



Resources available from

**kickstart
tutors**

Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE BIOLOGY

Topic Paper: 3.1 Transport in cells
Part 2

Time allowed: 45 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



43 Marks



Q7.

- (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.

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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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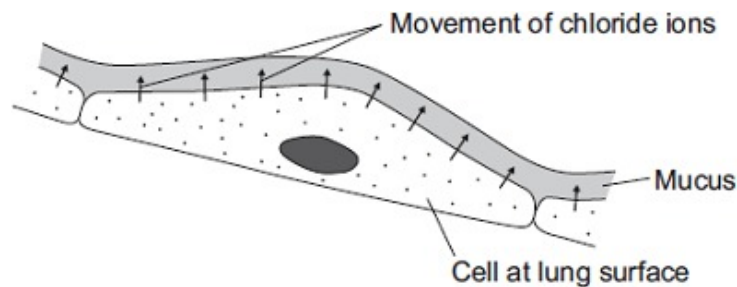
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(4)

(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)



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)

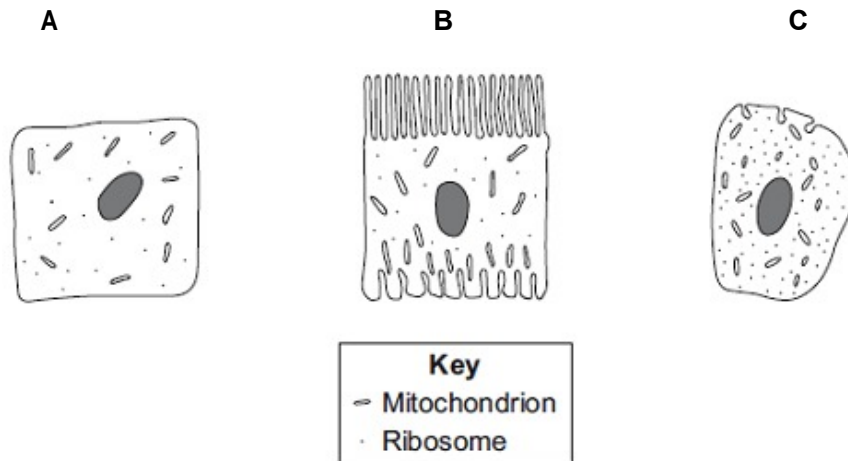


(iii) Many of the cells in the root store starch.

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(1)
(Total 7 marks)

Q9. 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)

Q10. Some substances move through membranes.

A student set up an investigation.

The student:

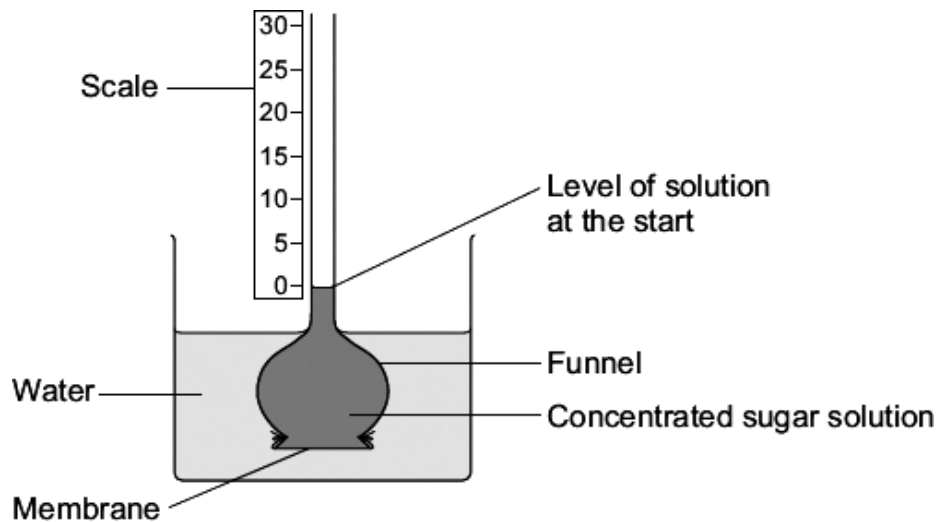
 tied a thin membrane across the end of a funnel

 put concentrated sugar solution in the funnel

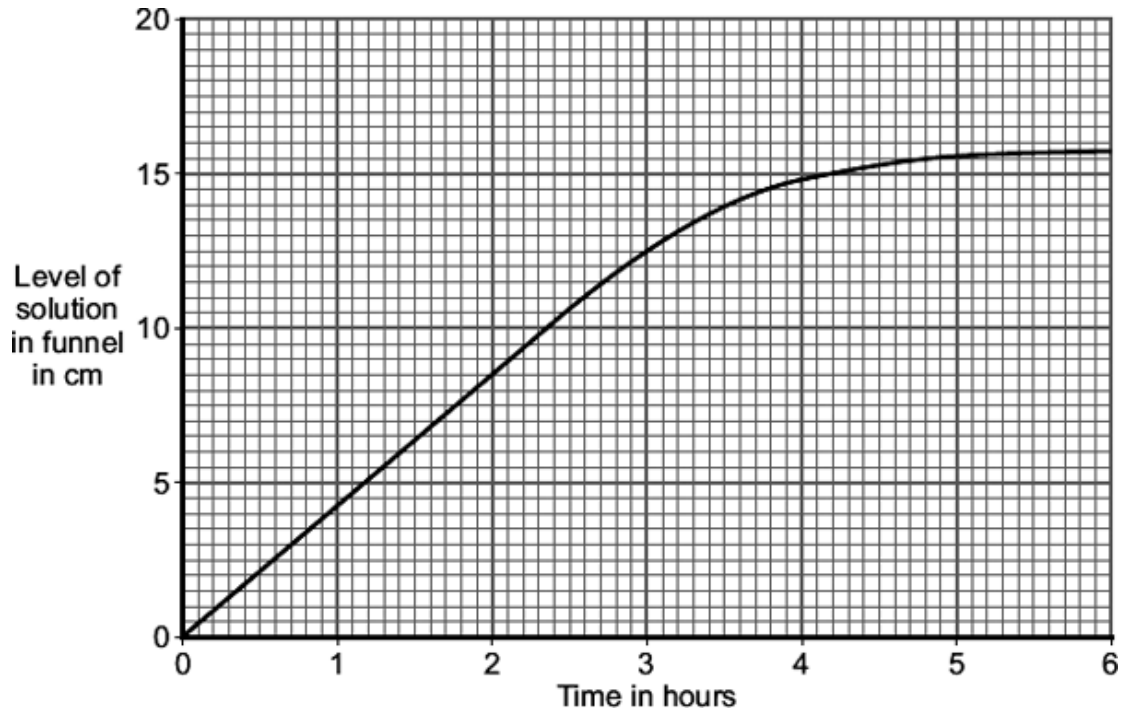
 put the funnel in a beaker of water

 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)



Q11. 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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- (b) What is meant by the *transpiration stream*?

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(3)



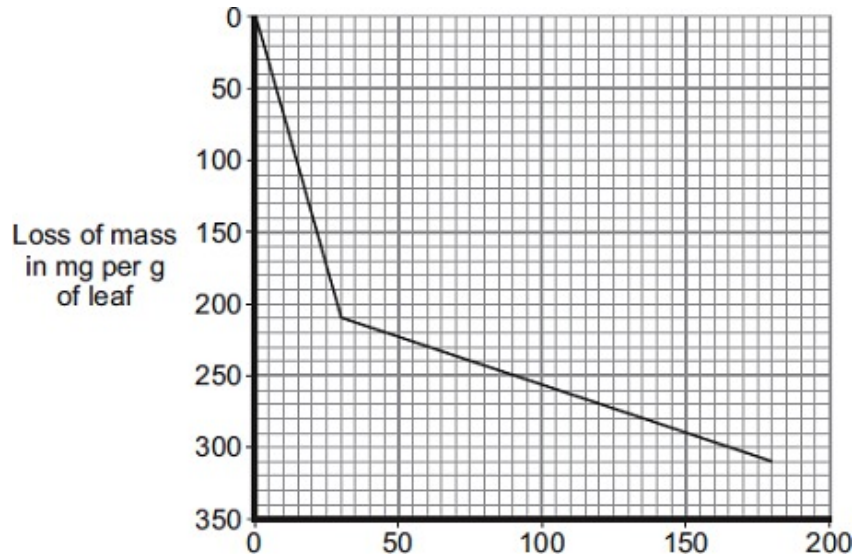
(c) Students investigated the loss of water vapour from leaves.

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.

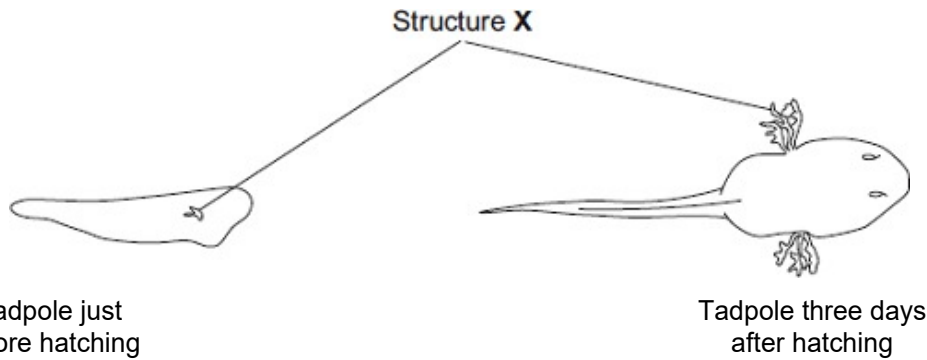
Suggest an explanation for the difference between the two rates.

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(2)
(Total 11 marks)



Q12. 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)