

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

BIOLOGY

2802

Human Health and Disease

Monday

10 JANUARY 2005

Morning

1 hour

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number										
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TIME 1 hour

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 provided 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.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	9	
2	8	
3	12	
4	9	
5	12	
6	10	
TOTAL	60	

This question paper consists of 14 printed pages and 2 blank pages.

Answer **all** the questions.

- 1 (a) It is often useful to be able to place diseases into different categories. However, some diseases are not easy to place precisely. Anorexia nervosa can be classed as a social disease.

Name **two** other categories of disease into which anorexia could be placed.

1

2 [2]

The changes in body mass of a female with anorexia were recorded over one year. The results are shown in Fig. 1.1. The ideal body mass of this person was 47 kg.

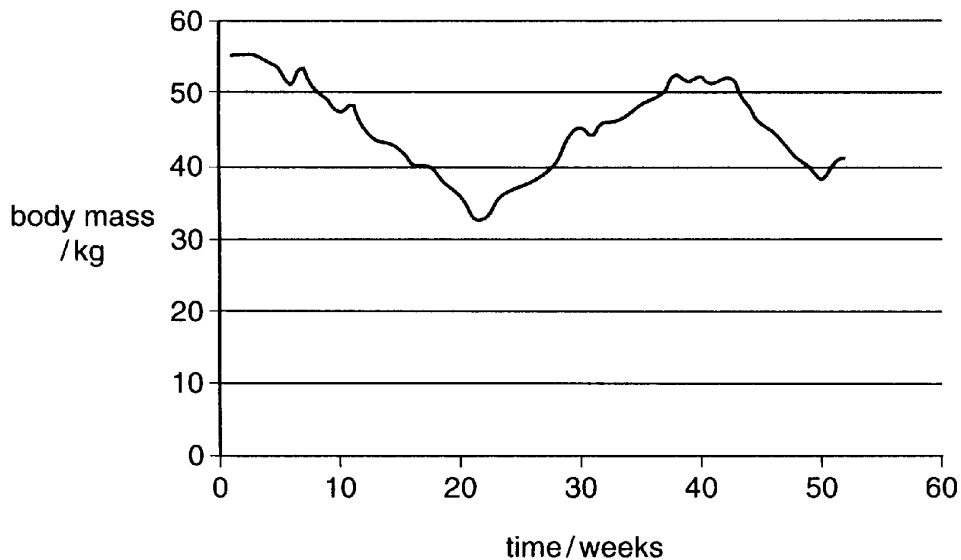


Fig. 1.1

- (b) In female anorexics, the menstrual cycle stops when body mass drops below 85% of the ideal body mass.
- (i) Using the information above, calculate 85% of this person's ideal body mass. Show your working. Express your answer to the nearest whole number.

Answer = kg [2]

- (ii) Using the letter **X**, mark a point on the curve in Fig. 1.1 at which the menstrual cycle would be expected to stop. [1]

- (c) Describe the signs and symptoms of anorexia, **other than** loss of weight and disruption of the menstrual cycle.

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..... [4]

[Total: 9]

2 Fig. 2.1 shows the transmission cycle of the single-celled organism that causes malaria.

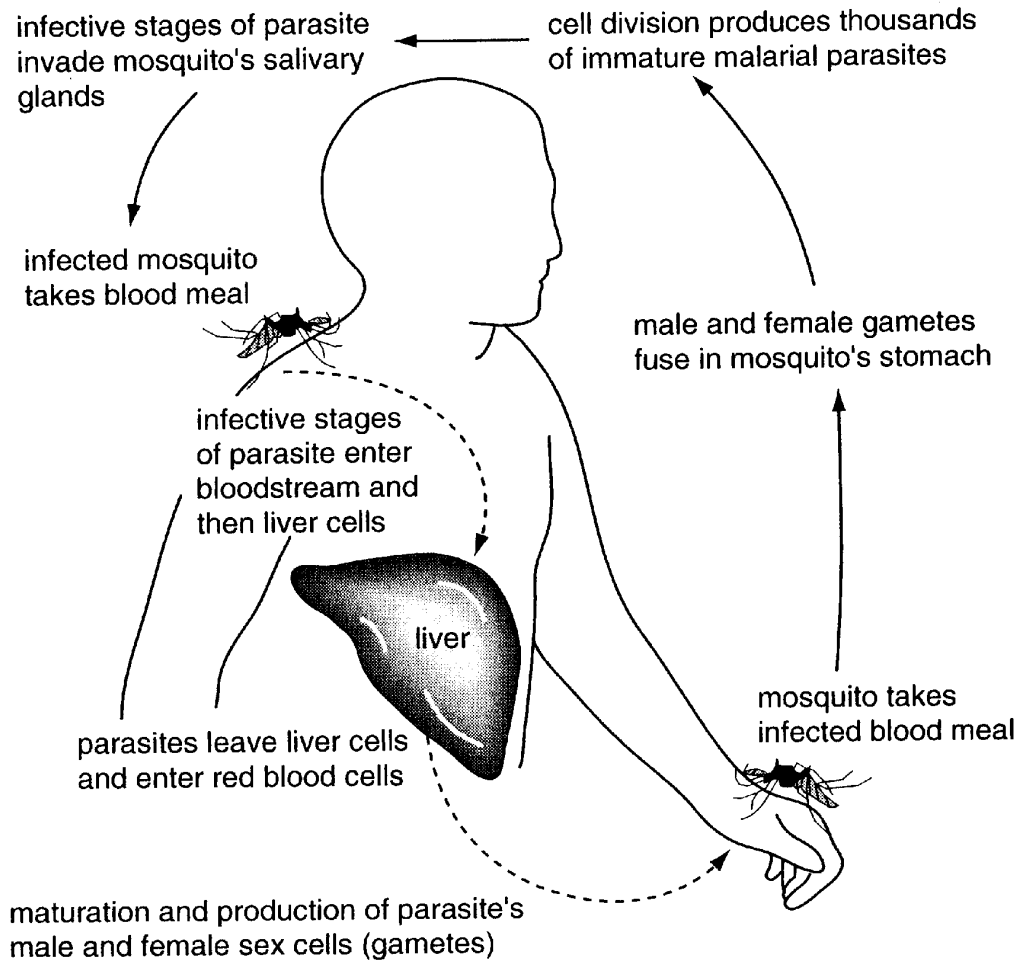


Fig. 2.1

- (a) Use your knowledge and the information shown in Fig. 2.1 to complete the passage below.

Malaria is caused by a single-celled organism called The organism is transmitted from one person to another by female mosquitoes. A mosquito takes up the gametes of the malarial parasite when it feeds on the blood of an person. Fertilisation occurs in the mosquito's stomach and the immature parasites reproduce. Infective stages of the parasite migrate to the mosquito's salivary glands. A new person becomes infected when the mosquito takes another meal of The parasites enter the liver of the new victim where further reproduction takes place before migrating to the red blood cells. When an organism, such as the mosquito, is involved in transmission it is called a The malarial parasite can also be transmitted by [6]

- (b) Describe **two** ways in which the transmission cycle of malaria can be disrupted.

1
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2
..... [2]

[Total: 8]

- 3 Fig. 3.1 is an X-ray photograph taken of the legs of a young child with a deficiency of vitamin D.

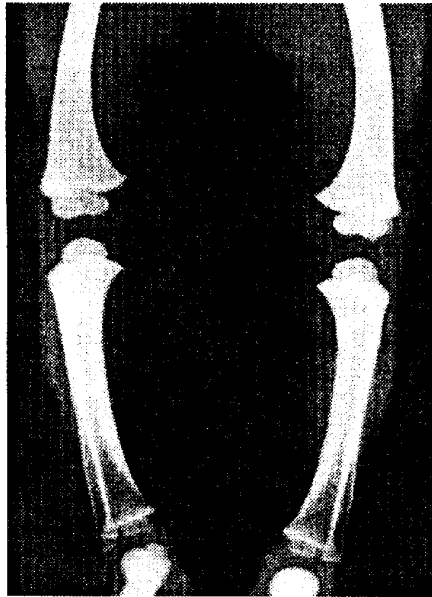


Fig. 3.1

- (a) Name the deficiency disease which this child has.

..... [1]

- (b) The effects of this disease may be reduced by improving the diet or giving supplements of vitamin D or calcium.

State **one other** way in which the effects of this disease may be reduced.

..... [1]

- (c) The reference nutrient intake (RNI) for calcium is 450 mg per day.

- (i) What is meant by the term *reference nutrient intake*?

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

- (ii) State **two** functions of calcium in the body.

1

2 [2]

(d) In a 24 week study of a large sample of children with this disease in Nigeria, various treatments were carried out. The sample was divided into three groups. The groups were treated as follows:

- group 1 was given intramuscular injections of vitamin D and placebo glucose tablets
- group 2 was given calcium tablets and placebo injections of sterile water
- group 3 was given both vitamin D injections and calcium tablets.

An extra group of healthy children was included as a control (group 4).

A placebo is a treatment that is expected to have no effect, such as the injections of sterile water in group 2 or the glucose tablets in group 1. Doctors took blood samples and measured the concentration of calcium ions before and after the treatment. They also took X-rays to look for signs of healing in the bones.

The results are shown in Table 3.1.

Table 3.1

	group			
	1	2	3	4
	vitamin D injections + placebo (glucose) tablets	placebo (sterile water) injections + calcium tablets	vitamin D injections + calcium tablets	control group of healthy children
average dietary calcium intake / mg day^{-1}	200	200	200	greater than 450
mean calcium ion concentration in blood before treatment / mg dm^{-3}	77	77	77	90
mean calcium ion concentration in blood after treatment / mg dm^{-3}	83	90	90	90
% children showing some healing in X-rays after 24 weeks	83	86	93	—
% children showing complete healing in X-rays after 24 weeks	19	61	58	—

- (i) The doctors concluded that the children in group 2 gained more benefit from their treatment than the children in group 1.

Describe the evidence in Table 3.1 that supports their conclusion.

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..... [3]

- (ii) Explain why the children in group 1 were given placebo tablets with their vitamin D injections.

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- (iii) Explain why group 4 was included in the study.

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..... [2]

[Total: 12]

4 Various substances in the tar from tobacco smoke have been identified as carcinogens; the most potent of these is benzpyrene. Tumours in the lungs can take many years to develop. Tumours are often malignant.

(a) State the meaning of the terms *carcinogen* and *malignant*.

carcinogen

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malignant

..... [2]

(b) Outline how substances such as benzpyrene affect the cells in the lungs.

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..... [3]

(c) State **two** symptoms which could alert someone to the possibility that they may have lung cancer.

symptom 1

.....

symptom 2

..... [2]

(d) Describe how tumours in the lungs are discovered and located.

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..... [2]

[Total: 9]

5 Fig. 5.1 is a drawing of a transverse section of part of a bronchiole from a healthy lung.

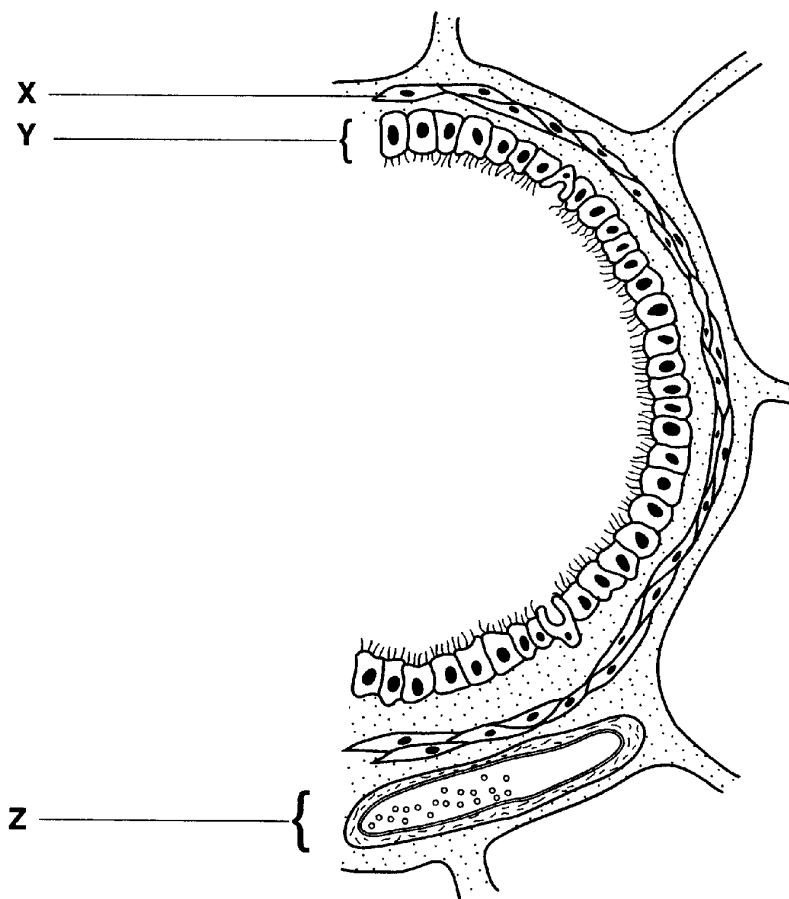


Fig. 5.1

(a) (i) Name tissues X and Y.

X

Y [2]

(ii) Identify structure Z.

Z [1]

6 Severe Acute Respiratory Syndrome (SARS) is a severe form of viral pneumonia. The disease was first described in China in November 2002. Within six weeks, 29 countries were affected. The number of cases in China was considered to be of epidemic proportions. The World Health Organisation called SARS 'the first worldwide epidemic of the twenty-first century'.

(a) State the meaning of the term *epidemic*.

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

(b) State the term used to describe a 'worldwide epidemic'.

..... [1]

(c) Vaccination can provide protection against many diseases by inducing artificial active immunity.

(i) What is meant by the word **artificial** in the term *artificial active immunity*?

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..... [1]

(ii) Describe how an effective vaccine can produce **active immunity** to a disease.

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(iii) In 2003, scientists started working to produce a vaccine for SARS.

Explain how vaccination may be used as part of an eradication programme for diseases such as SARS.

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..... [3]

[Total: 10]

END OF QUESTION PAPER