OCR
Oxford Cambridge and RSA

Thursday 21 May 2015 – Afternoon

AS GCE BIOLOGY

F211/01 Cells, Exchange and Transport

Candidates answer on the Question Paper.

OCR supplied materials:
None

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

Duration: 1 hour

* F 2 1 1 0 1 *

* 4 8 3 7 1 6 8 9 3 3 *

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- 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(s) 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)** Transpiration is the loss of water vapour from the aerial parts of a plant.

(i) Name the pores through which most water vapour is lost from a leaf.

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

(ii) Describe how the guard cells surrounding the leaf pores are adapted to their role.

.....

.....

.....

.....

.....

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

(iii) Name **one** other part of the leaf from which water may be lost.

.....

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

(b) Water lost from the leaf must be replaced with water from the xylem.

Complete the following passage about movement of water from the xylem to the cells of the leaf using the most appropriate terms.

When water is lost from the cells of the leaf it reduces the .....

in those cells. As a result, water enters the cells by ..... .

This process occurs across the plasma membrane which is ..... .

If all the water lost from the leaf cells is not replaced, they lose .....

and the leaf may wilt. **[4]**

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(c) The cohesion-tension theory is often used to explain the mechanism by which water moves up the xylem from the roots to the leaves.

Use this theory to explain how water moves from the roots to the leaves.

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

[Total: 11]

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2 **(a)** Table 2.1 compares some features of animal cells, plant cells, yeast cells and bacterial cells.

Complete the table.

Feature	Animal	Plant	Yeast	Bacterium
Means of cell division	cytokinesis	cytokinesis		binary fission
Presence of nucleus				
Material in cell wall	none		chitin	
Presence of ribosomes				

[4]

Table 2.1

(b) Fig. 2.1 shows some undifferentiated plant cells, such as those found at the tips of roots and shoots.

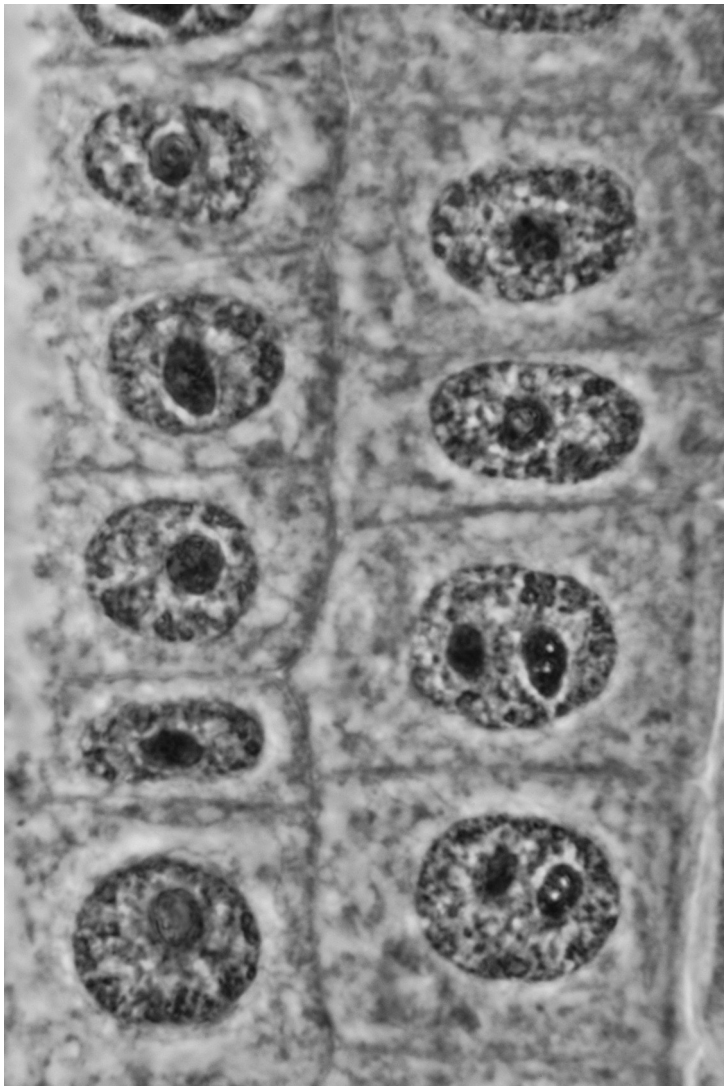


Fig. 2.1

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(i) Name the type of tissue that undergoes cell division to form these undifferentiated plant cells.

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

(ii) State the features shown in Fig. 2.1 that would **not** be found in mature xylem vessels.

.....

.....

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

(iii) Describe how the structure of the cell walls in xylem vessels would differ from the cell walls shown in Fig. 2.1.

.....

.....

.....

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

(c) Name **two** types of cell that can be found in **phloem** tissue.

.....

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

[Total: 11]

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3 **(a)** **(i)** Name the **two** types of epithelial tissue found in the lungs and airways.

.....

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

(ii) The epithelial cells in the lungs are arranged into structures called alveoli.

Explain how the alveoli create a surface for efficient gaseous exchange.



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

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

(b) To improve gaseous exchange, the air in the alveoli is refreshed by ventilation. The air movement created by ventilation can be recorded using suitable apparatus.

(i) Name the apparatus used to record these air movements.

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

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Fig. 3.1 shows a trace recorded from this apparatus.

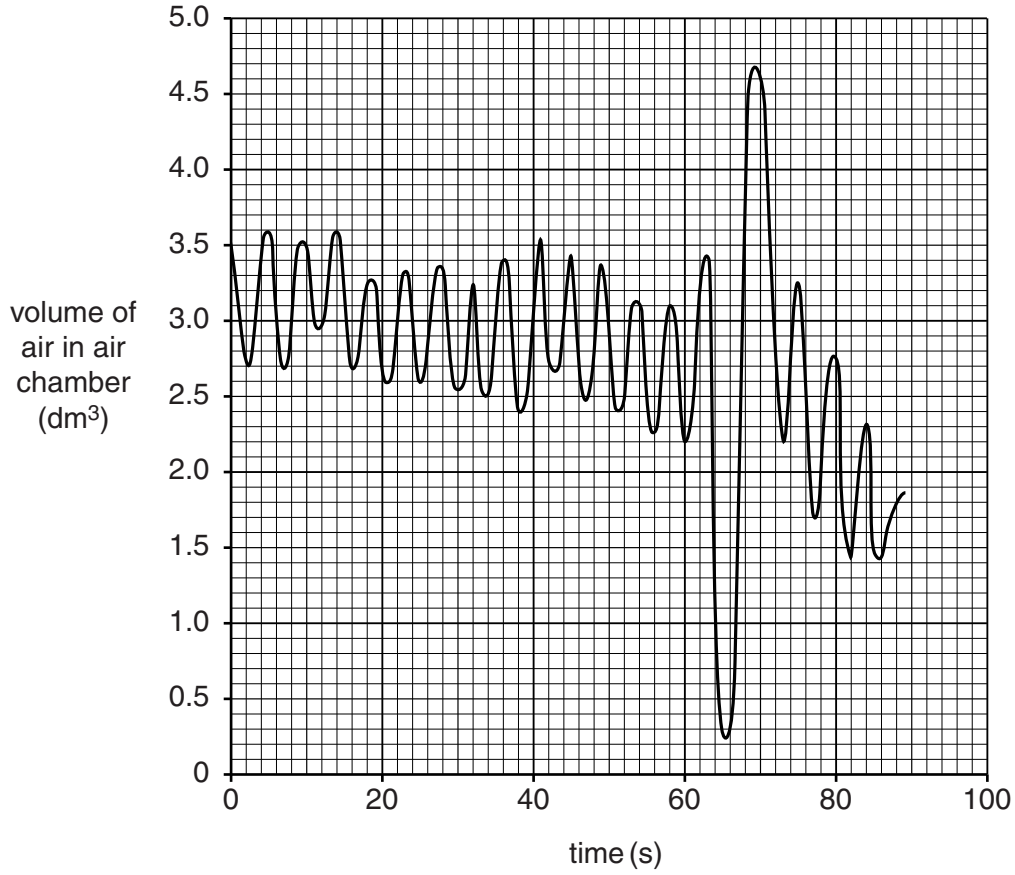


Fig. 3.1

(ii) Calculate the rate of breathing over the first minute from the trace.

answer = ... breaths per minute **[1]**

(iii) Using the trace, calculate the rate of oxygen consumption over the first minute.

Show your working.

answer = ... $dm^3\ min^{-1}$ **[2]**

[Total: 11]

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4 **(a)** Describe the structure of a plasma (cell surface) membrane.

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

(b) A student investigated the movement of substances through the cell surface membrane of yeast cells using an indicator.

- The student was supplied with a suspension of yeast cells in a slightly alkaline solution.
- The indicator used is yellow in alkaline conditions but turns red in acidic conditions.

The student mixed the indicator with the yeast suspension and labelled the tube containing this suspension **A**. The suspension was red/pink in colour.

(i) The student took a small sample from tube **A** and centrifuged this sample.

After centrifuging, the student observed that the liquid portion was colourless but the cells at the bottom were red/pink.

Suggest the mechanism by which the indicator enters the cells and suggest the component of the membrane involved.

mechanism .....

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

(ii) The student took a small sample from suspension **A** and added alkaline ammonia solution. There was no colour change.

What could the student conclude about the permeability of the yeast plasma membrane?

.....

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

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(iii) The student then took another sample from suspension **A** and boiled it. When this boiled suspension was centrifuged the liquid portion was yellow and the cells at the bottom were red/pink.

The student suggested that the liquid in the suspension was yellow because boiling the yeast had damaged the plasma membrane, allowing the indicator out of the cells.

Describe the effect of high temperature on the structure of the yeast cell membranes.



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

.....

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

[Total: 10]

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5 (a) Table 5.1 and Table 5.2 list events that occur during the cardiac cycle.

Each event in Table 5.1 is immediately followed by one of the events listed in Table 5.2.

Complete Table 5.1 by inserting the appropriate letters of the events from Table 5.2.

The first row has been completed for you.

Event in the order in which they occur	**Letter describing the event that follows**
atrial walls start to relax	D
sinoatrial (SA) node generates electrical signals	
atrioventricular (AV) node receives electrical signals from SA node	
ventricle walls start to contract	
ventricle walls relax	

Table 5.1

Event	**Letter**
atrioventricular valves close	A
semilunar valves close	B
walls of atria contract	C
ventricle walls start to contract	D
electrical signals transmitted down septum	E

Table 5.2

[4]

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(b) Fig. 5.1 shows a normal ECG trace. The electrical activity of the heart is measured in millivolts (mV).

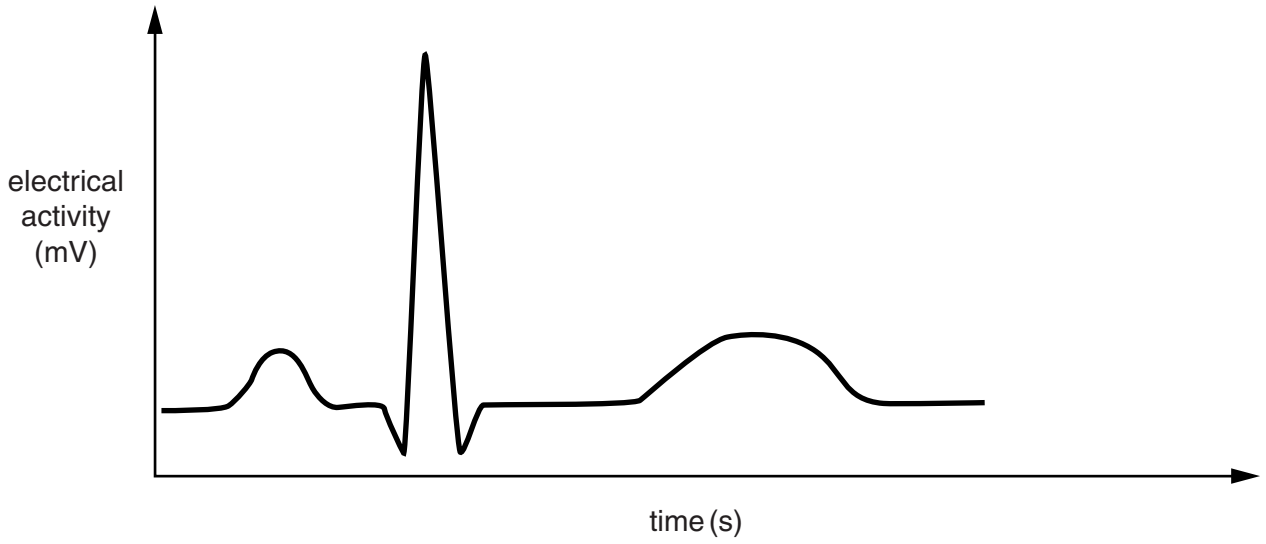
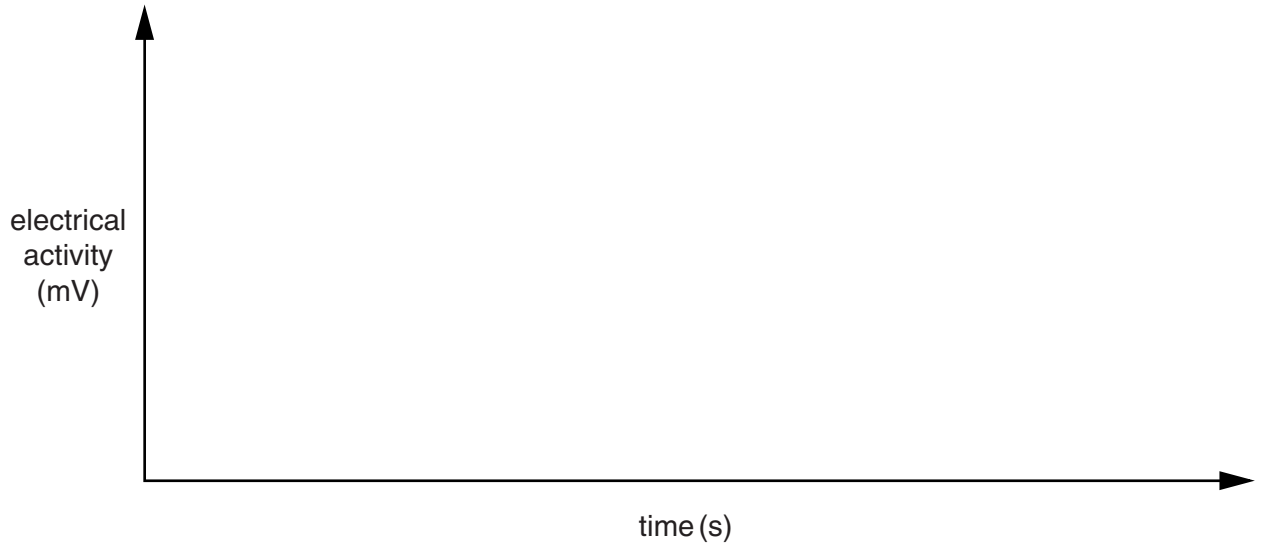


Fig. 5.1

In a condition known as supraventricular tachycardia, electrical signals leak from the atrial walls directly to the top of the ventricles. This causes the ventricle walls to contract twice for every atrial contraction.

(i) Using the axes below, sketch an ECG trace that might be expected in a patient with this condition.



[1]

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(ii) Suggest and explain what effect supraventricular tachycardia might have on blood flow from the heart.

.....

.....

.....

.....

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

(c) The blood circulatory system of a mammal undergoes changes at, or soon after, birth.

(i) One of these changes is that the foramen ovale, a hole in the septum between the right and left atria, closes. In the fetus, the foramen ovale allows blood to flow directly from the right atrium to the left atrium.

Suggest why the foramen ovale is open in the fetus before birth.

.....

.....

.....

.....

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

(ii) Another change occurring after birth is that fetal haemoglobin is replaced with adult haemoglobin.

State one difference between fetal haemoglobin and adult haemoglobin **and** give one reason why this difference is essential to the fetus.

difference .....

.....

reason .....

.....

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

[Total: 11]

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6 **(a)** Table 6.1 gives the functions of certain organelles in a eukaryotic cell.

Complete the table by stating the function associated with each organelle.

The first row has been completed for you.

Organelle	Function
nucleus	contains the genetic material
smooth endoplasmic reticulum	....
lysosome	....
ribosome	....

[3]

Table 6.1

(b) One theory about the evolution of organelles is the endosymbiotic theory. This theory suggests that the mitochondria and chloroplasts found in eukaryotic cells represent formerly free-living bacteria that were absorbed into a larger cell.

The following list describes a number of features of mitochondria and chloroplasts.

Place a tick (✓) next to the **three** statements that could be used as evidence for the endosymbiotic theory.

- mitochondria contain ribosomes that are smaller than those found in the cell cytoplasm ☐
- chloroplasts contain chlorophyll and other photosynthetic pigments ☐
- mitochondria are a similar size to bacteria ☐
- the inner membrane of a mitochondrion is folded to form cristae ☐
- chloroplasts contain many disc-shaped membranes called thylakoids ☐
- chloroplasts have their own circular DNA ☐

[3]

[Total: 6]

END OF QUESTION PAPER

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ADDITIONAL ANSWER SPACE

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

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ADDITIONAL ANSWER SPACE

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