Centre Number	Candidate Number

Candidate Name _____

CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Advanced Subsidiary Level and Advanced Level

BIOLOGY 9700/2

PAPER 2 Structured Questions AS Core

MAY/JUNE SESSION 2002

1 hour

Candidates answer on the question paper.
No additional materials are required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

All working for numerical answers must be shown.

INFORMATION FOR CANDIDATES

The intended 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 question paper consists of 11 printed pages and 1 blank page.

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Local Examinations Syndicate

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For Examiner's Use

Answer **all** the questions.

Write your answers in the spaces provided.

1 Fig. 1.1 shows the life cycle of a species of brown seaweed.

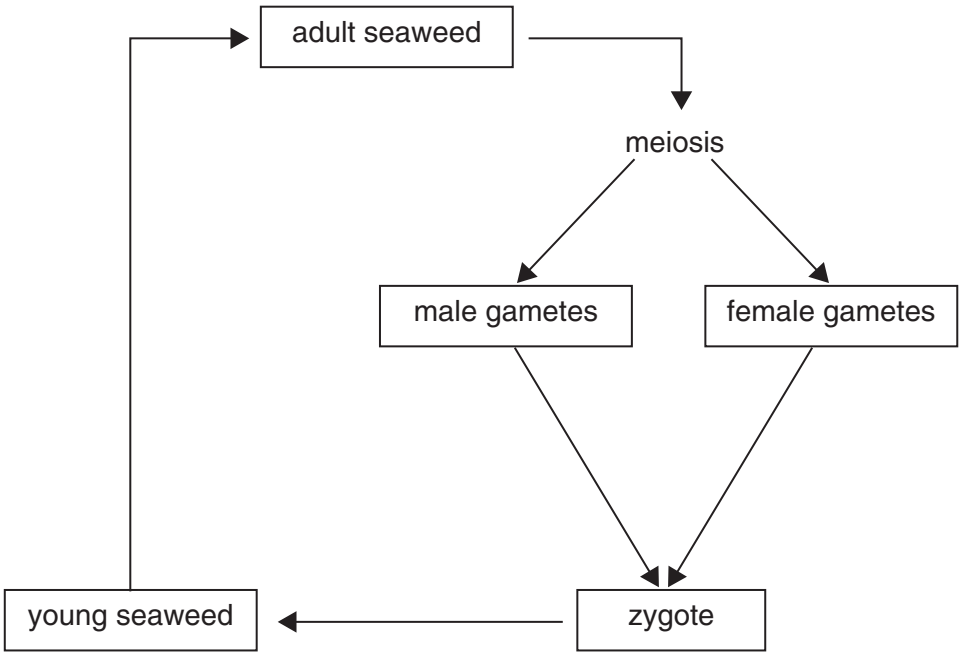


Fig. 1.1

(a) Indicate on Fig. 1.1, with the letter **M**, one stage where mitosis occurs. [1]

(b) DNA replication occurs in cells during interphase before they divide by mitosis.

Explain why it is important that replication occurs before mitosis.

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.....[2]

(c) Explain why DNA replication is described as *semi-conservative*.

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.....[2]

(d) Explain why meiosis occurs in the life cycle of this seaweed.

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.....[3]

[Total : 8]

2 A student investigated the activity of catalase by measuring the release of oxygen from hydrogen peroxide. The reaction occurs as follows.

$$2\ H_2O_2 \longrightarrow 2\ H_2O + O_2$$

The student used a solution of catalase that was mixed with a 5% hydrogen peroxide solution and placed in the apparatus shown in Fig. 2.1. The total volume of gas collected was recorded every 15 seconds. The results are shown in Fig. 2.2.

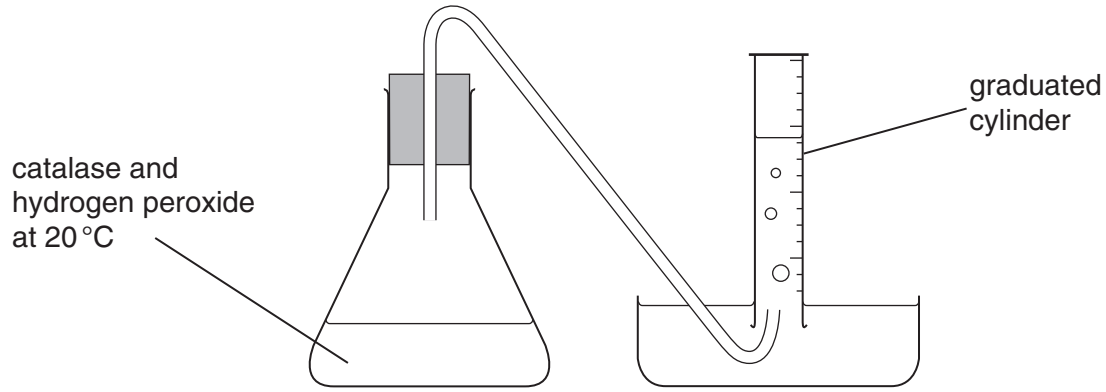


Fig. 2.1

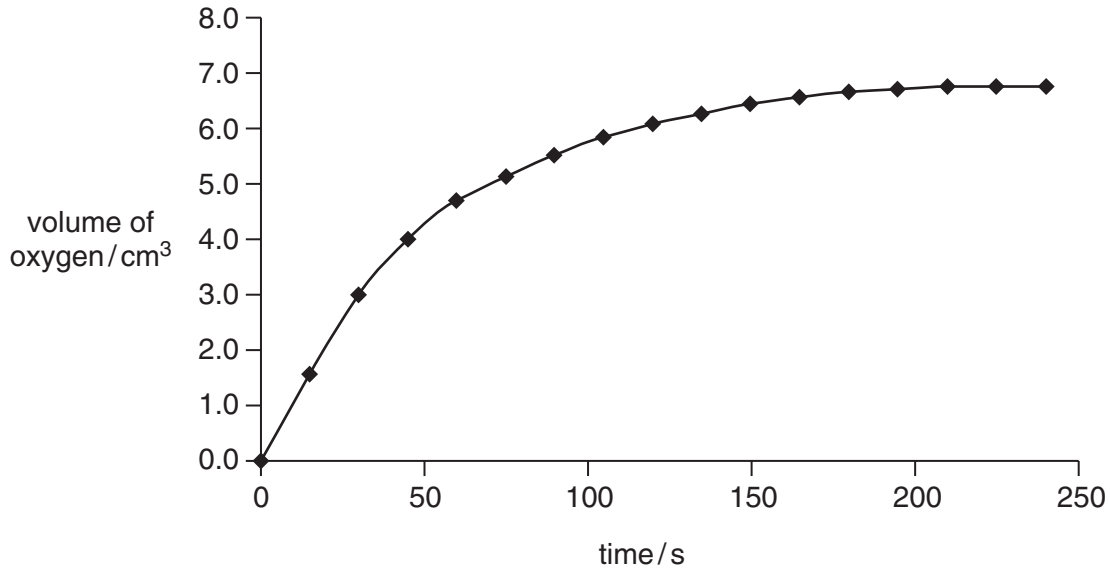


Fig. 2.2

(a) Explain why the total volume of gas collected after 210 seconds remains constant.

.....

.....[1]

Catalase and hydrogen peroxide were kept separately at 10 °C for 30 minutes before they were added together. The reaction mixture was then kept at 10 °C.

(b) Sketch, on Fig. 2.2, the results you would expect when the experiment was repeated at 10 °C. [1]

(c) Describe and explain the results you would expect if the catalase solution was pre-treated by being kept in a water bath at 70 °C before being added to the hydrogen peroxide.

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.....[3]

(d) Explain how you would use this apparatus to investigate the effect of changing the substrate concentration on the activity of catalase.

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.....[4]

[Total : 9]

For Examiner's Use

3 T lymphocytes have protein receptors in their cell surface membranes. These T cell receptors are very similar in structure to antibody molecules. Each type of T cell receptor binds specifically to one type of antigen. Fig. 3.1 shows part of a cell surface membrane of a T cell with an antigen bound to a T cell receptor.

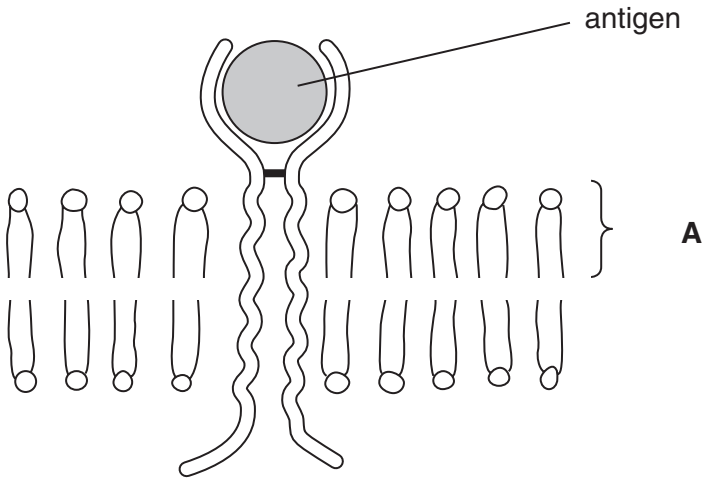


Fig. 3.1

(a) With reference to Fig. 3.1,

(i) name the molecule labelled **A**;

.....[1]

(ii) describe the structure of molecule **A**;

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.....

.....[3]

(iii) explain why membranes are described as *fluid mosaic* in structure.

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.....[2]

(b) Explain, in terms of protein structure, how it is possible for each type of T cell receptor to bind specifically to one type of antigen.

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.....[3]

[Total : 9]

4 Fig. 4.1 shows the left side of the human heart at a particular phase in the cardiac cycle.

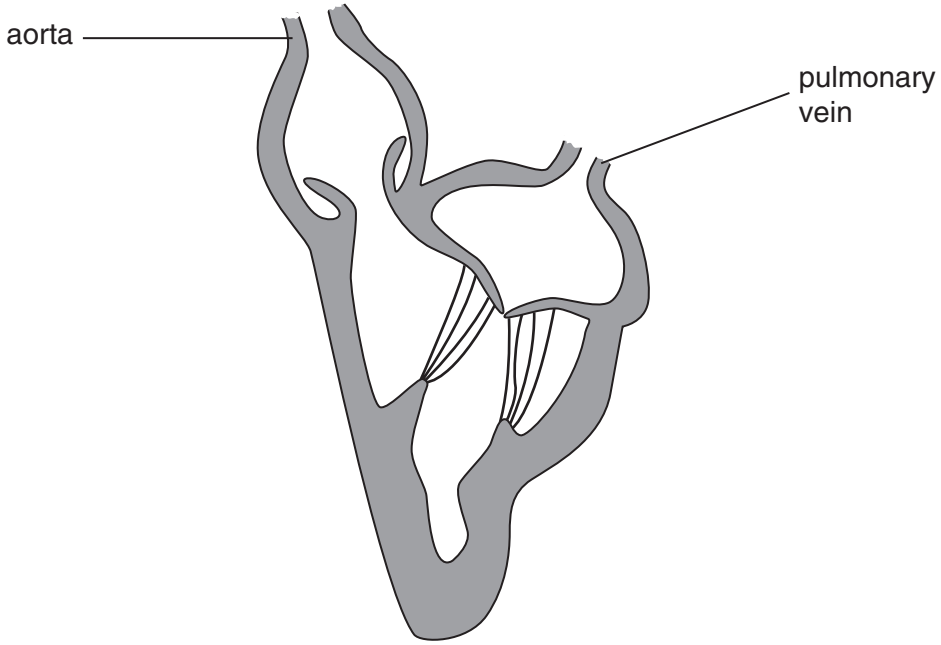


Fig. 4.1

(a) Describe the events occurring in the phase of the cardiac cycle shown in Fig. 4.1.

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.....[2]

(b) Explain how the structure of the heart ensures that blood flows from the pulmonary vein to the aorta and not in the reverse direction.

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.....[3]

(c) Blood pressure is usually measured by placing a cuff over an artery in the arm.

Explain why the blood pressure in the left ventricle falls to zero in the cardiac cycle, but the lowest pressure recorded in the arteries is about 10 kPa.

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.....[3]

(d) Coronary heart disease and stroke are two forms of cardiovascular disease. Smoking is recognised as a contributory factor to these diseases.

Explain how smoking may contribute to the development of cardiovascular diseases, such as coronary heart disease and stroke.

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.....[3]

[Total : 11]

5 People who misuse heroin may become tolerant to the drug and physically dependent on it.

(a) Explain the terms *drug tolerance* and *physical dependence*.

drug tolerance .....

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physical dependence .....

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.....[3]

(b) Alcoholic liver disease develops in some people who consume large quantities of alcohol over a long period of time.

Describe the changes that may occur in the liver in people who consume alcohol over a long period of time.

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.....[4]

[Total : 7]

6 Fig. 6.1 shows part of the nitrogen cycle.

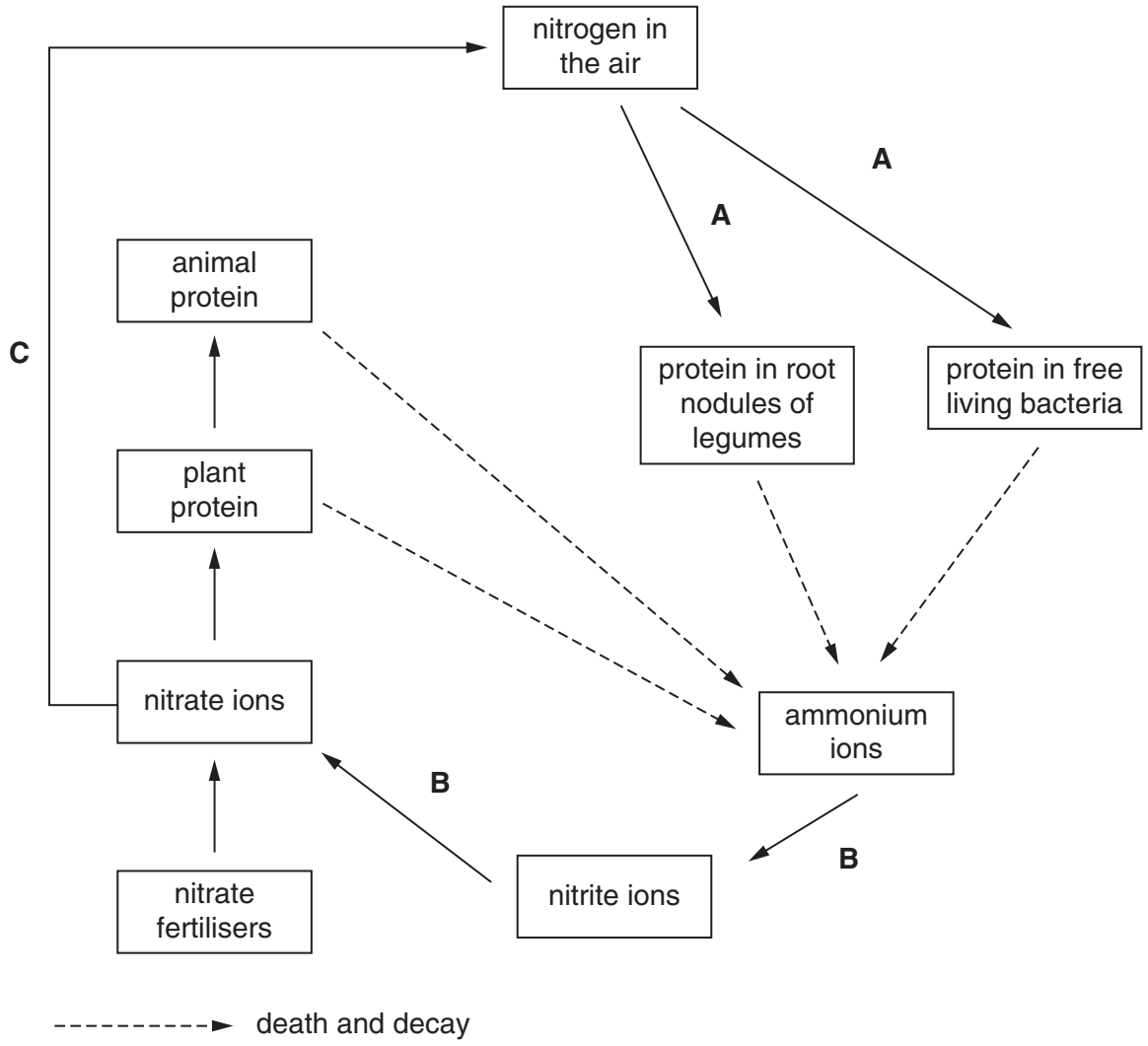


Fig. 6.1

(a) With reference to Fig. 6.1,

(i) name the processes **A** to **C**;

A .....

B .....

C .....[3]

(ii) explain how a farmer may maintain the fertility of soil without using nitrogen fertilisers.

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.....[3]

[Total : 6]

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