Chapter B1
Cells

KEY TERMS

excretion: removal from organisms of the waste products of metabolism (chemical reactions in cells including respiration), toxic materials and substances in excess of requirements

growth: a permanent increase in size and dry mass by an increase in cell number or cell size or both

movement: an action by an organism or part of an organism causing a change of position or place

nutrition: taking in of materials for energy, growth and development; plants require light, carbon dioxide, water and ions; animals need organic compounds and ions and usually need water

reproduction: the processes that make more of the same kind of organism

respiration: the chemical reactions in cells that break down nutrient molecules and release energy for metabolism

sensitivity: the ability to detect or sense stimuli in the internal or external environment and to make appropriate responses

magnification: the size of an object in illustration divided by the real size of the object

Exercise B1.01 Observing and drawing organisms

This exercise will help you to improve your observation and drawing skills (AO3.3). You will also practise calculating magnification.

You need:

- **specimens of two different fish**
- **a sharp HB (medium hard) pencil and a good eraser**
- **a ruler to measure in mm.**

a Observe the fish carefully. Look for similarities and differences between them.

b On the blank page following, make a large drawing of one of the fish. You can turn the page sideways if this works better. Leave space around the drawing for labels.

c Label your drawing to point out any interesting features of the fish.

Use the checklist below to give yourself a mark for your drawing. For each point, award yourself:

- **2 marks if you did it really well**
- **1 mark if you made a good attempt at it and partly succeeded**
- **0 marks if you did not try to do it, or did not succeed.**

Self-assessment checklist for drawing:

Check point	Marks awarded	
	You	Your teacher
You used a sharp pencil and rubbed out mistakes really thoroughly.		
You have drawn single lines, not many tries at the same line.		
You have drawn the specimen the right shape, and with different parts in the correct proportions.		
You have made a really large drawing, using the space provided.		
You have included all the different structures that are visible on the specimen.		
You have drawn label lines with a ruler, touching the structure being labelled.		
You have written the labels horizontally and neatly, well away from the diagram itself.		
Take 1 mark off if you used any shading or colours.		
Total (out of 14)		

12–14 Excellent.
10–11 Good.
7–9 A good start, but you need to improve quite a bit.
5–6 Poor. Try this same drawing again, using a new sheet of paper.
1–4 Very poor. Read through all the criteria again, and then try the same drawing.

d i Measure the actual length of the fish, in mm.

length of real fish = ... mm

ii Measure the same length on your drawing.

length on drawing = ... mm

iii Use your measurements to calculate the magnification of your drawing. Write down the equation you will use, and show your working.

magnification = ...

e Complete Table 1.01 to describe at least three differences between the two fish.

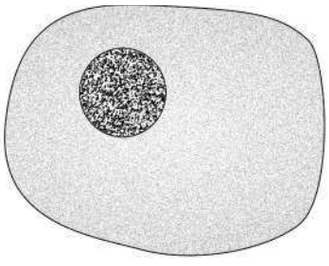
Feature	Fish 1	Fish 2

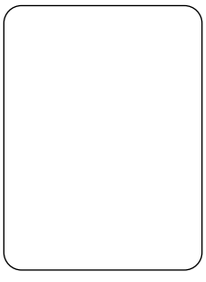
Table 1.01

Exercise B1.02 Animal and plant cells

This exercise will help you to improve your knowledge of the structure of animal and plant cells, and give you more practice in calculating magnification.

The diagram shows an animal cell, and the outline of a plant cell. They are not drawn to the same scale.





a On the animal cell, label the following parts:

cell membrane **cytoplasm** **nucleus**

b Complete the diagram of the plant cell, and then label the following parts:

cell membrane **cytoplasm** **large vacuole containing cell sap** **nucleus**
chloroplast **cell wall** **membrane around vacuole**

c The actual maximum width of the animal cell is 0.1 mm.

i Measure the maximum width of the diagram of the animal cell, in mm .....

ii Calculate the magnification of the animal cell diagram. Show your working.

magnification = ...

d The magnification of the plant cell diagram is × 80. Calculate the real height of the plant cell. Show your working.

height = ...

Exercise B1.03 Drawing cells and calculating magnification

This exercise helps you to improve your observation and drawing skills (AO3.3), as well as giving you more practice in calculating magnification.

Look carefully at Image B1.01 in the Cambridge IGCSE Combined and Co-ordinated Sciences Coursebook.

a i In the space below, make a large diagram of the largest cell (the one on the right of the photograph). You cannot see all of the cell, as its ends are out of the picture. Draw only the part that you can see.

ii Label these structures on your diagram. You will have to make a sensible guess as to which structure is the nucleus.

cell wall **position of cell membrane** **chloroplast** **nucleus**

Use the checklist below to give yourself a mark for your drawing. For each point, award yourself:

- **2 marks if you did it really well**
- **1 mark if you made a good attempt at it and partly succeeded**
- **0 marks if you did not try to do it, or did not succeed.**

Self-assessment checklist for drawing:

Check point	Marks awarded	
	You	Your teacher
You used a sharp pencil and rubbed out mistakes really thoroughly.		
You have drawn single lines, not many tries at the same line.		
You have drawn the specimen the right shape, and with different parts in the correct proportions.		
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You have included all the different structures that are visible on the specimen.		
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Take 1 mark off if you used any shading or colours.		
Total (out of 14)		

12–14 Excellent.
10–11 Good.
7–9 A good start, but you need to improve quite a bit.
5–6 Poor. Try this same drawing again, using a new sheet of paper.
1–4 Very poor. Read through all the criteria again, and then try the same drawing.

b The magnification of the photograph in Figure B1.6 is × 2000.

i Calculate the real width of the largest cell in the photograph.
Show your working.

width .....

ii Calculate the magnification of your drawing of the plant cell.

magnification = ...

Exercise B1.04 Organelles

This exercise tests your knowledge of the functions of organelles in animal and plant cells.

This list contains organelles that are found in cells.

cell membrane	**cell wall**	**cytoplasm**	**chloroplast**
mitochondrion	**nucleus**	**ribosome**	**vacuole**

Write the name of the organelle beneath its function.

a Contains chromosomes made of DNA, and controls the activity of the cell.

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b An extra, strong layer surrounding a plant cell, made of cellulose.

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c A jelly-like substance where many metabolic reactions happen.

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d Every cell is surrounded by one of these. It controls what enters and leaves the cell.

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e Some plant cells have these, but animal cells never do. This is where photosynthesis takes place.

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f This is a space inside a cell that contains a liquid, for example cell sap.

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