



**ENVIRONMENTAL SYSTEMS  
STANDARD LEVEL  
PAPER 2**

Monday 21 May 2001 (afternoon)

1 hour

Name

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Number

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**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 A: Answer Section A in the spaces provided.
- Section B: Answer one question from Section B. Write 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 number of the Section B question answered in the box below.

QUESTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
SECTION A	ALL	/20	/20	/20
SECTION B	.....	/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	.....	TOTAL /40	TOTAL /40	TOTAL /40

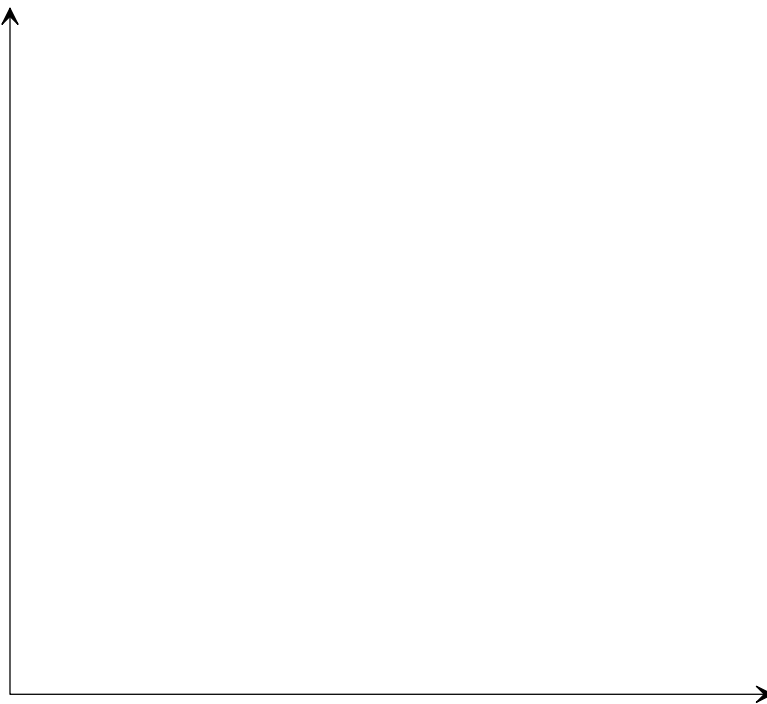
**SECTION A**

Both questions must be answered by **all** candidates in the spaces provided.

1. The table below gives human population statistics for country **A** and country **B** in millions.

<b>Country \ Year</b>	<b>1940</b>	<b>1960</b>	<b>1980</b>	<b>2000</b>	<b>2020</b>
<b>A</b>	100	120	130	135	138
<b>B</b>	50	60	80	110	150

- (a) (i) On the axes below, **sketch** the population growth curves for country **A** and country **B**, between the years 1940 and 2020. [3]



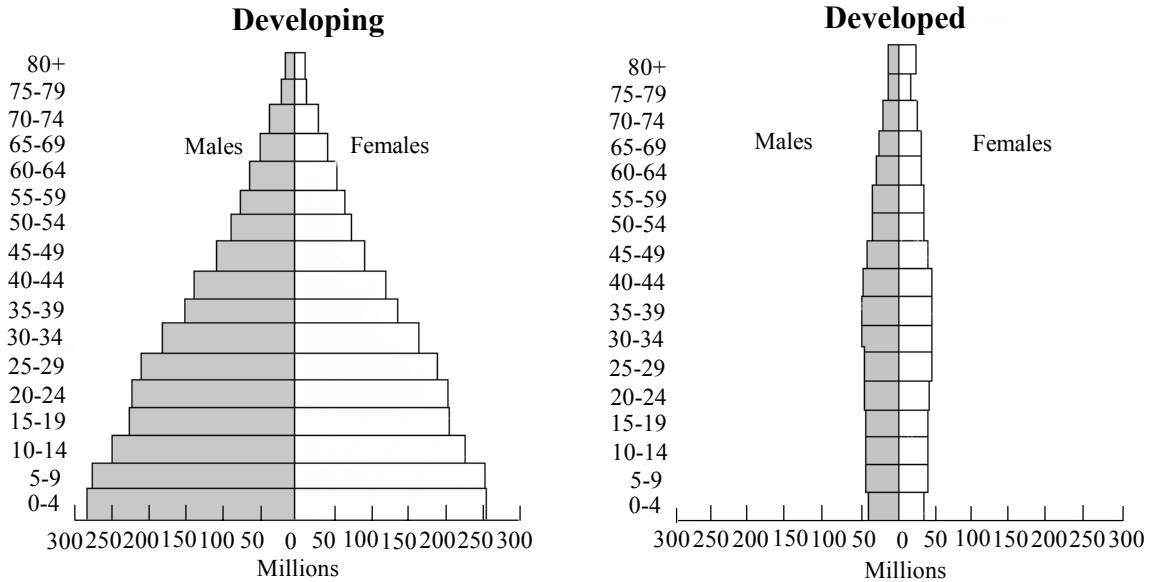
- (ii) Which country, **A** or **B**, is most likely to be the **developing** country? Explain your answer. [1]

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*(This question continues on the following page)*

(Question 1 continued)

- (b) The age/sex pyramids below show the populations of developed and developing countries in 1998.



[Source: United Nations Population Division in World Population data sheet, 1998, Population Reference Bureau.]

- (i) Estimate how many people under the age of 15 there are in developing countries and developed countries. [2]

Developing: .....

Developed: .....

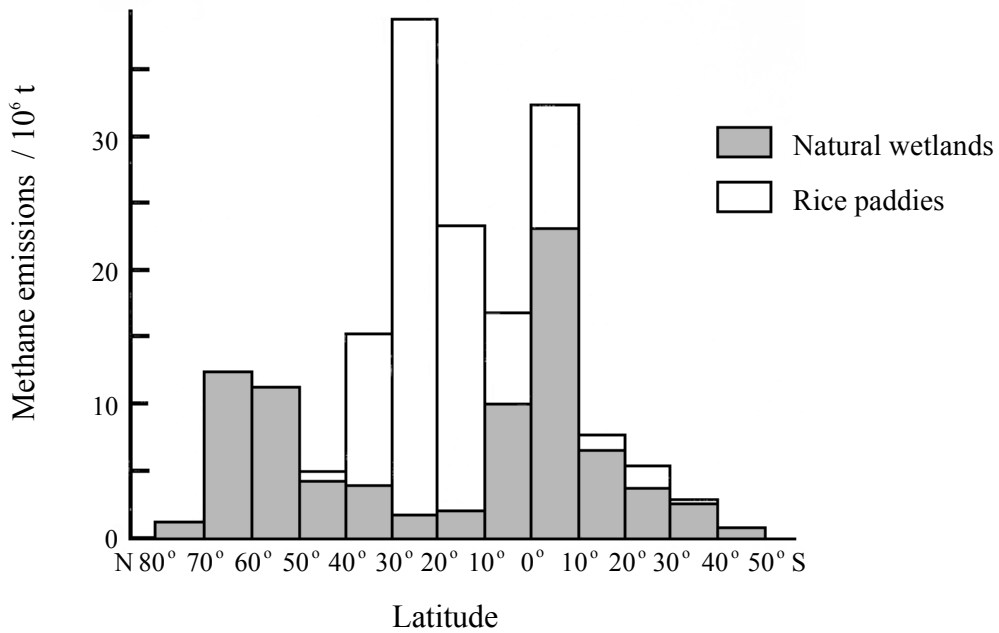
- (ii) Why is the number of people under the age of 15 important? [1]

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- (iii) Discuss the significance of **two** differences, other than the number of people under the age of 15, between the two age / sex pyramids above. [4]

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2. The diagram below shows variations in methane emissions from all of the natural wetlands and rice paddies (areas of rice farming) found at different latitudes.



(a) Explain why these areas release methane. [1]

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(b) Describe and explain the variation in methane production from both natural wetlands **and** rice paddies. [4]

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*(This question continues on the following page)*

*(Question 2 continued)*

- (c) Explain how increasing the global land area for rice production might change the distribution of biomes on earth.

[4]

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**SECTION B**

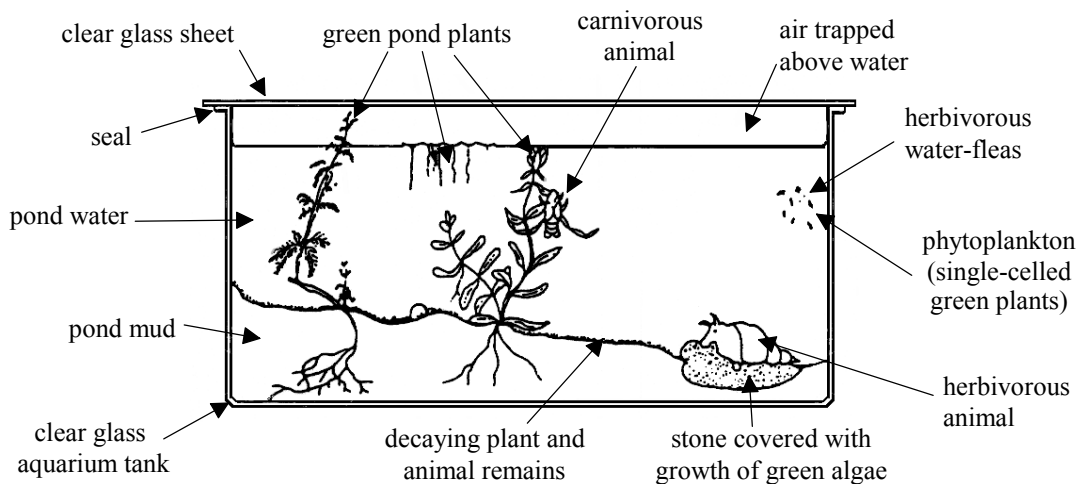
Answer **one** question. Write your answers in a continuation answer booklet. Write your name and candidate number on the front cover of the continuation answer booklet, and attach it to this question paper using the tag provided.

Each essay question is marked out of a total of 20 marks of which 3 marks are allocated to the expression and development of ideas as follows:

- 0 No expression of relevant ideas.
- 1 Expression and development of relevant ideas is limited.
- 2 Ideas are relevant, satisfactorily expressed and reasonably well developed.
- 3 Ideas are relevant, very well expressed and well developed.

3. (a) As well as their direct impact on the atmosphere, the effects of fossil fuel use are widespread. Discuss the range of effects of fossil fuel use on the environment. [8]
- (b) What steps could be taken to reduce these effects? [5]
- (c) The average cost of petrol (gasoline) for automobiles is four times higher in Europe than in the USA. Discuss the environmental implications of this difference. [4]
- Expression of ideas* [3]

4. The diagram below represents a sealed aquarium which has been placed in sunlight.



- (a) Compare, with the aid of flow diagrams, this ecosystem to a named ecosystem that you have studied in terms of inputs and outputs. [8]
- (b) Using the organisms shown in the aquarium above, draw a possible food chain with **three** trophic levels. Describe a possible feedback mechanism that might play a role in regulating one of the populations in your food chain. [5]
- (c) Explain how the first and second laws of thermodynamics apply to the energy transformations in the aquarium ecosystem. [4]
- Expression of ideas* [3]

5. Convection cells occur in the Earth’s atmosphere and in the asthenosphere (upper part of the mantle).
- (a) Describe, with the aid of labelled diagrams, **one** convection cell from the atmosphere and **one** from the asthenosphere. Explain how these cells contribute to the movement of materials and energy. [8]
- (b) What similarities are there in the functioning of these two cells? [3]
- (c) Describe the processes that transfer materials and energy in the hydrosphere. [6]
- Expression of ideas* [3]
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