OCR
RECOGNISING ACHIEVEMENT

Wednesday 11 January 2012 – Morning

AS GCE BIOLOGY

F211 Cells, Exchange and Transport

F2100101111

Candidates answer on the Question Paper.

OCR supplied materials:
- Insert (inserted)

Other materials required:
- Electronic calculator
- Ruler (cm/mm)

Duration: 1 hour

F 2 1 1

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- The Insert will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

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 **60**.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Fig. 1.1 shows an air sac and a capillary in the mammalian lung.

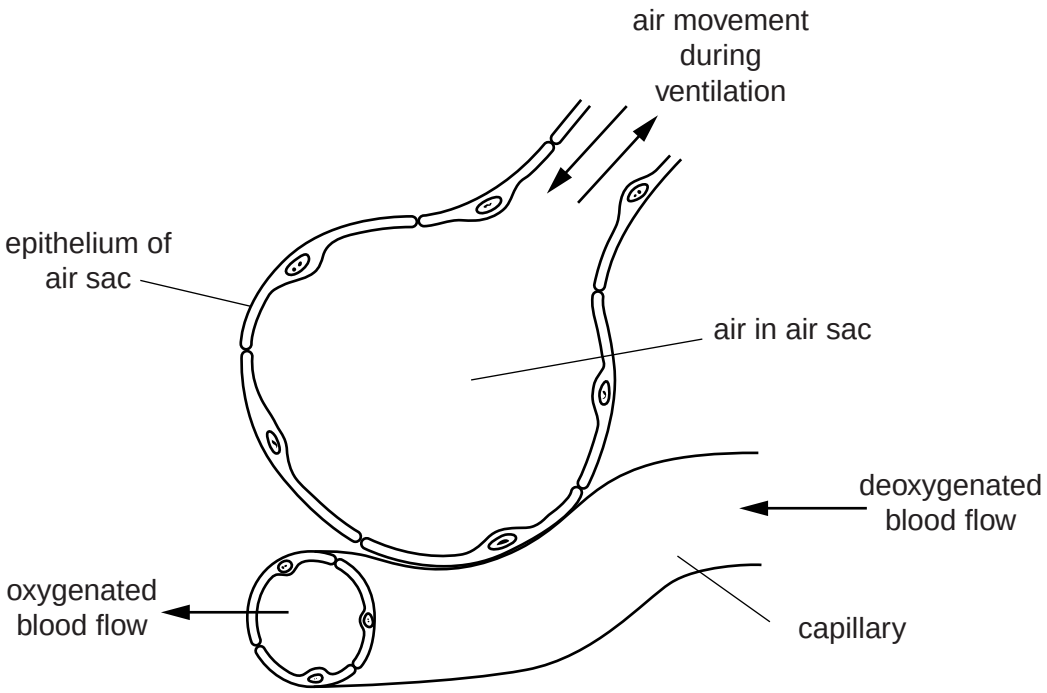

Fig. 1.1

(a) The mammalian lungs contain many air sacs.

(i) Name the air sacs **and** state why there are many air sacs in the lungs.

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

(ii) Name the type of epithelium in the walls of the air sacs.

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

(iii) The air sacs contain many elastic fibres.

Explain the role of these elastic fibres during ventilation.

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

(b) For efficient gaseous exchange to occur, a steep diffusion gradient must be maintained between the air in the air sacs and the blood.

A steep diffusion gradient can be maintained by ventilating the lungs. This refreshes the air in the air sacs.

(i) Explain how refreshing the air in the air sacs helps to maintain a steep diffusion gradient.

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

(ii) Describe **and** explain **one other** way in which a steep diffusion gradient is maintained in the lungs.

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

[Total: 9]

2 **(a)** Complete the following paragraph about cells by using the most appropriate term(s).

Cells that are not specialised but still have the ability to divide are called ..... cells. Such cells can be found in the ..... of the long bones of mammals. These cells can ..... into other types of cell, such as erythrocytes that carry oxygen in the blood. In plants, ... tissue also contains cells that are not specialised. **[4]**

(b) Sponges are simple eukaryotic multicellular organisms that live underwater on the surface of rocks.

Sponges have a cellular level of organisation. This means that they have no tissues.

Each cell type is specialised to perform a particular function.

One type of cell found in a sponge is a collar cell. Collar cells are held in position on the inner surface of the body of the sponge.

Fig. 2.1 is a diagram showing a vertical section through the body of a sponge and an enlarged drawing of a collar cell.

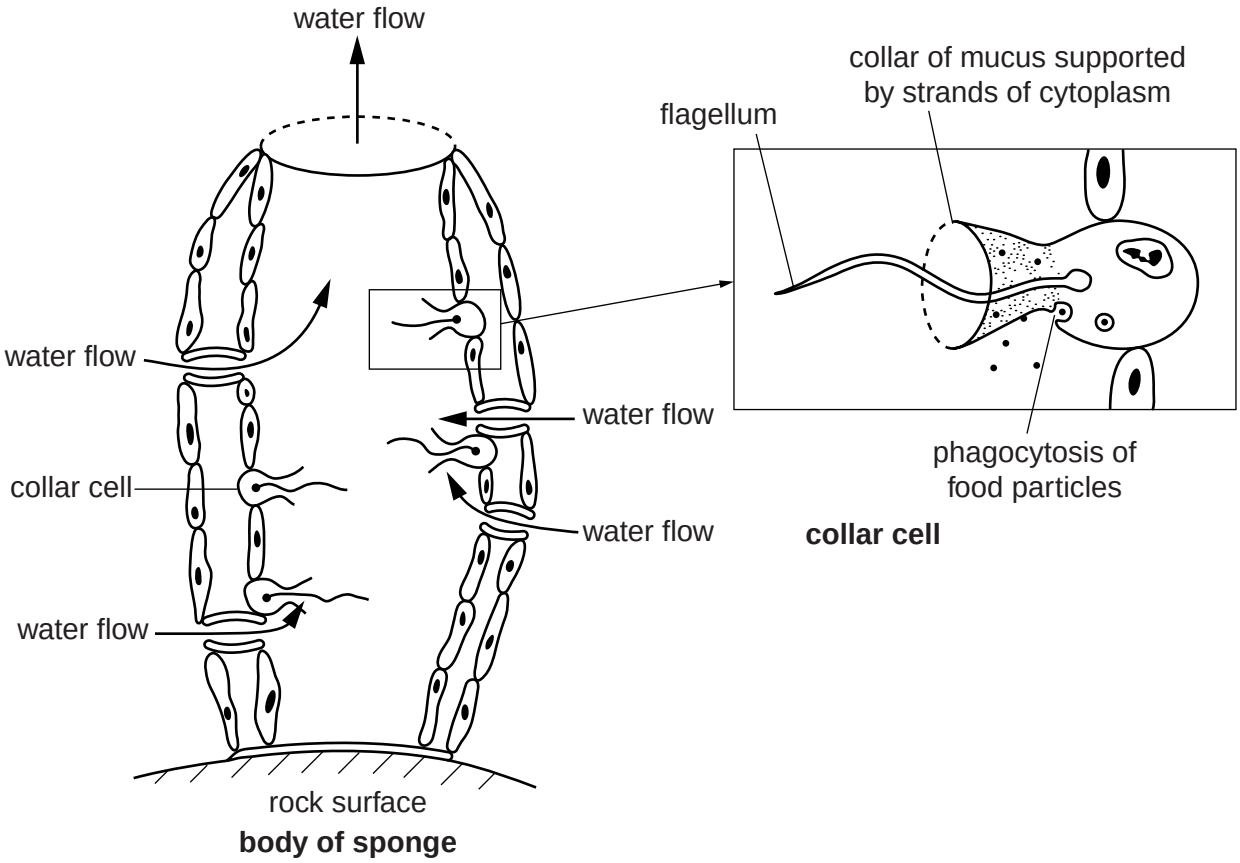

Fig. 2.1

(i) Suggest **one** function of the flagellum in the collar cell.

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

(ii) Suggest **one** possible role for the collar of mucus in the cell.

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

(c) In more advanced organisms, cells are organised into tissues consisting of one or more types of specialised cells.

Describe how cells are organised into tissues, using **xylem** and **phloem** as examples.

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

[Total: 10]

3 Three examples of fluids in the mammalian body are blood, tissue fluid and lymph.

(a) Complete Table 3.1 below comparing different features of arterial blood, tissue fluid and lymph.

Table 3.1

feature	arterial blood	tissue fluid	lymph
hydrostatic pressure		low	
presence of large proteins	yes		
presence of neutrophils	yes		
presence of erythrocytes			no

[4]

(b) In a closed circulatory system, blood is kept inside blood vessels.

(i) Suggest **two** advantages of keeping the blood inside vessels.

1 .....

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2 .....

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

(ii) Describe **and** explain how the wall of an artery is adapted both to withstand and maintain high hydrostatic pressure.

In your answer you should use appropriate technical terms, spelt correctly.

to withstand pressure .....

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to maintain pressure .....

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..... **[5]**

[Total: 11]

4 The use of microscopy has greatly enhanced our knowledge of cell structure.

(a) Explain the difference between *magnification* and *resolution*.

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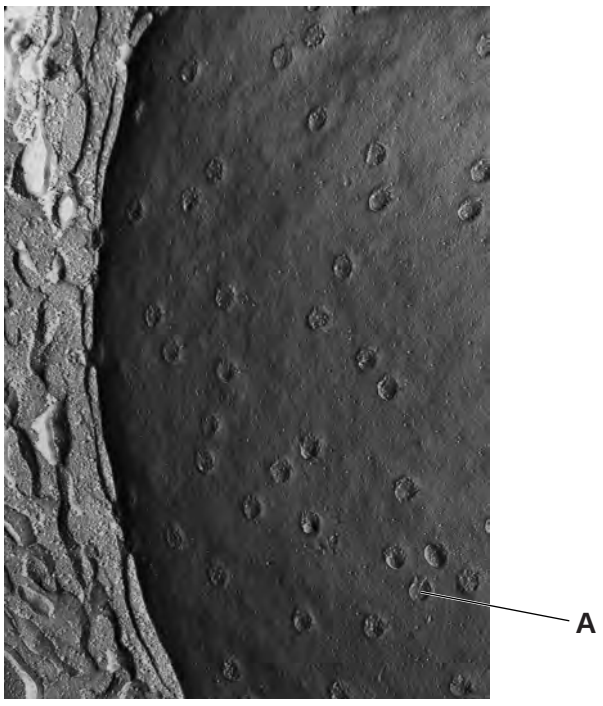
..... **[2]**

(b) State the resolution that can be achieved by each of the following types of microscope.

light microscope .....

transmission electron microscope ..... **[2]**

(c) Fig. 4.1 is an electron micrograph showing part of a nucleus.



x 25000

Fig. 4.1

(i) A student stated that Fig. 4.1 was taken using a scanning electron microscope.

What evidence supports the student's statement?

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

(ii) On Fig. 4.1, the nuclear pore complex, labelled **A**, is 3 mm wide.

Calculate the actual diameter of the pore, in nanometres.

Answer = ... nm **[2]**

(iii) State the function of the nuclear pores.

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

(d) State **two** features of a eukaryotic cell, other than nuclear pores, that would **not** be visible using medium power of a light microscope.

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

[Total: 10]

5 **(a)** A student used a potometer to investigate the effect of light intensity on the rate of transpiration in a healthy leafy shoot.

The results obtained are shown in Table 5.1.

Table 5.1

light intensity in arbitrary units (a.u.)	rate of transpiration (mm min^{-1})			
	trial 1	trial 2	trial 3	mean
10	5.0	7.0	5.0	5.7
20	5.0	7.0	5.0	5.7
30	12.0	12.0	11.0	11.7
40	24.0	23.0	26.0	24.3
50	32.0	33.0	32.0	32.3

(i) Describe the trend shown in the mean rate of transpiration as light intensity increases from 20 to 50 a.u.

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

(ii) Suggest why the rate of transpiration did not change between light intensities 10 a.u. and 20 a.u.

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

(b) **(i)** Explain why transpiration is unavoidable during the day.

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

(ii) Fig. 5.1, **on the insert**, is a photograph of a transverse section of a leaf taken from a xerophyte.

Describe the xerophytic features of this leaf **and** explain how each feature reduces loss of water vapour.

In your answer you should use appropriate technical terms, spelt correctly.

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[Total: 11]

6 Membranes are a fundamental part of the cell. They are found both at the surface of a cell and inside a cell.

(a) State **three** roles of membranes **inside** cells.

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

(b) Cells contain a large number of membrane-bound vesicles. Many of these vesicles transport substances between organelles.

(i) Outline how the vesicles are moved from one organelle to another.

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

(ii) The proteins embedded in the membranes of vesicles have different functions.

- COPI and COPII proteins are known as ‘address proteins’.
- Vesicles that transport materials from the Golgi to the rough endoplasmic reticulum (RER) are coated in COPI proteins.
- Vesicles that transport materials to the Golgi from the RER are coated in COPII proteins.

Suggest how these proteins ensure that a vesicle is transported to the correct target organelle.

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(c) Cells in the pancreas secrete proteins such as the enzymes pancreatic amylase and protease.

Describe how these extracellular enzymes are secreted from the cells.

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

[Total: 9]

END OF QUESTION PAPER

ADDITIONAL PAGE

If additional space is required, you should use the lined pages below. The question number(s) must be clearly shown.

15

ADDITIONAL PAGE

ADDITIONAL PAGE