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MARINE SCIENCE

0697/03

Paper 3 Practical Assessment Paper

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. Any blank pages are indicated.

1 Fig. 1.1 shows a species of flat fish.

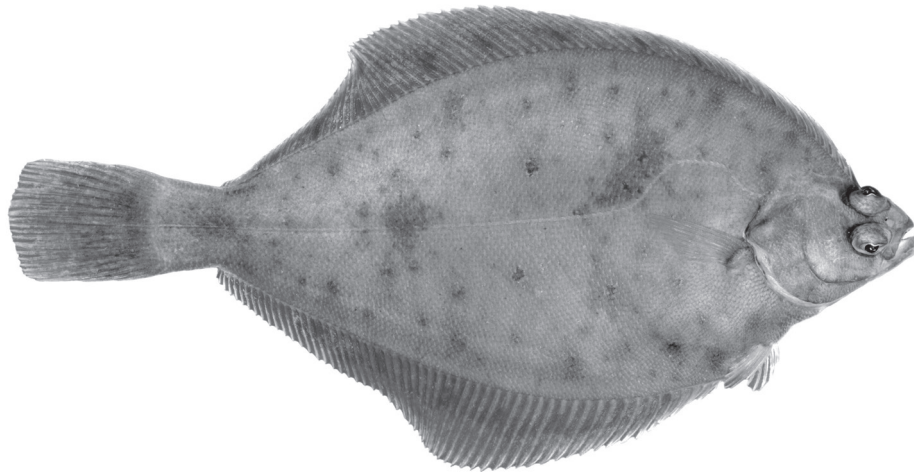


Fig. 1.1

(a) Make a large drawing of the specimen shown in Fig. 1.1.

Do **not** show all the markings.

[4]

(b) (i) On your diagram label the following features:

- the operculum
- the lateral line
- a named median fin.

[3]

(ii) The actual total length of the fish is 23 cm.

Add a scale line to your drawing.

[1]

(iii) Use the information in **1(b)(ii)** and the formula provided to calculate the magnification of the fish in Fig. 1.1.

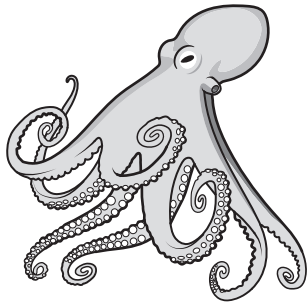
$$\text{magnification} = \frac{\text{image length}}{\text{actual length}}$$

Space for working.

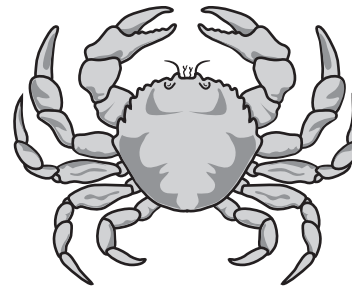
..... [3]

[Total: 11]

2 (a) Fig. 2.1 shows two species of invertebrate, **A** and **B**.



A



B

not to scale

Fig. 2.1

(i) State the phylum that each species belongs to.

A

B

[2]

(ii) Using Fig. 2.1, complete Table 2.1 to show similarities and differences between the two species.

Table 2.1

feature	species A	species B
number of limbs
type of limbs
position of eyes
antennae

[4]

(b) A student investigates how tide height varies over a 24-hour period at one location.

Fig. 2.2 shows the graph from the data collected.

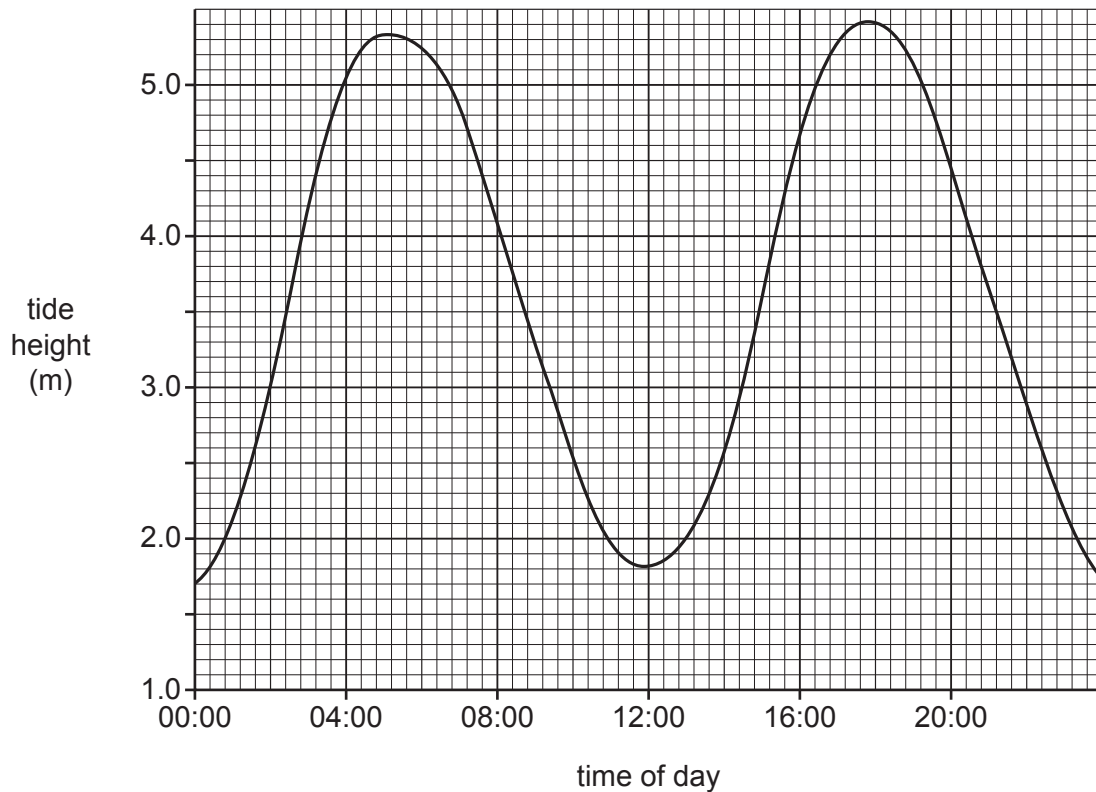


Fig. 2.2

Use Fig. 2.2 to

- (i) state the time of the first high tide of the day [1]
- (ii) state the height of the tide at 14:00 m [1]
- (iii) calculate the time between a high tide and the next low tide.

..... [1]

- (c) A student takes samples of sea water during the day. The student measures the density of the water samples.

Fig. 2.3 shows the results.

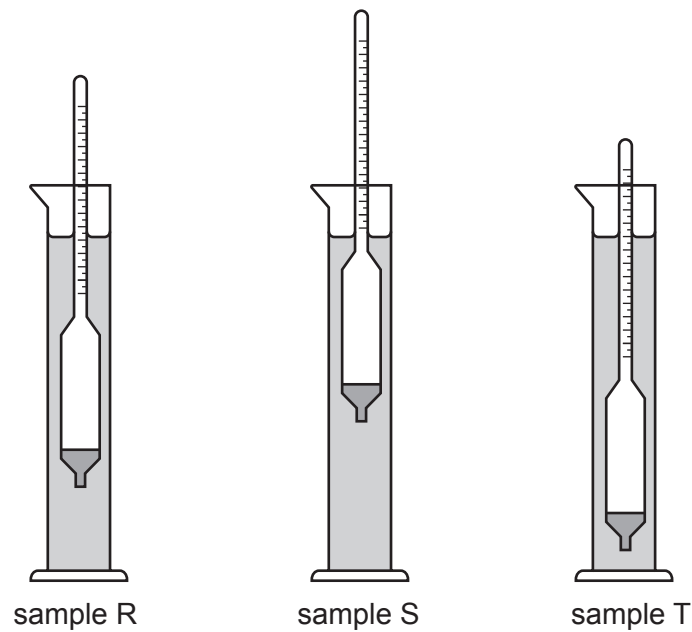


Fig. 2.3

- (i) Name the piece of equipment placed into the water that is used to measure density.

..... [1]

- (ii) Order the samples in Fig. 2.3 from least dense to most dense.

least dense

.....

most dense

[1]

[Total: 11]

- 3 A student compares the density of the shells of three different species of marine mollusc from a rocky shore.

They collected ten shells for each species from the same beach area.

- (a) Describe a method to find the mean shell density for each species.

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..... [4]

- (b) The student notes that the shells of each species are a different shape.

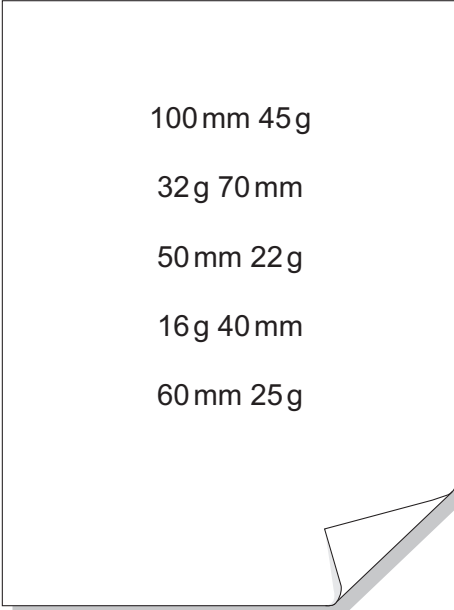
Describe a method they could use to investigate which shell shape is the most streamlined.

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..... [4]

[Total: 8]

- 4 A student investigated the relationship between the length and mass of mussel shells. They randomly selected five shells from an exposed rocky shore.

Fig. 4.1 shows a page from their notebook where they recorded their results.



100mm	45g
32g	70mm
50mm	22g
16g	40mm
60mm	25g

Fig. 4.1

- (a) (i) Use the information in Fig. 4.1 to complete Table 4.1 by ranking the data from shortest to longest shell.

Include headings for each column.

Table 4.1

[3]

- (ii) The mean length of the five mussel shells is 64 mm.

Calculate the mean mass of the mussel shells.

Show your working.

mean massg [2]

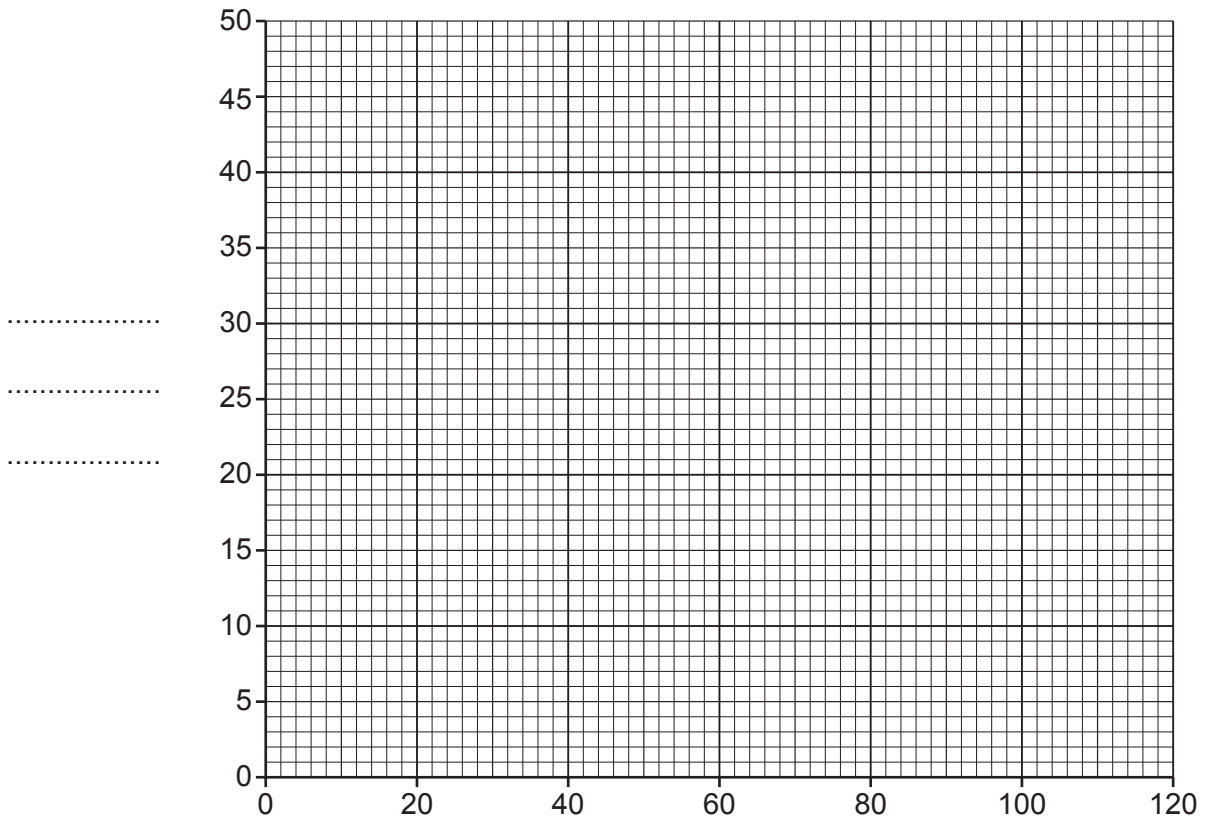
(iii) Calculate the simplest ratio for shell length : shell mass.

..... [1]

(b) (i) Use the information in Table 4.1 to complete the graph in Fig. 4.2 by plotting length against mass of mussel shells.

Draw a line of best fit through the data points.

Include labels for the axes.



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..... [3]

Fig. 4.2

(ii) Use your graph to estimate the mass of shell that has a length of 90 mm.

..... [1]

(iii) State the relationship between length and mass of the mussel shells.

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..... [1]

- 5 A student notices that the distribution of barnacle species varies with the distance from the low tide level on a rocky shore.

The student forms the following hypothesis.

As the distance from the low tide level increases up a rocky shore, the number of all barnacle species decreases.

- (a) Design and describe an investigation which you could carry out to test this hypothesis.

Use the headings given to structure your answer.

- Method, including all the equipment needed and a safety precaution.
- Presentation and analysis of the results.

Method, including all the equipment needed and a safety precaution.

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Presentation and analysis of the results.

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[14]

(b) Describe the limitations of your method and suggest improvements.

Suggest further work to extend the investigation.

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[5]

[Total: 19]

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