

3 (a) Fig. 3.1 is a photograph of a necklace starfish, *Fromia monilis*.

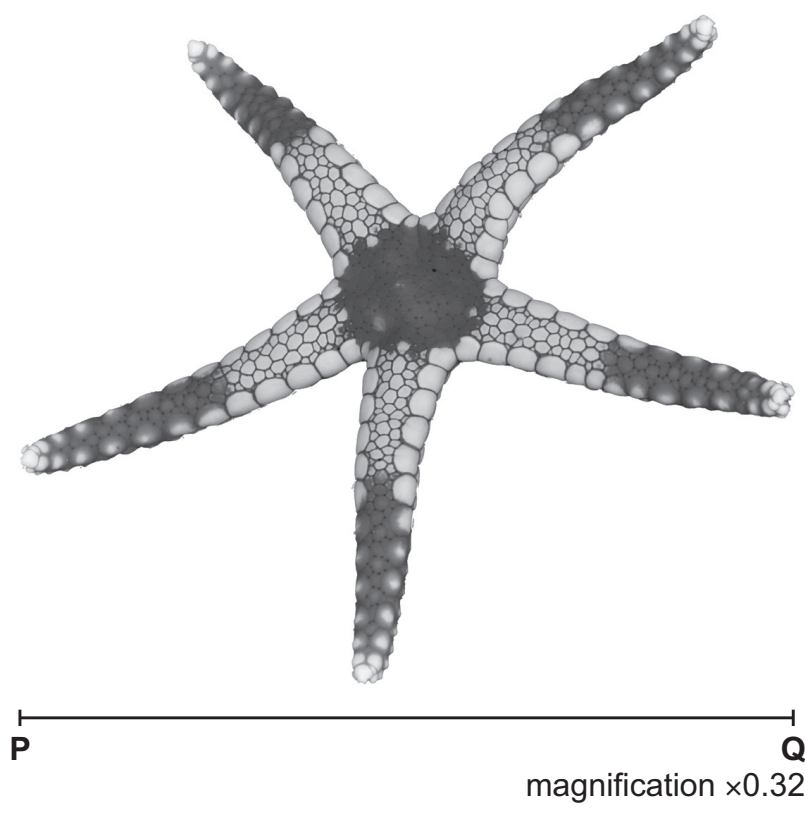


Fig. 3.1

(i) Draw a large diagram of the necklace starfish shown in Fig. 3.1.

[4]

(ii) Line PQ in Fig. 3.1 represents the diameter of the necklace starfish.

Measure the length of line PQ in Fig. 3.1.

length of line PQ mm

Calculate the actual diameter of the necklace starfish using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line PQ in Fig. 3.1}}{\text{actual diameter of the necklace starfish}}$$

Give your answer to **two** significant figures.

Space for working.

..... mm
[3]

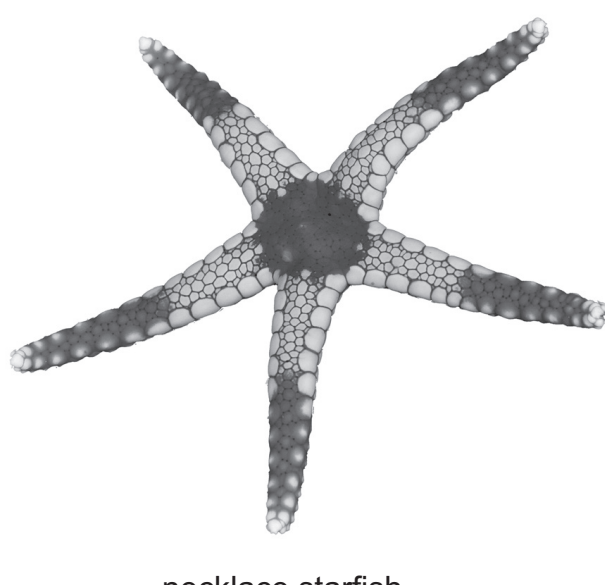
(iii) Fig. 3.2 is a photograph of a spiny starfish, *Marthasterias glacialis*. Fig. 3.3 is a photograph of a necklace starfish.

The magnifications of the photographs are **not** the same.



spiny starfish

Fig. 3.2



necklace starfish

Fig. 3.3

State **two** ways the spiny starfish in Fig. 3.2 differs from the necklace starfish in Fig. 3.3, and **one** way it is similar.

Do **not** include references to size in your answer.

difference 1

.....

difference 2

.....

similarity 1

..... [3]

(b) Seven-armed starfish live in the sea.

Scientists investigated the distribution of seven-armed starfish, *Luidia ciliaris*, in one region.

- Photographs of 20m² areas of seabed were taken at different depths.
- The depth of the water in each area was measured when the water was at its highest level (high tide).
- The numbers of seven-armed starfish in each photograph were counted.
- All photographs were taken on the same day in July.

(i) State **two** ways that the method used by the scientists ensured that the numbers of seven-armed starfish counted at different depths could be compared.

1

.....

2

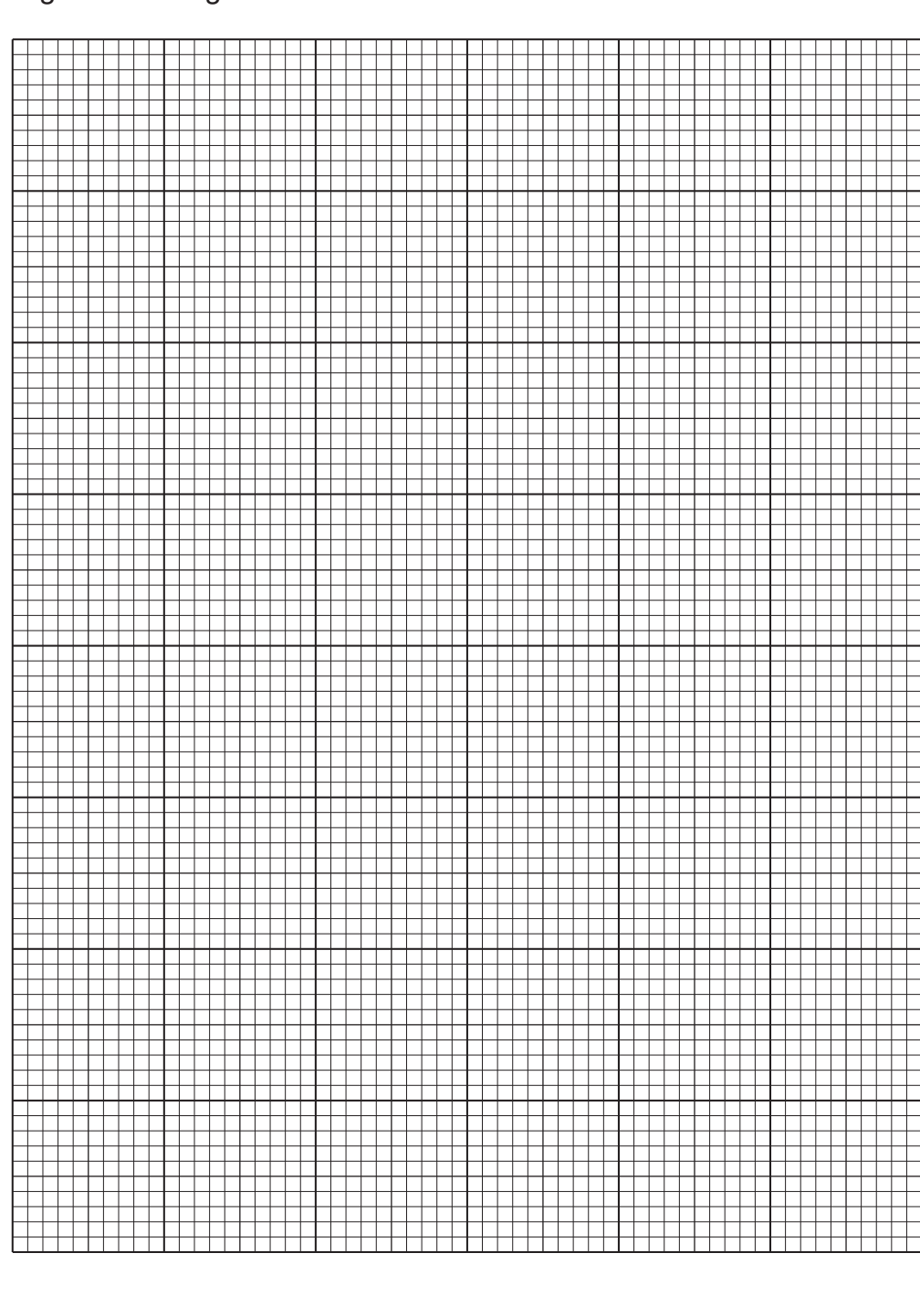
..... [2]

The results of the investigation are shown in Table 3.1.

Table 3.1

depth/m	number of seven-armed starfish counted
0.0–9.9	337
10.0–19.9	1486
20.0–29.9	1243
30.0–39.9	241
40.0–49.9	121

(ii) Plot a histogram on the grid of the data in Table 3.1.



[4]

(iii) State the depth range in Table 3.1 at which most seven-armed starfish were found.

..... m [1]

(iv) Using the information in Table 3.1, calculate the total number of seven-armed starfish that were photographed at all depths, and use this value to calculate the percentage of starfish that were photographed in the 0.0–9.9m range.

Express the percentage as a whole number.

Space for working.

total number of seven-armed starfish photographed

percentage of seven-armed starfish photographed at 0.0–9.9m% [3]

[Total: 20]