

**Laboratory 25**  
**Water Absorption and Transport in Plants**  
**Student Tip Sheet**

This lab combines several of the concepts and activities that have already been discussed. These activities will use and thus assess your understanding of osmosis, microscopic measurement, and basic use of the microscope. Osmosis especially can be a difficult concept, but this practical application of how the plant actually uses the process will hopefully be a clarifying illustration. Before you follow your teacher's instructions please review osmosis and cellular transport by completing the following exercise.

Also, a review of microscopic measurement is enclosed for your benefit.

**Review of Cellular Transport**

Cells and other particles tend to move from an area of higher concentration to an area of lower concentration. Imagine that a person walks into the lab wearing strong perfume. Shortly the entire room is permeated by the fragrant particles. The particles move to completely fill the confined space, moving from an area of high concentration to low. Similarly, a semipermeable membrane that permits passage in and out of some particles and prohibits other ones surrounds cells. Areas of higher concentration of particles are known to be **hypertonic** as compared to areas of lower concentrations of particles known to be **hypotonic**. If both inside and outside the cell have the same concentrations of particles, they are said to be **isotonic**.

Draw arrows to indicate the direction of the *movement of water* across these semi-permeable membranes.

(semipermeable membrane)

(semipermeable membrane)



**Hypotonic**

**Hypertonic**

**Isotonic**

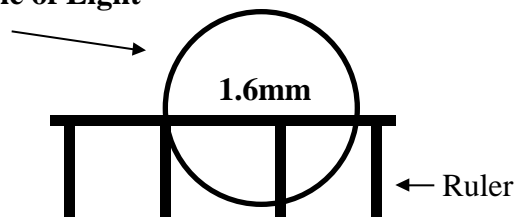
## Review of Microscopic Measurement

The following exercises will allow you to measure the diameters of the low and high power fields of view of the microscope. After which, accurate measurements of cells or structures can be accomplished using these standard measurements.

Measure the Circle of Light

### Low Power Field of View (10X)

*Caution:* Be certain to use the 10X objective, not the 4X objective.



Place a translucent plastic ruler across the stage so that the metric measurement edge of the ruler is visible through the microscope as a horizontal line along the diameter of the low power field. Be sure you are looking at the millimeter side of the ruler. Record the estimate of the number of millimeters that you see along the diameter. \_\_\_\_\_ Change this figure to micrometers: This is the size of the diameter of the field (circle of light) for low power.

### High Power Field of View (40X)

Calculate the fractional difference between low power magnification and high power magnification of your microscope. (If the low power objective is 10X and the high power objective is 40X, then the fractional difference is 4.) Divide the fractional difference into the diameter of the field for low power: \_\_\_\_\_  $\mu\text{m}$ . This is the size of the high power field diameter.

## Microscopic Image Measurement

To accurately measure the size of a microscopic cell, structure, or other similar image, first determine which objective you are using and note the diameter of the field of view. Next, count or estimate the number of cells/structures that are or could be aligned along a single line extending across the diameter. Finally divide this cell/structure numerical count into the appropriate field diameter and note the resulting micrometer measurement.