

CANDIDATE  
NAME

CENTRE  
NUMBER

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**MARINE SCIENCE**

Paper 1 AS Structured Questions

**9693/01**

**May/June 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.

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 **14** printed pages and **2** blank pages.

1 Fig. 1.1 shows the global distribution of warm water coral reefs.

The reefs are shaded black.

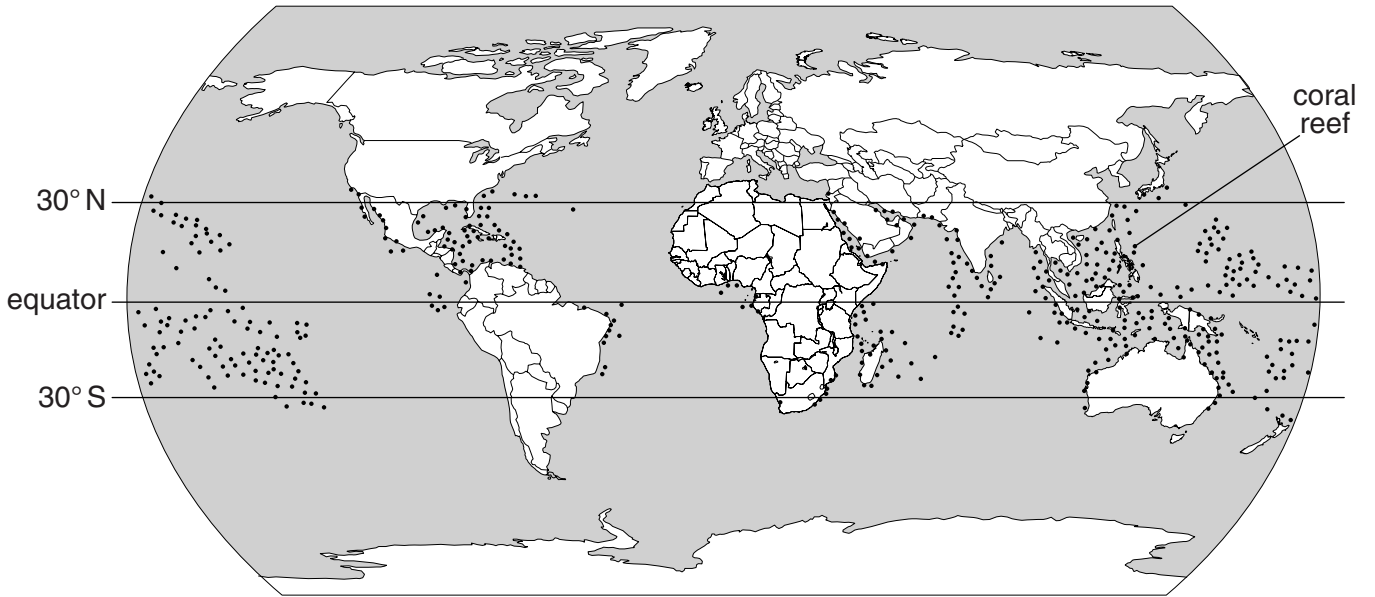


Fig. 1.1

(a) (i) With reference to Fig. 1.1, state **one** feature of the global distribution of warm water coral reefs.

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

(ii) Suggest a reason for this global distribution.

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

(b) Explain why each of the following conditions are necessary for the growth of corals.

(i) clear water .....  
.....  
.....[2]

(ii) a rocky substrate .....  
.....[1]

(c) Fig. 1.2 shows the changes in the percentage of coral cover on Caribbean coral reefs between 1970 and 2010.

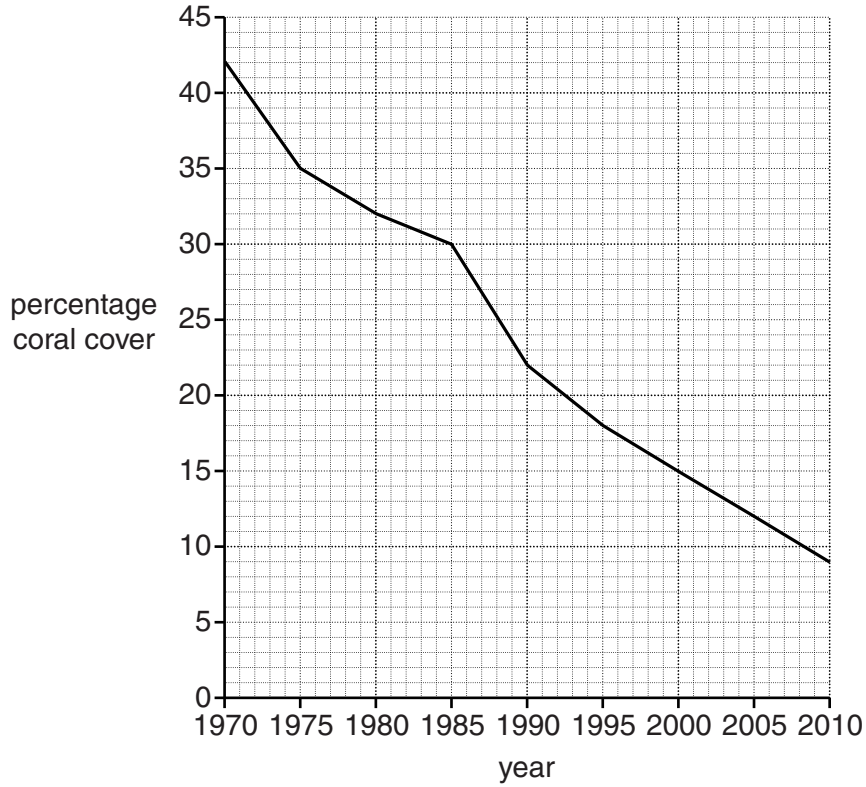


Fig. 1.2

(i) With reference to Fig. 1.2, describe the change in the coral cover between 1990 and 2010.

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

(ii) Suggest **three** reasons for the change in coral cover.

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

[Total: 9]

2 Fig. 2.1 shows part of a marine food web in the Southern Ocean.

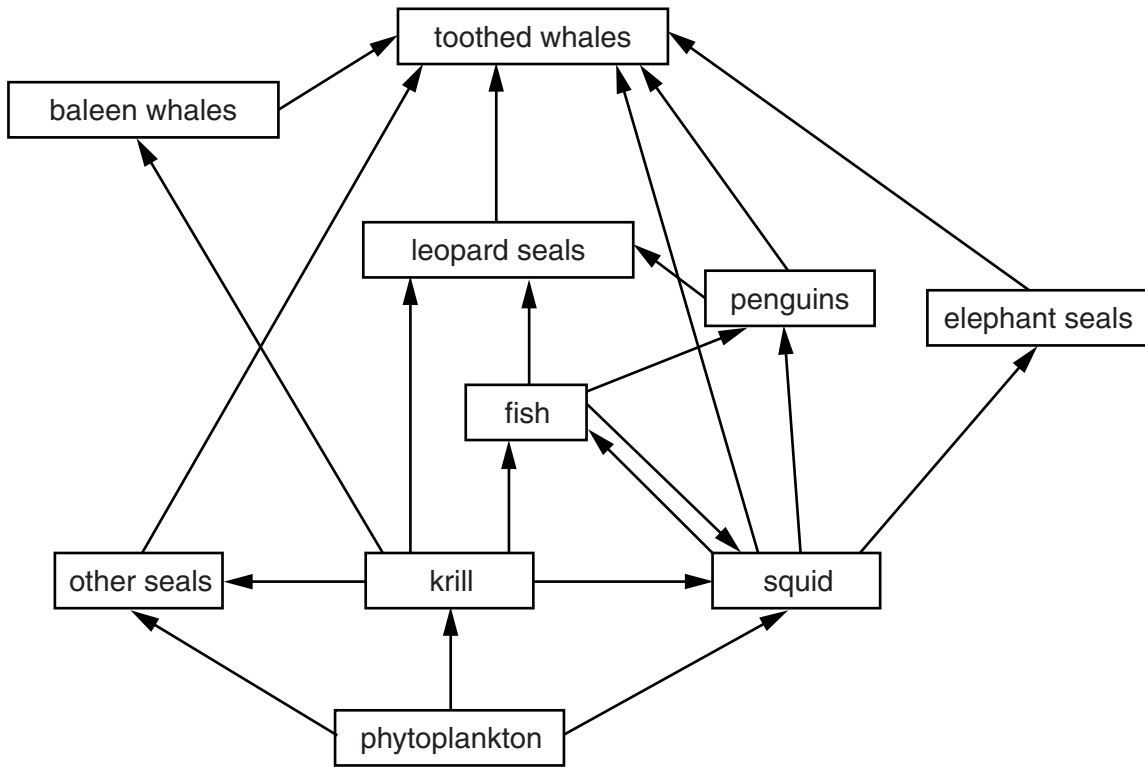


Fig. 2.1

(a) (i) Using an example from Fig. 2.1, explain what is meant by the term *trophic level*.

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

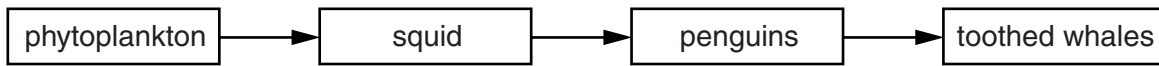
(ii) Explain what the arrows shown in Fig. 2.1 represent.

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

(iii) Suggest why there are two arrows between squid and fish.

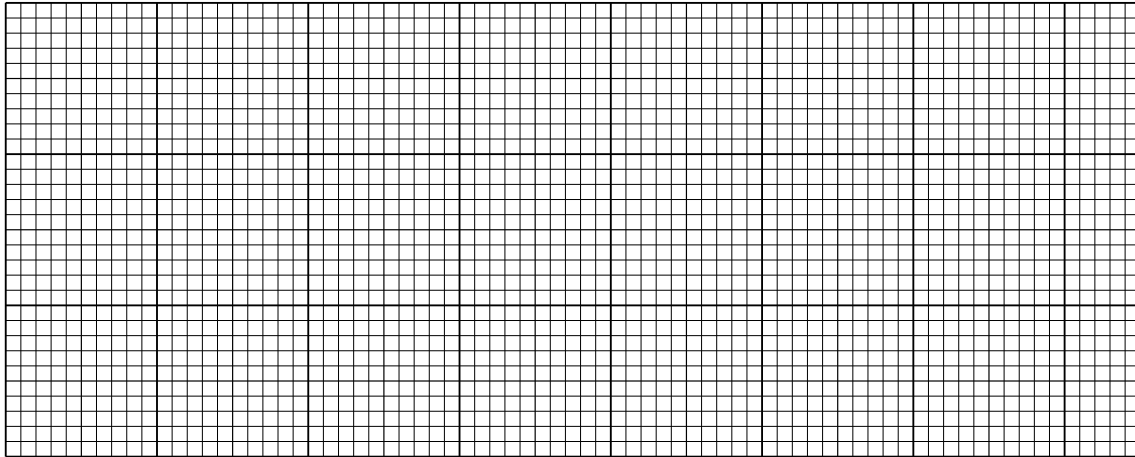
.....  
 .....  
 .....  
 ..... [2]

(iv) Fig. 2.2 shows one food chain from the Southern Ocean food web.



**Fig. 2.2**

On the grid sketch and label a pyramid of **numbers** for this food chain.



[3]

(b) (i) The process of upwelling occurs frequently in the Southern Ocean.

Describe what is meant by the term *upwelling*.

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

(ii) Suggest the possible effects of upwelling on the organisms in the food web in Fig. 2.1.

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

[Total: 15]



3 (a) With reference to named marine organisms, explain the meaning of each of the following terms.

(i) *symbiosis* .....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(ii) *parasitism* .....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(b) Tube worms such as *Tevnia* are found at hydrothermal vents. These worms do not have a digestive system.

Explain how they obtain their nutrition.  
.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

[Total: 9]

4 (a) Describe how tropical cyclones develop.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(b) Fig. 4.1 shows the air pressure at different distances from the centre of a tropical cyclone.

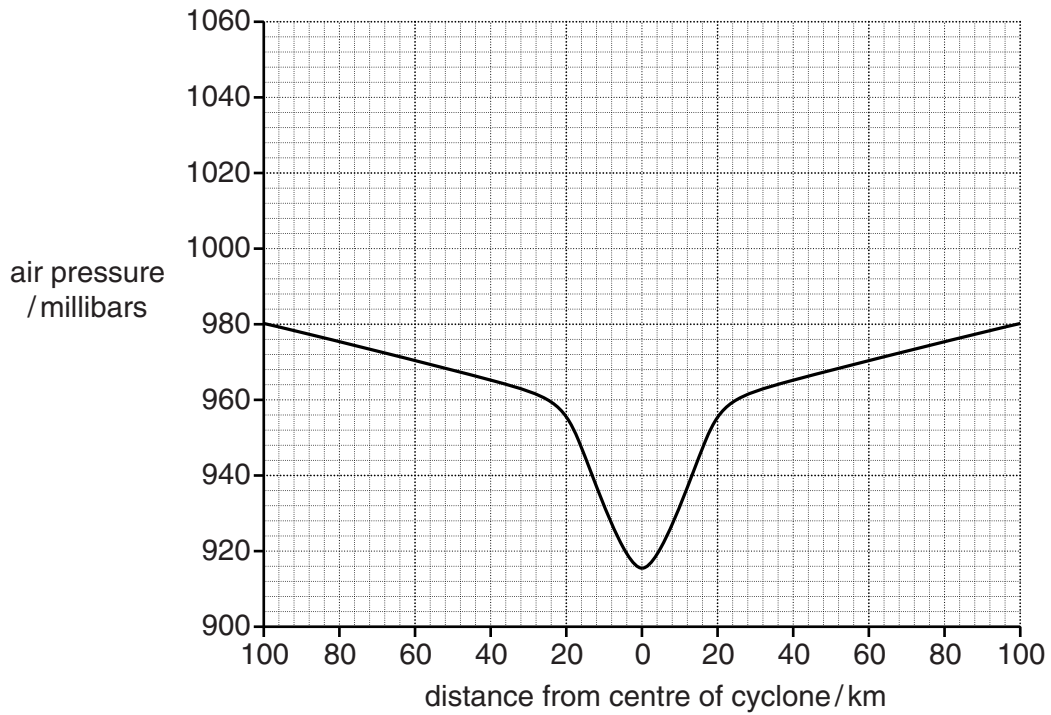


Fig. 4.1

(i) With reference to Fig. 4.1, calculate the difference between the maximum and minimum air pressure.

.....[1]



- (ii) Table 4.1 shows the wind speed at different distances from the centre of the same cyclone as in Fig. 4.1.

**Table 4.1**

distance from cyclone centre / km	wind speed / km hour <sup>-1</sup>
100	70
80	130
60	190
40	240
20	180
0	50
20	180
40	240
60	190
80	130
100	70

Plot a graph of these data on Fig. 4.1.

Use the right-hand y-axis for your scale.

[4]

- (iii) State the relationship between wind speed and distance from the centre of a cyclone.

Suggest an explanation for this relationship.

relationship .....

.....

explanation .....

.....

.....

.....[3]

**[Total: 12]**

- 5 (a) Fig. 5.1 shows the relationship between depth and water temperature in a water column in the Indian Ocean.

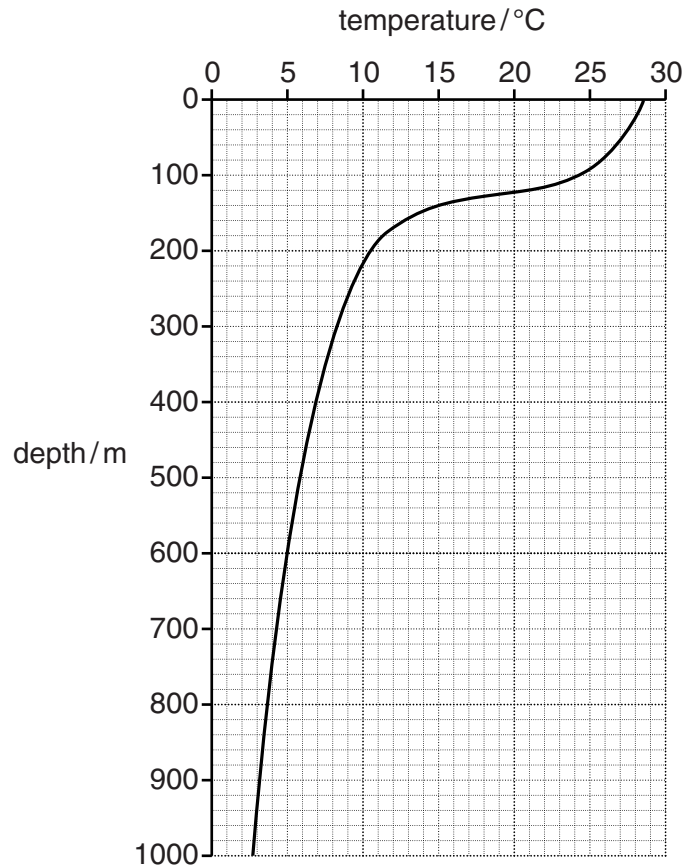


Fig. 5.1

- (i) Between 100 m and 200 m depth there is a large fall in the temperature.

State the name given to this part of the water column.

.....[1]

- (ii) On Fig. 5.1, sketch another line to show how you would expect the temperature of the water in the **Arctic Ocean** to vary. [2]

- (b) (i) The density of sea water varies with depth.  
On Fig. 5.1 label with a line and the letter **D**, the position where the sea water has the greatest density.

State a reason for your choice.

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

- (ii) State **two** factors that decrease the salinity of sea water.

1 .....  
.....

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

- (c) Explain why the dissolved oxygen concentration varies in the surface waters of the oceans.

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

[Total: 10]

6 (a) Explain why rocky shores support a greater number of species than sandy shores.

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 ..... [4]

(b) Fig. 6.1 shows part of a mangrove forest.



**Fig. 6.1**

(i) Suggest how mangroves help to reduce erosion of the coast.

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

- (ii) The world total area of mangrove forest has fallen from 18.8 million hectares in 1980 to 15.2 million hectares in 2005.

Suggest **three** reasons for this fall.

1 .....

.....

2 .....

.....

3 .....

.....[3]

**[Total: 10]**

- 7 (a) Fig. 7.1 shows the changes in the concentration of carbon dioxide in the atmosphere, the concentration of carbon dioxide in sea water and the pH of sea water from 1990 to 2010.

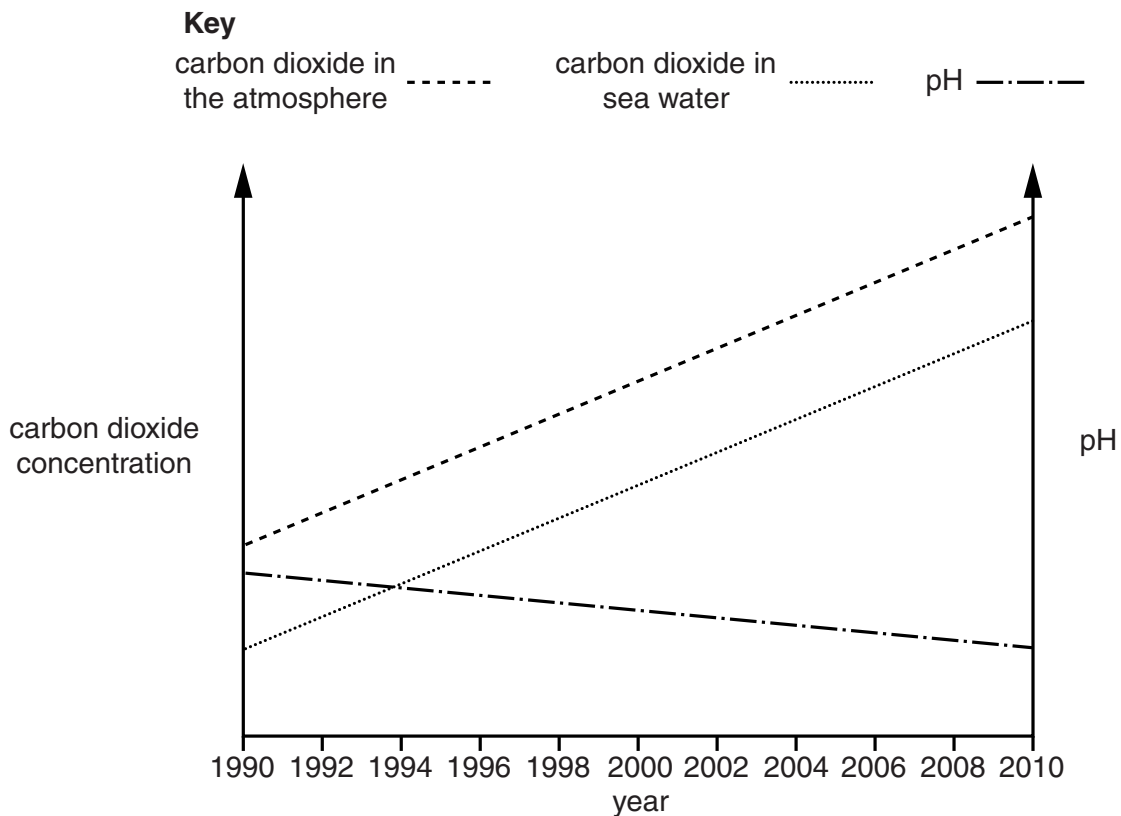


Fig. 7.1

- (i) Describe the relationship between the concentration of carbon dioxide in the atmosphere and the concentration of carbon dioxide in sea water shown in Fig. 7.1. Suggest an explanation for this relationship.

relationship .....

.....

explanation .....

.....

.....

.....[3]

(ii) State the relationship between the concentration of carbon dioxide in sea water and the pH of sea water shown in Fig. 7.1. Suggest an explanation for this relationship.

relationship .....

.....

explanation .....

.....

.....

.....[3]

(b) Calcium is present in rocks on land.

Explain how calcium from these rocks can become part of the sediment at the bottom of the ocean.

.....

.....

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.....

.....

.....

.....

.....

.....

.....[4]

**[Total: 10]**

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*Copyright Acknowledgements:*

Question 1 Figure 1.1 © NASA; <http://www.nasa.gov/>.

Question 6b Figure 6.1 © Science Photo Library Reference code C001/6128; Martin Shields;  
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