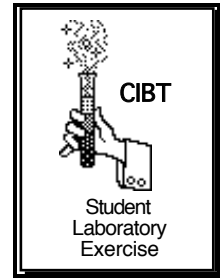


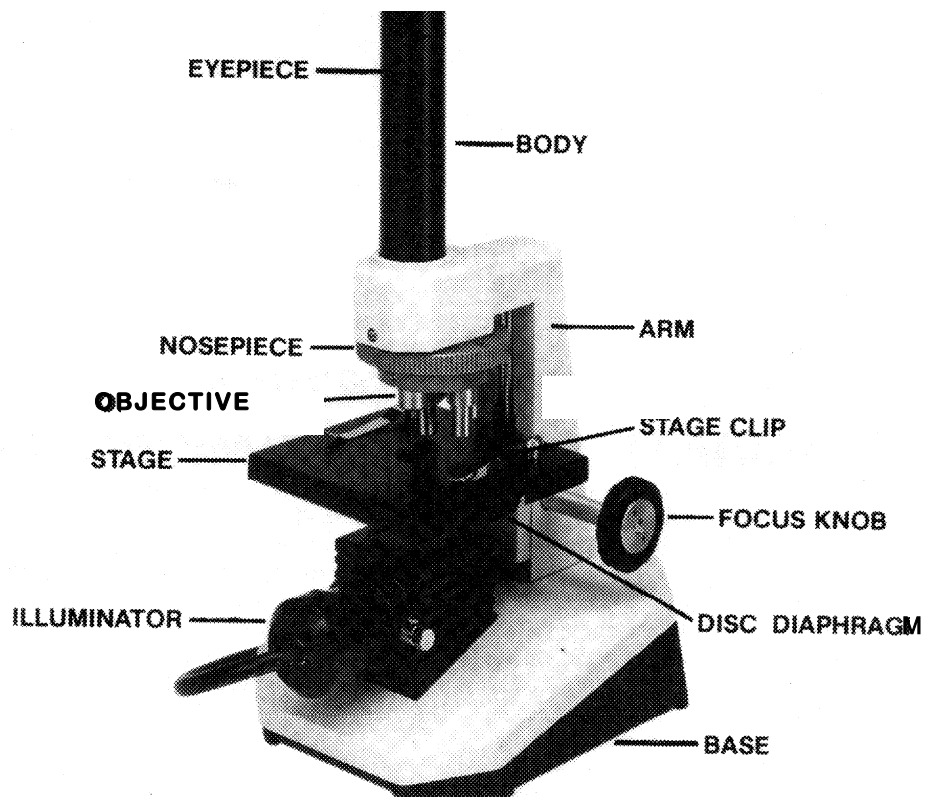
# Microscopes!



Name \_\_\_\_\_ Date \_\_\_\_\_

## Introduction

The microscope was invented in the 1500's and has been a major tool of biology ever since. By means of lenses, the microscope can magnify things too small to be seen by the naked eye. One type of microscope we have in the lab is a compound microscope. You are to learn the structures and functions of the parts of this microscope. See the diagram and descriptions below.



## Parts of a Microscope

- **Eyepiece** magnifies the image ten times (10x). Do NOT remove it from the microscope because it will allow dirt into the body tube or you could drop and break it.
- **Body tube** keeps the eyepiece and objective lenses at standard distances.
- Low power **objectives** magnify the specimen 4x and 10x. ALWAYS START YOUR FOCUSING ON LOW POWER. Start with the 4x objective to scan the slide and then switch to the 10x objective. High power **objective** magnifies the object 20x on your microscopes. THE MICROSCOPE SHOULD ALWAYS BE LEFT ON LOW POWER WHEN PUTTING IT AWAY.
- **Stage** is the structure on which you place the slide. There are stage clips to hold the slide in place. The stage should be dry so you can easily move the slide to find whatever you are looking for.
- **Focus knob** is used to focus the specimen.
- **Diaphragm** is below the stage, is round and has holes. Some have more complicated structures. It allows you to adjust the amount of light coming up from the mirror. It works like the iris of your eye that controls the amount of light entering the pupil.
- **Illuminators** are built into these microscopes. The light is found under the stage to shine the light up through the specimen you are looking at.

## Learn These Terms for Homework

1. **Magnification** is the ability to enlarge an image (what you see looking through the eyepiece). The total magnification for the microscope is obtained by multiplying the magnification of the eyepiece times the magnification of the objective lens. The eyepiece on the microscope is 10x and the three objective lenses are 4x, 10x and 20x.

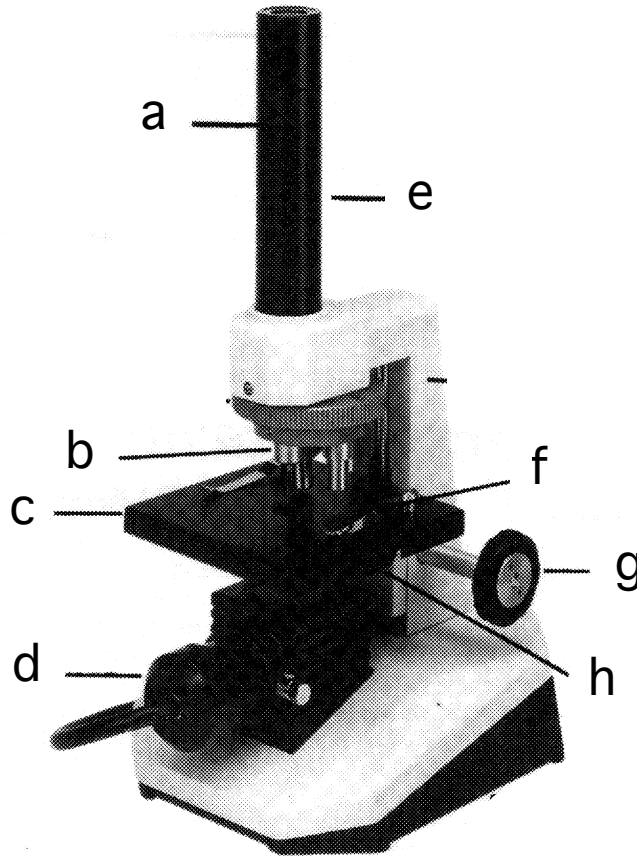
What is the total magnification using each of the objective lenses?

4x= \_\_\_\_\_ 10x= \_\_\_\_\_ 20x= \_\_\_\_\_

2. **The Field of view** is what is observed looking through the microscope. It is circular. The field of view on low power is larger than the field of view on high power.
3. **Transmitted light** is what goes through a thin specimen and is used in the compound microscope. Your specimen, therefore, has to be thin enough to allow light to go through it.
4. **Reflected light** is used in the stereo microscopes to observe large specimens. Light reflects off the surface so you can see the surface of the object, such as a flower.

## Study sheet

Identify each of the parts of the microscope and describe their functions.



| Microscope part | Function |
|-----------------|----------|
| a.              |          |
| b.              |          |
| c.              |          |
| d.              |          |
| e.              |          |
| f.              |          |
| g.              |          |
| h.              |          |

## Materials

- Slides
- Eyedroppers
- Compound microscopes
- Plastic coverslips
- Tweezers
- letters from newsprint paper
- 
- Books about microscopes. An excellent book is the following: Kumin, Maxine. *The Microscope*. ISBN# 0-06-023524-1. Harper Collins Publisher. This book is out of print but can be obtained through Amazon.com. There are many other books available through Amazon.com that are at the elementary level.

## Procedure

### Part I. Compound Microscope:

1. Go to the table or desk where your teacher has placed the microscopes. The microscope should have been left with the low power lens in use.
2. Obtain a clean slide and coverslip. If the slide is not clean, use a paper towel and water to clean it.
3. Place a piece of newspaper under the objective lens and find a letter “e” in a word. You do not need to use a slide for this. Do not use the capital “E.” Make sure the “e” is in a normal position to your naked eye.
4. With a pencil, sketch the letter as you see it while looking through the microscope.



5. Compare how the “e” looks under the microscope to how it looks with the naked eye.

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6. Switch to high power.
7. Now how does the “e” look?

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8. Get a piece of colored paper. Put it on the stage without a slide and look through the microscope. Describe what you see under the microscope compared to what you see with your naked eye:

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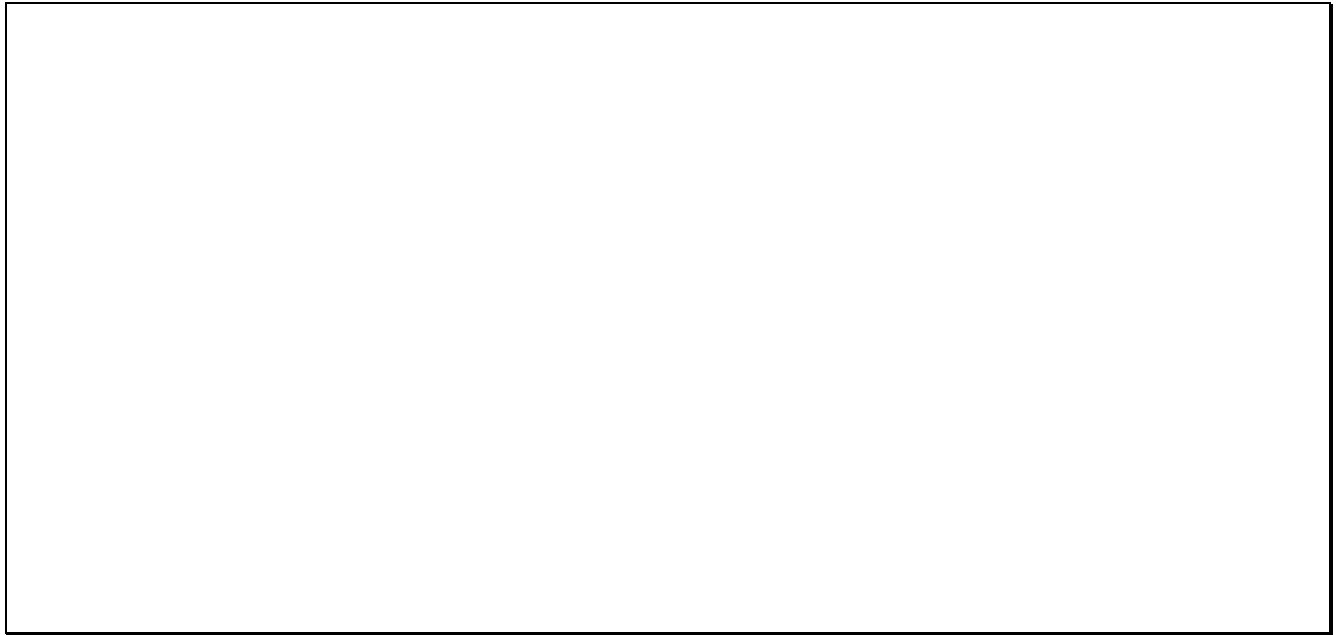
**Observe a couple of strands of pond algae, or a drop from a hay infusion.**

- Take the algae from the container with a tweezers and place the strands on the slide. TAKE ONLY A COUPLE OF STRANDS or t. will look like a pile of junk under the microscope.
- Add a drop of pond water and a coverslip. You might also need to use Protoslo, if you are using hay infusion, to slow down the creatures in the drop.
- Wipe any water from under the slide with a piece of paper towel.
- Place the slide on the stage and observe under LOW POWER (4x and then 10x)
- Sketch what you see in the box below.



**Algae strand or drop of water under low power**

9. Switch the microscope to HIGH POWER (20X) and observe the algae very carefully. Make another sketch in the box below.



**Algae strand or drop of water under high power**

**Part II. Stereo Microscope:**

1. Examine the stereo microscope. Working with a partner find as many differences between a compound microscope and a stereo microscope and list them here:

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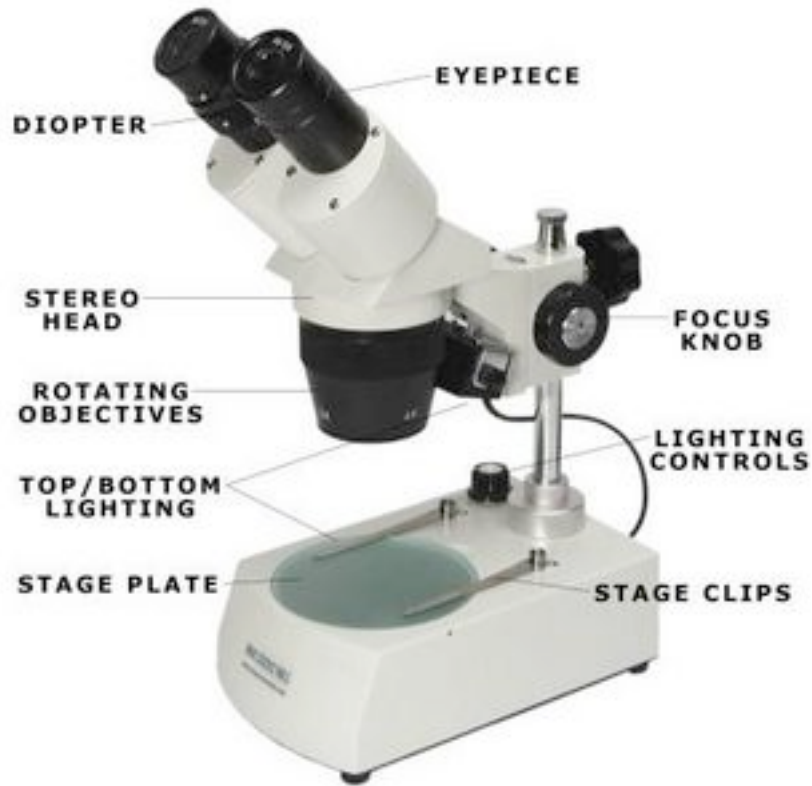
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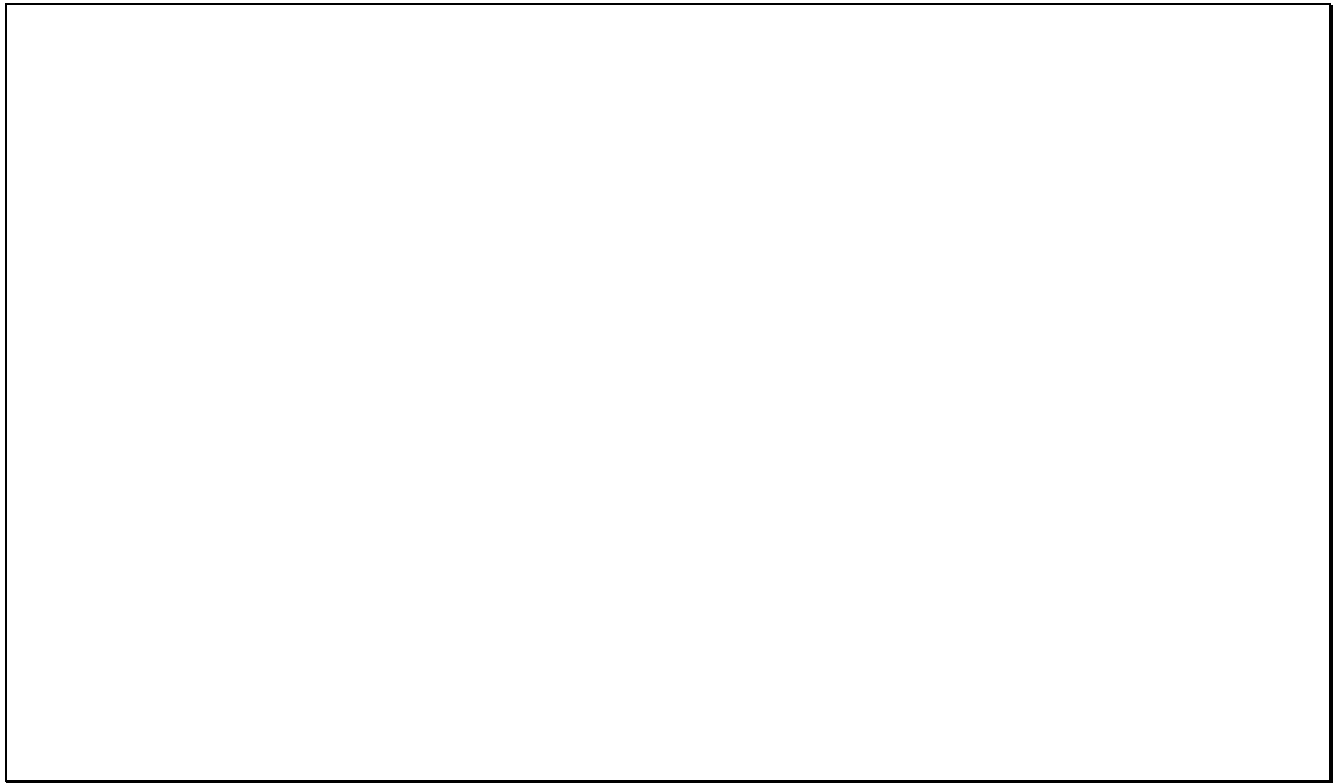


2. Fill in what these parts do:

| Microscope part      | Function |
|----------------------|----------|
| a. Eye piece         |          |
| b. Rotating objects  |          |
| c. Stage plate       |          |
| d. Focus knob        |          |
| e. Lighting controls |          |

3. Choose an object or an organism to explore under the stereo microscope on the lab desk.

3. Sketch the organisms seen under the stereo microscope. Follow the rules of scientific drawing:
  - a. Draw only what you see! Do not include what you think you should see.
  - b. All drawings must be done in pencil ONLY.
  - c. Drawings must be large and clear so that features can be easily distinguished.
  - d. Always use distinctive drawings, do not sketch.
  - e. Give your drawing a title, write the magnification and label important features.



### **Part III. Activity: History of Microscopes**

Go to the following web site and write a paper on the history of microscopes:

<http://www.hometrainingtools.com/history-of-the-microscope/a/1356/>

Or read the History of the Microscope in the *The World of the Microscope Book*, before writing your paper.



#### Part IV. ELA Activity: Poetry and Science

1. If available, read the book *Microscope* by Maxine Kumin. If this book is not available, substitute another book that is relevant to this exercise.
2. Write a ten-line poem containing some of the words, concepts or activities pertaining to microscopes and things you learned while using materials in this kit.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_