Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

MARINE SCIENCE **5180/02**

Paper 2 **May/June 2023**

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 **16** pages. Any blank pages are indicated.

[Turn over

Section A

1 Anchovies are small pelagic fish that feed on plankton.

Skipjack tuna are predatory fish that feed on many species, including anchovies.

Scientists analysed the catch of anchovies and the catch of skipjack tuna from an area of the Pacific Ocean over five years.

The results are shown in Table 1.1.

Table 1.1

	catch of fish/thousand kg	
year	**anchovies**	**skipjack tuna**
2012	25	10
2013	35	15
2014	50	22
2015	25	30
2016	10	25

(a) (i) Plot a graph to show the catch of anchovies **and** the catch of skipjack tuna between 2012 and 2016. Join the points for each set of data with ruled, straight lines.
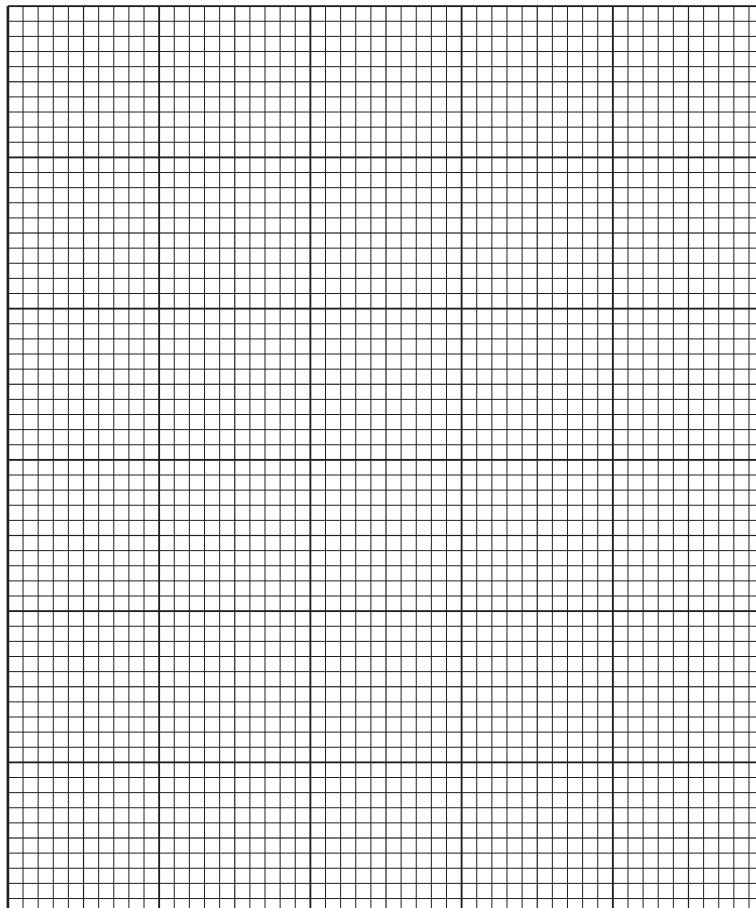
[5]

(ii) Describe the change in catch of anchovies between 2012 and 2016.

....

....

....

.... [2]

(iii) Use the data in Table 1.1 to suggest why the catch of skipjack tuna changed between 2012 and 2016.

....

....

....

....

....

.... [3]

(b) Scientists examined the gut contents of the skipjack tuna. The percentage of skipjack tuna with anchovies in their gut is shown in Table 1.2.

Table 1.2

year	percentage of skipjack tuna with anchovies in their gut
2012	75
2013	85
2014	65
2015	55
2016	

(i) In 2016, 500 skipjack tuna were analysed and 210 were found to have anchovies in their gut.

Calculate the percentage of skipjack tuna with anchovies in their gut in 2016.

....% [1]

(ii) Suggest **two** reasons why gut content analysis of the skipjack tuna may **not** be an accurate measure of the population of anchovies.

1 ....

....

2 ....

....
[2]

(c) Suggest **two** methods used by a government to keep the fishing of anchovies sustainable.

1 ....

....

2 ....

....
[2]

[Total: 15]

BLANK PAGE

2   Most salmon sold for food is produced by aquaculture.

Table 2.1 shows nutritional information for wild salmon, and salmon produced by aquaculture.

Table 2.1

nutritional component	amount of nutritional component per 100 g salmon	
	wild salmon	**aquaculture salmon**
protein / g	22	20
fat / g	7	13
iron / mg	0.5	0.3
vitamin D / mg	0.014	0.011
energy / joules	640	870

(a) (i) Give **one** essential component of a balanced diet that is **not** shown in Table 2.1.

.... [1]

(ii) Use data from Table 2.1 to calculate the mass of protein found in 2.4 kg of wild salmon.

Show your working.

....g [2]

(iii) Use Table 2.1 to suggest **two** explanations why some people think that it is healthier to eat wild salmon compared with aquaculture salmon.

1 ....

....

....

....

2 ....

....

....

....

[4]

(b) Salmon produced by aquaculture are fed on pellets made from other species of marine fish.

The fish in the pellets could be replaced with insect larvae grown on waste food materials.

Scientists compared the growth of salmon fed on pellets containing fish with the growth of salmon fed on pellets containing insect larvae.

Three factors were measured:

- change in mass of salmon over 114 days

- mass of faeces produced per kilogram of pellet

- mass of amino acid per gram of salmon.

The results are shown in Table 2.2.

Table 2.2

factor	salmon fed on pellets containing fish	salmon fed on pellets containing insect larvae
mean mass of salmon at the start / g	1398	1400
mean mass of salmon after 114 days / g	3702	3680
mean mass of faeces produced per kilogram of pellet / g	150	225
mean mass of amino acid per gram of salmon / mg	150	148

(i) State the name given to polymers of amino acids.

.... [1]

(ii) The rate of increase of mean mass of salmon fed on pellets containing fish is 20.2 gram per day.

Use Table 2.2 to calculate the rate of increase of mean mass of salmon fed on pellets containing insect larvae.

Show your working. State the unit.

.... [3]

(iii) A scientist suggested that the environmental sustainability of salmon aquaculture is improved by using pellets made from insect larvae instead of pellets made from fish.

Discuss the extent to which you agree with the scientist's suggestion. Use information from Table 2.1 and **(b)(ii)** in your answer.

....

....

....

....

....

....

....

.... [4]

[Total: 15]

Section B

3 **(a)** Name **one** boat building material and describe **one** property that makes it suitable for this.

material ....

property ....

....

[2]

(b) Describe the method **and** the environmental impacts of pelagic long-lining.

....

....

....

....

....

....

....

....

....

....

....

....

.... [5]

(c) Outline the principles of a four-stroke diesel engine.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

.... [8]

[Total: 15]

4 (a) Outline plate tectonic theory.

....

....

....

....

....

....

....

....

....

....

.... [4]

(b) (i) Outline the process of photosynthesis.

....

....

....

....

....

....

....

.... [3]

(ii) Explain how the physical and chemical properties of sea water affect the growth of primary producers.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

.... [8]

[Total: 15]

14

BLANK PAGE

BLANK PAGE

BLANK PAGE