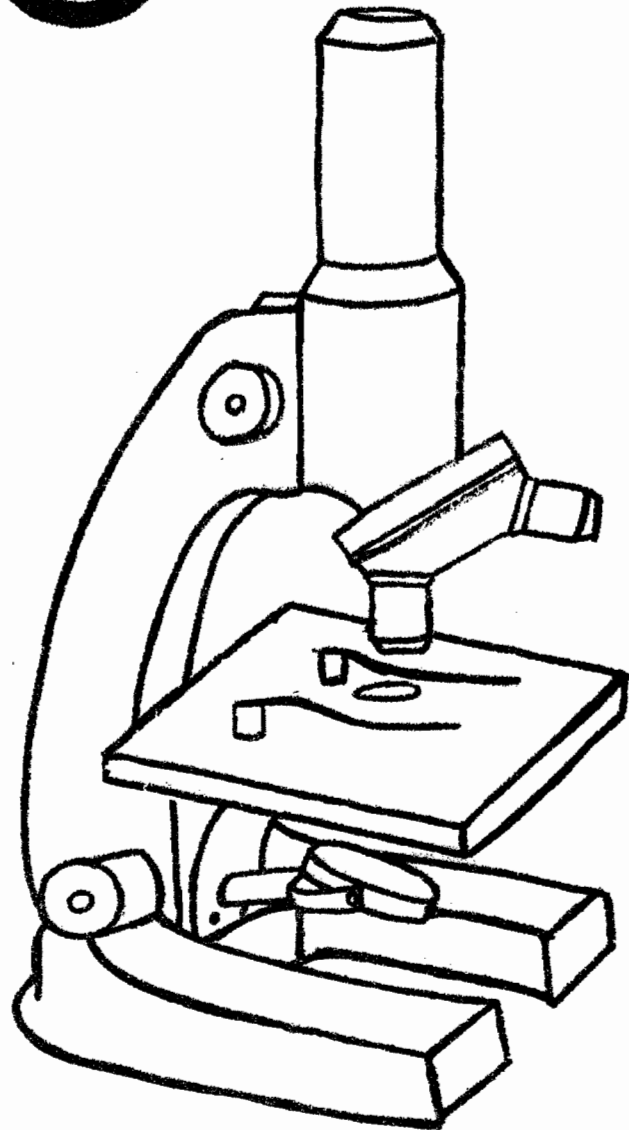


# The Microscope



G. Grambo

## The Microscope

This unit is designed using hands on activities. Students will work at their own pace ,experimenting, filling out the sheets, and taking the two quizzes. This unit begins with a simple lens and then moves on to the more complicated compound microscope. This unit is designed for use in the fifth grade but may be used with any grade.

Gregory Grambo  
The Louis Armstrong Middle  
School

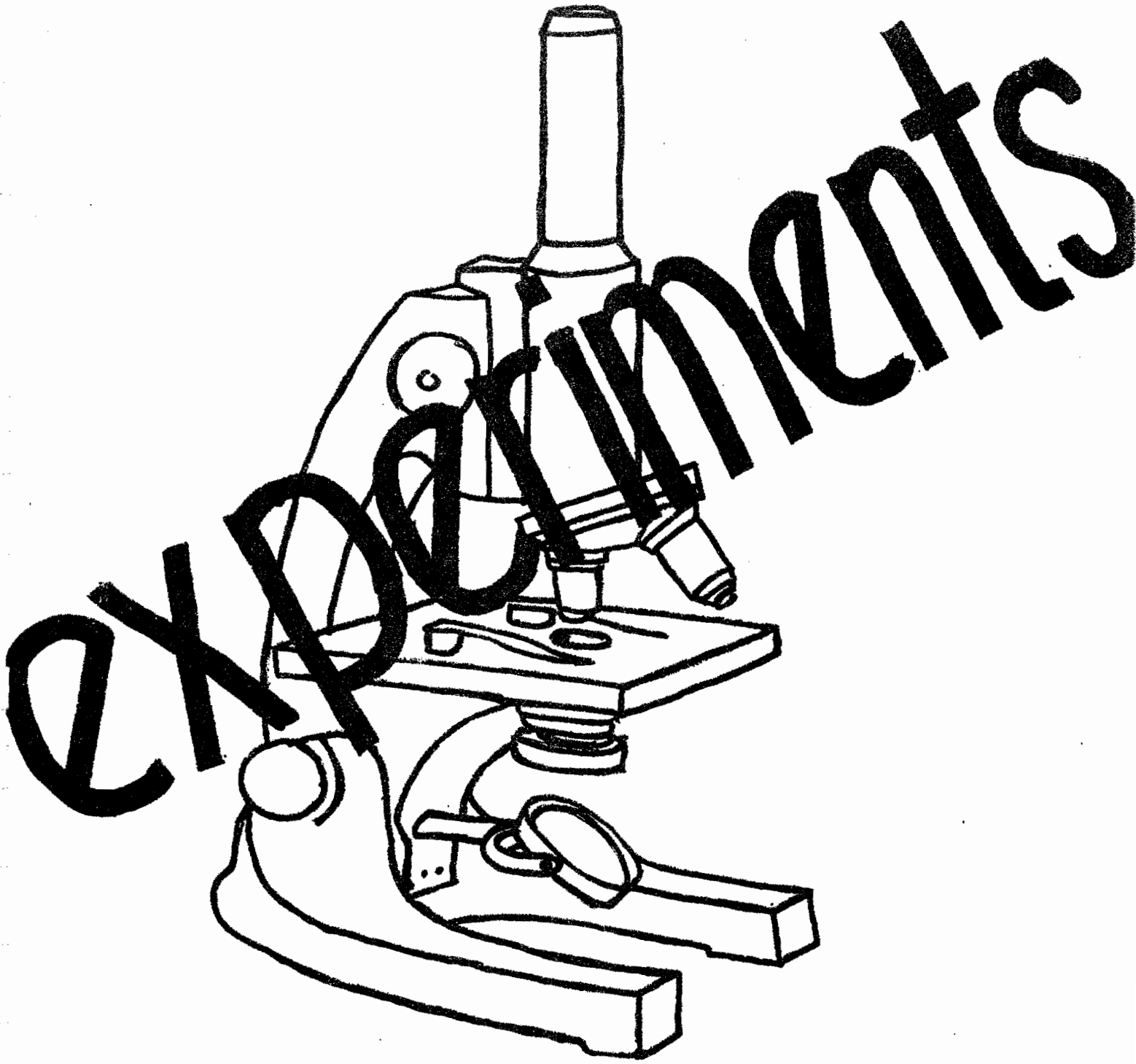
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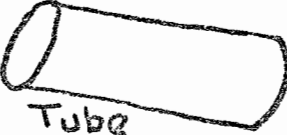

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# The Microscope Experiment I

Name \_\_\_\_\_  
Class \_\_\_\_\_ Box No \_\_\_\_\_

## Problem - What is a lens?

1) Begin With   glass plates  Tube  Jeweler's lens (Ask teacher)


2) Look at the two glass plates in your box. How are they different?

3) Look at them from the side too. 


4) Place the plates on these words. How do the plates affect what you see?

5) Why does this happen to the words?

This special glass plate was invented by ancient Chinese people. It is called a lens.

6) How might a lens be helpful to someone who fixes jewelry? 

Ask your teacher if you want to see a Jeweler's lens

7) How might a lens be helpful to a police person? 

8) Why might you want to use a lens to look at this fingerprint?

9) What can a lens let you see, that your eyes can't?

The lens is used in a magnifying glass. The lens is also a simple microscope. Micro means small and scope means to see. Microscopes make small things look larger.

10) What might happen if you hold one lens behind another lens and look through them?



11) When we put 2 simple microscopes, or lenses, together we get a compound microscope?

12) How does a compound microscope make things look?

How would a compound microscope be useful to a scientist?

## Homework -

1) What is a compound microscope?

2) How is it different from a simple microscope?

# Experiment 2

## Problem - What is a compound microscope?

1) Begin With

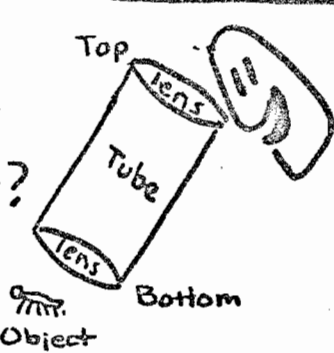


compound microscope

Lens

Tube

2) How will this set up of lenses help see small things better?



Top lens

Tube

Bottom lens

Object

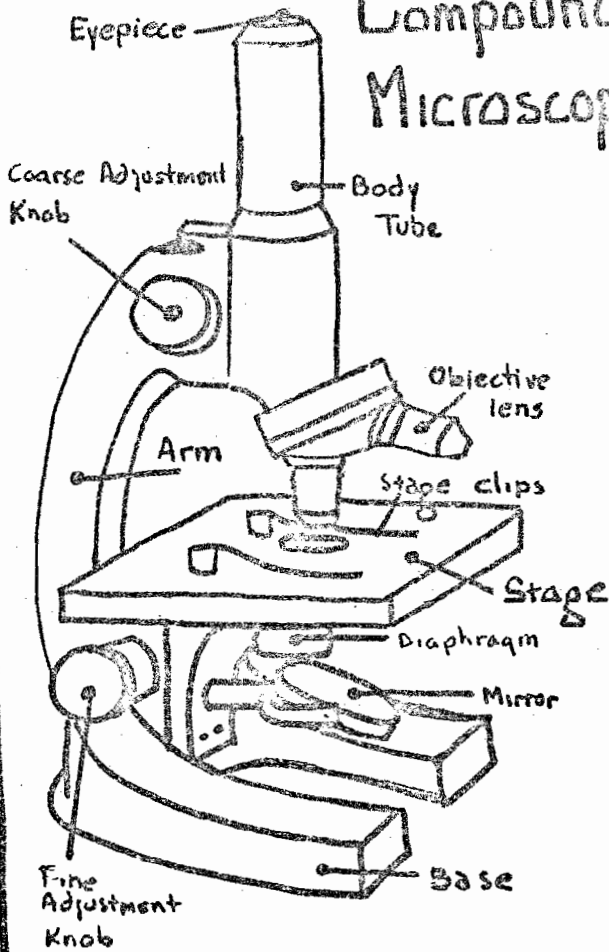
3) What might happen if we put a more powerful lens on the bottom?

4) Scientists built a microscope with tubes and lenses. On the bottom is a changeable lens. These lenses are called objectives. The lens you look through is called the eyepiece. (see other side)

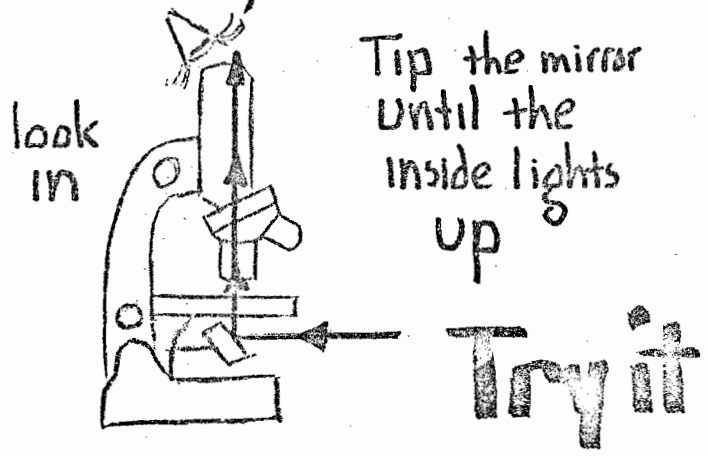
6) Why might we call the place we put the object to be viewed, a stage?  
(on a microscope)

5) What do we call the thing actors stand on during a play?

# 7) Compound Microscope



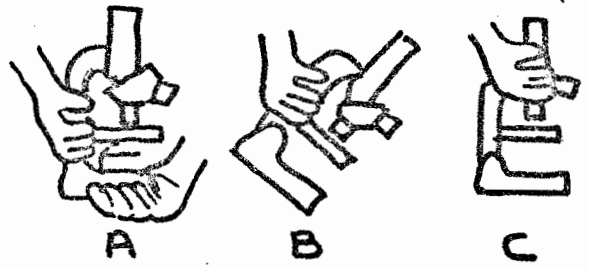
8) light bounces off the mirror, goes, through the stage, through the lenses, and to the eye.



The arm should face the body.  
 Neve Tip A microscope

9) There is a hole in the stage to let the light through.

10) Which do you think is the best way to hold the compound microscope?



11) Why is this the best way to hold the microscope?

## Homework-

1-Why shouldn't you stand in front of the mirror?

2-Why shouldn't you drop a microscope?




# The Microscope Experiment 3

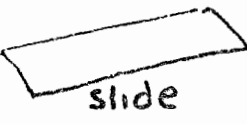
Name \_\_\_\_\_  
Class \_\_\_\_\_ Box No \_\_\_\_\_

Problem - How can we use a compound microscope?


1) Begin With



objects



slide

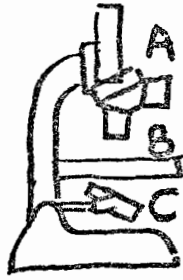


microscope

2) Describe how light moves through the microscope.

3) You look through the microscope on low power. You have light and now want to look at an object.

Where would you put the object?

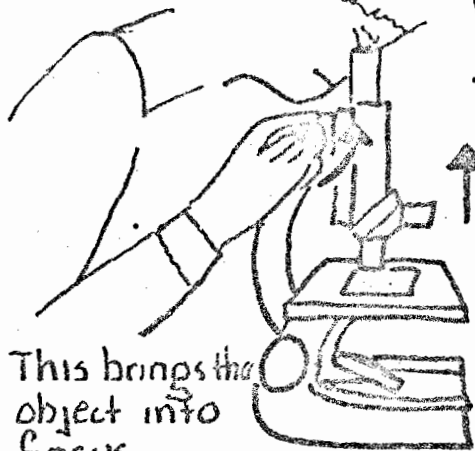


4) Why would you put it there?

5) There are 3 objects in an envelope in your box.  
How can we view these objects under a microscope?

6) Place object on the microscope. Turn the coarse adjustment knob clockwise ↻ until the objective lens almost touches your object. Look through the eyepiece. Turn the coarse adjustment knob counter clockwise ↻ until the dot on the object can be seen clearly. (see pictures)  
(in focus)

7) Turning the knob counter clockwise raises the body tube.



This brings the object into focus

Remember Never Tip A Microscope

8) Can you see the dot on each object?

Why or Why not?

Why does the object have to be Thin?

9) look at the stage

You want to look at small objects. Why can't you just dump these objects on the stage?

10) Ask for a Slide

How can this help you see your objects?

11) look under the stage. Find the diaphragm. Turn it.

What do you think its job is?

12) Why is there a base on a microscope?

13) On a microscope what is the job of the Arm?

Homework-

1- Describe how to focus a microscope?

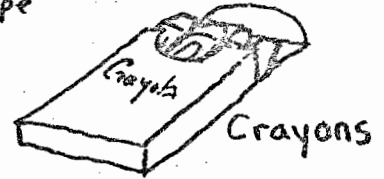
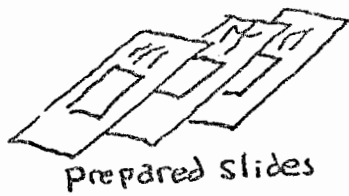
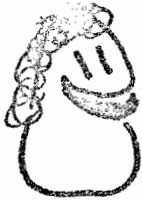
# The Microscope Experiment 4

Name \_\_\_\_\_

Class \_\_\_\_\_ Box No \_\_\_\_\_

## Problem - What is high and low power?

1) Begin With



2) Describe how to use a microscope, in 5 or 6 steps

Step 1-

Step 4-

Step 2-

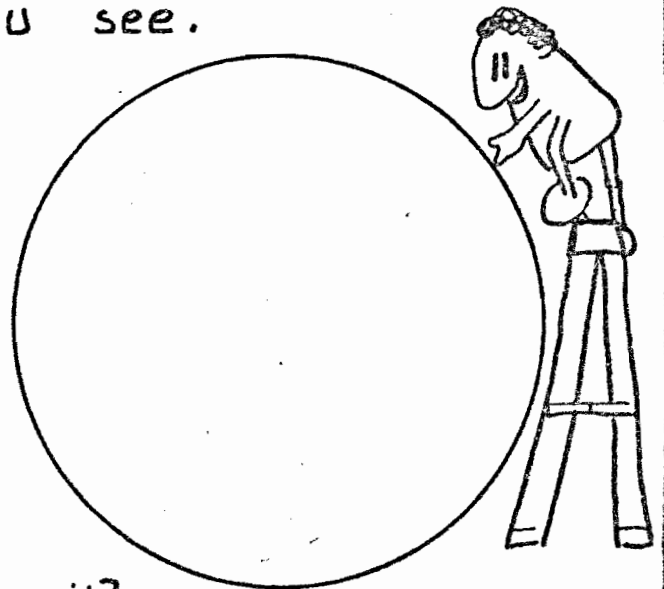
Step 5-

Step 3-

Step 6-

3) Ask your teacher for the slides that are already made. These are prepared slides.

5) Focus the picture. Draw what you see.

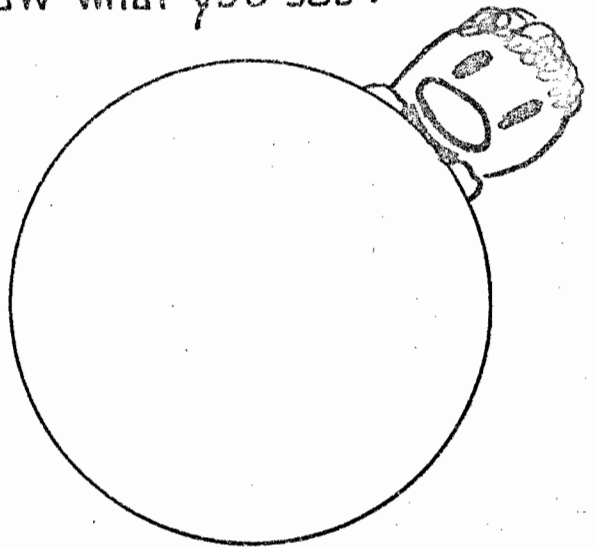


What is it? \_\_\_\_\_

4) Put one slide on the stage. Turn the objective lens until the 4x or 10x lens points at the stage.

7) Raise the body tube by turning the coarse adjustment knob clockwise. Turn the objective lens until the 40X lens points at the stage. Focus again. Remember never send the lens down to the stage when you focus. You will probably smash the slide.

8) Draw what you see.



9) How are the two pictures different?

10) Which gives more detail?

11) Which do you think is more powerful?

Why do you say this?

12) The eyepiece is a lens which magnifies. The objectives also magnify, or make the picture larger. If the eyepiece is 10X, and the objective lens is 10X, we multiply 10 by 10 and get 100. The image will be 100 times larger than the original thing.

## Homework -

1) Why is 10X called low power and 40X is called high power?

2) How much larger will the picture be?

eyepiece	objective
10X	30X

eyepiece	objective
20X	40X

# Experiment 5

## Problem - Let's look under low power.

1) Begin With

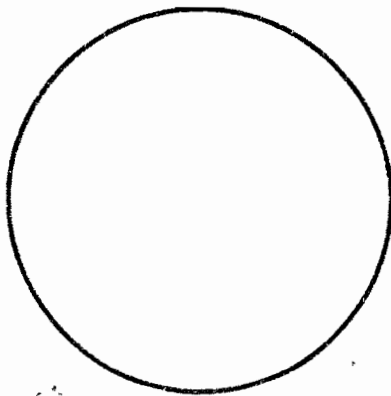


Prepared slides

2) Explain how we set up a slide to look at under low power.

3) How do you know when you are at low power?

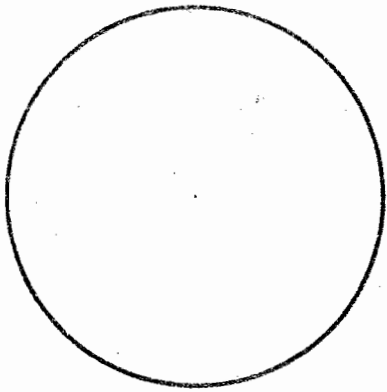
4) Look at prepared slides under low power. Draw what you see.



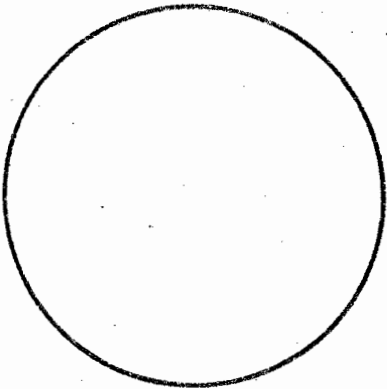
Object \_\_\_\_\_

Power \_\_\_\_\_

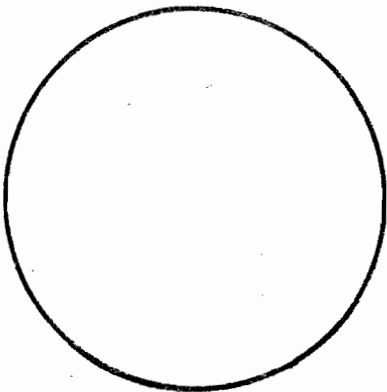
eyepiece \_\_\_\_\_ total magnification \_\_\_\_\_



Object \_\_\_\_\_  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_ total \_\_\_\_\_  
 magnification



Object \_\_\_\_\_  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_ total \_\_\_\_\_  
 magnification



Object \_\_\_\_\_  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_ total \_\_\_\_\_  
 magnification

Homework -

ii-What is your most interesting object? Describe it in words.

# Experiment 6

## Problem - Let's look under high power.

1) Begin With



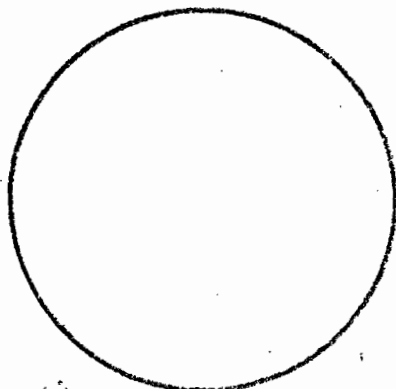
Prepared slides



2) Explain how we set up a slide to look at under high power.

3) How do you know when you are at high power?

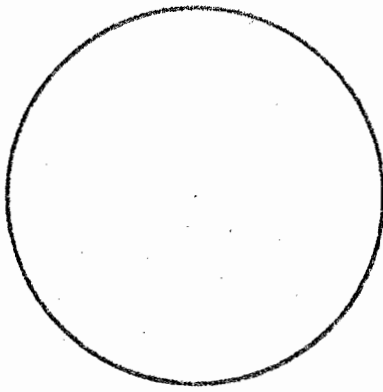
4) Look at prepared slides under high power. Draw what you see.



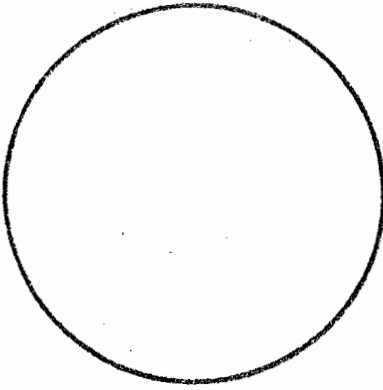
Object \_\_\_\_\_

Power \_\_\_\_\_

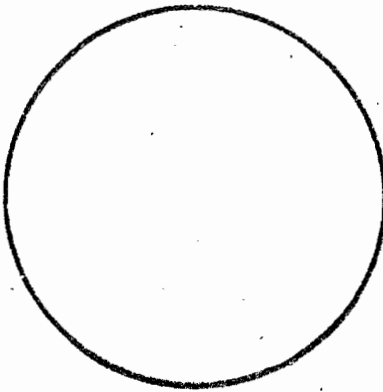
eyepiece \_\_\_\_\_ total magnification \_\_\_\_\_



Object \_\_\_\_\_  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_ total \_\_\_\_\_  
 magnification



Object \_\_\_\_\_  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_ total \_\_\_\_\_  
 magnification



Object \_\_\_\_\_  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_ total \_\_\_\_\_  
 magnification

Homework -

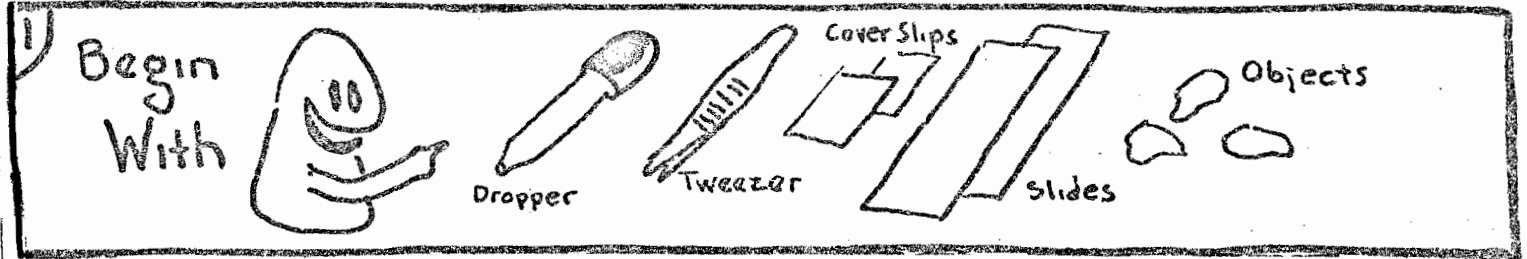
1) - What is your most interesting object? Describe it in words.



# The Microscope Experiment 7

Name \_\_\_\_\_  
Class \_\_\_\_\_ Box No \_\_\_\_\_

## Problem- How can we prepare our own slides?

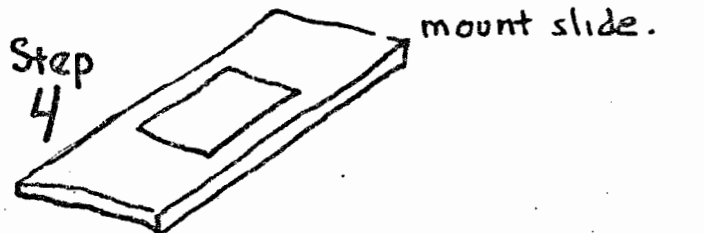
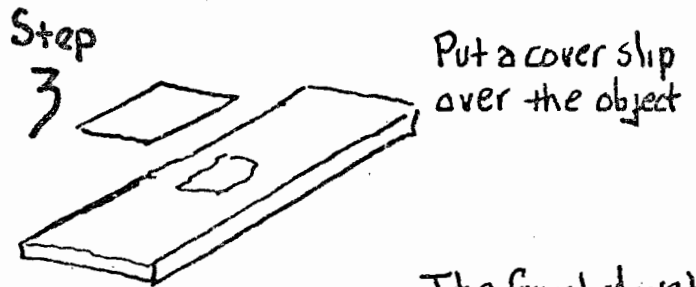
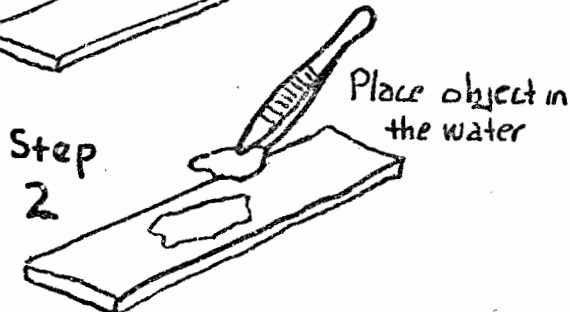
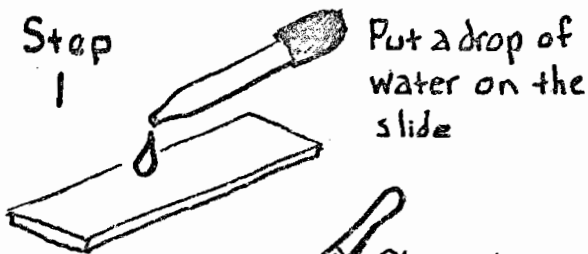


2) Examine a prepared slide.  
What is it made of?  
How was it made?

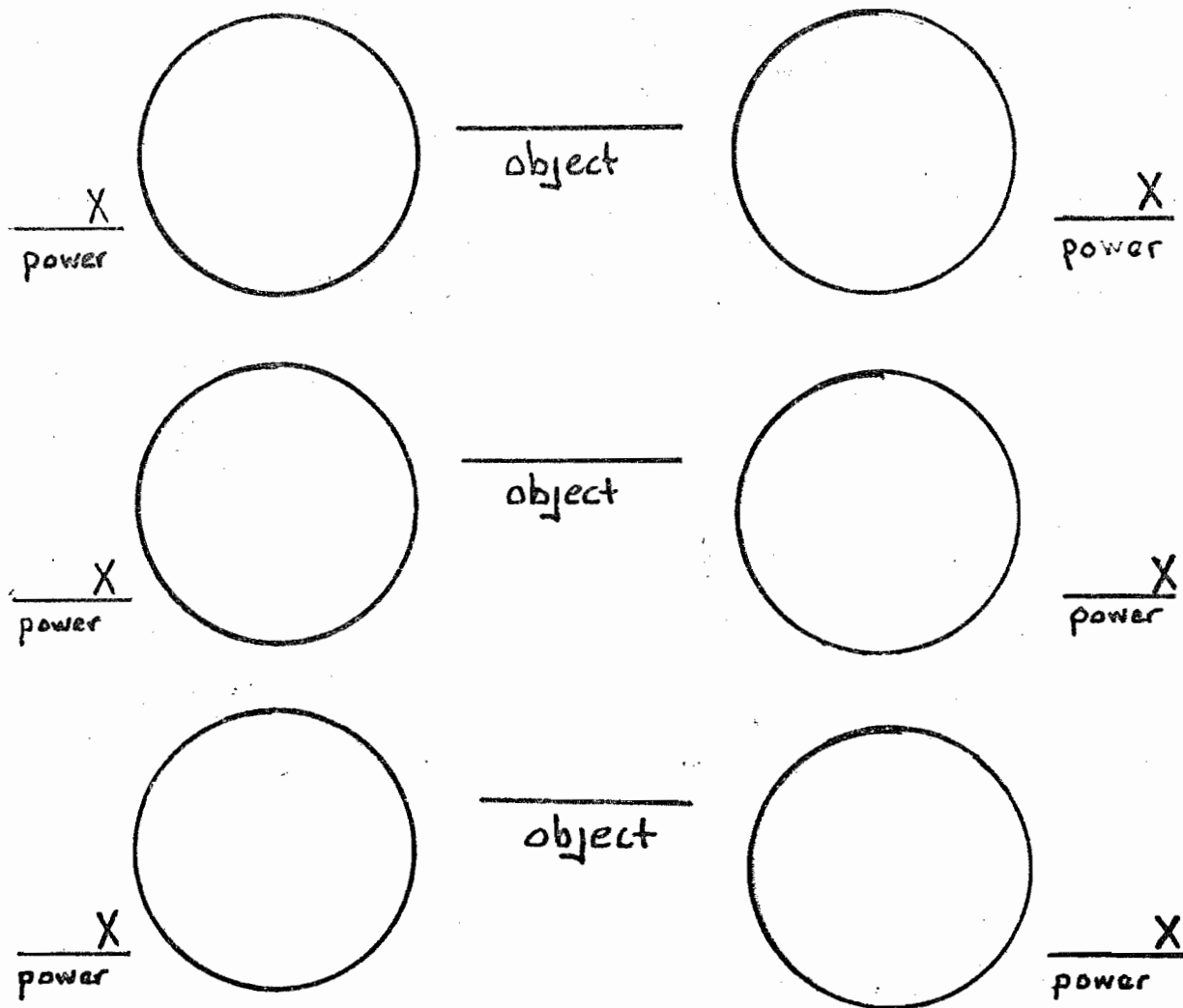
3) Why must the object you put on the slide be very thin?

Objects are put on slides so they won't fall through the stage

4) This is how we make a Wet Mount Slide



5) Prepare Three (3) wet mount slides. Draw what you see under high and low power. Call teacher when your slides are ready.



### Homework -

- 1- Bring objects from home to make a slide from.
- 2- Explain how to make a wet mount slide. (In your words)

# The Microscope

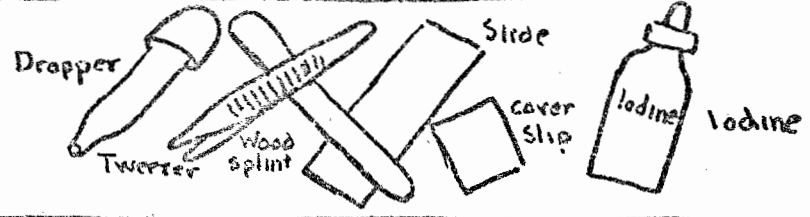
## Experiment 8

Name \_\_\_\_\_

Class \_\_\_\_\_ Box No. \_\_\_\_\_

### Problem - What's inside your mouth?

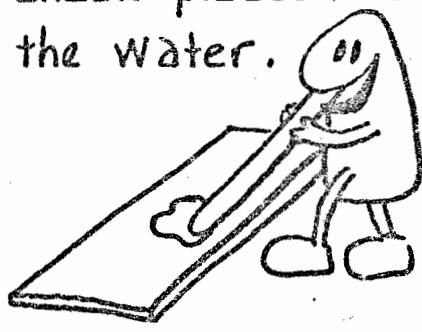
1) Begin With



2) Scrape inside of your cheek with a wood splint.

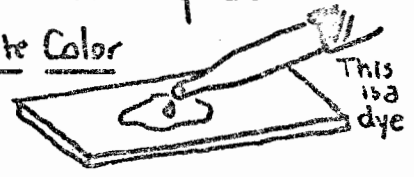


3) Put a drop of water on a slide. Put cheek pieces into the water.

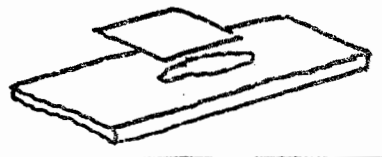


4) Add a drop of iodine

Note Color



5) Put on a cover slip



6) How can you tell if anything is on the slide?

8) How can you look closer at the slide?

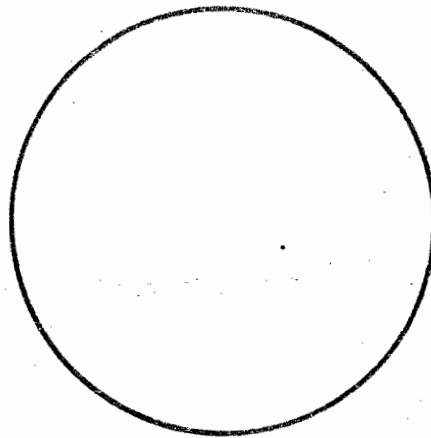
7) Try using the magnifying glass. Why can't you see anything?

Why might you need to look closer?

9) How can you focus the slide under low power?

Describe

Power \_\_\_\_\_  
eyepiece \_\_\_\_\_  
Total \_\_\_\_\_  
magnification.

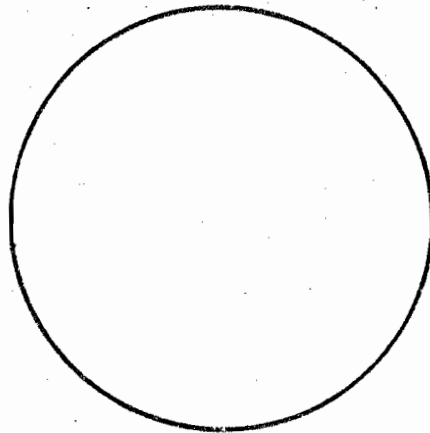


Draw what you see

10) How can you focus the slide under high power?

Describe

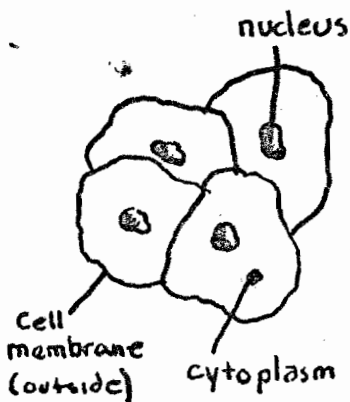
Power \_\_\_\_\_  
eyepiece \_\_\_\_\_  
Total \_\_\_\_\_  
magnification



Draw what you see

11) Why are the pictures different?

12) Cheek Cell



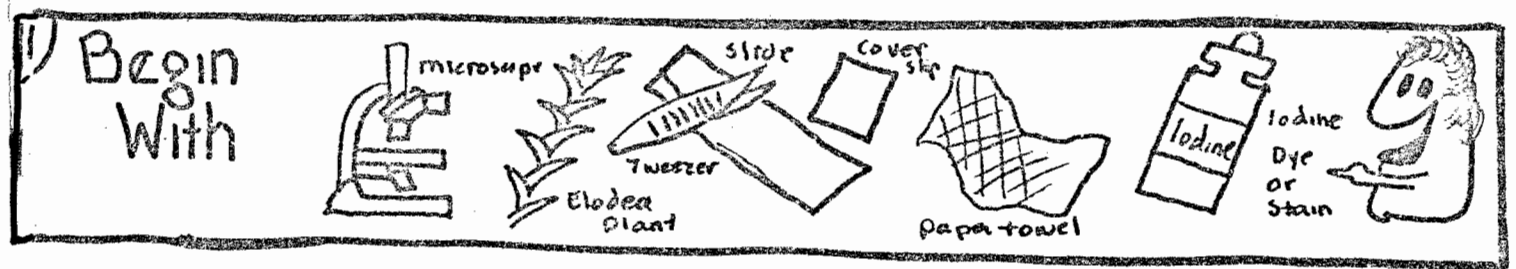
Homework -

place slide and splint in the cup on the teachers desk.

1) What can you tell me about the inside of your mouth?

2) Why does everything look orange?

Problem - How can we stain a specimen or object?



2) How would you prepare a wet mount of a leaf from this elodea plant?

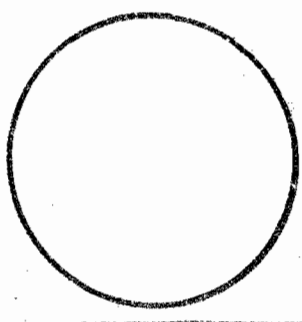
3) Elodea is a plant people put in their fish tanks. You can buy it in a pet shop

4) You want to get light in your microscope so you can see the slide.  
How would you get light in your microscope?

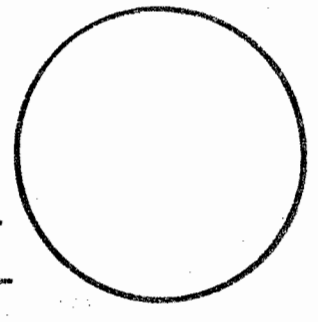
5) How would you focus your microscope?  
What does the coarse adjustment knob do?

6) How is high power different from low power?

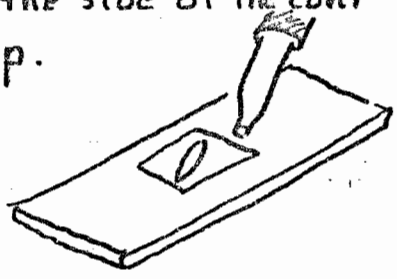
7) look at slide  
Low Power  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_  
 total \_\_\_\_\_  
 magnification \_\_\_\_\_



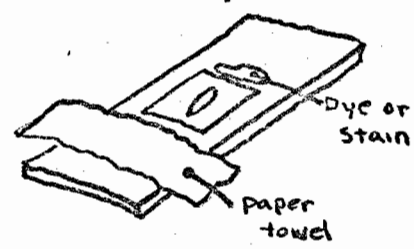
High Power  
 Power \_\_\_\_\_  
 eyepiece \_\_\_\_\_  
 total \_\_\_\_\_  
 magnification \_\_\_\_\_



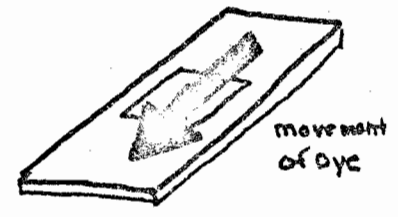
8) Place slide on table  
 Place a drop of iodine on the side of the cover slip.



Place a paper towel on the other side of the cover slip.



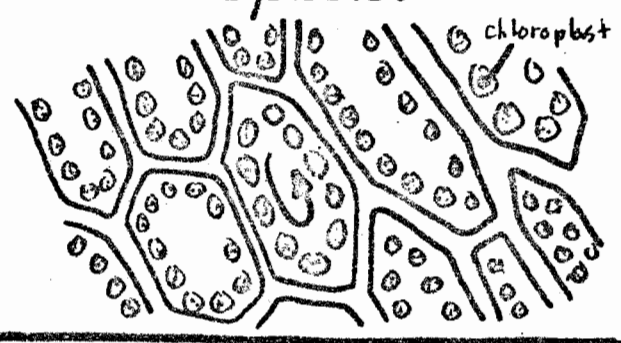
Stain or iodine will move over the specimen and color it.



9) look at the slide again.  
 How did the dye help you?

10) Plants and animals are made up of cells. That join together. Plant cells are rectangular. Animal cells are round or oval. All have a nucleus (a kind of brain), a outside, (a cell wall or membrane), and cytoplasm

11) look at one cell under high power. Do you see movement?  
 This is cyclosis.

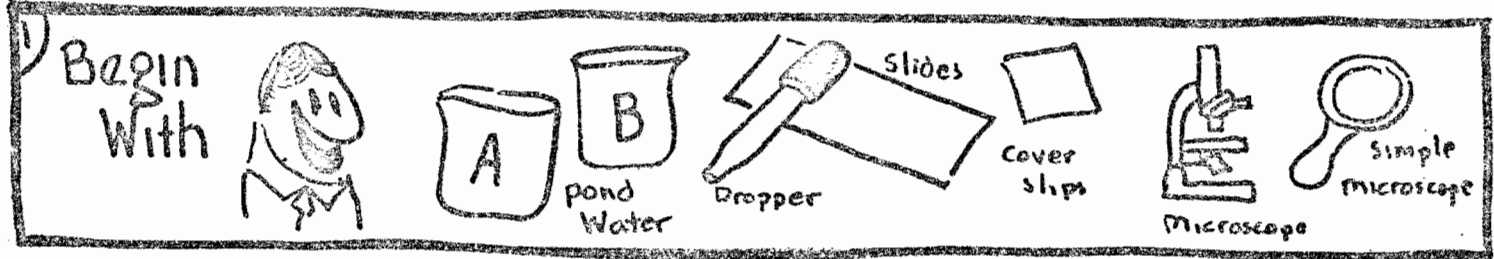


Homework-


- 1- How is one cell different from a tree or person?
- 2- How does dye or stain help you see a specimen?

# Experiment 10

## Problem- What's inside of pond water?



2) Examine a sample of pond water with a simple microscope. Describe what you see.




3) What might we see if we look closer?

4) How can we get a closer look at the pond water?

5) How is a pond different from a lake?

6) How does a pond get fresh clean water?



7) Why is a pond usually dirtier than a lake or the ocean?

8) Have you ever noticed that fish tanks get very Green? This is because a very small green plant called Algae begins to live in the water. Why is pond water Green?

9) If you saw plant cells under a microscope, how would you know they were plant cells and not animal cells?

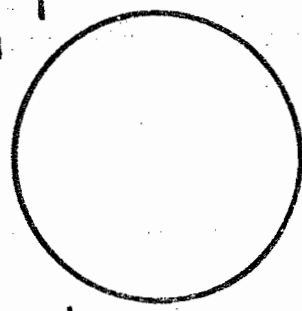
11) Many things live in pond water. Some are plants, some are one cell animals, some are multi cell animals. Some have a particular shape some do not. These cells reproduce, or make new cells, by dividing themselves.

12) Check your pond life sheet. What kind of things are living in your pond water?

10) Place a drop of pond water on a slide. Should you view it under high or low power?

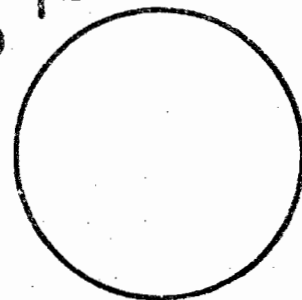
Why?

Sample A



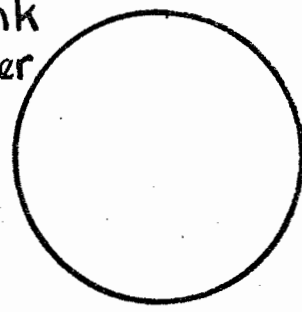
power \_\_\_\_\_  
eyepiece \_\_\_\_\_  
total magnification \_\_\_\_\_

Sample B



power \_\_\_\_\_  
eyepiece \_\_\_\_\_  
total magnification \_\_\_\_\_

Sink Water



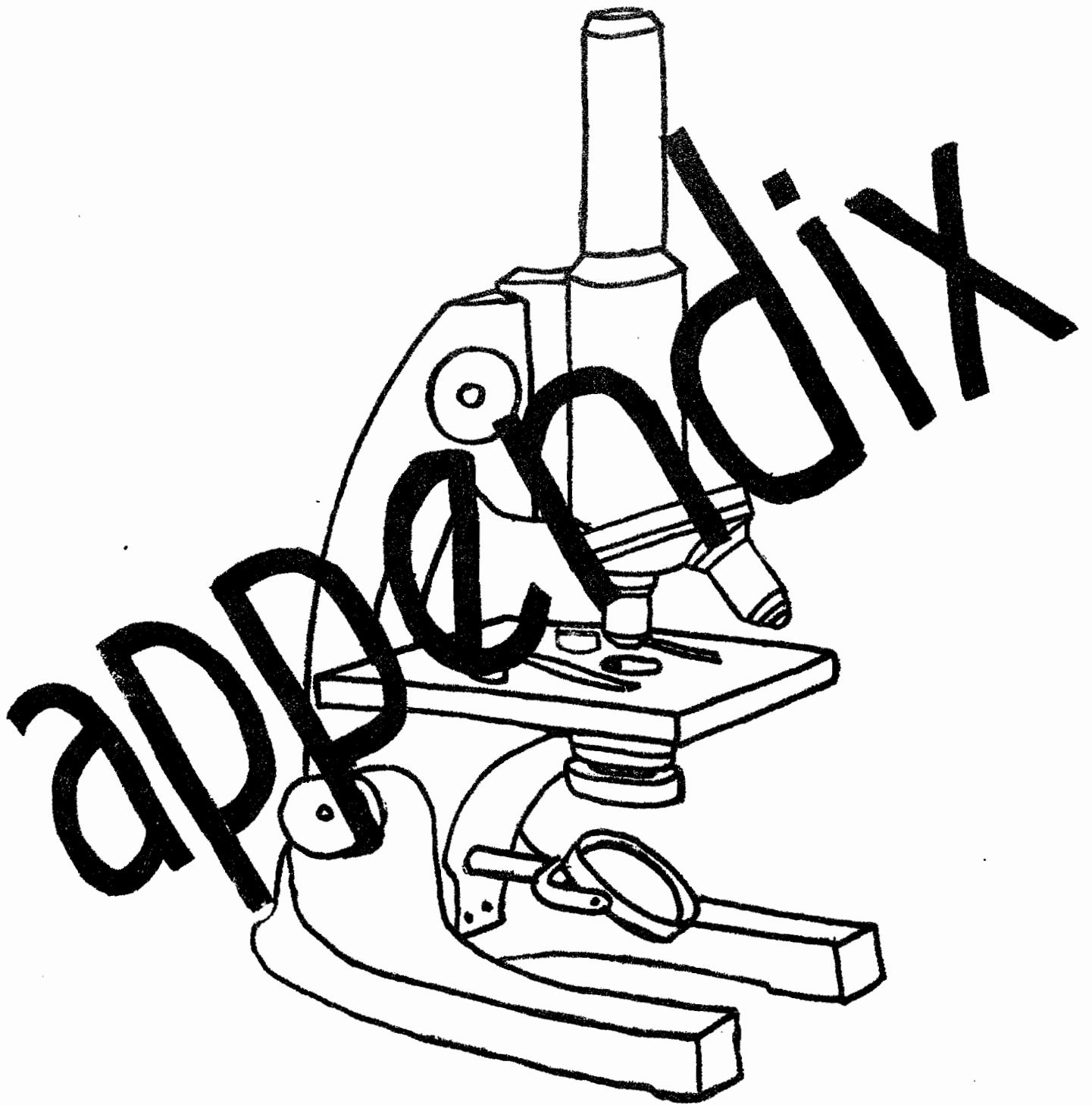
power \_\_\_\_\_  
eyepiece \_\_\_\_\_  
total magnification \_\_\_\_\_

Dump Slides in Beaker on Desk

Homework -

1- How is pond water different from sink water?





Name \_\_\_\_\_  
Class \_\_\_\_\_ Box No \_\_\_\_\_  
The Microscope

## Quiz - Experiments 1-5

1) What is a lens?

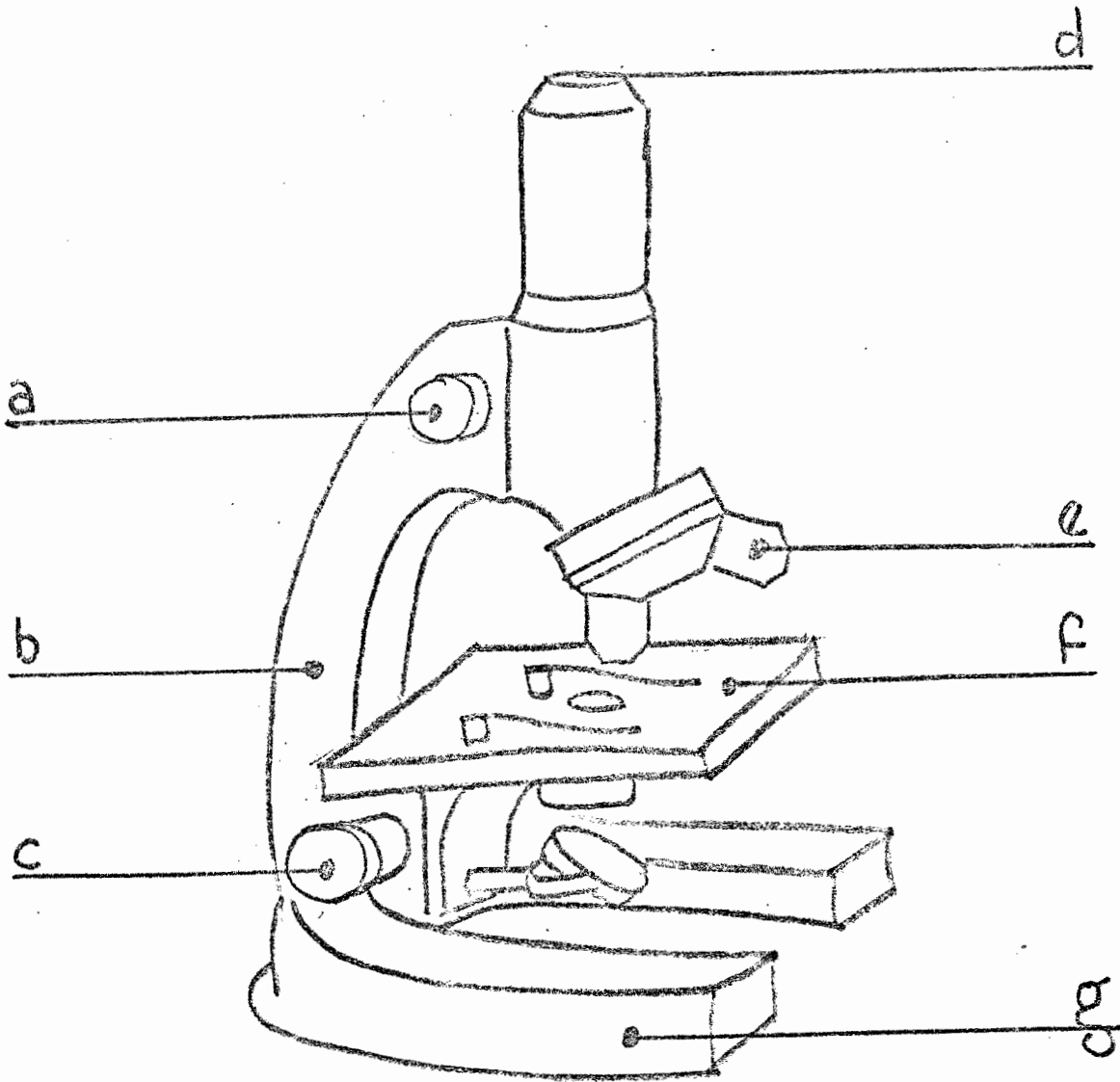
2) How is a lens different from a piece of glass?

3) What is a compound microscope? How is it different from a simple microscope?

4) Describe how to focus a compound microscope?

5) The eyepiece is 10X, The objective lens is 4X. What is the total magnification?

6) Label the parts of the microscope.





Name \_\_\_\_\_

Class \_\_\_\_\_ Box No \_\_\_\_\_

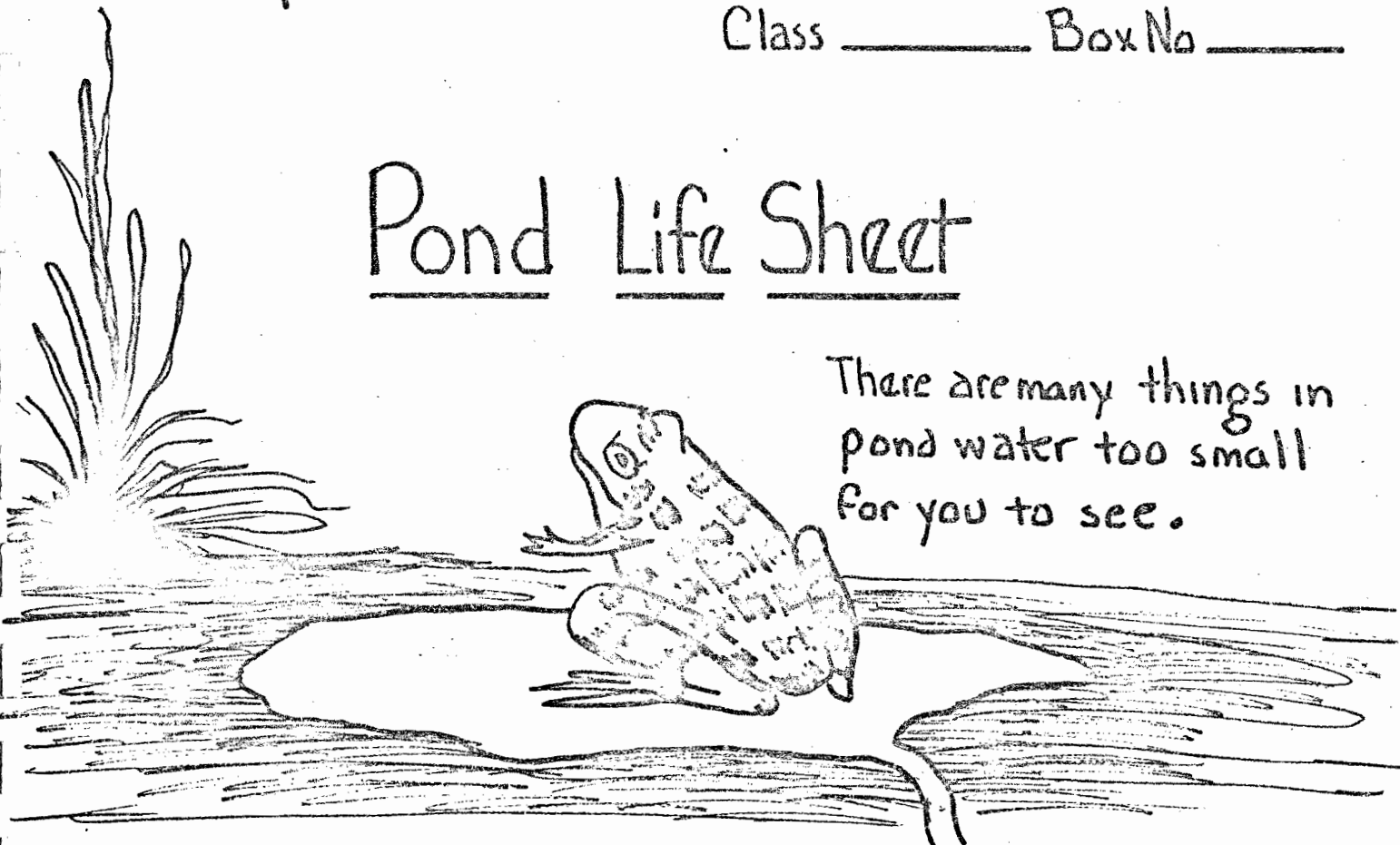
The Microscope

## Quiz-Experiments 6-10

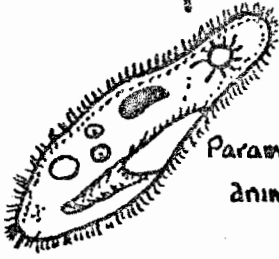
- 1) How is high power different from low power?
- 2) How can we make a wet mount slide?
- 3) How can we stain a specimen for use under a microscope?
- 4) Why is pond water green?
- 5) Describe or draw one type of animal or plant that lives in pond water. Give its name.

# Pond Life Sheet

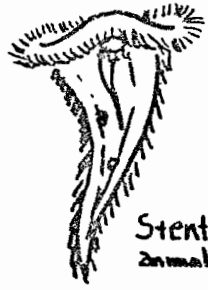
There are many things in pond water too small for you to see.



## Microscopic animals and plants in a drop of pond water

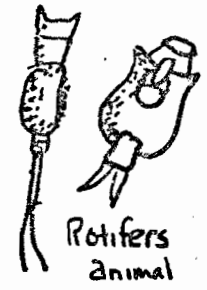


Paramecium animal

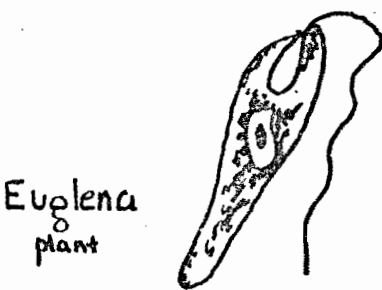


Stentor animal

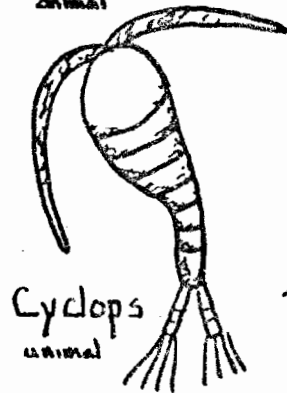
Amoeba animal



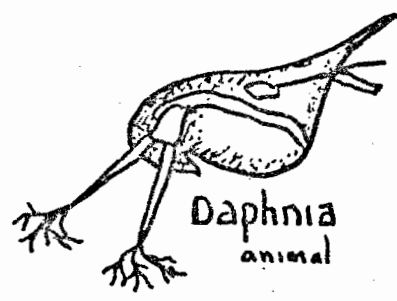
Rotifers animal



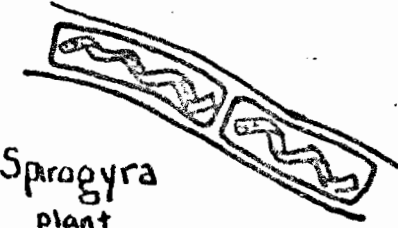
Euglena plant



Cyclops animal



Daphnia animal



Spirogyra plant



Scenedosmus plant

Grantha

# The Microscope

Mr Grambo

## Materials list

Your group is responsible for all materials in your box. Keep them neat and clean. Report missing materials to your teacher.

### Objects (with dots)

transparent  
translucent  
opaque

Eye dropper

Paper towel

Prepared slides (box)

Blank slides

Cover slips

2 lenses (magnifiers)

Plate glass

Iodine (Tincture) stain

Wood Splints

### On hand Materials

Compound Microscopes

Elodea plant

Pond Water

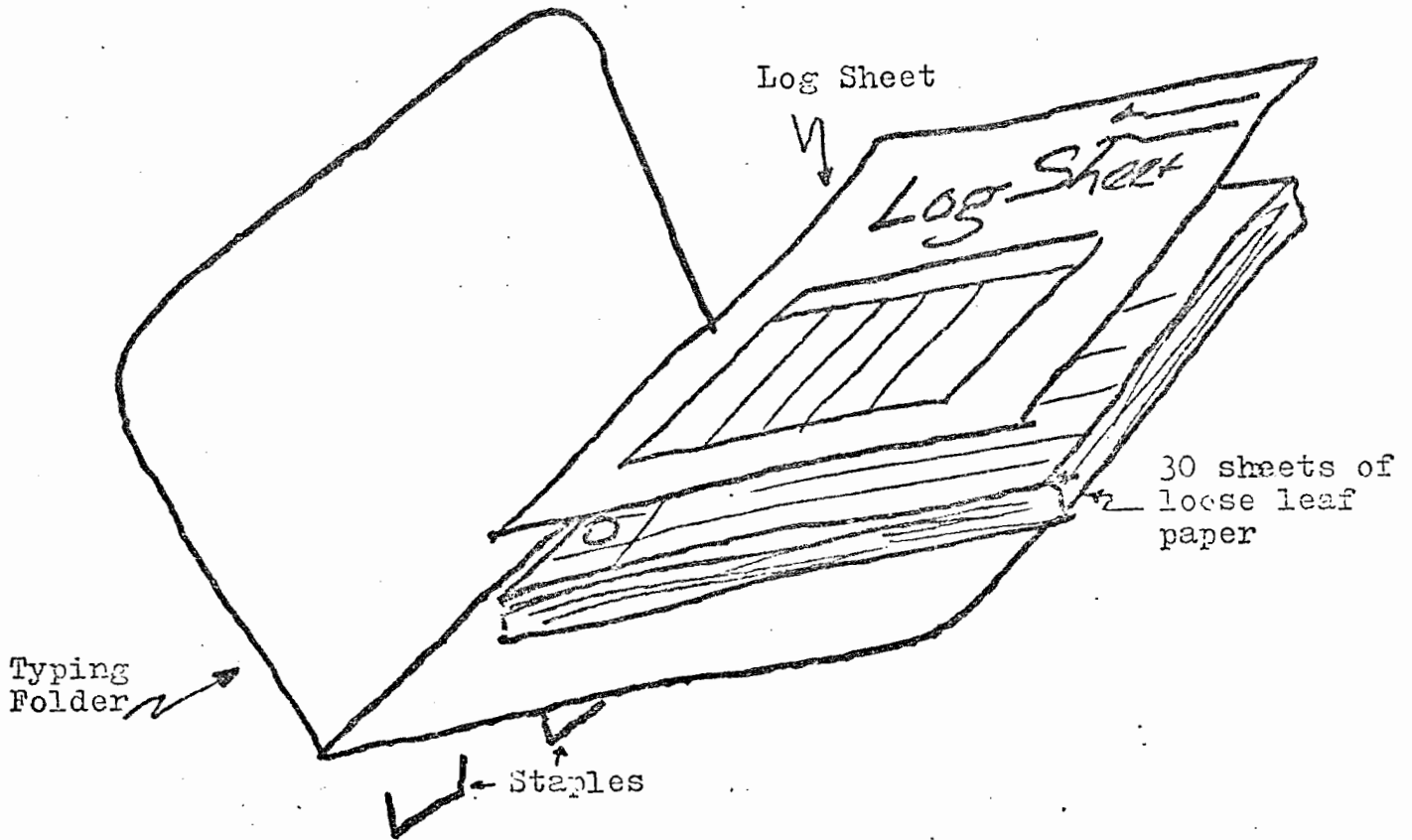
(or organism cultures)

Jewlers lens

tweezers



How To Set Up A Log Book



Bind 30 sheets of paper along with the log sheet into a typing folder. Staple folder closed so papers will not fall out. Place students name and class at the top of the folder. Students may wish to decorate their folders. Pass out folders at the beginning of the period, and collect them at the end. Store folders in a milk crate or in a box. Students will write a summary of each days experiment into the log book. Periodically check log books.

