Calculating Magnification

When you look through a microscope, you see a magnified image of the specimen on the slide. Magnification describes how much larger an object appears when viewed through a microscope than its actual size. Calculating the magnification of the image will give you an idea of the sizes of its features.

There are two magnifying features of every microscope: the eyepiece and the objective lens. The **eyepiece** has a lens that magnifies the image 10× (times) its actual size. The objective lenses magnify the image by different levels.

Eyepiece 10×	•	Scanning Objective	4×
		Low-Power Objective	10×
		High-Power Objective	40×

The total magnification of the image is the product of multiplying the eyepiece magnification by the objective lens magnification.

The examples below show how to calculate the total magnification of the daphnia under each lens.

EXAMPLE

Eyepiece • Scanning Objective = Total Magnification
(10×) • (4×) = 40×
This image is magnified 40× its actual size.

EXAMPLE

Eyepiece • Low-Power Objective = Total Magnification
(10×) • (10×) = 100×
The image is magnified 100× its actual size.

EXAMPLE

Eyepiece • High-Power Objective = Total Magnification
(10×) • (40×) = 400×
This image is magnified 400× its actual size.

Calculating Specimen Size

The field of view is the area seen through the microscope eyepiece. You can calculate the estimated size in micrometers (μm) of a specimen or object you are viewing based on the size of the field of view. Since many specimens viewed are smaller than a millimeter, the sizes of specimens are usually written in micrometers. Use these steps to calculate specimen size.

1. Place a ruler on the microscope stage and use the coarse adjustment to focus the image in the 4× objective lens.
2. Look at the markings on a ruler viewed in the eyepiece, as shown in the image below.
3. Estimate the diameter of the field of view to the nearest millimeter, which is approximately 4 mm in this example.
4. Remove the ruler and put the slide specimen on the stage.
5. Adjust the slide so the specimen is at one side of the field of view. Estimate the size of the specimen based on the field of view. The length of the daphnia specimen viewed under the scanning objective lens is about 2 mm.
6. Convert mm to μm.

length of specimen • 1000 μm/mm = ?
2 mm • 1000 μm/mm = 2000 μm