Name _____ Date _____ Period _____

The Microscope

Purpose

The purpose of this investigation is to develop skill in using the compound light microscope. You will learn to identify and work with the parts of the microscope, prepare a wet-mount slide, observe a specimen, and make microscopic measurements of specimens.

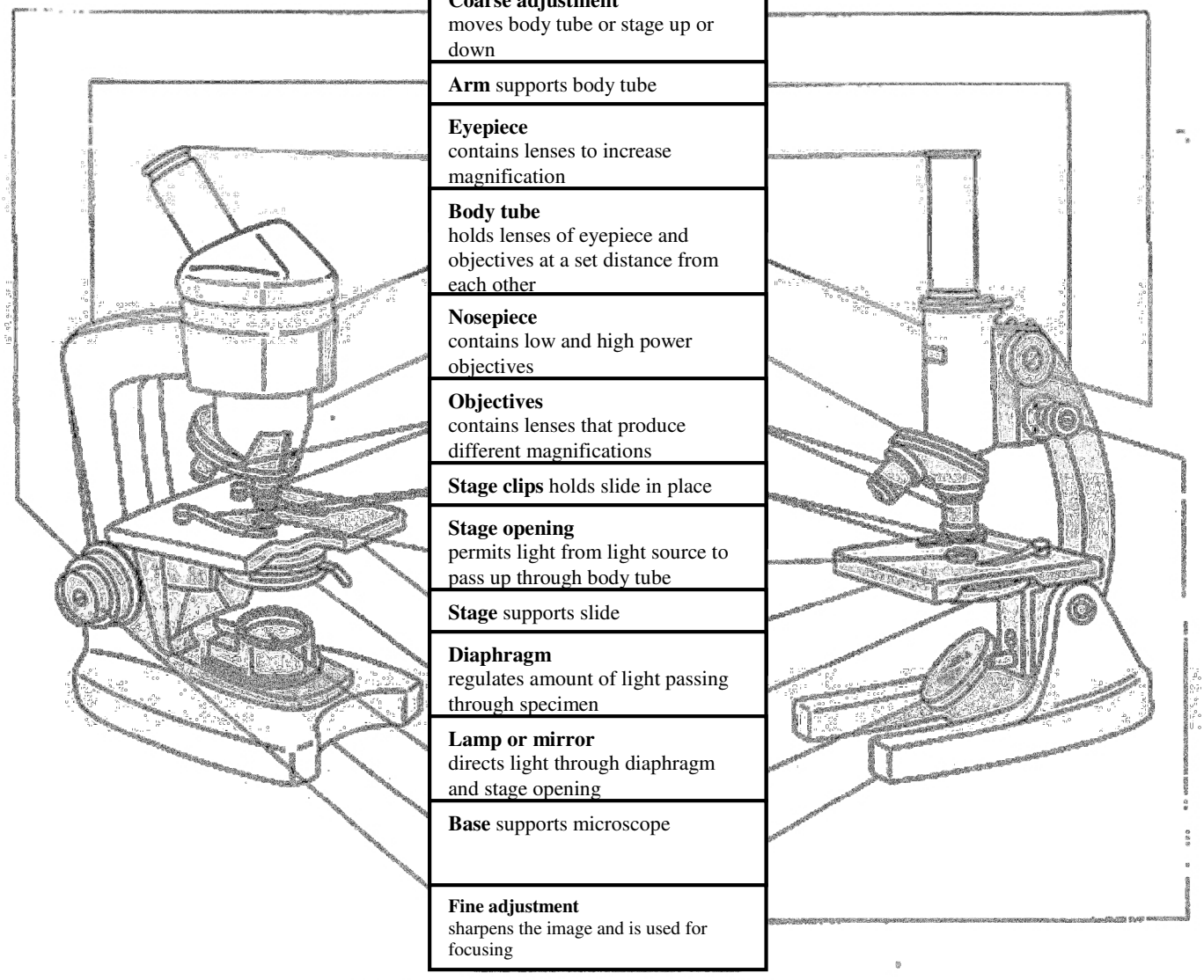
Materials

Microscope	Cover slip	Fine newsprint
Lens paper	Water	Pipette
Glass slide	Scissors	Transparent metric ruler

Procedure

PART A – Identifying and Using the Parts of a Microscope

1. Carry the microscope with one hand under the base and the other hand grasping the arm.
2. Place the microscope on the laboratory table, about 10 centimeters from the edge of the table.
3. Look at the drawing in Figure 1-1 that is most like your microscope. Identify the parts and functions of your microscope.



Coarse adjustment moves body tube or stage up or down

Arm supports body tube

Eyepiece contains lenses to increase magnification

Body tube holds lenses of eyepiece and objectives at a set distance from each other

Nosepiece contains low and high power objectives

Objectives contains lenses that produce different magnifications

Stage clips holds slide in place

Stage opening permits light from light source to pass up through body tube

Stage supports slide

Diaphragm regulates amount of light passing through specimen

Lamp or mirror directs light through diaphragm and stage opening

Base supports microscope

Fine adjustment sharpens the image and is used for focusing

FIGURE 1-1 The Compound Microscope

4. Using figure 1-1, locate the nosepiece and gently turn it so that the low-power objective is in line with the body.
5. The nosepiece will click into place when the objective is in the proper position.
6. Keeping both eyes open, look through the eyepiece.
7. Turn on the lamp. This circle of light is the field of view.
8. To make the circle of light as bright as possible, you may have to adjust the diaphragm.

PART B – Preparing and Observing a Wet Mount

1. Cut out a small piece of newspaper that contains the letter "e".
2. Place the letter "e" in the center of the slide.
3. Using the pipette, place a drop of water on the top of the letter "e".
4. Place the cover slip at about a 45º angle over the drop of water.
5. Gently lower the cover slip onto the slide as shown in Figure 1-2. If air bubbles appear, gently tap the cover slip with the eraser end of a pencil.

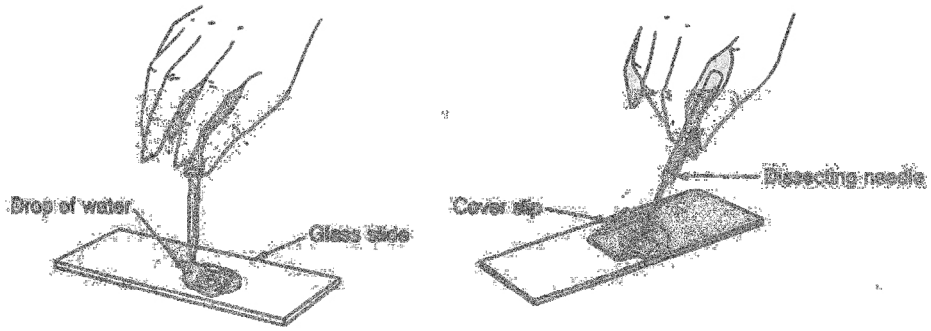


FIGURE 1-2 Preparing a Wet-Mount Slide

6. Place the wet mount of the letter "e" on the stage of the microscope **with the letter facing you** as you would read it.
7. Adjust the slide so that the letter is above the opening of the stage. Use the stage clips to hold the slide in place.
8. Look through the eyepiece and slowly turn the coarse-adjustment knob toward you, until the letter "e" comes into focus.
9. In the circle, sketch what you see in figure 1-3a.
10. To observe a specimen under high-power magnification, turn the nosepiece until the high-power objective clicks into place.
11. Use only the fine-adjustment knob to bring the specimen into focus. Sketch what you see in the circle in Figure 1-3b.

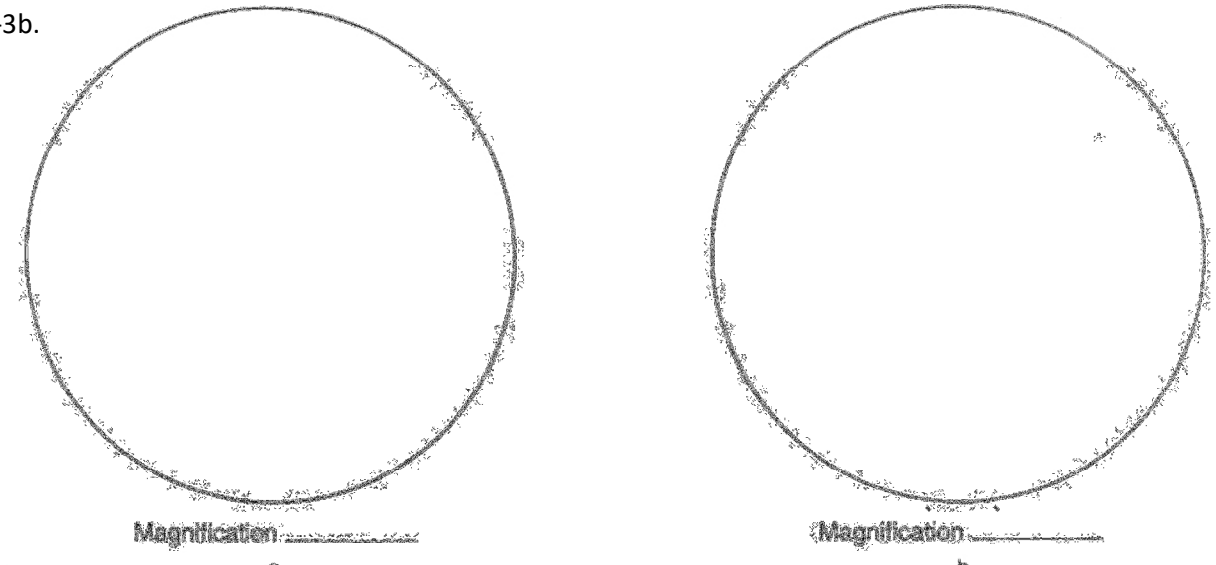


FIGURE 1-3 Sketches of the Letter "e"

PART C – Measuring an Object Under the Microscope

1. Remove and clean the glass slide with the letter "e".
2. Place the millimeter scale of the transparent plastic ruler over the center of the stage opening of the microscope.
3. Use the low-power objective of the microscope to locate the millimeter lines of the ruler.
4. Place these lines in the middle of the field of view and use the coarse-adjustment knob to bring them into focus.
5. Use the fine-adjustment knob to make the image clearer.
6. The distance between two lines on the ruler represents 1 mm. **One micron is equal to 0.001 millimeter**.
7. While looking through the eyepiece, move the ruler so that one of the millimeter lines is seen at one end of the field of view as shown in figure 1-4.

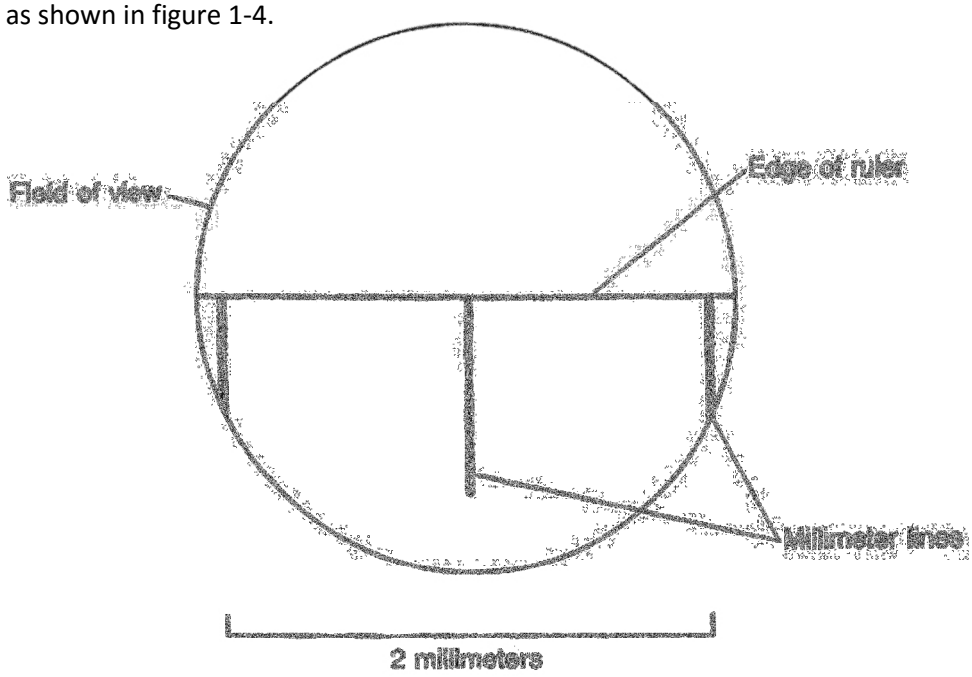


FIGURE 1-4 Transparent Ruler Under Low-Power Magnification

8. To determine the diameter of the field of view under low power, count the number of millimeter lines that are visible. You may have to estimate the diameter to the nearest tenth of a millimeter.
9. Because under high power the thickness of one millimeter takes up practically the entire field of view, it is difficult to estimate the diameter of the field of view under high power.
10. The diameter can be calculated on paper:
    a. **Divide the magnification of the high-power objective.**
       For example 40x, by the magnification of the low-power objectives, for example 10x.
    b. Then **divide the diameter of the low-power field of view in microns by the answer to part a**.
       If the diameter of the low-power filed is 2mm, the calculation would be:
       (a) 40 / 10 = 4 and (b) 2000 μm / 4 = 500 μm.
11. Before returning the microscope to the storage area, remove the slide from the stage. Click the low-power objective into place and lower the body tube as far as it will go.
12. Place the stage clips in their proper position and carefully carry the microscope to the storage area.

Observations And Conclusions

PART A

1. Label the parts of the microscope in Figure 1-5.

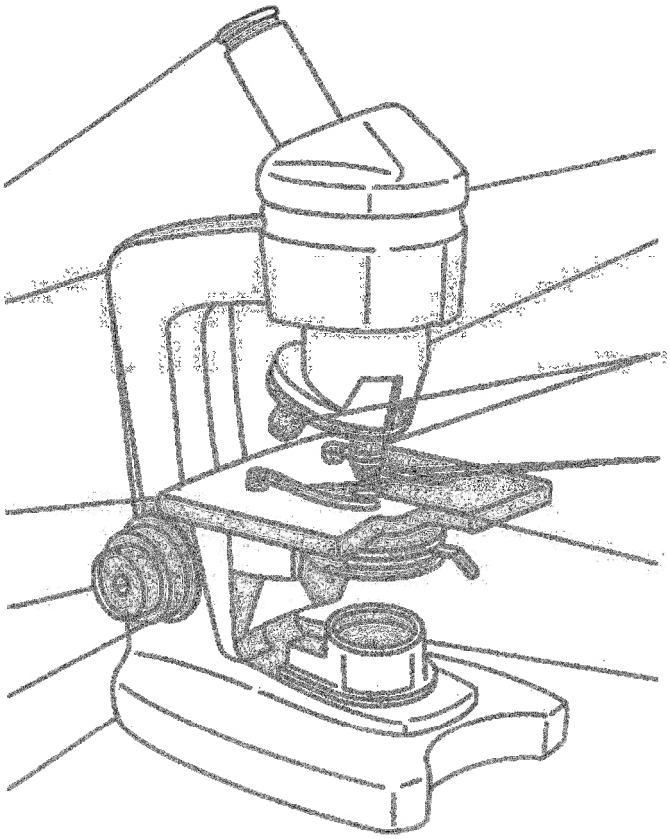


FIGURE 1-5 The Compound Microscope

PART B

1. Looking through the microscope, in what direction does the letter "e" appear to move when you move the slide in the following directions?

   a. to the right _____

   b. to the left _____

   c. away from you _____

   d. toward you _____

2. Determine the total magnification of your microscope under the following magnifications.
   a. low power
   b. high power
3. What happens to the focus of the letter "e" as you change from low-power to high-power magnification?
4. How many times is the magnification increased when you change from low-power to high-power magnification?
5. What happens to the field of view when you change from low-power to high-power magnification?

PART C

1. How many microns are there in 1 millimeter?
2. What is the diameter of the field of view under low power?
3. Show your calculations for the diameter in microns of the field of view under high power.