Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Education
June 2005
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

BIOLOGY (SPECIFICATION B) BYB1
Unit 1 Core Principles

Monday 6 June 2005 Morning Session

In addition to this paper you will require:
- a ruler with millimetre measurements.

You may use a calculator.

Time allowed: 1 hour

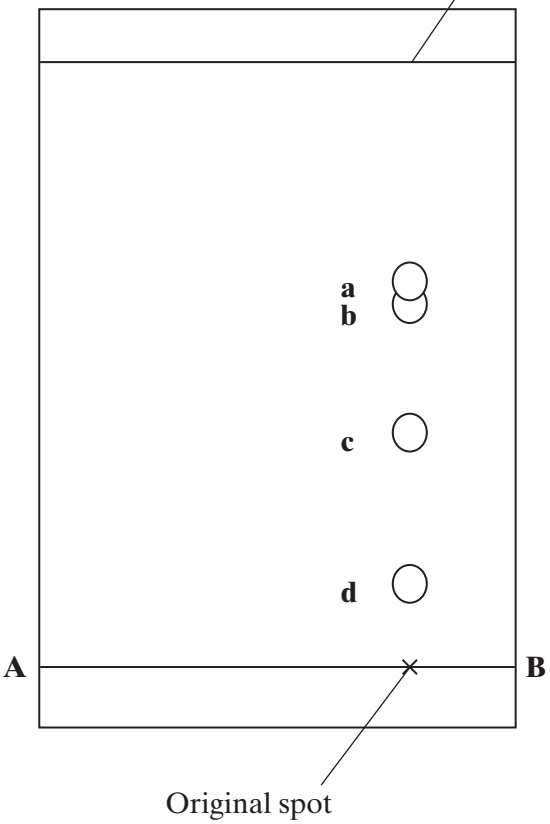
Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

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.

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			

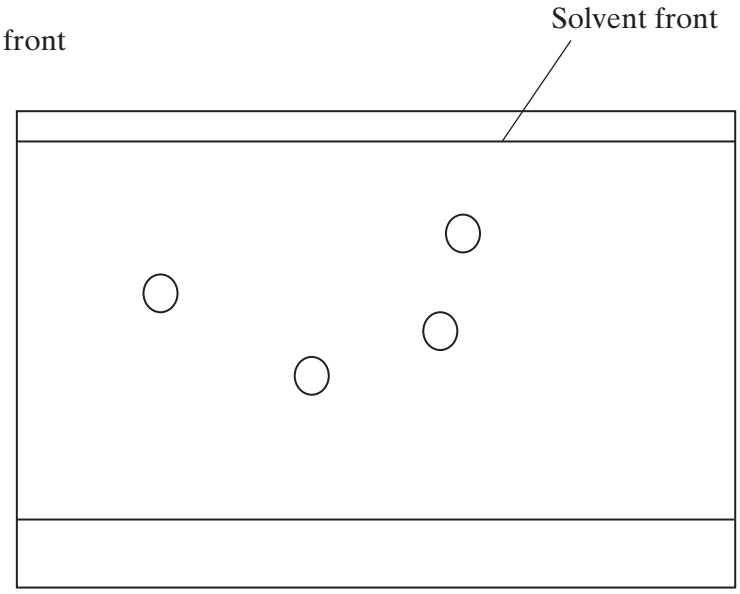
Answer **all** questions in the spaces provided.

1 A mixture contained three reducing sugars and one non-reducing sugar. Chromatography was used to separate these sugars. After the first chromatogram, the chromatography paper was turned on its side and placed in a different solvent. **Figures 1** and **2** show the results.



First chromatogram

Figure 1



Chromatogram after turning

Figure 2

(a) On **Figure 2**

(i) draw the position of line **A** – **B**;

(ii) label the sugars **a**, **b**, **c** and **d**. *(2 marks)*

(b) (i) For each chromatogram, calculate the Rf value for sugar **d**.
Show your working.

Rf value in **Figure 1** ..... Rf value in **Figure 2** .....
(2 marks)

(ii) Explain why the two Rf values are different.

.....

.....
(1 mark)

(c) The second chromatogram was cut up, so that each sugar was on a different piece of paper. The four sugars were then dissolved from the pieces of paper. Describe how a simple biochemical test could be used to determine which of the four solutions produced contained the non-reducing sugar.

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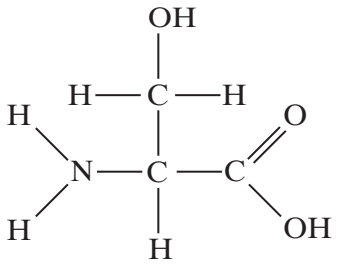
(2 marks)

7

2 The diagram shows the structure of the amino acid serine.



(a) (i) Draw a box on the diagram around the R group of serine and label the box with the letter **R**. *(1 mark)*

(ii) Draw a circle around each of the parts of the serine molecule which would be removed when **two** other amino acid molecules join directly to it. *(1 mark)*

(b) (i) Which **two** substances are formed when two amino acid molecules join together?

1 .....

2 .....

(1 mark)

(ii) Name the type of bond formed between the joined pair of amino acid molecules.

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(1 mark)

(c) Explain how a change in the primary structure of a globular protein may result in a different three-dimensional structure.

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(3 marks)

7

3 (a) Small samples of plant tissue were placed in a cold, isotonic solution and then treated to break open the cells to release the organelles. The different organelles were then separated. Describe a technique that could be used to

(i) break open the cells;

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.....

(ii) separate the organelles.

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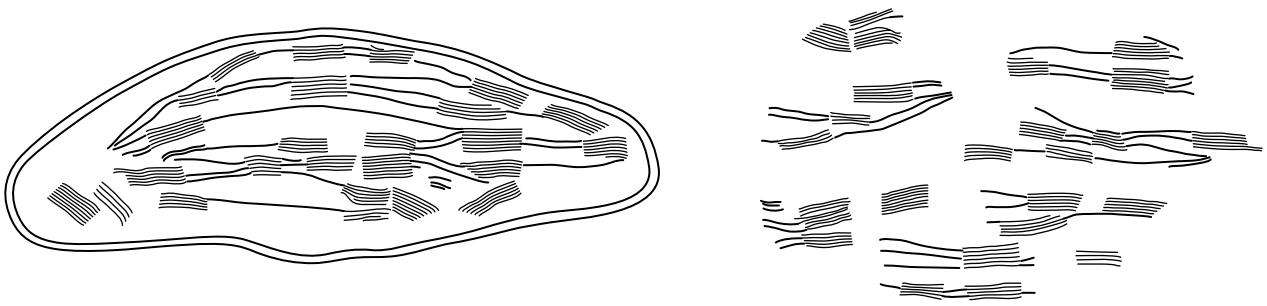
(2 marks)

(b) One group of organelles was placed in a hypotonic solution. The diagram shows one of these organelles seen under an electron microscope before and after it was placed in the hypotonic solution.



Before After

(i) Name the organelle.

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(1 mark)

(ii) Describe and explain the effect on the organelle of placing it in the hypotonic solution.

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(4 marks)

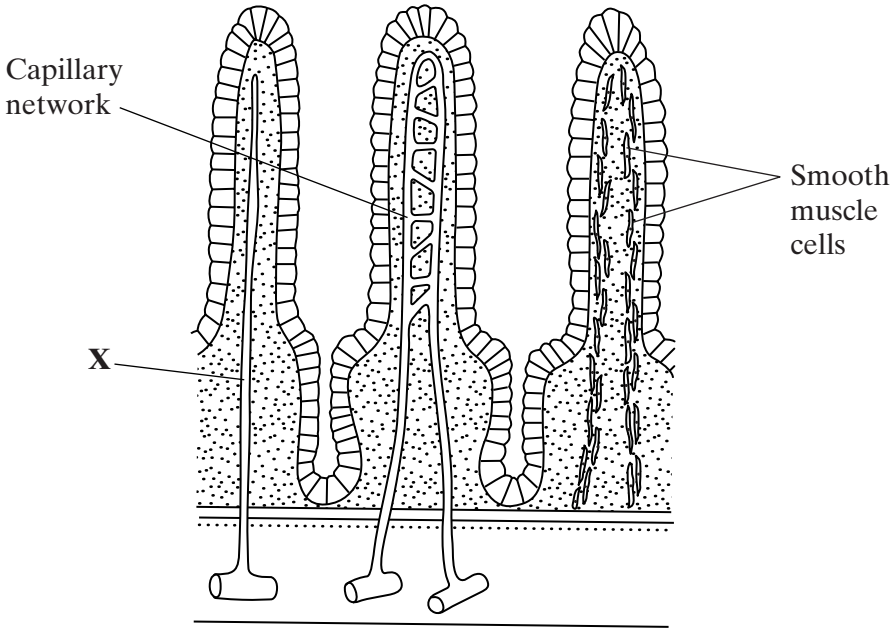
7

4 (a) Complete the table.

Part of gut where digestion occurs	**Enzyme**	**Substrate**	**Product**
Stomach		Protein	
Duodenum	Lipase		
Duodenum		Starch	
Ileum			Glucose

(4 marks)

(b) The diagram shows different structures present in the wall of part of the ileum.



(i) Describe the function of part **X**.

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(1 mark)

(ii) Suggest an advantage of having muscle cells in the villi.

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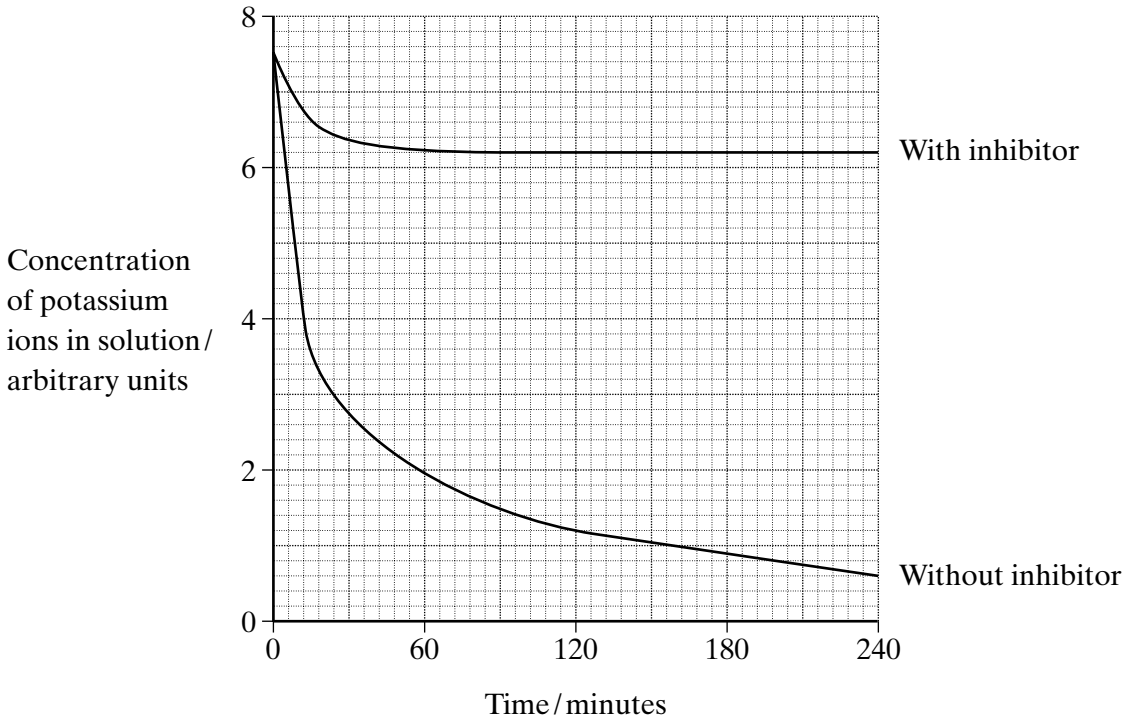
(2 marks)

7

5 Two samples of the roots of pea plants were placed in solutions containing potassium ions. An inhibitor to prevent respiration was added to one solution. The concentrations of potassium ions in the two solutions were measured at regular intervals. The graph shows the results.



(a) Explain the decrease in the concentrations of potassium ions in the two solutions between 0 and 30 minutes.

(i) With inhibitor

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(2 marks)

(ii) Without inhibitor

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(1 mark)

(b) Explain why there is no further decrease in the concentration of potassium ions in the solution with the inhibitor after 60 minutes.

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(2 marks)

(c) The substance malonate is an inhibitor of respiration. It has a structure very similar to the substrate of an enzyme that catalyses one of the reactions of respiration. Explain how malonate inhibits respiration.

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(2 marks)

7

TURN OVER FOR THE NEXT QUESTION

6 (a) Describe how air is taken into the lungs.

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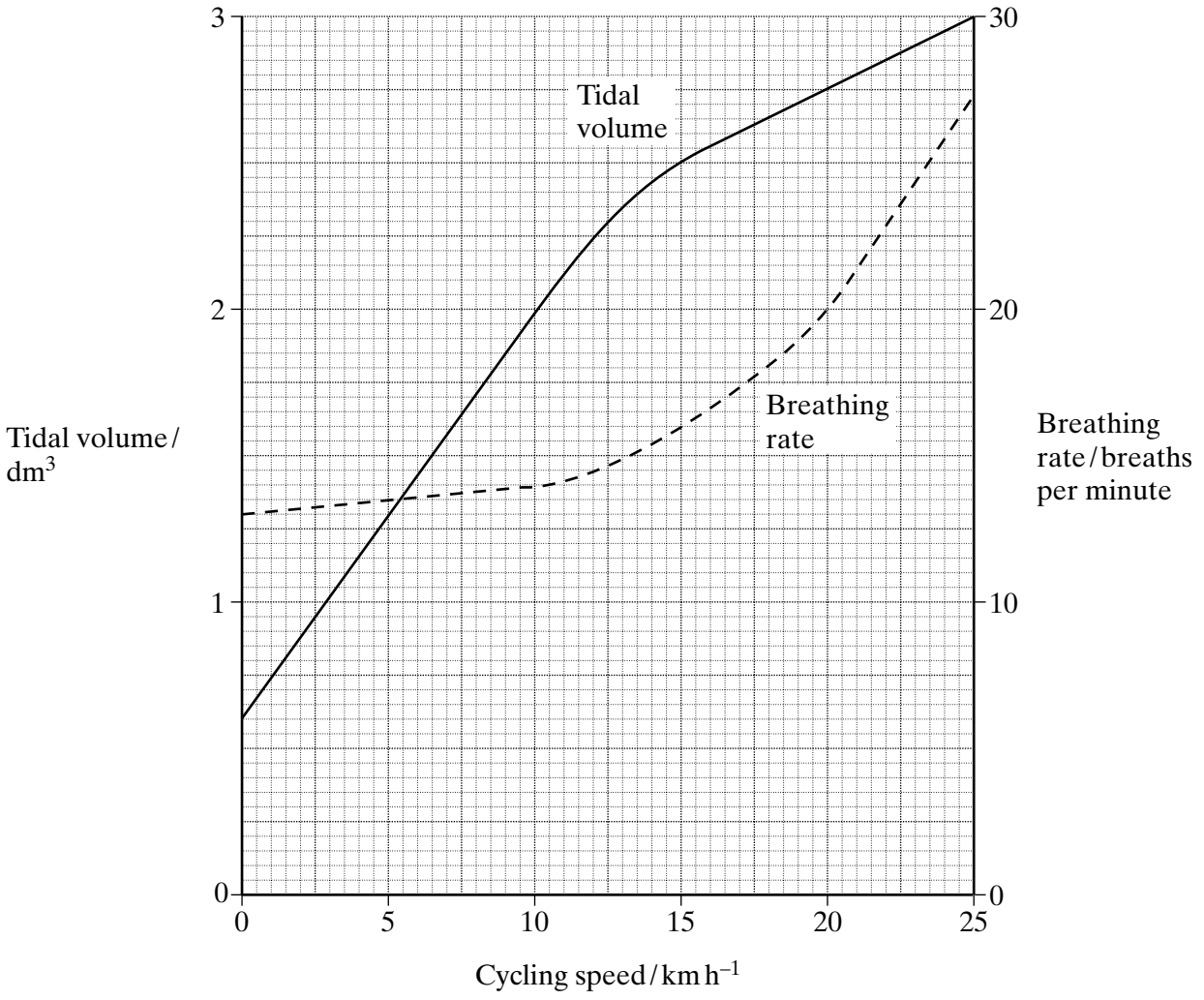
(3 marks)

The volume of air breathed in and out of the lungs during each breath is called the tidal volume. The breathing rate and tidal volume were measured for a cyclist pedalling at different speeds. The graph shows the results.



(b) Describe the **two** curves.

(i) Tidal volume .....

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(ii) Breathing rate .....

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(2 marks)

(c) Calculate the total volume of air breathed in and out per minute when the cyclist is cycling at $20\,km\,h^{-1}$. Show your working.

..... dm^3

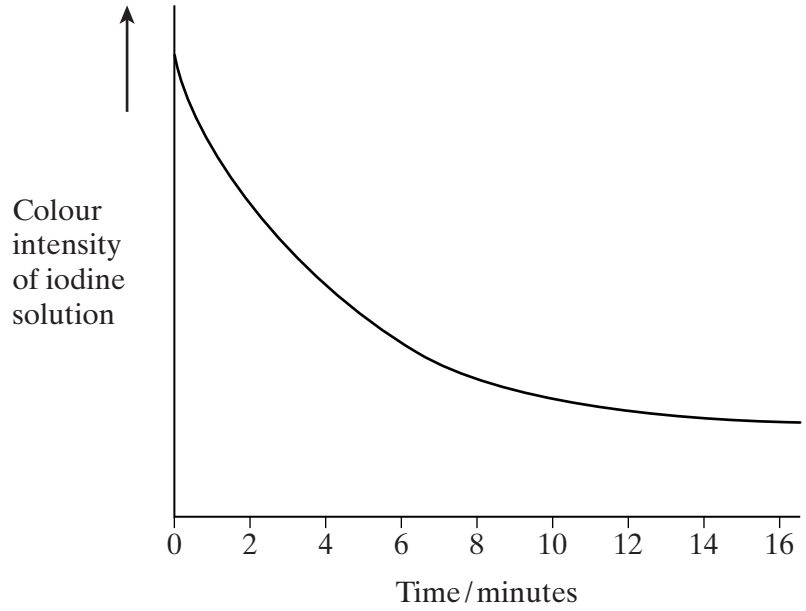
(2 marks)

7

TURN OVER FOR THE NEXT QUESTION

Question 7 should be written in continuous prose, where appropriate.
Quality of Written Communication will be assessed in the answer.

7 In an investigation into carbohydrase activity, the contents from part of the gut of a small animal were collected. The contents were added to starch solution at pH 7 and kept in a water bath at 25 °C. At one-minute intervals, samples were removed and added to different test tubes containing dilute iodine solution. The colour intensity of each sample was determined. The graph shows the results.



(a) Explain the change in colour intensity.

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(2 marks)

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

(i) at 35 °C;

(ii) at pH 2.

(2 marks)

(c) Explain how

(i) raising the temperature to 35 °C affects carbohydrase activity;

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(ii) decreasing the pH affects carbohydrase activity.

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(7 marks)

11

END OF QUESTIONS

QWC

1

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