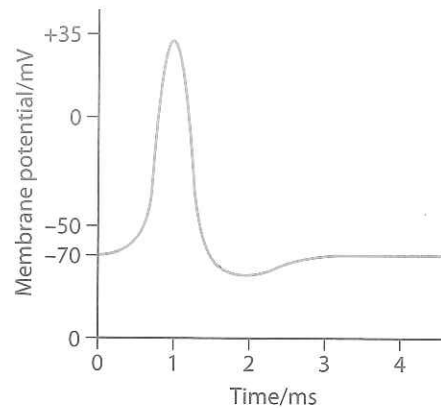


Revision test 1

Section A: Structures and functions of cells and tissues

Answer ALL questions. Write your answers in the spaces provided.

1 The graph shows a recording of an action potential.



(a) What state is the membrane potential at 1 ms on the graph?

- A depolarised
- B hyperpolarised
- C polarised
- D repolarised.

1 mark

(b) Sodium channels open to allow an increased flow of sodium ions into the neuron.

Use the graph to estimate the time when this happens.

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Look for the time when the membrane potential starts to increase for depolarisation. Also you are looking for a precise time not a range

1 mark

(c) State the time when hyperpolarisation is at its greatest.

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1 mark

In action potentials remember depolarised is when membrane potential is positive and polarised is when the membrane potential is negative. 'Hyper' means over or above, so this will be the membrane potential when it is at the **most** negative membrane potential.

(d) At what time do the potassium channels open?

- A 1 ms
- B 2 ms
- C 3 ms
- D 0.5 ms

1 mark

Potassium ions diffuse out of the cell and take positive charge with them, making the cell potential more negative. When do the cells start becoming more negative?

Guided

(e) Explain how the normal balance of sodium and potassium ions is regained.


2 marks

The Na⁺/K⁺ ATP pumps use energy to rapidly transport

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 You can revise action potential on page 11 of the Revision Guide.

Total for Question 1 = 6 marks

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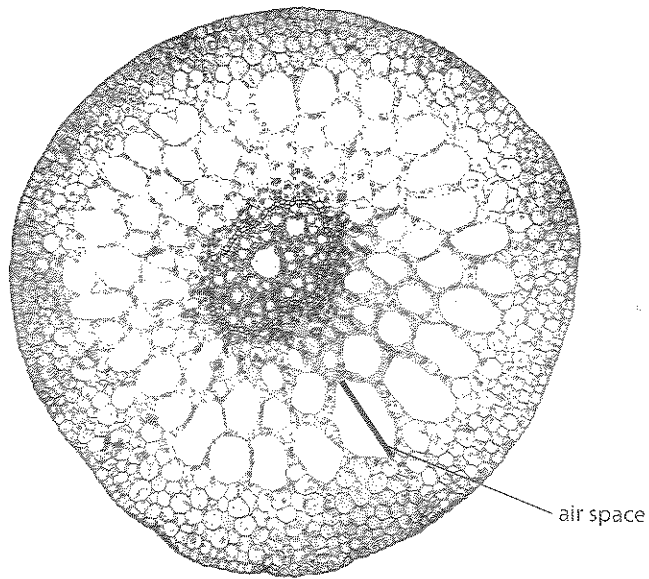
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Guided

2 The photograph shows a transverse section of a pondweed stem through a light microscope.



(a) The total magnification of the image is $\times 50$. The eyepiece lens has a magnification of $\times 10$. Calculate the magnification of the objective lens.

2 marks

total magnification = eyepiece lens \times the objective lens

Magnification =

(b) Calculate the actual length of the air space marked on the photograph.

2 marks

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

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

length of air space = $\frac{\text{500}}{\text{500}}$ = μm

You need to measure the actual length of the air space first. Be careful of the units.

(c) All aquatic plants have a similar stem structure, with a cortex of parenchyma cells with large air spaces. Suggest an explanation of why the stems have a structure like this.

3 marks

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Consider what an aquatic plant needs to do in order to survive.

Total for Question 2 = 7 marks

3 Plants are complex multi-cellular organisms and have many different specialised cell types.

(a) Give a definition for specialised cells.

2 marks

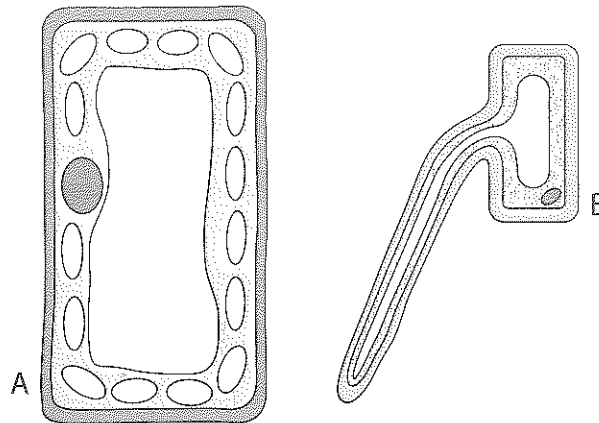
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Guided

(b) Below are diagrams of two specialised plant cells A and B.



(i) State the names and functions of cell A and cell B.

2 marks

Cell A is a it carries out

Cell B is a it takes up

(ii) Compare cells A and B.

In your answer explain the differences between the two cells.

4 marks

You should use the number of marks as a guide for how many points to write. If you are asked to compare two things, one of those points must be a similarity or a difference.

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 **Links** You can revise specialised plant cells on page 5 of the Revision Guide.

Total for Question 3 = 8 marks

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4 Myoglobin is a protein found in muscle cells, which binds on to oxygen. There are two different types of muscle cells. They can be fast twitch or slow twitch.

Fast twitch muscle cells rely mainly on anaerobic respiration for energy. Anaerobic means without oxygen.

(a) Choose the statement below, which is **true**.

1 mark

- A Slow twitch muscle cells have less myoglobin than fast twitch muscle cells.
- B Slow twitch muscle cells have more myoglobin than fast twitch muscle cells.
- C Slow twitch muscle cells have no myoglobin.
- D Slow twitch muscle cells have the same quantity of myoglobin as fast twitch muscle cells.

(b) Skeletal muscles have a bundle-within-bundles structure. They are covered in a tough layer of connective tissue, within this are many bundles, each of which contains 10 to 100 or more muscle fibres or cells.

Muscle cells also have a bundle-within-bundle structure. Describe the structure of a muscle cell, in terms of the muscle's main function of contraction.

2 marks

It's important to read the question and note down what the question tells you. For this question, your answer should focus on features specific to a muscle cell, not general features of any cell such as a nucleus or cell membrane.

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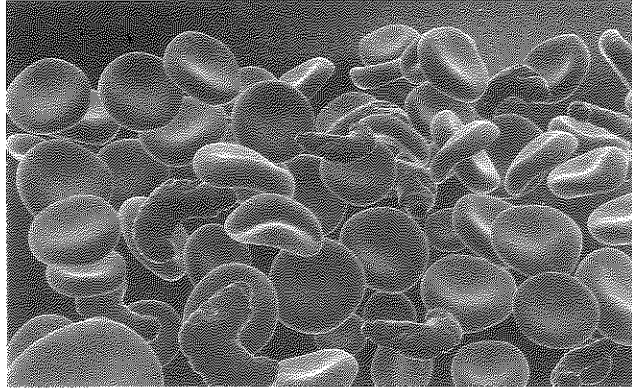
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Total for Question 4 = 3 marks



- 5 Sickle-cell disease is an inherited condition, where the haemoglobin is abnormal. This causes the red blood cells to be inelastic. They only last for about 10–20 days compared to 3–4 months normally. Below is an image showing sickle cells next to some normal red blood cells.



Deduce the problems these abnormal red blood cells could cause people who suffer from sickle-cell disease.

Your answer should explain the effects of the inelastic red blood cells and their short life span.

6 marks

Remember that normal red blood cells squeeze through capillaries and that they carry oxygen to cells for respiration.

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 **Links** You can revise red blood cells on page 6 of the Revision Guide.

Total for Question 5 = 6 marks

END OF SECTION TOTAL FOR SECTION A = 30 MARKS