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

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

8210040505

BIOLOGY **9700/02**

Paper 2 Structured Questions AS **October/November 2007**

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 pen.
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 ON 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.

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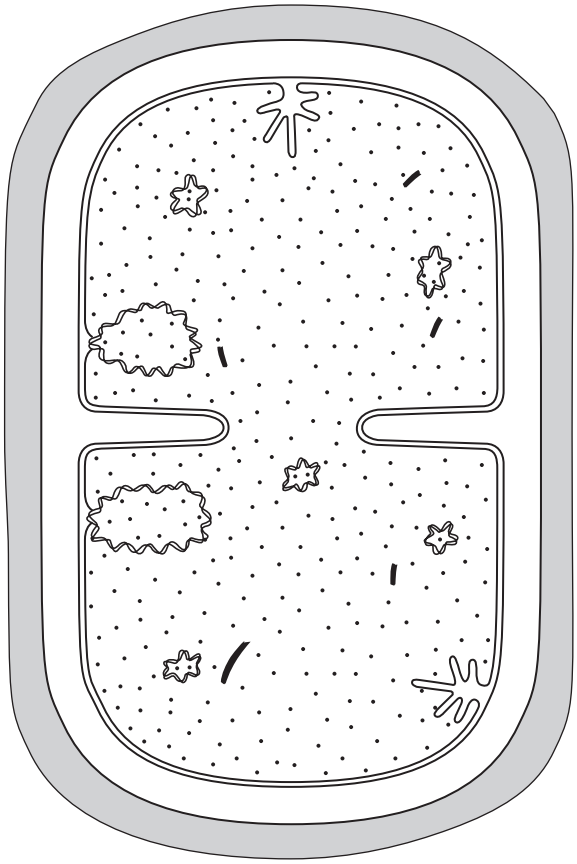
This document consists of **13** printed pages and **3** blank pages.

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Answer **all** the questions.

1 Fig. 1.1 shows a bacterial cell dividing by binary fission.



magnification = x 37 500

Fig. 1.1

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(a) With reference to Fig. 1.1, state three structural features of prokaryotic cells that are **not** shown by eukaryotic cells.

1 .....

2 .....

3 .....[3]

(b) Plant cells divide by mitosis, not by binary fission.

(i) State three roles of mitosis in plants.

1 .....

2 .....

3 .....[3]

(ii) Explain why cells that are produced as a result of mitosis are genetically identical.

.....

.....

.....

.....

.....

.....[3]

[Total: 9]

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2 Scientists have developed a variety of ways to represent the three dimensional structure of proteins. Fig. 2.1 shows one way of representing the structure of the protein, haemoglobin.

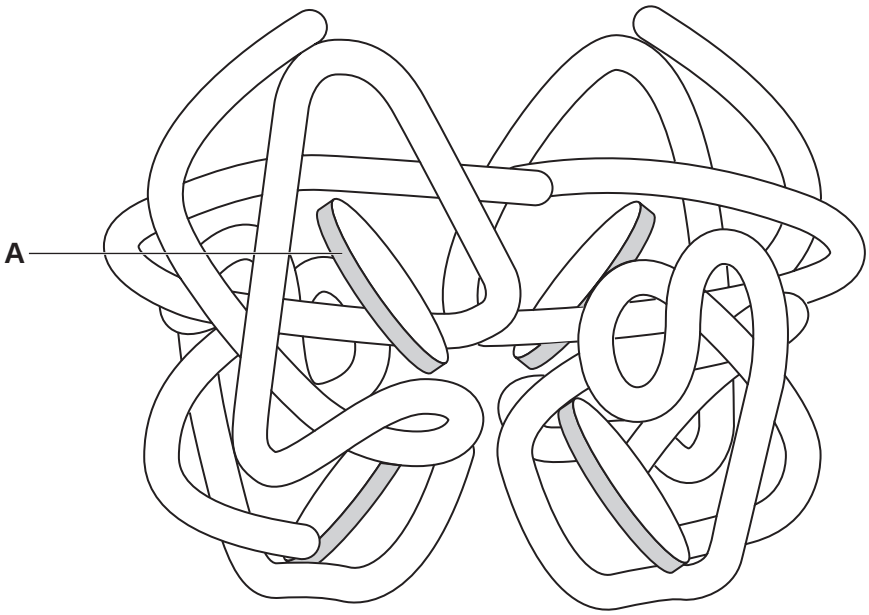


Fig. 2.1

(a) (i) Name **A** and state its role.

name .....

role .....

.....

.....[3]

(ii) With reference to Fig. 2.1, explain why a molecule of haemoglobin is said to show **both** tertiary structure and quaternary structure.

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.....[2]

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Fig. 2.2 shows the oxygen haemoglobin dissociation curve when the partial pressure of carbon dioxide is very low.

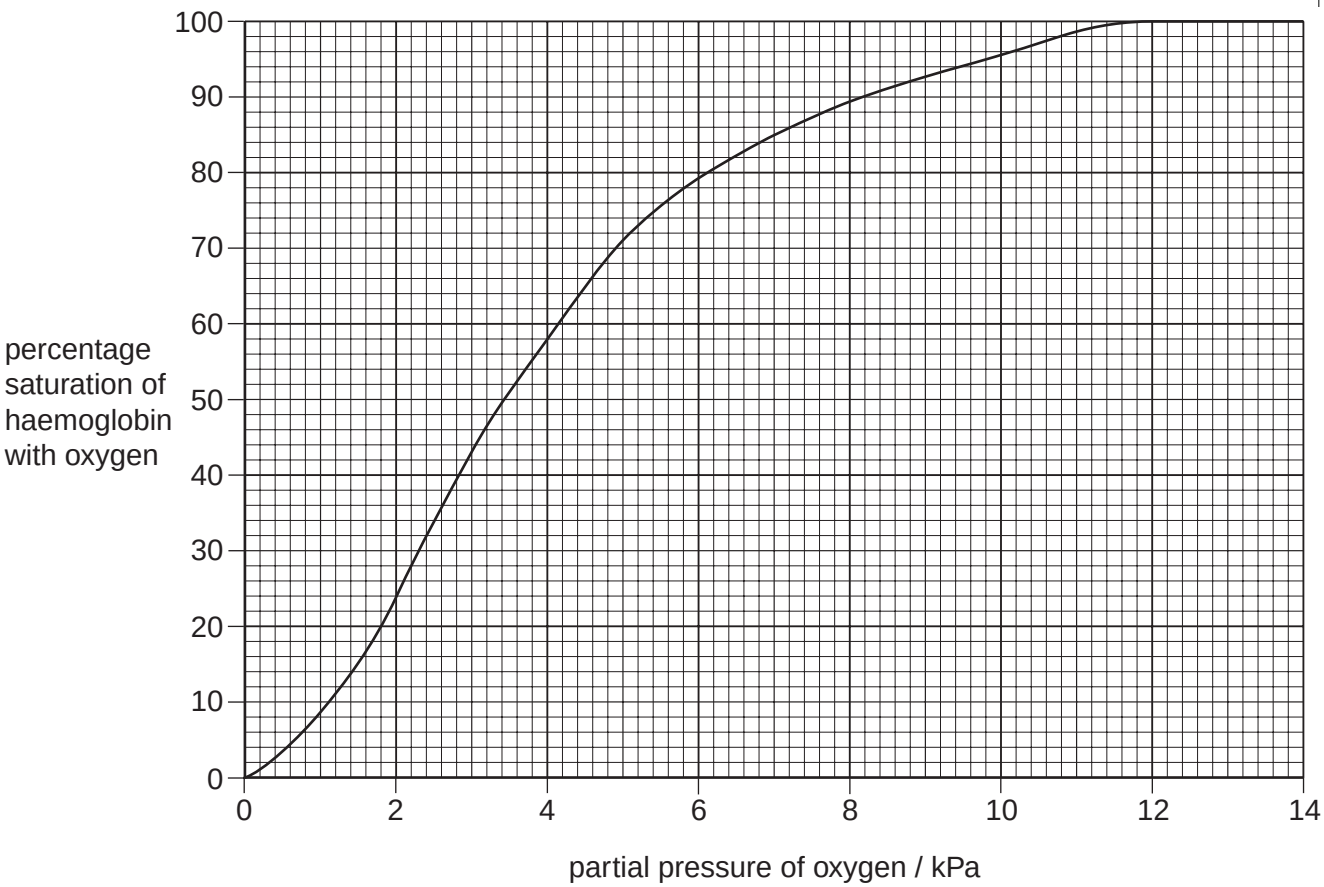


Fig. 2.2

(b) With reference to Fig. 2.2,

(i) state the percentage saturation of haemoglobin with oxygen at

4 kPa ..... %

12 kPa ..... % [2]

(ii) explain how the shape of the curve between 6 kPa and 2 kPa helps in the delivery of oxygen to respiring tissues.

.....

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.....[4]

(c) **Sketch on** Fig. 2.3 below the dissociation curve that you would expect if the concentration of carbon dioxide is increased. [2]

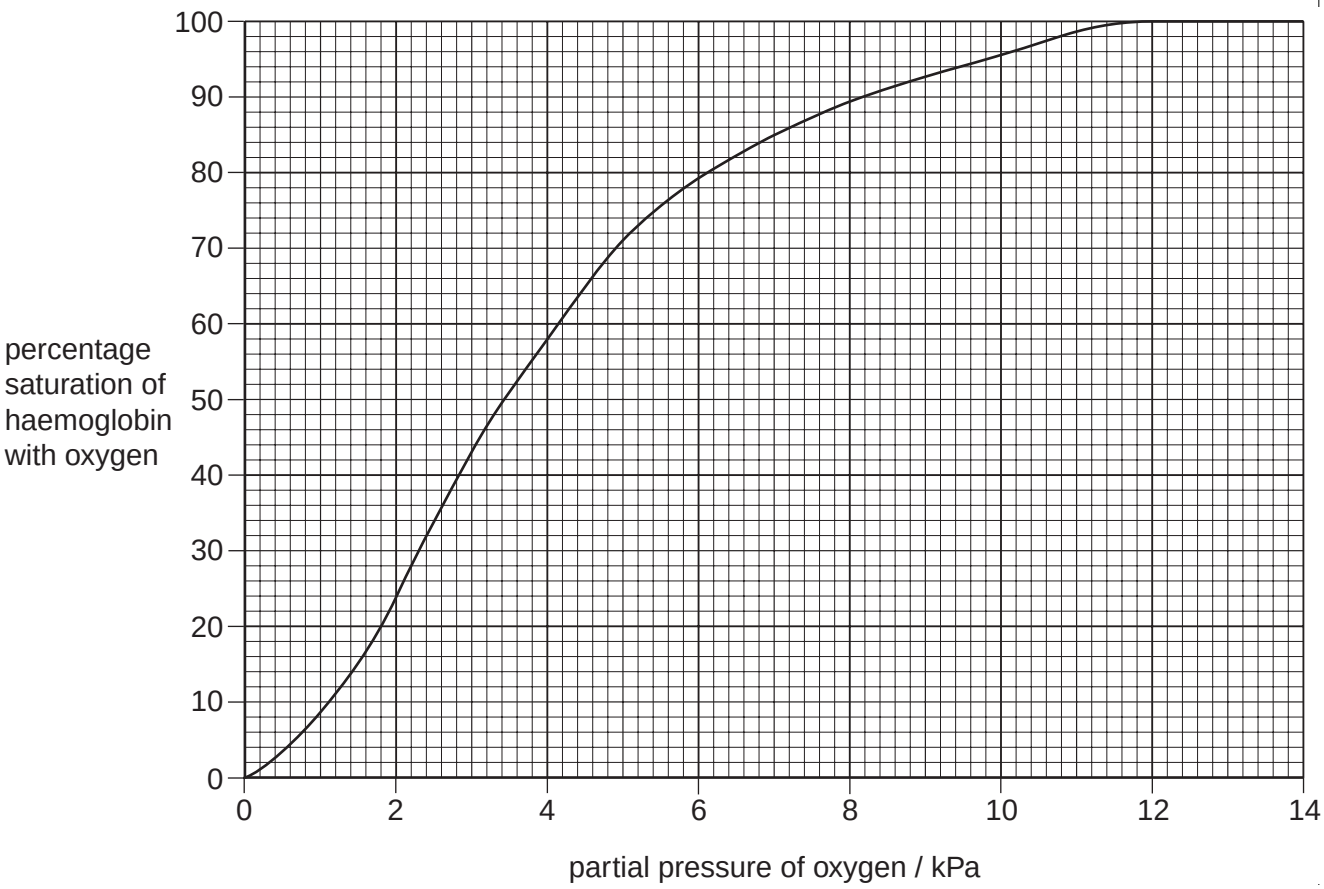
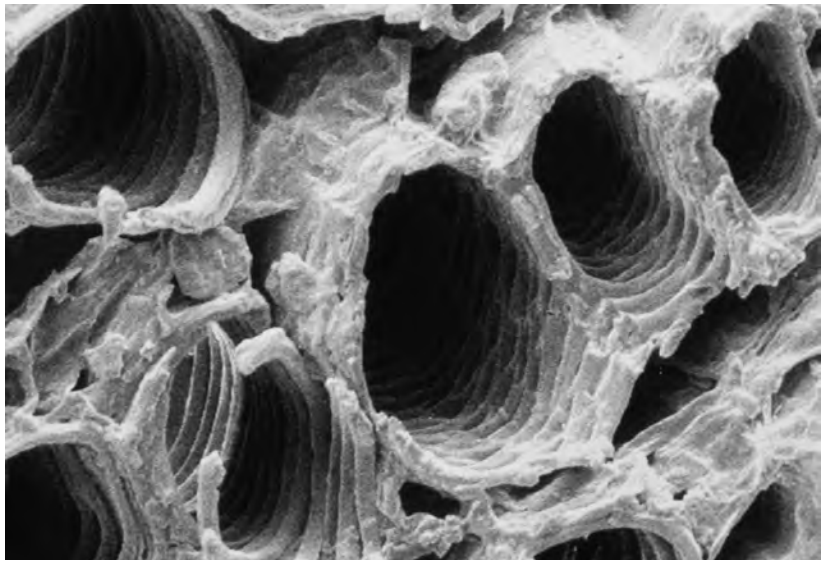


Fig. 2.3

[Total: 13]

3 Fig. 3.1 shows an electron micrograph of some xylem vessels in tobacco leaf fragments in a cigarette.



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Fig. 3.1

(a) (i) Describe **and** explain two features of the xylem vessels, **visible** in Fig. 3.1, that are adaptations for the transport of water in a plant.

feature .....

explanation .....

.....

feature .....

explanation .....

.....[2]

(ii) Explain the mechanisms that cause movement of water in xylem vessels.

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.....[4]

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(b) When tobacco leaf fragments in cigarettes are burnt, substances that are hazardous to health are released.

Name three of these hazardous substances and for each describe **one** effect on the body.

substance .....

effect .....

.....

substance .....

effect .....

.....

substance .....

effect .....

.....[3]

[Total: 9]

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4 Fig. 4.1 shows the changes in blood pressure in the left atrium, left ventricle and aorta during one complete contraction of the heart. It also shows a recording of the electrical activity of the heart.

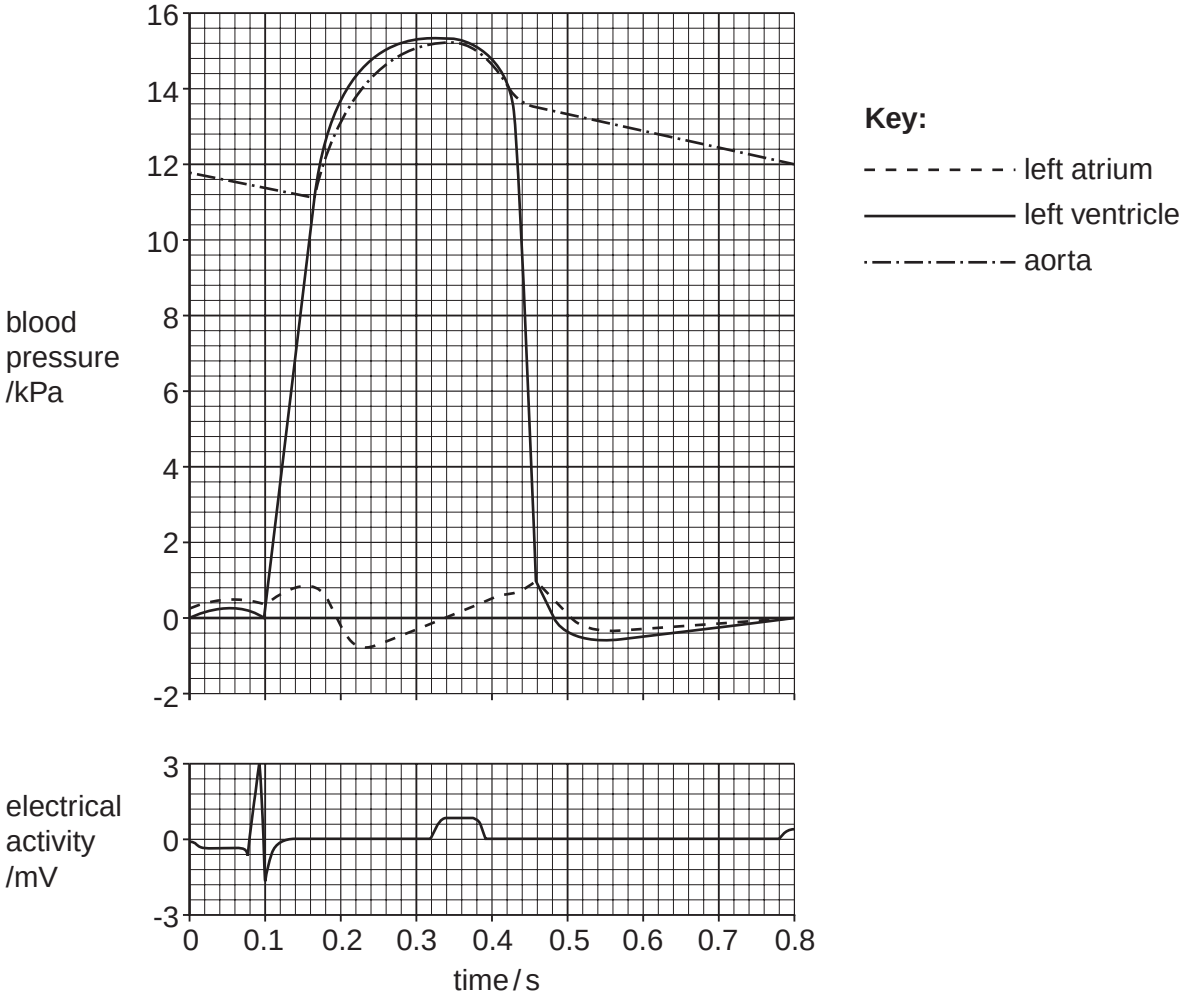


Fig. 4.1

(a) Name the source of the electrical activity in the heart.

.....[1]

(b) Explain how the heart is coordinated so that the ventricle contracts after the atrium has contracted.

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..... [4]

(c) With reference to Fig. 4.1, calculate the heart rate in beats per minute. Show your working and express your answer to the nearest whole number.

Answer = ... beats min^{-1} [2]

(d) The pressure in the **right ventricle** is rarely higher than 4.0 kPa.

Explain why the pressure in the right ventricle is much lower than that in the left ventricle.

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.....

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.....[2]

[Total: 9]

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For Examiner's Use

5 **(a)** **(i)** Name the organism that causes tuberculosis (TB).

.....[1]

(ii) Explain how TB is transmitted from an infected person to an uninfected person.

.....

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.....[2]

The World Health Organisation (WHO) collects data on TB from its six different regions as shown in Table 5.1. In 2003, it used these figures to estimate

- the total number of people with the disease in each region
- the number of deaths from TB.

Many of those who died from TB were also infected with HIV.

Table 5.1

WHO region	number of cases per 100 000 population	number of deaths from TB (including TB deaths in people infected with HIV) per 100 000 population
Africa	345	78
The Americas	43	6
Eastern Mediterranean	122	28
Europe	50	8
South-East Asia	190	38
Western Pacific	112	19

(b) Explain the advantage of expressing the number of cases and the number of deaths as 'per 100 000 population'.

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.....[2]

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(c) Using the information in Table 5.1, outline the reasons why TB has a greater impact on the health of people in some regions rather than others.

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.....[3]

(d) The number of cases of TB decreased considerably in many countries during the 20th century. Over the past 20 years, the number of cases worldwide has increased very steeply. A vaccine against TB has existed since 1921.

Explain why TB has not been eradicated even though a vaccine has existed since 1921.

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.....[3]

[Total: 11]

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[Turn over

6 **(a)** An ecosystem may be as small as a pond or as large as a forest. Some scientists consider that the whole biosphere is an ecosystem.

Give a detailed definition of the term *ecosystem*. You may use **another** example in your answer.

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.....[3]

(b) In 1978, the American ecologist Paul Colinvaux published a book of essays with the title 'Why Big Fierce Animals are Rare'.

Explain why 'big, fierce animals' are rare in ecosystems.

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.....[3]

(c) Many tropical islands have nitrogen-deficient soils. Leguminous trees, such as Royal Poinciana, *Delonix regia*, grow well in such conditions.

Explain why leguminous plants grow well in these conditions.

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.....[3]

[Total: 9]

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