

Week 3

IGCSE Biology

Homework bundle for this week

本周作业合集

exercises.lol

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Name: _____ Score: _____

1. Which part of the cell contains DNA and controls the cell?
 - ☐ nucleus
 - ☐ cytoplasm
 - ☐ cell membrane
 - ☐ mitochondria
2. A red blood cell is specialised to carry oxygen. It has:
 - ☐ no nucleus and lots of haemoglobin
 - ☐ a large nucleus
 - ☐ chloroplasts
 - ☐ a tail
3. Magnification is calculated as:
 - ☐ image size $\div$ actual size
 - ☐ actual size $\div$ image size
 - ☐ image size $\times$ actual size
 - ☐ image size $+$ actual size
4. Which part releases energy by respiration?
 - ☐ mitochondria
 - ☐ nucleus
 - ☐ cell wall
 - ☐ vacuole
5. A group of similar cells working together is a:
 - ☐ tissue
 - ☐ organ
 - ☐ organ system
 - ☐ organism
6. An image is 40 mm across and the real object is 0.5 mm. What is the magnification?

7. Which parts are found ONLY in plant cells? (Select all that apply.)

- ☐ cell wall
- ☐ chloroplasts
- ☐ large vacuole
- ☐ nucleus

Tick every correct option.

8. A root hair cell's long shape gives it a large surface area for absorbing water.

- ☐ True ☐ False

9. An image is 60 mm and the magnification is $\times 300$. What is the actual size (mm)?

10. Several different tissues working together form an _____.

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1. **nucleus**

The nucleus holds DNA and controls the cell.

2. **no nucleus and lots of haemoglobin**

No nucleus leaves more room for haemoglobin, which carries oxygen.

3. **image size $\div$ actual size**

Magnification = image $\div$ actual.

4. **mitochondria**

Mitochondria are the site of aerobic respiration.

5. **tissue**

A tissue is a group of similar cells.

6. **80**

$40 \div 0.5 = \times 80$.

7. **cell wall; chloroplasts; large vacuole**

The nucleus is in both; the cell wall, chloroplasts and large vacuole are plant-only.

8. **True**

Its structure fits its function of absorption.

9. **0.2**

Actual = $60 \div 300 = 0.2$ mm.

10. **organ**

An organ is made of several tissues.

2.1 Cell structure

Name: _____ Class: _____ Date: _____

Total: 10 marks

KEY WORDS plant 植物 • cells 细胞 • organ 器官 • cell wall 细胞壁 • organism 生物体

Objective

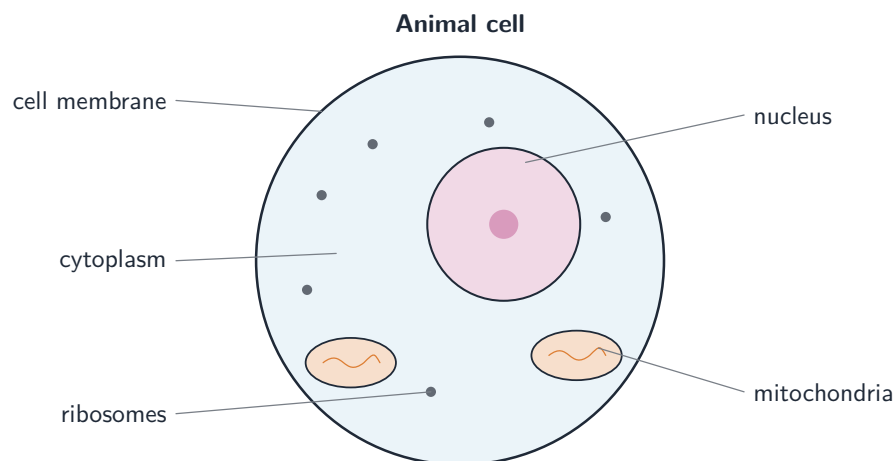
Build the skills to answer exam questions on **cell structure** 细胞结构 — comparing plant, animal and bacterial cells, the function of each structure, and **specialised cells** 特化细胞.

You must be able to:

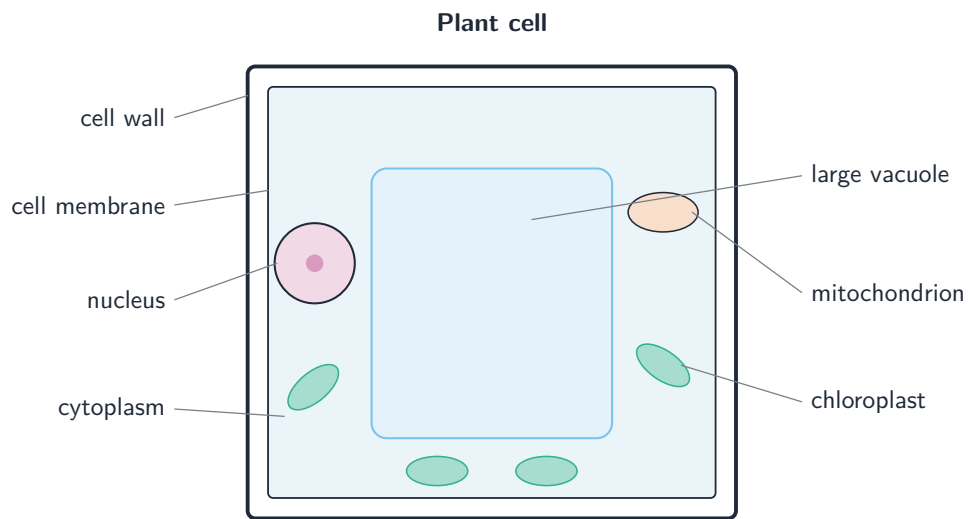
- state which structures are in plant, animal and bacterial cells
- give the function of each structure
- link a specialised cell to its feature, and order the levels of organisation

1 Worked examples

■ Comparing cells



Animal cell: membrane, cytoplasm, nucleus, mitochondria, ribosomes



A plant cell also has a cell wall, a large vacuole and chloroplasts

- **bacterium:** no nucleus (a loop of DNA), plus plasmids; no mitochondria.
- **levels:** cell → tissue → organ → organ system → organism.

2 Practice

2.1 Name three structures found in a plant cell but **not** an animal cell. [3]

2.2 State the function of mitochondria. [1]

3 Exam-style questions

3.1 A cell has no nucleus, but has a cell wall, a loop of DNA and plasmids. It is a: [1]

- **A** plant cell
 - **B** animal cell
 - **C** bacterial cell
 - **D** red blood cell
-

3.2 A red blood cell is a specialised cell.

(a) State its job. [1]

(b) Explain how having no nucleus suits this job. [2]

3.3 Put these in order from smallest to largest: organ, cell, organism, tissue, organ system. [2]

Solutions

2.1 cell wall; (large) vacuole; chloroplasts.

2.2 where respiration happens to release energy.

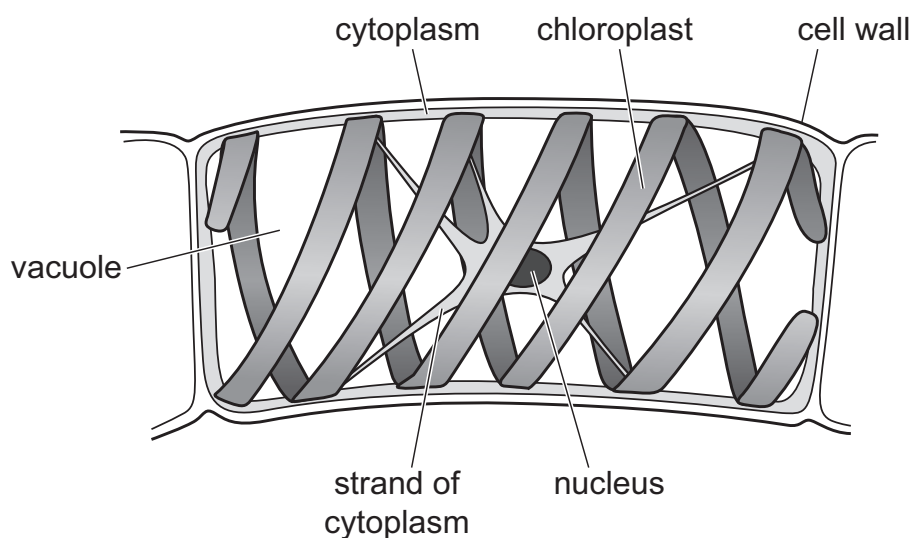
3.1 C. No nucleus + plasmids + a DNA loop → a bacterial cell.

3.2 (a) to transport oxygen.

(b) with no nucleus there is more room for haemoglobin, so it can carry more oxygen.

3.3 cell → tissue → organ → organ system → organism.

3 The diagram shows a single cell from an organism called *Spirogyra*.



Which features does *Spirogyra* share with plant cells?

	cell wall	chloroplast	cytoplasm	nucleus	vacuole
A	yes	yes	yes	yes	yes
B	yes	yes	no	no	yes
C	yes	no	yes	yes	no
D	no	yes	yes	no	yes

4 Which term describes each structure?

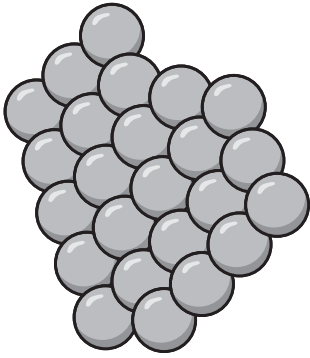
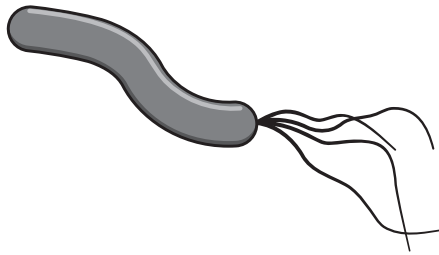
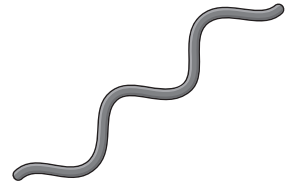
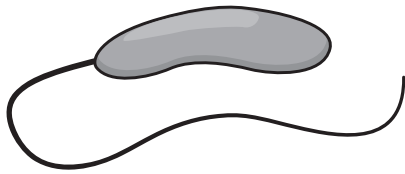
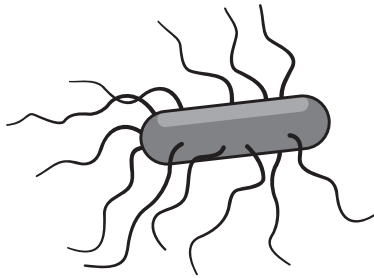
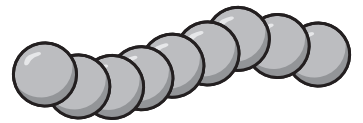
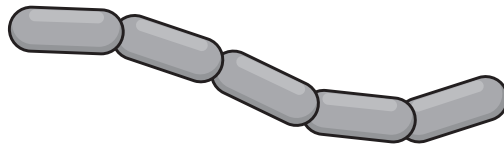
	structure		
	brain	liver	neurone
A	organ	organ	cell
B	organ	tissue	cell
C	tissue	organ	tissue
D	tissue	cell	organ

3 A palisade cell and a neurone are observed under a light microscope.

Which cell component is found only in the palisade cell?

- A** cell membrane
- B** cell wall
- C** cytoplasm
- D** nucleus

1 (a) Fig. 1.1 shows drawings of seven species of bacteria.

**A****B****C****D****E****F****G**

not to scale

Fig. 1.1

Use the key to identify each species of bacteria in Fig. 1.1.

Write the letter of each species (**A** to **G**) in the correct box beside the key.

One has been done for you.

key

1	(a)	hair-like structure or structures visible	go to 2	
	(b)	no hair-like structures visible	go to 4	
2	(a)	more than one hair-like structure	go to 3	
	(b)	one hair-like structure only	<i>Vibrio cholerae</i>	
3	(a)	hair-like structures attached at one end only	<i>Helicobacter pylori</i>	
	(b)	hair-like structures attached all over	<i>Salmonella typhi</i>	
4	(a)	bacteria have a spiral shape	<i>Treponema pallidum</i>	
	(b)	bacteria do not have a spiral shape	go to 5	
5	(a)	bacteria are grouped to form a chain	go to 6	
	(b)	bacteria do not form a chain	<i>Staphylococcus aureus</i>	
6	(a)	bacteria in the chain are cylindrical in shape	<i>Streptobacillus moniliformis</i>	
	(b)	bacteria in the chain are circular in shape	<i>Streptococcus pyogenes</i>	F

[3]

(b) (i) A cylinder-shaped bacterium has a length of $2\mu\text{m}$ and a diameter of $0.5\mu\text{m}$.

Calculate:

- the radius of this bacterium
- the volume of this bacterium.

Include the units in your answers.

Space for working.

radius

volume

[4]

(ii) State the name of the kingdom that bacteria belong to.

..... [1]

(c) Fig. 1.2 is a diagram of a virus.

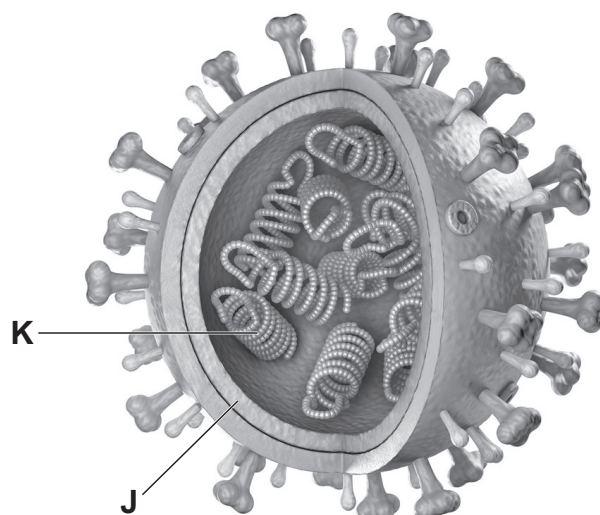


Fig. 1.2

(i) State the name of the parts labelled **J** and **K** in Fig. 1.2.

J

K

[2]

(ii) State **two** structures present in bacteria that are absent in viruses.

1

2

[2]

[Total:12]

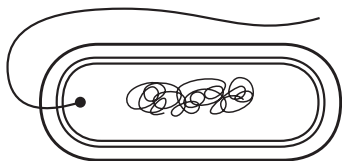
3 Which structures are found in both plant and animal cells?

- A cell walls and cell membranes
- B nuclei and cell walls
- C cytoplasm and chloroplasts
- D cell membranes and nuclei

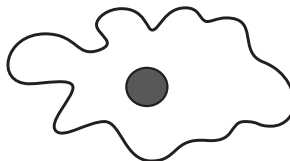
2 The diagrams show four organisms.

Which organism is a prokaryote?

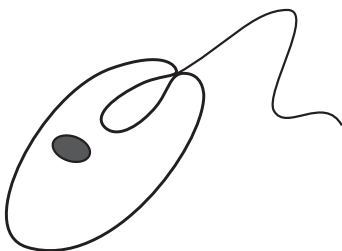
A



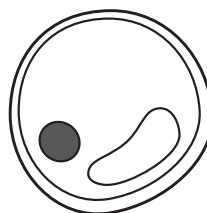
B



C



D



NOT TO
SCALE

5 Fig. 5.1 is a diagram of a plant root hair cell.

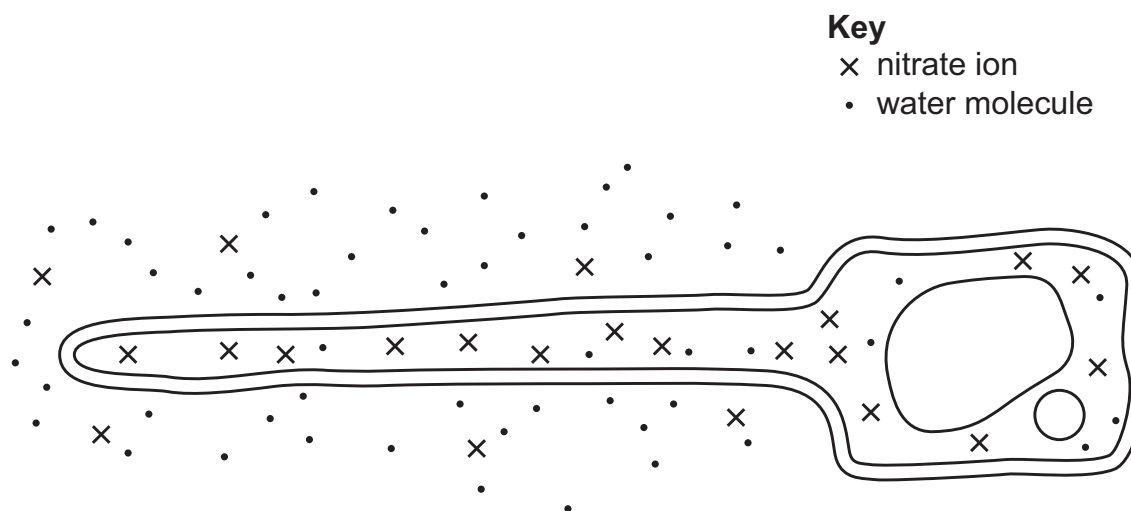


Fig. 5.1

- (a) (i) Using the information in Fig. 5.1, explain how nitrate ions are transported into the root hair cell.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

- (ii) State **two** ways that nitrogen fixation occurs.

1

2 [1]

- (b) State the name of the process that moves water molecules into root hair cells.

..... [1]

..... [5]

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	cell membrane	cell wall	plasmid	ribosomes
A	yes	yes	yes	no
B	no	yes	yes	yes
C	yes	no	yes	yes
D	yes	yes	no	yes

2.2 Size of specimens

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS magnification 放大倍数 • size of specimens 标本大小 • specimen 标本 • tissue 组织
• organ 器官

Objective

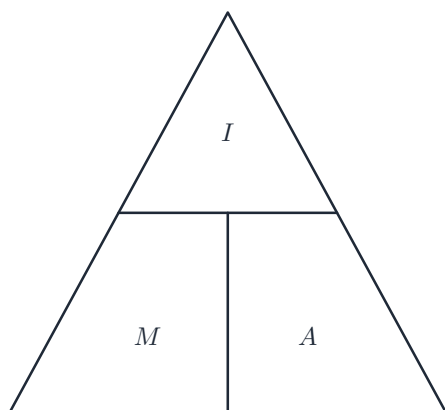
Build the skills to answer exam questions on the **size of specimens** 标本大小 — the **magnification** 放大倍数 formula and converting units.

You must be able to:

- use magnification = image size ÷ actual size (and rearrange it)
- convert between mm and μm
- give magnification as a number with no unit

1 Worked examples

■ Magnification

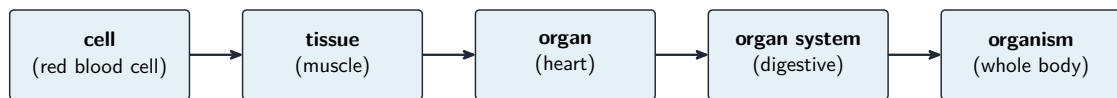


I = image size
 M = magnification
 A = actual size

$$M = \frac{I}{A}$$

cover a letter to get its formula

Cover the quantity you want: magnification = image ÷ actual; actual = image ÷ magnification



Cells make tissues, organs and organ systems

Image 5.00 mm at $\times 250$: $\text{actual} = \frac{5.00}{250} = 0.02 \text{ mm} = 20 \mu\text{m}$.

Units: $1 \text{ mm} = 1000 \mu\text{m}$. Always use the same unit before dividing.

2 Practice

2.1 Write the formula for magnification. [1]

2.2 Convert 0.05 mm into μm . [1]

3 Exam-style questions

3.1 Magnification has the unit: [1]

- **A** mm
 - **B** μm
 - **C** no unit
 - **D** cm
-

3.2 A cell has an actual size of $40 \mu\text{m}$. It is drawn 20 mm wide.

(a) Convert the actual size to mm. [1]

(b) Calculate the magnification of the drawing. [2]

3.3 A structure is shown at $\times 400$ and its image size is 8.0 mm . Calculate its actual size in μm . [3]

Solutions

2.1 magnification = $\frac{\text{image size}}{\text{actual size}}$.

2.2 $0.05 \times 1000 = 50 \mu\text{m}$.

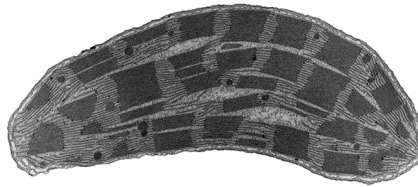
3.1 C. Magnification is just a number — no unit.

3.2 (a) $40 \mu\text{m} = 0.04 \text{ mm}$.

(b) magnification = $\frac{20}{0.04} = 500$.

3.3 actual = $\frac{\text{image}}{\text{magnification}} = \frac{8.0}{400} = 0.02 \text{ mm}; = 20 \mu\text{m}$.

- 4 The diagram shows an image of a chloroplast. The image is 5 cm long.



The actual length of the chloroplast is $5\text{ }\mu\text{m}$.

What is the magnification of the image?

- A** $\times 10$ **B** $\times 1000$ **C** $\times 10\,000$ **D** $\times 100\,000$

- 4 In a human, the diameter of the aorta as it leaves the heart is 36 mm.

The thickness of the wall of the aorta at this point is 9 mm.

What is the diameter of the lumen of the aorta at this point?

- A** 1800 m **B** $2700\text{ }\mu\text{m}$ **C** $18\,000\text{ }\mu\text{m}$ **D** $27\,000\text{ }\mu\text{m}$

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

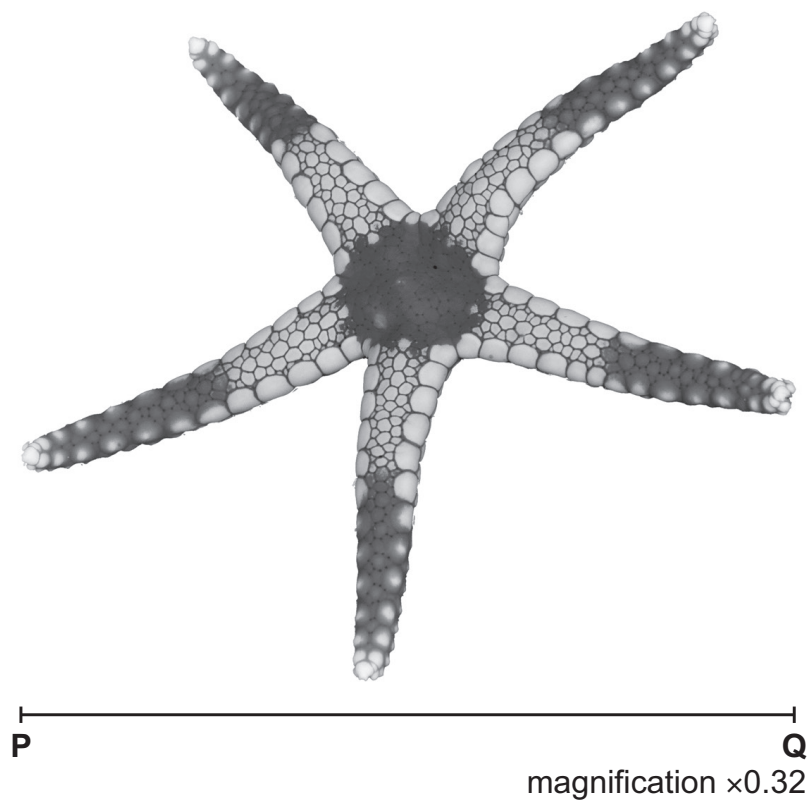


Fig. 3.1

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

(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]

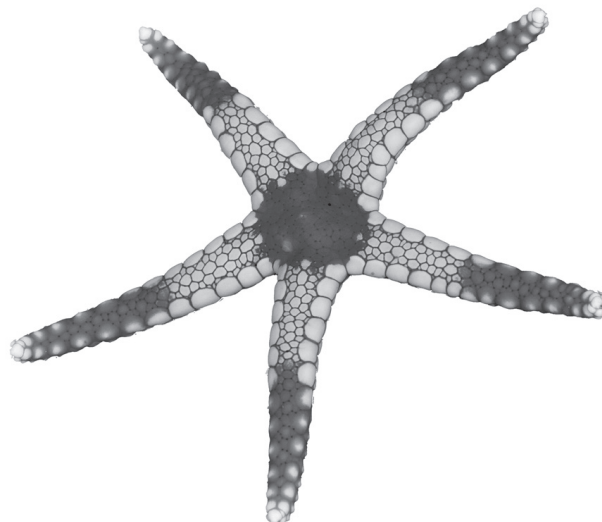
- (iii) Fig. 3.2 is a photograph of a spiny starfish, *Marthasterias glacialis*. Fig. 3.3 is a photograph of a necklace starfish.

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 20 m² 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

.....

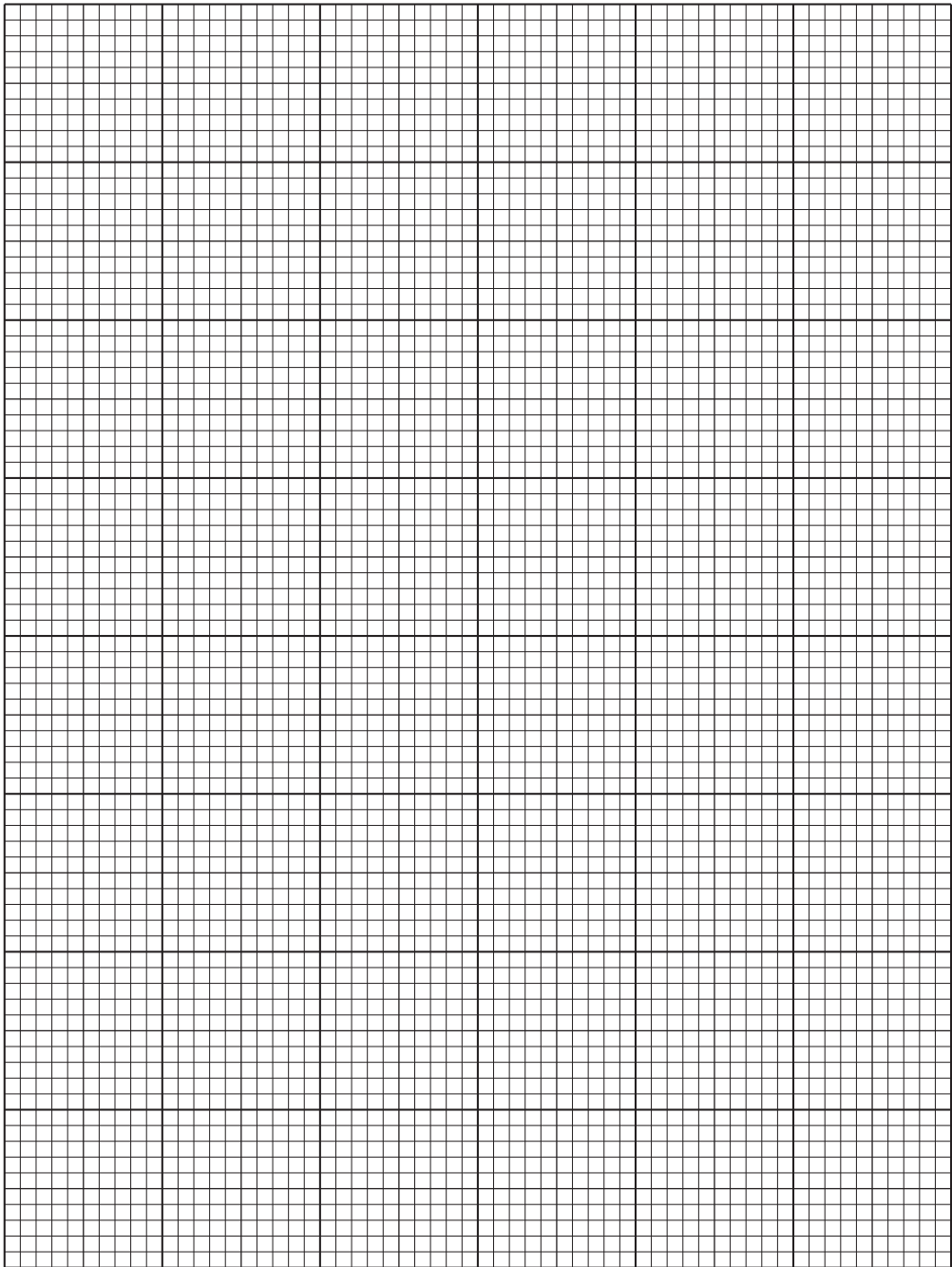
[2]

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.



(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 0.0–9.9 m range.

Express the percentage as a whole number.

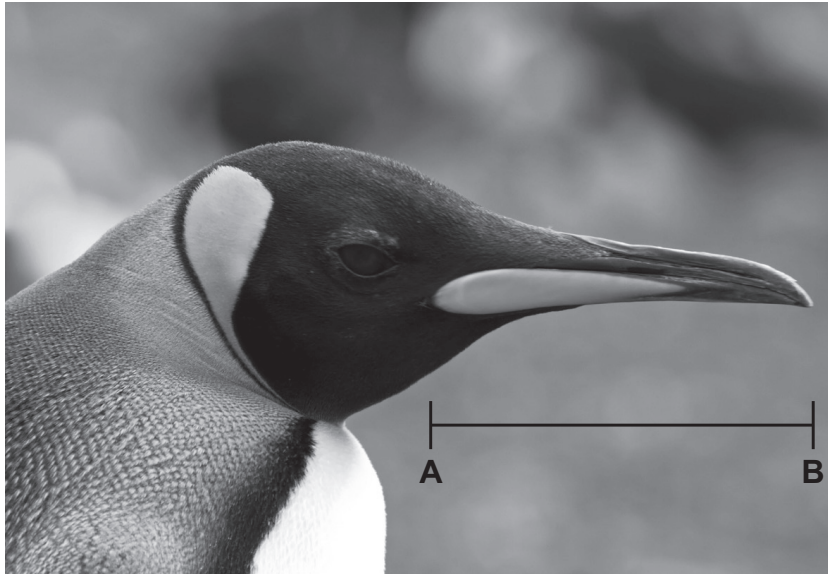
Space for working.

total number of seven-armed starfish photographed

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

[Total: 20]

- 3 (a) Fig. 3.1 is a photograph of the head of a king penguin.



magnification $\times 0.42$

Fig. 3.1

- (i) Make a large drawing of the head of the king penguin shown in Fig. 3.1.

(ii) The length of line **AB** represents the length of the penguin’s beak.

Measure the length of line **AB** in Fig. 3.1.

length of line **AB** mm

Use your measurement and the formula to calculate the actual length of the penguin’s beak.

magnification =
$$\frac{\text{length of line **AB** in Fig. 3.1}}{\text{actual length of the penguin’s beak}}$$

Give your answer to **one** decimal place.

Space for working.

..... mm

[3]

(b) Fig. 3.2 shows the heads of a gentoo penguin and a black-footed penguin.



gentoo



black-footed

not to scale

Fig. 3.2

Other than size, state **two** ways the gentoo penguin differs from the black-footed penguin in Fig. 3.2.

1

.....

2

.....

[2]

A beaker of hot water can be used to represent a penguin.

[6]

[6]

[Total: 15]

The magnification used was $\times 250$.

The image size of the structure was 5.00 mm.

What was the actual length of the structure?

- A** $1.25 \times 10^3 \text{ mm}$
B $1.25 \times 10^3 \mu\text{m}$
C $2.00 \times 10^1 \mu\text{m}$
D $2.00 \times 10^{-5} \mu\text{m}$

4 A cell is $65\text{ }\mu\text{m}$ across.

What is this measurement in mm?

- A** 0.00065 mm **B** 0.0065 mm **C** 0.065 mm **D** 0.65 mm