



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
 General Certificate of Education  
 Advanced Subsidiary Level and Advanced Level

CANDIDATE  
 NAME

CENTRE  
 NUMBER

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**MARINE SCIENCE**

**9693/02**

Data-Handling and Free-Response  
 SPECIMEN PAPER

**For Examination from 2008**

**1 hour 15 minutes**

Candidates answer Section A on the question paper.

Additional Materials: Answer Booklet/Paper

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

| For Examiner's Use |  |
|--------------------|--|
| 1                  |  |
| 2                  |  |
| <b>Total</b>       |  |

This document consists of 7 printed pages and 1 blank page.



## Section A

Answer both questions in this section.

- 1 An investigation was carried out into the uptake of nitrate ( $\text{NO}_3^-$ ) ions on a coral reef flat. The investigation was designed to test the hypothesis that:

Organisms on the reef flat remove nitrate ions from the water as it flows over them.

Fig. 1.1 shows the relationship of the reef flat to the open sea, the reef crest and the land. Sea water flows in over the reef crest and then continues over the reef flat.

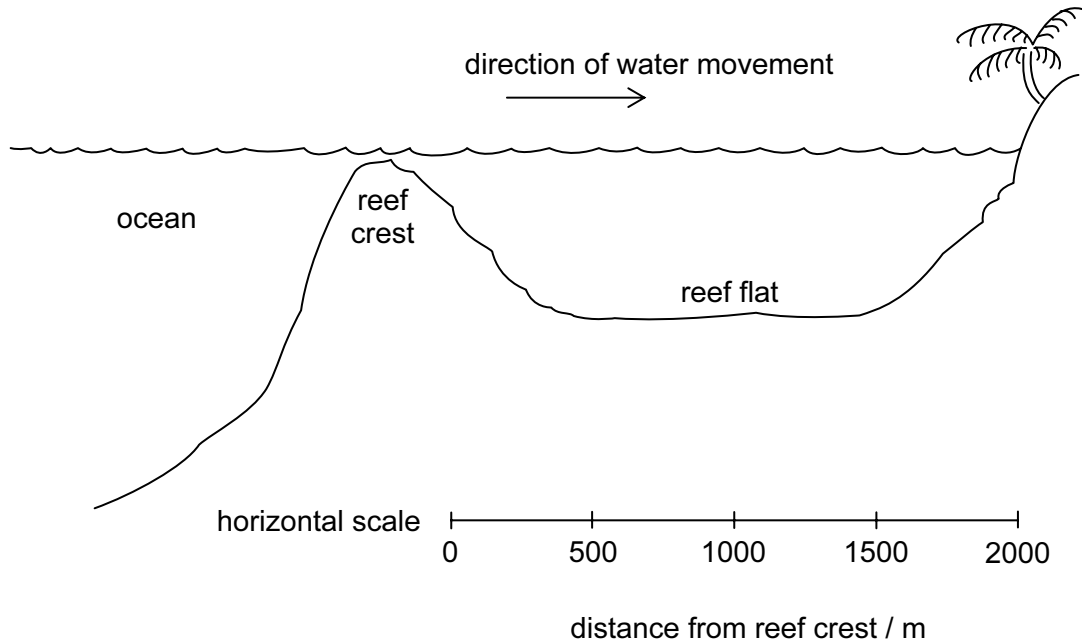


Fig. 1.1

The researchers took water samples at different distances from the reef crest. The concentration of nitrate ions in each sample was measured. This was repeated on the next day. The results are shown in Fig. 1.2.

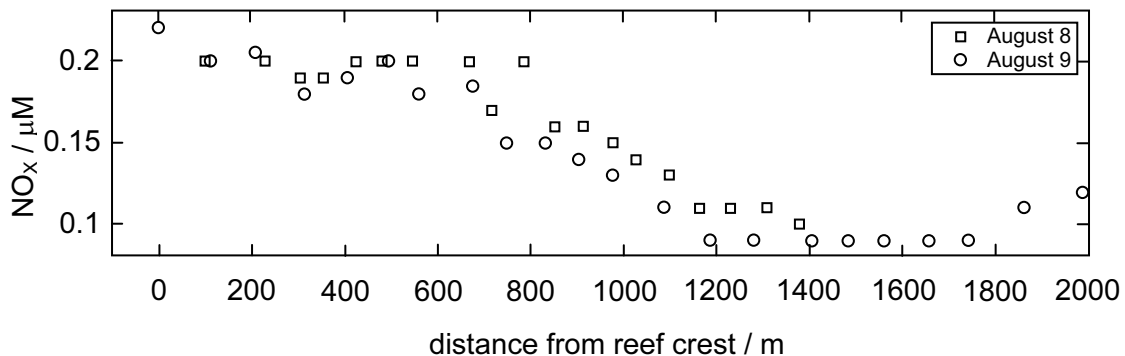


Fig. 1.2

- (a) Suggest which organisms living on the coral reef flat take nitrate ions from the water, and explain your suggestion.

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

- (b) With reference to Fig. 1.2, describe the relationship between the concentration of nitrate ions in the water and the distance from the reef crest.

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

- (c) (i) Do the results of this investigation support or refute the hypothesis being tested? Explain your answer.

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

- (ii) State **one** reason why these results should be regarded with uncertainty.

.....  
..... [1]

- (iii) Suggest **one** way in which this uncertainty could be reduced.

.....  
..... [1]

(d) As the water flows over the reef flat, its velocity decreases. Previous investigations had shown a negative correlation between distance from the reef crest and water velocity – that is, the water slows down as it flows over the reef flat. The researchers used their results to formulate a new hypothesis:

The rate of uptake of nitrate ions from the water by the organisms on the reef is determined by the rate of flow of water across them.

(i) Explain why the velocity of the water decreases as it flows over the reef flat.

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

(ii) Explain how the results from the first experiment could have led the researchers to formulate their new hypothesis.

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

**[Total: 12]**

2 (a) Fig. 2.1 shows the surface salinity of the world's oceans. The figures are in parts per thousand. The measurements were taken in August.

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Examiner's  
Use

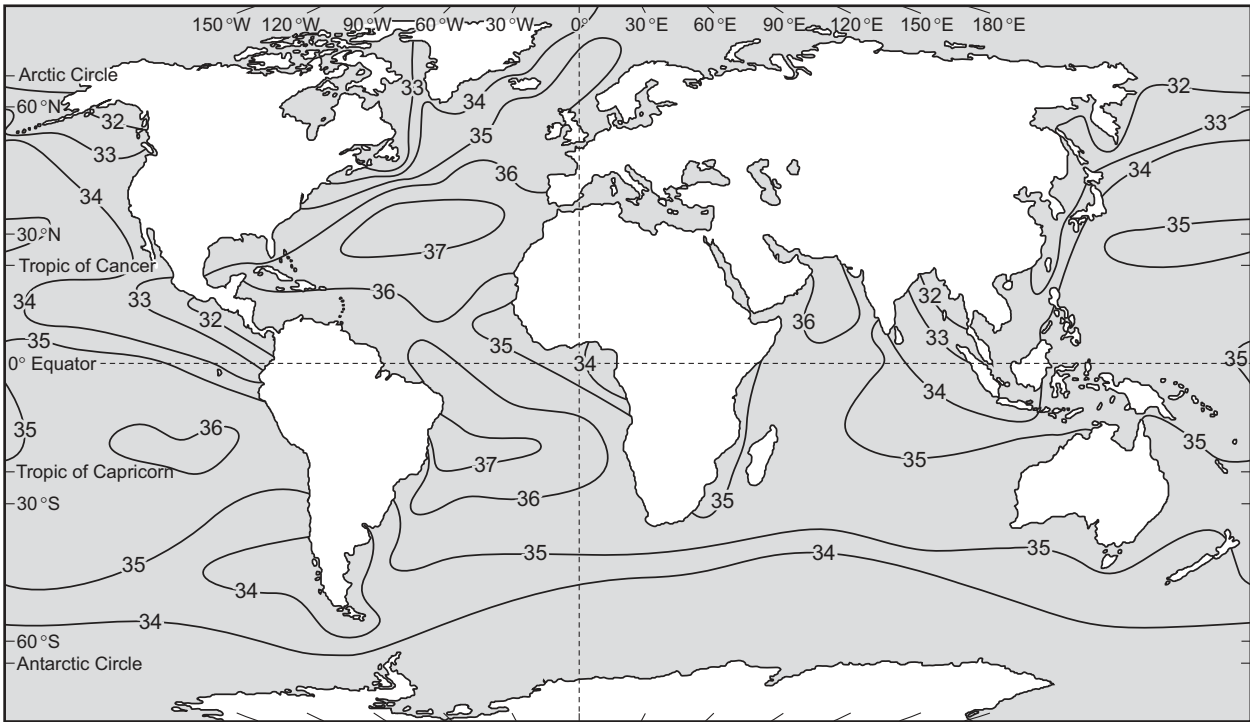


Fig. 2.1

(i) With reference to Fig. 2.1, describe how surface salinity varies with distance from land.

.....  
 ..... [1]

(ii) Suggest an explanation for the pattern that you have described.

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

(b) Fig. 2.2 shows the difference between evaporation and precipitation, measured in cm, at latitudes between 40°N and 50°S.

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Use

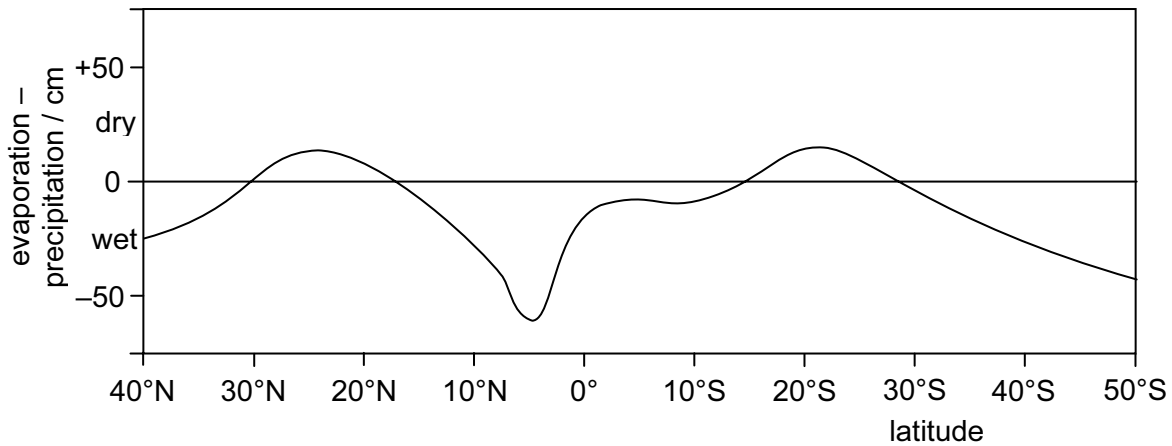


Fig. 2.2

Surface salinity tends, in general, to be slightly lower at high latitudes and the Equator than at intermediate latitudes.

Use the information in Fig. 2.2 to explain this relationship between surface salinity and latitude.

.....

.....

.....

..... [3]

(c) Mangrove trees are able to survive in saline water. Describe two environmental factors, other than salinity, that may lead to the development of mangrove forest along a shore, rather than another type of ecological community.

1 .....

.....

2 .....

..... [2]

[Total: 8]

**Section B**

**Answer both questions in this section.**

- 3** (a) With reference to examples within a marine ecosystem, describe the meaning of the term *trophic level*. [2]
- (b) Explain how populations of marine predators and prey may be inter-related. [5]
- (c) Discuss the possible benefits of shoaling in tuna and sardines. [8]
- [Total: 15]**
- 4** (a) Describe what is meant by the term *atoll*. [2]
- (b) Explain the Darwin-Dana-Daly theory of atoll formation. [5]
- (c) Discuss the evidence that supports this theory. [8]
- [Total: 15]**

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