

ADVANCED SUBSIDIARY GCE
APPLIED SCIENCE
Unit 4: Cells and Molecules

G623

Candidates answer on the question paper

OCR Supplied Materials:
None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 14 January 2009
Afternoon

Duration: 45 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks 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.
- This document consists of **12** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	9	
2	8	
3	14	
4	14	
TOTAL	45	

Answer **all** the questions.

1 A physiotherapy student was researching cystic fibrosis.

Fig. 1.1 shows a cystic fibrosis (CF) sufferer undergoing therapy.



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Fig. 1.1

(a) What is the cause of cystic fibrosis?

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

(b) State **three** symptoms of cystic fibrosis.

- 1.
- 2.
- 3. [3]

(c) Explain how the therapy shown in Fig. 1.1 is likely to benefit the patient with cystic fibrosis.

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

- (d) Pregnant women can have tests at 18 weeks to see if the foetus has cystic fibrosis. The test is 95% accurate and involves analysing cells taken from the amniotic fluid.

What are the moral and ethical issues for a pregnant woman to consider if she has taken the test and been told that the result is positive and knows that her foetus has CF?

.....

.....

.....

.....

.....

..... [3]

[Total: 9]

- 2 A trainee teacher produced **Worksheet 1** and **Flash Cards** to use with his class during revision. Imagine you are one of his students using these assessment tools.

Worksheet 1

- (a) (i) Match the three cell structures with their functions.
Draw a ruled line to link each structure to its function. [3]

cell structure

function

1 Golgi apparatus

- activities associated with aerobic respiration

2 nucleus

- controls cellular activity

3 mitochondrion

- processing and packaging substances

- 'reads' mRNA during protein synthesis

- (ii) Some cell structures are visible with a light microscope.
Draw a ring around any cell structure in the list above that is **only** visible using an electron microscope. [1]

Flash Cards

- (b) The flash cards were to be used to revise features shown by light and electron microscopes.

Each card had a question on one side and the correct answer on the other side.

Fig. 2.1 shows an example.

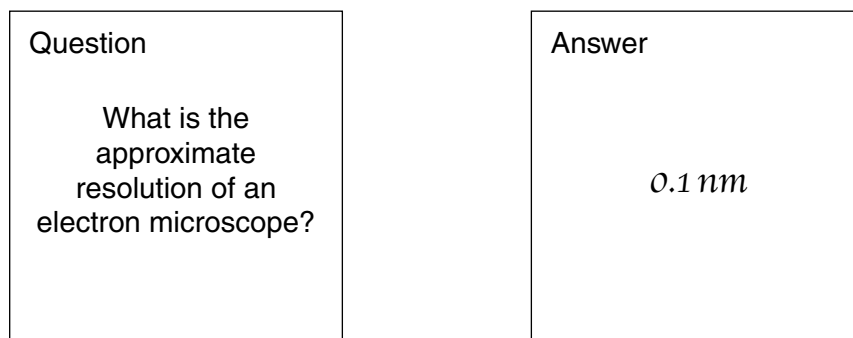


Fig. 2.1 Example Flash Card

State the correct answers to questions (i) to (iv) in the right hand boxes.

Question (i)

What focuses the electron beam?

Answer (i)

Question (ii)

What is the maximum magnification possible with light microscopes?

Answer (ii)

Question (iii)

What is always true about the state of specimens viewed with an electron microscope?

Answer (iii)

Question (iv)

What must be maintained inside an electron microscope?

Answer (iv)

[4]

[Total: 8]

3 (a) Carbohydrates can be identified and sorted into groups using chemical tests.

Three of these groups are starches, reducing sugars and non-reducing sugars.

(i) Name a reagent used to test for the presence of starch in a cell sample.

..... [1]

(ii) A lab technician has shown that a sample contains no reducing sugars. He then carries out a test for non-reducing sugars.

- The stages involved in one chemical test used to confirm the presence of a non-reducing sugar in a sample are listed below.
- They are not in the order in which they would be carried out during the test.

A add an equal volume of dilute hydrochloric acid and boil for 2–3 minutes

B add Benedict's reagent

C carefully add sodium hydrogencarbonate solution until neutrality is achieved

D cool the sample

E dissolve a sample of the sugar in water

F heat in a water bath

G look for colour change or appearance of orange red precipitate.

Arrange the letters in the correct order. The first and last have been done for you.

E **G** [3]

(iii) State **two** ways in which sucrose differs from glucose.

1. [1]

2. [1]

- (b) Sucrase is an enzyme that occurs in some of the cells that line the human small intestine.

Sucrase promotes the following change:



- (i) Name the type of reaction that sucrase promotes.

..... [1]

- (ii) What name is given to the reaction that reverses the change shown above?

..... [1]

- (iii) Students sometimes call enzymes 'biological catalysts'.

Suggest what this means.

.....
 [1]

- (iv) All enzymes have some features in common.

Complete Table 3.1.

Table 3.1

feature	comment
chemical nature of enzymes	
relative quantity of enzyme required to promote change	
3 factors that affect enzyme activity	factor 1
	factor 2
	factor 3

[5]

[Total: 14]

- 4 (a) Imagine that you are a technician working in a pathology lab. The grid on the haemocytometer in Fig. 4.1 is used to count cells. Only the central part of the haemocytometer is shown in Fig. 4.1.

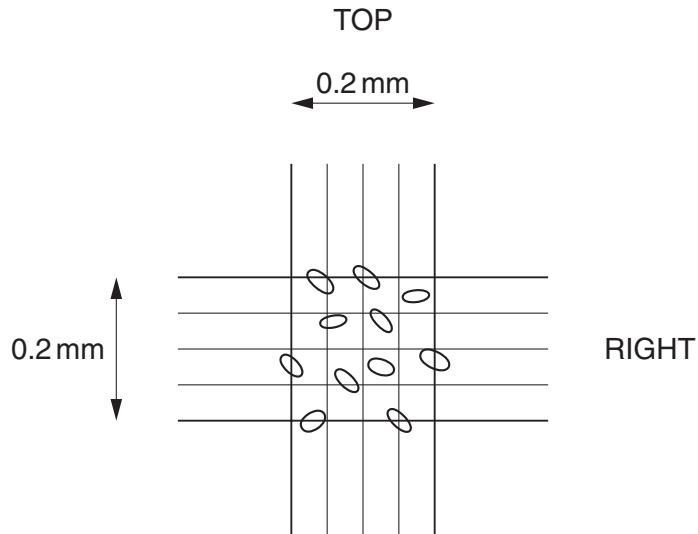


Fig. 4.1 Cells on a haemocytometer grid

The haemocytometer chamber in the slide has a depth of 0.1 mm.

- (i) How many cells would be included in the count in the central 4 × 4 chamber?
 [1]

- (ii) Show that the volume of the central 4 × 4 chamber is 0.004 mm³.
 volume = [2]

- (b) Explain why a technician in a pathology laboratory might be asked to count blood cells or look for abnormal cells.

 [3]

10
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