

**ADVANCED GCE
BIOLOGY**

Environmental Biology

MONDAY 28 JANUARY 2008

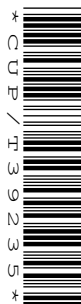
2805/03

Morning

Time: 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials: Electronic calculator
Ruler (cm/mm)



Candidate
Forename

Candidate
Surname

Centre
Number

--	--	--	--	--

Candidate
Number

--	--	--	--

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **90**.
- 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	14	
2	18	
3	13	
4	16	
5	16	
6	13	
TOTAL	90	

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

Answer **all** the questions.

- 1 Table 1.1 shows the mean percentage annual change in forest cover for three countries from 1990 to 2005. A negative number indicates deforestation within that country and a positive number indicates an increase in tree cover.

Table 1.1

country	total land area / thousands of hectares	total forested area in 2005 / thousands of hectares	mean percentage annual change of forest cover from 1990 to 2000	mean percentage annual change of forest cover from 2000 to 2005
Brazil	851 488	477 698	−0.52	−0.63
Rwanda	2 634	480	0.82	7.91
Malaysia	32 975	20 890	−0.35	−0.65

- (a) (i) With reference to Table 1.1, describe the **overall** changes in forest cover for Brazil **and** Rwanda for the period from 1990 to 2005.

.....

[2]

- (ii) Calculate the percentage area of Brazil that was forested in 2005.

Answer =% [1]

- (b) Deforestation often involves the removal of forest by humans cutting and burning trees. This provides building materials and fuels as well as land for agriculture, homes or industry.

State **three** environmental problems of deforestation.

1

 2

 3
[3]

- (c) The rates of deforestation for Brazil and Malaysia between 1990 and 2005 are similar.

Suggest why the data in Table 1.1 make it difficult to compare the impacts of deforestation between these two countries.

.....

.....

.....

.....[2]

- (d) Forests usually provide habitats for a great number of species. The loss of species from ecosystems is likely to affect food webs. However, predicting how the removal of one species from a food web might affect others is difficult.

Suggest why it might be difficult to predict such effects.

.....

.....

.....

.....

.....

.....[3]

- (e) Undisturbed rainforests are thought to be globally important because they may act as carbon sinks.

- (i) State what is meant by a *carbon sink*.

.....

.....[1]

- (ii) One possible reason for an increase in tree cover in countries where rainforests are being cut down is the establishment of oil palm plantations. These have different carbon storage capacities compared with undisturbed rainforest.

Suggest why this might be so.

.....

.....

.....[2]

[Total: 14]

- 2 Fig. 2.1 and Fig. 2.2, **on the insert**, show the results of a long-term study into the annual and monthly mean phytoplankton colour for the North Sea.

The colour intensity of phytoplankton is measured using a colour index. A high colour index value indicates a high chlorophyll concentration.

Phytoplankton are the primary source of food for all oceanic food chains. The colour intensity of the phytoplankton is directly proportional to the water temperature.

Phytoplankton is, therefore, a very sensitive indicator of sea temperature change.

- (a) Using Fig. 2.1, describe the **overall** pattern of phytoplankton colour intensity from 1950 until 2000.

.....
.....
.....
.....[2]

- (b) Fig. 2.2 shows the monthly changes that occurred in the colour index value of the phytoplankton from 1950 to 2000.

- (i) Explain why colour intensity of the phytoplankton varies throughout the year.

.....
.....
.....
.....[2]

- (ii) Using the monthly data in Fig. 2.2, compare the pattern for 1955 with the pattern for 2000.

.....
.....
.....
.....
.....
.....
.....[3]

- (c) Explain why the colour intensity of phytoplankton is directly proportional to the sea temperature.

.....

.....

.....

.....[3]

- (d) During this study, scientists also considered many abiotic and biotic factors that influenced the phytoplankton.

- (i) Define the term *abiotic*.

.....

.....[1]

- (ii) Suggest a **biotic** factor that the scientists might have measured which could have affected the growth of the phytoplankton **and** explain your choice.

.....

.....

.....

.....[2]

- (e) Scientists, such as those working for the Intergovernmental Panel on Climate Change (IPCC), suggest that global climate change is the main cause for such a rise in sea temperatures and predictive models suggest that this will continue to increase.

Describe **and** explain the changes to the atmosphere that are thought to be responsible for global climate change.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[5]

[Total: 18]

[Turn over

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

- 3** Golf courses are heavily treated with chemicals to control weeds and insect pests. The application rates for golf courses are about seven times those of agricultural land.

The United States Environmental Protection Agency has identified many of the organophosphate pesticides commonly used and linked these to various human health problems such as cancer, reproductive complications, neurotoxic damage and skin irritation.

A phenomenon termed 'treadmilling' is often seen on golf courses whereby pesticides need to be continuously reapplied during the summer months to control pest species.

- (a)** Suggest where in the human body organophosphates might act to cause 'neurotoxic damage'.

.....
.....[1]

- (b)** Explain why, even with treadmilling, pest species are often not eliminated.

.....
.....
.....
.....
.....
.....[3]

The caterpillar stage of the armyworm has a natural control agent, *Cotesia marginiventris*, a parasitoid wasp. This wasp lays its eggs inside the caterpillar, and these hatch into larvae, which eat their host.

Describe how you would **set up** and **establish** biological control of the pest *S. frugiperda* on a golf course **and** outline how you would evaluate the success of the biological control.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[8]

Quality of Written Communication [1]

[Total: 13]

- 4 The Environment Agency assesses the aesthetic quality of waterways in England and Wales. This assessment is based on the colour and odour of the water as well as the presence or absence of litter and oil.

- Colour and odour are assessed qualitatively at the bank side.
- Litter items in the waterways and on the banks are counted.
- Oil is assessed as a percentage cover of the water surface.

Using this information, a waterway is classified into one of four grades:

grade 1 – good
 grade 2 – fair
 grade 3 – poor
 grade 4 – bad.

- (a) Suggest one **advantage** and one **disadvantage** of this method of assessing water quality.

advantage

.....

disadvantage

.....[2]

- (b) State **two** abiotic factors you would measure to assess the water quality **and** explain why you have chosen each factor.

factor

explanation

.....

.....

factor

explanation

.....

.....[4]

.....[2]

- Suggest how a **named** indicator species may be used to assess water **or** air pollution in a given area.

[3]

- [5]

[Turn over

- 5 Fig. 5.1 shows the data collected for the percentage cover of scarlet oak, *Quercus coccinea*, on a 130 metre long transect through virgin forest.

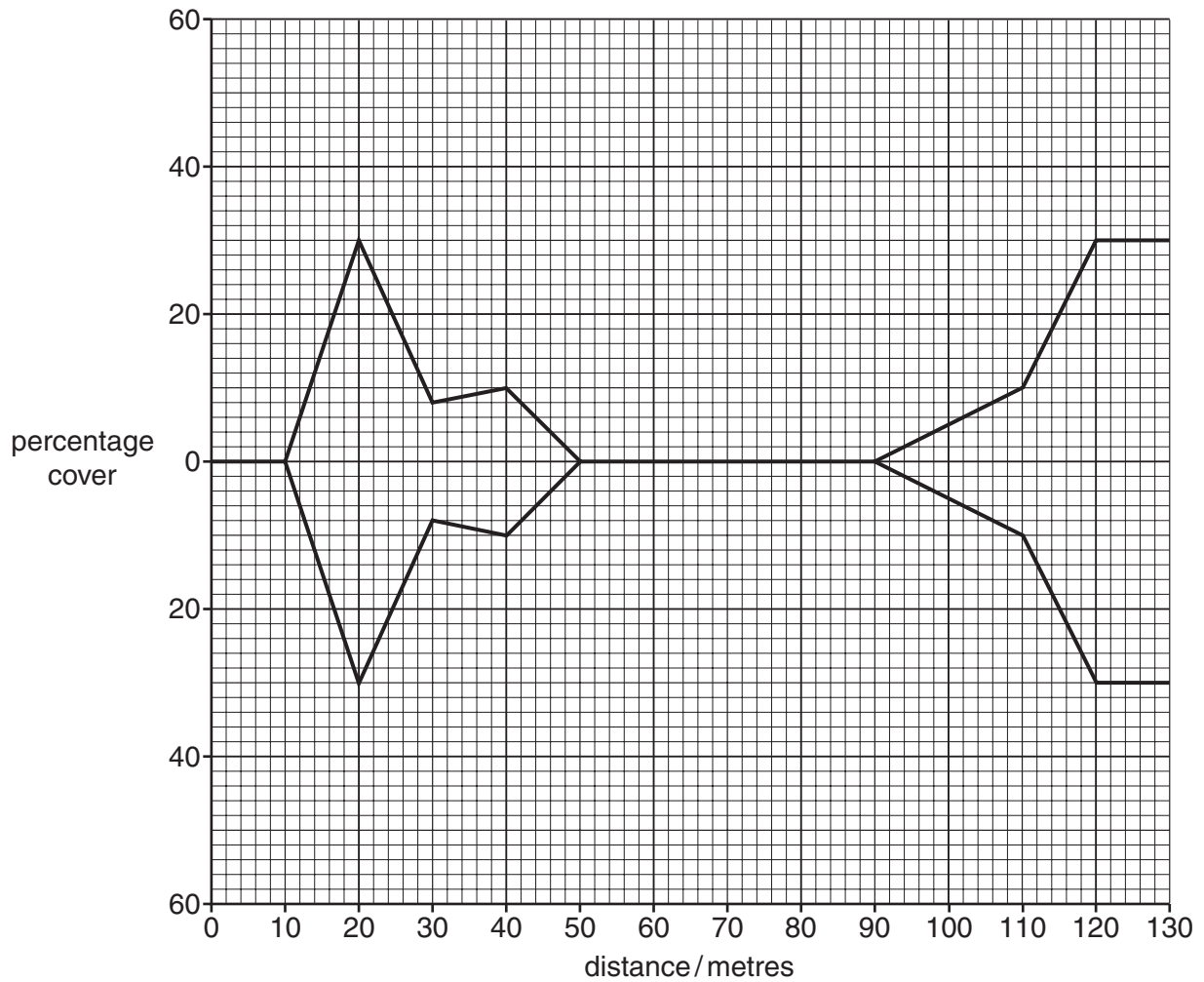


Fig. 5.1

- (a) With reference to Fig. 5.1, describe the distribution of *Q. coccinea* along the transect.

.....

[2]

- (b) Suggest **two** reasons why the trees are not evenly distributed along the transect.

1

 2
[2]

(c) State **one** advantage of using a kite diagram to represent the data.

.....
.....[1]

(d) In this study the scientists used a belt transect.

State **two** ways in which a belt transect differs from a line transect.

1
.....
2
.....[2]

Describe how you would carry out a soil **structure** analysis in these upland regions.

[8]

[Total: 16]

- 6 Many local wildlife trusts raise funds to transform agricultural land into nature reserves. At Abbotts Hall Farm in Essex, the Essex Wildlife Trust together with the Worldwide Fund for Nature and the Environment Agency have successfully converted a large area of unproductive farmland into natural marshland.

- (a) Discuss some of the problems that a wildlife trust could face when attempting to convert former agricultural land into a nature reserve.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

- (b) Suggest **two** economic **benefits** of creating and maintaining nature reserves.

1

.....

2

.....

.....[2]

- (c) Many of the picnic tables and chairs on nature reserves have come from companies that use sustainably produced timber.

Suggest how timber production could be managed sustainably.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[3]

- (d) Describe the steps that central government could take to increase the recycling done by local councils in the UK.

.....

.....

.....

.....[2]

- (e) Recycled paper consists mostly of cellulose and can be used as a mulch. Mulch is used to cover the surface of the soil and prevents weed growth without the need for pesticides. The mulch takes a long time to degrade.

Suggest why mulch made from paper takes a long time to degrade.

.....

.....

.....

.....[2]

[Total: 13]

END OF QUESTION PAPER