



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

CANDIDATE
NAME

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NUMBER

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MARINE SCIENCE

9693/01

Paper 1 AS Structured Questions

October/November 2011

1 hour 30 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.

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	
3	
4	
5	
6	
Total	

This document consists of **12** printed pages.



- 1 The concentration of dissolved oxygen in the oceans varies as the depth changes. Fig. 1.1 shows how the concentration of dissolved oxygen in sea water varies with depth.

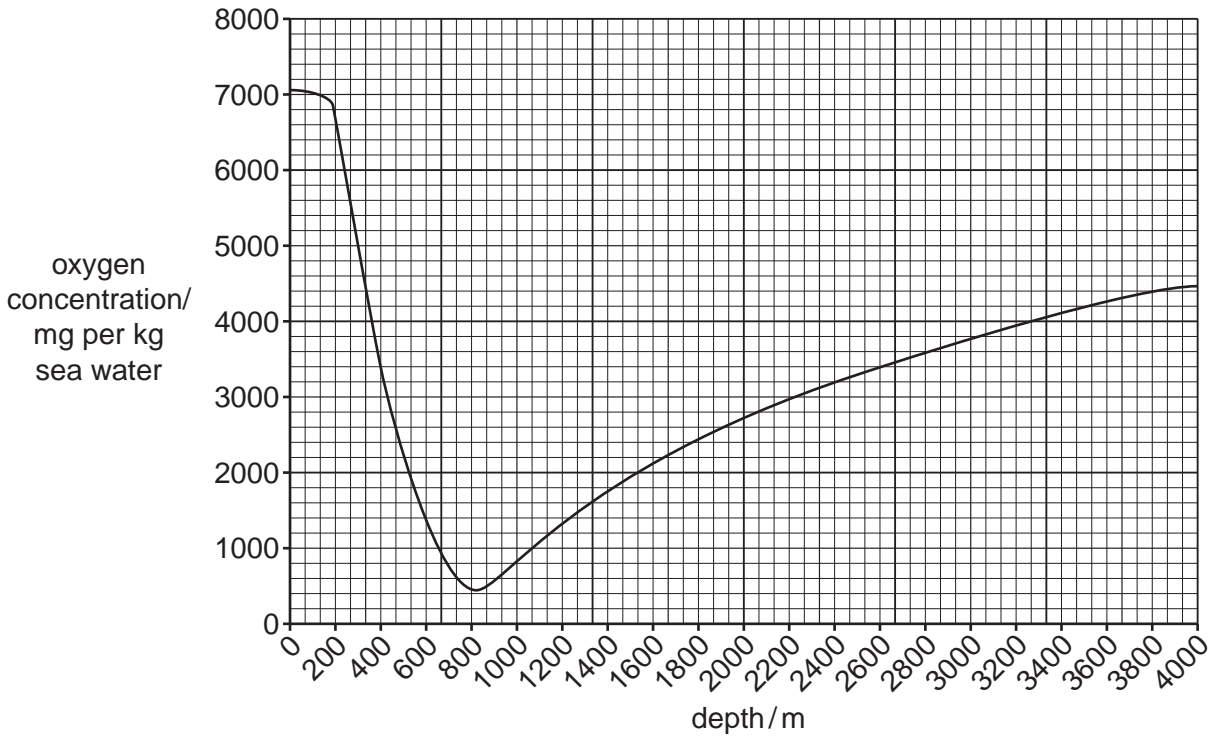


Fig. 1.1

- (a) State the **two** depths at which the oxygen concentration is 3400 mg per kg sea water.

1 m

2 m

[2]

- (b) Describe the changes in the concentration of dissolved oxygen as the depth increases from 0 m to 2000 m.

.....

.....

.....

.....

.....

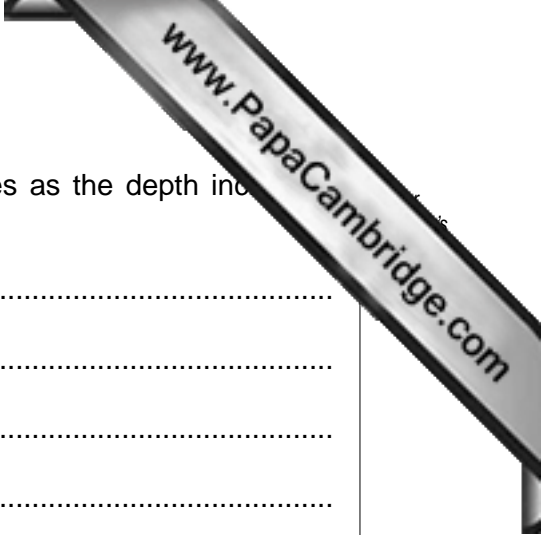
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[4]



(c) Suggest why the concentration of dissolved oxygen changes as the depth increases from 0 m to 800 m.

.....
.....
.....
.....
.....
.....
..... [3]

(d) Suggest why the concentration of dissolved oxygen increases as the depth increases from 1000 m to 4000 m.

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

[Total: 10]

2 (a) Define each of the following terms used in ecology.

(i) *population* [1]

(ii) *habitat* [1]

(iii) *ecosystem* [2]

(b) State the type of relationship between each of the following pairs of organisms

(i) cleaner fish and groupers [1]

(ii) tuna and nematodes [1]

(iii) coral and zooxanthellae [1]

(c) Fig. 2.1 shows the relationship between the populations of two species of fish over a period of time.

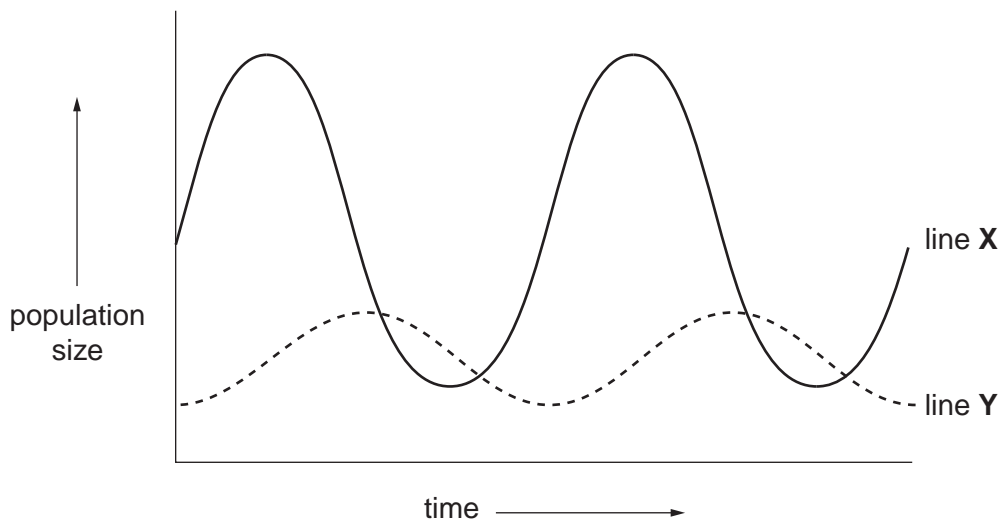


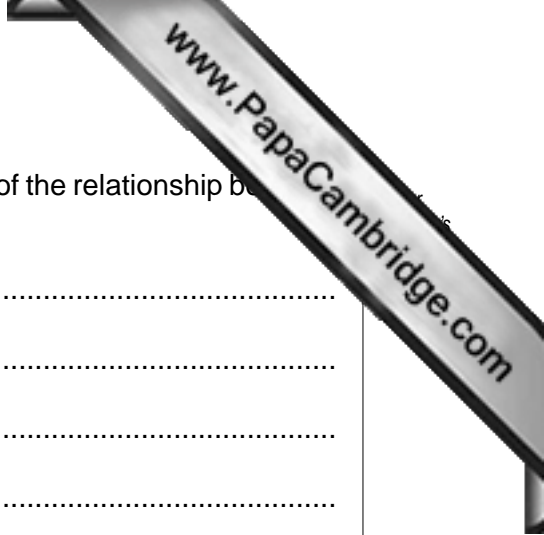
Fig. 2.1

(i) State which line, X or Y, on Fig. 2.1, represents the population of the predator and which line represents the population of the prey.

population of the predator
line

population of the prey.
line

[1]



(ii) Using the information in Fig. 2.1, describe **three** features of the relationship between the predator and the prey.

1

.....

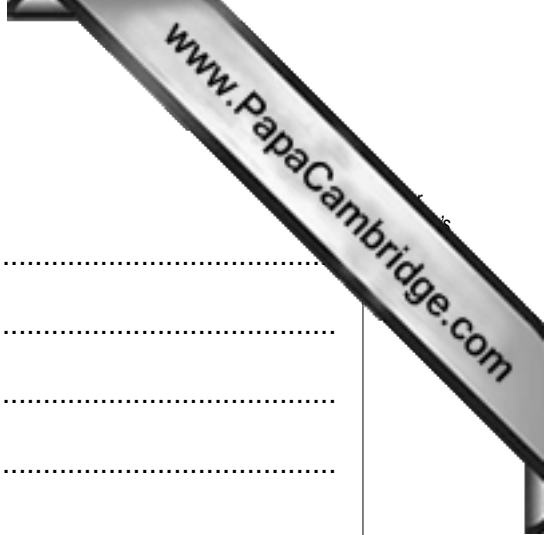
2

.....

3

..... [3]

[Total: 11]



3 (a) Outline the process of photosynthesis.

.....
.....
.....
.....
.....
.....
.....
.....
..... [4]

(b) Suggest **three** reasons why photosynthesis cannot take place at a hydrothermal vent.

1

2

3

..... [3]

(c) Explain what is meant by the term *chemosynthesis*.

.....
.....
.....
.....
.....
.....
.....
.....
..... [3]

(d) Fig. 3.1 is a food web showing some of the relationships of organisms at a hydrothermal vent. The figures represent the energy values in arbitrary units for two of the organisms.

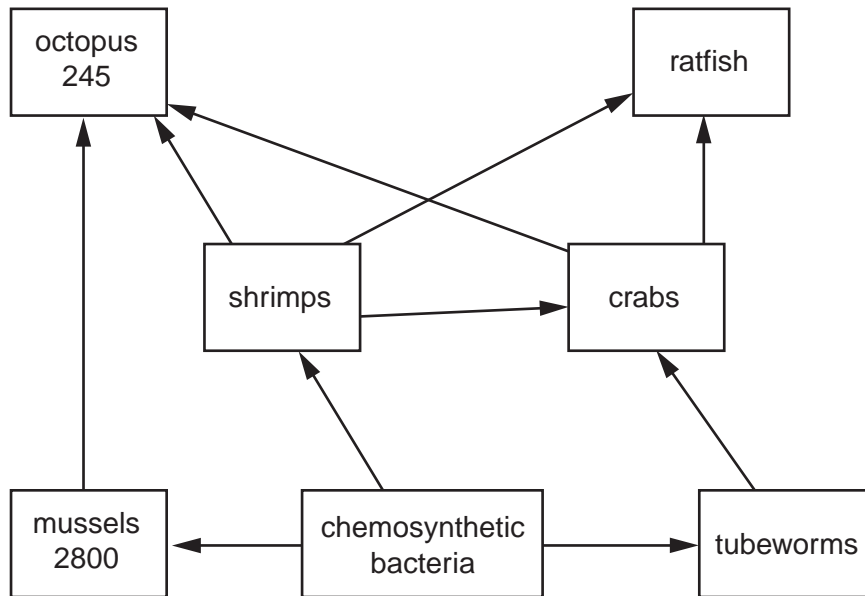


Fig. 3.1

(i) Name **two** organisms, shown in Fig. 3.1, which have a symbiotic relationship.
 and [1]

(ii) Ratfish feed on clams and clams feed on chemosynthetic bacteria.
 Add this information to the food web in Fig. 3.1. [3]

(iii) The relationship between the amount of energy transferred from one trophic level to the next higher trophic level is called the conversion efficiency.
 This is calculated by dividing the energy value at one level by the energy value at the previous level and expressing the answer as a percentage.

Mussels and octopus are in different trophic levels.
 Calculate the conversion efficiency of the link between mussels and octopus.
 Show your working.

..... [3]

[Total: 17]

4 (a) State **one** biological use for each of the following nutrients.

(i) nitrogen

.....
 [1]

(ii) carbon

.....
 [1]

(iii) magnesium

.....
 [1]

(iv) phosphorus

.....
 [1]

(b) Fig. 4.1 shows the relationship between the concentration of carbon dioxide in the atmosphere, calcium carbonate concentration in seawater and the rate of skeletal growth of coral.

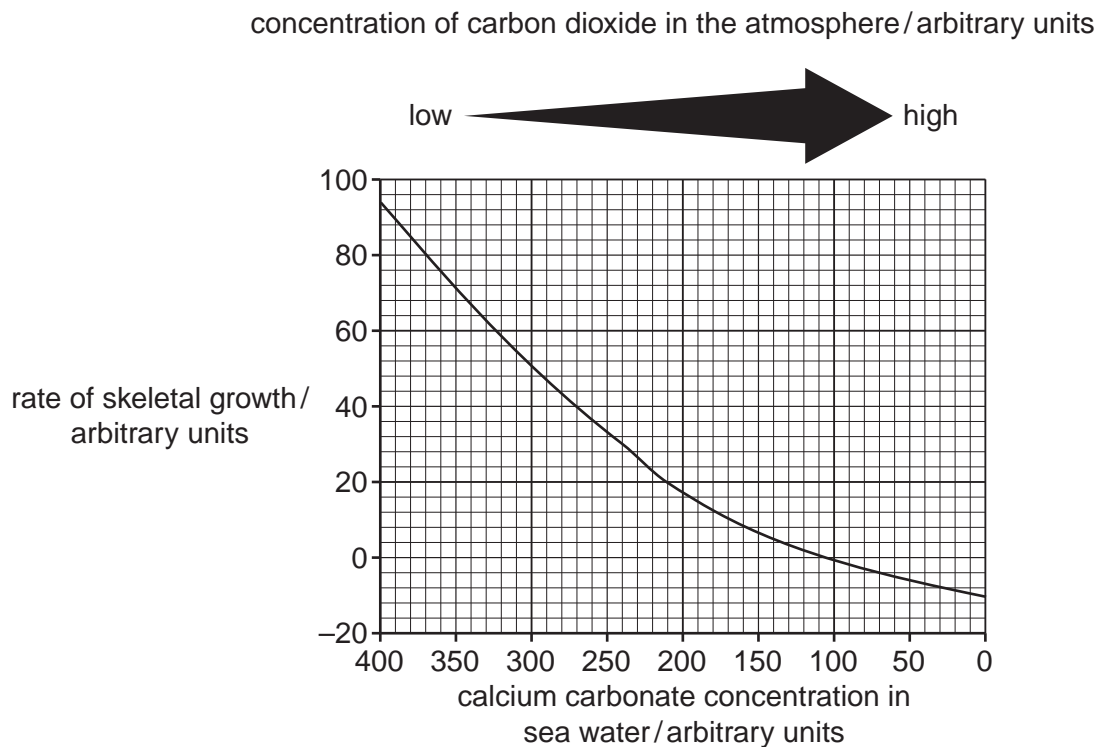
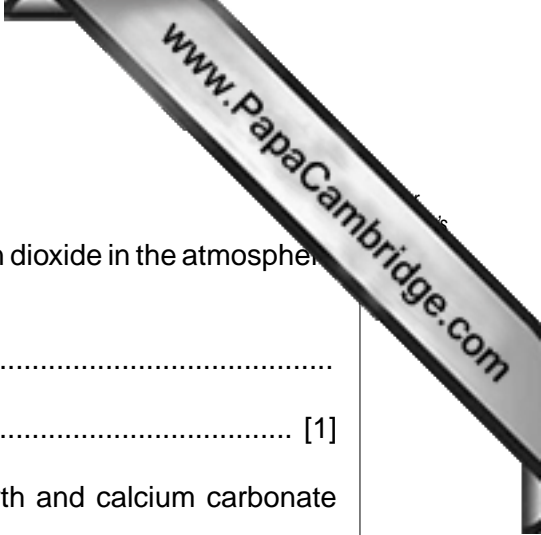


Fig. 4.1



Use the information in Fig. 4.1 to answer parts (i) to (iv).

- (i) State the relationship between the concentration of carbon dioxide in the atmosphere and calcium carbonate concentration in sea water.

.....
 [1]

- (ii) State the relationship between the rate of skeletal growth and calcium carbonate concentration in sea water.

.....
 [1]

- (iii) Find the rate of skeletal growth at a calcium carbonate concentration in sea water of 240 arbitrary units.

..... [1]

- (iv) Calculate the change in the rate of skeletal growth when the concentration of calcium carbonate in sea water falls from 350 to 210 arbitrary units.
 Show your working.

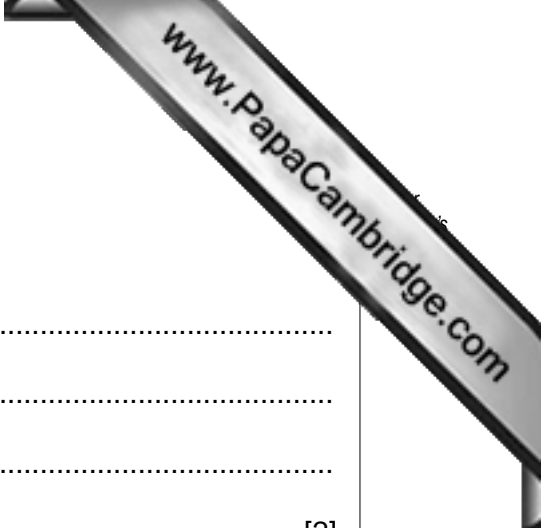
..... arbitrary units [2]

- (c) Suggest how increasing concentrations of carbon dioxide in the atmosphere affect the growth of coral.

.....

 [3]

[Total: 12]



5 (a) Explain what is meant by each of the following terms.

(i) *erosion*.

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

(ii) *sedimentation*.

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

(b) State **three** features of an estuary.

1
2
3 [3]

(c) State **three** factors that may lead to the formation of rocky shores.

1
2
3 [3]

(d) (i) Define the term *littoral zone*.

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

(ii) Suggest **two** environmental factors which change within the littoral zone.

1
2 [2]

[Total: 13]

6 Fig. 6.1 shows a section of the ocean and the ocean floor.

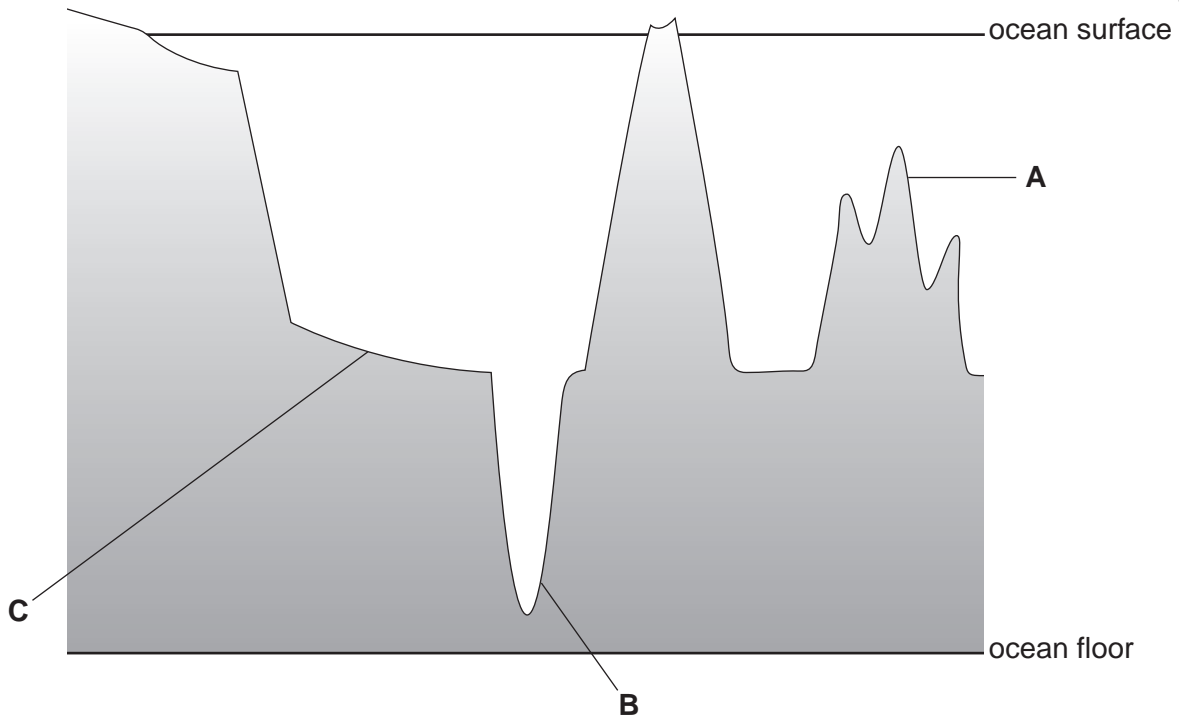


Fig. 6.1

(a) Name the parts labelled **A**, **B** and **C** and describe how each of these is formed.

(i) **A**

.....

.....

..... [3]

(ii) **B**

.....

.....

..... [3]

(iii) **C**

.....

.....

..... [3]



(b) Explain how the movement of tectonic plates may produce volcanoes.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 12]

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