

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education  
January 2005  
Advanced Subsidiary Examination



**BIOLOGY (SPECIFICATION B)**  
**Unit 1 Core Principles**

**BYB1**

Monday 10 January 2005 Morning Session

**In addition to this paper you will require:**

- a ruler with millimetre measurements.

You may use a calculator.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
QWC			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Time allowed: 1 hour

**Instructions**

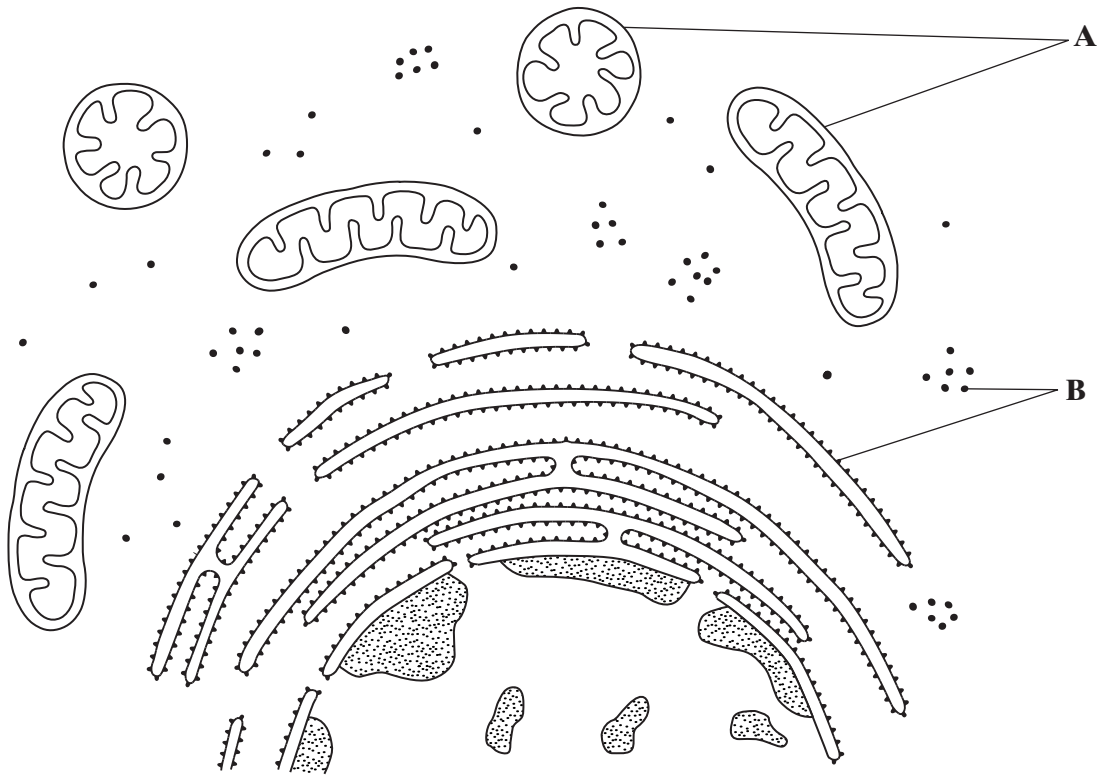
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

**Information**

- The maximum mark for this paper is 54.
- Mark allocations are shown in brackets.
- Answers for **Questions 1 to 6** are expected to be short and precise.
- Question 7** should be answered in continuous prose. Quality of Written Communication will be assessed in the answer. You will be awarded up to 1 mark for your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate. The legibility of your handwriting and the accuracy of your spelling, punctuation and grammar will also be taken into account.

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

1 The diagram shows part of an animal cell as seen through an electron microscope.



(a) Name the organelles labelled **A** and **B**.

**A** .....

**B** .....

(2 marks)

(b) Explain why the shapes of the two organelles labelled **A** appear different.

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(2 marks)

(c) Give the function of organelle **B**.

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(1 mark)

(d) The epithelial cells of the small intestine have large numbers of organelle **A**.  
Explain how this is an adaptation for the function of these cells.

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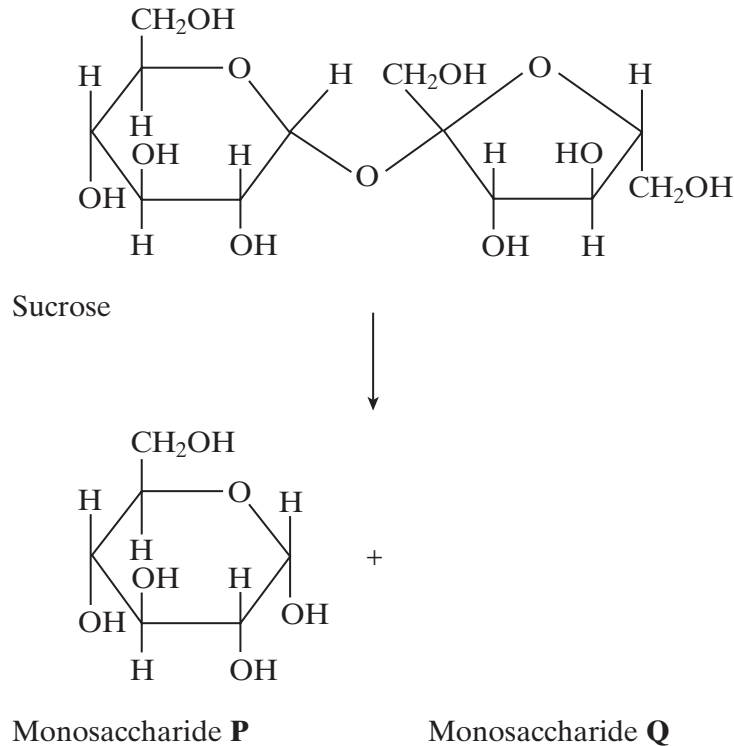
(3 marks)

8

**TURN OVER FOR THE NEXT QUESTION**

**Turn over** ►

- 2 Sucrose is a disaccharide. It is formed from two monosaccharides **P** and **Q**. The diagram shows the structure of molecules of sucrose and monosaccharide **P**.



- (a) (i) Name monosaccharide **Q**.

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(1 mark)

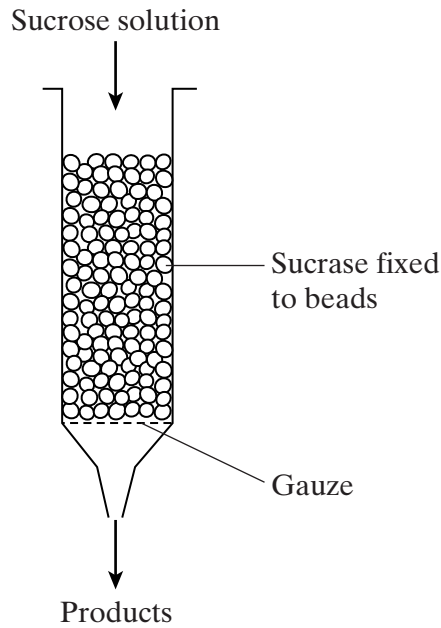
- (ii) Draw the structure of a molecule of monosaccharide **Q** in the space above.

(1 mark)

- (b) The enzyme sucrase catalyses the breakdown of sucrose into monosaccharides. What type of reaction is this breakdown?

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(1 mark)

- (c) The diagram shows apparatus used in breaking down sucrose. The enzyme sucrase is fixed to inert beads. Sucrose solution is then passed through the column.



Describe a biochemical test to find out if the solution collected from the apparatus contains

- (i) the products;

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(2 marks)

- (ii) the enzyme.

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(2 marks)

3 (a) (i) The human gut secretes both exopeptidases and endopeptidases. Explain how the action of an exopeptidase differs from that of an endopeptidase.

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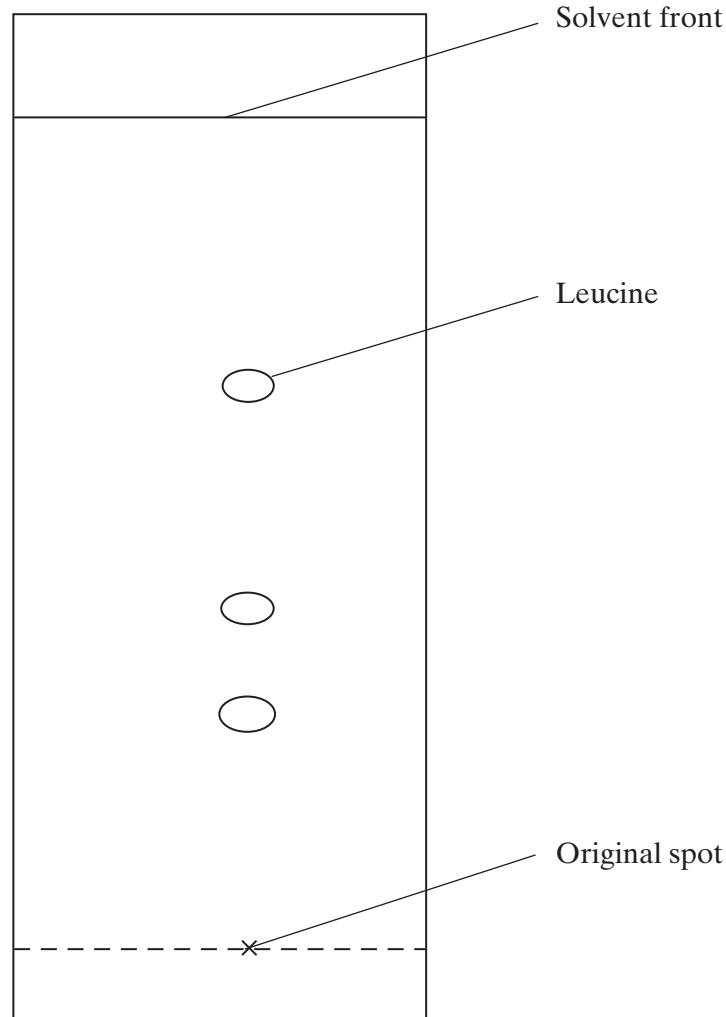
(2 marks)

(ii) Explain the advantage of producing both types of enzyme rather than just exopeptidases.

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(2 marks)

- (b) A polypeptide was mixed with an exopeptidase and kept at 37°C for several hours. The amino acids in the resulting solution were separated using chromatography. The diagram shows the chromatogram obtained. The position of one of the three amino acids, leucine, is labelled.



- (i) Draw a line on the chromatogram to show the level of the solvent at the start. (1 mark)
- (ii) Calculate the R<sub>f</sub> value of leucine.

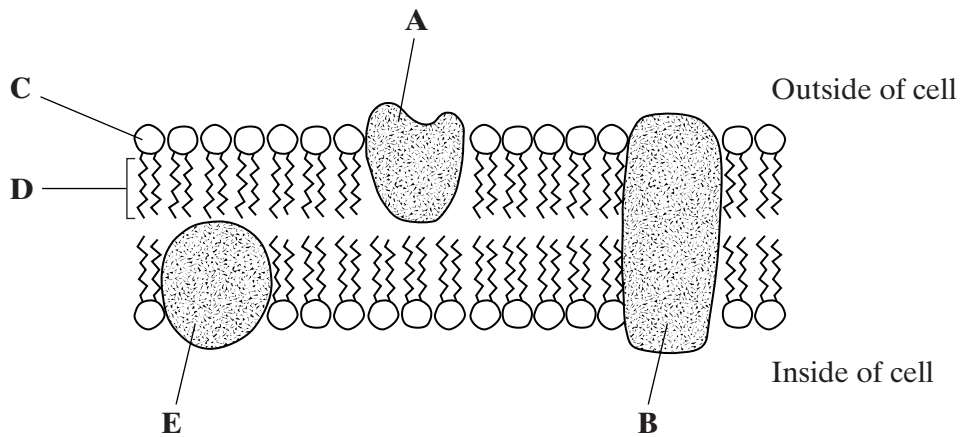
R<sub>f</sub> value ..... (1 mark)

- (iii) Explain why leucine has moved further than the other amino acids.

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

**Turn over** ►

4 The diagram shows part of a cell surface membrane.



- (a) Complete the table by writing the letter from the diagram which refers to each part of the membrane.

Part of membrane	Letter
Channel protein	
Contains only the elements carbon and hydrogen	

(2 marks)

- (b) Explain why the structure of a membrane is described as *fluid-mosaic*.

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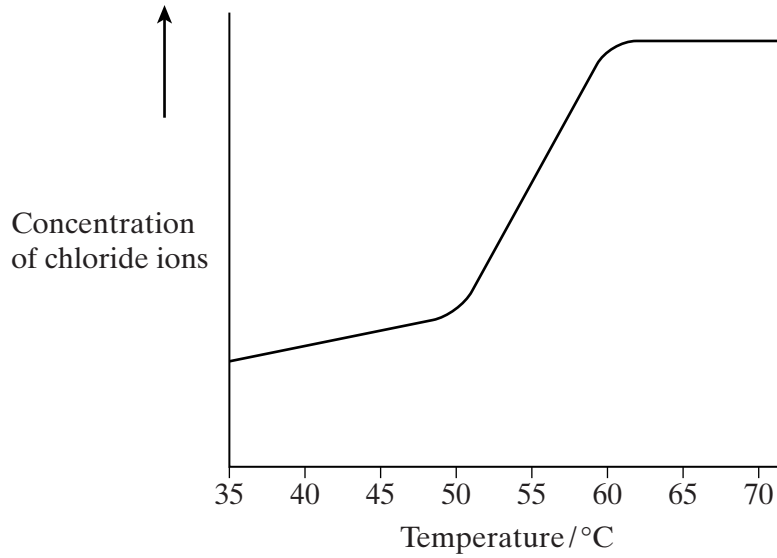
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(2 marks)



- (c) When pieces of carrot are placed in water, chloride ions are released from the cell vacuoles. Identical pieces of carrot were placed in water at different temperatures. The concentration of chloride ions in the water was measured after a set period of time. The graph shows the results.



Describe and explain the shape of the curve.

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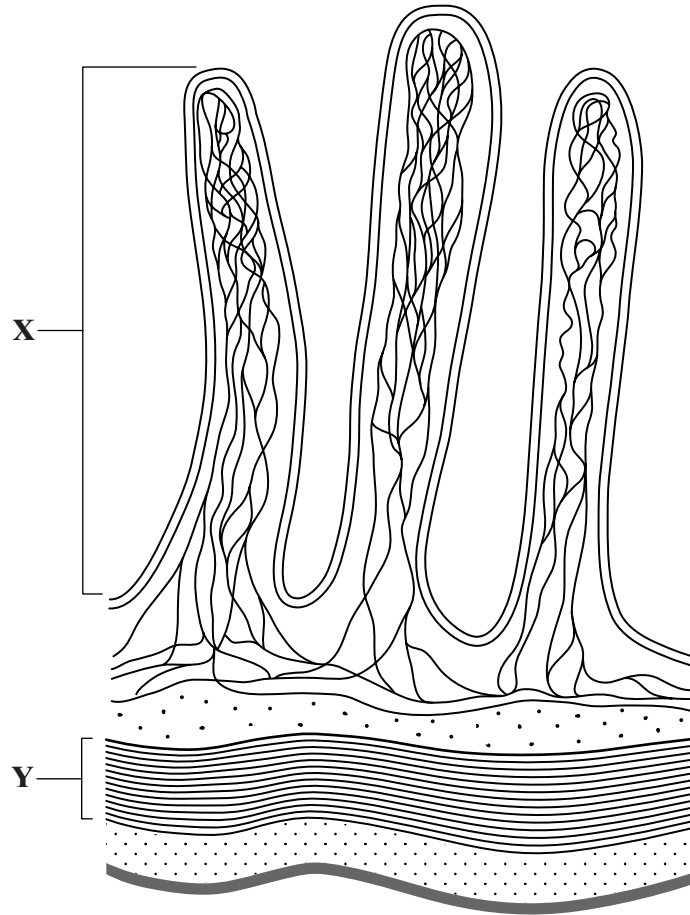
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(3 marks)

7

Turn over ►

5 The diagram shows part of the gut wall of an animal.



(a) (i) Name the structure labelled **X**.

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(1 mark)

(ii) Describe the function of the layer labelled **Y**.

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 (2 marks)

(b) Describe and explain how **two** features shown in the diagram increase the rate of absorption of digested food.

Feature 1

Description

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Explanation

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Feature 2

Description

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Explanation

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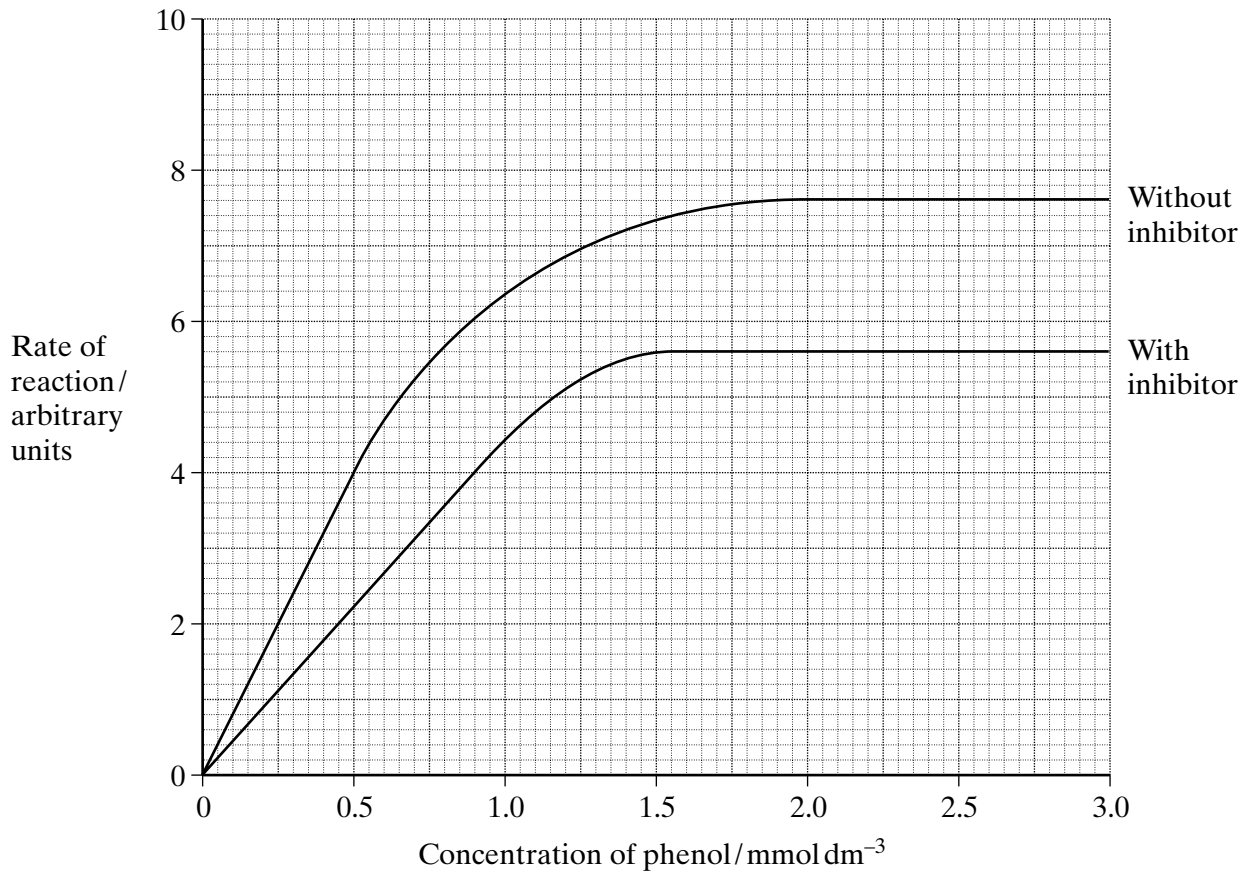
(4 marks)

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7

**TURN OVER FOR THE NEXT QUESTION**

**Turn over** ▶

- 6 In an investigation, the rate at which phenol was broken down by the enzyme phenol oxidase was measured in solutions with different concentrations of phenol. The experiment was then repeated with a non-competitive inhibitor added to the phenol solutions. The graph shows the results.



- (a) Explain why an increase in concentration of phenol solution from 2.0 to 2.5  $\text{mmol dm}^{-3}$  has no effect on the rate of the reaction without inhibitor.

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(2 marks)

(b) Explain the effect of the non-competitive inhibitor.

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(2 marks)

(c) Calculate the percentage decrease in the maximum rate of the reaction when the inhibitor was added. Show your working.

Percentage decrease .....  
(2 marks)

(d) Draw a curve on the graph to show the results expected if a competitive inhibitor instead of a non-competitive inhibitor had been used.

(1 mark)



**TURN OVER FOR THE NEXT QUESTION**

**Turn over** ►

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Answers to **Question 7** should be written in continuous prose.  
Quality of Written Communication will be assessed in these answers.

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**7** (a) Describe and explain how fish maintain a flow of water over their gills.

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*(4 marks)*

(b) Describe and explain how the structure of the mammalian breathing system enables efficient uptake of oxygen into the blood.

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(6 marks)

$\frac{\quad}{10}$

**END OF QUESTIONS**

**QWC**

$\frac{\quad}{1}$

**THERE ARE NO QUESTIONS PRINTED ON THIS PAGE**