1 Classification

Definitions to learn

- (S) **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
- (S) **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
- **binomial system** an internationally agreed system in which the scientific name of an organism is made up of two parts showing the genus and species
- **species** a group of organisms that can reproduce and produce fertile offspring

Note – some of the definitions that Core candidates need to learn are simpler. Please see the Coursebook page 2 for these.

Exercise 1.1 Observing and drawing organisms

This exercise will help you to improve your observation and drawing skills (AO3.3), and also your knowledge of the classification of organisms. 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 check list 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 check list 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.
10–12 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 this table to describe at least **three** differences between the two fish.

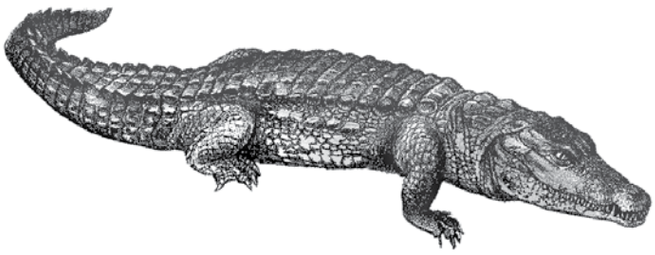
Feature	Fish 1	Fish 2

Exercise 1.2 Using keys

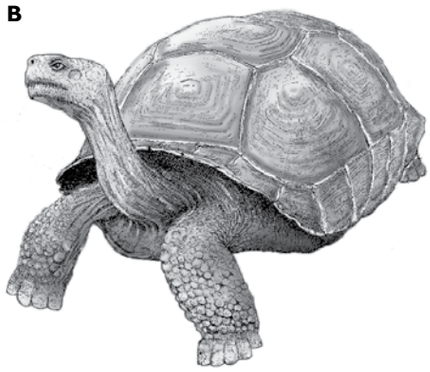
This exercise will help you to improve your observation and drawing skills (AO3.3), and also your knowledge of the classification of organisms. You will also practise calculating magnification.

The drawings show four vertebrates.

A

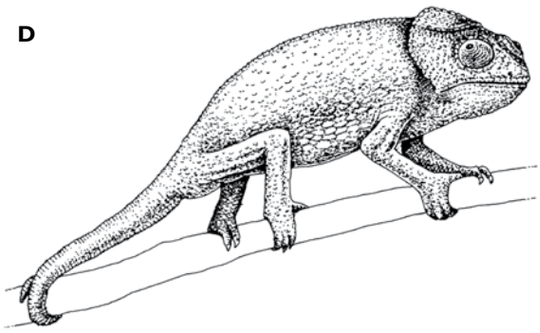


B



C

D



a Use the dichotomous key below to identify each of these four animals.
List the sequence of statements that you worked through to find the name.
Animal A has been done for you.

1	**a**	Shell present	*Geochelone elephantopus*
	b	Shell absent	go to **2**
2	**a**	Four legs	go to **3**
	b	No legs	*Ophiophagus hannah*
3	**a**	Scales on back form large plates	*Crocodylus niloticus*
	b	Scales on back do not form large plates	*Chamaeleo gracilis*

A **1b, 2a, 3a** **Crocodylus niloticus**

B .....

C .....

D .....

b **i** What is the correct term for the two-word Latin name of an organism?

.....

ii Explain what the two parts of the name tell you.

.....

c State **one** feature, visible on all of the animals in the drawings, which indicates that they are all reptiles.

.....

2 Cells

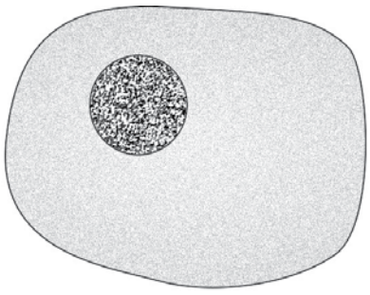
Definitions to learn

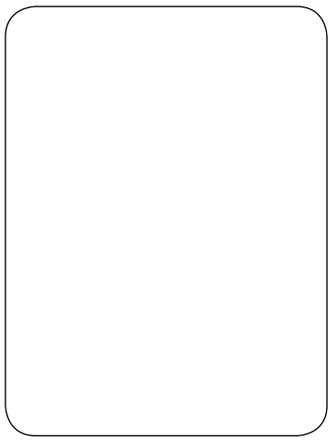
- **tissue** a group of cells with similar structures, working together to perform a shared function
- **organ** a structure made up of a group of tissues, working together to perform specific functions
- **organ system** a group of organs with related functions, working together to perform body functions
- **magnification** = $\frac{\text{size of object in illustration}}{\text{real size of object}}$

Exercise 2.1 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 2.2 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 Figure **2.5** on page 20 in your Coursebook.

a **i** In the space below, make a large diagram of the largest cell (the one near the top 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 check list below to give yourself a mark for your drawing.
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Self-assessment check list for drawing:

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1–4 Very poor. Read through all the criteria again, and then try the same drawing.

b The magnification of the photograph in Figure **2.5** 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 = ...