Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

For Examiner's Use

General Certificate of Education
January 2008
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

BIOLOGY (SPECIFICATION B) **BYB3/W**
Unit 3 Physiology and Transport

Wednesday 9 January 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 blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- 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.
- 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 (a) In dry conditions, the rate of transpiration is affected by an increase in temperature. Describe and explain how.

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(2 marks)

(Extra space) .....

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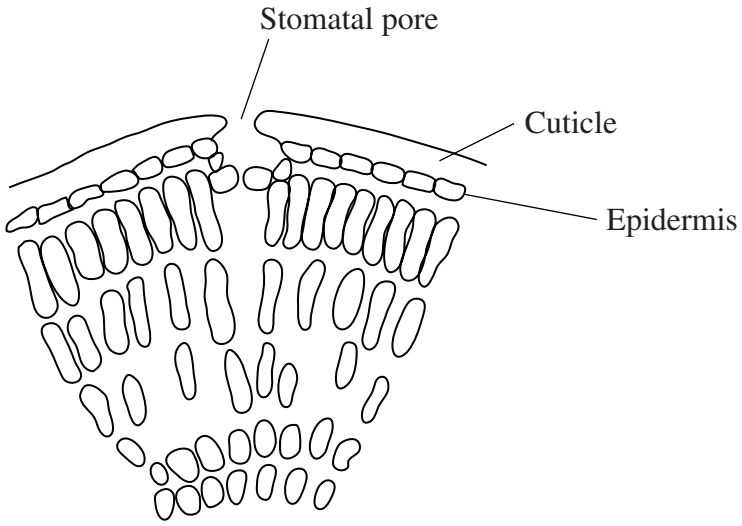
1 (b) *Hakea* is a plant that grows in hot, dry deserts. The drawing shows part of a *Hakea* leaf.



Give **two** features of the *Hakea* leaf shown in the drawing that reduce the rate of transpiration. In each case explain how the feature contributes to a lower rate of transpiration.

Feature .....

Explanation .....

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Feature .....

Explanation .....

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(4 marks)

6

Turn over for the next question

2 (a) The control of breathing in a human involves chemoreceptors.

Give **two** parts of the body where these chemoreceptors are found.

1 .....

2 .....

(2 marks)

2 (b) Exercise leads to an increase in the rate of breathing. Explain how.

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(4 marks)

(Extra space) .....

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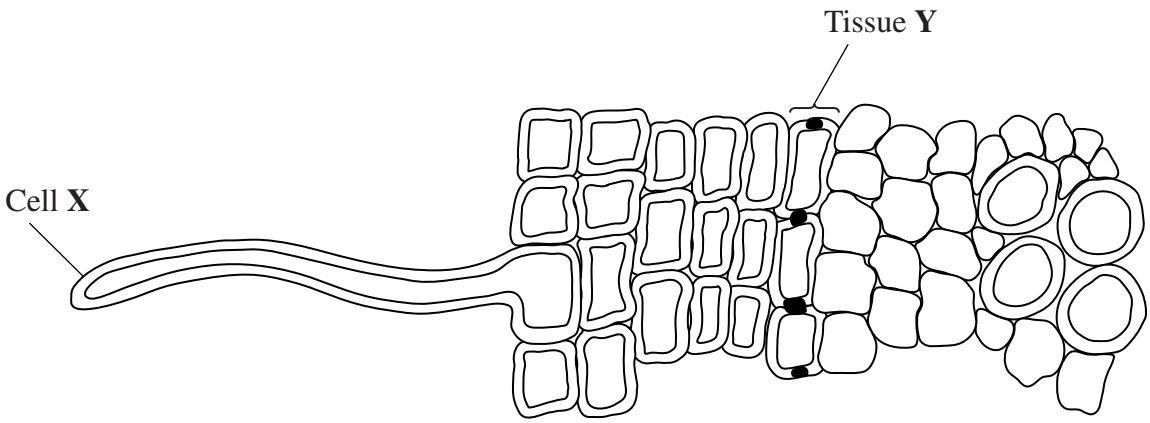
6

3 The diagram shows some cells from a root.



3 (a) (i) Name cell **X**.

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(1 mark)

3 (a) (ii) Using only the information in the diagram, explain how cell **X** is adapted for its function.

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(1 mark)

3 (b) (i) Name tissue **Y**.

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(1 mark)

3 (b) (ii) Tissue **Y** controls the entry of substances into the xylem. Explain how.

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(2 marks)

(Extra space) .....

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5

4 (a) Name **two** substances in a muscle cell that can be used as sources of energy.

1 .....

2 .....

(2 marks)

4 (b) During vigorous exercise, lactic acid production results in muscle fatigue. Explain how.

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(2 marks)

(Extra space) .....

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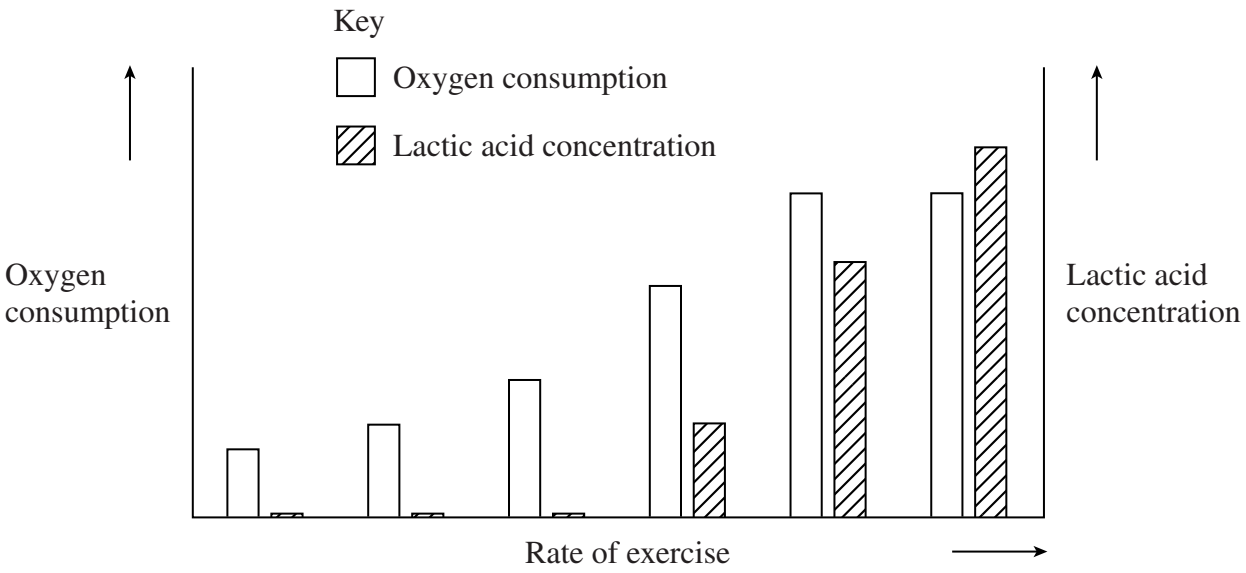
4 (c) Scientists measured the oxygen consumption of an athlete at different rates of exercise. They also measured the lactic acid concentration in the athlete's muscles.

The results are shown on the graph.



4 (c) (i) Describe the changes in oxygen consumption and lactic acid concentration as the rate of exercise increased.

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(1 mark)

(Extra space) .....

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4 (c) (ii) Explain the changes in lactic acid concentration as the rate of exercise increased.

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(3 marks)

(Extra space) .....

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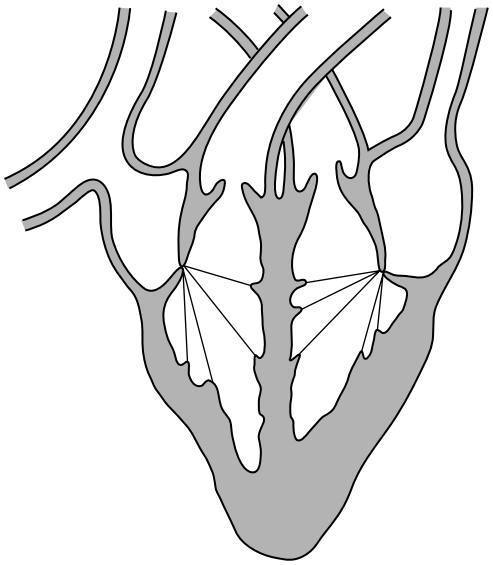
8

Turn over for the next question

5 The diagram shows a vertical section through a mammalian heart.



5 (a) Using a label line and the letter **A**, label the left atrium. *(1 mark)*

5 (b) On the diagram, draw **one** arrow to show where the blood carrying little oxygen enters the heart and **one** arrow to show where it leaves the heart. *(2 marks)*

5 (c) (i) The walls of the left and right ventricles have different thicknesses. Explain the advantage of this.

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(1 mark)

(Extra space) .....

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5 (c) (ii) The left and right ventricles pump the same volume of blood with each beat of the heart. Explain why.

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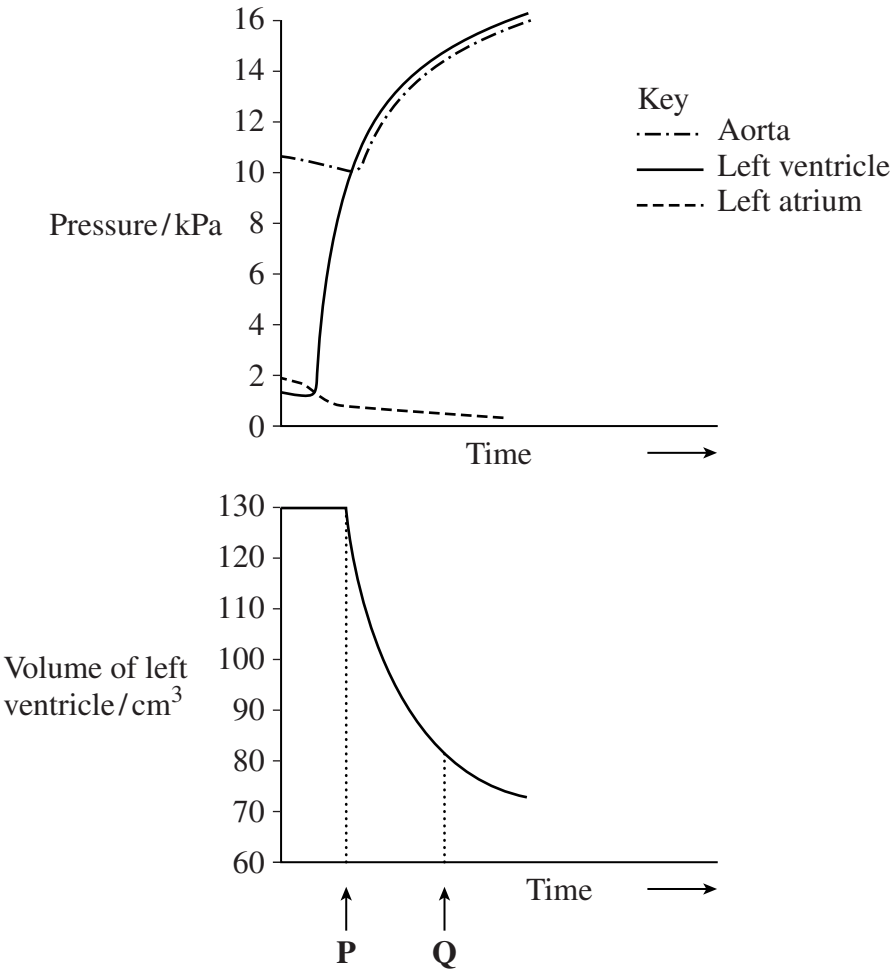
(1 mark)

5 (d) The graphs shows some of the pressure and volume changes that take place in the left side of the heart during part of a cardiac cycle.



Using information from the graphs, describe the events that produce the changes in the volume of the left ventricle between times **P** and **Q**.

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(4 marks)

9

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

6 (a) Organic substances produced in a leaf move through the phloem to the roots. Describe and explain how.

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(4 marks)

(Extra space) .....

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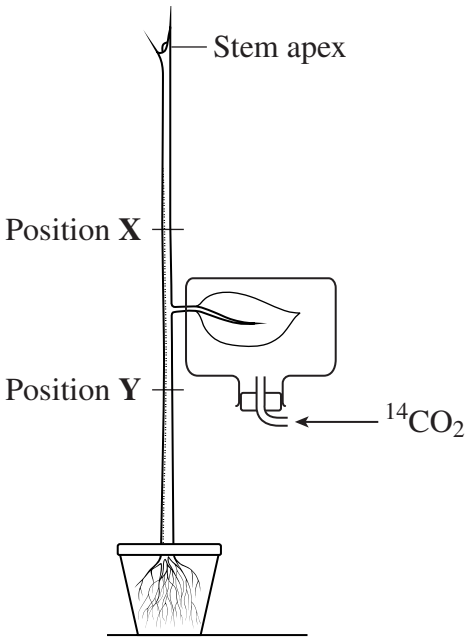
Question 6 continues on the next page

Scientists investigated the movement of organic substances in four plants, **A**, **B**, **C** and **D**. One leaf from each plant was supplied with carbon dioxide containing the radioactive isotope of carbon, ^{14}C.

Figure 1 shows one of these plants.

Figure 1



Each plant was treated differently before it was supplied with the radioactive isotope.

- Plant **A** – ringed at position **X**
- Plant **B** – ringed at position **Y**
- Plant **C** – ringed at position **X** and at position **Y**
- Plant **D** – not ringed

6 (b) All four plants were kept in bright light for one hour. Explain why.

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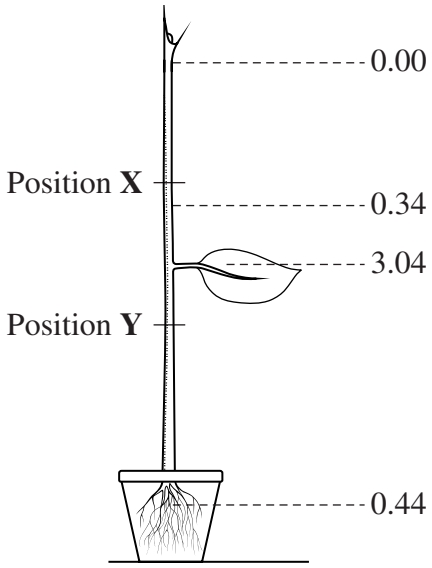
(1 mark)

6 (c) **Figure 2** shows the distribution of ^{14}C after one hour in one of the plants.

Figure 2



6 (c) Which plant, **A**, **B**, **C** or **D**, is shown in **Figure 2**.
Explain your answer.

Plant .....

Explanation .....

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(3 marks)

6 (d) Using the information given, explain the purpose of including plant **D** in the investigation.

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(1 mark)

9

Turn over ▶

Write your answers to **Question 7** in continuous prose.
Quality of Written Communication will be assessed in these answers.

7 (a) Explain how tissue fluid is formed and how it is returned to the circulatory system.

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(6 marks)

(Extra space) .....

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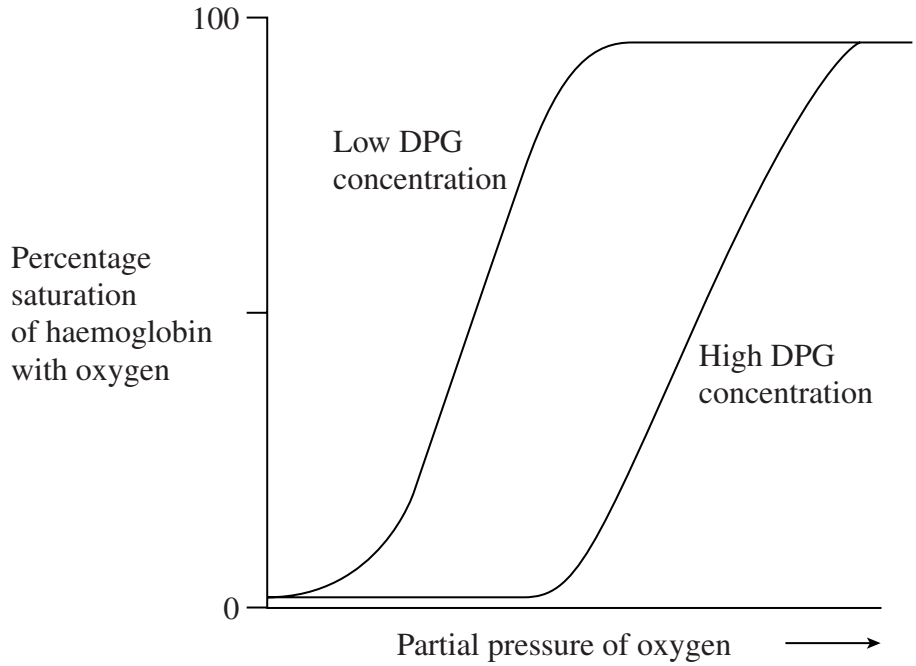
7 (b) DPG is a substance produced in small amounts in red blood cells. The graph shows the effects of DPG on the oxygen haemoglobin dissociation curve.



Anaemia is a condition in which not enough oxygen is delivered to the tissues. The red blood cells of people with anaemia produce large amounts of DPG. Explain the advantage to people with anaemia of producing large amounts of DPG.

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(4 marks)

END OF QUESTIONS

10

QWC

1

If you need extra space use this page 16 for your answers.