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Centre Number						Candidate Number					
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For Examiner's Use
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General Certificate of Education  
January 2008  
Advanced Level Examination



**BIOLOGY (SPECIFICATION B)**  
**Unit 5 The Environment**

**BYB5/W**

Wednesday 23 January 2008 9.00 am to 10.15 am

**For this paper you must have:**

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

Time allowed: 1 hour 15 minutes

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in **Section A** and **Section B** in the spaces provided.
- 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 66.
- 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 **Section A** are expected to be short and precise.
- Answer questions in **Section B** in continuous prose where appropriate. Quality of written communication will be assessed in these answers.
- You are reminded that this test requires you to use your knowledge of Modules 1-4 as well as Module 5 in answering synoptic questions. These questions are indicated by the letter **S**.

For Examiner's Use			
Question	Mark	Question	Mark
1			
2			
3			
4			
5			
6			
7			
8			
Total (Column 1) →			
Total (Column 2) →			
Quality of Written Communication			
TOTAL			
Examiner's Initials			

**SECTION A**

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

- 1 (a) A farmer changed the use of his land from raising animals to growing cereal crops. This is more efficient in terms of total food production. Explain why.

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*(2 marks)*

- (b) The farmer was paid to stop using one of his fields for farming. Over the next 20 years the species in the field changed. Describe a method that could be used to measure these changes.

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*(4 marks)*

- 2 (a) Scientists investigated the changes in the different types of plant species growing on a disused football pitch. Eventually the grass became replaced by a woodland community.

Explain how this happened.

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(3 marks)

- (b) Bluebells are small herbaceous plants that grow in woodland. Scientists investigated the abiotic factors which might affect the distribution of bluebells.

Give **three** abiotic factors the scientists would measure and explain how each factor might affect the distribution of bluebells.

Factor .....

Explanation .....

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Factor .....

Explanation .....

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Factor .....

Explanation .....

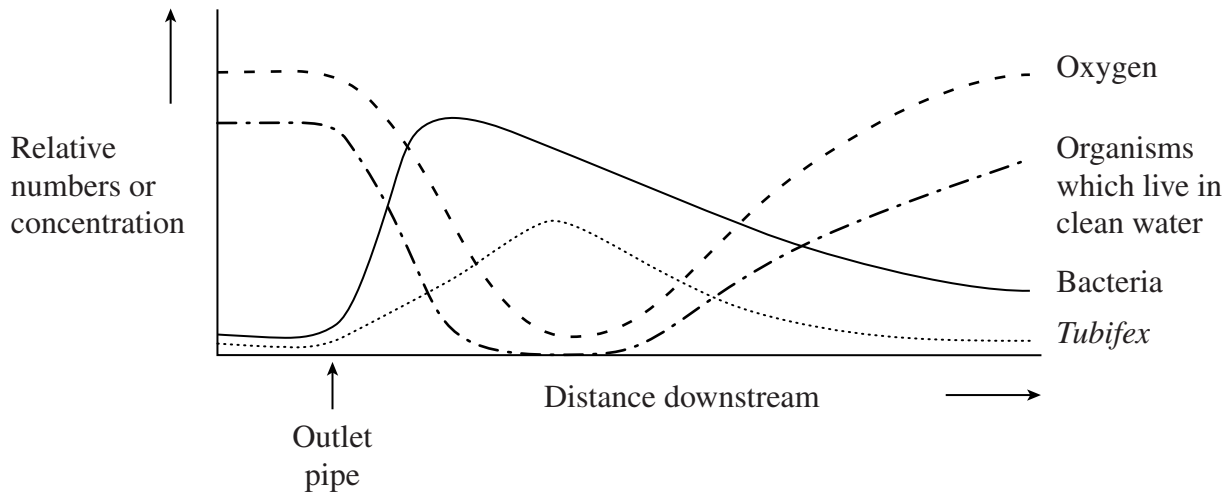
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(3 marks)

6

- 3 Scientists investigated the quality of water in a stream. At one point an outlet pipe was pouring organic effluent into the stream. **Figure 1** shows some of the results. The curves are drawn using different scales on the y axis.

**Figure 1**



- (a) Explain the changes in the concentration of oxygen in the water.

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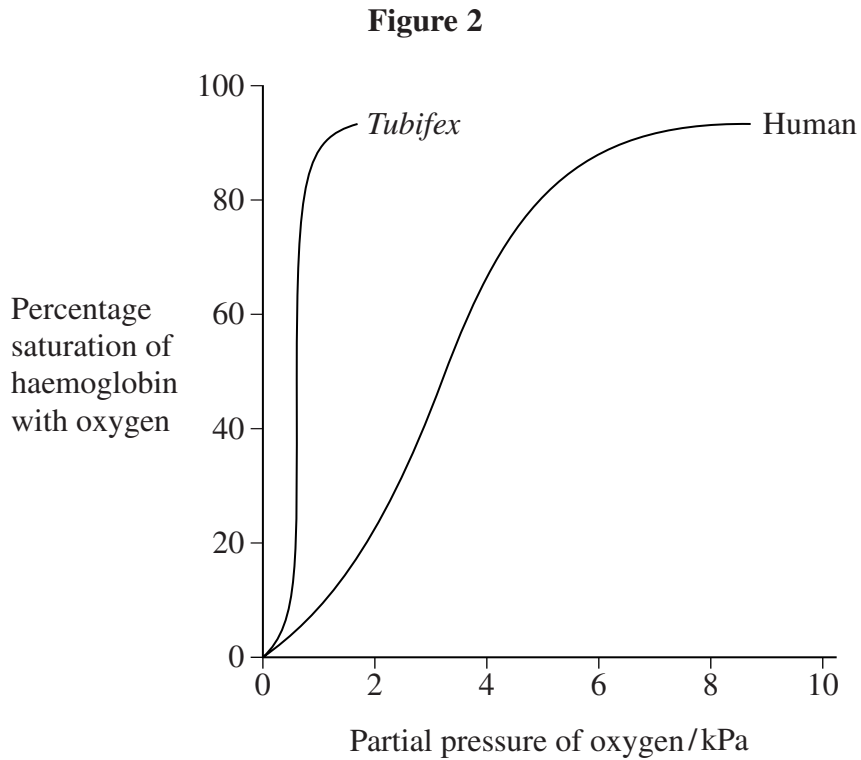
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(4 marks)

S (b) *Tubifex* is a small aquatic worm. Large numbers occurred in some places in the stream as shown in **Figure 1**.

**Figure 2** shows the oxygen dissociation curve for haemoglobin from *Tubifex* and from a human.



The haemoglobin of *Tubifex* is an adaptation to its habitat. Explain how.

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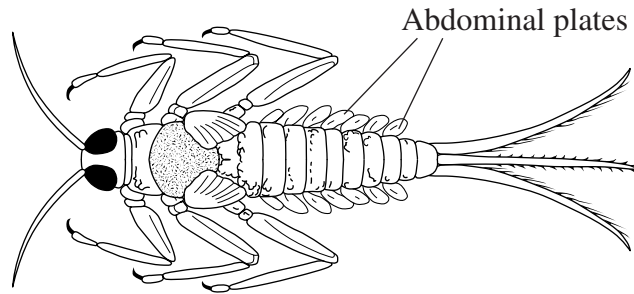
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(3 marks)

**Question 3 continues on the next page**

**Turn over ►**

S (c) The drawing shows one of the clean-water organisms found in the stream.



The abdominal plates are adaptations for gas exchange. Suggest and explain what features they will have for efficient gas exchange.

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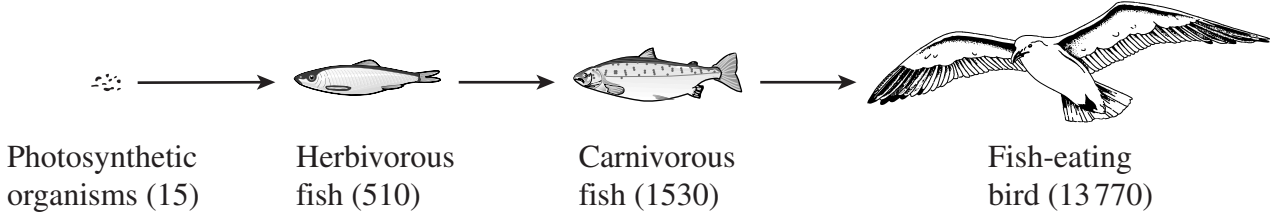
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(3 marks)

4 DDT is a pesticide. It used to be sprayed on crops to kill insects. Runoff from fields could carry DDT into lakes and rivers. The diagram shows a food chain after DDT had been in use for many years. The numbers in brackets are the concentrations of DDT in the tissues of the organisms. The units are parts per million.



(a) Fish-eating birds died from DDT poisoning. Explain why.

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(2 marks)

S (b) Many insect populations became resistant to DDT. Explain how.

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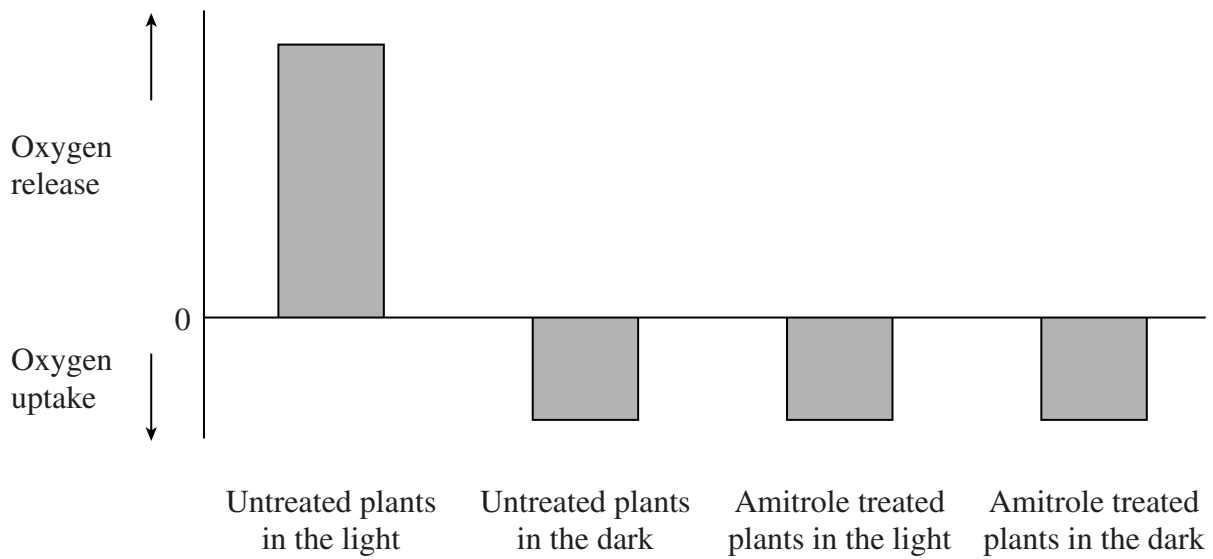
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(4 marks)

- 5 Amitrole is a weed killer. The bar chart shows the effect of amitrole on oxygen uptake and release by plants.



- S (a) Describe and explain the results shown in the chart.

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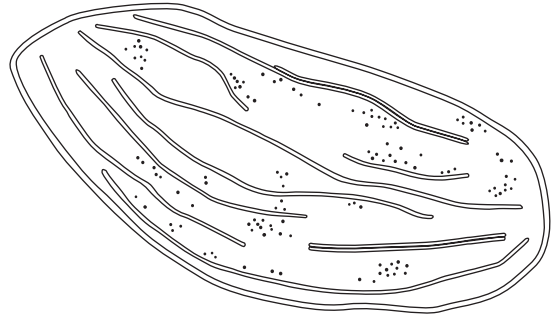
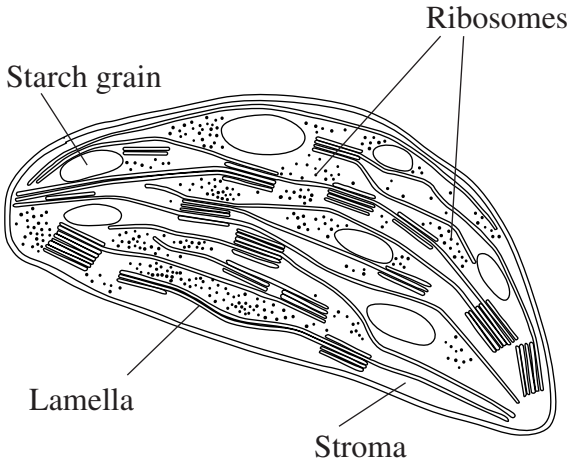
(4 marks)



S (b) The diagrams show the effects of treatment with amitrole on chloroplast structure.

Chloroplast from an untreated plant

Chloroplast from a treated plant



Other than the absence of starch grains, describe **two** changes in the structure of chloroplasts caused by treatment with amitrole. Explain how each change would affect photosynthesis.

Change .....

Explanation .....

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Change .....

Explanation .....

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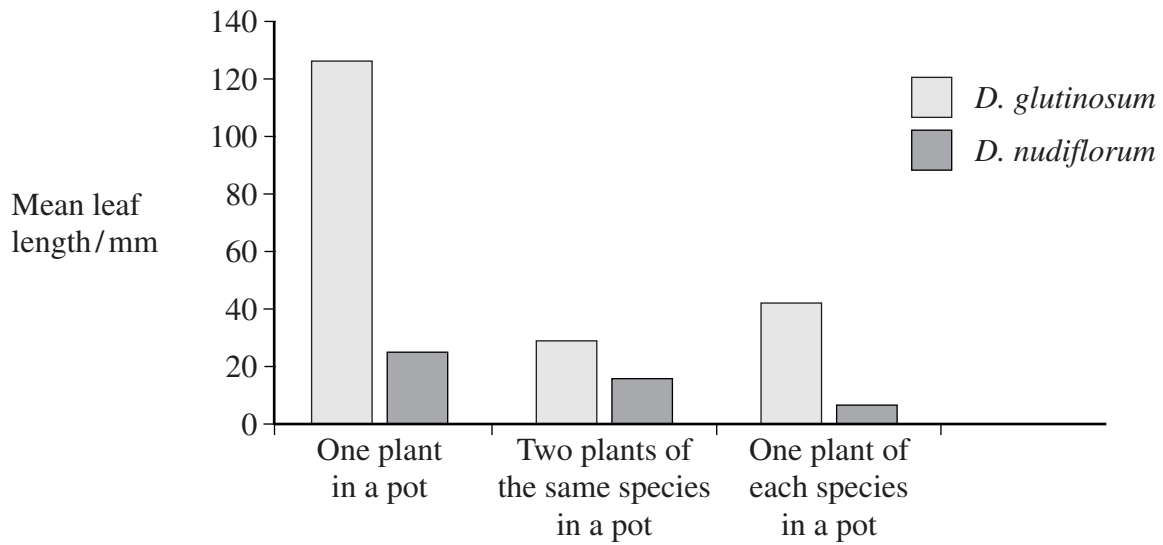
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(4 marks)

6 (a) Scientists investigated competition between two species of plant, *Desmodium glutinosum* and *Desmodium nudiflorum*. The scientists grew the plants in pots in three different conditions.

- One plant in a pot
- Two plants of the same species in a pot
- One plant of each species in a pot

They measured mean leaf length in plants grown in each condition. The bar chart shows the results.



What does the bar chart show about the effect of competition on mean leaf length?

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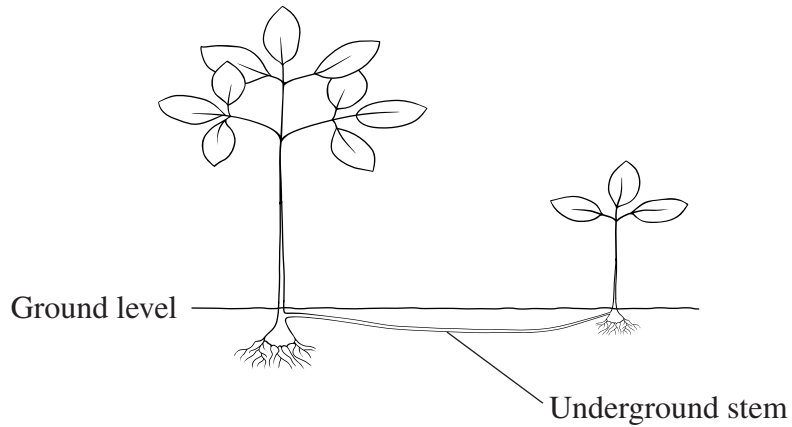
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(2 marks)

S (b) *Desmodium nudiflorum* produces horizontal underground stems from which new plants arise, as shown in the drawing.



Explain the advantage of this type of reproduction when colonising an area.

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(3 marks)

S (c) Complete the table to show the classification of *Desmodium nudiflorum*.

Kingdom	Plantae
	Angiospermophyta
	Dicotyledoneae
	Fabales
Family	Fabaceae
Genus	

(2 marks)

**SECTION B**

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

Write answers in continuous prose, where appropriate.  
Quality of Written Communication will be assessed in these answers.

7 (a) Explain how carbon in dead plant tissue is made available for photosynthesis.

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*(6 marks)*

(b) (i) Name the type of bacteria involved in the conversion of nitrite ions to nitrate ions.

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*(1 mark)*

S (ii) Bacteria have a different cell structure from plants. Give **two** ways in which the structure of a bacterial cell is different from that of a plant cell.

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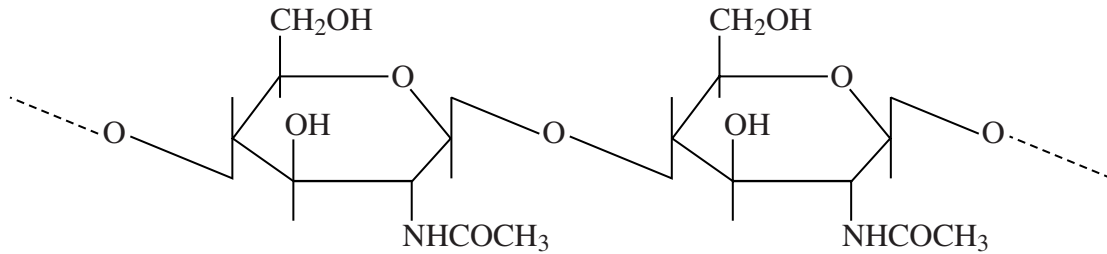
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*(2 marks)*

- S (c) Chitin is part of the hard outer covering of insects. It contains nitrogen. It is made of monomers of a substance called N-acetylglucosamine, which is derived from glucose. The diagram shows the molecular structure of chitin.



Describe **two** ways in which the structure of chitin is similar to that of cellulose.

- 1 .....
- .....
- 2 .....
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(2 marks)

**Turn over for the next question**

- 8 (a) Wood lemmings are small mammals. In some years, the population of lemmings in an area becomes very high. This is often followed by a rapid fall in the size of the population.

Suggest **three** biotic factors that might cause a rapid decline in population size. Explain how each factor might bring about this decline.

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(6 marks)

- S (b) In wood lemmings, the sex of an individual is determined by X and Y chromosomes. Females are XX and males are XY. A different form of the X chromosome, X\*, is also found in populations of wood lemmings. The X\* chromosome causes lemmings with X\*Y to develop as females.

An X\*X female lemming mated with an XY male. What would be the expected ratio of male to female offspring? Explain your answer.

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(2 marks)

**S** (c) The X\* chromosome was formed by a mutation. What environmental factor could have caused this mutation?

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(1 mark)

**S** (d) Suggest what effect this mutation has on the composition of lemming populations over many generations. Explain your answer.

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(2 marks)

**11**

**END OF QUESTIONS**

**QWC**

**1**

**There are no questions printed on this page**