

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS****Advanced Subsidiary GCE****BIOLOGY****2802**

Human Health and Disease

Wednesday **16 JANUARY 2002** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Candidate Name	Centre Number	Candidate Number											
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**TIME** 1 hour 30 minutes**INSTRUCTIONS TO CANDIDATES**

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces on the question paper.
- Read each question carefully before starting your answer.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- An insert is provided for Fig. 4.1, question 4.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	9	
2	12	
3	18	
4	12	
5	14	
6	10	
7	15	
<b>TOTAL</b>	<b>90</b>	

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**This question paper consists of 18 printed pages, 2 blank pages and an insert.**

**BLANK PAGE**

Answer **all** the questions.

1 There are several different categories of disease. The table below gives causes of five of these categories.

(a) Complete the table below. Give a different category in each case. One has been done for you.

cause	category of disease
a pathogen	
lack of a nutrient in the diet	
permanent or temporary damage to the body	physical
DNA passed from parents to offspring	
a progressive decline in function of part or parts of the body	

[4]

Chronic bronchitis is a condition suffered by some people who smoke.

(b) (i) State the meaning of the term *chronic*.

.....  
 .....[1]

(ii) State **three** symptoms of chronic bronchitis.

1. ....  
 2. ....  
 3. ....[3]

(c) Smoking-related diseases are sometimes called *social diseases*. Explain why.

.....  
 .....  
 .....[1]

[Total : 9]

2 Stroke and coronary heart disease are both diseases of the cardiovascular system. They involve blood vessels in different parts of the body.

(a) State **two** ways in which strokes differ from coronary heart disease.

- 1. ....
- 2. ....[2]

(b) Describe the effects of carbon monoxide and nicotine on the cardiovascular system.

*carbon monoxide* .....

.....

.....

.....

*nicotine* .....

.....

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.....[4]

Fig.2.1 shows the annual death rates from coronary heart disease (CHD) in men and women in certain countries in the late 1990s.

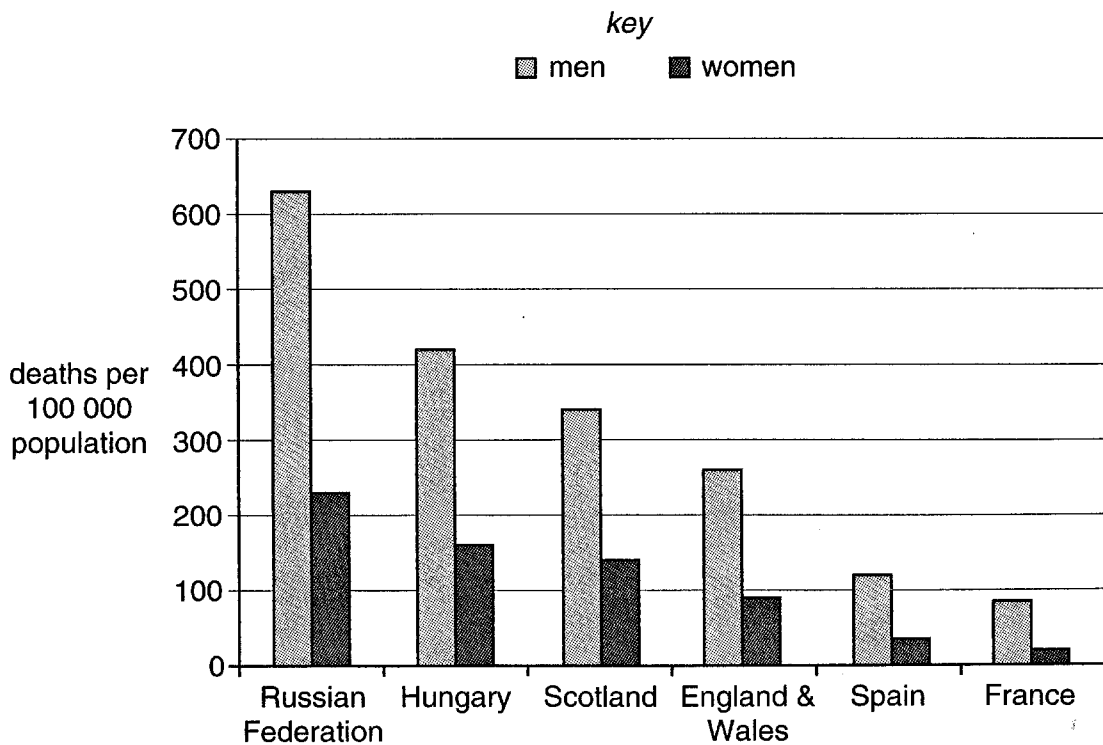


Fig. 2.1

- (c) Use the data from Fig. 2.1 to compare the death rates from CHD in these countries.  
*Credit will be given if you use figures to support your answer.*

.....  
.....  
.....  
.....  
.....[3]

- (d) State the ways in which health authorities could reduce death rates from CHD.

.....  
.....  
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.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

[Total : 12]

3 (a) Complete the following passage about vitamin D.

Vitamin D promotes the strengthening of the skeleton by ensuring a plentiful supply of ..... ions in the blood. Infants and children who are deprived of vitamin D develop the disease called ..... which is associated with weak and deformed bones that cannot support their weight. Some women who have many pregnancies and breast feed their babies may suffer from a softening of bones called ..... Vitamin D is found in some foods, such as ..... However, most of the body's vitamin D is made in the body when the ..... is exposed to .....

[6]

Dietary Reference Values (DRVs) are based on studies of the British population. Table 3.1 shows DRVs for protein for women.

**Table 3.1**

DRV	15–18 years	19–50 years	over 50 years
Estimated Average Requirement (EAR)/g day <sup>-1</sup>	37.1	36.0	37.2
Reference Nutrient Intake (RNI)/g day <sup>-1</sup>	45.4	45.0	46.5

(b) Explain the difference between the Estimated Average Requirement (EAR) and the Reference Nutrient Intake (RNI).

.....  
 .....  
 .....  
 .....  
 .....  
 ..... [2]

(c) State **two** reasons why the protein intake of 19–50 year old women might be greater than the values given in Table 3.1.

- 1. ....
- 2. ....[2]

(d) Explain why women over the age of 50 should maintain a protein intake similar to that of younger women.

- .....
- .....
- .....
- .....[2]

(e) Outline **two** advantages of publishing Dietary Reference Values.

- 1. ....
- .....
- 2. ....
- .....[2]

Children in many developing countries suffer from severe protein energy malnutrition. As a result they show reduced growth and are susceptible to infectious diseases, such as measles.

(f) Explain why young children with protein energy malnutrition are especially susceptible to measles.

- .....
- .....
- .....
- .....
- .....[2]

Supplementary feeding programmes provide such children with a diet rich in carbohydrate but with limited quantities of high quality protein.

(g) Suggest reasons for providing these children with this type of diet.

- .....
- .....
- .....
- .....[2]

[Total : 18]

4 Fig. 4.1 is provided for you on an insert. It shows some cells from part of the epithelium of the gaseous exchange system.

(a) Name the type of cell labelled **M** shown in Fig. 4.1 and state its function.

*name* .....

*function* .....[2]

Four structures found in the gaseous exchange system are listed below.

alveolus, bronchiole, bronchus, trachea

(b) Underline the structures which contain cell type **M**. [1]

(c) State the likely effect of heavy smoking on cell type **M**.

.....  
.....[1]

(d) Name the type of cell labelled **N** in Fig. 4.1.

.....[1]

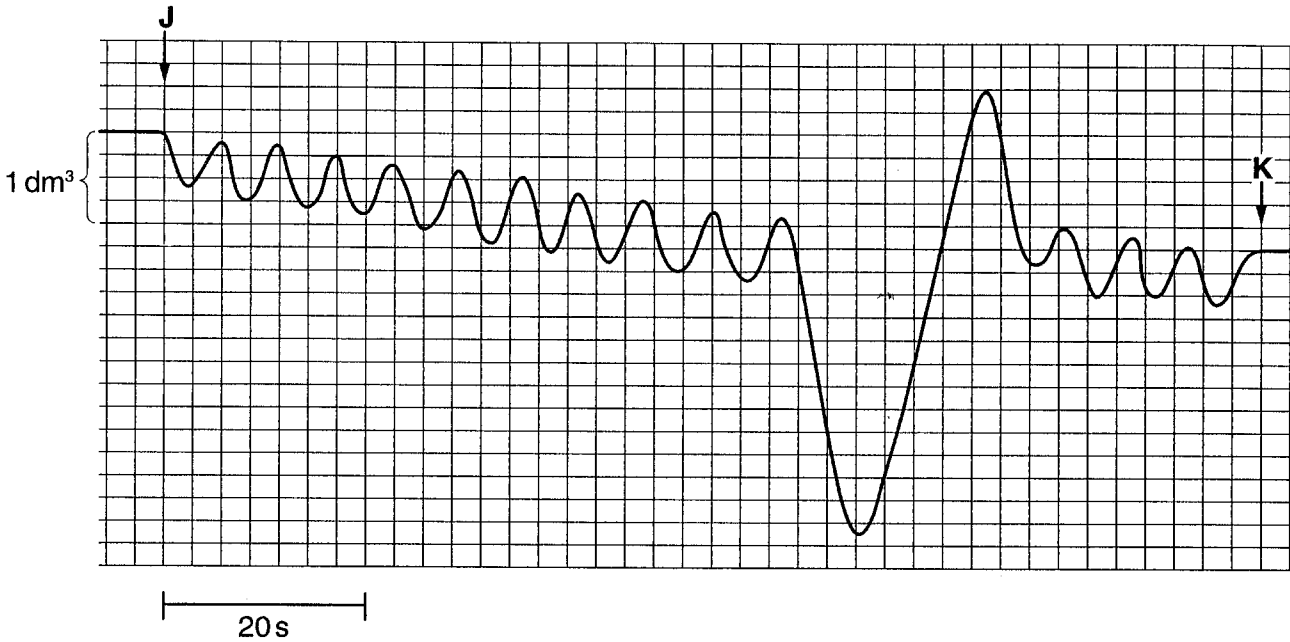
(e) Complete the table below to show the function of each of the following in the gaseous exchange system.

	function
cartilage	
smooth muscle	
elastic fibres	

[3]



A spirometer measures the volumes of gas breathed in and out of the lungs. Fig. 4.2 shows the results obtained from a 17 year old male who was sitting down while breathing in and out of a spirometer.



**Fig. 4.2**

(f) Describe this person's breathing between points **J** and **K** on the spirometer trace.

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.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[4]

[Total: 12]

- 5 Table 5.1 shows some measurements made of the gaseous exchange and cardiovascular systems at rest and at the end of a period of strenuous exercise.

**Table 5.1**

	at rest	at end of strenuous exercise
ventilation rate / $\text{dm}^3 \text{min}^{-1}$	6	90
oxygen consumption / $\text{cm}^3 \text{min}^{-1}$	250	2500
breathing rate / breaths $\text{min}^{-1}$	12	24
cardiac output / $\text{dm}^3 \text{min}^{-1}$	5	25
heart rate / beats $\text{min}^{-1}$	70	190
stroke volume / $\text{cm}^3$	71	132
systolic blood pressure / kPa	15	26

- (a) Explain why the changes shown in Table 5.1 occur during exercise.

*Credit will be given for the use of calculations based on this information to help with your explanation.*

*(In this question, one mark is available for the quality of written communication.)*

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(b) Explain why sprinting or swimming at high speed cannot be sustained for very long.

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.....  
.....  
.....  
.....[3]

(c) Outline **three** advantages to the heart if a person takes regular aerobic exercise.

.....  
.....  
.....  
.....  
.....[3]

[Total : 14]

**Turn to page 14 for Question 6.**

- 6 The following passage is adapted from the World Health Organisation's *World Health Report – 1999*.

**HIV/AIDS control in South-East Asia: the challenge of expanding successful programmes.**

The human immunodeficiency virus (HIV) was slower to emerge in South-East Asia than in other parts of the world, but is now a serious public health problem and a threat to development. The first patient from South-East Asia with AIDS was identified in 1984. Since then a total of 92 391 cases of the disease have been reported in this region up to 1st July 1997. However, because of under-reporting and under-diagnosis the reported cases only reflect a proportion of the true problem. The World Health Organisation estimates that there are currently more than 5.5 million people in South-East Asia who are infected with HIV – 18% of the global total.

- (a) State **three** ways in which HIV is transmitted.

- 1 .....
- 2 .....
- 3 .....[3]

- (b) Explain the **problems** that are encountered by governments, in places such as South-East Asia, in controlling the spread of HIV/AIDS.

*(In this question, one mark is available for the quality of written communication.)*

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.....[7]

[Total : 10]

- 7 Tetanus is a disease caused by a bacterium. When the tetanus bacteria enter the body they release a toxin which causes muscular rigidity and extreme pain. Children in the UK are routinely vaccinated against tetanus at an early age.

Fig. 7.1 is a diagram that shows three B lymphocytes (P, Q and R) and the events that occur during an immune response to the tetanus toxin.

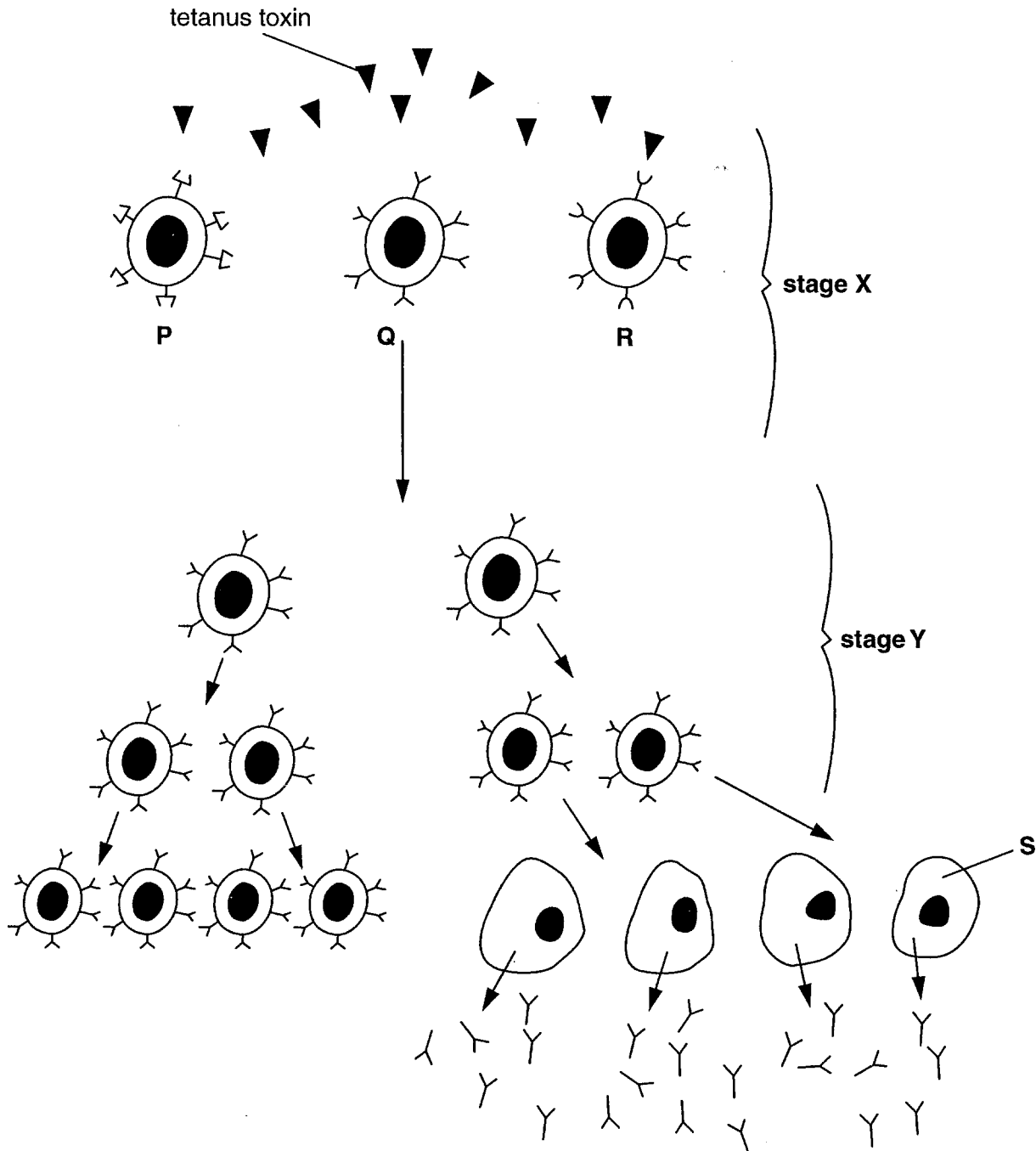


Fig. 7.1



(a) (i) Explain what is happening at stages **X** and **Y** in the immune response to tetanus toxin.

.....  
.....  
.....  
.....  
.....[3]

(ii) Name the cells labelled **S**.

.....[1]

A study investigated active and passive immunity to tetanus toxin. One person, **G**, was injected with the antibodies to tetanus toxin. Another person, **H**, was injected with the vaccine for tetanus and produced antibodies as a result. Blood samples were taken from both people at regular intervals over the following few weeks and analysed for antibodies against tetanus.

The results of the study are shown in Fig. 7.2.

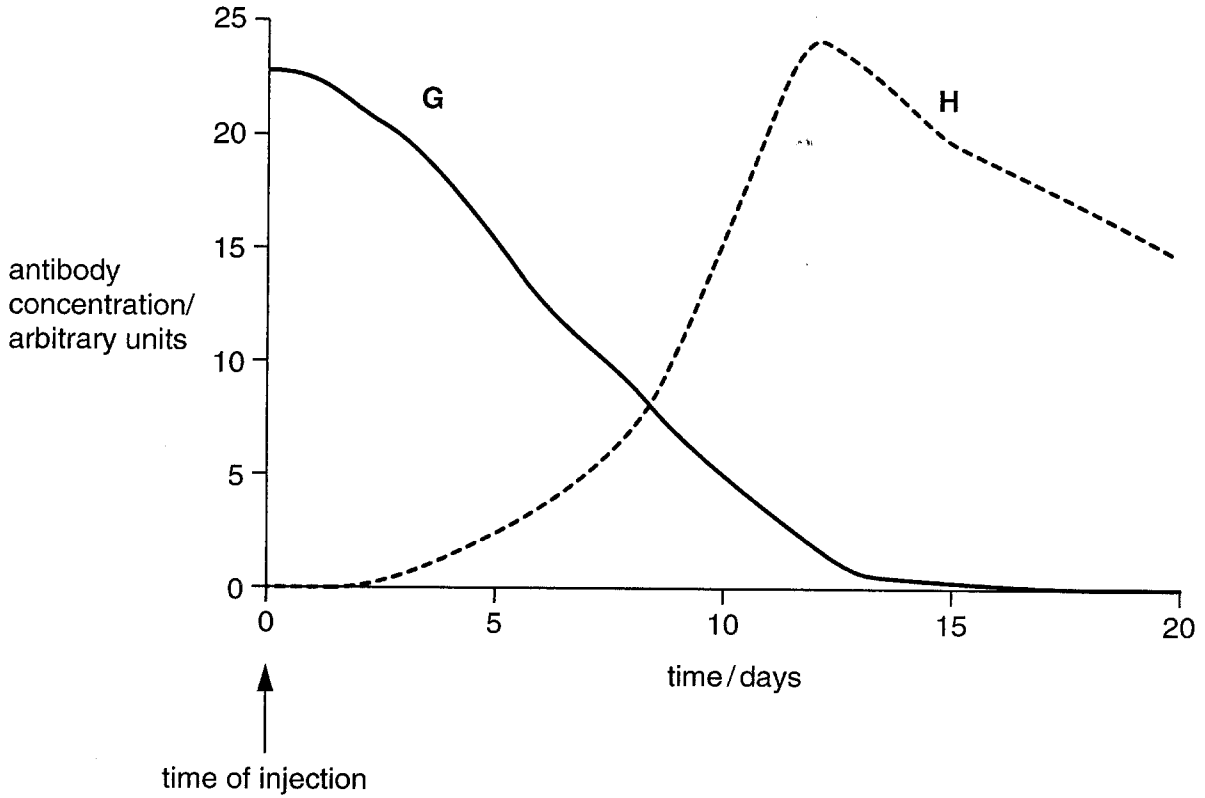


Fig. 7.2

(b) (i) Explain why the type of immunity gained by **G** is described as passive immunity.

.....  
.....  
.....  
.....[2]

(ii) Describe the advantages of receiving passive immunity to diseases, such as tetanus, compared with active immunity.

.....  
.....  
.....  
.....[2]

- (c) Explain why there is a slow increase in antibody concentration in the curve for **H**. You may find it helpful to refer to Figs. 7.1 and 7.2 before you write your answer.

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.....[4]

- (d) Explain why person **H** may not need further vaccinations against tetanus.

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.....[3]

[Total : 15]

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*Copyright Acknowledgements:*

Question 2. Fig. 2.1 © Bar chart data obtained from Heart and Stroke Statistical Update, American Heart Association 2001.

Question 3. Tab. 3.1 © Taken from Table 7.1, page 79 Dietary Reference Values for Food Energy and Nutrients in the United Kingdom. COMA. HMSO. 1991, ISBN-11-321397-2.

Question 4. Fig. 4.1 © Photograph of cell obtained from Science Photo Library.

Question 2. Passage © Box 2.7, page 26. HIV/AIDS control in South-East Asia: the challenge of expanding successful Programmes. World Health Report – 1999. *Making a Difference*. World Health Organisation. ISBN 92-4-156194-7.

OCR has made every effort to trace the copyright holders of items used in this Question paper, but if we have inadvertently overlooked any, we apologise.

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**Advanced Subsidiary GCE**

**BIOLOGY**

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**INSERT**

Wednesday

**16 JANUARY 2002**

Afternoon

1 hour 30 minutes

**INSTRUCTIONS TO CANDIDATES**

This insert contains Fig. 4.1.

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**This insert consists of 2 printed pages.**

**Fig. 4.1 for Question 4**

