The Thomas Alleyne Academy

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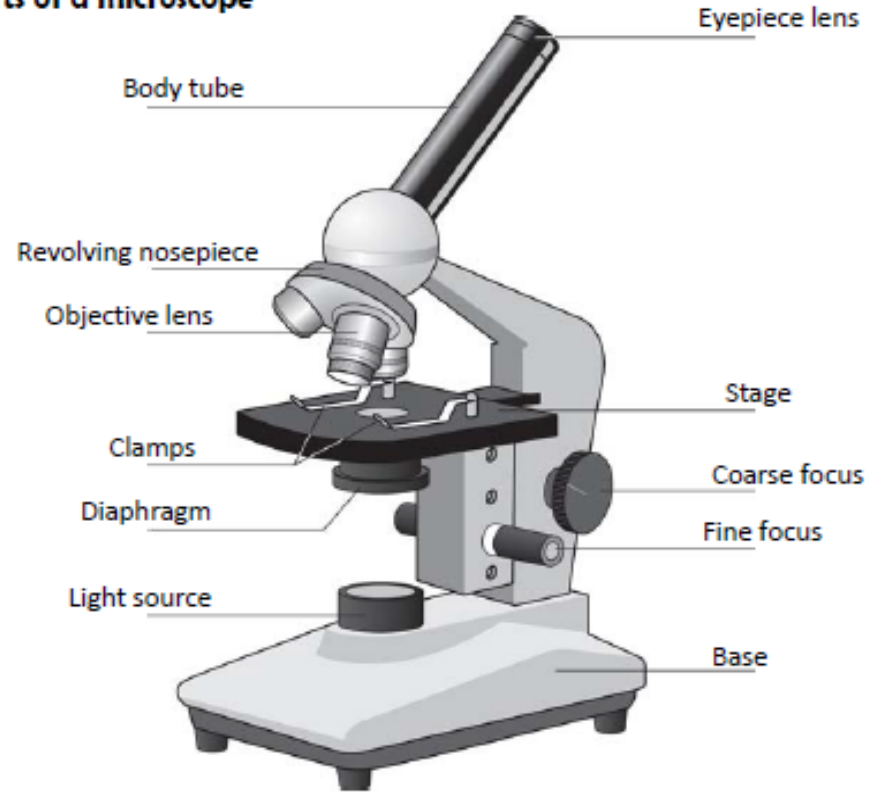
Knowledge Organiser - Cells, Tissues and Organs

Science Department

KPI 7BC 1: Use a microscope to produce an image of a cell in focus.

Parts of a microscope



Part of microscope	Function
Stage	Area where specimen is placed
Clamps	Hold the specimen still whilst it is being viewed
Light source	Illuminates the specimen
Objective lens	Magnifies the image of the specimen
Eyepiece lens	Magnifies the image of the specimen
Course/fine focus	Used to focus the specimen so it can be seen clearly
Revolving nosepiece	Holds 2 or more objective lenses

Using a microscope

To view an object down the microscope we can use the following steps:

1. Plug in the microscope and turn on the power
2. Rotate the objectives and select the lowest power (shortest) one
3. Place the specimen to be viewed on the stage and clamp in place
4. Adjust the course focus until the specimen comes into view
5. Adjust the fine focus until the specimen becomes clear
6. To view the specimen in more detail repeat the process using a higher power objective

Magnification

We can use the following equation to calculate the magnification of an object viewed through a microscope:

$$magnification = \frac{image\ size}{actual\ size}$$

Preparing a microscope slide

To prepare a slide to view onion cells we can use the following steps:

1. cut open an onion
2. use forceps to peel a thin layer from the inside
3. spread out the layer on a microscope slide
4. add a drop of iodine solution to the layer
5. carefully place a cover slip over the layer

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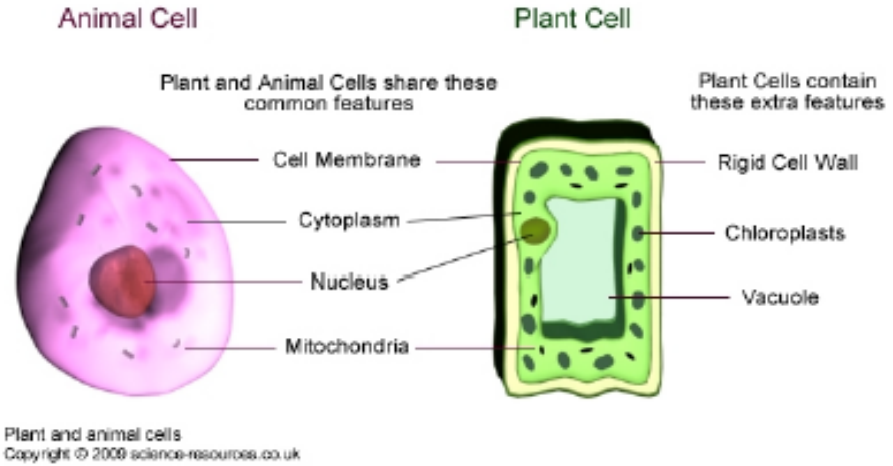
KPI 7BC 2: label plant and animal cells; state the function of the organelles; and compare plant and animal cells

Cells

Cells are the building blocks of all living organisms

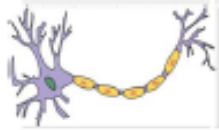


Plant and animal cells

Organelle	Definition
Cell wall	Made of cellulose, which supports the cell
Cell membrane	Controls movement of substances into and out of the cell
Cytoplasm	Jelly-like substance, where chemical reactions happen
Nucleus	Contains genetic information and controls what happens inside the cell
Vacuole	Contains a liquid called cell sap, which keeps the cell firm
Mitochondria	Where most respiration reactions happen
Chloroplast	Where photosynthesis happens

Specialised cells

Specialised cells are found in multicellular organisms. Each specialised cell has a particular function within the organism.

	Type of cell	Function	Special features
Animal cells	 Red blood cells	To carry oxygen	• Large surface area, for oxygen to pass through • Contains haemoglobin, which joins with oxygen • Contains no nucleus
	 Nerve cells	To carry nerve impulses to different parts of the body	• Long • Connections at each end • Can carry electrical signals
	 Male reproductive cell (sperm cell)	To reach female cell, and join with it	• Long tail for swimming • Head for getting into the female cell
Plant cells	 Root hair cell	To absorb water and minerals	• Large surface area
	 Leaf cell	To absorb sunlight for photosynthesis	• Large surface area • Lots of chloroplasts

Unicellular Organisms

Some organisms are only made of a single cell, these are called unicellular organisms. All the processes needed for the organism to survive happen in that one, single cell. There are no tissues, organs or organ systems. Unicellular organisms often have structural adaptations to help them survive.

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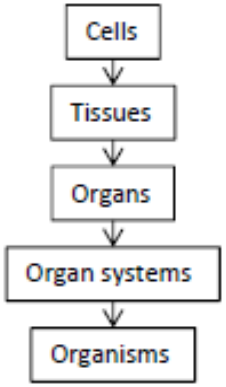
KPI 7BC 3: describe the relationship between cells, tissues and organs; and describe the function of the main organ systems

The make up of an organism

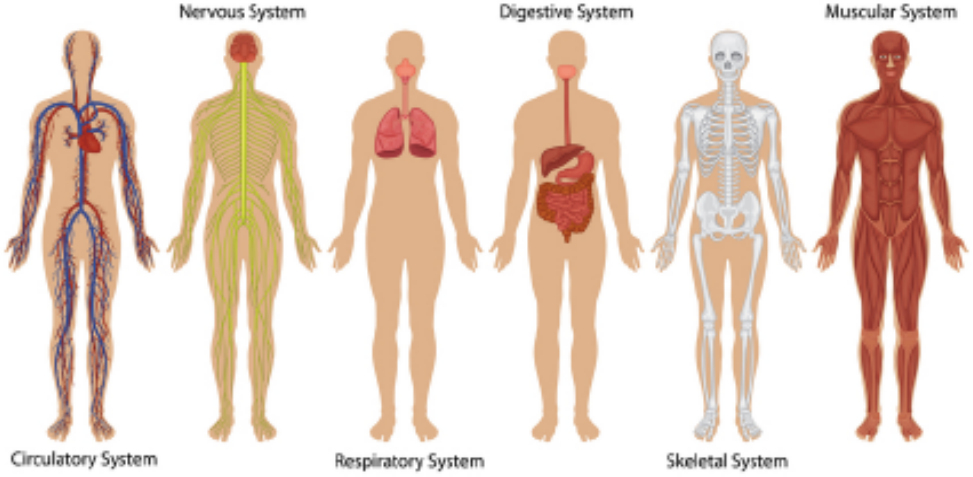
Organisms are constructed according to the following hierarchy:



Cell	Nerve cell, muscle cell, root hair cell	Smallest functional structure of a living thing
Tissue	Muscle, epithelial (cover bodily surfaces), glandular (produces hormones and enzymes)	A group of cells with a similar structure and function
Organ	Intestine, heart, flower, leaf, brain	Made up of a group of tissues working together to perform a particular job
Organ system	Respiratory, digestive, reproductive	Made up of a group of organs working together to do a particular job
Organism	Human, oak tree, lion, shark	An individual living thing

Organ systems

The following organ systems are found in humans. They each carry out a particular function.



Circulatory system	**Heart and blood vessels**	**Transports substances around the body**
Nervous system	**Brain, spinal column, nerves**	**Transmits nerve impulses around the body**
Respiratory system	**Lungs, trachea, nose, mouth**	**Provides oxygen needed for respiration**
Digestive system	**Oesophagus, stomach, intestines, liver**	**Extracts nutrients from food**
Skeletal system	**Bones**	**Holds the human body up**
Muscular system	**Muscle**	**Responsible for movement of the human body**