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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6124742067

MARINE SCIENCE **9693/02**

Paper 2 AS Data Handling and Free Response **October/November 2012**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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.
You may use a pencil for any diagrams, graphs or rough work.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

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	
3	
4	
Total	

This document consists of **9** printed pages and **3** blank pages.

Section A

Answer **both** questions.

For Examiner's Use

1 In an investigation, the concentration of dissolved carbon dioxide and the pH of the water in a lagoon were measured at regular intervals over a period of 24 hours.

The results are shown in Table 1.1.

Table 1.1

time (24 hour clock)	concentration of carbon dioxide / mg dm^{-3}	pH of water
0600	26.7	6.5
1200	8.2	6.9
1800	2.8	7.5
2400	10.2	6.8
0600	27.1	6.4

(a) Using the information in Table 1.1, describe the changes in the concentration of carbon dioxide.

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(b) Suggest explanations for the changes you have described.

For Examiner's Use

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(c) **(i)** Describe the relationship between the concentration of dissolved carbon dioxide and the pH of the water.

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(ii) Suggest an explanation for this relationship.

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[Total: 10]

2 The calcification rate of a coral is a measure of the rate at which calcium carbonate ($CaCO_3$) is deposited in a coral skeleton. The calcification rate is influenced by a number of factors, including the availability of calcium carbonate and the temperature of sea water.

For Examiner's Use

(a) Suggest **two** factors, other than temperature and availability of calcium carbonate, that affect the growth rate of corals. Give an explanation for the effect of each factor on the growth rate of corals.

factor 1 .....

effect on growth rate of coral .....

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factor 2 .....

effect on growth rate of coral .....

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(b) In an investigation, the calcification rates of a large coral (*Porites*) were determined at a number of sites in Australia, Hawaii and Thailand. The calcification rate was measured as the mass of calcium carbonate deposited in the coral, per unit area, per year.

The results of this investigation are shown in Fig. 2.1.

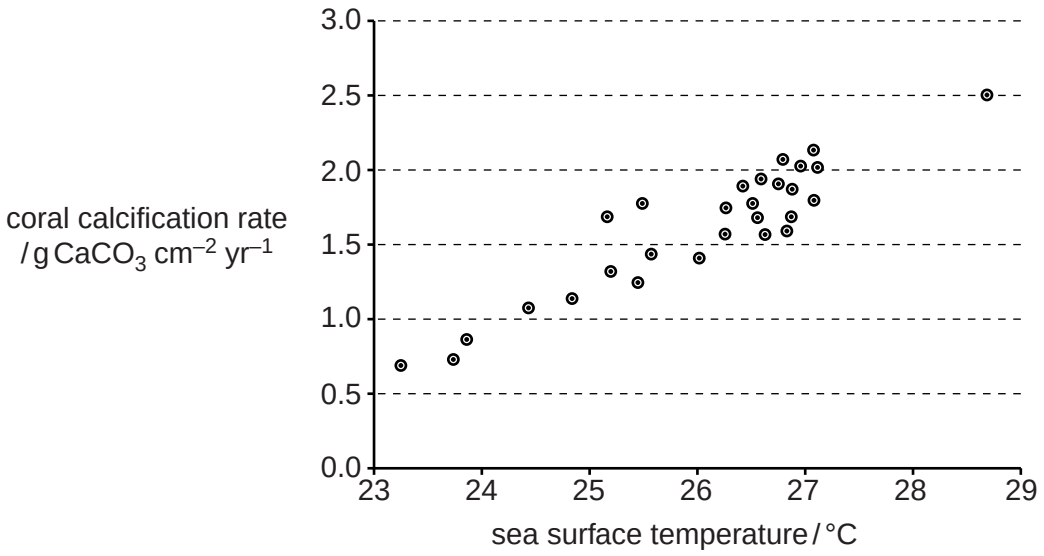

Fig. 2.1

For Examiner's Use

(i) Formulate a suitable hypothesis, based on the data shown in Fig. 2.1, for this investigation.

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(ii) Do the results of this investigation support or refute your hypothesis? Give an explanation for your answer.

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(iii) Give reasons why the data shown in Fig. 2.1 could lead to uncertainty in the interpretation of the results.

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[Total: 10]

Section B

Answer **both** questions.

For Examiner's Use

3 **(a)** Explain what is meant by the *Coriolis effect*.

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(b) Explain how salinity gradients form in water columns to produce ocean layers and how subsequent mixing of these layers may occur.

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(c) Suggest explanations for each of these observations.

For Examiner's Use

(i) The concentration of dissolved oxygen is often low in a lagoon.

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(ii) The salinity of the water in a lagoon may be higher than the salinity in the open ocean.

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[Total: 15]

4 **(a)** Explain how isostasy may produce shallow seas at the edge of continents.

For Examiner's Use

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(b) Explain how the processes of erosion and sedimentation give rise to the formation of rocky shores and muddy shores.

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(c) State what is meant by the term *biodiversity* and explain why rocky shores usually have a higher biodiversity than sandy shores.

For Examiner's Use

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