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MARINE SCIENCE**0697/22**

Paper 2 Theory and Practical Skills

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

This document has **16** pages.

- 1 Figure 1.1 is a photograph of *Bathynomus giganteus*, an animal that lives on the seabed in very deep water.

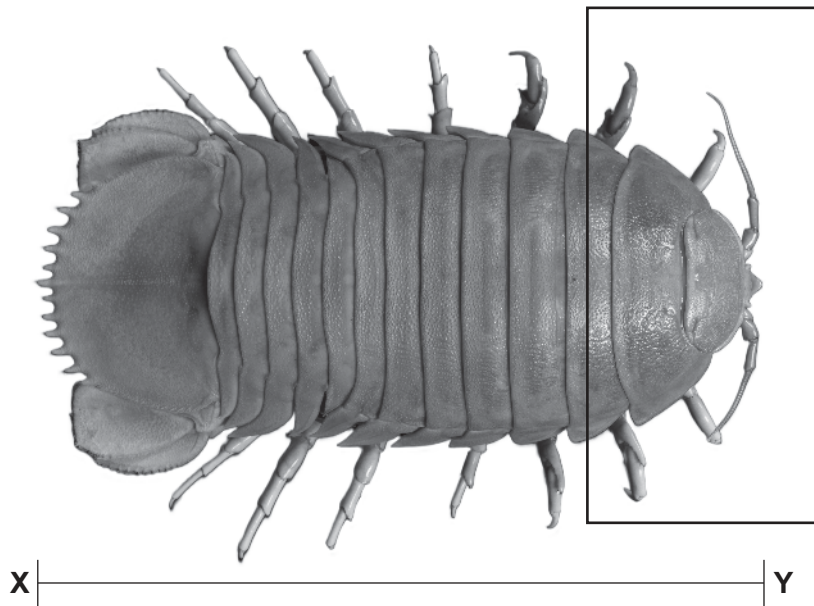


Figure 1.1

- (a) (i) Make a large, accurate drawing of the area inside the box.
Do **not** show the markings.

- (ii) Measure the length of the photograph of *Bathynomus giganteus* in Figure 1.1, between **X** and **Y**.

Give your answer in centimetres.

length = ... cm [1]

- (iii) The magnification of the photograph is $\times 0.5$.

Use your answer in **(a)(ii)** to calculate the actual length, in centimetres, of the *Bathynomus giganteus* in Figure 1.1, measured between **X** and **Y**.

Give your answer to the nearest whole number.

actual length = ... cm [1]

- (iv) Table 1.1 lists some of the features that are needed to classify marine invertebrates.

Complete Table 1.1 for *Bathynomus giganteus* by stating whether a feature is present or absent. The first two features have been completed for you.

Table 1.1

feature	present or absent
antennae	present
tube feet	absent
abdominal segments with jointed legs	
bilateral symmetry	
exoskeleton	
setae	

[2]

- (v) *Bathynomus giganteus* is classified as an invertebrate.

Using Table 1.1 and your own knowledge, state the domain and invertebrate group that *Bathynomus giganteus* is classified in.

domain

invertebrate group [2]

- (b) *Bathynomus giganteus* is a detritivore that lives on the seabed in the midnight zone.

- (i) Describe what is meant by detritivore.

.....

 [2]

- (ii) Explain, with reference to an abiotic condition, why a large proportion of organisms that live on the seabed in the midnight zone are predators and detritivores.

.....

 [3]

[Total: 15]

- 2 The Great Pacific Garbage Patch (GPGP) is the largest plastic garbage patch in the world.

Figure 2.1 shows a map of the eastern Pacific Ocean, showing the different mass concentrations of plastic found in the water of this garbage patch.

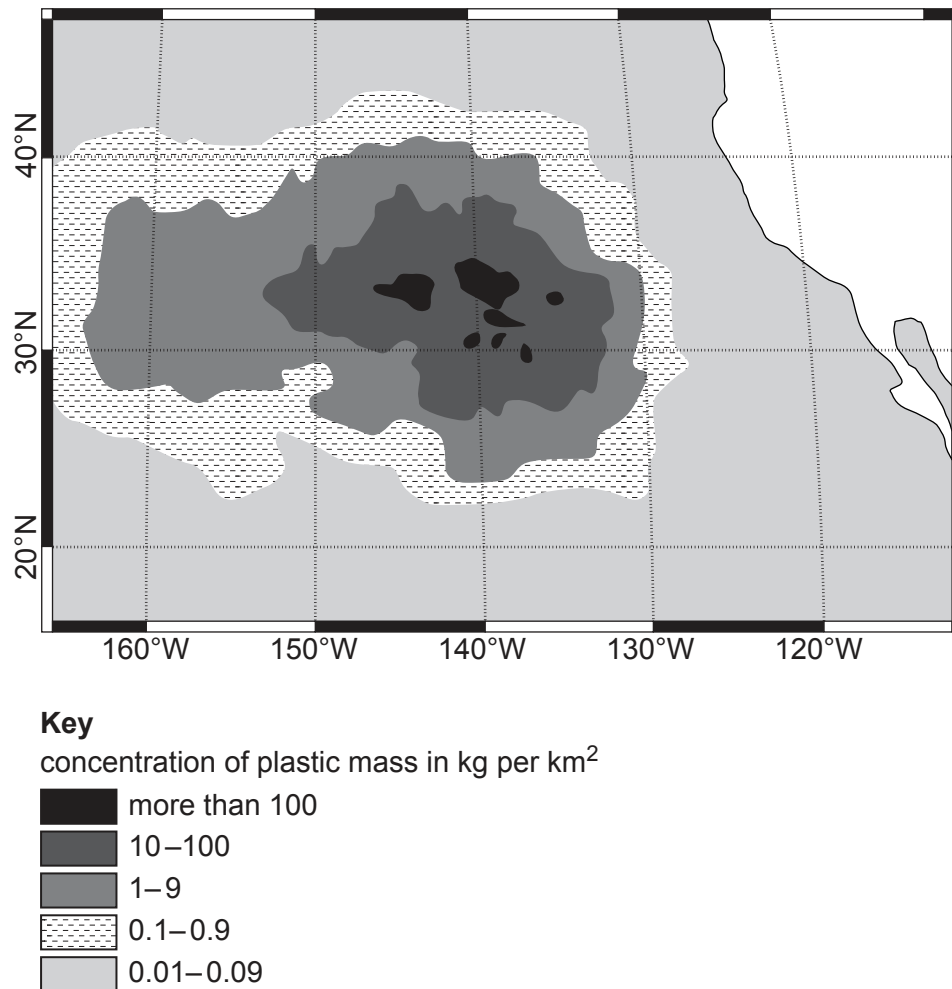


Figure 2.1

- (a) (i) Give the mass concentration of plastic found at a latitude of 149°W and longitude of 33°N.

..... kg per km² [1]

- (ii) Describe the distribution of plastic within the GPGP.

.....

.....

.....

..... [2]

- (iii) The GPGP has been formed by the North Pacific oceanic gyre.

Give the location of **one** other oceanic gyre.

..... [1]

- (iv) Explain how oceanic gyres produce plastic garbage patches.

.....

 [3]

- (b) Scientists investigated the change in mean mass concentration of plastic in the GPGP over time.

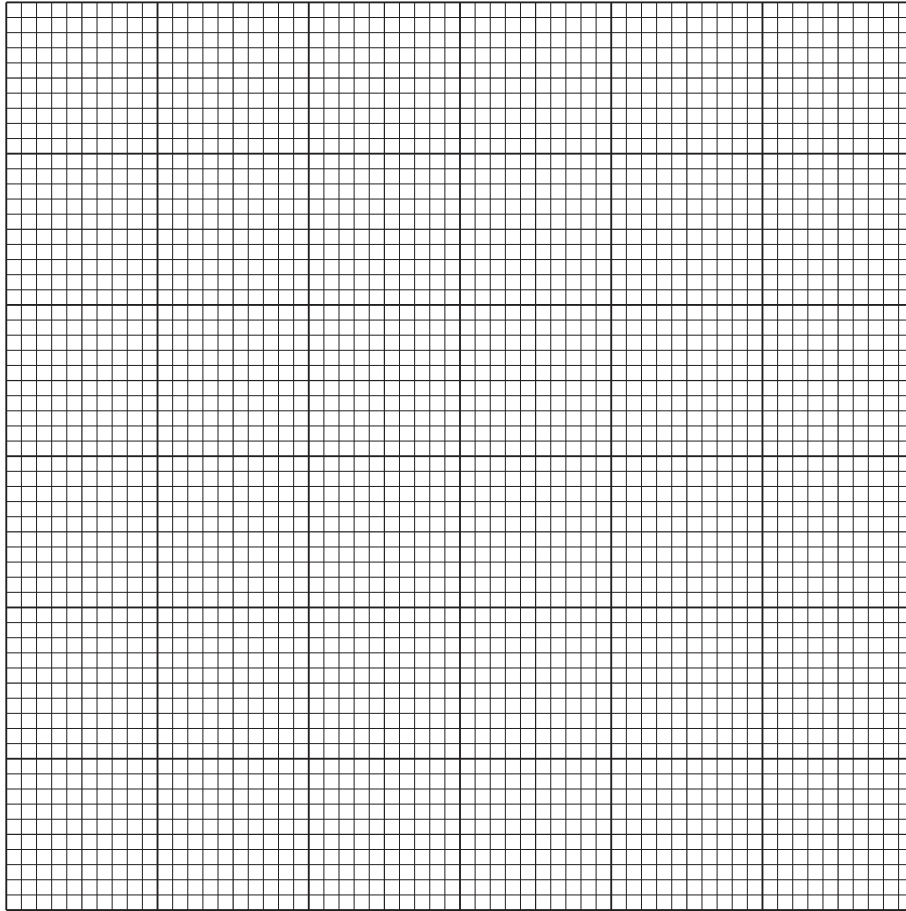
Samples were taken inside the GPGP and from water surrounding the GPGP. The mean mass concentrations of plastic in kg per square kilometre were calculated.

The results are shown in Table 2.1.

Table 2.1

time period	mean mass concentration of plastic / kg per km ²	
	in water inside the GPGP	in water surrounding the GPGP
1985 to 1994	0.45	0.08
1995 to 2004	0.60	0.10
2005 to 2014	1.10	0.18
2015	1.20	0.22

- (i) Use the data in Table 2.1 to draw a bar chart to show the mean mass concentration of plastic in water inside the GPGP and in water surrounding the GPGP.



[5]

- (ii) Compare the change in mean mass concentration of plastic in the area within the GPGP with the change in mean mass concentration of plastic in the water surrounding the GPGP.

.....

.....

.....

..... [2]

- (iii) Explain how the scientists would need to design their sampling method to ensure that a valid conclusion about the changes in mean mass concentration of plastic over time can be made.

.....

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..... [3]

- 3 Since 1980 a large area of global mangrove forest has been removed by human activity.

One of the biggest causes of this deforestation was the development of shrimp farms.

Figure 3.1 shows an area of mangrove forest that is being cleared to set up a shrimp farm.



Figure 3.1

- (a) Mangrove forests, rocky shores and sandy shores are examples of coastal ecosystems.

- (i) Define an ecosystem.

..... [1]

- (ii) Name **two other** types of coastal ecosystem.

1

2

[2]

- (b) Table 3.1 shows the estimated global coastal area of mangrove forests between 1980 and 2020.

Table 3.1

year	estimated global coastal area of mangrove forest/ hectares
1980	19 808
1990	16 361
2010	14 653
2020	12 258

- (i) Calculate the percentage decrease in area of mangrove forest between 1980 and 2020.

Give your answer to the nearest whole number.

Show your working.

percentage decrease% [2]

- (ii) Explain how the loss of mangrove forest could contribute to increased global warming.

.....

.....

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.....

.....

..... [3]

- (c) A new method of shrimp farming has been recently developed. This new method maintains areas of mangrove forest around the shrimp farms rather than removing them entirely.

- (i) Prop roots are one adaptation of mangrove trees to help them survive.

Explain **one** other adaptation of mangrove trees.

.....

.....

.....

..... [2]

- (ii) Prop roots of mangrove trees trap sediment released into the sea water from new shrimp farms. This reduces the cloudiness of the sea water.

Describe how scientists could measure light penetration into sea water in an area with new shrimp farms.

.....

.....

.....

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.....

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.....

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..... [3]

[Total: 13]

- 4 Figure 4.1 shows part of a rocky shore.



Figure 4.1

- (a) (i) Describe how a pair of students can measure the profile of a rocky shore.

.....

.....

.....

.....

.....

..... [3]

- (ii) Give a safety precaution that should be taken when measuring the profile of a rocky shore.

.....

..... [1]

- (b) Figure 4.2 shows the profile of the intertidal zone of a rocky shore moving up the shore from the low tide level.

Figure 4.3 shows the percentage cover of rocks with mussels on the same rocky shore from the low tide level.

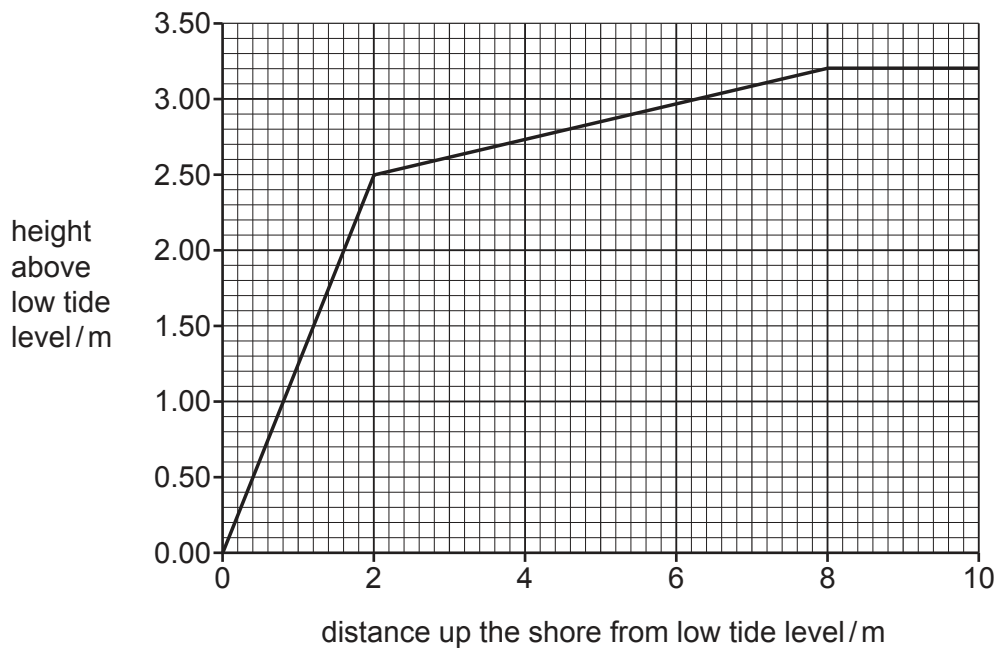


Figure 4.2

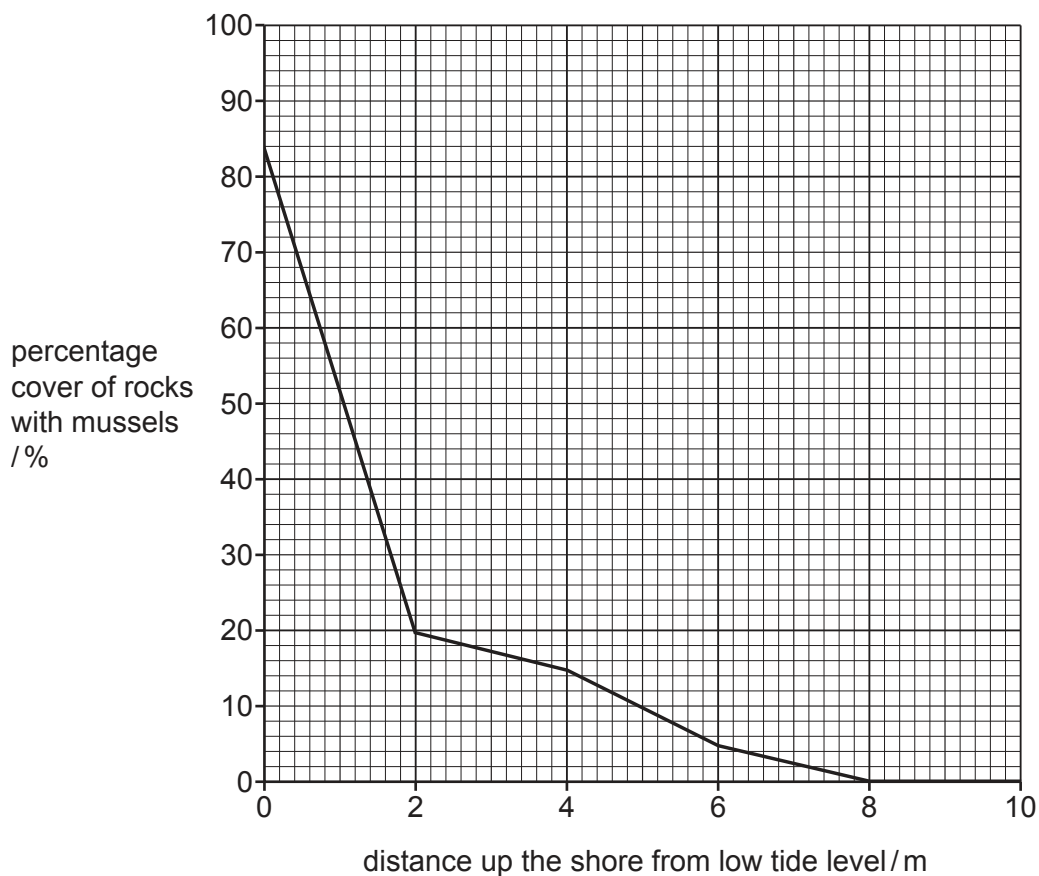


Figure 4.3

- (i) Describe the change in profile of the shore shown in Figure 4.2.

.....

.....

.....

..... [2]

- (ii) Use Figure 4.2 and Figure 4.3 to determine the percentage cover of rocks with mussels when the height above the low tide level is 1.75 m.

Show your working.

percentage cover = ...% [2]

- (iii) Explain the change in percentage cover of rocks with mussels up the shore from low tide level. Include abiotic factors of the intertidal zone of rocky shores and the adaptations of mussels to support your answer.

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..... [4]

[Total: 12]

- 5 Figure 5.1 shows an open aquaculture system for producing a species of fish called sea bass.



Figure 5.1

- (a) (i) State **one** way that open aquaculture systems, such as that shown in Figure 5.1, differ from closed aquaculture systems.

.....
 [1]

- (ii) Outline how open aquaculture systems enable the growth of healthy fish that do not suffer from disease.

.....

 [4]

- (b) A student reads that some aquaculture systems release warm water into the surrounding water.

Warming the water affects the solubility of gases such as oxygen and carbon dioxide.

- (i) Explain why a lack of oxygen in the water would harm fish.

.....

.....

.....

..... [2]

- (ii) Describe a simple, laboratory-based experiment the student could complete to investigate the effect of water temperature on carbon dioxide solubility.

.....

.....

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.....

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..... [3]

- (c) A student obtains some sea bass from a market.

The student grinds up pieces of the fish and carries out food tests on the samples.

The results are shown in Table 5.1.

Complete Table 5.1 to give the **two** substances present in the sea bass.

Table 5.1

test	final colour of solution	nutrient present
add biuret solution and leave for ten minutes	lilac / purple	
dissolve in ethanol, add water and shake	white emulsion	

[2]

[Total: 12]

[Turn over]

- 6 The combustion of fossil fuels releases carbon dioxide gas into the atmosphere. Carbon dioxide is an acidic gas and can cause acidification of water.

Acidification of water may cause the rate of photosynthesis of producers to decrease.

- (a) (i) Complete the word equation for photosynthesis.

carbon dioxide + ... → + ... [2]

- (ii) Name the green pigment present in plants and algae that absorbs light energy.

..... [1]

- (iii) Outline how a student could identify the pH of a sample of sea water.

.....

.....

..... [2]

- (b) Describe an investigation which you could safely carry out to test the effect of water pH on the photosynthesis rate of an aquatic plant.

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..... [6]

[Total: 11]

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