

Lab 2 Report Sheet

Microscopic Observation of Cells

Your Name _____

Lab Partners _____

Lab Section _____ Team Number _____

Prelab Assignment

- *Before* coming to lab, to get an overview of this laboratory activity and to use your lab time efficiently, read carefully the introduction and procedures of each part of the experiment in the lab handout. If you and your group members are not familiar with the procedure before coming to lab, you may have difficulty completing this exercise during the lab period.
- *After* reading the [Lab 2](#) handout (especially [Part B](#) of the procedure!) answer the following [17 questions](#) in the spaces provided [on pages 1 - 3](#). **Please be aware that you need to go online to answer question #3.**

Lab 2 Prelab Questions

Use the hypothetical data below for the following four microscopes to answer questions 1 and 2.

Microscope Number	Objective Lens	Ocular Lens
1	10X	20X
2	25X	5X
3	20X	10X
4	40X	20X

1. If a slide showing the same types of living organisms is examined with each of the four microscopes, in which *two microscopes* will the microbes appear to move at the *same speed*? Record the *microscope numbers* in space provided to the right and *explain* your reasoning below.

(record answer here)

2. Given that each slide had the same density of microbes, with which microscope would you expect to observe the *greatest number* of microbes at any given instant? Record *the number* of the microscope in space provided to the right and *explain* your reasoning below.

(record answer here)

Prelab Questions (cont.)

3. a.) Study the parts of the microscope illustrated in figure 1 on page 1 of this lab. Now it's time to get a little "virtual" practice using the microscope by doing the "Basic Microscope Tutorial" at <http://virtualurchin.stanford.edu/microtutorial.htm>. It might take you 5 to 10 minutes to complete this online activity.
- b.) Now do the virtual activity, "Microscope Measurement: How big is that object in the microscope?," at <http://virtualurchin.stanford.edu/microscope.htm>. After completing the *Microscope Measurement* activity **print your results** and staple the page on top of page 1 of the report pages. **Enter the following information before printing:** Your first and last name, the date, Biol 100 and the letter of your lab section. This online activity will take you about 5 to 15 minutes.

Microscope Prelab "Quiz" For Questions 4 – 15 record the letter(s) of the correct response(s) in the spaces provided.

4. _____ How much are you magnifying something when you are using 10X oculars and the 40X objectives?
a.) 400X b.) 4000X c.) 100X d.) 10X e.) 40x
f.) Can't calculate without additional information.
5. _____ How much are you magnifying something when you are using 10X oculars and the 10X objectives?
a.) 4000X b.) 4000X c.) 40X d.) 100X e.) 10X
f.) Can't calculate without additional information.
6. _____ You must decrease the amount of light when looking at thin and/or transparent cells or tissue sections such as cheek or amoeba cells. Describe two ways you can use to decrease light intensity (i.e. decrease the amount of light passing through the scope). Select the two choices that apply.
a.) Adjust the dimmer switch d.) Change to a higher power objective
b.) Open the iris diaphragm. e.) Adjust the course focusing knob.
c.) Close the iris diaphragm. f.) Change to a lower power objective
7. _____ Which objective must be in place when you are put away the scope?
a.) high power b.) 10X c.) 40X d.) 4X e.) It does not matter.
8. _____ Which focusing knob do you use with the 10X and 40X objectives?
a.) Both the course and fine focusing knob. d.) Fine focusing knob
b.) Course focusing knob e.) Small focusing knob
c.) Large focusing knob
9. _____ What do you grasp when lifting and carrying the scope? (Select all that apply.)
a.) The arm d.) The rotating nose piece.
b.) The top or oculars. e.) The stage.
c.) The base. f.) It does not matter.
10. _____ What objective(s) must you always use when you first start looking at a slide? Select all that apply.
a.) 4X b.) 10X c.) 400X d.) Oil immersion e.) It doesn't matter.
11. _____ Which objective allows you to see the largest area of the object that you are viewing?
a.) 4X b.) 10X c.) 400X d.) Oil immersion e.) It doesn't matter.
12. _____ What objective must be in place when you remove a slide from the stage of your scope?
a.) 4X b.) 10X c.) 400X d.) Oil immersion e.) It doesn't matter.
13. _____ What do you adjust if you can see two overlapping circles with part of the object in each circle?
a.) The distance between the oculars. d.) Change to a different objective.
b.) The focus. e.) The distance between your eye and the oculars,
c.) The iris diaphragm. f.) Drink a cup of coffee to sober up.
14. _____ What are wet mounts?
a.) The slides that you make of dead specimens. c.) The slides that you make of living specimens.
b.) The prepared slides that you are given. d.) Something illegal.

Prelab Questions (cont.)

15. _____ What is a cover slip?

- a.) The small glass or plastic cover that is placed over the objects you view on a slide.
- b.) The cover that is placed on the jars that protects the living specimens.
- c.) The plastic cover that covers and protects scope.
- d.) A glass or plastic cover that slips onto the objective lens.
- e.) A garment worn under a pretty dress.

16. A hypothetical microscope you are using has the following objective magnifications:

Low power: 5x

Medium power: 10x

High power: 40x.

If the diameter of the field of view at low power is 6000 μm (micrometers), what is the diameter in micrometers of the field of view at high power? Record your answer in the space provide and show and/or explain how you arrived at your. **No work, no credit.**

Work:

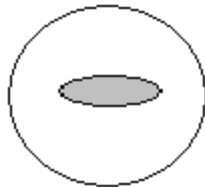
Answer: _____

17. Estimate the length of the following microscopic objects. Show how you arrived at your answers in the spaces provided. **No work, no credit.** Base your calculations on the following field sizes: Low power: 4.5 mm; Medium power: 1.8 mm; High power: 0.45 mm

a.) **Object A** viewed at low power

Estimated length of object A = _____ μm

Work:

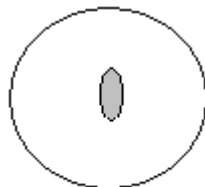


A

b.) **Object B** viewed at medium power

Estimated length of object B = _____ μm

Work:



B

☺ End of Prelab Questions ☹

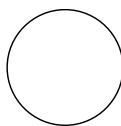
Lab 2 Observations

Note: Perform procedures that can only be done in the lab before attempting questions that can be performed outside of the biology laboratory!

1. Fill in the Summary Chart below as you follow the procedures on [pages 7 – 9](#).

	Low Power	Medium Power	High Power	Oil Immersion
Magnification of Objective Lens				
Total Magnification				
Field Diameter	mm	mm	mm	mm
Field Diameter	μm	μm	μm	μm

2. Using low-power (the 4x objective) compare the position and orientation of the image of the letter “a” as seen through the ocular with the position of the letter “a” as seen on the slide without using the microscope. What two orientation differences of the image are there?
3. In the circle below use a *sharp* pencil to make a *simple* sketch of the letter as viewed under low-power.



Letter “a” as viewed at Magnification: _____ x

4. Slowly move the slide horizontally away from you. Which way does the image move?
5. While looking into the ocular, slowly move the slide from right to left. Which way does the image move?
6. Make a rough estimate of what fraction of the letter "a" is visible when viewed under high power as compared to low power.

(write answer here)

(write answer here)

(write answer here)

7. Does switching from low power to high power change the position of the image of the letter “a”? Offer an explanation why in the space below.

_____ (write answer here)

8. Under high power is the illumination brighter or less bright than it is with low power? Offer an explanation why in the space below.

_____ (write answer here)

9. Why is it necessary to center your object (or the position of the slide you wish to view) before changing to high power?

10. Move the diaphragm lever in each direction while observing the field. What happens?

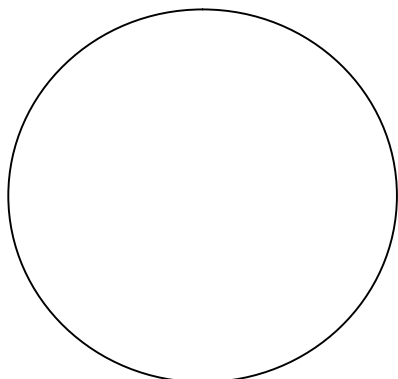
11. Is it more desirable to increase or decrease the light when changing to a higher magnification? Why?

12. What is the approximate actual height in millimeters (mm) and micrometers (μm) of your letter “a”?

Height of the letter “a” = _____ mm = _____ μm

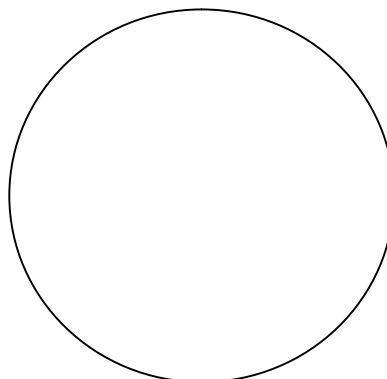
Drawings Cells for Part D

See [pages 9 – 11 of the procedure](#) for what is required in the drawings below!



Cheek Cell as viewed at _____x

Approximate Cell Diameter in μm :

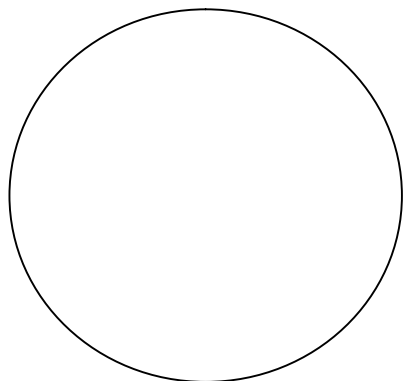


Spirogyra viewed at _____ x

Approximate Cell Dimensions:

Length: _____ μm Width: _____

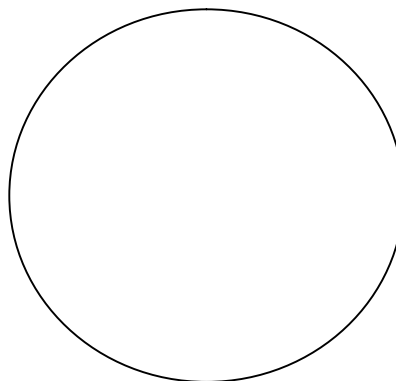
Microscopic Organisms of your Choice:



Viewed at _____x

Approximate Cell Size in μm :

Identity of Organism:



Viewed at _____ x

Approximate Cell Size in μm :

Identity of Organism:

Application Questions

Use the following hypothetical data for the following four microscopes to answer questions 1-2, below

Microscope Number	Objective Lens	Ocular Lens
1	25X	5X
2	15X	10X
3	20X	10X
4	40X	5X

- 1 . If a slide showing the same types of living organisms is examined with each of the microscopes, in which two microscopes will the microbes appear to move with the same degree of rapidity? _____
(write answer here)
2. Given that each slide had the same density of microbes, with which microscope would you expect to observe the greatest number of microbes at any given instant? _____
(write answer here)
3. What is meant by resolution (resolving power) of a microscope? Magnification?
4. A hypothetical microscope you are using has the following objective magnifications: low power objective 3x, medium power objective 12x and high power objective 30x. If the diameter of the low power objective field is 6000 μm (micrometers), what is the diameter of the field of view at medium power in micrometers? Show your work below.
Work: _____ **Answer:** _____
5. You observe an object whose length is 1/4 the diameter of the high power field of view of the hypothetical microscope in #4, above. What is its length in micrometers? Show your work.
Work: _____ **Answer:** _____

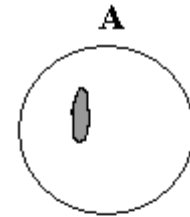
6. Estimate the length of the following microscopic objects, A-C, below. Show how you arrived at your answers in the spaces provided. No work, no credit.

Base your calculations on the following field diameters:

Low power (40x): 4.5 mm Medium power (100x): 1.8 mm High power (400x): 0.45 mm

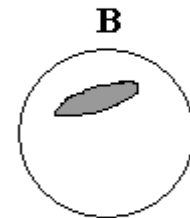
- a.) Estimated length of object "A" viewed at **low power**: _____ μm

Work:



- b.) Estimated length of object "B" viewed at **medium power**: _____ μm

Work:



- c.) Estimated length of object "C" viewed at **high power**: _____ μm

Work:

