

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Education
June 2006
Advanced Level Examination



BIOLOGY (SPECIFICATION B)
Unit 6 Section A Applied Ecology

BYB6/A

Friday 23 June 2006 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 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.
- **Section A** and **Section B** will be marked by different examiners. You must ensure that any supplementary sheets are fastened to the appropriate question paper answer book.
- Do all rough work in this book. Cross through any work you do not want 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			
Number	Mark	Number	Mark
1			
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Total (Column 1) →			
Total (Column 2) →			
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Examiner's Initials			

SECTION A

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

- 1 (a) Give **two** fishing regulations and explain how each helps to maintain fish stocks.

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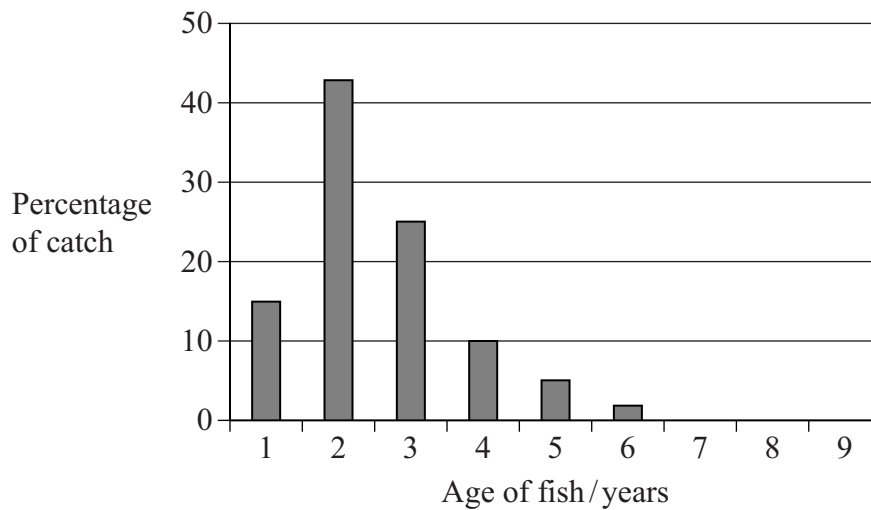
2

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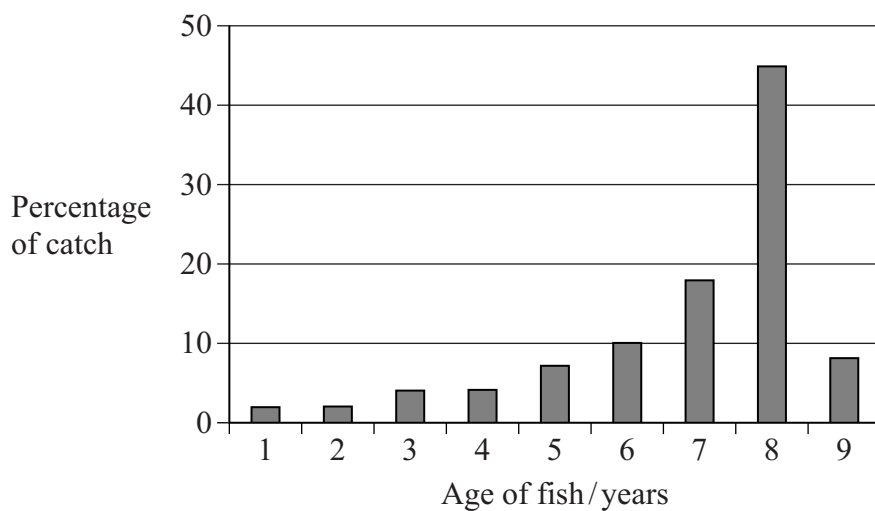
(2 marks)

- (b) Fishing effort is a measure of the size of a fishing fleet and the number of days the fleet spends fishing. The bar charts show the ages of one species of fish caught in areas where there have been different fishing efforts.

High fishing effort



Low fishing effort



Describe and explain the effect of reducing fishing effort on stocks of this species of fish.

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(2 marks)

4

Turn over for the next question

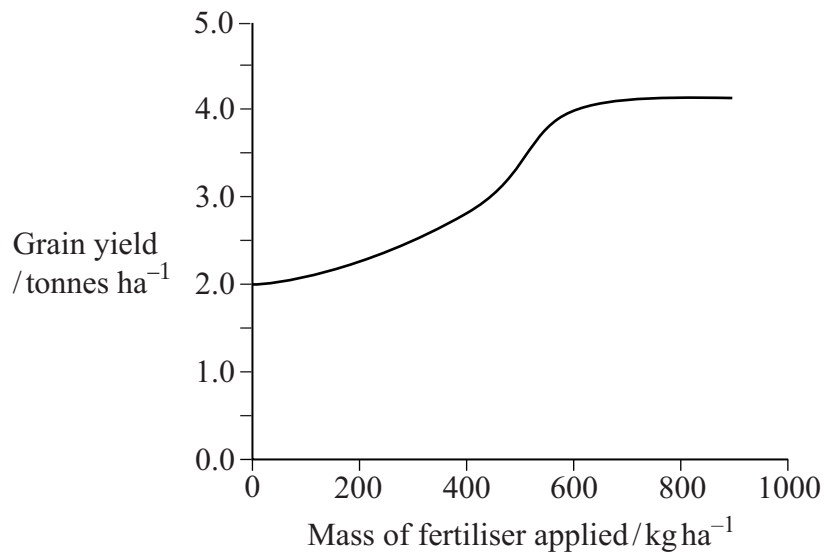
Turn over 

2 (a) Explain how including leguminous plants in a crop rotation reduces the need to use artificial fertilisers.

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(2 marks)

(b) The graph shows the effects of applying potassium fertiliser at different rates to a crop of wheat.



Explain how the graph shows the law of diminishing returns.

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(2 marks)

S (c) Application of very high concentrations of fertiliser to the soil causes plants to wilt. Explain why.

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(2 marks)

- 3 The table shows the numbers of adult butterflies in two areas of the same tropical forest. In the logged area some trees had been cut down for timber. In the virgin forest no trees had been cut down. The two areas were the same size.

Butterfly species	Logged forest		Virgin forest	
	Number	$n(n-1)$	Number	$n(n-1)$
<i>Eurema tiluba</i>	72	5112	19	342
<i>Cirrochroa emalea</i>	43	1806	132	17 292
<i>Partenos sylvia</i>	58	3306	14	182
<i>Neopithecops zalmora</i>	6	30	79	6162
<i>Jamides para</i>	37	1332	38	1406
Total	216	11 586	282	25 384

- (a) Describe a method for finding the number of one of the species of butterfly in the virgin forest.

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(2 marks)

- (b) The index of diversity of a forest can be calculated using the equation $d = \frac{N(N-1)}{\sum n(n-1)}$.

Calculate the index of diversity for the virgin forest. Show your working.

Answer (2 marks)

- (c) What does the table show about the effects of logging on the butterfly populations?

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(2 marks)

4 Sulphuric acid is used as a contact herbicide to kill the leaves of potato plants before harvest. This reduces the spread of disease.

(a) Suggest why a systemic herbicide would not be suitable for this purpose.

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(2 marks)

(b) Some of this sulphuric acid may enter rivers and lakes. Explain **two** ways in which this can affect aquatic organisms.

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(4 marks)

5 (a) The kidney tubules of desert-dwelling rodents have a structural adaptation which allows the animals to survive in a dry environment.

(i) Describe this structural adaptation.

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S (ii) Explain how desert-dwelling rodents are able to produce concentrated urine.

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..... (4 marks)

(b) The table shows the ratios of urine concentration : blood plasma concentration for some mammals.

Mammal	Ratio of urine : blood plasma concentration
A	4.0 : 1
B	7.5 : 1
C	8.0 : 1
D	8.9 : 1
E	18.0 : 1

Using information in the table, explain which mammal is best adapted for living in dry conditions.

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- 6 (a) Explain how the use of insecticides may poison the animals at the top of a food chain.

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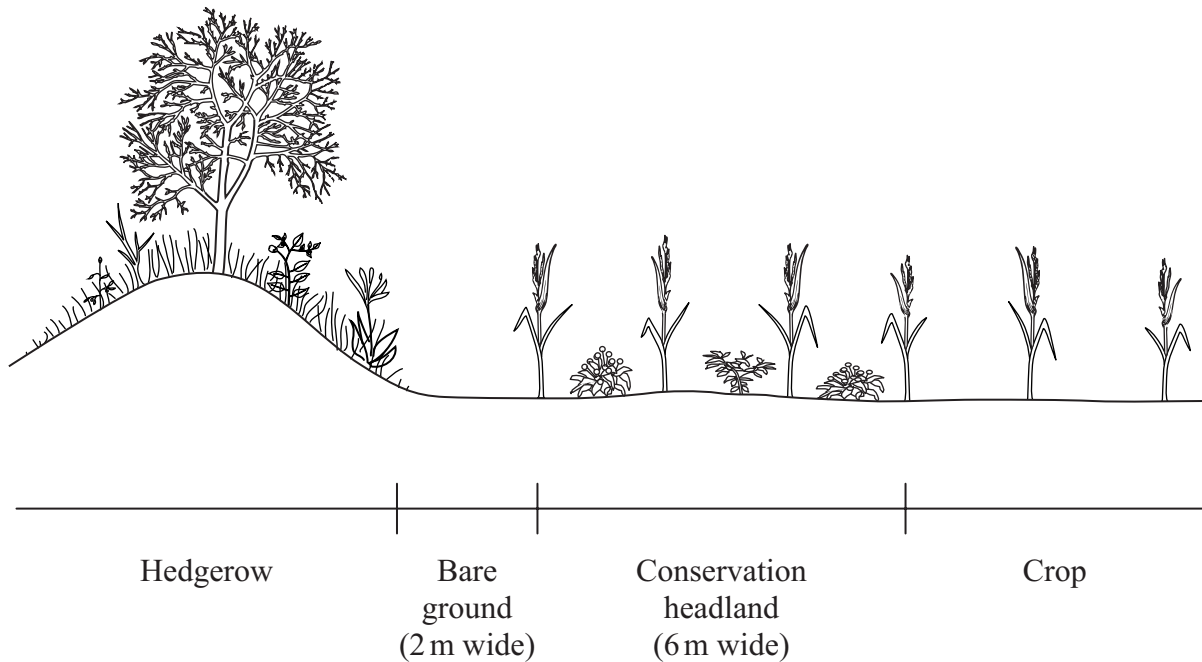
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(2 marks)

The diagram shows a hedgerow and part of a field with a crop. The land is farmed in a way that conserves wildlife. The strip of bare ground next to the hedgerow is ploughed frequently to prevent any plants from growing. The first 6 m of the field, called the conservation headland, is sprayed with a selective herbicide to control some kinds of weeds. The rest of the field is sprayed with herbicide to kill all weeds.



- S (b) Suggest **one** advantage of leaving a strip of bare ground between the hedgerow and the field.

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(1 mark)

(c) Suggest the benefit of allowing some weeds to grow in the conservation headland.

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(2 marks)

S (d) After harvesting the crop, the farmer digs the unwanted stems and roots into the soil. Explain how the nutrients contained in these plant parts become available for use by other organisms.

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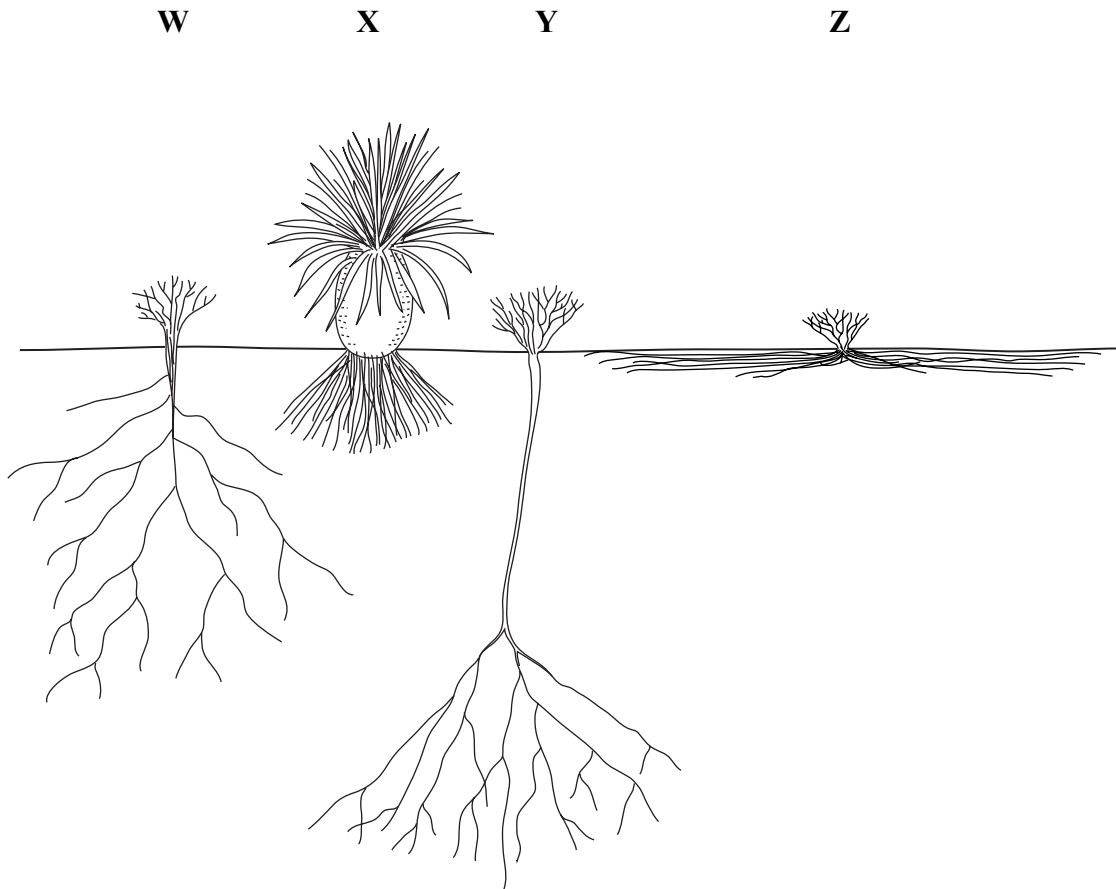
(4 marks)

9

Turn over for the next question

Turn over 

7 The drawing shows four common plants found in the Mojave Desert.



(a) Explain how **three** features of the plants shown in the drawing are adaptations to desert conditions.

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(3 marks)

(b) Resurrection plants can lose up to 95 % of their water content without dying. They can survive for many years in this desiccated state and will revive within hours of rainfall. Suggest which of the plants **W** to **Z** is most likely to be a resurrection plant. Give a reason for your choice.

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(2 marks)

S (c) Water taken up by plants is used in photosynthesis. Describe what happens to water in this process.

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(3 marks)

S (d) Compared with other plants, resurrection plants contain higher concentrations of one kind of sugar in their tissues. Describe a biochemical test that could be used to identify this sugar as a non-reducing sugar such as sucrose.

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(4 marks)

END OF SECTION A

SECTION B IS PROVIDED AS AN INSERT

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