*This is the **Foundation Combined** version — Higher Tier and Separate-only content removed.*

All living things are made of cells. There are two fundamentally different types: eukaryotic (with a nucleus) and prokaryotic (without).

Required Practical: Using a light microscope to prepare, observe, draw and label specimens of animal and plant cells (e.g. onion cells, cheek cells).

- Eukaryotic cells have a membrane-bound nucleus containing DNA. Examples: animal, plant and fungal cells.
- Animal cell organelles: nucleus (controls cell), cell membrane (controls entry/exit), cytoplasm (site of reactions), mitochondria (aerobic respiration / ATP), ribosomes (protein synthesis).
- Plant cells additionally have: cell wall (cellulose — structural support), chloroplasts (contain chlorophyll — site of photosynthesis), permanent vacuole (cell sap — maintains turgidity).
- Prokaryotic cells (bacteria): NO membrane-bound nucleus — circular chromosome floats in cytoplasm. Features: cell wall, ribosomes, cell membrane, sometimes plasmids and flagellum.
- Cells specialise (differentiate) by switching specific genes on or off.
- Red blood cell: no nucleus, biconcave shape, packed with haemoglobin — maximises O■ carrying.
- Root hair cell: long extension gives large surface area — absorbs water (osmosis) and minerals (active transport).
- Nerve cell (neurone): very long, many dendrites, myelin sheath — for rapid signal transmission.
- Sperm cell: tail (flagellum) for swimming, many mitochondria for energy, acrosome to penetrate egg.

Key Terms

Eukaryotic	Cell with a membrane-bound nucleus (animals, plants, fungi)
Prokaryotic	Cell without a nucleus — DNA is circular chromosome in cytoplasm (bacteria)
Organelle	A specialised structure within a cell with a specific function
Plasmid	Small circular ring of extra DNA found in bacteria
Differentiation	Process by which a cell becomes specialised for a specific function

■ **Exam Tip:** Remember the three extras in plant cells: cell WALL, CHLOROPLASTS, VACUOLE. Bacteria are PROKARYOTIC — no nucleus, circular DNA. Exam questions often ask you to identify a cell type from a diagram — look for these distinctive features.