OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

BIOLOGY

2805/03

Environmental Biology

Thursday **29 JANUARY 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	16	
2	15	
3	18	
4	14	
5	12	
6	15	
TOTAL	90	

This question paper consists of 18 printed pages and 2 blank pages.

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For Examiner's Use

Answer **all** the questions.

1 **(a)** Asian elephants are now ten times as rare as African elephants in the wild. During the 1990s, their numbers halved to 20 000. It is estimated that if a similar rate of decline was to continue, they would face extinction in the wild within thirty years.

Suggest reasons for the decline in the numbers of Asian elephants in the wild.

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(b) Early in 2002, London Zoo's Asian elephants were transferred to Whipsnade Wildlife Park, in the hope that they might breed. At present, there is only one male and six females in this group of captive elephants. Only four or five Asian elephants are usually born in captivity each year.

Explain why captive breeding using only one male may be a disadvantage to this population.

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(c) State **three** reasons why animals often do **not** breed successfully when in captivity.

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Rare and endangered plant species can be maintained in botanic gardens and seed banks. Seeds are kept in seed banks at low temperature and in an atmosphere that contains very little oxygen.

(d) Explain why seeds are stored in seed banks under such conditions.

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(e) Explain the benefits of storing rare and endangered plant species in botanic gardens and seed banks.

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[Total: 16]

2 The number of pesticide-resistant species increased during the 20th century. Fig. 2.1 illustrates the changes in the numbers of pesticide-resistant species, worldwide, of

- insects
- fungi
- weeds.

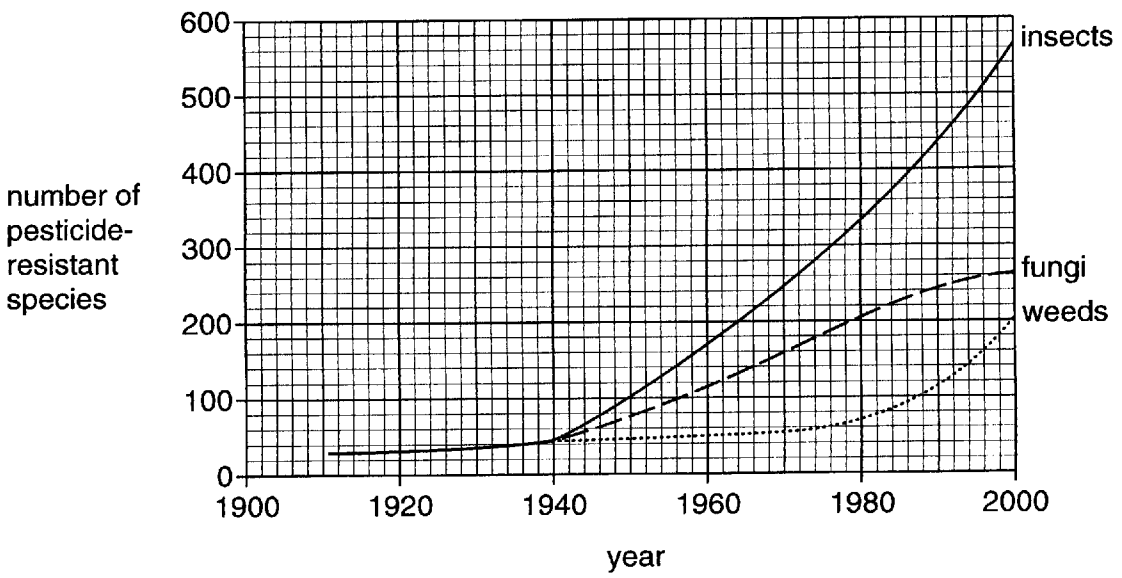

Fig. 2.1

(a) Describe **and** explain the trends shown in Fig. 2.1. You will be credited for using the data in your answer.

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(b) State **two** reasons, other than the development of pesticide-resistance, why the use of pesticides gives cause for concern.

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

Livestock, such as beef cattle, are reared using extensive and intensive methods of production. Table 2.1 shows some information about the production of beef cattle using these two methods.

Table 2.1

	extensive	intensive
number of cattle per hectare	0.17	7.4
growth rate / kg year^{-1}	70	370
age at which first calf is born / years	4-5	2
survival of calves / %	45	>90
age at slaughter / months	46-60	14-17

Discuss the differences between **extensive** and **intensive** methods of rearing livestock, such as beef cattle.

You will gain credit if you use the data in Table 2.1 to support your answer.

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[Turn over

For Examiner's Use

[7]

Quality of Written Communication [1]

[Total: 15]

For Examiner's Use

3 Biological Oxygen Demand (BOD) is a measure used to assess the levels of water pollution.

Typical figures are shown in Table 3.1.

Table 3.1

level of pollution	BOD / mg dm^{-3}
low	3
moderate	100
high	250

(a) State a type of pollution that might lead to such an increase in BOD **and** explain exactly how this increase is brought about.

type of pollution .....

explanation .....

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(b) BOD is determined as follows:

- take several samples of polluted water
- measure the oxygen concentration in each sample
- place each sample in the dark for five days at 25 °C
- remeasure the oxygen concentration in each sample.

Explain:

(i) why several samples are taken;

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(ii) how the concentration of oxygen is measured;

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(iii) why the samples are placed in the dark;

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(iv) why the samples are kept at 25 °C;

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(v) why the samples are left for five days.

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For Examiner's Use

(c) A variety of methods can be used to reduce the BOD of polluted waters.

Suggest how the BOD of polluted waters could be reduced.

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(d) Outline how indicator species are used to measure levels of pollution.

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[Total: 18]

[Turn over

For Examiner's Use

4 'The European Commission yesterday admitted it is facing its gravest fishing crisis to date and said that it would have little choice but to propose a total ban on fishing for cod, haddock and whiting in British coastal waters next year.'

The Guardian, 29/10/2002

(a) This crisis in European waters is a result of overfishing in order to meet an increasing demand. In recent decades, fish have been removed from the seas in ever increasing numbers.

State **three** factors that have contributed to this crisis.

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(b) The crisis can only be overcome if fish stocks are allowed to recover.

Outline the measures that are necessary to ensure that fishing can be continued without depleting stocks.

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

Fish are part of a complex marine ecosystem and therefore interact with other species and the physical environment.

Fig. 4.1 shows part of a marine food web that includes cod.

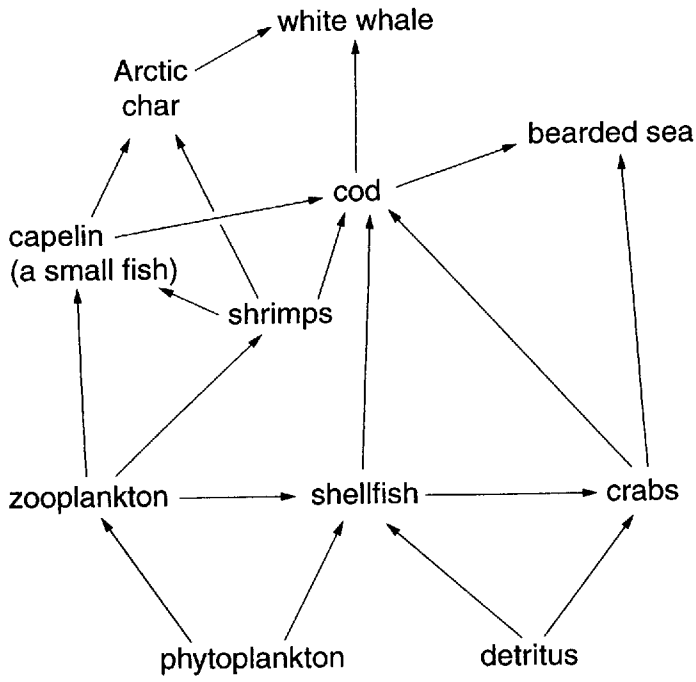

Fig. 4.1

If a carnivorous fish, such as cod, were to disappear from the marine ecosystem there would be an ecological imbalance.

Describe the possible effects of such an imbalance on the marine ecosystem.

You will gain credit if you use the information in Fig. 4.1.

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For Examiner's Use

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Quality of Written Communication [1]

[Total: 14]

[Turn over

For Examiner's Use

5 **(a)** Counting animal populations can be difficult.

State **three** reasons why animal populations may be difficult to count.

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(b) In the 19th century, the Eastern North Pacific grey whale was hunted until it was close to extinction. An estimate in 1997-98 suggested that numbers had risen to around 27 000. This estimate was based on photographs.

A further series of photographs was taken in 2001 and 2002, the results of which are shown in Table 5.1.

Table 5.1

number photographed in 2001	1 426
number photographed in 2002	1 365
number of whales recognised in both sets of photographs	108

With reference to the 'capture-recapture' method,

(i) use the data in Table 5.1 to calculate the population size of Eastern North Pacific grey whales in 2001/2002. Show your working.

Answer ..... [2]

(ii) outline the assumptions that are made when using this method to estimate whale populations.

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(c) When estimating population sizes of small invertebrates, taking photographs would not be practical.

Describe an appropriate alternative to taking photographs.

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[Total: 12]

[Turn over

6 **(a)** There are about 6 500 Sites of Special Scientific Interest (SSSIs) in England, Wales and Scotland.

Explain

(i) why an area may be designated as a SSSI;

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(ii) the implications for the users of land which has been designated a SSSI.

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(b) National Parks were established in England and Wales under the same Act of Parliament as SSSIs. Fig. 6.1 shows an area of a typical UK National Park.

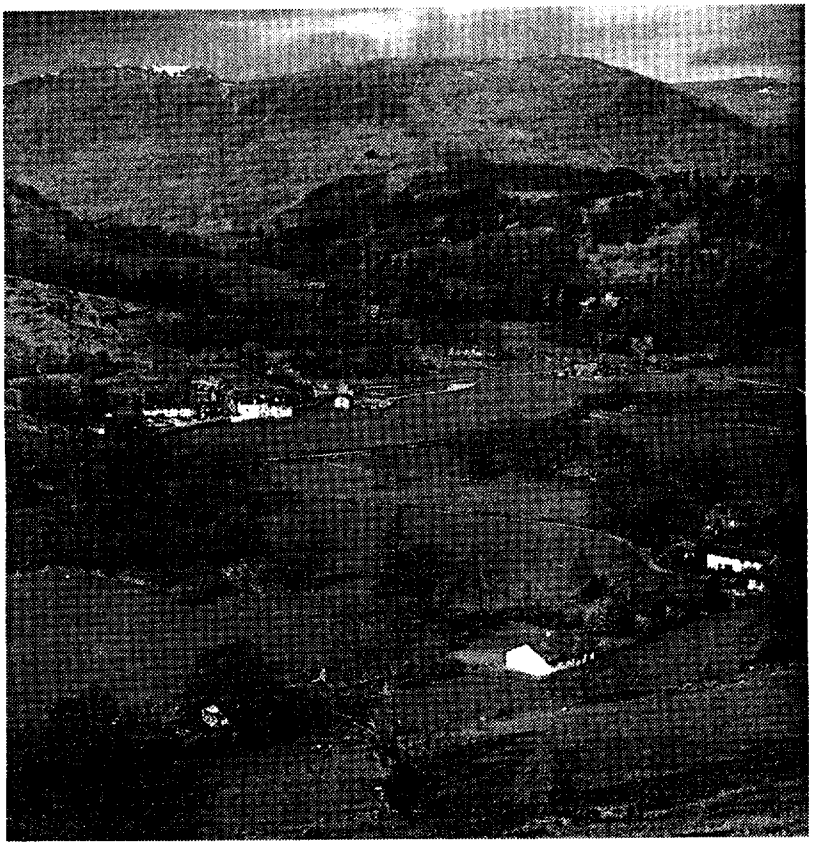

Fig. 6.1

For Examiner's Use

(i) With the help of Fig. 6.1, describe the features of National Parks.

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(ii) Outline the difficulties involved in maintaining National Parks.

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For Examiner's Use

(c) Fig. 6.2 shows the distribution of Environmentally Sensitive Areas (ESAs) in England and Wales. An ESA is an area of environmental importance that is under threat from particular farming practices. These areas are designated by the Department for Environment, Food and Rural Affairs (DEFRA).

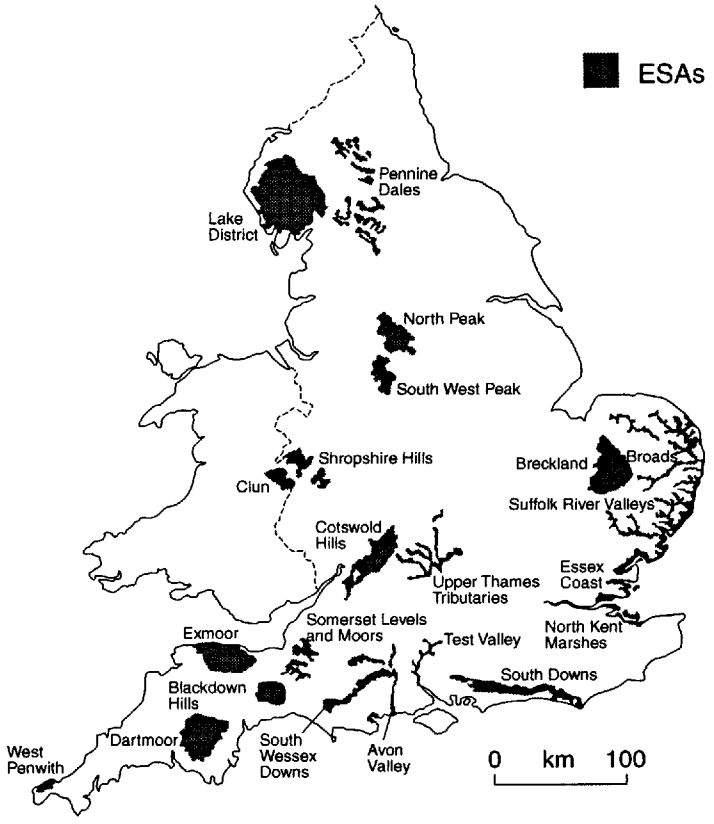

Fig. 6.2

Describe **two** ways in which DEFRA regulates farming practices in ESAs.

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[Total: 15]

END OF QUESTION PAPER