OCR
Oxford Cambridge and RSA

Thursday 26 May 2016 – Afternoon

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

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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 **20** pages. Any blank pages are indicated.

Answer **all** the questions.

1 *Amoeba proteus* is a single-celled organism that lives in freshwater habitats. Fig. 1.1 is a drawing of *A. proteus*.

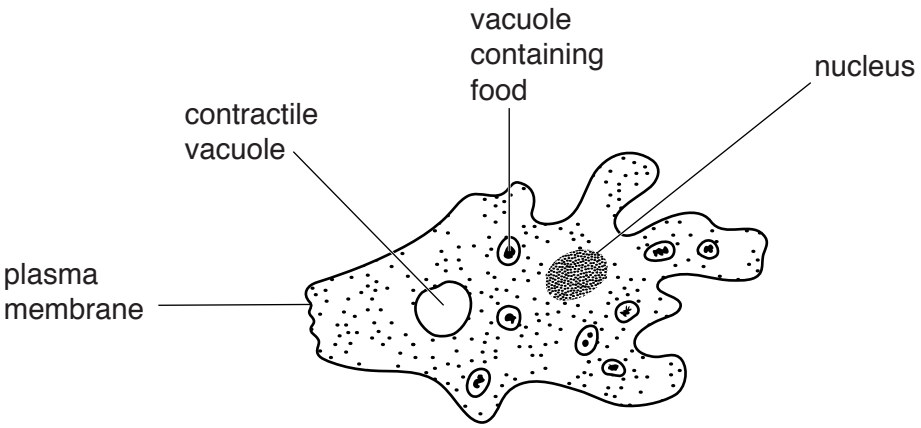

Fig. 1.1

(a) Explain why an *Amoeba* does **not** need a specialised surface for gaseous exchange.

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

(b) State **one** feature shown in Fig. 1.1 that would **not** be present in a prokaryotic cell.

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

(c) One role of the plasma membrane is to act as a barrier between the cell and its surroundings.

(i) Which component of the plasma membrane acts as a barrier to mineral ions entering the cell?

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

(ii) Describe **two other** roles of membranes in an *Amoeba*.

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

(d) Water continually enters an *Amoeba* from its surroundings. The contractile vacuole is an organelle that collects water from inside the cell and expels it from the cell. The contractile vacuole expands as it collects water and then fuses with the plasma membrane to release the water from the cell.

(i) Name the process by which water is expelled from the *Amoeba*.

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

(ii) What would happen to an *Amoeba* if it had no contractile vacuole?

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

(e) A student investigated the activity of the contractile vacuole when an *Amoeba* was placed in solutions of different water potential.

The student placed the *Amoeba* in each solution and counted the number of times the contractile vacuole filled and emptied in the first minute. The results are shown in Table 1.1.

Water potential surrounding *Amoeba* (kPa)	**Number of times the contractile vacuole filled and emptied in the first minute**
0	19
–100	14
–200	9
–300	5
–400	2
–500	0

Table 1.1

Explain why the contractile vacuole emptied more frequently when the water potential surrounding the *Amoeba* was –100 kPa compared to when the water potential was –400 kPa.

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

[Total: 10]

2 **(a)** Stem cells can specialise to form a variety of cell types.

What other feature is shown by stem cells but not by specialised cells?

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

(b) Table 2.1 lists a number of specialised cells found in the gaseous exchange system of a mammal.

Complete the table to describe the function of each type of specialised cell.

Specialised cells	Function of cells in the gaseous exchange system
Ciliated cells	....
Goblet cells	....
Smooth muscle cells	....
Squamous epithelial cells	....

Table 2.1

[4]

(c) Plants also contain specialised cells.

Cells in the phloem are specialised so that translocation can occur.

What is meant by translocation?

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

[Total: 7]

3 Table 3.1 lists the **maximum** magnification and resolution of three different types of microscope.

Microscope	Magnification	Resolution (nm)
X	×1500	200
Y	×100 000	20
Z	×500 000	1

Table 3.1

(a) Which microscope, **X**, **Y** or **Z**, is a **transmission** electron microscope?

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

(b) Fig. 3.1(a) and Fig. 3.1(b) below show root hairs on the surface of roots. The two images were taken using different types of microscope.

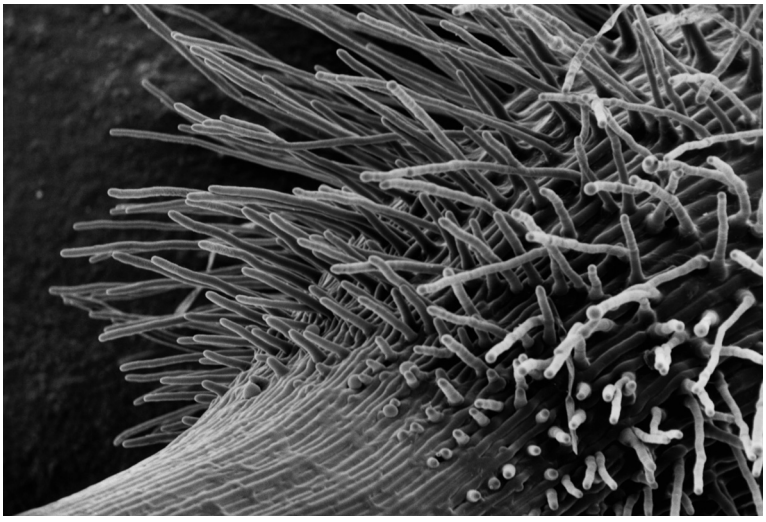

Fig. 3.1(a)

Fig. 3.1(b)

One of the images was taken using a scanning electron microscope.

Identify which image, **Fig. 3.1(a)** or **Fig. 3.1(b)**, was taken using a scanning electron microscope.

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Justify your choice.

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

(c) Complete the following paragraph about the transport of water across the root cortex.

Water can follow different pathways from the epidermis to the xylem in the root.

In the apoplast pathway, water passes between the cells and through the ..... .

In the symplast pathway, water enters the cell cytoplasm by osmosis and passes from cell to cell via specialised cell junctions called ..... .
At the ..... layer, water passing between the cells must enter the symplast pathway because passage between the cells is blocked by the ..... . **[4]**

Question 3(d) begins on page 8

(d) The uptake of water from the soil is dependent upon its availability. Some plants living in habitats where water is not easily available are adapted to conserve water.

As part of an investigation, a student measured the surface area of a sample of leaves. The student selected leaves from a variety of habitats, placed each leaf on graph paper and drew the outlines. The outlines are shown in Fig. 3.2.

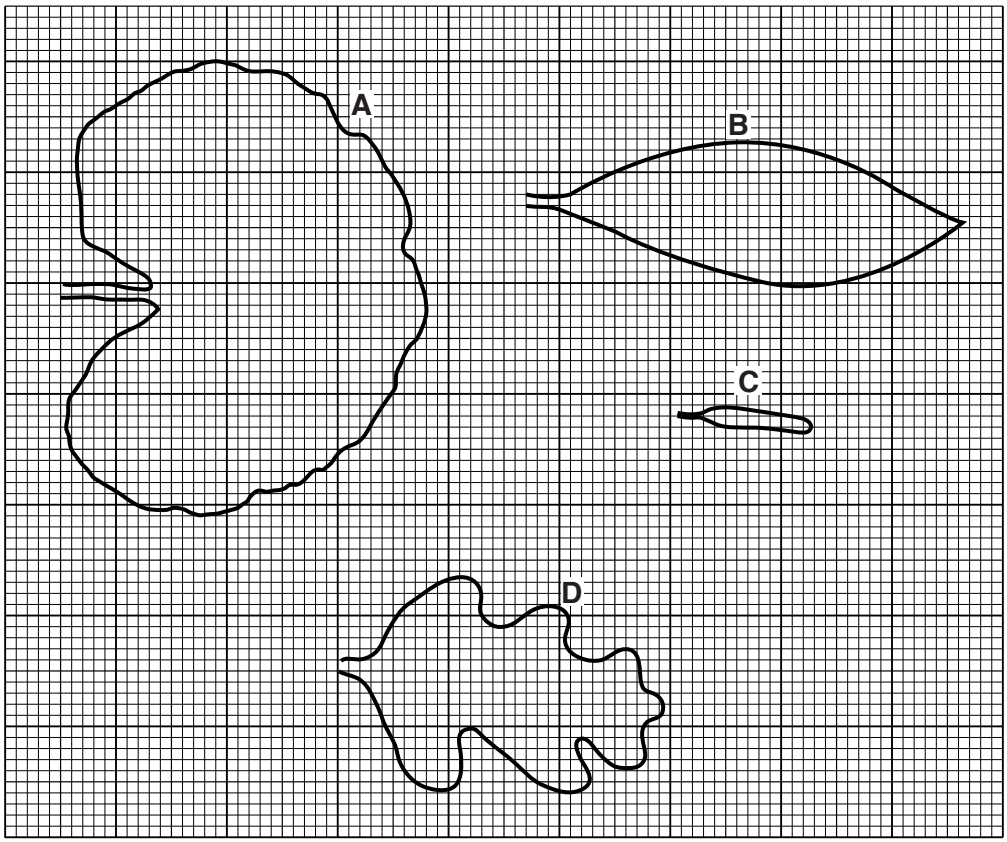

Fig. 3.2

(i) Which leaf, **A**, **B**, **C** or **D**, is most likely to have come from a plant adapted to living in a habitat with low water availability?

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

(ii) Explain the reason for your choice in **(i)**.

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

(iii) State **one other** adaptation that leaves might have to conserve water.

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

(e) One environmental factor that affects the loss of water **vapour** from the leaves is air movement.

Explain how increased air movement increases the loss of water vapour from the leaves.

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

[Total: 12]

4 **(a)** Cells are usually stained before viewing under a light microscope.

Explain why cells need to be stained.

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

(b) Fig. 4.1, **on the insert**, shows a cell during mitosis.

(i) Name the stage of mitosis shown.

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

(ii) From the start of mitosis, describe the events that have taken place in this cell to enable it to reach the stage shown in Fig. 4.1.

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

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

(c) Mitosis occupies only a small part of the cell cycle.

Outline the events that take place in the rest of the cell cycle.

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

[Total: 11]

5 Mosses are small plants with no true roots. Each plant is anchored by simple root-like structures which do not contain vascular tissue.

The leaves of moss plants are usually one cell thick and are attached to a thin stem. Neither the leaves nor stem contain vascular tissue.

Fig. 5.1 shows a leaf from a typical moss plant.

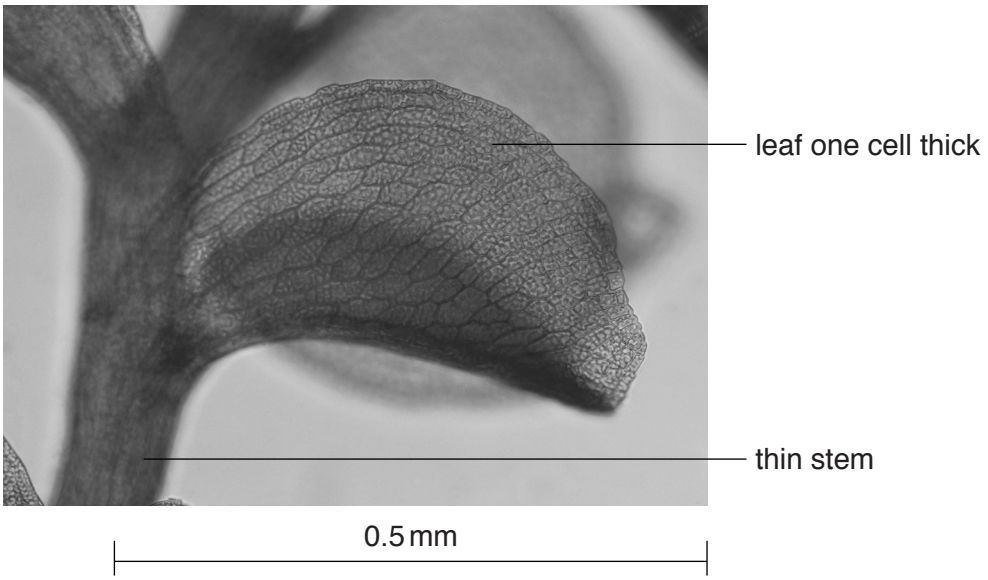

Fig. 5.1

(a) Suggest **and** explain how the absence of vascular tissue might affect the size to which moss plants can grow.

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

(b) Although a moss plant has no vascular tissue, water still moves through the plant from the root-like structures to the leaves.

Use your knowledge of the mechanisms of water transport to explain the movement of water through the moss plant.

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

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

(c) **(i)** What is meant by the term *tissue*?

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

(ii) Leaves of dicotyledonous plants contain types of cells that are not found in the leaves of mosses, such as that shown in Fig. 5.1.

Other than the cells found in vascular tissues, name **two** types of cell found in the leaves of dicotyledonous plants that are not found in the leaves of mosses.

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

[Total: 10]

6 Fig. 6.1, **on the insert**, shows a small artery. These small arteries are found linking the larger arteries with the arterioles that carry blood into the capillary beds of an organ or tissue.

(a) Calculate the thickness of the wall of the artery between the points marked **A** and **B** on Fig. 6.1.

Show your working and express your answer to the nearest **micrometre**.

Answer = ... μm **[2]**

(b) Table 6.1 contains a number of statements that can be used to explain some features of the mammalian heart and blood vessels.

A	Both atria pump blood into the ventricles.
B	The pressure is very high.
C	The left ventricle wall creates higher pressure than the right ventricle wall.
D	The pressure fluctuates a lot.
E	Mammals have a double circulatory system.
F	The muscle contracts to maintain blood pressure.
G	The ventricles are larger than the atria.

Table 6.1

Table 6.2 lists some structural features of the heart or blood vessels.

Select the most appropriate statement, **A** to **G**, from Table 6.1 (on page 14) to explain each feature.

The first one has been completed for you.

Structural features of the heart or blood vessels	Statement (A to G)
The wall of the left ventricle is two to three times thicker than the wall of the right ventricle.	**C**
Small arteries have muscular walls.	
The wall of the left atrium is the same thickness as the wall of the right atrium.	
Arteries close to the heart have a lot of elastic tissue in their walls.	
There is a septum that divides the left side of the heart from the right.	

Table 6.2

[4]

Question 6(c) begins on page 16

(c) Fig. 6.2 shows a **transverse** section through the heart.

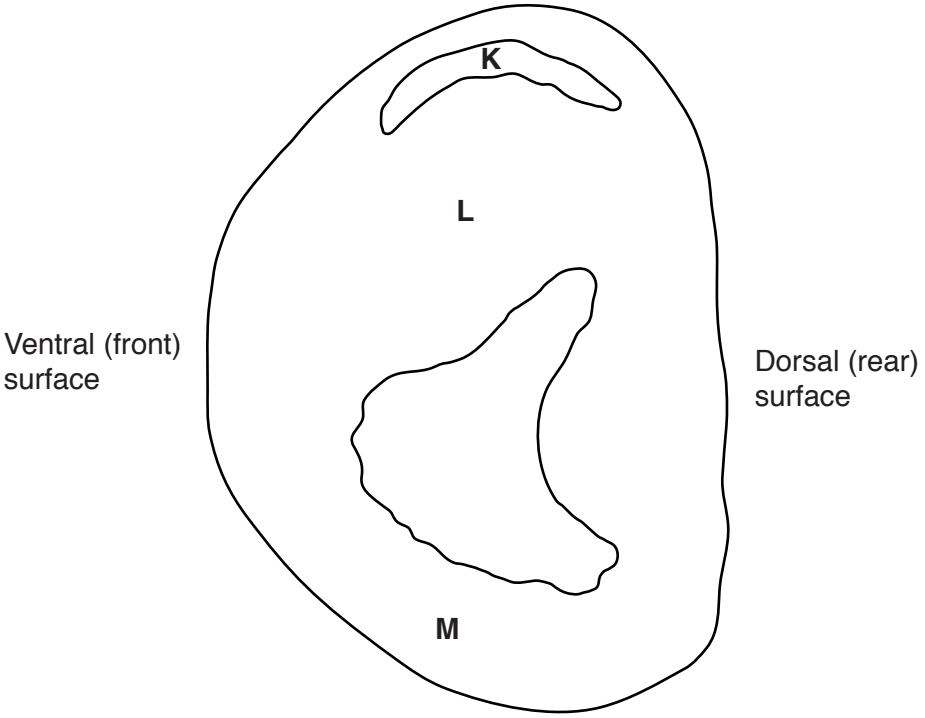
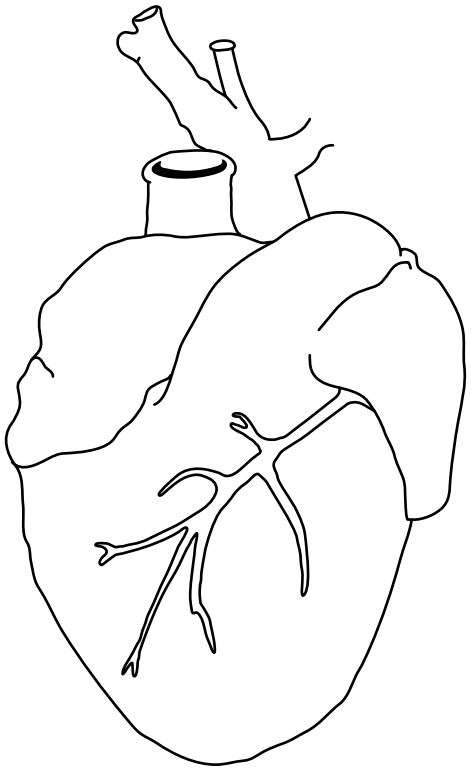


Fig. 6.2

(i) **On the diagram below** draw a line to show where the section in Fig. 6.2 has been taken.



[1]

(ii) Identify the features represented by **K**, **L** and **M** on Fig. 6.2.

K .....

L .....

M .....

[3]

[Total: 10]

END OF QUESTION PAPER

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 margin(s).

ADDITIONAL ANSWER SPACE

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