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MARINE SCIENCE**0697/13**

Paper 1 Theory and Data Handling

May/June 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 80.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Any blank pages are indicated.



1 (a) Fig. 1.1 shows three different fishing methods.

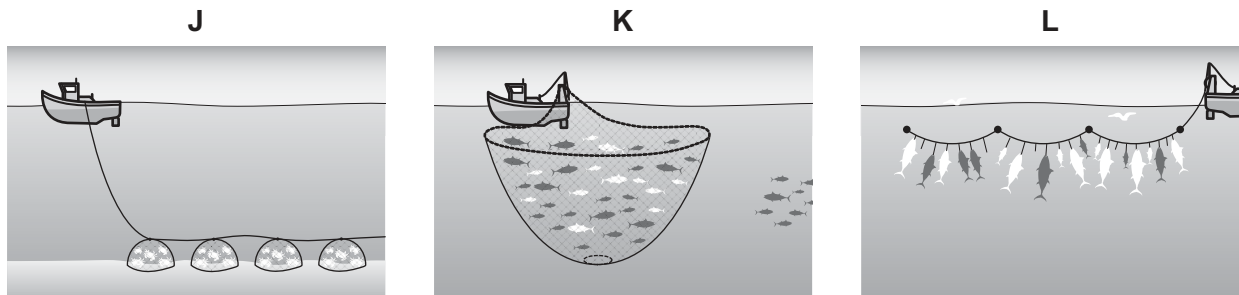


Fig. 1.1

(i) Name the **three** fishing methods shown in Fig. 1.1.

J

K

L [3]

(ii) Suggest **two** reasons why fishing method **J** has a lower juvenile bycatch death rate than fishing methods **K** and **L**.

.....

 [2]

(iii) State **one** fishery strategy that can increase the sustainability of fishing method **J**.

..... [1]



(b) Fig. 1.2 shows a fishing boat using sonar to detect the depth of a fish shoal.

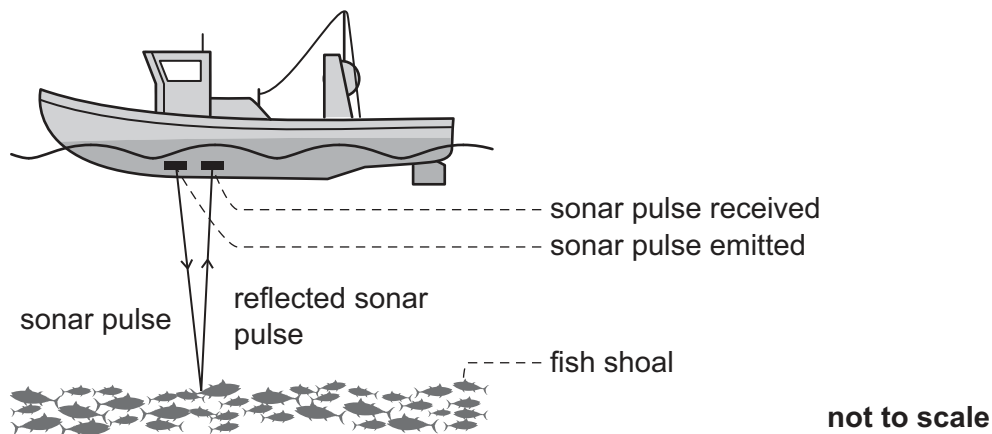


Fig. 1.2

The speed of sound in water is 1480 metres per second.

The time between the pulse being emitted and being received by the fishing boat is 0.04 seconds.

Calculate the depth of the fish shoal using the formula shown.

$$\text{speed} = \frac{\text{distance travelled by sonar pulse}}{\text{time}}$$

Show your working.

depth of fish shoal = m [3]

[Total: 9]



- 2 (a) Some statements about different ocean zones are listed.

Draw a single ruled line to match each ocean zone to the statement which correctly describes the ocean zone.

You should draw **three** lines in total.

ocean zone

statement

midnight zone

the region below the spring low tide

the seabed

the region with high light intensity,
variable temperature and low water
pressure

subtidal zone

the region above a depth of 200 m

pelagic zone

the whole column of open water

the region with no light, a stable
temperature and high water pressure

the region between high tide and
low tide

[3]





(b) Mangrove forests are coastal ecosystems found in estuaries.

(i) Explain how the salinity in an estuary changes during a tidal cycle.

.....

.....

.....

..... [2]

(ii) Explain **one** adaptation of a mangrove tree that enables it to live in waterlogged soil with low oxygen concentration.

.....

.....

.....

..... [2]

(c) Banded archerfish are adapted to live in mangrove forests.

(i) Explain how **one** adaptation of the banded archerfish enables it to live in mangrove forests.

.....

.....

.....

..... [2]

(ii) State the domain and kingdom the banded archerfish is classified in.

domain

kingdom

[2]

[Total: 11]



- 3 Fig. 3.1 shows how the Atlantic Ocean has changed in the last 65 million years. The line through the Atlantic Ocean is a plate boundary.

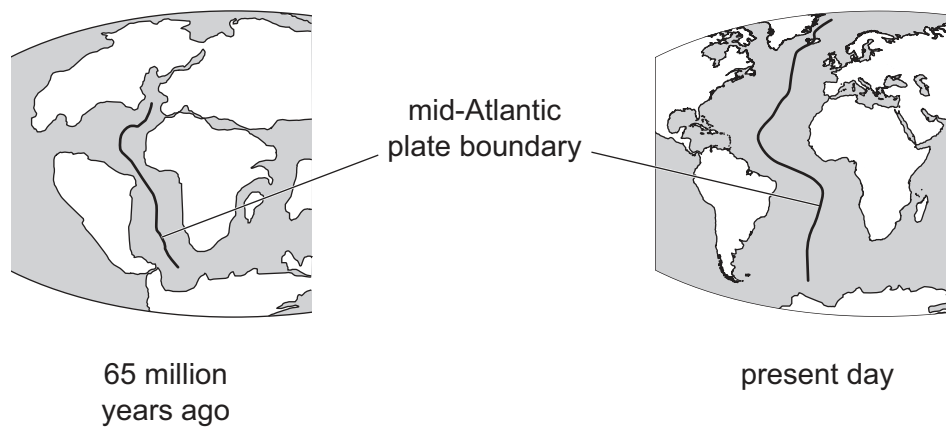


Fig. 3.1

- (a) (i) Name the type of plate boundary found in the mid-Atlantic Ocean.

Give reasons to explain your choice.

name

reasons

.....

[3]

- (ii) Outline why tectonic plates are moving.

.....

[2]



- (b) Water from the Atlantic Ocean evaporates, condenses into clouds and returns to land as precipitation.

Complete Table 3.1 to show how the energy in the water changes during the named processes.

Tick (✓) **one** box in each row.

Table 3.1

	energy in the water		
process	increases	decreases	no change
condensation			
evaporation			
precipitation			

[2]

- (c) Table 3.2 shows some properties of a sample of fresh water and a sample of sea water.

Table 3.2

property	fresh water	sea water
mean salinity / ppt	0.3	35
mean pH	7.0	8.2

- (i) Explain the difference in mean salinity between fresh water and sea water.

.....

.....

.....

..... [2]

- (ii) Explain why the mean salinity of the Red Sea is higher than 35 ppt.

.....

.....

.....

..... [2]

- (iii) Suggest a reason for the different pH values of fresh water and sea water.

.....

..... [1]







4 Coastal ecosystems provide important benefits, such as recreation and tourism, to humans.

(a) Mangrove forests and coral reefs are two types of coastal ecosystems.

Name **two other** types of coastal ecosystems.

1

2

[2]

(b) State **two other** important benefits which marine ecosystems provide to humans.

1

2

[2]

(c) Tourism affects marine ecosystems.

Explain the impact that **two other** named human activities have on marine ecosystems.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 8]





5 Fig. 5.1 shows a manatee eating seagrass.



Fig. 5.1

(a) Seagrass cells have cell walls.

State **one** function of the cell wall.

.....
..... [1]

(b) Both plants and animals undertake gas exchange and respiration.

Describe the differences between gas exchange and respiration.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
..... [5]





(c) Manatees are very large herbivores.

(i) Define the term herbivore.

.....
..... [1]

(ii) Explain why herbivores, such as manatees, receive a greater proportion of the Sun's energy through the food chain than carnivores.

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

[Total: 9]







6 Microplastics are small pieces of plastic less than 5 mm in size.

(a) Explain why microplastics are found in oceans.

.....

.....

.....

.....

.....

..... [3]



- (b) Scientists investigated the effect of microplastic pollution on the growth rate of cold-water coral polyps over a period of eight weeks.

Cold-water coral polyps do **not** have a mutualistic relationship with zooxanthellae.

Fig. 6.1 shows the growth rate of cold-water coral polyps in sea water polluted with microplastics (group **M**) and in sea water with **no** microplastics (group **N**).

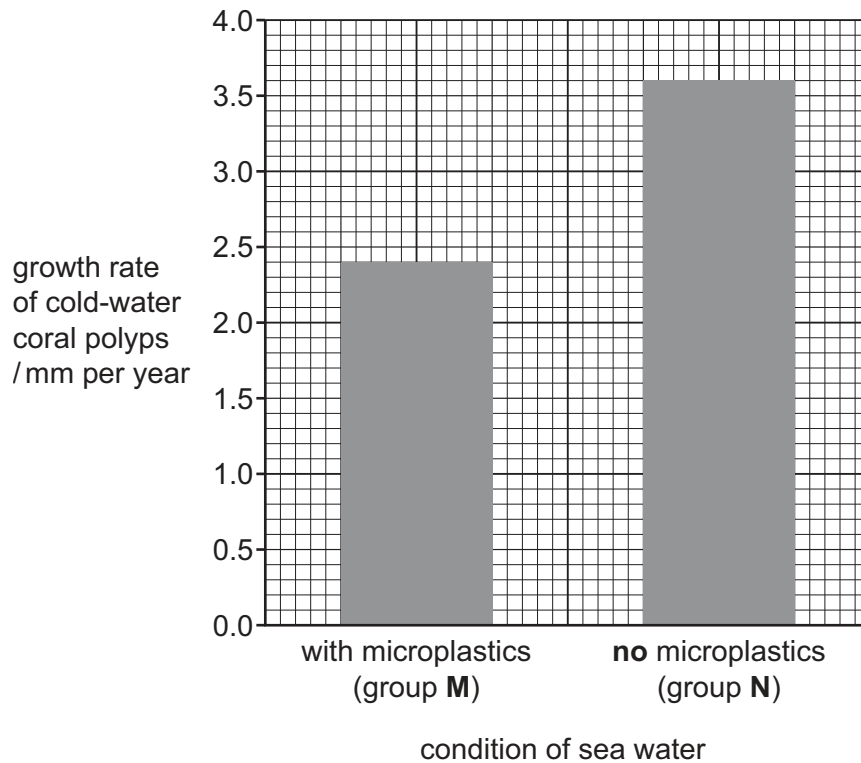


Fig. 6.1

- (i) Use Fig. 6.1 to calculate the percentage decrease in growth rate of the cold-water coral polyps in group **M** compared with those in group **N**.

Show your working.

percentage decrease in growth rate = % [2]





- (ii) Suggest **three** reasons for the difference in growth rates between the cold-water coral polyps in group **M** compared with those in group **N**.

.....

.....

.....

.....

.....

.....

.....

..... [3]

- (iii) Scientists repeated the investigation with coral polyps that contain zooxanthellae.

Explain how the results of this investigation will be different to the investigation with cold-water coral polyps.

.....

.....

.....

.....

.....

..... [2]

- (iv) Suggest how **one** named strategy can reduce the impact of plastics on marine ecosystems.

.....

.....

.....

..... [2]

[Total: 12]



- 7 (a) Describe how ecotourism differs from tourism.

.....

.....

.....

.....

..... [2]

- (b) Fig. 7.1 shows a conservation area located within a national marine park. The conservation area contains a sandy shore that is a turtle nesting site and is also an ecotourism attraction.

The conservation area is located 14 km from the nearest town and other tourism attractions.

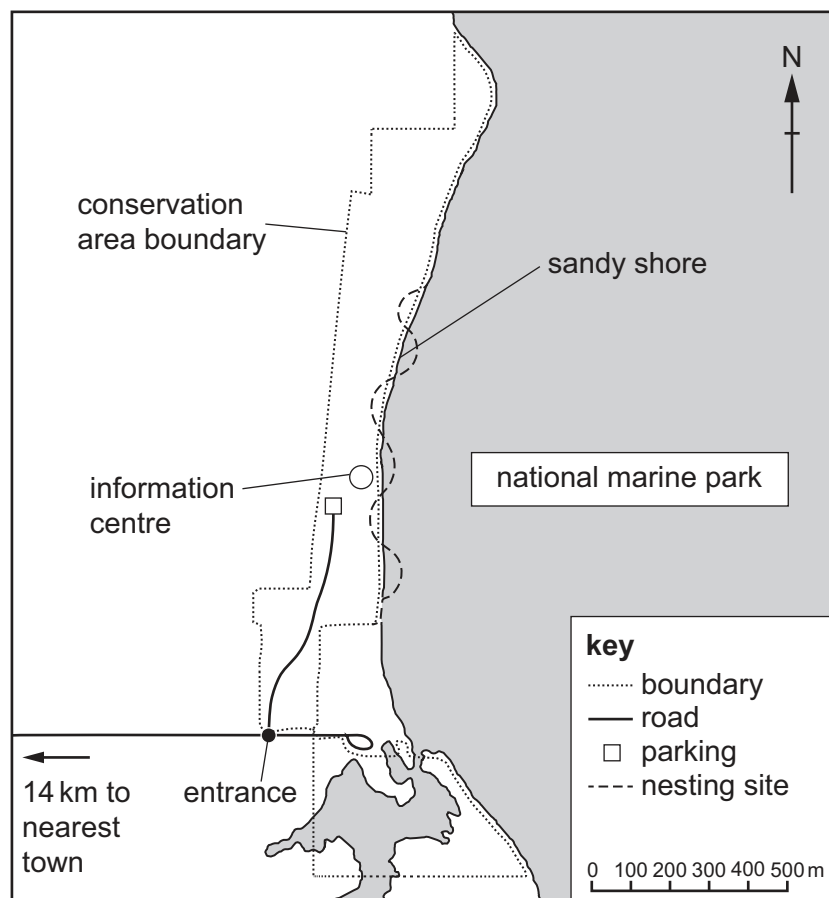


Fig. 7.1



(i) The national marine park has the following rules:

- rule 1: no more than 70 people are allowed on the beach at any time
- rule 2: mobile phones must be switched off when on the beach
- rule 3: no water sports are allowed within the national marine park.

Suggest a different ecological reason for each rule.

rule 1 reason

.....

rule 2 reason

.....

rule 3 reason

..... [3]

(ii) Suggest how the conservation area benefits from being located within a national marine park.

.....

.....

..... [2]

(iii) Suggest a sustainable method for tourists to reach the national marine park from the nearest town.

Give a reason for your suggestion.

.....

.....

..... [2]

(iv) A business wants to build a tourist hotel next to the conservation area boundary.

Describe **one** possible conflict between the hotel and the ecotourism attraction.

.....

.....

..... [2]

[Total: 11]



8

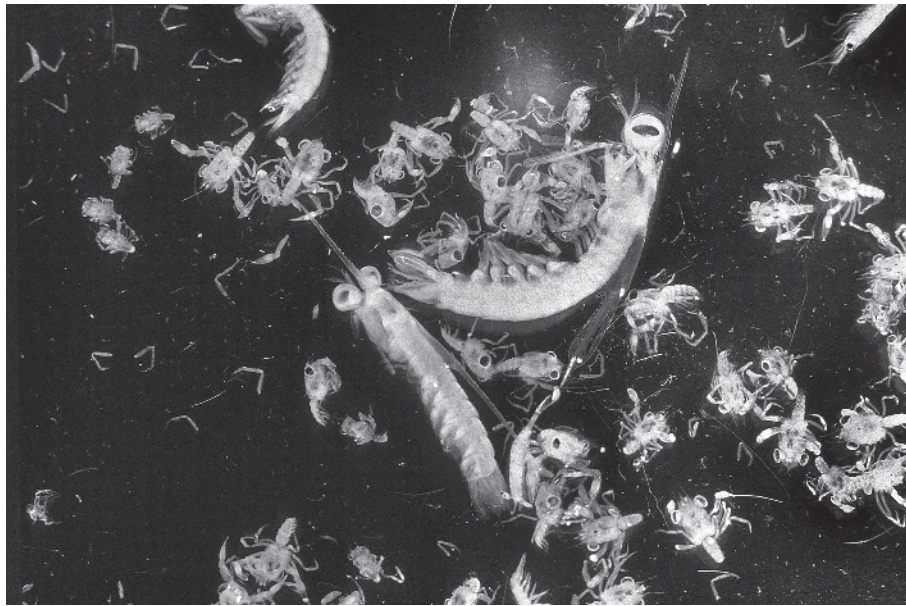


Fig. 8.1

(a) Discuss the importance of plankton to the marine ecosystem.

[6]

[6]



(b) Some plankton reproduce asexually.

Describe asexual reproduction.

.....

.....

.....

..... [2]

[Total: 8]





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