

Name:

Date:

Period:

Biology: Introduction to the Compound Microscope

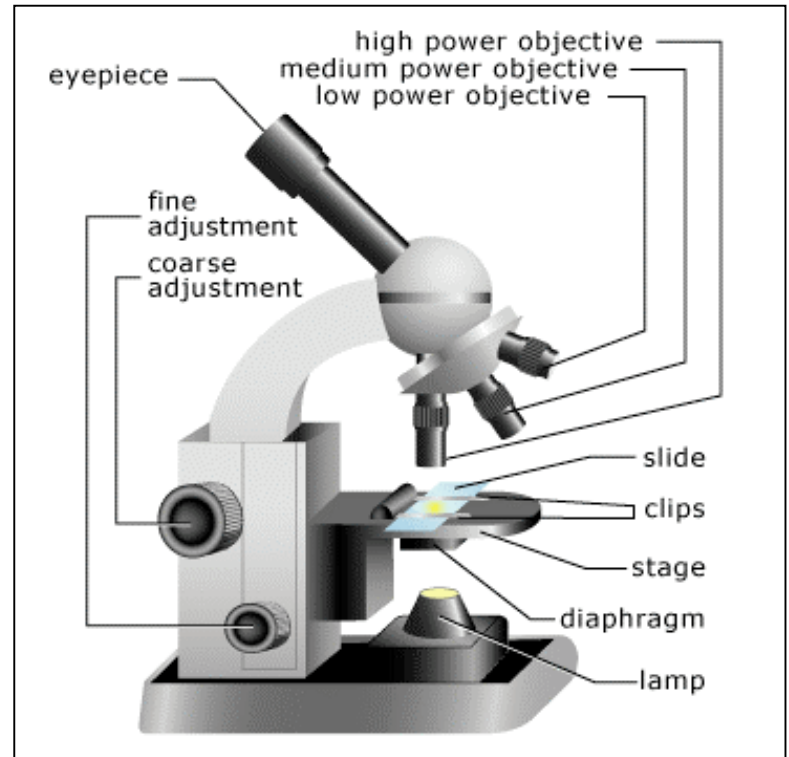
PART I: Care and use of the Microscope

Introduction

The human eye cannot distinguish objects much smaller than 0.1 MM in size. The microscope is a tool of biology that extends vision and allows observation of much smaller objects. The most commonly used compound microscope is monocular (one eyepiece). Light reaches the eye after being passed through the objects to be examined. In this investigation, you will learn how to use and care for a microscope.

Procedure

1. Carry the microscope with both hands, one hand under its base, the other on the arm.
2. When setting the microscope on a table...
 - Keep it away from the edge.
 - Wrap the electrical cord around a gas jet
3. Move the microscope as little as possible.
 - Move to the microscope rather than moving the microscope.
 - Avoid bumping or jarring, as this can damage the lenses.
4. Lens Adjustment
 - Start with the lowest power object lens (usually the shortest)
 - Focus on specimen
 - Rotate to the next power objective lens and refocus.
 - If the lens is dirty, call the teacher over to assist you.
 - Never use paper towels, shirt sleeves, or Kleenex as these may scratch the lens.
5. Focusing
 - Start with the coarse focus adjustment (big knob).
 - Slowly move up and down until the specimen is visible
 - Switch to the fine focus adjustment (small knob)
 - Slowly move up and down until the image is clear.
6. Light Adjustment
 - Locate the diaphragm and turn to change the amount of light
 - Start with low light.
 - Different specimens are best viewed under different light intensities.
7. When you are finished:
 - Set the lens back to the lowest power
 - Remove any specimen slides
 - Raise the stage all the way up
 - Turn off the power/ light.



Microscope Measurement

Introduction:

When viewing a specimen under the microscope it is difficult to determine the actual size of the object being observed. In this activity you will practice using the compound microscope and determining the field of diameter under low, medium, and high power.

1. Prepare your microscope for low-power observation.
2. Place a millimeter ruler on the stage of the microscope so that it covers half of the stage opening. Refer to the picture below:

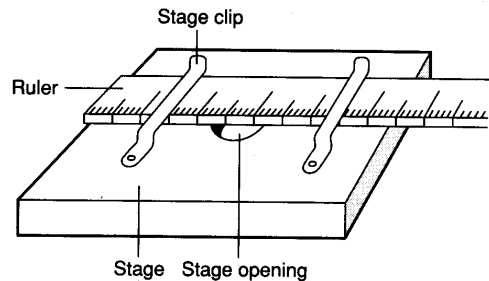


Figure 1

3. Look through the eyepiece. Focus on the edge of the ruler using the coarse adjustment. Adjust the position of the ruler so that the view in the low-power field is similar to the picture below:

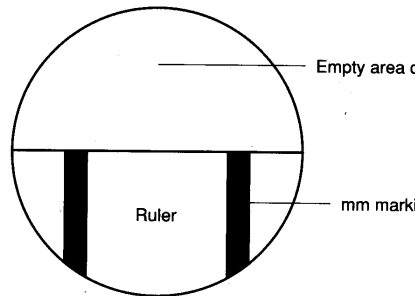


Figure 2

4. Place the center of one mark at the left side of the field of view. Make sure that the edge of the ruler is exactly across the center of the field.
5. Note that 1-millimeter is the distance from the middle of one mark to the middle of the next mark.
6. *Record* in your data section the measurement of the low-power field diameter in millimeters.
7. *Record* the low-power magnification in your data section.
8. Skip ahead and complete the calculation section of the lab. When finished you will know the high power and low-power field of view diameter in micrometers (μm) and can proceed to #9.
9. Obtain prepared slides of various organisms and practice estimating their lengths. Place the name of the organism and their approximate length in your data table.

Data

Power	Field of diameter (mm)	Field of diameter (μm)

To determine the high-power field diameter in micrometers use the following formula.

$$\text{High power field diameter} = \frac{\text{low-power magnification}}{\text{high power magnification}} \times \text{low-power field diameter}$$

Calculations

To determine the magnification that the specimen is being observed at use the following calculation:

$$\text{Total Magnification} = \text{Ocular Lens Power} \times \text{Objective Lens Power}$$

Power	Magnification
Low	
Medium	
High	

Part II: Observing prepared slides

Introduction

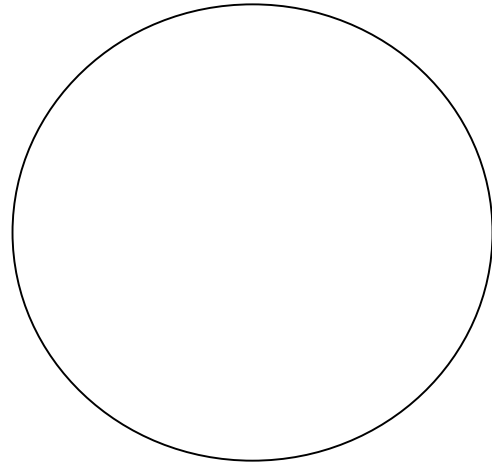
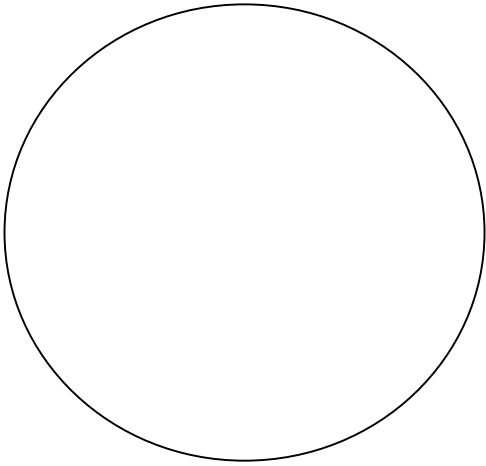
In this lab you will be refining your observation skills using the microscope. You will be given a prepared slide and create two diagrams that represent what you observe at different magnifications.

Purpose: *Create your own purpose that describes the skills that you will learn in this activity.*

Procedure:

1. Before putting the slide on the stage make sure the objective lens is set to low power.
2. Place slide on stage
3. Observe specimen
4. Create two diagrams, one under low power and the other under high power, of the specimen using the "Guidelines for drawing diagrams" reference sheet.

Data:



Analysis (Answers are to be written in complete sentences)

1. How many micrometers are in 1 millimeter?
2. Does the field of view increase or decrease as you move from low-power magnification to high-power magnification?
3. How many times is the magnification increased when you change from low power to high-power magnification?
4. If a microscope has a low-power magnification of 100x, a high-power magnification of 600x, and a low-power field diameter of 1800 micrometers, what is the high power field diameter in μm ?

Conclusion:

Complete the following sentence prompts for the conclusion to this activity. Write in paragraph form and attach to this lab packet.

- The purpose of these labs was to...
- A few important skills learned in this lab were...
- To determine the magnification that a slide is being viewed at...
- Scientists use microscopes as a scientific tool in order to...