Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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1152586236

MARINE SCIENCE **9693/11**

Paper 1 AS Structured Questions **May/June 2018**

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.
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 **16** printed pages and **4** blank pages.

DC (NH/FC) 146730/3

CAMBRIDGE International Examinations

[Turn over

1 Different species of coral can grow at different maximum depths.

Fig. 1.1 shows the percentage of coral species that can grow at different maximum depths in the Atlantic Ocean and the Indo-Pacific Ocean.

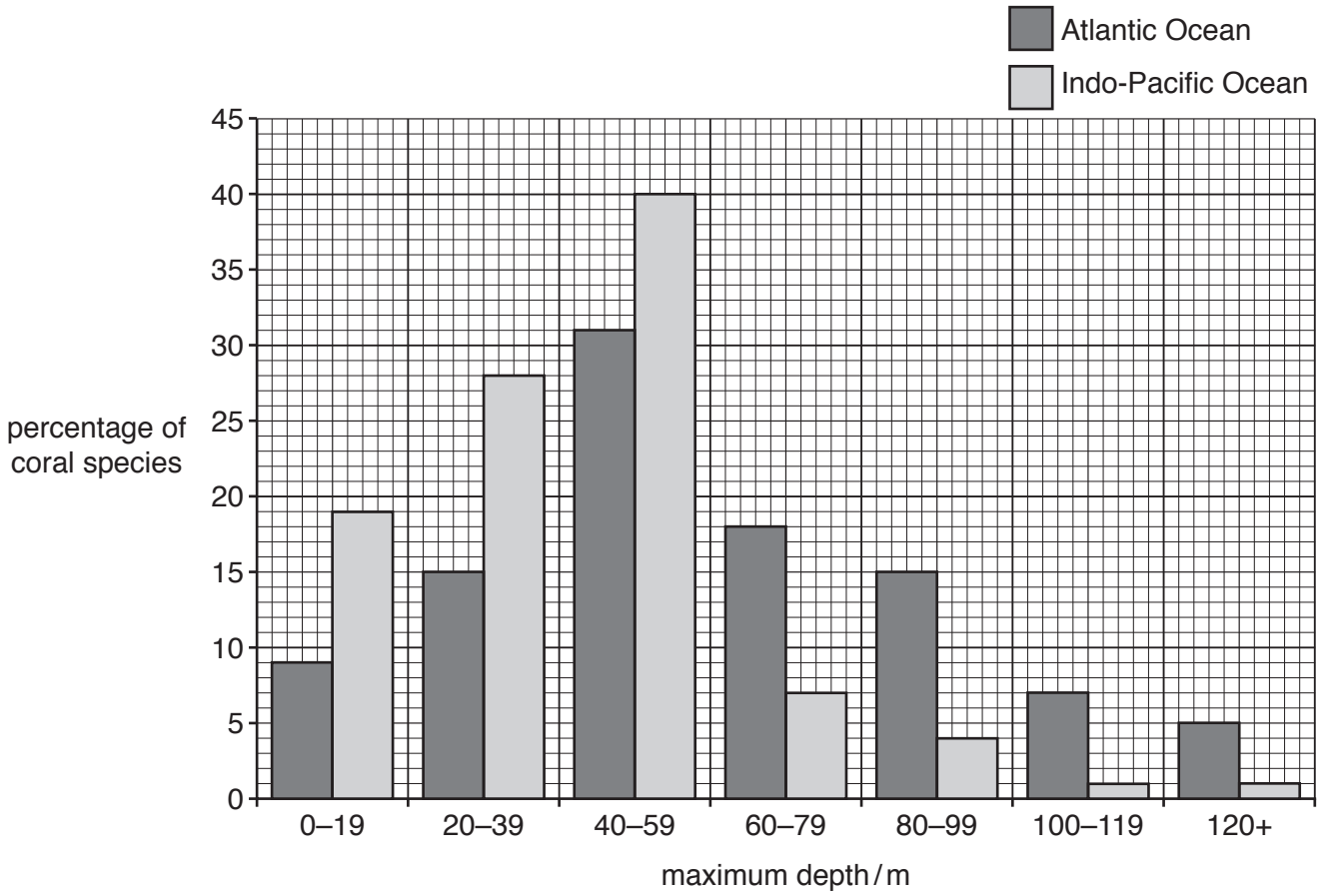

Fig. 1.1

(a) Calculate the percentage of coral species in the Indo-Pacific Ocean that can grow at a depth greater than 39 m.

.....

[1]

(b) With reference to Fig. 1.1, describe the relationship between maximum depth and the percentage of coral species growing in the Atlantic Ocean.

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.....[2]

(c) Explain why few coral species can grow at a depth greater than 120 m.

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.....[3]

(d) Coral reef drilling produces cores of material. Bands can be seen in the cores.

Explain how these bands can be used to reconstruct the history of a reef.

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.....[3]

[Total: 9]

2 (a) (i) State **three** factors required for the development of a tropical cyclone (hurricane / typhoon).

1 .....

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2 .....

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3 .....

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[3]

(ii) Describe the role of evaporation **and** condensation in the formation of a tropical cyclone.

evaporation

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.....

condensation

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[4]

(iii) Suggest how upwelling may prevent the formation of a tropical cyclone.

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.....[2]

(b) Fig. 2.1 shows how the wind speed in a tropical cyclone changes with distance from the centre of the tropical cyclone.

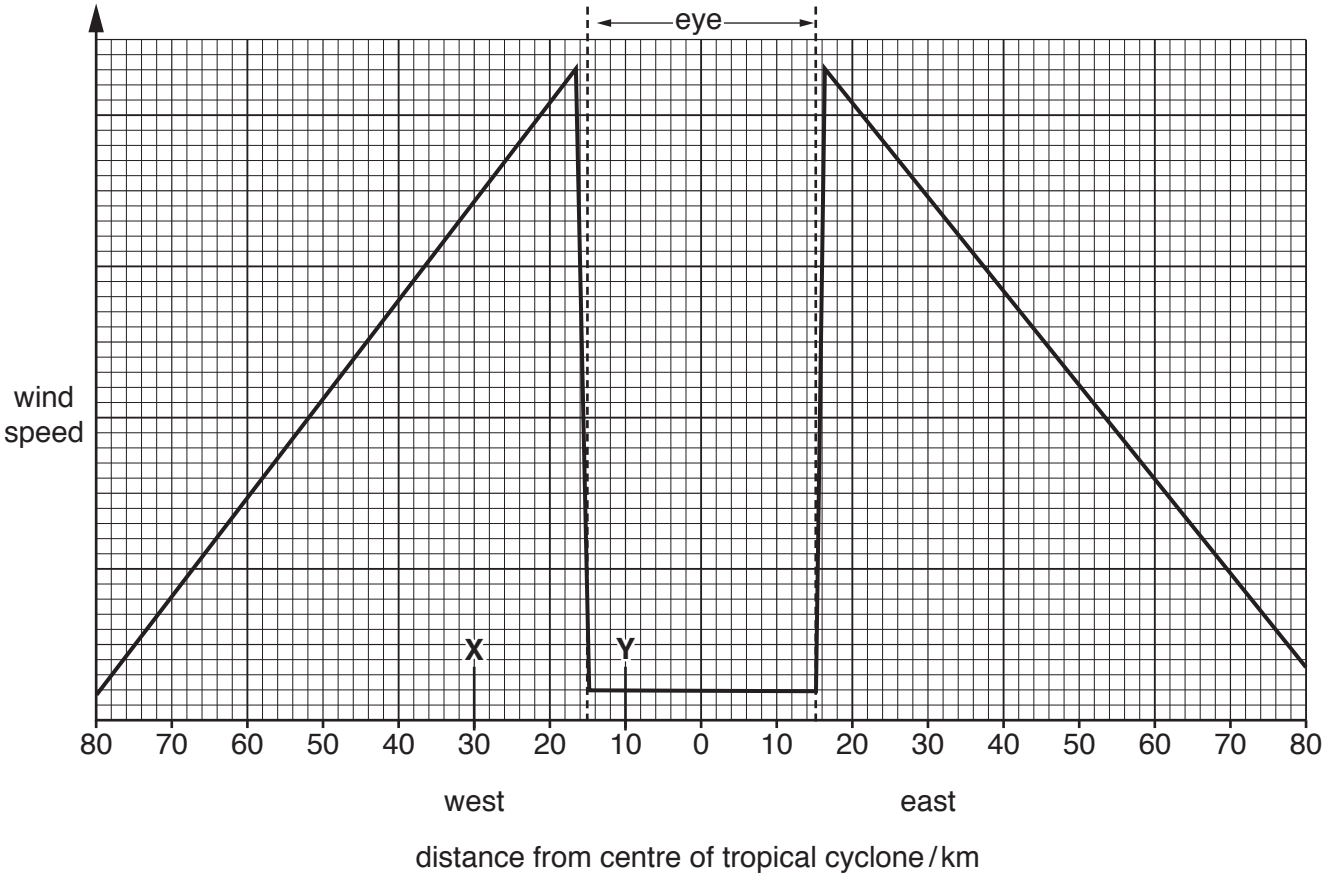

Fig. 2.1

(i) State the width of the eye of the tropical cyclone shown in Fig. 2.1. Include the unit.

.....
[2]

(ii) With reference to Fig. 2.1, suggest how the weather conditions at location **X** differ from those at location **Y**.

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.....[2]

[Total: 13]

3 Fig. 3.1 shows part of a marine food web in the Ross Sea.

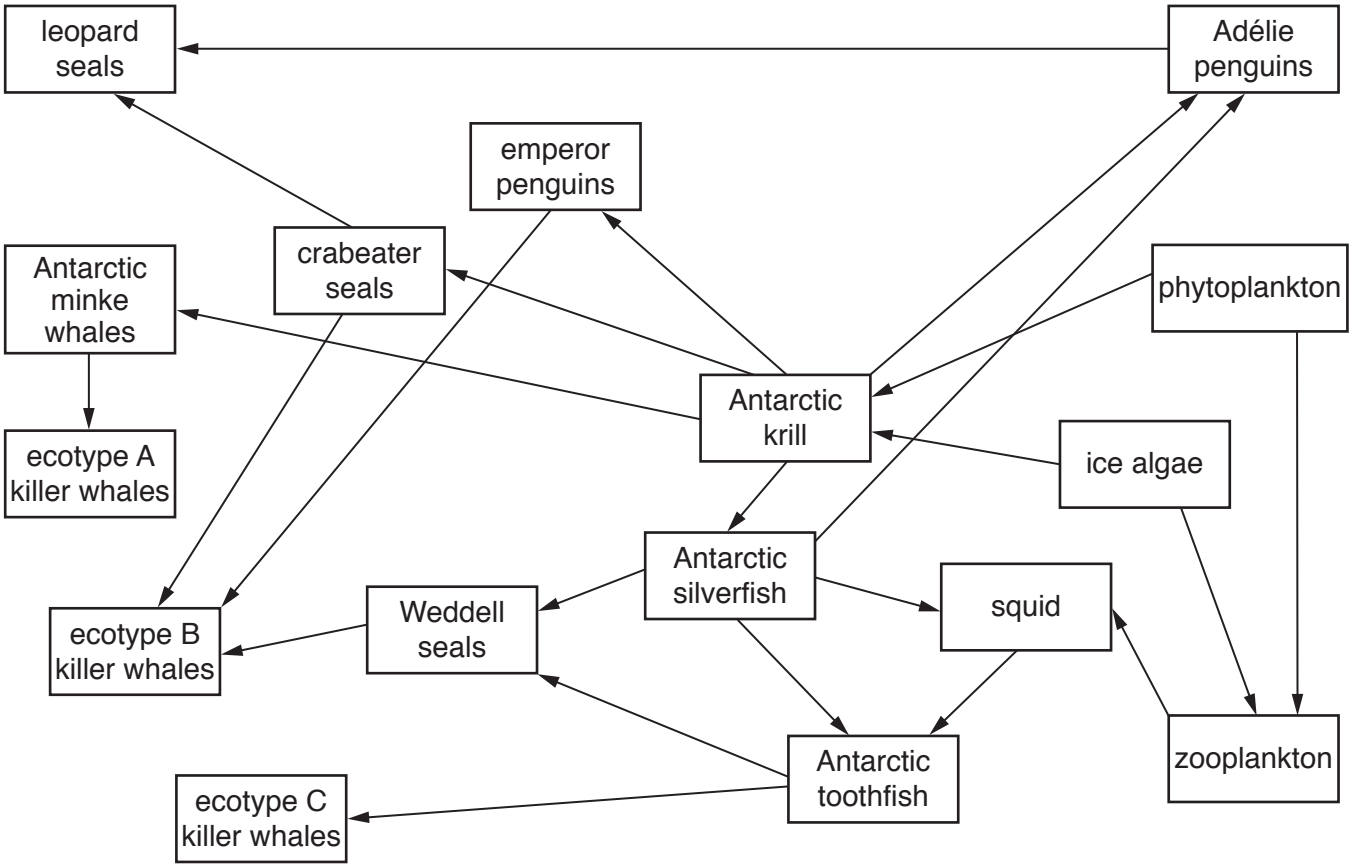

Fig. 3.1

(a) With reference to Fig. 3.1, complete Table 3.1 to show the trophic level to which each organism belongs.

Table 3.1

organism	trophic level
ice algae	
Antarctic silverfish	

[2]

(b) (i) Fig. 3.2 shows a food chain taken from Fig. 3.1.

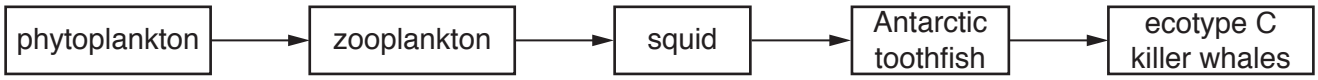

Fig. 3.2

Sketch **and** label a pyramid of energy for this food chain. Your pyramid does not have to be drawn to scale.

[3]

(ii) The food chains within Fig. 3.1 do not have more than five trophic levels.

Outline why there is a limit to the number of trophic levels that a food chain can support.

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.....[2]

(iii) Three different ecotypes of killer whale are shown in Fig. 3.1.

Suggest which ecotype of killer whale has a generalised ecological niche **and** the advantage of having a generalised niche.

ecotype .....

advantage

.....

.....

[2]

(c) Large numbers of Antarctic toothfish are harvested by humans for food.

Suggest **and** explain how this could affect the population of the Adélie penguins.

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.....[3]

(d) Antarctic krill is considered to be a keystone species in this food web.

With reference to Fig. 3.1, suggest what is meant by a *keystone species*.

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.....[2]

(e) With reference to Fig. 3.1, and your knowledge of the cycling of calcium in the marine environment, describe how calcium dissolved in sea water becomes part of the body of the Antarctic toothfish.

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.....[3]

[Total: 17]

4 **(a)** Fig. 4.1 shows aerial views of two atolls.

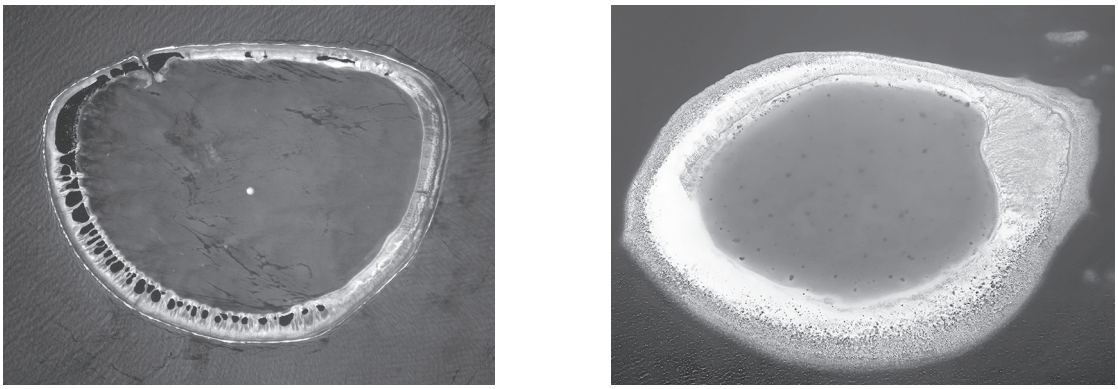

Fig. 4.1

State **two** features that these atolls have in common.

1 .....

.....

2 .....

.....

[2]

(b) According to the Darwin-Dana-Daly theory, the formation of a fringing reef is followed by the formation of a barrier reef.

(i) Explain how a fringing reef is formed.

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.....[3]

(ii) Describe how a barrier reef differs from a fringing reef.

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.....[2]

[Total: 7]

[Turn over

5 **(a)** Table 5.1 lists and describes two types of tectonic plate boundary and geological features formed at the sea bed at these boundaries.

Complete Table 5.1.

Table 5.1

type of plate boundary	description	geological feature
	two plates move away from each other	
transform or conservative		earthquakes

[3]

(b) Fig. 5.1 shows a section through the outer layers of the Earth at a plate boundary.

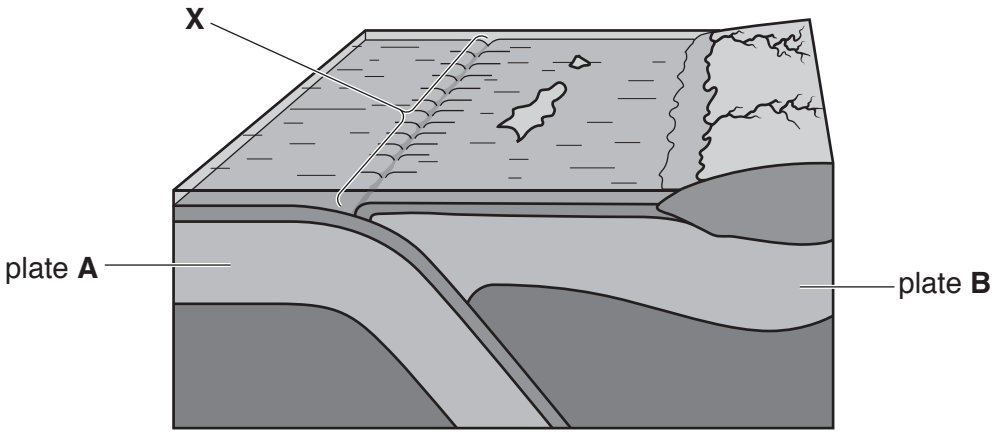

Fig. 5.1

(i) Name the geological feature labelled **X**.

.....[1]

(ii) Draw arrows on Fig. 5.1 to show the direction of movement of plate **A** and plate **B**. [1]

(iii) Describe the process shown in Fig. 5.1.

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.....[3]

[Total: 8]

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6 An algal bloom is a rapid, uncontrolled increase in the population of algae in fresh water or sea water.

Fig. 6.1 shows some of the stages in the development of an algal bloom and its effect on marine organisms.

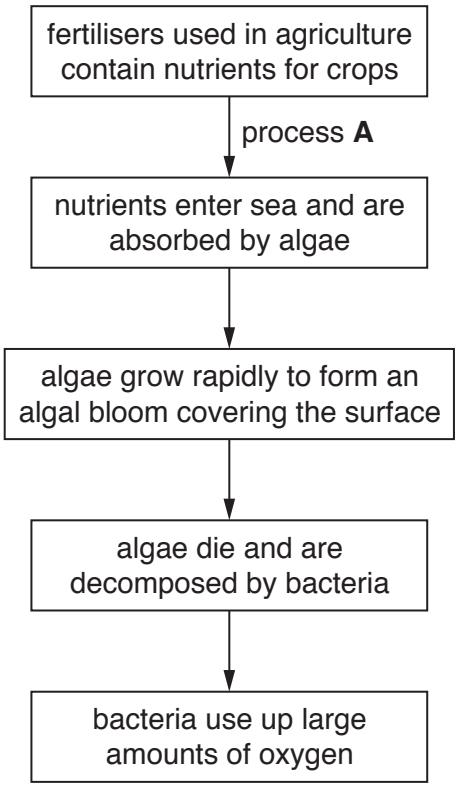

Fig. 6.1

(a) Name process **A**.

.....[1]

(b) Suggest **one** nutrient, other than calcium, present in agricultural fertilisers.

.....[1]

(c) Suggest how algal blooms cause the death of other marine organisms.

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.....[3]

(d) Use Fig. 6.1 and your own knowledge to predict how increased rainfall could affect the rate at which an algal bloom develops.

Explain your prediction.

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.....[2]

[Total: 7]

[Turn over

7 **(a)** Fig. 7.1 shows a tide pool (rock pool) on a rocky shore.

Fig. 7.1

Organisms living in pools are subjected to wave action.

Explain how wave action can be beneficial to the organisms in the tide pool.

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.....[3]

(b) Explain how the conditions that result in the formation of rocky shores differ from those that result in the formation of muddy shores.

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.....[2]

(c) Muddy shores tend to have lower biodiversity than rocky shores.

Explain why habitats with low biodiversity tend to contain wide ecological niches.

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.....[2]

[Total: 7]

8 Fig. 8.1 shows the changes in temperature, density and salinity with increasing depth of the ocean.

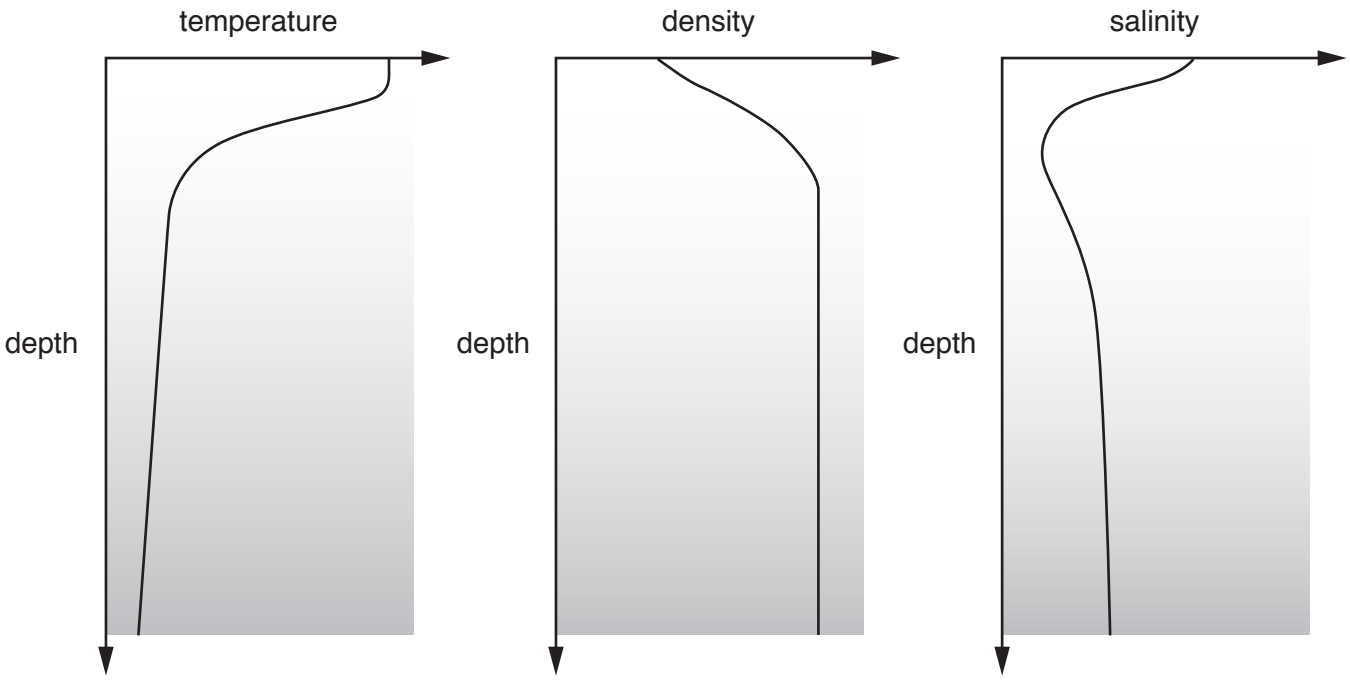

Fig. 8.1

(a) (i) State the name of the ocean layer with the largest temperature gradient.

.....[1]

(ii) Use Fig. 8.1 and your own knowledge to describe the relationships between temperature, density and salinity in the ocean.

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.....[3]

(b) Explain why oxygen concentration varies with ocean depth.

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.....[3]

[Total: 7]

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