

CANDIDATE
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MARINE SCIENCE

9693/23

Paper 2 AS Data-Handling and Free-Response

May/June 2018

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 an HB pencil for any diagrams or graphs.

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

DO **NOT** WRITE IN ANY BARCODES.

Section A

Answer **both** questions in this section.

Write your answers in the spaces provided on the Question Paper.

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

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.

This document consists of **10** printed pages and **2** blank pages.

Section A

Answer **both** questions in this section.

- 1 When a whale dies, its carcass (body) falls to the deep ocean floor. The carcass creates a complex ecosystem, which supports a variety of deep-sea organisms for decades.

At first, scavengers and decomposers feed on the carcass. Later, the community of organisms resembles the community found at a hydrothermal vent.

Only the skeleton of the whale remains, and bacteria feeding on it generate hydrogen sulfide. This is used by chemosynthetic bacteria, which support a food web including many diverse and rare species of mussels, worms and snails.

- (a) State the trophic level of the chemosynthetic bacteria. Explain your answer.

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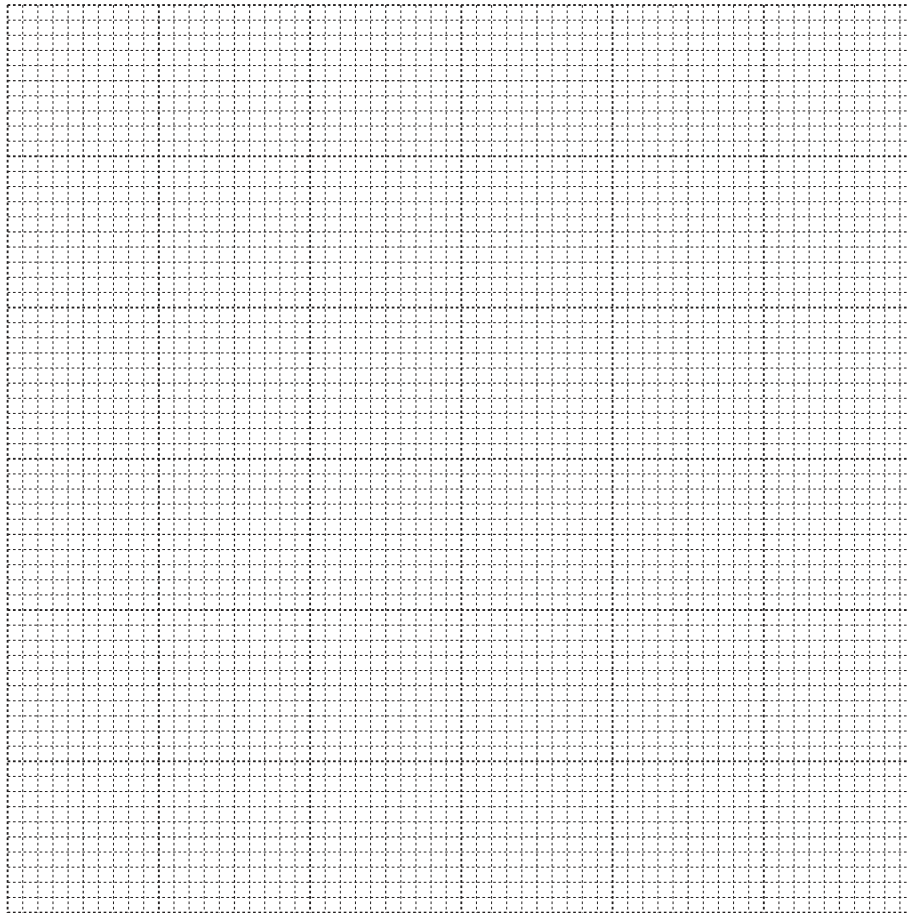
..... [3]

Table 1.1 shows the change in the number of species on a newly fallen whale carcass over time.

Table 1.1

age of whale carcass /months	number of species on the whale carcass
6	15
14	31
24	33
33	38
42	42
57	50

(b) On the grid, plot a graph of the data in Table 1.1. Join the points on your graph with ruled straight lines.



[4]

(c) Describe the relationship between the age of whale carcass and the number of species present.

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..... [2]

[Total: 9]

2 Coral bleaching, in which coral polyps expel their zooxanthellae, can be caused by increased sea water temperature.

(a) State the type of interrelationship between coral and zooxanthellae.

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 [1]

Some marine biologists suggested the hypothesis that coral reef communities do not recover from coral bleaching.

Fig. 2.1 is a graph of the predicted changes following a severe coral bleaching event based on this hypothesis.

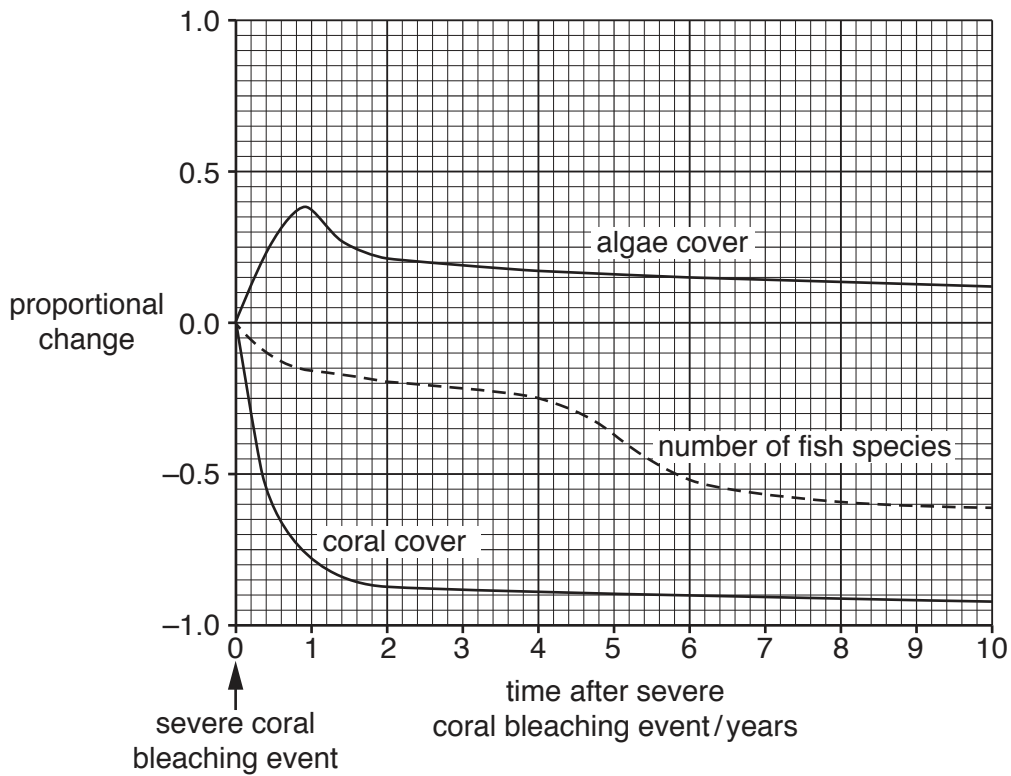


Fig. 2.1

(b) (i) Describe how the coral reef communities ten years after a bleaching event are predicted to differ from the communities before the event occurred.

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 [3]

- (ii) Suggest how the predicted changes in algae cover may result in a reduction in coral cover.

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..... [2]

(c) In 1998, a reef in Western Australia suffered a severe coral bleaching event.

Fig. 2.2 shows the results of a study of the changes in percentage coral cover and percentage algae cover before and after this event. It also shows the changes in the density of herbivorous fish.

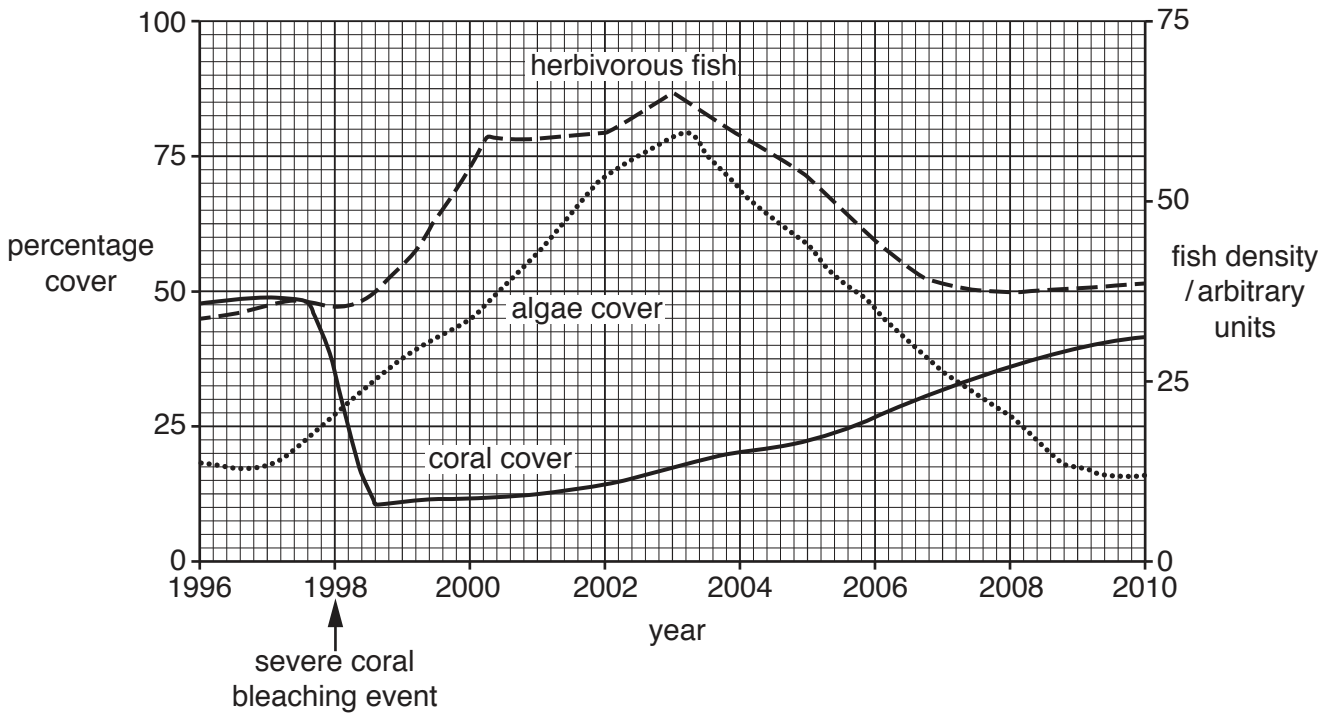


Fig. 2.2

(i) Suggest how percentage coral cover may be measured on a coral reef.

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..... [2]

(ii) Explain why the hypothesis that coral reef communities do not recover from a bleaching event is **not** supported by the results shown in Fig. 2.2.

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..... [2]

(iii) Use information from Fig. 2.2 to suggest a reason for the changes in density of herbivorous fish.

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..... [1]

[Total: 11]

Section B

Answer **both** questions in this section.

3 (a) Describe how a tropical cyclone develops.

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..... [5]

(b) Explain the meaning of the terms *ecosystem* and *biodiversity*.

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..... [5]

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