

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Education
January 2006
Advanced Subsidiary Examination



BIOLOGY (SPECIFICATION B)
Unit 1 Core Principles

BYB1

Tuesday 10 January 2006 9.00 am to 10.00 am

For this paper you must have:

- a ruler with millimetre measurements

You may use a calculator

Time allowed: 1 hour

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

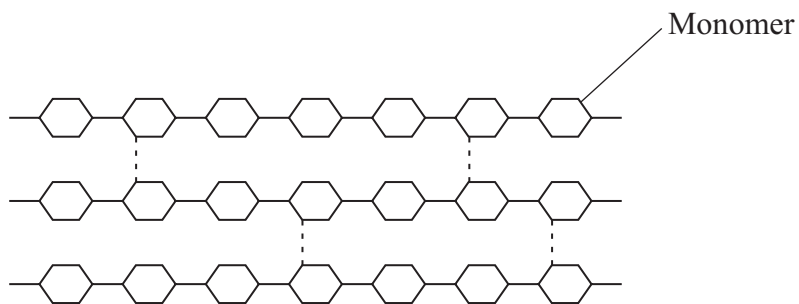
- The maximum mark for this paper is 54.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in all answers.
- Answers for **Questions 1 to 6** are expected to be short and precise.
- Answer **Question 7** in continuous prose. Quality of Written Communication will be assessed in the answer.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
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4			
5			
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7			
Total (Column 1) →			
Total (Column 2) →			
Quality of Written Communication			
TOTAL			
Examiner's Initials			

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Answer **all** questions in the spaces provided.

- 1 Cellulose is made from one type of monomer. The monomers are held together by bonds. The diagram shows parts of three cellulose molecules in a cell wall.



- (a) Name the monomer present in cellulose.

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(1 mark)

- (b) Name the type of reaction that converts cellulose to its monomers.

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(1 mark)

- (c) Cotton is a plant fibre used to make cloth. Explain how cellulose gives cotton its strength.

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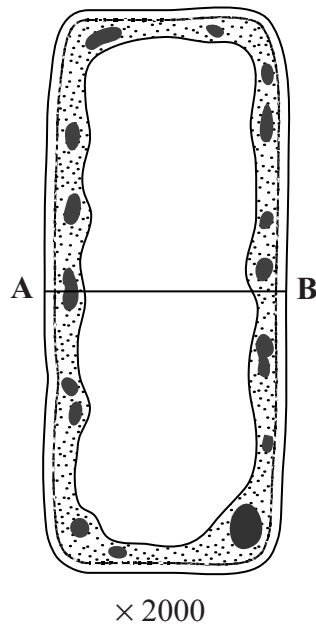
(3 marks)

5

Turn over

- 2 **Figure 1** shows a section through a palisade cell in a leaf as seen with a light microscope. The palisade cell has been magnified $\times 2000$.

Figure 1



- (a) Calculate the actual width of the cell, measured from **A** to **B**, in μm . Show your working.

Answer μm (2 marks)

- (b) Palisade cells are the main site of photosynthesis. Explain **one** way in which a palisade cell is adapted for photosynthesis.

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(2 marks)

- (c) Water enters and leaves cells by osmosis. **Figure 2** shows the water potential (ψ) in three palisade cells.

Figure 2

Cell A	Cell B	Cell C
$\psi = -224 \text{ kPa}$	$\psi = -198 \text{ kPa}$	$\psi = -212 \text{ kPa}$

Draw arrows on **Figure 2** to show the net movement of water between the cells. Explain your answer.

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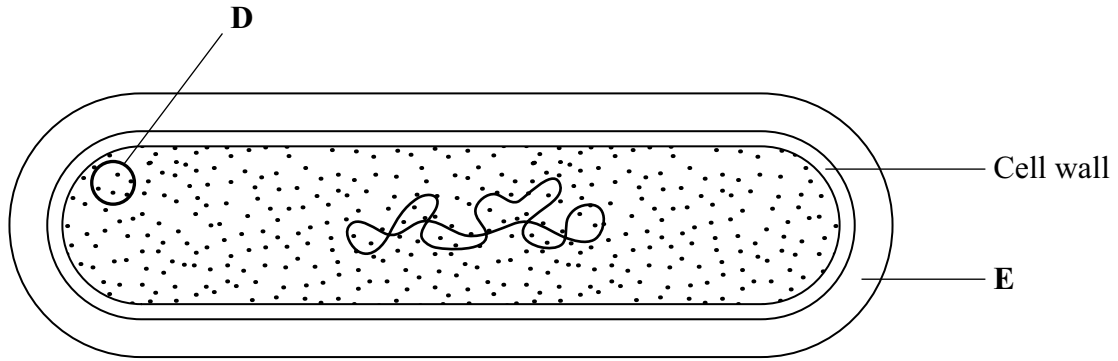
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(2 marks)

6

Turn over 

3 (a) The diagram shows a bacterial cell.



(i) Name the parts labelled **D** and **E**.

D

E
(2 marks)

(ii) Give **one** function of the cell wall.

.....
.....
(1 mark)

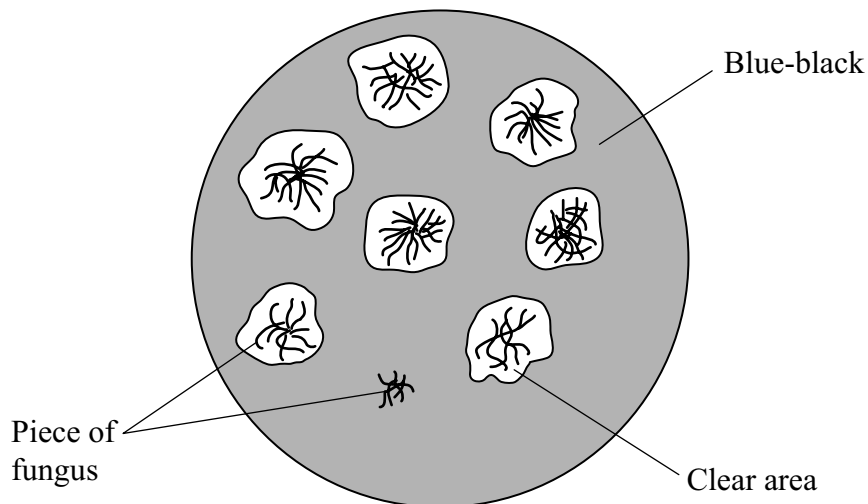
(b) Name **two** structures present in eukaryotic cells that are not present in the cells of prokaryotes.

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2

(2 marks)

- (c) Several small pieces of a saprophytic fungus were placed on a starch agar plate. After 48 hours the iodine solution was poured over the starch agar. The result is shown in the diagram below.



- (i) Explain why there is a clear area around most of the pieces of fungus.

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(2 marks)

- (ii) Suggest why one piece of fungus has no clear area round it.

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(1 mark)

8

Turn over

- 4 (a) Bile is made in the liver. Explain **one** function of bile.

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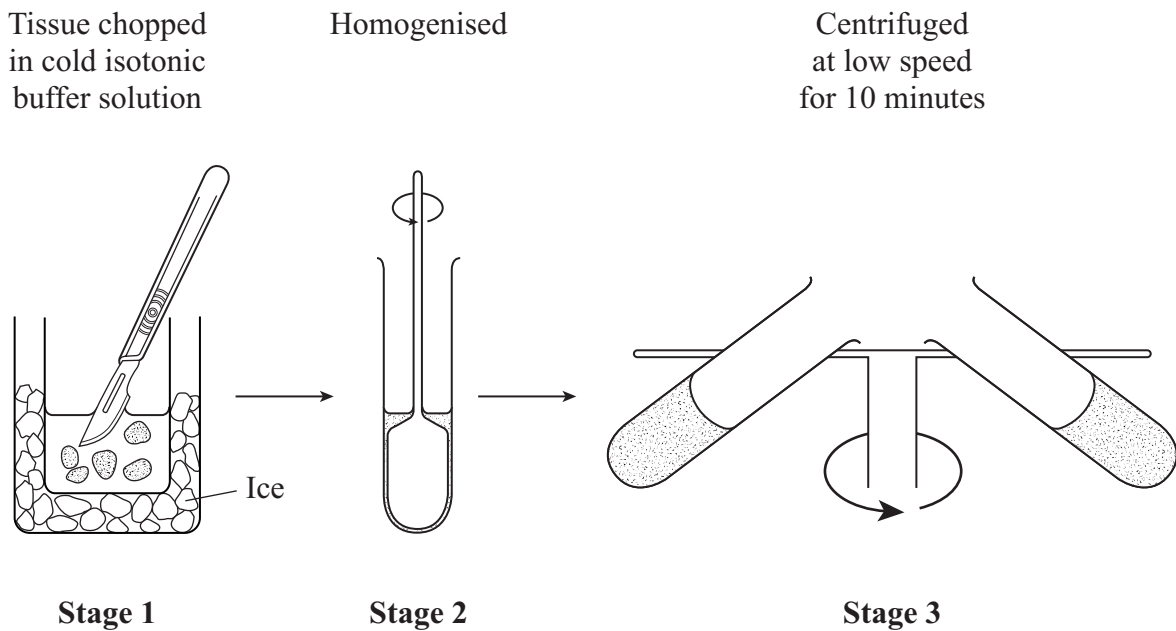
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(2 marks)

- (b) Mitochondria were isolated from liver tissue using differential centrifugation. The tissue was chopped in cold, isotonic buffer solution. A buffer solution maintains a constant pH. The first stages in the procedure are shown in the diagram.



(i) The tissue was chopped in cold, isotonic buffer solution. Explain the reason for using

a *cold* solution;

.....

an *isotonic* solution;

.....

a *buffer* solution.

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(3 marks)

(ii) Why is the liver tissue homogenised?

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(1 mark)

(iii) Describe what should be done after **Stage 3** to obtain a sample containing only mitochondria.

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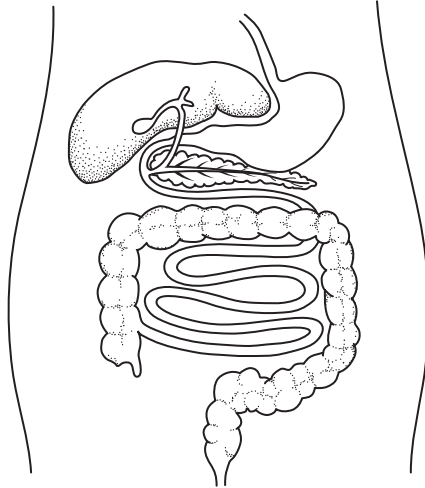
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(2 marks)

8

5 Proteins are broken down by endopeptidases and exopeptidases.

(a) The diagram shows part of the human digestive system.



Label, with a guideline and the letter **Q**, **one** organ where an exopeptidase is made.

(1 mark)

(b) Proteins are digested into amino acids. Describe in outline how you could separate amino acids from a mixture and then identify them.

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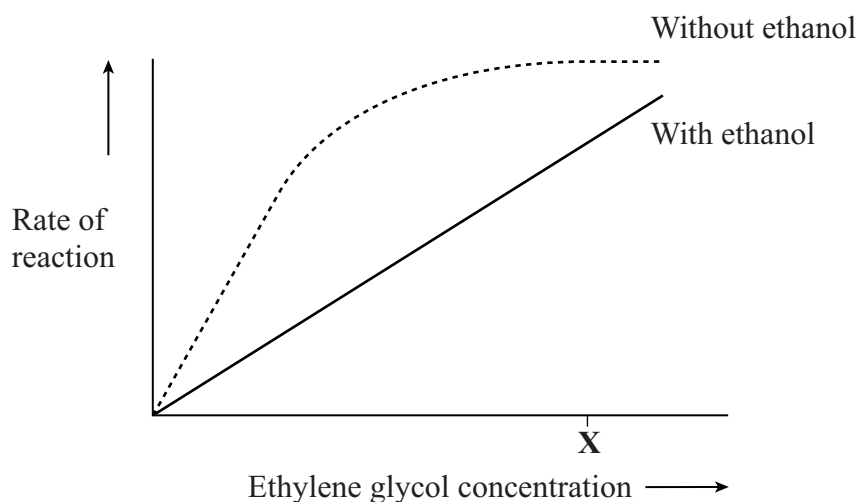
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(3 marks)

- (c) Ethylene glycol is a substance used in car anti-freeze. If it is accidentally swallowed it enters the liver cells where it is converted to poisonous oxalic acid. Ethanol inhibits the production of oxalic acid and can be used to treat patients who have swallowed anti-freeze.

In an investigation, the rate of reaction of an enzyme that makes oxalic acid was measured with and without ethanol present. The graph shows the results.



- (i) Increasing the concentration of ethylene glycol above X without ethanol present does not increase the rate of the reaction. Explain why.

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(2 marks)

- (ii) Use the information in the graph to explain how ethanol prevents oxalic acid production.

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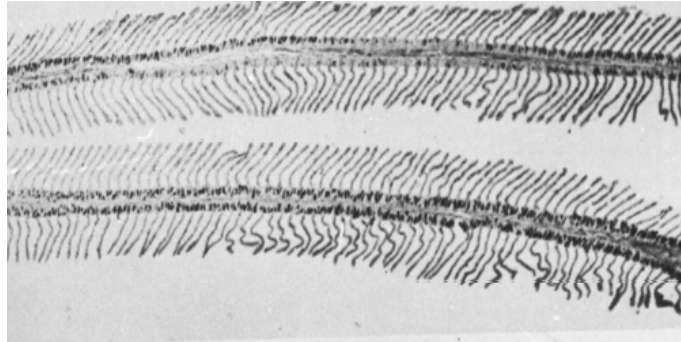
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(2 marks)

- 6 (a) The photograph shows part of the gill of a fish as seen through a light microscope. It is magnified $\times 400$.



- (i) Explain how the structure of the gill makes oxygen uptake efficient.

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(2 marks)

- (ii) Water containing dissolved oxygen flows over the gill in the opposite direction to the blood flow inside. Explain why this arrangement is important for efficient oxygen uptake.

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(2 marks)

(b) Describe how the gills of a fish are ventilated **after** water has entered through its mouth.

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(3 marks)

(c) There is a one-way flow of water over the gills of a fish whereas there is a two-way flow of air in the lungs of a mammal. Suggest **one** advantage to a fish of this one-way flow of water over its gills.

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(1 mark)

8

Turn over for the next question

Turn over 

Answer **Question 7** in continuous prose.
Quality of Written Communication will be assessed in these answers.

7 (a) Explain how **three** features of a plasma membrane adapt it for its functions.

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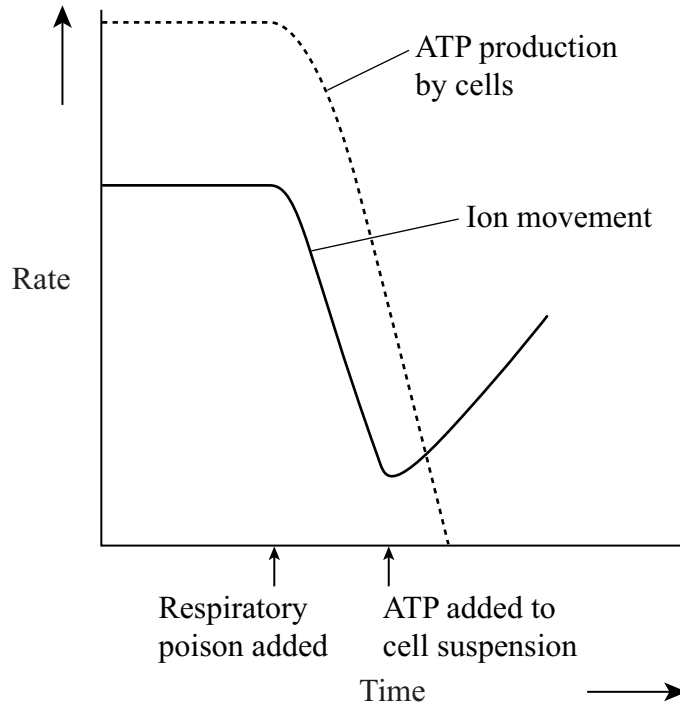
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(6 marks)

(b) ATP breaks down to ADP and phosphate releasing energy. The graph shows the rate of ion movement and the rate of ATP production in an investigation carried out on a suspension of cells. At a certain point in the investigation, a respiratory poison was added to the cell suspension. Later, ATP was added to the same cell suspension.



Describe and explain the changes in the rate of ion movement.

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(4 marks)

END OF QUESTIONS

10

QWC

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