UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/23**

Paper 2 Structured Question AS **October/November 2011**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces provided at the top of this page.
Write in dark blue or black ink.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **13** printed pages and **3** blank pages.

1 Fig. 1.1 is an electron micrograph of three cells of the same species of bacterium, *Erwinia carotovora*.

For Examiner's Use

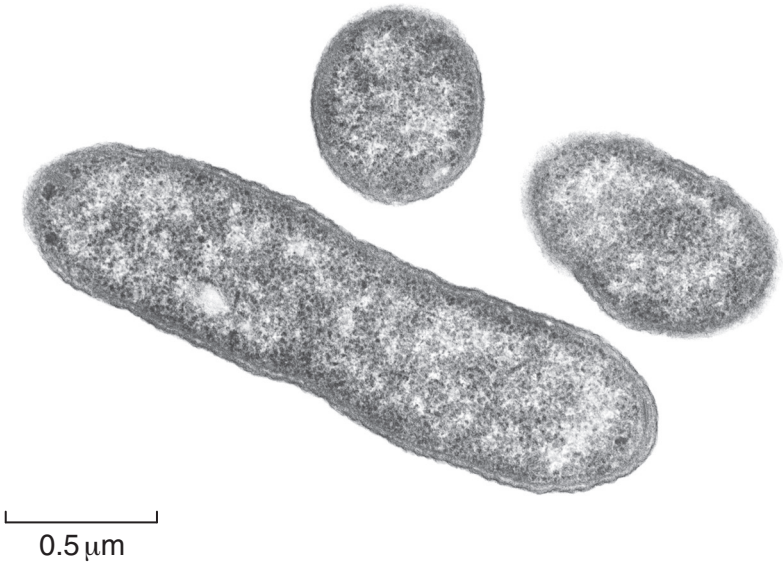

Fig. 1.1

(a) Calculate the magnification of the electron micrograph in Fig. 1.1.

Show your working and give your answer to the nearest 10 000.

magnification × ..... [2]

(b) Name three structures, present in animal cells, which are **not** present in the cells shown in Fig. 1.1.

1. .....

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2. .....

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3. .....

..... [3]

(c) *E. carotovora* is a rod-shaped bacterium.

For Examiner's Use

Explain why two of the bacterial cells in Fig. 1.1 do **not** appear rod-shaped.

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..... [1]

(d) *E. carotovora* causes a disease in carrot and potato plants.

The bacteria release an enzyme called pectinase which hydrolyses the polysaccharide pectin. Pectin helps plant cells to attach to each other.

(i) Name the type of chemical bond which will be hydrolysed by pectinase.

..... [1]

(ii) Suggest what effect this disease will have on vegetables, such as carrots and potatoes.

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..... [2]

[Total: 9]

2 **(a)** Describe the function of each of the following structures in the human heart:

(i) sinoatrial node (SAN)

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..... [2]

(ii) atrioventricular node (AVN)

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..... [2]

(iii) left atrioventricular (bicuspid) valve.

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..... [2]

(b) Fig. 2.1 shows the changes in blood pressure in the left atrium, left ventricle and aorta during one complete cardiac cycle.

For Examiner's Use

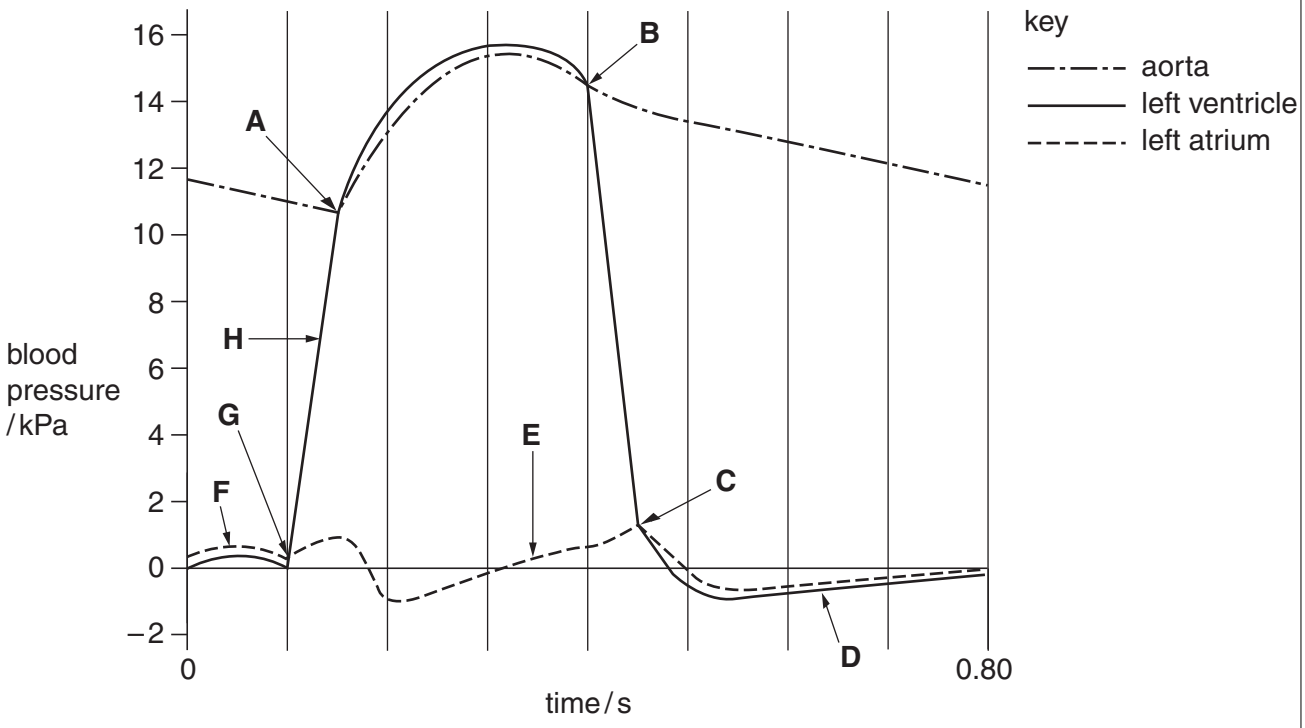

Fig. 2.1

Complete the table below using the appropriate letter, **A** to **H**, to match the points from the graph to the correct statement.

You must only put one letter in each box. You may use each letter once, more than once or not at all.

statement	letter
left atrioventricular (bicuspid) valve starting to open	
left atrioventricular (bicuspid) valve starting to close	
left ventricle starting to contract	
minimum blood remaining in left ventricle	

[4]

[Total: 10]

3 Fig. 3.1 is a photomicrograph of a transverse section through a leaf from a tea plant, *Camellia sinensis*.

For Examiner's Use

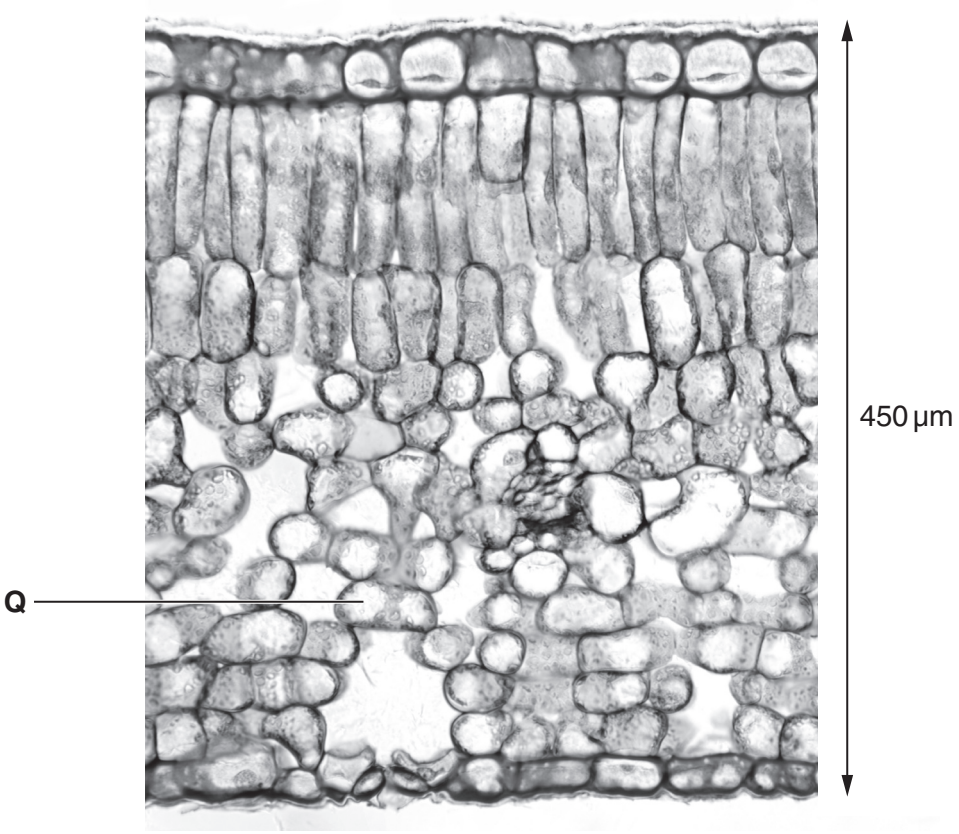

Fig. 3.1

(a) Use label lines and the letters **X**, **Y** and **Z** to label the following features on Fig. 3.1.

X a cell of the upper epidermis

Y a palisade mesophyll cell

Z a guard cell

[3]

(b) Describe **and** explain how water moves from inside the leaf at point **Q** on Fig. 3.1 to the atmosphere outside the leaf during transpiration.

For Examiner's Use

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..... [4]

(c) The leaf of *C. sinensis*, shown in Fig. 3.1, has developed in a sunny position.

State three features of the leaf, **visible in Fig. 3.1**, which show that it has developed in a sunny position.

1. .....

.....

2. .....

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3. .....

..... [3]

[Total: 10]

4 Fig. 4.1 shows a graph of the number of people, worldwide, estimated to be newly infected with the human immunodeficiency virus (HIV) in the years 1990 to 2008.

For Examiner's Use

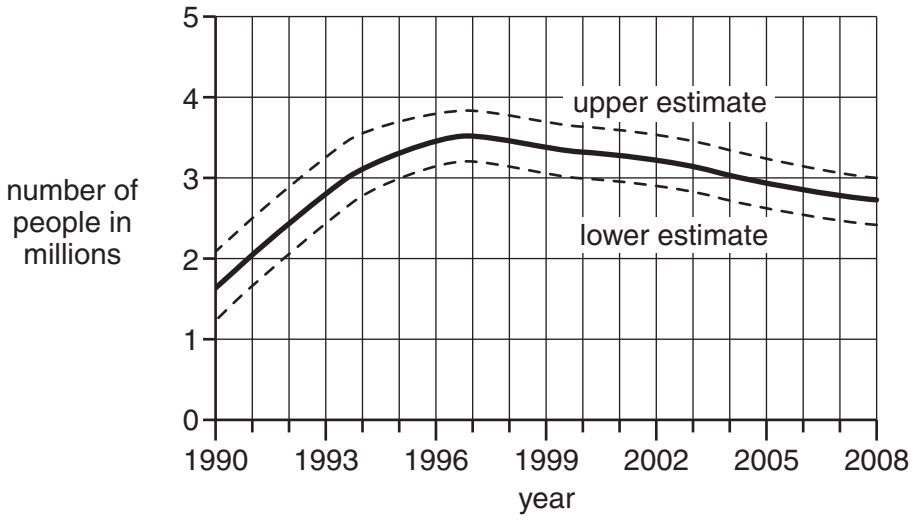

Fig. 4.1

(a) (i) Use the information in Fig. 4.1 to describe the changes in the number of people newly infected with HIV.

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..... [3]

(ii) Suggest possible explanations for the decrease in the number of people newly infected with HIV.

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..... [3]

(b) Explain why it was necessary to include the upper and lower estimates on the graph in Fig. 4.1.

For Examiner's Use

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..... [1]

Fig. 4.2 shows a graph of the total number of estimated deaths due to HIV/AIDS over the same time period as the graph in Fig. 4.1.

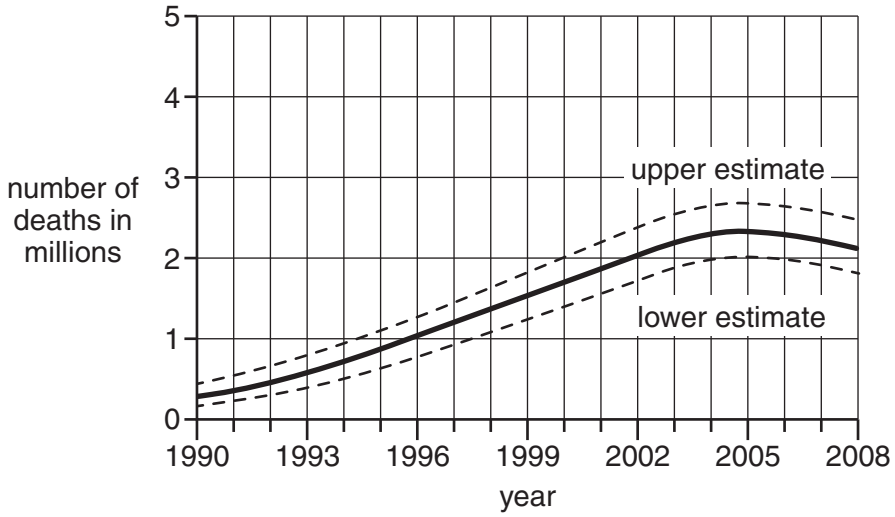

Fig. 4.2

(c) Use the information given in Fig. 4.1 **and** Fig. 4.2 to explain the relationship between new HIV infections and deaths due to HIV/AIDS.

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..... [4]

[Total: 11]

5 Fig. 5.1 represents part of a DNA molecule.

For Examiner's Use

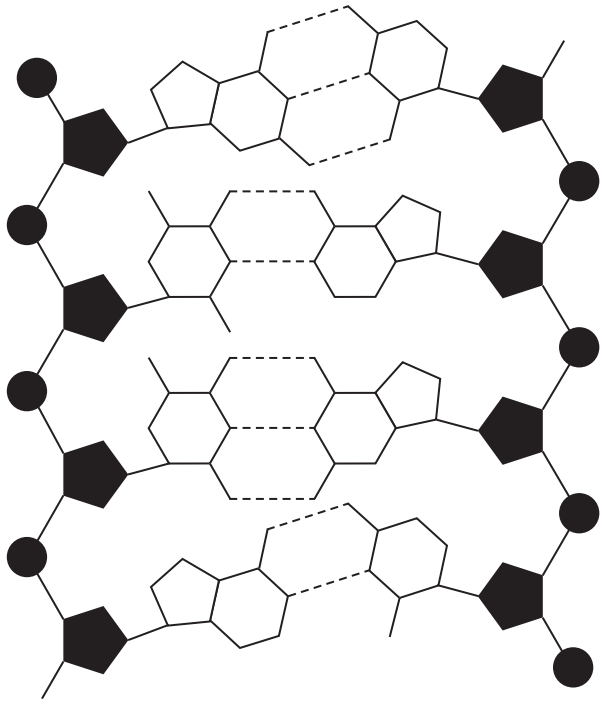

Fig. 5.1

(a) On Fig. 5.1

(i) draw a box around a nucleotide [1]

(ii) label, with the letter **P**, a phosphate group. [1]

(b) Describe how a DNA molecule replicates.

For Examiner's Use

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..... [5]

(c) DNA codes for polypeptides in cells. Transfer RNA (tRNA) is involved in this process.

Describe the role of tRNA in the production of polypeptides in cells.

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..... [3]

[Total: 10]

For Examiner's Use

6 **(a)** State the term for each of the following:

(i) all organisms of the same species living in a defined area at a particular time.

..... [1]

(ii) the interaction of all living organisms with each other and their non-living environment in a self-contained location

..... [1]

(iii) the process of converting nitrate ions in soil to nitrogen gas in the atmosphere.

..... [1]

Mangroves are trees which grow on tropical coastlines in salt water.

Fig. 6.1 shows part of a food chain from a mangrove area.

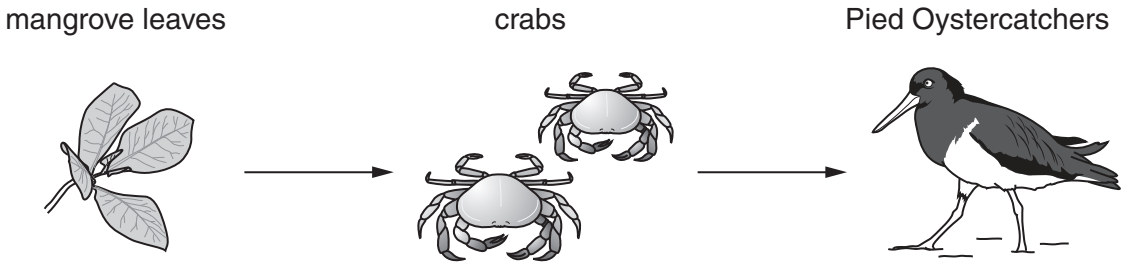

Fig. 6.1

(b) **(i)** Name the trophic level of the Pied Oystercatchers.

..... [1]

(ii) Explain why the energy taken in by the crabs is not all available to the Pied Oystercatchers.

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..... [2]

(c) The crabs in Fig. 6.1 also feed on mangrove leaves that have fallen to the ground. The leaves which are not eaten supply a source of nitrogen for the mangrove trees.

For Examiner's Use

Explain how nitrogen from compounds in the dead leaves is made available to the growing plants.

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..... [4]

[Total: 10]

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