

Cell Structure

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Biology
Exam Board	AQA
Topic	4.1 Cell Biology
Sub-Topic	Cell Structure
Difficulty Level	Gold Level
Booklet	Question Paper

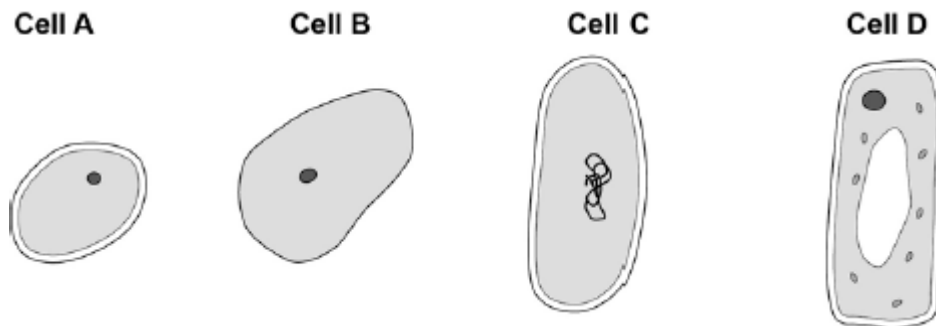
Time Allowed: 58 minutes

Score: /57

Percentage: /100

Grade Boundaries:

Q1. The figure below shows four different types of cell.



- (a) Which cell is a plant cell?

Give **one** reason for your answer.

Cell

Reason

(2)

- (b) Which cell is an animal cell?

Give **one** reason for your answer.

Cell

Reason

(2)

- (c) Which cell is a prokaryotic cell?

Give **one** reason for your answer.

Cell

Reason

(2)

- (d) A scientist observed a cell using an electron microscope.

The size of the image was 25 mm.

The magnification was $\times 100\,000$

Calculate the real size of the cell.

Use the equation:

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

Give your answer in micrometres.

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

Real size = micrometres

(3)

(Total 9 marks)

Q2. Different antibiotics destroy bacteria in different ways.

- Some antibiotics disrupt the bacterial cell membrane.
 - Some antibiotics disrupt the bacterial cell wall.
- (a) Antibiotics that disrupt the bacterial cell membrane often cause more side effects in humans compared with antibiotics that disrupt bacterial cell walls.

Suggest why.

.....

(1)

- (b) Some antibiotics prevent ribosomes functioning.

Suggest how this damages the bacterium.

.....

(1)

- (c) Drug manufacturers are spending less on research into new antibiotics.

One reason why is because new antibiotics are rarely prescribed.

Some people think that governments should pay drug manufacturers to develop new

antibiotics.

Suggest why.

.....

.....

.....

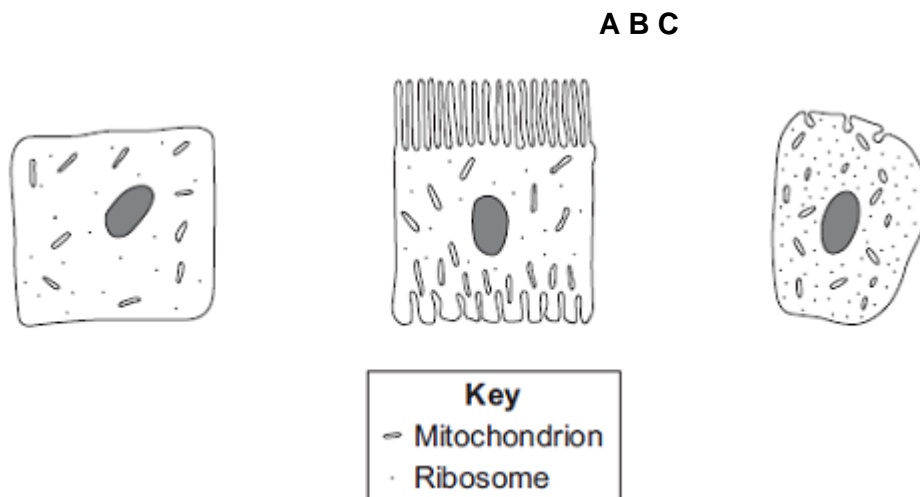
.....

.....

.....

(3)
(Total 5 marks)

Q3. 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 be best adapted to increase diffusion into or out of the cell?

Give **one** reason for your choice.

.....

.....

(1)

- (b) (i) Cell **C** is found in the salivary glands.

Name the enzyme produced by the salivary glands.

.....

(1)

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

.....

.....

.....

.....

(2)

(Total 4 marks)

- Q4.(a)** Mr and Mrs Smith both have a history of cystic fibrosis in their families.

Neither of them has cystic fibrosis.

Mr and Mrs Smith are concerned that they may have a child with cystic fibrosis.

Use a genetic diagram to show how they could have a child with cystic fibrosis.

Use the symbol **A** for the dominant allele and the symbol **a** for the recessive allele.

(3)

- (b) Mr and Mrs Smith decided to visit a genetic counsellor who discussed embryo screening.

Read the information which they received from the genetic counsellor.

- Five eggs will be removed from Mrs Smith's ovary while she is under an anaesthetic.
- The eggs will be fertilised in a dish using Mr Smith's sperm cells.
- The embryos will be grown in the dish until each embryo has about thirty cells.
- One cell will be removed from each embryo and tested for cystic fibrosis.
- A suitable embryo will be placed into Mrs Smith's uterus and she may become pregnant.
- Any unsuitable embryos will be destroyed.

- (i) Suggest why it is helpful to take five eggs from the ovary and not just one egg.

.....

.....

(1)

- (ii) Evaluate the use of embryo screening in this case.

Remember to give a conclusion to your evaluation.

.....

.....

.....

.....

.....

.....

.....

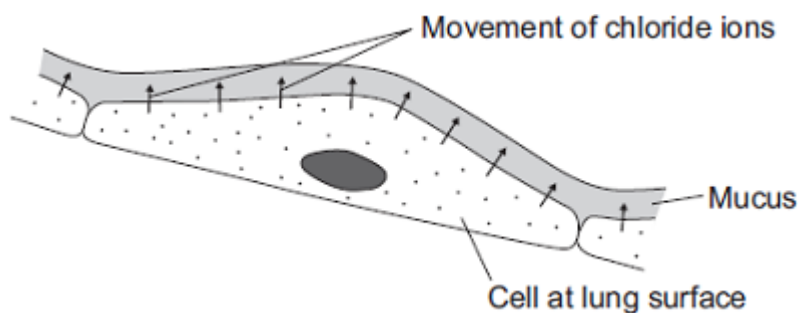
.....

.....

(4)

- (c) In someone who has cystic fibrosis the person's mucus becomes thick.

The diagram shows how, in a healthy person, cells at the lung surface move chloride ions into the mucus surrounding the air passages.



The movement of chloride ions causes water to pass out of the cells into the mucus.

Explain why.

.....

(3)

(Total 11 marks)

- Q5.** 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)

- Q6.** 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 \times 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.

.....

.....

.....

.....

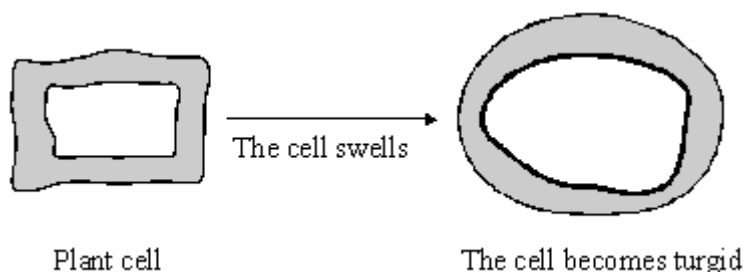
.....

.....

(3)

(Total 7 marks)

- Q7.** (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)

Q8. (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)