



ADVANCED GCE
BIOLOGY
 Environmental Biology

2805/03

Candidates answer on the question paper

OCR Supplied Materials:

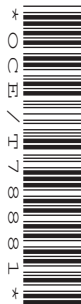
- Insert (inserted)

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 17 June 2009
Afternoon

Duration: 1 hour 30 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

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

INFORMATION FOR CANDIDATES

- The number of marks 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.
- This document consists of **16** pages. Any blank pages are indicated.

FOR EXAMINER'S USE

Qu.	Max	Mark
1	12	
2	22	
3	11	
4	16	
5	18	
6	11	
TOTAL	90	

Answer **all** the questions.

- 1 (a) Two types of plastic that can be successfully recycled are PET and HDPE. These types of plastic are used to make drinks bottles.

The total energy required to recycle 1 tonne of these bottles into pellets is 51.91 kJ. To create pellets from raw materials requires 8.43 MJ per tonne of raw materials.

Calculate how much energy is saved per tonne of starting material by using recycled plastic compared to using raw materials.

Show your working and give your answer to two decimal places.

Answer = MJ [2]

- (b) State **two** environmental benefits of recycling plastics.

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 [2]

- (c) Bacteria can synthesise and store different types of lipid granules.

Polyhydroxybutyrate (PHB) is one such lipid that can be synthesised by bacteria. PHB is stored as granules, which can be extracted from the bacteria and used to produce biodegradable plastic.

- (i) Suggest why bacteria synthesise and store lipid granules.

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 [2]

- (ii) Suggest **two** advantages of using bacteria to manufacture biodegradable plastics.

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- (iii) Although PHB is biodegradable, it breaks down slowly when buried in landfill sites.

Suggest why this might be the case.

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- (iv) For PHB to be decomposed it has to be digested by microorganisms.

State **two** products of PHB **digestion**.

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2 [2]

[Total: 12]

- 2 Students investigated three sites along a stream and sampled the numbers of indicator species. They also measured the oxygen concentration in the water at each site. Table 2.1 shows the results they obtained.

Table 2.1

group of indicator species	site 1	site 2	site 3
mayflies	27	0	20
shrimps	136	84	157
stoneflies	8	0	10
caddis larvae	15	3	16
tubeworms	2	920	15
oxygen concentration / mg dm⁻³	64	38	60

- (a) Explain the characteristics of indicator species that make them good indicators of pollution.

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- (b) Use the data from Table 2.1 to describe **and** explain how the results indicate that there is organic pollution at site 2.

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- (c) Explain why there is a limit to the population size of a given species at any of the three sites.

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- (d) Describe **one** method by which the oxygen concentration might have been determined at the sites.

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- (e) State **two abiotic** factors, **other than oxygen concentration**, that could lead to population differences at each of the study sites.

1

2 [2]

- Discuss how this agricultural activity near to site 2 could explain the results found in the study.
- Discuss how this agricultural activity might conflict with the conservation interests of those managing the nature reserve.

..... [7]

[Total: 22]

- 3 (a) Polychlorinated biphenyls (PCBs) were introduced in the 1930s as lubricants in pipeline systems and to insulate electrical components. They are persistent and toxic chemicals and their use was banned by law in 1979.

Describe **three** effects of PCBs on organisms.

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- 2
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- 3
- [3]

- (b) PCBs are classed as persistent organic pollutants.

Explain why PCBs are described as *persistent* and *organic* pollutants.

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- [2]

QUESTION 3(c) STARTS ON PAGE 8

A study was carried to investigate the effects of PCBs in animal tissue.

Fig. 3.1 shows the mean concentration of PCBs in parts per million recorded in a variety of animals.

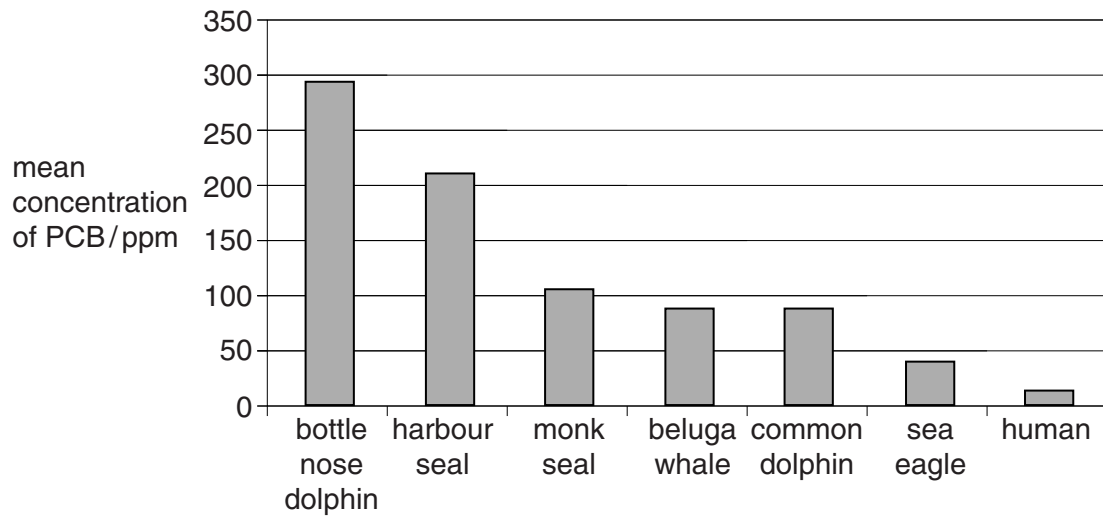


Fig. 3.1

- (c) Suggest how the data might have been obtained from the common dolphin in the investigation.

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- (d) Explain why dolphin, seal and whale populations have higher concentrations of PCBs in their tissues than sea eagles and humans.

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[Total: 11]

- 4 Changes in farming practices since the 1950s have turned much of the arable land in the UK into large areas of monoculture where field boundaries have been removed. Consequently, large numbers of wild flowers, butterflies, mammals and birds have disappeared from UK farmland.

There have been many attempts to increase the abundance and diversity of wildlife in farmland. One such attempt has been the introduction of 'beetle banks'.

Fig. 4.1, **on the insert**, shows a 'beetle bank' in an arable field. As can be seen, a 'beetle bank' is a section of land running through a crop, in which no crop is grown. This provides a habitat for species of beetle, especially predatory ground beetles, and will help to reduce the numbers of cereal pests such as aphids.

- (a) (i) Describe **three disadvantages** of using 'beetle banks' on an arable farm.

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- (ii) Describe **two** methods, **other than 'beetle banks'**, that farmers can use to reduce the numbers of cereal pests.

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- (b) Students wanted to carry out a biological survey of a 'beetle bank' in an arable field.

Describe how they would assess the population size of the species of beetle in the 'beetle bank'.

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- (c) Changes in farming practices are believed to be one cause of the decline in many bird populations since the 1960s.

- (i) Describe how the increased use of pesticides **and** the removal of hedgerows could have led to this decline in bird populations.

use of pesticides

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removal of hedgerows

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- (ii) Suggest **two** factors, **other than changes in farming practices**, which could have led to this decline in bird populations.

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[Total: 16]

- 5 Roadside verges in the Lake District National Park in the UK contain a large variety of locally rare plant and animal species.

A recent study by the County Council has led to local legislation to ensure that these verges are maintained. This is because they form part of a network of wildlife corridors through the countryside.

- (a) Outline **four** ways in which these verges might be threatened in a National Park, such as the Lake District.

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- (b) Mowing is one way of managing roadside verges.

Some verges are mown early in the spring and then again in the autumn. However, flower-rich verges are generally mown only in the autumn.

- (i) Suggest why mowing verges can promote **plant** biodiversity.

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- (ii) Explain why the mowing of flower-rich verges is generally restricted to the autumn.

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

National Parks rely on research and funding from non-governmental conservation bodies, such as the Royal Society for the Protection of Birds (RSPB).

Explain how the various activities of the RSPB has helped to conserve wildlife in the UK.

[8]

Quality of Written Communication [1]

[Total: 18]

Turn over

- 6** Some African elephant populations are at risk of extinction. In certain countries this is due to poachers taking ivory illegally. This ivory still obtains a high price on global markets and policing of this trade is difficult, especially as ivory from other sources is legal.

Testing the DNA found in ivory allows the geographic origin of the elephant population from which the ivory was taken be determined. Suspect ivory can then be traced to specific living elephant populations allowing it to be confiscated if necessary.

- (a) (i)** State **two** possible sources of elephant DNA, **other than ivory**.

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2 **[2]**

- (ii)** Explain why the analysis of DNA from confiscated ivory should involve examining many different genes on different chromosomes.

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- (b)** Scientists can accurately trace confiscated ivory to specific living elephant populations.

What does this suggest about the population dynamics of African elephants?

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- (c) African elephants were registered on The Convention in International Trade in Endangered Species (CITES) list for endangered species in 1990.

State **four** potential benefits of CITES registration for the conservation of endangered species, such as the African elephant.

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[Total: 11]

END OF QUESTION PAPER

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