Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MARINE SCIENCE **0697/02**

Paper 2 **May/June 2022**

1 hour 30 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 60.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

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Section A

Answer **both** questions in this section.

Write your answers in the spaces provided.

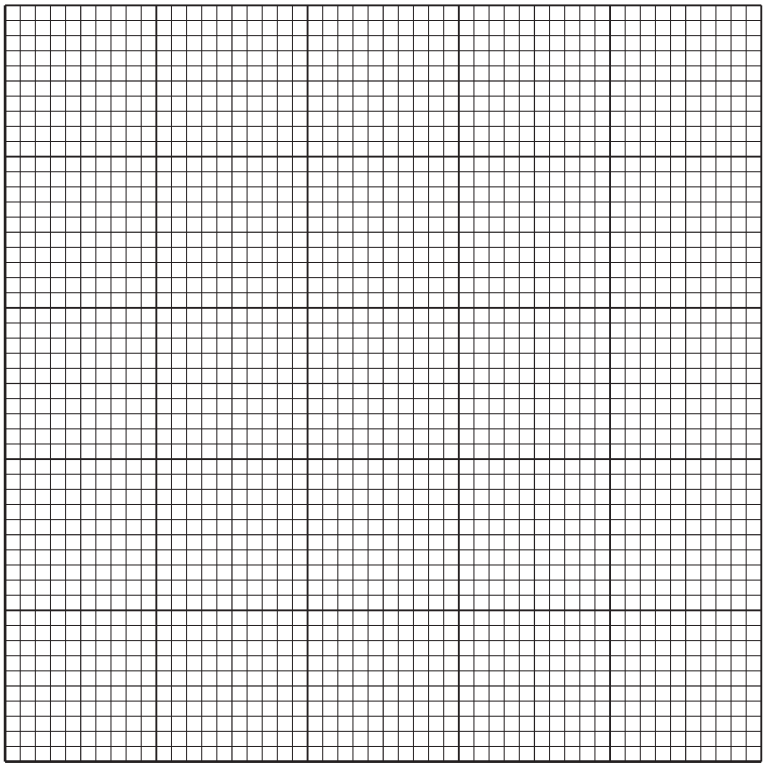
1 Table 1.1 shows information about the catch for yellowfin tuna using pole and line.

Table 1.1

year	catch /tonnes	fishing effort /days	catch per unit effort (CPUE) /tonnes per day
2013	19000	63247	0.30
2014	18000	36144	0.50
2015	16000	22877	0.70
2016	8500	29061	0.29
2017	17500	25042	0.70
2018	18200	26640	

(a) (i) Draw a line graph to show the catch each year between 2013 and 2018.

Join your points with straight, ruled lines.



[5]

(ii) Describe the change in catch between 2013 and 2018.

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..... [2]

(iii) The catch per unit effort (CPUE) was calculated using the formula:

$$\text{catch per unit effort (CPUE)} = \frac{\text{catch}}{\text{fishing effort}}$$

Use Table 1.1 to calculate the CPUE for 2018.

CPUE = ... tonnes per day [1]

(iv) Suggest **two** reasons for the change in CPUE between 2015 and 2016.

1 .....

2 .....

[2]

(v) The fishing effort was measured as the number of days of fishing of all the boats in the fleet.

Suggest why this method of determining fishing effort may not be an accurate measure of the true effort used in catching the fish.

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..... [1]

[Turn over

(b) To conserve fish stocks, scientists investigated the effect of building artificial reefs.

An artificial reef was placed on the sea bed. Each year, the scientists recorded:

- the percentage of the artificial reef covered with coral polyps
- the number of different species found on and around the reef
- the catch of rainbow runner fish.

The results are shown in Table 1.2.

Table 1.2

year	percentage of artificial reef covered with coral polyps	number of different species found	catch of rainbow runner fish / kg
2008	2	5	435
2010	10	14	415
2012	30	22	490
2014	40	28	550
2016	50	27	645

The coral on the reef contained zooxanthellae.

Rainbow runner fish are high trophic level predators.

Use the data in Table 1.2 to suggest an explanation for the change in catch of rainbow runner fish over time.

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[Total: 15]

2 Seafood is a major source of nutrition for humans.

(a) Table 2.1 shows the masses of some nutrients found in a range of seafoods.

Table 2.1

seafood	mass of nutrient in 84 g of seafood / g				
	fat	protein	glycogen	vitamin A	calcium
cod	1.0	20	0	0.000	0.013
lobster	0.5	17	1	0.018	0.078
oyster	4.0	10	6	0.000	0.078
salmon	10.0	24	0	0.036	0.013
tuna	1.5	26	0	0.018	0.013

(i) State which of the seafoods in Table 2.1 has the highest mass of polysaccharide.

..... [1]

(ii) The recommended daily mass of protein required by a 16-year-old is 50 g.

Use Table 2.1 to calculate the mass of tuna that would provide 50 g of protein.
State the units.
Show your working.

..... [2]

(iii) Explain which of the seafoods in Table 2.1 is most likely to go rancid if exposed to the air for a long period of time.

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(b) The shelf life of food is the length of time that the food is fit for human consumption. Temperature and method of handling of seafood can affect shelf life.

Fig. 2.1 shows the results of an investigation into the effect of temperature on the shelf life of seabream.

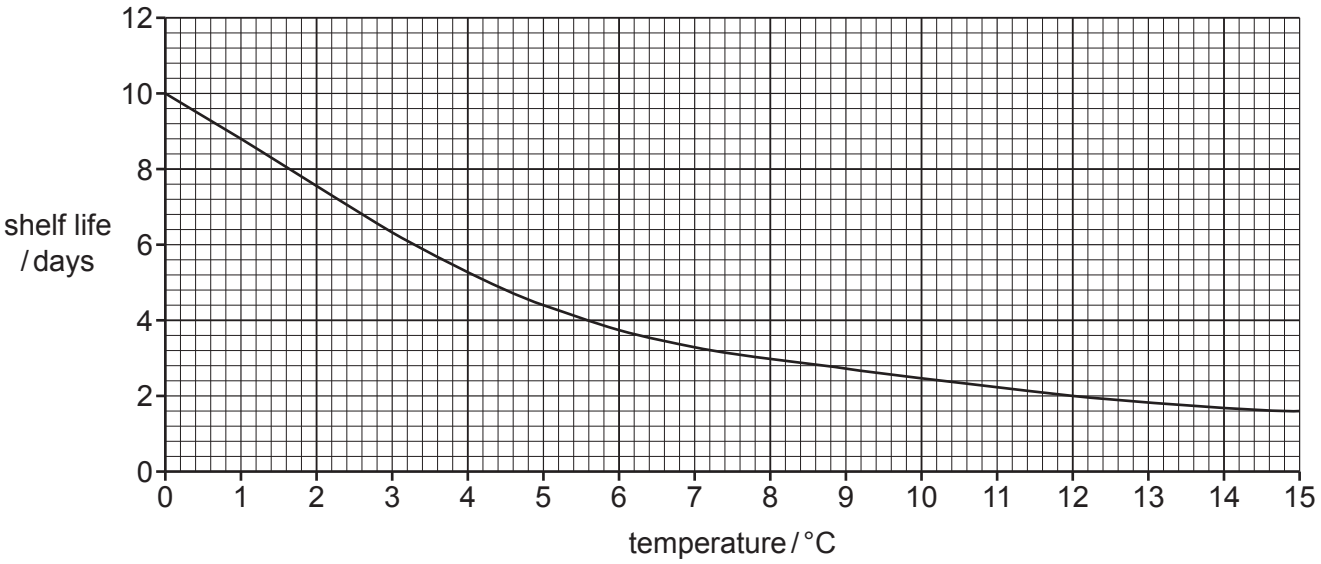

Fig. 2.1

(i) Use Fig. 2.1 to determine the increase in shelf life of seabream stored at 0 °C compared to seabream stored at 12 °C.

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(ii) Use your answer to **(b)(i)** to calculate the percentage increase in shelf life between seabream stored at 0 °C and seabream stored at 12 °C.
Show your working.

.....% [2]

(c) The effect of different handling and cleaning methods on the quality of the fish over time was also investigated.

Seabream were caught and treated with three different methods, A, B and C.

A: rough handling; fish stored in dirty ice inside boxes that had not been cleaned
B: careful handling; fish stored in clean ice inside boxes cleaned with water
C: careful handling; fish stored in clean ice inside boxes treated with chemical disinfectants

The quality of the fish was scored on a scale of 1 to 10 each day, with 10 being the highest quality and 1 the lowest quality.

The fish was no longer fit for consumption when the quality was scored below 4.

The results are shown in Fig. 2.2.

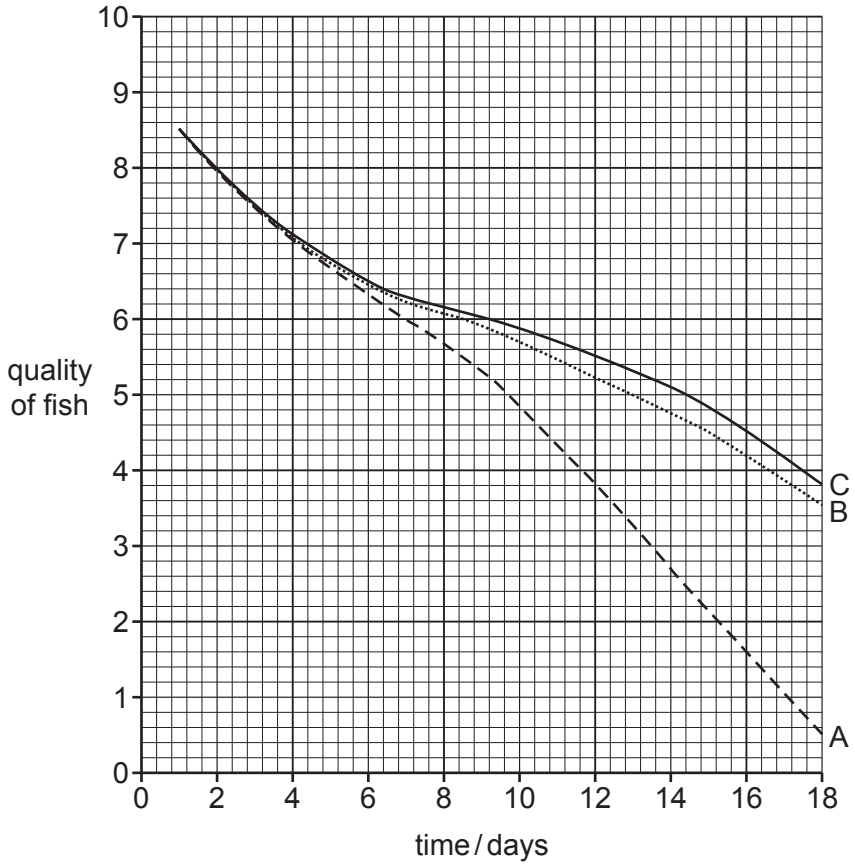

Fig. 2.2

(i) Use Fig. 2.2 to suggest why method B is recommended as the best preservation method for fish stored on boats.

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(ii) Use Fig. 2.1 and Fig. 2.2 to suggest explanations for the effects of the three different methods of treatment on the quality of fish.

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[Total: 15]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

3 **(a)** Outline the features of wet and dry monsoons.

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(b) Outline how the chemical properties of sea water affect marine life.

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[Total: 15]

4 **(a)** **(i)** Describe the use of pelagic long-lines.

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(ii) Explain the principles of fish aggregating devices (FADs).

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(b) Describe the uses of **three** named navigational aids found on fishing boats.

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[Total: 15]