IBO

IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 3

Thursday 14 November 2002 (morning)

1 hour 15 minutes

Name

Number

INSTRUCTIONS TO CANDIDATES

*   Write your candidate name and number in the boxes above.
*   Do not open this examination paper until instructed to do so.
*   Section I: Answer one Option from Section I in the spaces provided.
*   Section II: Answer two Options from Section II in the spaces provided.
*   You may continue your answers in a continuation answer booklet, and indicate the number of booklets used in the box below. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.
*   At the end of the examination, indicate the letters of the Options answered in the boxes below.

OPTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
SECTION I	. . . .	/15	/15	/15
SECTION II	. . . .	/15	/15	/15
SECTION II	. . . .	/15	/15	/15
NUMBER OF CONTINUATION BOOKLETS USED	. . . .	TOTAL /45	TOTAL /45	TOTAL /45

882-190

SECTION I

Options on analysing ecosystems – Options A, B and C

*The compulsory question below relates to the detailed study of ecosystems in a marine, terrestrial or freshwater environment. Select the option on which you will base your answers by marking (×) **ONE** box only.*

Option		Mark (×) **ONE** box only
A	Analysing Marine Ecosystems	
B	Analysing Terrestrial Ecosystems	
C	Analysing Freshwater Ecosystems	

1. (a) (i) Name and briefly describe a local ecosystem you have investigated and to which you will refer in answering all the questions below. *[1]*

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(ii) State **two** physical (abiotic) characteristics of this ecosystem and explain how they influence its productivity. *[3]*

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(This question continues on the following page)

(Question 1 continued)

(b) Draw a food web for the local ecosystem identified in (a) (i). Name at least **six** species and
     show at least **three** trophic levels in your diagram.   *[3]*

(c) (i)   Describe measurements you might make to estimate the net primary productivity of the
           ecosystem.   *[3]*

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     (ii) State how your measurements could be used to calculate the net primary productivity.   *[1]*

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                                                                              (This question continues on the following page)

(Question 1 continued)

    (iii) Outline how **two** factors might cause the net primary productivity of your named ecosystem to vary from year to year. *[2]*

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(d)   Outline how **two** factors might cause the diversity of your named ecosystem to vary from year to year. *[2]*

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SECTION II

*This section contains a question on each of Options D, E and F. Answer **two** of these questions, related to your chosen options.*

Option D – Impacts of resource exploitation

2.   The graph below shows the amount of nitrogenous fertiliser put on agricultural land in different regions of the world.
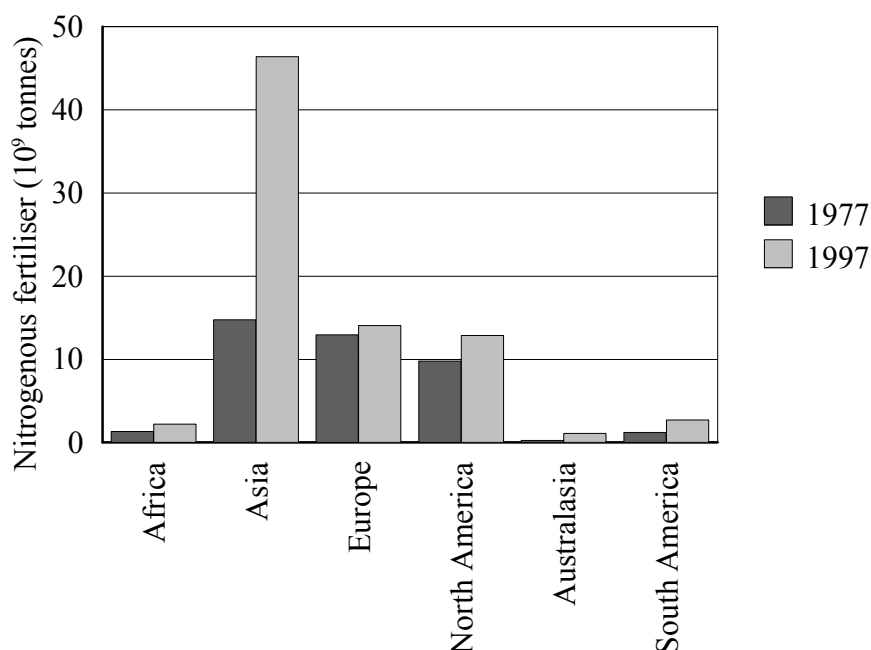
(a)   (i)   Explain why different amounts of nitrogenous fertiliser were used by the different regions in 1977.   *[3]*

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(This question continues on the following page)

(Question 2 continued)

      (ii)   State and explain the changes in the amount of nitrogenous fertiliser used between 1977 and 1997. *[3]*

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(b)   Explain how increasing the use of nitrogenous fertiliser might affect the ecological footprint and substainability of these regions. *[3]*

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(c)   Apart from the use of fertilisers, state what other advances have increased world food production since 1977. *[3]*

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(d)   Describe the environmental impacts of a named commercial farming system that you have studied, other than those caused by fertiliser use. *[3]*

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Option E – Conservation and biodiversity

3.   (a)   Explain the term *biodiversity*.   *[2]*

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(b)   List **four** arguments for the preservation of biodiversity.   *[2]*

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(c)   Describe the processes that may lead to the formation of new species.   *[3]*

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(d)   Discuss the relative advantages and disadvantages of a species-based conservation strategy
compared to the use of reserves.   *[4]*

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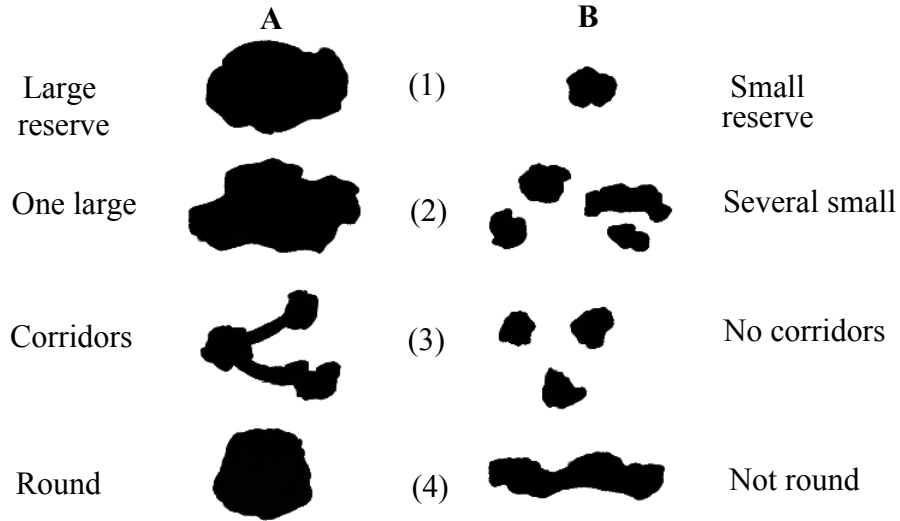
(This question continues on the following page)

(Question 3 continued)

(e) The diagram below shows the layout of various conservation reserves. The reserves represent "islands" containing protected ecosystems surrounded by unprotected areas affected by human activities.

For each pair (1) to (4), explain why the areas represented in column A might be considered better for conservation than the areas in column B. *[4]*

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Option F – Pollution

4. The table below gives the average quantity of lead in petrol (gasoline) sold in a number of cities in 1994.

City	Country	Lead (g l^{-1})
Cairo	Egypt	0.8
Karachi	Pakistan	1.5 – 2
London	UK	0.15
Los Angeles	USA	0.026
Manila	Philippines	1.16
New York	USA	0.026
Tokyo	Japan	0.1
Rio de Janeiro	Brazil	0.45

[source: UNEP]

(a) (i) State **one** reason why the average quantity of lead in petrol (gasoline) varies from city to city.   *[1]*

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(ii) Explain the environmental effects of the presence of lead in petrol (gasoline).   *[2]*

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(iii) Suggest how the data would have changed since 1994.   *[1]*

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(This question continues on the following page)

(Question 4 continued)

(b) (i)   Name a pollutant that may have a higher concentration in rural areas than cities.   *[1]*

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(ii) Outline **one** effect of this pollutant.   *[1]*

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(iii) Suggest **two** ways in which the concentration of this pollutant in the environment might be reduced.   *[2]*

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(c) Outline **two** methods of monitoring named pollutants directly.   *[2]*

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(d) For a named industry, describe and evaluate the methods of waste control.   *[5]*

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