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| Surname             |  |  |  |  |  |  |                  |  |  |  | Other Names |  |  |  |  |  |  |  |  |  |  |  |
| Centre Number       |  |  |  |  |  |  | Candidate Number |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |
| Candidate Signature |  |  |  |  |  |  |                  |  |  |  |             |  |  |  |  |  |  |  |  |  |  |  |

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| For Examiner's Use |
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General Certificate of Education  
June 2008  
Advanced Subsidiary Examination



**BIOLOGY (SPECIFICATION B)**  
**Unit 3 Physiology and Transport**

**BYB3/W**

Tuesday 3 June 2008 9.00 am to 10.00 am

**For this paper you must have**

- a ruler with millimetre measurements.
- You may use a calculator.

Time allowed: 1 hour

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. **Answers written in margins or on blank pages will not be marked.**
- If you need extra space use page 16 for your answers.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

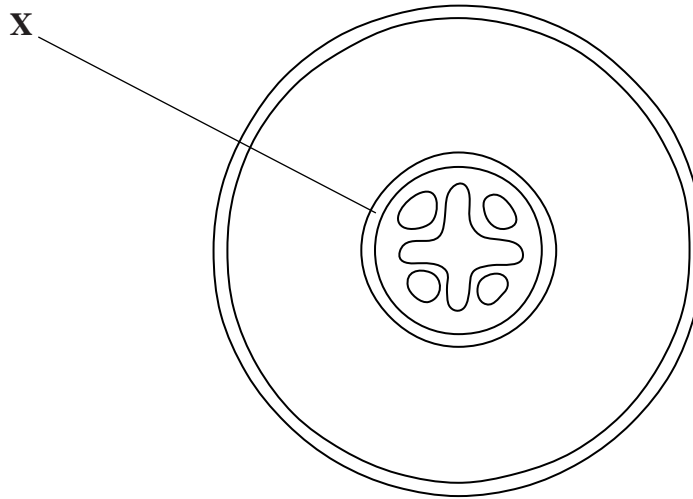
- The maximum mark for this paper is 54.
- The marks for questions are shown in brackets. One mark will be awarded for Quality of Written Communication.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in your answers.
- Answers for **Questions 1 to 6** are expected to be short and precise.
- Answer **Question 7** in continuous prose. Quality of Written Communication will be assessed in the answer.

| For Examiner's Use               |      |          |      |
|----------------------------------|------|----------|------|
| Question                         | Mark | Question | Mark |
| 1                                |      |          |      |
| 2                                |      |          |      |
| 3                                |      |          |      |
| 4                                |      |          |      |
| 5                                |      |          |      |
| 6                                |      |          |      |
| 7                                |      |          |      |
|                                  |      |          |      |
| Total (Column 1) →               |      |          |      |
| Total (Column 2) →               |      |          |      |
| Quality of Written Communication |      |          |      |
| TOTAL                            |      |          |      |
| Examiner's Initials              |      |          |      |



Answer **all** questions in the spaces provided.

**1** The diagram shows a cross-section through a root.



**1** (a) On the diagram,

**1** (a) (i) use a guideline and the letter **E** to label the epidermis

(1 mark)

**1** (a) (ii) use a guideline and the letter **P** to label the phloem.

(1 mark)

**1** (b) Describe the role of tissue **X** in the entry of water and mineral ions into the xylem.

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(2 marks)

(Extra space) .....

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- 1 (c) Desert plants have roots which are adapted for life in the desert.

Describe and explain **one** way in which roots are adapted for life in the desert.

Adaptation .....

.....

Explanation .....

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(Extra space) ..... (2 marks)

.....

6

**Turn over for the next question**

**Turn over ►**

- 2 The table shows the concentrations of some substances in a person's leg muscle. The measurements were made at rest and after vigorous exercise.

| Substance in leg muscle | Concentration in leg muscle/ arbitrary units |                         |
|-------------------------|--|-------------------------|
|                         | At rest                                      | After vigorous exercise |
| ATP                     | 4.8  | 3.5                     |
| lactate                 | 0.9  | 23.5                    |
| glycogen                | 75.0   | 22.0                    |

- 2 (a) Explain the change in concentration of

- 2 (a) (i) ATP

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 .....  
 (1 mark)

- 2 (a) (ii) lactate

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 .....  
 .....  
 (1 mark)

- 2 (a) (iii) glycogen.

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 .....  
 (1 mark)



- 2 (b) Lactate is produced by muscles during vigorous exercise. Describe what happens to this lactate.

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(4 marks)

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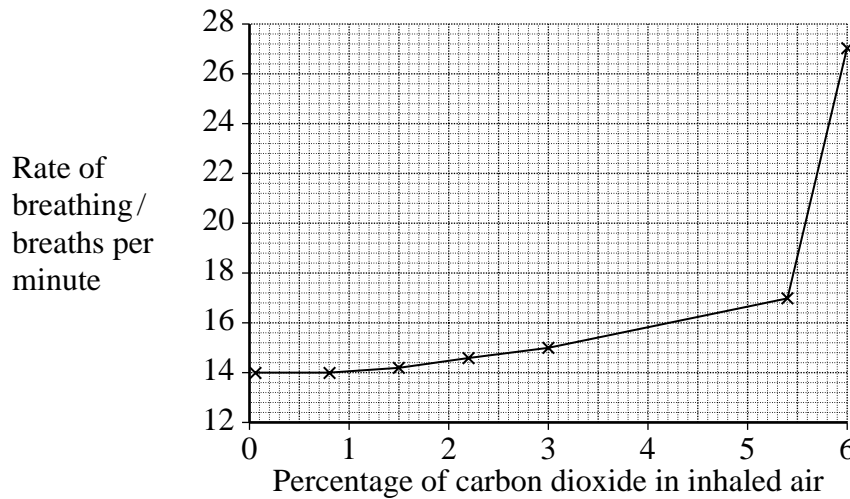
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**Turn over for the next question**

- 3 (a) **Figure 1** shows the effect of increasing the percentage of carbon dioxide in inhaled air on the rate of breathing.

**Figure 1**



Describe what the graph shows about the effect of increasing the percentage of carbon dioxide in inhaled air on the rate of breathing.

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(2 marks)

- 3 (b) An increase in the concentration of carbon dioxide in the blood stimulates chemoreceptors in the walls of the carotid artery and the aorta. Explain how stimulation of these chemoreceptors leads to a change in the rate of breathing.

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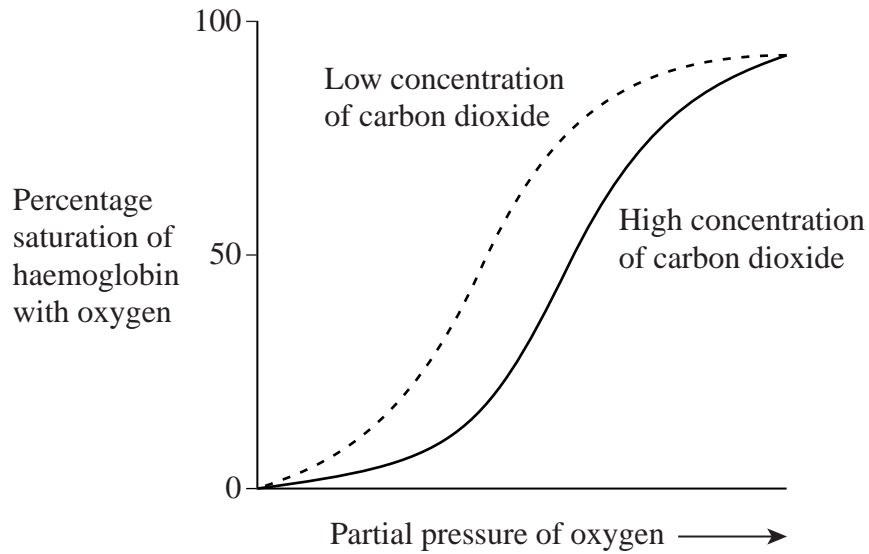
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(3 marks)

- 3 (c) **Figure 2** shows oxygen haemoglobin dissociation curves for human haemoglobin at different carbon dioxide concentrations.

**Figure 2**



An increase in the concentration of carbon dioxide increases the supply of oxygen to the tissues. Use **Figure 2** to explain how.

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(Extra space) ..... (2 marks)

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- 4 (a) Name the artery that takes oxygenated blood away from the heart.

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(1 mark)

- 4 (b) The walls of arteries contain elastic tissue.

Explain the function of the elastic tissue.

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(2 marks)

(Extra space) .....  
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- 4 (c) The table shows some features at different times during a cardiac cycle. The times are not in the correct sequence.

| Time during cardiac cycle | Ventricular pressure /kPa | Ventricular volume /cm <sup>3</sup> | Atrio-ventricular valves | Semilunar valves |
|---------------------------|---------------------------|-------------------------------------|--------------------------|------------------|
| <b>A</b>                  | 2.0                       | 70                                  | open                     | shut             |
| <b>B</b>                  | 12.0                      | 105                                 | shut                     | open             |
| <b>C</b>                  | 1.5                       | 125                                 | open                     | shut             |
| <b>D</b>                  | 14.0                      | 80                                  | shut                     | open             |

- 4 (c) (i) Starting with **A**, put the times during the cardiac cycle in the correct sequence.

**A**

(1 mark)

- 4 (c) (ii) At which time during the cardiac cycle, **A**, **B**, **C** or **D**, does the blood first leave the ventricle? Give the reason for your answer.

Time during the cardiac cycle

Reason .....

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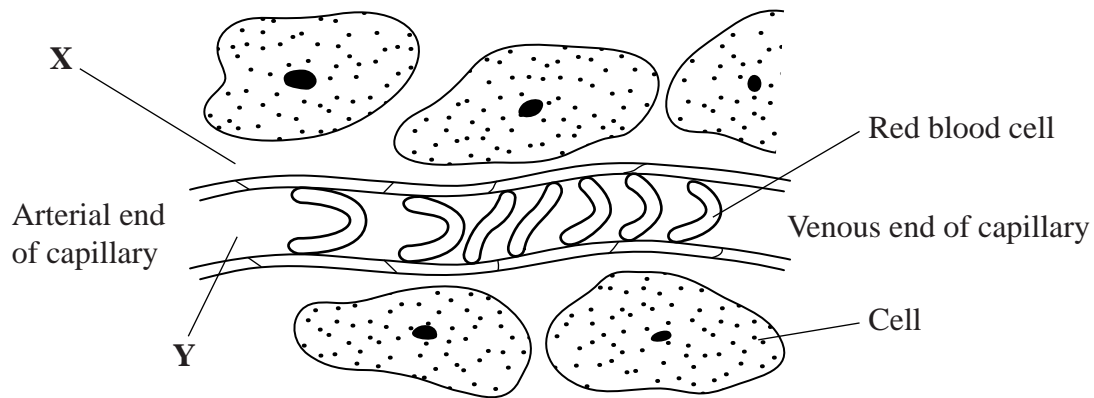
(2 marks)

(Extra space) .....

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- 5 (a) **Figure 3** shows a blood capillary and some surrounding cells.

**Figure 3**



- 5 (a) (i) Give **one** way in which the composition of fluid **X** is different from the composition of plasma at **Y**.

Give a reason for your answer.

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(2 marks)

- 5 (a) (ii) Explain how fluid is returned to the blood at the venous end of the capillary.

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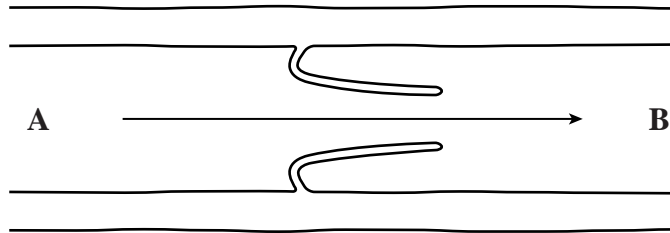
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(4 marks)



- 5** (b) Blood returns to the heart in veins. Veins have semilunar valves, like the one shown in **Figure 4**. The valve shown is open. The arrow represents blood flow to the heart.

### Figure 4



- 5** (b) (i) Changes in the pressure at **A** and **B** cause the valve to shut. Explain how.

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(Extra space) ..... (2 marks)

- 5 (b) (ii) Varicose veins in the legs occur when the valves in the veins are damaged. One form of treatment is to wear special stockings. These stockings are tightest at the ankle and get gradually looser further up the leg.

Suggest why wearing these stockings is a suitable form of treatment for people who have varicose veins.

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(Extra space) ..... (2 marks)

6 (a) Describe the role of the following in the maintenance of the heartbeat.

6 (a) (i) sinoatrial node (SAN)

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 (1 mark)

6 (a) (ii) atrioventricular node (AVN)

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 .....  
 (1 mark)

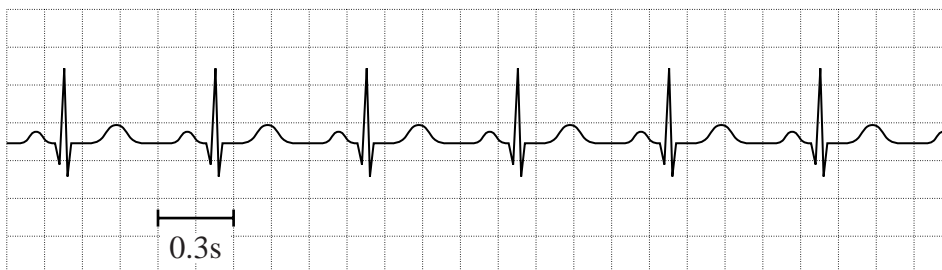
6 (a) (iii) bundle of His

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 .....  
 (1 mark)

6 (b) An ECG is a recording of the electrical activity of the heart.

6 (b) (i) **Figure 5** shows an ECG. Each large spike shows the electrical activity when the ventricles contract.

**Figure 5**



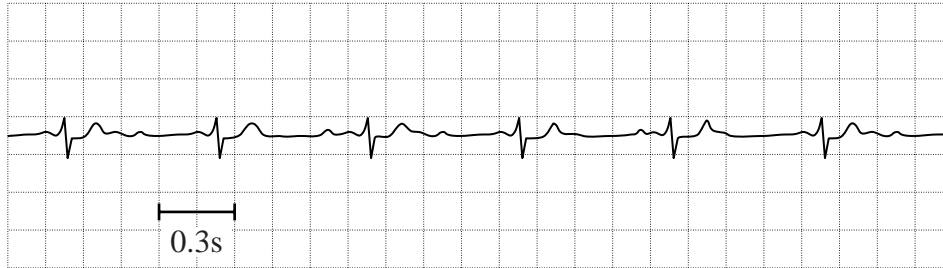
Calculate the heart rate shown in **Figure 5**. Show your working.

Answer ..... (2 marks)



- 6 (b) (ii) **Figure 6** shows an ECG from a person with a damaged atrioventricular node (AVN).

**Figure 6**



Explain the differences between the ECG in **Figure 6** and the ECG in **Figure 5**.

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(2 marks)

(Extra space) .....

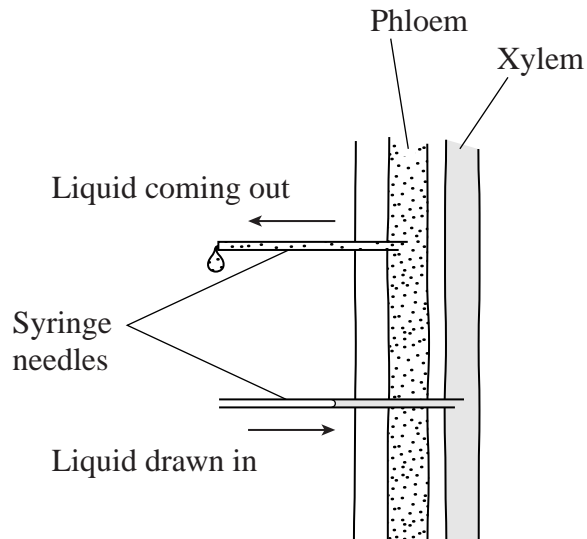
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**Turn over for the next question**

7 (a) Xylem transports water through a plant. Describe and explain how the cells of xylem are adapted for this function.

[illegible]

- 7 (b) A student used syringe needles filled with a liquid to puncture the phloem and xylem in a stem. The student observed whether liquid came out or was drawn in from each needle. The results are shown in the diagram.



Explain what the results illustrate about the mechanisms of transport in the phloem and in the xylem.

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(4 marks)

(Extra space) .....

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**END OF QUESTIONS**

**QWC**

**10**

**1**

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Question 6 [www.cardionetics.com](http://www.cardionetics.com)

[www.theallpapers.com](http://www.theallpapers.com)

