OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced GCE

BIOLOGY

2805/03

Environmental Biology

Tuesday   **29 JANUARY 2002**   Morning   1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
    Electronic calculator

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 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.

Answer **all** the questions.

1 In Britain, numbers of water voles have fallen by 90% in the past 15 years. During the summer of 2000, conservation workers released water voles, bred in zoos, into the wild, as part of a national programme to save the species from extinction.
The animals were placed in cages that allowed them to come and go. The cages were stocked with food and guarded to ensure that the voles were not harmed by predators.
The water vole is one of several hundred plant and animal species on the British government's Biodiversity Action Plan programme. This scheme grew out of the Rio Earth Summit, where nations signed the Biodiversity Convention, which compels them to take action to reverse the decline of their endangered species.

(a) List **three** reasons why so many species have become endangered throughout the world.

1 ....

2 ....

3 ....[3]

Although the water voles have been bred successfully in captivity, this has not always been the case with many endangered species.

(b) Explain **two** problems which occur when attempting to breed animals in captivity.

1 ....

....

2 ....

....[4]

When captive bred species are released into the wild, they are vulnerable to predators and find it difficult to obtain enough food, resulting in early death.

(c) State **two** other reasons why captive bred individuals do not always survive well in the wild.

1 ....

....

2 ....

....[2]

3

(d) Suggest an alternative to captive breeding that might be used to save endangered species.

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....[1]

Reasons for maintaining biodiversity may be both ethical and economic.

(e) Explain, in the context of maintaining biodiversity, what are meant by

   (i) ethical reasons;

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....[2]

   (ii) economic reasons.

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....[3]

[Total : 15]

       [Turn over

4

2 Ancient hedgerows were once a common sight in the English landscape. However, as agriculture has become more intensive, hedgerows have rapidly disappeared. In Britain during the twentieth century, hedgerow removal averaged 8 000 km per year.

(a) Discuss the reasons why hedgerows have been removed and explain why this removal is of concern to conservationists. (*In this question, 1 mark is available for the quality of written communication.*)

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As well as removing hedgerows, other intensive farming techniques were employed during the second half of the twentieth century in order to maximise the production of food. Fig. 2.1 shows how the sales of pesticides have increased.
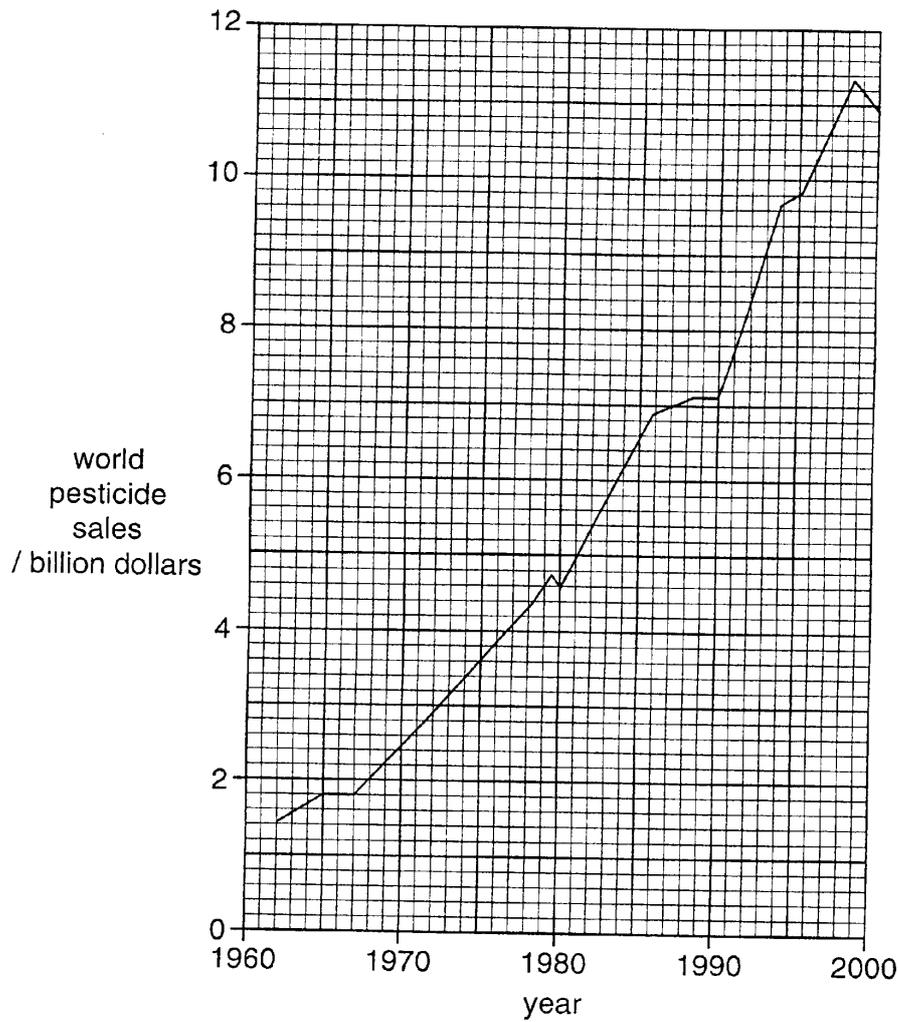
Fig. 2.1

(b) With reference to Fig. 2.1, calculate the percentage increase in pesticide sales between 1966 and 1999. Show your working.

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....[2]

[Turn over

(c) Explain why the increase in pesticide use is of concern to many people.

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....[3]

(d) Suggest **one** alternative to the use of pesticides and outline how it would keep pests under control.

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....[2]

[Total : 15]

8

3 A group of students used randomly placed 0.25 m² quadrats to analyse the distribution of plant species in an area of chalk grassland. The data they recorded on two particular species, yarrow, *Achillea millefolium*, and salad burnet, *Sanguisorba minor*, is shown in Table 3.1.

Table 3.1

quadrat	number of individual plants per quadrat	
	yarrow	salad burnet
1	3	0
2	2	0
3	0	6
4	4	7
5	3	0
6	2	5
7	5	5
8	2	0
9	3	8
10	6	0
11	0	3
12	0	6
13	2	4
14	1	0
15	5	4
16	4	7
17	3	0
18	1	6
19	0	8
20	4	0

9

(a) Explain how the students would have determined the most suitable size of quadrat to use in this investigation.

....

....

....

....[3]

(b) State which of the two plants shows the highest species frequency. Explain your reasoning.

species ....

reasoning ....

....[3]

(c) Calculate the mean number of salad burnet plants per square metre. Show your working.

....

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....[3]

The students also investigated the quality of the soil in the area, by determining the percentage of water and organic matter, including humus.

(d) Describe how they would have determined

(i) the percentage of water;

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....[3]

(ii) the percentage of organic matter.

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....[3]

[Total : 15]

[Turn over

4 Fig. 4.1 shows the changes in atmospheric concentrations of one type of chlorofluorocarbon (CFC-11) since 1970 and the projected changes to 2050.
Fig. 4.2 shows levels of ozone above the Antarctic, measured between 1957 and 1990.
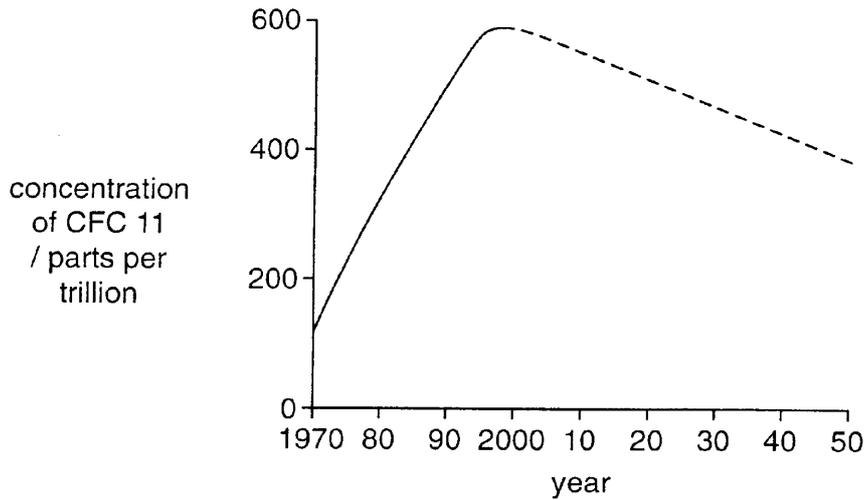
Fig. 4.1

Fig. 4.2

(a) State **two** reasons for the increase in CFCs between 1970 and 1990.

1 ....

2 ....[2]

11

CFCs are thought to be responsible for the destruction of ozone in the atmosphere.

(b) Explain how this statement is supported by the data shown in Figs. 4.1 and 4.2.

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....[3]

(c) Describe how CFCs lead to the destruction of ozone.

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....[4]

The projection in Fig. 4.1 shows that the concentration of CFC-11 is expected to decrease.

(d) Explain what has been done to try to achieve this projected decrease.

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....[3]

(e) Explain why the projected rate of decrease is less steep than the earlier increase.

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....[3]

[Total : 15]

[Turn over

5 Fig. 5.1 shows the area of derelict land in different regions of England.
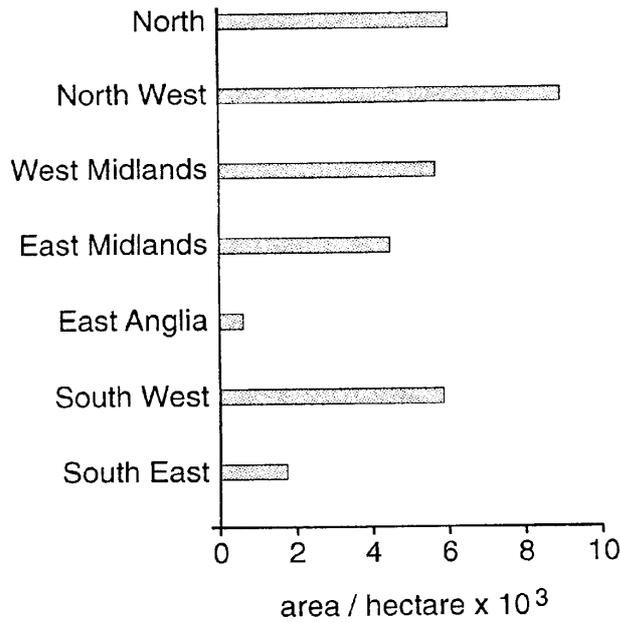
Fig. 5.1

(a) (i) State what is meant by derelict land.

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....

....[1]

(ii) With reference to Fig. 5.1, suggest why there is a significant difference between the area of derelict land in East Anglia and the North West.

....

....[2]

Much of this land has the potential to be restored to create valuable wildlife habitats. In order to do so, it is necessary to try and speed up the process of ecological succession.

(b) Explain what is meant by *ecological succession*.

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....[3]

13

(c) State **two** problems that might have to be overcome before a wildlife habitat can be established on derelict land.

1 ....

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2 ....

....[2]

There are many spoil heaps in Cornwall and Devon, resulting from the extraction of china clay.

(d) Outline and explain the steps that need to be taken in order to establish thriving plant populations on such spoil heaps. (*In this question, 1 mark is available for the quality of written communication.*)

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[Total : 15]

[Turn over

6 Fig. 6.1 compares all the various energy inputs and outputs of a 19th century extensive farm and a later 20th century intensive farm. The farms are mixed (arable and livestock), of a comparable size and situated in the same part of the UK.

Extensive farm

input (GJ)

horses	services, e.g. blacksmith supplies, e.g. seeds	coal	farm workers
160	16	4	65

total input
245 GJ

output (GJ)

meat and dairy produce	cereals
440	3000

total output
3440 GJ

Intensive farm

input (GJ)

seeds	fertilisers pesticides	fuel	machinery	farm workers	electricity	feed
490	2500	4100	1100	20	860	970

total input
10 040 GJ

output (GJ)

cereals	other crops	meat	dairy products
18 700	1600	260	90
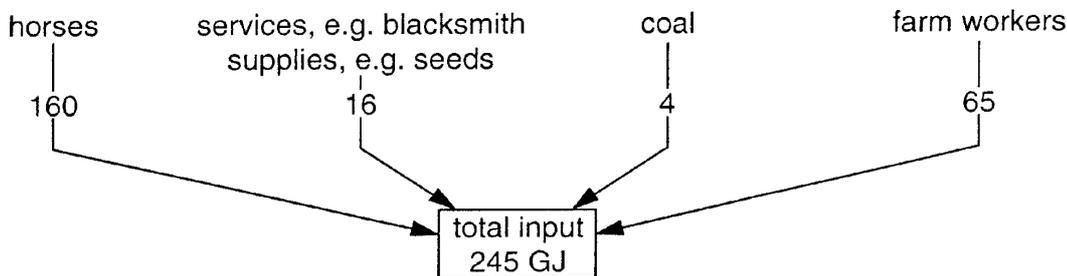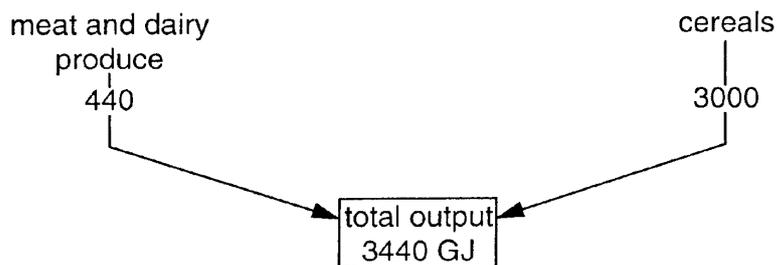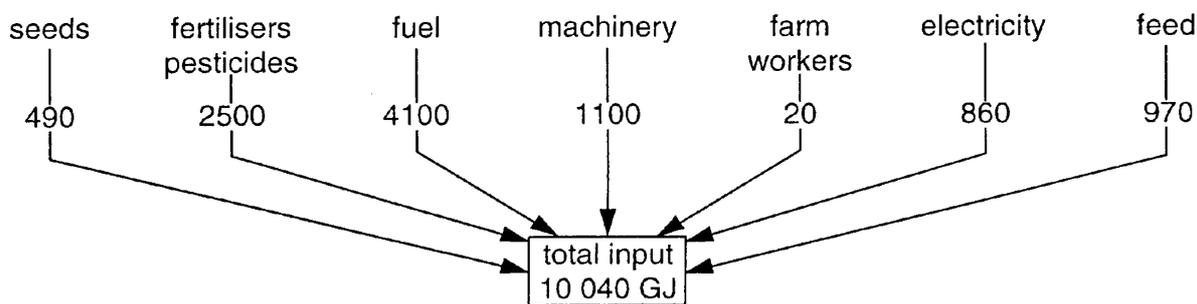
1 GJ = 10³ kJ
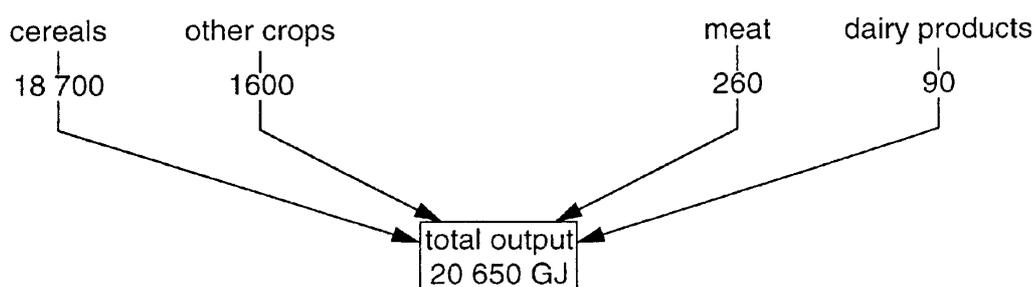
total output
20 650 GJ

Fig. 6.1

The output of the intensive farm is considerably greater than the extensive farm.

(a) State which farm is the most energy efficient. Explain your answer.

most energy efficient ....

explanation ....

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....[4]

(b) With reference to Fig. 6.1, explain how **three** named factors have contributed to the higher output in the intensive farm.

factor 1 ....

explanation ....

....

factor 2 ....

explanation ....

....

factor 3 ....

explanation ....

....[6]

Crop rotation was an important feature of extensive farming. Legumes, such as clover, help to maintain soil fertility when used in crop rotation.

(c) Explain how legumes can contribute to increased soil fertility.

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....[5]

[Total : 15]