

1.

Cells can be classified according to their structure.

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

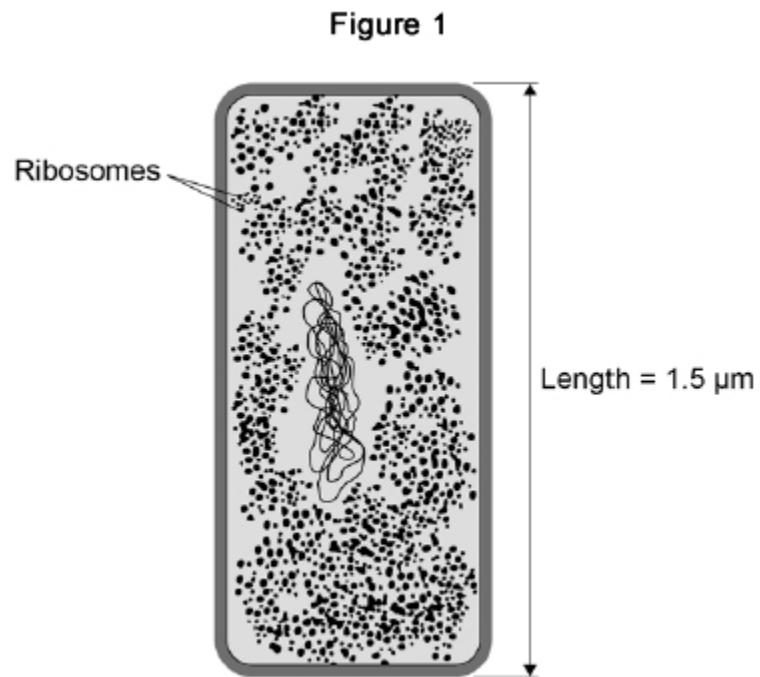
Write a tick or a cross in each box.

**Table 1**

	Nucleus	Plasmids	Cytoplasm
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?

---

---

(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).

---



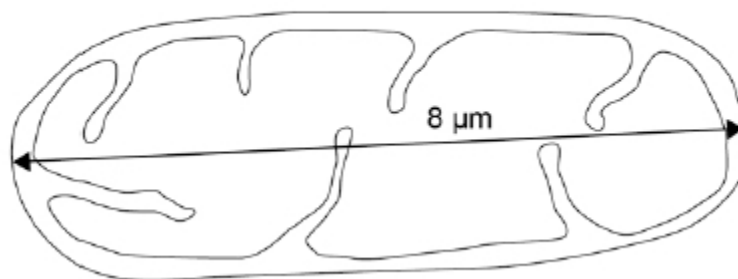
---

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.

---

---

---

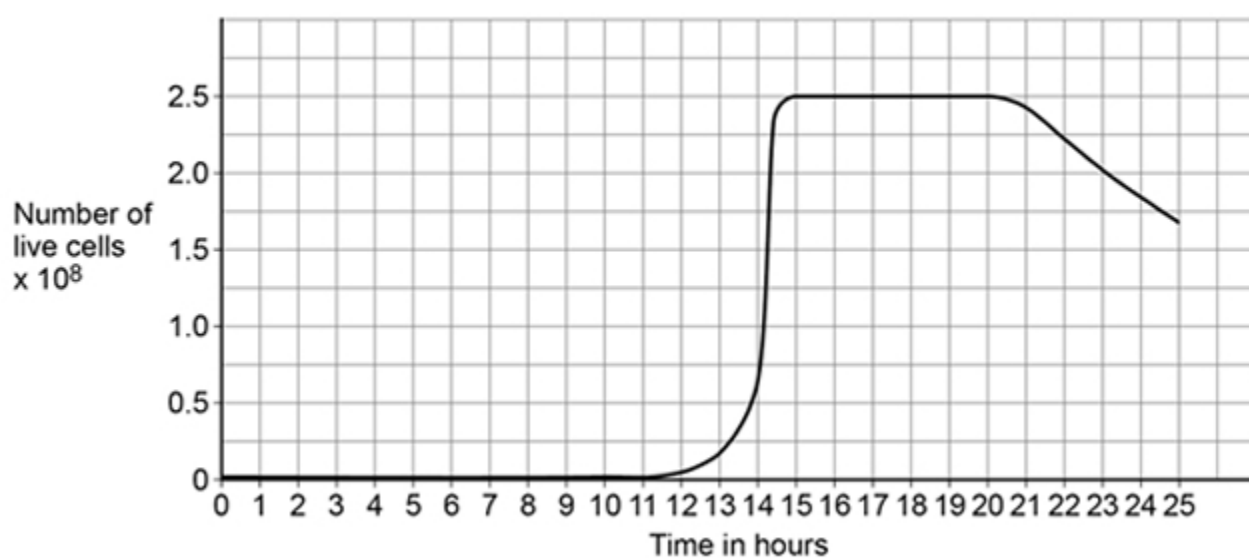
---

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.

---

---

---

---

---

---

(3)

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

(1)

(Total 12 marks)

**2.**

Living organisms are made of cells.

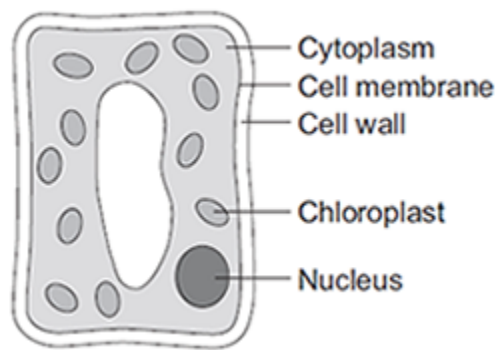
- (a) Animal and plant cells have several parts. Each part has a different function.

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. \_\_\_\_\_

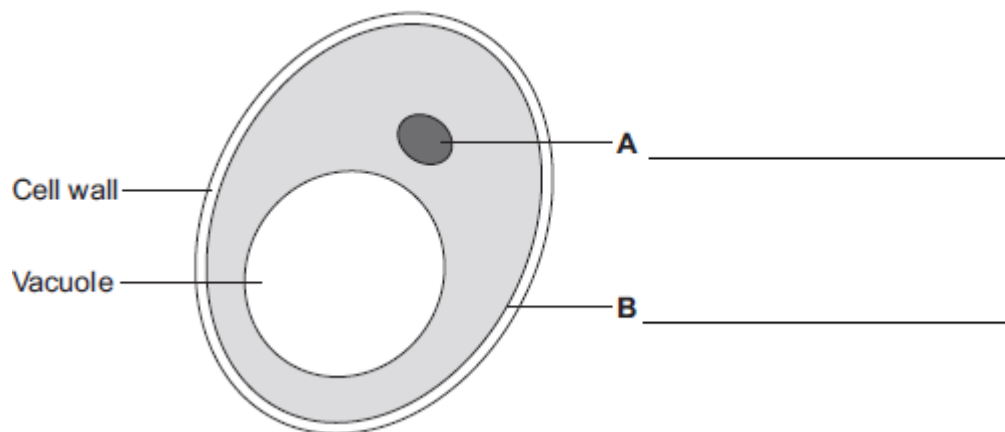
(2)

(Total 5 marks)

**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?

\_\_\_\_\_  
\_\_\_\_\_

(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

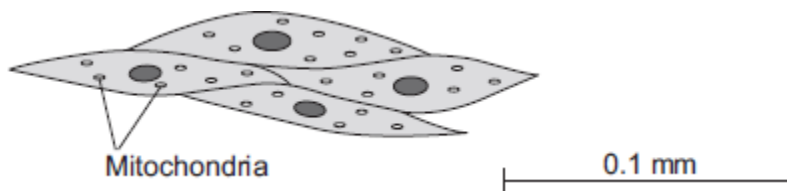
\_\_\_\_\_

(1)

(Total 5 marks)

4.

The image below shows some muscle cells from the wall of the stomach, as seen through a light microscope.



(a) Describe the function of muscle cells in the wall of the stomach.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2)

- (b) The figure above is highly magnified.

The scale bar in the figure above represents 0.1 mm.

Use a ruler to measure the length of the scale bar and then calculate the magnification of the figure above.

---

---

---

---

Magnification = \_\_\_\_\_ times

(2)

- (c) The muscle cells in **Figure above** contain many mitochondria.

What is the function of mitochondria?

---

---

---

---

(2)

- (d) The muscle cells also contain many ribosomes. The ribosomes cannot be seen in the figure above.

- (i) What is the function of a ribosome?

---

---

(1)

- (ii) Suggest why the ribosomes **cannot** be seen through a light microscope.

---

---

(1)

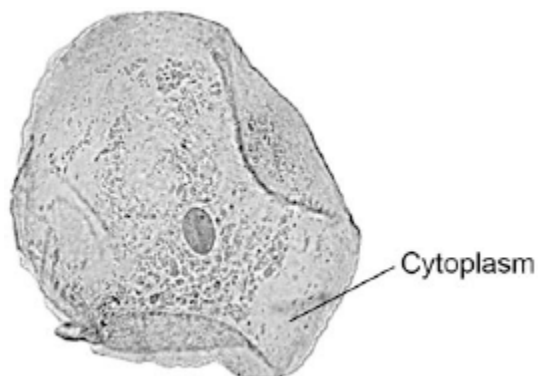
(Total 8 marks)



5.

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

**Figure 1**



© Ed Reschke/Photolibrary/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

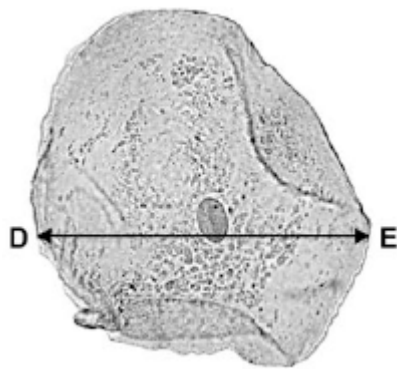
☐

(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:

$$\text{real size} = \frac{\text{image size}}{\text{magnification}} \quad \text{_____ mm}$$

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

(3)

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

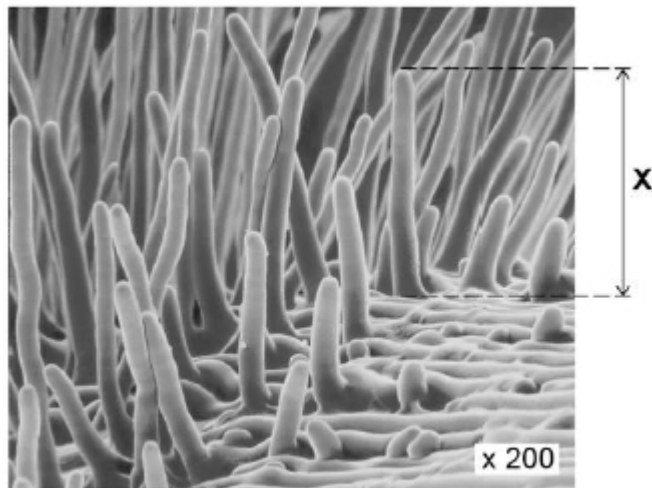
☐

(1)

(Total 9 marks)

6.

The image below shows part of a root from a cress plant.



(a) What type of microscope was used to create the image above?

---

(1)

- (b) The magnification of the cress root in the image above is  $\times 200$ .  
There are 1000 micrometres ( $\mu\text{m}$ ) in a millimetre (mm).

Calculate the real length of the root hair, **X**.

Give your answer in micrometres ( $\mu\text{m}$ ).

---



---



---



---

Real length **X** = \_\_\_\_\_  $\mu\text{m}$

**(2)**

- (c) Root hair cells take up water from the soil.

Explain **one** way in which the root hair cell is adapted to this function.

---



---



---



---

**(2)**

The table shows the water uptake by a plant's roots on two different days.

	Mean water uptake in $\text{cm}^3$ per hour
Cold day	1.8
Hot day	3.4

- (d) Explain why the mean rate of water uptake is higher on a hot day than on a cold day.

---



---



---



---



---



---

**(3)**

- (e) The concentration of mineral ions in the soil is lower than in root hair cells.  
Root hair cells take up mineral ions from the soil.  
Root hair cells contain mitochondria.

Explain why root hair cells contain mitochondria.

---

---

---

---

---

---

---

---

**(4)**

**(Total 12 marks)**