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RECOGNISING ACHIEVEMENT

Wednesday 9 January 2013 – Morning

AS GCE BIOLOGY

F211/01 Cells, Exchange and Transport

Candidates answer on the Question Paper.

OCR supplied materials:
- Insert (inserted)

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

Duration: 1 hour

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 page 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.

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Answer **all** the questions.

1 **(a)** List **three** reasons why a large, multicellular animal, such as a mammal, needs a transport system.

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

Fig. 1.1, **on the insert**, shows the nervous pathways that coordinate heart action.

Above the diagram is a trace showing the electrical activity associated with one heart beat.

(b) **(i)** State the full name given to a trace showing the electrical activity of the heart.

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

(ii) Identify the components of the heart labelled **A** and **B** on Fig. 1.1.

A .....

B .....
[2]

(c) **(i)** During the electrical stimulation of the heart, there is a short delay between the excitation of the atria and excitation of the ventricles.

Explain why this delay is essential.

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

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(ii) The Purkyne tissue carries the excitation wave down the septum to the apex of the heart.

Explain why the excitation wave is carried to the apex.

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

[Total: 10]

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2 **(a)** Fig. 2.1, **on the insert**, shows a yeast cell with scars resulting from its reproductive process.

(i) Name the process of asexual reproduction in yeast.

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

(ii) Outline the process of asexual reproduction in yeast.

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

(b) **(i)** A yeast cell can continue producing new cells until its surface is covered by scars.

The surface area of a sphere is given by the formula $4\pi r^2$, where $\pi = 3.14$.

The area of a circle is given by the formula πr^2.

Assuming that the cell in Fig. 2.1 contained no scars, calculate how many potential new cells could be produced by this cell.

Show your working.

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

(ii) Even when the environmental conditions are perfect, one yeast cell rarely produces the calculated number of potential new cells.

Suggest why the reproductive potential of the yeast cell is not reached.

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

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(c) Yeast cells separate after cell division. In a multicellular organism, the cells do not separate but become organised to form the body structure.

Describe how the cells in a multicellular organism are organised.



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

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

[Total: 11]

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3 **(a)** The structure of cell membranes can be described as 'proteins floating in a sea of lipids'. This membrane structure allows certain substances to pass through freely whereas other substances cannot.

State the term used to describe a membrane through which some substances can pass freely but others cannot.

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

(b) Complete the following paragraph about cell membranes, using the most appropriate terms.

The model of cell membrane structure is called the .... model. Phospholipid bilayers with specific membrane proteins account for the ability of the membrane to allow both passive and ..... transport mechanisms. Ions and most polar molecules are insoluble in the phospholipid bilayer. However, the bilayer allows diffusion of most non-polar molecules such as .....Protein channels, which may be gated, and ..... proteins enable the cell to control the movement of most polar substances. **[4]**

(c) One function of membranes that is not mentioned in **(b)** is cell signalling.

(i) State what is meant by *cell signalling*.

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

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(ii) Explain how cell surface membranes contribute to the process of cell signalling.



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

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

[Total: 10]

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4 **(a)** A student used a potometer to investigate the effect of leaf area on the rate of transpiration.

This apparatus is shown in Fig. 4.1.

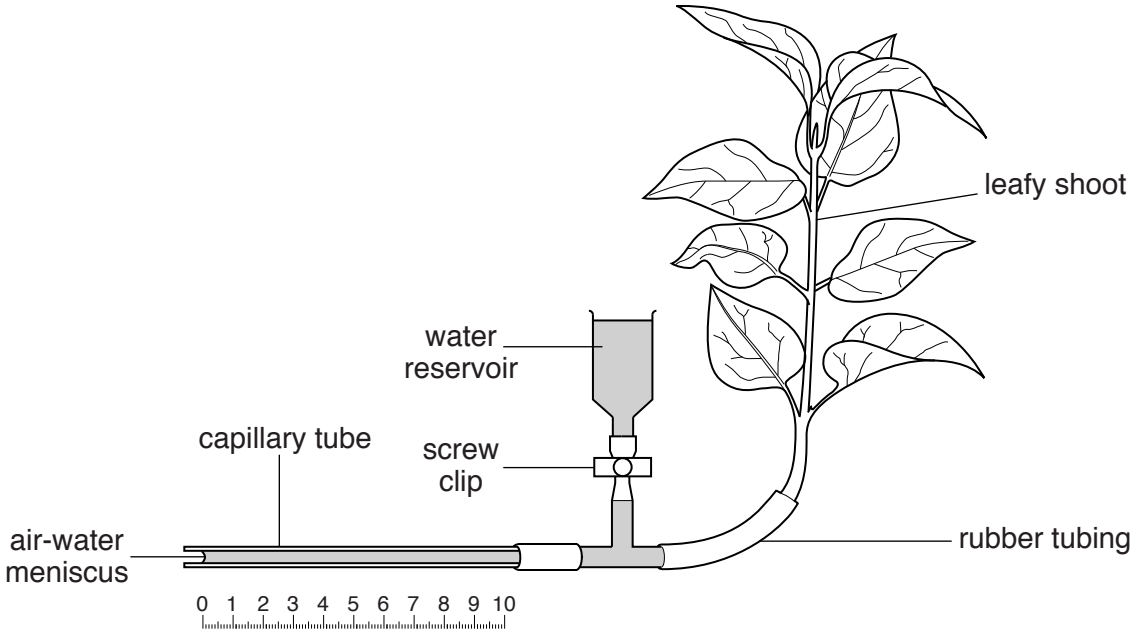


Fig. 4.1

The student presented the results of their investigation in a table, as shown below.

Number of leaves present on shoot attached to potometer	Mean rate of bubble movement
0	7
2	28
4	49
6	73
8	92

Table 4.1

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(i) State what information the student has **not** included in their table of results.

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

(ii) Describe **and** explain the data shown by the student's results.

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

QUESTION 4(b) STARTS ON PAGE 10

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(b) As part of the evaluation of the investigation, the student wrote the following statements:

1 One limitation is that the leaves were not all the same size.

2 I assembled the potometer under water and the leaves got wet.

3 During my investigation the sun came out and the lab warmed up very quickly.

For each statement, explain why this may affect the results **and** suggest how the student could improve the investigation.

Statement 1

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Statement 2

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Statement 3

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[6]

[Total: 11]

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Question 5 starts on page 12

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5 **(a)** Complete Table 5.1 below which compares different types of cell.

Place a tick (✓) or a cross (✗) in each box to indicate whether the feature is present or absent. The first row has been completed for you.

	Cell type		
Feature	**Plant cell**	**Animal cell**	**Bacterial cell**
mitochondria	✓	✓	✗
chloroplasts			
cellulose cell wall			
centrioles			
ribosomes			

Table 5.1

[4]

(b) In an investigation, cells were broken up (homogenised) and the component organelles were separated into tubes.

Each tube was then tested to determine the identity of the component organelle(s).

The observations are shown in Table 5.2.

Test for the…	**Tube**			
	1	**2**	**3**	**4**
ability to make ATP	no ATP produced	ATP produced	no ATP produced	no ATP produced
presence of DNA	DNA present	trace amount	no DNA present	no DNA present
ability to produce proteins	no proteins made	no proteins made	no proteins made	proteins made
ability to digest bacteria	none	some ability	none	none

Table 5.2

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(i) Identify the tube that contains the following organelles:

nuclei .....

ribosomes .....

mitochondria .....

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

(ii) Which of the organelles listed in **(i)** is the smallest in size?

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

[Total: 9]

Question 6 starts on page 14

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6 **(a)** The lignin in the xylem vessel walls of plants and the C-rings of cartilage in the mammalian trachea perform an important role.

(i) Explain why lignin is essential in the wall of a xylem vessel.

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

(ii) Explain why cartilage is essential in the trachea.

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

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(b) All living organisms exchange substances with their external environment.

The following data apply to an average person:

- the surface area of the body is approximately 1.8 m^2
- the volume of the body is approximately 0.07 m^3
- the surface area of the lungs is approximately 70 m^2.

Comment on the significance of this information for gas exchange.

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

[Total: 9]

END OF QUESTION PAPER

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ADDITIONAL ANSWER SPACE

If additional answer space is required, you should use the following lined page. The question number(s) must be clearly shown in the margin.

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