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Student number

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Name \_\_\_\_\_

Date \_\_\_\_\_

Attempt/Time taken \_\_\_\_\_

# GCSE BIOLOGY

Topic Paper: 1.1 Cell structure  
Part 2

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Time allowed: 40 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.

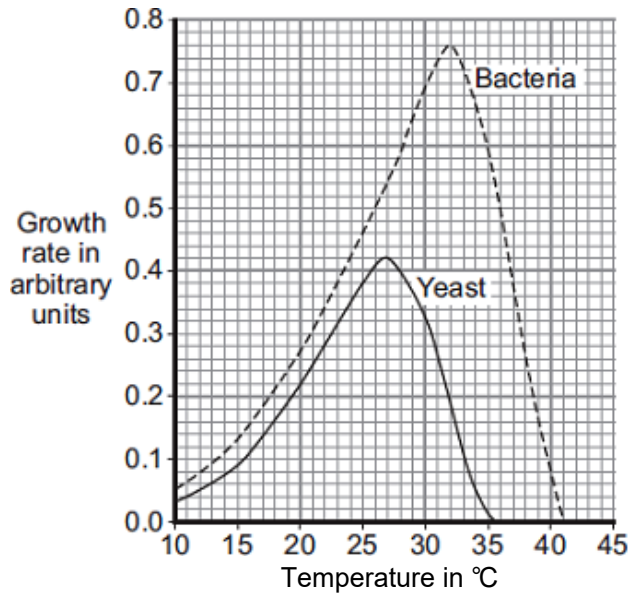


**38 Marks**



- (b) Sourdough bread is light in texture and tastes slightly sour. The bread is made using two types of microorganism, a yeast and a bacterium. The bacterium can make acids such as lactic acid. The acid makes the bread taste sour.

The graph shows how the growth rates of the yeast and the bacteria change with temperature.



- (i) Sourdough bread rises fastest at 27°C.  
Use information from the graph to explain why.

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(2)

- (ii) The bread tastes most sour if it rises at 32°C.  
Use information from the graph to explain why.

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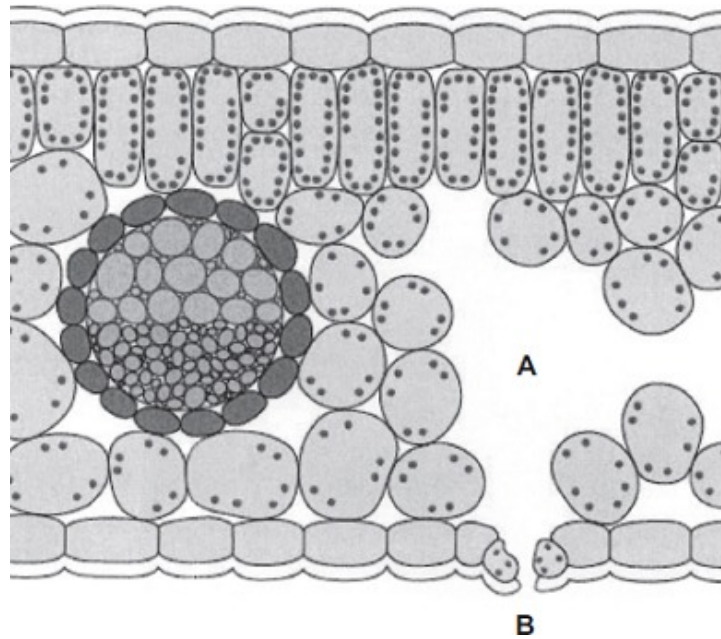
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(2)

(Total 7 marks)

**Q7.** The diagram shows a section through a plant leaf.



(a) Use words from the box to name **two** tissues in the leaf that transport substances around the plant.

epidermis	mesophyll	phloem	xylem
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..... and .....

(1)

(b) Gases *diffuse* between the leaf and the surrounding air.

(i) What is *diffusion*?

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(2)

(ii) Name **one** gas that will diffuse from point **A** to point **B** on the diagram on a sunny day.

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(1)

(Total 4 marks)





**Q9.** Fresh milk is a mixture of compounds including lipid, protein and about 5% lactose sugar.

Lactose must be digested by the enzyme lactase, before the products can be absorbed.

Lactase can be added to fresh milk to pre-digest the lactose. This makes 'lactose-free' milk, which is suitable for people who do not produce enough lactase of their own.

A student investigated the effect of changing pH and temperature on the digestion of lactose in milk.

The results are shown in **Tables 1** and **2**.

**Table 1**  
**Effect of pH**

pH	Time taken to digest lactose in minutes
4.0	20
5.0	18
6.0	13
7.0	7
8.0	5
9.0	6

**Table 2**  
**Effect of temperature**

Temperature in °C	Time taken to digest lactose in minutes
25	20
30	14
35	11
40	6
45	29
50	No digestion

(a) The label on a carton of lactose-free milk states:

'Lactase is normally produced in the stomach of mammals.'

The results in **Table 1** suggest that this statement is **not** true.

Explain how.

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(2)



(b) Explain, as fully as you can, the results shown in **Table 2** .

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**(3)**

(c) Bile is produced in the liver and is released into the small intestine.

Bile helps the digestion of lipid in the milk.

Describe how.

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**(2)**

**(Total 7 marks)**



**Q10.**

(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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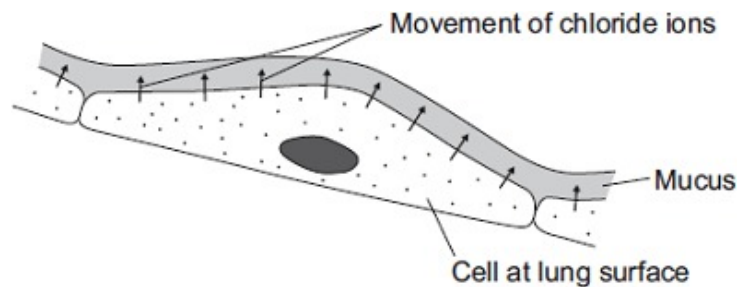
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(4)

(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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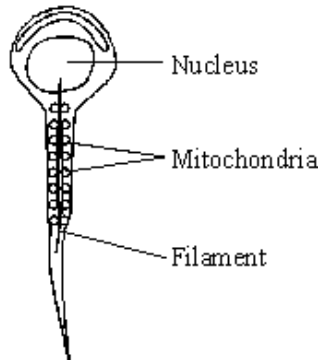
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(3)  
(Total 11 marks)





**Q11.** The diagram shows a human sperm. Inside the tail of the sperm is a filament mechanism that causes the side to side movement of the tail, which moves the sperm.



(a) Describe the function of the mitochondria and suggest a reason why they are arranged around the filament near the tail of the sperm.

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(3)

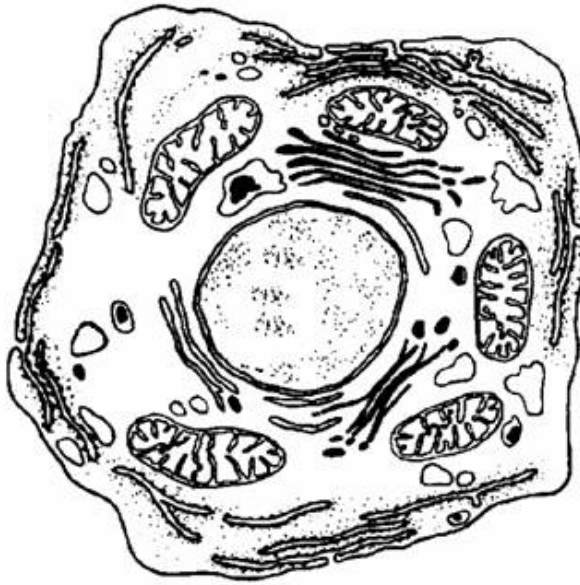
(b) Explain the significance of the nucleus in determining the characteristics of the offspring.

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(2)

(Total 5 marks)

**Q12.** The drawing shows an animal cell, seen at a very high magnification using an electron microscope.



- (a) (i) Label a mitochondrion [plural = mitochondria]. (1)
- (ii) What happens in the mitochondria?  
..... (1)
- (b) (i) Name and label the structure where you would find chromosomes. (1)
- (ii) What are chromosomes made of?  
..... (1)
- (c) What controls the rate of chemical reactions in the cytoplasm?  
..... (1)
- (Total 5 marks)**