

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Advanced Subsidiary GCE**

**APPLIED SCIENCE**

**G623**

Unit 4: Cells and Molecules

Monday                      **16 JANUARY 2006**                      Afternoon                      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; border-collapse: collapse;"> <tr> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> </tr> </table>							<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></td> <td style="width: 15px; height: 20px;"></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 the spaces provided on the question paper.
- Read instructions and questions carefully.

**INFORMATION FOR CANDIDATES**

- You may use a calculator.
- You are advised to show all the steps in any calculations.
- You will be awarded marks for the quality of written communication where this is indicated in the question.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
Planning	25	
1	11	
2	13	
3	8	
4	13	
<b>TOTAL</b>	<b>70</b>	

---

**This question paper consists of 10 printed pages and 2 blank pages.**

Answer **all** the questions.

1 Imagine that you are given some plant cells suspended in water.

(a) Describe how you would prepare a temporary microscope slide, for use with a light microscope, to investigate the structure of these plant cells.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Name **two** structures you might expect to see in the plant cells you observe and **two** additional structures that could only be observed using an electron microscope.

	structure	structure
light microscope		
electron microscope		

[4]

- (c) Name **three** structures found in **both** plant and animal cells and describe their functions.

name	function

[3]

[Total: 11]

- 2 Technicians who work in medical laboratories in hospitals often need to look at blood smears.

Fig. 2.1 is a scale diagram of blood cells.

Normal red cells are, on average, 7.2  $\mu\text{m}$  in diameter.

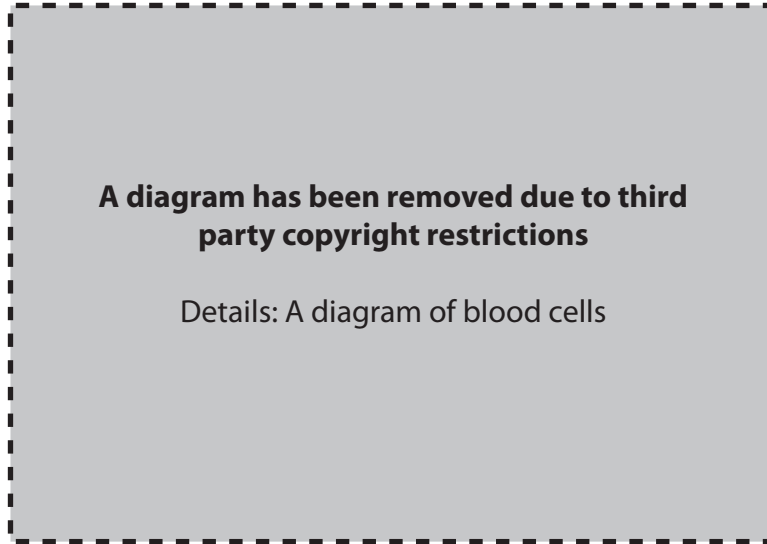


Fig. 2.1

- (a) Explain the reason for the pale central area of cell A.

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

- (b) Name cell B as fully as you can.

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

- (c) If cell A is a normal, average cell with a diameter of 7.2  $\mu\text{m}$ , use Fig. 2.1 to calculate the maximum dimension of cell B.

Show your working.

maximum dimension = .....  $\mu\text{m}$  [3]

(d) Technicians in laboratories may use a special slide called a haemocytometer.

State what it is used for.

.....  
.....  
.....

Describe the features of the haemocytometer which allow a technician to do this.

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

(e) A technician examined blood smears taken from two patients.

Patient **X**. Blood smear showed fewer cells of type **A**.

Patient **Y**. Blood smear contained a much higher number of cells of type **B**.

(i) Suggest **one** medical condition that could account for **each** patient's results.

patient **X** ..... [1]

patient **Y** ..... [1]

(ii) Use your scientific knowledge to explain your suggestion for patient **Y**.

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

[Total: 13]

- 3 Water is an important constituent of living cytoplasm. It serves as a solvent for a large variety of solutes and provides the medium for most of the reactions going on in a cell. It also acts as a major structural component. The surface membrane of a cell is selectively permeable and has a structure which may be described using the fluid mosaic model.

- (a) Fig.3.1 shows the arrangement of molecules in the surface membrane according to the fluid mosaic model.

Label A, B, C and D.

Choose your answers from the following list:

cholesterol

glycolipid

glycoprotein

phospholipid

protein

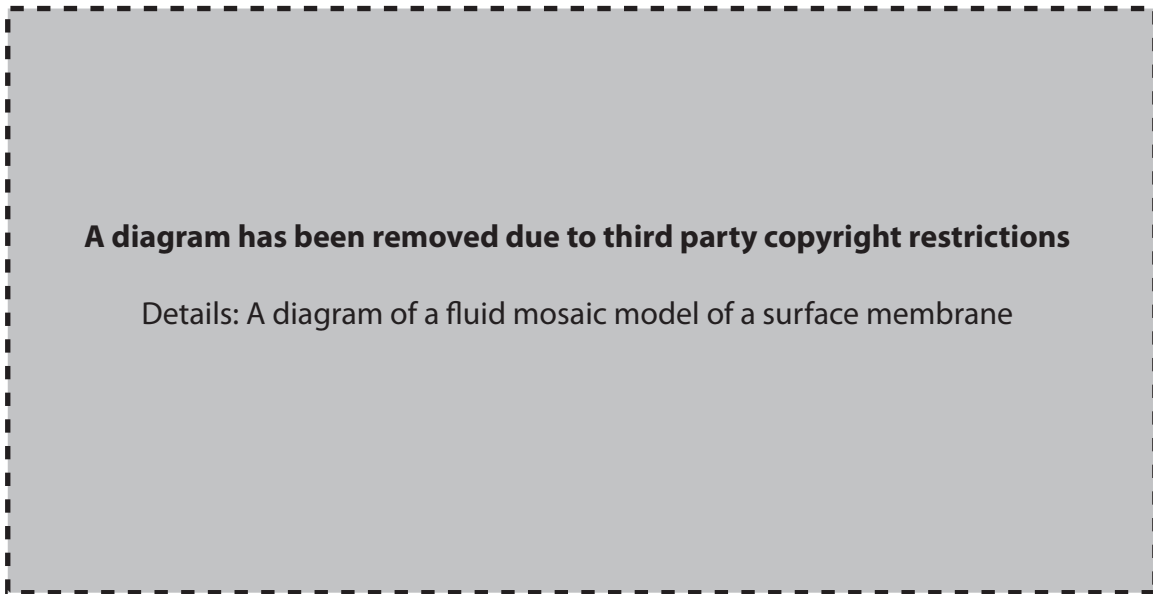


Fig. 3.1

[4]



4 Students researching into Huntington's chorea (disease) found the following information.

Huntington's chorea (HC) is a progressive disorder of motor, cognitive, and psychiatric disturbances.

The diagnosis of HC rests on positive family history, characteristic clinical findings, and the detection of an expansion in the HC gene that is equal to, or more than, 36 CAG trinucleotide repeats.

HC is inherited in a dominant manner. The normal allele has fewer than, or equal to, 26 CAG repeats. The mutant HC allele has greater than, or equal to, 36 CAG repeats. Alleles with 36 or more CAG repeats are observed in individuals with HC.

Use the information above and your scientific knowledge to answer questions (a) to (e).

(a) What are the clinical symptoms of HC?

.....

..... [2]

(b) State the genetic indicator for HC.

..... [1]

(c) State what the initials CAG stand for.

.....

.....

.....

.....

.....

..... [3]



(d) State and explain the risk for a couple who want to have children since HC is inherited in a **dominant** way.

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

(e) Discuss the moral and ethical implications of diagnostic testing for genetic disorders.  
In this part of the question, two marks are available for the quality of written communication.

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

Quality of Written Communication [2]

[Total: 13]

**END OF QUESTION PAPER**





---

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.