

# Edexcel IAL Biology A Level

## Core Practical 5

Use a light microscope to make observations and labelled drawings of suitable animal cells.

Use a graticule with a microscope to make measurements and understand the concept of scale.

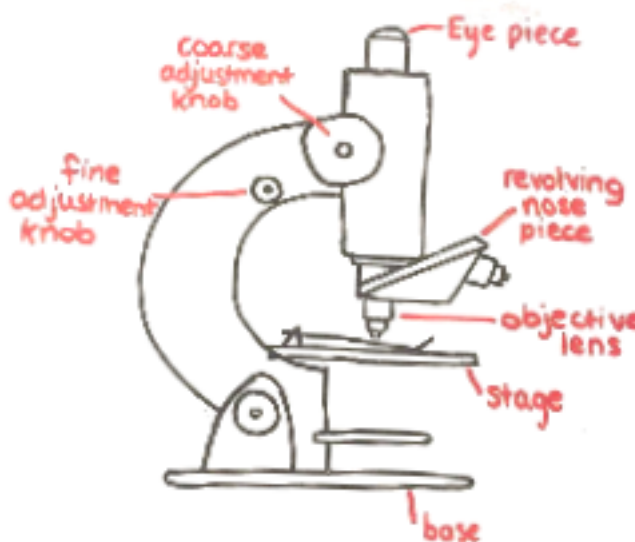


## Equipment list

- Light microscope
- Microscopic slide, specimen and cover slip

## Method

1. Begin by securing the prepared slide to the stage of the microscope, using the accompanying clip.
2. Rotate the revolving nosepiece to line up the **lowest power** objective lens.
3. Look through the eyepiece and use the coarse adjustment knob to lower and raise the stage until an **image comes into focus**.
4. Then use the fine adjustment knob to focus the image further.
5. In order to see and study cells steps 3 and 4 may need to be repeated using a **higher power objective lens** - 3 are usually found on the nosepiece.
6. Produce a biological drawing of cell(s) observed.

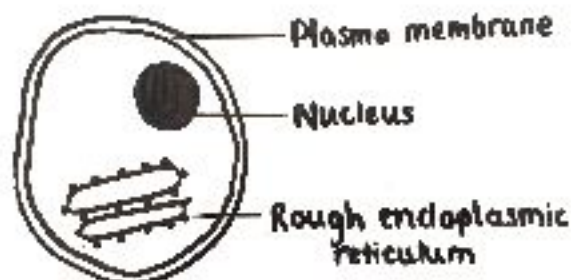


## Biological drawings

When producing biological drawings, in this case of cells being observed under the microscope, certain rules should be followed:

- Draw in pencil only
- Use blank white paper
- Do not sketch - draw clear, unfeathered lines only
- Include labels
- Label lines should be drawn with a ruler and not cross over each other
- Do not shade the drawing - for instance when indicating the thickness of membranes / cell walls instead draw 2 lines
- Include the magnification of the microscope in the title
- Make diagrams as simple as possible and draw them an appropriate size so everything can clearly be seen
- Include a scale bar where possible

Liver cell (x 400)

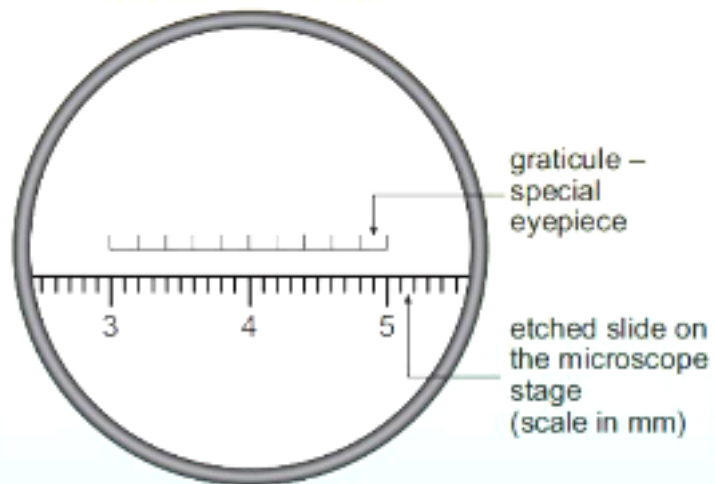


## Using a graticule

By using an eyepiece graticule and a stage micrometer the **size of cells** and **potentially their organelles** can be accurately calculated. An eyepiece graticule is a ruled line with regular intervals that appears when you look down the microscope and a stage micrometer is a microscopic slide with an accurate scale and is used to calibrate the eyepiece as follows:

1. Place the stage micrometer on the stage and **line up its scale with the eyepiece** graticule. On the stage micrometer 1 division is equal to 0.1mm.
2. Count how many eyepiece divisions are equal to 1 stage division. This can be used to calculate the **length** of each eyepiece division at this magnification - for instance, if 10 eyepiece divisions are equal to 1 stage division (0.1 mm) then each eyepiece division measures  $0.1 \div 10 = 0.01$  mm.
3. The stage micrometer can now be replaced with the microscopic slide containing the specimen. It is important **not to change any adjustments or objective lenses at this point**.
4. When observing cells now, their length or size of organelles can be calculated accurately by counting the number of eyepiece divisions - for instance a cell that is 3 eyepiece divisions

view down microscope

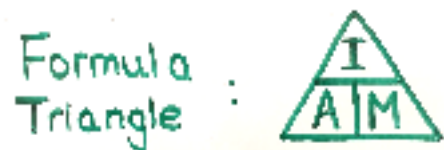


wide would be 0.03 mm wide.

The following formula can also be used to calculate **magnification** and **object and image sizes** when observing specimens:

$$\text{Image size} = \text{Actual size} \times \text{Magnification}$$

( $\mu\text{m}/\text{mm}$ )      ( $\mu\text{m}/\text{mm}$ )



## Risk assessment

This experiment is low risk however it is important to keep in mind that microscopes can be heavy so should be handled carefully and not put on the edges of workbenches where they could be knocked off. Furthermore, when preparing various samples to observe there is a risk of someone being allergic, for instance where some species of plant are being handled in the lab before being cut to use as specimens.

