Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MARINE SCIENCE **5180/02**

Paper 2 **October/November 2015**

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Section A
Answer **both** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer **both** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **11** printed pages and **1** blank page.

International Examinations

[Turn over

Section A

Answer **both** questions in this section.

1 Cod, haddock, plaice and whiting are commercially important species of fish caught in the North Sea.

Table 1.1 shows the spawning stock biomass of cod in the North Sea for the years 1990, 1995, 2000, 2005 and 2010.

Table 1.1

year	spawning stock biomass of cod /thousand tonnes
1990	80
1995	80
2000	50
2005	26
2010	52

(a) (i) Plot a line graph of the data in Table 1.1. Join the points on your graph with straight lines.
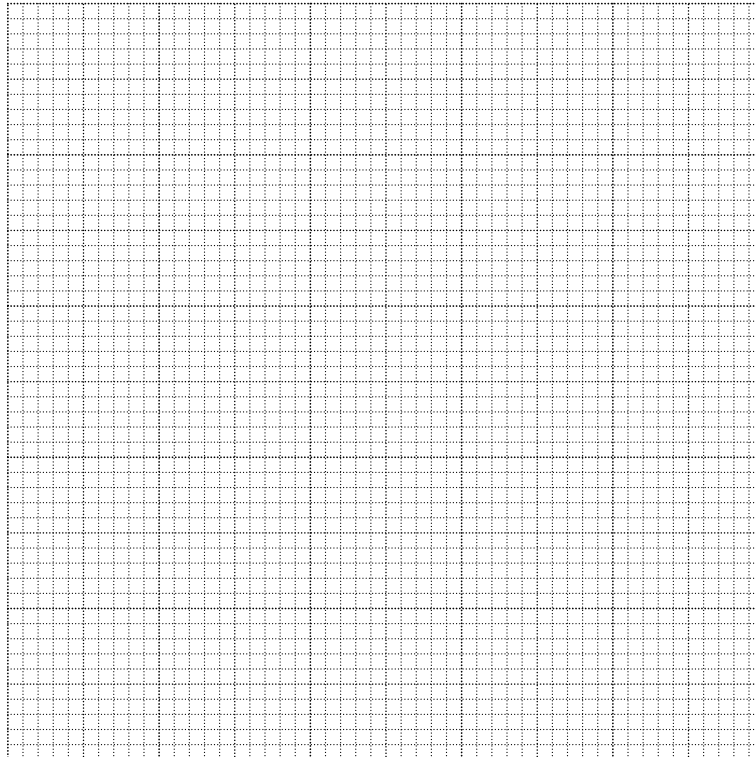
[5]

(ii) Describe the trend in the spawning stock biomass from 1990 to 2010.

....

.... [1]

(iii) Suggest what is meant by the term *spawning stock biomass*.

....

....

.... [2]

(b) Table 1.2 shows the spawning stock biomass for haddock, plaice and whiting every five years from 1990 to 2010.

Table 1.2

year	spawning stock biomass/thousand tonnes		
	haddock	**plaice**	**whiting**
1990	70	380	520
1995	160	200	410
2000	120	220	415
2005	390	230	210
2010	180	500	320

Use the information in Table 1.2 to find each of the following:

(i) the year in which the spawning stock biomass for haddock was the highest

.... [1]

(ii) the **two** species of fish with an overall increase in spawning stock biomass from 1990 to 2010

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

(iii) the overall change in spawning stock biomass for whiting, from 1990 to 2010.

answer = ... [2]

(c) Suggest **two** reasons for the change in the spawning stock biomass of whiting from 1990 to 2010.

1 ....

....

2 ....

.... [2]

[Total: 15]

2 Salmon are important food fish which may be harvested from wild stocks or produced by aquaculture.

Aquaculture of salmon is an important industry in Scotland, producing over 140 000 tonnes of salmon per year.

(a) Suggest **three** advantages of producing salmon by aquaculture, rather than harvesting wild salmon.

1 ....

....

2 ....

....

3 ....

.... [3]

(b) Salmon in aquaculture may become infested with sea lice. Sea lice are considered to be pests because they are external parasites of salmon.

Suggest what effect sea lice would have on the yield of salmon. Give a reason for your answer.

effect ....

....

reason ....

.... [2]

(c) Residues of pesticides in food are carefully measured.

Table 2.1 shows the concentrations of pesticide residues in eight samples of wild salmon and in eight samples of salmon produced in aquaculture.

Table 2.1

sample number	concentration of pesticide residues/mg per kg	
	in wild salmon	in salmon produced by aquaculture
1	0.003	0.009
2	0.000	0.003
3	0.004	0.010
4	0.003	0.009
5	0.000	0.010
6	0.010	0.010
7	0.007	0.008
8	0.003	0.020
mean		

(i) Complete Table 2.1 by calculating the mean concentrations of pesticide residues in wild salmon and in salmon produced by aquaculture.

Write your answers in the empty boxes in Table 2.1. [2]

(ii) Compare the mean concentration of pesticide residues in wild salmon with the mean concentration of pesticide residues in salmon produced by aquaculture. Suggest a reason for the difference.

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.... [3]

(iii) Suggest **two** economic considerations which should be made before using pesticides in aquaculture operations.

1 ....

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2 ....

.... [2]

(d) Stocking density is important in aquaculture. Stocking density is the mass of fish per unit volume of water.

Some organisations recommend a maximum stocking density for salmon of 22 kg per m^3 of water.

Suggest **three** reasons why a high stocking density may reduce the yield of salmon produced in aquaculture.

1 ....

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2 ....

....

3 ....

.... [3]

[Total: 15]

Turn over for Section B

       [Turn over

Section B

Answer **both** questions in this section.

3   **(a)** Freshly-caught fish may spoil rapidly. Explain what is meant by each of the following types of spoilage.

   (i) *rigor mortis*

   ....

   ....

   ....

   ....

   ....

   ....

   .... [3]

   (ii) *autolysis*

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   ....

   .... [2]

   (iii) *rancidity*

   ....

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   ....

   .... [2]

   (iv) *putrefaction*

   ....

   ....

   ....

   .... [2]

(b) Compare the appearance of a fresh fish with a spoilt fish.

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.... [6]

[Total: 15]

4 (a) Give **three** features of a typical fishing boat.

1 ....

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2 ....

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3 ....

.... [3]

(b) Outline the functioning of a 4-stroke diesel engine.

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.... [8]

(c) Explain the principle of a fish aggregating device (FAD).

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.... [4]

[Total: 15]

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