

Letter "e" Lab

PURPOSE: For you to become more familiar with how to use a microscope, to practice detailed drawings from the microscope, and to explore the microscopic world.

Follow the instructions VERY carefully and answer questions or make neat detailed drawings when directed to do so. When recording your answers, write the letter you will find before the questions on this lab.

1. Find a lower-cased letter "e" in a piece of normal sized print (not a headline). Cut it out. (It does not need to be perfect.)
2. Place the "e" in the middle of a clean slide. Place 1 drop of water on the "e". (Don't let the pipette touch the letter "e". You may lose your "e".)
3. Now cover the drop of water and letter "e" with a cover slip.
4. Make sure the low power objective lens is in place and that the diaphragm is all the way open.
5. Make sure the bottom of your slide is dry before placing it on the stage. **Set it on the stage so that the "e" would be "right side up"** and over the condenser. Fasten with stage clips.
6. Look at the microscope from the side. Use the coarse adjustment knob to lower the stage until it stops.
7. While looking through the eyepiece lens, slowly raise the stage by turning the coarse adjustment knob until the letter comes into focus. Use the fine adjustment knob if necessary to sharpen the focus. Observe the letter "e". (Do NOT change the position of the letter!!!) If you can't see it, check your problem list.
8. In your lab book, draw a circle the same size as the circle to the right. When you look through the microscope, you will be looking at a circle of light. This circle represents your "Field of View". Below the circle, label it "Letter 'e' on low power".

A. Draw the letter "e" the same size and in EXACTLY the same position as you see it through the microscope. **DRAWING MUST BE VERY DETAILED AND SHOULD NOT JUST LOOK LIKE: e**

Answer this question below your drawing:

B. What did you notice about the letter "e" when you first looked at it through your microscope?

9. While looking through your microscope, move the slide to the left.

C. Which way does the image move?

10. While looking through your microscope, move the slide to the right.

D. Which way does the image move?

11. While looking through your microscope, move the slide up and down.

E. Which way does the image move?

12. Before changing the power of the objective lenses, the specimen must be in sharp focus and it **MUST** be in the center of the circle of light you are looking through otherwise you will NOT see it on the next power. **Begin all microscope work on low power!**

F. What is this circle of light called?

13. Now use the revolving nosepiece to put your microscope on to the medium power objective lens. Re-focus if necessary. **AGAIN**, make sure some part of the "e" is in the middle of your field of view.

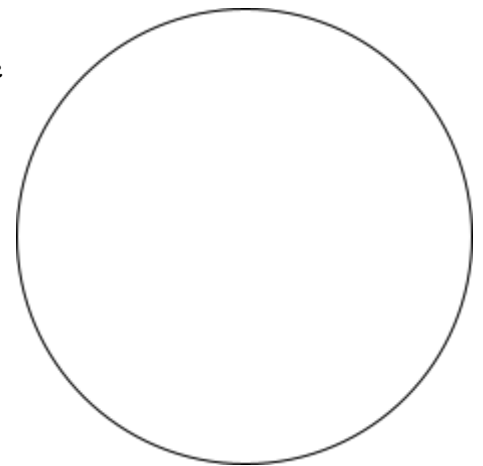
14. Watching from the side, **VERY CAREFULLY** switch the microscope to the high power objective lens. Make sure that the objective lens does not hit the slide, but expect it to be **VERY CLOSE**.

REMEMBER: ALL focusing on high power should be done with the FINE ADJUSTMENT KNOB!!!

G. Draw another circle on your paper, the same size as the circle above. Below the circle, label it "Letter 'e' on high power". In your circle, draw what you see in your field of view as best you can. Remember to **DRAW WHAT YOU SEE!!!**

H. Is the field of view larger under high power or low power?

I. Is the field of view brighter under high or low power?



RESOLVING POWER AND DEPTH OF FIELD

15. Prepare a slide of a 1 cm square of colored newsprint just like you did for your letter "e". (No black.)

J. What color is your newsprint when you look at it with your eye, no microscope?

RESOLVING POWER is the ability to distinguish between two separate points that are very close together.

Microscopes have resolving power greater than that of the human eye. In order to see this effect, you will look at colored newsprint under the microscope.

16. Observe and focus the slide under low power. Then switch to medium power and refocus. Then switch to high power. Examine the different colors in your field of view.

K. What patterns do you see in the different colors?

L. What colors do you see now under high power?

The DEPTH OF FIELD refers to the position of the stage where the object is in good focus. On low power it shouldn't be a problem to see the entire object you are looking at in complete focus. However, when you use high power, it may be difficult to focus on the entire object. You will need to use the fine adjustment knob to focus on the different layers. In order to see this effect, you will look at two crossed hairs under the microscope.

17. Prepare another slide like above but this time you will use two different hairs preferably different color. Cross them on the slide, then add one drop of water and the cover slip.

18. View the slide under low power. Focus directly on the point where the hairs cross.

M. Are both hairs in focus under low power?

19. Switch to medium power and refocus. Then switch to high power and refocus again. (If you don't see the hairs on the next higher power, what should you do???)

N. Once you see the point where the two hair cross under high power, explain what the two hairs look like. Are they both in focus at the same time?

20. OPTIONAL but super fun! Prepare some slides like above (with water and the cover slip) of other things such as pieces of cloth, different colored paper, money (no water necessary), dog hair, tiny dead bugs, etc. NO BLOOD, you've seen it on the TV microscope anyway!!! Ask Ms. Rikkers if you're not sure you should look at it. Try to get things that are thin enough for light to pass through. . . it's much easier. Ask Ms. Rikkers for some prepared slides as well.

MICROSCOPE LAB CLEAN UP

- ALL solid waste should be placed in the trash can. This includes tiny letter "e"s, any other used newsprint, dead bugs, hairs, fingernails, used paper towels, etc.
- Slides and cover slips need to be cleaned and dried with a paper towel.
- Microscopes on low power, unplugged, cords neatly wrapped around the base, covers on, away from edge.
- Lab stations should be as neat or neater than when you got there.

ALL LAB STATIONS WILL BE CHECKED BEFORE YOU LEAVE. Make them clean before you sit and you will make everyone happy.