbon dioxide is **not** being produced
A	
	Carbon dioxide production is **fastest**
B	
	Carbon dioxide production is **slowing down**

Question 3 continues on the next page

4.1.1.2 Animal and plant cells

Question 04 · continued

The equation for fermentation is repeated here.

glucose → ethanol + carbon dioxide

0 3 . 7 Suggest **one** reason why fermentation in the flask stopped.

[1 mark]

0 3 . 8 Fermentation is controlled by enzymes.

The investigation was repeated at 2 °C and at 75 °C.

No carbon dioxide was produced at either of these temperatures.

Suggest why **no** carbon dioxide was produced at 2 °C or at 75 °C.

[2 marks]

Reason at 2 °C

Reason at 75 °C

0 3 . 9 Anaerobic respiration also happens in animal cells.

Complete the equation for anaerobic respiration in animal cells.

Choose answers from the box.

[2 marks]

carbon dioxide	**ethanol**	**glucose**	**lactic acid**	**water**

_____ → _____

13

4.1.1.2 Animal and plant cells

Question 05

November 2021 | 8464/B/2F | Original Q1

0 1 A human body cell contains 46 chromosomes.

0 1 . 1 How many chromosomes does a human sperm cell contain?

[1 mark]

Tick (✓) **one** box.

22 ☐ 23 ☐ 46 ☐

0 1 . 2 Draw **one** line from each word to the meaning of that word.

[3 marks]

Word	Meaning
Gene	A small ring of DNA in the cytoplasm
Genome	All the genetic material of an organism
Nucleus	A small section of DNA which codes for a protein
	A structure which contains chromosomes

4.1.1.2 Animal and plant cells

Question 05 · continued

Some plants contain a harmful chemical called PTC.

Some people can taste PTC.

0 1 . 3 Suggest **one** advantage of being able to taste PTC.

[1 mark]

Only people with a dominant allele **T** can taste PTC.

People with **only** the allele **t** cannot taste PTC.

0 1 . 4 A person has the genotype **Tt**.

What word describes the person's genotype?

[1 mark]

Tick (✓) **one** box.

- Heterozygous ☐
- Phenotype ☐
- Recessive ☐

0 1 . 5 Give the genotype of a person who **cannot** taste PTC.

[1 mark]

4.1.1.2 Animal and plant cells

Question 05 · continued

0 1 . 6 A woman and a man plan to have a child.

The woman and the man both have the genotype **Tt**.

Complete **Figure 1** to show the possible genotypes of the child.

[2 marks]

Figure 1

		Woman	
		T	**t**
Man	**T**	**T T**	
	t		

0 1 . 7 What is the chance of the child being able to taste PTC?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

25% ☐ 50% ☐ 75% ☐ 100% ☐

10

4.1.1.2 Animal and plant cells

Question 06

June 2022 | 8464/B/1F | Original Q5

0 5 Bacteria can cause a variety of diseases in humans.

0 5 . 1 What are **two** similarities between a bacterial cell and an animal cell?

[2 marks]

Tick (✓) **two** boxes.

- Both have a cell membrane. ☐
- Both have a cell wall. ☐
- Both have a nucleus. ☐
- Both have cytoplasm. ☐
- Both have plasmids. ☐

0 5 . 2 Salmonella food poisoning is caused by bacteria in food.

Give **one** symptom of salmonella food poisoning.

Do **not** refer to vomiting or diarrhoea in your answer.

[1 mark]

_____

_____

Question 5 continues on the next page

4.1.1.2 Animal and plant cells

Question 06 · continued

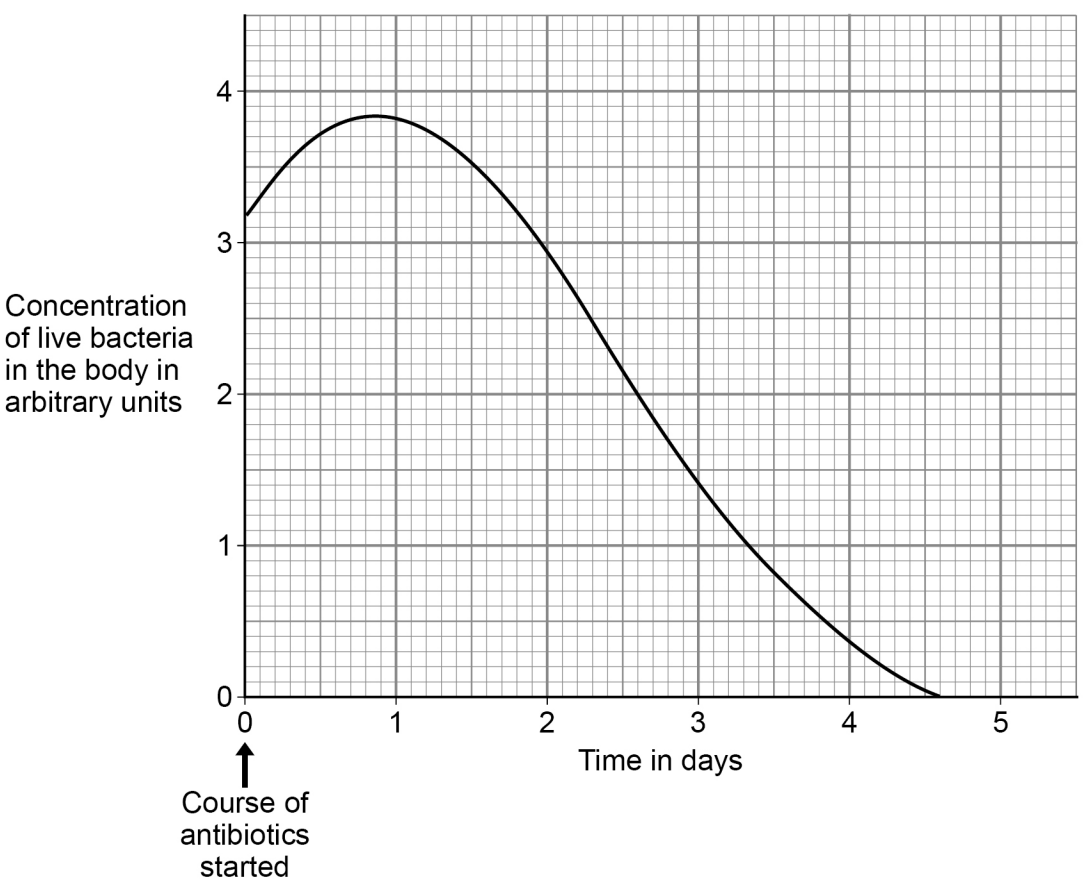
0 5 . 3 What is the name of the first antibiotic developed?

[1 mark]

A child with a severe bacterial infection was given a course of antibiotics.

Figure 7 shows how the concentration of live bacteria in the child's body changed when taking the course of antibiotics.

Figure 7



4.1.1.2 Animal and plant cells

Question 06 · continued

0 5 . 4 The concentration of live bacteria in the body continued to increase after starting the course of antibiotics.

Suggest **one** reason why.

[1 mark]

0 5 . 5 After 3 days of taking the antibiotic:

- the child felt better
- there were still bacteria in the child's body.

Why did the child feel better?

[1 mark]

Tick (✓) **one** box.

Bacteria had become immune to the antibiotic. ☐

The child had become resistant to the bacteria. ☐

There were fewer toxins in the body than at day 0 ☐

0 5 . 6 Suggest why doctors do **not** give antibiotics to patients with minor infections.

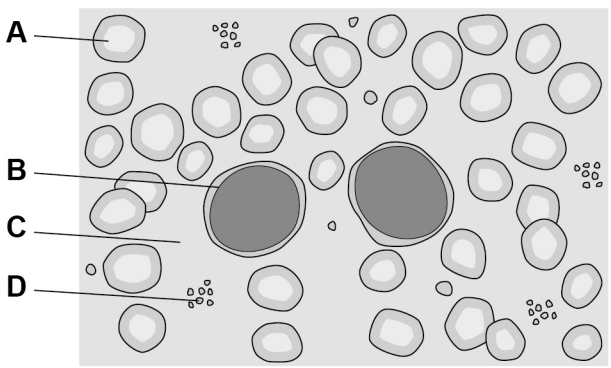
[1 mark]

Question 5 continues on the next page

Question 06 · continued

Figure 8 shows blood viewed using a microscope.

Figure 8



0 5 . 7 A vaccine will stimulate the production of antibodies.

Which part of the blood in **Figure 8** produces antibodies?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 5 . 8 Which part of the blood in **Figure 8** starts the clotting process?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

9

4.1.1.2 Animal and plant cells

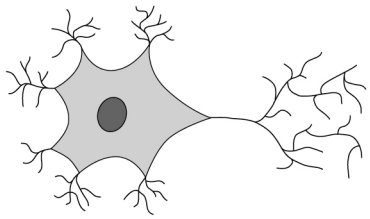
Question 07

June 2023 | 8464/B/1F | Original Q1

0 1 The human body is made of different types of cell.

0 1 . 1 Draw **one** line from each type of cell to the organ system where the cell is found.

[3 marks]

Type of cell	Organ system
 Brain cell	Circulatory system
 Red blood cell	Nervous system
	Reproductive system
 Sperm cell	Respiratory system

4.1.1.2 Animal and plant cells

Question 07 · continued

0 1 . 2 Explain **one** way a sperm cell is adapted for its function.

[2 marks]

Question 1 continues on the next page

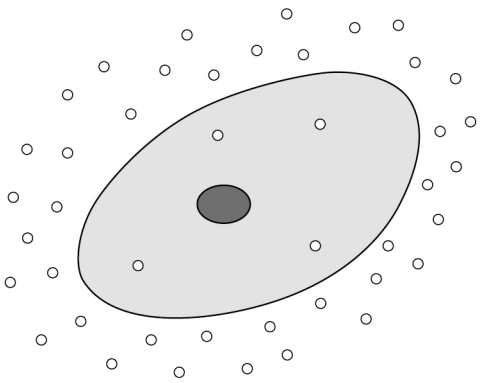
4.1.1.2 Animal and plant cells

Question 07 · continued

Figure 1 shows a cell.

Oxygen molecules are shown inside and outside the cell.

Figure 1



Key

○ Oxygen molecule

0 1 . 3 Give **one** way you can tell that the cell in **Figure 1** is **not** a plant cell.

[1 mark]

0 1 . 4 Which part of a cell controls the movement of substances into and out of the cell?

[1 mark]

Tick (✓) **one** box.

Cell membrane ☐

Cytoplasm ☐

Nucleus ☐

4.1.1.2 Animal and plant cells

Question 07 · continued

0 1 . 5 What is the name of the process that moves oxygen molecules into the cell in **Figure 1**?

Give the reason for your answer.

[2 marks]

Tick (✓) **one** box.

Active transport ☐

Diffusion ☐

Osmosis ☐

Reason _____

_____

0 1 . 6 Name **two** substances that move **into** most cells in the body from the blood.

Do **not** refer to oxygen in your answer.

[2 marks]

1 _____

2 _____

11

4.1.1.2 Animal and plant cells

Question 08

June 2023 | 8464/B/1F | Original Q7

0 7 **Figure 10** shows onion cells viewed using a light microscope.

Figure 10

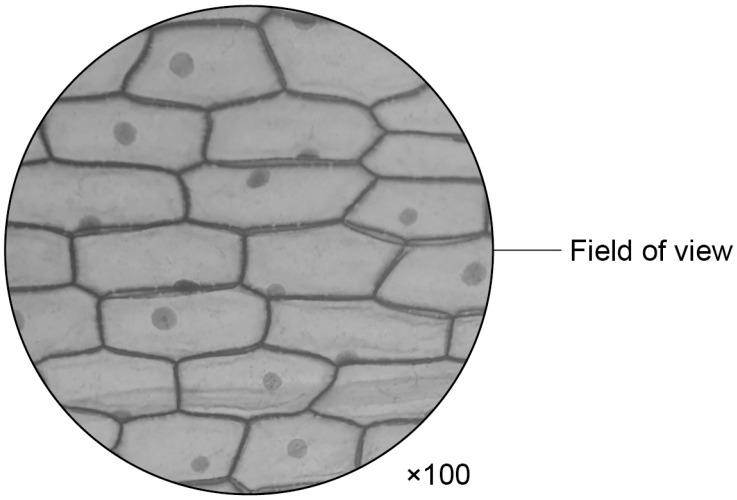
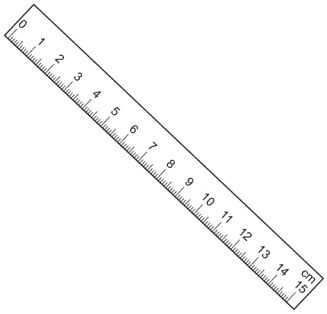


Figure 11 shows the apparatus given to a student.

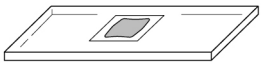
Figure 11



Microscope



15 cm transparent ruler



Prepared slide of onion cells

4.1.1.2 Animal and plant cells

Question 08 · continued

Describe how the student could use the apparatus to estimate the **mean** length of onion cells on the slide.

[6 marks]

6

4.1.1.2 Animal and plant cells

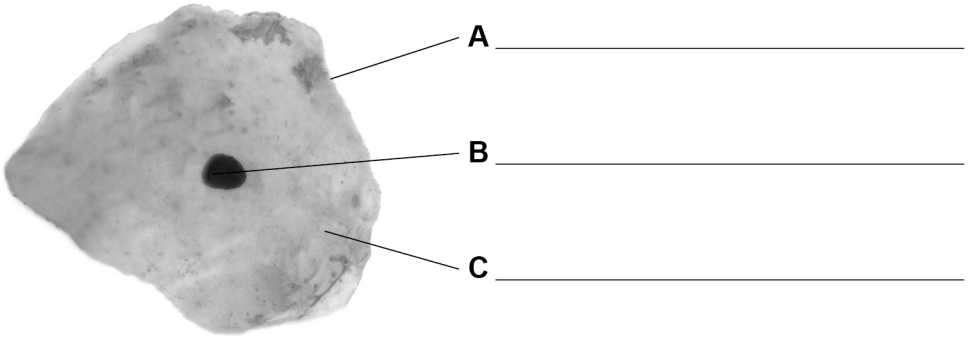
Question 09

June 2024 | 8464/B/1F | Original Q1

0 1 This question is about cells.

Figure 1 shows an animal cell.

Figure 1



0 1 . 1 Label parts **A**, **B** and **C** on **Figure 1**.

Choose answers from the box.

[3 marks]

cell membrane	**cell wall**	**chloroplast**
cytoplasm	**nucleus**	

4.1.1.2 Animal and plant cells

Question 09 · continued

0 1 . 2 What is the function of the nucleus in a cell?

[1 mark]

Tick (✓) **one** box.

To contain a solution called cell sap ☐

To control the activities of the whole cell ☐

To control the movement of substances into the cell ☐

0 1 . 3 What is the function of the mitochondria in a cell?

[1 mark]

Tick (✓) **one** box.

To produce glucose during photosynthesis ☐

To produce proteins for the cell ☐

To release energy in respiration ☐

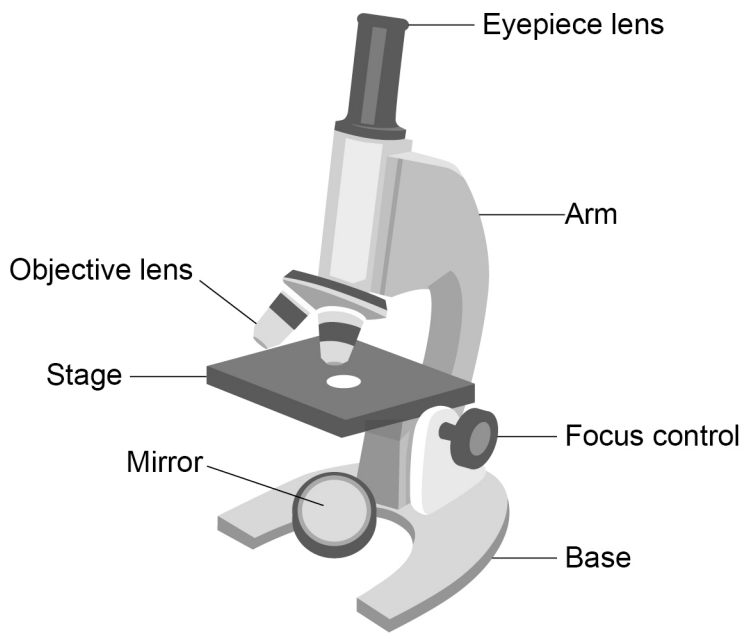
Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 09 · continued

0 1 . 4 **Figure 2** shows a light microscope.

Figure 2



A student is given a prepared slide of animal cells to view using the microscope.

Complete the sentences.

Use labels from **Figure 2**.

[4 marks]

Place the slide on the _____.

Use the objective lens that has low power.

Look through the _____.

Direct the light by moving the _____.

Make the image larger by using the high power _____.

4.1.1.2 Animal and plant cells

Question 09 · continued

0 1 . 5 **Figure 3** shows a different animal cell.

Figure 3



Calculate the magnification of the image in **Figure 3**.

Complete the following steps.

[4 marks]

Measure the width of the image from **Y** to **Z**, in millimetres (mm).

Width of image = _____ mm

Give the width of the image in micrometres (μm).

1 mm = 1000 μm

_____

Width of image = _____ μm

The cell in **Figure 3** has a real width of 40 micrometres (μm).

Use the equation to calculate the magnification.

$$\text{magnification} = \frac{\text{width of image in μm}}{\text{real width of cell in μm}}$$

_____

_____

_____

Magnification = × _____

13

4.1.1.2 Animal and plant cells

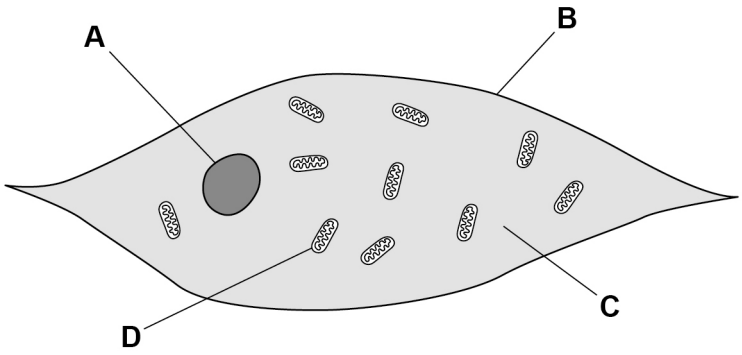
Question 10

June 2025 | 8464/B/1F | Original Q1

0 1 This question is about cells.

Figure 1 shows a muscle cell.

Figure 1



0 1 . 1 The nucleus and cytoplasm are parts of a muscle cell.

Draw **one** line from each part of the muscle cell to the correct label from **Figure 1**.

[2 marks]

Part of the muscle cell	Label from Figure 1
	A
Cytoplasm	B
Nucleus	C
	D

4.1.1.2 Animal and plant cells

Question 10 · continued

0 1 . 2 What is the function of the nucleus?

[1 mark]

0 1 . 3 What part of a cell controls the movement of substances into the cell?

[1 mark]

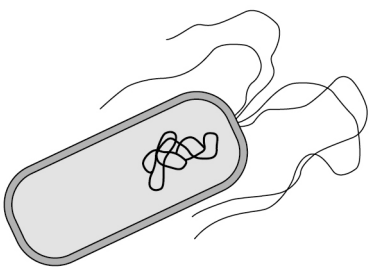
Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 10 · continued

Figure 2 shows a bacterial cell.

Figure 2



0 1 . 4 What type of cell is the bacterial cell in **Figure 2**?

[1 mark]

Tick (✓) **one** box.

- A fungal cell ☐
- A prokaryotic cell ☐
- A sperm cell ☐

0 1 . 5 Which are **two** features of bacterial cells?

[2 marks]

Tick (✓) **two** boxes.

- Bacterial cells are larger than animal cells. ☐
- Bacterial cells contain a loop of DNA. ☐
- Bacterial cells contain a nucleus. ☐
- Bacterial cells contain chloroplasts. ☐
- Bacterial cells have a cell wall. ☐

4.1.1.2 Animal and plant cells

Question 10 · continued

Stem cells are cells that are **not** specialised.

Stem cells can be collected from human bone marrow.

0 1 . 6 What type of stem cells are found in bone marrow?

[1 mark]

Tick (✓) **one** box.

- Adult stem cells ☐
- Embryonic stem cells ☐
- Meristem cells ☐

0 1 . 7 Which process produces stem cells in humans?

[1 mark]

Tick (✓) **one** box.

- Digestion ☐
- Mitosis ☐
- Respiration ☐

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 10 · continued

0 1 . 8 Stem cells can be used to produce blood cells.

A blood transfusion is when a patient is given blood cells.

Table 1 compares two different methods of providing blood cells that can be given to a patient.

Table 1

Blood cells produced from stem cells in a laboratory	Blood cells from a blood donation
• A small sample of blood is taken from a person. • All of the new blood cells can function for 120 days. • The stem cells from the blood sample can produce unlimited quantities of blood cells.	• 470 cm^3 of blood is collected from a person. • The cells can function for between 1 and 120 days.

A scientist stated:

'Blood cells produced from stem cells are better to use for a blood transfusion than blood cells from a donation.'

Suggest **two** reasons that support the scientist's statement.

[2 marks]

1 _____

_____

2 _____

_____

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4.1.1.2 Animal and plant cells

Question 11

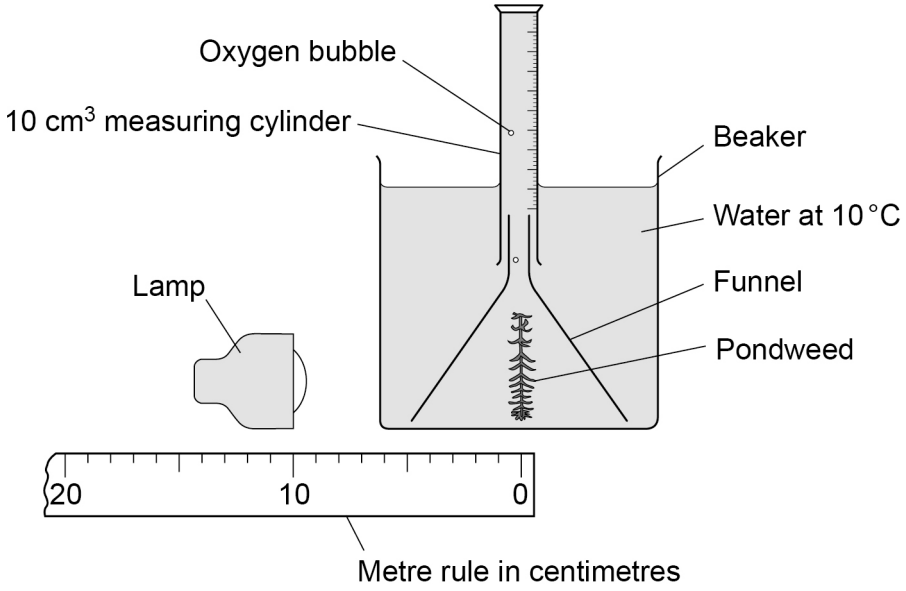
June 2025 | 8464/B/1F | Original Q2

0 2 Photosynthesis is important for plant growth.

A student used pondweed to investigate photosynthesis.

Figure 3 shows the apparatus used.

Figure 3



This is the method used.

1. Set up the apparatus as shown in **Figure 3**.
2. Switch on the lamp.
3. After 1 hour, record the volume of oxygen collected in the measuring cylinder.
4. Repeat steps 1 to 3 a further four times, placing the lamp at different distances from the pondweed.

4.1.1.2 Animal and plant cells

Question 11 · continued

0 2 . 1 What are **two** control variables the student should use in the investigation?

[2 marks]

Tick (✓) **two** boxes.

- The distance of the lamp from the pondweed. ☐
- The length of the pondweed. ☐
- The size of the beaker. ☐
- The temperature of the water. ☐
- The volume of oxygen collected. ☐

Table 2 shows the results.

Table 2

Distance of the lamp from the pondweed in cm	Volume of oxygen in cm^3
10	
20	1.0
30	0.4
40	0.2
50	0.0

0 2 . 2 Describe the trend shown in **Table 2**.

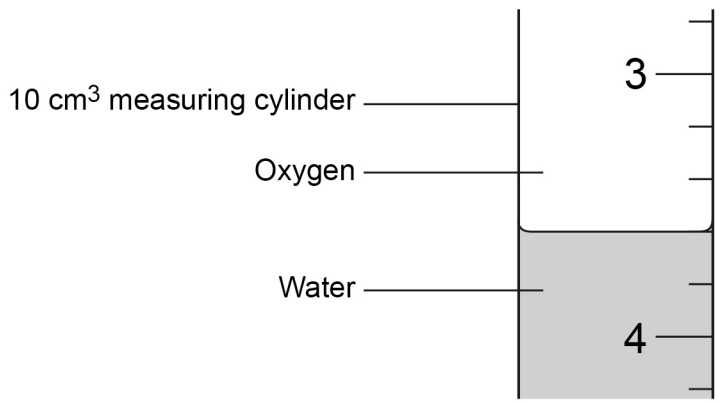
[1 mark]

4.1.1.2 Animal and plant cells

Question 11 · continued

0 2 . 3 **Figure 4** shows the volume of oxygen when the lamp was 10 cm from the pondweed.

Figure 4



What volume of oxygen is shown in **Figure 4**?

[1 mark]

Volume = _____ cm^3

4.1.1.2 Animal and plant cells

Question 11 · continued

0 2 . 4 The student repeated the investigation using a measuring cylinder with smaller intervals of 0.1 cm^3.

What did using smaller intervals improve?

[1 mark]

Tick (✓) **one** box.

Accuracy ☐

Repeatability ☐

Reproducibility ☐

0 2 . 5 The student did the investigation at 10 °C.

The student repeated the investigation at 20 °C.

Complete the sentence.

Choose the answer from the box.

[2 marks]

smaller	**the same**	**greater**

Compared to the results at 10 °C, the volumes of oxygen collected

in one hour at 20 °C would be _____.

Give a reason for your answer.

_____

_____

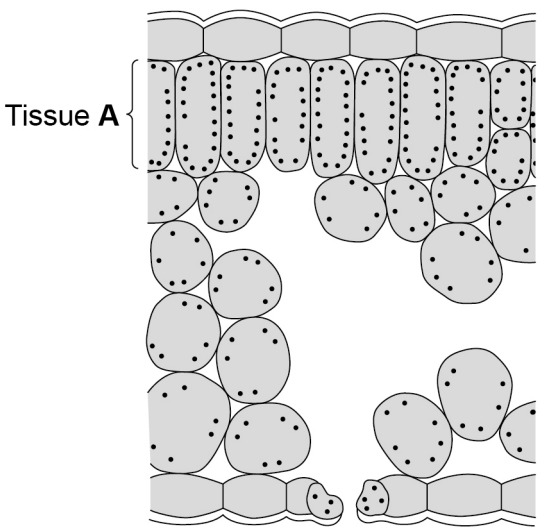
4.1.1.2 Animal and plant cells

Question 11 · continued

Photosynthesis is important for apple trees.

Figure 5 shows a section through the leaf of an apple tree.

Figure 5



0 2 . 6 What is tissue **A**?

[1 mark]

Tick (✓) **one** box.

Epidermis ☐

Palisade mesophyll ☐

Spongy mesophyll ☐

0 2 . 7 The cells in tissue **A** contain chloroplasts.

What is the name of the green chemical in chloroplasts?

[1 mark]

_____

4.1.1.2 Animal and plant cells

Question 11 · continued

Apple scab is a disease of apple trees.

Apple scab is caused by a fungus.

Figure 6 shows a leaf from an apple tree infected with apple scab fungus.

Figure 6



0 2 . 8 How could the fungal infection be removed from the tree?

[1 mark]

Tick (✓) **one** box.

Destroy the affected leaves. ☐

Spray the affected leaves with antibiotics. ☐

Use an antitoxin on the affected leaves. ☐

Question 2 continues on the next page

4.1.1.2 Animal and plant cells

Question 11 · continued

0 2 . 9 Infection with apple scab fungus decreases the number of chloroplasts in the leaves.

Explain why apple trees with apple scab fungus produce smaller apples than apple trees that are **not** infected.

[3 marks]

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