Once we know the actual size of an object we can calculate the magnification of a drawing of that same object. Measure the size of your drawing and convert the measurement into micrometers (μm). Divide the size of your drawing by the actual size of the object and you have the magnification of your drawing. For instance, if a drawing is 20 cm across, it is 200,000 μm. If the actual specimen was 50 μm in length, then the magnification of the drawing is 200,000 divided by 50, a magnification of 4000 times.

$$\text{Magnification of drawing} = \frac{\text{size of drawing (in } \mu\text{m)}}{\text{actual size of object (in } \mu\text{m)}}$$

Calculate the size of your drawing and include this measurement in the caption for your drawing.

Try the following problems in microscopic calculation. Note that the values in the questions may not be the same as for the microscopes you have used:

1. If the magnification of the objective lens is 40X and the ocular lens is 10X, what is the total magnification of the microscope image?

   400x

2. If the ocular lens is 10X and the objective lens is 100X (oil immersion), what is the total magnification?

   1000x

3. The field of view at low power (50X magnification) is 3.6 cm by measurement. What is the size of the field of view in micrometers? What would be the size of the field of view at medium power (100X)?

   36000μm 18,000 μm

4. The field of view at medium power (100X) is 1.75 cm by measurement. What would be the size of the field of view at high power (400X)? How big would the field of view be using the oil immersion lens (1000X)?

   4375μm 1750 μm

5. The field of view at medium power is 1.75 cm. You estimate that 7 objects can fit across the field of view. How big is the object?

   2500 μm

6. The field of view at medium power is 1.75 cm. At high power, you estimate that 12 objects will fit across the field of view. How big is the object?

   364.6 μm.

7. You estimate the size of an object as 150 micrometers. You produce a drawing that is 10 cm across. What is the magnification of your drawing?

666.7 X

8. You estimate the field of view as 3.6 cm at low power (50X). At high power (objective lens only = 40X) you estimate that 5 objects will span the field of view. You produce a drawing that is 27 cm across. What is the magnification of your drawing?

300 X

F. Staining specimens.

There are many ways of staining specimens to improve visibility of details. Some stains can be used with live specimens, while others work only with dead objects. Many stains are noxious chemicals that require special care to prevent damage. A few (such as picric acid) are even explosive if not used properly.

Some of the common stains are:

Crystal Violet - used for bacterial staining, plant chromatin and animal nerve tissue

Eosin - for showing blood cells and some cell components

Giemsa - for showing different types of white blood cells

Hematoxylin - for nucleus components

Methylene Blue - for bacteria, mitochondria and nerve cell components

Sudan Black - for fatty structures, golgi bodies, chromosomes and leukocyte grains

Wright Stain - for blood components.

Prepare a wet mount slide of your cheek cells by lightly rubbing the inside of your cheek with a toothpick. Smear the sample on a clean slide and place one drop of crystal violet or methylene blue onto the smear. Use a cover slip as usual. If there is too much stain, wick away the excess by holding a small scrap of absorbent paper to the edge of the cover slip. Draw what you see under the microscope.