OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE **2803/01**

BIOLOGY

Transport

TUESDAY 16 JANUARY 2007   **Afternoon**

Time: 45 minutes

Additional materials: Electronic calculator
                         Ruler (cm/mm)

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. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE

Qu.	Max.	Mark
1	10	
2	6	
3	15	
4	14	
TOTAL	45	

This document consists of **13** printed pages and **3** blank pages.

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2

Answer **all** the questions.

1 A student was studying the surface area to volume ratio of three unicellular organisms, **A**, **B** and **C**, from the same habitat. Fig. 1.1 shows the three organisms and some of the calculations the student made.

	A	B	C
scale: ├──────┤ 0.075 mm			
surface area / mm²	0.28	3.1	23
volume / mm³	0.02	0.59	11.3
surface area to volume ratio	14:1		2:1

Fig. 1.1

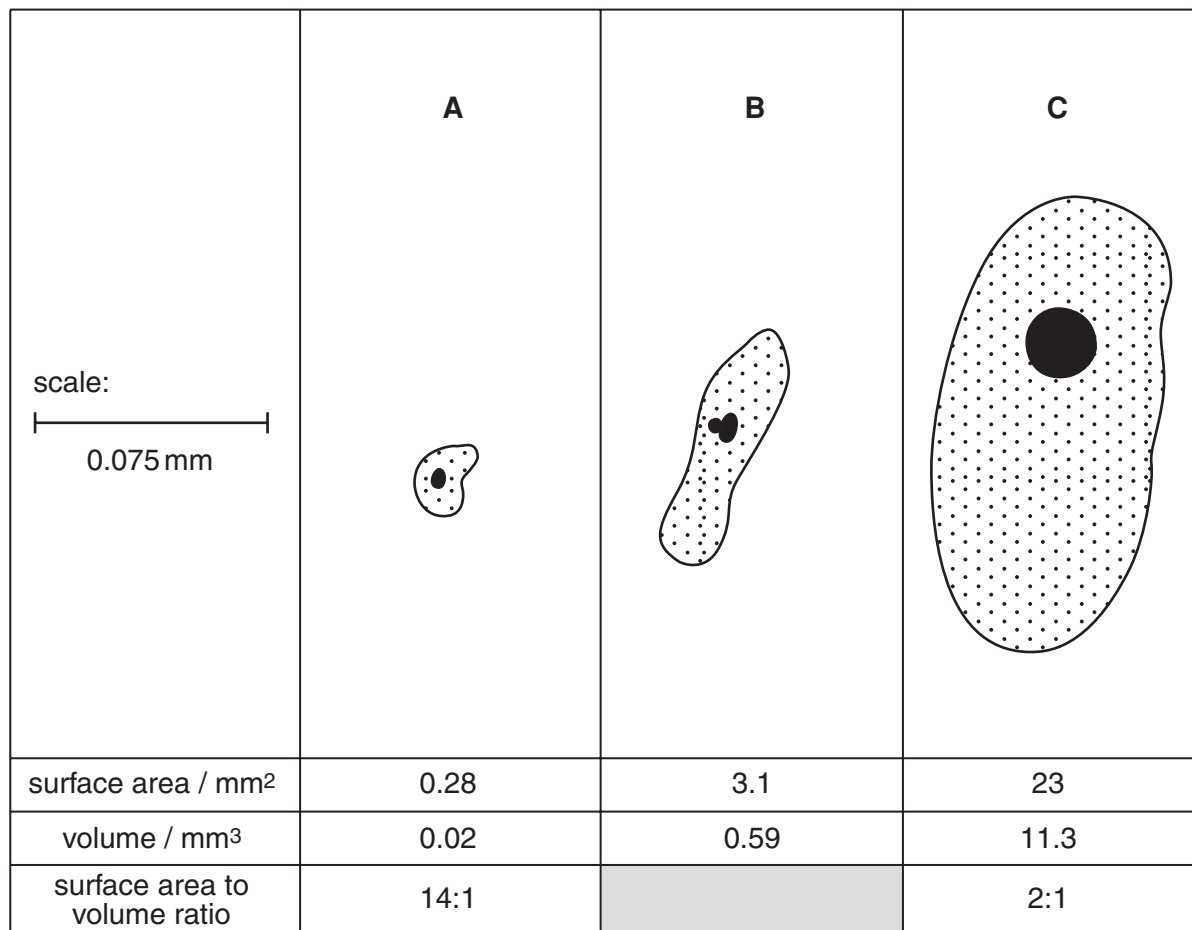(a) (i) Calculate the surface area to volume ratio for organism **B to the nearest whole number**.

Write your answer in the shaded box in Fig. 1.1. [1]

(ii) By how many times does the surface area to volume ratio for organism **C** differ from that for organism **A**?

....[1]

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3

(b) The student determined the rate of oxygen uptake for the three organisms in cm^3 of oxygen $g^{-1} h^{-1}$. The student found that the results were:

$1.0 \, cm^3 \, g^{-1} h^{-1}$

$0.5 \, cm^3 \, g^{-1} h^{-1}$

$7.0 \, cm^3 \, g^{-1} h^{-1}$

State which of the three figures is most likely to be the value for the rate of oxygen uptake for **organism C**.

....[1]

(c) None of the organisms **A**, **B** or **C** has a transport system.

Explain why organisms larger than organism **C** need to have transport systems.

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....[3]

[Turn over

4

(d) Fig. 1.2 shows the detailed structure of a small part of the mammalian lung.
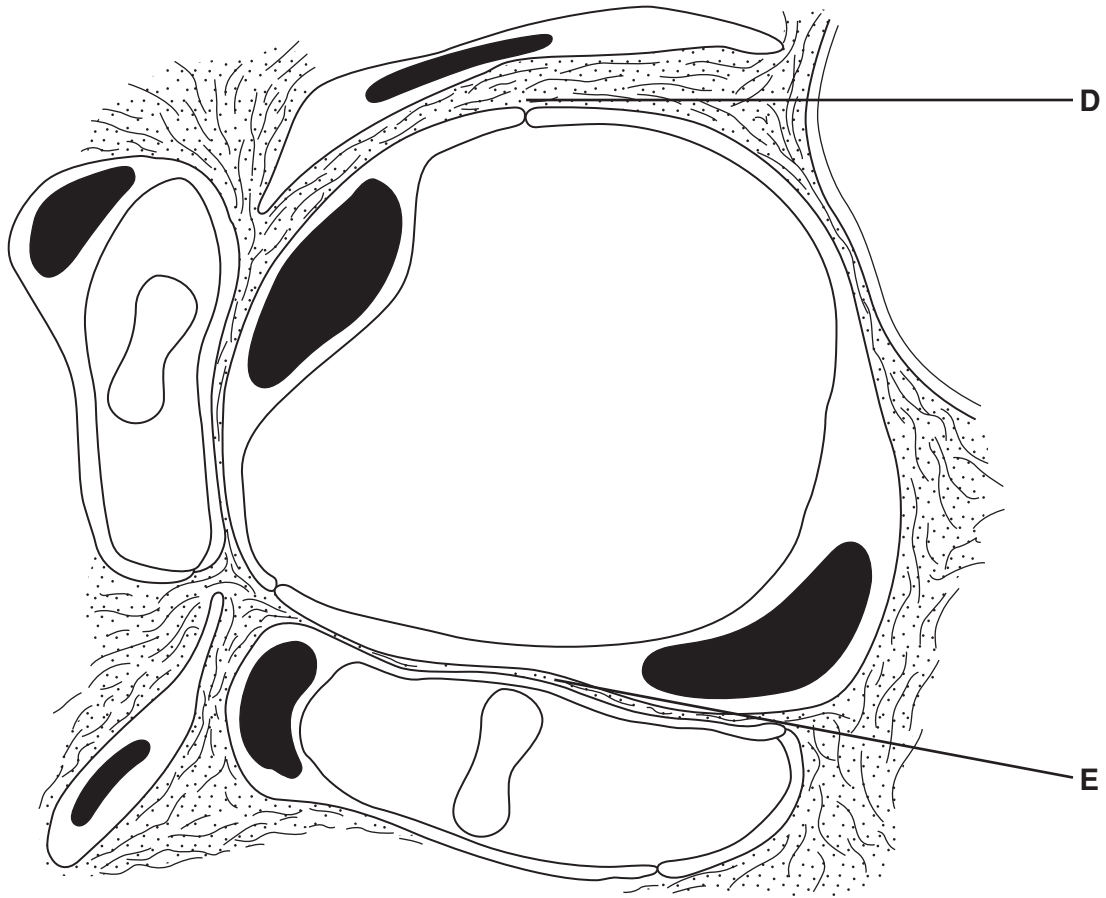
Fig. 1.2

(i) State the name of the structure shown between lines **D** and **E**.

....[1]

(ii) List **three** features of the structure which you have identified in **(i)** which make it suitable for gas exchange.

1 ....

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2 ....

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3 ....

....[3]

[Total: 10]

2   Table 2.1 contains some terms or names of structures related to the mammalian heart and circulatory system.

Complete Table 2.1 by selecting the statement from the list **A** to **I** below that best matches the term or structure in the table.

The first one has been done for you.

You may use each letter once, more than once or not at all.

Table 2.1

term or structure	statement
a closed system	**A**
a double circulation	
Purkyne tissue	
fibrous tissue between the atria and the ventricles	
atrioventricular node (AVN)	
sinoatrial node (SAN)	
coronary artery	

A   the blood flows in vessels

B   the left and right side of the heart contract at different times

C   transmits waves of excitation to the base of the heart

D   initiates the cardiac cycle

E   is unable to conduct waves of excitation

F   carries oxygen to the heart muscle

G   conducts waves of excitation over the walls of the ventricles

H   blood passes twice through the heart for one complete circuit of the body

I   delays transmission of the waves of excitation by about 0.1 s   [6]

[Total: 6]

[Turn over

3 Fig. 3.1 is a photograph of blood showing both red and white blood cells.
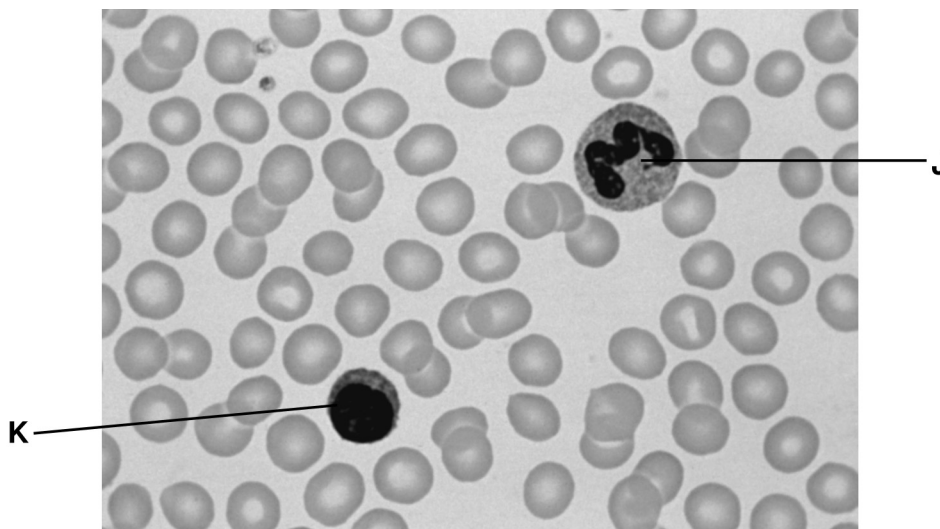
© Ed Reschke, Peter Arnold Inc / Science Photo Library

Fig. 3.1

(a) Complete the table below to give the name and function of the white blood cells labelled **J** and **K**.

cell	name	function
J		
K		

[4]

7

(b) In this question, one mark is available for the quality of spelling, punctuation and grammar.

Describe how red blood cells, such as those shown in Fig. 3.1, are adapted for their function.

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....[6]

Quality of Written Communication [1]

[Turn over

8

(c) Athletes often train at high altitudes for several weeks before competing in events at sea level.

Explain how this training may improve the performance of these athletes.

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....[4]

[Total: 15]

9

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4   Transpiration may be defined as the loss of water vapour by diffusion from a plant to its environment.

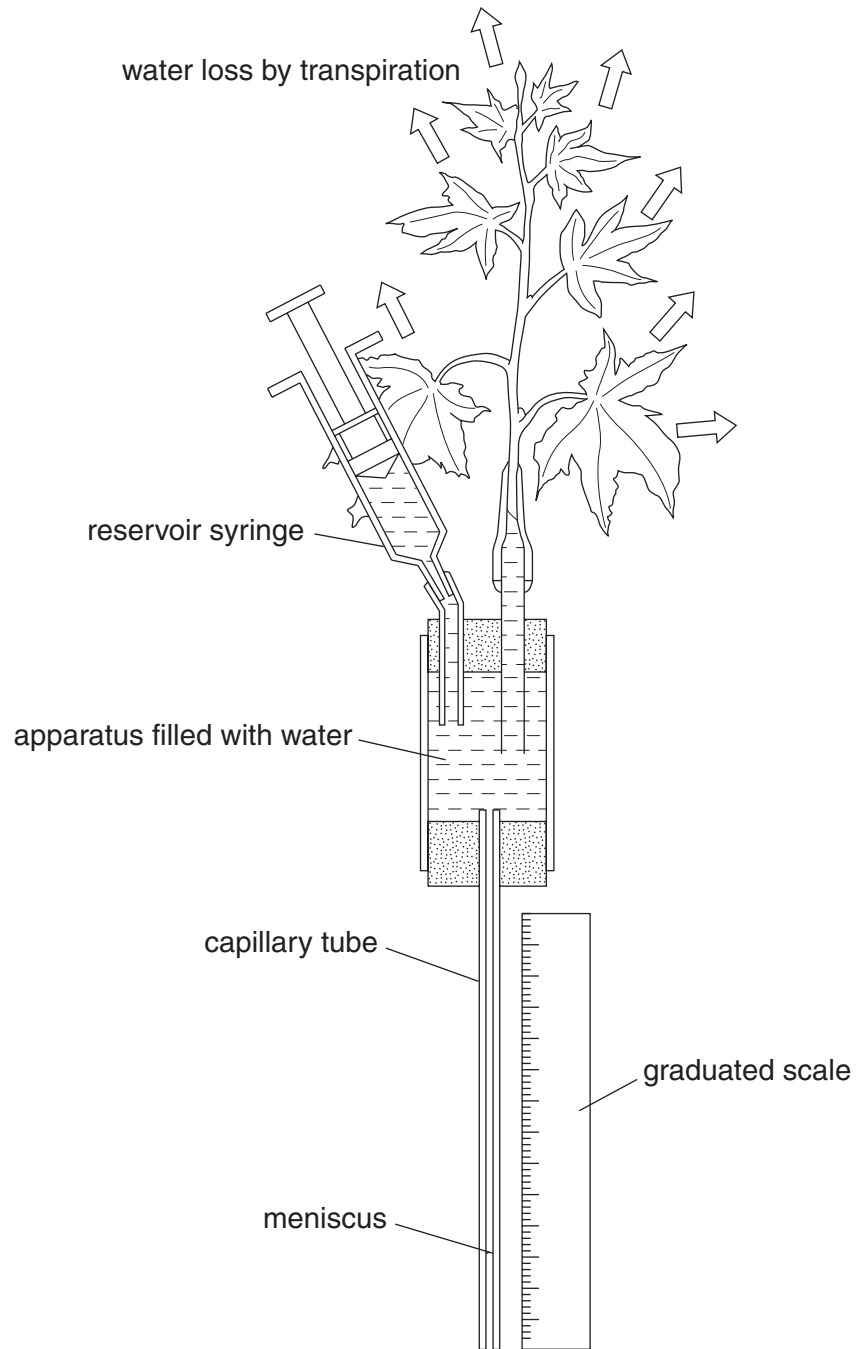Fig. 4.1 shows apparatus that can be used to estimate transpiration rates of a leafy shoot.

Fig. 4.1

11

(a) (i) State the name of the apparatus shown in Fig. 4.1.

....[1]

(ii) A student was told that any results gained by using the apparatus shown in Fig. 4.1 are not measures of the actual transpiration rate, but only give values from which transpiration can be **estimated**.

With reference to the definition of transpiration **and** the apparatus in Fig. 4.1, explain why the results gained by using the apparatus are **not** measures of the actual transpiration rate.

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....[3]

(iii) Describe the precautions you would take when setting up and using the apparatus shown in Fig. 4.1 in order to get valid readings from which the transpiration rate can be estimated.

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....[4]

[Turn over

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(b) Fig. 4.2 shows the results gained from an experiment to compare the rates of transpiration in two species, **P** and **Q**. Both species were kept under the same conditions during the course of the experiment.
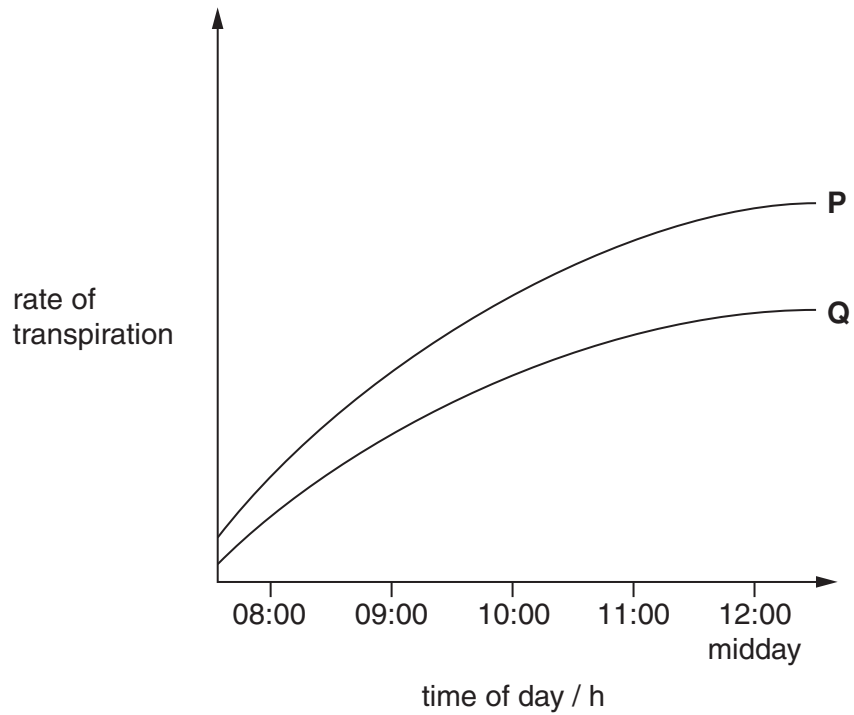

Fig. 4.2

(i) Give **two** possible explanations for the increase in the rate of transpiration in **both** species **P** and **Q** over the course of the experiment.

1 ....

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2 ....

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....[4]

(ii) Species **P** has smaller leaves than species **Q**. The student had predicted that the rate of transpiration would be **lower** in **P** than in **Q** due to its smaller leaves.

Suggest and explain one possible reason why the results are **not** as the student predicted.

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....[2]

[Total: 14]

END OF QUESTION PAPER

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