Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

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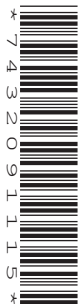
MARINE SCIENCE **5180/02**

Paper 2 **October/November 2017**

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.

[Turn over

Section A

Answer **both** questions in this section.

Write your answers in the spaces provided.

1 **(a)** Table 1.1 shows the catch of six commercially important species by one State on the east coast of America.

The figures give the total catch for each of the five years from 2009 to 2013.

Table 1.1

species	catch/tonnes				
	2009	**2010**	**2011**	**2012**	**2013**
barracuda	52.0	50.7	19.4	8.3	8.5
blue crab	734.6	1146.4	1448.5	1543.9	993.2
flounder	10.2	8.6	12.8	1.5	2.9
octopus	1.8	0.3	3.4	0.0	0.1
sea bass	21.7	41.4	61.1	32.7	25.8
swordfish	380.3	466.3	483.9	609.2	376.9

Use the information in Table 1.1 to find each of the following.

(i) The **two** species with the highest catch in 2009.

.... and .... [1]

(ii) The catch of sea bass in 2012.

.... tonnes
[1]

(iii) The total catch of all six species in 2013.

....[2]

(b) (i) State the trend in the catches of barracuda from 2009 to 2013.

....

....[1]

(ii) Suggest **two** reasons for this trend.

1 ....

....

2 ....

....
[2]

(c) Table 1.2 gives information about the economic value of swordfish catches from 2009 to 2013.

Table 1.2

year	total value of catch /thousand dollars	value per tonne /thousand dollars
2009	2385	6.27
2010	3678	7.89
2011	4005	8.28
2012	4837	7.94
2013	3287	

(i) Use the data in Table 1.1 **and** Table 1.2 to calculate the value per tonne of swordfish in 2013.

Show your working.

.... thousand dollars
[2]

(ii) Use the data in Table 1.2 to compare the value per tonne of swordfish in 2009 with the value per tonne in 2012.

....

....

....

....[2]

(iii) Suggest an explanation for your answer to **1(c)(ii)**.

....

....[1]

(d) Flounders are demersal fish.

Suggest a suitable fishing method for flounders. Give an explanation for your answer.

....

....

....

....

....

....[3]

[Total: 15]

2 Growth rates and the age of fish populations are important for the management of fish stocks.

(a) In an investigation, marine fish were reared in large tanks of sea water.

Every two weeks, from 10 weeks of age until 24 weeks of age, samples of fish were removed. The length of each fish was measured and the mean calculated.

Fig. 2.1 shows the results of this investigation.
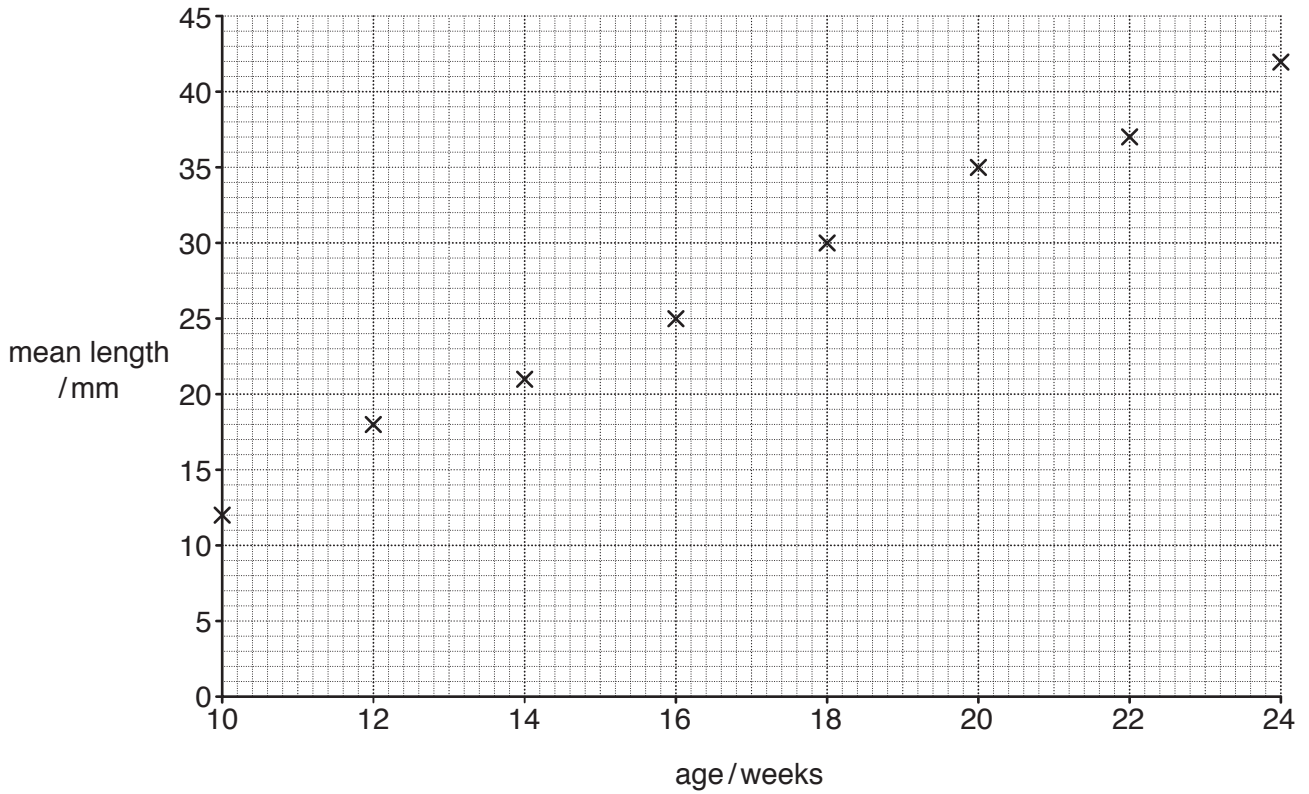
Fig. 2.1

(i) Draw a line of best fit through the points on Fig. 2.1. [1]

(ii) Use Fig. 2.1 to find the mean length of fish at 19 weeks of age. On Fig. 2.1, show how you obtained this value.

.... mm
[2]

(iii) Explain how the mean length of a sample of fish is calculated.

....

....

....

....[2]

(iv) Table 2.1 shows some of the data from Fig. 2.1.

Table 2.1

age/weeks	mean length/mm
10	12
24	42

Use the information in Table 2.1 to calculate the growth rate of these fish.

Show your working.

.... mm per week

[2]

(v) Suggest **three** factors that could affect the growth rate of these fish.

1 ....

2 ....

3 ....

[3]

(b) (i) One method of estimating the size of a population is tag-release-recapture.

In this method, a sample of fish is caught and the fish are tagged so that they can be identified. These fish are then released. A second sample of fish is then captured and the number of these fish with a tag is recorded.

The following formula is used to calculate the population size:

$$\text{population size} = \frac{N_1 \times N_2}{N_3}$$

where
N_1 is the number of fish caught and tagged
N_2 is the total number of fish in the second sample
N_3 is the number of tagged fish in the second sample.

Table 2.2 shows the results of one investigation that used tag-release-recapture.

Table 2.2

number of fish caught and tagged (N_1)	315
total number of fish in the second sample (N_2)	4560
number of tagged fish in the second sample (N_3)	25

Use the formula to calculate the population size.

Show your working.

....
[3]

(ii) Suggest **two** reasons why this method may give inaccurate results.

1 ....

....

2 ....

....
[2]

[Total: 15]

   [Turn over

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

3 **(a)** State what is meant by the term *biodiversity*.

....

....[1]

(b) Describe the characteristic **external** features of each of the following groups of animals.
Give **one** example of each group from the marine environment.

(i) arthropods

features ....

....

....

....

example ....

[3]

(ii) echinoderms

features ....

....

....

....

example ....

[4]

(c) Describe the life cycle and growth of corals.

....

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....[7]

[Total: 15]

4 **(a)** Modern fishing boats have a number of navigational aids.

Explain the use of each of the following navigational aids.

(i) compass

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....[2]

(ii) radar

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....[2]

(iii) echo sounder

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....[2]

(b) Discuss the advantages of producing fish by aquaculture, compared with harvesting wild stocks.

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....[9]

[Total: 15]

12

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