OCR
Oxford Cambridge and RSA

Thursday 25 May 2017 – 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

* F 2 1 1 0 1 *

* 1 1 6 9 7 7 7 1 9 3 *

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- The insert will be found inside 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(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

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 The cell is surrounded by a plasma (cell surface) membrane. Substances entering or leaving the cell must pass through this membrane.

(a) (i) State what is meant by the term *partially permeable barrier* as applied to the plasma (cell surface) membrane.

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

(ii) What is the main component of the plasma (cell surface) membrane that acts as a barrier to the movement of charged particles (ions)?

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

(iii) In order for certain cellular activities to take place, charged particles need to move across the plasma (cell surface) membrane.

Describe how charged particles can move across this membrane.

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

(b) (i) Explain what is meant by the term *osmosis*.

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

(ii) A gardener wants to kill weeds growing in his garden. He puts a small amount of salt onto each weed and this kills them.

Explain how the salt kills the weeds.

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

[Total: 11]

2 A student investigated the sizes and shapes of leaves of different plants. The student:

- measured the length, width and thickness of a number of leaves
- calculated the surface area to volume ratio of each leaf to the nearest whole number
- recorded the shape of each leaf.

Some of the student's results are shown in Table 2.1.

Length of leaf (mm)	Surface area (mm^2)	Volume (mm^3)	SA : Vol ratio	Shape of leaf
50	4080	1964	2	nearly-round
100	16024	7855	2	nearly-round
50	157	39	4	needle-shaped

Table 2.1

(a) Use the information in Table 2.1 to answer the following questions.

(i) What is the effect on the surface area of increasing the length of the nearly-round leaves?

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

(ii) What is the effect on the surface area to volume ratio of increasing the length of the nearly-round leaves?

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

(b) **Using the data in Table 2.1**, describe how the surface area of a needle-shaped leaf compares with the surface area of a nearly-round leaf of the same length.

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

(c) While carrying out some research into xerophytes, the student read the following information on the internet:

> 'The leaves of xerophytes are adapted to reduce transpiration (the loss of water from the leaves). Many xerophytes have small leaves, often reduced to the shape of needles. This adaptation reduces the surface area to volume ratio of the leaf. A smaller surface area to volume ratio reduces the rate of transpiration.

(i) Why is the definition of transpiration given in this information **not** wholly accurate?

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

(ii) The information on the internet contains another error that can be identified by analysing the data in **Table 2.1**.

Identify the error **and** use the data to explain why the information is **not** correct.

error .....

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explanation .....

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[3]

(iii) The leaves of xerophytes have other adaptations that help the plants to survive in dry environments. Some of these adaptations are shown in the table below.

Complete the table.

The first row has been completed for you.

Adaptation	Explanation
Leaf rolled	This traps moist air in the enclosed space
Thick waxy cuticle	
	These reduce the movement of air over the surface of the leaf
Fewer air spaces in spongy mesophyll	

[3]

[Total: 11]

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PLEASE DO NOT WRITE ON THIS PAGE

3 Fig. 3.1 is a diagram of the external features of the mammalian heart.

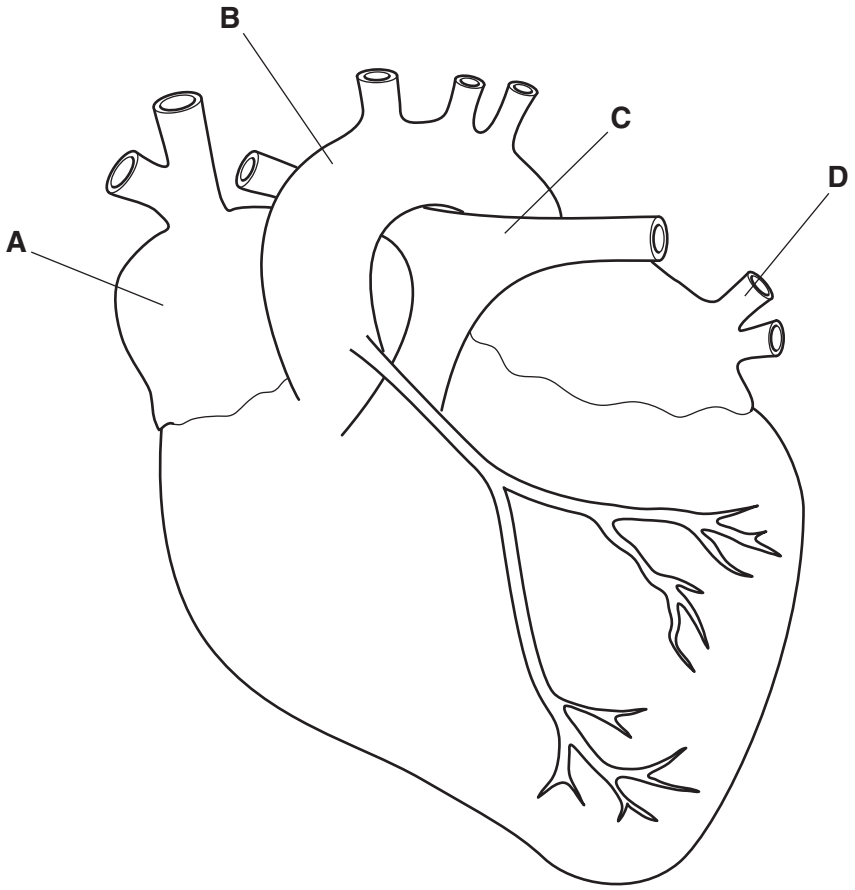

Fig. 3.1

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

A .....

B .....

C .....

D .....

[4]

(b) Explain why there are two vessels carrying blood away from the heart in a mammal.

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

(c) Explain why the left ventricle of the mammalian heart is larger than the right ventricle.

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

[Total: 10]

4 Scientists use different types of microscope for investigating the structure of cells.

(a) State the maximum resolution and magnification of a **light microscope**.

resolution .....

magnification .....

[2]

(b) Fig. 4.1 shows a diagram of a bacterium called *Eschericia coli (E. coli)*.

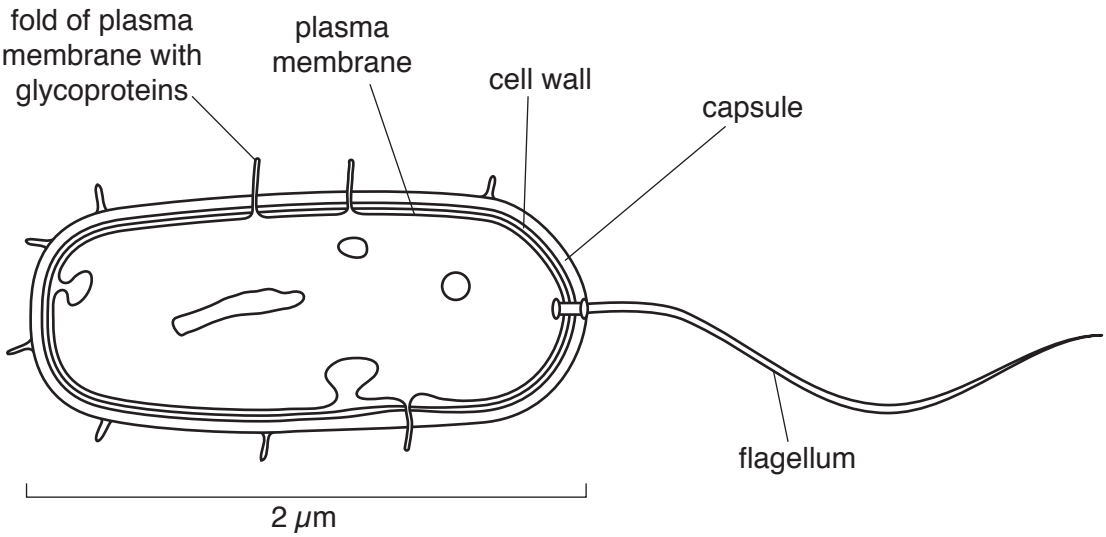

Fig. 4.1

(i) The true length of this bacterial cell, excluding the flagellum, is 2 µm.

Calculate the magnification of this image.

Show your working.

Answer = × ..... **[2]**

(ii) Fig. 4.1 was drawn from an image created by an electron microscope.

Explain why a scientist could not have drawn this diagram from a light microscope image.

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

(c) There are differences between bacterial cells and plant cells.

State how the cell wall and the ribosomes in a bacterium are different from those in a plant cell.

cell wall .....

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ribosomes .....

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[2]

(d) In 2011, an outbreak of *E. coli* food poisoning killed a number of people in Germany. A news article at the time included the following statement:

> 'This is a new strain of *E. coli* and the surface of the bacterium is adapted to stick to the surface of vegetables and to the lining of the human gut.'

Suggest how the bacterium might be adapted to sticking to cells lining the human gut.

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

[Total: 10]

5 **(a)** Some cells have the potential to transform into many types of cell and are capable of regenerating and repairing tissue.

(i) Name the type of cell that has the potential to transform into many types of cell.

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

(ii) Suggest where the type of cell in **(a)(i)** can be found in the human body.

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

(b) Differentiation is the term used to describe how a cell becomes specialised to perform a particular function.

Neutrophils and erythrocytes are two types of cell that differ in structure although they differentiate from the same source.

(i) Complete the table to show how these cells differ in structure by writing **present** or **absent** in each box.

Structural feature	Neutrophil	Erythrocyte
Nucleus		
Lysosomes		
Mitochondria		

[3]

(ii) Explain how **erythrocytes** are specialised to perform their function.

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

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

[Total: 9]

6 Fig. 6.1, **on the insert**, is a photomicrograph of a section through the lungs.

(a) (i) Name the type of airway shown in the photograph.

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

(ii) Name the tissues labelled **R**, **S** and **T**.

R .....

S .....

T .....

[3]

(b) The tissues labelled **R**, **S** and **T** contain different types of cell.

Describe and explain the functions of tissues **R** and **S** in the airway.

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

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

[Total: 9]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

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

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INSERT

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INSTRUCTION TO EXAMS OFFICER/INVIGILATOR

- Do not send this Insert for marking; it should be retained in the centre or recycled. Please contact OCR Copyright should you wish to re-use this document.

INFORMATION FOR CANDIDATES

- This Insert contains Fig. 6.1.
- This document consists of **2** pages. Any blank pages are indicated.

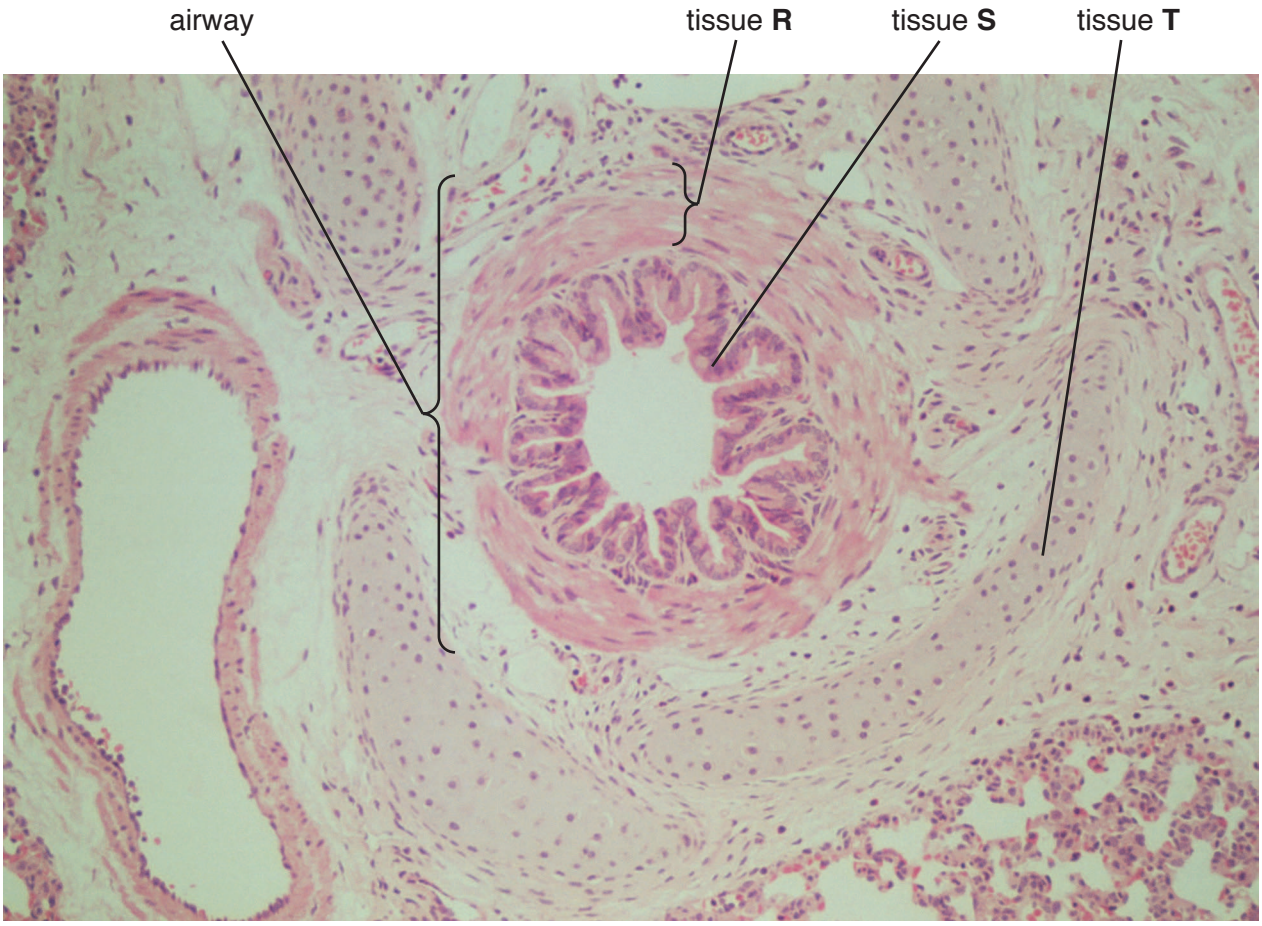

Fig. 6.1