

Transport in Cells

Question Paper 1

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

Time Allowed: 58 minutes

Score: /58

Percentage: /100

Grade Boundaries:

Q1. Plants need nitrate ions in order to make proteins.

A plant is growing in soil flooded with water.

Explain why the plant cannot absorb enough nitrate ions.

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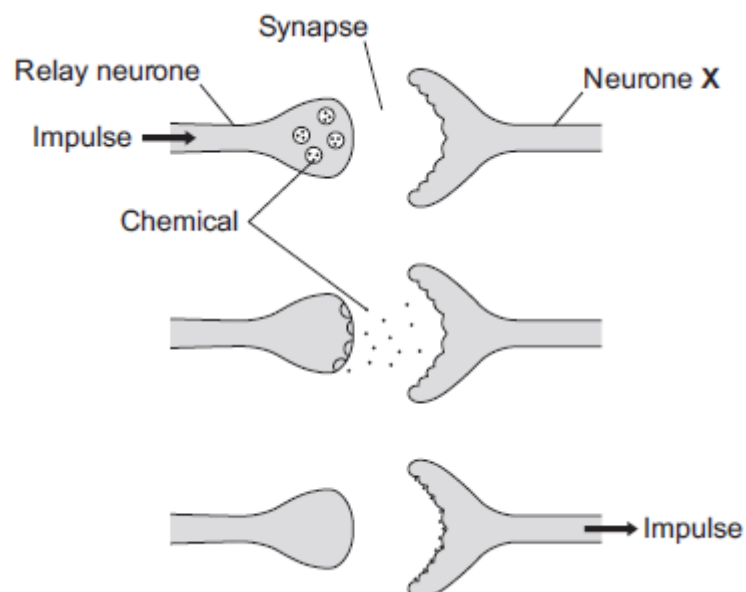
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(Total 5 marks)

Q2. 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**?

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(1)

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

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(3)

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

Toxin	Effect at the synapse
Curare	Decreases the effect of the chemical on neurone X
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

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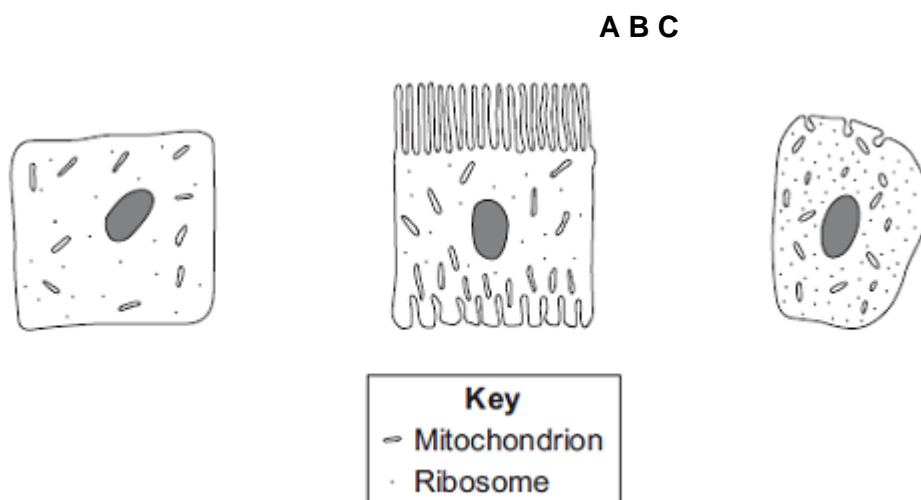
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Strychnine

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(2)
 (Total 6 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.

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(1)

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

Name the enzyme produced by the salivary glands.

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(1)

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

producing this enzyme.

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(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.

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| <ul style="list-style-type: none">• 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 |
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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.

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(1)

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

Remember to give a conclusion to your evaluation.

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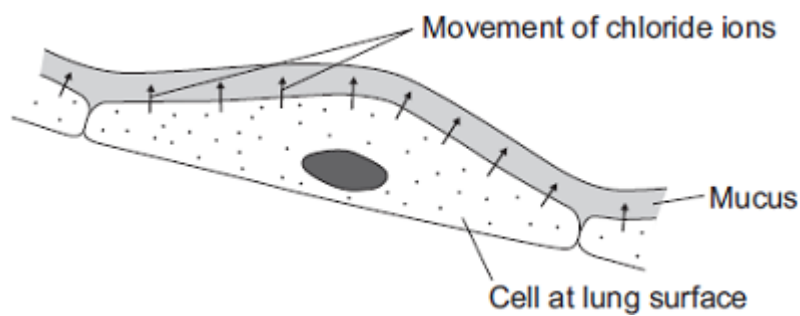
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(4)

- (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.

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(3)
(Total 11 marks)

Q5.Plants exchange substances with the environment.

- (a) Plant roots absorb water mainly by osmosis.
Plant roots absorb ions mainly by active transport.

Explain why roots need to use the two different methods to absorb water and ions.

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(4)

(b) What is meant by the *transpiration stream*?

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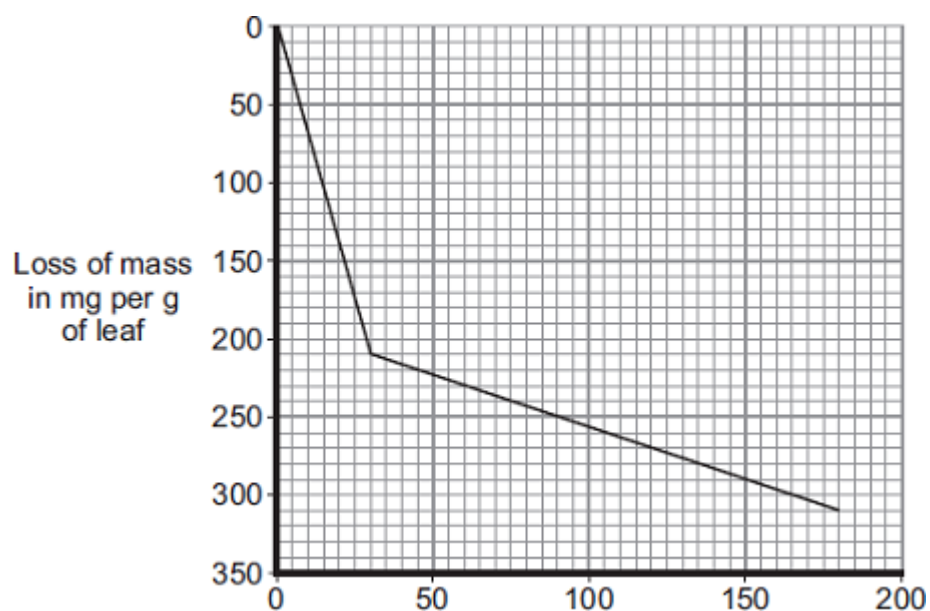
(3)

(c) Students investigated the loss of water vapour from leaves.

The students:

- cut some leaves off a plant
- measured the mass of these leaves every 30 minutes for 180 minutes.

The graph shows the students' results.



(i) The rate of mass loss in the first 30 minutes was 7 milligrams per gram of leaf

per minute.

Calculate the rate of mass loss between 30 minutes and 180 minutes.

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Rate of mass loss = milligrams per gram of leaf per minute

(2)

- (ii) The rate of mass loss between 0 and 30 minutes was very different from the rate of mass loss between 30 and 180 minutes.

Suggest an explanation for the difference between the two rates.

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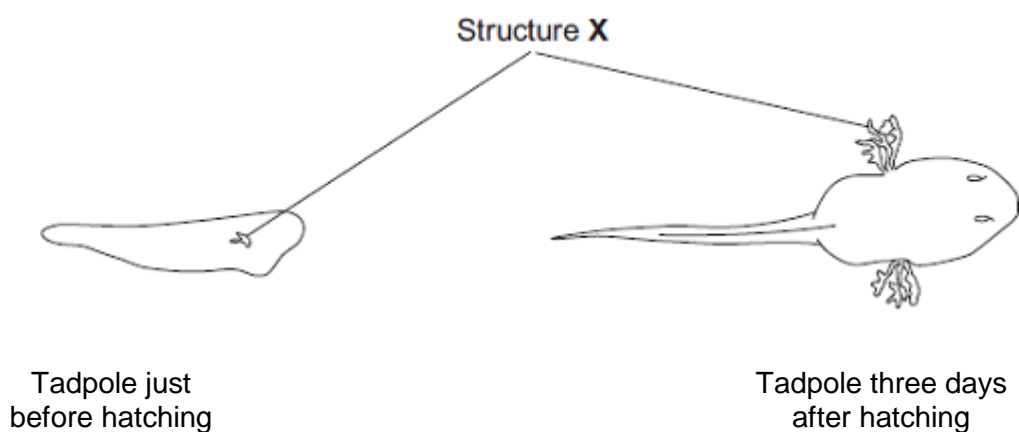
(2)

(Total 11 marks)

Q6. The young stages of frogs are called tadpoles. The tadpoles live in fresh water.

The drawings show a tadpole just before hatching and three days after hatching.

Structure **X** helps in the exchange of substances between the tadpole and the water.



- (a) Name **one** substance, other than food, that the tadpole needs to exchange with the water in order to grow.

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(1)

- (b) Suggest how the changes in the tadpole shown in the drawings help it to survive as it grows larger.

You should **not** refer to movement in your answer.
To gain full marks you should refer to structure **X**.

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(4)

(Total 5 marks)

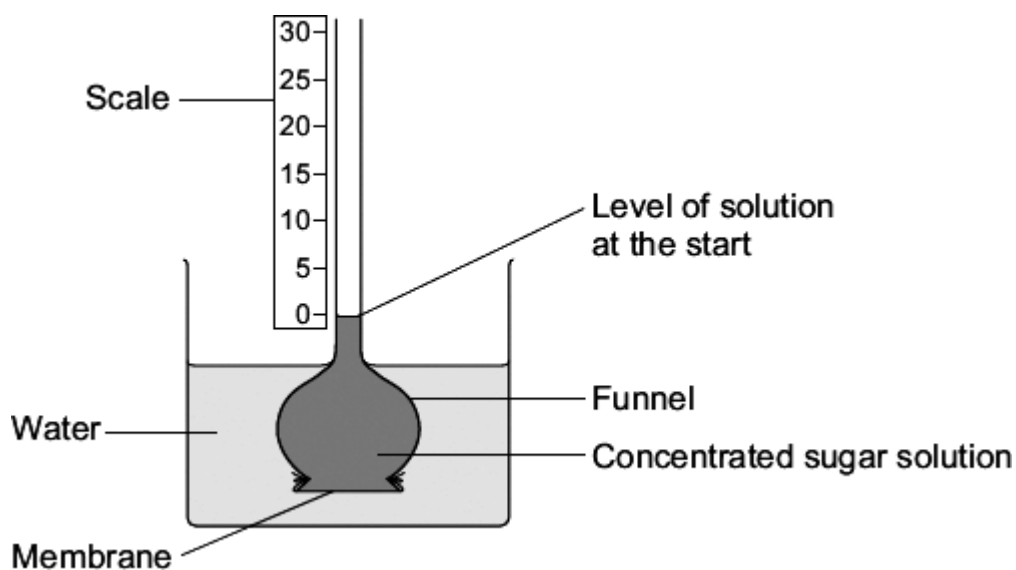
Q7. Some substances move through membranes.

A student set up an investigation.

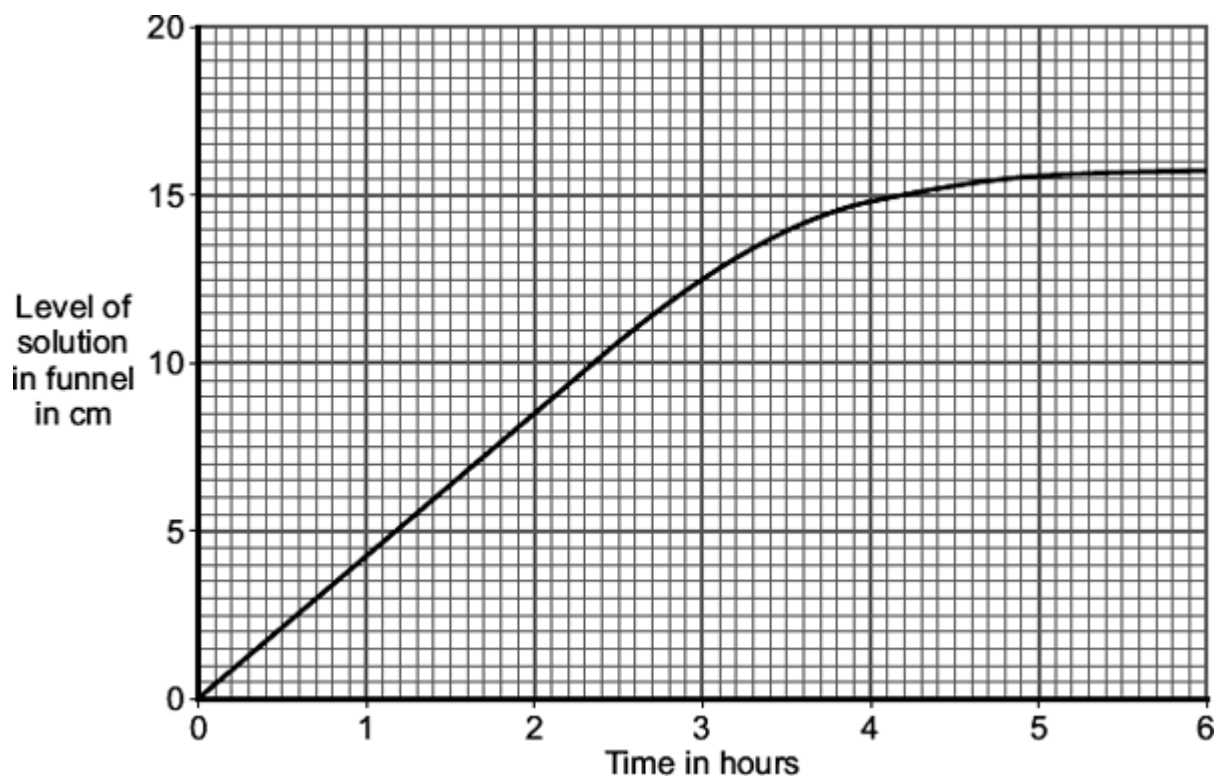
The student:

- tied a thin membrane across the end of a funnel
- put concentrated sugar solution in the funnel
- put the funnel in a beaker of water
- measured the level of the solution in the funnel every 30 minutes.

The diagram shows the apparatus.



The graph shows the results.



- (a) After 3 hours, the level of the solution in the funnel is different from the level at the start.

Explain why, as fully as you can.

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(3)

- (b) The student repeated the investigation using dilute sugar solution instead of concentrated sugar solution.

In what way would you expect the results using dilute sugar solution to be different from the results using concentrated sugar solution?

Give the reason for your answer.

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(2)

(Total 5 marks)

- Q8.** 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.

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(2)

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

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(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.

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(1)

- (ii) A root hair cell contains many mitochondria.

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(2)

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

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(1)

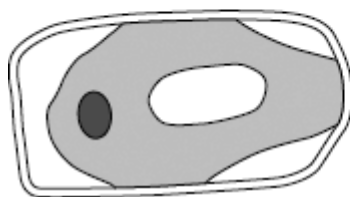
(Total 7 marks)

Q9. The diagram shows the same plant cell:

- after 1 hour in distilled water
- after 1 hour in strong sugar solution.



After 1 hour in distilled water



After 1 hour in strong sugar solution

(a) Describe **two** ways in which the cell in the strong sugar solution is different from the cell in distilled water.

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- 2
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(2)

(b) Explain how the differences between the cell in the strong sugar solution and the cell in distilled water were caused.

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(2)

(Total 4 marks)