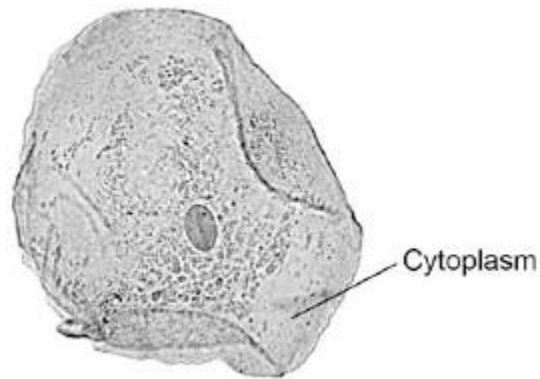


1 **Figure 1** shows a human cheek cell viewed under a light microscope.

**Figure 1**



© Ed Reschke/Photolibary/Getty Images

(a) Label the nucleus **and** cell membrane on **Figure 1**.

(2)

(b) Cheek cells are a type of body cell.

Body cells grow through cell division.

What is the name of this type of cell division?

Tick **one** box.

Differentiation

Mitosis

Specialisation

(1)

(c) Ribosomes and mitochondria are **not** shown in **Figure 1**.

What type of microscope is needed to see ribosomes and mitochondria?

---

(1)

(d) What is the advantage of using the type of microscope you named in part (c)?

Tick **one** box.

Cheaper

Higher magnification

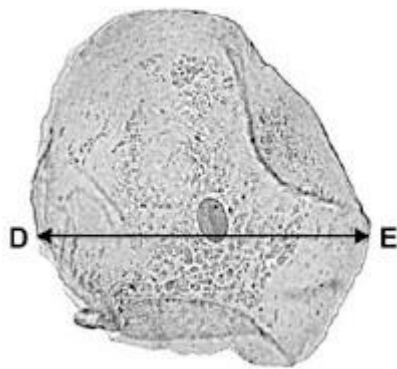
Lower resolution

(1)

(e) The cheek cell in **Figure 2** is magnified 250 times.

The width of the cell is shown by the line **D** to **E**.

**Figure 2**



Calculate the width of the cheek cell in micrometres ( $\mu\text{m}$ ).

Complete the following steps.

Measure the width of the cell using a ruler \_\_\_\_\_ mm

Use the equation to work out the real width of the cell in mm:

$$\text{real size} = \frac{\text{image size}}{\text{magnification}} \quad \underline{\hspace{2cm}} \text{mm}$$

Convert mm to  $\mu\text{m}$  \_\_\_\_\_  $\mu\text{m}$

(3)

(f) A red blood cell is  $8\ \mu\text{m}$  in diameter.

A bacterial cell is 40 times smaller.

Calculate the diameter of the bacterial cell.

Tick **one** box.

$0.02\ \mu\text{m}$

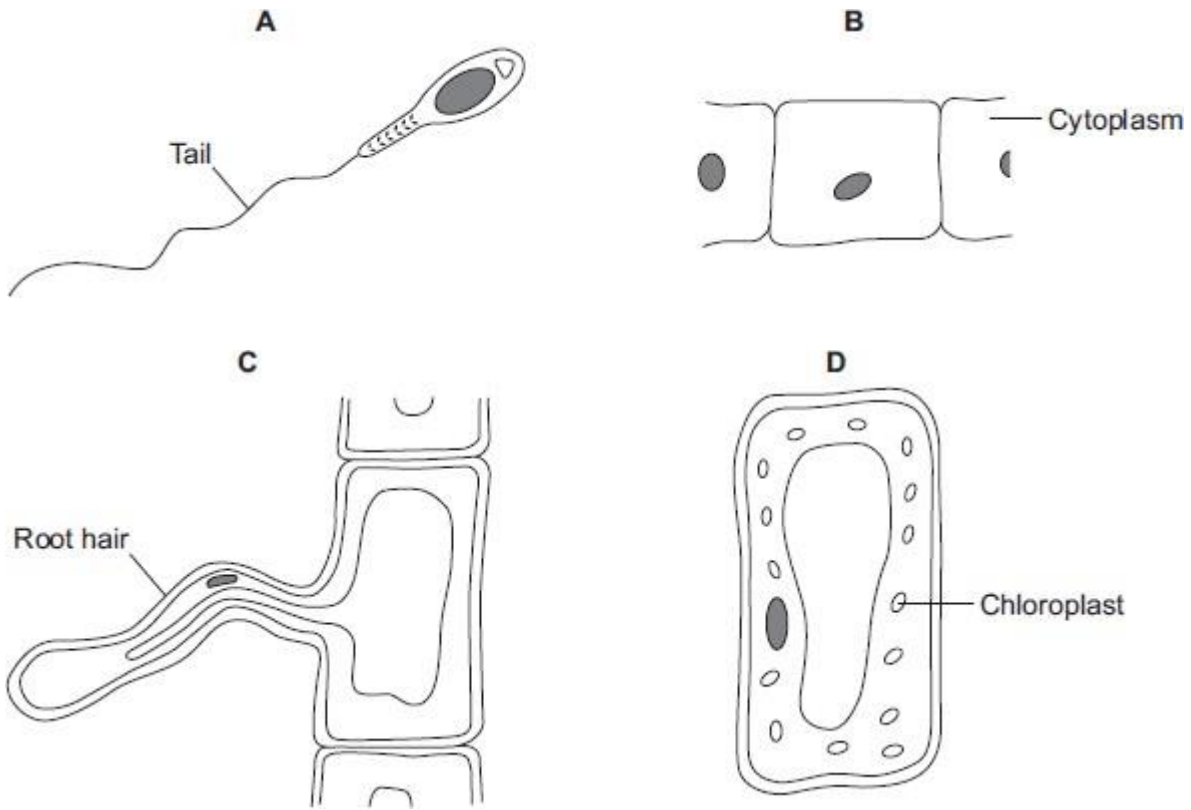
$0.2\ \mu\text{m}$

$2.0\ \mu\text{m}$

$20.0\ \mu\text{m}$

(1)  
(Total 9 marks)

- 2 The diagrams show four types of cell, **A**, **B**, **C** and **D**.  
Two of the cells are plant cells and two are animal cells.



- (a) (i) Which **two** of the cells are plant cells?

Tick (✓) **one** box.

- A and B**
- A and D**
- C and D**

(1)

- (ii) Give **one** reason for your answer.

---



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(1)

(b) (i) Which cell, **A**, **B**, **C** or **D**, is adapted for swimming?  (1)

(ii) Which cell, **A**, **B**, **C** or **D**, can produce glucose by photosynthesis?  (1)

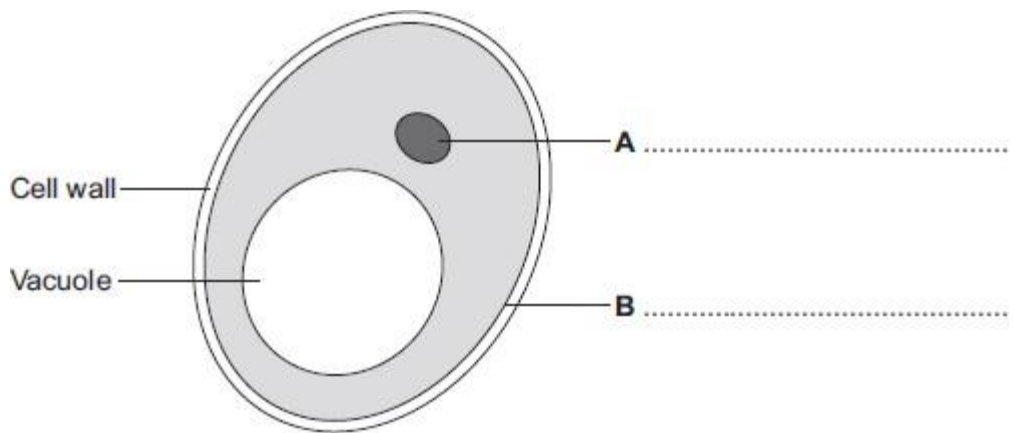
(c) Cells **A**, **B**, **C** and **D** all use oxygen.  
 For what process do cells use oxygen?  
 Draw a ring around **one** answer.

**osmosis                      photosynthesis                      respiration**

(1)  
**(Total 5 marks)**

**3** Human cells and yeast cells have some parts that are the same.

(a) The diagram shows a yeast cell.



Parts **A** and **B** are found in human cells and in yeast cells. On the diagram, label parts **A** and **B**.

(2)

(b) Many types of cell can divide to form new cells.  
 Some cells in human skin can divide to make new skin cells.  
 Why do human skin cells need to divide?

---



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(1)

(c) Human stem cells can develop into many different types of human cell.

(i) Use the correct answer from the box to complete the sentence.

<b>embryos</b>	<b>hair</b>	<b>nerve cells</b>
----------------	-------------	--------------------

Human stem cells may come from

\_\_\_\_\_

(1)

(ii) Use the correct answer from the box to complete the sentence.

<b>cystic fibrosis</b>	<b>paralysis</b>	<b>polydactyly</b>
------------------------	------------------	--------------------

Human stem cells can be used to treat

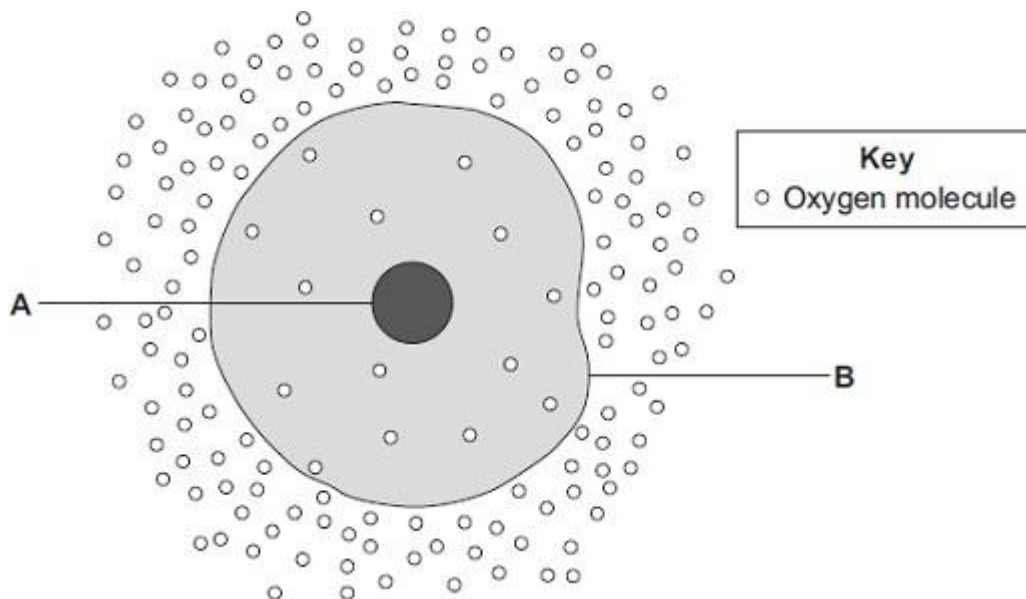
\_\_\_\_\_

(1)

(Total 5 marks)

**4**

The diagram shows a cell.



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

cell membrane	chloroplast	cytoplasm	nucleus
---------------	-------------	-----------	---------

**A** \_\_\_\_\_

**B** \_\_\_\_\_

(2)

(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)

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

Why?

Use information from the diagram.

\_\_\_\_\_

\_\_\_\_\_

(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)

(Total 6 marks)

**5**

Substances can move into cells and out of cells.

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

Water moves into cells and out of cells by

active transport.

osmosis.

reabsorption.

The water moves through a 

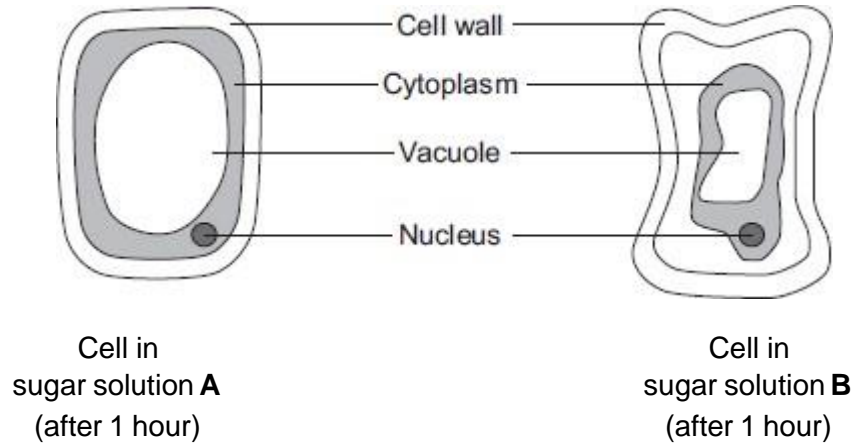
freely permeable
non-permeable
partially permeable

 membrane.

(2)

(b) Students put plant cells into two different strengths of sugar solutions, **A** and **B**.

The diagram below shows what the cells looked like after 1 hour.



(i) Describe **two** ways in which the cell in sugar solution **B** is different from the cell in sugar solution **A**.

1. \_\_\_\_\_
- \_\_\_\_\_
2. \_\_\_\_\_
- \_\_\_\_\_

(2)

(ii) A student put red blood cells into water.

Suggest what would happen to the cells.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

(1)

(c) In the human body, glucose is absorbed into the blood from the small intestine.

The small intestine contains many villi.

Which **two** of the following help the absorption of glucose in the small intestine?



Tick (✓) **two** boxes.

Villi have a cell wall.

Villi are covered in thick mucus.

Villi give the small intestine a large surface area.

Villi have many blood capillaries.

(2)  
(Total 7 marks)

**6**

Cells can be classified according to their structure.

(a) Complete **Table 1** to show which features each cell type has.

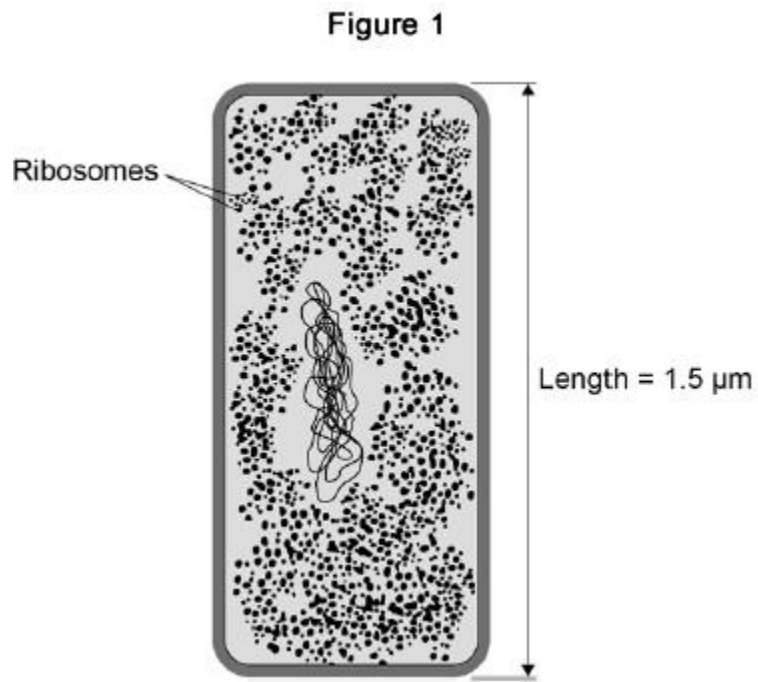
Write a tick or a cross in each box.

**Table 1**

	<b>Nucleus</b>	<b>Plasmids</b>	<b>Cytoplasm</b>
Prokaryotic cell			
Eukaryotic cell			

(2)

Figure 1 shows a cell.



(b) What type of cell is shown in **Figure 1**.

Tick **one** box.

An animal cell

A bacterial cell

A plant cell

(1)

(c) The cell in **Figure 1** contains ribosomes.

What is the function of ribosomes?

---

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(1)

(d) There are 1000 micrometres ( $\mu\text{m}$ ) in a millimetre (mm).

The length of the cell in **Figure 1** is 1.5 micrometres ( $\mu\text{m}$ ).

Give the length of the cell in millimetres (mm).

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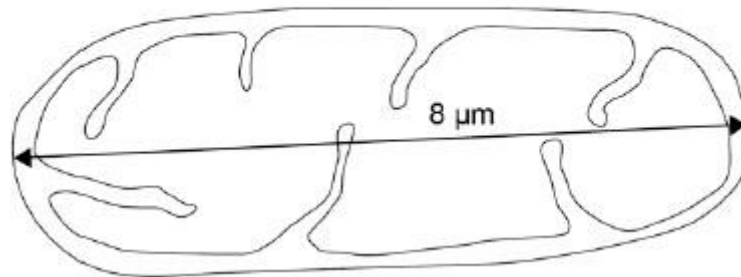
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Length of cell = \_\_\_\_\_ mm

(1)

**Figure 2** shows a mitochondrion viewed with a microscope.

**Figure 2**



(e) Give **one** reason why the cell in **Figure 1** does **not** contain mitochondria.

Use information from **Figure 1** and **Figure 2**.

---

---

(1)

The cell in **Figure 1** divides once every 30 minutes.

**Table 2** shows how many cells are present after a given time.

**Table 2**

Time in minutes	Number of cells present
0	1
30	2
60	4

(f) Calculate how many cells will be present after 2 hours.

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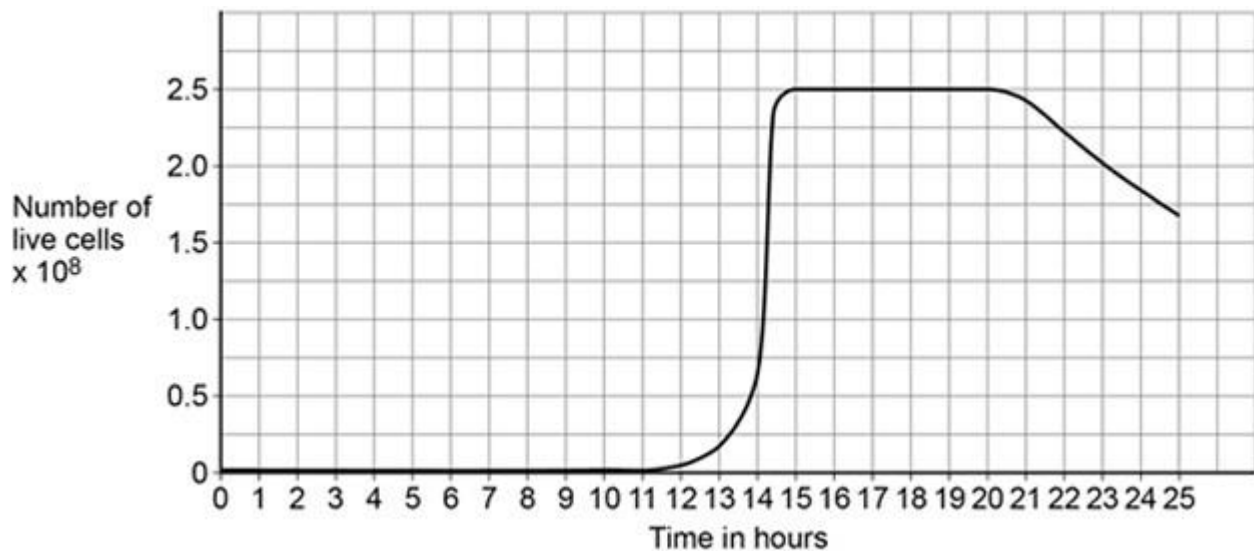
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Number of cells = \_\_\_\_\_

(2)

Cells like the one in **Figure 1** are kept in a culture solution for 25 hours.

The graph below shows the number of live cells present.



(g) Describe the changes in the number of live cells shown in the graph above in the first 20 hours.

Use data from the graph in your answer.

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(3)

(h) Suggest **one** reason why the number of live cells decreases after 20 hours.

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(1)

(Total 12 marks)

**7** Living organisms are made of cells.

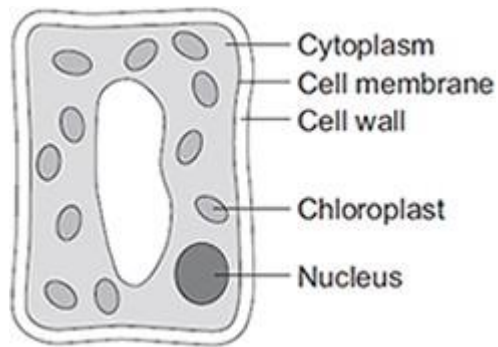
(a) Animal and plant cells have several parts. Each part has a different function.

Draw **one** line from each cell part to the correct function of that part.

Cell part	Function
Cell membrane	Where most energy is released in respiration
Mitochondria	Controls the movement of substances into and out of the cell
Nucleus	Controls the activities of the cell
	Where proteins are made

(3)

(b) The diagram below shows a cell from a plant leaf.



Which **two** parts in the diagram above are **not** found in an animal cell?

1. \_\_\_\_\_

2. \_\_\_\_\_

(2)

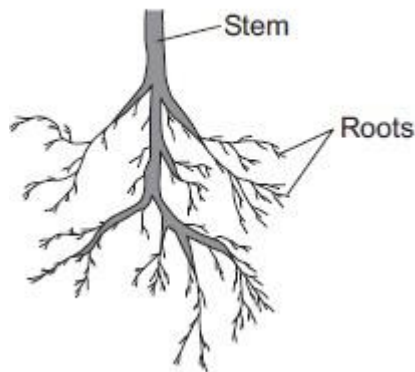
(Total 5 marks)

8

Plants need different substances to survive.

**Figure 1** shows the roots of a plant.

**Figure 1**



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

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

\_\_\_\_\_

(1)

- (ii) The plant in **Figure 1** 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?

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.

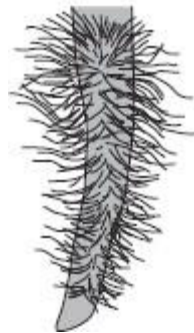
The absorption of mineral ions needs energy.

(2)

- (iii) The plant in **Figure 1** has roots adapted for absorption.

**Figure 2** shows a magnified part of a root from **Figure 1**.

**Figure 2**



Describe how the root in **Figure 2** is adapted for absorption.

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(2)

- (b) The leaves of plants have stomata.  
What is the function of the stomata?

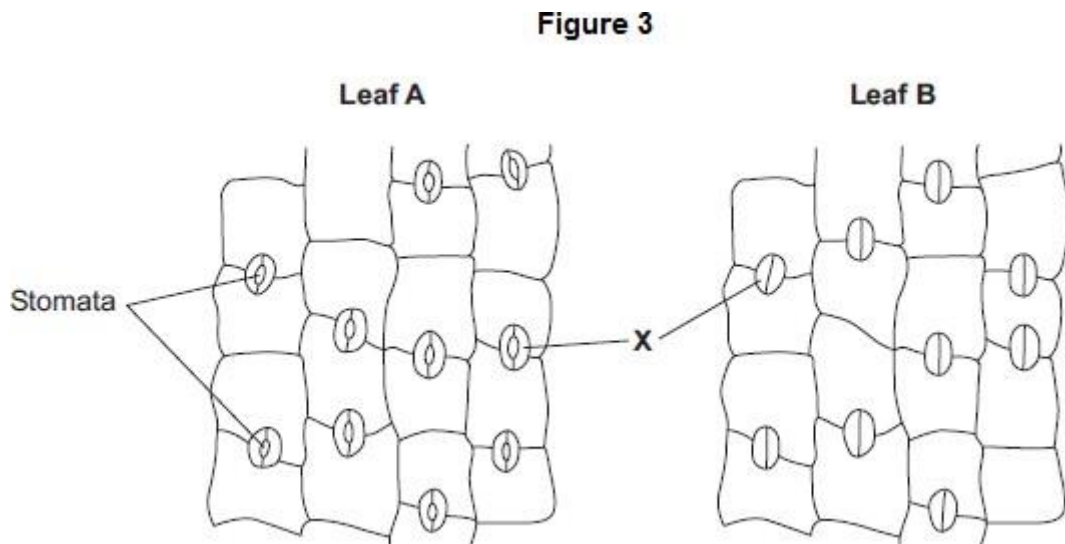
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(1)

- (c) **Figure 3** shows the underside of two leaves, **A** and **B**, taken from a plant in a man's house.



- (i) In **Figure 3**, the cells labelled **X** control the size of the stomata.  
What is the name of the cells labelled **X**?

Tick (✓) **one** box.

Guard cells	
Phloem cells	
Xylem cells	

(1)

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

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(1)



(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 3**?

---

---

(1)

(Total 9 marks)

## Mark schemes

- 1**
- (a) nucleus labelled correctly 1
- cell membrane labelled correctly 1
- (b) mitosis 1
- (c) electron (microscope) 1
- (d) higher magnification 1
- (e) 45 (mm) 1
- 45 / 250 **or** 0.18 (mm)  
*allow ecf* 1
- 180 ( $\mu\text{m}$ ) 1
- allow 180 ( $\mu\text{m}$ ) with no working shown for 3 marks*
- (f) 0.2  $\mu\text{m}$  1

[9]

- 2**
- (a) (i) **C and D**  
*no mark if more than one box is ticked* 1
- (ii) any **one** from:  
*do not allow if other cell parts are given in a list*
- (have) cell wall(s)
  - (have) vacuole(s)
- 1
- (b) (i) **A**  
*apply list principle* 1
- (ii) **D**  
*apply list principle* 1

	(c) respiration			
	<i>apply list principle</i>			
			1	
				[5]
<b>3</b>	(a) <b>A</b> = nucleus			
	<i>allow phonetic spelling</i>			
			1	
	<b>B</b> = (cell) membrane			
			1	
	(b) for repair / growth <b>or</b> to replace cells			
	<i>ignore new cells / skin</i>			
			1	
	(c) (i) embryos			
			1	
	(ii) paralysis			
			1	
				[5]
<b>4</b>	(a) (i) <b>A</b> = nucleus			
			1	
	<b>B</b> = (cell) membrane			
			1	
	(ii) any <b>two</b> from:			
	<i>ignore shape</i>			
	• no (cell) wall			
	• no (large / permanent) vacuole			
	• no chloroplasts / chlorophyll			
			2	
	(b) because high to low oxygen / concentration <b>or</b> down gradient			
	<i>allow 'more / a lot of oxygen molecules <u>outside</u>'</i>			
	<i>ignore along / across gradient</i>			
			1	
	(c) a tissue			
			1	
				[6]
<b>5</b>	(a) osmosis			
			1	
	partially permeable			
			1	

(b) (i) any **two** from:

*allow correct answers in terms of A*

- vacuole is small(er)
- cytoplasm has shrunk  
*allow cytoplasm is smaller*
- gap between cytoplasm and cell wall
- cell wall curves inwards  
*allow cell B is flaccid or cell A is turgid*
- the (cell) membrane has moved away from the wall

2

(ii) any **one** from:

- water will move / diffuse in
- (cells) will swell
- (cells) will burst  
*ignore turgid*

1

(c) villi give the small intestines a large surface area

1

villi have many blood capillaries

1

[7]

6

(a)

x	✓	✓
✓	x	✓

*1 mark for each correct row if no other marks awarded allow a mark for one correct column*

2

(b) a bacterial cell

1

(c) make / synthesise / produce protein  
*allow produce enzymes*

1

(d) 0.0015 (mm)

*allow  $1.5 \times 10^{-3}$  (mm)*

1

(e) mitochondria are longer / bigger (than the cell)

*allow too big*

1

(f)

2<sup>4</sup>

*an answer of 16 scores 2 marks*

*allow 2 × 2 × 2 × 2 or a correct list showing doubling at each time interval*

1

16

*allow 90 mins = 8 for 1 mark*

1

(g) (number of live cells / bacteria) stays level / the same until 11 hours

*answer must refer to number of live cells / bacteria (not the shape of the graph)*

*allow (number of cells / bacteria) is very low until 11 hours allow number in the range 10-11 hours*

1

then (number of live cells / bacteria) increases rapidly to  $2.5 \times 10^8$

**or**

from 11 hours to 14.5 hours

*allow (then) increases exponentially*

1

then (number of live cells / bacteria) stays at  $2.5 \times 10^8$

*allow (number of live cells / bacteria) stays the same for the next 5 hours*

**or**

stays the same from 15 to 20.5 hours

*if no other mark awarded allow for 1 mark the idea that the graph is level, then increases, then levels off again*

1

(h) any **one** from:

- lack of food / nutrients / oxygen / space

**or**

competition for space

- build-up of toxins

*allow ethanol*

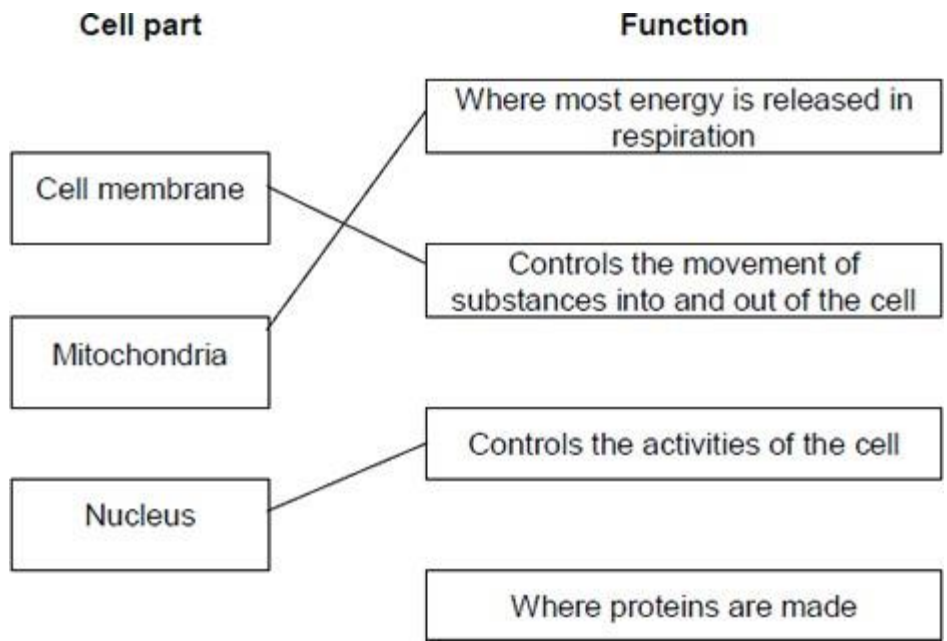
- temperature too high

1

[12]

7

(a)



*extra lines cancel*

3

(b) Cell wall

*in either order*

1

Chloroplast

*allow (permanent) vacuole*

1

[5]

8

(a)

(i)

water / H<sub>2</sub>O

*accept oxygen*

*allow H<sub>2</sub>O*

*do **not** allow H<sup>2</sup>O or H2O*

1

(ii) the mineral ions are absorbed by active transport

1

the absorption of mineral ions needs energy

1

(iii) have (many root) hairs

1

(which) give a large surface area (for absorption)

1

- (b) carbon dioxide in  
**or**  
oxygen out  
**or**  
control water loss  
*accept gas exchange*  
*ignore gases in and out*  
*ignore gain / lose water*

1

- (c) (i) guard cells

1

- (ii) (stomata are) closed  
*allow there is no gap / space*

1

- (iii) plant will wilt / droop  
*ignore die*

1

**[9]**