OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

Advanced Subsidiary GCE

BIOLOGY

F211 QP

Unit F211: Cells, Exchange and Transport

Specimen Paper

Candidates answer on the question paper.
Additional Materials:

Scientific calculator

Time: 1 hour

Candidate Name	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use a scientific calculator.
- You are advised to show all the steps in any calculations.
- The total number of marks for this paper is **60**.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**12**	
2	**10**	
3	**13**	
4	**13**	
5	**12**	
TOTAL	**60**	

This document consists of **14** printed pages and **2** blank pages.

Answer **all** the questions.

1 The table below compares features of typical eukaryotic and prokaryotic cells.

(a) **(i)** Complete the table by placing one of the following, as appropriate, in each empty box of the table.

- a tick (✓)
- a cross (✖)
- the words 'sometimes present'

Some of the boxes have been completed for you.

	eukaryotic cell	prokaryotic cell
cell wall	sometimes present	✓
nuclear envelope	✓	
Golgi apparatus		✖
ribosomes		✓
flagellum	sometimes present	

(ii) Outline the roles of the Golgi apparatus and the ribosomes.

Golgi apparatus .....

.....

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

Ribosomes.....

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

(b) Fig. 1.1 is a diagram of a mammalian sperm cell.

Fig. 1.1

Explain how the structure of the sperm cell is specialised for carrying out its role.

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

(c)(i) Explain the meaning of the term *tissue*.

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

(ii) Name **one** example of a plant tissue.

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

[Total: 12]

2 Fig. 2.1 represents the structure of a plasma (cell surface) membrane.

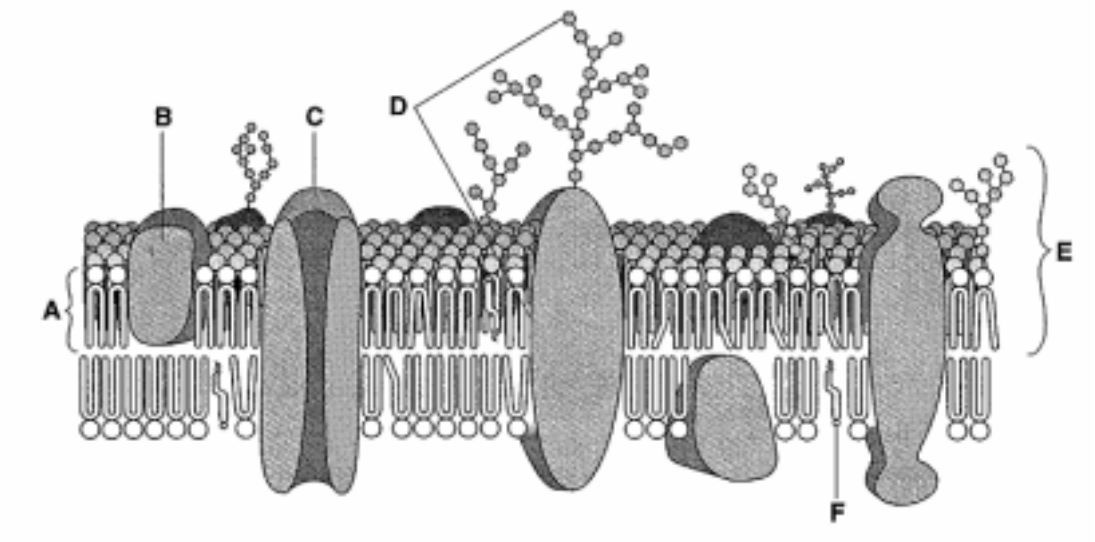

Fig. 2.1

(a) (i) Name molecules **A, B** and **F**.

In your answer you should spell the names of the molecules correctly.

A .....

B .....

F..... [3]

(ii) **E** represents the width of the plasma (cell surface) membrane in a typical animal cell.

State the approximate width of the membrane.

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

(b) (i) Describe the structure of molecule **A**.

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

(ii) State **one** function of molecule **C**.

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

(iii) Molecule **D** is a glycoprotein. This molecule consists of a protein embedded in the membrane with a branched carbohydrate chain projecting out from the surface of the cell.

Outline **three** roles of glycoproteins in membranes.

1.....

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2.....

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3.....

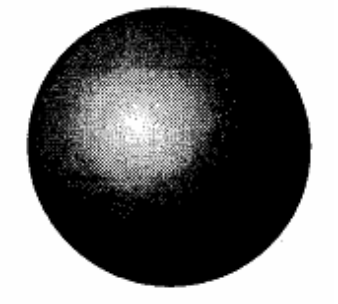
..... **[3]**

[Total: 10]

3 **(a)** A student investigated how the surface area of a single-celled organism is related to its volume. The student used two spheres, **A** and **B**, as models of two organisms. The surface area and volume of each sphere was calculated.

The results are shown in Table 3.1.

Table 3.1

	sphere **A**	sphere **B**
		
diameter / cm	1	3
surface area / cm^2	3.14	28.27
volume / cm^3	0.52	14.14

(i) The student calculated the surface area:volume ratio of sphere **B** as 2:1.

Calculate the surface area:volume ratio of sphere **A**. Show your working.

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

(ii) How does the surface area:volume ratio of sphere **B** differ from that of sphere **A**?

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

(iii) Single-celled organisms generally have a surface-area to volume ratio more like that of sphere **A** than sphere **B**.

Explain why.

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

(b) The lungs in the mammalian body are well developed to allow effective exchange of gases.

Describe the features of the lungs that make them effective organs for the exchange of gases.

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

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.... **[5]**

(c) Fig. 3.1 shows the trace from a spirometer. A spirometer is a device designed to measure the volume of air entering and leaving the lungs. A chamber in the spirometer contains soda lime to absorb the carbon dioxide released by respiration. The measurements shown were recorded from a healthy 17-year-old student at rest.

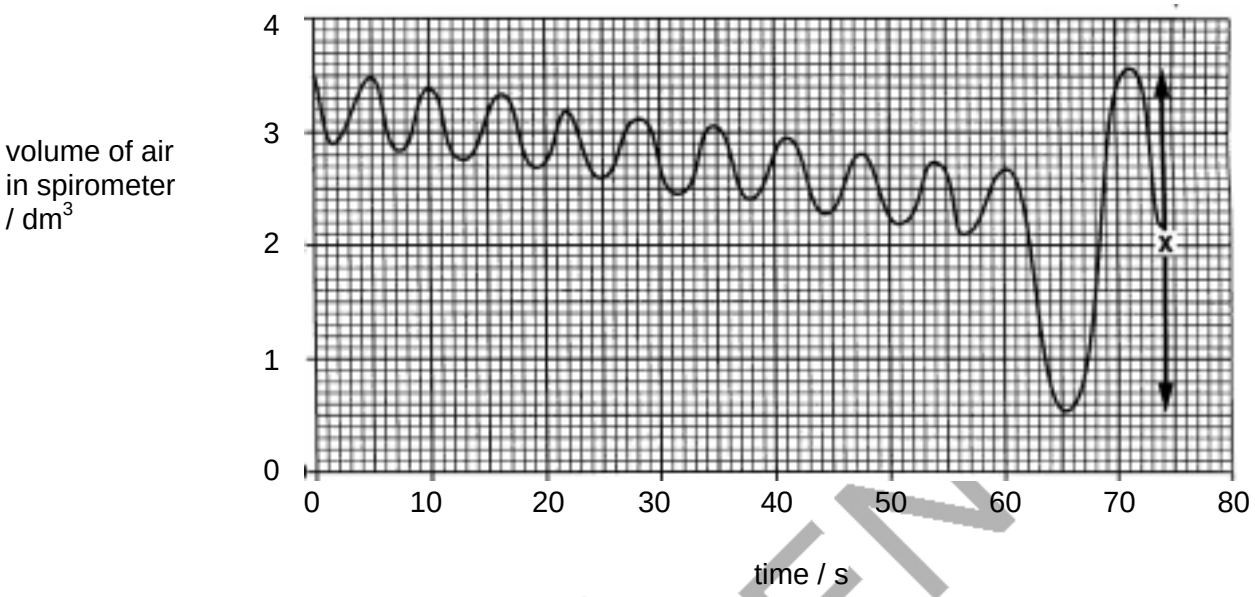

Fig 3.1

(i) Explain why the volume of air in the spirometer drops slowly over the first minute.

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

(ii) After one minute, the student was asked to breathe in as deeply as possible and then breathe out as much as possible.

The resulting change in the trace is shown in Fig. 3.2 as **X**.

State the term given to measurement **X**.

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

[Total: 13]

4 (a) The transport system in mammals is a double circulatory system driven by a pump (the heart).

Explain what is meant by a *double circulatory system*.

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

(b) Fig. 4.1 gives information about the relative thickness of the walls of three chambers of the heart:

- left ventricle
- right ventricle
- right atrium

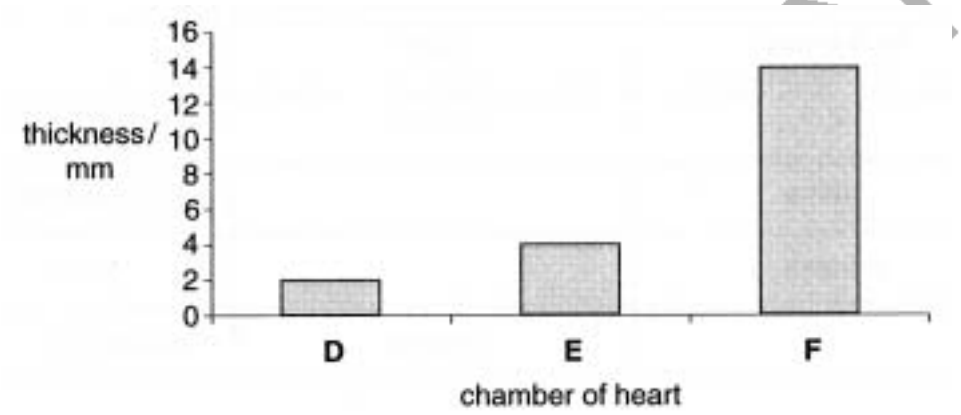

Fig. 4.1

(i) State which of these chambers are identified by the letters **D**, **E** and **F**.

D .....

E .....

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

(ii) Explain, with reference to its function, why the wall of chamber **F** is much thicker than the walls of chambers **D** and **E**.

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

[Turn over

(c) Use the most appropriate terms to complete the paragraph below about the role of haemoglobin in the mammalian blood.

Haemoglobin, a pigment found in the blood of mammals, has an important role in the transport of respiratory gases. Each haemoglobin molecule contains haem groups. In the lungs, oxygen binds with the atom of …… in each haem group. The maximum number of molecules of oxygen that can be carried by one molecule of haemoglobin is …… . In areas like muscle tissue where the partial pressure of oxygen is low, oxygen dissociates from the haem group. This dissociation is increased by the presence of carbon dioxide; this is called the …… …… . Most of the carbon dioxide produced in respiring tissues diffuses into the red blood cells where the enzyme …… …… catalyses a reaction leading to the production of hydrogen ions and hydrogen carbonate ions. The hydrogen ions combine very readily with haemoglobin to form a compound known as …… …… . The effect of this is to increase the release of oxygen from haemoglobin. **[5]**

[Total: 13]

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5 Transpiration is the loss of water from plants by evaporation. Fig. 5.1 shows a potometer, an apparatus used to **estimate** transpiration rates.

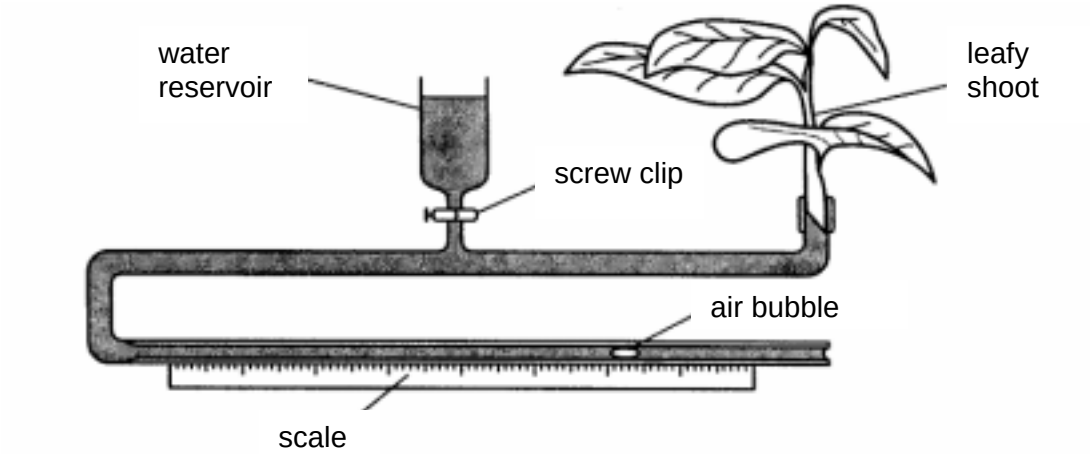

Fig. 5.1

(a) Transpiration itself is not measured directly by a potometer.

State what is measured by this apparatus.

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

(b) Describe how the apparatus should be set up to ensure that valid measurements can be made.

In your answer, you should make clear how the steps in the process are sequenced.

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..... **[7]**

(c) A student investigated the transpiration rates of two different plants **A** and **B**.

The results of the investigation are shown in Table 5.1.

Table 5.1

reading	estimate of transpiration rate / arbitrary units	
	plant **A**	plant **B**
1	45	107
2	39	99
3	41	106
4	46	101
5	38	103
mean	42	

(i) Calculate the mean estimated transpiration rate for plant **B**.

Express your answer to the nearest whole number and write it in the shaded box in Table 5.1. **[1]**

(ii) The student prepared a temporary slide of a transverse section through one of the leaves. Fig. 5.2 shows a diagram the student drew of the **lower epidermis** from one of the leaves.

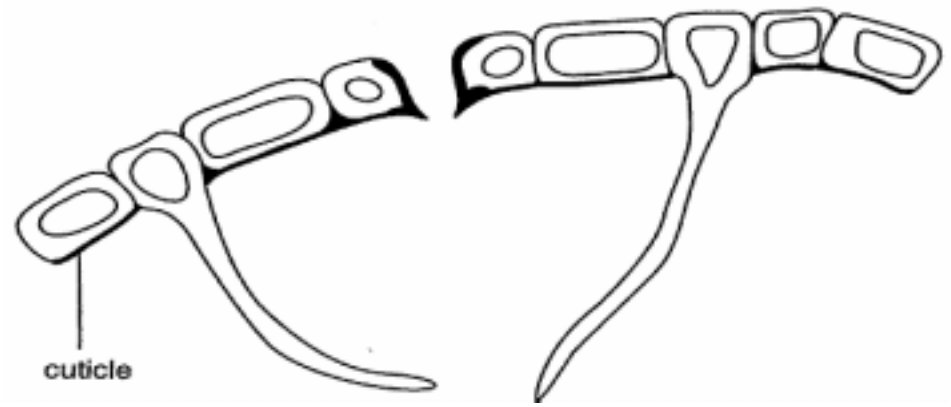

Fig. 5.2

State from which plant, **A** or **B**, the leaf was taken. Explain your answer.

Plant.....

Explanation.....

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

[Total: 12]

Paper Total [60]

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