



**ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 2**

Wednesday 14 May 2008 (afternoon)

1 hour 15 minutes

Candidate session number

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INSTRUCTIONS TO CANDIDATES

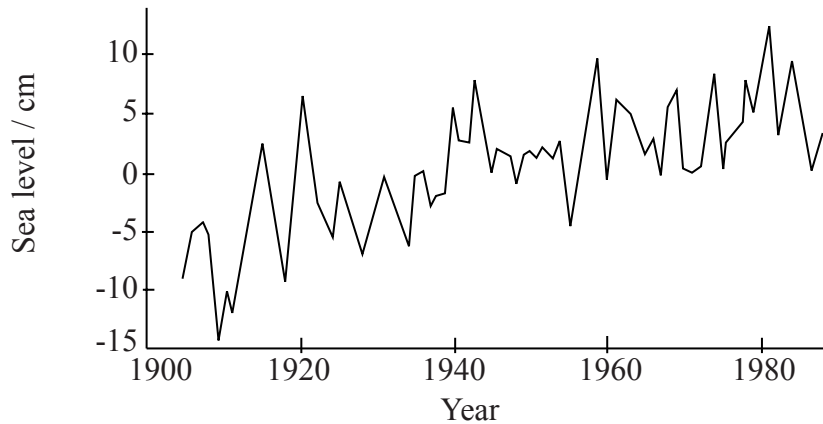
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all of Section A in the spaces provided.
- Section B: answer one question from Section B. Write your answers on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the numbers of the questions answered in the candidate box on your cover sheet and indicate the number of sheets used in the appropriate box on your cover sheet.



SECTION A

Answer **all** the questions in the spaces provided.

1. The graph below shows changes in the sea level on the island of Oahu in the Hawaiian Islands, Pacific Ocean, over the last century. Zero represents the mean sea level in 1950.



[Source: Modified from Patrick D Nunn, *Oceanic Islands*, Blackwell, Oxford, 1994, page 299]

- (a) Describe and discuss possible explanations for the shape of the curve in the graph. [6]

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(Question 1 continued)

- (b) Identify the years in which the lowest and highest levels were recorded. [1]

Lowest level:

Highest level:

- (c) Describe processes that might be involved in the transfer of phosphorus from the water of the ocean surrounding a remote island to the soil of that island. [3]

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- (d) State whether a remote oceanic island is an open, closed or isolated system. Explain your answer. [1]

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2. (a) Name and briefly describe an ecosystem which you have studied.

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Name an organism from each of the following trophic levels found in this ecosystem. [2]

Producer:

Herbivore (first order consumer):

Carnivore (second order consumer):

Decomposer:

- (b) Choose **one** of the organisms named in 2(a) above, and explain how a **named** abiotic factor and a **named** biotic factor might influence the abundance of that organism.

Name of organism chosen:

- (i) Effect of abiotic factor: [2]

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- (ii) Effect of biotic factor: [2]

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3. Distinguish between the concepts *succession* and *zonation*, describing a detailed example of each.

[6]

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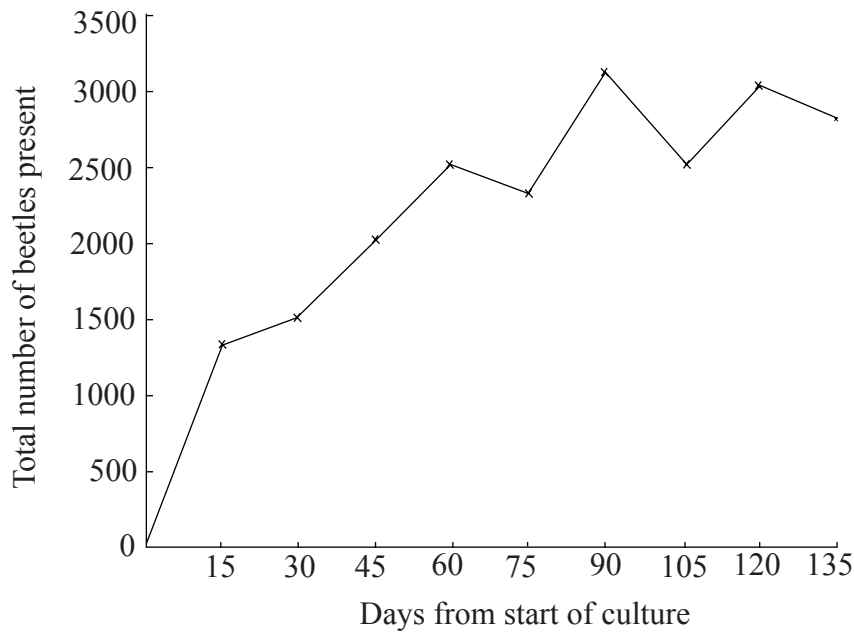
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4. (a) Define the term *carrying capacity*. [1]

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- (b) The graph below shows the number of flour beetles (all life stages – eggs, larvae, pupae and adults) in 64 grams of flour after an increasing number of days.



[Source: Modified from David Lack, *The Natural Regulation of Animal Numbers*, Clarendon Press, Oxford, 1954, page 18]

- (i) Explain the shape of curve in the graph, with reference to the concepts of carrying capacity and negative feedback. [4]

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(Question 4 continued)

- (ii) Predict what might happen if this experiment were to be continued for another 300 days, assuming no additional flour were to be added. [2]

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SECTION B

Answer **one** question. Write your answers on the answer sheets provided. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.

Each essay question is marked out of a total of 20 marks of which 3 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.

5. (a) Draw an annotated diagram to show how movements of matter in the asthenosphere can affect the distribution of the Earth's crustal plates. [3]

(b) With the help of **two** diagrams, distinguish between the features of constructive and destructive margins of crustal plates. [7]

(c) Explain, using examples, how the movement of the Earth's crustal plates has influenced evolution and biodiversity. [7]

Expression of ideas [3]

6. (a) Compare the structure and properties of sandy and loam soils. [5]

(b) Describe **two** processes that cause soil degradation, and evaluate **two** conservation measures that could be used to counter these forms of degradation. [6]

(c) Describe **two** impacts of acid deposition on soils and evaluate **two** strategies that might be used to counter these impacts. [6]

Expression of ideas [3]

7. (a) Describe the requirements for photosynthesis to occur, stating the inputs and outputs of the process. [5]

(b) Describe what is meant by gross primary productivity and explain how this differs from net primary productivity. [4]

(c) Construct a flow diagram to show the movement of energy through an ecosystem with at least three trophic levels. Label all flows and storages. [8]

Expression of ideas [3]

