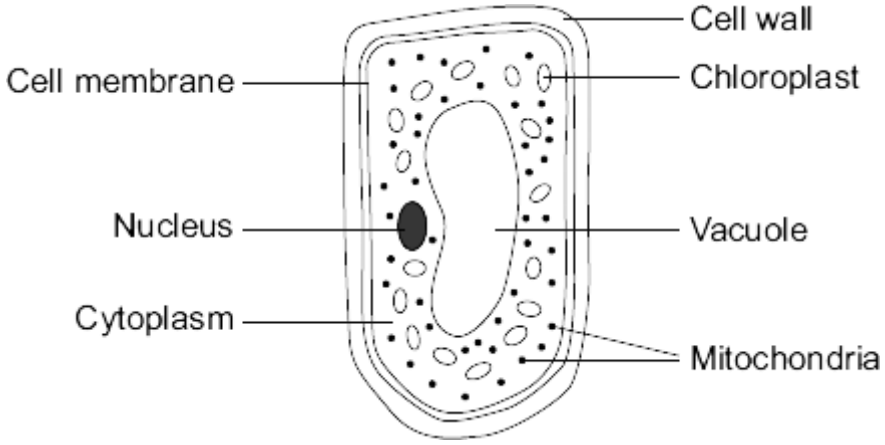
**Q1.** The diagram shows a cell from a plant leaf.




(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.

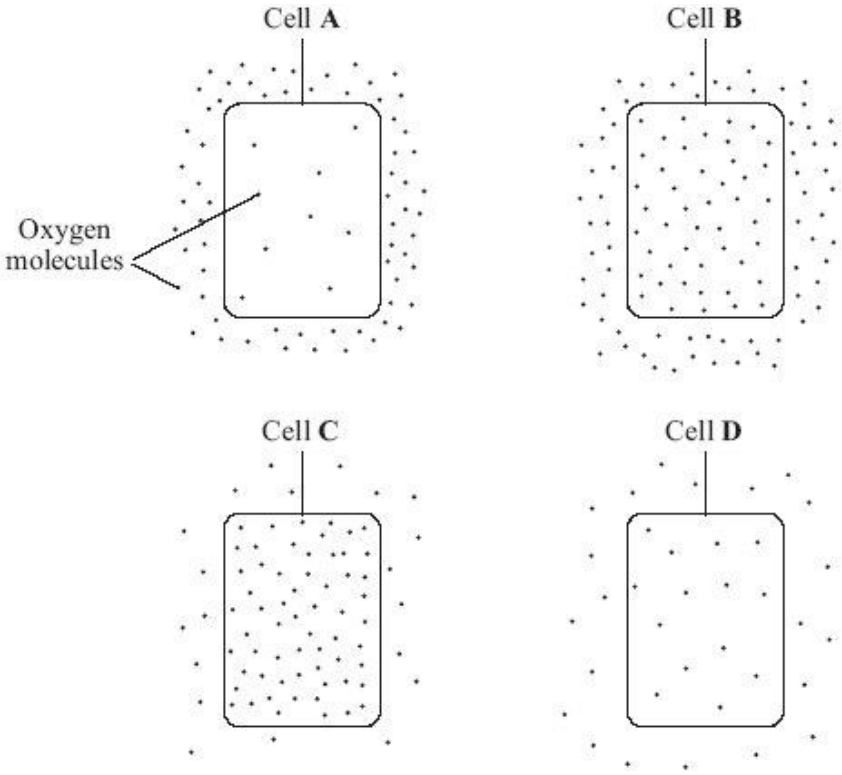
The oxygen produced by the chloroplasts passes out of the cell by

| |
|---|
| diffusion. |
| digestion. |
| respiration. |

**(1)**

**(Total 5 marks)**

**Q2.** (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)**

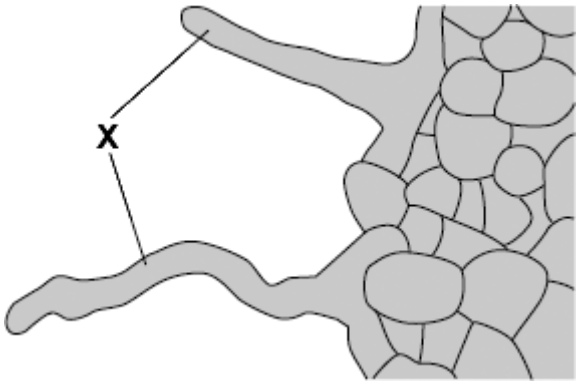
(iv) Some cells produce oxygen in the process of

| |
|---|
| diffusion |
| photosynthesis |
| respiration |

.

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

**Q3.** 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)**

**Q4.** In fish and chip shops, potatoes are cut into chips several hours before they are cooked.

The amount of water in the chips must be kept constant during this time.

To keep the water in the chips constant, the chips are kept in salt solution.

A student investigated the effect of different concentrations of salt solution on the mass of chips.

- He weighed each of five chips.
- He placed each chip into a different concentration of salt solution.
- After one hour he removed the chips, then reweighed them.

His results are shown in the table.

| **Concentration of salt solution** | **0 M** | **0.5 M** | **1 M** | **2 M** | **3 M** |
|---|---|---|---|---|---|
| Mass of chip at start in grams | 2.6 | 2.8 | 2.8 | 2.5 | 2.6 |
| Mass of chip after one hour in grams | 2.7 | 2.8 | 2.7 | 2.3 | 2.1 |

(a) (i) In which concentration of salt solution did the chip gain mass?

_____ M

**(1)**

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

The chip gained mass because water entered by

| |
|---|
| digestion |
| osmosis |
| respiration |

**(1)**

(b) In which concentration of salt solution should the chips be kept?

_____ M

Give a reason for your answer.

_____

_____

**(2)**

(c) How could the student have made his investigation more reliable?

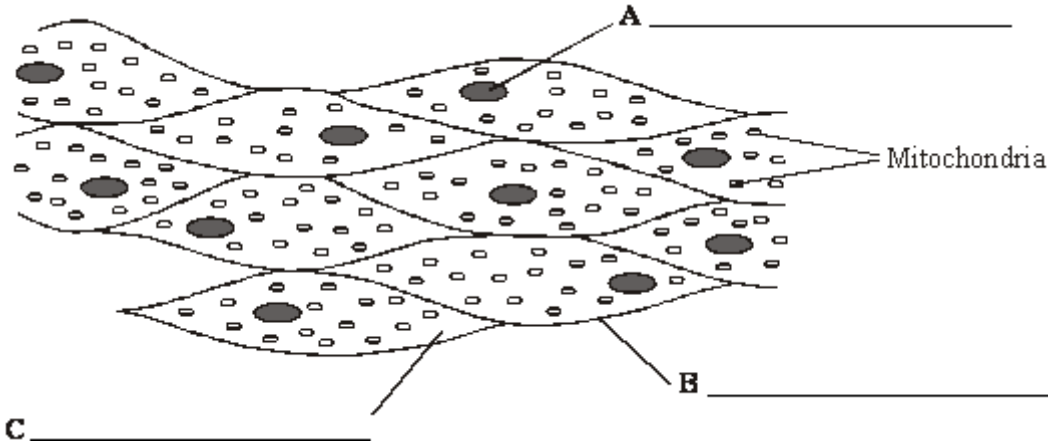
_____

_____

**(1)**

**(Total 5 marks)**

**Q5.** 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?

_____

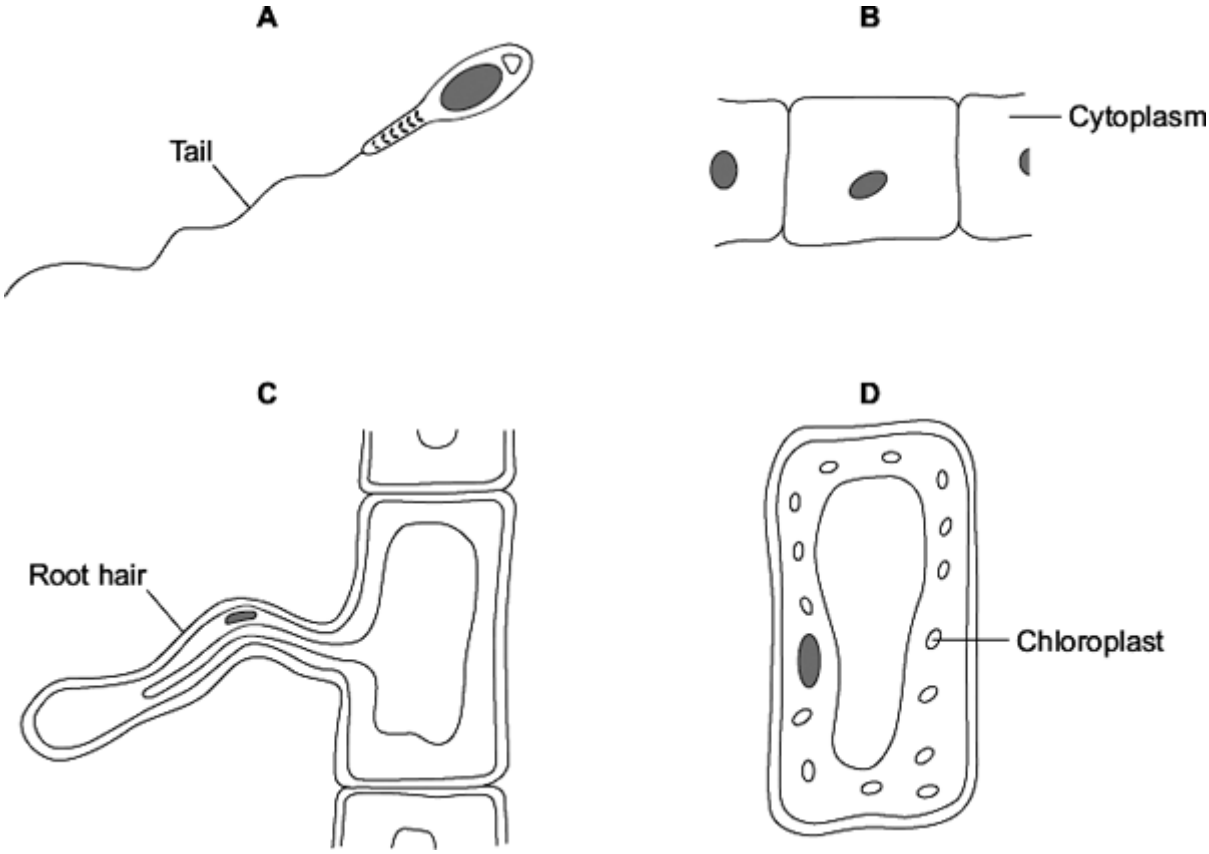
_____

_____

**(2)**

**(Total 5 marks)**

**Q6.** 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.

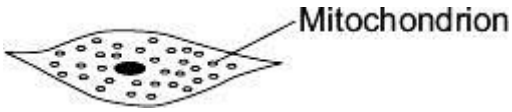
**osmosis** **photosynthesis** **respiration**

**(1)**

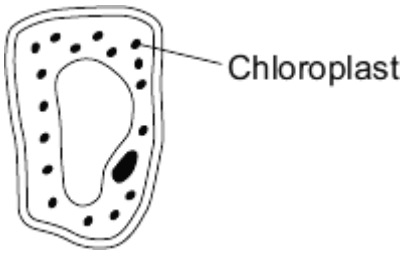
**(Total 5 marks)**

**Q7.** The diagrams show four cells, **A**, **B**, **C** and **D**.

**A**

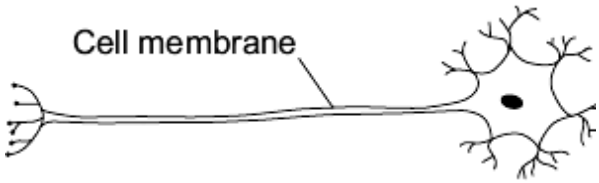



**B**




**C**


**D**




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

(a) Which cell can photosynthesise? ☐

**(1)**

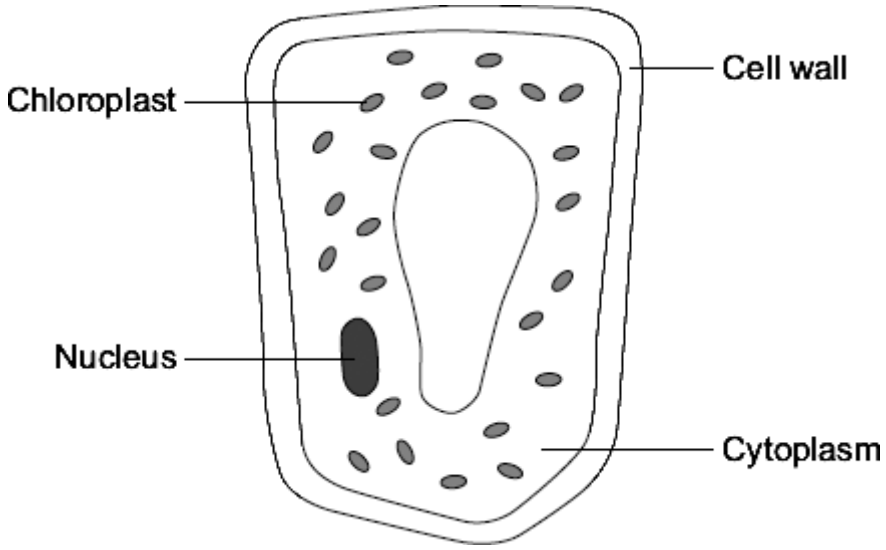
(b) Which cell is adapted for receiving and sending information? ☐

**(1)**

(c) Which cell is adapted to respire quickly?

**(1)**

**Q8.** 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**<br>**Parts of the cell** | **List B**<br>**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)**

**Q9.** Substances can move into and out of cells.

(a) (i) How does oxygen move into and out of cells?

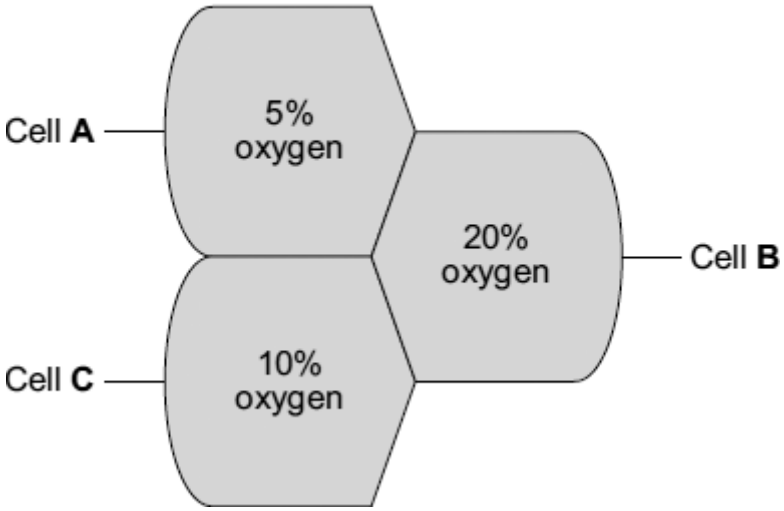
Draw a ring around **one** answer.

**diffusion** **digestion** **photosynthesis**

**(1)**

(ii) **Diagram 1** shows the percentage concentration of oxygen in three cells, **A**, **B** and **C**.

**Diagram 1**




Oxygen can move from cell to cell.

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

**(1)**

(b) (i) How does water move into and out of cells?

Draw a ring around **one** answer.

**breathing** **osmosis** **respiration**

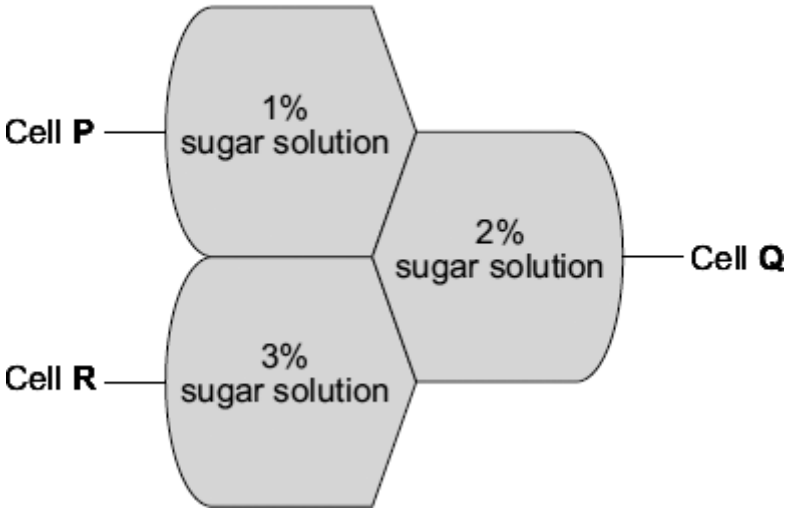
**(1)**

(ii) Differences in the concentration of sugars in cells cause water to move into or out of cells at different rates.

**Diagram 2** shows three different cells, **P**, **Q** and **R**.

The information shows the percentage concentration of sugar solution in cells **P**, **Q** and **R**.

**Diagram 2**



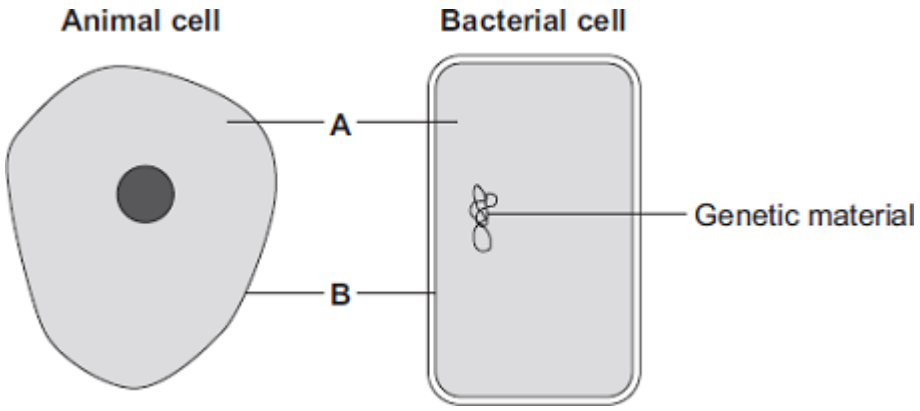

Water can move from cell to cell.

Into which cell, **P**, **Q** or **R**, will water move the fastest?

**(1)**

**(Total 4 marks)**

**Q10.** 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)**

**Q11.** (a) **List A** gives four structures in the human body. **List B** gives the functions of some structures in the body. Draw a straight line from each structure in **List A** to the correct function in **List B**.

| **List A – Structure** | **List B – Function** |
|---|---|
| | Surround and protect the lungs |
| Alveoli | |
| | Filter the blood |
| Veins | |
| | Carry blood towards the heart |
| Villi | |
| | Absorb digested food |
| Ribs | |

| |
|---|
| Allow oxygen to enter the blood |

**(4)**

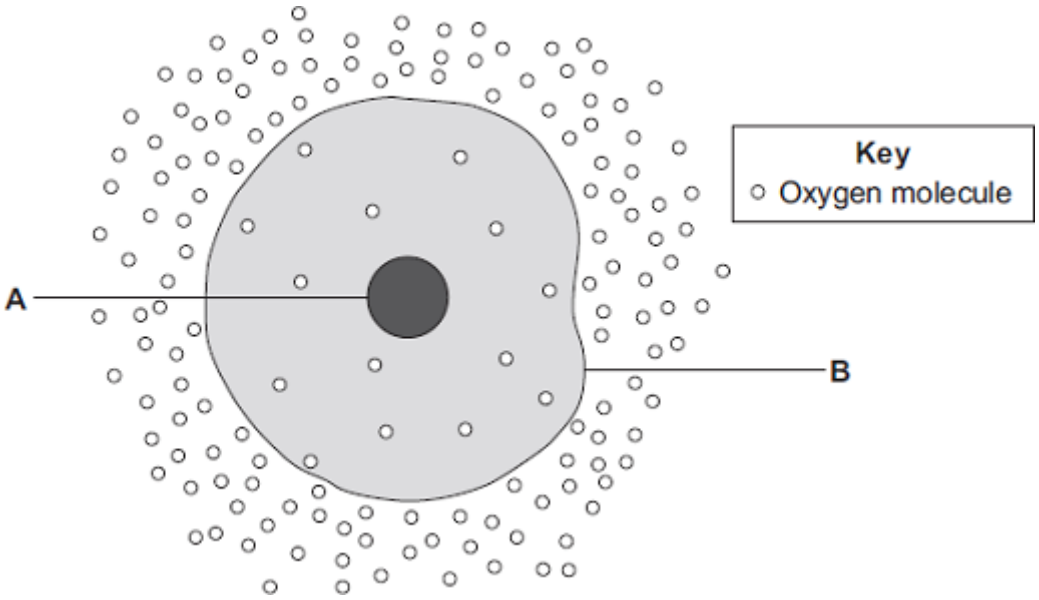
(b) Draw a ring around the correct answer to complete the sentence.

In the lungs, oxygen enters the blood from the air by

| |
|---|
| diffusion. |
| filtration. |
| respiration. |

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

**Q12.** 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)**

**Q13.** Stem cells can be collected from human embryos and from adult bone marrow.
Stem cells can develop into different types of cell.

The table gives information about using these two types of stem cell to treat patients.

| Stem cells from human embryos | Stem cells from adult bone marrow |
|---|---|
| It costs £5000 to collect a few cells. | It costs £1000 to collect many cells. |
| There are ethical issues in using embryo stem cells. | Adults give permission for their own bone marrow to be collected. |
| The stem cells can develop into most other types of cell. | The stem cells can develop into only a few types of cell. |
| Each stem cell divides every 30 minutes. | Each stem cell divides every four hours. |
| There is a low chance of a patient's immune system rejecting the cells. | There is a high chance of a patient's immune system rejecting the cells. |
| More research is needed into the use of these stem cells. | Use of these stem cells is considered to be a safe procedure. |

Scientists are planning a new way of treating a disease, using stem cells.

Use **only** the information above to answer these questions.

(a) Give **three** advantages of using stem cells from embryos instead of from adult bone marrow.

1. _____

2. _____

3. _____

**(3)**

(b) Give **three** advantages of using stem cells from adult bone marrow instead of from embryos.

1. _____

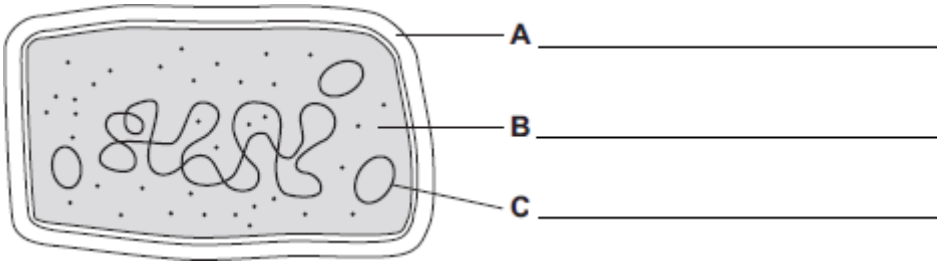
2. _____

3. _____

**(3)**

**(Total 6 marks)**

**Q14.** (a) The diagram shows the structure of a bacterial cell.




(i) On the diagram use words from the box to label structures **A**, **B** and **C**.

| | | | | |
|---|---|---|---|---|
| **cell membrane** | **cell wall** | **chloroplast** | **cytoplasm** | **plasmid** |

**(3)**

(ii) Give **one** difference between the structure of the bacterial cell and an animal cell.

_____

**(1)**

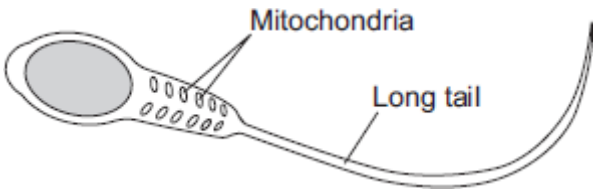
(iii) Name **one** structure that is found in a plant cell but is **not** found in a bacterial or an animal cell.

_____

**(1)**

(b) Cells can be specialised for a particular job.

The diagram shows the structure of a human sperm cell.




Describe how the long tail and the mitochondria help the sperm to do its job.

Long tail _____

_____

_____

Mitochondria _____

_____

_____

**(4)**

**(Total 9 marks)**

**Q15.** Living organisms are made of cells.

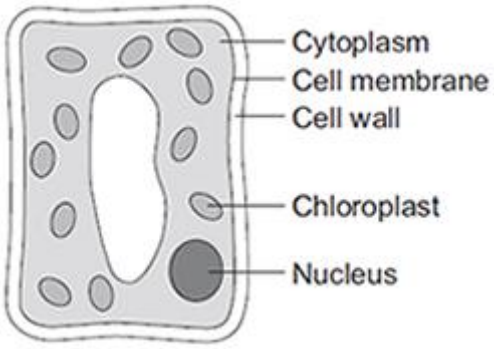
(a) Animal and plant cells have several parts. Each part has a different function.

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

| Cell part | Function |
| --- | --- |
| | Where most energy is released in respiration |
| Cell membrane | |
| | Controls the movement of substances into and out of the cell |
| Mitochondria | |
| | Controls the activities of the cell |
| Nucleus | |
| | 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)**

**Q16.** Substances can move into and out of cells.

(a) (i) How does oxygen move into and out of cells?

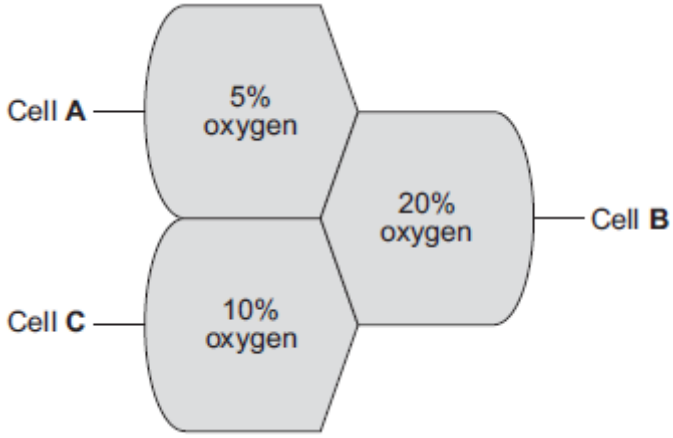
Draw a ring around **one** answer.

**diffusion** **digestion** **photosynthesis**

**(1)**

(ii) **Diagram 1** shows the percentage concentration of oxygen in three cells, **A**, **B** and **C**.

**Diagram 1**




Oxygen can move from cell to cell.

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

**(1)**

(b) (i) How does water move into and out of cells?

Draw a ring around **one** answer.

**breathing** **osmosis** **respiration**

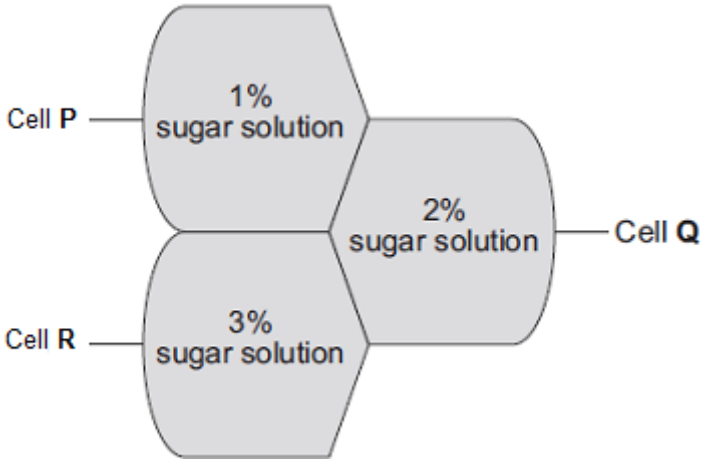
**(1)**

(ii) Differences in the concentration of sugars in cells cause water to move into or out of cells at different rates.

**Diagram 2** shows three different cells, **P**, **Q** and **R**.

The information shows the percentage concentration of sugar solution in cells **P**, **Q** and **R**.

**Diagram 2**



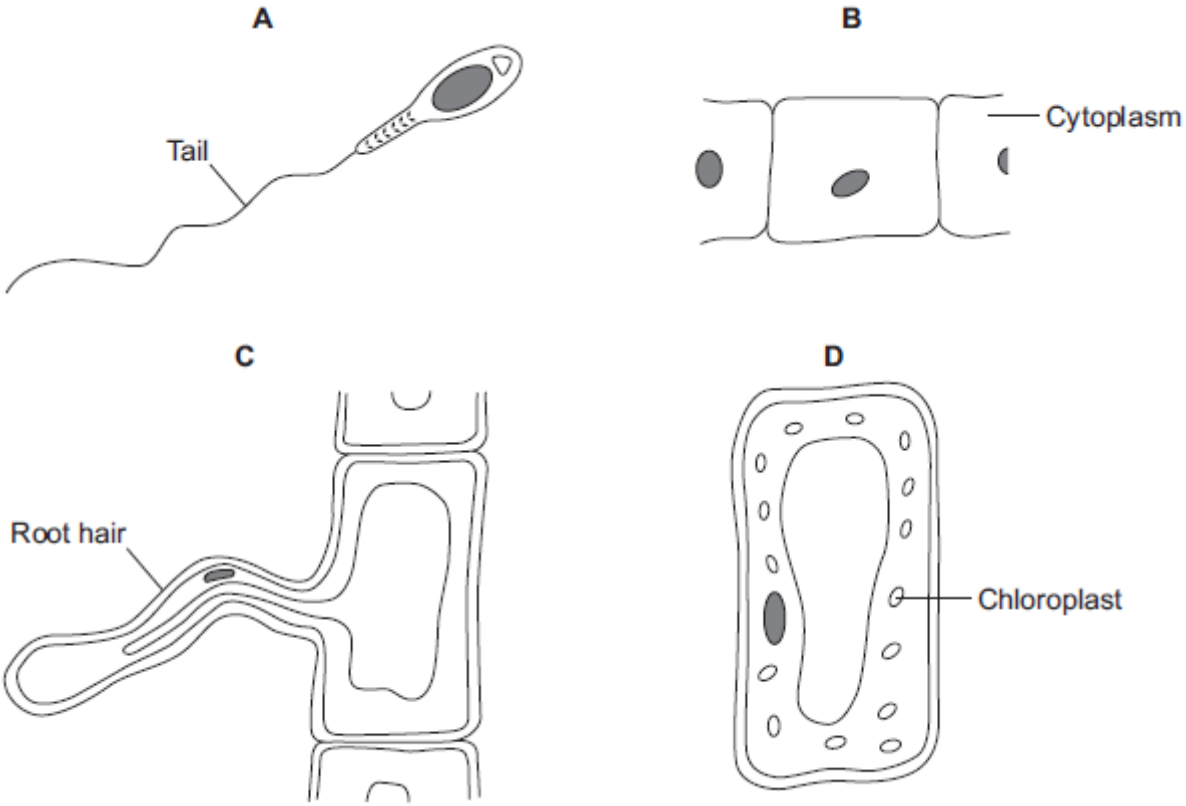

Water can move from cell to cell.

Into which cell, **P**, **Q** or **R**, will water move the fastest? ☐

**(1)**

**(Total 4 marks)**

**Q17.** 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.

_____

_____

**(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)**

**Q18.** 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

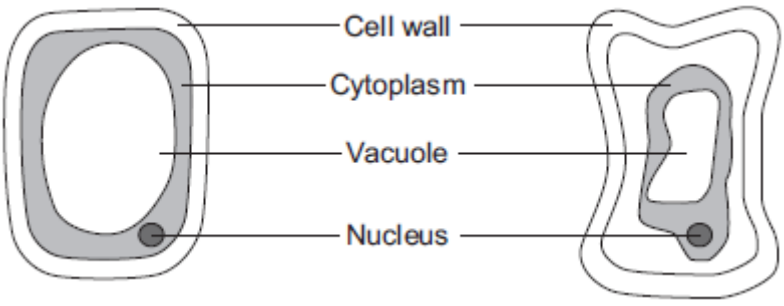
- freely permeable
- non-permeable
- partially permeable

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.




Cell in sugar solution **A** (after 1 hour)

Cell in sugar solution **B** (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. ☐

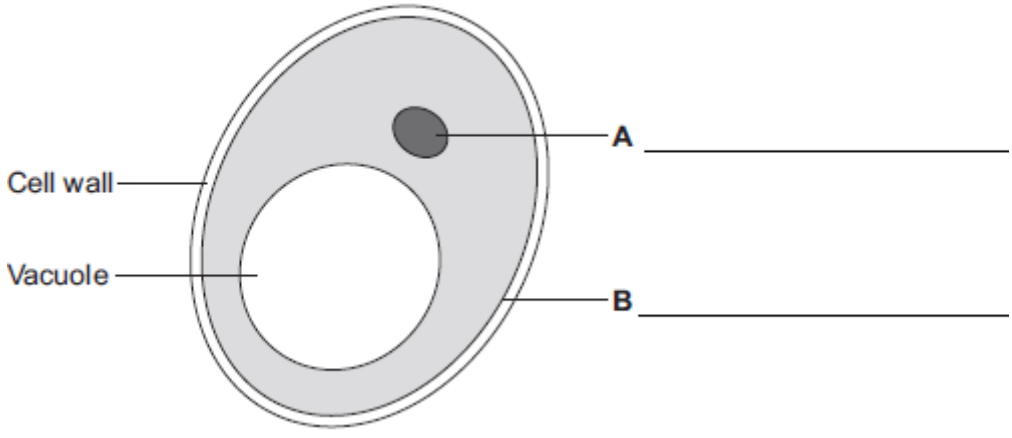
Villi have many blood capillaries. ☐

**(2)**

**(Total 7 marks)**

**Q19.** 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.

| **embryos** | **hair** | **nerve cells** |
|---|---|---|

Human stem cells may come from

_____

**(1)**

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

| **cystic fibrosis** | **paralysis** | **polydactyly** |
|---|---|---|

Human stem cells can be used to treat

_____

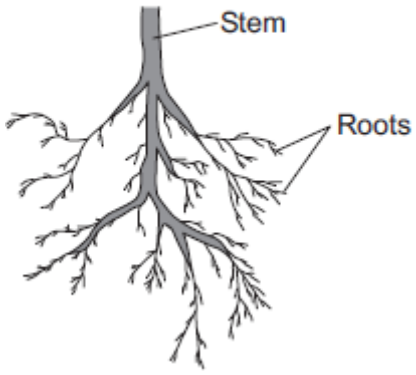
**(1)**

**(Total 5 marks)**

**Q20.** 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.

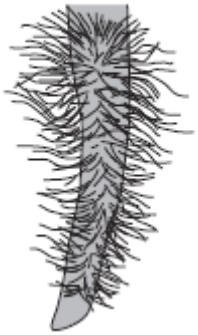
| | |
|---|---|
| The mineral ions are absorbed by active transport. | ☐ |
| The mineral ions are absorbed by diffusion. | ☐ |
| The mineral ions are absorbed down the concentration gradient. | ☐ |
| The absorption of mineral ions needs energy. | ☐ |

**(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.

_____

_____

_____

_____

**(2)**

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

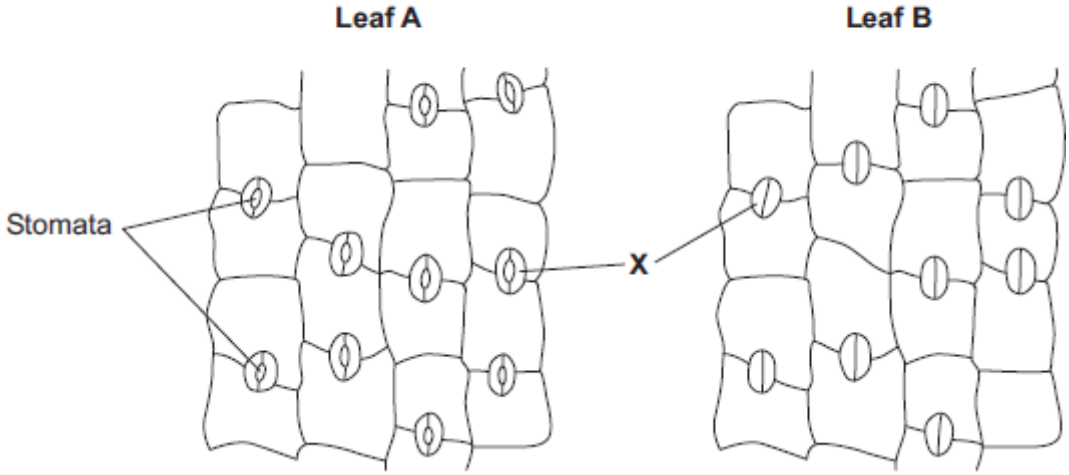
_____

_____

**(1)**

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

**Figure 3**




(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**.

_____

_____

**(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**?

_____

_____

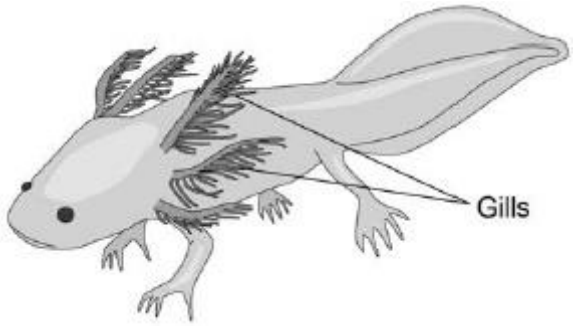
**(1)**

**(Total 9 marks)**

**Q21.** An animal called an axolotl lives in water.

**Figure 1** shows an axolotl.

**Figure 1**




Oxygen enters the axolotl's bloodstream through the gills by diffusion.

(a) What is diffusion? Tick (✓) **one** box.

| | |
|---|---|
| The movement of particles from a high concentration to a low concentration | ☐ |
| The movement of particles from a low concentration to a high concentration | ☐ |
| The movement of water from a concentrated solution to a more dilute solution | ☐ |

**(1)**

(b) Describe how **one** feature of the axolotl's gills increases the rate of diffusion of oxygen.

Use information from **Figure 1**.

Feature _____

Description _____

_____

_____

**(2)**

If a gill of an axolotl is removed, stem cells in the damaged area will divide and a new gill will grow.

(c) Complete the sentence.

Choose the answer from the box.

| **adaptation** | **differentiation** | **evolution** | **variation** |
|---|---|---|---|

When stem cells specialise to produce gill cells, this process is

known as _____.

**(1)**

(d) Complete the sentence.

Choose the answer from the box.

| binary fission | mitosis | mutation |
|---|---|---|

To grow a new gill the stem cells divide by _____.

**(1)**

(e) Which **one** of the following does **not** contain stem cells?

Tick (✓) **one** box.

Bone marrow ☐

Embryos ☐

Hair ☐

Meristem tissue ☐

**(1)**

(f) Axolotls are small animals. Axolotls are used in stem cell research.

What are **two** advantages of using axolotls in stem cell research?

Tick (✓) **two** boxes.

Axolotls are cheap to feed. ☐

Axolotls are easy to breed. ☐

Axolotls are endangered. ☐

Axolotls live in water. ☐

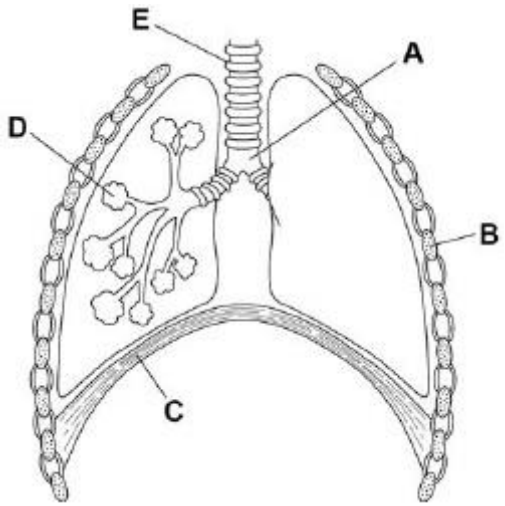
Axolotl research is cruel. ☐

**(2)**

Oxygen uptake in humans takes place in the lungs.

**Figure 2** shows the human breathing system.

**Figure 2**




(g) Where does oxygen enter the bloodstream?

Tick (✓) **one** box.

**A** ☐ **B** ☐ **C** ☐ **D** ☐

**(1)**

(h) Name part **E** on **Figure 4**.

_____

**(1)**

(i) Which blood vessel carries blood to the lungs?

Tick (✓) **one** box.

Aorta ☐

Pulmonary artery ☐

Vena cava ☐

**(1)**

**(Total 11 marks)**

**Q22.** After a meal rich in carbohydrates, the concentration of glucose in the small intestine changes.

The table below shows the concentration of glucose at different distances along the small intestine.

| Distance along the small intestine in cm | Concentration of glucose in mol $dm^{-3}$ |
|---|---|
| 100 | 50 |
| 300 | 500 |
| 500 | 250 |
| 700 | 0 |

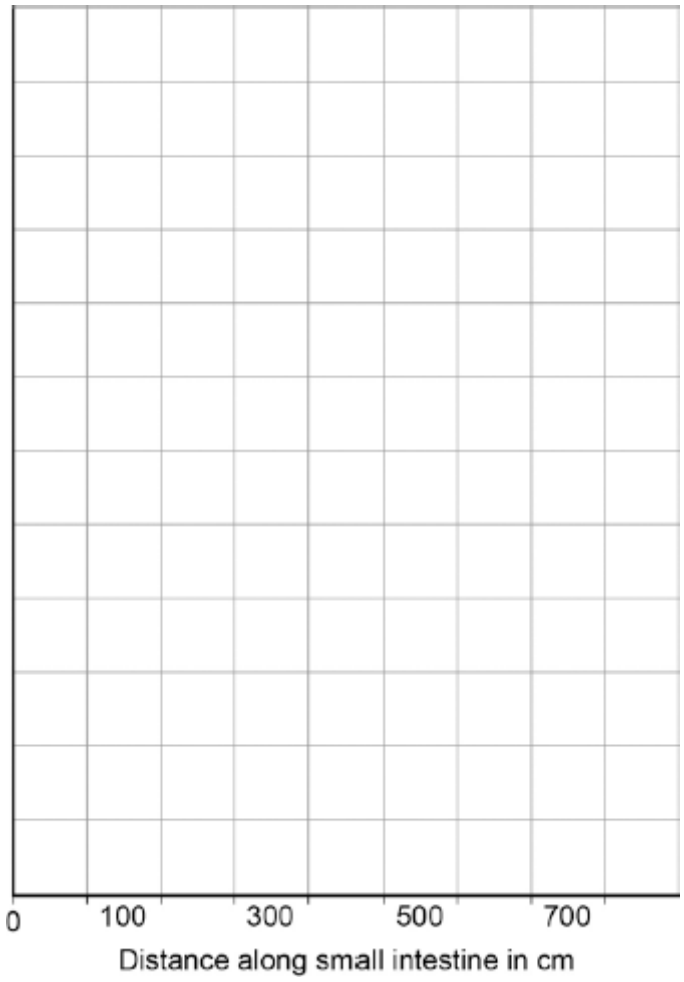
(a) At what distance along the small intestine is the glucose concentration highest?

_____ cm

**(1)**

(b) Use the data in the table to plot a bar chart on the graph below.

- Label the *y*-axis.
- Choose a suitable scale.




**(4)**

(c) Look at the graph above.

Describe how the concentration of glucose changes as distance increases along the small intestine.

**(2)**

(d) Explain why the concentration of glucose in the small intestine changes between 100 cm and 300 cm.

**(2)**

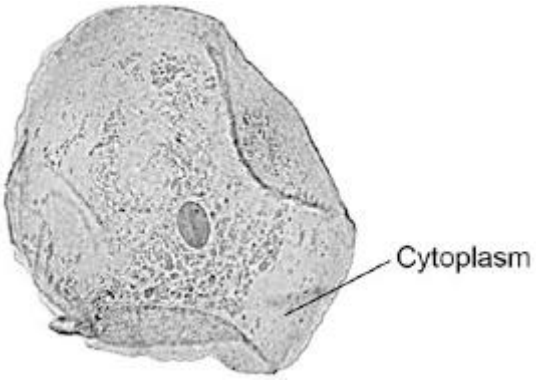
(e) Explain why the concentration of glucose in the small intestine changes between 300 cm and 700 cm.

**(3)**

**(Total 12 marks)**

**Q23.** **Figure 1** shows a human cheek cell viewed under a light microscope.

**Figure 1**






(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 ☐

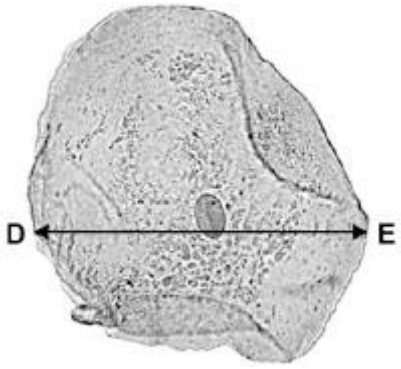
Lower resolution ☐

**(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 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:

$$\textbf{real size} = \frac{\textbf{image size}}{\textbf{magnification}}$$

_____ mm

Convert mm to μm _____ μm

**(3)**

(f) A red blood cell is 8 μm 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)**

**Q24.** Gases enter and leave the blood by diffusion.

(a) Define the term diffusion.

_____

_____

**(1)**

(b) Name the main gases that diffuse into and out of the blood **in the lungs**.

Into the blood _____

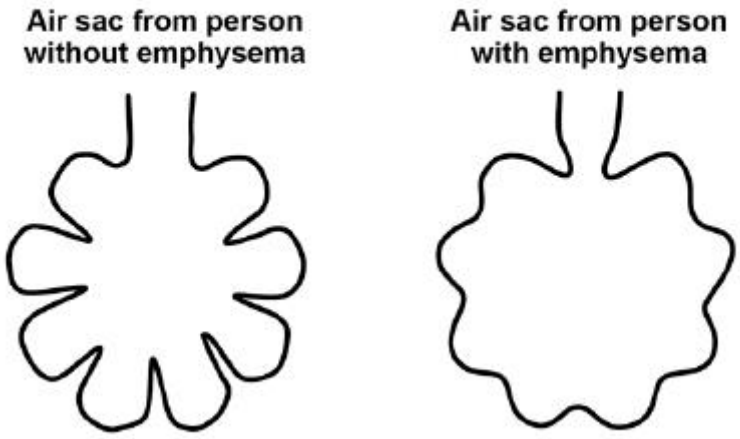
Out of the blood _____

**(1)**

(c) Smoking can cause emphysema.

Look at **Figure 1** below.

Figure 1




Emphysema causes the walls of the air sacs in the lungs to break down

Explain how this will affect the diffusion of gases into and out of the blood.

_____

_____

_____

_____

**(2)**

Smoking during pregnancy can cause low birth mass in babies.

**Table 1** shows the World Health Organisation categories for birth mass.

**Table 1**

| Category | Birth mass in g |
|---|---|
| Above normal birth mass | > 4500 |
| Normal birth mass | 2500–4500 |
| Low birth mass | 1500–2499 |
| Very low birth mass | 1000–1499 |
| Extremely low birth mass | < 1000 |

(d) Complete **Table 2**.

Use information in **Table 1**.

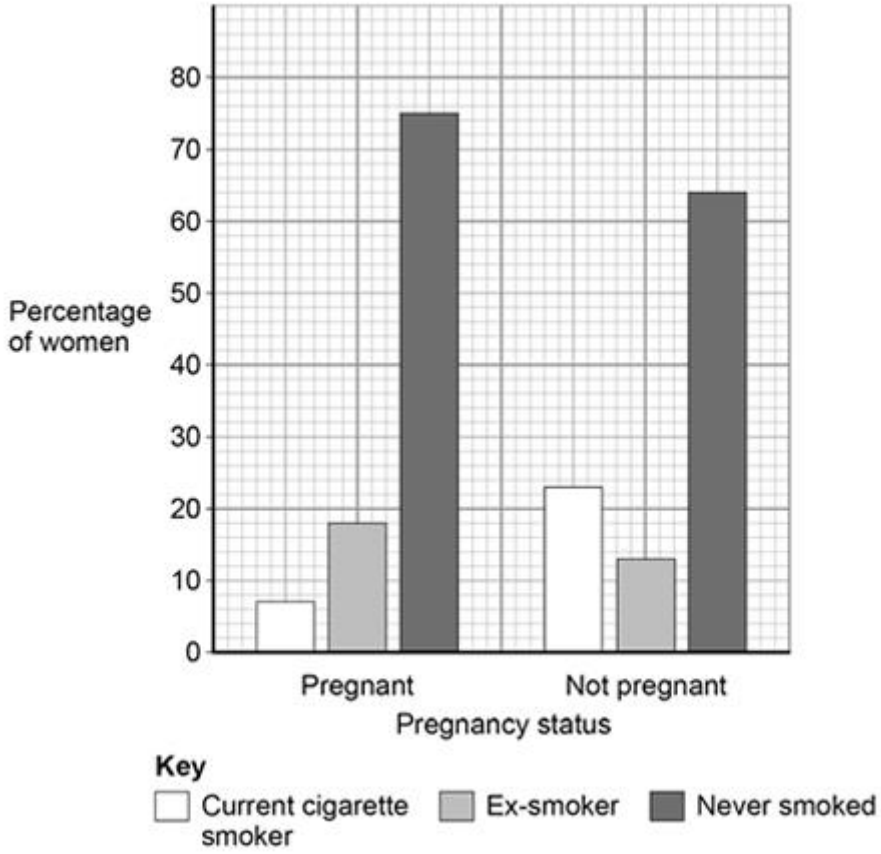
**Table 2**

| Baby | Birth mass in g | Category |
|---|---|---|
| **A** | 2678 | Normal birth mass |
| **B** | 1345 | |
| **C** | 991 | |

**(2)**

**Figure 2** shows data from a study about pregnancy and smoking in women in the UK.

Figure 2




(e) Sampling from the whole UK population would **not** be appropriate for this study.

Give **one** reason why.

_____

_____

**(1)**

(f) Give **three** conclusions that can be made about smoking in pregnant women compared with non-pregnant women.

Use information from **Figure 2**.

1. _____

_____

2. _____

_____

3. _____

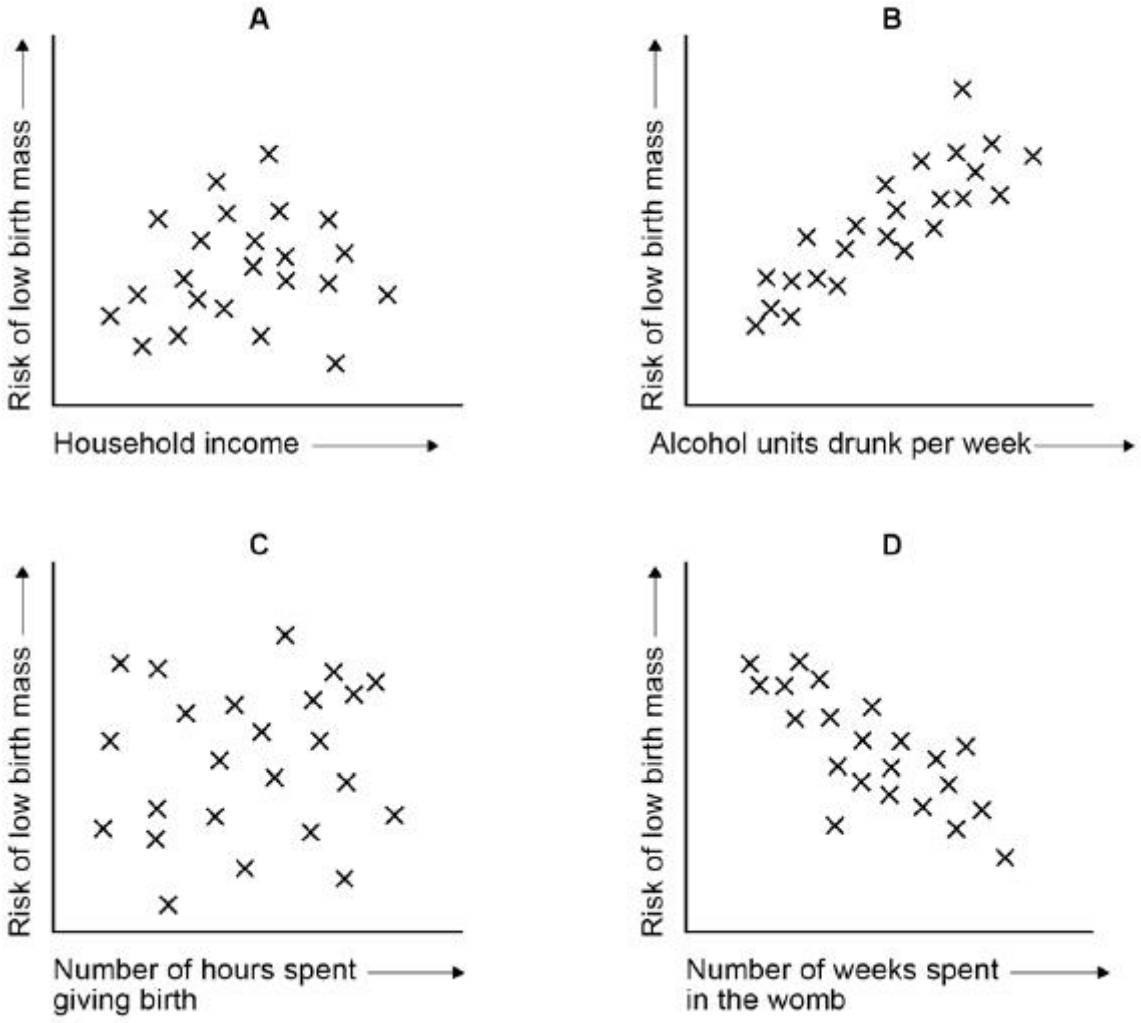
_____

**(3)**

Other factors can also be linked to low birth mass.

**Figure 3** shows the relationship between four of these factors and the risk of low birth mass.

Figure 3




(g) What type of graph is shown in **Figure 3**?

Tick **one** box.

Bar graph ☐

Histogram ☐

Line graph ☐

Scatter graph ☐

**(1)**

(h) Which of the graphs in **Figure 3** shows a positive correlation?

Tick **one** box.

**A** ☐ **B** ☐ **C** ☐ **D** ☐

**(1)**

(i) A student concluded that the longer a woman spends giving birth, the greater the risk of low birth mass.

Give **one** reason why the student's conclusion is **not** correct.

Use evidence from **Figure 3**.

_____

_____

**(1)**

**(Total 13 marks)**

**Q25.** Earthworms are small animals that live in soil. Earthworms have no specialised gas exchange system and absorb oxygen through their skin.

(a) What is the name of the process in which oxygen enters the skin cells?

Tick **one** box.

Active transport ☐

Diffusion ☐

Osmosis ☐

Respiration ☐

**(1)**

The table below shows information about four skin cells of an earthworm.

| Cell | Percentage of oxygen | |
|---|---|---|
| | Outside cell | Inside cell |
| **A** | 9 | 8 |
| **B** | 12 | 8 |
| **C** | 12 | 10 |
| **D** | 8 | 12 |

(b) Which cell has the smallest difference in percentage of oxygen between the outside and the inside of the cell?

Tick **one** box.

| A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|

**(1)**

(c) Which cell will oxygen move **into** the fastest?

Tick **one** box.

| A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|

**(1)**

(d) Earthworms have a large surface area to volume ratio.

Suggest why a large surface area to volume ratio is an advantage to an earthworm.

_____

_____

**(1)**

(e) The earthworm uses enzymes to digest dead plants.

Many plants contain fats or oils.

Which type of enzyme would digest fats?

_____

_____

**(1)**

(f) Earthworms move through the soil.

This movement brings air into the soil.

Dead plants decay faster in soil containing earthworms compared with soil containing **no** earthworms.

Explain why.

_____

_____

_____

_____

_____

_____

**(3)**

(g) When earthworms reproduce, a sperm cell from one earthworm fuses with an egg cell from a different earthworm.

Name the process when an egg cell and a sperm cell fuse.

_____

**(1)**

(h) Some types of worm reproduce by a process called fragmentation.

In fragmentation, the worm separates into two or more parts. Each part grows into a new worm.

What type of reproduction is fragmentation?

_____

**(1)**

**(Total 10 marks)**

**Q26.** 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.

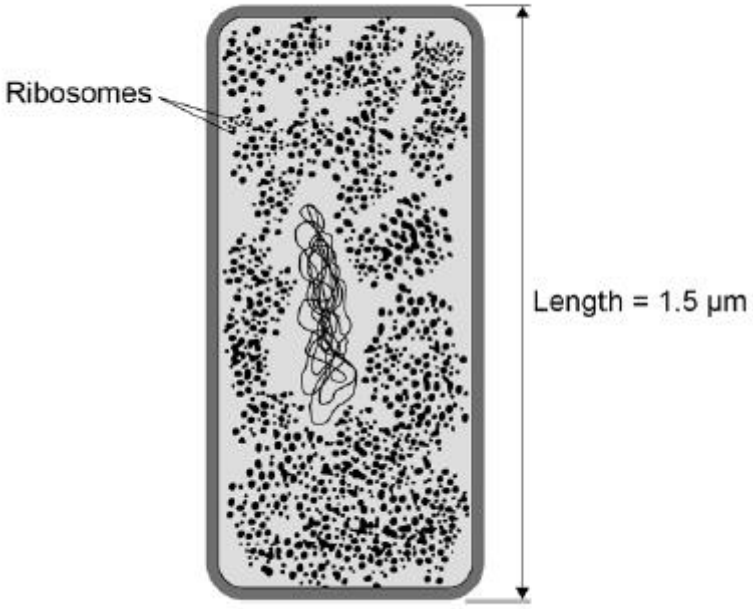
**Table 1**

| | **Nucleus** | **Plasmids** | **Cytoplasm** |
|---|---|---|---|
| Prokaryotic cell | | | |
| Eukaryotic cell | | | |

**(2)**

**Figure 1** shows a cell.

Figure 1



(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).

_____

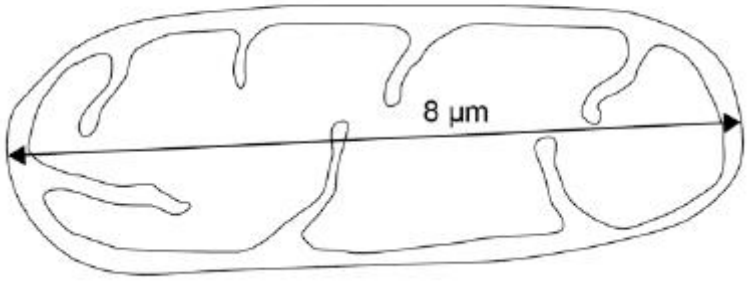
_____

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.

_____

_____

_____

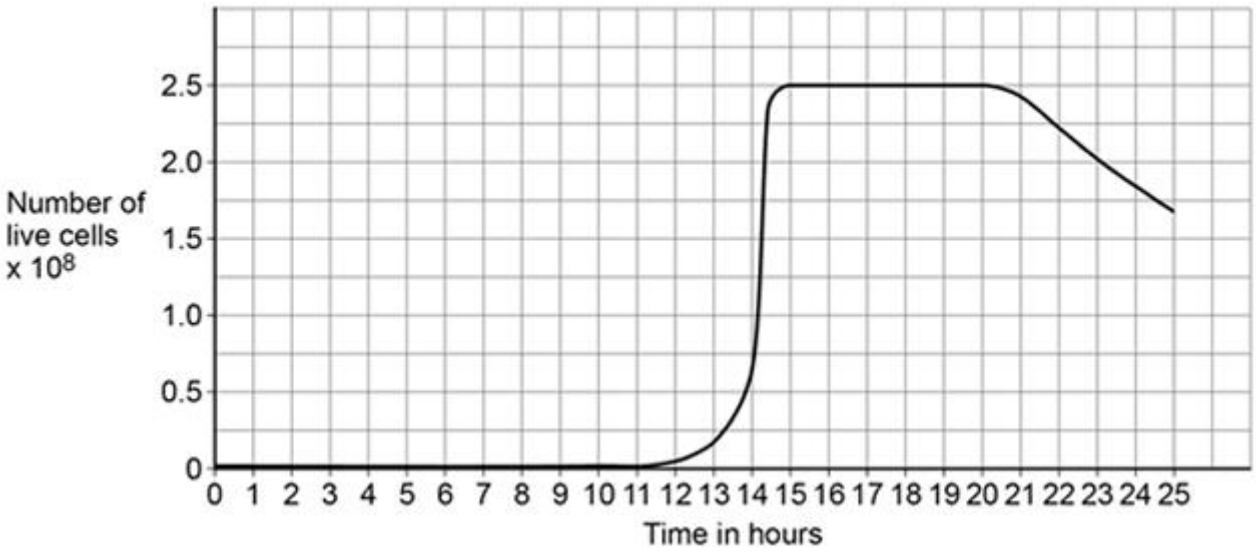
_____

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)**

**Q27.** This question is about the cell cycle.

(a) Chromosomes are copied during the cell cycle.

Where are chromosomes found?

Tick **one** box.

Cytoplasm ☐

Nucleus ☐

Ribosomes ☐

Vacuole ☐

**(1)**

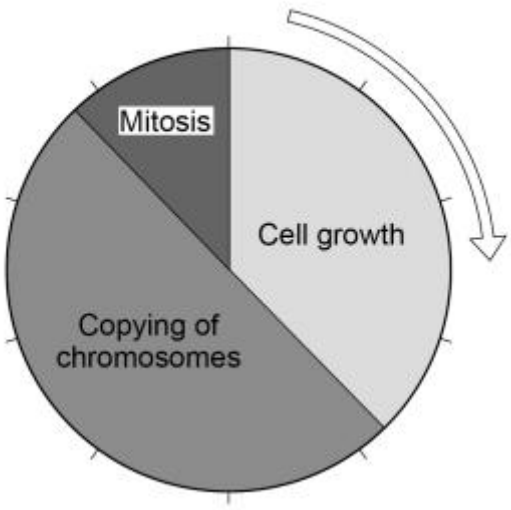
(b) What is the name of a section of a chromosome that controls a characteristic?

_____

**(1)**

**Figure 1** shows information about the cell cycle.

**Figure 1**




(c) Which stage of the cell cycle in **Figure 1** takes the most time?

Tick **one** box.

Cell growth ☐

Copying of chromosomes ☐

Mitosis ☐

**(1)**

(d) During mitosis cells need extra energy.
Which cell structures provide most of this energy?

Tick **one** box.

Chromosomes ☐

Cytoplasm ☐

Mitochondria ☐

Ribosomes ☐

**(1)**

(e) The cell cycle in **Figure 1** takes two hours in total.
The cell growth stage takes 45 minutes.

Calculate the time taken for mitosis.

_____

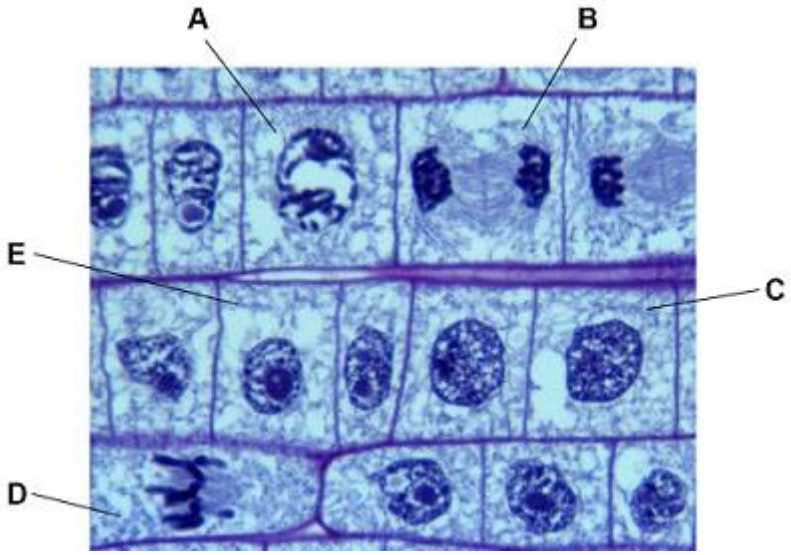
_____

_____

Time = _____ minutes

**(2)**

**Figure 2** shows some cells in different stages of the cell cycle.




(f) Which cell is **not** dividing by mitosis Tick **one** box.

| A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|

**(1)**

(g) Cell **E** in **Figure 2** contains 8 chromosomes. Cell **E** divides by mitosis.

How many chromosomes will each new cell contain?

Tick **one** box.

2 ☐

4 ☐

8 ☐

16 ☐

**(1)**

(h) Why is mitosis important in living organisms?

Tick **one** box.

To produce gametes ☐

To produce variation ☐

To release energy ☐

To repair tissues ☐

**(1)**

**(Total 9 marks)**