

Cell structure What are eukaryotic cells?	Cell structure What are prokaryotic cells?
Cell structure How is the genetic material arranged in a bacterial cell?	Cell structure Give the prefixes centi, milli, micro and nano as powers of ten.
Cell structure What is standard form?	Cell structure List the parts found in most animal cells.
Cell structure What extra parts do plant cells often have?	Cell structure Function of the nucleus?

Bacterial cells. Much smaller than eukaryotic cells, with cytoplasm and a cell membrane surrounded by a cell wall. Genetic material is not enclosed in a nucleus.

Cells with genetic material enclosed in a nucleus, plus a cell membrane and cytoplasm. Plant and animal cells are eukaryotic.

Centi 10^{-2} , milli 10^{-3} , micro 10^{-6} , nano 10^{-9} .

As a single DNA loop, not enclosed in a nucleus. There may also be one or more plasmids.

Nucleus, cytoplasm, cell membrane, mitochondria and ribosomes.

A number between 1 and 10 multiplied by a power of ten, for example 3×10^{-4} .

Contains the genetic material (DNA) and controls the activities of the cell.

Chloroplasts and a permanent vacuole filled with cell sap. Plant and algal cells also have a cell wall made of cellulose.

Cell structure

Function of mitochondria?

Cell structure

Function of ribosomes?

Cell structure

Function of chloroplasts?

Cell structure

Function of the cell membrane?

Cell structure

Function of the cell wall in plants and algae?

Cell structure

When should you use estimation to compare sub-cellular structures?

Cell structure

Required practical 1: which lens do you start with and why?

Cell structure

Required practical 1: what must a drawing include?

Where proteins are made (protein synthesis).

Where aerobic respiration takes place, releasing energy for the cell.

Controls the movement of substances into and out of the cell.

They contain chlorophyll and absorb light energy for photosynthesis.

When you only need to judge relative size or area, by rounding the measurements to easy numbers.

Made of cellulose. It strengthens the cell.

Clear labels, a title and a magnification scale, drawn in sharp pencil with no shading.

The lowest-power objective lens, to find the specimen and avoid the lens hitting the slide.

Cell structure

How is a sperm cell adapted for its function?

Cell structure

How is a nerve cell adapted for its function?

Cell structure

How is a muscle cell adapted for its function?

Cell structure

How is a root hair cell adapted for its function?

Cell structure

How is a xylem cell adapted for its function?

Cell structure

How is a phloem cell adapted for its function?

Cell structure

What is cell differentiation?

Cell structure

Why is differentiation important?

It is long to carry impulses over long distances, and has branched connections at the ends to connect with other cells.

Tail to swim, many mitochondria for energy, streamlined head, and enzymes in the head to get into the egg.

Long hair-like projection gives a large surface area to absorb water and mineral ions. Many mitochondria release energy for active transport.

Protein fibres that shorten to contract the cell, and many mitochondria to release energy for contraction.

Elongated cells joined end to end into tubes. Pores in the end walls let cell sap with dissolved sugars move from cell to cell.

Forms a hollow tube with no end walls, and strengthened walls, to carry water and mineral ions up the plant.

It lets cells become specialised so they can carry out specific functions efficiently in a multicellular organism.

The process by which cells acquire different sub-cellular structures to carry out a particular function, becoming specialised.

Cell structure

When do most animal cells differentiate, compared with plant cells?

Cell structure

What is cell division mainly used for in mature animals?

Cell structure

Why does an electron microscope show more detail than a light microscope?

Cell structure

What is resolving power?

Cell structure

What is the magnification equation?

Cell division

What are chromosomes?

Cell division

How are chromosomes found in body cells?

Cell division

What are the three overall stages of the cell cycle?

Repair and replacement.

Most animal cells differentiate at an early stage. Many plant cells keep the ability to differentiate throughout life.

The ability to distinguish between two points that are close together as separate points.

It has much higher magnification and resolving power.

Structures in the nucleus made of DNA molecules. Each carries a large number of genes.

Magnification = size of image ÷ size of real object.

Growth and DNA replication; mitosis; division of the cytoplasm and cell membranes.

Normally in pairs.

Cell division

What happens to the DNA before a cell divides?

Cell division

What happens in mitosis?

Cell division

Why is mitosis important in multicellular organisms?

Cell division

What is a stem cell?

Cell division

What can stem cells from human embryos do?

Cell division

What can stem cells from adult bone marrow do?

Cell division

What is meristem tissue?

Cell division

What is therapeutic cloning?

One set of chromosomes is pulled to each end of the cell and the nucleus divides.

It replicates to form two copies of each chromosome.

An undifferentiated cell capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation.

It is important for growth and development (and repair and replacement).

Form many types of cell, including blood cells.

They can be cloned and made to differentiate into most different types of human cell.

An embryo is produced with the same genes as the patient, so stem cells from it are not rejected by the patient's body.

Tissue in plants whose stem cells can differentiate into any type of plant cell, throughout the life of the plant.

Cell division

Give two risks or objections to using stem cells.

Cell division

How can plant stem cells be used?

Transport in cells

Define diffusion.

Transport in cells

Give three substances that move by diffusion in the body.

Transport in cells

Name three factors that affect the rate of diffusion.

Transport in cells

Why does a single-celled organism not need an exchange surface?

Transport in cells

How do you calculate surface area to volume ratio?

Transport in cells

Why do large multicellular organisms need exchange surfaces and a transport system?

To clone rare species to protect them from extinction, and to clone crop plants with desirable features such as disease resistance.

Risk of transfer of viral infection; some people have ethical or religious objections.

Oxygen and carbon dioxide in gas exchange, and urea from cells into blood plasma.

The spreading out of the particles of any substance in solution, or particles of a gas, resulting in a net movement from an area of higher concentration to an area of lower concentration.

It has a large surface area to volume ratio, so enough molecules can diffuse in and out.

Concentration gradient, temperature and surface area of the membrane.

Their surface area to volume ratio is small, so diffusion across the outside would not supply all cells.

Surface area $\div$ volume. For a cube: surface area = $6 \times \text{side}^2$, volume = side^3 .

Transport in cells

What makes an exchange surface more effective?

Transport in cells

How is the small intestine adapted for exchange?

Transport in cells

How are the lungs adapted for gas exchange?

Transport in cells

How are the gills of a fish adapted for exchange?

Transport in cells

How are roots and leaves adapted for exchange?

Transport in cells

Define osmosis.

Transport in cells

How do you calculate percentage change in mass?

Transport in cells

Osmosis required practical (RP3 Triple, RP2 Combined): what is measured and what is varied?

Villi give a large surface area, a thin wall gives a short diffusion path, and a good blood supply carries absorbed molecules away.

Large surface area, thin membrane (short diffusion path), efficient blood supply (animals) and ventilation (animal gas exchange).

Many gill filaments with lamellae give a large surface area, thin, with a good blood supply and water flowing over them.

Many alveoli give a large surface area, thin walls, a good blood supply and ventilation.

The diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.

Root hairs give a large surface area for water and ions. Leaves are flat and thin with air spaces and stomata for gas exchange.

Measure the mass of plant tissue before and after. Vary the concentration of salt or sugar solution.

$$(\text{final mass} - \text{initial mass}) \div \text{initial mass} \times 100.$$

Transport in cells

Osmosis required practical: what does a loss in mass show?

Transport in cells

Define active transport.

Transport in cells

Give two examples of active transport.

Transport in cells

How does active transport differ from diffusion?

Movement of substances from a more dilute to a more concentrated solution, against a concentration gradient, using energy from respiration.

Water moved out of the cells by osmosis because the solution was more concentrated than the cell contents.

It moves substances against the concentration gradient and needs energy from respiration.

Mineral ions into plant root hairs from the soil, and sugar from the gut into the blood.