

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Advanced Subsidiary GCE**

**HUMAN BIOLOGY**

**2858/01**

Case Studies

Tuesday

**10 JANUARY 2006**

Morning

45 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate  
Number

Candidate Name

Centre Number

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**TIME** 45 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 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 may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	22	
2	23	
<b>TOTAL</b>	<b>45</b>	

**This question paper consists of 11 printed pages, 1 blank page and an insert.**



- (c) You were told in the case study that insulin stimulates the uptake of glucose in liver and muscle cells by facilitated diffusion. Fig. 1.2 shows one way in which facilitated diffusion of glucose may occur across a cell surface membrane.

**A diagram has been removed due to third party copyright restrictions**

Details: A diagram showing one way in which facilitated diffusion of glucose may occur across a cell surface membrane, adapted from Foundation Biology by Dennis Taylor and Mary Jones (1994), ISBN: 0521 421 993

- (i) Identify the structures X and Y on Fig. 1.2.

X .....

Y ..... [2]

- (ii) Give one piece of evidence from the diagram which indicates that the uptake of glucose is by facilitated diffusion and not by active transport.

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

- (iii) State one other difference between facilitated diffusion and active transport.

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

(d) You were told in the case study that glucose is converted into the insoluble polysaccharide glycogen.

Describe the structure of a glycogen molecule.  
You may use labelled diagrams to explain your answer.

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[4]

- (e) If insulin does not work efficiently, diabetes mellitus may develop. One of the early symptoms of this disease is a blurring of vision caused by a build up of glucose in the lens of the eye, which is accompanied by the uptake of water. This distorts the shape of the lens.

Explain why accumulation of glucose within the lens results in the uptake of water.

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

- (f) Outline how blood glucose concentrations can be measured.

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

[Total: 22]

This question is based on the article 'IMMUNISATION IN SCHOOL' (Case Study 2).

- 2 (a) You were told in the case study that polio is caused by a virus, and diphtheria and tetanus by bacteria.

State which type of microorganism causes the following diseases.

disease	type of microorganism
mumps	
tuberculosis (TB)	
rubella	

[3]

- (b) Outline the meaning of the following terms used in the case study.

(i) notifiable disease .....

.....

..... [1]

(ii) epidemic .....

.....

..... [1]

(iii) endemic .....

.....

..... [1]

(iv) live vaccine .....

.....

..... [1]

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**Question 2 continues on page 8**

- (c) In Case Study 2, you were told that the programme of vaccinations and boosters would give lifelong immunity to polio and long-term immunity to other diseases.

Fig.2.1 shows how the concentration of antibodies in blood changes when a first vaccination is followed by a second vaccination or booster.

**A graph has been removed due to third party copyright restrictions**

Details: A graph showing how the concentration of antibodies in blood changes when a first vaccination is followed by a second vaccination or booster, graph taken from <http://ukonline.co.uk>





- (ii) Suggest one reason why vaccination programmes may not be successful in giving a person long-term immunity.

.....

.....

[1]

- (d) Immunity can be artificial or natural and active or passive. In the following examples taken from the case study, identify the type of immunity achieved. The first example has been done for you.

example	type of immunity achieved
receiving injected MMR vaccine	artificial active
receiving antibodies across the placenta	
receiving an anti-tetanus anti-toxin injection	
picking up the polio virus from contaminated water	

[3]

- (e) In the case study, Sarah explains what she means by herd immunity. In order to prevent transmission of measles occurring, it has been calculated that a herd immunity of 93 – 95% is required. Table 2.1 shows the percentage of the UK population aged 14 years and under who had received the measles vaccine by 1998 and 2003.

Table 2.1

**A table has been removed due to third party copyright restrictions**

Details: A table showing the percentage of the UK population ages 14 years and under who had received the measles vaccine by 1998 and 2003

- (i) Calculate how many children aged 14 years and under would need to have been vaccinated by 2003 to have achieved a herd immunity of 93%.  
Show your working.

Answer = ..... million [2]

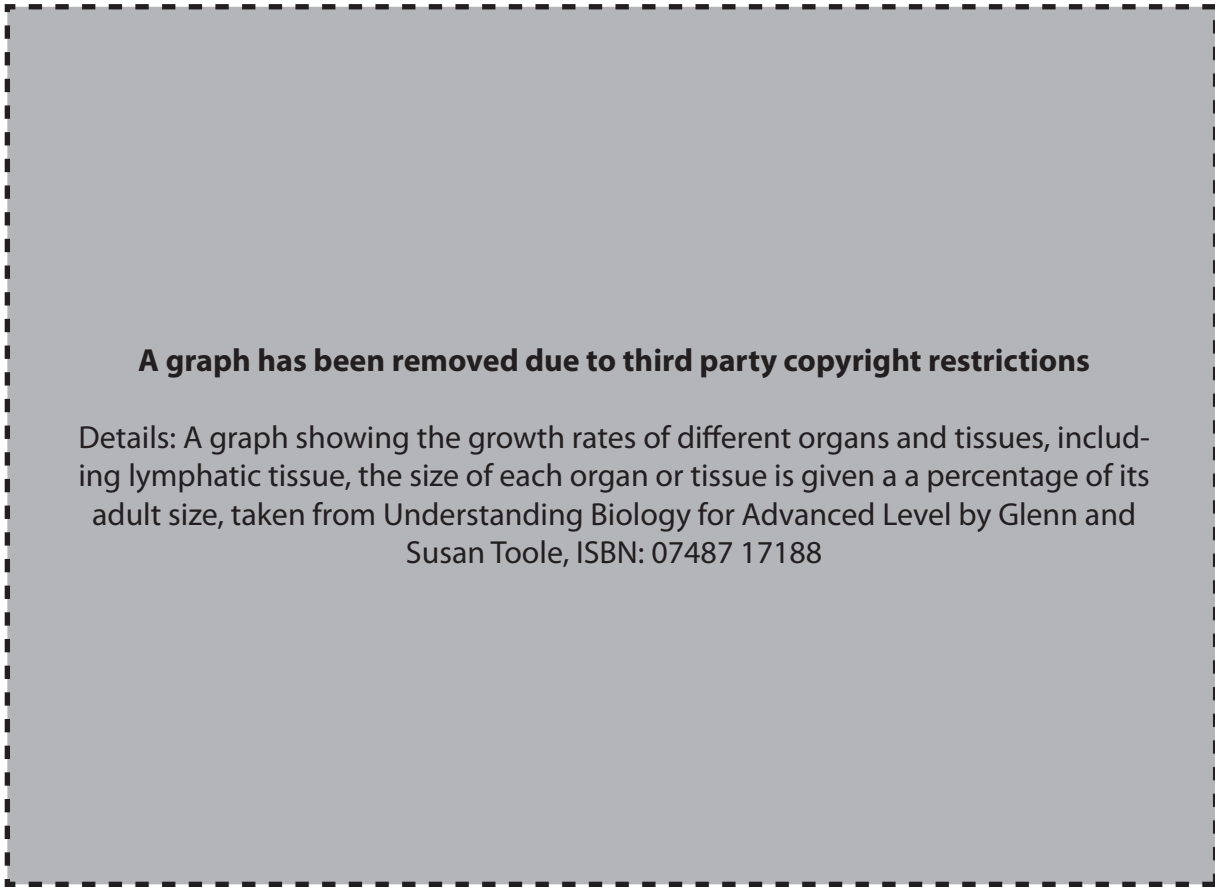
- (ii) Suggest a reason for the decline in the number of children vaccinated against measles.

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

**Question 2 continues on page 12**

(f) In the case study, you were told that a baby's immune system takes time to develop.

Fig.2.2 shows the growth rates of different organs and tissues, including lymphatic tissue. The size of each organ or tissue is given as a percentage of its adult size.



Using the information from Fig. 2.2, suggest why the ability to develop long-term immunity increases from birth to 12 years of age.

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..... [2]

[Total: 23]

END OF QUESTION PAPER

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