OCR

RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

BIOLOGY   **2802**

Human Health and Disease

Thursday   **8 JANUARY 2004**   Morning   1 hour

Candidates answer on the question paper.
Additional materials:
    Electronic calculator
    Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number

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	5	
2	11	
3	12	
4	10	
5	13	
6	9	
TOTAL	60	

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

[Turn over

Answer **all** the questions.

1 The table below gives information about four categories of disease or illness.

Complete the table.

category of disease or illness	definition	example
....	inadequate quantity of a nutrient in the diet	....
non-infectious	....	lung cancer
mental	....	schizophrenia
inherited	....	cystic fibrosis

[5]

[Total: 5]

[Turn over

4

2 Fats in the diet provide the two essential fatty acids, linoleic acid and linolenic acid.

(a) Give **one** reason why these two fatty acids must be present in the diet.

....

....[1]

A 25 year old woman is concerned that she may be eating too much saturated fat.

She discovers that there are Dietary Reference Values (DRVs) for fats. These include:

- total fat in the diet should not be greater than 35% of the total energy intake per day

- of this no more than 10% should be saturated fat.

She calculates that her total energy intake should be 8 830 kJ per day.

Each gram of fat provides 37 kJ.

(b) Calculate the maximum mass of fat in grams that the woman could consume if she is not to exceed the DRV for **total fat** in the diet.

Show your working and express your answer to the nearest whole number.

Answer .... g [2]

(c) Explain the reasons for limiting the quantity of fat in the diet.

....

....

....

....

....

....

....

....[4]

The woman decided to find out whether it is healthier to eat meat or fish. She compared the composition of mackerel (fish) and stewing steak (meat).

Some of the information that she found is summarised in Table 2.1.

Table 2.1

nutrient	mass per 100 g	
	mackerel (fish)	stewing steak (meat)
protein / g	18.7	30.9
vitamin A / µg	45.0	0.0
vitamin D / µg	25.0	0.0
calcium / mg	11.0	15.0
iron / mg	0.8	3.0

(d) Explain, using the data in Table 2.1, the **advantages** and **disadvantages** for the health of the young woman of including mackerel in her diet instead of stewing steak.

....

....

....

....

....

....

....

....

....[4]

[Total: 11]

[Turn over

3 To be of greatest benefit, aerobic exercise needs to increase the heart rate into the 'training zone', which is between 65% and 85% of a person's **maximum** heart rate.

(a) Suggest why people are advised **not** to train beyond 85% of their maximum heart rate.

....

....

....[1]

Two 17 year old males, **R** and **S**, exercised on a treadmill which was set at different speeds. Their heart rates and blood lactate concentrations were measured immediately they had finished running at each of the speeds tested. After each test they rested and then continued at a higher speed. This continued until they were not able to run any faster.

One 17 year old, **R**, was a very fit long distance runner. **S** did not take very much exercise at all. The results of the investigation are shown in Figs. 3.1**A** and **B**.
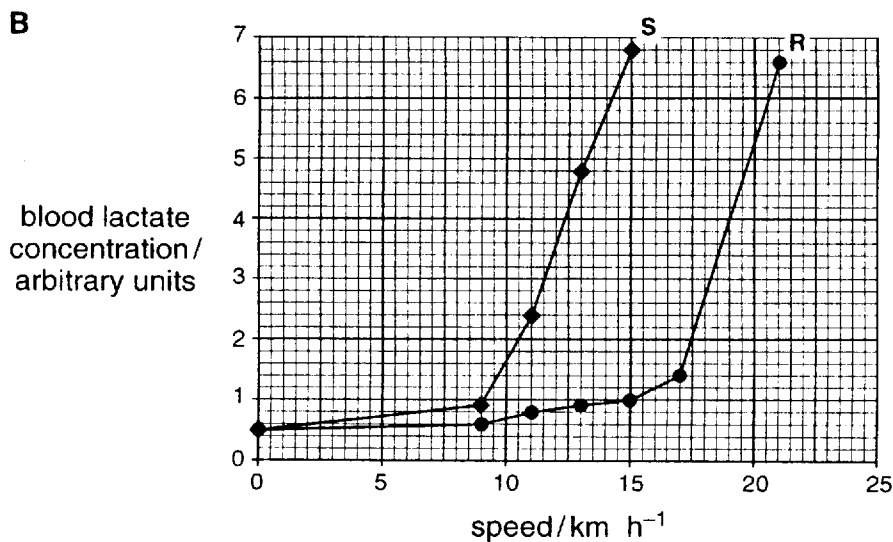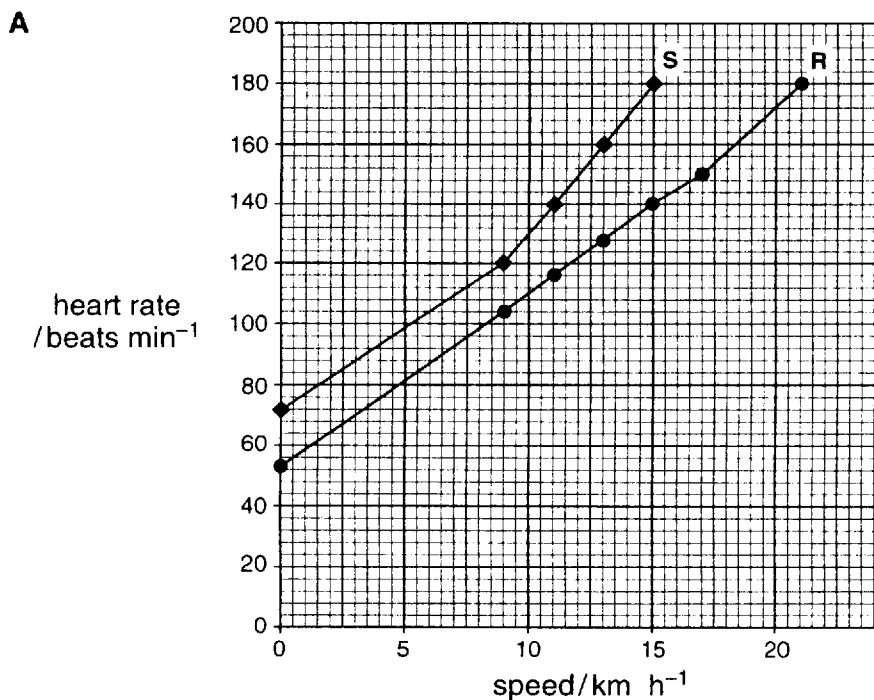

Fig. 3.1

The maximum heart rate is calculated by subtracting a person's age from 220. The 'training zone' for a 17 year old male is between 132 and 173 beats per minute.

(b) State the **lowest** speeds on the treadmill that achieve heart rates in the training zones for **R** and **S**.

R .... $km\,h^{-1}$

S .... $km\,h^{-1}$ [1]

(c) Describe the evidence from Fig. 3.1 which shows that **S** has a **lower** level of aerobic fitness than **R**.

....

....

....

....

....

....

....[4]

(d) Both **R** and **S** used more oxygen as the speed of the treadmill increased.

Outline the changes that occur in the **gas exchange system** during exercise to increase the uptake of oxygen.

....

....

....

....

....[3]

(e) Suggest a training programme that **S** could follow to improve his aerobic fitness.

....

....

....

....

....

....[3]

[Total: 12]

[Turn over

8

4   Most children have antibodies to measles in their bloodstream at birth, giving them a natural immunity. The concentration of these antibodies decreases quite quickly after birth. Between the ages of about 6 to 12 months the concentration is low enough to make children susceptible to measles.

(a) **(i)**   State the term given to the type of natural immunity described above.

....[1]

(ii)   State how antibodies to measles come to be present in children **at birth**.

....

....[1]

A two year old child, who had **not** been vaccinated against measles, became infected with the disease. The concentration of antibodies specific to measles was measured in samples of blood taken at intervals of time for the following ten years. The results for the first eight weeks of this study are shown in Fig. 4.1.
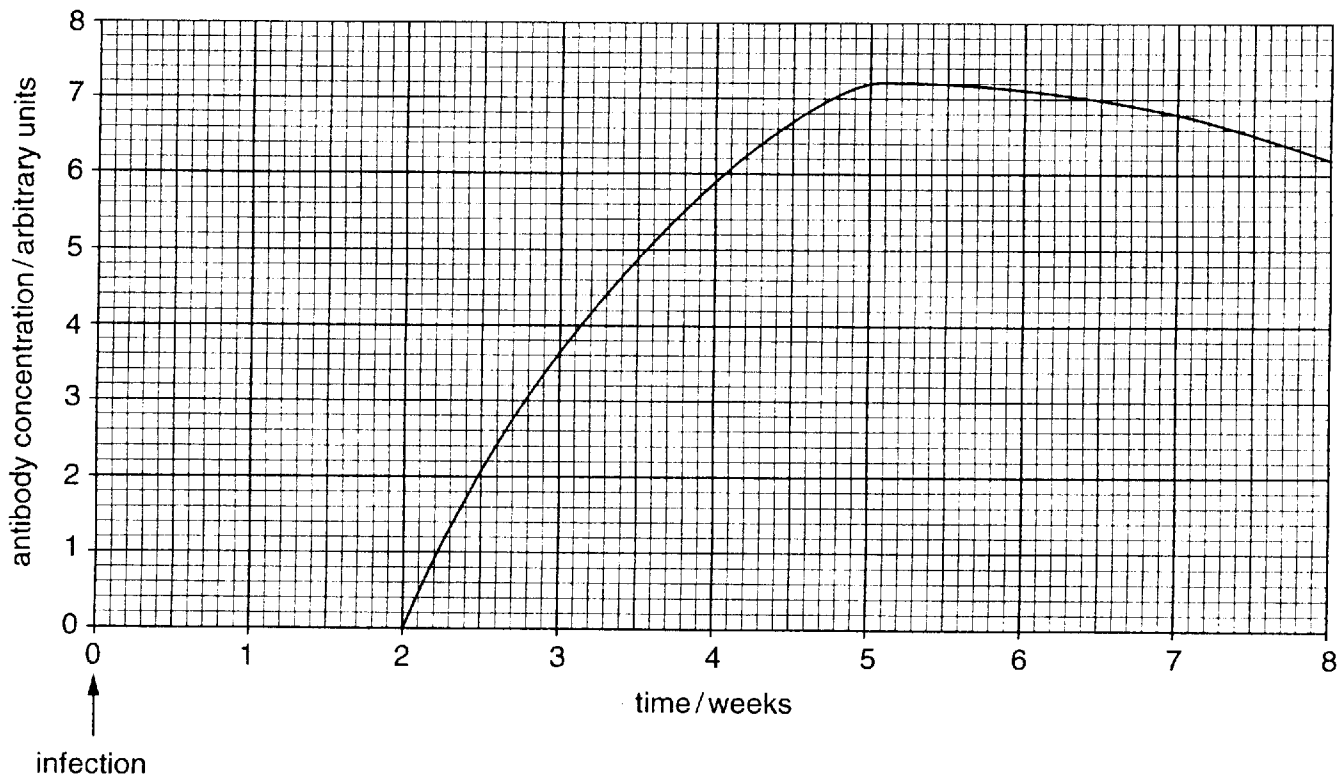
Fig. 4.1

(b)   State the name of the type of cell that produces antibodies.

....[1]

9

(c) Explain why there is a delay between the time of infection and the first appearance of antibodies in the blood.

....

....

....

....

....

....[3]

(d) This child is unlikely to develop the symptoms of measles if exposed to the pathogen again. Explain why.

....

....

....

....

....[2]

(e) Some children fail to respond to the measles vaccine when it is given too early, for example at or before 6 months of age.

Suggest why this is the case.

....

....

....

....

....[2]

[Total: 10]

2802 Jan04

[Turn over

5 People in many countries, especially in Africa and South-East Asia, are at high risk of acquiring malaria.

Blood collected from a person known to have malaria was examined in an electron microscope. Fig. 5.1 shows a drawing made from an electron micrograph of a red blood cell infected by malarial parasites.
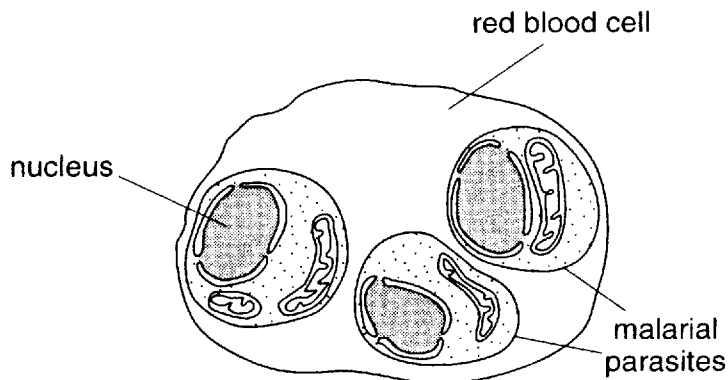
Fig. 5.1

(a) State the name of the organism that causes malaria.

....[1]

(b) Explain how an infected person is likely to have acquired malaria.

....

....

....

....

....[3]

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

Outline the problems that are associated with controlling the spread of malaria.

....

....

....

....

....

....

....

11

....[Total:..13]....

....[Turn......

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....[8]

Quality of Written Communication   [1]

[Total: 13]

2802 Jan04

[Turn over

6   Table 6.1 shows the death rates from coronary heart disease (CHD) of men and women between the ages of 35 and 74 for some European countries. It also shows the prevalence of cigarette smoking among men and women of all ages in those countries. The prevalence of smoking is the percentage of men and women who smoke cigarettes every day.

(The data refer to the mid to late 1990s.)

Table 6.1

	deaths from CHD / deaths per 100 000		prevalence of smoking / %	
non-Mediterranean countries	men	women	men	women
Latvia	904	292	67	12
Russian Federation	639	230	67	27
Scotland	321	122	33	29
Finland	288	81	27	19
Czech Republic	318	115	43	31
Hungary	420	161	40	27
Mediterranean countries				
Greece	170	18	46	28
Italy	140	37	38	26
Spain	121	32	48	25
France	85	21	40	27

(a)   Suggest **one** reason why health authorities are especially concerned about the death rates from CHD for people in the 35 to 74 age group.

....

....

....[1]

(b)   Using **only** the information given in Table 6.1, explain whether or not the following hypotheses are supported by the data.

You should quote data from the table in support of your answers.

(i)   Mediterranean countries have lower death rates from CHD than non-Mediterranean countries.

supported or not supported ....

explanation ....

....

....

....

....

(ii) Men are more at risk of CHD than women.

supported or not supported ....

explanation ....

....

....

....

....

(iii) Death rates from CHD are highest in countries with the highest prevalence of smoking.

supported or not supported ....

explanation ....

....

....

....

....

[5]

[Turn over

14

(c) A 50 year old man who regards himself as 'in good health' was asked by an insurance company to answer a series of questions about his health.

Here are some of his answers to the questions:

- smoke 20 cigarettes a day
- drink at least 8 pints of beer a week – most on Saturday evenings
- play football in the park on Sundays
- drive to work
- spend most evenings at home watching television
- rarely eat fresh fruit and vegetables
- father died of a heart attack at age 45.

Use the answers above to explain the statement 'health is more than simply the absence of disease'.

....

....

....

....

....

....

....

....

....

....[3]

[Total: 9]

END OF QUESTION PAPER