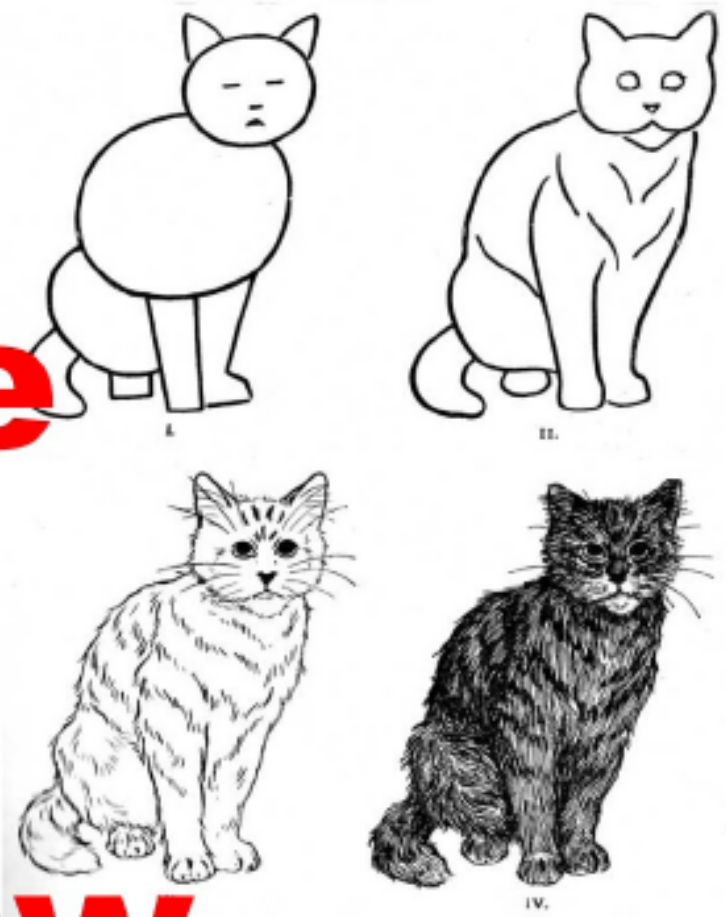
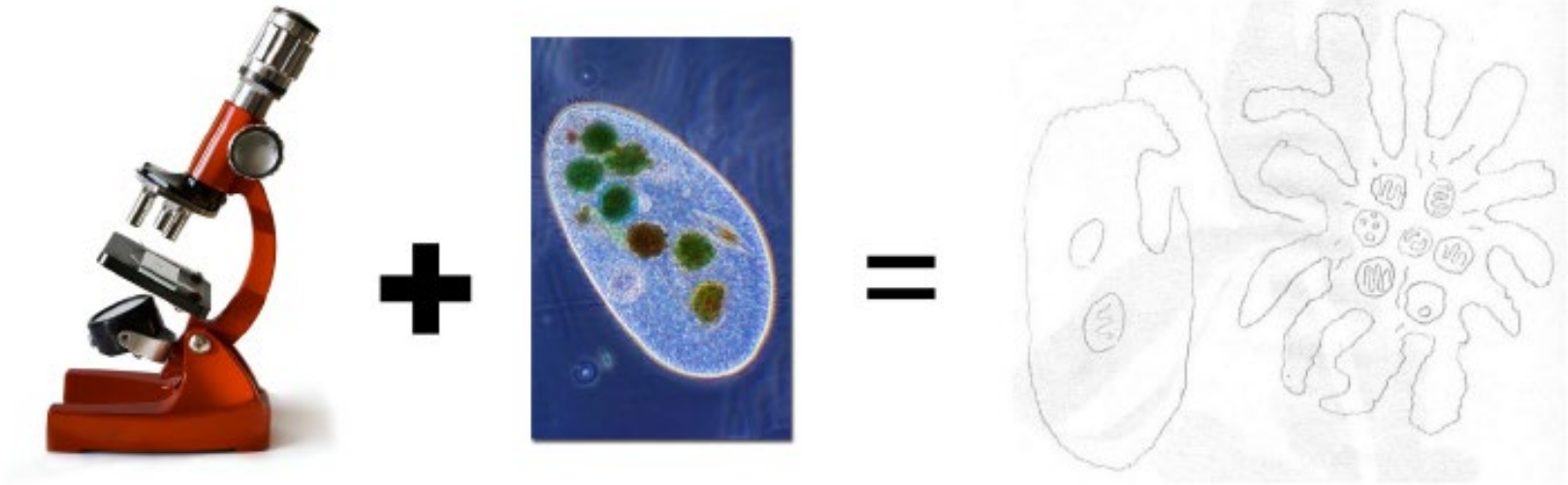
Science 10 Unit C: Biology

Using a Microscope and How to Draw



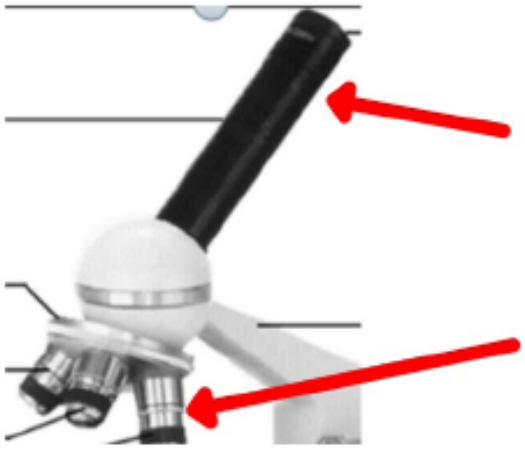
A critical skill for microscope operators is to know how to draw what they see in the microscope.

This is what we will study today.



Magnification Factors

Compound microscopes use two lenses to create an image. Each lens has a magnification factor.



The eye piece usually has a magnification of 10x.

There are three objective lenses: Low, Med and High power.

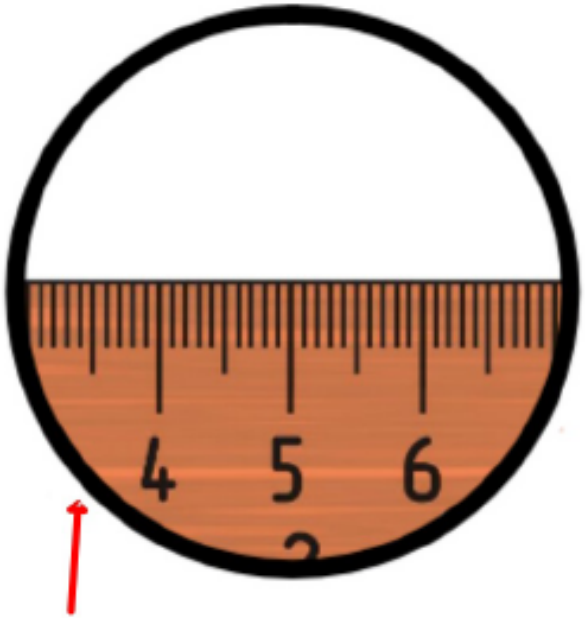
To find the total magnification of the microscope, we multiply the two numbers.

ex) A low power lens has a magnification of 4x. If the eye piece has a magnification of 10x, what is the total magnification of the microscope?

Field of View

When you look through a microscope, the area you see is called the field of view.

At low power, the FOV can be measured by how wide the circle is.



The field of view here is 4 cm.

At higher power, the field of view may be less than 1 mm, so measuring with a ruler is not practical. In these cases, we use a formula to calculate the field of view:

$$\frac{\text{HP FOV}}{\text{LP FOV}} = \frac{\text{LP Magnification}}{\text{HP Magnification}}$$

where:

HP = high powered
LP = low powered
FOV = Field of View

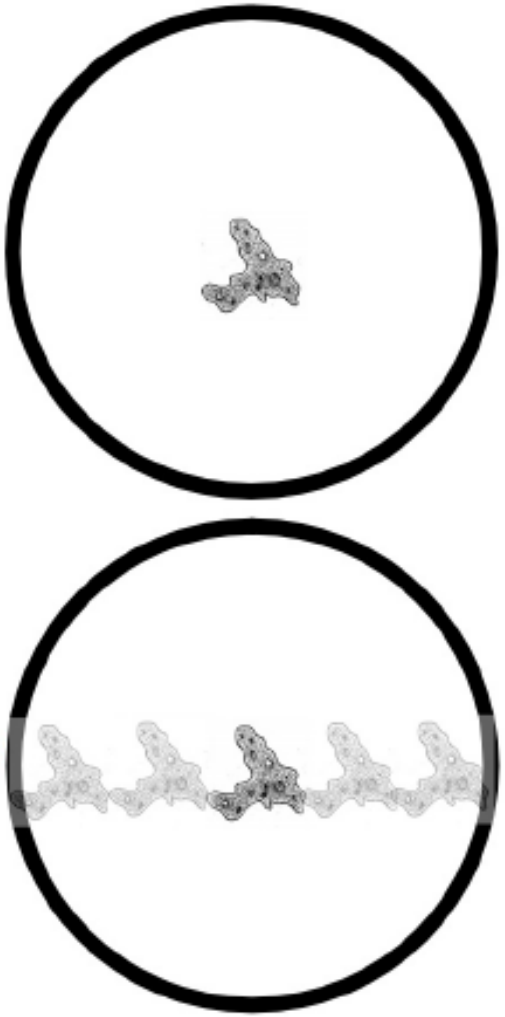
ex) A student uses a microscope with the following specs:

Eye Piece: 10x
Low Power Objective: 4x
High Power Objective: 30x

If the field of view at low power is 3.5 cm, what is the field of view at high power?

Estimating the size of a sample:

ex) The field of view for the diagram below is 20 mm. Estimate the size of the organism.



To estimate size, estimate how many of the sample will fit into the field of view and divide.

$$\frac{20\text{ mm}}{5\text{ organisms}} = 4\text{ mm/ organism}$$

Often, the size of an object under a microscope is very small. So we may use small units such as a micrometer (10^{-6}), or µm.

ex) The estimated size of an organism is 7.55 µm. What is the size in m? In mm?

How to Draw a Biological Diagram

Now that we know how to describe with measurements the size of what we see in a microscope, now we can talk about how to draw what we see.

Steps for Drawing a Biological Diagram:

1. **Use unlined, white paper.**
2. **Draw only one cell (one image) - and draw only what you can see!!**

(Some slides may have several cells showing, pick only one and draw it!!)

3. Draw the image approximately half a page in size using clear, unbroken lines.

4. Add details to your diagram using only the OUTLINE of the structure.

***Do NOT shade or colour your diagrams!! Stains used in slide preparation alter the natural colour.**

5. Labels are drawn using straight horizontal lines and written in lower case (no capital letters) to the right of the diagram!!

6. Measure, with a ruler, and record on the diagram the length of the diagram in millimetres.

7. In the lower right hand corner of your diagram include:

- Your name
- Subject of drawing
- Power Magnification of microscope
- Size of the object.
- F.O.V.
- Fit number