

Q1.

A student prepared some animal cells to view using a microscope.

Figure 1 shows the student preparing the cells.

Figure 1



- (a) Name two pieces of laboratory equipment the student could have used to prepare cells to view using a microscope.

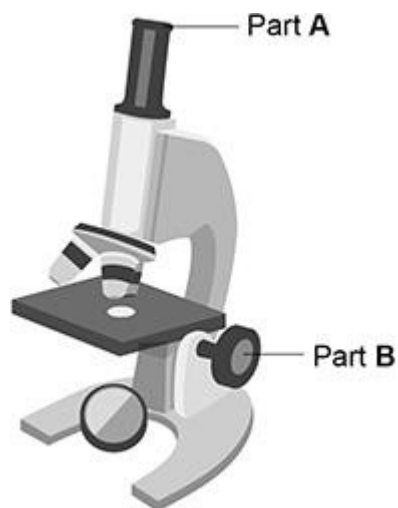
1 _____

2 _____

(2)

Figure 2 shows the student's light microscope.

Figure 2



- (b) Name part A.

(1)

- (c) What is the function of part B?

(1)

- (d) The student tried to look at the cells using the microscope.

Suggest one reason why the student could not see any cells when looking through part A.

(1)

- (e) Red blood cells are specialised animal cells.

Compare the structure of a red blood cell with the structure of a plant cell.

(6)

- (f) When placed into a beaker of water:

a red blood cell bursts

a plant cell does not burst.

Explain why the red blood cell bursts but the plant cell does not burst.

(2)

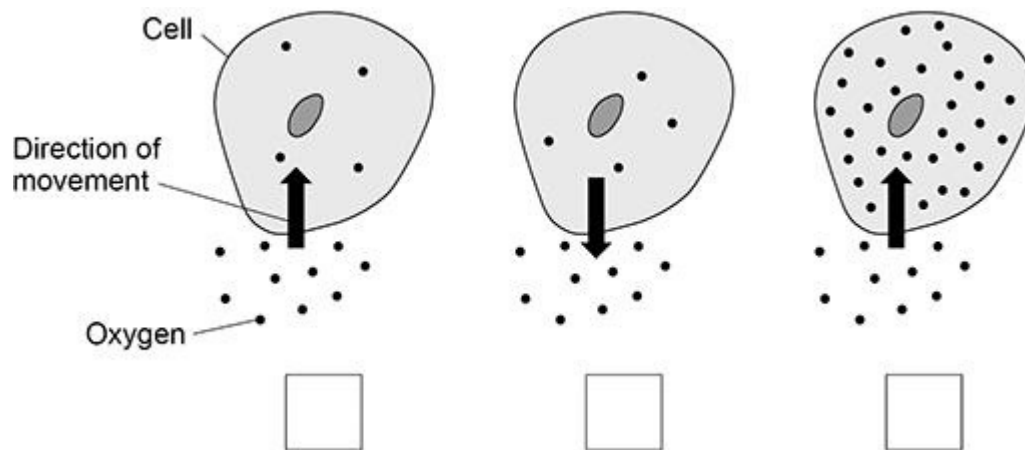
(Total 13 marks)

Q2.

This question is about cells.

(a) Which diagram shows oxygen moving by diffusion?

Tick (✓) one box.



(1)

(b) Complete the sentences.

Choose answers from the box.

carbon dioxide	chlorophyll	energy
light	mineral ions	water

Plant cells absorb substances from the soil.

Plant cells use osmosis to absorb _____.

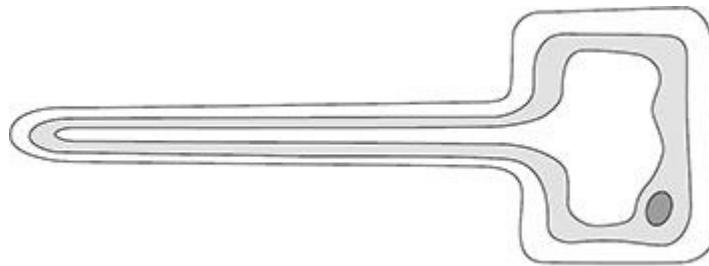
Plant cells use active transport to absorb _____.

Active transport moves substances against the concentration gradient and needs _____.

(3)

Figure 1 shows a specialised cell that absorbs substances from the soil.

Figure 1



(c) Name the type of specialised cell in Figure 1.

(1)

(d) Describe how the cell in Figure 1 is adapted to increase the absorption of substances from the soil.

(1)

A sperm cell is another specialised cell.

Figure 2 shows a sperm cell.

Figure 2



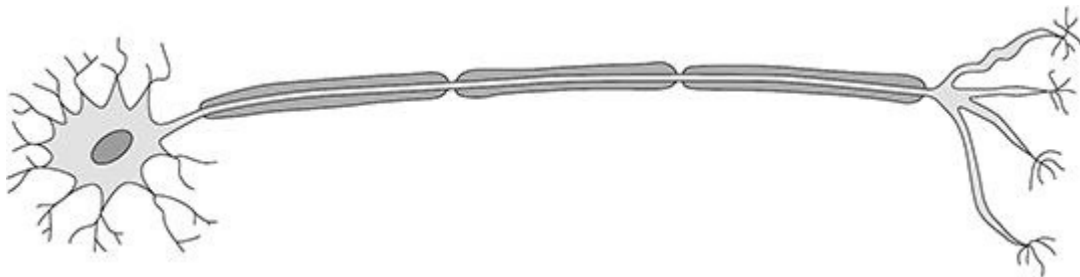
- (e) Draw one line from each feature to how the feature helps the sperm cell carry out its function.

Feature of sperm cell	How the feature helps
Contains a nucleus	To break the outer layer of the egg
	To help the cell to swim to the egg
Has a long tail	To provide the chromosomes for fertilisation
	To release energy

(2)

Figure 3 shows another specialised cell.

Figure 3



- (f) Name the type of cell in Figure 3.

Describe one feature of the cell that helps it to carry out its function.

Name of the cell _____

Feature of the cell _____

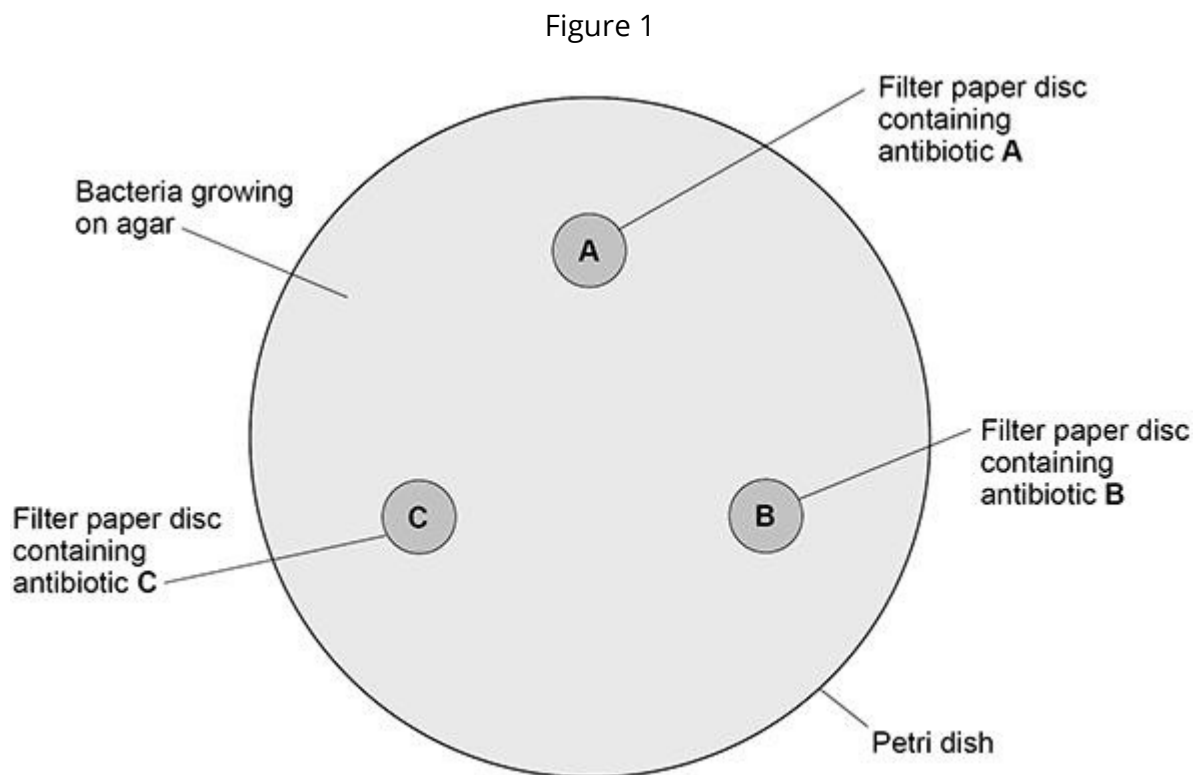
(2)

(Total 10 marks)

Q3.

A student investigated the effectiveness of three different antibiotics.

Figure 1 shows how the student set up an agar plate.



The student used aseptic techniques to make sure that only one type of bacterium was growing on the agar.

(a) Describe two aseptic techniques the student should have used.

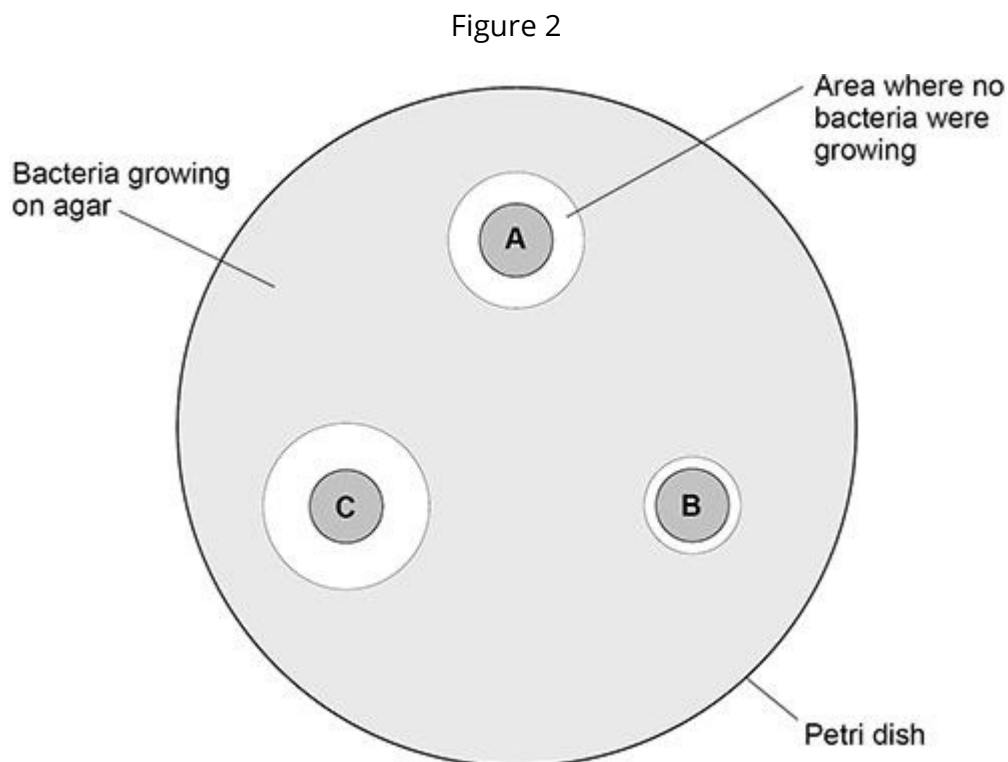
1 _____

2 _____

(2)

The student placed the agar plate in an incubator at 25 °C for 48 hours.

Figure 2 shows the agar plate after 48 hours.



- (b) Which antibiotic is the least effective?

Give a reason for your answer.

Least effective antibiotic _____

Reason _____

(1)

- (c) Calculate the area where no bacteria were growing for antibiotic C.

Use $\pi = 3.14$

Give the unit.

Area = _____ Unit _____

(5)

- (d) Suggest one way the student could improve the investigation.

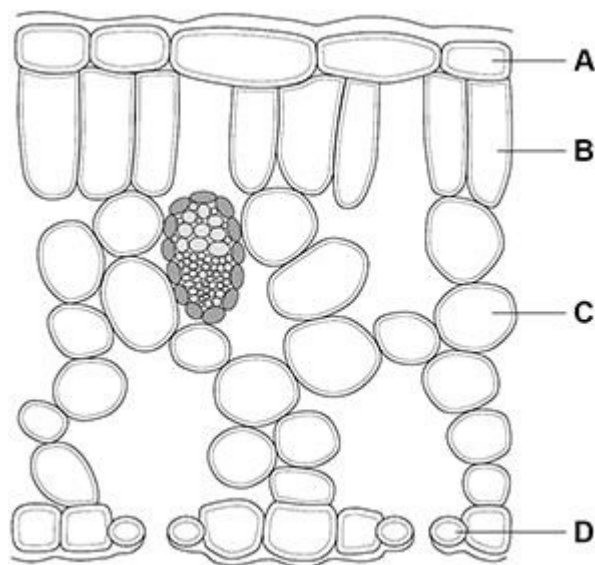
(1)

(Total 9 marks)

Q4.

Figure 1 shows a cross section of a leaf.

Figure 1



- (a) Which cell is most transparent?

Tick (✓) one box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>	D	<input type="checkbox"/>
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(1)

- (b) Which cell structure in a leaf mesophyll cell is not found in a root hair cell?

.....

(1)

Plants lose water through their leaves.

- (c) Name the cells in a leaf that control the rate of water loss.

.....

(1)

- (d) Water is taken in by the roots, transported up the plant and lost from the leaves.

Which scientific term describes this movement of water?

.....

(1)

- (e) Which change would decrease the rate of water loss from a plant's leaves?

Tick (✓) one box.

Increased humidity

☐

Increased light intensity

☐

Increased density of stomata

☐

Increased temperature

☐

(1)

- (f) Compare the structure and function of xylem tissue and phloem tissue.

.....

.....

.....

.....

.....

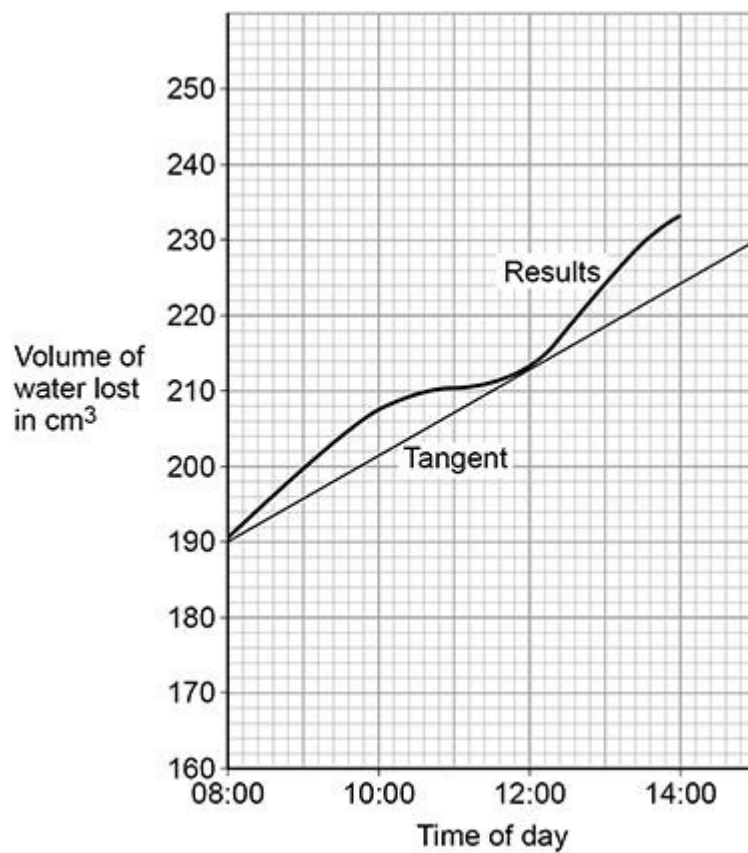
.....

.....

(6)

Figure 2 shows the total volume of water lost from a plant over 6 hours.

Figure 2



(g) Determine the rate of water loss at 12:00

Use the tangent on the graph above.

Give your answer:

- in cm³ per minute
- in standard form.

Rate of water loss = _____ cm³ per minute

(4)

- (h) The rate of water loss at midnight was much lower than at 12:00

Explain

why.

(2)

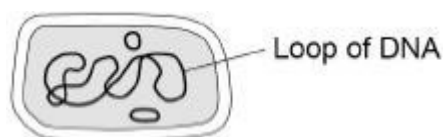
(Total 17 marks)

Q5.

This question is about cells.

- (a) Figure 1 shows a cell.

Figure 1



What type of cell is shown in Figure 1?

Tick (✓) one box.

Animal

☐

Bacterium

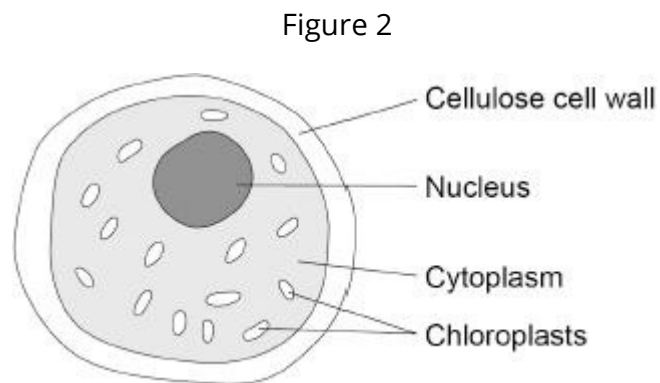
☐

Plant

☐

(1)

Figure 2 shows an algal cell.



(b) What is the function of the cell wall?

Tick (✓) one box.

To contain the genetic material

☐

To stop the chloroplasts leaking out

☐

To strengthen the cell

☐

(1)

(c) The algal cell is green.

Which part of the algal cell makes it green in colour?

Tick (✓) one box.

Cellulose

☐

Chloroplast

☐

Cytoplasm

☐

Nucleus

☐

(1)

- (d) Cells contain sub-cellular structures.

Draw one line from each structure to its function.

Structure	Function
	Controls transport of substances into the cell
Cell membrane	Where energy is released
Mitochondria	Where glucose is made
Ribosomes	Where photosynthesis takes place
	Where proteins are made

(3)

A student prepared a microscope slide of cheek cells.

The student looked at one cell using a microscope.

Figure 3 shows the image the student saw.

Figure 3



(e) What should the student do to get a clear image?

Tick (✓) one box.

Adjust the focus knob

☐

Make the light dimmer

☐

Put water on the slide

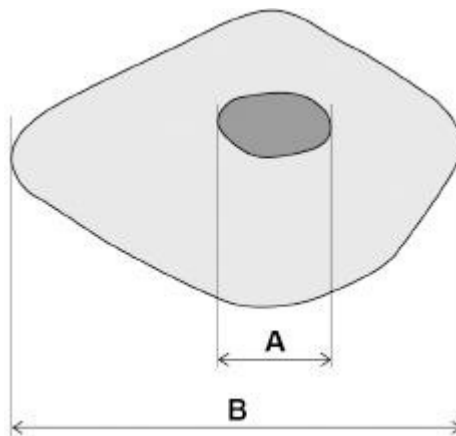
☐

(1)

The student then obtained a clear image.

Figure 4 shows the clear image.

Figure 4



(f) Measure the length of the nucleus (A) and the length of the cell (B) in millimetres (mm).

A = _____ mm

B = _____ mm

(2)

(g) How many times longer is the cell (B) than the nucleus (A)?

Number of times longer = _____

(1)

- (h) The student looked at another cell.

The image width of the cell was 40 mm

The real width of the cell was 0.1 mm

Calculate the magnification of the cell.

Use the equation:

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

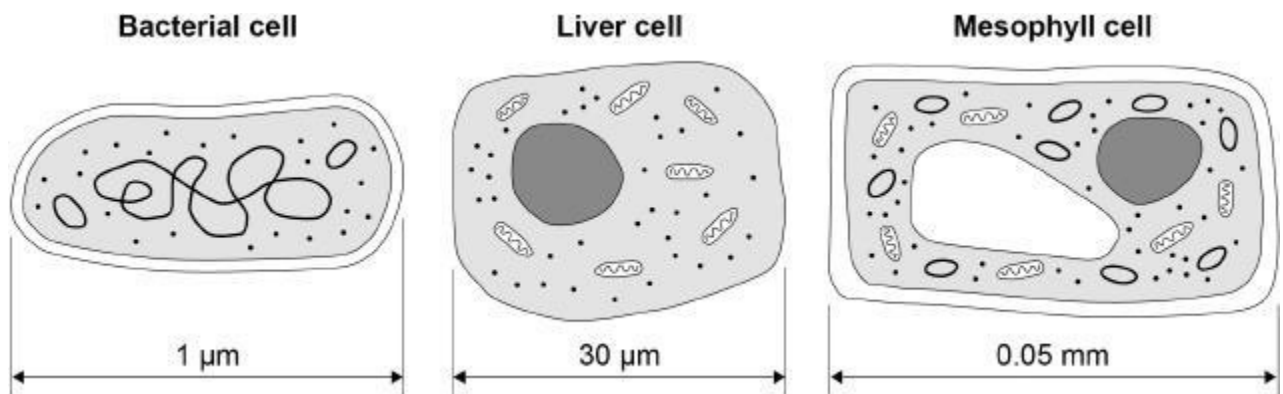
Magnification = \times _____

(2)

(Total 12 marks)

Q6.

The diagram below shows three types of cell.



- (a) Give two similarities between the prokaryotic cell and the eukaryotic cells in the diagram above.

1 _____

2 _____

(2)

- (b) Give three differences between the prokaryotic cell and the eukaryotic cells in the diagram above.

1 _____

2 _____

3 _____

(3)

- (c) Calculate the ratio of the size of the bacterial cell to the size of the mesophyll cell.

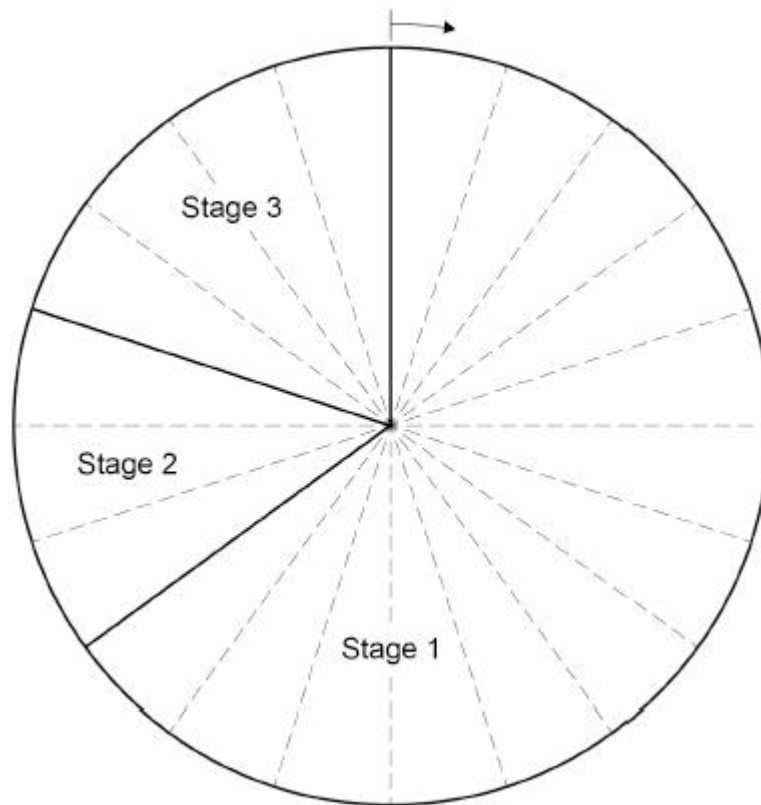
Ratio = 1 : _____

(2)

- (d) Name the type of cell division that produces genetically identical body cells for growth and repair.

(1)

The chart below shows a cell cycle.



- (e) What percentage of the time for one cell cycle is represented by stage 2 and stage 3 together?
Tick (✓) one box.

7% ☐ 35% ☐ 40% ☐ 65% ☐

(1)

- (f) Describe what happens during each stage of the cell cycle.

Stage 1

Stage 2

Stage

3

(4)

(Total 13 marks)

Q7.

Figure 1 shows an animal cell viewed using a microscope.

Figure 1



- (a) The cell contains a nucleus.

What is the function of the nucleus?

(1)

- (b) Name one type of cell that does not contain a nucleus.

(1)

- (c) Draw a simple diagram of the cell in Figure 1.

Label two parts of the cell.

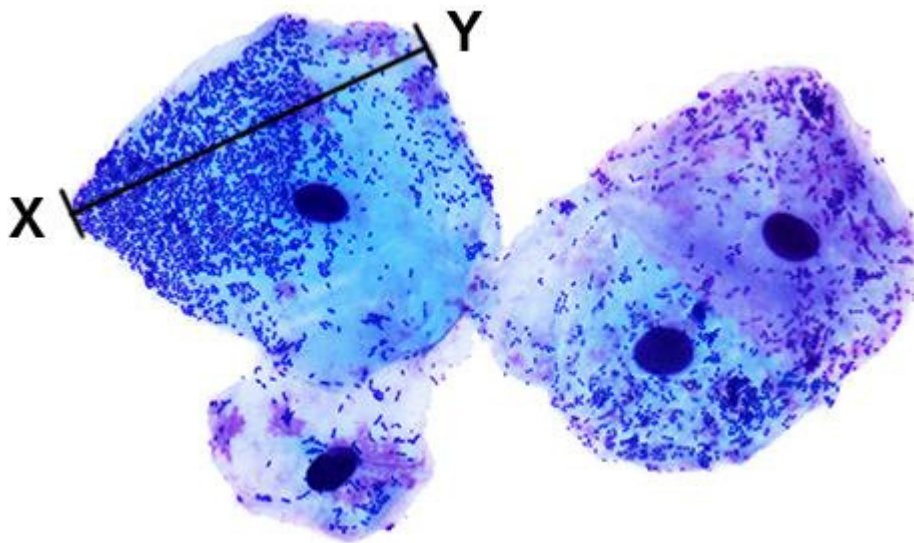
(2)

- (d) Name one structure found in a plant cell but not found in an animal cell.

(1)

Figure 2 shows some different cells.

Figure 2



- (e) The real length from point X to point Y is 0.06 mm

Calculate the magnification.

Use the equation:

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

Magnification = \times _____

(3)

- (f) The cells shown in Figure 2 were viewed using a light microscope.

Give two advantages of using an electron microscope instead of a light microscope.

1 _____

2 _____

(2)

(Total 10 marks)

Q8.

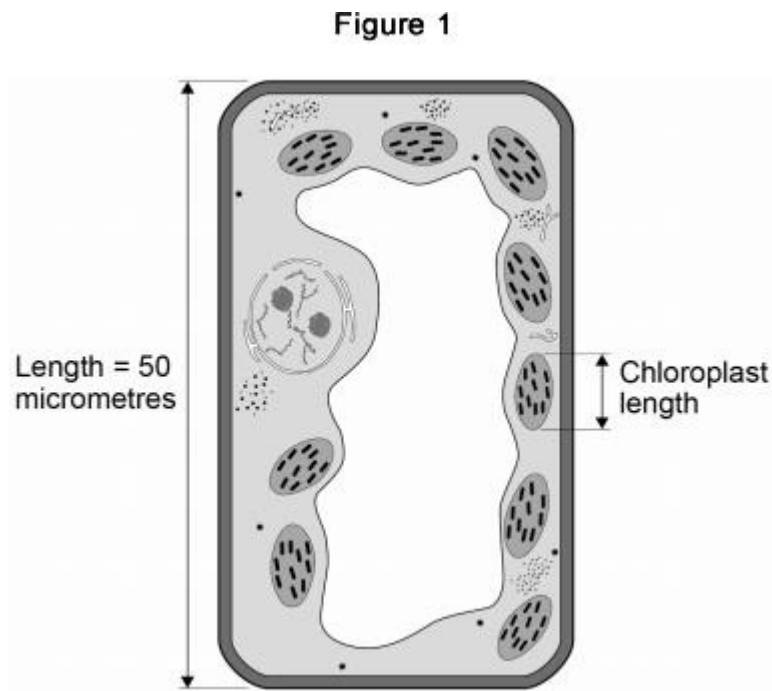
Plants are made up of cells, tissues and organs.

- (a) Draw one line from each level of organisation to the correct plant part.

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

(2)

Figure 1 shows a plant cell drawn to scale.



(b) Where in a plant would the cell in Figure 1 be found?

Tick one box.

Epidermis

☐

Palisade mesophyll

☐

Phloem

☐

Xylem

☐

(1)

(c) Calculate the length of the chloroplast labelled in Figure 1.

Length = _____ micrometres

(2)

- (d) Cells in plant roots do not photosynthesise.

Give one reason why.

(1)

- (e) As a plant grows, new root hair cells are formed from unspecialised cells.

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

Tick one box.

Differentiation

☐

Metabolism

☐

Transpiration

☐

Transport

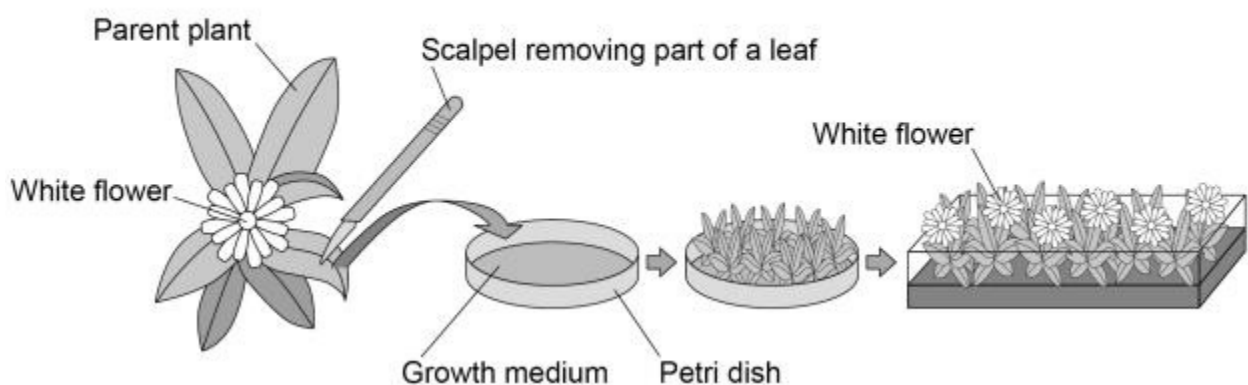
☐

(1)

Scientists can clone plants using tissue culture.

Figure 2 shows the process of tissue culture.

Figure 2



(f) Why might scientists want to clone plants?

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.

☐

(1)

(g) What is the advantage of cloning plants using tissue culture?

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.

☐

(1)

(h) The growth medium in Figure 2 helps the plants to grow.

Name one substance in the growth medium.

(1)

(Total 10 marks)

Q9.

Cells can be classified according to their structure.

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

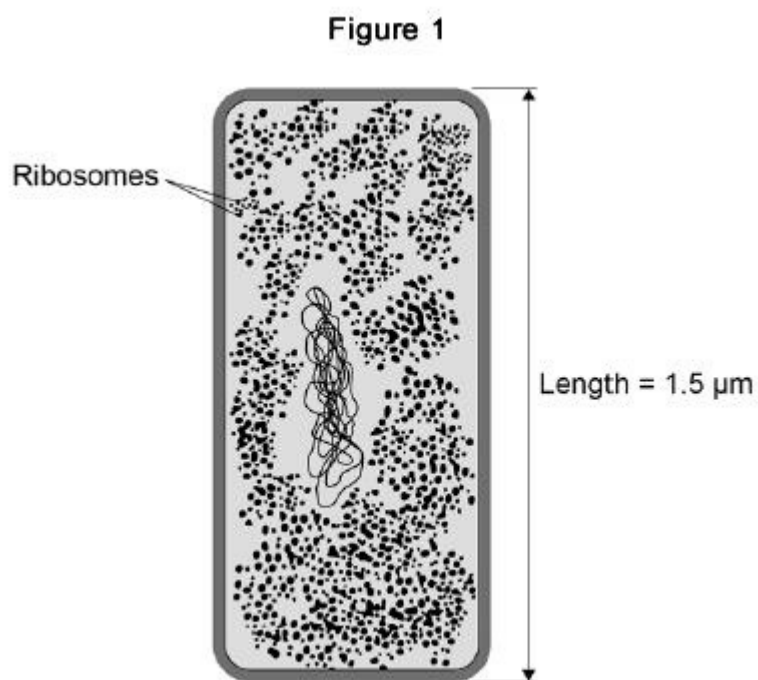
Write a tick or a cross in each box.

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)

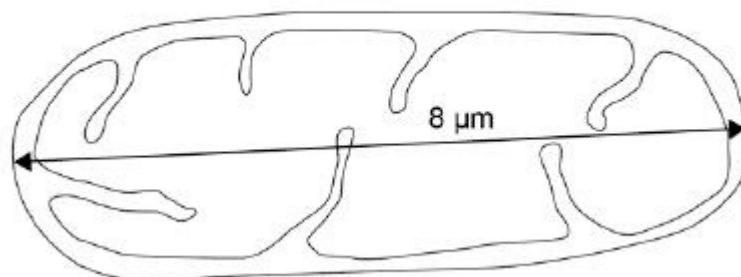
- (d) There are 1000 micrometres (μm) in a millimetre (mm). The length of the cell in Figure 1 is 1.5 micrometres (μm). Give the length of the cell in millimetres (mm).

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

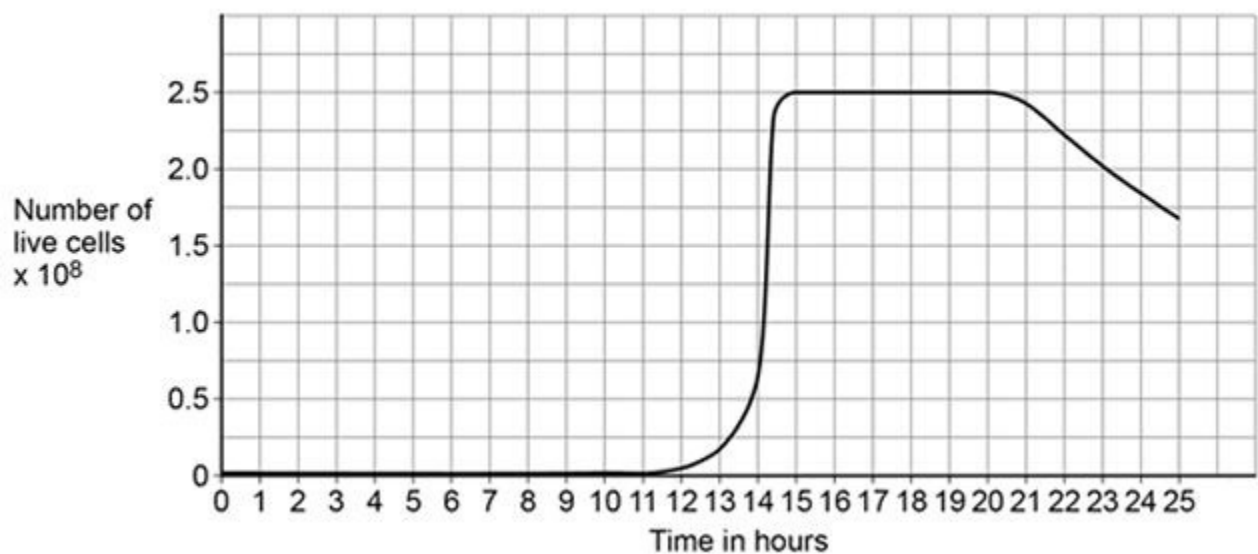
- (f) Calculate how many cells will be present after 2 hours.

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)

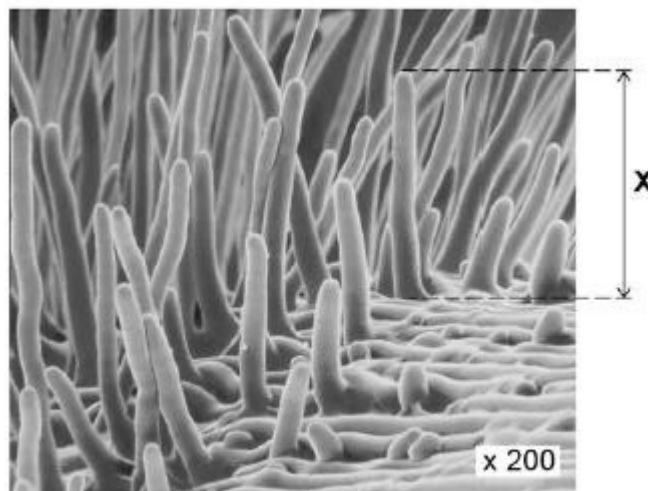
- (h) Suggest one reason why the number of live cells decreases after 20 hours.

(1)

(Total 12 marks)

Q10.

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 (μm) in a millimetre (mm).

Calculate the real length of the root hair, X.

Give your answer in micrometres (μm).

Real length X = _____ μm

(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 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.

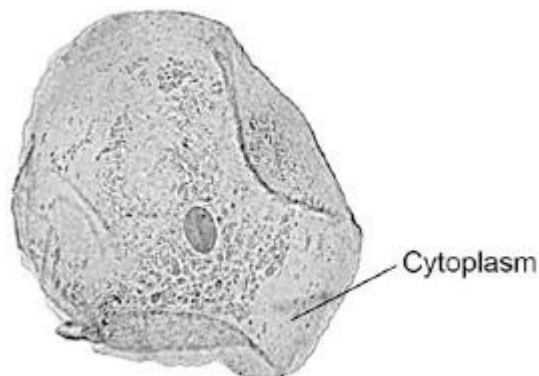
(4)

(Total 12 marks)

Q11.

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

☐

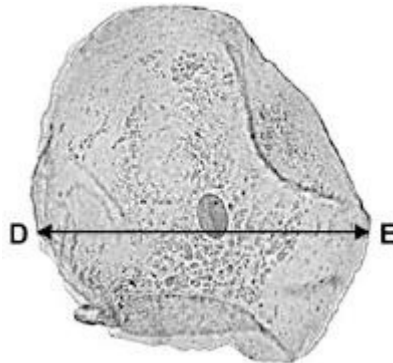
Lower resolution

☐

(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 (μm).

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:

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

Convert mm to μm _____
 μm

(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 μm

☐

0.2 μm

☐

2.0 μm

☐

20.0 μm



(1)

(Total 9 marks)

Q12.

Living organisms are made of cells.

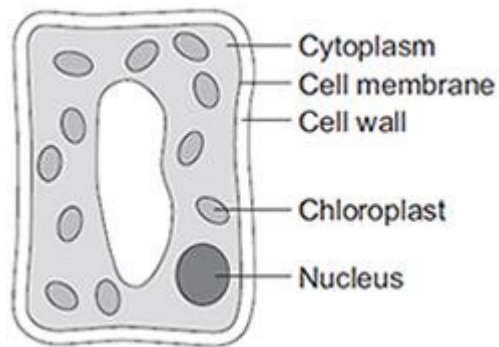
- (a) Animal and plant cells have several parts. Each part has a different function.

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)