

# Middle School Science Stage 4 Course

## Through the Microscope Set 2



# Glossary

Read through this list of terms and their meanings which are introduced throughout this unit.

Term	Meaning
<b>Aerobic</b>	In the presence of oxygen.
<b>Cell</b>	The basic structural unit of all life.
<b>Cell membrane</b>	A layer in animal and plant cells that holds everything in.
<b>Cell wall</b>	A protective outer layer of a plant cell made from cellulose.
<b>Cellulose</b>	A complex sugar and a part of a plant cell wall.
<b>Chloroplast</b>	Food producer of a plant cell.
<b>Cytoplasm</b>	Jelly-like material in cells that helps keep the cell alive and carry out functions.
<b>Microscope</b>	A piece of equipment that shows an image that is larger than the original object.
<b>Nucleus</b>	Controls the growth of the cell and the activities inside it.

# The Building Blocks of Living Things

## Who discovered cells?

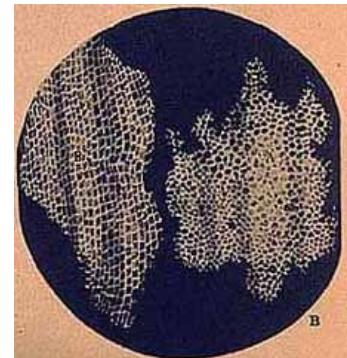


Robert Hooke

In 1665 an Englishman, **Robert Hooke**, invented a two lens microscope.

Hooke used his microscope to examine many things.

When he examined some cork he observed structures that were like boxes. He called these boxes **cells** because they reminded him of the tiny cells or rooms where monks lived inside a monastery. The term "cells" has been used ever since.



Cork cells as drawn by Robert Hooke



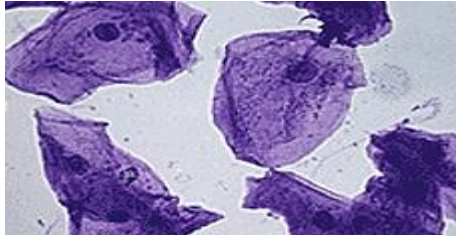
Microscope invented by Robert Hooke

This is the microscope designed by Robert Hooke.

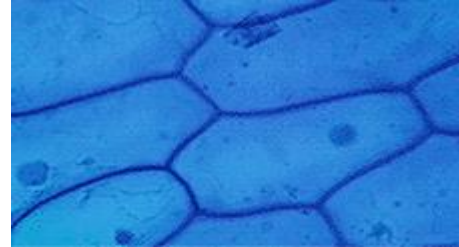
There is a glass ball used for focussing light from a lamp and it contains an eyepiece similar to modern microscopes.

# Cells

Cells are the basic building blocks of all animals and plants. Cells are very small and all have a purpose. If it doesn't do anything productive, it is not needed.



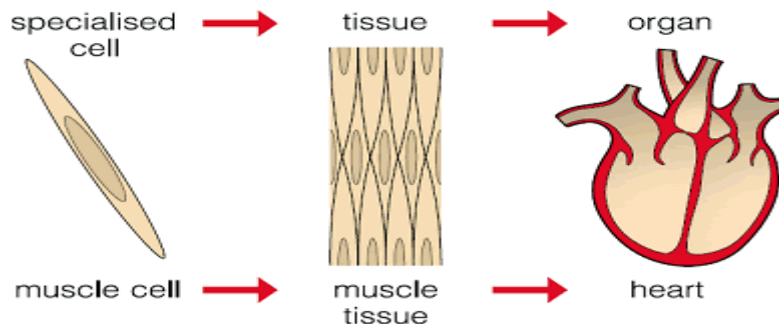
These are cheek cells viewed through a microscope.



These are onion cells viewed through a microscope.

Cells of the same type group together to form **tissue**. Tissues are made up in a similar way to a brick wall. They can be several layers thick.

Different tissues work together to form **organs**. The heart is an important organ that pumps blood. It is made up of muscle tissue and nerve tissue.

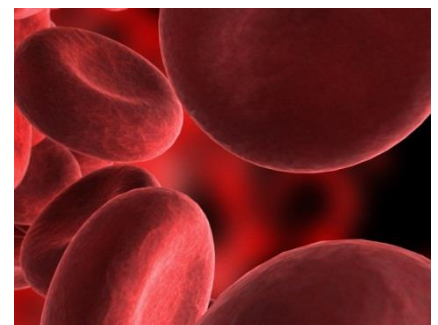


## Animal Cells

There are millions of cells in the human body.

These cells have two main roles:

- to carry out activities that keep the cell alive.
- to carry out their special function as part of a tissue.



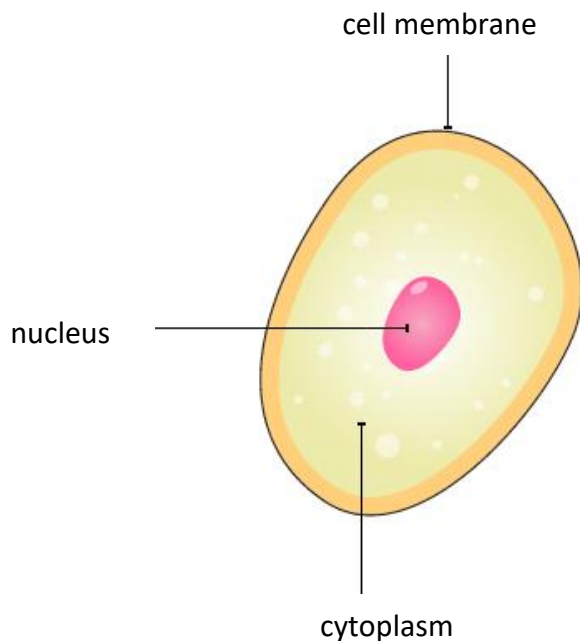
Red blood cells

For their special function as part of a tissue, cells often have special sizes, shapes or features. Scientists say that the cells are **specialised**.

## A typical animal cell

An animal cell is the smallest part of an animal that can show the characteristics of life. Every animal cell has some parts that are the same.

The **cell membrane**, the **cytoplasm** and the **nucleus** keep the cell alive. Even though all the animal cells you have seen are different sizes and shapes, they all have these parts in common.



This diagram shows that animal cells have a round or irregular shape, a **cell membrane**, a **nucleus** and **cytoplasm**.

## Parts and functions in animal cells

Part	Description	Function
Cell membrane	The edge or boundary of an animal cell.	The cell membrane surrounds the cell and controls which substances move in and out.
Nucleus	A large dark spot near the centre of the cell.	The control centre of the cell. The nucleus directs the growth of the cell and the activities that take place inside the cell.
Cytoplasm	A jelly-like material held in the cell by the cell membrane.	Chemical reactions occur in the cytoplasm to keep the cell alive and carry out its specialised function.



## Activity 1

Answer the questions below.

1. What are the three main parts of an animal cell? \_\_\_\_\_

\_\_\_\_\_

2. What is the function of the nucleus? \_\_\_\_\_

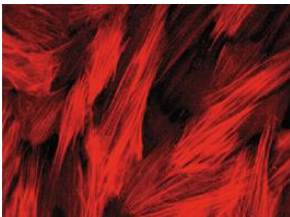
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3. What does cytoplasm look like? \_\_\_\_\_

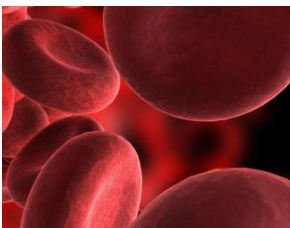
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## Specialised animal cells

Here are some examples of specialised animal cells.



**Muscle cells** are specialised to contract and shorten, over and over again.



**Red blood cells** are specialised to carry oxygen around the body.



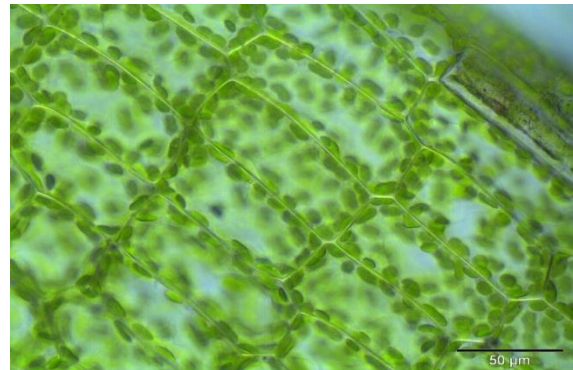
**Nerve cells** are specialised to carry electrical messages from one part of the body to another.

# Plant Cells

There are millions of cells in a plant.

Plant cells have the same roles as animal cells:

- to carry out activities that keep the cell alive.
- to carry out its special function as part of a tissue.



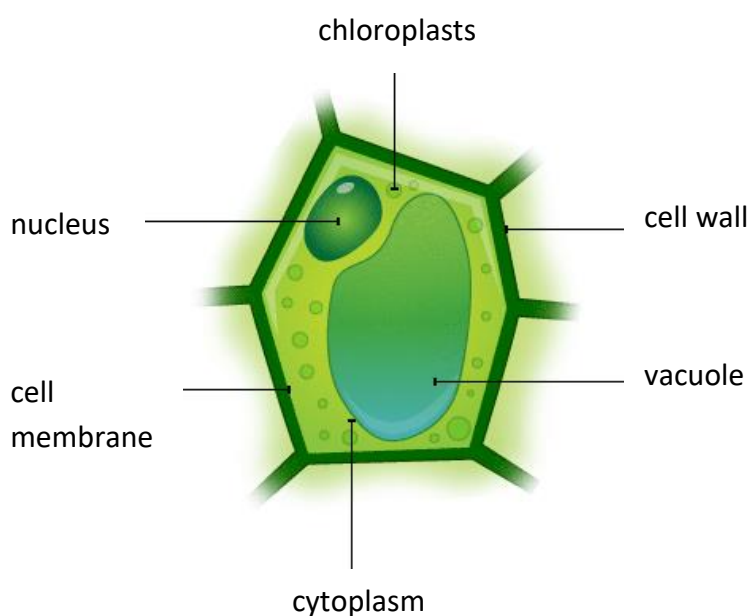
Leaf cells

Tissue cells often have special sizes, shapes or features. Scientists say that the cells are **specialised**.

## A typical plant cell

Plant cells, like animal cells, have a **cell membrane**, a **nucleus** and **cytoplasm**.

Plant cells also have a **cell wall**, **vacuole** and **chloroplasts**. These are not found in animal cells.



This diagram shows that plant cells have a regular shape, a **cell membrane**, a **nucleus**, **cytoplasm**, **chloroplasts**, **cell wall**, and a **vacuole**.

## Parts and functions in plant cells

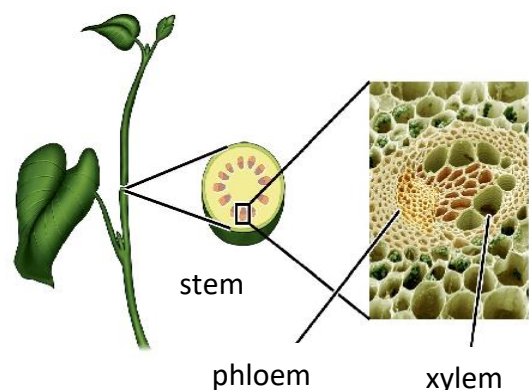
Part	Description	Function
Cell membrane	A thin wall beneath the cell wall.	The cell membrane surrounds the cell and controls which substances move in and out.
Nucleus	A large dark spot near the centre of the cell.	A control centre of the cell. The nucleus directs the growth of the cell and the activities that take place inside the cell.
Cytoplasm	A jelly-like material held in the cell by the cell membrane.	Chemical reactions occur in the cytoplasm to keep the cell alive and carry out its specialised function.
Cell wall	The outside rigid layer surrounding a plant cell.	Helps the plant hold its shape and keeps it growing upright.
Chloroplasts	Tiny green sacs found in the cytoplasm	Chloroplasts make food for plants. This process is called <b>photosynthesis</b> .
Vacuole	A bag of water with substances dissolved in it.	Stores food for a plant and helps control the amount of water in a plant.

## Specialised plant cells

Here are some examples of specialised plant cells grouped into tissue.

Phloem (pronounced flo-em) cells form pipes to carry dissolved sugars throughout the plant.

Xylem (pronounced zy-lem) cells form pipes to carry water throughout the plant.







## Activity 2

Answer the questions below.

1. What do chloroplasts look like? \_\_\_\_\_

\_\_\_\_\_

2. What part of the plant makes food? \_\_\_\_\_

3. What is the function of the vacuole? \_\_\_\_\_

\_\_\_\_\_

## Differences Between Animal and Plant Cells

### Shape

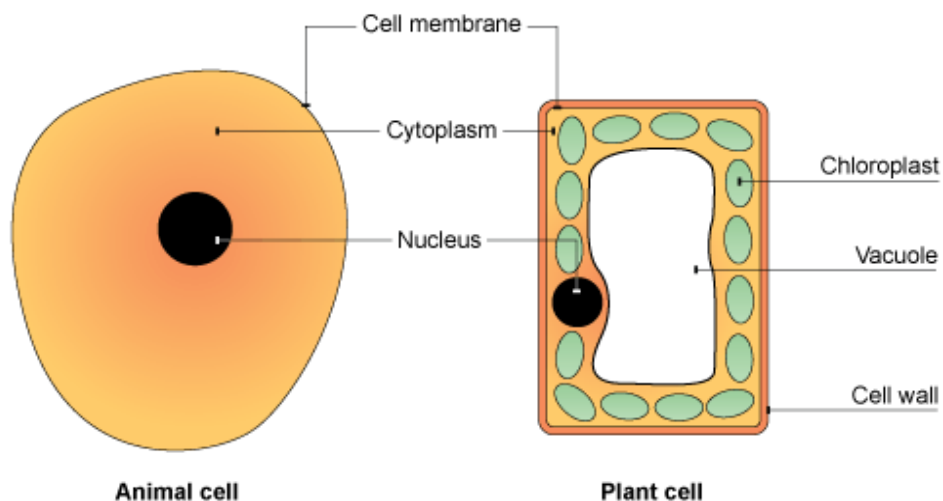
Animal cells usually have an irregular shape.

Plant cells usually have a regular shape.

### Parts

Animal cells and plant cells both have: cell membrane, cytoplasm and nucleus.

Plant cells also have: chloroplasts, vacuole and cell wall.





## Activity 3

1. Name three parts of a plant cell **not** found in animal cells.

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2. Draw a plant cell in the box below and label the following parts.

<b>Chloroplast</b>	<b>cell wall</b>	<b>nucleus</b>	<b>vacuole</b>
	<b>cell membrane</b>	<b>cytoplasm</b>	