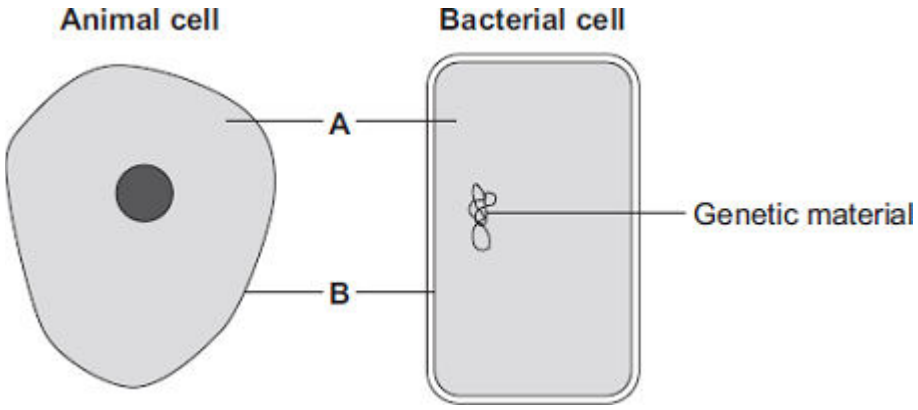
1 The diagrams show an animal cell and a bacterial cell.



(a) (i) Structures **A** and **B** are found in both the animal cell and the bacterial cell.

Use words from the box to name structures **A** and **B**.

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

A .....

B .....

(2)

(ii) Both cells contain genetic material.

Name the structure in the animal cell that contains genetic material.

.....

(1)

(b) **List A** gives three structures found in animal cells.

List B gives four functions of cell structures.

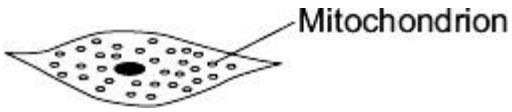
Draw **one** line from each structure in **List A** to its correct function in **List B**.

List A – Structure	**List B – Function**
	Controls what substances enter the cell
Cell membrane	
	Photosynthesis
Mitochondrion	
	Protein synthesis
Ribosome	
	Respiration

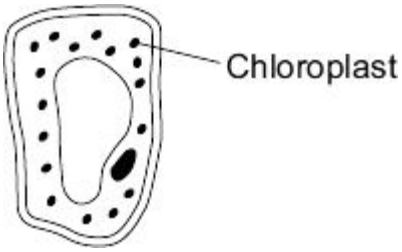
(3)
(Total 6 marks)

2 The diagrams show four cells, **A**, **B**, **C** and **D**.

A

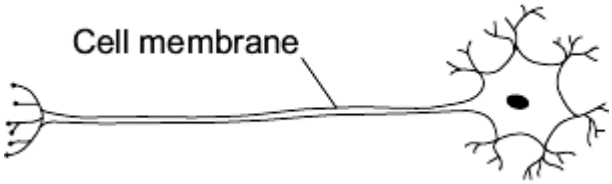


B



C

D



Use letters **A**, **B**, **C** or **D** to answer these questions.

(a) Which cell can photosynthesise? ☐

(1)

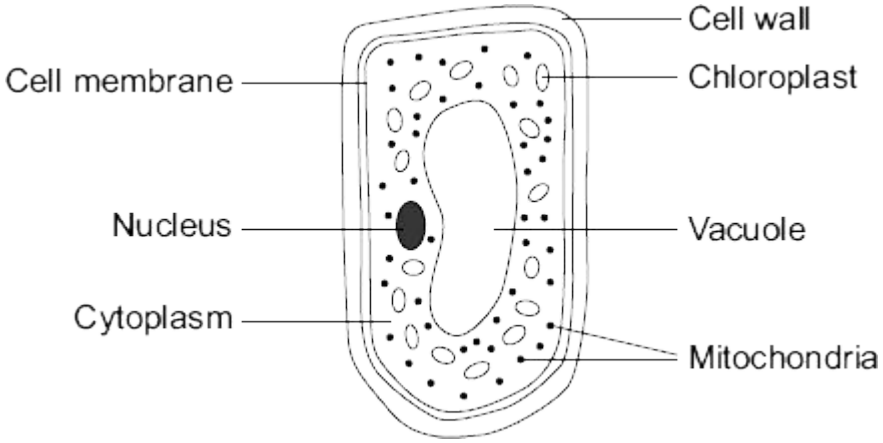
(b) Which cell is adapted for receiving and sending information? ☐

(1)

(c) Which cell is adapted to respire quickly? ☐

(1)
(Total 3 marks)

3 The diagram shows a cell from a plant leaf.



(a) Name the part of this cell that:

(i) controls the passage of substances in and out of the cell

.....

(1)

(ii) is filled with cell sap.

.....

(1)

(b) Give the names of **two** parts of the leaf cell that would **not** be found in a human liver cell.

..... and .....

(2)

(c) The chloroplasts produce oxygen.

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

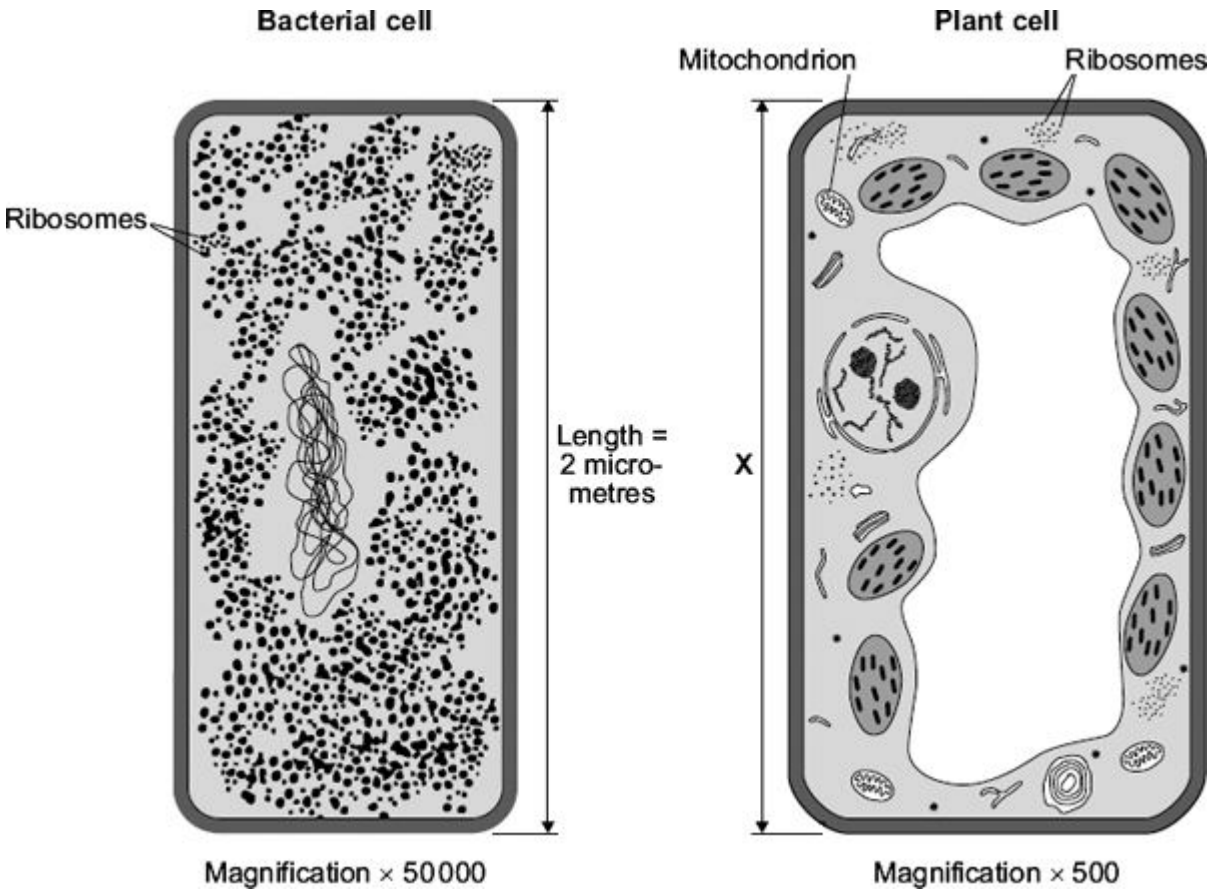
The oxygen produced by the chloroplasts passes out of the cell by

diffusion.
digestion.
respiration.

(1)

(Total 5 marks)

4 The diagram shows two cells, a bacterial cell and a plant cell.



(a) (i) Both the bacterial cell and the plant cell contain ribosomes.

What is the function of a ribosome?

.....

.....

(1)

(ii) The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Give **one** other way in which the plant cell is different from the bacterial cell.

.....

.....

(1)

(b) (i) Both cells are drawn the same length, but the magnification of each cell is different.

The real length of the bacterial cell is 2 micrometres.
Calculate the real length, **X**, of the plant cell. Give your answer in micrometres.

Show clearly how you work out your answer.

.....

.....

.....

X = ... micrometres

(2)

(ii) Most mitochondria are about 3 micrometres in length.

The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Use your answer to part (b)(i) and the information in the diagram to suggest why.

.....

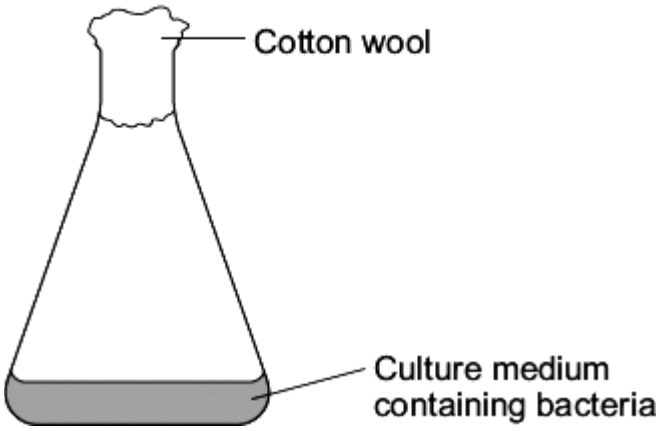
.....

(1)
(Total 5 marks)

5 Some students grew one species of bacterium in a flask.

Diagram 1 shows the flask.

Diagram 1



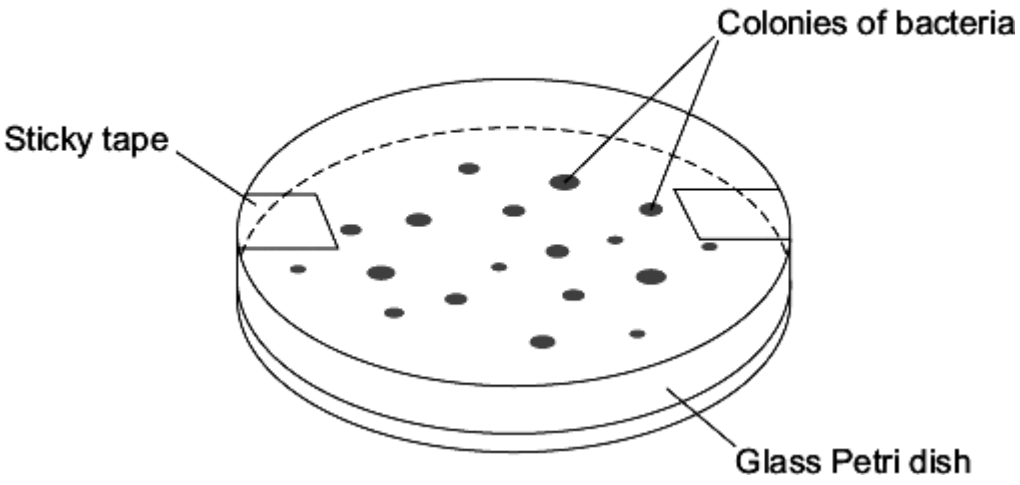
The students wanted to find the number of bacteria in 1 cm^3 of the culture medium.

The students:

- diluted 1 cm^3 of the culture medium from the flask with 999 cm^3 of water
- added 1 cm^3 of diluted culture to sterilised nutrient agar in a Petri dish
- placed the Petri dish in an incubator at 25 °C.

Diagram 2 shows the Petri dish after 3 days in the incubator.

Diagram 2



(a) Each colony of bacteria is formed where one bacterium landed on the agar jelly.

How is each colony formed?

.....

.....

(1)

(b) Complete the following calculation to find how many bacteria there were in 1 cm^3 of the undiluted culture.

Number of colonies of bacteria in the Petri dish = ...

These colonies were formed from 1 cm^3 of the culture diluted × 1000.

Therefore, number of bacteria in 1 cm^3 of undiluted culture = ...

(2)

(c) It is important to sterilise the culture medium and all the apparatus before use.

Explain why.

.....

.....

.....

.....

(2)

(d) The bacteria would grow faster at 35 °C. In a school laboratory, the Petri dish should **not** be incubated at a temperature higher than 25 °C.

Why?

.....

.....

(1)

(e) The students decided to repeat their investigation.

Why?

.....

.....

(1)

(Total 7 marks)

6 The table shows the concentrations of three mineral ions in the roots of a plant and in the water in the surrounding soil.

Mineral ion	Concentration in millimoles per kilogram	
	Plant root	Soil
Calcium	120	2.0
Magnesium	80	3.1
Potassium	250	1.2

(a) (i) The plant roots could **not** have absorbed these mineral ions by diffusion.

Explain why.

.....

.....

.....

.....

(2)

(ii) Name the process by which the plant roots absorb mineral ions.

.....

(1)

(b) How do the following features of plant roots help the plant to absorb mineral ions from the soil?

(i) A plant root has thousands of root hairs.

.....

.....

(1)

(ii) A root hair cell contains many mitochondria.

.....

.....

.....

.....

(2)

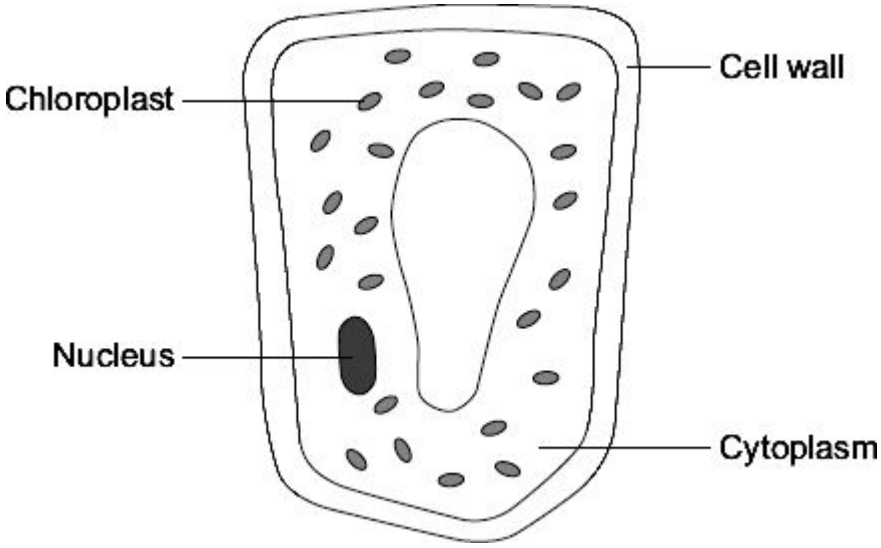
(iii) Many of the cells in the root store starch.

.....

.....

(1)
(Total 7 marks)

7 The diagram shows a plant cell from a leaf.



(a) **List A** gives the names of three parts of the cell.
List B gives the functions of parts of the cell.

Draw a line from each part of the cell in **List A** to its function in **List B**.

List A **Parts of the cell**	**List B** **Functions**
	Where most of the chemical reactions take place
Nucleus	
	Absorbs light energy to make food
Cytoplasm	
	Strengthens the cell
Chloroplast	
	Controls the activities of the cell

(3)

(b) Respiration takes place in the cell.

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

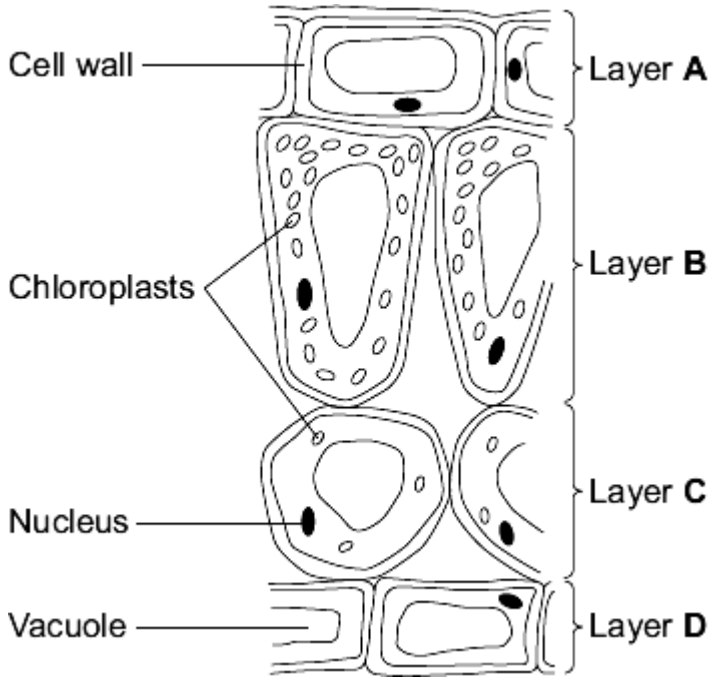
All cells use respiration to release

- energy
- oxygen.
- sugar.

(1)
(Total 4 marks)

8 Leaves are made from layers of cells.

The diagram shows a section through part of a leaf.



(a) (i) Which word in the table describes layer **A**?

Tick (✓) **one** box.

Layer A	**Tick (✓)**
Tissue	
Organ	
Cell	

(1)

(ii) Which word describes a whole leaf?

Draw a ring around **one** answer.

organ **tissue** **organism**

(1)

(b) (i) Which **two** layers of cells, **A**, **B**, **C** and **D**, can photosynthesise?

Use information from the diagram to help you.

Tick (✓) **two** boxes.

Layer **A** ☐

Layer **B** ☐

Layer **C** ☐

Layer **D** ☐

(2)

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

.....

.....

(1)

(c) List **X** gives the names of two parts of a cell.
List **Y** gives information about parts of a cell.

Draw **one** line between each part of the cell in list **X** and information about it in list **Y**.

List X **Part of a cell**	**List Y** **Information**
	Controls the passage of substances into the cell
Vacuole	
	Contains the cell sap
Nucleus	
	Controls the activities of the whole cell

(2)
(Total 7 marks)

9 Cells contain a solution of salts and sugars.

A student is investigating how cells change when they are put into water.

(a) The student:

- looks at a plant cell using a microscope
- adds water to the cell.

The plant cell swells up.

Explain why, as fully as you can.

.....

.....

.....

.....

.....

.....

(3)

(b) When **animal** cells are put in water, they swell up, and then burst.
When **plant** cells are put in water, they swell up, but do **not** burst.

How does the structure of plant cells prevent them from bursting?

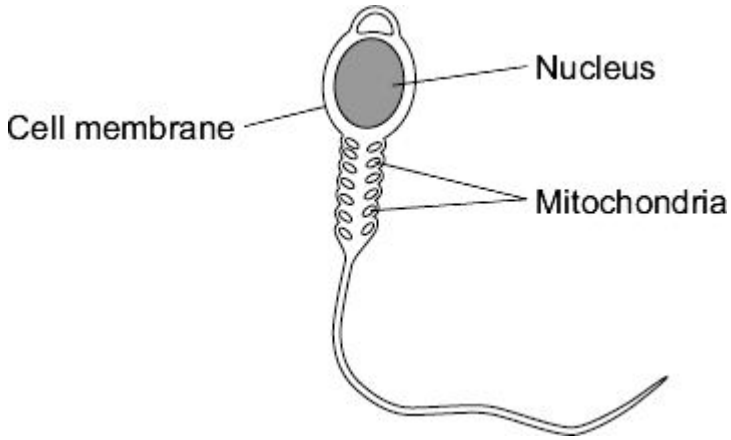
.....

.....

(1)
(Total 4 marks)

10 Cells in the human body are specialised to carry out their particular function.

(a) The diagram shows a sperm cell.



The sperm cell is adapted for travelling to, then fertilising, an egg.

(i) How do the mitochondria help the sperm to carry out its function?

.....

.....

(1)

(ii) The nucleus of the sperm cell is different from the nucleus of body cells.

Give **one** way in which the nucleus is different.

.....

.....

(1)

(b) Stem cells from human embryos are used to treat some diseases in humans.

Explain why.

.....

.....

.....

.....

(2)
(Total 4 marks)

11 Humans reproduce sexually.

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

(a) (i) At fertilisation [chromosomes / genes / sex cells] join together.

(1)

(ii) At fertilisation a single cell forms, which has new pairs of [chromosomes. / nuclei. / sex cells.]

(1)

(b) Cystic fibrosis can be inherited by children whose parents do not have it.

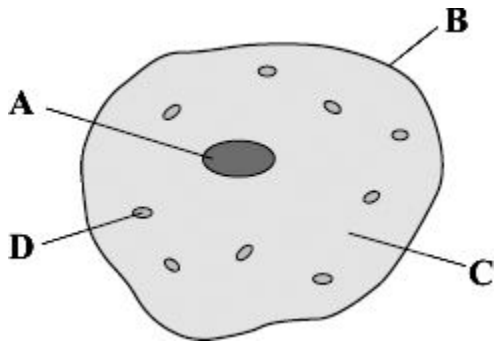
(i) A person who has cystic fibrosis has [two / three / four] copies of the cystic fibrosis allele.

(1)

(ii) The cystic fibrosis allele is [large. / recessive. / strong.]

(1)

(c) The diagram shows a human body cell.



Choose the correct answer from the box to complete each sentence.

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

(i) The part of the cell labelled **B** is the .....

(1)

(ii) The part of the cell labelled **C** is the .....

(1)

(d) Which part of the cell, **A**, **B**, **C** or **D**:

(i) contains the allele for cystic fibrosis ☐

(1)

(ii) is affected by cystic fibrosis? ☐

(1)

(Total 8 marks)

12 Plants need mineral ions for healthy growth.

(a) Which part of a plant takes in mineral ions?

Tick (✓) **one** box.

Flower ☐

Leaf ☐

Root ☐

(1)

(b) Leaves are usually green.

(i) What is the green substance in leaves?

Draw a ring around your answer.

chlorophyll **glucose** **starch**

(1)

(ii) The green substance in leaves is important to plants.

Explain why.

.....

.....

.....

.....

(2)

(c) A shortage of mineral ions can affect a plant.

Draw **one** line from each mineral ion to the effect of its shortage.

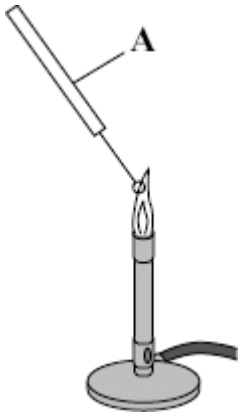
Mineral ion	**Effect of its shortage**
Magnesium	Yellow leaves
Nitrate	Stunted growth
	White flowers

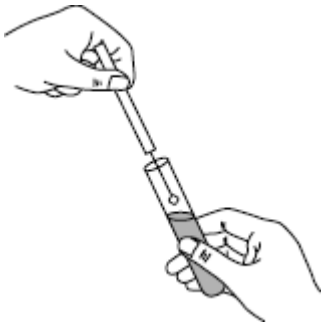
(2)
(Total 6 marks)

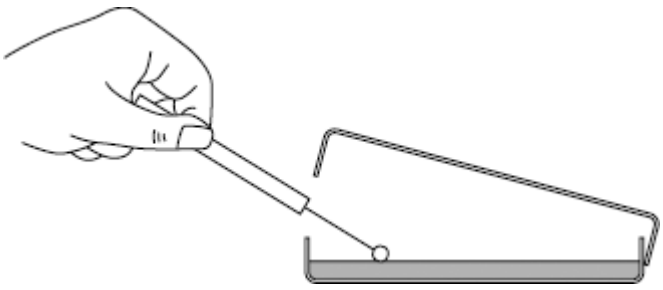
13 (a) It is important to prevent contamination when growing microorganisms.

The diagram shows the transfer and culturing of microorganisms.

Stage V  A Petri dish with agar is heated to 150 °C for 50 minutes, then cooled

Stage W 

Stage X 

Stage Y 

Stage Z  Petri dish kept at 25 °C for 48 hours

(i) Name the apparatus labelled **A** in stage **W**.

Draw a ring around **one** answer.

inoculating loop **pipette** **thermometer**

(1)

(ii) Give the letters of the **two** stages from **V**, **W**, **X**, **Y** and **Z**, which are carried out to kill microorganisms.

Stages ☐ and ☐

(2)

(iii) Give the letter of the stage, **V**, **W**, **X**, **Y** or **Z**, where incubation takes place.

Stage ☐

(1)

(b) A culture medium used for growing microorganisms contains various nutrients.

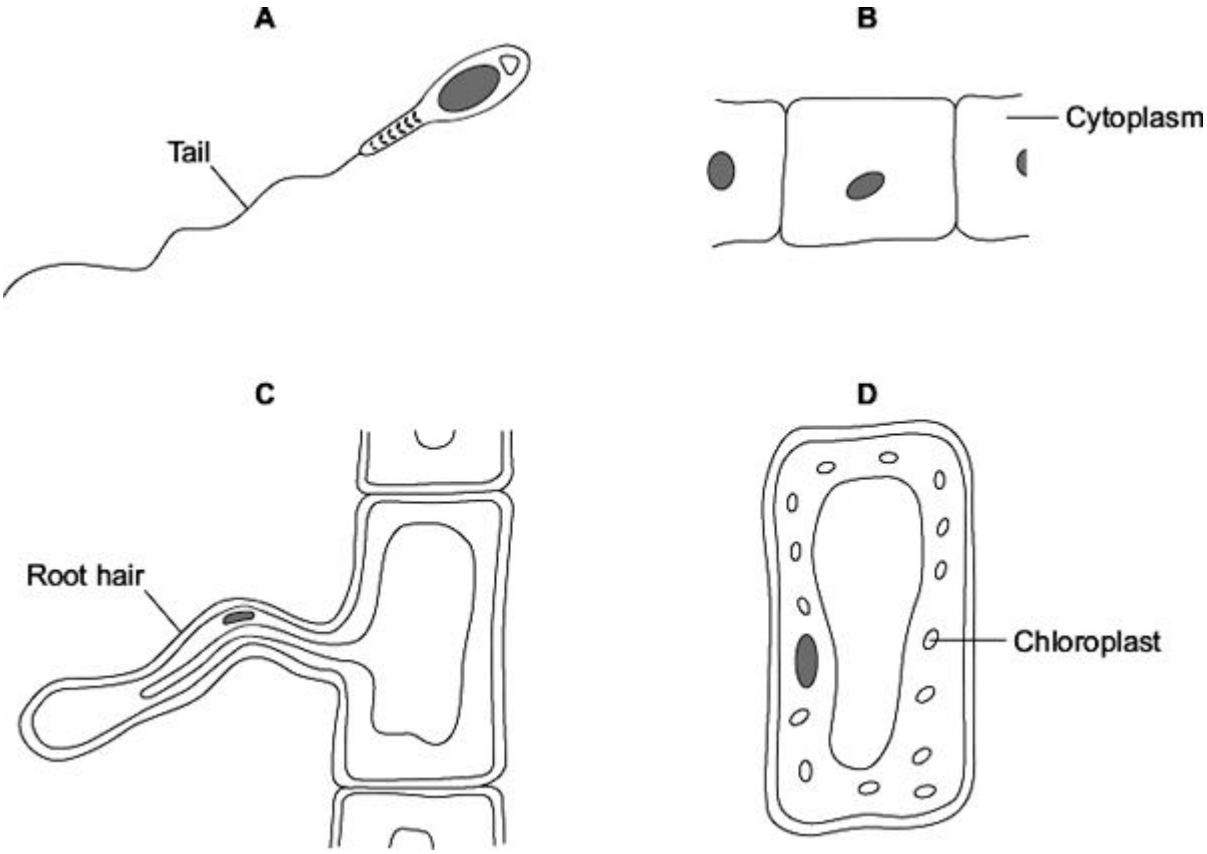
Which nutrient is the main source of energy for the microorganisms?

Draw a ring around **one** answer.

carbohydrates **mineral ions** **vitamins**

(1)
(Total 5 marks)

14 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) Which part is found **only** in plant cells?

Draw a ring around **one** answer.

cell membrane **cell wall** **nucleus**

(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.

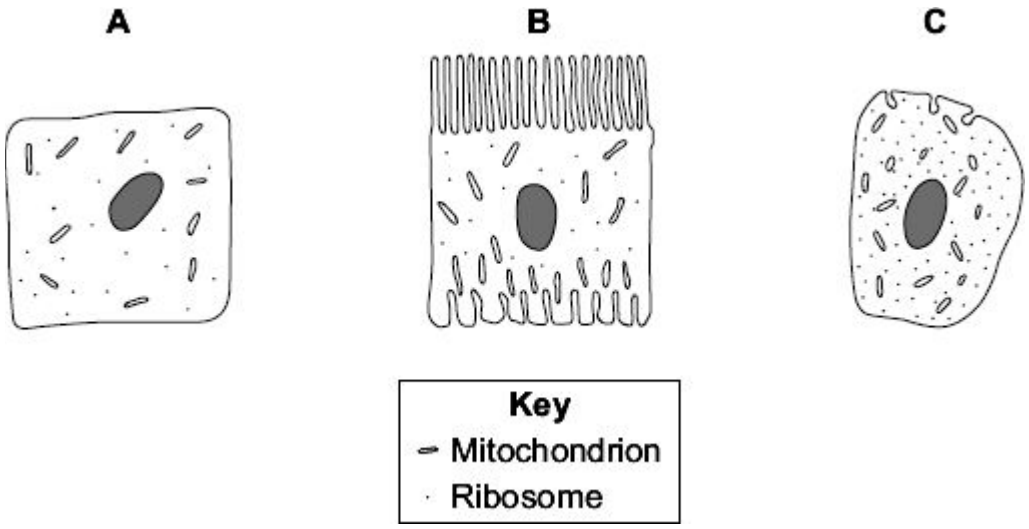
For what process do cells use oxygen?

Draw a ring around **one** answer.

osmosis **photosynthesis** **respiration**

(1)
(Total 5 marks)

15 Diagrams **A**, **B** and **C** show cells from different parts of the human body, all drawn to the same scale.



(a) Which cell, **A**, **B** or **C**, appears to have adaptations to increase diffusion into or out of the cell? ☐

Give **one** reason for your choice.

.....

.....

(1)

(b) (i) Cell **C** is found in the pancreas.

Name **one** useful substance produced by the pancreas.

.....

(1)

(ii) Use information from the diagram to explain how cell **C** is adapted for producing this substance.

.....

.....

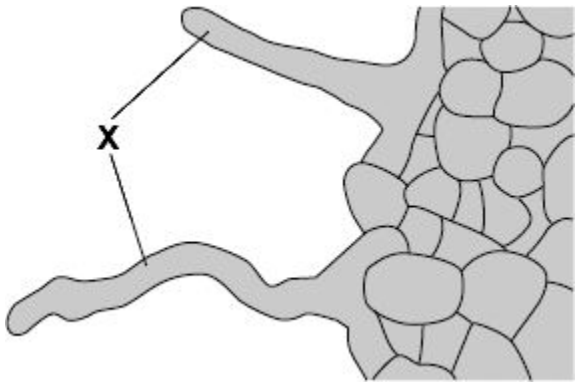
.....

.....

(2)

(Total 4 marks)

16 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.



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

Draw a ring around **one** answer.

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

(1)

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

1 .....

2 .....

(2)

(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.

(i) Carbon dioxide enters leaves through

alveoli.
stomata.
villi.

(1)

(ii) Carbon dioxide enters leaf cells by

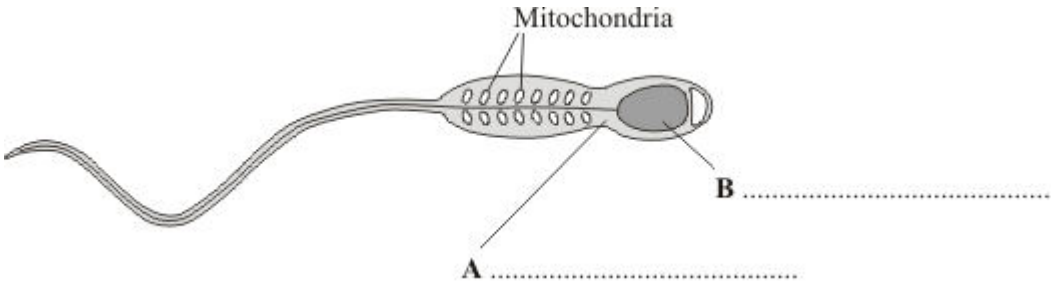
active transport.
diffusion.
reabsorption.

(1)

(Total 5 marks)

17 This question is about cells.

(a) (i) The diagram shows a sperm cell.

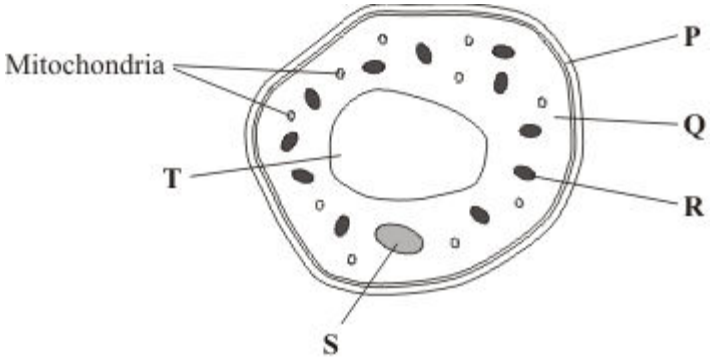


Use words from the box to label parts **A** and **B**.

cell membrane	**cytoplasm**	**nucleus**

(2)

(ii) The diagram shows a cell from a leaf.



Give the letters of **two** parts of the leaf cell which would **not** be found in a sperm cell.

☐ and ☐.

(1)

(b) Sperm cells have many mitochondria.

Why do sperm cells need many mitochondria?

Tick (✓) **one** box.

Sperm cells are involved in fertilisation.	☐
Sperm cells are produced in very large numbers.	☐
Sperm cells need a lot of energy to swim.	☐

(1)
(Total 4 marks)

18 Some students investigated the effect of pH on the growth of one species of bacterium.

They transferred samples of bacteria from a culture of this species to each of eight flasks. Each flask contained a solution of nutrients but at a different pH.

After 24 hours, the students measured the amount of bacterial growth.

(a) It was important that the flasks in which the bacteria grew were not contaminated with other microorganisms.

Describe **two** precautions the students should have taken to prevent this contamination.

1 .....

.....

2 .....

.....

(2)

(b) To see the effect of pH on the growth of the bacteria, other conditions should be kept constant.

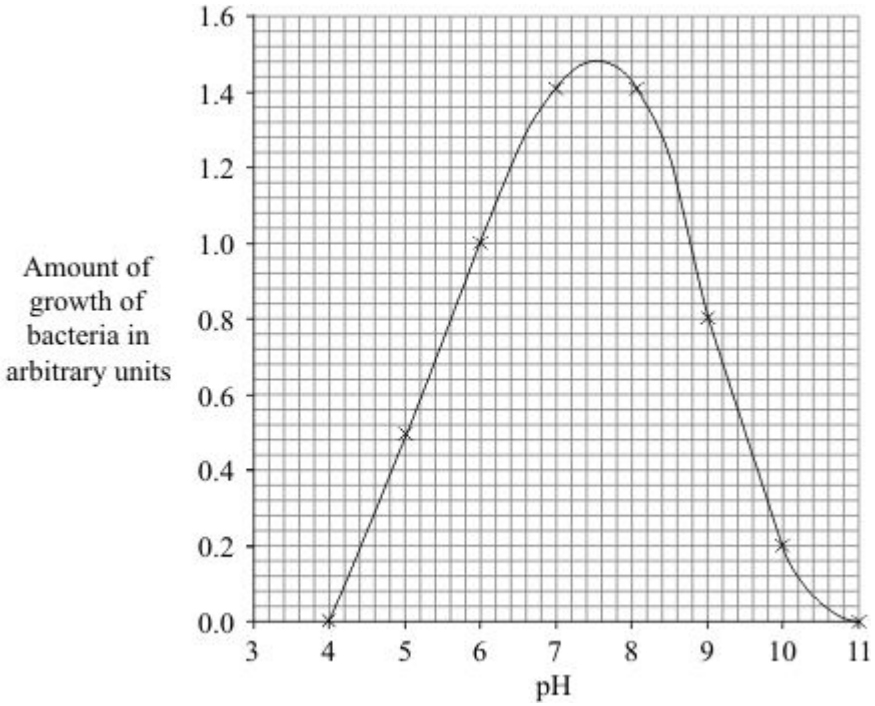
Suggest **two** conditions which should have been kept constant for all eight flasks.

1 .....

2 .....

(2)

(c) The graph shows the results of the investigation.



The students wanted to find the best pH for the growth of this species of bacterium.

(i) Use the graph to estimate the pH at which the bacteria would grow best.

pH .....

(1)

(ii) What could the students do to find a more accurate value for the best pH for growth of the bacteria?

.....

.....

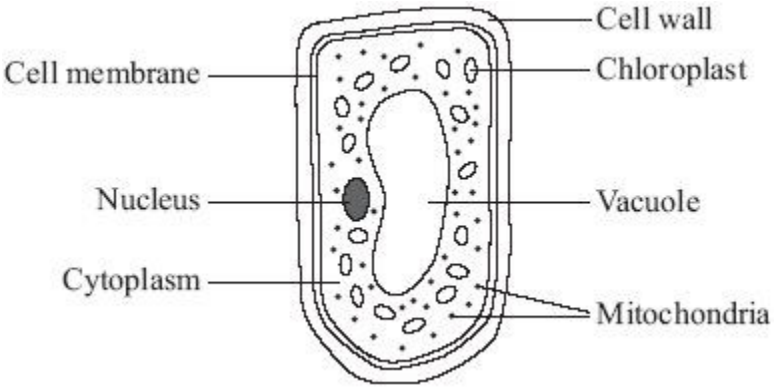
(1)

(Total 6 marks)

19

Diagram 1 shows a cell from a leaf.

Diagram 1



(a) How is the leaf cell specialised to carry out photosynthesis?

Tick (✓) **one** box.

It has a permanent vacuole. ☐

It has many chloroplasts. ☐

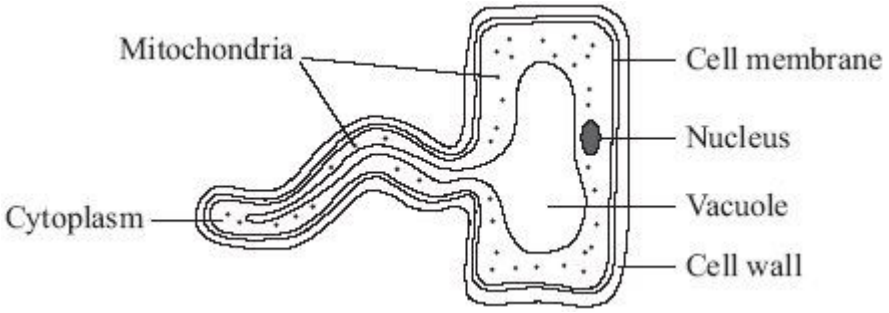
It has cytoplasm. ☐

It has many mitochondria. ☐

(1)

(b) **Diagram 2** shows another type of plant cell.

Diagram 2



Give **two** ways in which this cell is different from an animal cell.

1 .....

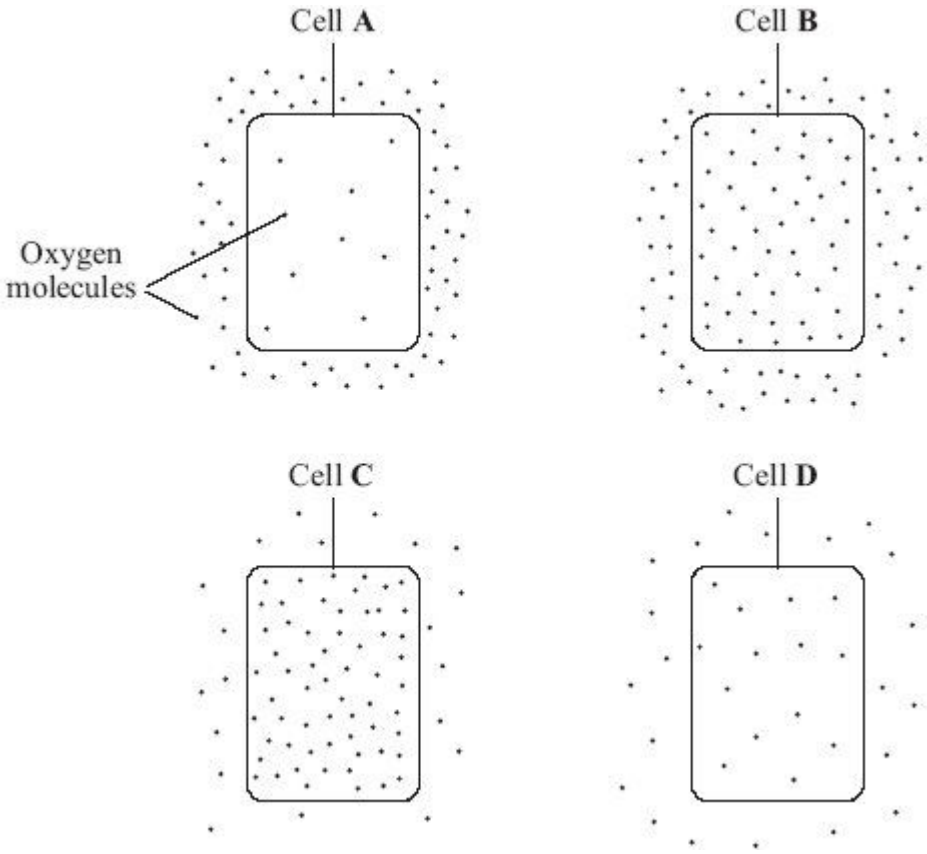
.....

2 .....

.....

(2)
(Total 3 marks)

20 (a) The diagrams show cells containing and surrounded by oxygen molecules. Oxygen can move into cells or out of cells.



Into which cell, **A**, **B**, **C** or **D**, will oxygen move the fastest?

Write your answer, **A**, **B**, **C** or **D**, in the box. ☐

(1)

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

(i) Oxygen is taken into cells by the process of

diffusion
osmosis
respiration

.

(1)

(ii) Cells need oxygen for

breathing
photosynthesis
respiration

.

(1)

(iii) The parts of cells that use up the most oxygen are the

membranes
mitochondria
nuclei

.

(1)

(iv) Some cells produce oxygen in the process of

diffusion
photosynthesis
respiration

.

(1)
(Total 5 marks)

21 (a) Microorganisms can be grown on agar jelly in a Petri dish.

List A gives three actions used when growing microorganisms.
List B gives four possible effects of these actions.

Draw a straight line from each action in **List A** to its effect in **List B**.

List A – Action	List B – Effect
	To reduce the growth of pathogens
The agar jelly is heated at 120°C for 30 minutes	
	To kill unwanted microorganisms
Make sure the temperature for growing the microorganisms is no higher than 25 °C	
	To prevent microorganisms from the air getting into the Petri dish
The lid of the Petri dish is held on with tape	
	To prevent oxygen entering the Petri dish

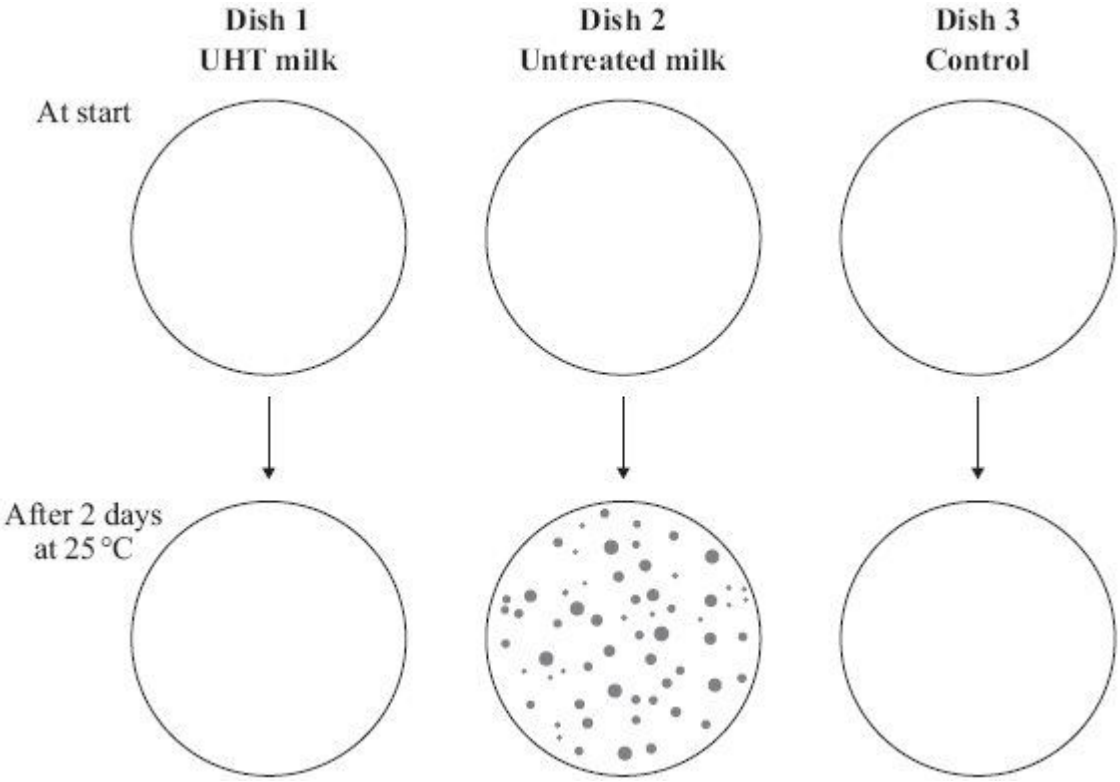
(3)

(b) UHT milk is milk that has been heated to 135 °C, then cooled.

In an investigation, three sterile Petri dishes containing sterile agar jelly were set up as follows.

- UHT milk was added to dish **1**.
- Untreated milk was added to dish **2**.
- Dish **3** was left unopened as a control.
- The dishes were kept at 25 °C for two days.

The results are shown in the diagram below.



(i) Describe the difference in appearance between dishes **1** and **2** after two days.

.....

.....

(1)

(ii) Give **one** reason for this difference.

.....

.....

(1)

(iii) There was no change in the appearance of dish **3** after two days.

Give **one** reason why.

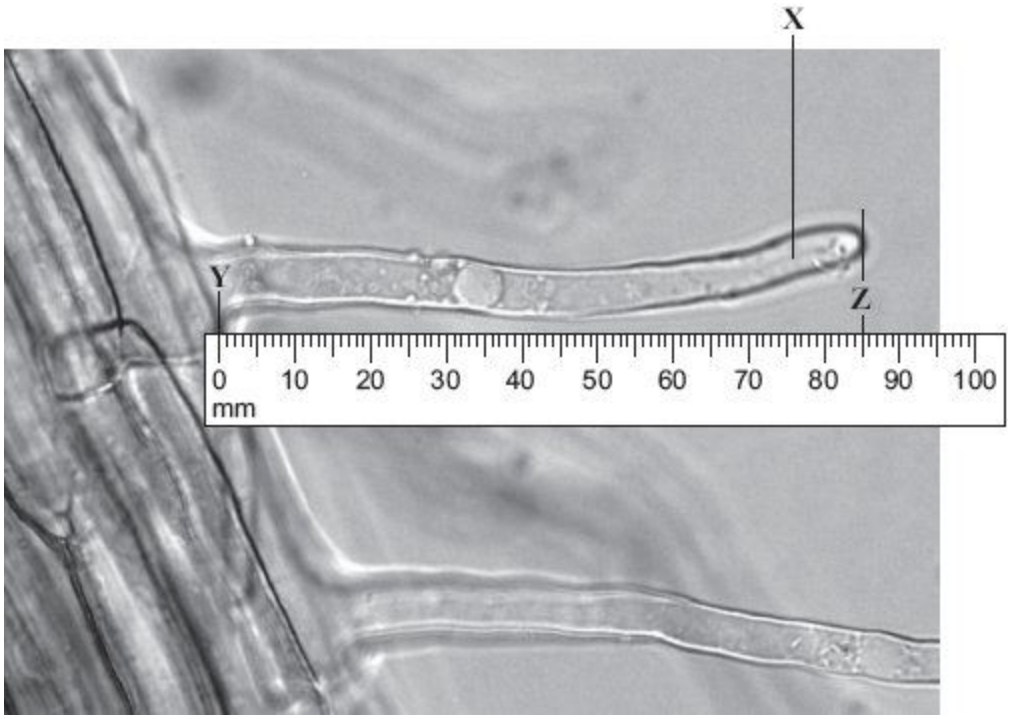
.....

.....

(1)

(Total 6 marks)

22 The photograph shows part of the surface of a plant root. This part of the root is covered with hundreds of structures like the one labelled **X**.



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

Draw a ring around **one** answer.

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

(1)

(b) (i) Use the scale to measure the length **Y**–**Z** on the photograph.

On the photograph, length **Y**–**Z** = ... mm.

(1)

(ii) The photograph shows the root magnified 100 times.

Calculate the actual length **Y**–**Z**.

.....

.....

.....

Actual length **Y**–**Z** = ...mm.

(2)

(iii) Structure **X** is very small. There are thousands of structures like **X** on a plant root.

How does this help the plant?

.....

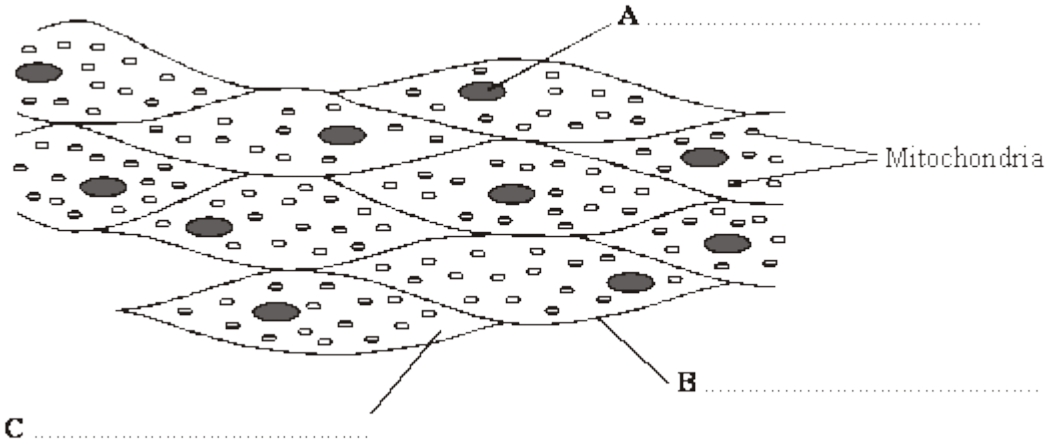
.....

.....

.....

(2)
(Total 6 marks)

23 The diagram shows a group of muscle cells from the wall of the intestine.



(a) On the diagram, use words from the box to name the structures labelled **A**, **B** and **C**.

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

(3)

(b) How are these muscle cells adapted to release a lot of energy?

.....

.....

.....

(2)

(Total 5 marks)

24 The pancreas is involved in digestion and controlling the internal conditions of the body.

(a) Name **two** digestive enzymes produced by the pancreas.

1 .....

2 .....

(2)

(b) Diabetes may be caused by a lack of insulin.

Part of the treatment for someone with diabetes is to pay careful attention to the diet.

(i) Give **one** symptom of diabetes.

.....

.....

(1)

(ii) Give **one** way in which a diabetic may be advised to change their diet.

.....

.....

(1)

(iii) How does this change in diet help the diabetic?

.....

.....

(1)

(iv) State **one** other way in which the symptoms of diabetes may be treated.

.....

(1)

(c) Many of the cells in the pancreas contain large numbers of ribosomes.

What is the function of ribosomes in a cell?

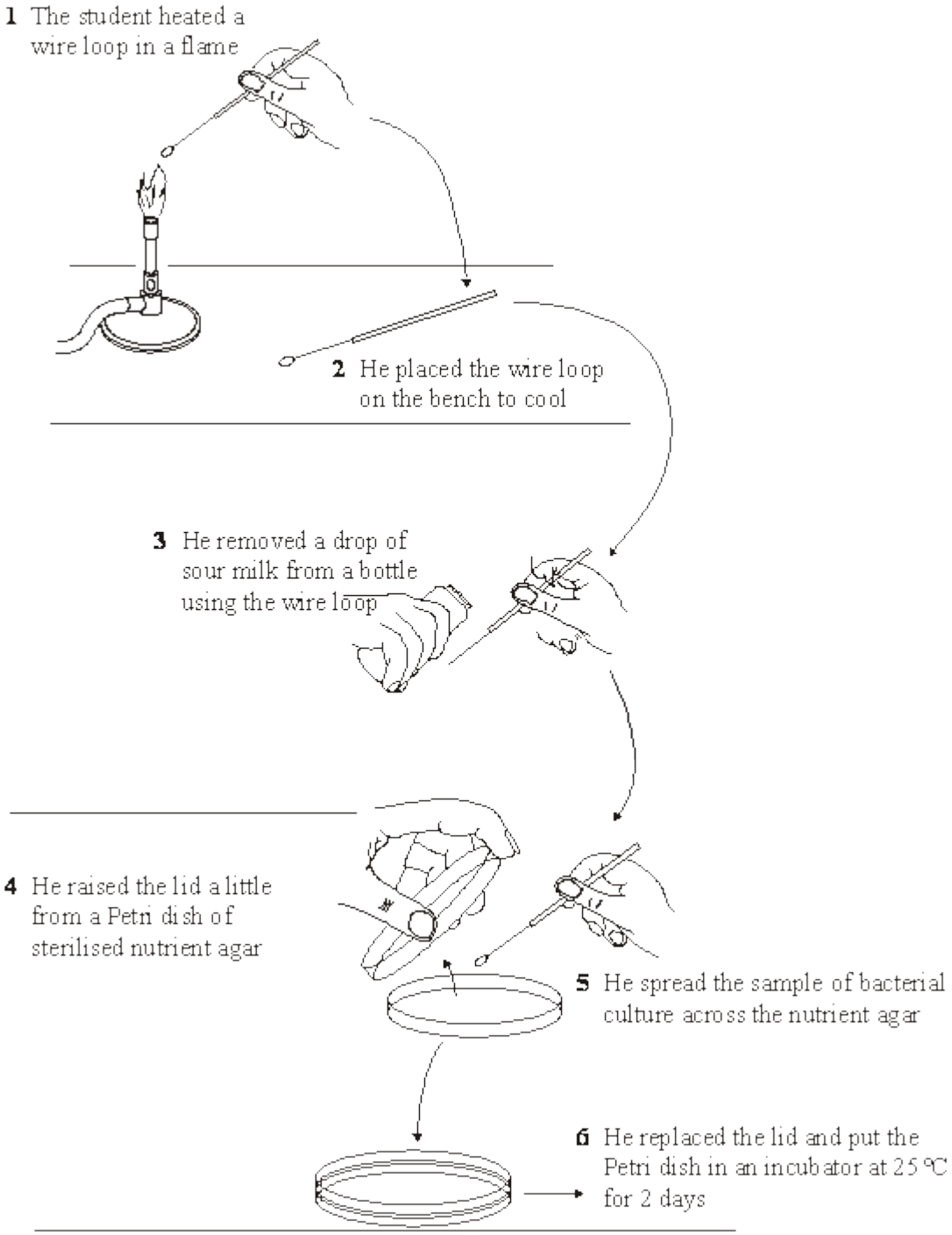
.....

.....

(1)

(Total 7 marks)

25 The diagram shows how a student transferred some sour milk from a bottle to a Petri dish of nutrient agar.



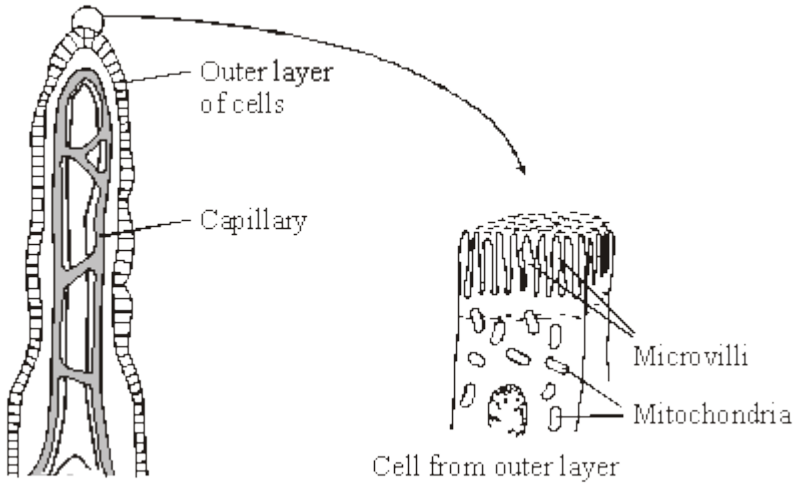
List A gives four actions carried out by the student.
List B gives five possible effects of these actions.

Draw a straight line from each action in List **A** to its effect in List **B**.
Draw only **one** line from each action.

List A – Action	List B – Effect
Heating loop in flame	Risk of contamination with bacteria increased
Placing loop on bench to cool	Risk of bacteria entering decreased
Only lifting lid of petri dish a little	Kills bacteria
Placing petri dish in incubator at 25°C rather than 35°C	Prevents air entering
	Risk of growth of pathogens decreased

(Total 4 marks)

26 The small intestine is lined with millions of villi.
The diagram shows the structure of a villus.



In the small intestine, some of the products of digestion are absorbed into the blood by *active transport*.

(a) Explain what is meant by *active transport*.

.....

.....

.....

.....

(2)

(b) How do microvilli and mitochondria help in the active transport of the products of digestion from the small intestine into the blood?

Microvilli .....

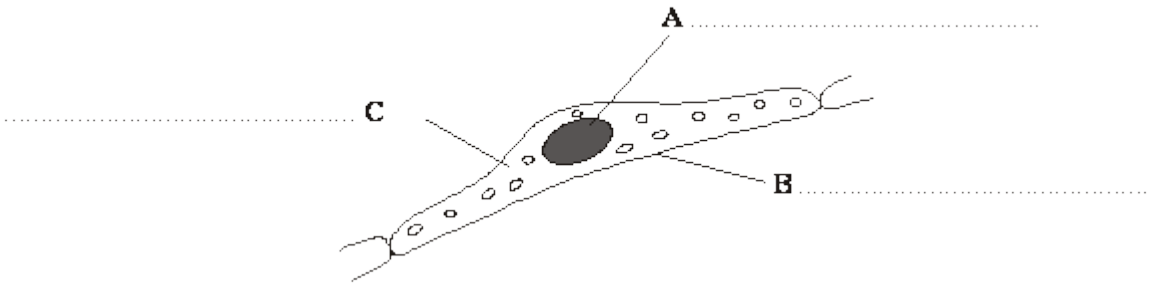
.....

Mitochondria .....

.....

(2)
(Total 4 marks)

27 The diagram shows a cell from the lining of the lung. This cell is specialised to allow gases to pass through quickly.



(a) Use words from the box to label structures **A, B** and **C**.

cell membrane	**chloroplast**	**cytoplasm**	**mitochondria**
nucleus			

(3)

(b) (i) Which feature of this cell allows oxygen to pass through quickly?

Put a tick (✓) in the box next to your choice.

It is thin. ☐

It has a large nucleus. ☐

It has many mitochondria. ☐

(1)

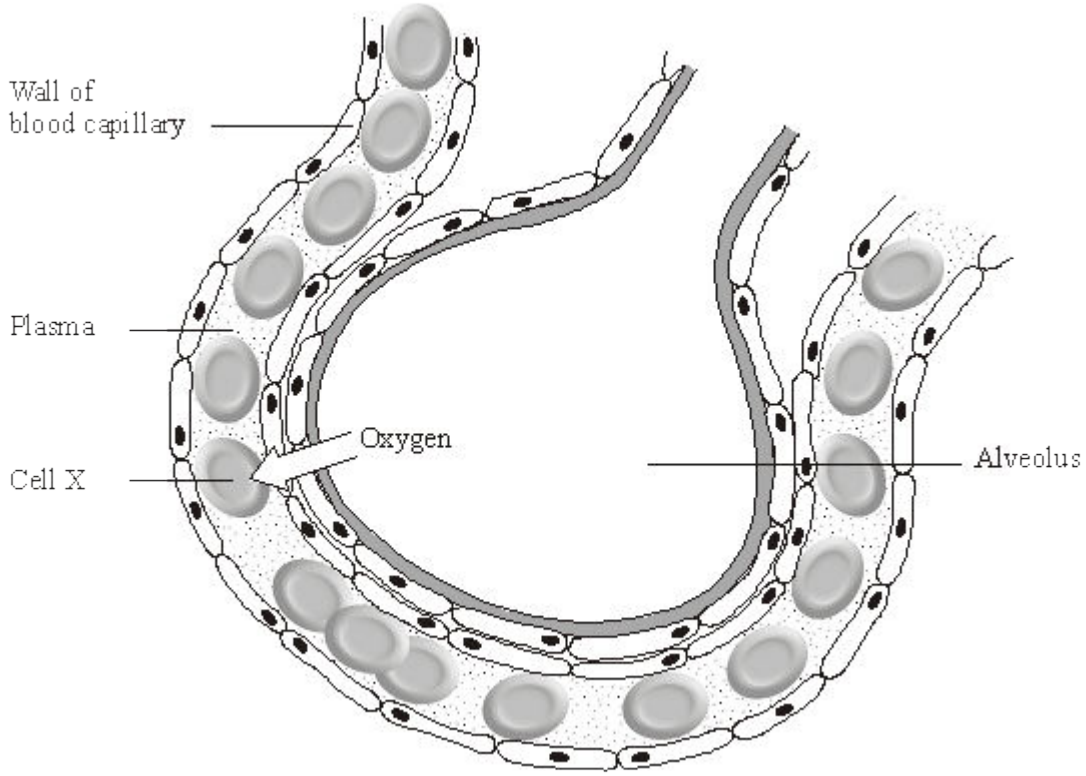
(ii) Complete the sentence by drawing a ring around the correct answer in the box.

Oxygen passes through this cell by

diffusion
osmosis
respiration

(1)
(Total 5 marks)

28 The diagram shows a small part of a lung.



(a) The arrow on the diagram shows the movement of oxygen from the air in the alveolus to cell **X.**

Complete the sentences by drawing a ring around the correct answer.

(i) Cell **X** is a

platelet
red cell
white cell

(1)

(ii) Oxygen moves from the air in the alveolus into cell **X** by

diffusion
filtration
respiration

(1)

(iii) The substance in cell **X** that combines with oxygen is called

glycogen
haemoglobin
lactic acid

(1)

(iv) Cell **X** does **not** have

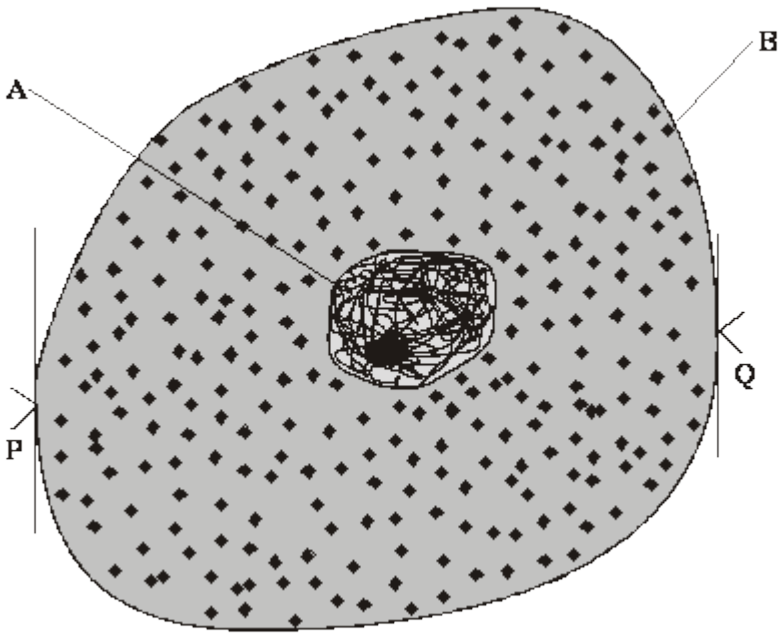
a cell membrane
cytoplasm
a nucleus

(1)

(b) **On the diagram**, draw an arrow to show the movement of carbon dioxide during gas exchange.

(1)
(Total 5 marks)

29 The diagram shows an animal cell.



(a) (i) Name structures **A** and **B** by choosing the correct words from the box.

cell membrane	**cell wall**	**cytoplasm**	**nucleus**	**vacuole**

Structure **A** .....

Structure **B** .....

(2)

(ii) Which structure named in the box controls the passage of substances in and out of the cell?

.....

(1)

(b) Distance **P** to **Q** on the diagram is the diameter of the cell. This distance was measured on three cells using a microscope. The results were as follows:

cell 1: 63 micrometres
cell 2: 78 micrometres
cell 3: 69 micrometres

Calculate the average diameter of these cells. Show clearly how you work out your final answer.

.....

.....

Average diameter = ... micrometres

(2)
(Total 5 marks)

30 The photograph shows a red blood cell in part of a blood clot. The fibres labelled **X** are produced in the early stages of the clotting process.

(a) Suggest how the fibres labelled **X** help in blood clot formation.

.....

(1)

(b) The average diameter of a real red blood cell is 0.008 millimetres.
On the photograph, the diameter of the red blood cell is 100 millimetres.

Use the formula to calculate the magnification of the photograph.

Diameter on photograph = Real diameter × Magnification

.....

.....

.....

Magnification = ...

(2)

(c) Some blood capillaries have an internal diameter of approximately 0.01 millimetres.

(i) Use information given in part (b) to explain why only one red blood cell at a time can pass through a capillary.

.....

(1)

(ii) Explain the advantages of red blood cells passing through a capillary one at a time.

.....

.....

.....

.....

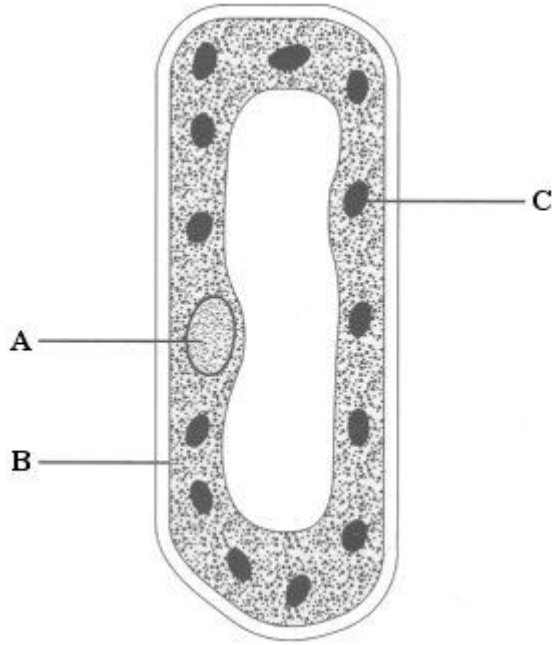
.....

.....

(3)

(Total 7 marks)

31 The diagram shows a cell from a plant leaf.



(a) Name structures **A** and **B**.

A .....

B .....

(2)

(b) Structure **C** is a chloroplast. What is the function of a chloroplast?

.....

(1)

(c) The table gives one difference between a plant cell and an animal cell.

Complete the table to give **two** more differences.

Plant cell	Animal cell
1. Has chloroplasts	1. No chloroplasts
2.	2.
3.	3.

(2)
(Total 5 marks)

32 (a) (i) Name the red pigment found in red blood cells.

.....

(1)

(ii) Describe, in detail, the function of this red pigment.

.....

.....

.....

.....

(2)

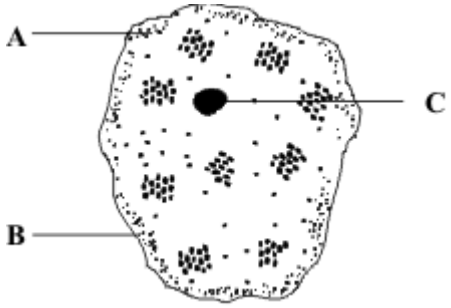
(b) Describe **one** other way in which the structure of a red blood cell is different from the structure of a white blood cell.

.....

.....

(1)
(Total 4 marks)

33 The diagram shows an animal cell.



(a) Name **each** labelled part and give its function.

A Name .....

Function .....

.....

B Name .....

Function .....

.....

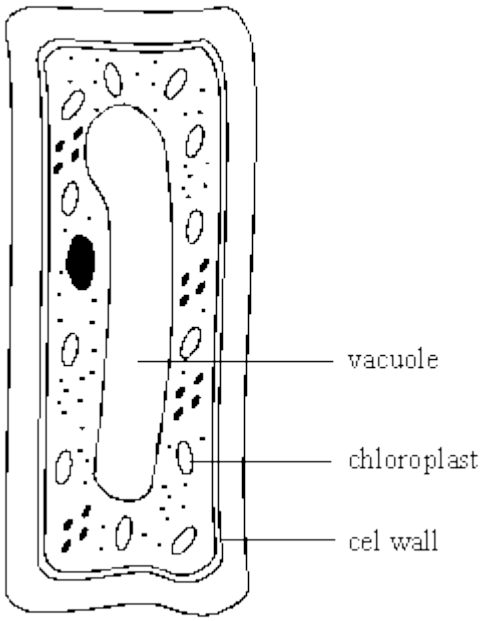
C Name .....

Function .....

.....

(6)

(b) (i) This plant cell also contains chloroplasts, a cell wall and a vacuole. Label **each** of these parts on the diagram.



(3)

(ii) Give the function of these parts of a plant cell.

Chloroplast function .....

.....

Cell wall function .....

.....

Vacuole function .....

.....

(3)

(Total 12 marks)

34 The following are precautions taken when preparing a streak of bacteria on an agar jelly plate.

Give a reason for each.

(i) The inoculating loop is heated in a hot bunsen flame.

REASON:

.....

.....

(1)

(ii) The loop is allowed to cool before putting it into the bacterial culture.

REASON:

.....

.....

(1)

(iii) The lid of the petri dish is only partly opened.

REASON:

.....

.....

(1)

(iv) The petri dish is sealed with sticky tape.

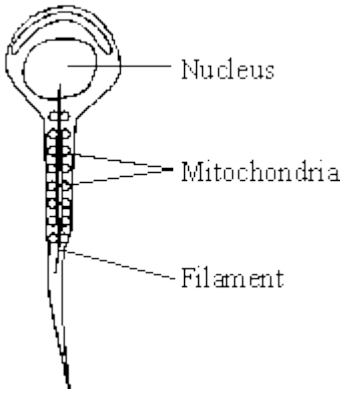
REASON:

.....

.....

(1)
(Total 4 marks)

35 The diagram shows a human sperm. Inside the tail of the sperm is a filament mechanism that causes the side to side movement of the tail, which moves the sperm.



(a) Describe the function of the mitochondria and suggest a reason why they are arranged around the filament near the tail of the sperm.

.....

.....

.....

.....

(3)

(b) Explain the significance of the nucleus in determining the characteristics of the offspring.

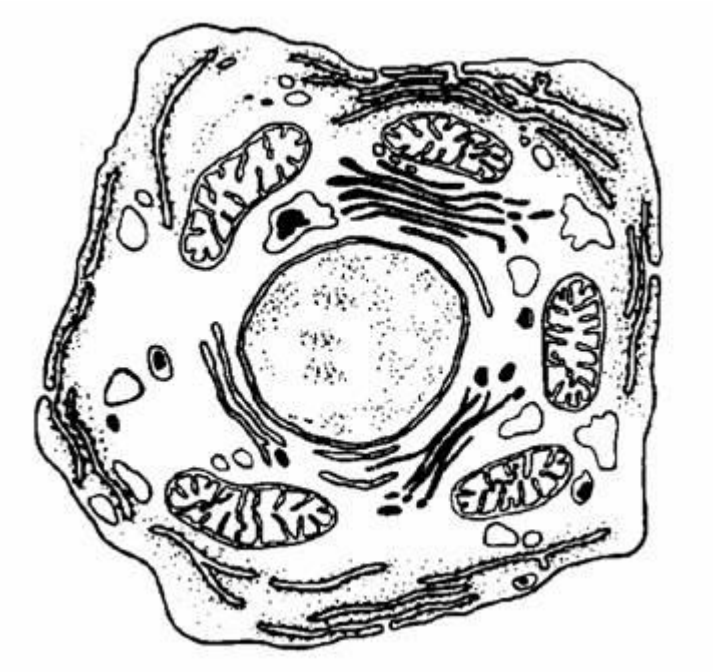
.....

.....

.....

(2)
(Total 5 marks)

36 The drawing shows an animal cell, seen at a very high magnification using an electron microscope.



(a) (i) Label a mitochondrion [plural = mitochondria].

(1)

(ii) What happens in the mitochondria?

.....

(1)

(b) (i) Name and label the structure where you would find chromosomes.

(1)

(ii) What are chromosomes made of?

.....

(1)

(c) What controls the rate of chemical reactions in the cytoplasm?

.....

(1)

(Total 5 marks)

37 (a) Put a tick (✓) in the correct boxes in the table below to show which of the parts given are present in the cells and organisms listed.

	CYTOPLASM	NUCLEUS	CELL WALL	GENES
Leaf mesophyll cell				
Sperm				

(2)

(b) (i) What is the main job of a leaf mesophyll cell?

.....

.....

(1)

(ii) Explain **one** way in which the structure of the leaf mesophyll cell helps it to carry out its job.

.....

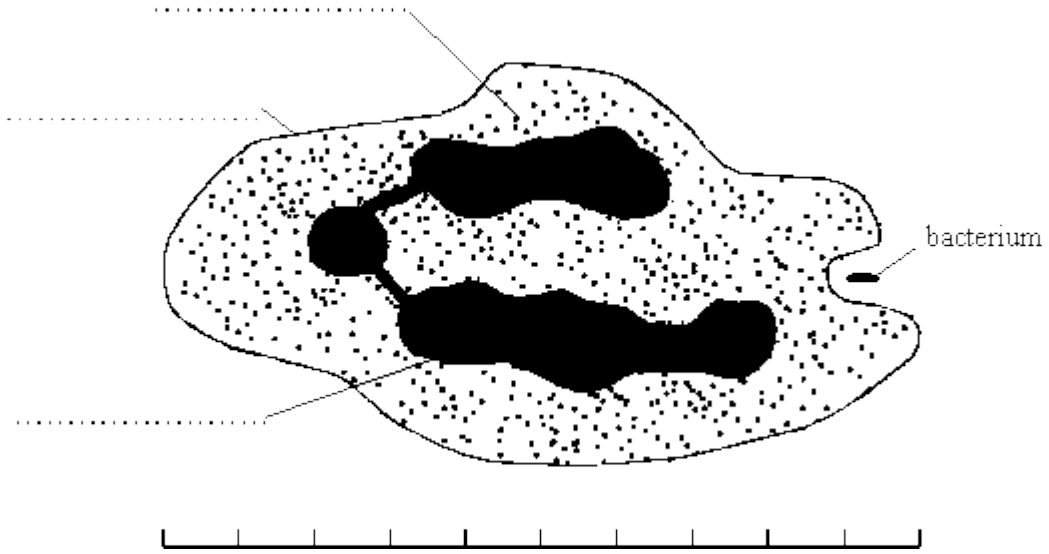
.....

.....

.....

(2)
(Total 5 marks)

38 The drawing shows a white blood cell ingesting a bacterium.



(i) Use words from the list to label the parts of the white blood cell.

cell membrane **cell wall** **cytoplasm** **nucleus** **vacuole**

(3)

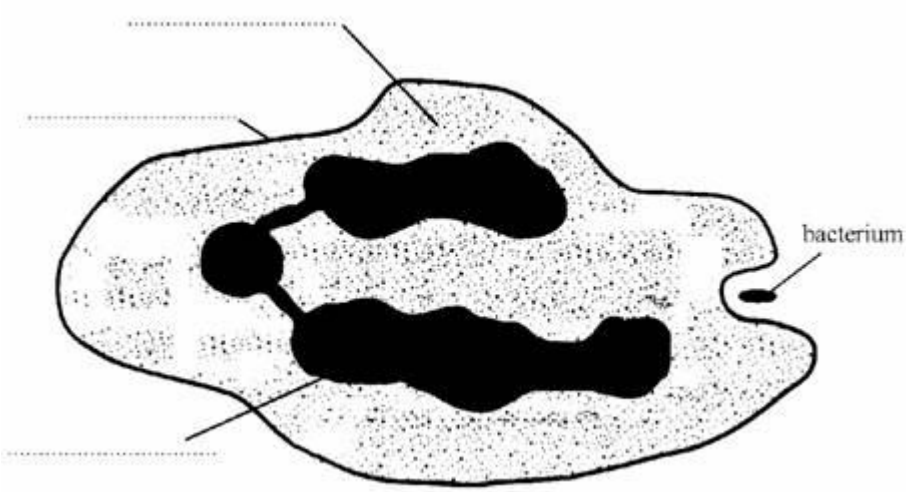
(ii) The scale shows that the white blood cell is 10 micrometres long.

How long is the bacterium? Show your working.

..... micrometres

(2)
(Total 5 marks)

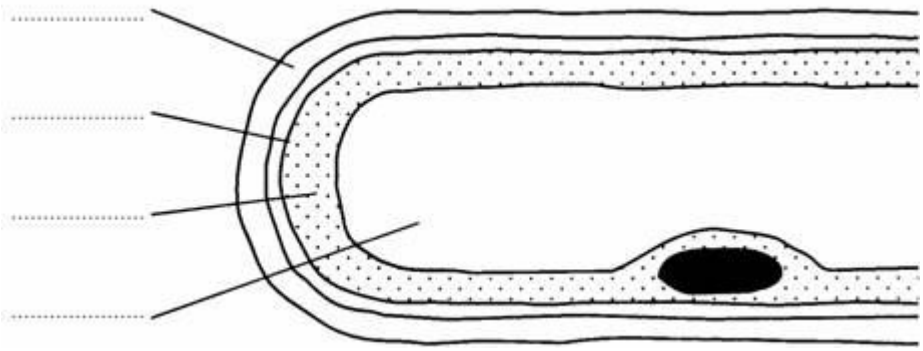
39 The drawing shows a white blood cell ingesting a bacterium.



Label the parts of the white blood cell.

(Total 3 marks)

40 The drawing shows part of a root hair cell.

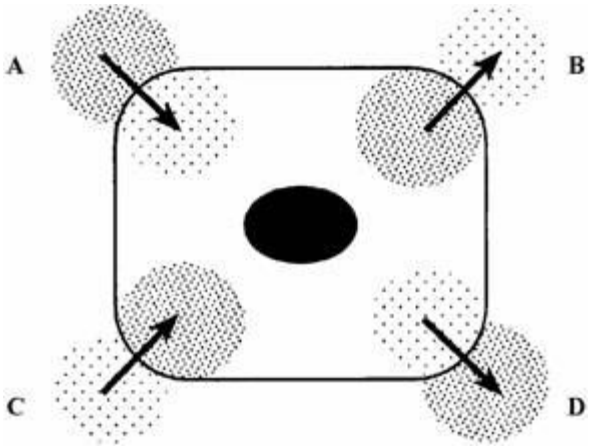


(a) Use words from the list to label the parts of the root hair cell.

cell membrane **cell wall** **cytoplasm** **nucleus** **vacuole**

(4)

(b) The diagram shows four ways in which molecules may move into and out of a cell. The dots show the concentration of molecules.



The cell is respiring aerobically.
Which arrow, **A**, **B**, **C** or **D** represents:

(i) movement of oxygen molecules; .....

(ii) movement of carbon dioxide molecules? .....

(2)

(c) Name the process by which these gases move into and out of the cell.

.....

(1)
(Total 7 marks)

41 (a) Balance the following equation for photosynthesis.

..... CO_2 + ... H_2O → $C_6H_{12}O_6$ + ... O_2

(1)

(b) Give **two** conditions necessary for photosynthesis apart from a suitable temperature range and the availability of water and carbon dioxide.

1. .....

2. .....

(2)

(a) Plants have leaves which contain guard cells and palisade cells. Explain how **each** of these kinds of cell assists photosynthesis.

Guard cells .....

.....

.....

.....

(2)

Palisade cells .....

.....

.....

.....

(2)

(d) Glucose is a product of photosynthesis. Give **three** uses which green plants make of glucose.

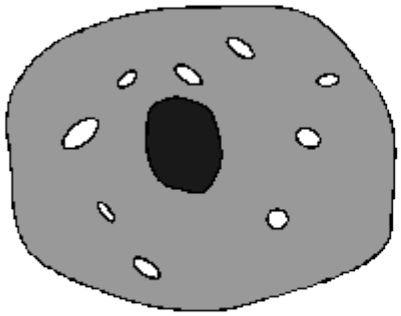
1. .....

2. .....

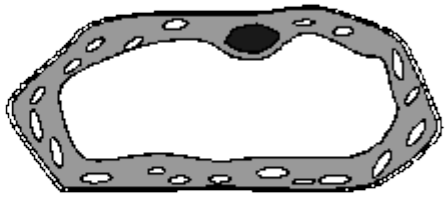
3. .....

(3)
(Total 10 marks)

42 The diagrams show a cheek cell from a human and a leaf cell from a plant.



Cheek cell



Leaf cell

(a) The two cells have a number of parts in common.

(i) On the cheek cell, label **three** of these parts which both cells have.

(3)

(ii) In the table, write the names of the **three** parts you have labelled above and describe the main function of each part.

Part	Function
.....	
.....	
.....	

(3)

(b) Blood contains white cells and red cells. State the function of each type of cell in the blood.

White cells .....

.....

Red cells .....

.....

(2)

(Total 8 marks)

43 Oxygen from our lungs is carried, by our blood, to cells in our body where aerobic respiration takes place.

(i) Complete the **two** spaces to balance the chemical reaction for aerobic respiration.

$$C_6H_{12}O_6 + 6O_2 \rightarrow \ldots\ldots CO_2 + \ldots\ldots H_2O$$

(1)

(ii) Name the substance with the formula $C_6H_{12}O_6$.

.....

(1)

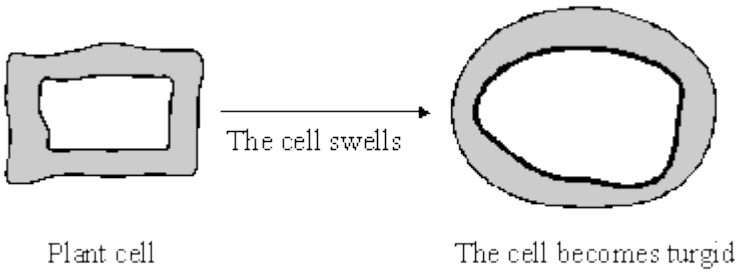
(iii) Name the structures in the cytoplasm of our cells where aerobic respiration takes place.

.....

(1)

(Total 3 marks)

44 (a) The diagrams show what happens to the shape of a plant cell placed in distilled water.



(i) Explain why the cell swells and becomes turgid. Name the process involved.

.....

.....

.....

(2)

(ii) Give **one** feature of the cell wall which allows the cell to become turgid.

.....

(1)

(b) Describe the change which will occur if a piece of peeled potato is placed in a concentrated sugar solution and explain why this change occurs.

.....

.....

.....

.....

.....

.....

(3)
(Total 6 marks)

45 (a) How many pairs of chromosomes are there in a body cell of a human baby?

.....

(1)

(b) Place the following in order of size, **starting with the smallest,** by writing numbers **1** – **4** in the boxes underneath the words.

chromosome	nucleus	gene	cell
☐	☐	☐	☐

(1)

(c) For a baby to grow, its cells must develop in a number of ways.

Explain how each of the following is part of the growth process of a baby.

(i) Cell enlargement

.....

(1)

(ii) The process of cell division by mitosis

.....

.....

.....

.....

.....

.....

(3)

(d) Why is cell specialisation (differentiation) important for the development and growth of a healthy baby from a fertilised egg?

.....

.....

(2)
(Total 8 marks)