OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

APPLIED SCIENCE

Cells and Molecules

G623

OCE/11956

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:
- Electronic calculator
- Ruler (cm/mm)

Tuesday 12 January 2010
Morning

Duration: 45 minutes

G6223

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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**.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.

  This means, for example, you should:
  - ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear;
  - organise information clearly and coherently, using specialist vocabulary when appropriate.
- 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.

Examiner's Use Only:			
1			
2			
3			
4			
Total			

DC (SHW 00429 3/09) 11956/4

Answer **all** the questions.

1 A group of students was preparing a presentation on the topic of 'Microscopy'.

They included some assessment questions. These are found in sections **(a)** and **(b)** of this question.

Fig. 1.1 shows human cheek cells as seen with a light microscope (photomicrograph).

Fig. 1.1

(a) Describe how to produce a temporary slide of the cheek cell tissue.

.....

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.....

.....

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

(b) Fig. 1.2 is a drawing of an animal cell as seen under an electron microscope.

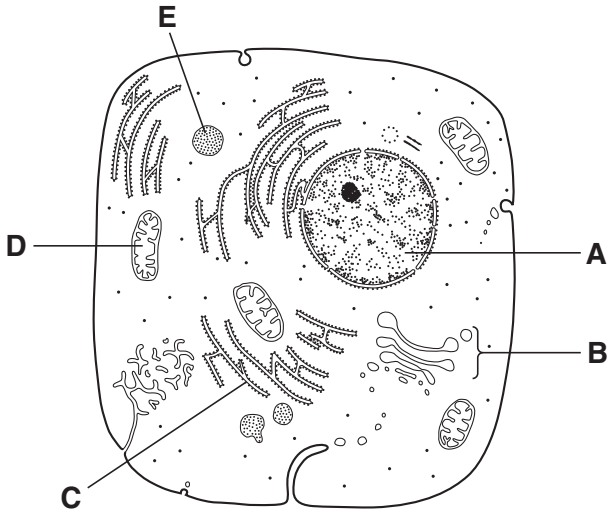

Fig. 1.2

(i) Complete Table 1.1 by

- identifying the labelled parts of the cell **A** to **E**
- naming the part of the cell responsible for the function stated.

Parts of the table have been completed for you.

Table 1.1

function	label	part of the cell
controls activities of cell	**A**	nucleus
site of aerobic respiration		
site of protein synthesis		
produces secretory vesicles		Golgi
contains digestive enzymes	**E**	

[6]

(ii) Suggest and explain one **advantage** of using the electron microscope rather than a light microscope to look at structures in the cheek cells.

.....

.....

.....

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

[Total: 11]

2 The students went on to learn about the molecules that can be found within cells.

They needed to know about the cell surface membrane to understand how cells function.

Fig. 2.1 shows the arrangement of molecules in a cell surface membrane according to the fluid mosaic model.

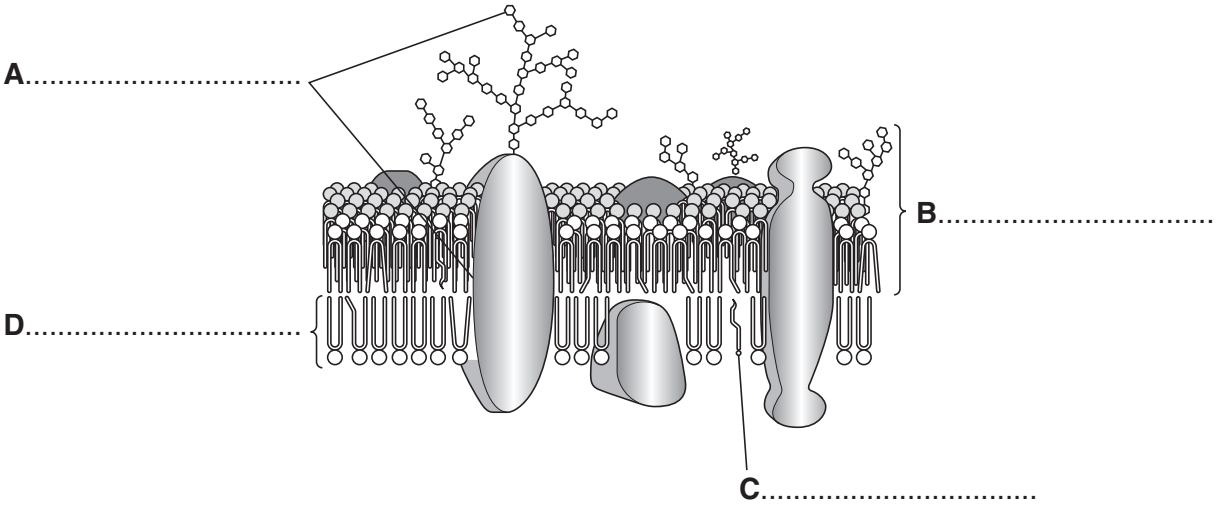

Fig. 2.1

(a) Name the molecules **A**, **B**, **C** and **D**.

Choose your answers from the following list.

cholesterol **glycolipid** **glycoprotein** **phospholipid** **protein**

[4]

(b) Water moves across the cell surface membrane by osmosis.

Complete Table 2.1 below to indicate

- the direction in which water will move across the cell membranes in different conditions
- whether the cell will burst.

Place a (✓) in the correct box in each row of Table 2.1.

Table 2.1

	net movement of water **into** the cell	no net movement of water	net movement of water **out** of the cell	cell bursts	
				yes	no
potato cells immersed in distilled water					
red blood cells immersed in concentrated salt solution					
red blood cells immersed in distilled water					

[6]

(c) Water is an important biological molecule.

Some of the properties of water are listed below, labelled **A** to **D**.

Each of the statements numbered **1** to **4**, refers to one of the functions of water.

Draw one line from each **property** to the correct **function** of water. The first has been done for you.

property	**function**
A. Large amount of energy is needed to change water into a vapour.	**1.** Excellent solvent.
B. Water below 4 °C is less dense than water above 4 °C.	**2.** Cooling in mammals by sweating and panting.
C. Large amount of energy is needed to raise the temperature of water.	**3.** Maintains circulation of water and aquatic life.
D. Small polar molecule.	**4.** Allows chemical reactions in cells to occur within a narrow temperature range.

[3]

(d) A student was carrying out some chemical tests to identify substances present in a solution.

This solution contained **two** different food substances.

The test results obtained are shown in Table 2.2 below.

Table 2.2

test		result	substance present
1	Biuret	a purple colour was observed	
2a	Benedict's and heat	the blue colour of the reagent did not change	
2b	dilute hydrochloric acid was added and the mixture was boiled; it was allowed to cool, neutralised and then test 2a was carried out	the blue colour of the reagent changed to a brick red precipitate	

(i) Complete Table 2.2 to identify the **two** food substances. **[2]**

(ii) Describe how the student would carry out a test for lipids.

.....

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

(iii) What would the student observe if a lipid was present?

.....

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

[Total: 18]

3 Scientists who work in pathology labs in hospitals often need to know the numbers of red blood cells in samples of different patients' blood.

One method they may use involves a haemocytometer slide.

Fig. 3.1 shows part of a haemocytometer slide. The slide is used to count cells in a sample of blood.

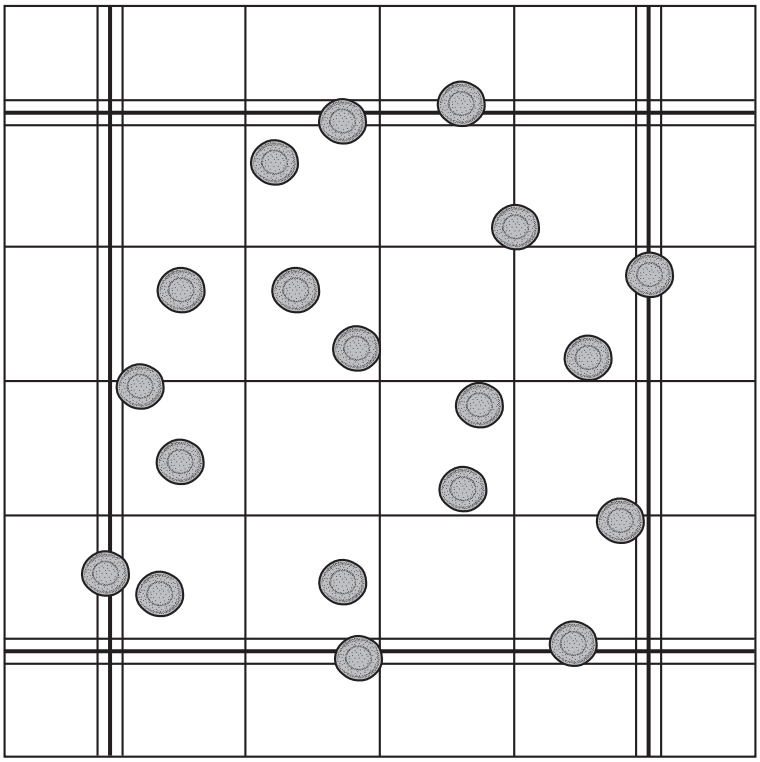

Fig. 3.1

(a) How many cells would be included in the count in the central chamber?

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

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

Imagine that you are the scientist using the haemocytometer.

The volume of the central chamber is 0.004 mm^3.

Use the value from **(a)** to calculate the number of cells in 1 cm^3.

Show your working.

number of cells in 1 cm^3 = ... **[3]**

(c) (i) State one reason why a haemocytometer will only provide an estimate of the number of living cells in a sample of blood.

.....

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

(ii) Suggest one **difference** that could be observed on a haemocytometer slide, between the red blood cells from a patient with a diet deficient in iron, compared with red blood cells from a healthy patient.

.....

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

(d) (i) Scientists in a pathology laboratory also count cells using a Coulter counter.

Describe how a Coulter counter determines the number of red blood cells present in a sample of blood.

.....

.....

.....

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.....

.....

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

(ii) State one advantage of using a Coulter counter, rather than a haemocytometer, to count cells in blood samples.

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

[Total: 10]

4 Huntington's disease is a genetic disorder, which is inherited in a dominant manner. The symptoms of the disease usually develop when people are between 30–50 years old.

(a) Claire has a family history of Huntington's disease. Her mother is developing early symptoms of the condition. Claire and her mother visited the doctor for advice.

State **two** clinical symptoms which the doctor might identify as early indicators of this genetic disease.

1. .....

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

(b) Claire, who is 25 years old, is pregnant with her first child. Claire is worried about the possibility of whether she or her child has inherited the disorder. The doctor said that she would refer Claire and her husband to a clinical geneticist for counselling if the couple wanted to discuss prenatal, diagnostic testing.

Suggest the moral and ethical implications of diagnostic testing for Huntington's disease for Claire and her husband, if the tests proved positive for the condition.

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..... **[4]**

[Total: 6]

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