



Recap

We previously covered the different types of cells, specifically eukaryotic cells (animal and plant cells) and prokaryotic cells (bacterial cells). You should understand the differences in the structures of both types of cells. Magnification was also covered, with common orders of magnitude in standard form.



Key Aims

1. Animal Cell Structure
2. Plant Cell Structure
3. Bacterial Cell Structure
4. Cell Sizes



AQA Specification

Students should be able to explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, chloroplasts in plant cells and plasmids in bacterial cells are related to their functions.

1.1.2. Animal and Plant Cells

	Animal	Plant	Bacteria
Eukaryotic or Prokaryotic	Eukaryotic	Eukaryotic	Prokaryotic
Unicellular or Multicellular	Either	Multicellular	Unicellular
Cell Membrane	✓	✓	✓
Nucleus	✓	✓	✗
Cytoplasm	✓	✓	✓
Mitochondria	✓	✓	✗
Cell Wall	✗	Cellulose	Peptidoglycan
Vacuole	✗	✓	✓
Chloroplasts	✗	✓	✗

Animal Cell Structure

Nucleus - genetic material is stored in the circular nucleus. Genetic material is vital to the life of an organism.

Cell membrane - The cell membrane controls the movement of substances in and out of the cell

Mitochondria - the mitochondria is the powerhouse of the cell. It is the place where aerobic respiration occurs, producing energy needed for the cell to survive and function.

Cytoplasm - the cytoplasm is a solvent in which chemical reactions take place. Enzymes are found in the cytoplasm





AQA Specification

Most animal cells have the following parts: a nucleus, cytoplasm, a cell membrane, mitochondria, ribosomes.

Ribosomes - ribosomes are the site of protein synthesis in the cell.

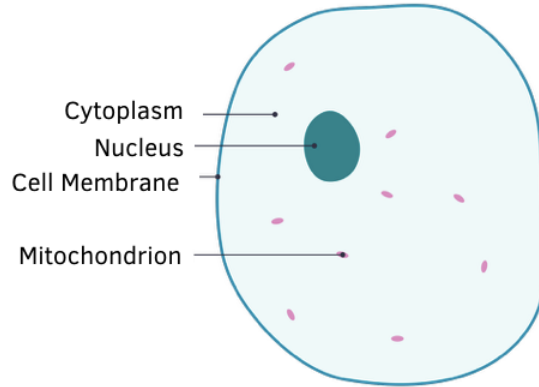


Fig 1. Animal Cell Structure.



AQA Specification

In addition to the parts found in animal cells, plant cells often have: chloroplasts, a permanent vacuoles filled with cell sap.

Plant Cell Structure

Plant cells have all of the above organelles, and in addition:

Cell Wall - the cell wall is made of cellulose, a carbohydrate. It is used to provide rigidity to the cell. **Algal** cells also have a cell wall.

Chloroplasts - these are the site of photosynthesis, which is required to make glucose for the plant. Chlorophyll in the chloroplasts absorbs light energy for photosynthesis, and gives leaves their green colour.

Vacuole - the vacuole contains sap which is a mix of salts and sugars.



AQA Specification

Plant and algal cells also have a cell wall made of cellulose, which strengthens the cell.

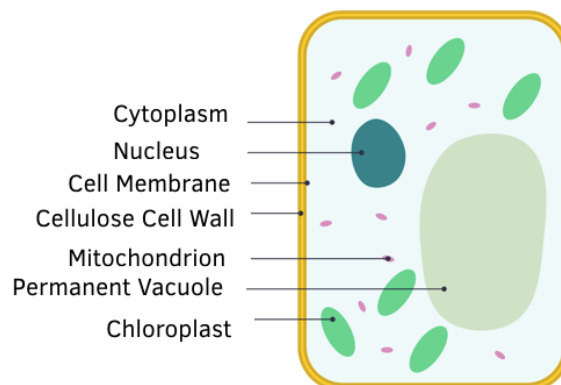


Fig 2. Plant Cell Structure.





Knowledge Recall

1. Which cell organelles are found only within a plant cell?
2. Which types of cell contains plasmids?
3. What is a bacterial cell wall made of?

Bacterial Cell Structure

Bacterial cells have all of the organelles that plant cells do, except for a true nucleus, chloroplasts or mitochondria.

Cell wall - the cell wall is not made of cellulose, but is instead made of peptidoglycan.

Free DNA - bacterial cells have DNA free in the cytoplasm. It is single-stranded, unlike DNA in a nucleus which is double-stranded.

Plasmids - some bacteria have small circular loops of DNA in the cytoplasm called plasmids.

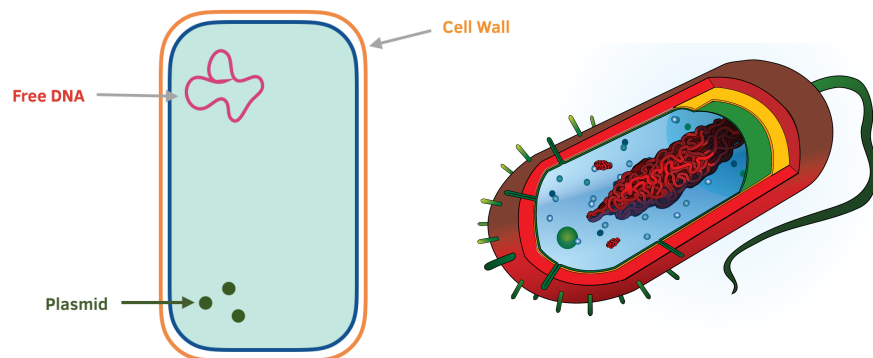


Fig 3. Bacterial Cell Structure.



AQA Specification

Students should be able to use estimations and explain when they should be used to judge the relative size or area of sub-cellular structures.

Cell Sizes

- **Plant cells and animal cells are larger than bacterial cells.** A plant cell is between 10-100 micrometres long and an animal cell is between 10-30 micrometers long. A bacterial cell on the other hand is between 0.5-5 micrometers long.

