Aim: To use a light microscope to prepare, observe, draw and label animal and plant cells.

Background Theory

- Cells are the basic unit of life — all living things are made of cells.
- Light microscopes use visible light and glass lenses. Max magnification ~x1500, resolution ~200 nm.
- Magnification = Image size ÷ Actual size. Units must match (both mm or both µm).
- 1 mm = 1000 µm. Convert before calculating.

★ Electron microscopes have much higher resolution (~0.1 nm) — reveal organelle ultrastructure.

★ Resolution is the ability to distinguish two separate points — more important than magnification for detail.

Equipment

- Light microscope
- Glass slides and coverslips
- Forceps and scalpel
- Iodine solution (plant cells)
- Methylene blue (animal cells)
- Onion bulb
- Cheek swab (from your own cheek)
- Distilled water
- Pencil and plain paper

Method — Plant Cells (Onion Epidermis)

1. Peel a small piece of epidermis from the inside of an onion scale leaf using forceps.
2. Place it flat on a clean glass slide and add 2 drops of iodine solution.
3. Lower a coverslip at 45° using a mounted needle to avoid trapping air bubbles.
4. Place the slide on the microscope stage and clip it in position.
5. Start on the lowest power objective (x4) and focus using the coarse focus wheel.
6. Switch to higher power (x10, then x40) and use the fine focus wheel.
7. Draw at least 5 cells. Use a sharp pencil — smooth lines, no shading.
8. Label: cell wall, cell membrane, nucleus, cytoplasm, vacuole, chloroplasts (if visible).

Variables

Independent variable	Type of stain used / magnification used
Dependent variable	Appearance and size of cells as viewed under the microscope
Controlled variables	Same light microscope; same preparation technique; same slide thickness

Results — Calculation Practice

Record your measurements and calculate:

Measurement	Image size (mm)	Magnification	Actual size (μm)

Analysis

- Calculate: Actual size = Image size ÷ Magnification. Convert mm to μm (× 1000).
- Compare plant and animal cells — identify structures present/absent in each.

★ Explain why electron microscopes can reveal more detail than light microscopes.

★ Suggest why the resolution of an electron microscope matters more than its magnification.

Exam Tip: ALWAYS show working in magnification calculations. Write the formula, substitute values, then calculate. State units (μm for actual size). Missing units = lost mark.

Common Mistake: Do NOT confuse magnification (bigger image) with resolution (more detail). High magnification without good resolution = bigger but blurry.