Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9693/13

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.

[Turn over

Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows diagrams of some of the substances found in sea water.

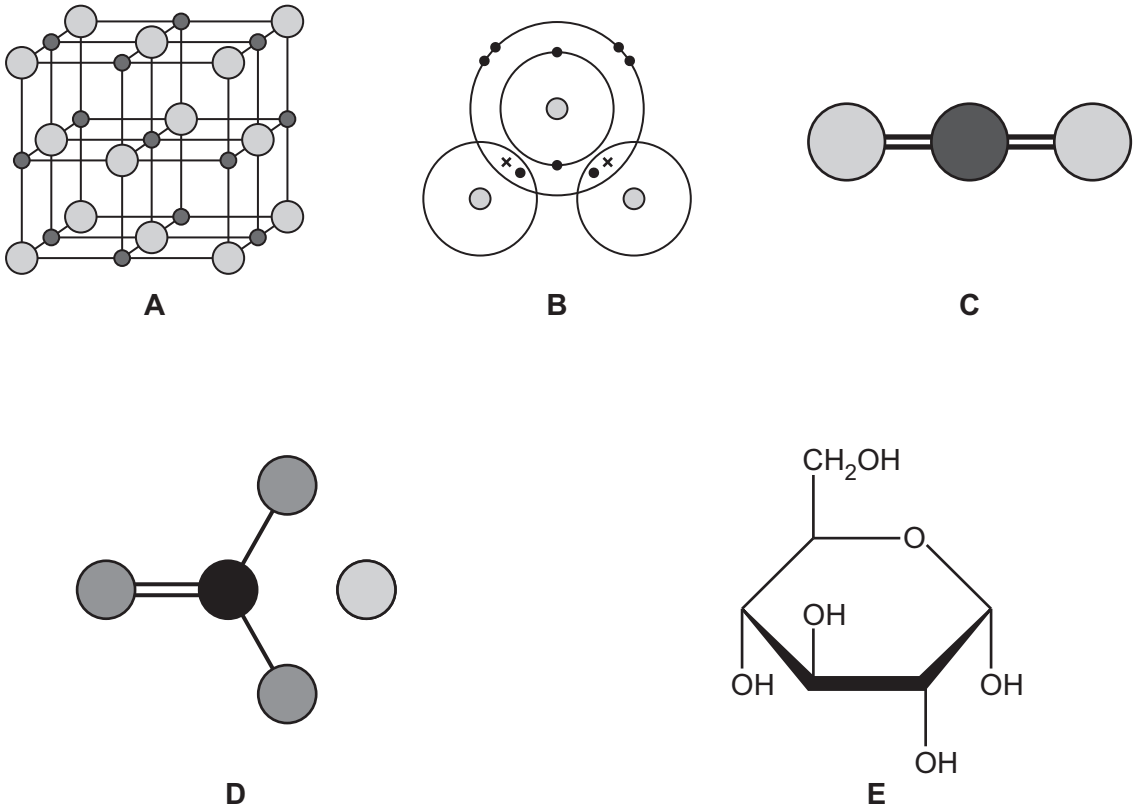

Fig. 1.1

(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]

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

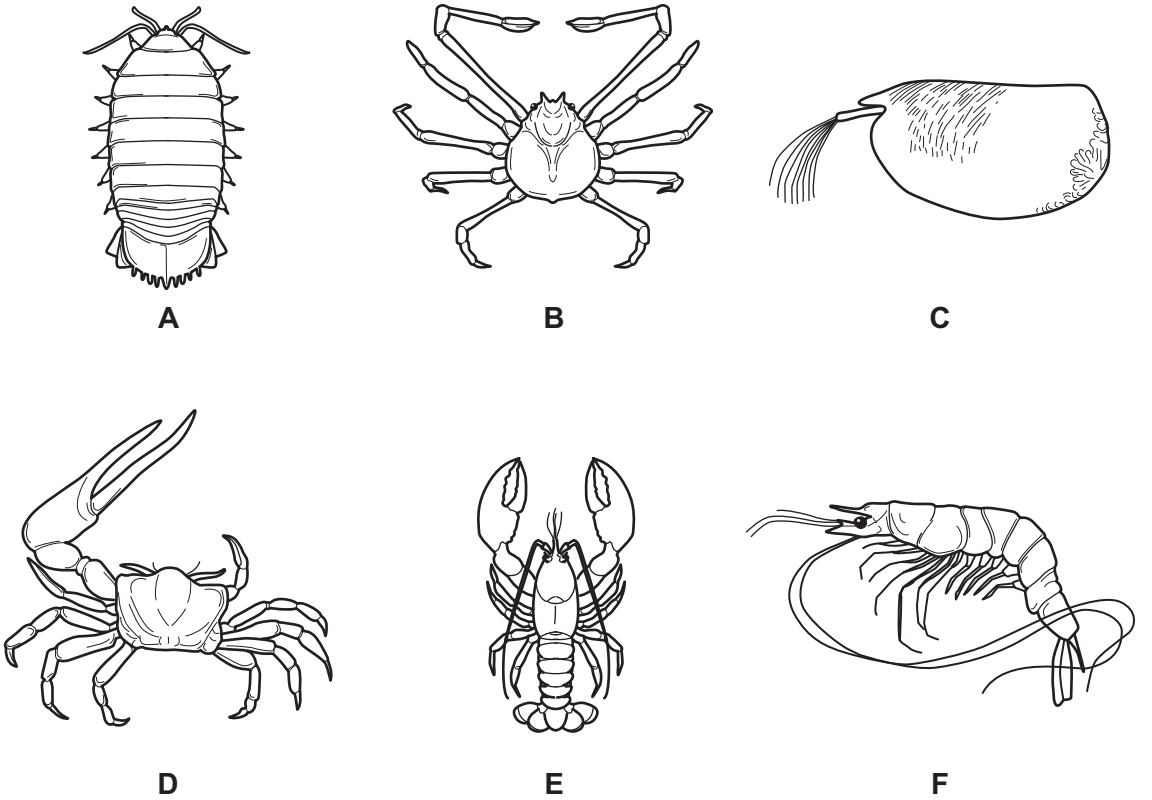


Fig. 2.1

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	*Penaeus monodon*	**F**
	antennae shorter than the length of its body	*Bathynomus giganteus*	.....
3	a visible tail-like structure	**go to 4**	
	no visible tail-like structure	**go to 5**	
4	visible claws	*Homarus gammarus*	.....
	no visible claws	*Alacia hettacra*	.....
5	claws of the same size	*Macrocheira kaempferi*	.....
	claws of different sizes	*Minuca pugnax*	.....

[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**.

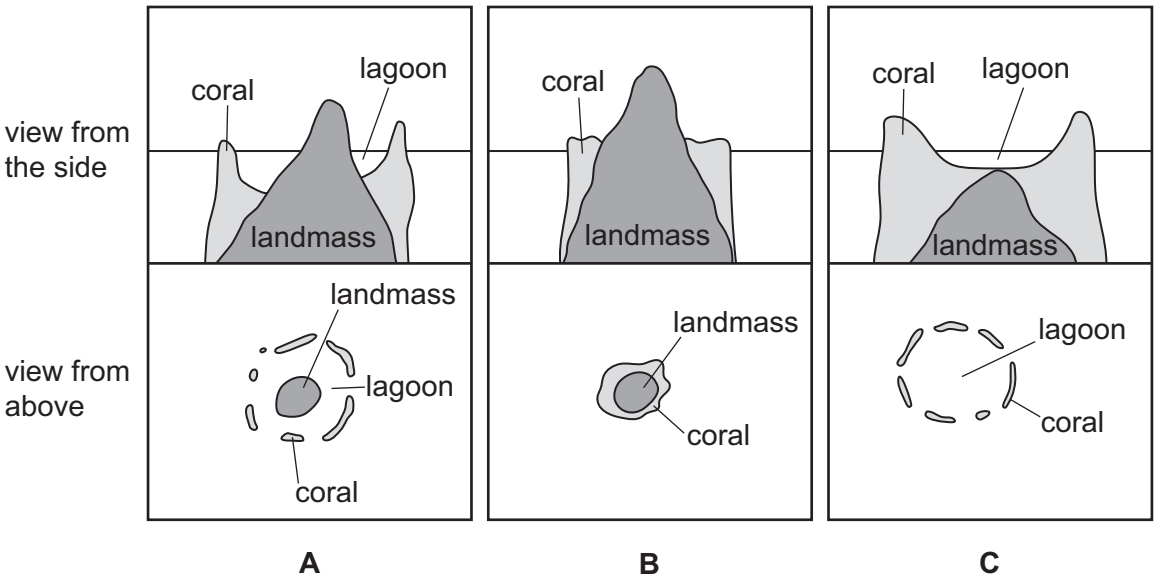


Fig. 3.1

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.

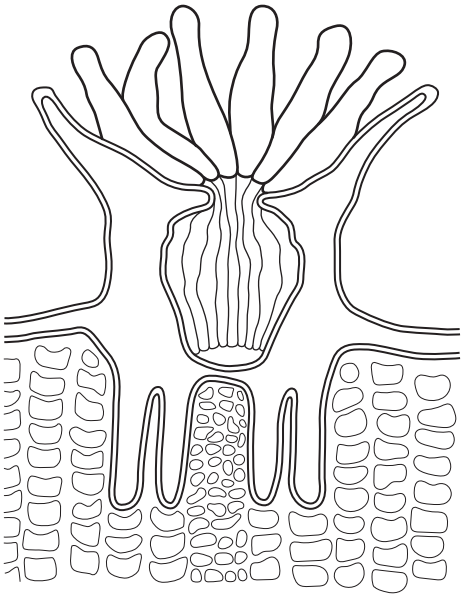


Fig. 3.2

[3]

(ii) Describe the function of nematocysts.

.....

..... [1]

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

1 .....

.....

2 .....

.....

3 .....

.....

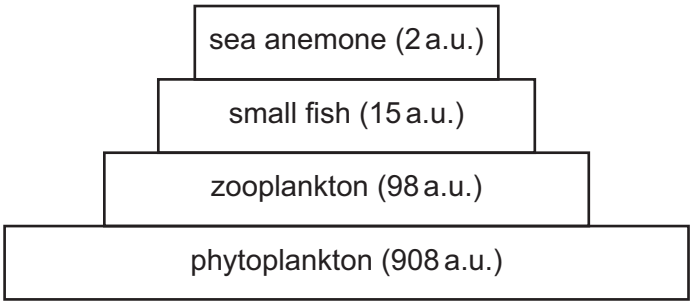
[3]

[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.



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.

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..... [3]

[Total: 7]

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

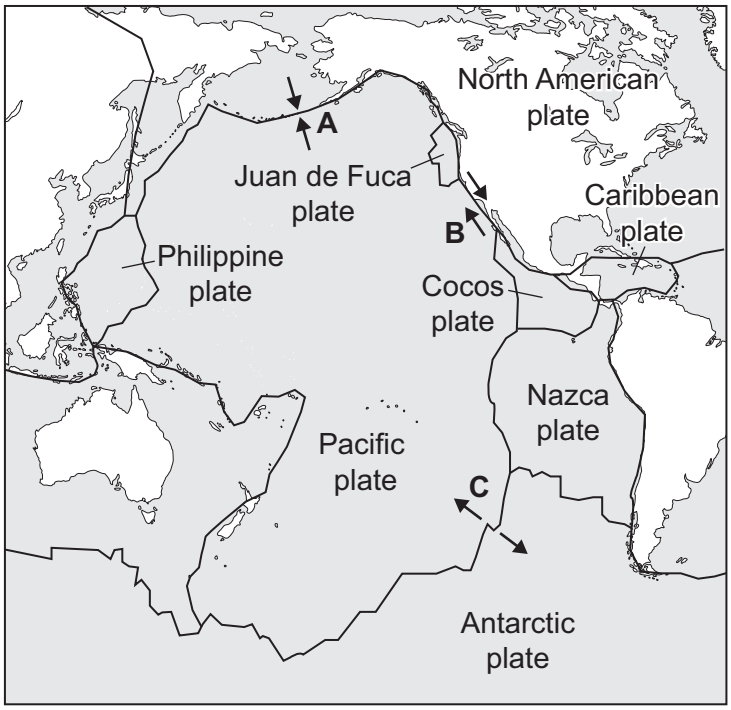

Fig. 6.1

(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.

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..... [4]

[Total: 7]

Section B

Answer **all** questions in this section.

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

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..... [8]

8 **(a)** Explain the adaptations of the red mangrove tree to its environment.

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..... [6]

(b) Explain the importance of mangrove forests to humans and to the environment.

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..... [7]

[Total: 13]

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

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..... [9]

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