Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

0895968708

MARINE SCIENCE **9693/01**

Paper 1 AS Structured Questions **October/November 2014**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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.

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

This document consists of **16** printed pages.

CAMBRIDGE International Examinations

1 **(a)** Describe the relationship between the following pairs of marine organisms:

(i) tuna and nematodes .....

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.....[2]

(ii) coral and zooxanthellae .....

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.....[2]

(b) Experiments were carried out to investigate each of the following:

1. the effect of temperature on the condition of coral

2. the effect of temperature on the density of zooxanthellae in the coral tissues.

Each experiment was carried out over a period of 15 days and all conditions other than temperature were kept the same.

Table 1.1 shows the results of experiment 1.

Table 1.1

temperature / °C	percentage of coral that were		
	healthy	bleached	dead
27.5	97	0	3
30.0	96	1	3
31.0	60	27	13
32.0	1	22	77

With reference to Table 1.1, describe the effect of increasing temperature on the condition of the coral.

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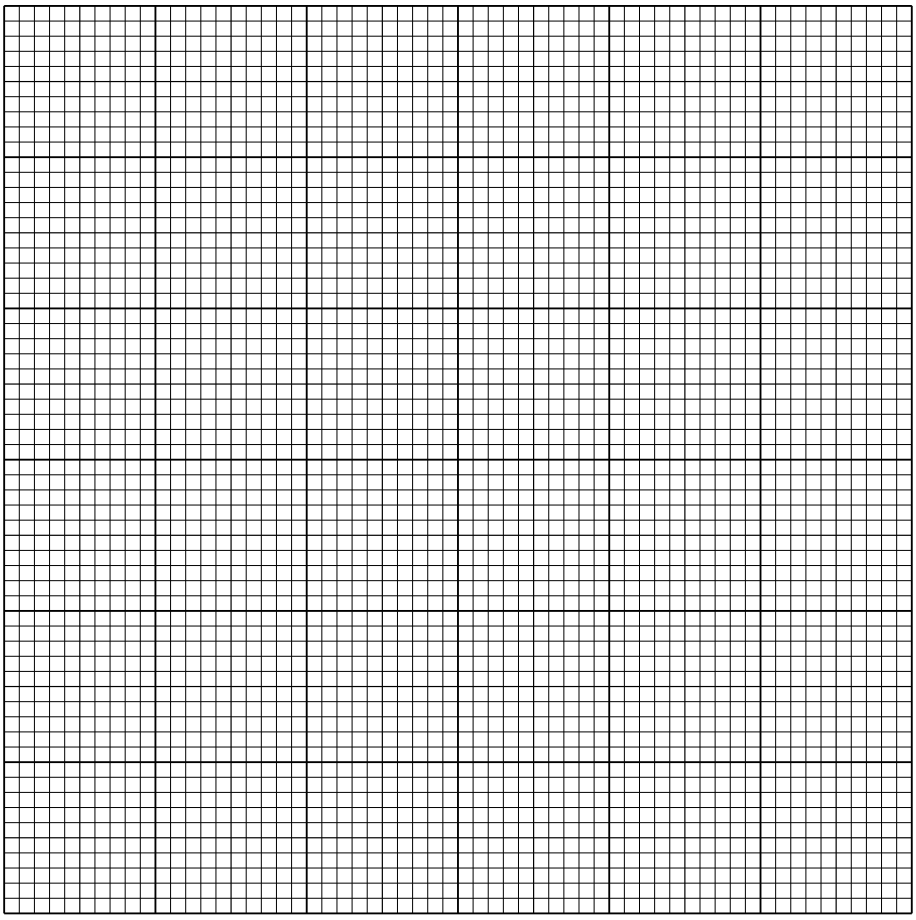
.....[3]

(c) Table 1.2 shows the results of experiment 2.

Table 1.2

temperature / °C	density of zooxanthellae / 10^6 cm^{-2}
27.5	1.10
30.0	0.60
31.0	0.25
32.0	0.05

(i) Draw a line graph of the data in Table 1.2. [4]



(ii) With reference to Table 1.2, state how the density of the zooxanthellae changes as the temperature increases from 30 °C to 32 °C.

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.....[1]

[Total: 12]

2 **(a)** Outline the process of photosynthesis.

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.....[4]

(b) Fig. 2.1 shows part of a food web in the Bering Sea.

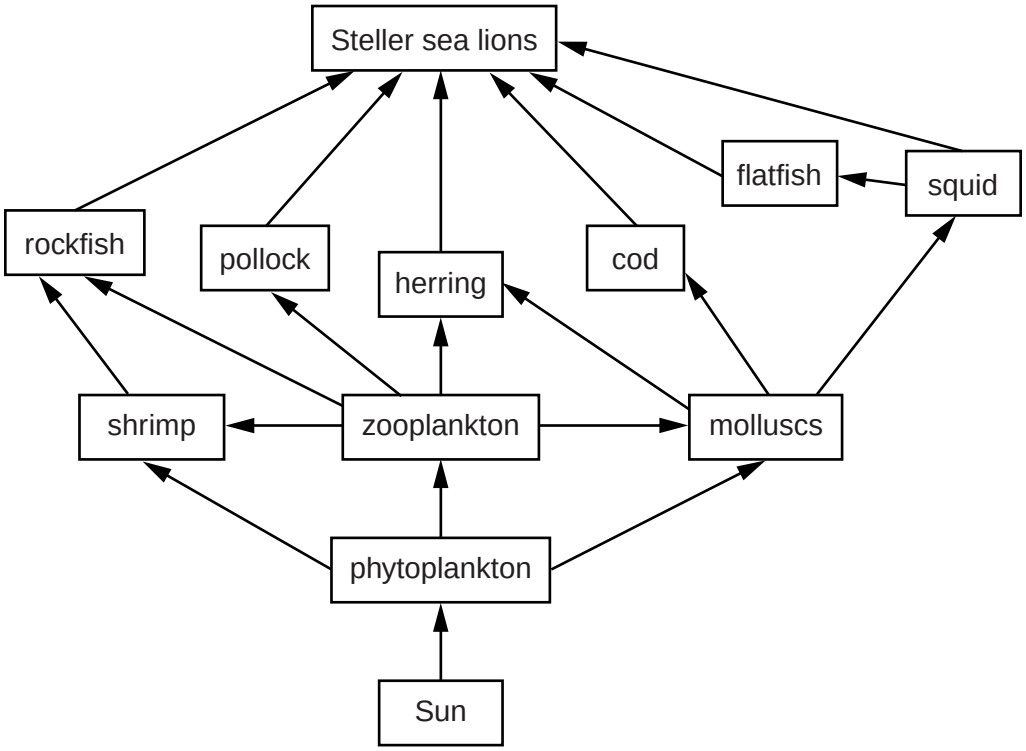

Fig. 2.1

(i) The food web in Fig. 2.1 shows that Steller sea lions eat cod.

State the terms used to describe the relationship between Steller sea lions and cod.

.....

.....[1]

(ii) Name **one** organism in the second trophic level.

.....[1]

(iii) Suggest **two** reasons why not all of the energy from the Sun reaches the phytoplankton.

1 .....

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2 .....

..... [2]

(iv) State how energy is lost as it passes along a food chain.

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.....[2]

(c) Fig. 2.2 shows the relative abundance of Steller sea lions and herring in the Bering Sea from 1965 to 1990.

Fig. 2.2 also shows the relative abundance of humans living near the Bering Sea over the same time period.

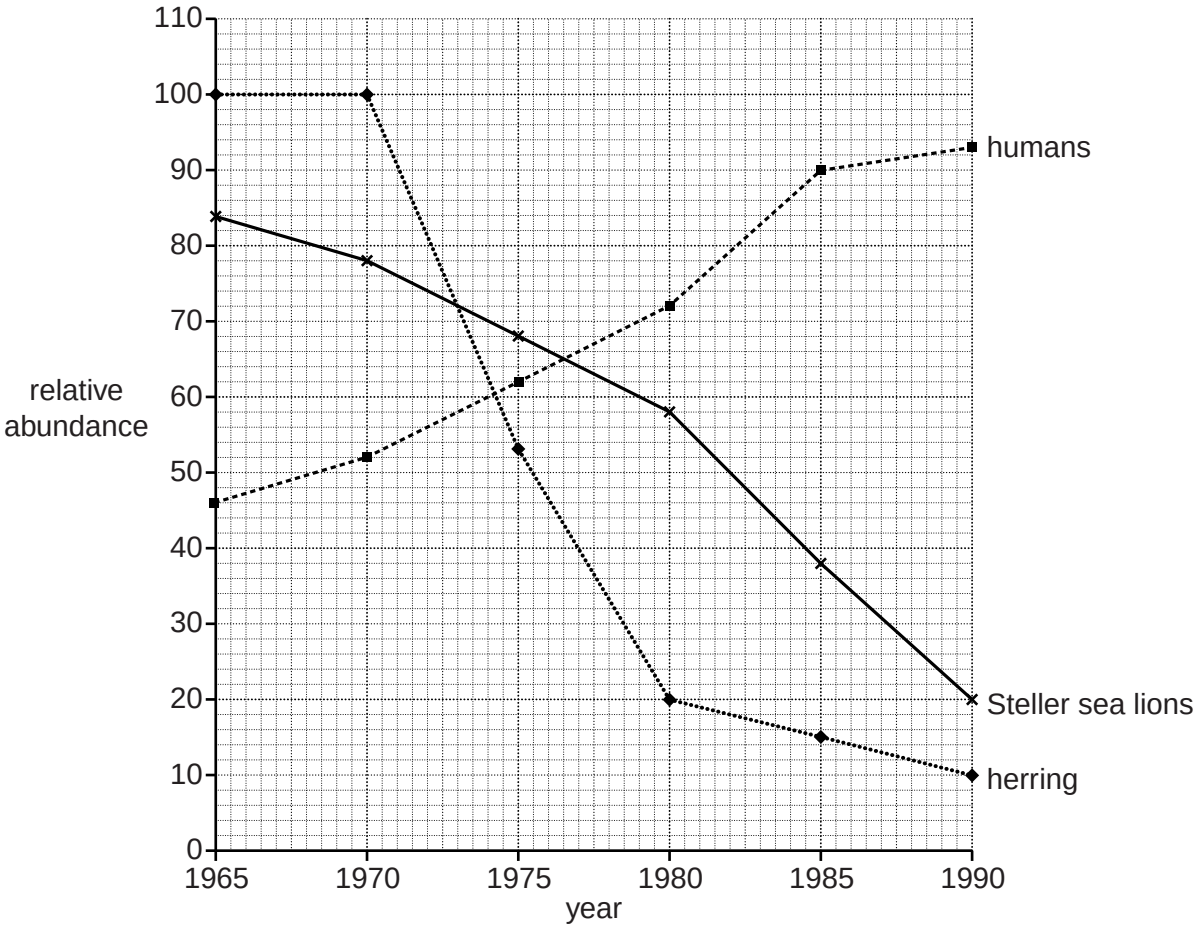

Fig. 2.2

(i) Using the information in Fig. 2.2, calculate the mean change in the relative abundance of Steller sea lions per year from 1965 to 1990.
Show your working.

..... [2]

(ii) With reference to Fig. 2.2, suggest and explain a possible reason for the change in the relative abundance of Steller sea lions from 1965 to 1990.

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.....[2]

[Total: 14]

3 **(a)** Fig. 3.1 show three stages **A**, **B** and **C**, in the formation of a coral atoll.

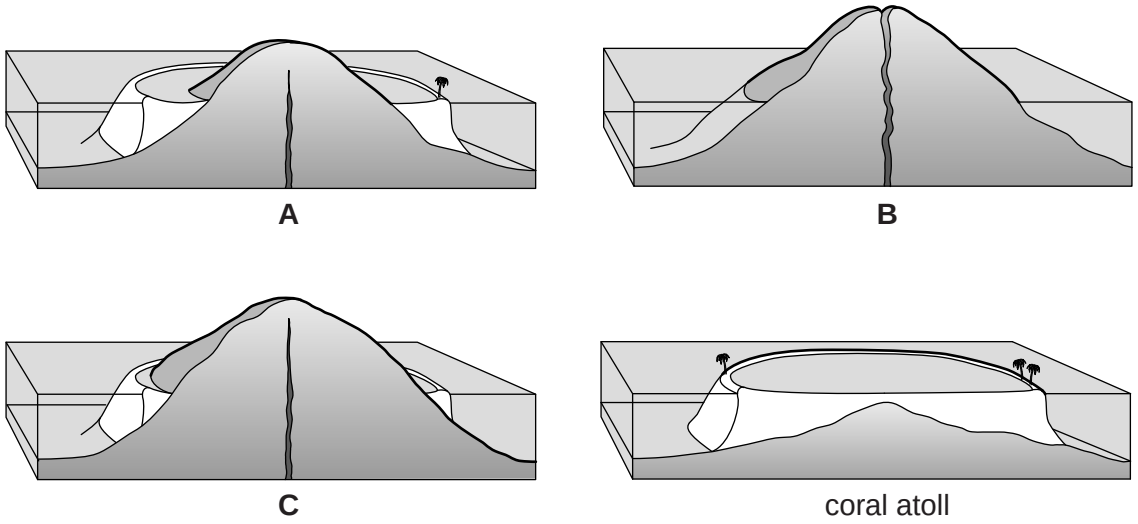

Fig. 3.1

(i) Name the types of reef shown at stages **A** and **C**.

A .....

C ..... [2]

(ii) List the stages **A**, **B** and **C** in the correct order of the formation of a coral atoll.

1 .....

2 .....

3 .....

4 coral atoll [2]

(b) Fig. 3.2 shows the suspended sediment concentration in sea water at different distances from the shore of Molokai Reef in Hawaii.

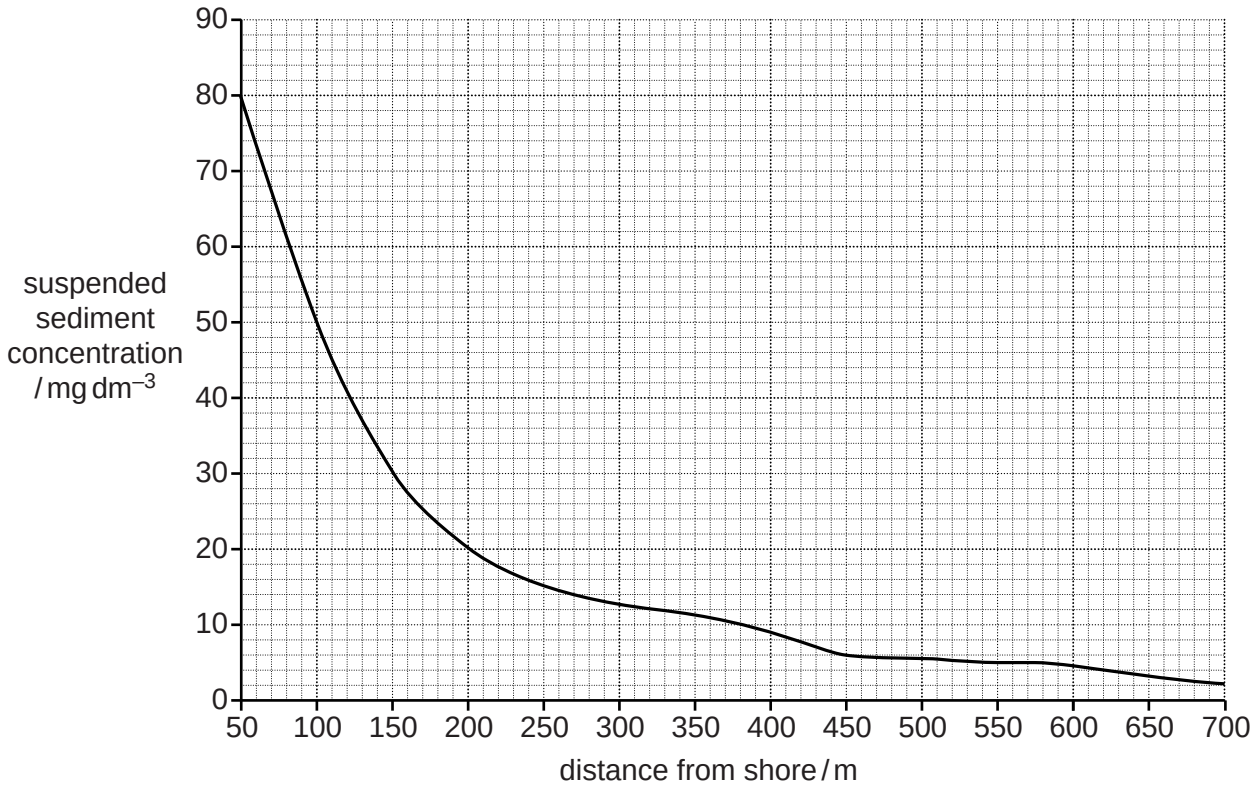

Fig. 3.2

(i) Suggest **two** sources of the suspended sediment close to the shore.

1 .....

2 .....[2]

(ii) A suspended sediment concentration of 10 mg dm^{-3} or less is considered to have only minor effects on the health and growth of the coral.
Higher concentrations have a severe effect on the health and growth of the coral.

Use Fig. 3.2 to suggest the distances from the sea shore between which the healthy corals would be found.

.....[1]

[Total: 7]

4 Carbon is an element found in many different compounds in living organisms and in the environment.

(a) Name **one** compound found in living organisms that contains carbon.

.....[1]

(b) Fig. 4.1 shows some of the ways in which carbon can move between the atmosphere, oceans and sediment at the bottom of the ocean.
The numbers are gigatonnes of carbon per year.

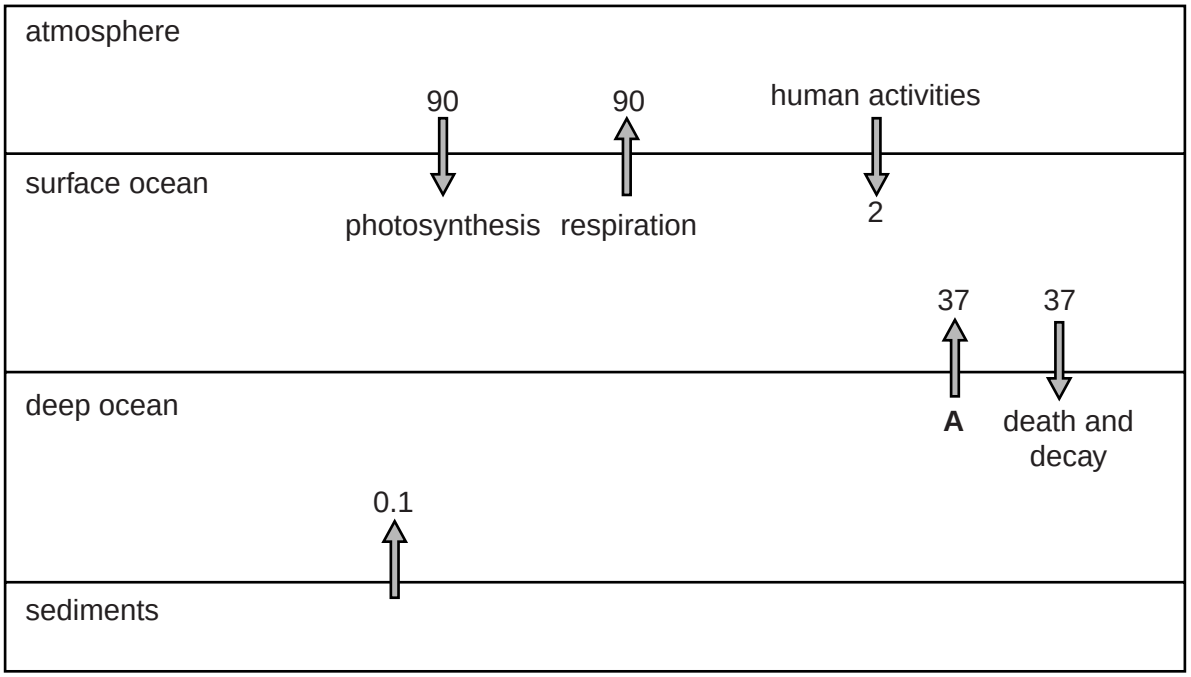

Fig. 4.1

(i) Name the form in which carbon enters the ocean from the atmosphere.

.....[1]

(ii) Suggest **one** human activity which contributes to the 2 gigatonnes of carbon added to the surface ocean each year.

.....[1]

(iii) Name process **A** shown in Fig. 4.1.

.....[1]

(iv) Suggest how the 0.1 gigatonnes of carbon are released from the ocean sediments.

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.....[1]

(v) The amount of carbon in the surface ocean stays approximately the same each year.

Explain why.

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.....[3]

(vi) The amount of carbon added to the surface ocean each year by human activities is increasing.

Suggest and explain **one** consequence of this increase.

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.....[2]

[Total: 10]

5 **(a)** Outline the theory of plate tectonics.

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(b) State **three** pieces of evidence for the theory of plate tectonics.

1 .....

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2 .....

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3 .....

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.....[3]

(c) Explain how tectonic processes can result in the formation of each of the following:

(i) underwater volcanoes .....

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.....[3]

(ii) underwater earthquakes .....

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.....[3]

[Total: 13]

6 **(a)** Outline the effects of evaporation and precipitation on the salinity of sea water.

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.....[2]

(b) Describe how salinity gradients form in water columns.

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.....[3]

(c) Fig. 6.1 shows an estuary.

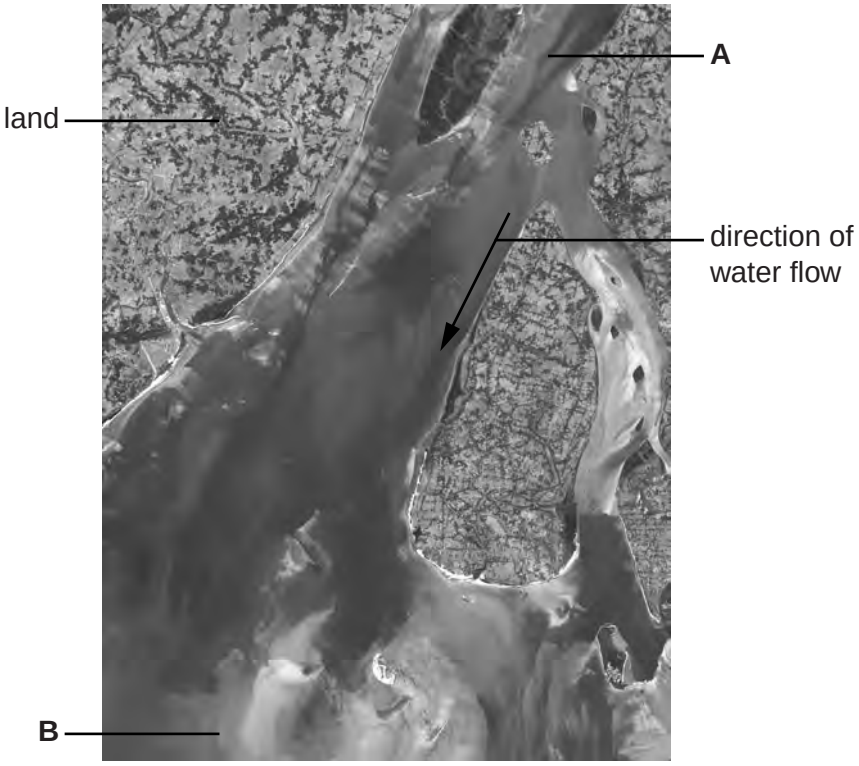
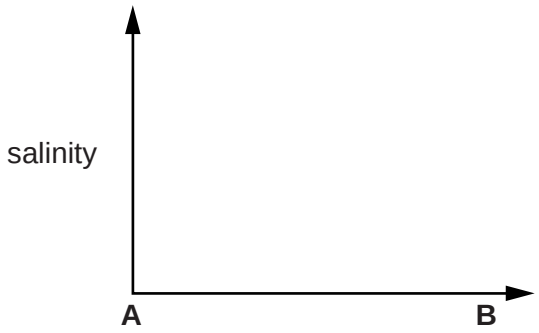


Fig. 6.1

(i) On the axes below sketch a line to show how the salinity of the water changes as it flows from point **A** to point **B**. [1]



(ii) Explain the shape of your line.

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.....[4]

[Total: 10]

7 **(a)** Describe the features of a hurricane.

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.....[4]

(b) Table 7.1 shows some data about different categories of hurricane.

Table 7.1

hurricane category	wind speed / km h^{-1}	central pressure / mbar	storm surge / m	damage level
1	119 – 153	greater than 980	1.2 – 1.5	light
2	154 – 177	965 – 979	1.8 – 2.4	moderate
3	179 – 209	945 – 964	2.7 – 3.6	extensive
4	211 – 249	920 – 944	4.0 – 5.5	extreme
5	greater than 249	less than 920	more than 5.5	catastrophic

(i) State the relationship between hurricane category and central pressure.

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.....[1]

(ii) Suggest the meaning of the term *storm surge*.

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.....[1]

(c) Suggest how hurricanes can be beneficial.

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[Total: 9]