

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

HUMAN BIOLOGY

2858/01

Case Studies

Monday

10 JANUARY 2005

Morning

45 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number										
	<table border="1" style="display: inline-table;"> <tr> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> </tr> </table>						<table border="1" style="display: inline-table;"> <tr> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> <td style="width: 15px; height: 15px;"></td> </tr> </table>					

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	23	
2	22	
TOTAL	45	

This question paper consists of 10 printed pages, 2 blank pages and an insert.

Answer all the questions.

This question is based on the article 'THE GASEOUS EXCHANGE SYSTEM AND INFLUENZA' (Case Study 1) .

- 1 Fig. 1.3 shows a transverse section through a part of the trachea and some of the surrounding tissues.

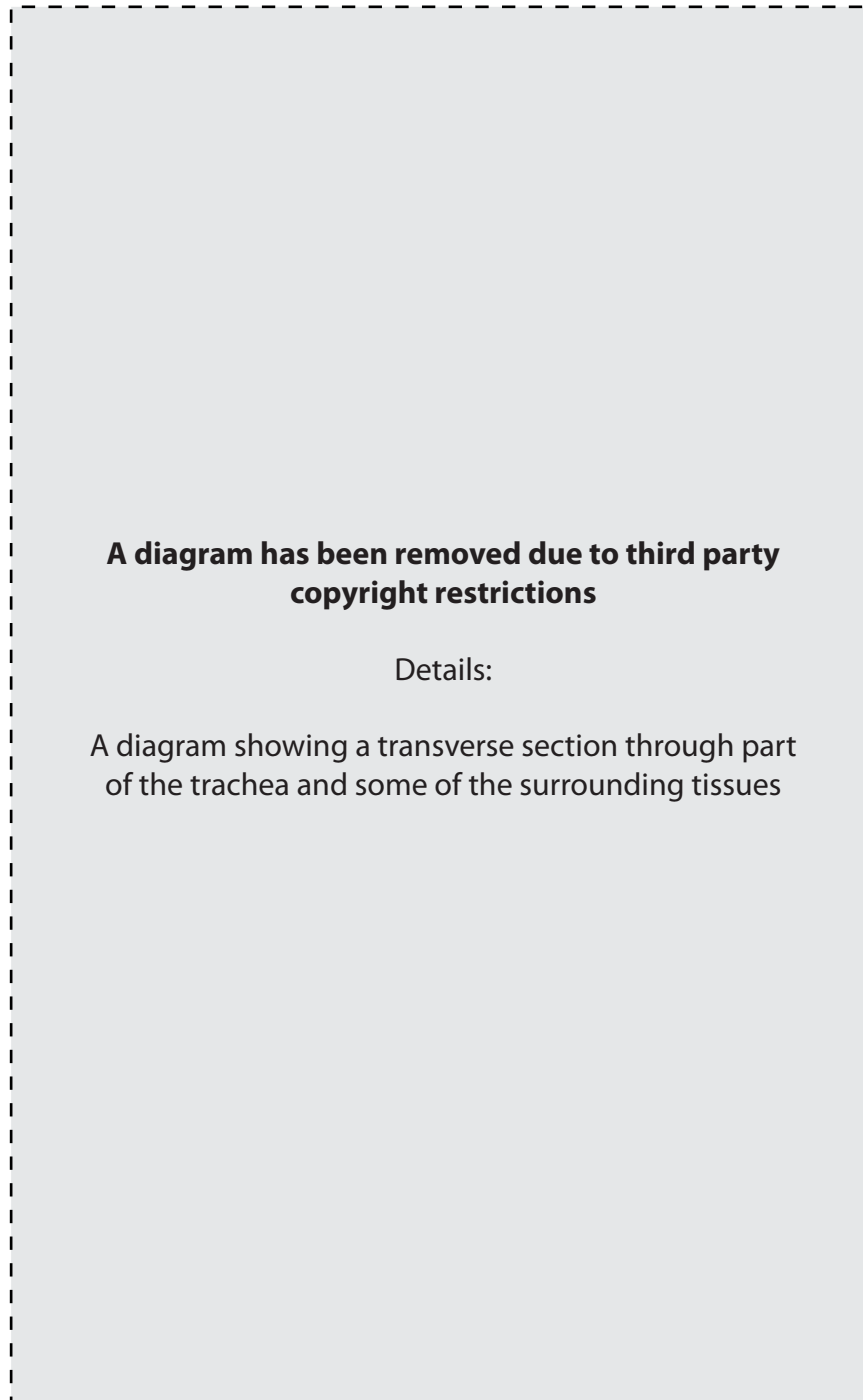


Fig. 1.3

- (a) (i) Explain what is meant by the term *tissue*.

.....

[2]

- (ii) Identify the tissues labelled **R** and **S** in Fig. 1.3.

R
S[2]

- (iii) Describe the role of cell **P** in the gaseous exchange system.

.....

[2]

- (b) Haemagglutination refers to the clumping together of red blood cells. The haemagglutinin protein on the influenza virus will clump red blood cells. Red blood cells with a specific antigen will also clump together in the presence of the corresponding antibody. This is the basis of blood grouping.

Complete Table 1.1 by filling in the correct antigens or antibodies for the ABO blood group system.

Table 1.1

blood group	red blood cell ABO antigens	plasma ABO antibodies
A	A	
B	B	
		none
	none	

[4]

- (c) Once the 'flu virus has attached to the cell surface membrane, the membrane folds inwards and the virus enters the cell enclosed in a membrane-bound vesicle. This is known as endocytosis and is one mechanism by which substances can enter cells.

State **three** processes, **other than endocytosis**, by which substances can enter cells.

1

2

3[3]

- (d) The viral RNA enters the nuclei of the cells lining the trachea.

- (i) State how the RNA enters the nucleus of a cell.

.....[1]

- (ii) State **two** differences between the **structure** of RNA and DNA.

RNA	DNA
1	
2	

[2]

- (e) You were told in the case study that, following endocytosis, the pH in the vesicle containing the virus particle is lowered and that this changes the structure of the protein called haemagglutinin.

Explain how a lowering of the pH could result in a change in the structure of the haemagglutinin protein.

.....

.....

.....

.....

.....[2]

- (f) The two viral envelope proteins, HA and NA, are synthesised on the ribosomes of the rough endoplasmic reticulum. The two proteins are then packaged and transported to the cell surface membrane.

State the organelle responsible for the packaging of the two viral proteins.

.....[1]

- (g) Neuraminidase inhibitors (NIs) have been shown to reduce the severity and duration of the symptoms of 'flu and can prevent the spread of this virus.

Describe ways in which the neuraminidase inhibitors may prevent the spread of the virus.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 23]

This question is based on the article 'PNEUMOCOCCAL INFECTION' (Case Study 2).

Pneumococcal disease is caused by the bacterium *Streptococcus pneumoniae*. The structure of this bacterium is similar to that of other prokaryotic cells.

- 2 (a) State **three** differences between the **structure** of a prokaryote such as *Streptococcus pneumoniae* and a eukaryotic human cell.

prokaryote	eukaryote
1	
2	
3	

[3]

- (b) In the case study, Sheila says that individuals are at a greater risk if they *already have a weakened immune system*.

Suggest how the immune system may be 'already weakened'.

.....

.....

.....

.....[2]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (OCR) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

OCR is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.