



Cambridge International AS & A Level

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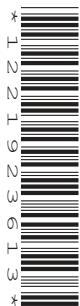


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MARINE SCIENCE

9693/13

Paper 1 AS Level Theory

May/June 2024

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 a section from the surface of the Earth to the centre of the Earth.

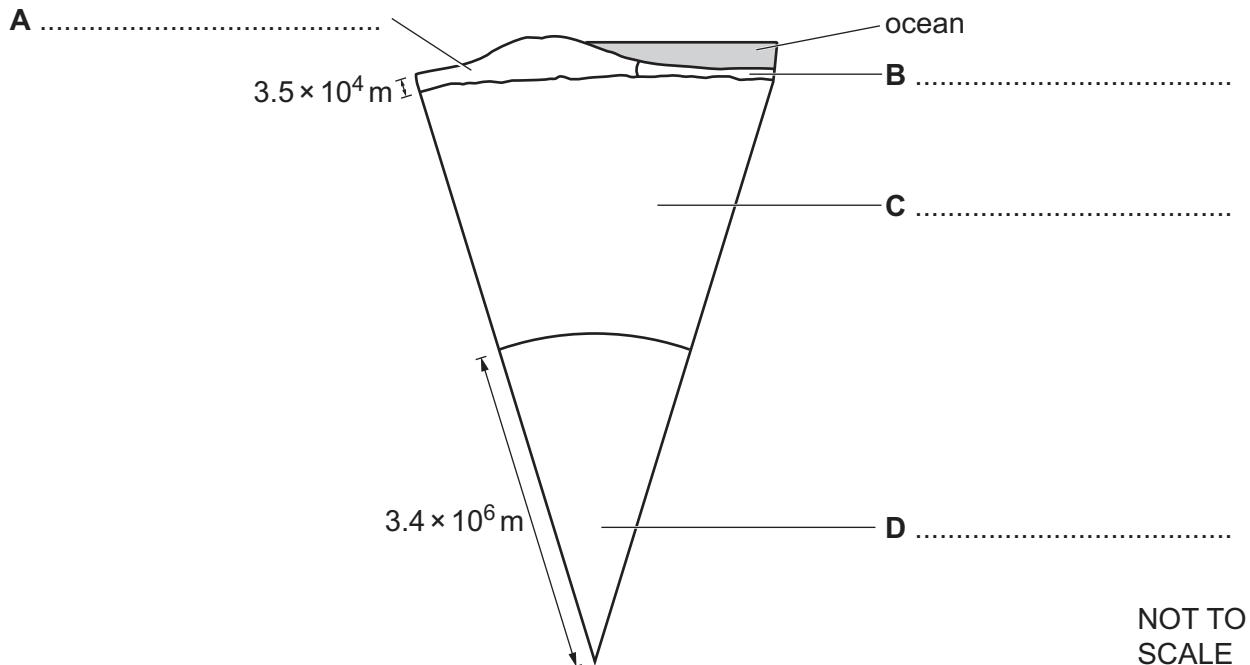


Fig. 1.1

(a) (i) On Fig. 1.1, identify the sections labelled **A**, **B**, **C** and **D**. [4]

(ii) The total distance from the surface to the centre of the Earth is 6.36×10^6 m.

Calculate the depth of layer **C**.

Give your answer in km.

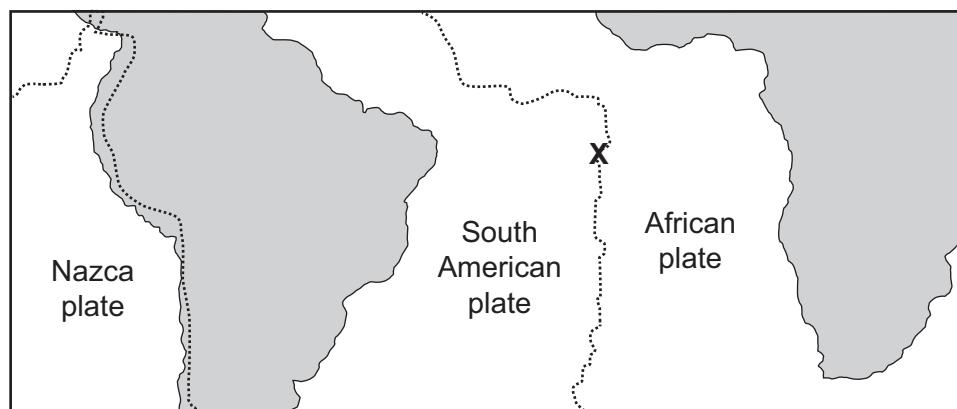
Show your working.

..... km [3]





(b) Fig. 1.2 shows part of three tectonic plates.



Key

	land
	ocean

Fig. 1.2

(i) Describe **two** ways continents provide evidence for the theory of plate tectonics.

1

.....

2

.....

[2]

There is a mid-ocean ridge at location X on Fig. 1.2.

(ii) Draw **two** arrows on Fig. 1.2 to show the direction of movement of the plates at location X.

[1]

(iii) State the type of plate boundary at location X.

..... [1]

(iv) Suggest why few fossils are expected to be found in rocks at location X.

.....

.....

[1]

[Total: 12]





2 Fig. 2.1 shows a rocky shore.



Fig. 2.1

The rocks in Fig. 2.1 have been weathered.

(a) Draw **one** line from each type of weathering to its description.

type of weathering

description

chemical

biological processes that cause cracks in rocks

organic

deposition of suspended particles

physical

reactions with rock that produce soluble minerals

temperature changes or environmental movements that cause the break-up of rocks

transportation of rock particles

[3]





(b) Small fragments of rock in Fig. 2.1 have been eroded.

State the **four** types of erosion.

1

2

3

4

[3]

(c) Fig. 2.2 shows a group of limpets on a rocky shore.

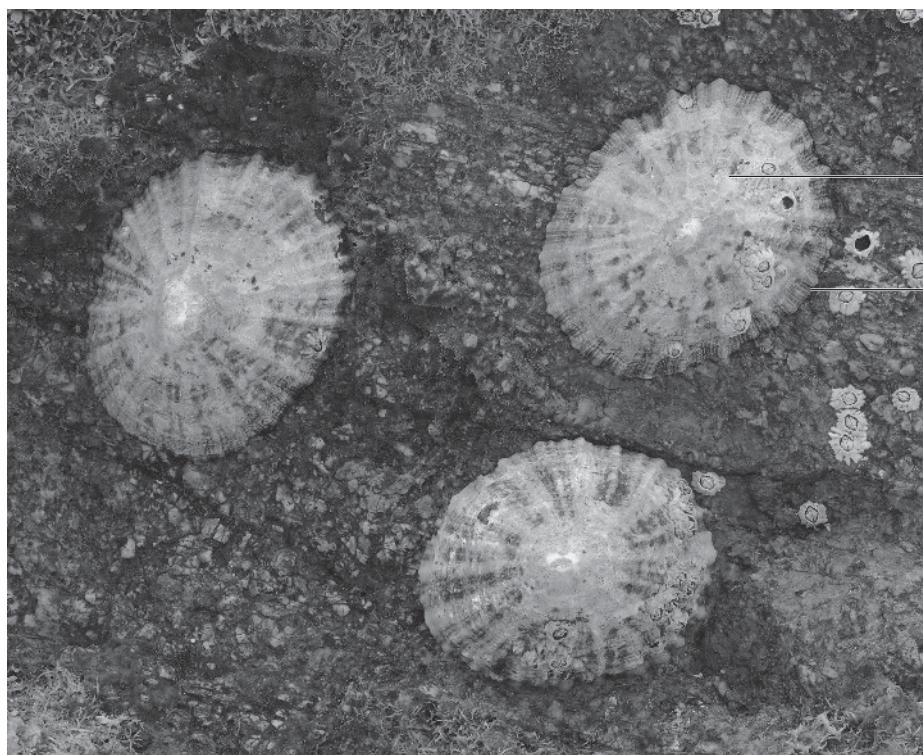


Fig. 2.2

Explain **two** ways that limpets are adapted to live on a rocky shore.

1

.....

2

.....

[2]

[Total: 8]





3 Fig. 3.1 shows a blue shark, *Prionace glauca*.

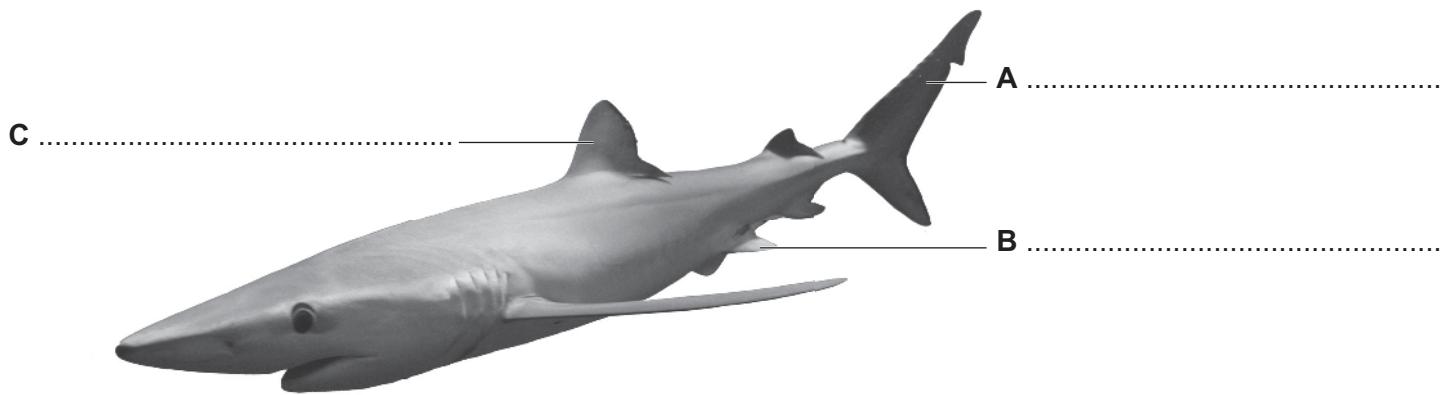


Fig. 3.1

(a) On Fig. 3.1, identify the fins labelled **A**, **B** and **C**. [3]

(b) Draw **one** line from each group to the name of that group for the blue shark.

group	name of group for blue shark
domain	Animalia
genus	Chordata
phylum	Eukarya
	<i>glauca</i>
	<i>Prionace</i>

[3]





(c) Table 3.1 shows the mass of dried shark fins exported from Japan between 1987 and 1997.

Table 3.1

year	mass of dried shark fins exported /kg
1987	600 000
1989	490 000
1991	410 000
1993	390 000
1995	380 000
1997	360 000

(i) Calculate the percentage decrease in the mass of dried shark fins exported between 1987 and 1997.

Show your working.

.....% [2]

(ii) Suggest **three** reasons for the decrease in the mass of dried shark fins exported.

1

.....

2

.....

3

.....

[3]





(d) Blue sharks are generally found in the epipelagic and mesopelagic zones of the open ocean.

State the meaning of these two terms.

epipelagic

.....
.....

mesopelagic

.....
.....

[2]

[Total: 13]





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4 Copepods are small crustaceans that form part of the plankton in the oceans.

(a) Define the term plankton.

.....

 [2]

(b) Fig. 4.1 shows a food chain involving copepods. The biomass of the population of each type of organism is given in mg m^{-3} .

phytoplankton	→	copepod	→	mackerel	→	tuna
100		400		10		1

Fig. 4.1

(i) Sketch **and** label a pyramid of biomass for the food chain shown in Fig. 4.1.

[3]

(ii) The data for biomass in Fig. 4.1 were collected after a period of high primary productivity.

Explain how this caused the relative biomass of the populations of phytoplankton and copepods.

.....

 [4]





(c) Fig. 4.2 shows part of a food web.

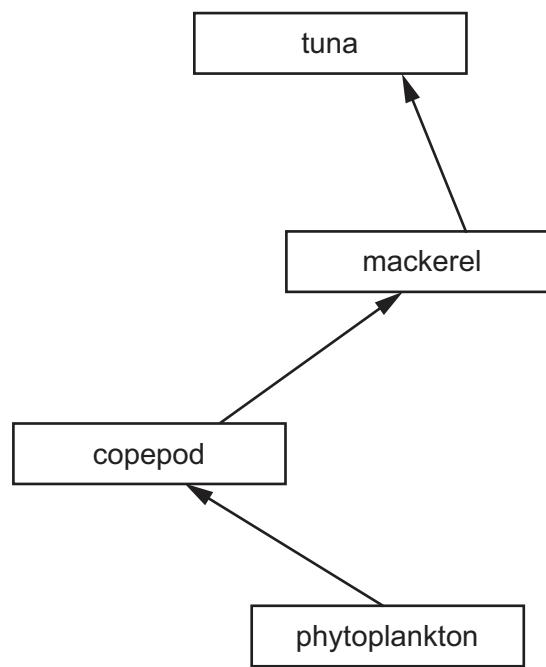


Fig. 4.2

Sea cucumbers are omnivores that consume phytoplankton and copepods.

Turtles are predators of sea cucumbers.

Copepods are parasites of sea cucumbers and consume the flesh of sea cucumbers.

Add this information to the food web in Fig. 4.2.

[3]

[Total: 12]





Section B

Answer **all** questions in this section.

5 (a) Explain how the alignment of the Earth, Sun and Moon results in a spring tide and a neap tide.

[7]





(b) Explain the factors which affect the height of spring tides at different locations on Earth.

[7]

[Total: 14]





6 (a) Explain why sea water is described as a chemical solution. Include named examples of the components in sea water in your answer.

[8]





(b) Explain how the pH of sea water can vary **and** describe the impact of pH change on coral reefs.

[8]

[Total: 16]



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