



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

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**MARINE SCIENCE**

**9693/01**

Paper 1 AS Structured Questions

**May/June 2008**

**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.

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                  |  |
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| <b>Total</b>       |  |

This document consists of **15** printed pages and **1** blank page.



1 Fig. 1.1 shows part of a marine food web.

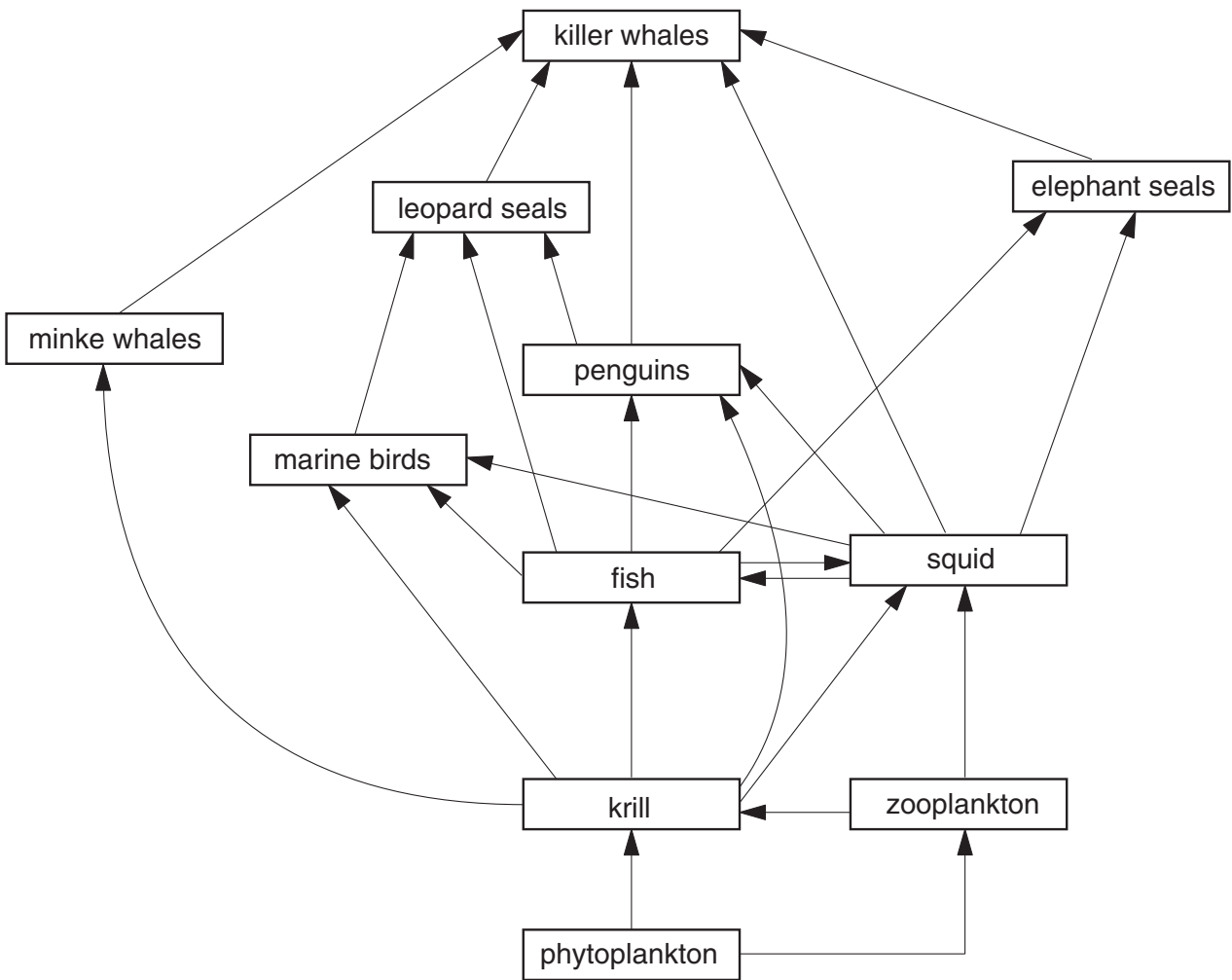


Fig. 1.1

(a) (i) What is the primary source of energy for this food web?

..... [1]

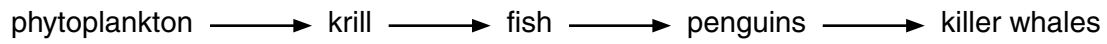
(ii) From the food web, write down a complete food chain that has the least number of trophic levels.

..... [1]

(iii) Explain what the arrows between each organism represent.

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

(iv) Draw a pyramid of biomass for the food chain –



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[2]

(b) Suggest why a drop in the numbers of leopard seals is unlikely to affect the population of killer whales.

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

(c) Fig.1.2 shows the relative amounts of energy in a food chain.

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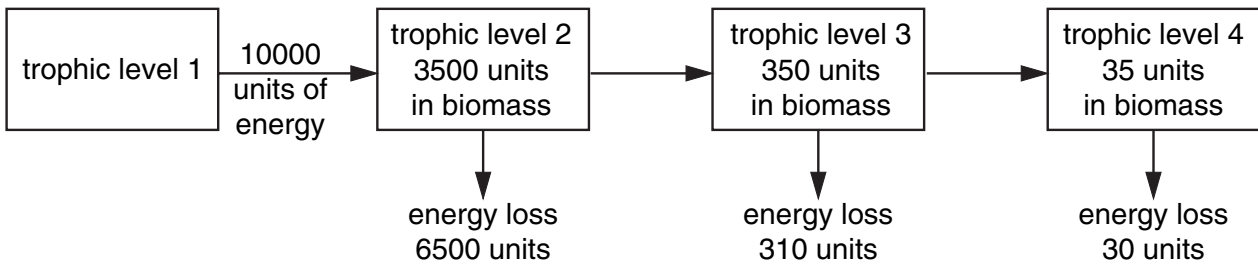


Fig. 1.2

(i) Calculate the percentage of the energy input to trophic level 2 that becomes part of the biomass at trophic level 3.

Show your working.

..... [2]

(ii) State **three** ways by which energy is lost from the food chain.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(d) Fig. 1.3 shows changes in the intensity of light reaching the surface of the Arctic sea over one year.

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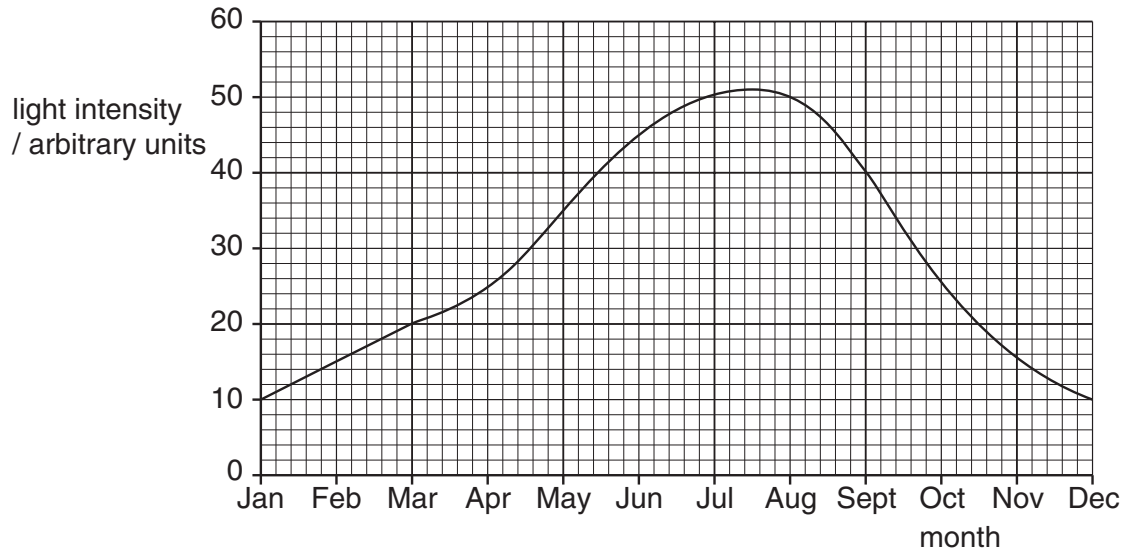


Fig. 1.3

With reference to Fig. 1.3 explain how the productivity of a food web is likely to change over the period September to October.

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..... [3]

[Total: 15]

2 (a) Explain the meaning of the term *photosynthesis*.

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..... [3]

(b) Explain the meaning of the term *succession*, giving a named example.

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..... [4]

[Total: 7]

3 Fig. 3.1 shows part of the nitrogen cycle in the sea.

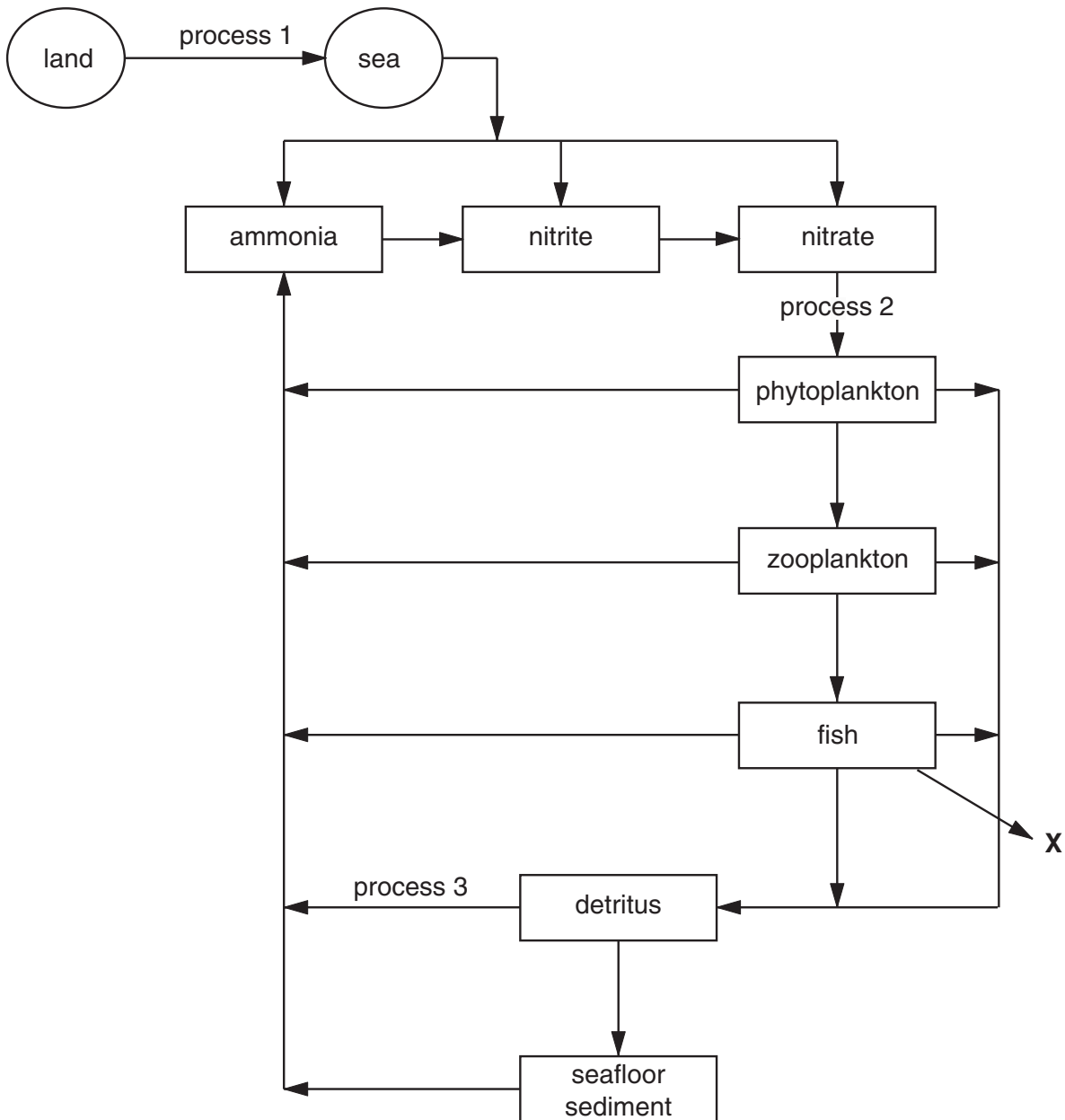


Fig. 3.1

(a) (i) Name processes 1 and 2.

process 1 .....

process 2 ..... [2]

(ii) Explain how phytoplankton make use of nitrates.

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

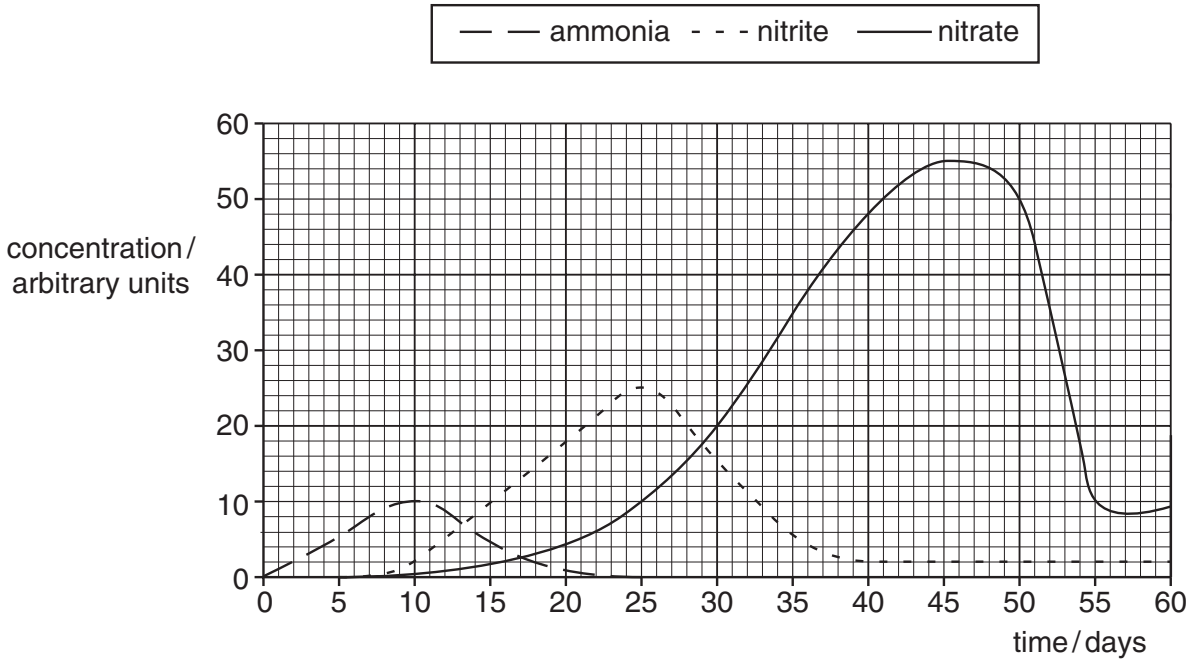
(iii) Suggest the group of organisms involved in process 3.

..... [1]

(iv) What takes place at X?

..... [1]

(b) Fig. 3.2 shows the changes in the concentrations of ammonia, nitrite and nitrate in a tank of seawater containing plants and fish.



**Fig. 3.2**

Using the information in Fig. 3.1 and Fig. 3.2,

(i) describe and explain the changes in the concentration of ammonia between day 0 and day 20,

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



(ii) describe and explain the changes in the concentrations of nitrite and nitrate from day 25 to day 45,

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..... [3]

(iii) suggest a reason for the rapid fall in the concentration of nitrate after day 45.

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..... [1]

[Total: 12]

4 (a) Describe the Darwin-Dana-Daly theory of atoll formation.

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..... [4]

(b) Name **three** methods used for the reconstruction of the history of coral reefs.

1 .....  
2 .....  
3 ..... [3]

(c) Suggest **three** reasons for the use of artificial reefs.

1 .....  
.....  
2 .....  
.....  
3 .....  
..... [3]

[Total: 10]

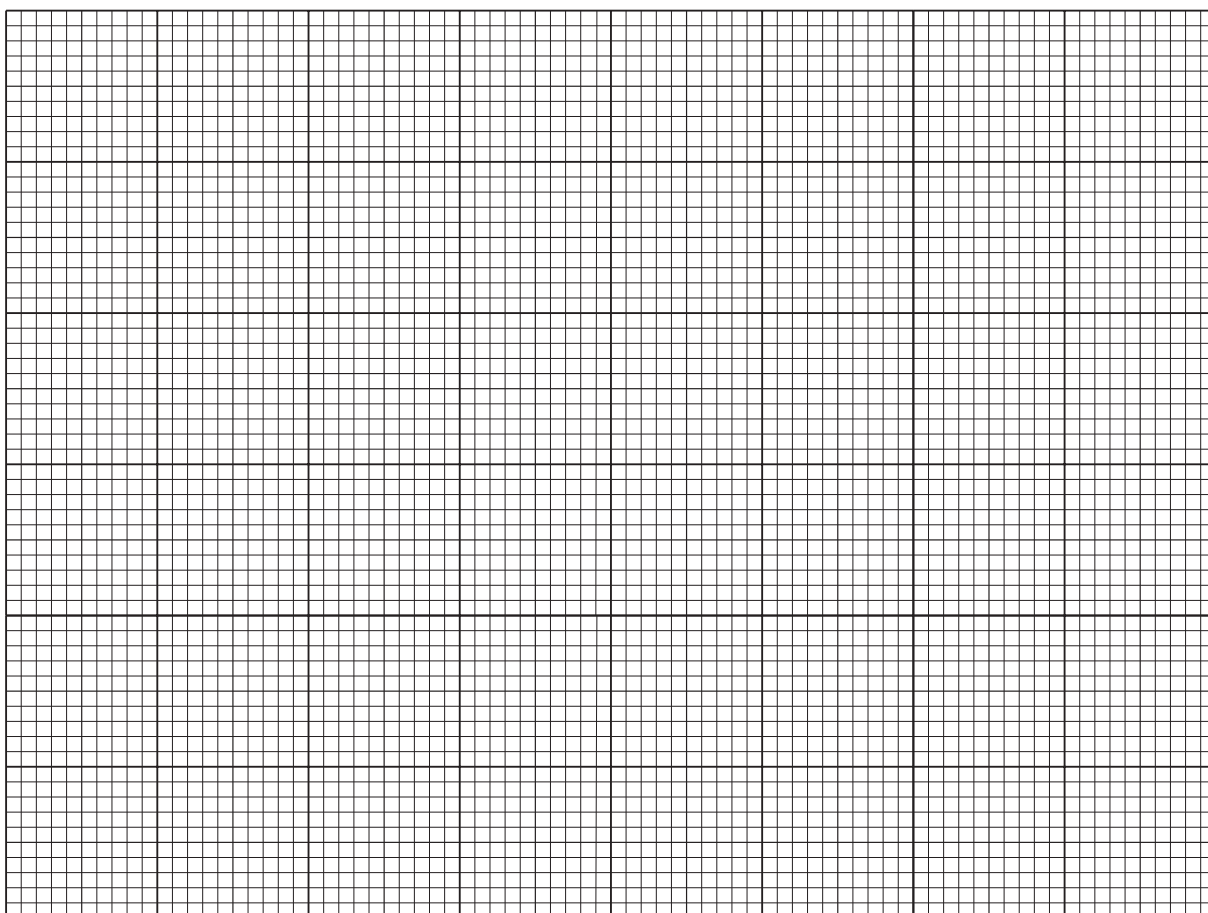
- 5 (a) Table 5.1 gives the concentrations of four ions present in sea water and fresh water. The concentrations are expressed as a percentage of the total ion content.

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**Table 5.1**

| ion               | percentage of total ion content |             | difference in percentage concentration |
|-------------------|---------------------------------|-------------|--|
|                   | sea water                       | fresh water |  |
| sodium            | 30.4                            | 7.4         | 23.0                                   |
| sulfate           | 7.8                             | 20.8        | 13.0                                   |
| chloride          | 55.0                            | 9.0         | 46.0                                   |
| hydrogencarbonate | 0.2                             | 30.2        | 30.0                                   |

- (i) Plot a bar chart of the differences in the percentage concentrations of these four ions.



[4]

(ii) State and explain three factors that affect the chemical composition of sea water.

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..... [6]

(b) Fig. 5.2 shows the maximum and minimum recorded levels of salinity in the surface water of the Pacific Ocean over a year.

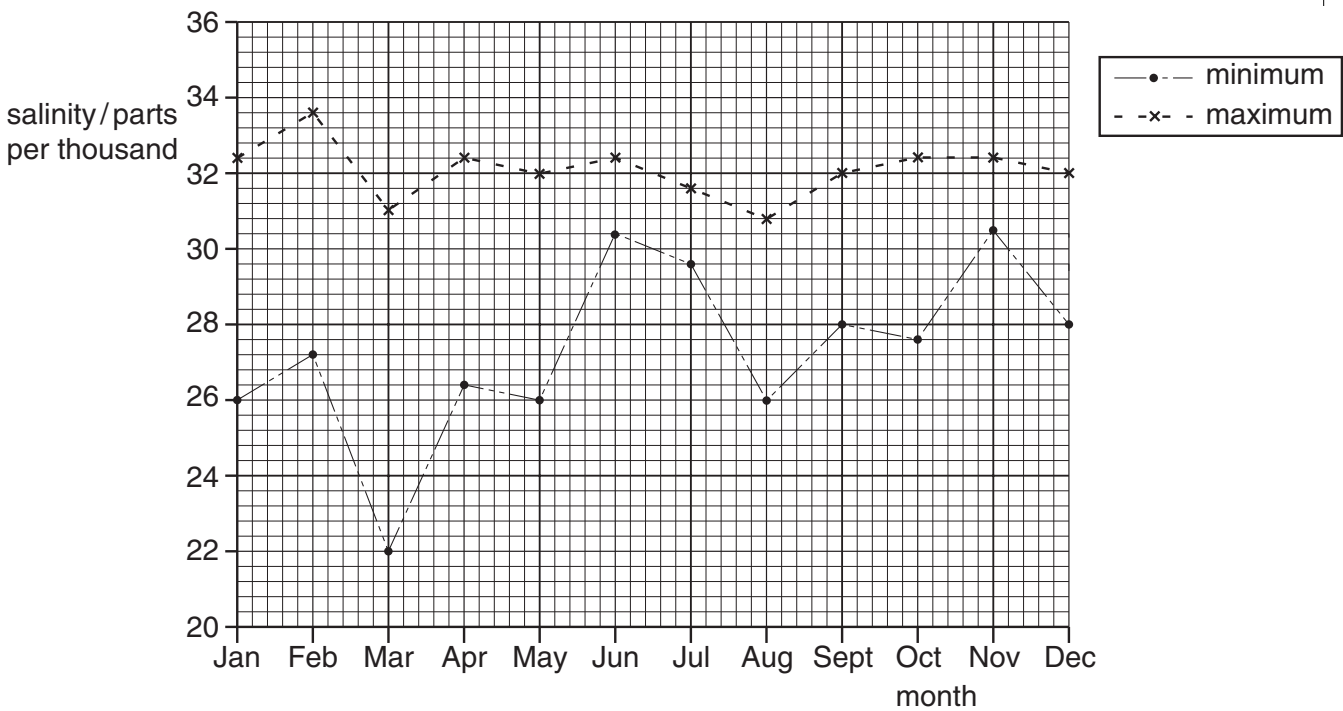


Fig. 5.2

(i) Use Fig. 5.2 to find the difference between the maximum and minimum recorded salinity in January.

..... [2]

(ii) Suggest **two** explanations for the large change in salinity between February and March.

1 .....

.....

.....

2 .....

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..... [4]

[Total: 16]

6 Fig. 6.1 shows changes in the percentage cover of coral and the relative numbers of Crown of Thorns starfish on one part of the Great Barrier Reef over a 50 year period.

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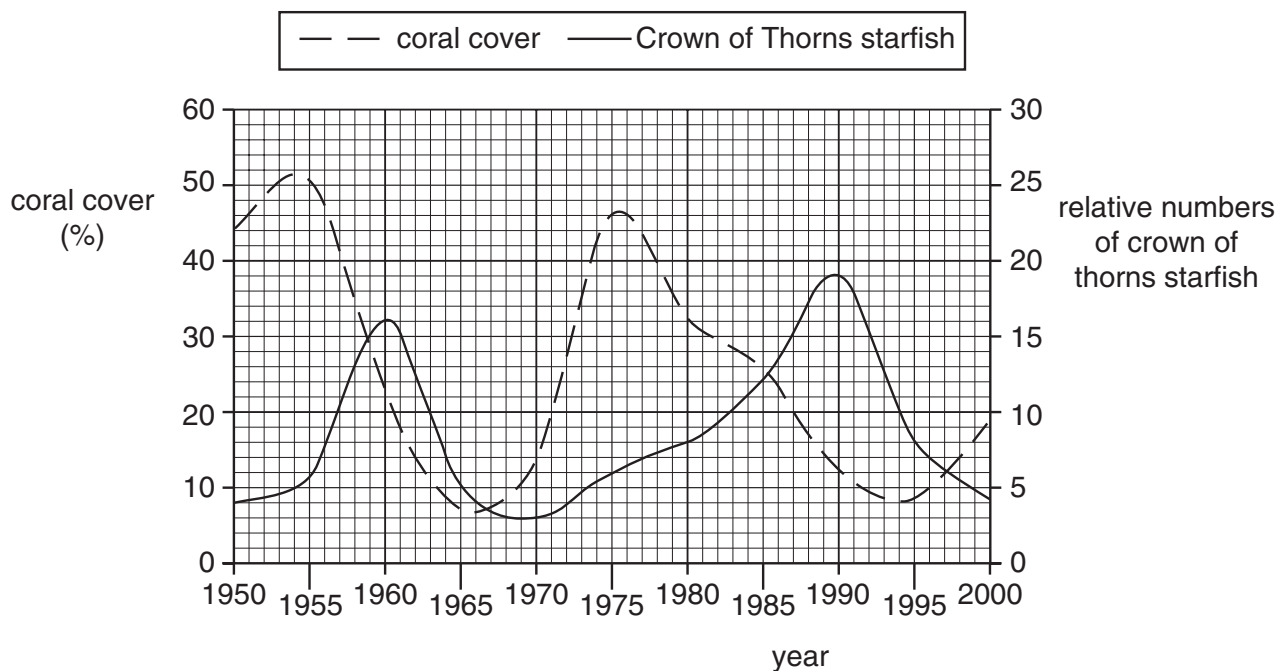


Fig. 6.1

(a) (i) Use Fig. 6.1 to find the difference between the maximum and minimum relative numbers of Crown of Thorns starfish.

..... [1]

(ii) Calculate the rate of increase of coral cover between 1970 and 1975.  
Show your working.

..... [2]

(iii) Describe the relationship between the coral and the Crown of Thorns starfish and suggest an explanation for this relationship.

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..... [4]

(iv) Suggest how the data for the Crown of Thorns starfish may have been collected.

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..... [4]

(b) Explain the meaning of the term *parasitism*, giving a named example.

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..... [4]

[Total: 15]

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