OCR
RECOGNISING ACHIEVEMENT

ADVANCED GCE

BIOLOGY

Environmental Biology

FRIDAY 22 JUNE 2007

2805/03

Afternoon

Time: 1 hour 30 minutes

Additional materials: Electronic calculator
Ruler (cm/mm)

CUP/T24775

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question 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	13	
2	16	
3	11	
4	17	
5	13	
6	20	
TOTAL	90	

This document consists of **15** printed pages and **1** blank page.

[Turn over

Answer all the questions.

1 Groups of students in the UK and Malaysia working in cooperation carried out research in areas of woodland. The students exchanged data and compared the soil characteristics of the two sites. Table 1.1 shows the results of their investigation.

Table 1.1

A table has been removed due to third party copyright restrictions

Details: A table of results showing features of soil and corresponding results for the soil samples from the UK and Malaysia

(a) Describe one method the students could use to measure the pH of the soil.

.....

.....

.....

.....

.....

..... [3]

(b) Using the information in Table 1.1, explain why the Malaysian soil is less permeable to water than the UK soil.

.....

.....

.....

.....

.....

..... [3]

(c) Students found that Malaysian soil was often waterlogged.

Explain why the uptake of nutrients by plants is **reduced** in waterlogged soils.

.....

.....

.....

.....

.....

..... [3]

(d) The students' investigation identified that soils from both sites in the study were acidic.

Research has shown that plants and animals may be adversely affected by acidic soils with a pH less than 5.

Explain how the following may be **adversely** affected in acidic conditions below pH 5:

growth of forest plants .....

.....

.....

.....

animals living in streams and rivers. .....

.....

.....

..... [3]

(e) Suggest a reason for the difference in colour between the two soils.

.....

..... [1]

[Total: 13]

2 Musk deer occur throughout forested mountain habitats in Asia and eastern Russia. They live in small groups, normally three individuals in a group, and are primarily active at night.

The deer are hunted illegally for traditional medicine and also threatened by habitat destruction. Populations of musk deer in China and Mongolia are listed in Appendix II of the Convention for International Trade in Endangered Species (CITES).

(a) Explain what is meant by the term *endangered species*.

.....

.....

.....

..... [2]

(b) Explain how placing musk deer on the CITES list may help prevent their extinction.

.....

.....

.....

..... [2]

(c) The numbers of musk deer have halved in ten years. In parts of China the populations have reached very low numbers. These populations are also widely separated.

Outline the possible consequences of this separation on the populations of musk deer.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) In this question, one mark is available for the quality of the use and organisation of scientific terms.

Musk deer populations in isolated habitats could be conserved by a programme of captive breeding. Zoos, such as London Zoo and Jersey Zoo, are involved in captive breeding of many endangered species.

Describe how a captive breeding programme for musk deer would be set up **and** discuss the problems associated with the reintroduction of the captively bred deer back into the wild.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [7]

Quality of Written Communication [1]

[Total: 16]

3 A study was carried out in south-east Scotland on the release of nitrous oxide (N_2O) from agricultural land. Nitrous oxide is produced by the action of bacteria in the soil.

In the study, six plots of grassland, **A** to **F**, were treated in different ways. Plots **B** to **F** were treated with substances containing nitrogen. The quantities applied to each plot contained the same mass of nitrogen, although in different compounds. Table 3.1 shows the results obtained for the various treatments.

Table 3.1

plot	treatment	N_2O produced / kg ha^{-1}
A	nothing added	57
B	inorganic fertiliser	531
C	urea	190
D	sewage sludge	13 537
E	cattle manure	319
F	poultry manure	6612

(a) Describe **three** variables in this experiment that the researchers would have taken into account to ensure that the results were valid.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(b) **(i)** Explain why plot **A** was included in the study.

.....

.....

.....

..... [2]

(ii) Suggest the possible sources of nitrogen in plot **A**.

.....

.....

.....

..... [2]

(c) State **two** sources of oxides of nitrogen, **other than from agricultural land**.

1 .....

.....

2 .....

..... [2]

(d) Nitrous oxide is known to be a greenhouse gas.

What are the possible consequences of a rise in atmospheric nitrous oxide concentration?

.....

.....

.....

..... [2]

[Total: 11]

4 Governments set targets for the level of recycling that local authorities must meet. Fig. 4.1 shows the percentage of total household waste recycled in Devon from 1990-1991 to 2004-2005.

A graph has been removed due to third party copyright restrictions

Details: A graph showing the percentage of total household waste recycled in Devon from 1990-1991 to 2004-2005

Fig. 4.1

(a) The target for recycling for the year 2005/2006 had been set at 36% by Devon County Council.

The total annual household waste collected during this period was 30 000 tonnes.

Calculate the mass of rubbish that should have been recycled and prevented from entering landfill. Show your working.

Answer = ... tonnes [2]

(b) Fig. 4.1 shows that the percentage of household waste recycled in Devon has increased over the period shown.

Outline the ways in which this increase in recycling could have been achieved.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Much household rubbish is deposited in landfill sites.

Suggest another method of disposal of household rubbish **and** a possible environmental problem associated with this form of disposal.

disposal method .....

.....

environmental problem .....

.....

..... [2]

(d) In this question, one mark is available for the quality of spelling, punctuation and grammar.

When landfill sites are full they are reclaimed and landscaped. Industrial sites, such as disused coal mines and china clay mines, can also be reclaimed.

Discuss the processes involved in the reclamation of such **industrial sites**.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [8]

Quality of Written Communication [1]

[Total: 17]

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

5 The Earth's resources must be used sustainably to prevent their over exploitation and destruction. Ecosystems can be given an economic value which estimates the worth of the resources and services they provide. Table 5.1 shows the results of a survey to estimate the value of various ecosystems.

Table 5.1

ecosystem	area / millions of hectares	estimated economic value / $US per hectare per year	% contribution to total value of all ecosystems
open ocean	33 200	252	35.8
estuaries	180	22 832	17.6
coral reefs	62	6075	1.6
tropical rainforests	1900	2007	16.3
temperate forests	2955	302	3.8
grasslands	3898	232	3.9
mangroves	165	9990	7.1
floodplains	165	19 580	13.8

(a) Suggest why the economic value is only an estimate.

.....

.....

.....

..... [2]

(b) Table 5.1 shows that although the estimated economic value per hectare per year is only $252 for open oceans they contribute 35.8% of the total value of all ecosystems surveyed.

Explain this observation.

.....

.....

.....

..... [2]

(c) State **two** reasons why tropical rainforests have a higher estimated economic value than temperate forests.

1 .....

.....

.....

2 .....

.....

..... [2]

(d) Suggest reasons why estuaries and floodplains have such a high estimated economic value.

.....

.....

.....

..... [2]

(e) Sustainable use of ecosystems is important to maintain resources for future generations.

Describe how fisheries in the North Sea could be managed sustainably.

.....

.....

.....

.....

.....

.....

.....

.....

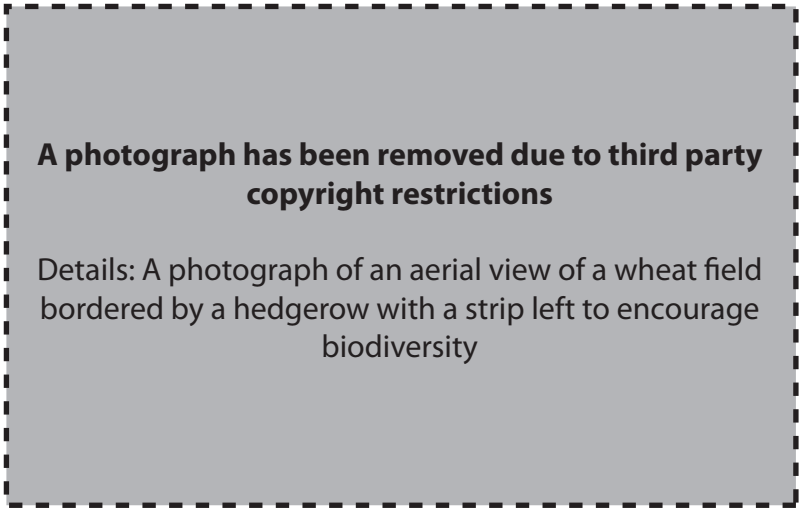
.....

..... [5]

[Total: 13]

6 Hedgerows are important in farming as they act as sites of refuge for beneficial insects, provide protection for the crop from adverse weather conditions and act as wildlife corridors.

Farmers are advised to leave strips of land between hedgerows and the crops in the fields to encourage biodiversity. Fig. 6.1 is an aerial view of a wheat field, bordered by a hedgerow, with a strip left to encourage biodiversity.



Source: http://forum.fwag.org

Fig. 6.1

(a) Describe how you would investigate whether leaving strips of land around fields encourages plant biodiversity.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(b) Another reason for leaving strips of land around fields with hedgerows is that crop yield near hedgerows can be low.

Suggest why crop yield near hedgerows can be low.

.....

.....

.....

.....

.....

..... [3]

(c) When hedgerows are destroyed there is a loss of biodiversity.

Suggest why this loss of biodiversity is of concern.

.....

.....

.....

.....

.....

..... [3]

The Royal Society for the Protection of Birds (RSPB) and the British Trust for Ornithology (BTO) carried out research into the declining populations of farmland bird species. In a study carried out from 1970 to 1998 they found that farmland bird species had decreased by up to 68% across rural areas of the UK.

(d) **(i)** Changes in farming practices, such as the increased use of pesticides, are highlighted by the RSPB and BTO as possible causes of this decline in bird species.

Suggest how the increased use of pesticides could have caused this decline.

.....

.....

.....

.....

.....

..... [3]

(ii) An increase in the number of predators, such as magpies and sparrowhawks, has also been suggested as a possible cause for the decline in the populations of farmland bird species.

Suggest why this may **not** be the cause.

.....

.....

.....

..... [2]

(e) Many farmland bird species are specialist feeders occupying very narrow ecological niches.

Suggest why this leads to greater ecological diversity.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 20]

END OF QUESTION PAPER