

**ADVANCED SUBSIDIARY GCE  
APPLIED SCIENCE**

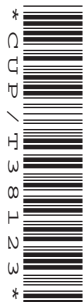
**G623**

Unit 4: Cells and Molecules

**TUESDAY 15 JANUARY 2008**

Afternoon  
Time: 45 minutes

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



Candidate Forename

Candidate Surname

Centre Number

Candidate Number

**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 45.
- 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	7	
2	21	
3	11	
4	6	
<b>Question Paper TOTAL</b>	<b>45</b>	

This document consists of **8** printed pages.

Answer **all** the questions.

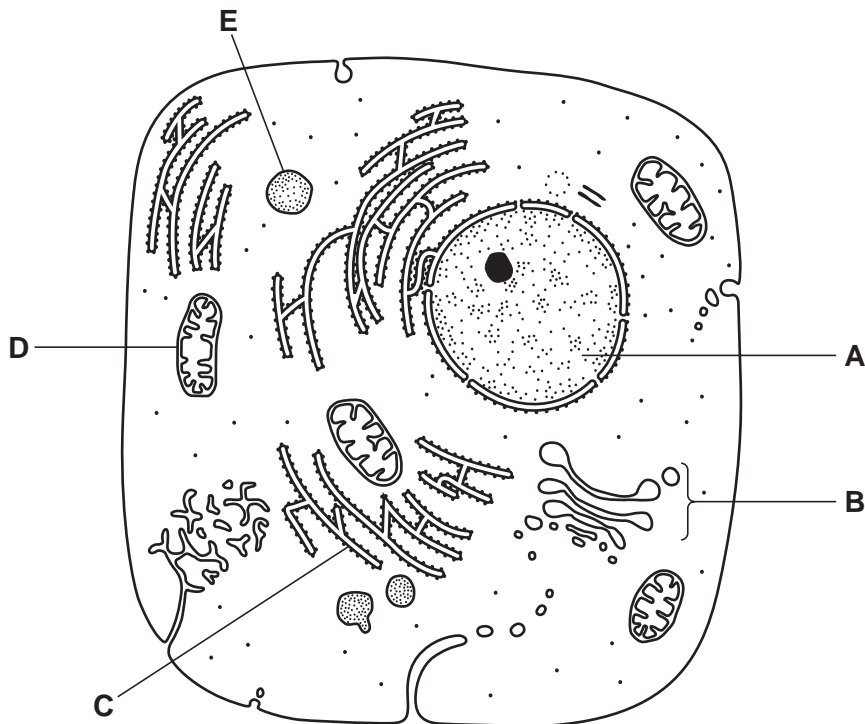
1 A trainee teacher produced Worksheet 1 to use with his class.

Imagine you are one of his students.

Complete the worksheet.

### Worksheet 1

Fig. 1.1 is a drawing of an animal cell as seen under an electron microscope.



**Fig. 1.1**

Complete the table by placing a tick (✓) under the appropriate letter or letters.

part or function	A	B	C	D	E
mitochondrion					
Golgi					
controls activities of the cell					
contains digestive enzymes					
carries out aerobic respiration					
rough endoplasmic reticulum					
visible using a light microscope					

[Total: 7]

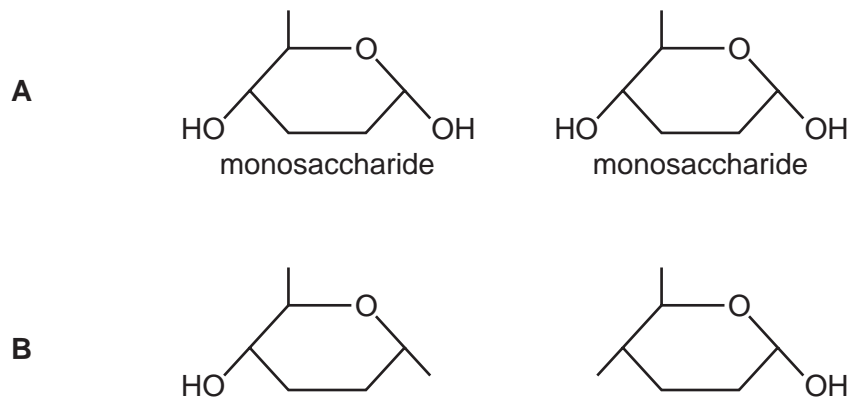
- 2 (a) A technician working in a laboratory has been asked to carry out tests to identify the food chemicals present in a snack food.

Complete the following table to summarise the tests she is likely to carry out.

food chemical	reagent(s) used	result if food chemical is present
starch		black colour
non-reducing sugar		
protein		
lipid/fat		

[7]

- (b) Fig. 2.1 shows an incomplete diagram of the way a disaccharide is formed from two molecules of monosaccharide.



**Fig. 2.1**

- (i) Two molecules of a monosaccharide are shown in diagram **A** in Fig. 2.1.

Name an example of a sugar that has this type of structure.

..... [1]

- (ii) Complete diagram **B**, to show the bonds present when the disaccharide is formed. [1]

- (iii) Name the disaccharide formed.

..... [1]

- (iv) Name an additional product when the disaccharide is formed.

..... [1]

- (v) State the specific names for the type of reaction and type of bond or link that occurs in the formation of the disaccharide.

reaction ..... bond or link ..... [2]

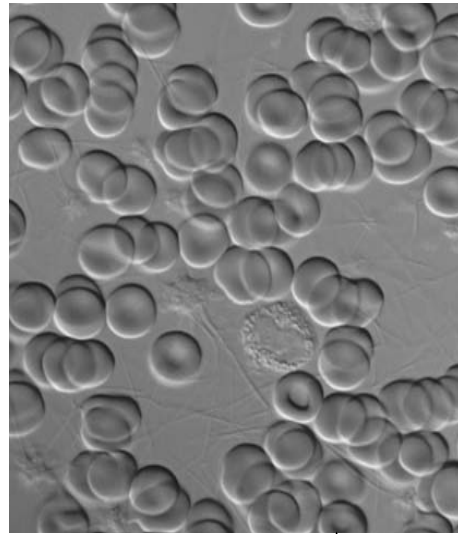
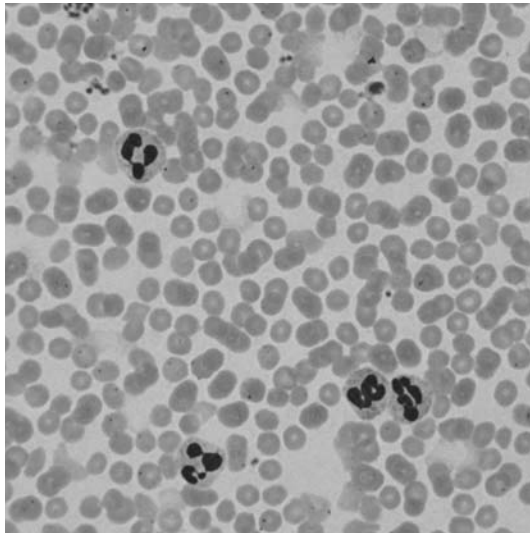
(c) Complete the following passage by inserting the most suitable words in the blank spaces.

An enzyme called lipase will ..... a triglyceride molecule to form one molecule of ..... and ..... molecules of ..... acids. These acids have a long, chain structure built up from atoms of ..... and ..... . The atoms in the backbone of the chain are linked by single or double bonds. Chains with single bonds are said to be ..... . Lipids containing triglycerides with more than one double bond are called ..... fats. [8]

[Total: 21]

3 Scientists who work in pathology laboratories in hospitals often need to know the size and relative numbers of red and white blood cells in samples of blood.

(a) Figs. 3.1 and 3.2 are micrographs of blood samples.



cell X

© Andrew Syred/Microscopix

**Fig. 3.1** Blood stained so that white cells and platelets are purple viewed by normal light microscopy ( $\times 1000$ )

**Fig. 3.2** Unstained blood, viewed with a contrast light microscope ( $\times 2500$ )

(i) How many white blood cells are visible in Fig. 3.1?

.....

[1]

(ii) Clearly label a white blood cell in Fig. 3.2.

[1]

(iii) 1. What is the apparent diameter of cell X, labelled in Fig. 3.2?

[1]

..... mm

2. Calculate the actual diameter of cell X.

Give your answer in  $\mu\text{m}$ .

.....  $\mu\text{m}$  [2]

- (b) Explain how a pathology technician uses a haemocytometer to determine the number of white cells in a specific volume of blood.

*In this question, two marks are available for a clear, ordered answer, and for spelling, punctuation and grammar.*

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

Quality of Written Communication [2]

[Total: 11]

4 (a) Students researching cystic fibrosis (CF) found the following.

- The disease affects epithelial cells which produce mucus.
- Affected cells produce mucus that is abnormally thick and sticky.
- The epithelia of the pancreatic duct are particularly affected.

Use this information to outline the **nutritional** problems that CF is likely to cause.

.....

.....

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.....

.....

.....

.....

.....

.....

..... [4]

(b) Diagnostic testing for genetic disorders raises moral and ethical issues.

Suggest **two** such issues.

1. ....

.....

2. ....

.....

..... [2]

[Total: 6]

**END OF QUESTION PAPER**

*Copyright Acknowledgements:*

Fig. 3.1 and Fig. 3.2 © Andrew Syred/Microscopix

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