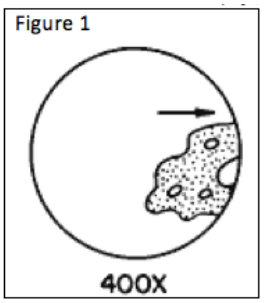
# Microscop"e" Lab

Learning Target: I can use the microscope to determine the relative size of a specimen.
LE Standards: Appendix A Lab Skills; 1.1; 3.1;

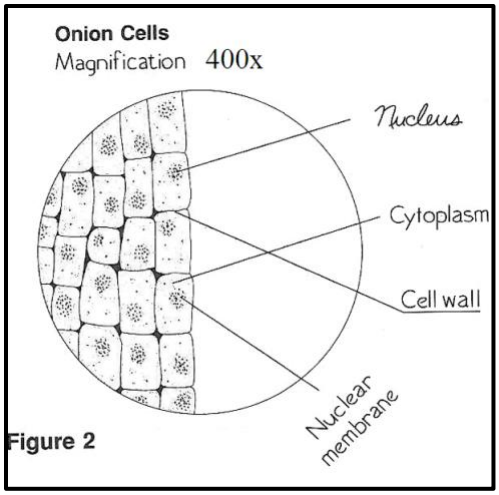
"Micro" refers to tiny, "scope" refers to view or look at. Microscopes are used to make more detailed observations and measurements of objects too small for the naked eye. The compound light microscope is the most common instrument used in education today. It is an instrument containing two lenses, which magnifies, and a variety of knobs to resolve the picture.

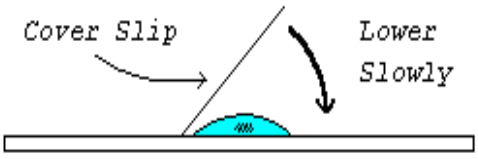
Watch/complete the following links to learn how to use a microscope:
https://www.youtube.com/watch?v=-b3Eejf4rDQ&t=107s
https://www.youtube.com/watch?v=OEZe1W21pHw
http://web.stanford.edu/group/inquiry2insight/cgi-bin/vu-r1b/vu.php?view=mictutl

**Pre-Lab Tasks**:




- a. Describe how and why light sometimes needs to be adjusted.
- b. Compare/contrast the coarse and fine adjustment knobs. (In your answer, explain why the fine adjustment knob and not the coarse adjustment knob should be used with high power objective lenses.)
- c. Describe why a wet mount slide would be used. What are the advantages and disadvantages to using wet mount slides?
- d. Figure 1 to the right shows an ameba moving out of the high-power field of view of a compound microscope in the direction indicated by the arrow. What should be done to center the ameba in the field of view and focus it sharply? Explain your answer.
  *Move the slide to the (left/right), and refocus with the (coarse/fine) adjustment. This is because…*
- e. Describe the ocular and objective lenses. Describe how to determine the total magnification of an image being viewed under the microscope. (Suppose Figure 2 on the right was being viewed under a microscope with an ocular lens having the power of 10x. What would be power of the objective lens? Explain your answer.)
- f. Draw the microscope image (Figure 2 on the right) using the following guidelines:
  - Use pencil - you can erase and shade areas.
  - Use only white printer paper
  - Use a perfectly round item for an outline.
  - Specimens should be drawn to **scale**.
  - Labeled with name and magnification.
  - All labels should be written on the outside of the circle.




**LAB Part 1**: Make a Wet Mount Slide e e e

1. Cut out the lowercase letter e and place it in the center of a clean slide.
2. Using a pipette or eyedropper, put a drop of water on the top of the letter.
   If too much water is added, the cover slip will "float" creating a water layer that is too thick.
   If too little water is added, the specimen may be crushed or dry out too quickly.
3. Place the edge of a cover slip at about a 45-degree angle over the drop of water with a pair of tweezers and gently lower the cover slip over the letter. Placing the cover slip in this manner prevents air bubbles from forming underneath the cover slip

**LAB Part 2**: View Under a Microscope

1. Turn the objective lens so that the lowest power objective (scanning) lens (eg. 4x) is clicked into position.
2. Place the microscope slide on the stage (with the letter "e" facing you as you would read it) and fasten it with the stage clips.
3. Look at the stage from the side and turn the coarse focus knob so the stage moves upward. Move it up as far as it will go without letting the slide touch the lens.
4. Now look into the eyepiece/ocular lens and use the coarse adjustment knob to bring the specimen into focus.
5. Look through the eyepiece/ocular lens and move the fine focus knob until the image becomes sharpened.
6. Adjust the diaphragm and light intensity.
7. Move the microscope slide around until the sample is in the center of the field of view.
   - ✎ g. Draw what you see to scale. *Label the image with the total magnification

8. When you have a clear image of your sample with the lowest power objective, you can change to the next objective lenses. You might need to readjust the sample into focus using the fine adjustment knob only and/or readjust the diaphragm and light intensity. **Do not let the objective lens touch the slide!**
   - ✎ h. Draw what you see to scale. *Label each image with the total magnification

9. When finished, lower the stage, click the low power lens into position and remove the slide.

**LAB Part 3**: Measuring with Microscopes

Any object observed under a microscope can be described in the word small, but precisely how small is critical information to many scientists. Scientists use the unit of a micrometer (µm) which 1,000 times smaller than the millimeter.

1 centimeter = 10 millimeters
1 millimeter = 1,000 micrometers

Frequently, the professional biologist needs to know the dimensions of the object examined under the microscope. One way to do this is to know the dimension of the field of view under each magnification, and then estimate the size of the object relative to the size of the field.

Watch the following video:
https://www.youtube.com/watch?v=_CkcYrns-6I

- ✎ i. Using a clear ruler, devise a strategy to determine the size of your specimen (microscopic image under low power) in millimeters and micrometers.
  1. The "e" specimen is ____ mm (length from left to right).
  2. The "e" specimen is ____ µm (length from left to right).

**LAB Part 4 Challenge**: Create a scale model that compares the "e" specimen and a skin cell.

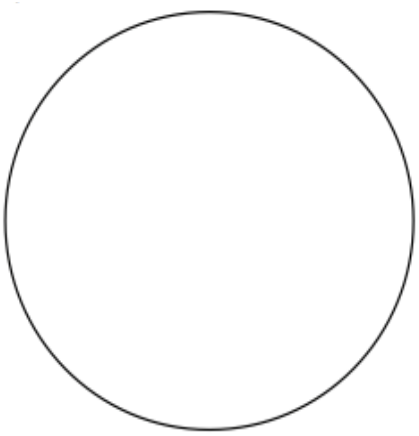
The "e" specimen is ____ µm (length from left to right).
A typical skin cell is 30 µm (length from left to right).

- ✎ j. Devise a strategy with your group that will compare the size of the letter e with the size of a typical skin cell. Explain and show your comparison on graph paper.

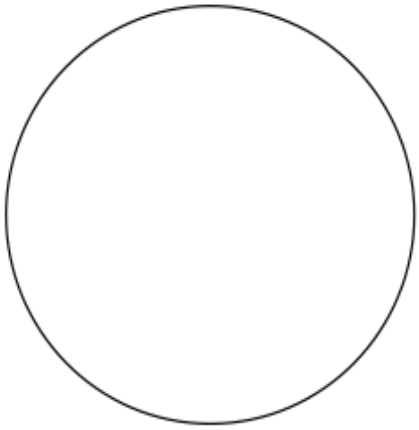
Hint:
Create a scale in which 1 unit of a graph/grid paper is equal to a micrometer value of your choice.
(For example, 1 unit of graph paper could equal 30 µm from left to right.)

Name:_____ _____ Date: _____ Class: _____ #: _____

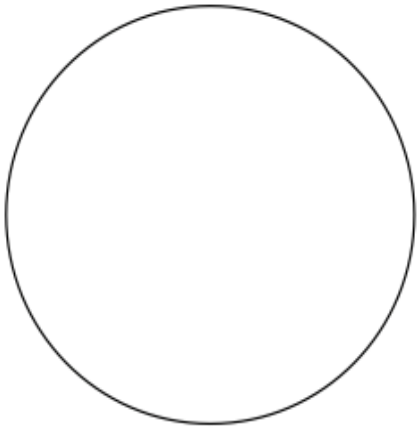
Recording Observations: _____



LOW POWER



MEDIUM POWER



HIGH POWER

| | 3 | 2 | 1 |
|---|---|---|---|
| Microscope Parts and Procedures<br><br>Pre-Lab Tasks | The student demonstrates strong understanding of microscope related parts and procedures. All pre-lab tasks are completed accurately and thoroughly. | The student demonstrates understanding of microscope related parts and procedures. Most pre-lab tasks are completed accurately and thoroughly however there is a need for more detail. | The student does not demonstrate understanding of microscope related parts and procedures. Few pre-lab tasks are completed accurately and thoroughly. |
| Slide Prep and View Under the Microscope<br><br>Scale Drawings and Total Magnification | The student demonstrates an accurate and thorough understanding of all microscope related procedures. The specimen is accurately drawn to scale and the total magnification is correctly indicated for each magnification level. | The student demonstrates an understanding of most microscope related procedures. The specimen is accurately drawn to scale and the total magnification is correctly indicated for most magnification levels. | The student does not demonstrate understanding of microscope related procedures. The specimen is inaccurately drawn to scale and the total magnification is incorrectly indicated for most magnification levels. |
| Measuring with Microscopes And Creating a Scale Model Comparing 2 Specimens | The size and scale of compared specimens are accurately displayed and thoroughly explained. | The size and scale of compared specimens are displayed and explained however accuracy or detail is limited. | The size and scale of compared specimens are neither accurately displayed or explained. |