

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use

General Certificate of Education
 January 2008
 Advanced Subsidiary Examination



BIOLOGY (SPECIFICATION B)
Unit 1 Core Principles

BYB1

Wednesday 9 January 2008 9.00 am to 10.00 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> a ruler with millimetre measurements. <p>You may use a calculator.</p>
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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 to be 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 your 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			
Question	Mark	Question	Mark
1			
2			
3			
4			
5			
6			
7			
Total (Column 1) →			
Total (Column 2) →			
Quality of Written Communication			
TOTAL			
Examiner's Initials			

There are no questions printed on this page

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

- 1 (a) The table shows some features of three different cells. Complete the table with a tick if the feature is present or a cross if it is absent.

Cell	Feature			
	Nucleus	Cell wall	Cell surface membrane	Ribosomes
Epithelial cell from the small intestine				
Palisade mesophyll cell				
Bacterium				

(3 marks)

- (b) Starch is a storage substance in plant cells. Give **two** features of starch that enable it to act as a storage substance. Explain how each feature enables starch to act as a storage substance.

Feature

Explanation

.....

Feature

Explanation

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(2 marks)

- (c) Glycogen is a polysaccharide. It is a storage substance in humans. Suggest **one** advantage of storing glycogen in muscle cells.

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(1 mark)

2 A student carried out biochemical tests on different brands of biscuit.

(a) Name the reagent or reagents that should be used to test for the presence of protein.

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(1 mark)

(b) One brand of biscuit contained 4.1 grams of fat per biscuit. 54 % of the fat in this biscuit was saturated fat.

(i) Calculate the total mass of saturated fat present in a packet of 18 of these biscuits.

Answer grams
(1 mark)

(ii) Saturated fats contain saturated fatty acids. What is a *saturated* fatty acid?

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(1 mark)

(c) (i) Describe how you would test a biscuit for reducing sugar.

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(2 marks)

(ii) You could use the test to compare the amount of reducing sugar in two different brands of biscuit. Suggest how.

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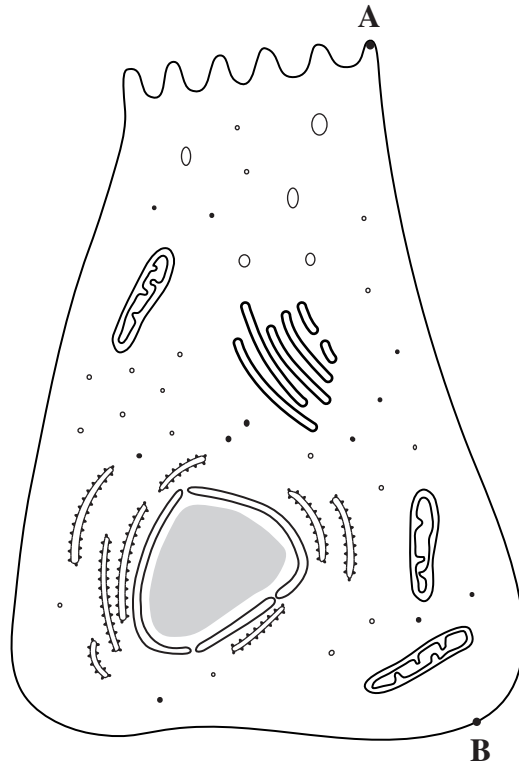
(2 marks)

7

Turn over for the next question

Turn over ►

- 3 The drawing shows a cell from the pancreas. The cell has been drawn at a magnification of $\times 10\,400$.



- (a) Calculate the actual length of the cell from **A** to **B**. Give your answer in micrometres and show your working.

Answer μm (2 marks)

(b) The cell produces and secretes enzymes. Explain how **two** of the organelles shown in the drawing are involved in producing or secreting enzymes.

Organelle

Explanation

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Organelle

Explanation

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(2 marks)

(c) The different organelles in pancreatic tissue were separated from each other by differential centrifugation.

(i) What difference between the cell organelles causes them to separate during centrifugation?

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(1 mark)

(ii) An isotonic solution was used during this process. Explain why an *isotonic* solution was used.

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(2 marks)

7

- 4 (a) (i) Name the type of reaction by which amino acids join together.

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(1 mark)

- (ii) Two substances are formed when two amino acids join together. Name these **two** substances.

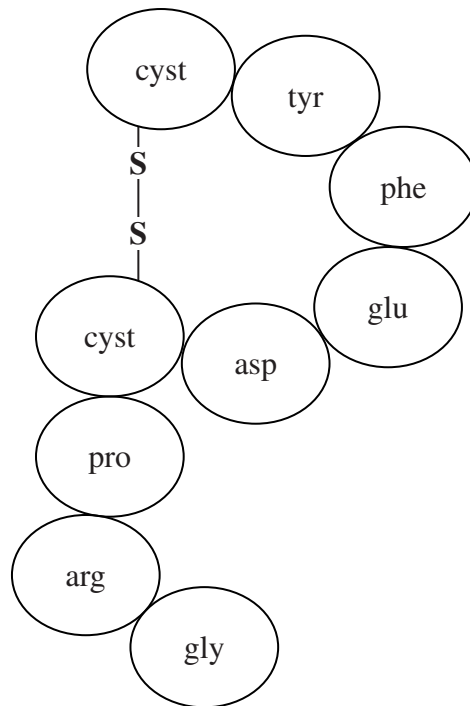
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(1 mark)

- (b) ADH is a hormone. **Figure 1** shows the amino acid sequence of human ADH.

Figure 1



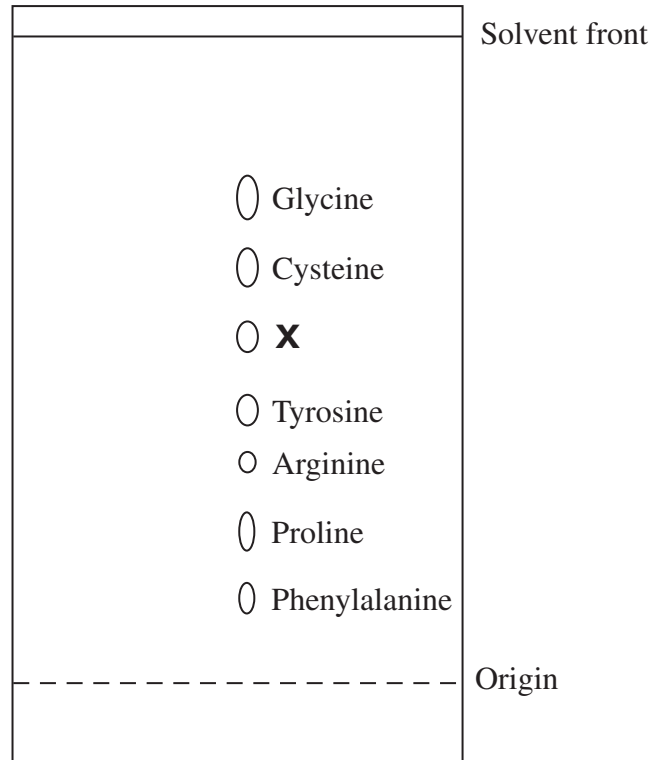
ADH targets specific cells in the kidney. The structure of the cell surface membrane of these cells enables them to respond to ADH. Explain how.

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(2 marks)

- (c) A scientist hydrolysed a sample of ADH into individual amino acids. The mixture of amino acids was loaded on a piece of chromatography paper. This paper was then put into a jar containing a solvent. **Figure 2** shows the results of using chromatography on the mixture of amino acids.

Figure 2



- (i) Calculate the R_f value for proline. Show your working.

Answer (2 marks)

- (ii) Glycine has moved further than any of the other amino acids. Explain why.

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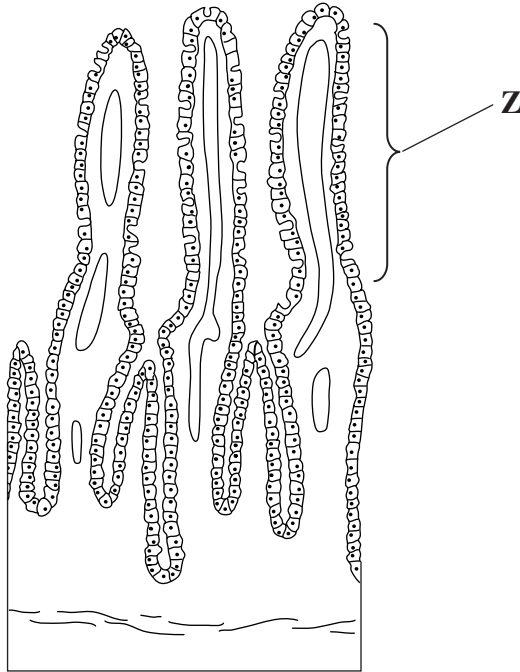
(1 mark)

- (iii) There are two amino acids at spot **X**. Use **Figure 1** and **Figure 2** to identify them.

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(1 mark)

5 The drawing shows a section through the wall of the ileum.



(a) (i) Name structure **Z**.

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(1 mark)

(ii) Give **one** other feature of the ileum that increases the surface area.

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(1 mark)

- (b) A biologist investigated the rate of absorption of sugars by the ileum before and after the addition of a respiratory inhibitor. The results are shown in the table.

Sugar	Rate of absorption by ileum / arbitrary units	
	Before addition of respiratory inhibitor	After addition of respiratory inhibitor
Glucose	1.52	0.45
Fructose	1.30	0.33
Xylose	0.24	0.24

- (i) Name the process by which xylose was absorbed by the ileum.

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(1 mark)

- (ii) Explain how glucose and fructose are absorbed by the ileum when no inhibitor is present.

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(3 marks)

- (iii) The concentration of sugars in the ileum and in the surrounding medium was standardised in this investigation. The rate of absorption of glucose by the ileum was different from the rate of absorption of fructose. Explain what caused this difference.

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(1 mark)

6 (a) Very small organisms do not have specialised gas exchange systems. Explain how they obtain sufficient oxygen for respiration.

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(2 marks)

(b) Larger organisms have specialised gas exchange systems. Explain how the countercurrent mechanism helps fish to extract oxygen from water.

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(3 marks)

- (c) A biologist investigated the effect of increasing the temperature of water on the rate of ventilation in goldfish. The results of this investigation are shown in the table.

Temperature of water / °C	Rate of ventilation / dm ³ kg ⁻¹ h ⁻¹
5	1.3
10	9.0
15	32.0
20	60.0

Describe and explain what the results show about the effect of the temperature of water on the rate of ventilation.

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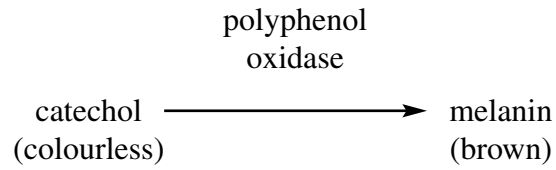
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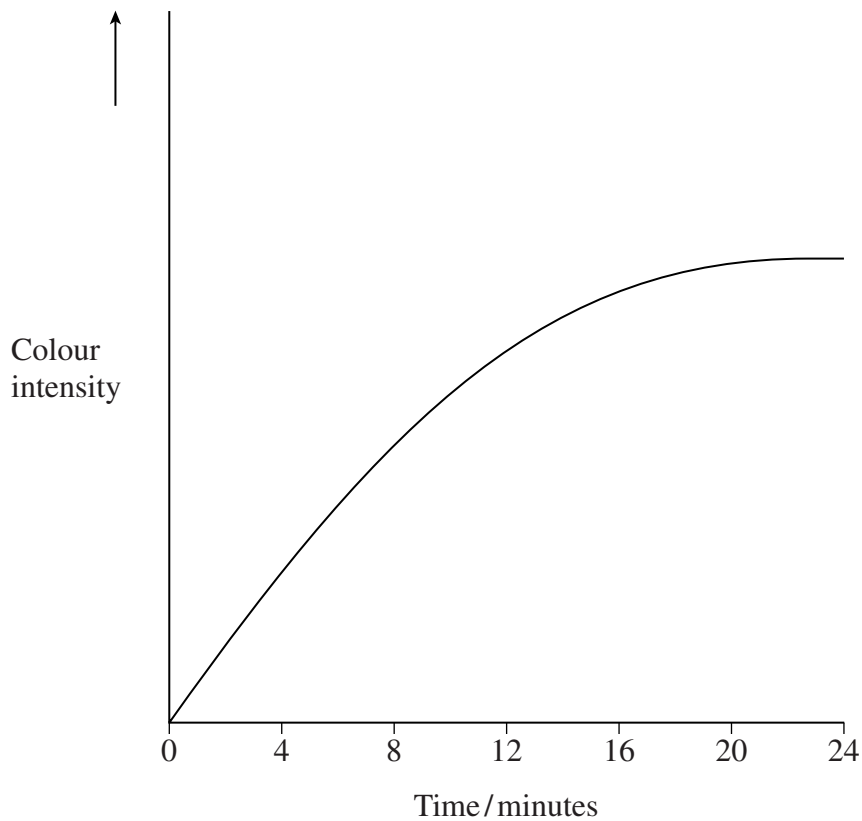
Turn over for the next question

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7 Polyphenol oxidase is an enzyme. It catalyses the following reaction.



A group of students investigated this reaction. They added 1 cm³ of the enzyme solution to 5 cm³ of catechol solution. They kept the mixture in a water bath at 30 °C. At two-minute intervals, they removed samples and determined the colour intensity of each sample. The graph shows the results.



(a) Explain the change in colour intensity.

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(1 mark)

(b) Draw clearly labelled curves on the graph to show the expected result if the investigation was repeated

(i) using 2 cm³ of the enzyme instead of 1 cm³ *(1 mark)*

(ii) at 20 °C instead of 30 °C. *(1 mark)*

(c) Competitive and non-competitive inhibitors affect the activity of enzymes. Explain how.

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(6 marks)

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- (d) Suggest a simple method by which you could find out whether an enzyme-catalysed reaction is being inhibited by a competitive or a non-competitive inhibitor.

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(2 marks)

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END OF QUESTIONS

QWC

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