OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

BIOLOGY
Transport

2803/01

| Monday | **16 JANUARY 2006** | Afternoon | 45 minutes |

Candidates answer on the question paper.
Additional materials:
 Electronic calculator
 Ruler (cm/mm)

Candidate Name

Centre Number

Candidate Number

TIME 45 minutes

INSTRUCTIONS TO CANDIDATES

* Write your name in the space above.
* Write your Centre number and Candidate number in the boxes above.
* Answer **all** the questions.
* Write your answers, in blue or black ink, in the spaces provided on the question paper.
* Pencils may be used for diagrams or graphs **only**.
* Read the questions carefully before starting your answer.
* Do not write in the bar code. Do not write in the grey area between the pages.
* **DO NOT** WRITE IN THE AREA **OUTSIDE** THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

* The number of marks 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.
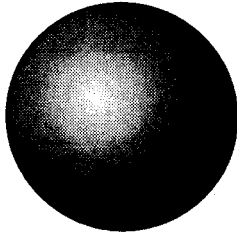
FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	8	
2	14	
3	16	
4	7	
TOTAL	45	

This question paper consists of 12 printed pages and 4 blank pages.

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[Turn over

Answer all the questions.

1 A student was told by a teacher that the surface area to volume ratio (SA:V ratio) of an organism varies according to its size. The student decided to investigate this using two spheres, **A** and **B**, as models of organisms of different sizes. These are shown in Table 1.1. The surface area and volume of each sphere were calculated.

Table 1.1

sphere **A**	sphere **B**

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

(a) (i) The student calculated the SA:V ratio of sphere **B** as 2:1. Calculate the SA:V ratio of sphere **A**. Show your working.

Answer = ... [2]

(ii) Describe how the SA:V ratio changes as the size of the sphere increases.

....

....

....

.... [2]

(b) The teacher also told the student that differences in the SA:V ratio, such as those seen between sphere **A** and sphere **B**, have influenced the need for transport systems.

Explain how such differences have influenced the need for transport systems in mammals.

....

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....

.... [3]

(c) There are several parts of the mammalian body where the surface area is relatively large to allow effective functioning.

State **one** example of such a part of the mammalian body.

.... [1]

[Total: 8]

[**Turn over**

2 **(a)** Fig. 2.1 shows the pressure changes in the aorta, left ventricle and left atrium during one cardiac cycle.

Various points are labelled **A** to **H**.
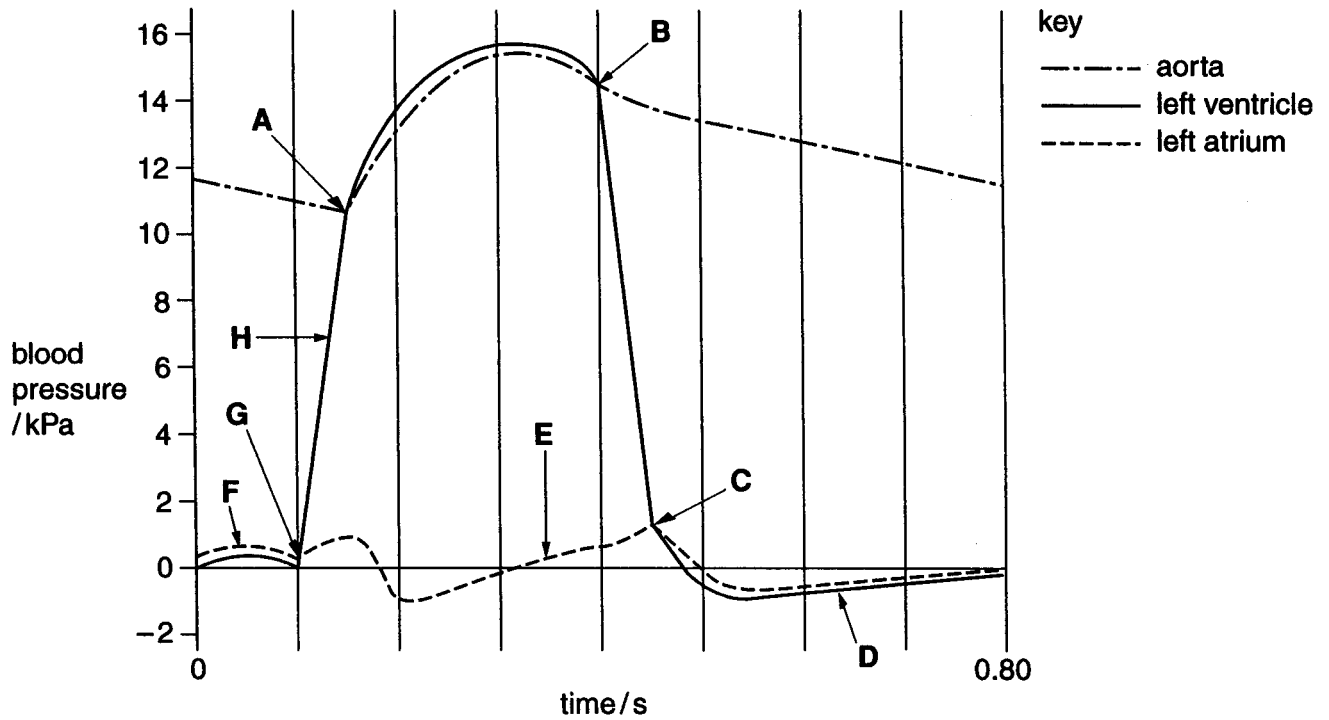
Fig. 2.1

In the table below, match up each statement with an appropriate letter from **A** to **H** on Fig. 2.1. One has been done for you.

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

statement	letter
semilunar (aortic) valve **starting** to open	*A*
atrio-ventricular (bicuspid) valve about to open	
semilunar (aortic) valve about to close	
atrio-ventricular (bicuspid) valve about to close	
left ventricle **starting** to contract	
both left atrium and left ventricle relaxing	
minimum blood volume in left ventricle	

[6]

(b) Complete the following paragraph on the control of the cardiac cycle using the most appropriate word or words.

Heart wall muscle is a special type of muscle called .... muscle. This muscle can contract or relax without nervous stimulation and is thus described as .... To ensure that the cardiac cycle stays in sequence there is an in-built control mechanism. The wall of the right atrium contains a special region of muscle called the .... which sets up a wave of electrical activity causing the atrial walls to contract almost simultaneously. There is a band of fibres between the atria and ventricles which .... the wave of activity passing to the ventricle walls. The wave of activity is picked up by the .... situated in the septum at the junction of the atria and ventricles. The wave of activity then passes down the septum in the .... causing the ventricles to contract.

[6]

(c) The changes in electrical activity that occur in the muscle of the heart wall during the cardiac cycle can be recorded as an electrocardiogram (ECG).

Fig. 2.2 shows a normal ECG.

- **P** represents activity in the atrial walls.
- **R** represents the contraction of the ventricles.
- **T** represents the recovery of the ventricle walls.

Fig. 2.3 shows an ECG from a person who has entered a condition known as fibrillation.

Fibrillation should be treated rapidly to increase the chances of survival.
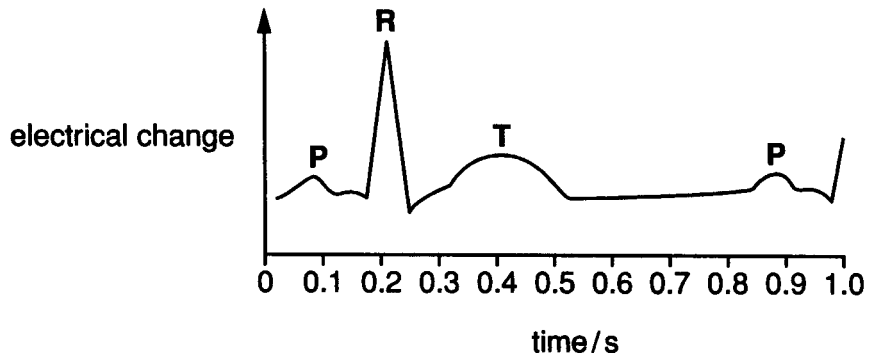
Fig. 2.2
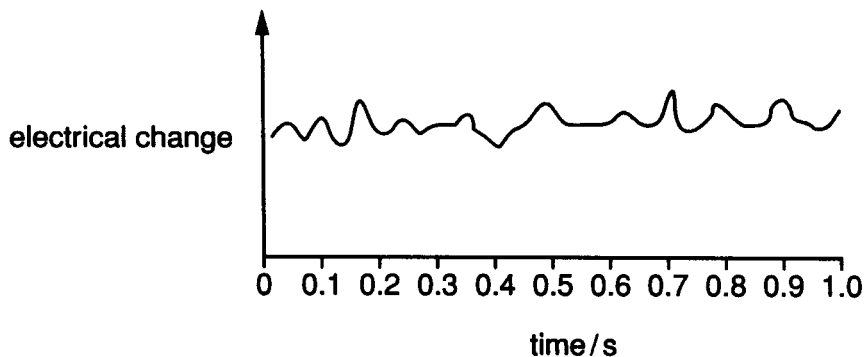
Fig. 2.3

Using the information in Figs. 2.2 and 2.3, suggest why a person with a fibrillating heart is unlikely to survive for long if not treated.

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....

....

.... [2]

[Total: 14]

8

3 Fig. 3.1 is a vertical section through part of a leaf of a dicotyledonous plant.
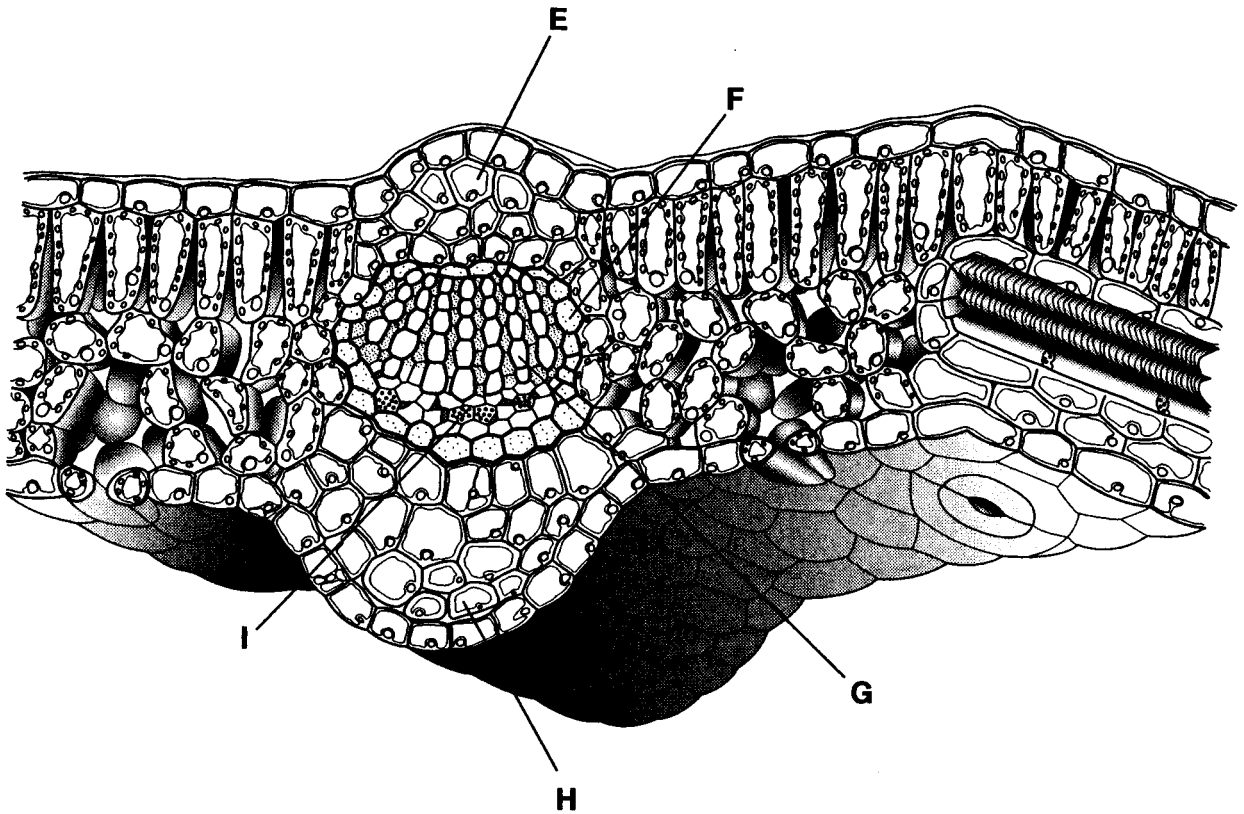
Fig. 3.1

(a) Complete the table below to identify xylem and phloem from the tissues labelled **E** to **I**.

tissue	letter
xylem	
phloem	

[2]

(b) (i) Define the term *transpiration*.

....

....

....

.... [2]

(ii) Explain why transpiration in plants cannot be avoided.

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....

.... [3]

(iii) The leaves of xerophytes show a variety of modifications that are not shown in Fig. 3.1. For instance, they may be covered in epidermal hairs.

Explain how a covering of leaf epidermal hairs helps xerophytes survive in their habitat.

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.... [2]

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

Explain how water travels up the stem and into the leaf of a dicotyledonous plant.

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.... [6]

Quality of Written Communication [1]

[Total: 16]

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4   Fig. 4.1 shows the effect of two different partial pressures of carbon dioxide on the dissociation curve for haemoglobin.

Fig. 4.1

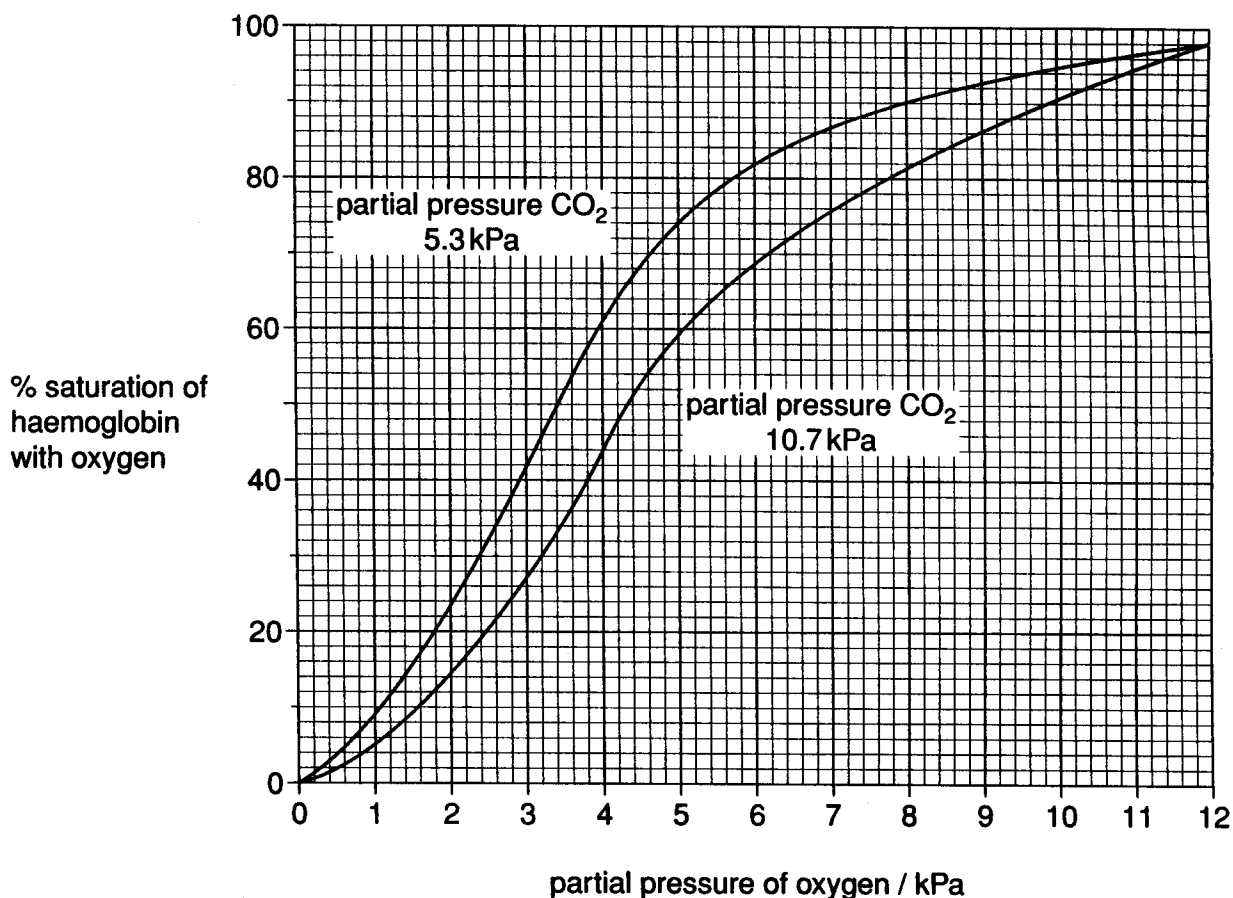**(a) (i)**   Name the effect illustrated by the two curves.

.... [1]

(ii)   The steepest part of each curve in Fig. 4.1 is between the oxygen partial pressures of 2 and 5 kPa.

Explain why it is important that this is so.

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.... [2]

(iii) Explain how the effect of increasing the partial pressure of carbon dioxide from 5.3 to 10.7 kPa ensures a greater delivery of oxygen to exercising muscle tissue.

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.... [2]

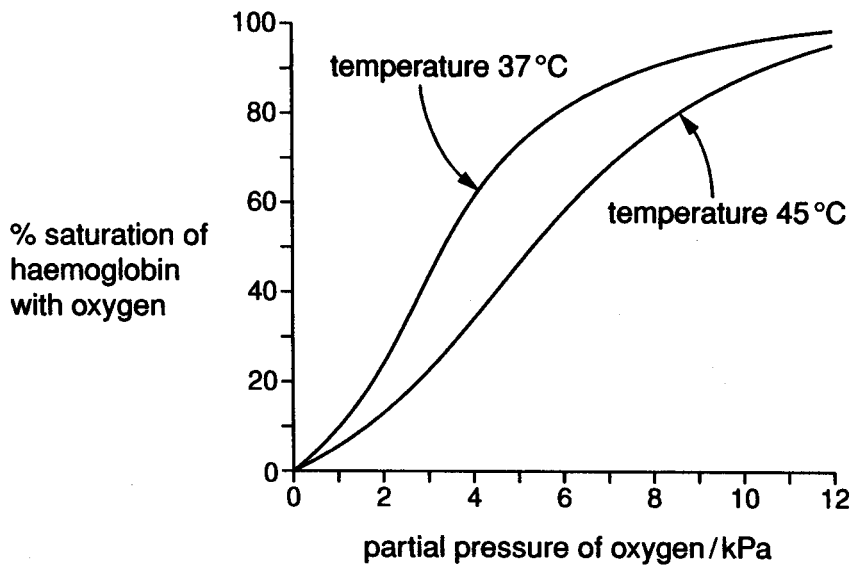**(b)** The effect shown in Fig. 4.2 also increases the delivery of oxygen to exercising muscle tissue.

Fig. 4.2

Suggest how exercising muscle tissue can bring about the changes seen in Fig. 4.2.

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.... [2]

[Total: 7]

END OF QUESTION PAPER