

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education  
 June 2006  
 Advanced Level Examination



**BIOLOGY (SPECIFICATION B)**  
**Unit 7 Section A Microbes and Disease**

**BYB7/A**

Friday 23 June 2006 1.30 pm to 3.45 pm

**For this paper you must have:**

- Section B provided as an insert (enclosed)
- a ruler with millimetre measurements

You may use a calculator.

Time allowed: The total time for Section A and Section B of this paper is 2 hours 15 minutes

**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.
- **Section A** and **Section B** will be marked by different examiners. You must ensure that any supplementary sheets are fastened to the appropriate question paper answer book.
- Do all rough work in this book. Cross through any work you do not want marked.

**Information**

- The maximum mark for **Section A** is 50.
- 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 all answers.
- You are advised to spend 1 hour on **Section A**.
- You are reminded that **Section A** requires you to use your knowledge of different parts of the specification as well as Module 7 in answering synoptic questions. These questions are indicated by the letter **S**.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
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Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

**1** (a) Give **one** function of the following features of a bacterial cell.

(i) Capsule

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.....  
*(1 mark)*

(ii) Mesosome

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.....  
*(1 mark)*

**S** (b) Bacterial cells from a pure culture were broken open. Describe a method that could be used to obtain a sample of ribosomes from these bacterial cells.

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*(2 marks)*

4
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2 (a) Give **two** factors, other than cost, that should be considered when selecting an antibiotic to treat a bacterial disease.

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2 .....

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(2 marks)

S (b) The table describes the effects of two antibiotics on bacteria.

Antibiotic	Effect
Tetracycline	prevents tRNA binding
Chloramphenicol	prevents peptide bonds forming

(i) Explain how each of these antibiotics slows down the rate of growth of bacteria.

Tetracycline .....

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Chloramphenicol .....

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(4 marks)

(ii) Suggest why tetracycline has no effect on human cells.

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(1 mark)

3 (a) An antigen in a vaccine leads to the production of antibodies. Describe the part played by B lymphocytes in this process.

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*(4 marks)*

S (b) Hepatitis B vaccine contains a viral antigen produced by genetically modified bacteria. Describe how the isolated gene that codes for a protein in the virus’s coat could be transferred to the bacterial cells.

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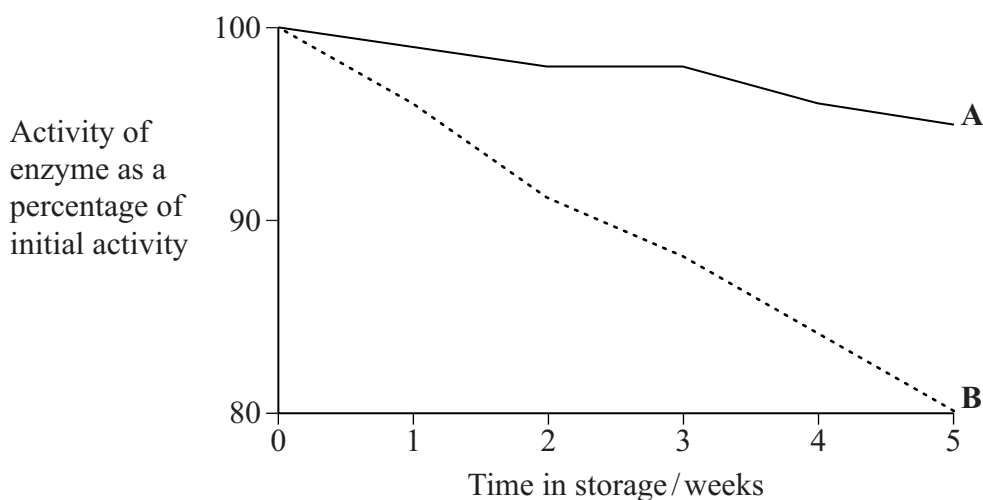
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*(3 marks)*

7
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- 4 (a) Alcohol oxidase is used in kits for measuring blood alcohol concentrations. In an investigation, the effect of storage on the activity of immobilised and non-immobilised alcohol oxidase was measured. The results are shown in the graph.



- (i) Give **two** ways in which enzymes can be immobilised.

1 .....

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2 .....

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*(2 marks)*

- (ii) Suggest which curve, **A** or **B**, shows the results from using the immobilised enzyme. Give **one** reason for your answer.

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*(1 mark)*

- S (b) Increased alcohol concentration in the blood causes muscle in arteriole walls to relax. Explain how this causes a reduction in blood pressure.

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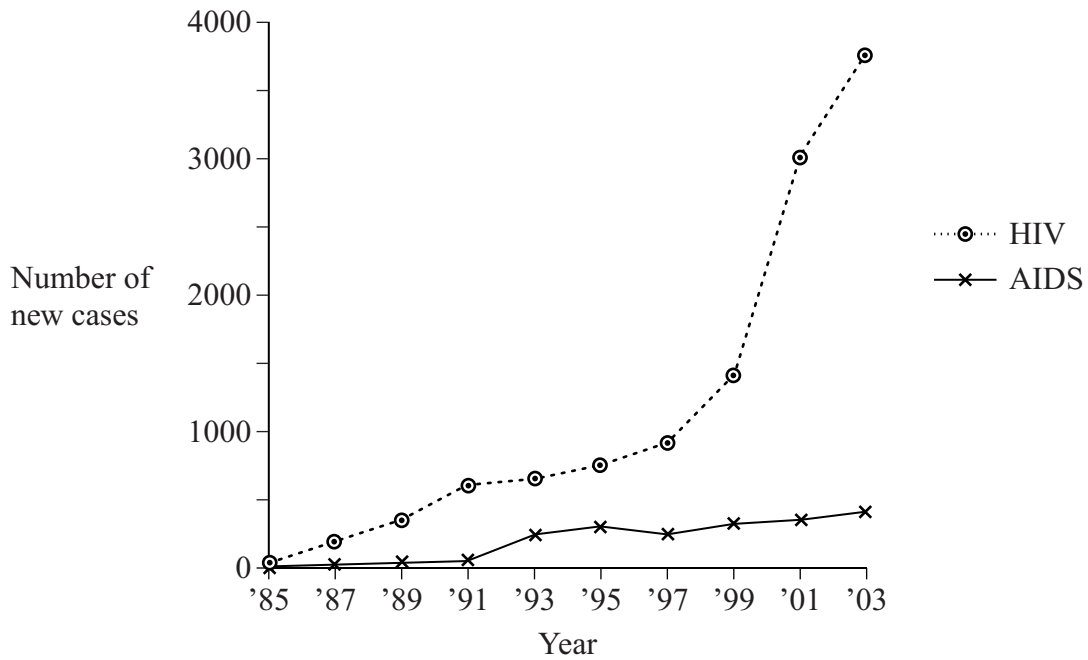
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*(2 marks)*

- 5 (a) Acquired immune deficiency syndrome (AIDS) can develop after infection by the human immunodeficiency virus (HIV). The graph shows the number of people newly infected with HIV and newly diagnosed with AIDS between 1985 and 2003.



- (i) Describe what the graph shows about the number of people newly infected with HIV.

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(1 mark)

- (ii) Explain why the curve for AIDS does not follow the same pattern as the curve for HIV.

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(2 marks)

- (b) Virus particles in a suspension can be counted using an electron microscope, but it is difficult to calculate the volume of the suspension that is visible in a particular field of view. One method of finding the number of virus particles in a suspension is to mix equal volumes of the virus suspension and a suspension containing tiny latex beads at a known concentration. The number of virus particles and beads in a particular field of view are then counted. In one investigation using this method, the latex bead suspension contained  $1 \times 10^8$  beads per  $\text{cm}^3$ . The table shows the results.

Field of view	Number of virus particles	Number of latex beads
1	82	16
2	74	15
3	78	16
4	83	17
5	77	16

Calculate the total number of virus particles present in  $1 \text{ cm}^3$  of the mixture. Show your working.

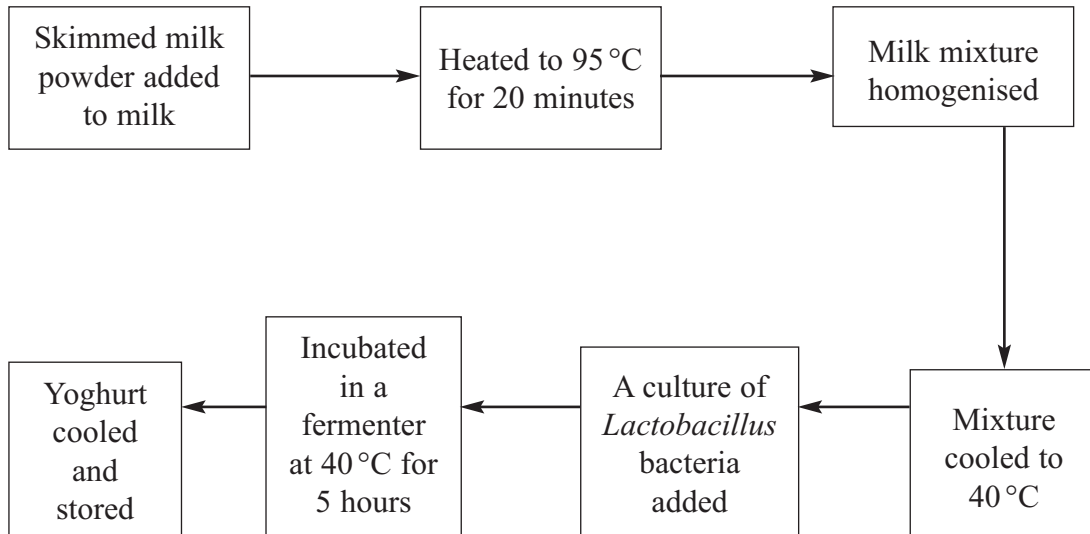
Answer ..... (2 marks)

5
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**Turn over for the next question**

**Turn over** 

6 The flow chart shows the main processes involved in the manufacture of yoghurt.



(a) (i) Explain why the milk mixture is heated to 95 °C for 20 minutes.

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(1 mark)

(ii) During incubation, the fermenter is continuously cooled to maintain a temperature of 40 °C. If it is not cooled the temperature will rise above 40 °C. Explain what causes this increase.

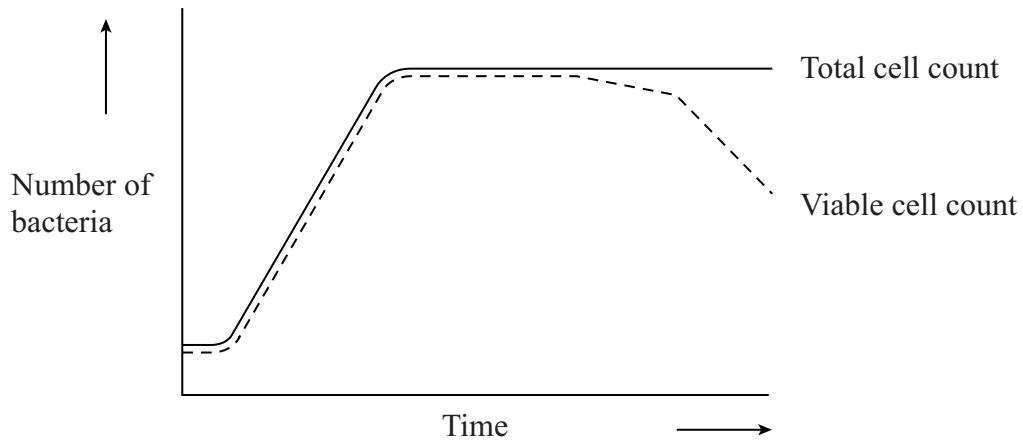
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(1 mark)

S (b) Milk contains lactose, a reducing sugar, which the *Lactobacillus* bacteria use as an energy source. Suggest how you could use Benedict’s solution to measure the concentration of lactose as it changes during the incubation.

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(3 marks)



(c) The graph shows the growth of a bacterial population in a culture at 25 °C.



(i) Explain the difference between the total cell count and the viable cell count.

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(2 marks)

(ii) Describe how the numbers used to construct the curve for the viable cell could have been obtained.

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(4 marks)

7 (a) *Salmonella typhimurium* causes food poisoning in humans but not in other mammals. Explain why these bacteria attach to human cells but not to the cells of other mammals.

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(2 marks)

S (b) *Salmonella* bacteria release toxins that cause the body temperature to rise. Although a small increase in body temperature can be beneficial, a large increase can cause serious harm.

(i) Describe the part played by the brain in detecting and controlling the increase in body temperature.

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(2 marks)

(ii) Explain how a large increase in a person's body temperature can cause harm.

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(2 marks)

S (c) Some species of bacteria, which live in soil and decompose organic material, release exotoxins. Suggest how the release of exotoxins benefits the bacteria.

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*(1 mark)*

(d) Washing hands with anti-bacterial soap reduces the risk of transmission of the bacteria that cause food poisoning. Tea tree oil is a plant extract used in soaps. It is claimed to have anti-bacterial properties. Outline a method for investigating this claim.

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*(4 marks)*

**END OF QUESTIONS**

**SECTION B IS PROVIDED AS AN INSERT**

**There are no questions printed on this page**