



Cambridge International AS & A Level

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MARINE SCIENCE**9693/13**

Paper 1 AS Level Theory

October/November 2025**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 or correction fluid.
- 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 Fig. 1.1 shows diagrams of some of the substances found in sea water.

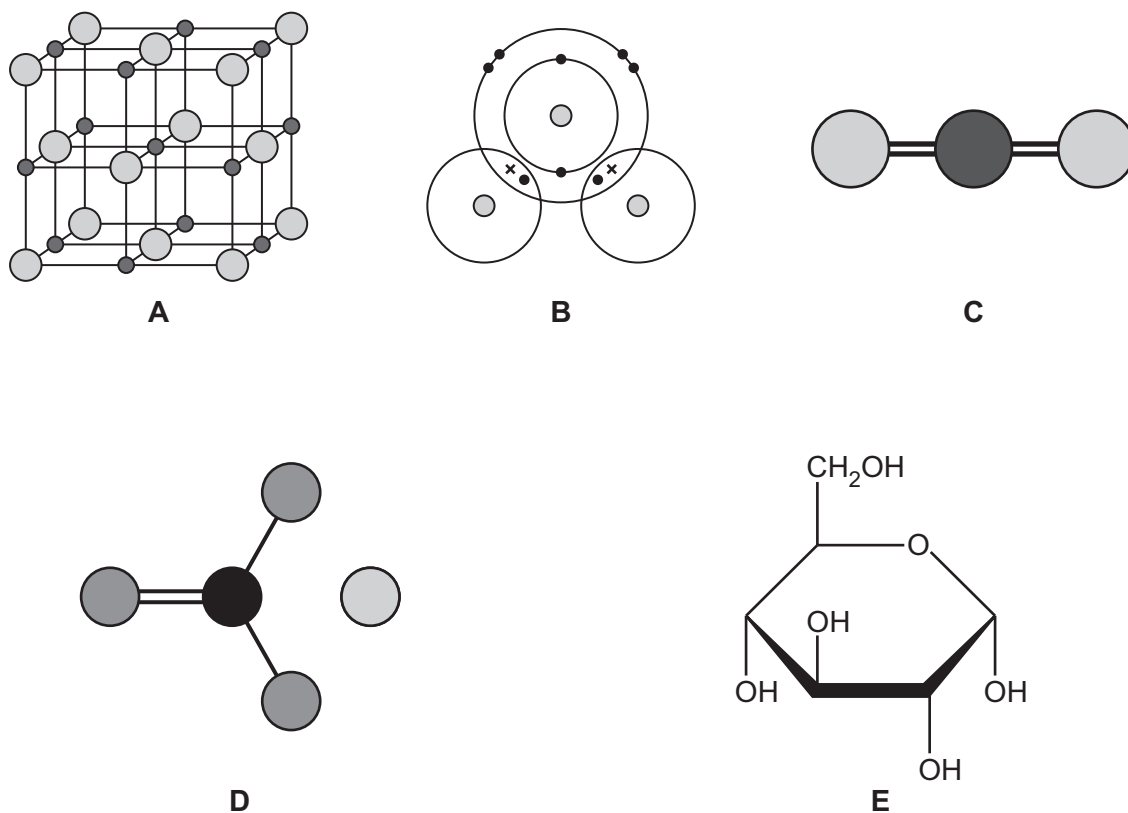


Fig. 1.1

- (a) State the letters from Fig. 1.1 that identify the substance or substances that:

are products of respiration **and**

are salts **and**

can form hydrogen bonds

has the formula CaCO_3

is a product of photosynthesis.

[5]

- (b) Describe the evidence from Fig. 1.1 which shows that substance **B** has covalent bonds.

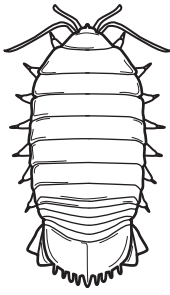
.....
 [1]

[Total: 6]

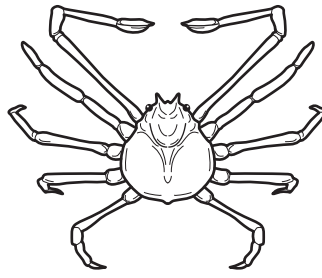




2 (a) Fig. 2.1 shows some drawings of different species of crustacean.



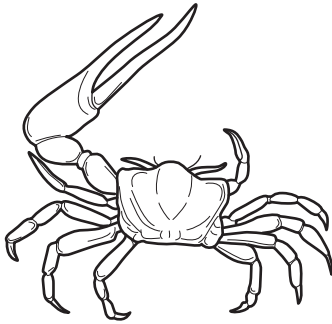
A



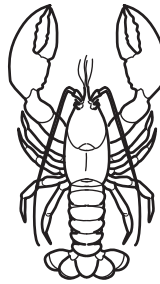
B



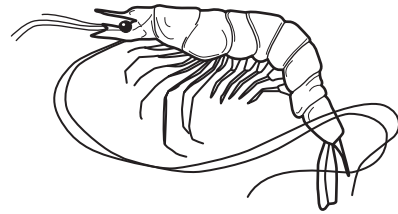
C



D



E



F

NOT TO SCALE

Fig. 2.1





Fig. 2.2 is a dichotomous key. This dichotomous key can be used to identify the different species of crustacean in Fig. 2.1.

Species **F** has been identified.

Complete Fig. 2.2 with the correct letter for each species.

			Letter
1	more than ten legs visible	go to 2	
	ten or fewer legs visible	go to 3	
2	one pair of antennae longer than the length of its body	<i>Penaeus monodon</i>	F
	antennae shorter than the length of its body	<i>Bathynomus giganteus</i>	
3	a visible tail-like structure	go to 4	
	no visible tail-like structure	go to 5	
4	visible claws	<i>Homarus gammarus</i>	
	no visible claws	<i>Alacia hettacra</i>	
5	claws of the same size	<i>Macrocheira kaempferi</i>	
	claws of different sizes	<i>Minuca pugnax</i>	

[3]

Fig. 2.2

(b) State **three** features that are typical of an adult crustacean.

- 1
- 2
- 3.....

[3]

[Total: 6]



- 3 (a) Fig. 3.1 shows the view from the side and the view from above of three different types of coral reef, **A**, **B** and **C**.

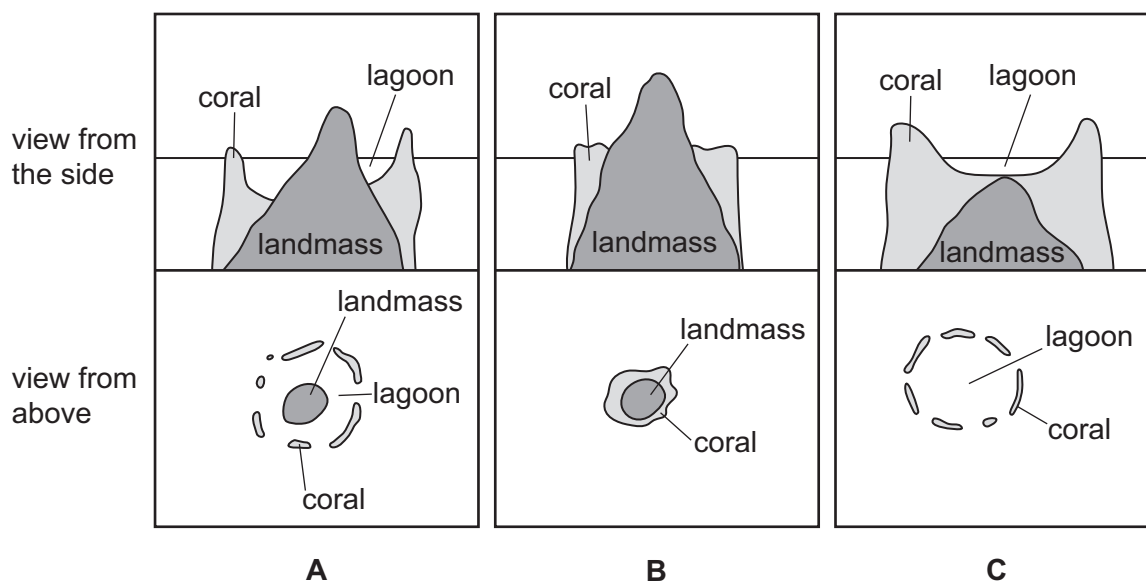


Fig. 3.1

Identify the types of coral reef shown in Fig. 3.1.

- A**
- B**
- C**

[3]



(b) Fig. 3.2 is a diagram of a coral polyp.

(i) On Fig. 3.2 label the:

- mouth
- stomach
- basal plate.

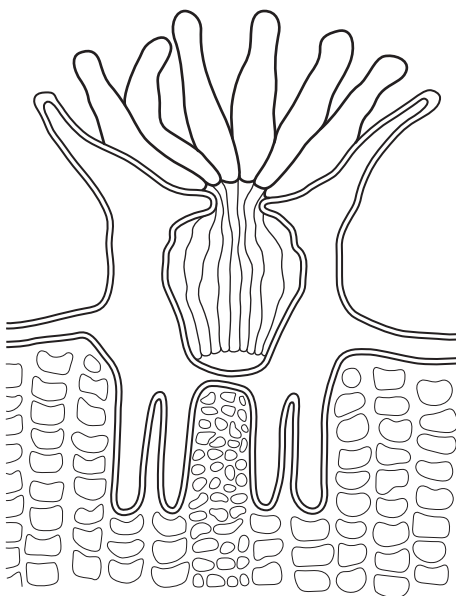


Fig. 3.2

[3]

(ii) Describe the function of nematocysts.

.....
 [1]

(c) State **three** causes of coral reef erosion.

1

 2

 3
 [3]

[Total: 10]



- 4 (a) Fig. 4.1 shows a pyramid of energy for a marine food chain.

The energy at each level is shown in arbitrary units (a.u.).

The pyramid of energy is **not** to scale.

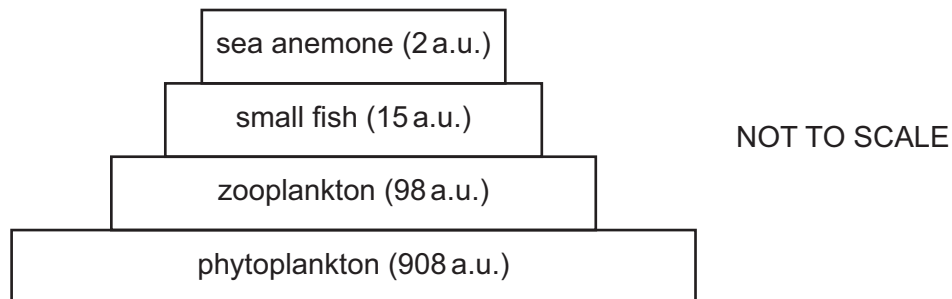


Fig. 4.1

- (i) Identify the tertiary consumer in Fig. 4.1.

..... [1]

- (ii) Calculate the percentage decrease in energy between trophic levels 2 and 3 in Fig. 4.1.

..... % [2]

- (iii) State **three** ways energy is lost between trophic levels 3 and 4 in Fig. 4.1.

- 1
- 2
- 3 [3]



- (b) Consumers gain essential elements from the organisms they eat.

Complete Table 4.1 by ticking (✓) the boxes to show **all** the essential elements that are found in each biological molecule.

Table 4.1

essential elements	biological molecule		
	chlorophyll	protein	DNA
nitrogen			
magnesium			
phosphorus			

[3]

[Total: 9]

- 5 Rocky shores are an example of a habitat found in the littoral zone and have high levels of biodiversity.

- (a) Define the term littoral zone.

.....
 [1]

- (b) State the **three** levels of biodiversity.

1
 2
 3 [3]

- (c) Outline the beneficial role of marine organisms in terms of climate control.

.....

 [3]

[Total: 7]



- 6 Fig. 6.1 is a diagram showing the direction of movement of some tectonic plates.

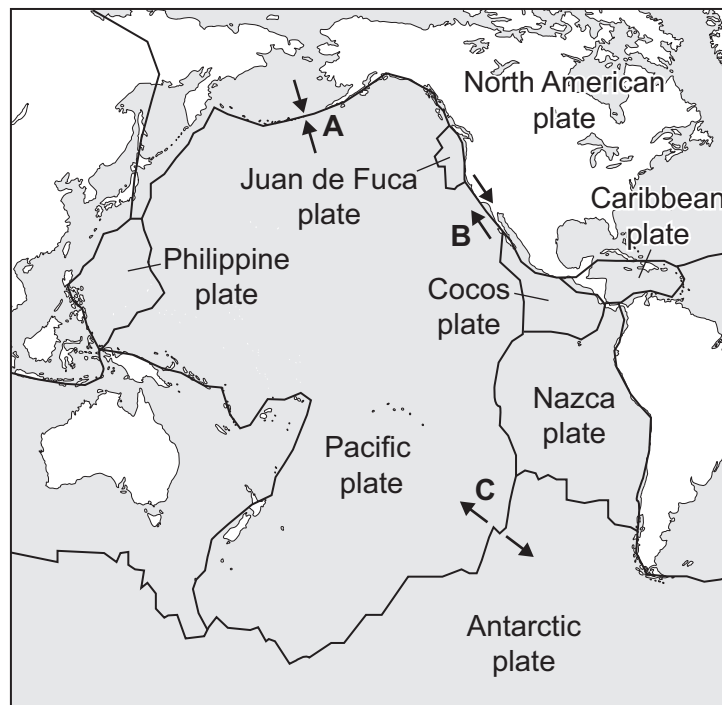


Fig. 6.1

- (a) Identify the type of plate boundary labelled **A** and the type of plate boundary labelled **B** in Fig. 6.1.

A

B [2]

- (b) State **one** feature that forms on the ocean floor at the plate boundary labelled **C** in Fig. 6.1.

..... [1]





(c) Explain how tsunamis form at the plate boundary labelled **A** in Fig. 6.1.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 7]





Answer **all** questions in this section.

- 7** Explain the factors that change the tidal range in one location.

[8]

[8]



[6]



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9 Explain the **abiotic** factors that affect the chemical composition of sea water with reference to named chemicals.

[9]





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