Microscope Lab

Objectives:

- Become familiar with the parts of a microscope
- Determine the total magnification of the microscope.
- Explain how to properly handle the microscope.
- Explain how to increase the amount of light when going from low to high power
- Explain the proper procedure for focusing under low and high power
- Describe changes in the field of view and available light when going from low to high power
- Recognize the differences in structure between plant and animal cells
- Identify and observe cells and cell structures

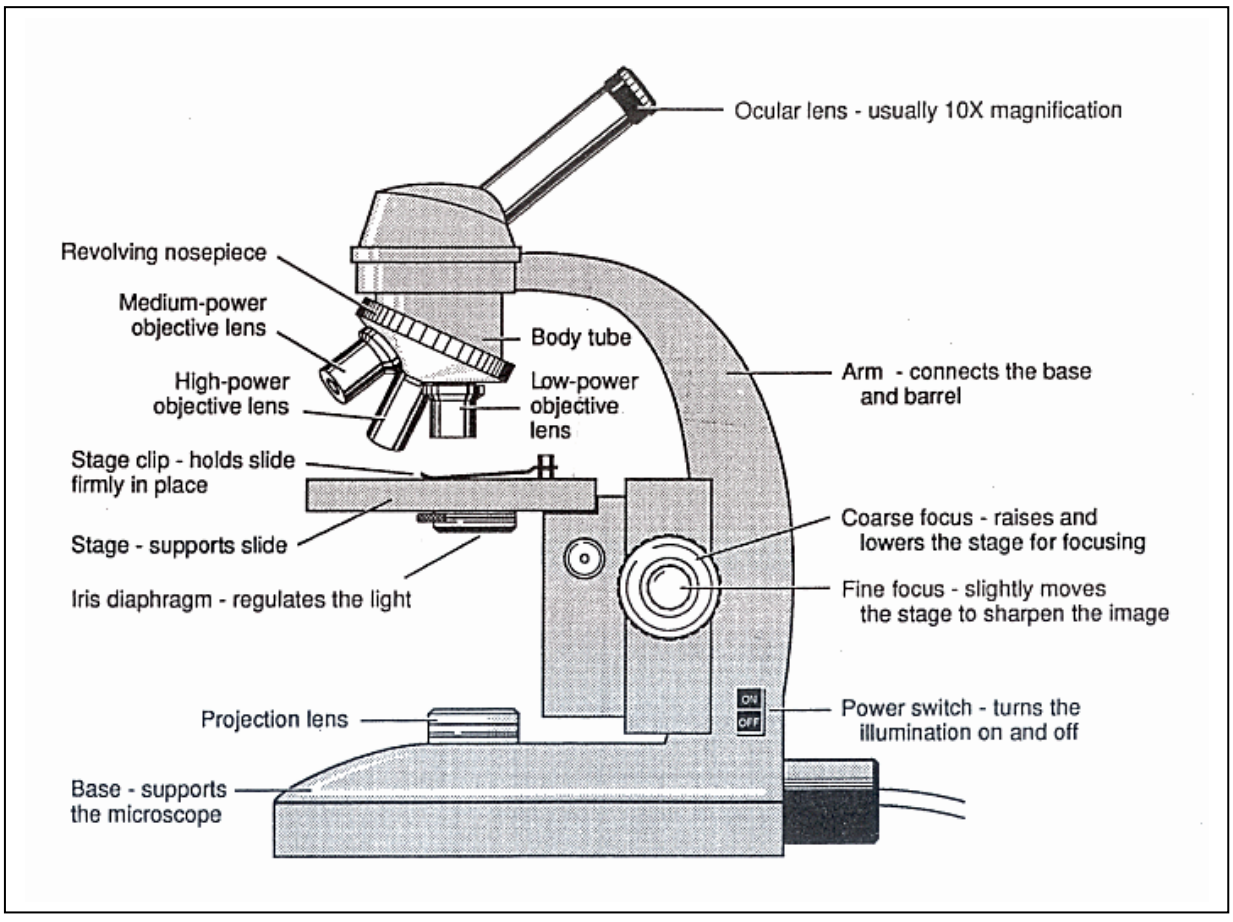
Materials:

microscope	water	medicine dropper
lens paper	newsprint	methylene blue
slides	forceps	human cheek cells
coverslips	onion	flat edged toothpick

Procedure:

Part I. Microscope Handling

1. **Carry the microscope with both hands** --- one on the arm and the other under the base of the microscope.
2. **Examine the microscope and give the function of each of the parts** listed in the diagram.



Part II. Determining Total Magnification:

Locate the numbers on the eyepiece and the low power objective and fill in the blanks below.

Eyepiece magnification _____	(X)	Objective magnification _____	=	Total Magnification _____X

2. Do the same for the high power objective.

Eyepiece magnification _____	(X)	Objective magnification _____	=	Total Magnification _____X

Write out the **rule for determining total magnification of a compound microscope.**

_____

Part III Making a Wet Mount

1. Use lens paper to clean slides, coverslips, and lenses.

2. Cut a small piece of newsprint that contains a lowercase"e". Using a medicine dropper, place a drop of water in the center of the slide. Place the newsprint in the drop of water. Lower the coverslip onto the slide from a 45° angle to prevent the formation of air bubbles.

3. Place your wet mount on the stage of the microscope and position it so that the letter "e" is facing you as you would read it. Use the stage clips to secure the slide on the stage.

4. Using the coarse-adjustment knob, lower the low power objective as far as it will go without hitting the slide. Watch the objective lens as you do this. **Never lower the objective while looking through the eyepiece**.

5. Look through the eyepiece. Adjust the low power objective by turning the coarse adjustment toward you. The letter "e" will soon come into view. To avoid eyestrain, keep both eyes open while looking through the microscope. Turn the fine adjustment to bring the image into sharp focus. You may wish to move the diaphragm to adjust the amount of light so that you can see the object more clearly. Draw a picture of what you see under the microscope in your lab book. Note the magnification.

6. Move the "e" into the exact center of the low power field while looking through the eyepiece. Next, look at the microscope from the side and rotate the nosepiece until the high power objective clicks into position. Look through the eyepiece. Turn the fine adjustment to bring the object on the slide into focus. **Caution: Never use the coarse adjustment when focusing using the high power lens**. This could break or damage the lens. Draw what you see in your lab book. Note the magnification.

<u>Part III Questions</u>

1. What magnification is printed on the lens of the low power objective?_____ high power objective?_____

2. What power is the eyepiece?_____

3. What is the total low power magnification? _____ high power magnification?_____

4. How does the letter "e" as seen through the microscope differ from the way an "e" normally appears? _____
_____

5. What happens to the "e" as you move the slide to the right? _____
_____

6. What happens to the "e" as you move the slide up? _____
_____

7. Describe the difference in appearance of the "e" from low power to high power.
_____
_____

8. Explain why a specimen to be viewed under the microscope must be thin. _____
_____

Part IV Plant and Animal Cells

1. Cut an onion lengthwise. Remove a thick scale and peel the delicate transparent tissue from the inner surface of the scale. Cut a square of the tissue and mount it in a drop of water. Make sure not to wrinkle the tissue. Add a coverslip to the wet mount. Look at the living cells under low power and then remove the slide from the microscope.

2. Place a drop of methylene blue stain next to the coverslip of the wet mount. Next, place a small piece of paper towel next to the coverslip on the side opposite the drop of methylene blue stain. As the towel absorbs the water, the methylene blue stain will be drawn under the coverslip. Remove and discard the piece of paper towel. **Note: You may want to repeat this process with a drop of water if the stain is too dark or if the stain did not move completely across the slide.**

3. Select one cell under low power that shows the contents clearly. Move it to the center of the microscope field and switch to high power. Using high power examine all parts of the cell. Use the fine adjustment to observe the cell at various depths. Draw and label the parts of the onion cell (nucleus, cytoplasm, cell wall, cell membrane) under high power in your lab book.

4. Gently scrape the inside of your cheek with the broad end of a clean toothpick. Prepare a wet mount of the material that you have scraped making sure to add a coverslip. Stain the cheek cells with methylene blue stain using the same procedure as above. Select one cell under low power that shows the contents clearly. Switch to high power to examine the cell. Use the fine adjustment to observe the cell at various depths looking very carefully at the outer edge of the cytoplasm. Draw and label the parts of the cheek cell (nucleus, cytoplasm, cell membrane) under high power in your lab book

Part IV Questions

1. What is the basic shape of the onion cell?_____

2. Are all the onion cells similar in shape? _____

3. When you add a drop of methylene blue, what effect does the stain have on the cells? _____
_____

4. Describe the shape of the cheek cell. _____

5. How does the edge of the cheek cell compare with the edge of the onion cell? _____
_____

6. What cell parts are found in plant cells that are not found in animal cells? _____
_____

7. What is the basic unit of structure of all living things? _____

*Extension
You may observe plasmolysis by adding a 6% salt solution to the slide. Plasmolysis is a condition in which the cell loses too much water and the cell contents shrink. Plasmolysis may lead to death of the cell. One drop of the salt solution should be added to the edge of the coverslip. Place a piece of paper towel on the opposite edge. The salt solution will be drawn under the cover slip as the paper towel pulls water out from under the coverslip. Observe the cells under low and high power. Note the location of the chloroplasts in relation to the cell wall. If the cell membrane and cell contents have shrunk away from the cell wall, the cell has plasmolyzed. Draw and label a plasmolyzed cell in the space provided. Add a drop of tap water to the wet mount using the procedure above and observe the appearance of the cells on low and high power.

**More Extensions
Use prepared slides to practice focusing the microscope.
Use different objects- strand of hair, cloth fibers, colored newsprint, insect legs, etc. to practice making wet mounts.