

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS****Advanced Subsidiary GCE****BIOLOGY****2803/01**

Transport

Monday

**6 JUNE 2005**

Morning

45 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name

Centre Number

Candidate  
Number

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**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.
- Read the questions carefully before starting your answer.

**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	11	
2	7	
3	14	
4	6	
5	7	
<b>TOTAL</b>	<b>45</b>	

**This question paper consists of 12 printed pages.**

Answer all the questions.

- 1 (a) Transpiration is the loss of water from plants by evaporation. Fig. 1.1 shows a potometer, an apparatus used to **estimate** transpiration rates.

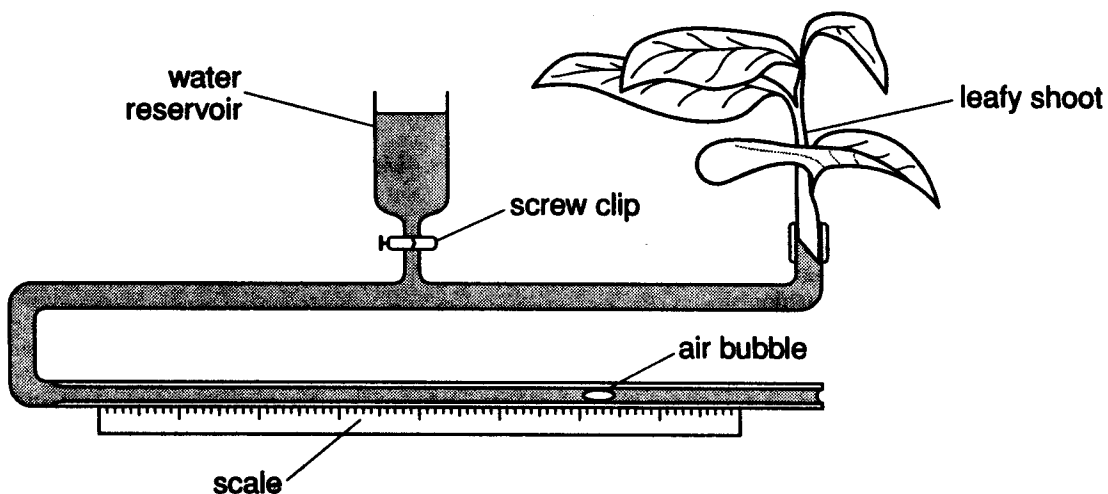


Fig. 1.1

- (i) Describe how the apparatus should be set up to ensure that valid measurements can be obtained.

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

- (ii) Transpiration itself is not measured by the potometer. State **precisely** what is measured by using the apparatus.

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

- (b) A student investigated transpiration rates of a plant under two conditions, A and B, in the laboratory using a potometer. In both cases the temperature, the humidity, and the duration were the same. A fan was placed next to the potometer and was turned on for condition B, but not for condition A.

The results are shown in Table 1.1.

**Table 1.1**

reading	estimate of transpiration rate / arbitrary units	
	condition A	condition 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 condition B. Express your answer to the nearest whole number and write it in Table 1.1. [1]
- (ii) Explain why the mean estimated transpiration rate for condition B is greater than that for condition A.

.....

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.....

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.....

.....

.....[3]

- (c) The student wanted to compare the rates of transpiration of two species of plant using the potometer shown in Fig. 1.1.

Suggest what the student would need to do in order to get a valid comparison of the rates of transpiration of the two species.

.....

.....

.....

.....[2]

[Total: 11]

- 2 (a) Oxygen is carried around the bodies of mammals, bound reversibly to the pigment haemoglobin. The pigment is found in both adult and fetal red blood cells.

Fig. 2.1 shows the dissociation curves for maternal and fetal oxyhaemoglobin.

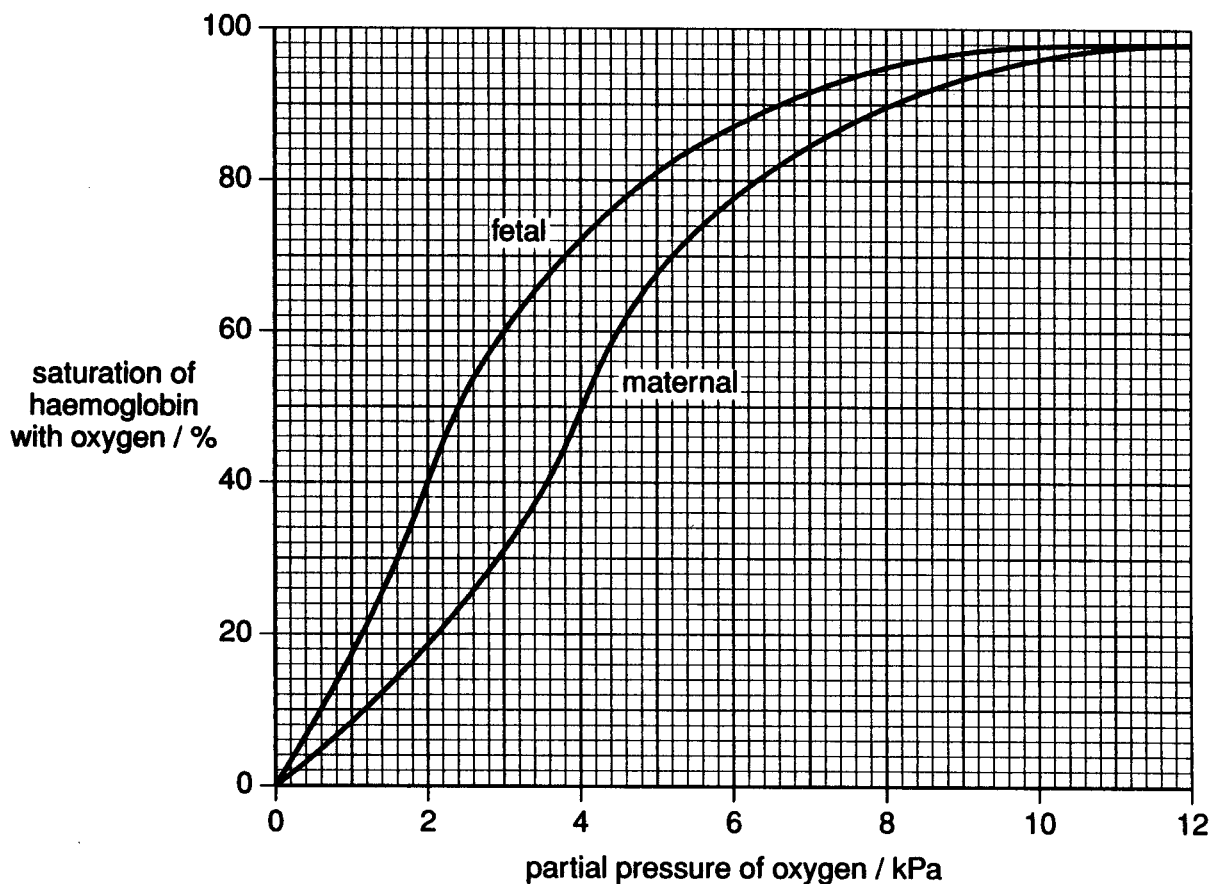


Fig. 2.1

- (i) State the difference in the percentage saturation of haemoglobin with oxygen between the fetal and the maternal blood at an oxygen partial pressure of 3 kPa.

.....[1]

**(ii)** Explain why the difference between the two curves is essential for the survival of the fetus.

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

**(b)** After birth, the adult form of haemoglobin gradually replaces the fetal form of haemoglobin.

Suggest why this is necessary.

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

[Total: 7]

- 3 (a) Fig. 3.1 shows the internal structure of the mammalian heart and associated blood vessels.

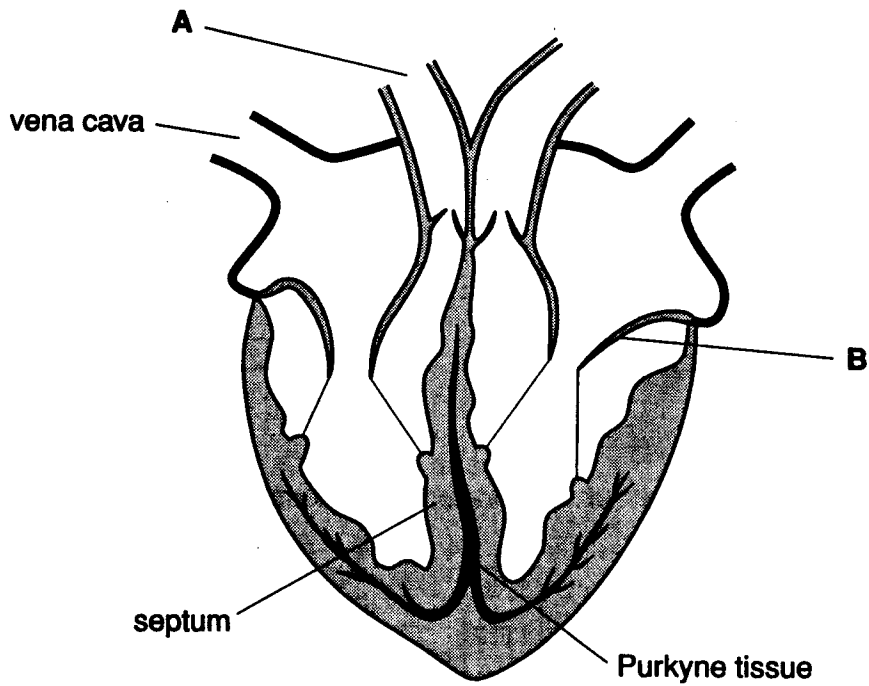


Fig. 3.1

- (i) State the name of structures A and B.

A .....

B .....[2]

- (ii) Use arrows on Fig. 3.1 to show the direction of blood flow through the left side of the heart. [1]

- (iii) Suggest how the heart would be affected if the Purkyne tissue ceased to function.

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

- (iv) The septum shown on Fig. 3.1 completely separates the left and right sides of the heart.

Explain why it is important that the two sides of the heart are completely separated.

.....

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.....

.....

.....[2]

**Question 3 continues on the next page.**





4 Xerophytes are plants that are adapted for survival in areas where there is not much water available in the soil.

(a) Xerophytes are usually found in habitats where the soil water potential is about  $-50$  kPa. Explain why the cell contents of the roots of xerophytes must have a water potential lower (more negative) than  $-50$  kPa if the plants are to survive in these habitats.

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

(b) Xerophytes have various modifications that reduce water loss from their leaves.

State **two** such adaptations that reduce water loss and explain how the reduction in loss is achieved.

adaptation 1 .....

.....  
.....  
.....

adaptation 2 .....

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

[Total: 6]

- 5 (a) Mammals exchange respiratory gases via their lungs, whose surface area is greatly enlarged by the presence of many alveoli.

Fig. 5.1 is a diagram showing part of the wall of an alveolus and an associated capillary.

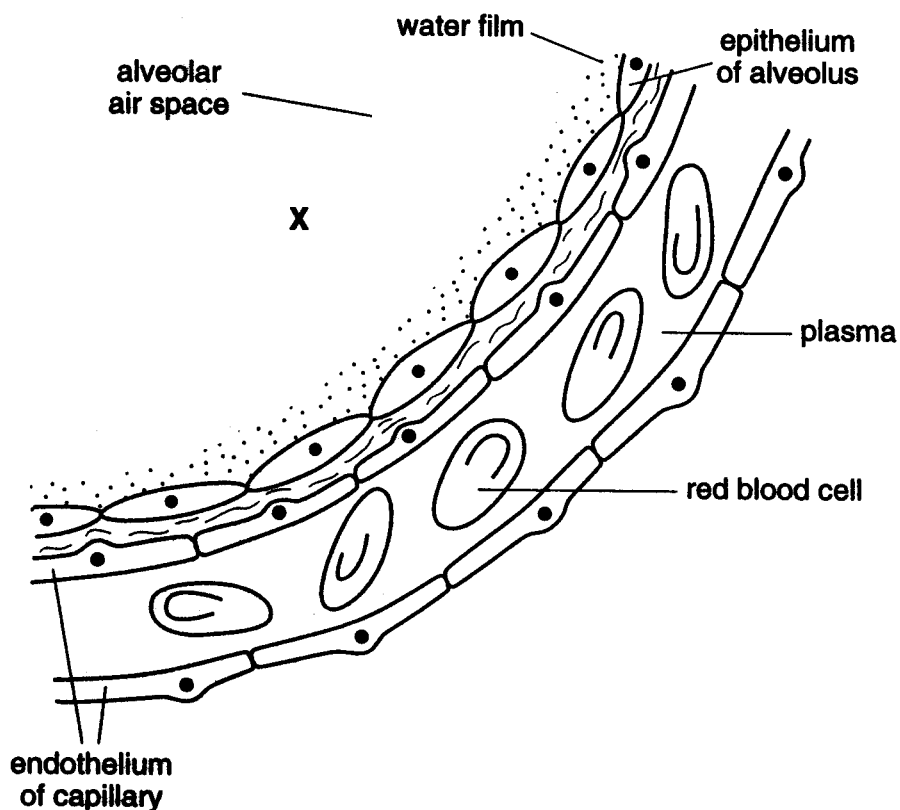


Fig. 5.1

Describe the mechanism by which oxygen gets from point X on Fig. 5.1 to the red blood cells.

.....

.....

.....

.....[2]

- (b) Once in the red blood cells, the oxygen is picked up by haemoglobin. Explain how **two** features of red blood cells, **other than the presence of haemoglobin**, make them efficient in the collection of oxygen and its transport to the tissues.

feature 1 .....

.....

.....

.....

feature 2 .....

.....

.....

.....[4]

- (c) In addition to the red blood cells shown in Fig. 5.1, various types of white blood cell can be found in the blood system. Some of these white blood cells are lymphocytes.

Describe **one** feature that would allow you to identify a white blood cell as a lymphocyte when viewed with a light microscope.

.....

.....[1]

[Total: 7]

**END OF QUESTION PAPER**