Honors Biology Name: _____

Microscope Skills Lab Date: _____ Hour: _____

Purpose:

Demonstrate the proper use and care of a compound light microscope. Focus the microscope at low power and high power. Make a wet-mount slide to examine under the microscope.

Research:

In almost every type of biological research, the microscope plays a fundamental role. Biologists use it to study the fine structures of cells and tissues – things too small to be seen with the unaided eye. The microscope used more often is the light microscope, which uses light to form an enlarged image of a specimen. Two types of light microscopes are the compound light microscope and the stereomicroscope. Compound light microscopes are used to view tiny living organisms as well as preserved cells mounted on glass – a microscope slide – and covered with a cover slip. A slide that is prepared with water is called a wet mount. Stereomicroscopes are used to study larger specimens and provide a three-dimensional view of the specimen's surface.

Under a compound light microscope, most objects and microorganisms are observed in a drop of water. If you think of that drop of water as a pond and the objects and microorganisms as fish in the pond, you will begin to see why it is important to be able to focus at different depths. Depth of field focusing is always done under high power with the fine adjustment knob.

1. What are two types of microscopes commonly used by biologists? _____

   _____

2. What covers a specimen when put on a microscope slide? _____

3. What is a wet mount? _____

4. What makes a stereomicroscope different than a compound light microscope? _____

   _____

Materials:

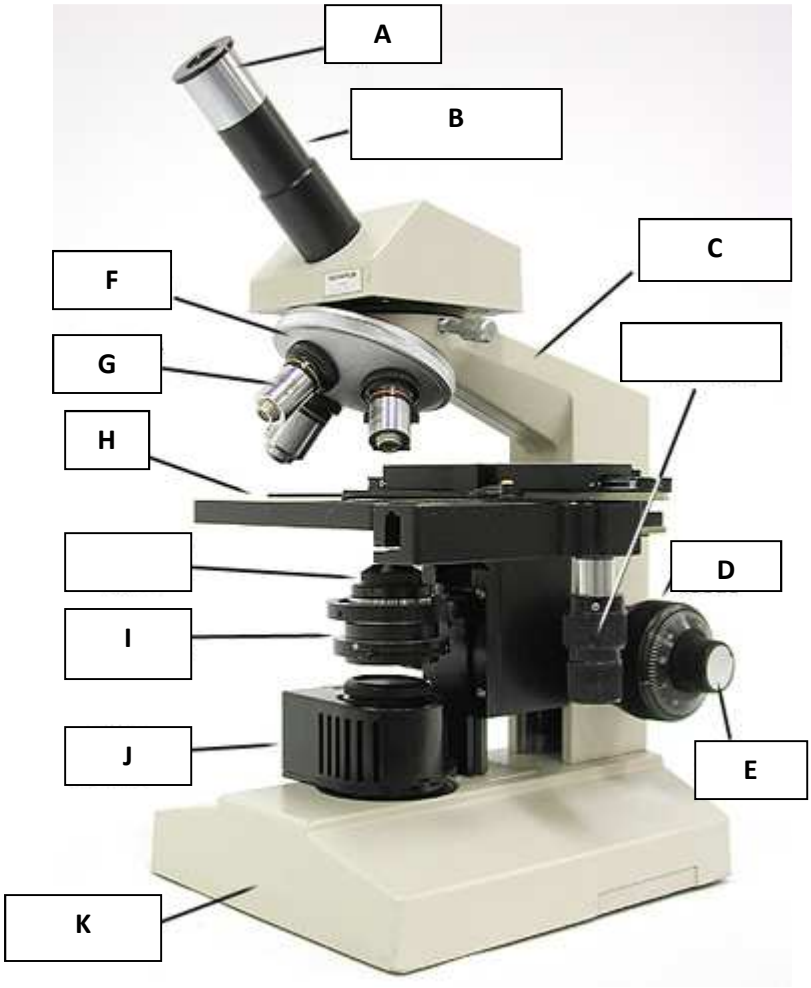
| | |
|---|---|
| Compound light microscope | prepared slide |
| Lens paper | water |
| Forceps | 2 glass microscope slides |
| 2 cover slips | eyedropper |
| Thread | scissors |

Hazards:

Standard safety contract applies.

Procedure:

1. Complete data table 1 using the diagram below:




2. Carry a microscope to your lab table as shown by your teacher.
3. Observe the magnification power (a number followed by an X) of the eyepiece and the low and high power objectives.
4. Record these numbers in your data table.
5. If your microscope has a built in lamp, plug it in and turn it on
6. Lower the stage as far as possible by turning the coarse adjustment knob toward you
7. Secure a prepared slide to the stage using the stage clips
8. Turn the low power objective into position over the stage
9. While observing the stage from eye level, use the coarse adjustment knob to position the objective as close to the slide as it will go without touching the slide
10. Look through the eyepiece
11. Focus the with the coarse adjustment knob by turning it away from you
12. Complete focusing by slowly turning the fine adjustment knob back and forth

13. When the object you are viewing is in focus and exactly in the middle of your field of vision, switch to higher power
14. Once slide is focused under high power, remove slide from stage clips and stage
15. Obtain a letter “R” from the teacher
16. Using an eyedropper, place one drop of water in the middle of a clean microscope slide
17. With forceps, place the “R” in the drop of water
18. Hold a cover slip at a 45° angle to the slide at the edge of the drop of water
19. Lower the cover slip slowly to avoid forming air bubbles
20. Place your wet mount slide on the microscope stage with the letter “R” facing you
21. Using the low power objective, center and focus the microscope on the letter “R”
22. Switch to high power
23. As you look through the eyepiece, slowly adjust the diaphragm to obtain the appropriate light for viewing
24. As you look into the microscope, use your fingers to move the slide to the right and then to the left
25. Obtain a ruler
26. Use the ruler under the microscope to determine the size of the “R”
27. Remove the wet mount slide from the stage clips and stage
28. Make a wet mount of two threads by crossing the threads in the center of a clean microscope slide
29. Using an eyedropper, add a drop of water to the slide
30. Add a cover slip to the slide
31. Place your wet mount on the stage of the microscope
32. Under low power, adjust the slide on the microscope stage so that the point is where the threads cross in the center of your field of vision
33. Bring the threads into focus
34. Switch to high power
35. Slowly turn the fine adjustment knob back and forth to practice focusing on different part of the two threads
36. Repeat step 25
37. Clean up

Data Table 1:

| Letter | Part Name | Function | Letter | Part Name | Function |
|---|---|---|---|---|---|
| A | | | F | | |
| B | | | G | | |
| C | | | H | | |
| D | | | I | | |
| E | | | K | | |

Data Table 2:

| | **Objective Lens Magnification** | **Ocular Lens Magnification** | **Total Magnification** |
|---|---|---|---|
| **Scanning Power** | | | |
| **Low Power** | | | |
| **High Power** | | | |

1. Summarize the steps for focusing an image using a compound light microscope. Be very specific. Write the directions in a numbered list.

2. How does the procedure for using the microscope differ under high power versus low power?

3. What happens as you adjust the diaphragm?

4. What happens to the image as you move the slide right?

5. What happens to the image as you move the slide away from you?

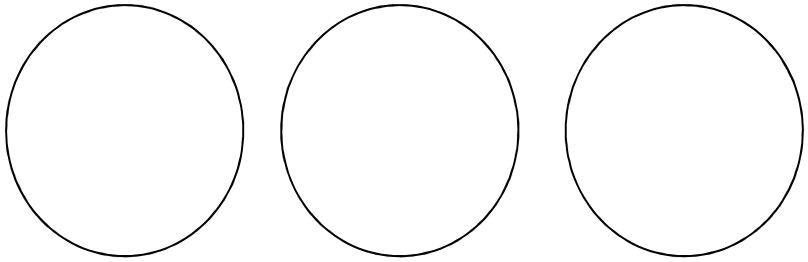
6. Describe the relationship between the image that you see through the microscope and the appearance of the slide on the stage.

7. In three steps, describe how to make a proper wet mount of the letter R.
a.

b.

c.

Draw the image that you see as you view the letter R through each objective lens. Your drawing must accurately show the width of the lines of the R. Record the magnification of each image.



Magnification: _____ _____ _____

Data Table 3:
*Calculations to estimate the width of the field of view*

| | Measured Width (mm) | Calculated Width (mm) |
|---|---|---|
| Scanning Power | | |
| Low Power | | |
| High Power | | |

8. Follow the directions in your lab to determine the measured width in millimeters of the scanning, low, and high power fields of view.
   a. Enter the values in Table 3.
   b. Is the ruler useful in measuring the width of the field of view at high power?
      _____
   c. Why not?

9. To calculate the width of the **low** power field of view, complete the calculation table below. Copy your final result into Table 3.

| width you measured for **scanning** power field (see Table 3) | X | magnification of **scanning** power (see Table 2) | ÷ | divided by magnification of **low** power (see Table 2) | = | calculated width of **low** power field of view |
|---|---|---|---|---|---|---|
| | X | | ÷ | | = | |

10. To calculate the width of the **high** power field of view, complete the calculation table below. Copy your final result into Table 3.

| width you measured for **scanning** power field (see Table 3) | X | magnification of **scanning** power (see Table 2) | ÷ | divided by magnification of **high** power (see Table 2) | = | calculated width of **high** power field of view |
|---|---|---|---|---|---|---|
| | X | | ÷ | | = | |

11. Which is a more accurate method to determine the width of the high power field of view: measuring with a ruler or calculating based on the width of the scanning power field of view? Why?

12. Determine the width of one leg of the letter "R."
   a. First, estimate what percentage of the width of the field of view is taken up by one line of the letter R as seen under high power. Refer to your drawing or replace the slide on the microscope. Does it take up the whole field (100%)? About half of it (50%)? A quarter of it (25%)? Or a different percentage of it?

      Your estimate: _____ %

   b. How wide is the line of the letter R you are looking at? To find this, complete the calculation table below.

| estimated percent of the field taken by one line (see 14a) | X | calculated width for high power field of view (from Table 3) | ÷ | 100 | = | width of one line of the letter R |
|---|---|---|---|---|---|---|
| % | X | mm | ÷ | 100 | = | mm |