

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use

General Certificate of Education
June 2008
Advanced Level Examination



**BIOLOGY (SPECIFICATION B)
Unit 6 Section A Applied Ecology**

BYB6/A

Wednesday 18 June 2008 1.30 pm to 3.45 pm

For this paper you must have:

- Section B provided as an insert (enclosed)
- a ruler with millimetre measurements.

You may use a calculator.

Time allowed: The total time for Section A and Section B of this paper is 2 hours 15 minutes

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 **Section A** is 50.
- 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, where appropriate.
- You are advised to spend 1 hour on **Section A**.
- You are reminded that **Section A** requires you to use your knowledge of different parts of the specification as well as Module 6 in answering synoptic questions. These questions are indicated by the letter S.

For Examiner's Use			
Question	Mark	Question	Mark
1			
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7			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			



J U N 0 8 B Y B 6 A 0 1

SECTION A

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

- 1 (a) The factors of rainfall, food availability, predation, temperature and soil pH can affect population size. Write each of these factors in the correct column of the table.

Factors that have a density-dependent effect	Factors that have a density-independent effect

(2 marks)

- 1 (b) Scientists calculated a diversity index for the animals in a pond. What data would they have to collect to carry out the calculation?

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(2 marks)

4



2 Otters are carnivorous mammals that feed both in fresh water and sea water.

2 (a) In coastal areas there are sometimes spillages of oil. These oil spills lead to a reduction in the otter population. Other than by killing otters directly, suggest how an oil spill may lead to a reduction in an otter population.

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(2 marks)

2 (b) Reduction of water pollution in rivers has benefited otters. Indicator species can be used to monitor water pollution. Explain how.

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(2 marks)

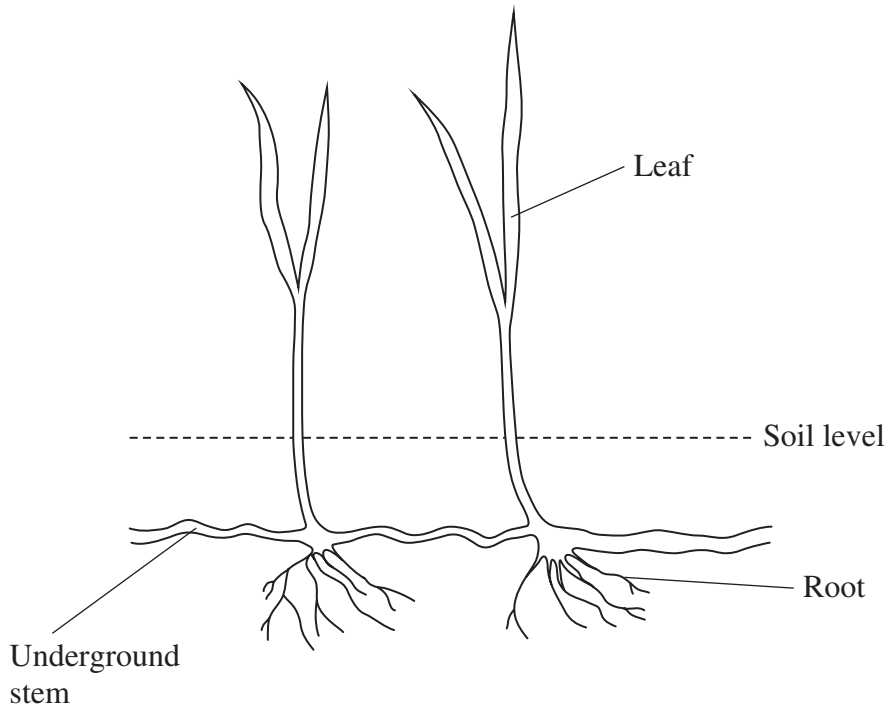
4

Turn over for the next question

Turn over ►



3 Couch grass is a weed. It has a stem that grows horizontally under the surface of the soil. Every few centimetres, a new shoot grows from this underground stem. The drawing shows how the couch grass grows.



S 3 (a) The couch grass shoots shown in the drawing may eventually become separate plants. These plants will be genetically identical. Use your knowledge of cell division to explain why.

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(2 marks)



3 (b) A gardener used a systemic herbicide rather than a non-systemic herbicide to kill couch grass. Explain why a systemic herbicide would be more effective in killing the couch grass.

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(2 marks)

3 (c) Another species of couch grass is an important weed in East Africa. Scientists have discovered a species of small fly that feeds on and kills this weed.

Suggest **two** factors that should be considered before using the fly as a biological control.

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(2 marks)

6

Turn over for the next question

Turn over ►



4 Salmon can be produced on fish farms.

4 (a) It is cheaper to catch farmed salmon than to fish for wild salmon. Give **one** other advantage of farming salmon.

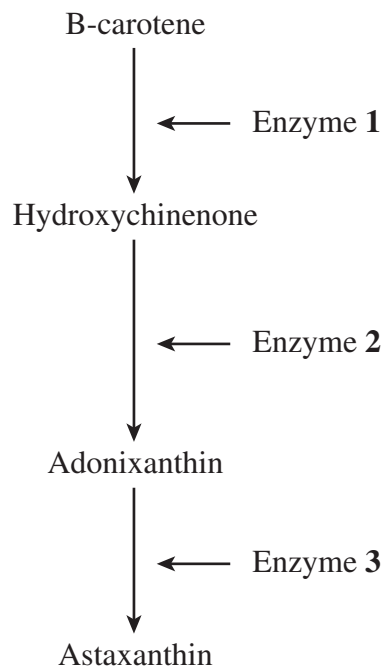
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(1 mark)

4 (b) Describe **one** difference between a closed fish-farming system and an open fish-farming system.

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(2 marks)

(Extra space)

S 4 (c) Salmon harvested from the wild have pink flesh. This colour is caused by a pigment called astaxanthin, which is stored in muscle tissue. Salmon cannot produce astaxanthin. They get it by eating crustaceans which can produce this pigment. The diagram shows some of the stages in the production of astaxanthin.



S 4 (c) (i) Microorganisms have been genetically engineered in an attempt to make them produce astaxanthin for use in the fish-farming industry. Explain how microorganisms could be genetically engineered for this purpose.

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(4 marks)

(Extra space)
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S 4 (c) (ii) Microorganisms that take up DNA during the genetic engineering process do not necessarily produce astaxanthin. Use the diagram to explain why the microorganisms may not produce astaxanthin.

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(2 marks)

(Extra space)
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5 Desert holly is a plant found in hot dry deserts.

5 (a) (i) White crystals cover some parts of the upper surface of its leaves. This is an adaptation that reduces water loss. Suggest how.

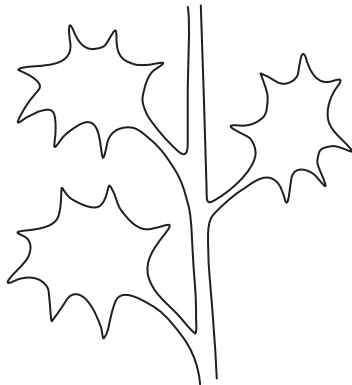
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(1 mark)

S 5 (a) (ii) The crystals are made from mineral ions absorbed from the soil water. The roots absorb these mineral ions against a concentration gradient. Explain how.

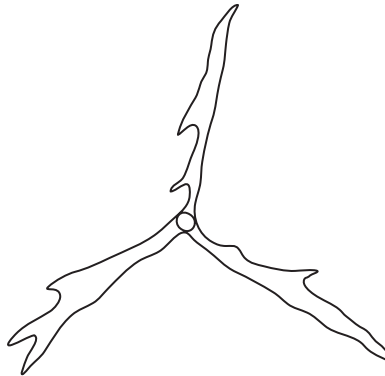
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(2 marks)

5 (b) Desert holly holds its leaves vertically as shown in the diagram.

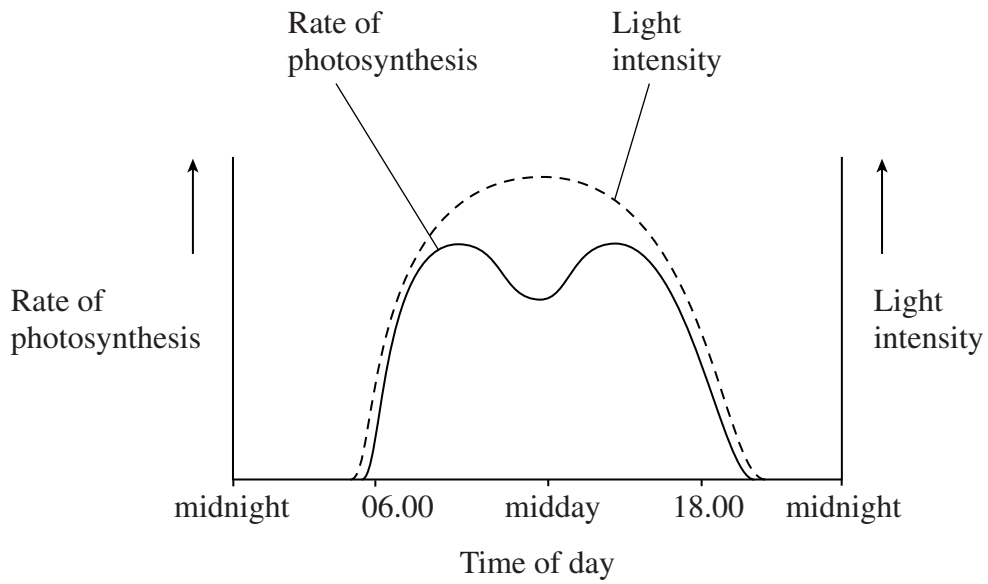
Plant viewed from the side



Plant viewed from above



The graph shows the changes in light intensity and the rate of photosynthesis for desert holly over a 24-hour period.



Use information from the diagram and the graph to suggest how desert holly conserves water.

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(3 marks)

(Extra space)

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S 5 (c) Many tropical plants use C4 photosynthesis whereas most plants in Britain use C3 photosynthesis. The light-independent reaction in C4 plants is different from that in C3 plants. Describe how.

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(2 marks)

Turn over ►



- 6 A conservation group working in Africa wants to prevent a species of rhino on a reserve from becoming extinct. The group used their knowledge and experience to estimate the probability of success of different conservation methods.

The table shows information about different conservation methods.

Conservation method	Factor associated with conservation method	Probability of rhinos being extinct within 30 years	Cost of conservation method / millions of £
No new conservation method	Disease	→ 0.85	0
	No disease	→ 0.51	
Fencing of the reserve	Disease	→ 0.90	0.6
	No disease	→ 0.40	
Make the reserve larger		→ 0.43	1.08
Take some rhinos into zoos for captive breeding	Successful breeding	→ 0.00	3.29
	Failure to breed	→ 0.95	



6 (a) There is £4 million available to spend on conservation of rhinos on the reserve. The conservationists have chosen fencing of the reserve and taking some rhinos into a captive breeding programme.

6 (a) (i) Suggest biological reasons for the risks associated with these two methods.

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(4 marks)

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6 (a) (ii) Making the reserve larger reduces the risk of the rhinos becoming extinct but only slightly. Suggest why.

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(1 mark)

(Extra space)
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Question 6 continues on the next page

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S 6 (b) The size of a population of rhinos may be reduced by a new disease. After many generations, the population may increase in size again and consist of rhinos resistant to the disease. Explain how.

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(*Extra space*) (3 marks)

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8



Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

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7 Abalone are molluscs that are permanently attached to rocks on the sea bed.

7 (a) Scientists measured changes in the population sizes of abalone in different areas. Describe how they might have used a sampling method to do this.

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(4 marks)

(Extra space)

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7 (b) Abalone are harvested for food. Population sizes are falling as a result of over harvesting. Use your knowledge of how fish stocks are maintained to suggest **two** regulations that could be used to maintain abalone stocks.

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(2 marks)



S 7 (c) Abalone carry out gas exchange using gills. A diffusion gradient is maintained over these gills.

S 7 (c) (i) Suggest how a diffusion gradient might be maintained over the gills.

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(3 marks)

(Extra space)
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S 7 (c) (ii) Suggest **two** ways in which the structure of the gills might be adapted for gas exchange.

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(2 marks)

END OF SECTION A

SECTION B IS PROVIDED AS AN INSERT



