

B1.2 Cell structure

Students' learning objective: *I am learning about the basic structure of cells so I can explain the function of each part.*

Students will have an awareness of what cells are from KS2. They also now have seen cells through their microscope in Topic B1.1.

Knowledge check

After working through the *General science quiz*, display the *Knowledge check* slide and, using MWBs, deliver the questions one by one, reteaching concepts as necessary.

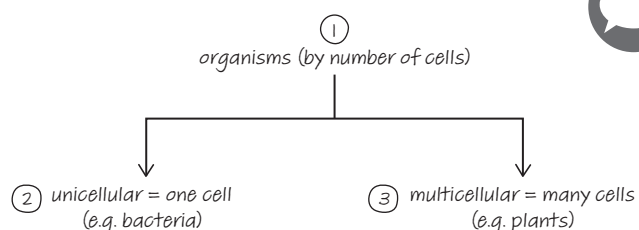
	Question	Answer	Notes
1	What do living things need to survive?	Oxygen, food	Look out for answers relating to shelter or protection, which are correct but have no relevance here.
2	When using a microscope, what do we see when we magnify and focus an image?	A bigger and sharper image of the sample	Students may provide specific answers, such as cells, but prompt them to think about how these cells appear when using a microscope and <i>focusing</i> the image.
3	Why do we need microscopes to see some things?	Some objects are too small to see with the naked eye	
4	Why did people hundreds of years ago not know about cells?	Cells are too small to see without a microscope, which had not been invented hundreds of years ago	

What is an organism?

What are the types of organism?

Start by providing a simple definition of the word organism – a living thing. Display the first slide, which shows some examples, e.g. humans, other animals, plants, fungi. Then display the second slide and click to reveal each diagram in turn. Explain that some organisms are made of only one cell and others are made of many, many cells working together.

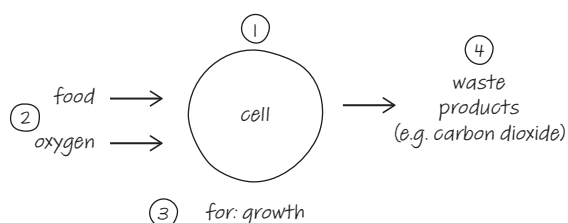
Draw the following flow chart sequentially, with each step accompanied by an explanation, similar to the one that follows.



- 1 Organisms can be one of two types, depending on how many cells they are made of.
- 2 Some organisms, such as bacteria, are made of only one cell. These are called *unicellular organisms*.
- 3 Others, such as a *hosta* plant, are made of many, many cells working together. These are called *multicellular organisms*.

What do organisms need to survive?

Build on this by drawing the diagram below sequentially, accompanying each step with an explanation, similar to the one that follows.



- 1 All cells within organisms need certain substances to survive.
- 2 For example, food and oxygen.
- 3 These also help the cell to grow.
- 4 Cells also need to get rid of waste products like carbon dioxide.

This will link on to the first sub-cellular structure: cell membrane.

Check for understanding

Display the CFU slide and, using MWBs, ask questions like the ones below.

- What are two things cells need to survive?
- What is the difference between a unicellular organism and a multicellular organism?
- Name a waste product that cells need to remove.
- Give an example of a unicellular organism.

The independent practice for this section is included in the questions that follow the guided explanation below.

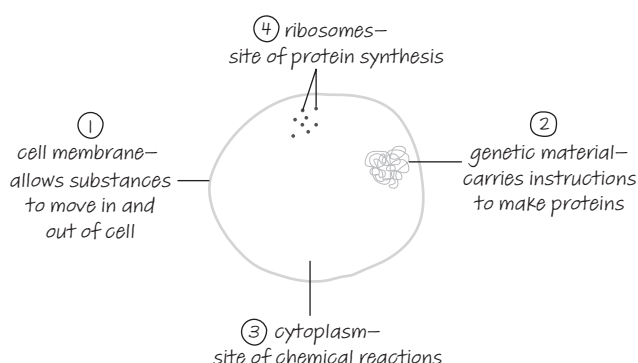
Guided explanation

What are the basic structures found in cells?

This topic will only focus on four structures found in all cell types. (Note that these structures are found in all cell types, but there are some cells of each type that may not have one or more of these structures.)

Students tend to think that all cells look like a circle or a rectangle, so it is important (with the CFU) that students can identify these structures in any cell.

Draw the following outline of a cell. Add the labels sequentially, with each step accompanied by an explanation, similar to the one that follows.



- 1 Cells need certain parts or structures to help them function well. To allow substances to move in and out of the cell, cells have a part called a *cell membrane*. The cell membrane allows oxygen to move in and carbon dioxide to move out of a cell. All cells have a cell membrane.
- 2 Cells need proteins to function. The instructions to make these proteins are found in something called *genetic material*. All cells have genetic material in them so they can make proteins.

3 The white space inside the cell is far from empty. It is made of a gel-like material in which all other parts of the cell are suspended. Chemical reactions (needed for cells to survive and function) happen in this part called the *cytoplasm*.

4 The final part found in all cells is the *ribosome*. This is very important because it is where proteins are made.

Say that these four structures are collectively called *sub-cellular structures*.

Check for understanding

Display each of the *CFU* slides in turn and, using MWBs, ask questions like the ones below.

- (First slide) Name the four sub-cellular structures.
- (Second slide) Identify the four sub-cellular structures in these cells. *The aim of this question is to check that all students can identify the structures in cells of different shapes.*

The third slide can act as a visual for the following questions.

- Which sub-cellular structure allows substances to enter and leave a cell?
- Which sub-cellular structure contains the information to make proteins?
- Which sub-cellular structure allows proteins to be made?
- Which sub-cellular structure allows chemical reactions to happen?
- Which of the basic sub-cellular structures in this cell are needed to make proteins? *Genetic material provides the information while ribosomes allow proteins to be made.*
- Cells need oxygen. What does it pass through to enter this cell?

Independent practice review

Student Practice Book questions 26–60 (pages 7–9).

Q	Notes
29	There may be some confusion when asking about the two types of organism, because students may think of the plant and animal kingdoms instead
42	Look out for students assuming that all sub-cellular structures can be seen using a microscope. The microscope that we are using in this unit cannot be used to visualise ribosomes or genetic material, because these structures are too small. The nucleus is visible under a microscope, but this structure will be described in the next topic (B1.3 Animal and plant cells).
44	Look out for students assuming that the shape of the cell is a mistake. It is important for students to understand that cells can vary in shape and size. Part (a) shows a cell with no genetic material. This would not be a mistake if this cell was a red blood cell, but at this stage it is more important to show students that cells generally do contain genetic material (even red blood cells do when immature). When discussing the answer to part (b) emphasise that the cell membrane does have gaps, but that these are very small and only allow specific substances to pass through.