



Cambridge International AS & A Level

CANDIDATE
NAME

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MARINE SCIENCE

9693/13

Paper 1 AS Level Theory

May/June 2026

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages. Any blank pages are indicated.

Section A

Answer **all** questions in this section.

- 1 (a) Figure 1.1 is a diagram of a marine food web.

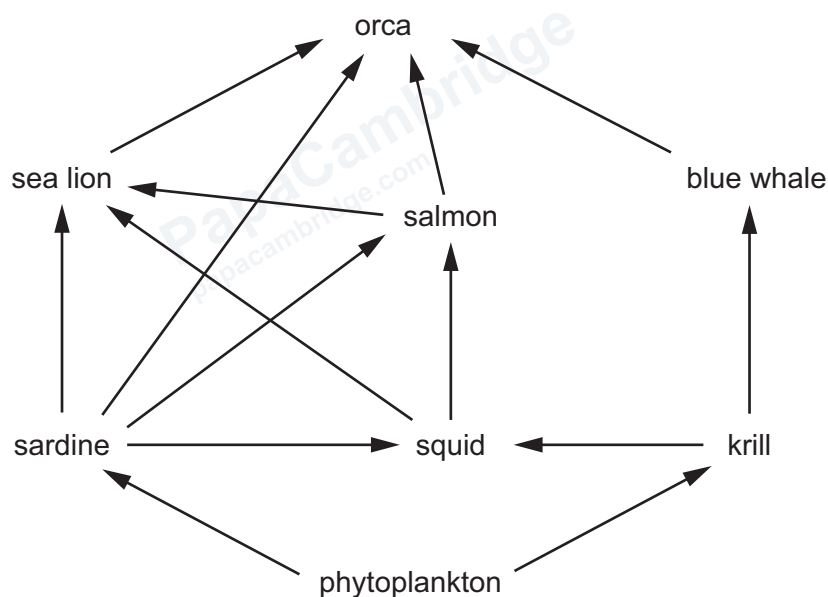


Figure 1.1

- (i) Identify the number of organisms shown in Figure 1.1 that occupy trophic level 2.

..... [1]

- (ii) Table 1.1 shows the feeding relationship terms for some of the organisms in Figure 1.1.

Complete Table 1.1 by placing ticks (✓) to show the terms that can be used to describe each organism.

Some organisms can be described using more than one term.

Table 1.1

organism	prey	secondary consumer	quaternary consumer
orca			
salmon			
sardine			
squid			

[4]

(b) Phytoplankton produce glucose.

Explain how the production of glucose affects productivity.

.....

.....

.....

.....

.....

..... [3]

(c) Describe the bonding within a glucose molecule.

.....

.....

.....

..... [2]

(d) Glucose molecules can form new substances.

Name **two** larger molecules composed only of glucose.

1

2 [2]

[Total: 12]

- 2 La Niña is one event in the El Niño Southern Oscillation (ENSO).

Figure 2.1 shows the Pacific Ocean and the continents surrounding it.

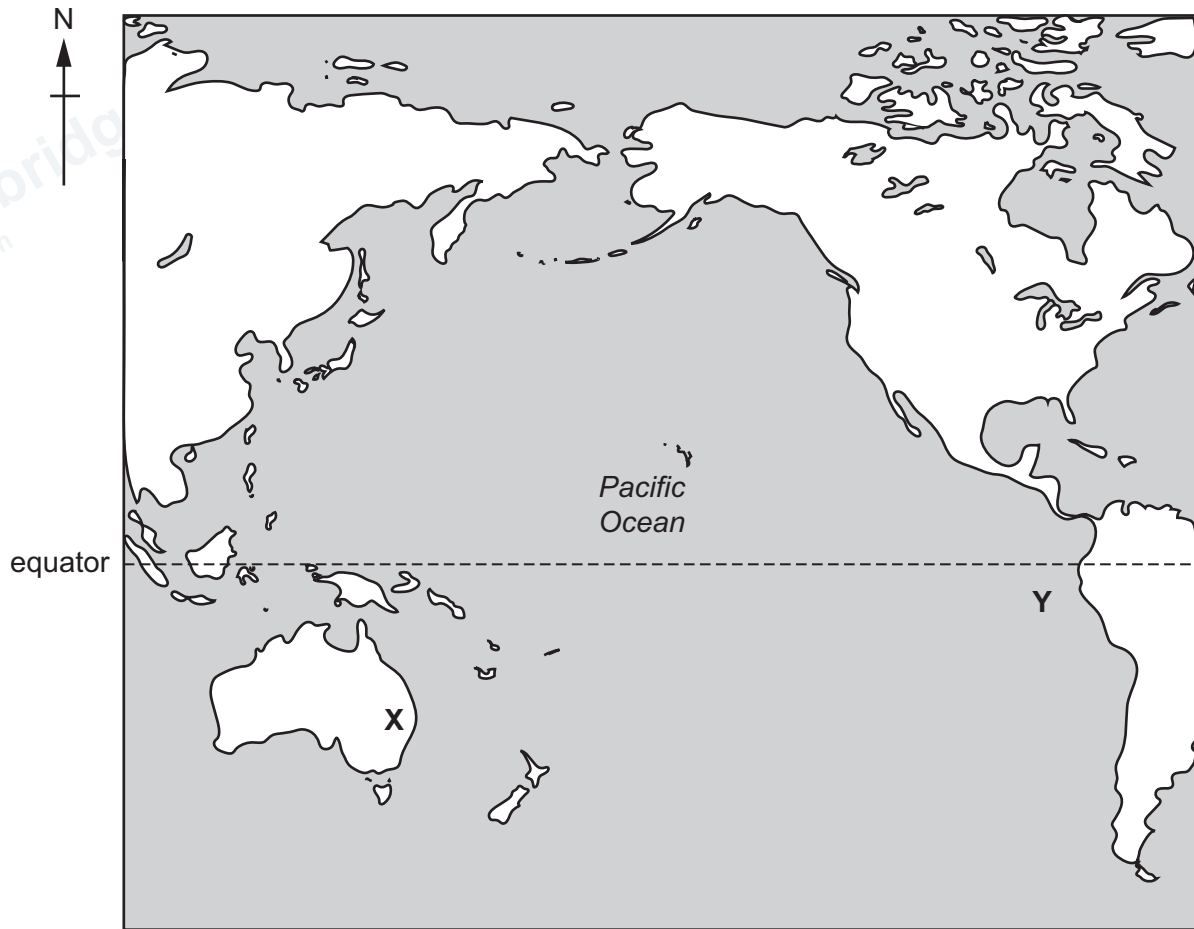


Figure 2.1

- (a) Describe the weather conditions at **X** in Figure 2.1 during a La Niña event.

.....

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..... [3]

(b) Explain the sea surface conditions at Y in Figure 2.1 during a La Niña event.

.....

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..... [4]

[Total: 7]

- 3 Figure 3.1 is a photograph of a species of coral.

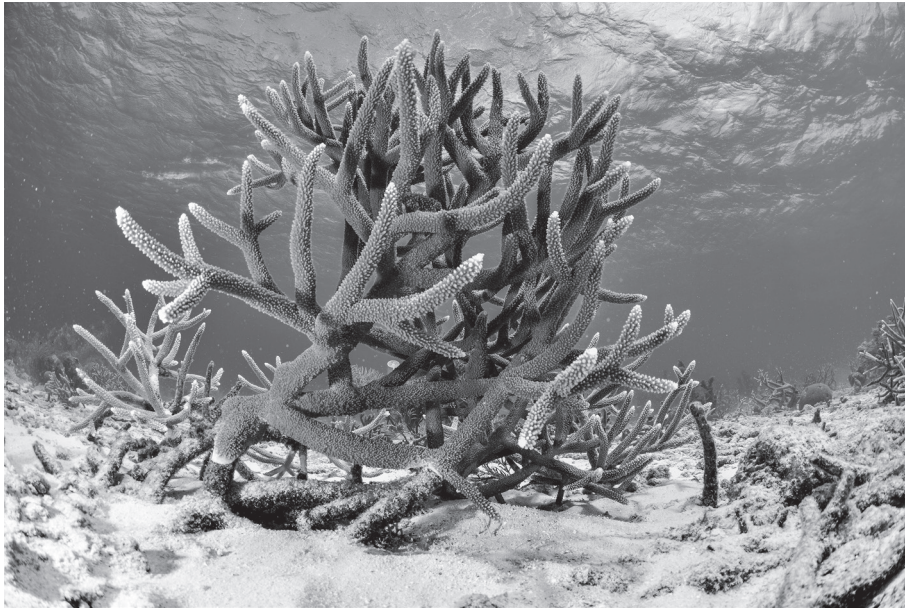


Figure 3.1

- (a) Describe what is meant by the term species.

.....

.....

.....

..... [2]

- (b) The species of coral in Figure 3.1 can form a coral reef.

Identify the type of coral shown in Figure 3.1.

..... [1]

- (c) State the phylum of coral.

..... [1]



(d) Describe the symbiotic relationship between coral and zooxanthellae.

.....

.....

.....

.....

.....

..... [3]

(e) State **two** abiotic factors that cause coral reef erosion.

1

2 [2]

(f) Artificial reefs can be introduced where reef erosion has occurred.

Describe the reasons for the use of artificial reefs.

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..... [4]

[Total: 13]

4 (a) Figure 4.1 is a diagram of an atom.

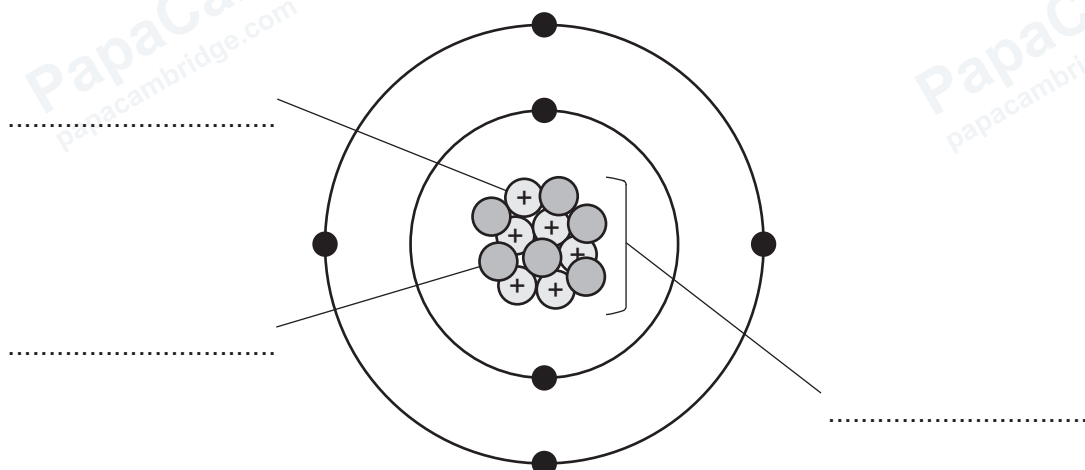


Figure 4.1

On Figure 4.1, complete the labels for the parts of an atom.

[1]

(b) Sodium chloride is an ionic compound.

Figure 4.2 is an incomplete diagram of a sodium ion and a chloride ion.

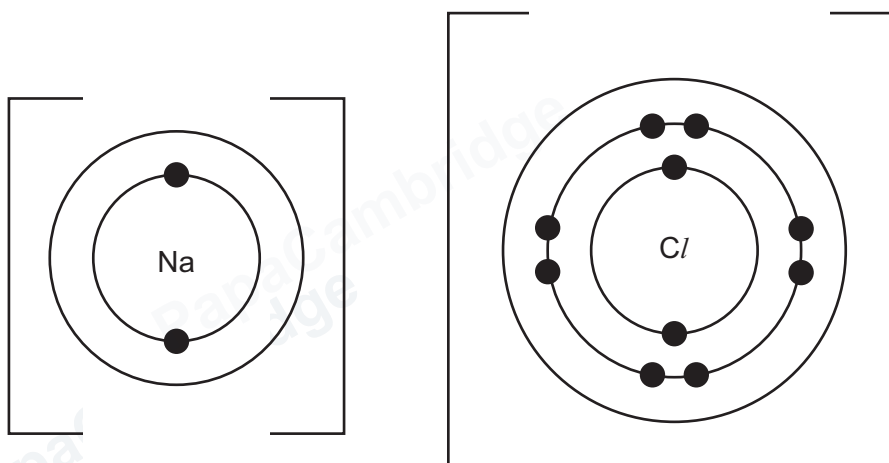


Figure 4.2

Complete Figure 4.2 to show the electrons in the outer shell in each ion **and** the charge on each ion.

[3]

- (c) Calcium carbonate is another important molecule in the marine environment.

State the chemical formula of calcium carbonate.

..... [1]

- (d) A student added two different masses of sodium chloride to two beakers of water.

- solution **A**: 5 g of sodium chloride dissolved in 250 cm^3 of water
- solution **B**: 10 g of sodium chloride dissolved in 250 cm^3 of water.

Explain how the change in mass of sodium chloride dissolved affects the density of the resulting solution.

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

[Total: 7]

- 5 Figure 5.1 shows the changes to nitrate ion concentration at increasing depth in the open ocean.

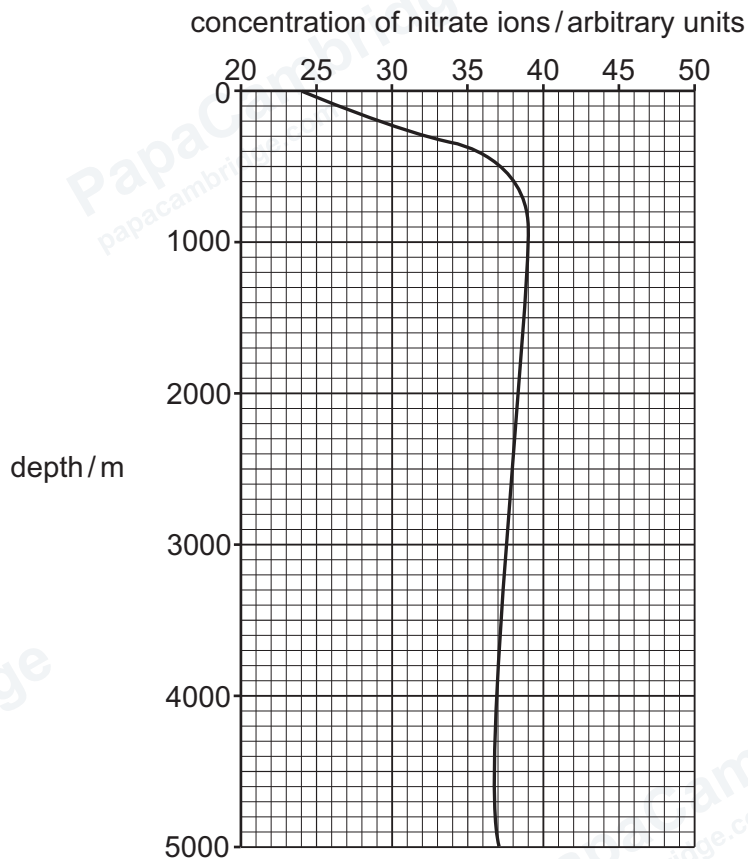


Figure 5.1

- (a) Use Figure 5.1 to calculate the percentage increase in the concentration of nitrate ions between the minimum and maximum concentrations.

..... % [2]

- (b) State **two** ways the nitrate ions at 0 m are replenished.

1

2

[2]

(c) State **one** reason why nitrate ions are found at a depth of 5000 m.

[1]

(d) Nitrate ions contain nitrogen.

Describe why nitrogen is required for photosynthesis to occur.

[1]

[Total: 6]



Answer **all** questions in this section.

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[9]

[9]



- 7 Describe how weathering, erosion and sedimentation processes affect the morphology of rocky shores **and** muddy shores.

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[8]





- 8 (a) Compare the differences in the internal **and** external features of cartilaginous fish **and** bony fish.

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..... [5]





(b) Discuss the ecological **and** economic importance of cartilaginous fish.

[8]

[Total: 13]





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