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

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|---|---|
| CANDIDATE NAME | |
| CENTRE NUMBER | |
| CANDIDATE NUMBER | |



**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 | |
| 5 | |
| 6 | |
| Total | |

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

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

*For Examiner's Use*

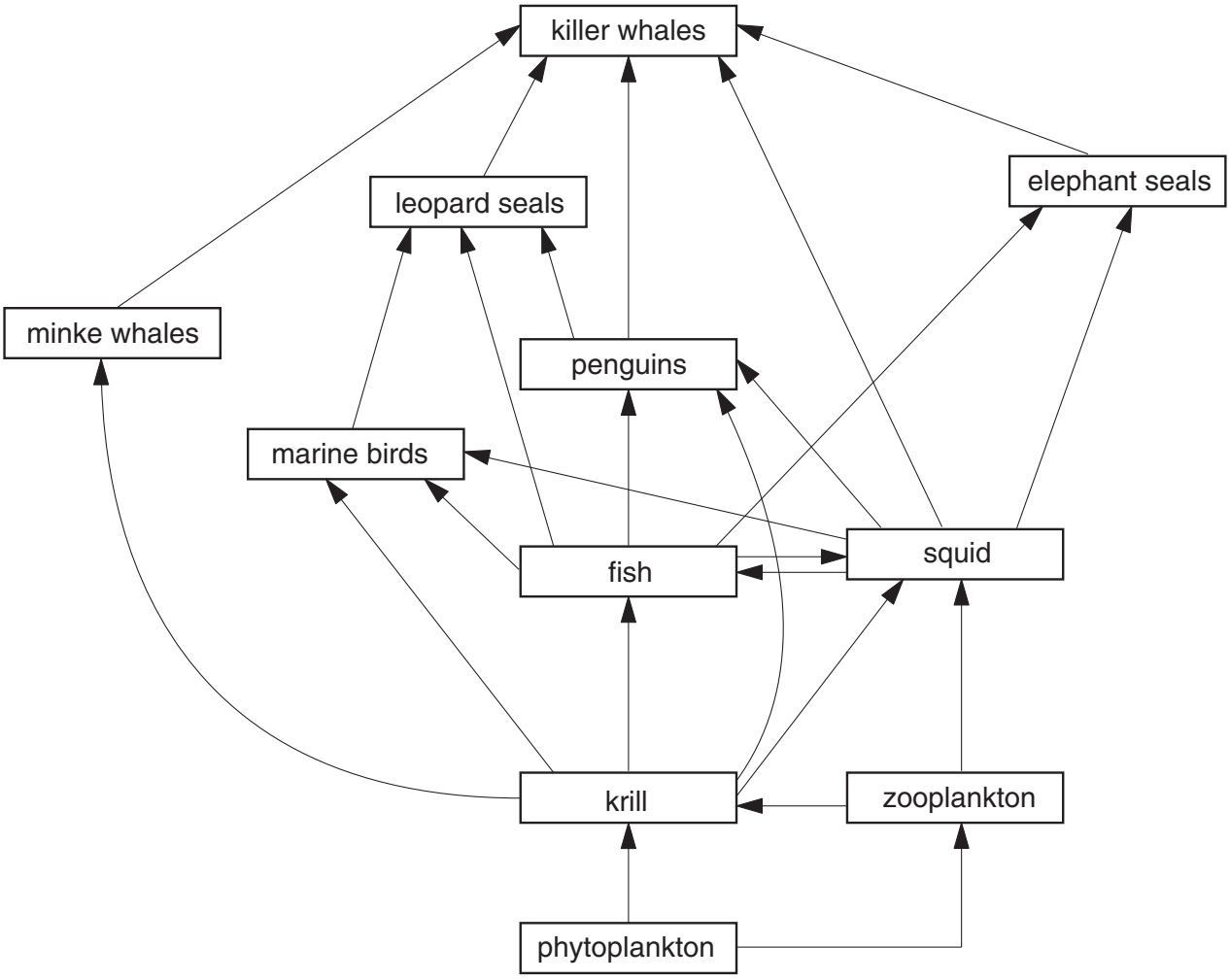


**Fig. 1.1**

**(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.

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..... [2]

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

phytoplankton ⟶ krill ⟶ fish ⟶ penguins ⟶ killer whales

*For Examiner's Use*

[2]

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

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..... [1]

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

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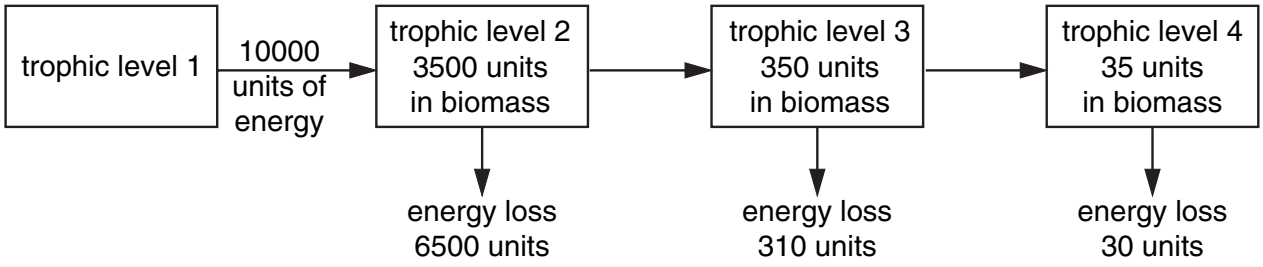


**Fig. 1.2**

**(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 .....

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2 .....

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3 .....

..... [3]

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

*For Examiner's Use*

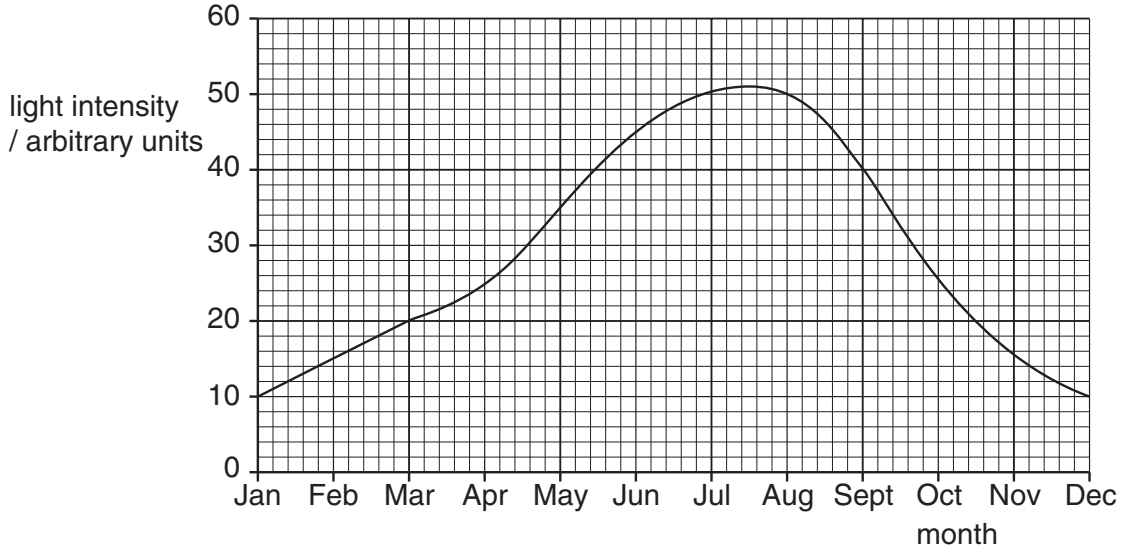


**Fig. 1.3**

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*.

For Examiner's Use

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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.

*For Examiner's Use*

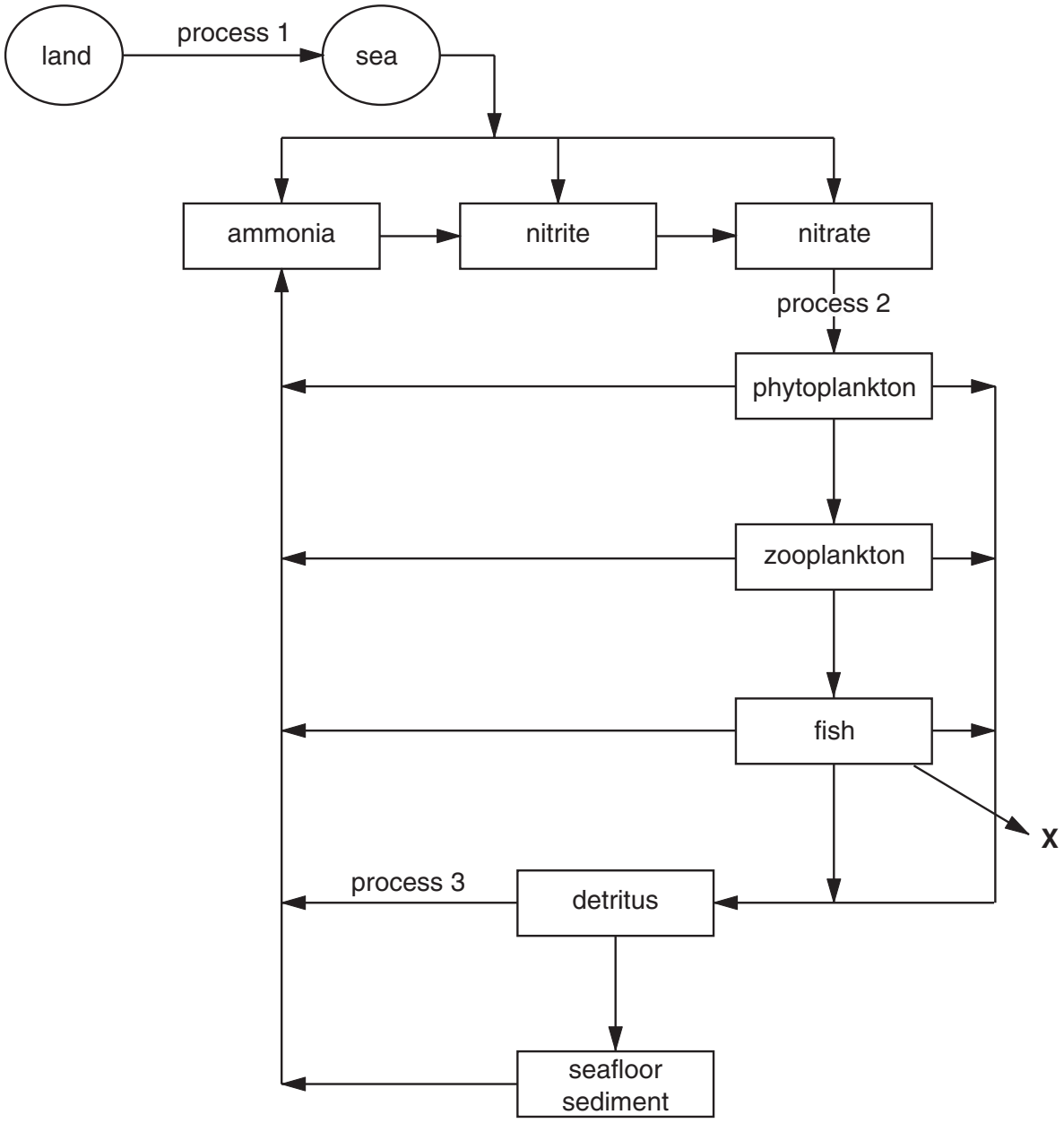


**Fig. 3.1**

**(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.

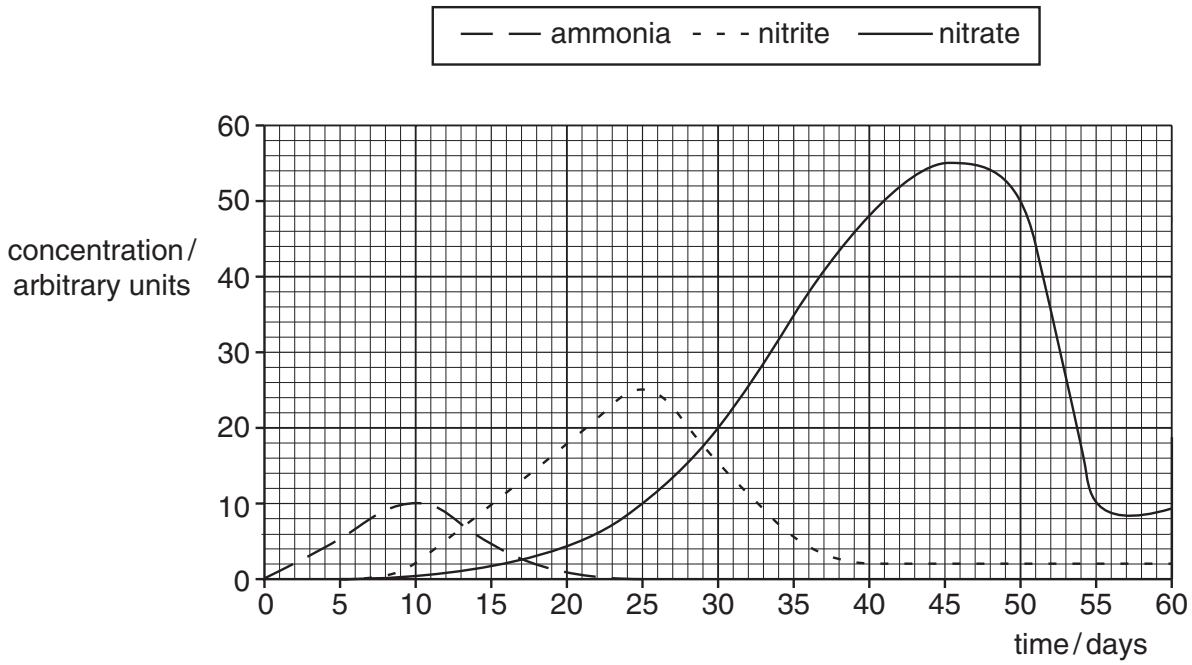


**Fig. 3.2**

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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..... [3]

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

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**(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.

*For Examiner's Use*

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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 .....

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2 .....

.....

3 .....

..... [3]

[Total: 10]

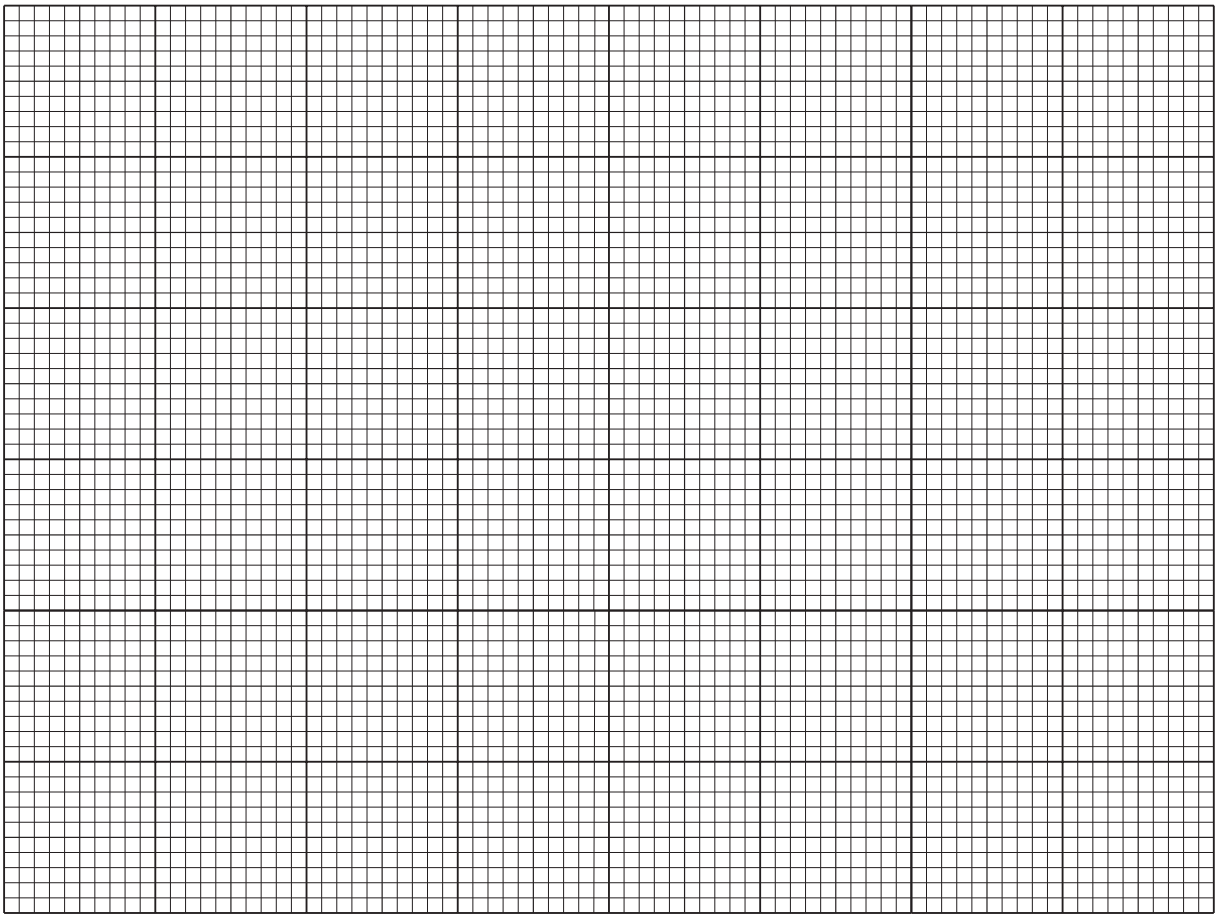
**5** **(a)** Table 5.1 gives the concentrations of four ions present in sea water and fresh water. The concentrations are expressed as a percentage of the total ion content.

*For Examiner's Use*

**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.

*For Examiner's Use*

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3 .....

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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.

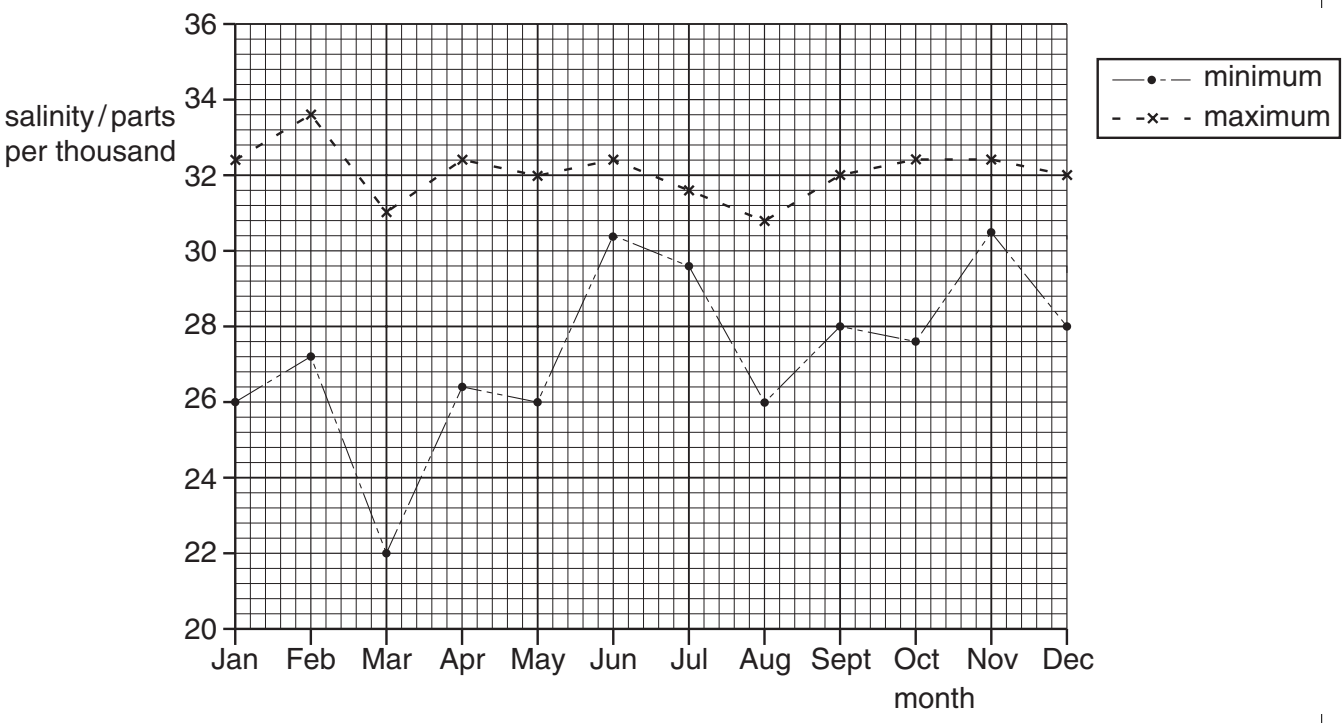


**Fig. 5.2**

**(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 .....

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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.

*For Examiner's Use*

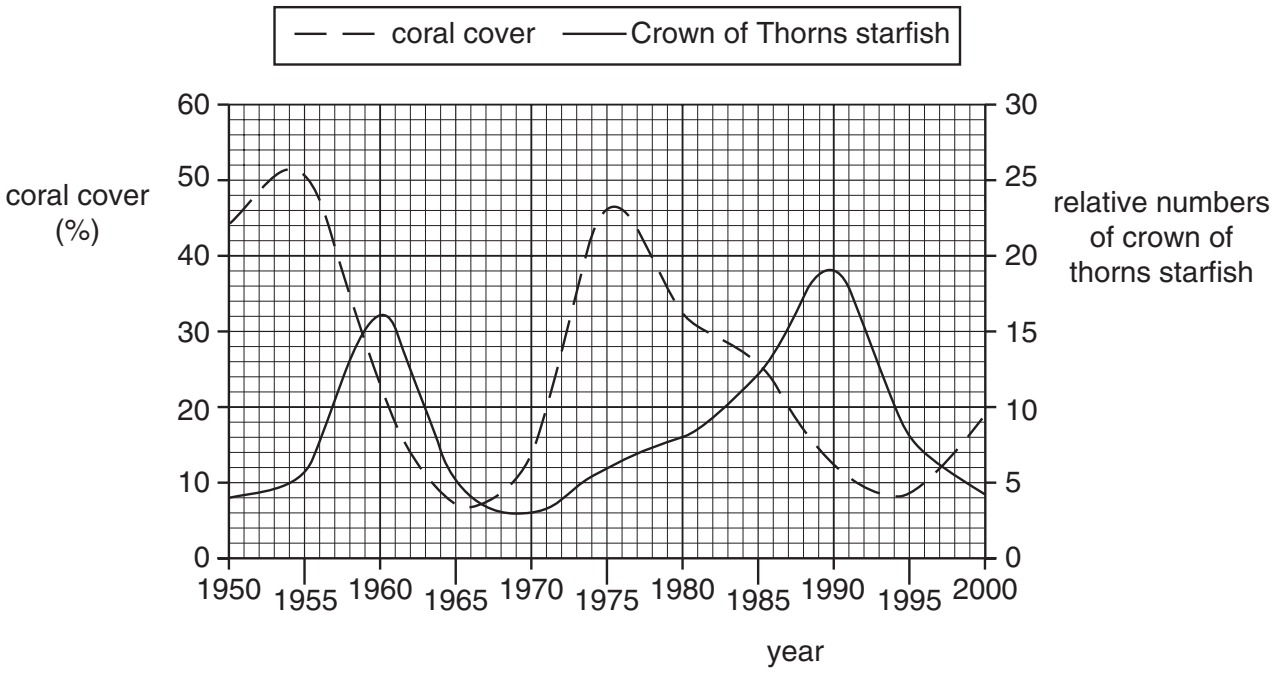


**Fig. 6.1**

**(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.

*For Examiner's Use*

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..... [4]

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

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

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..... [4]

[Total: 15]

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