

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use

General Certificate of Education
 January 2009
 Advanced Subsidiary Examination



Biology
Unit 1 Biology and disease

BIOL1

Thursday 8 January 2009 9.00 am to 10.15 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 15 minutes

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 16 for your answers.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in all answers.
- Quality of Written Communication will be assessed in all answers.

For Examiner's Use			
Question	Mark	Question	Mark
1			
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4			
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Total (Column 1) →			
Total (Column 2) →			
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Examiner's Initials			



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

1 (a) (i) What is atheroma?

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(2 marks)

(Extra space)

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1 (a) (ii) Atheroma makes it more likely that a blood clot will form. Describe how a blood clot may lead to a myocardial infarction.

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(3 marks)

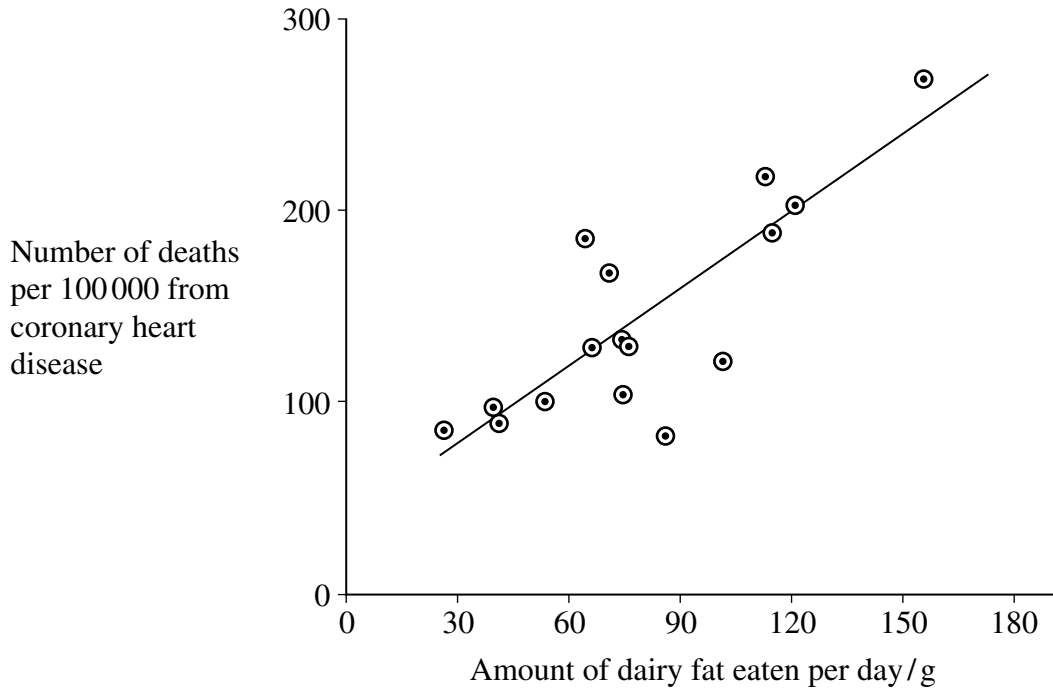
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1 (b) The graph shows the relationship between the amount of dairy fat eaten and the deaths from coronary heart disease (CHD) in different countries.



1 (b) (i) The number of deaths is given per 100 000 people. Explain why.

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(2 marks)

1 (b) (ii) Does the evidence from the graph show that eating dairy fat causes coronary heart disease? Explain your answer.

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(2 marks)

Turn over ►



2 (a) Sucrose, maltose and lactose are disaccharides.

2 (a) (i) Sucrase is an enzyme. It hydrolyses sucrose during digestion. Name the products of this reaction.

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(2 marks)

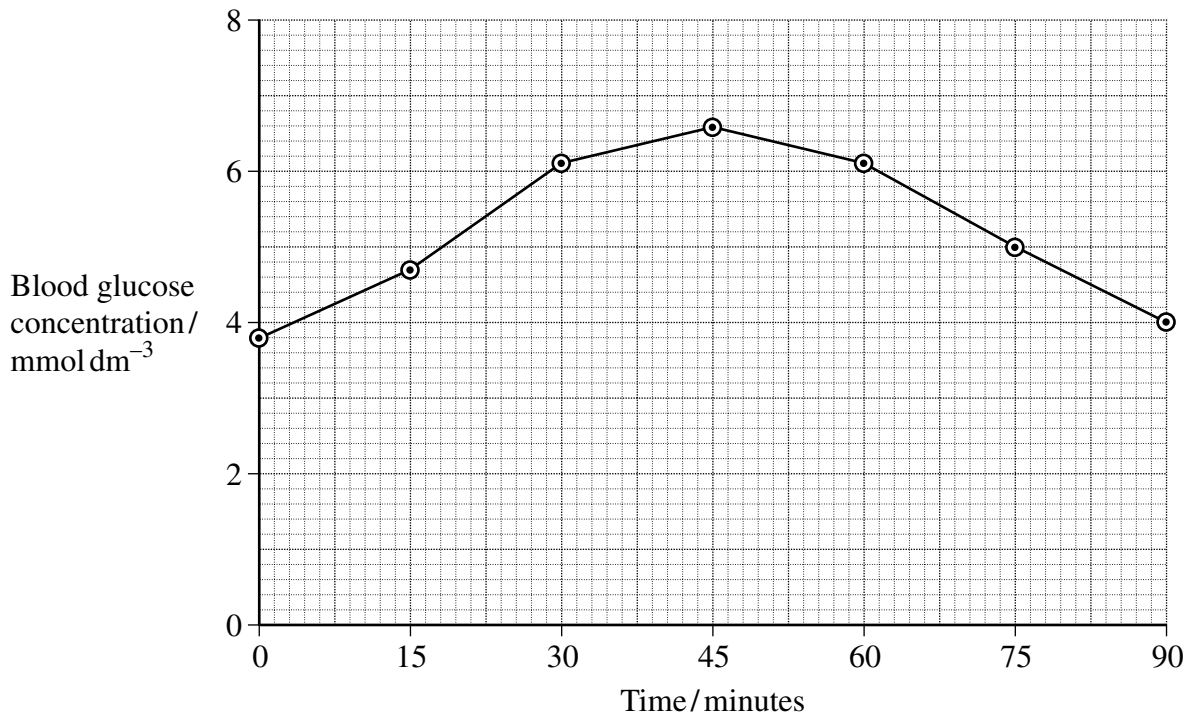
2 (a) (ii) Sucrase does **not** hydrolyse lactose. Use your knowledge of the way in which enzymes work to explain why.

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2 (b) A woman was given a solution of sucrose to drink. Her blood glucose concentration was measured over the next 90 minutes. The results are shown on the graph.



2 (b) (i) Describe how the woman's blood glucose concentration changed in the period shown in the graph.

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(2 marks)

2 (b) (ii) Explain the results shown on the graph.

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(2 marks)

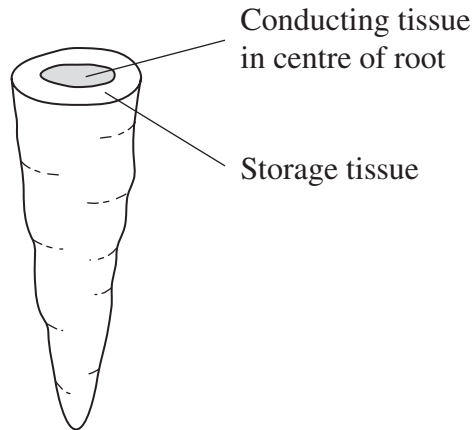
2 (b) (iii) This woman was lactose intolerant.

On the graph, sketch a curve to show what would happen to her blood glucose concentration if she had been given a solution of lactose to drink instead of a sucrose solution.

(1 mark)



3 The diagram shows a carrot.



A group of students investigated the effect of sucrose concentration on the length of cylinders cut from a carrot.

3 (a) The students used a cork borer to cut cylinders from the carrot. Describe how the students should cut these cylinders to make sure that this was a fair test and would produce reliable results.

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(2 marks)

3 (b) They measured the initial length of each cylinder then placed the cylinders into test tubes containing different concentrations of sucrose solution. Bungs were placed in the tubes and the tubes were left overnight. Explain why the bungs were placed in the tubes.

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(2 marks)



3 (c) The students then measured the final lengths of the carrot cylinders. Their results are shown in the table.

Concentration of sucrose/mol dm ⁻³	$\frac{\text{Final length}}{\text{Initial length}}$
0.0	1.4
0.2	1.4
0.4	1.2
0.6	1.1
0.8	0.9

3 (c) (i) The students used these results to find the concentration of sucrose that has the same water potential as the carrot cylinders. Describe how they could have done this.

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(2 marks)

(Extra space)

3 (c) (ii) Was it important in this investigation that the carrot cylinders had the same initial length? Explain your answer.

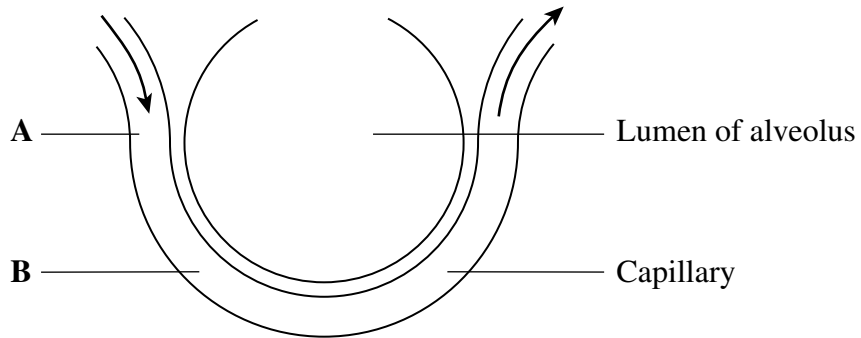
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(1 mark)

Turn over ►



4 The diagram shows part of an alveolus and a capillary.



10 μm

4 (a) The rate of blood flow in the capillary is 0.2 mm s^{-1} . Calculate the time it would take for blood in the capillary to flow from point A to point B. Show your working.

Answer seconds
 (2 marks)

4 (b) The rate of diffusion of oxygen is affected by the difference between its concentration in the alveolus and its concentration in the blood.

4 (b) (i) Circulation of the blood helps to maintain this difference in oxygen concentration. Explain how.

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(1 mark)



4 (b) (ii) During an asthma attack, less oxygen diffuses into the blood from the alveoli. Explain why.

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4 (c) Scientists investigated a new drug to treat asthma. People with asthma took part in a trial. They were divided into two groups, an experimental group and a control group.

4 (c) (i) It was important to have a control group in this trial. Explain why.

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4 (c) (ii) People in the experimental group were given the drug in an inhaler. Describe how the control group should have been treated.

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5 (a) Phagocytes and lysosomes are involved in destroying microorganisms. Describe how.

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(3 marks)

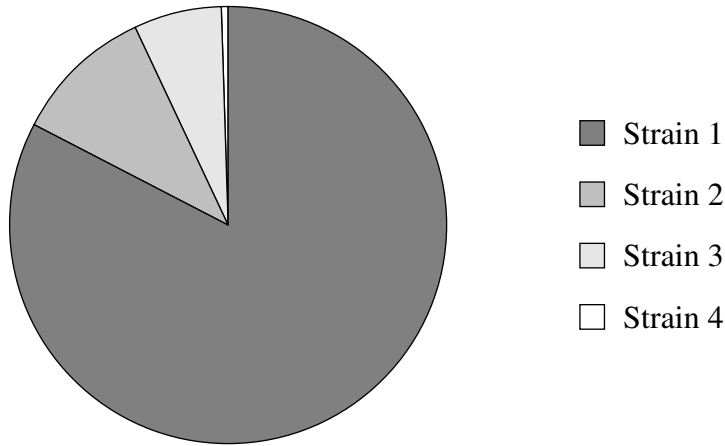
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5 (b) The pie chart shows the proportions of people infected with four different strains of influenza virus early in 2004.



5 (b) (i) A person may develop influenza twice within a short time. Use information from the pie chart to explain why.

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(2 marks)

5 (b) (ii) The information in the pie chart is valuable to companies who make influenza vaccines. Use your knowledge of antigens to explain why.

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(2 marks)

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Turn over ►



6 Read the following passage.

Campylobacter jejuni is a bacterium. It is one of the commonest causes of diarrhoea in humans. The illness that it causes does not usually last very long and many sufferers do not even go to the doctor. The only treatment required is the use of oral rehydration solutions to replace the water lost by diarrhoea. In 1998, laboratory tests confirmed 60 000 cases of diarrhoea caused by this bacterium in the UK. The bacterium was more frequently found in males than in females with a ratio of 1.5 : 1.

5

In rare cases, the nervous system may be affected. Scientists are now beginning to understand the cause of this. Sugars in the antigens on the surface of the bacteria are identical to some of the sugars on the surface of nerve cells. Antibodies produced against the bacteria may therefore attack the body's nerve cells. There can be serious problems if this leads to paralysis of the diaphragm. Breathing difficulties result and the patient may die.

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Use information in the passage and your own knowledge to answer the following questions.

- 6** (a) (i) The number of cases of diarrhoea confirmed as being caused by *Campylobacter jejuni* in the UK in 1998 was 60 000 (lines 4–5). Explain why the true number of cases is thought to be more than this.

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(1 mark)

- 6** (a) (ii) Calculate the number of cases of diarrhoea confirmed as being caused by *Campylobacter jejuni* in men in 1998.

Answer

(1 mark)



6 (b) Explain how an oral rehydration solution (ORS) replaces water lost by diarrhoea (lines 3–4).

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(3 marks)

(Extra space)

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6 (c) Explain why antibodies produced against *Campylobacter jejuni* also attack nerve cells (lines 9–10).

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(3 marks)

(Extra space)

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6 (d) Explain how paralysis of the diaphragm leads to breathing difficulties (line 11).

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(2 marks)

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Turn over ►



7 (a) The structure of a cholera bacterium is different from the structure of an epithelial cell from the small intestine. Describe how the structure of a cholera bacterium is different.

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7 (b) Scientists use optical microscopes and transmission electron microscopes (TEMs) to investigate cell structure. Explain the advantages and the limitations of using a TEM to investigate cell structure.

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END OF QUESTIONS

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