Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

For Examiner's Use

General Certificate of Education
June 2008
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

BIOLOGY (SPECIFICATION B) **BYB1**
Unit 1 Core Principles

Tuesday 3 June 2008 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 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. **Answers written in margins or on blank pages will not be marked**.
- If you need extra space use page 14 for your answers.
- Do all rough work in this book. Cross through any work you do not want to be marked.

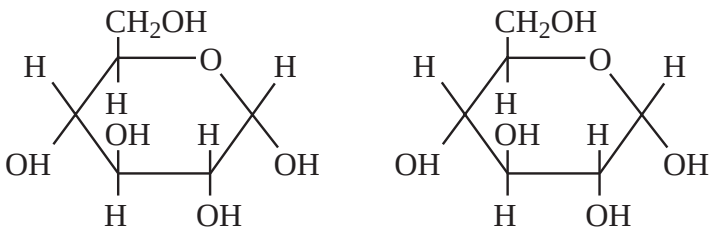
Information

- The maximum mark for this paper is 54.
- The marks for questions are shown in brackets. One mark will be awarded for Quality of Written Communication.
- 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			

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

1 The diagram shows two glucose molecules. These two molecules can join together to form a molecule of maltose.



1 (a) (i) Draw a box round the parts of the two glucose molecules that would be removed when the two molecules are joined together.

(1 mark)

1 (a) (ii) Name the type of reaction that joins these molecules together.

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(1 mark)

1 (a) (iii) How many hydrogen atoms are there in a molecule of maltose? Write your answer in the box.

(1 mark)

1 (b) Maltose is a reducing sugar. Describe how you could use a biochemical test to distinguish maltose from sucrose.

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(2 marks)

(Extra space) .....

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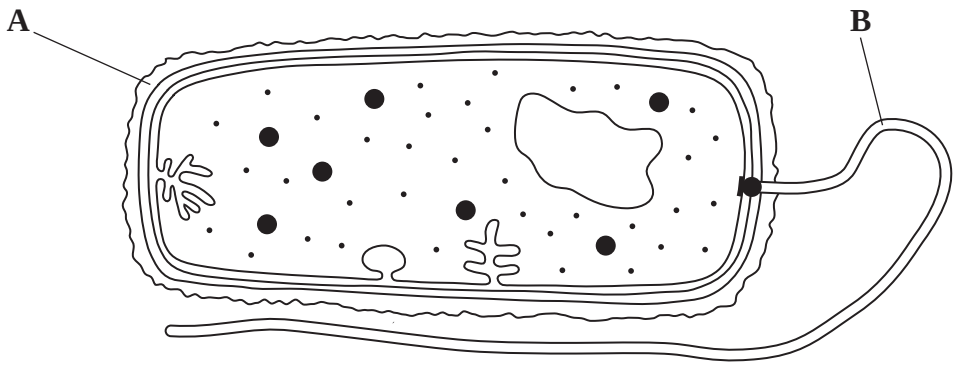
5

2 The drawing shows a bacterial cell.



2 (a) Name structures **A** and **B**.

A .....

B .....

(2 marks)

2 (b) Name **one** organelle in a bacterial cell that is also in the cells of eukaryotes.

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(1 mark)

2 (c) The ultrastructure of a bacterial cell cannot be seen with a light microscope. Explain why the ultrastructure of the bacterial cell can only be seen with an electron microscope.

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(2 marks)

2 (d) Mitochondria are organelles found in eukaryotes. Biologists think that mitochondria originated from prokaryotes. Suggest **two** structural features of mitochondria that provide evidence for this theory.

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2 .....

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(2 marks)

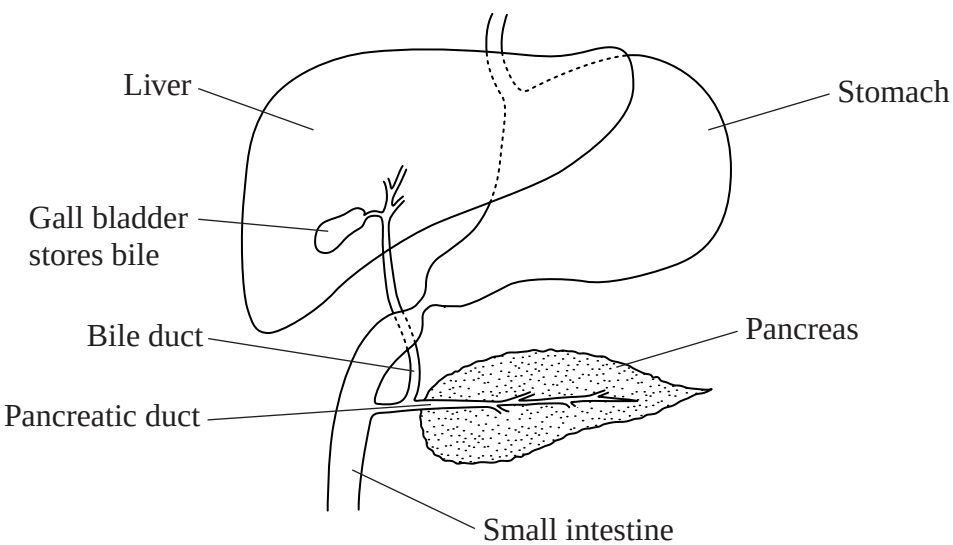
7

3 (a) Complete the table about digestive enzymes.

Enzyme	**Site of production**	**Substrate**	**Product**
	Salivary glands		Maltose
Endopeptidase	Stomach		
	Pancreas	Lipid	
	Ileum		Glucose

(4 marks)

The diagram shows part of the human digestive system.



3 (b) Surgery is sometimes carried out to remove the gall bladder. Explain why a change in diet is required after removal of the gall bladder.

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(3 marks)

(Extra space) .....

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3 (c) Pancreatic enzymes become active when they reach the duodenum. If the pancreatic duct becomes blocked, enzymes can become active in the pancreas. Suggest how activation of these enzymes in the pancreas could affect the pancreas.

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(1 mark)

(Extra space) .....

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8

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4 (a) Give **one** example of the biological importance of water as a solvent.

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(1 mark)

4 (b) Explain how each of the following properties of water are of benefit to living organisms.

4 (b) (i) When water freezes to form ice it becomes less dense.

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(1 mark)

(Extra space) .....

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4 (b) (ii) A large amount of heat energy is required to evaporate water.

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(1 mark)

(Extra space) .....

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4 (b) (iii) Water has a high specific heat capacity.

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(2 marks)

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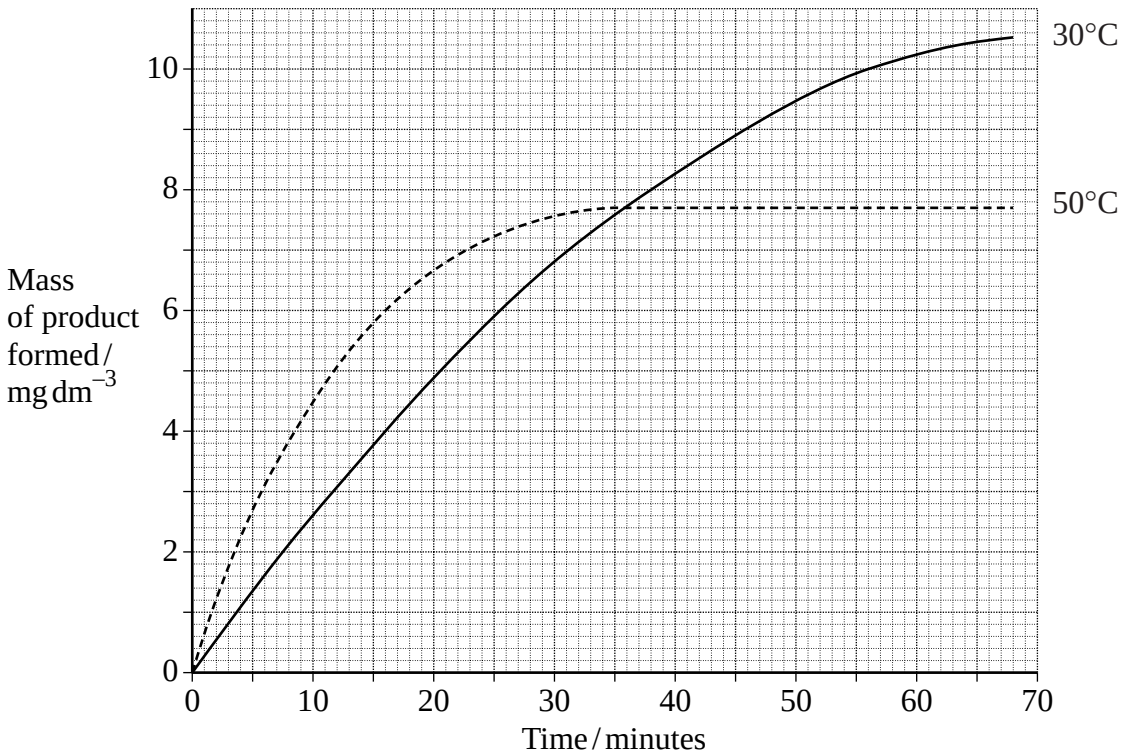
5

5 Biologists investigated the mass of product formed in an enzyme-controlled reaction at two different temperatures. The results are shown in the graph.



5 (a) Calculate the rate of reaction in the first 10 minutes at 30 °C.

Rate = ... mg dm^{-3} min^{-1} *(1 mark)*

5 (b) (i) The initial rate of the reaction was slower at 30 °C than at 50 °C. Explain why.

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(2 marks)

(Extra space) .....

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5 (b) (ii) Explain the shape of the curve between 20 and 60 minutes at 50 °C.

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(3 marks)

(Extra space) .....

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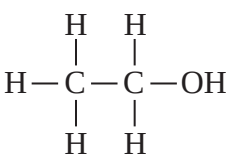
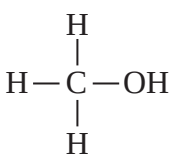
5 (c) Ethanol dehydrogenase is an enzyme present in the liver. It catalyses the conversion of ethanol to ethanal. Methanol is an inhibitor of ethanol dehydrogenase. The structural formulae of ethanol and methanol are shown in the diagram.



Ethanol



Methanol

Use information in the diagram to explain how methanol inhibits ethanol dehydrogenase.

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(3 marks)

(Extra space) .....

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6 (a) Explain how a person breathes in.

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(3 marks)

(Extra space) .....

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6 (b) Pulmonary ventilation is the volume of air that can be breathed in and out in one minute. Pulmonary ventilation is calculated from the equation

pulmonary ventilation = breathing rate × tidal volume

where breathing rate is the number of breaths per minute and
tidal volume is the volume of air breathed in and out in one breath.

Table 1 shows the pulmonary ventilation and breathing rates of an athlete at rest and after vigorous exercise.

Table 1

	Pulmonary ventilation / cm^3 per minute	**Breathing rate / breaths per minute**
At rest	7500	15
After vigorous exercise	135 000	45

6 (b) (i) Calculate the tidal volume of the athlete at rest.

Answer ..... cm^3 *(1 mark)*

6 (b) (ii) Calculate the percentage increase in pulmonary ventilation after vigorous exercise. Show your working.

Answer ..... *(2 marks)*

6 (c) **Table 2** shows the percentage of gases in samples of inhaled and exhaled air.

Table 2

	Percentage in	
Gas	**inhaled air**	**exhaled air**
Oxygen	20.55	16.01
Carbon dioxide	0.04	3.99
Nitrogen	78.53	75.20
Water vapour	0.48	4.42
Other gases	0.40	0.38

Use information in **Table 2** to explain why the percentage of nitrogen is lower in exhaled air than in inhaled air.

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(1 mark)

(Extra space) .....

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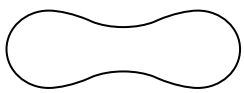
7

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

7 The diagram shows a cross-section of a red blood cell.



7 (a) The shape of a red blood cell allows it to take up a large amount of oxygen in a short time. Explain how.

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(2 marks)

(Extra space) .....

7 (b) A technician estimated the number of red blood cells in a sample of blood. First she diluted the blood sample with an isotonic solution.

7 (b) (i) What is an *isotonic* solution?

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(1 mark)

7 (b) (ii) The technician did not use distilled water to dilute the blood sample. Use your knowledge of water potential to explain why.

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(3 marks)

(Extra space) .....

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7 (c) Describe how the structure of the plasma membrane controls the movement of substances into and out of a cell.

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(Extra space) .....

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(6 marks)

12

END OF QUESTIONS

QWC

1

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