



ADVANCED SUBSIDIARY GCE
BIOLOGY
 Transport

2803/01

Candidates answer on the question paper

OCR Supplied Materials:
 None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 14 January 2009
Afternoon

Duration: 45 minutes



| | | | |
|-----------------------|--|----------------------|--|
| Candidate Forename | | Candidate Surname | |
|-----------------------|--|----------------------|--|

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|---------------|--|--|--|--|--|------------------|--|--|--|--|
| Centre Number | | | | | | Candidate Number | | | | |
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks 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.
- This document consists of **12** pages. Any blank pages are indicated.

| FOR EXAMINER'S USE | | |
|--------------------|-----------|------|
| Qu. | Max. | Mark |
| 1 | 14 | |
| 2 | 6 | |
| 3 | 15 | |
| 4 | 10 | |
| TOTAL | 45 | |

Answer **all** the questions.

- 1 Fig. 1.1 shows a potometer that is used to measure the rate of water uptake by a leafy shoot.

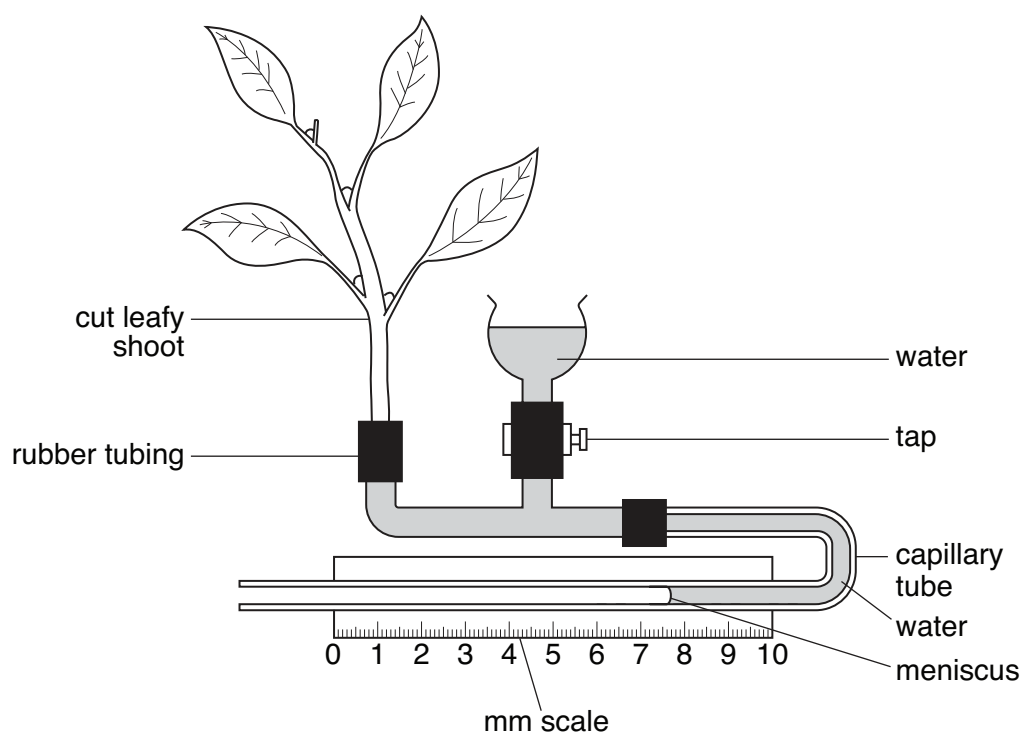


Fig. 1.1

A student used the potometer to investigate the rate of water uptake of a leafy shoot. The student changed two environmental conditions:

- temperature
- wind speed.

The results are recorded in Table 1.1.

Table 1.1

| experiment | temperature / °C | wind speed | mean rate of movement of meniscus / mm h ⁻¹ |
|------------|---------------------|------------|--|
| 1 | 15 | low | 12 |
| 2 | 15 | high | 22 |
| 3 | 25 | low | 24 |
| 4 | 25 | high | 45 |
| 5 | 35 | low | 64 |
| 6 | 35 | high | 120 |

- (a) List **four** precautions that the student should have taken when **setting up** the potometer to ensure that the results obtained were valid measures of the rate of water uptake under the given conditions.

1

.....

2

.....

3

.....

4

..... [4]

- (b) Using the data in Table 1.1, describe **and** explain the effect of temperature and wind speed on the rate of water uptake.

temperature

.....

.....

.....

.....

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.....

.....

wind speed

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..... [4]

- (c) The rate of water movement up the leafy shoot was also measured, using another technique, **before** it was cut from the plant. The rate was found to be **less** than the rate of water uptake in the potometer when kept under identical environmental conditions.

Suggest why the rate of water movement in the shoot before it was cut from the plant was less than that measured using the potometer.

.....

.....

.....

..... [2]

- (d) The water moves up the leafy shoot in xylem vessels.

Describe **and** explain **two** features of xylem vessels that are adaptations for the transport of water in plants.

feature

explanation

.....

feature

explanation

..... [4]

[Total: 14]

5
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PLEASE DO NOT WRITE ON THIS PAGE

- 2 Fig. 2.1 gives some information about two organisms, a unicell (*Amoeba*) and a mammal (adult human).

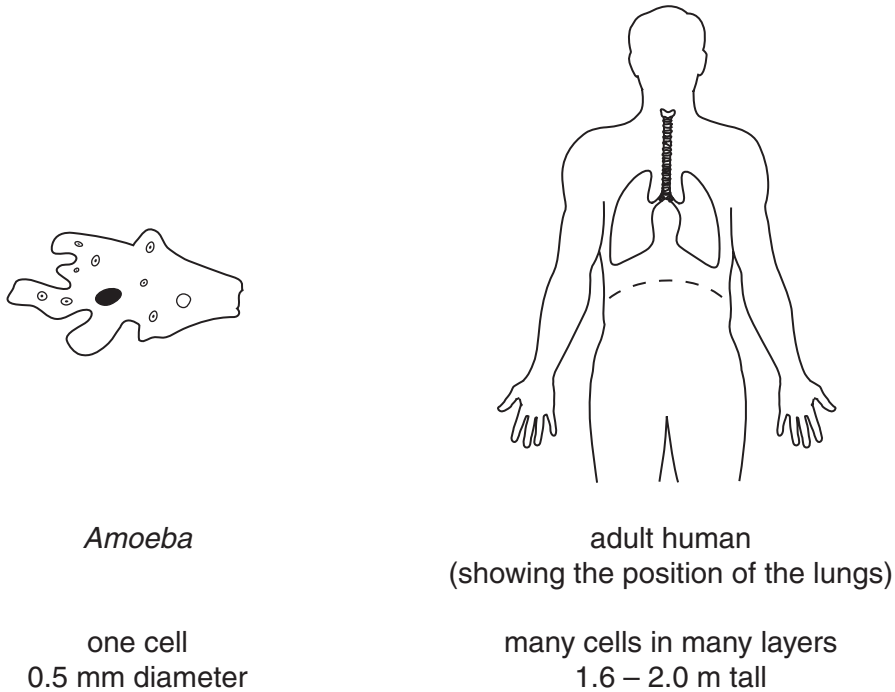


Fig. 2.1

- (a) Humans have a blood circulatory system whereas an *Amoeba* does not.

Explain why a human needs a blood circulatory system and an *Amoeba* does not.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Fig. 2.1 shows that humans have lungs.

List **three** properties of lungs which make them effective in carrying out their function.

- 1
- 2
- 3 [3]

[Total: 6]

- 3 Fig. 3.1 shows the changes in blood pressure in the atria, ventricles, and arteries leaving the heart, during one complete cardiac cycle.

Graphs **A** and **B** represent the two sides of the heart.

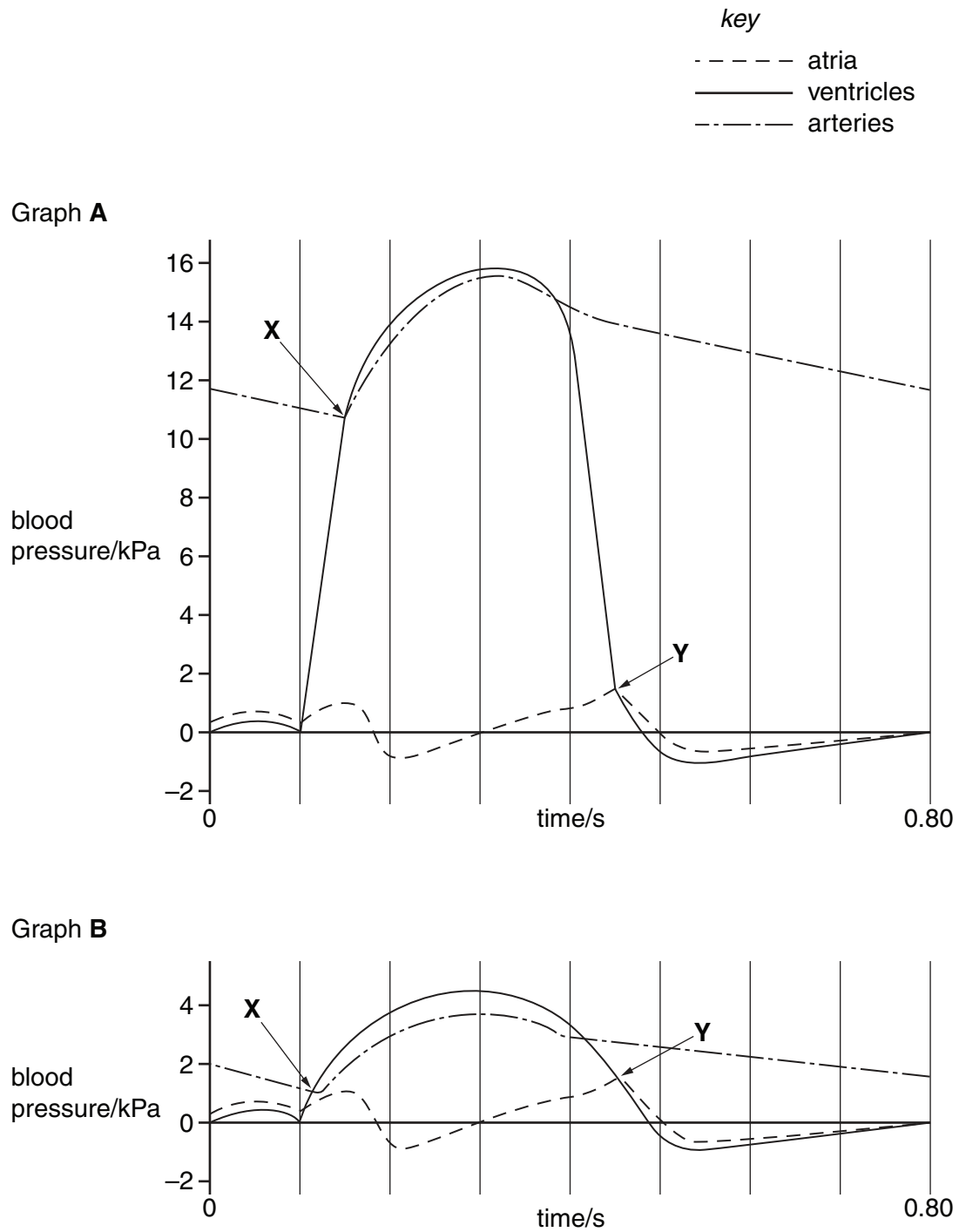


Fig. 3.1

- (a) With reference to Fig. 3.1, calculate the heart rate in beats per minute.

Show your working and express your answer **to the nearest whole number**.

Answer = beats min^{-1} [2]

- (b) A student was told that the data in Fig. 3.1 provide information on the functioning of the valves in the heart.

Using the information in Fig. 3.1 and your knowledge of heart structure and the cardiac cycle, explain why:

- point **X** indicates where the semilunar valves open
- point **Y** indicates where the atrio-ventricular valves open.

X (semilunar valves open)

.....

.....

.....

Y (atrio-ventricular valves open)

.....

.....

..... [4]

- (c) Use your knowledge of heart structure and function to explain why:

- graph **A** must represent the left side of the heart
- graph **B** must represent the right side of the heart.

.....

.....

.....

.....

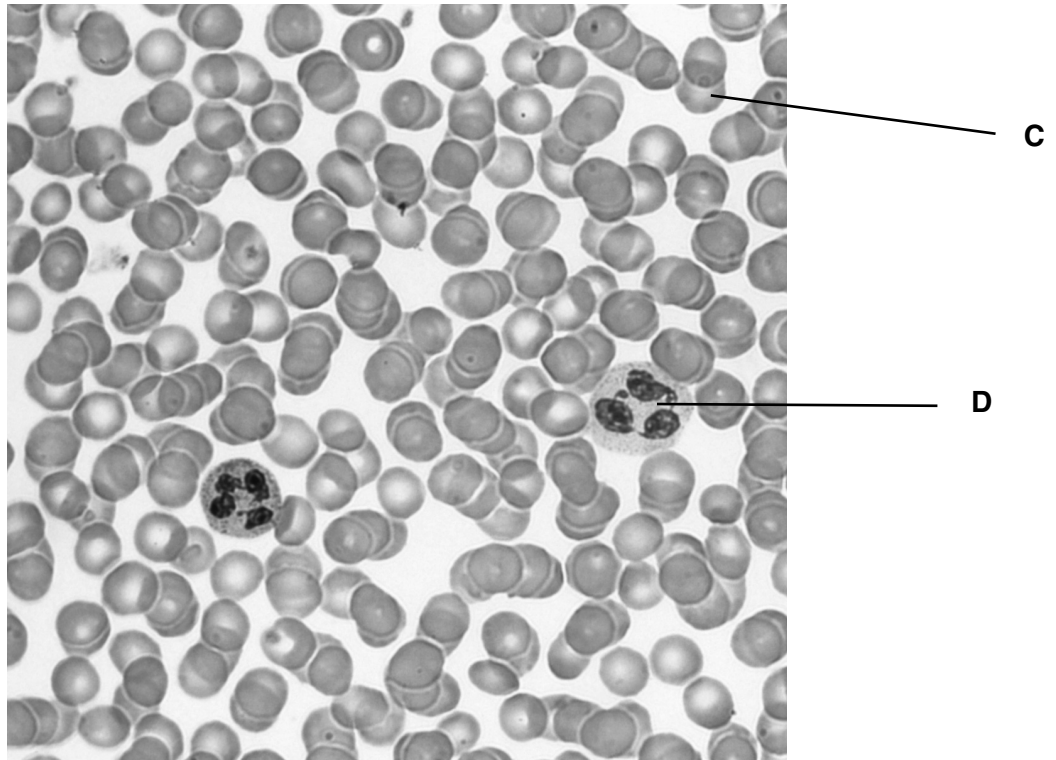
..... [2]

Describe the structure of veins **and** explain how their structure is related to their function.

..... [6]

[Total: 15]

4 Fig. 4.1 is a photomicrograph of mammalian blood.



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Fig. 4.1

(a) Name cells **C** and **D**.

C

D [2]

(b) At the capillaries, tissue fluid is formed from plasma.

(i) State the **main** difference between plasma and tissue fluid.

.....
 [1]

(ii) Describe briefly how tissue fluid is formed at the capillaries.

.....

 [2]

- (c) Use the most appropriate term(s) to complete the paragraph below about the role of haemoglobin.

Haemoglobin is a pigment found in the blood of mammals. It 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 which ultimately leads 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: 10]