

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS****Advanced GCE****BIOLOGY****2805/03**

Environmental Biology

Monday

**31 JANUARY 2005**

Afternoon

1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number										
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**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 are advised 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.

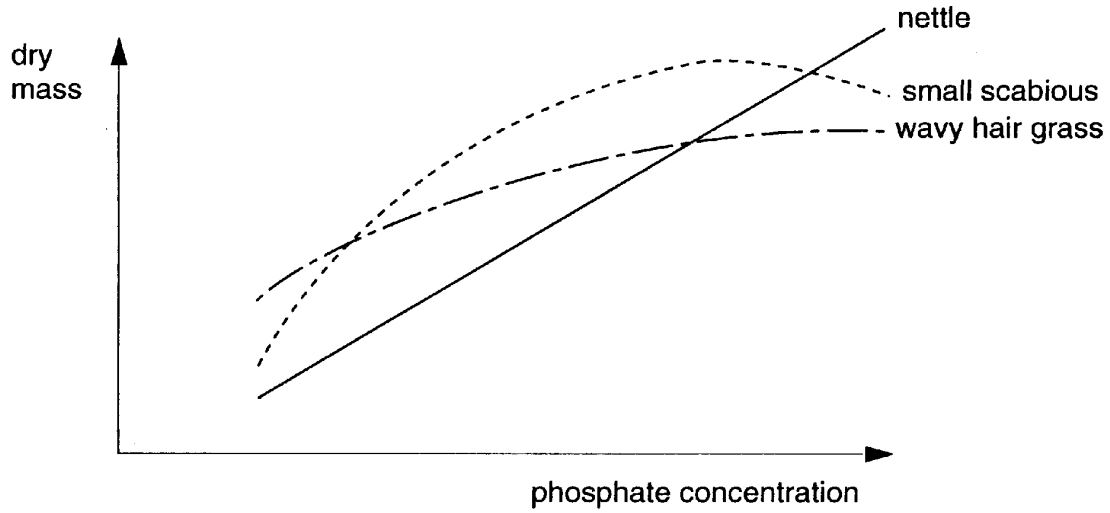
<b>FOR EXAMINER'S USE</b>		
<b>Qu</b>	<b>Max.</b>	<b>Mark</b>
1	17	
2	15	
3	16	
4	15	
5	17	
6	10	
<b>TOTAL</b>	<b>90</b>	

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**This question paper consists of 18 printed pages, 2 blank pages and an insert.**

Answer **all** the questions.

- 1 Fig. 1.1 shows the effect of increasing phosphate concentration on the growth of three plant species, which commonly grow as weeds amongst crops in the UK.



**Fig. 1.1**

- (a) Describe the effects of increasing phosphate concentration on the growth of these three plant species.

.....  
.....  
.....  
.....  
.....[4]

- (b) Increased crop yield is often brought about by the application of inorganic fertilisers. Using the information in Fig. 1.1, explain:

- (i) why the effect of phosphate on weed species might mean that this increase in crop yield may be less than expected;

.....  
.....  
.....  
.....  
.....  
.....[4]

(ii) why nettles often thrive in drainage ditches at the edges of fertilised fields.

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

(c) Farmers may need to keep species, such as nettles, under control through the application of appropriate herbicides. Both inorganic fertilisers and herbicides are responsible for damage to the natural environment, in particular a reduction in biodiversity.

Explain how inorganic fertilisers and herbicides bring about this reduction in biodiversity.

inorganic fertilisers .....

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

herbicides .....

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

[Total: 17]

- 2 (a) Some manufacturers of paper and timber products claim that their raw materials come from 'sustainable forest resources'.

With reference to paper and timber production, explain what is meant by

- (i) *a biological resource;*

.....

.....

.....

.....[2]

- (ii) *sustainable production.*

.....

.....

.....

.....[2]

Table 2.1 compares the amounts of household waste recycled in England in 1996/97 and 2001/02.

**Table 2.1**

	1996/97	2001/02
total household waste / 1000 tonnes	22 549	25 592
total household recycling / 1000 tonnes	1 682	3 180
household waste recycling rate / %	7.46	

- (b) Calculate the percentage of total waste that was recycled in 2001/02. Show your working and write your answer in Table 2.1. [2]





- 3 The cyclamen mite is a pest of strawberry crops in California. Populations of these mites are usually kept under control by a species of predatory mite of the genus *Typhlodromus*.

An experiment was carried out to investigate the effectiveness of predation in controlling cyclamen mites.

Both predator and prey mites were released on a group of strawberry plants in a greenhouse and the numbers of both types of mite were monitored over a period of 12 months. The results are summarised in Fig. 3.1. A second investigation was carried out on a crop of strawberry plants growing in a field. The plants were sprayed periodically with parathion, an insecticide that reduces the number of predators, but does not affect the cyclamen mite. The effects of this on the numbers of cyclamen mites is summarised in Fig. 3.2.

key:

- - - = cyclamen mite (prey)  
— = *Typhlodromus* (predator)

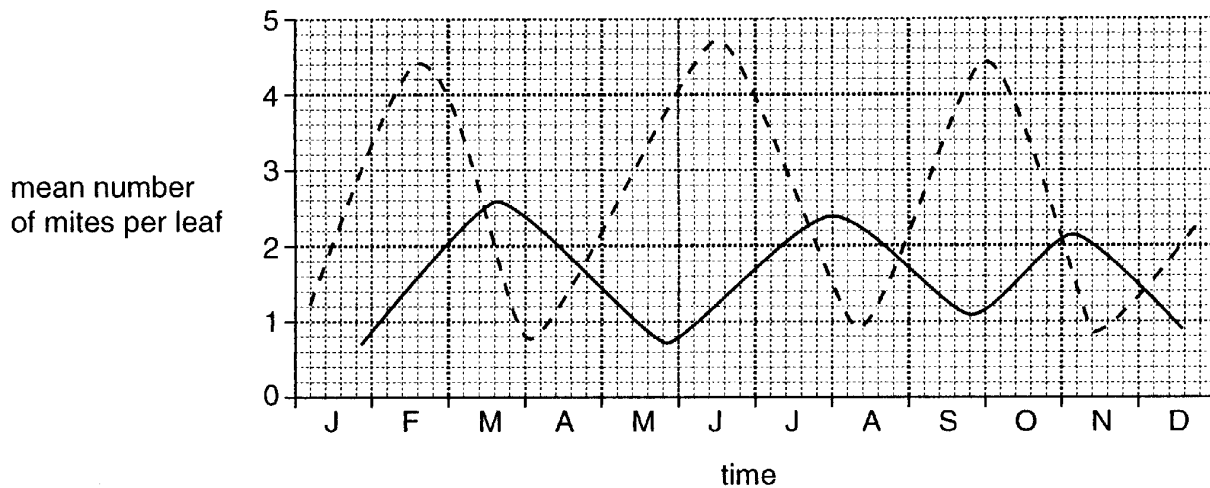


Fig. 3.1

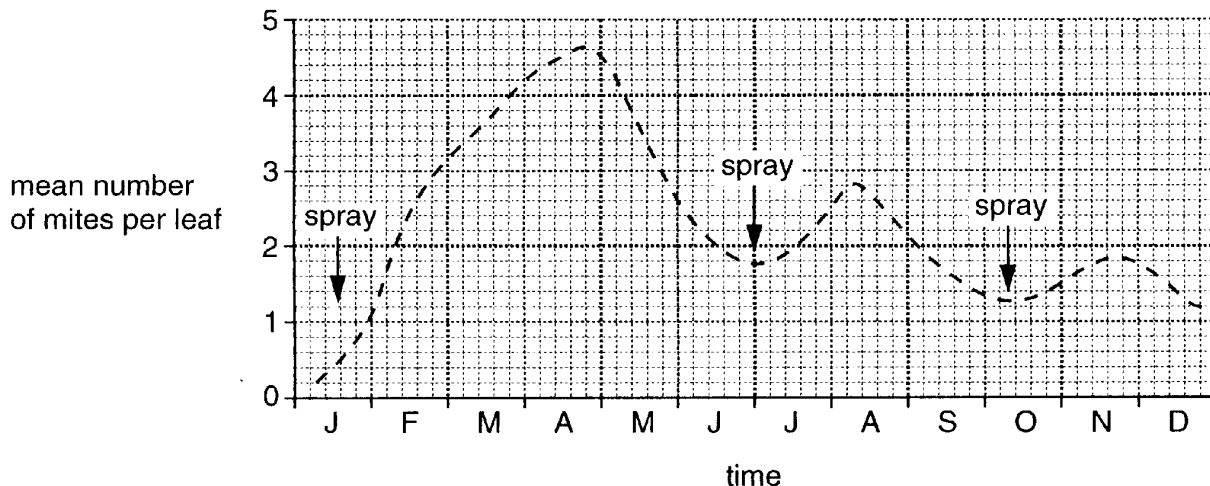


Fig. 3.2





(d) Suggest **two** methods of pest control other than the use of predatory mites or insecticides.

1 .....

2 .....[2]

[Total: 16]

- 4 The climax vegetation in tropical areas with abundant rainfall is rainforest. Although rainforests now cover less than 4% of the land surface of the Earth, they account for more than 20% of the planet's net carbon fixation. By comparison, temperate forests are about half as productive (per unit area), while boreal forests (forests of northern latitudes) and grasslands are only a quarter as productive.

A 13 km<sup>2</sup> rainforest preserve in Costa Rica has 450 species of trees, more than 1000 other plant species, 400 species of birds, 58 species of bats and 130 species of amphibians and reptiles.

Fig. 4.1 shows a diagram of a typical area of tropical rainforest.

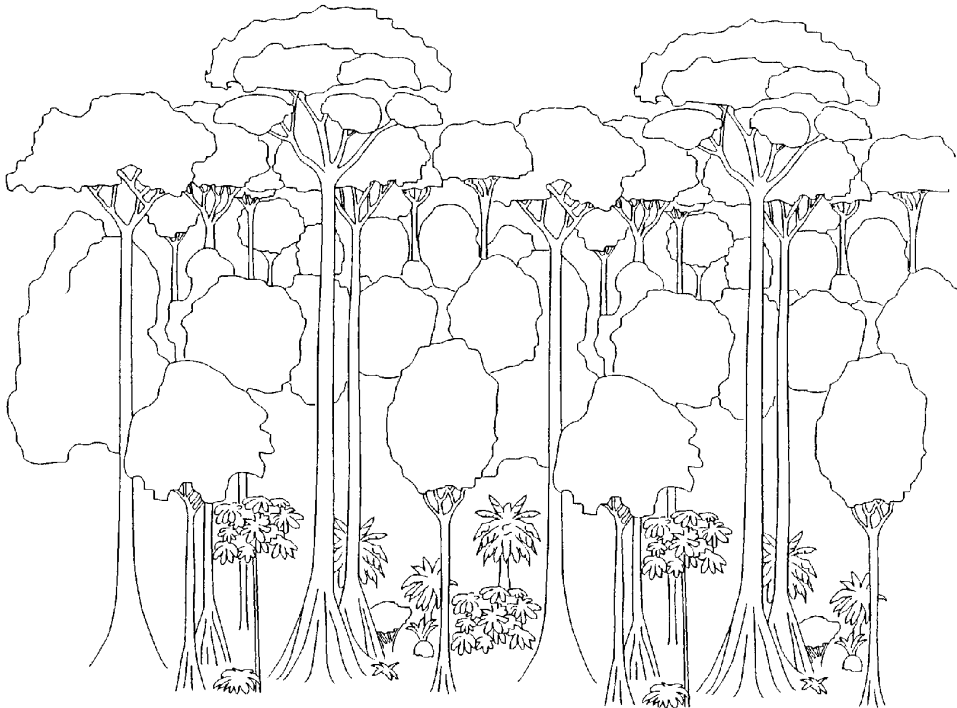


Fig. 4.1

- (a) List **three** reasons why tropical rainforests have been destroyed, so that they now cover only 4% of the land surface of the Earth.

- 1 .....
- 2 .....
- 3 .....[3]



(c) Outline the **international** measures that can be taken to try and halt the decline of the tropical rainforests.

.....

.....

.....

.....

.....

.....[3]

[Total: 15]

- 5 Fig. 5.1, on an insert, illustrates the profile of a sand dune system, together with kite diagrams of some plant species. This summarises the results of a belt transect carried out over the dunes.

The results of the transect were initially recorded using the ACFOR scale:

- A – abundant
- C – common
- F – frequent
- O – occasional
- R – rare

- (a) Outline the advantages and disadvantages of using a scale, such as the ACFOR scale.

advantages .....

.....

.....

disadvantages .....

.....

.....[3]

- (b) Explain

- (i) how such a transect would have been carried out;

.....

.....

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.....

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.....

.....

.....[4]

- (ii) how the ACFOR readings would have been converted to kite diagrams. You may use the space below for any diagrams to help your answer.

.....

.....

.....

.....

.....

.....[3]

- (c) The distribution of plant species in sand dunes will be influenced by a number of abiotic factors, such as temperature.

Explain how to measure, in different parts of the sand dune system, variations in temperature of the sand or soil.

.....

.....

.....

.....[2]

- (d) Sand dune systems are a result of the process of succession. The semi-fixed dunes represent an intermediate sere between yellow and fixed dunes.

Explain

- (i) what is meant by a *sere*;

.....

.....[1]



6 The presence, absence or abundance of certain species may be able to tell us a great deal about the environment in which they live. For example, whether the soil is acidic or alkaline, wet, dry or salty.

(a) State what name is given to such species.

.....[1]

(b) In addition, levels of pollution may be measured by recording the presence, absence or abundance of certain species. In the case of air pollution, it is lichens that are often assessed, whereas levels of water pollution may be measured by investigating certain invertebrate species.

(i) State what is meant by the term *pollution*.

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

You may answer the following questions in relation to **either** air **or** water pollution. Please state which you have chosen.

Air or water .....

(ii) Explain how pollution of air **or** water may occur.

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





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**INSERT**

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**INSTRUCTIONS TO CANDIDATES**

- This insert contains Fig. 5.1.

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**This insert consists of 2 printed pages.**

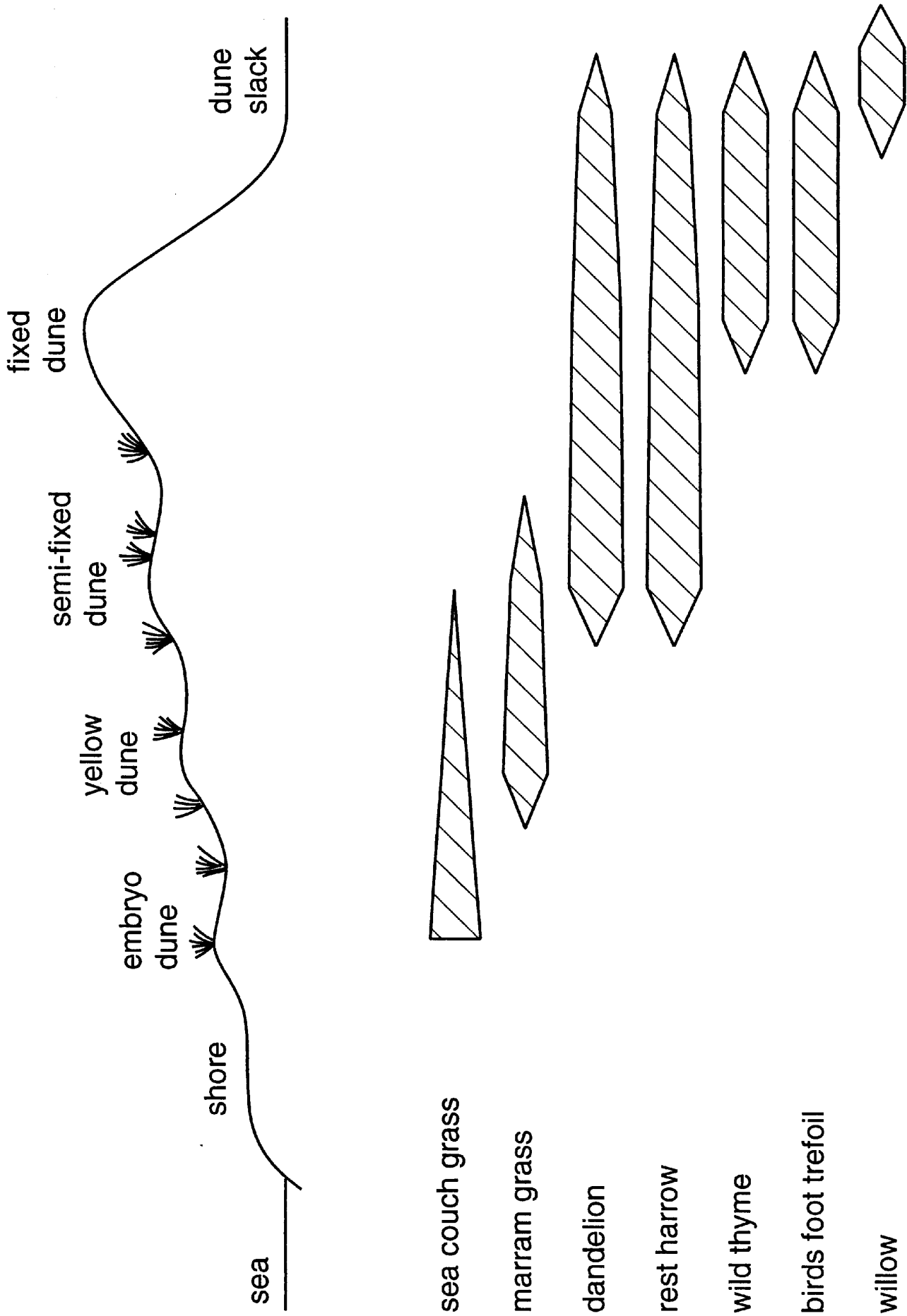


Fig. 5.1