OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced GCE

BIOLOGY 2805/03

Environmental Biology

Friday **25 JUNE 2004** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	15	
2	15	
3	15	
4	15	
5	15	
6	15	
TOTAL	90	

This question paper consists of 15 printed pages and 1 blank page.

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For Examiner's Use

Answer **all** the questions.

1 **(a)** Industrial decline in the UK has led to increasing areas of derelict land in many counties. It is possible that some of these areas could be used to establish habitats for a range of wildlife.

Explain what sort of land may be described as derelict.

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China clay has been mined in Cornwall since 1770. This activity has resulted in the production of around 5 million tonnes of waste each year. This has created a large number of huge mounds or tips.
Such tips represent a hostile environment for plants and, left on their own, they are colonised very slowly indeed.

(b) Suggest **three** reasons why these china clay tips present a hostile environment for plants.

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(c) In order to speed up succession on these tips, the following procedures are carried out:

- spray with seeds of fast-growing grasses, mixed with a suitable mulch, such as wet wood shavings or peat
- sow legumes, such as clover or bird's foot trefoil
- plant small shrubs
- finally, plant sapling trees.

Explain:

(i) the benefit of the grasses being fast-growing;

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(ii) the purpose of the mulch;

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(iii) the importance of sowing legumes;

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(iv) the benefits of planting shrubs and trees.

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(d) Outline how this sequence of procedures is **similar** to the process of natural ecological succession.

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[Total: 15]

For Examiner's Use

2 Many species of animals and plants are classed as endangered as a result of human activities.

(a) List **three** human activities responsible for **plant** species becoming endangered.

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(b) Explain the reasons for concern when animal and plant species become endangered.

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(c) In this question, one mark is available for the quality of written communication.

The African elephant is an example of a species which was placed on the endangered list, but has now been removed from the list as a result of various measures that were used to protect the species.
The Convention in the International Trade in Endangered Species (CITES) played an important part in protecting African elephants.

Discuss the measures used to protect African elephants.

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For Examiner's Use

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Quality of Written Communication [1]

[Total: 15]

[Turn over

For Examiner's Use

3 **(a)** Fig. 3.1 shows the annual global production of chlorofluorocarbon gases (CFCs) during the second half of the 20th century.
An international agreement on the production and use of CFCs, known as the Montreal Protocol, was reached in 1987.

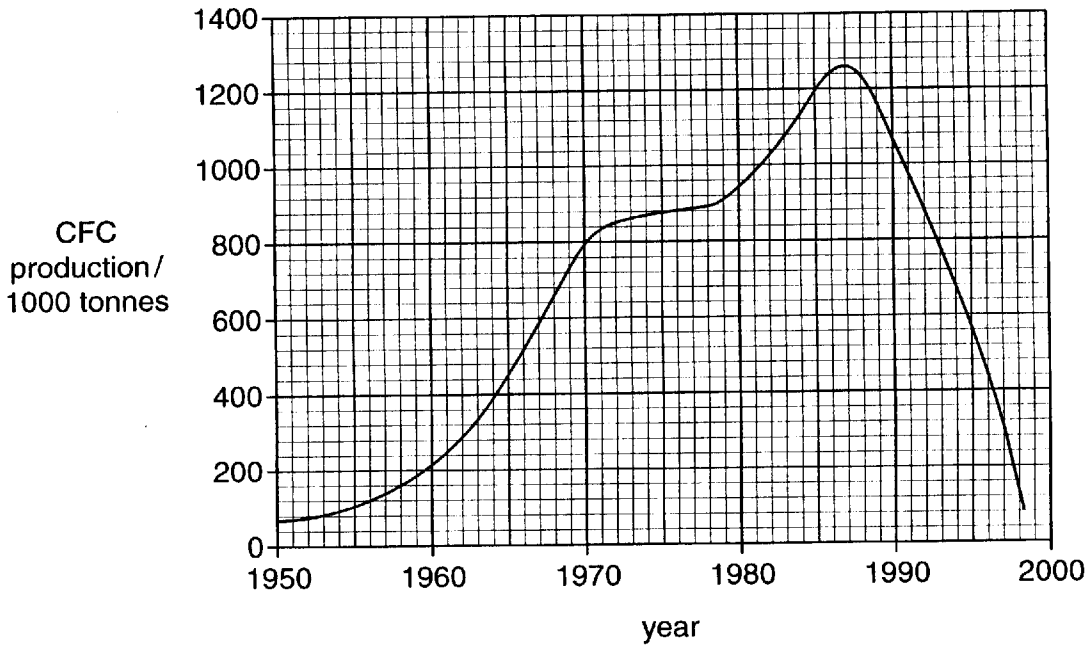

Fig. 3.1

Describe **and** explain the changes in annual global production of CFCs

(i) between 1950 and 1987;

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For Examiner's Use

(ii) after the Montreal Protocol in 1987.

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(b) In 1985, an article published in the science journal, *Nature*, confirmed that a 'hole' had been detected in the ozone layer above the Antarctic. The presence of this 'hole' gave rise to considerable concern. If it spread, it would have serious consequences for living organisms.

Explain why the loss of ozone gave cause for concern.

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(c) A recent report from the United Nations Environment Programme (UNEP) stated that 'the ozone layer will slowly recover over the next 50 years'.

Explain why the recovery of the ozone layer is expected to take this length of time.

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[Total: 15]

4 Plant populations can be investigated by the use of quadrat sampling. Quadrat size varies and different sizes are used in different situations.

(a) On Fig. 4.1,

(i) draw a graph to show how the number of species recorded varies as the size of quadrat increases; [1]

(ii) indicate the optimum size of quadrat to use. [1]

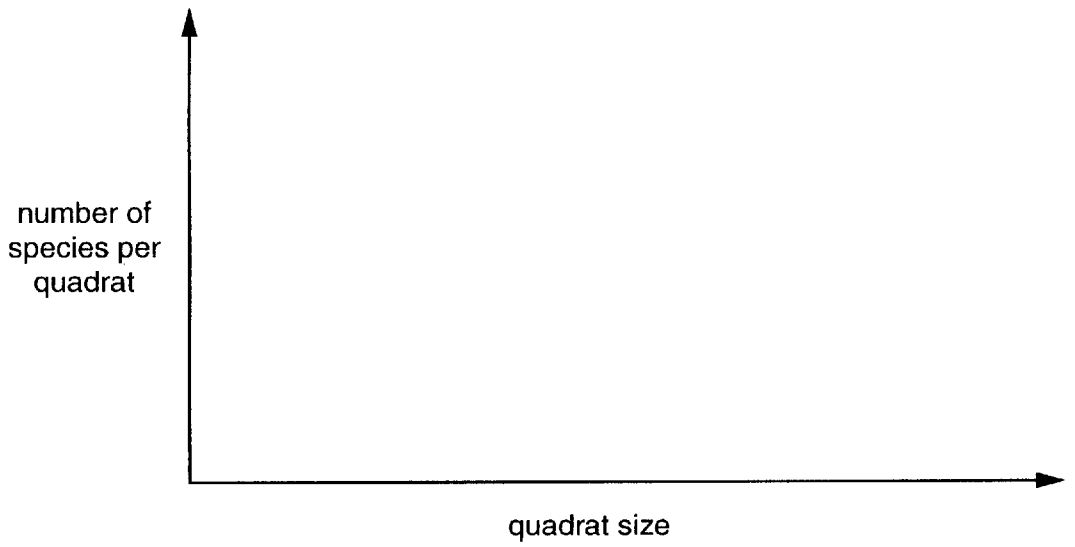

Fig. 4.1

(b) Explain how you would use a quadrat to determine:

species frequency;

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percentage cover.

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(c) Outline the problems associated with assessing percentage cover.

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Fig. 4.2 shows a point quadrat.

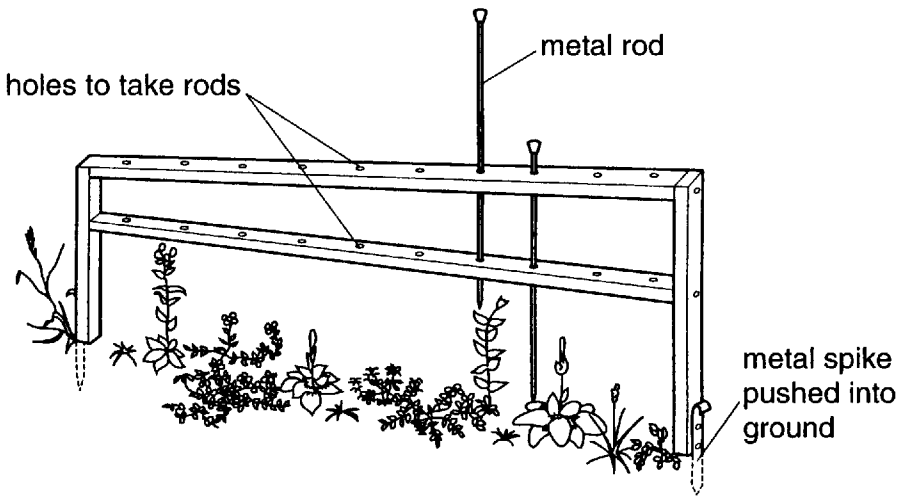

Fig. 4.2

A group of students used a point quadrat to determine the percentage cover of plant species in the middle of some sand dunes between the sea and a wood. They placed the point quadrat at one position on the dunes, as shown in Fig. 4.2, and lowered ten metal rods. They recorded how many times the rods hit each species. Their results are shown in Table 4.1.

Table 4.1

species	number of 'hits'
lady's bedstraw	14
clover	12
lesser hawkbit	18
ragwort	10
ribwort plantain	16
bird's foot trefoil	8
others	32

Calculating the number of 'hits' as a percentage of the total 'hits' is an estimate of percentage cover for each species.

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(d) (i) Using the results in Table 4.1, calculate the percentage cover for lesser hawkbit. Show your working and express your answer to the nearest 0.1%.

Answer ..... % [2]

(ii) Explain how the students could use the point quadrat to investigate changes in vegetation across the sand dunes.

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[Total: 15]

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For Examiner's Use

5 **(a)** List **three** advantages and **three** disadvantages of organic farming.

advantages

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3 .....

disadvantages

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(b) In this question, one mark is available for the quality of written communication.

The intensification of agriculture in the UK during the second half of the 20th century has had many environmental implications. Of particular concern are:

- increased production and release of farm waste
- increased areas of land cultivated for intensive agriculture
- destruction of hedgerows.

Discuss the environmental implications of these changes.

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For Examiner's Use

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Quality of Written Communication [1]

[Total: 15]

[Turn over

For Examiner's Use

6 The end of the last century saw a number of massive 'die-offs' of marine mammals. These included various species of porpoises, dolphins and seals. Suspicion fell on a group of organochlorines called polychlorinated biphenyls (PCBs) which have a variety of industrial uses.

Investigation showed that, at each step up the food chain, these chemicals became more concentrated. Animals occupying the highest trophic level accumulate very high concentrations of PCBs in their tissues.

(a) State the sources of PCBs.

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(b) Explain how PCBs become more concentrated at each step up the food chain.

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(c) Blood samples from bottlenose dolphins were analysed for concentrations of PCBs and the rate of mitosis in lymphocytes. The results are shown in Fig. 6.1.

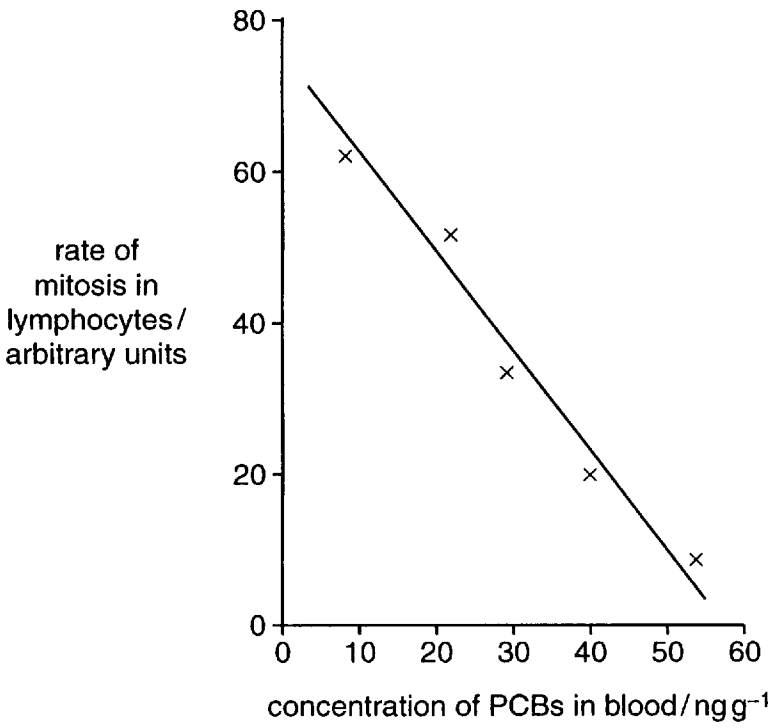

Fig. 6.1

PCBs appear to reduce the effectiveness of the immune system of marine mammals.

Discuss whether the data in Fig. 6.1 support this conclusion.

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(d) Suggest how chemicals, such as PCBs, may reduce the rate of mitosis in lymphocytes.

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(e) Studies have shown that another organochlorine, DDT, dissolves in fat and is stored in the blubber of marine mammals. During starvation and during infections, fat stores are broken down to provide energy.

Explain why this is likely to put marine mammals at even greater risk of disease.

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[Total: 15]

END OF QUESTION PAPER