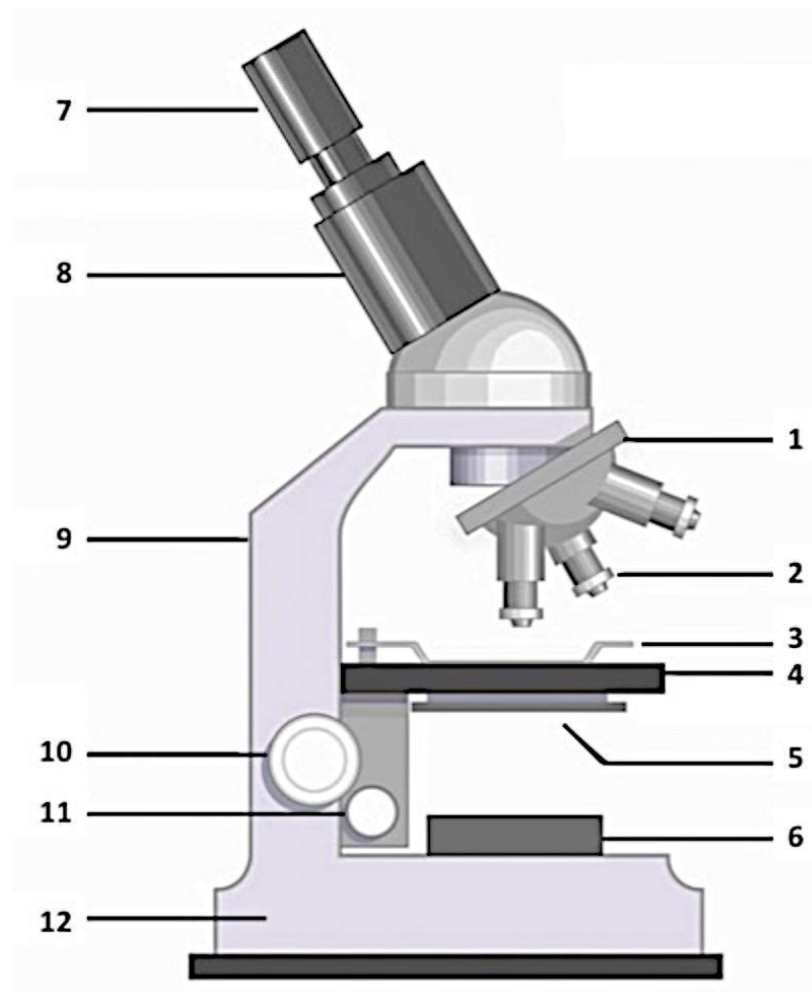


# LAB STATION: PARTS OF THE MICROSCOPE

**Directions:** During the course of this school year, you will often use a compound light microscope in our lab activities. It is essential that you master the concepts relating to the microscope. Using the drawing below, label each of the numbered parts of the microscope. In addition, give the function of each of the parts. Make sure that you can locate each of the numbered parts from the drawing on the actual microscope at your station.

## Tasks:

- Label the parts of the microscope.
- State the function of each part.
- Locate each part on the microscope at this lab station.
- Completely answer each of the questions on your Microscope Chat handout.



# LAB STATION: THE LETTER "E"

**Directions:** At this station you will be observing the letter "e" under the microscope. Your teacher may have provided you with a prepared slide of the letter "e." If not, you will need to make your own.

- Get a clean slide from the supply table.
- Cut the smallest "e" you can find from the newspaper. The best size for the "e" is found in an article in the paper. Do not use an "e" from the title of an article or from the classified section.
- Place the "e" on a slide and cover with a cover slip.

Place the slide on the stage so that the "e" is right side up when viewed with your naked eye. Observe the "e" under the microscope with the 4x objective.

## Tasks:

- Make a slide of the letter "e" or use the prepared slide provided.
- Observe the letter "e" under the microscope.
- Practice getting the slide positioned correctly on the stage.
- Practice getting the "e" in focus using both low and higher magnifications.
- Clean up this station before moving to the next lab station..

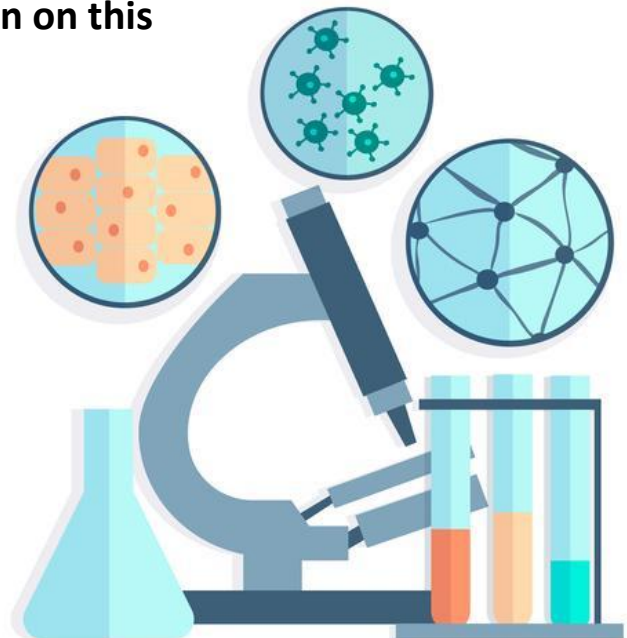


# LAB STATION: PROPER USE OF THE MICROSCOPE

**Directions:** The compound light microscope is of great importance to biologists. It is possibly the most important tool used in the study of life science. Without the microscope, scientists would be unable to view and study the cells that compose all living things. A compound light microscope consists of three essential parts: A light source to illuminate the object being viewed, and two sets of lenses (ocular and objectives) that magnify the image. The microscope is a very expensive piece of equipment. It is extremely important that you learn to handle and use the microscope in the proper way. Please read the accompanying page of rules for the proper use of the microscope and carry out each step of instructions.

## Tasks:

- Read the accompanying page found at this lab station entitled “Proper Care and Use of the Compound Microscope.”
- Carry out the instructions given on this page of instructions.
- Answer the questions on your student handouts.



# LAB STATION: PROPER USE OF THE MICROSCOPE

## Rules for Using the Microscope

A microscope has been placed at this station. Read and carry out each step below.

1. Remove the cover and unwind the power cord. Plug the power cord into the nearest electrical outlet.
2. Make sure that the microscope is at least 10 cm from the edge of the table and that the power cord is not dangling off the edge of the table.
3. Turn on the microscope light.
4. Make sure that the shortest objective (4x objective) is locked into place.
5. Look into the ocular. You should see a white circle of light. This is called the "field of view."
6. Locate the microscope's diaphragm. Look at the microscope from the side and look for the diaphragm apparatus underneath the stage of the microscope. Determine how to operate the diaphragm. It may be a circular disk that is turned, or it may have a small lever that can be moved. Adjust the diaphragm while looking into the microscope. What happens?
7. Place the slide on the stage and secure it with the slide clips. Make sure that the slide is centered over the stage opening. Use the coarse adjustment knob to bring the image into focus. On your handout, make a drawing of the image you see. Remember to adjust the diaphragm to see the object more clearly.
8. Gently use the rotating nosepiece to move the 10x objective into place. Use the coarse adjustment and the fine adjustment to bring the image into sharp focus. Make a drawing of this field of view on your lab handout.
9. Gently swing the 40x objective into place. **NEVER USE THE COARSE ADJUSTMENT WHEN FOCUSING THE 40X OBJECTIVE.** Make a drawing of this field of view on your lab handout.
10. When you are finished, remove the slide from the stage. Use the rotating nosepiece to return the 4x objective into place. Unplug the power cord from the electrical outlet and wrap the cord around the microscope. Replace the cover on the microscope.
11. Always carry the microscope with both hands. Hold the arm of the microscope in one hand and place your other hand under the base.

# LAB STATION: WHAT HAPPENS WHEN .....

**Directions:** The microscope is not always a simple tool to use. Every beginning biology student has experienced the frustration of viewing their own eyelashes, and not being able to get an image to come into focus. This station will allow you to practice the skills needed to become an efficient microscope user. Complete each step below. Answer the questions on your student handout as you complete each step.

1. Clean the lenses of the objectives and ocular with lens paper. Never clean or wipe the lenses of the microscope with anything but the lens paper provided by your teacher. Use a new piece of lens paper each time you clean the lenses.
2. How many objectives does the microscope have?
3. Turn on the microscope and look into the ocular. What happens when you turn the ocular while looking into the microscope?
4. Turn the coarse adjustment knob away from you. What happens?  
Turn the coarse adjustment knob toward you. What happens?
5. Turn the fine adjustment knob away from you. What happens?
6. A prepared slide has been left at this station. Place the slide on the stage and bring it into focus using the low power objective. While looking in the ocular, slowly move the slide from right to left. What happens?
7. While looking in the ocular, slowly move the slide away from you. What happens?
8. Locate the diaphragm under the microscope stage. While looking through the microscope, change the setting of the diaphragm. What happens?
9. Now turn the diaphragm in the opposite direction. What happens?

## Tasks:

- Read and carry out each step listed above.
- Make accurate observations as you carry out each step.
- Record your answers on your student handout.



DISCOVERIES

# LAB STATION: ELECTRON MICROSCOPES

**Directions:** An understanding of the microscopic world is key to our understanding of living organisms. An electron microscope is capable of much greater magnifications than a light microscope.

Use your notes, textbook (page 29) or conduct an internet search to answer the questions on the student handout about electron microscopes.

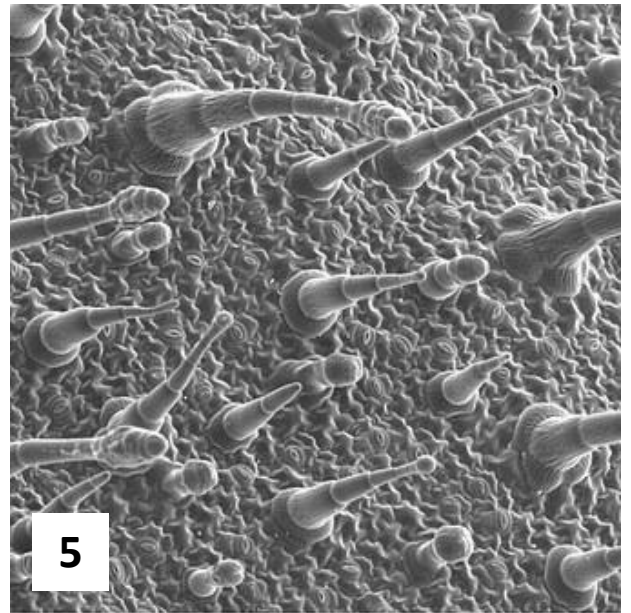
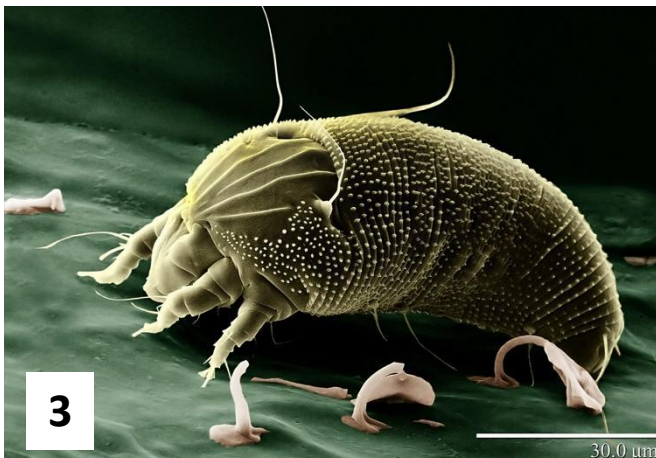
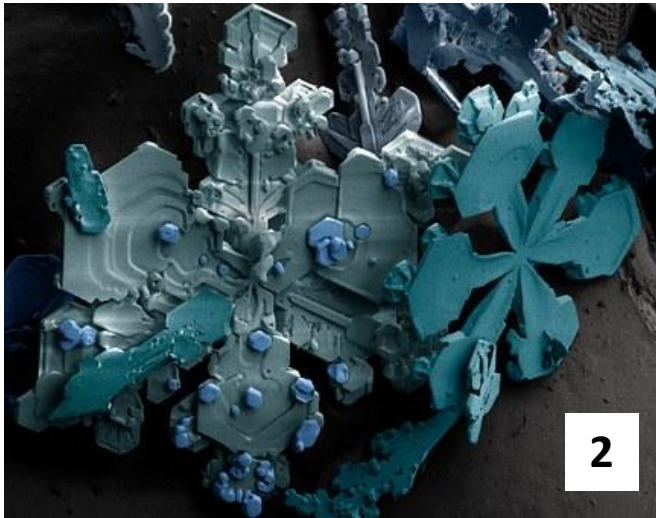
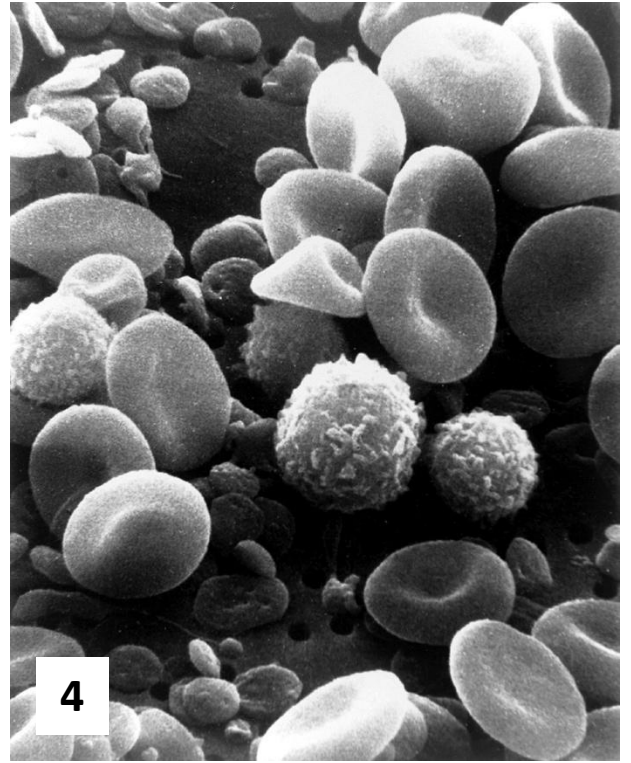
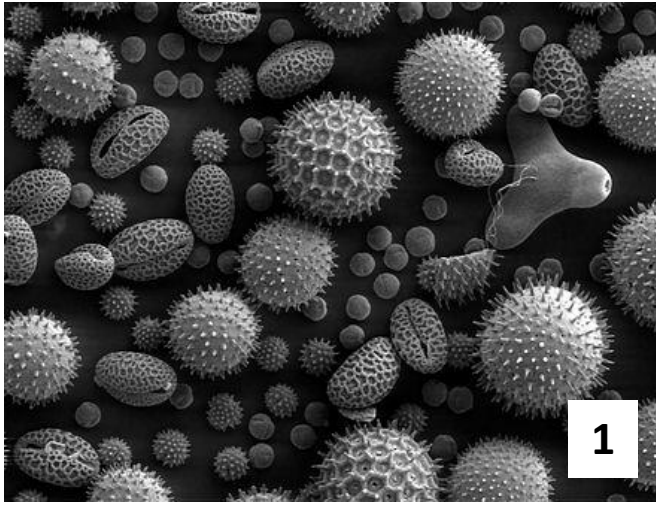
At this station you will find 5 photographs taken with the electron microscope. Study each photograph. What is shown in each photograph?

## Tasks:

- Read a short passage in your textbook, page 29, or on the internet to gather information about electron microscopes.
- Complete the questions on your student handout.
- Study the electron micrographs to try to determine what the objects are.



# Electron Micrographs



# LAB STATION: THE HISTORY OF THE MICROSCOPE

**Directions:** When, where and how were microscopes first invented? The history of the microscope is an interesting story. At this station you will learn about the important people involved in the invention of the microscope, and how microscopes improved over the years.

At this station you will find a laptop computer that has been set to a web site called "History of the Microscope." Alternatively, your teacher may have printed articles from this site and left them at this station for you to read. Use the web site or the printed articles to answer the questions on your student handout. <http://www.visioneng.com/resources/history-of-the-microscope/>

## Task:

- Read the history of the microscope and answer the questions on your student handouts.





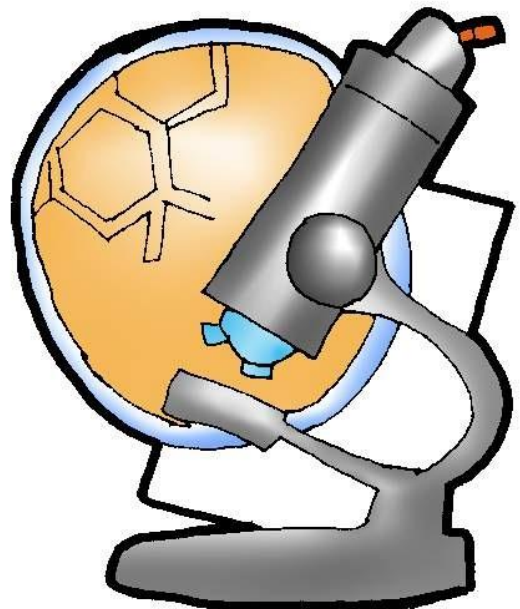
# LAB STATION: THE WET MOUNT SLIDE

**Directions:** Most of the slides we will make are wet mount slides. Wet mount slides are used to view living organisms, as well as liquid substances of all kinds. They are also used for any sort of specimen that needs to be kept moist. Use the steps below to make a wet mount slide of the cells in a flower or leaf.

1. Obtain a clean, dry slide.
2. Today you will be making a wet mount slide of the cells in a flower petal or leaf. Slowly tear a leaf or flower petal to expose a thin strip of cells along the torn border. Put your specimen in the center of the slide. Make sure that your specimen is small enough to fit under the coverslip.
3. Add one large drop of water. It should be one solid drop of water over the specimen. It should not run all over the slide or get on the back of the slide.
4. Hold a clean coverslip at a 45-degree angle over the specimen. Allow one edge of the coverslip to touch the edge of the drop of water.
5. Gently lower the coverslip into place.
6. The whole coverslip should be in contact with water, but make sure the back of the slide is dry.
7. Place the slide on the stage of the microscope and focus on the torn edge of the flower or leaf.

## Tasks:

- Practice the procedure of making a wet mount slide.
- Practice drawing images seen under the microscope.
- Complete the questions on your student handout.
- Clean up this station before moving to the next station.



# LAB STATION: MAGNIFICATION AND RESOLUTION

**Directions:** The microscope carries out two functions that allow you to view the microscopic world. These two functions are magnification and resolution. You will explore both of these at this station.

1. Look for the whole number on the ocular. How many times does the ocular magnify?
2. Look for the whole numbers on the objectives. How many times does each objective magnify?
3. How do you determine the total magnification when viewing a specimen?
4. Complete questions 1 – 5 on your student handout before proceeding.
5. From a magazine or funny paper cut out a small piece of colored paper. Place the colored paper on a clean dry slide. Place a cover slip on top of the paper. View with the 10x objective. How does the image compare with the image you see with your naked eye? Make a sketch of the colored paper as it appears under the microscope.
6. You have just seen an example of the resolving power (resolution) of the microscope. What is resolution?

## Tasks:

- Determine the difference between magnification and resolution.
- Make a slide to illustrate the resolving power of the microscope.
- Complete the questions on your student handout.
- Clean up this lab station before proceeding to the next lab station.

