

CANDIDATE
NAME

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MARINE SCIENCE

9693/01

Paper 1 AS Structured Questions

October/November 2019

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 **17** printed pages and **3** blank pages.

Answer **all** the questions in the spaces provided.

1 Scientists studied the behaviour of fish in a shoal.

They estimated the mean distance between the individual fish in the shoal. The distance was measured in body lengths of the fish.

The scientists then simulated the presence of a predator by creating a disturbance in the water. They measured the mean distance between the fish again.

Table 1.1 shows the results.

Table 1.1

presence or absence of predator	mean distance between fish / body lengths
no predator	2.8
predator	0.9

(a) (i) Explain the meaning of the term *predator*.

.....

.....

.....

..... [2]

(ii) Calculate the decrease in the mean distance between the fish after a simulated predator was introduced.

State the unit.

..... [1]

(iii) Explain why the mean distance between the fish decreased.

.....

..... [1]

(b) When tuna are feeding, the mean distance between the tuna in the shoal decreases.

(i) Suggest the advantages of this to the tuna.

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

(ii) Suggest disadvantages of shoaling for the tuna.

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

[Total: 8]

2 (a) Fig. 2.1 is a series of diagrams showing the Darwin-Dana-Daly theory of atoll formation.

They are not in the correct order.

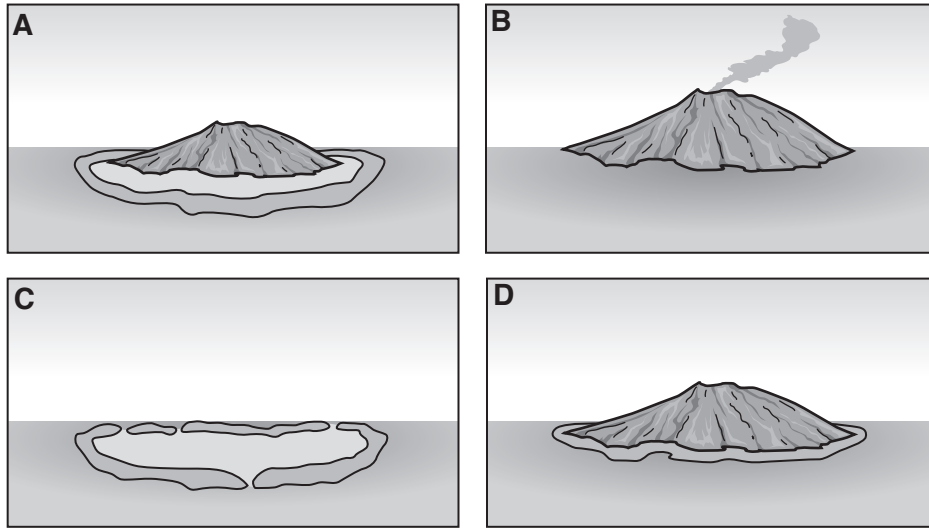


Fig. 2.1

(i) Write the letters in the correct order to show the sequence of stages in the formation of an atoll.

..... [1]

(ii) State why this explanation of atoll formation is considered to be a theory and not a hypothesis.

.....

..... [1]

(b) Fig. 2.2 is a section through one of the stages of atoll formation.

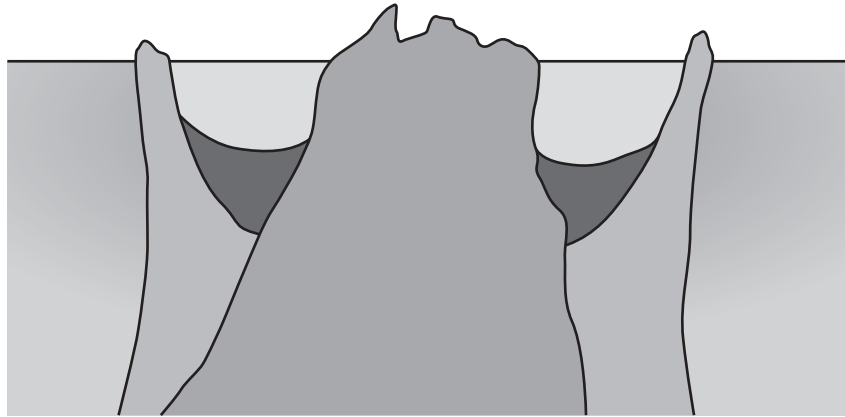


Fig. 2.2

On Fig. 2.2, use label lines to label the following structures:

- lagoon
- coral reef
- island.

[3]

(c) Many coral reefs around the world are threatened by erosion.

Outline factors that lead to coral reef erosion.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 9]

- 3 (a) El Niño occurs every three to five years and results in a change in the weather patterns in the Pacific Ocean.

Fig. 3.1 shows two maps.

Map **A** shows the normal weather and sea temperatures in the southern Pacific Ocean.

Map **B** shows the weather and sea temperatures during an El Niño event in the southern Pacific Ocean.

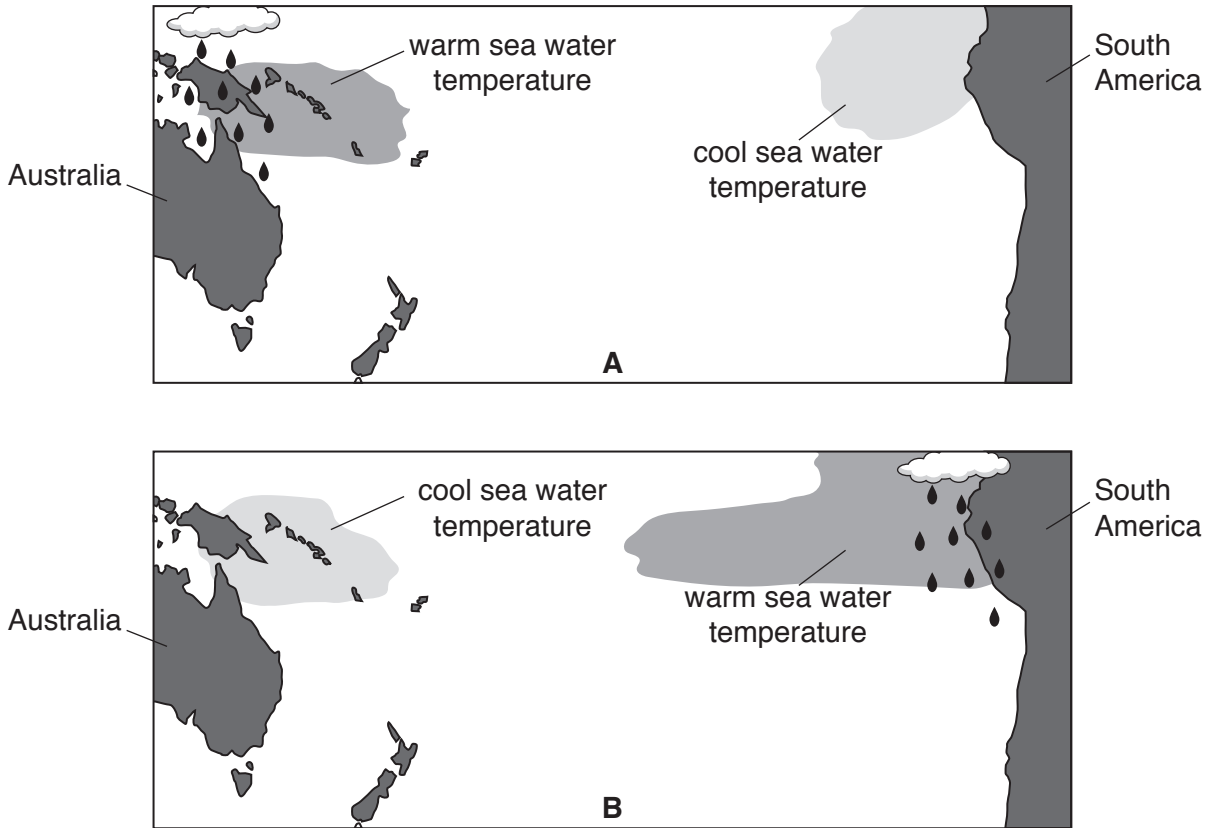


Fig. 3.1

- (i) On map **A**, draw an arrow to show the direction of the prevailing winds. [1]
- (ii) Use Fig. 3.1 to describe how the conditions differ in the southern Pacific Ocean during an El Niño event.

.....

.....

.....

..... [2]

(iii) Describe **and** explain the effects of an El Niño event on the fish populations off the western coast of South America.

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..... [4]

(b) Explain how ocean surface currents are produced.

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..... [4]

[Total: 11]

4 (a) Fig. 4.1 shows a pyramid of biomass from a marine environment.

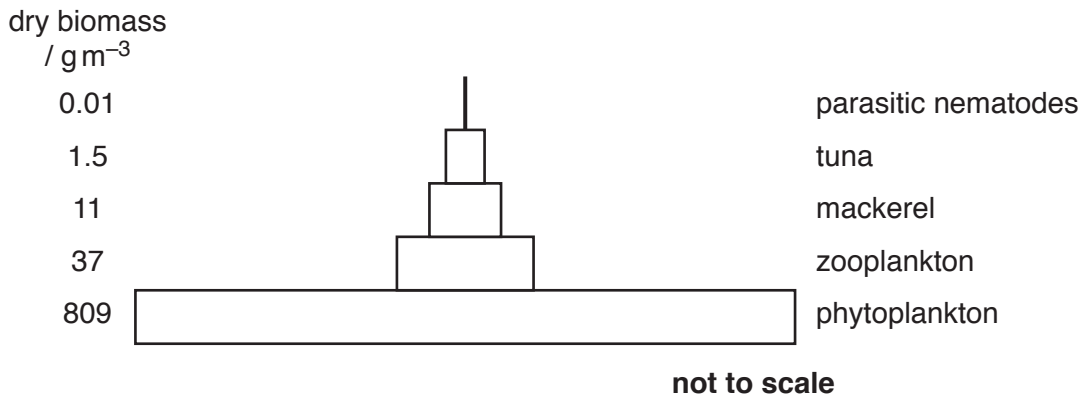


Fig. 4.1

(i) State the number of trophic levels shown in Fig. 4.1.
 [1]

(ii) Name the first consumer in this food chain.
 [1]

(iii) The data for dry biomass are an estimate.
 Suggest why scientists can only estimate the dry biomass at each trophic level.

 [2]

(iv) Use the information from Fig. 4.1 to sketch a pyramid of numbers for this food chain.

[3]

(b) State **two** ways energy is made available to food chains.

1

2

[2]

(c) State **three** reasons why energy is lost between trophic levels.

1

2

3

[3]

[Total: 12]

5 (a) Table 5.1 shows the mean density of different parts of the Earth.

Table 5.1

mean density / g cm ⁻³	name of the part of the Earth
2.4	
2.7 to 2.9	
3.0 to 3.3	
3.4 to 5.6	

(i) Use the information in Table 5.1 and the principles of isostasy to identify which row in the table represents the following parts of the Earth:

- continental crust
- mantle
- oceanic crust
- sediments on the continental shelf.

Write your answers in Table 5.1. [3]

(ii) Use the units for density shown in Table 5.1 to suggest how density is calculated.

.....
 [1]

(b) Environmental factors determine the type of shore that forms in the littoral zone, for example in estuaries.

(i) Explain what is meant by the term *estuary*.

.....

 [2]

(ii) Explain why muddy shores often form in estuaries.

.....

.....

.....

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.....

.....

..... [3]

[Total: 9]

6 (a) Fig. 6.1 shows how the salinity and temperature of sea water change with depth.

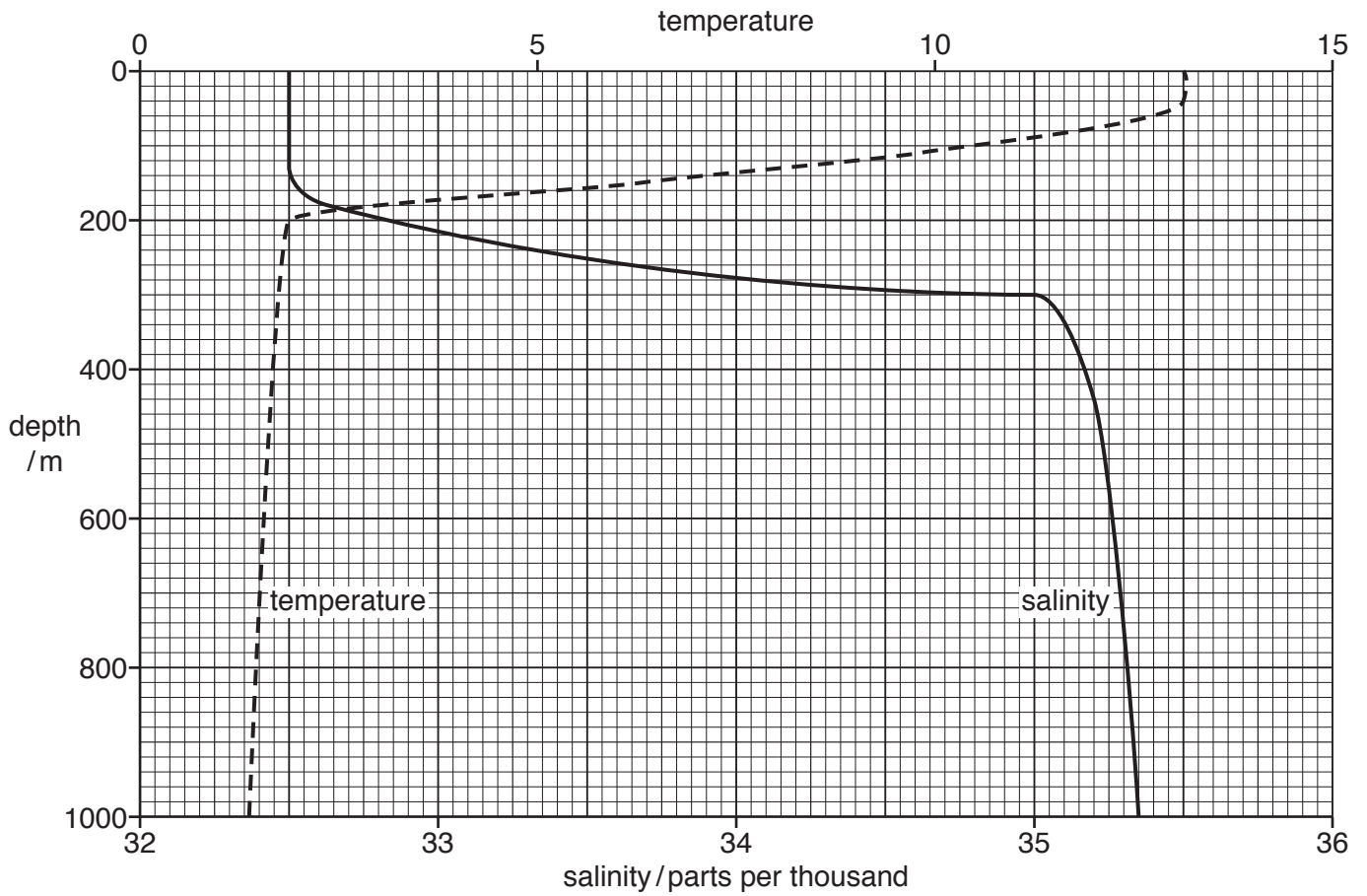


Fig. 6.1

(i) State the unit for temperature that is missing from Fig. 6.1.

..... [1]

(ii) Describe the general trends in salinity and temperature as depth increases, shown in Fig. 6.1.

salinity

.....

temperature

.....

[2]

(iii) Use Fig. 6.1 to estimate the depth range of the thermocline.

..... to m [2]

(b) State **three** factors, other than depth, that affect the salinity of sea water.

1

2

3

[3]

[Total: 8]

7 (a) Fig. 7.1 is a diagram showing part of the carbon cycle in the marine environment.

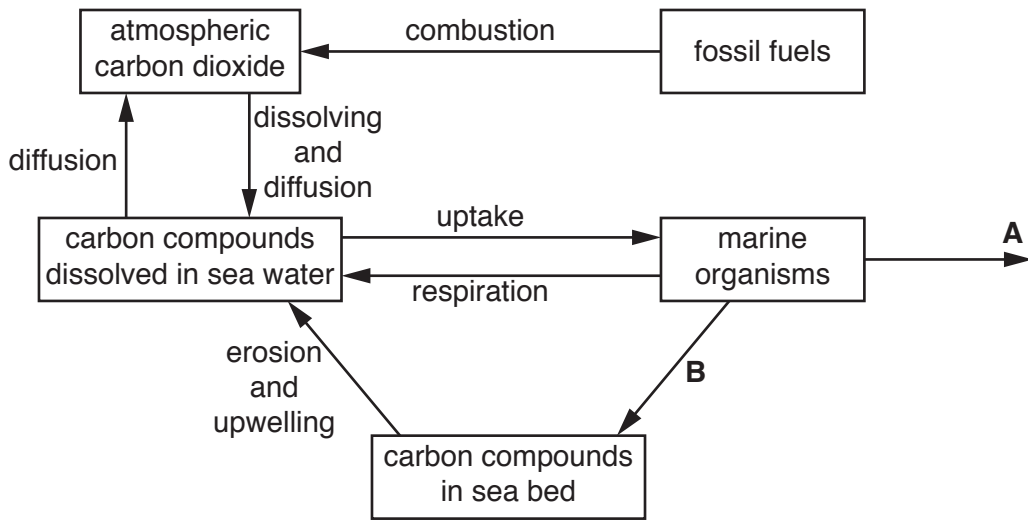


Fig. 7.1

(i) State the process occurring at **A**.

..... [1]

(ii) Describe the processes occurring at **B**.

.....

 [3]

(b) Carbon dioxide is needed for photosynthesis.

Explain how a decrease in atmospheric carbon dioxide could affect productivity in the oceans.

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..... [4]

[Total: 8]

8 A coral reef is an example of a non-extreme environment with high biodiversity.

It is a complex ecosystem.

Fig. 8.1 shows a coral reef.



Fig. 8.1

(a) Explain the meaning of the term *ecosystem*.

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

(b) Explain why sand on a reef slope is an environment that has low biodiversity.

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

(c) Extreme environments also have low biodiversity.

State **one** example of an extreme marine environment.

..... [1]

(d) Explain, using a named example, why organisms living in the open ocean usually occupy generalised ecological niches.

example

.....

.....

.....

.....

[3]

[Total: 10]

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