

**ADVANCED SUBSIDIARY GCE
BIOLOGY**

Transport

TUESDAY 15 JANUARY 2008

2803/01

Afternoon

Time: 45 minutes

Candidates answer on the question paper.

Additional materials: Electronic calculator
Ruler (cm/mm)

Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- 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 for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 45.
- 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.

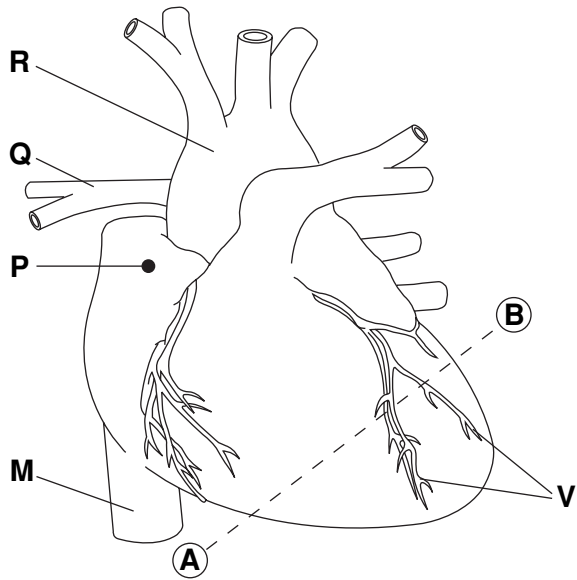
FOR EXAMINER'S USE

Qu.	Max.	Mark
1	5	
2	12	
3	10	
4	5	
5	13	
TOTAL	45	

This document consists of **11** printed pages and **1** blank page.

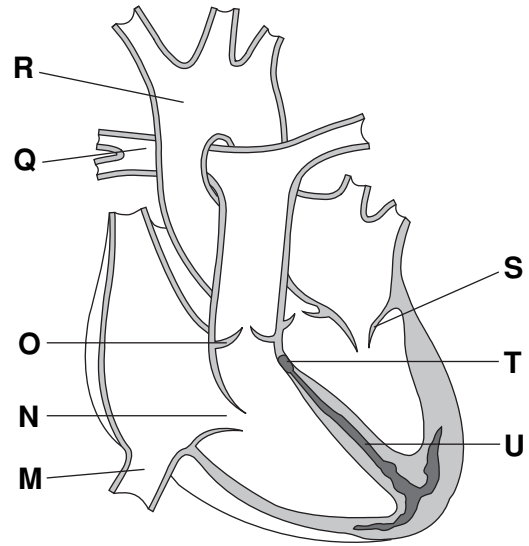
Answer **all** the questions.

- 1 Figs. 1.1, 1.2 and 1.3 show different views of the mammalian heart. Fig. 1.3 is a cross-section of the region indicated by the dashed line **A** to **B** on Fig. 1.1.



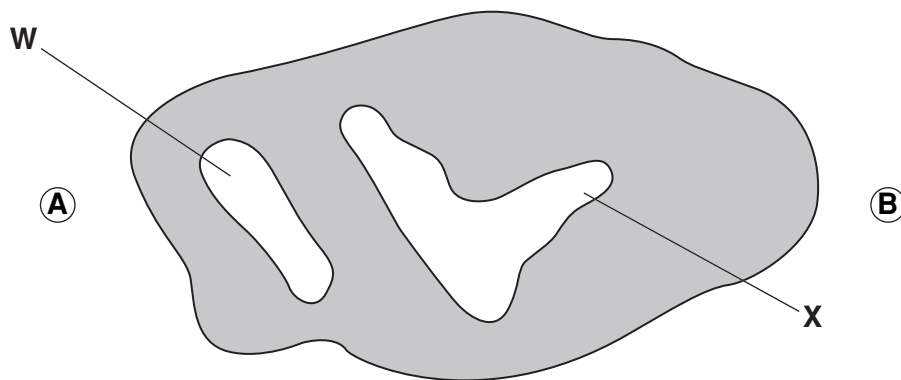
external view ($\times 0.5$)

Fig. 1.1



internal view ($\times 0.5$)

Fig. 1.2



*cross-section of region **A** to **B** in Fig. 1.1 ($\times 1$)*

Fig. 1.3

Complete the table below by indicating the letter which matches the named structure.

One has been done for you.

structure	letter
vena cava	M
coronary artery	
atrio-ventricular node	
aorta	
left ventricle	
bicuspid valve	

[5]

[Total: 5]

- 2 (a) Fig. 2.1 is a drawing of a cross-section of a plant organ.

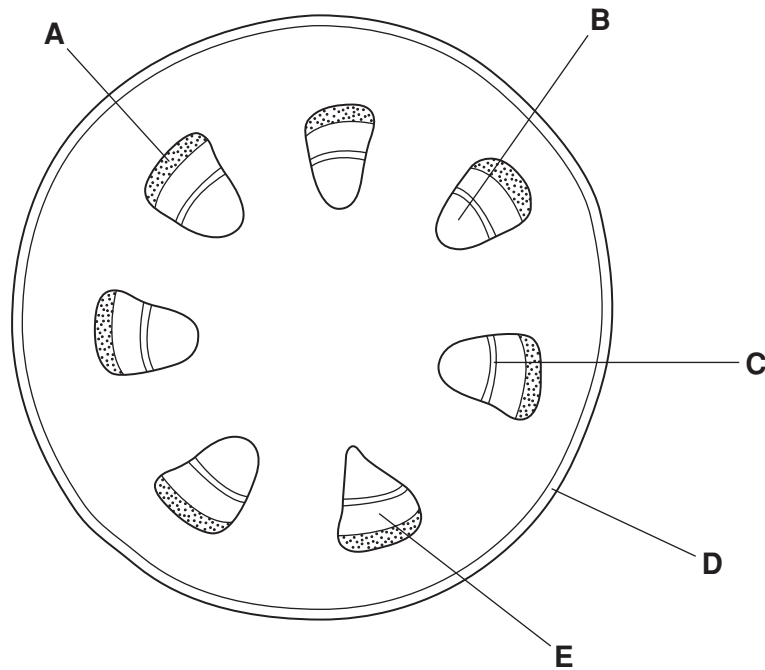


Fig. 2.1

- (i) State the name of the organ shown.
[1]
- (ii) Which of the tissue areas **A** to **E** represents the phloem?
[1]
- (b) Phloem transports assimilates (organic products of photosynthesis) from sources to sinks.
- (i) Name the main assimilate transported in the phloem.
[1]
- (ii) Explain what is meant by the terms *source* and *sink*.

[2]

[6]

[Total: 12]

3 Fig. 3.1 shows a dissociation curve for haemoglobin in a mammal.

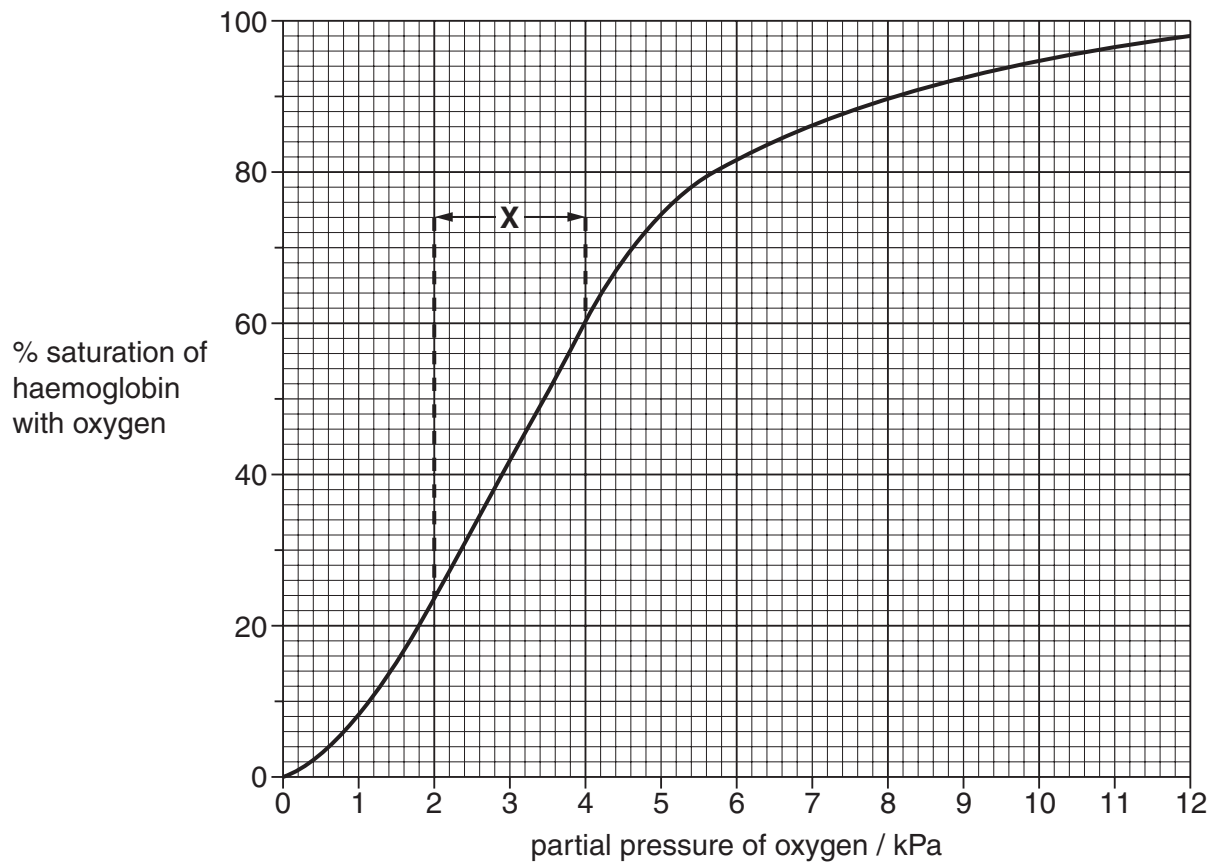


Fig. 3.1

(a) The shape of this curve is described as sigmoid and results from the way in which haemoglobin is loaded with oxygen.

(i) How many **molecules** of oxygen can one molecule of haemoglobin carry when it is fully saturated?

.....[1]

(ii) Explain how the loading of haemoglobin with oxygen gives rise to this sigmoid curve.

.....

.....

.....

.....[2]

- (b) The curve is steepest in the region marked **X** on Fig. 3.1.

Explain how the steepness of the curve in region **X** helps the mammal to function more effectively.

.....

.....

.....

.....

.....

.....[3]

- (c) (i) Draw on Fig. 3.1 the curve you would expect if the partial pressure of **carbon dioxide** is raised. [2]

- (ii) Explain why the change you have shown in response to an increase in the partial pressure of carbon dioxide is important to help the mammal function more effectively.

.....

.....

.....

.....

.....[2]

[Total: 10]

4 Fig. 4.1 shows some xerophytic plants.



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Fig. 4.1

Complete the following paragraph on xerophytic plants, using the most appropriate word or words.

Xerophytes are plants living in desert habitats where the conditions are very Their leaves show a variety of modifications to transpiration. Many have a thick cuticle. Their leaves may be covered with hairs which trap In some, the leaves are in the form of needles which reduces their surface area. Their are often sunken into pits in the surface of the leaf or stem.

[5]

[Total: 5]

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- 5 (a) A student carried out an investigation into acclimatisation. Blood samples were taken from two people:

- a twenty-four year old woman who had always lived at **sea level**
- a twenty-seven year old man who had lived at an altitude of **5000 m** for the previous two months.

The number of red blood cells per dm^3 was determined for each sample.

The results are shown in Table 5.1.

Table 5.1

altitude	number of red blood cells per dm^3
sea level	4.9×10^{12}
5000 m	7.1×10^{12}

- (i) Calculate the percentage by which the number of red blood cells per dm^3 in the **man** is greater than that in the woman.

Show your working.

Answer = % [2]

- (ii) Explain why a greater number of red blood cells per dm^3 is needed for more effective functioning of a person at high altitude.

.....

.....

.....

.....

.....

.....[3]

- (iii) Suggest **three** ways in which the investigation that the student carried out could be improved to make it more valid.

1
.....
2
.....
3
.....[3]

- (b) The student was then provided with the following information.

- People going to high altitudes may take the drug acetazolamide which inhibits the enzyme carbonic anhydrase in red blood cells.
- If the brain detects an increase in the concentration of carbon dioxide in the blood, an increase in breathing rate is initiated.

- (i) Describe the role of carbonic anhydrase in red blood cells.

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

- (ii) Suggest how taking acetazolamide helps to improve oxygen carrying capacity at high altitude.

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

[Total: 13]

END OF QUESTION PAPER

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Fig. 4.1

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