

Name:

Date:

B1 - Test 2  
CELL BIOLOGY

**GCSE**  
AQA  
BIOLOGY

Mark

Grade

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### Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

### Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

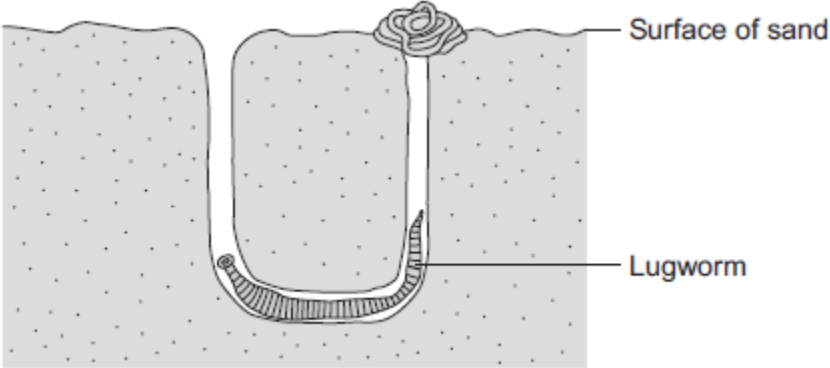
### Information

- The marks for the questions are shown in brackets

1

The lugworm lives in a U-shaped burrow in the sand on the seashore.

The diagram below shows a lugworm in its burrow.



(a) Some scientists investigated the effect of different salt concentrations on lugworms.

The scientists:

- collected 50 lugworms from the seashore
- separated them into five groups of 10 lugworms
- weighed each group of 10 lugworms
- placed each group into a different concentration of salt solution and left them for 8 hours
- took each lugworm out of the solution and placed it on blotting paper for 30 seconds
- re-weighed each group of 10 lugworms.

(i) Why did the scientists use groups of 10 lugworms and not just 1 lugworm at each concentration?

.....  
.....

(1)

(ii) Suggest why the scientists placed each lugworm on blotting paper for 30 seconds before they reweighed the groups of lugworms.

.....  
.....

(1)

(iii) How might the method of blotting have caused errors in the results?

.....  
.....

(1)

(iv) Suggest **one** improvement the scientists could make to their investigation.

.....

(1)

(b) The table below shows the scientists' results.

Concentration of salt in arbitrary units	Mass of 10 lugworms at start in grams	Mass of 10 lugworms after 8 hours in grams	Change in mass in grams	Percentage (%) change in mass
1.0	41.2	61.8	+20.6	+50
2.0	37.5	45.0	+7.5	
3.0	55.0	56.1	+1.1	+2
4.0	46.2	22.2	-24.0	-52
5.0	45.3	22.6	-22.7	-50

(i) The scientists calculated the **percentage** change in mass at each salt concentration.

Why is the **percentage** change in mass more useful than just the change in mass in grams?

Use information from the table in your answer.

.....  
.....  
.....  
.....

(2)

(ii) Calculate the percentage change in mass for the 10 lugworms in the salt solution with a concentration of 2.0 arbitrary units.

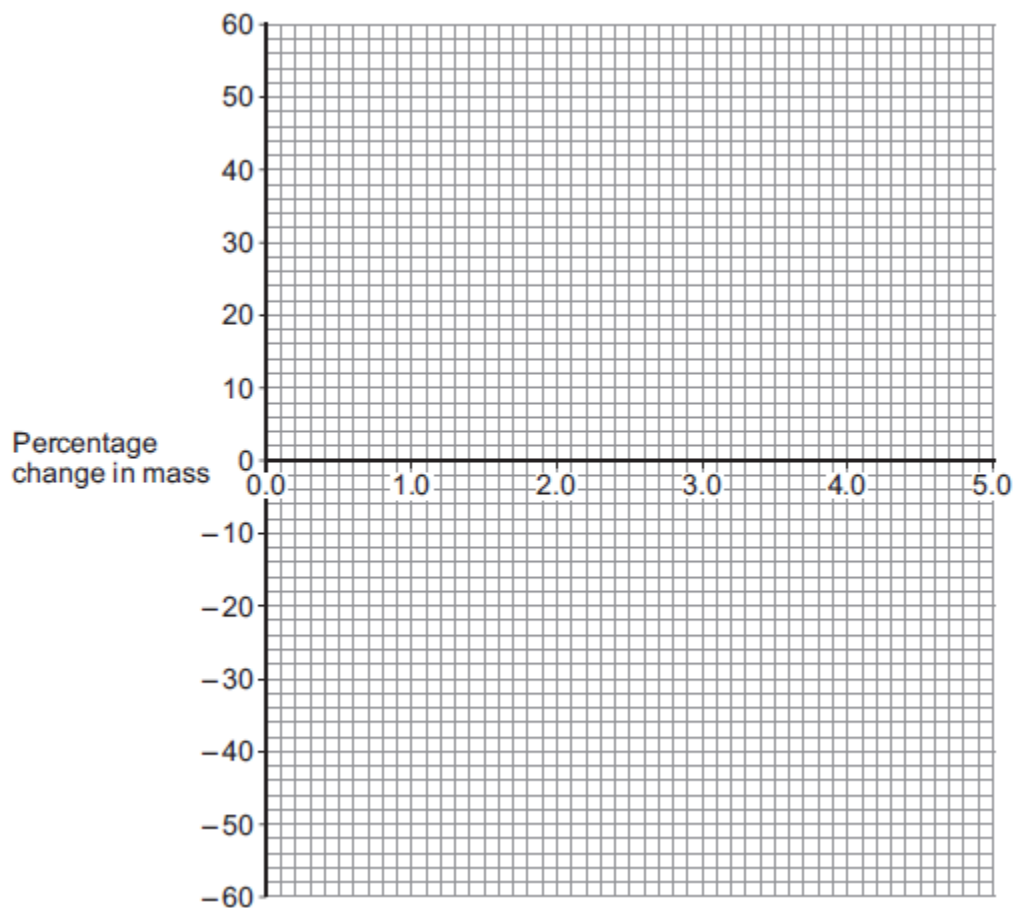
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Percentage change in mass = ..... %

(2)

(c) (i) On the graph paper below, draw a graph to show the scientists' results:

- plot the **percentage** change in mass
- label the horizontal axis
- draw a line of best fit.



(4)

(ii) The scientists thought one of their results was anomalous.

Draw a ring around the anomalous result on your graph.

(1)

(iii) Suggest what might have happened to cause this anomalous result.

.....  
.....

(1)

(d) (i) What do you think is the concentration of salts in the lugworm's natural environment?

Use information from your graph to give the reason for your answer.

Concentration = ..... %

Reason .....

.....  
.....  
.....

(2)

(ii) The mass of the lugworms decreased in the salt solution with a concentration of 5.0 arbitrary units.

Explain what caused this.

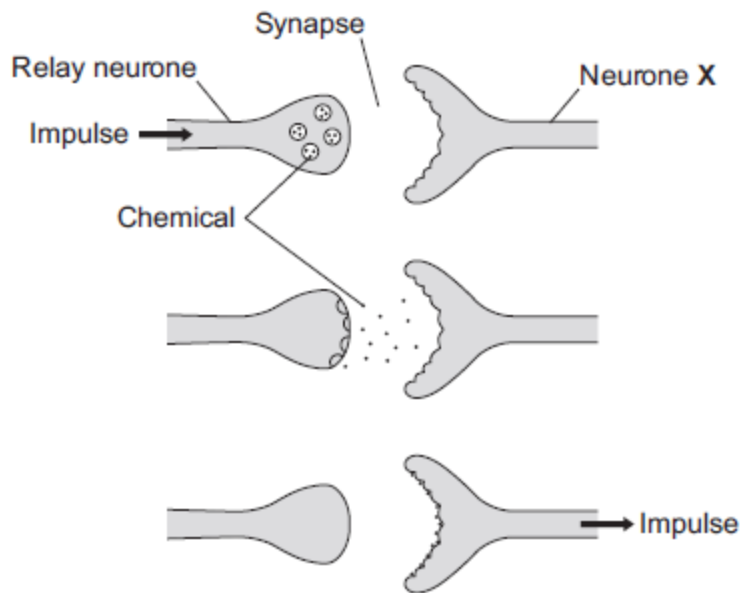
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(3)

(Total 19 marks)

2

The diagram below shows how a nerve impulse passing along a relay neurone causes an impulse to be sent along another type of neurone, neurone X.



(a) What type of neurone is neurone **X**?

.....

**(1)**

(b) Describe how information passes from the relay neurone to neurone **X**.  
Use the diagram to help you.

.....  
.....  
.....  
.....  
.....  
.....

**(3)**

(c) Scientists investigated the effect of two toxins on the way in which information passes across synapses. The table below shows the results.

<b>Toxin</b>	<b>Effect at the synapse</b>
Curare	Decreases the effect of the chemical on neurone <b>X</b>
Strychnine	Increases the amount of the chemical made in the relay neurone

Describe the effect of each of the toxins on the response by muscles.

Curare .....

.....  
.....

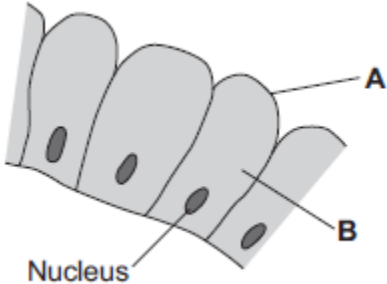
Strychnine .....

.....  
.....

**(2)**  
**(Total 6 marks)**

3

The image below shows some cells in the lining of the stomach.



(a) (i) Use words from the box to name structures **A** and **B**.

cell membrane	chloroplast	cytoplasm	vacuole
---------------	-------------	-----------	---------

**A** .....

**B** .....

(2)

(ii) What is the function of the nucleus?

Tick (✓) **one** box.

To control the activities of the cell

To control movement of substances into and out of the cell

To release energy in respiration

(1)

(b) Draw **one** line from each part of the human body to its correct scientific name.

Part of human body	Scientific name
Layer of cells lining the stomach	An organ
Stomach	An organism
Mouth, stomach, intestines, liver and pancreas	An organ system
	A tissue

**(3)**  
**(Total 6 marks)**

**4** In sexual reproduction, an egg fuses with a sperm.

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

An egg and a sperm fuse together in the process of

- cloning.  
fertilisation.  
mitosis.

**(1)**

(ii) Egg cells and sperm cells each contain the structures given in the box.

- chromosome****gene****nucleus**

List these three structures in size order, starting with the smallest.

1 ..... (smallest)

2 .....

3 ..... (largest)

**(2)**



- (iii) The egg and the sperm contain genetic material.

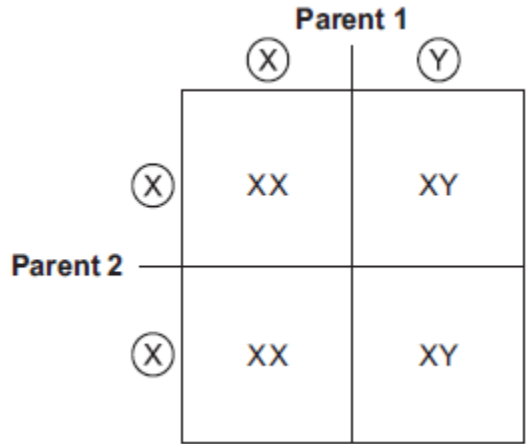
Draw a ring around the correct answer to complete the sentence.

The genetic material is made of

- |                                   |
|-----------------------------------|
| carbohydrate.<br>DNA.<br>protein. |
|-----------------------------------|

(1)

- (b) The diagram below shows the inheritance of **X** and **Y** chromosomes.



- (i) Draw a tick (✓) on the part of the diagram that shows a sperm cell.

(1)

- (ii) What is the chance of having a female child?

Give the reason for your answer.

.....

.....

.....

.....

(2)

(Total 7 marks)

**5**

**In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Diffusion is an important process in animals and plants.

The movement of many substances into and out of cells occurs by diffusion.

Describe why diffusion is important to animals and plants.



The water moves through a

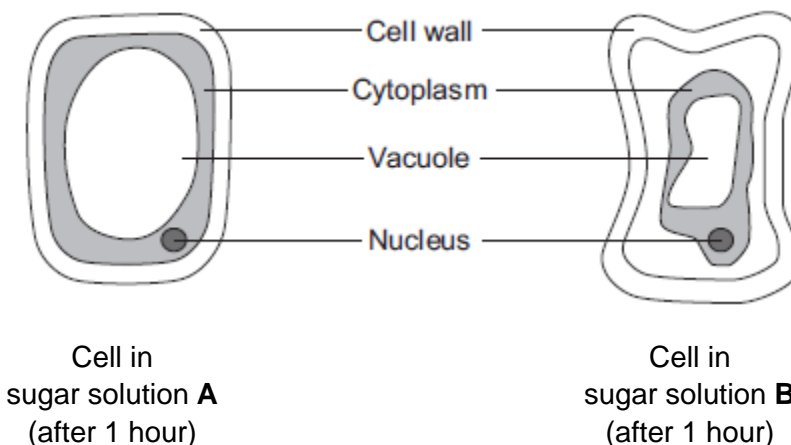
- freely permeable
- non-permeable
- partially permeable

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.



(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)

**7** Plant roots absorb water from the soil by osmosis.

(a) What is osmosis?

.....

.....

.....

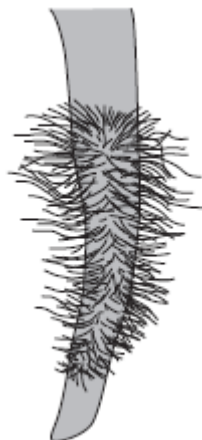
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(3)

(b) The image below shows part of a plant root.



The plant root is adapted for absorbing water from the soil.

Use information from the diagram to explain how this plant root is adapted for absorbing water.

.....

.....

.....

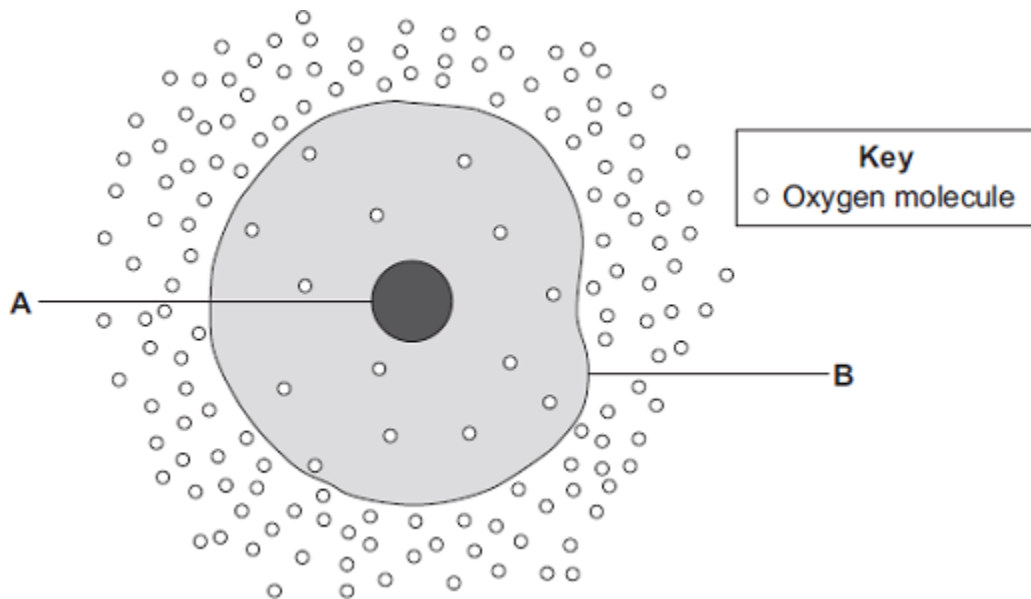
.....

.....

.....

(3)  
(Total 6 marks)

**8** 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)**

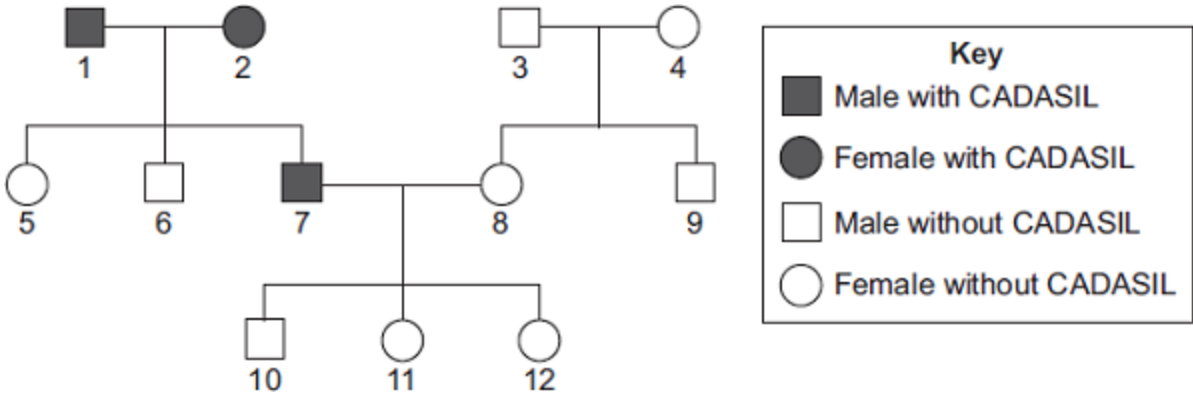
**(Total 6 marks)**

9

CADASIL is an inherited disorder caused by a dominant allele.

CADASIL leads to weakening of blood vessels in the brain.

The diagram shows the inheritance of CADASIL in one family.



(a) CADASIL is caused by a *dominant allele*.

(i) What is a *dominant allele*?

.....  
.....

(1)

(ii) What is the evidence in the diagram that CADASIL is caused by a dominant allele?

.....  
.....

(1)

(iii) Person 7 has CADASIL.

Is person 7 homozygous or heterozygous for the CADASIL allele?

Give evidence for your answer from the diagram.

.....  
.....

(1)

- (b) Persons **7** and **8** are planning to have another baby.  
Use a genetic diagram to find the probability that the new baby will develop into a person with CADASIL.

Use the following symbols to represent alleles.

**D** = allele for CADASIL

**d** = allele for not having CADASIL

Probability = .....

**(4)**

- (c) Scientists are trying to develop a treatment for CADASIL using stem cells.  
Specially treated stem cells would be injected into the damaged part of the brain.

- (i) Why do the scientists use stem cells?

.....  
.....  
.....  
.....

**(2)**

- (ii) Embryonic stem cells can be obtained by removing a few cells from a human embryo.  
In 2006, scientists in Japan discovered how to change adult skin cells into stem cells.  
Suggest **one** advantage of using stem cells from adult skin cells.

.....  
.....

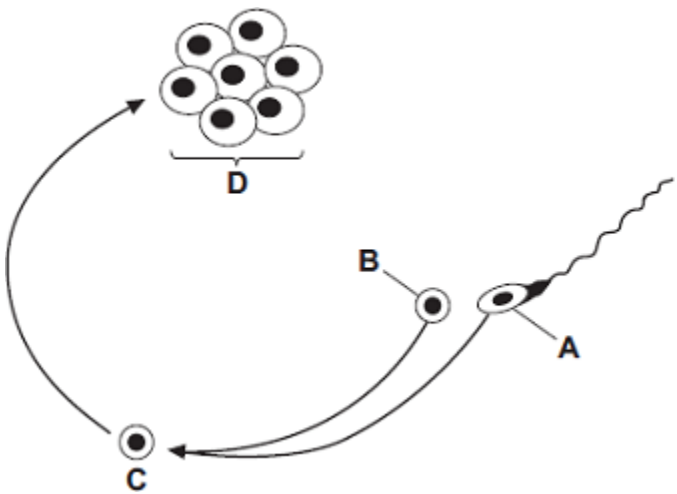
**(1)**

**(Total 10 marks)**



10

The diagram shows some of the stages in IVF (in vitro fertilisation).



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

egg	embryo	fertilised egg	ovary	sperm
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- Structure **A** .....
- Structure **B** .....
- Structure **C** .....
- Structure **D** .....

(4)

(b) What do doctors do next with structure **D**?

- .....
- .....
- .....
- .....

(2)

(c) The table gives statistics for an IVF clinic.

	Age of women treated			
	Below 35 years	35 – 37 years	38 – 39 years	40 – 42 years
Number of women treated	414	207	106	53
Number of women who produced one baby	90	43	17	1
Number of women who produced twins	24	8	4	1
Number of women who produced triplets	1	0	0	0

- (i) About what proportion of the treated women aged 35 – 37 years produced one or more babies?

Draw a ring around your answer.

**one quarter      one third      half**

**(1)**

- (ii) This clinic does **not** give IVF treatment to women over 42 years of age.

Use data from the table to explain why.

.....

.....

.....

.....

**(2)**

- (iii) The committee which regulates IVF treatment now advises that only one embryo is used in each treatment.

Suggest **one** reason for this.

.....

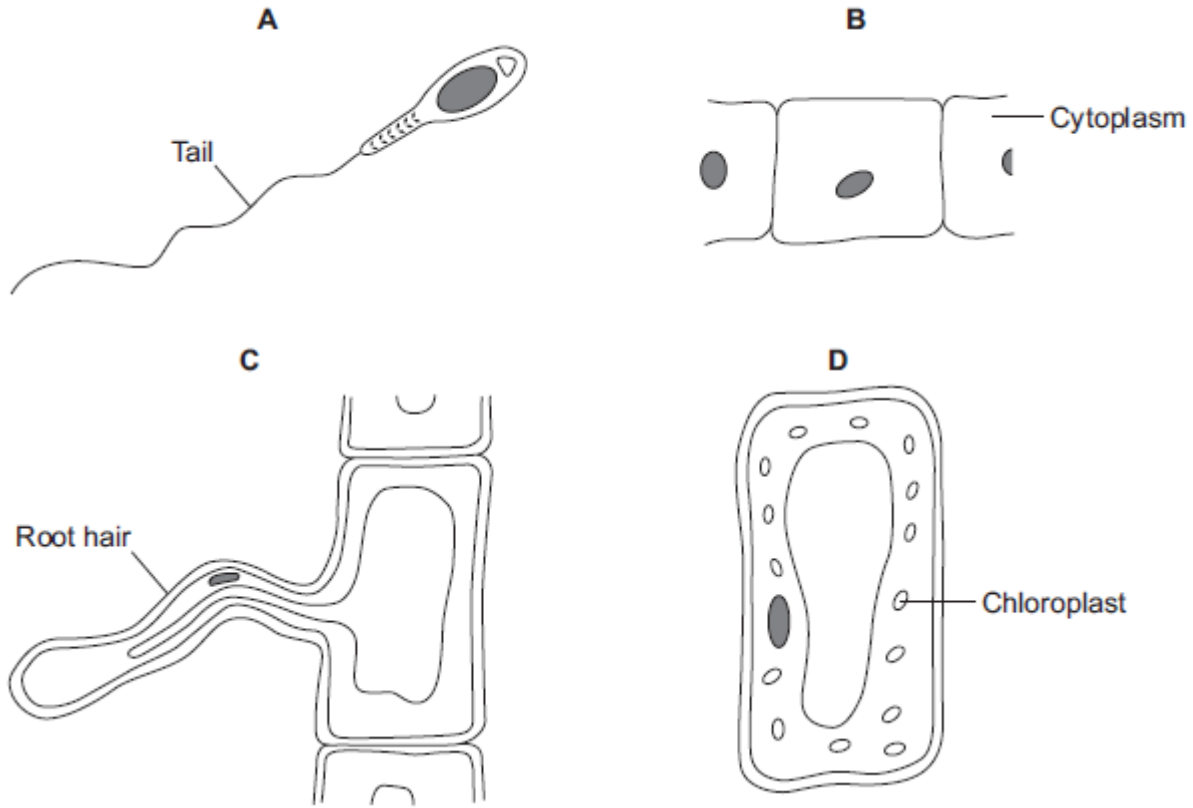
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**(1)**

**(Total 10 marks)**

11

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)