

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use

General Certificate of Education
 June 2007
 Advanced Subsidiary Examination



BIOLOGY (SPECIFICATION B)
Unit 1 Core Principles

BYB1

Monday 4 June 2007 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.

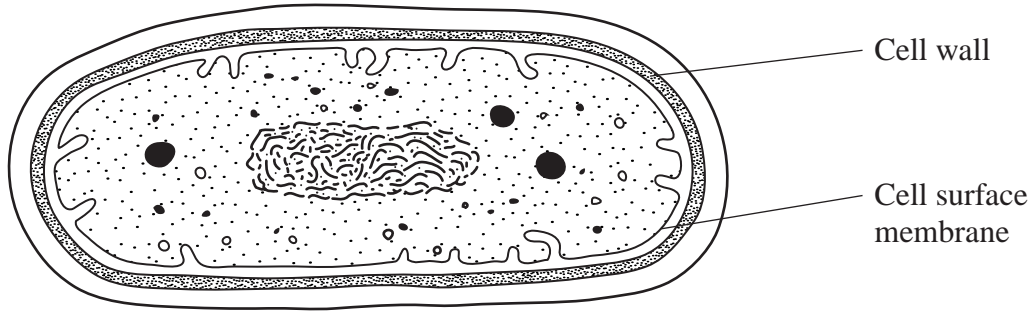
Information

- The maximum mark for this paper is 54.
- The marks for questions are shown in brackets. 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 7** are expected to be short and precise.
- Answer **Question 8** 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			
8			
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 a bacterial cell as seen under the electron microscope.



(a) (i) This bacterial cell and a plant mesophyll cell both have a cell wall and a cell surface membrane. Give **one** other way in which the structure of this bacterial cell is similar to the structure of a plant mesophyll cell.

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 (1 mark)

(ii) Give **three** ways in which the structure of this bacterial cell is different from the structure of a plant mesophyll cell.

1.

 2.

 3.

 (3 marks)

(b) An animal cell contains many membrane-bound organelles such as a nucleus and mitochondria. Name **one** other membrane-bound organelle contained in an animal cell. Describe its function.

Name of organelle

Function of organelle

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2 Describe how the gut wall is adapted

(a) to push food down the oesophagus

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(2 marks)

(b) to neutralise the stomach acid in the duodenum

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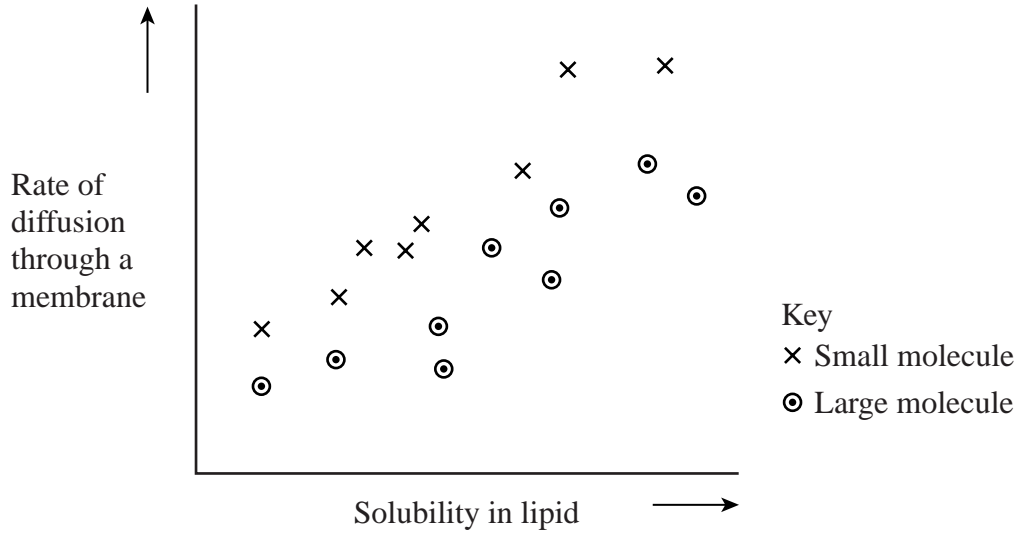
(2 marks)

(c) to absorb the products of digestion in the iluem.

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(3 marks)

- 3 (a) The graph shows the effect of molecule size and solubility in lipid on the rate of diffusion of substances through a cell surface membrane.



- (i) Describe how solubility in lipid affects the rate of diffusion through a membrane. Explain your answer.

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(2 marks)

- (ii) Describe how molecular size affects the rate of diffusion. Suggest an explanation for your answer.

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(2 marks)

- (b) Name **two** factors which affect the rate of facilitated diffusion of a substance through a membrane.

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- 4 (a) Describe how the structure of cellulose makes it suitable for its function in cell walls.

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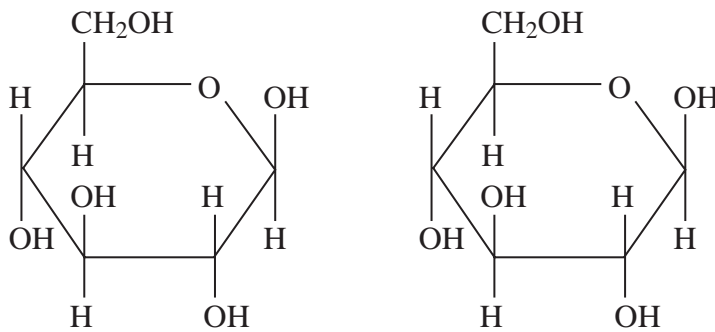
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(3 marks)

- (b) The diagram shows two of the glucose molecules used to make cellulose.

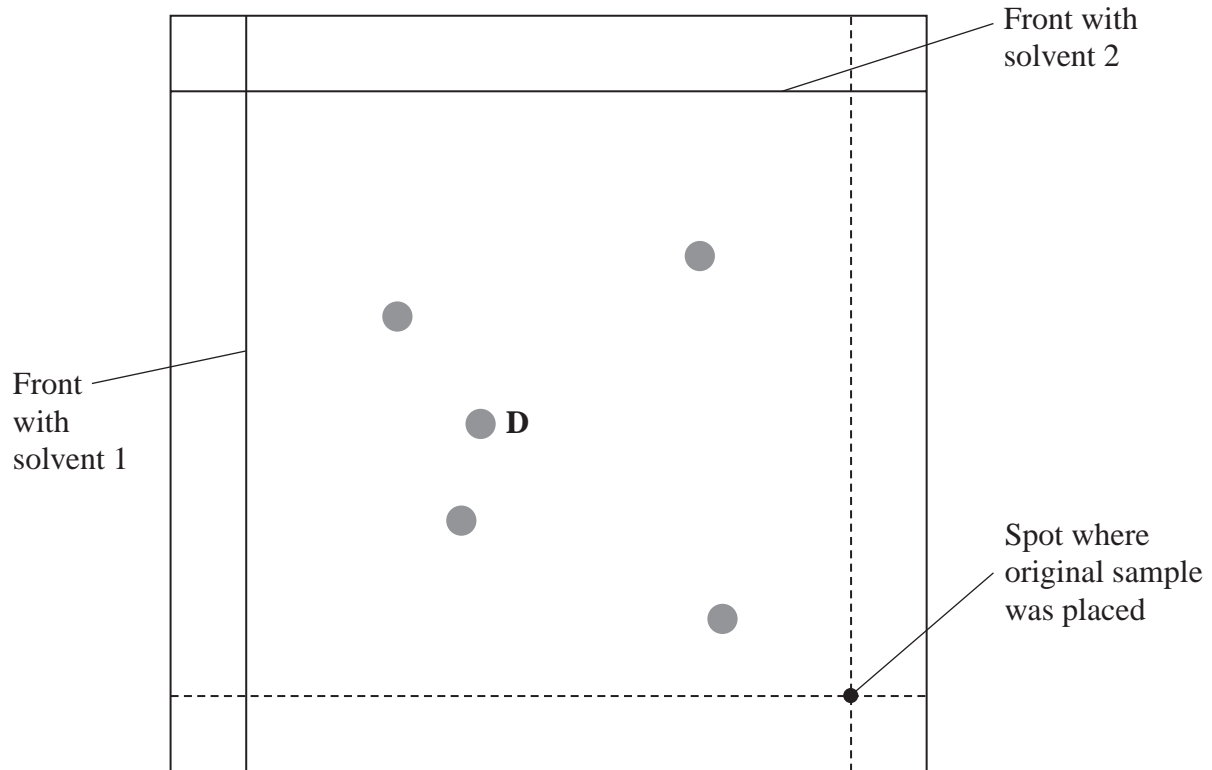


When these two glucose molecules join together by a condensation reaction, atoms are removed. Draw a box around the atoms which are removed. (1 mark)

- (c) Cellulose and starch are made from different types of glucose molecule. Draw a diagram to show the structure of a glucose molecule used to make starch.

(1 mark)

- 5 Two-way chromatography was used to identify the amino acids in a sample of orange juice. The chromatogram which was produced is shown in the diagram.



- (a) Describe how the chromatogram was produced.

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(4 marks)

- (b) Two different solvents were used to produce this chromatogram. The table shows the Rf values of some different amino acids in each of these solvents.

Amino acid	Rf value in first solvent	Rf value in second solvent
Alanine	0.63	0.27
Asparagine	0.32	0.21
Glutamic acid	0.61	0.45
Proline	0.46	0.20
Tyrosine	0.21	0.56

Identify the amino acid labelled **D** on the chromatogram. Explain your answer.

Amino acid

Explanation

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(2 marks)

6

Turn over for the next question

6 Students investigated the digestion of lipids in milk by lipase. They set up three test tubes.

In tube **A**, milk was incubated with lipase only.

In tube **B**, milk was incubated with lipase and bile salts.

In tube **C**, milk was incubated with bile salts only.

Their results are shown in the table.

Time/ minutes	Mean pH		
	A Lipase only	B Lipase and bile salts	C Bile salts only
0	8.5	8.5	8.5
10	8.0	7.7	8.5
20	7.6	7.0	8.5
30	7.3	6.5	8.5
40	7.0	6.5	8.5
50	6.5	6.5	8.5
60	6.5	6.5	8.5

(a) The pH changed in test tube **A**. Explain why.

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(2 marks)

(b) The pH did not fall below a value of 6.5 in tube **A**. Suggest **one** reason why.

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(1 mark)

(c) The rate at which the pH fell in tube **A** was different from the rate at which the pH fell in tube **B**. Explain why the pH fell at a different rate.

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(2 marks)

(d) Explain why test tube **C** was set up.

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(1 mark)

7 (a) Some of the enzymes produced by the gut wall hydrolyse polypeptides. Different enzymes hydrolyse the peptide bonds between different amino acids in a polypeptide. Use your knowledge of the way in which enzymes work to explain why.

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(3 marks)

(b) Endopeptidases are produced by the stomach wall and by the pancreas. Exopeptidases are produced by the small intestine. This results in the efficient digestion of polypeptides. Explain why.

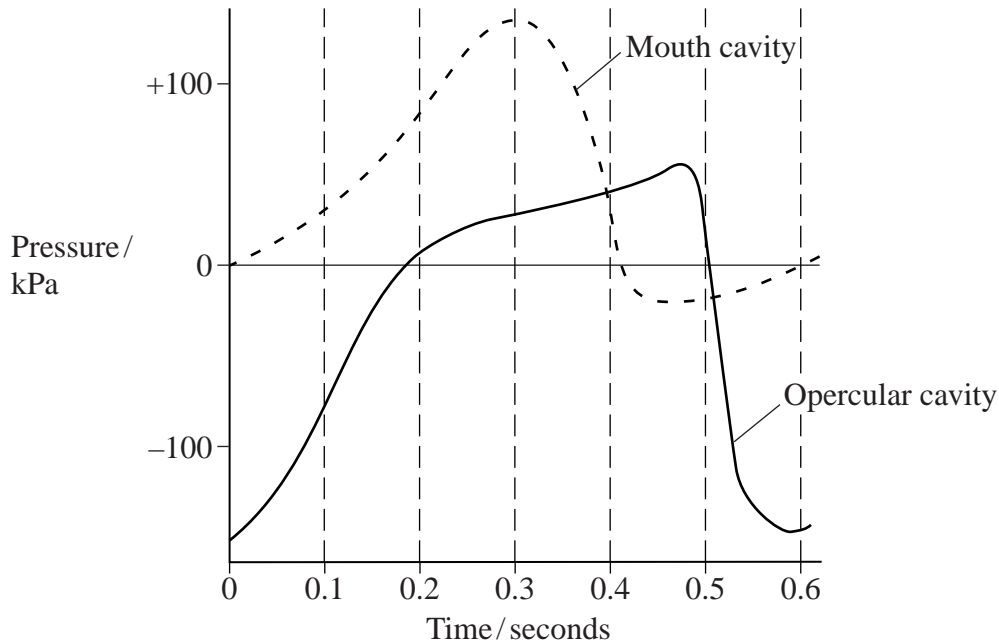
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(2 marks)
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6

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- 8 (a) The graph shows the pressure changes in the mouth cavity and opercular cavity of a fish during one ventilation cycle.



- (i) Using information from the graph and your own biological knowledge, describe how a fish maintains a flow of water over the gills.

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- (ii) For how long during this ventilation cycle is water flowing over the gills?
Explain your answer.

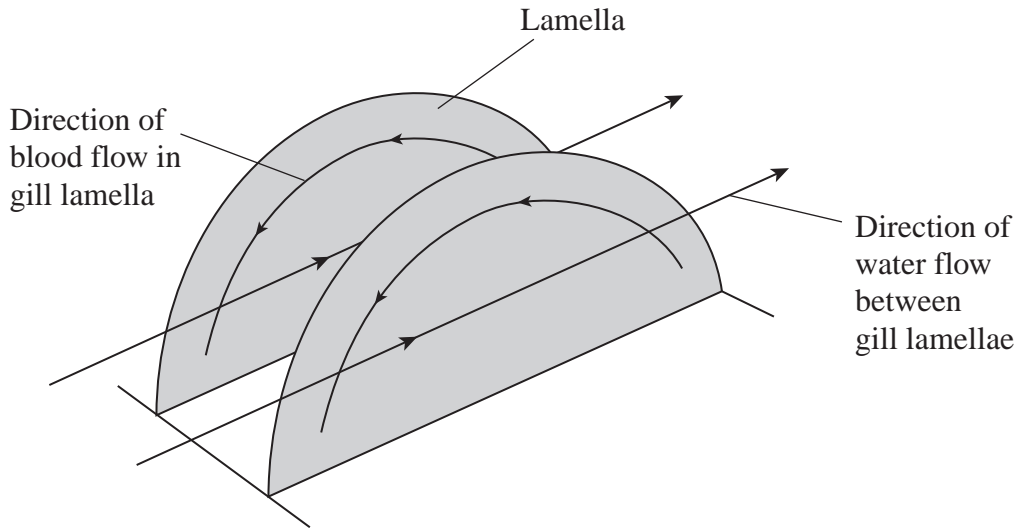
Time seconds

Explanation

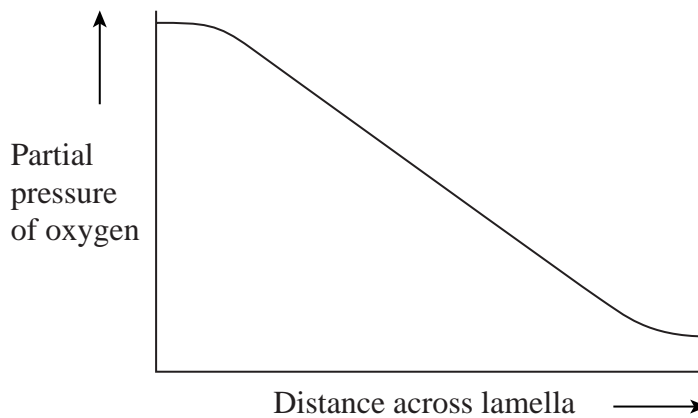
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(2 marks)

Question 8 continues on the next page

- (b) The diagram shows the direction of blood flow in the capillaries of gill lamellae and the direction of water flow over the lamellae.



Partial pressure can be used as a measure of concentration. The graph shows the changes in the partial pressure of oxygen in water as it passes over a gill lamella.



- (i) Draw a curve on the graph to show the changes in the partial pressure of oxygen in the blood across the gill lamella. (1 mark)
- (ii) Explain the advantage to the fish of the blood and water flowing in opposite directions.

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(2 marks)

END OF QUESTIONS