



1 Fig. 1.1 is an image of a sohal surgeonfish.

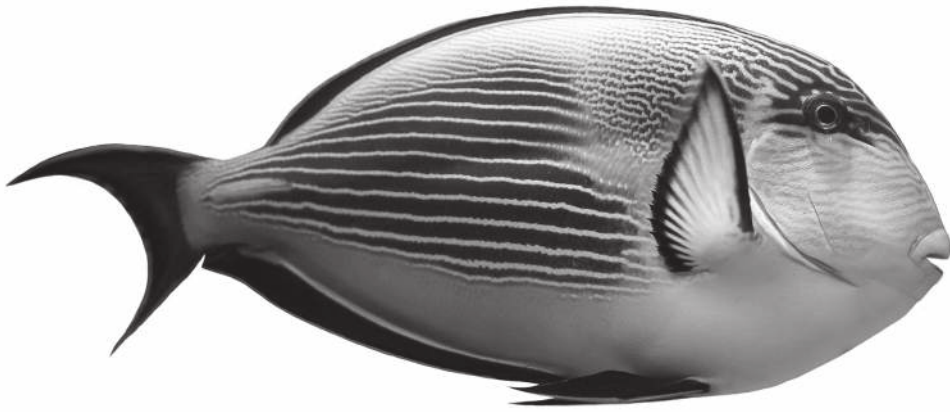


Fig. 1.1

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

Do **not** show the markings.

[4]

(b) On your drawing label each of the following features:

- a median fin (for example the caudal fin)
- a paired fin (for example a pelvic fin)
- the operculum.

[3]

- (c) (i) Measure the length of the image of the fish in Fig. 1.1.

image length = ..... cm [1]

- (ii) The magnification of the image of the fish in Fig. 1.1 is  $\times 0.4$ .

Calculate the actual length of the fish in Fig. 1.1.

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

State the unit.

actual length = ..... [2]

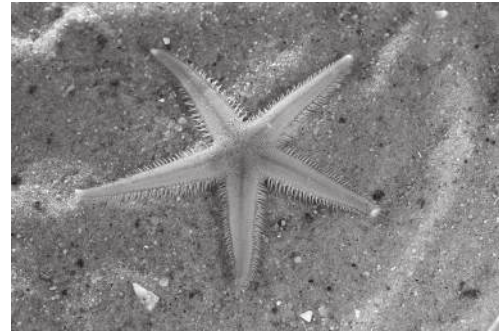
- (iii) On your drawing of the fish, draw a suitable scale line to show the actual length of the specimen. [1]

[Total: 11]

2 Fig. 2.1 shows a giant clam and Fig. 2.2 shows a starfish.



**Fig. 2.1**



**Fig. 2.2**

(a) Name the group each species belongs to.

giant clam .....

starfish .....

[2]

(b) Table 2.1 shows some features used to help identify species.

Complete Table 2.1 by:

- placing a tick (✓) in the box if the feature is present for the organism
- placing a cross (✗) in the box if the feature is absent.

**Table 2.1**

feature	giant clam	starfish
shell		
tube feet		
penta-radial (5-fold) symmetry		
tentacles		

[4]

(c) The giant clam is a filter feeder. To examine what giant clams may be feeding on, a sample of water was taken from their habitat. Fig. 2.3 shows a sample from the water when examined under a microscope.

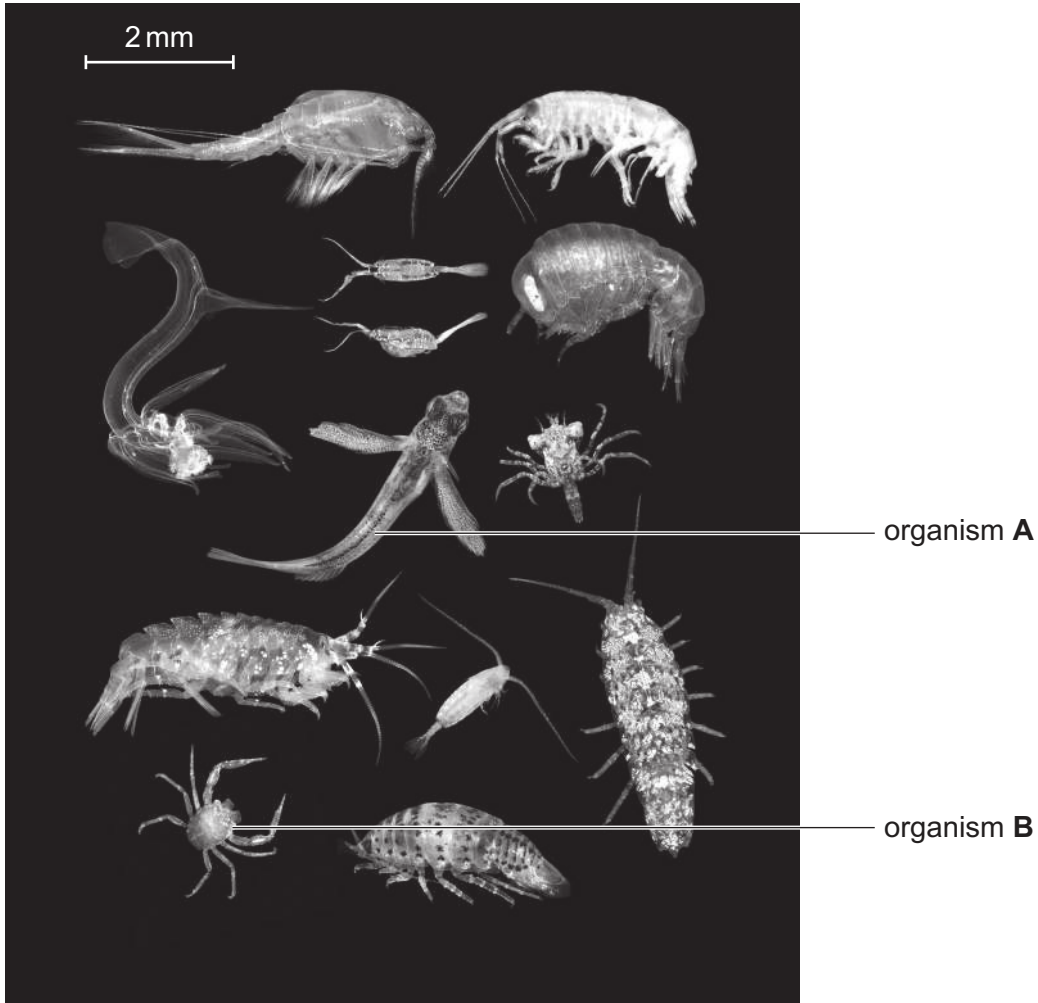


Fig. 2.3

(i) Name the type of organisms shown in the photograph.

..... [1]

(ii) Describe **three** features, visible in Fig. 2.3, that show how organism **A** differs from organism **B**.

1 .....

2 .....

3 .....

[3]

[Total: 10]

3 (a) Fig. 3.1 shows a mussel. Fig. 3.2 shows a population of mussels.



**Fig. 3.1**



**Fig. 3.2**

A class of students wanted to find the mean volume of mussels living on a rocky shore. They chose ten mussels at random from the shore.

(i) Explain how to select a random sample.

.....

.....

.....

.....

.....

.....

..... [3]



- (b) The class of students investigated the number of organisms at each trophic level in this community.

Their data is shown in Table 3.1.

**Table 3.1**

<b>organism</b>	<b>trophic level</b>	<b>number of organisms</b>
phytoplankton	1	12 700
zooplankton	2	6 530
mussels	3	63
shore crabs	4	1

- (i) In the space below, draw a pyramid of numbers to represent the data shown in Table 3.1.

[3]

- (ii) Suggest why it would be difficult for the class of students to count the exact number of phytoplankton and zooplankton.

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

[Total: 12]





- 4 A tilapia aquaculture operation investigated the growth rate of its fish.

The aquaculture operation collected data on the length and mass of each of seven fish from one pond and recorded the data in a notebook.

- (a) Fig. 4.1 and Fig. 4.2 show the last fish being measured.



Fig. 4.1

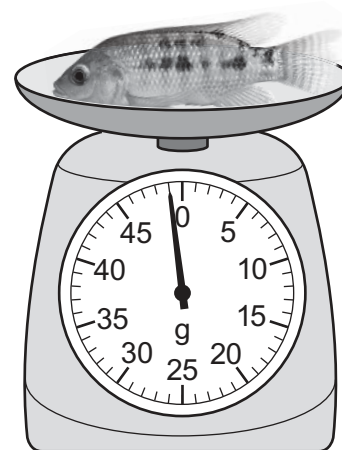


Fig. 4.2

Use Fig. 4.1 to measure the length of this fish.

Use Fig. 4.2 to measure the mass of this fish.

Write both measurements in Fig. 4.3.

Fish 1 length = 12.2 cm	mass = 36g
Fish 2 length = 15.6 cm	mass = 61g
Fish 3 length = 14.1 cm	mass = 52g
Fish 4 length = 13.9 cm	mass = 49g
Fish 5 length = 14.8 cm	mass = 58g
Fish 6 length = 14.3 cm	mass = 52g
Fish 7 length = _____ cm	mass = _____ g

Fig. 4.3

[2]

(b) Draw a table of results for the data shown in Fig. 4.3, including fish 7.

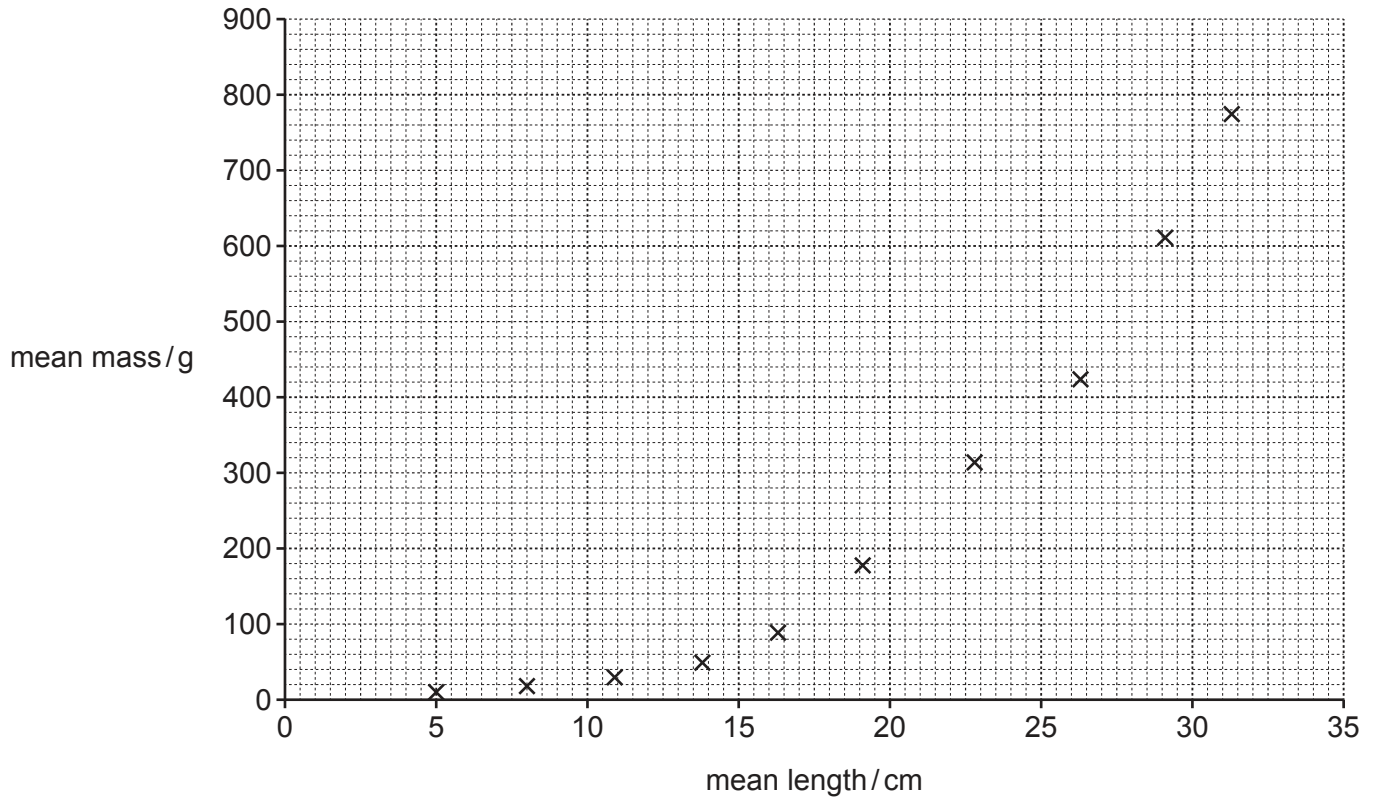
In your table rank by **fish length** from smallest to largest.

[4]

(c) The tilapia aquaculture operation had 10 ponds of fish.

Fig. 4.4 shows the relationship between mean length and mean mass for fish in each of the tilapia ponds.

Each data point represents the mean length and mean mass of fish in one pond.



**Fig. 4.4**

(i) Draw a curve of best fit through the data points in Fig. 4.4. [1]

(ii) Use your curve of best fit to estimate the mass of a fish which has a length of 25 cm.

..... g [1]

(iii) State the relationship between the mean length and mean mass of the fish shown in Fig. 4.4.

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

[Total: 9]







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