Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8654991873

MARINE SCIENCE **0697/21**

Paper 2 Theory and Practical Skills **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 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.

DC (PB/SG) 332523/3

[Turn over

1 Fig. 1.1 is an image of a coral polyp.

Fig. 1.1

(a) (i) In the space below, make a large, accurate drawing of the part of the coral polyp inside the box shown in Fig. 1.1.

[4]

(ii) On Fig. 1.1, draw a line to show the length of the tentacle between **A** and **B**.

Measure the line that you have drawn in millimetres.

length of line = ... mm [1]

(iii) The image in Fig. 1.1 has a magnification of ×50.

Use your answer to **(a)(ii)** to calculate the actual length of the tentacle between **A** and **B**. Show your working.

Give your answer in millimetres and to **one** decimal place.

actual length = ... mm [2]

(b) (i) State the name of the domain and kingdom for the classification of this coral polyp.

domain .....

kingdom .....
[2]

(ii) State how the symmetry of the coral polyp is different to the symmetry shown by echinoderms.

.....

..... [1]

(c) Outline the life cycle of coral polyps.

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..... [4]

[Total: 14]

2 Oceanic currents and gyres circulate water around the World Ocean.

Fig. 2.1 shows a map of oceans and seas in the world, with the major oceanic currents and gyres.

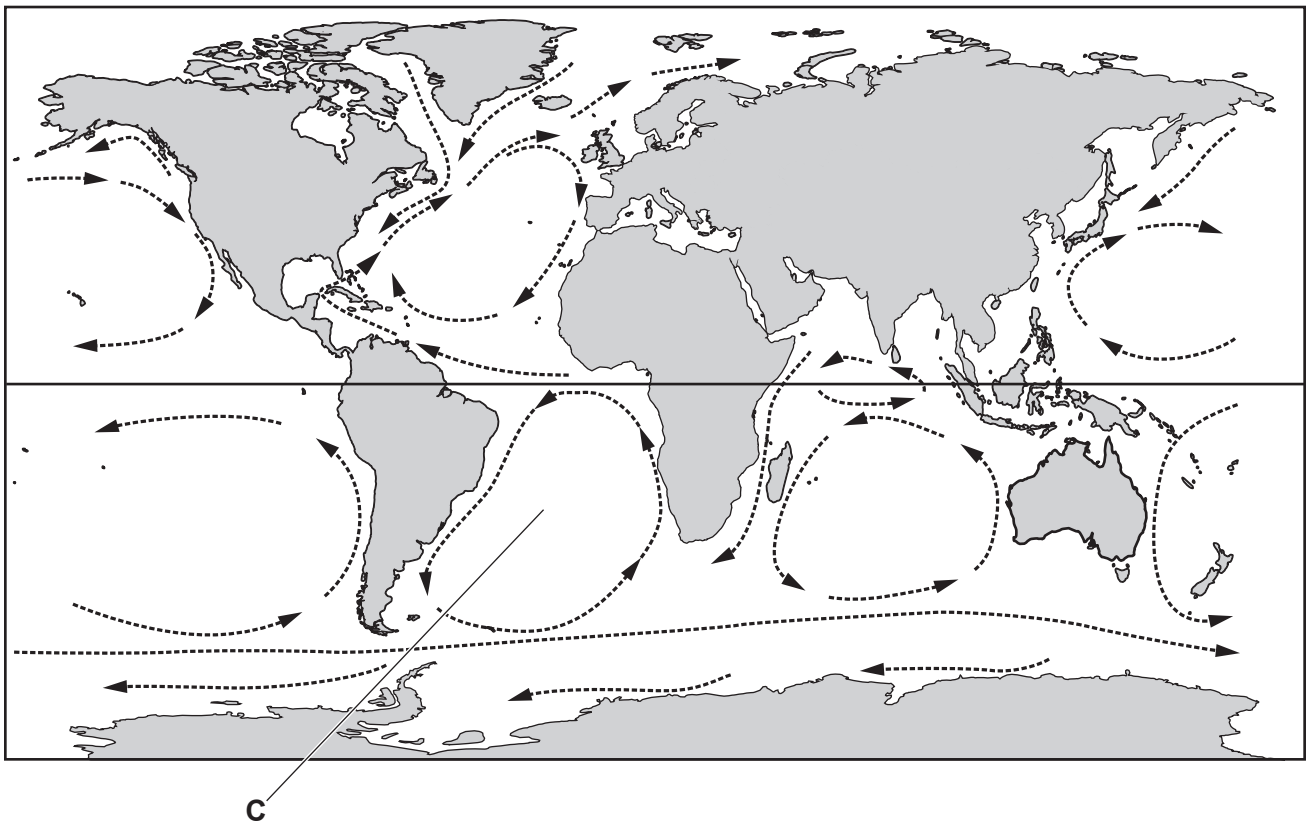

Fig. 2.1

(a) (i) Name the ocean labelled **C** in Fig. 2.1.

..... [1]

(ii) State the name of the deepest point of the World Ocean.

..... [1]

(iii) Outline the factors that cause oceanic currents.

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..... [3]

(b) The salinity of water in oceans and seas can vary.

Fig. 2.2 shows the salinities of water in different areas of the Pacific Ocean.

The lines represent areas of water with the same salinity.

All salinities are given in parts per thousand (ppt).

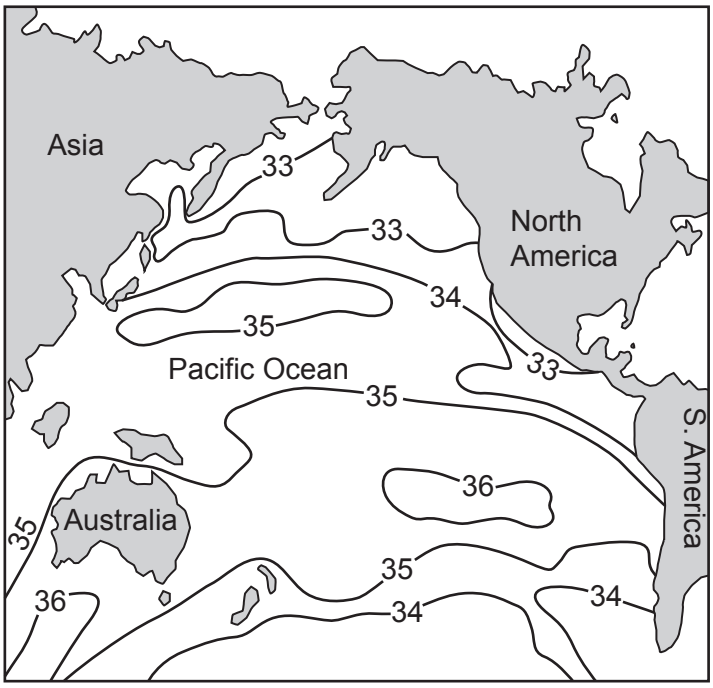

Fig. 2.2

(i) State the range of salinities in the Pacific Ocean shown in Fig. 2.2.

..... [1]

(ii) Explain how **three** environmental factors cause the variation of salinities shown in Fig. 2.2.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Salinity affects the density of sea water.

(i) Describe a method to find the density of a sample of sea water.

.....

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..... [3]

(ii) Explain how changes to water temperature can cause convection currents.

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..... [2]

[Total: 14]

3 Aquaculture can be used to produce large quantities of grouper for human consumption.

(a) Grouper provide a rich source of protein in the human diet.

(i) Describe how to test a sample of a grouper for protein.

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..... [3]

(ii) State **one** function of protein in the diet.

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..... [1]

(b) Suggest **two** methods that are used to reduce the spread of disease in aquaculture systems.

1 .....

.....

2 .....

.....

[2]

(c) Grouper can be fed with standard pellets which are made from fish collected from the sea.

Scientists investigated the growth of grouper using a new type of feed pellets made from plant protein.

Two cages with grouper were set up. The grouper in one cage were fed with standard pellets. The grouper in the second cage were fed with pellets made from plant protein.

Equal numbers of grouper of the same size and age were placed into each cage.

The mean mass of the grouper in each cage was determined each month for six months. The results are shown in Table 3.1.

Table 3.1

month	mean mass of grouper / g	
	fed with standard pellets	fed with plant protein pellets
0	220	220
1	250	245
2	275	280
3	300	305
4	355	350
5	475	450
6	855	800

(i) Over six months the mean mass of grouper fed with standard pellets increased by 635 g.

Calculate the increase in mean mass of grouper fed with plant protein pellets over six months.

increase in mean mass = ... g [1]

(ii) When fed with standard pellets, the mean growth rate of grouper was 106 g per month over the six-month period.

Use your answer to **(c)(i)** to calculate the mean growth rate of the grouper fed with plant protein pellets.

Give your answer to the nearest whole number.

mean growth rate = ... g per month [1]

(iii) Equal numbers of grouper of the same size and age were placed into each cage.

State **two** other variables that need to be kept constant in this investigation.

1 .....

2 .....
[2]

(iv) The scientists claim that the plant protein pellets are better for the environment and will **not** affect the profitability of grouper aquaculture.

Evaluate the scientists' claim.

Use the data in Table 3.1 to support your answer.

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..... [3]

[Total: 13]

4 A student investigates the distribution of lugworms and clams in the intertidal zone of a sandy shore from the low tide level towards the high tide level.

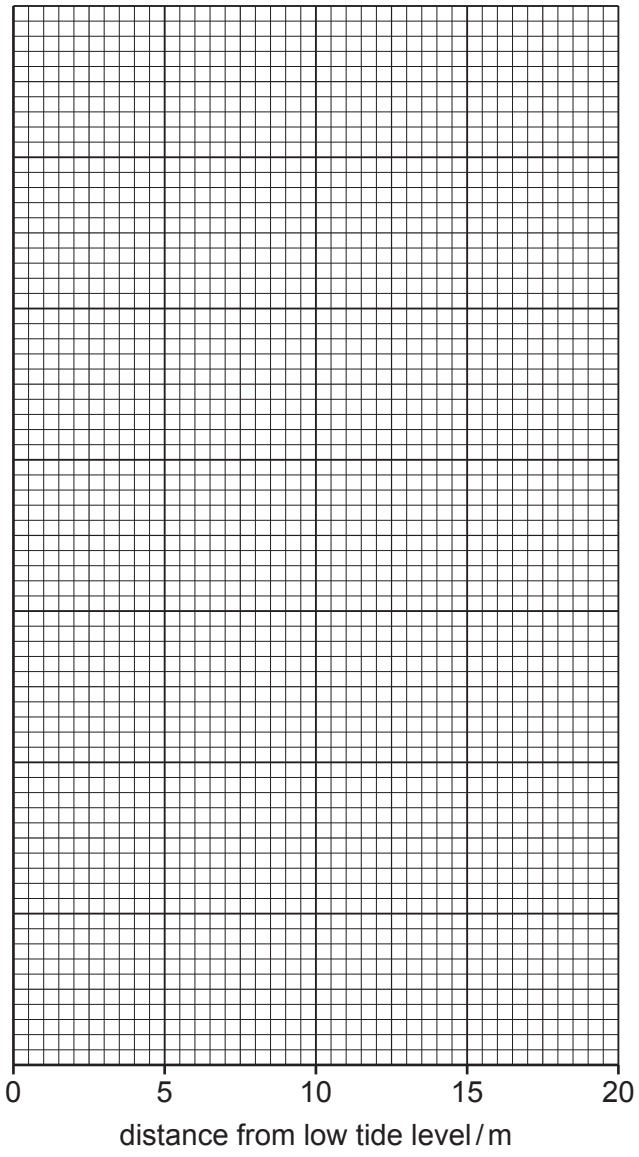
Table 4.1 shows the data collected.

Table 4.1

distance from low tide level /m	number of organisms per m^2	
	lugworm	clam
0	10	8
5	8	14
10	4	12
15	1	6
20	0	2

(a) (i) Draw a line graph to show the numbers of lugworms and clams between 0 m and 20 m from the low tide level, as shown in Table 4.1.

Join your points for each set of data with ruled, straight lines.
Label each line clearly.



[5]

(ii) Compare the distributions of lugworms and clams along the shore.

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..... [2]

(iii) Outline a method to collect the data in Table 4.1.

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..... [3]

(b) Explain how lugworms are adapted to live on sandy shores.

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..... [4]

[Total: 14]

Question 5 starts on the next page.

5 Nutrients, such as nitrogen, cycle through marine ecosystems.

(a) Explain how nitrogen in the organic molecules of fish is eventually taken up by producer organisms in the ocean.

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..... [4]

(b) Fertilisers from land farming often cause pollution if they run off into the sea.

A group of students investigate the effect that adding a fertiliser to samples of sea water has on the oxygen concentration of the water.

This is the method the students use.

- Fill five 500 cm^3 beakers with sea water with an oxygen concentration of 4 mg per dm^3.
- Add a different number of drops of liquid fertiliser to the sea water in each beaker.
- Leave the beakers of sea water on a window ledge for a total of eight weeks.
- Use an oxygen meter to measure the oxygen concentration of the sea water at four weeks and at eight weeks.

The students' results are shown in Fig. 5.1.

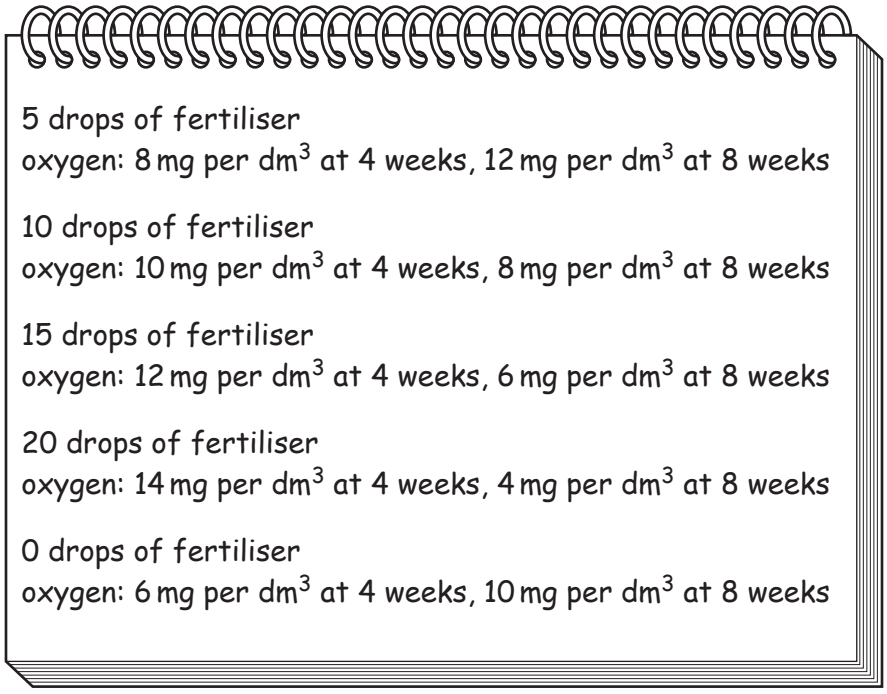

Fig. 5.1

(i) Draw a suitable table for recording the results shown in Fig. 5.1.

In your table, write the results in order from the lowest to the highest number of drops of fertiliser added.

[4]

(ii) Suggest an explanation for the increases in oxygen concentration over the first four weeks.

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..... [2]

(iii) When more than five drops of fertiliser were added, the oxygen concentrations decreased at eight weeks.

Suggest an explanation for these decreases in oxygen concentration.

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..... [2]

(iv) Explain **two** ways to improve this investigation.

1 .....

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2 .....

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[4]

[Total: 16]

Question 6 starts on the next page.

6 Pelagic trawling is a method of fishing.

(a) (i) Describe the method of pelagic trawling.

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..... [2]

(ii) State **one** negative environmental impact of pelagic trawling.

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..... [1]

(b) Benthic trawling along the seabed is another method of fishing.

One impact of benthic trawling is increased sediment release from the seabed into the water column. The sediment affects light penetration.

Describe an investigation to test the impact of benthic trawling on light penetration in the water column. Your method should include a relevant safety precaution.

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..... [6]

[Total: 9]

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