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

Microscopes allow us to view cells and sub-cellular structures in detail. The two main types are the light microscope and the electron microscope.

Required Practical: Using a light microscope to observe and draw cells. Calculating actual cell size from drawings using magnification formula.

- Light microscope: uses visible light, can magnify up to ~×1500, resolution ~200 nm. Can be used to view living cells.
- Electron microscope: uses a beam of electrons, much higher magnification (×500,000+) and resolution (~0.1 nm). Samples must be dead and in a vacuum.
- Because electrons have a shorter wavelength than light, electron microscopes can resolve much finer detail — revealing ribosomes, mitochondria cristae, and cell membranes.
- Magnification formula: Magnification = Image size ÷ Actual size. Rearranged: Actual size = Image size ÷ Magnification.
- Units: 1 mm = 1000 µm. Always convert to the same unit before calculating.
- To prepare a slide: cut a thin section, place on slide, add stain (iodine for starch/plant cells, methylene blue for animal cells), lower coverslip at 45° to avoid bubbles.
- When drawing cells: use pencil, smooth continuous lines, label lines should not cross, no shading, draw what you see (not from memory).

Key Terms

Magnification	How much larger the image appears compared to the real object
Resolution	The ability to distinguish two separate points as distinct — determines the detail visible
Staining	Adding a coloured dye to make cell structures more visible under a microscope

■ **Exam Tip:** Always show working in magnification calculations: write the formula, substitute values, calculate, then state the unit. A common error is forgetting to convert mm to µm before calculating.