

Tools of the Biologist

Objective: To become familiar with the tools the biologist uses in the laboratory

In today's lab, you will move through several stations using various tools to measure a variety of objects. When you are finished with the activities at your station, work on your **Tools of the Biologist Worksheet** until the next station becomes available.



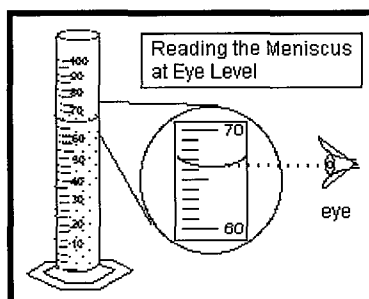
Title your lab paper properly and record all your answers for each station using full sentences!

Station I: *Calculating Mass*

1. Using the **triple beam balance**, calculate the mass of the block in grams.
2. Convert this measure to kilograms.
3. Reweigh the same block on the **electronic balance**.
4. Convert this measure to milligrams.

Station II: *Calculating Volume*

1. Calculate the volume of water in the graduated cylinder in milliliters (Hint! Read the bottom of the meniscus at eye level at pictured below)



2. Describe the procedure you can use to calculate the volume of the block provided for you at your station.
3. Determine and record the volume of your block in millimeters (mm^3).

Station III: *Calculating Length*

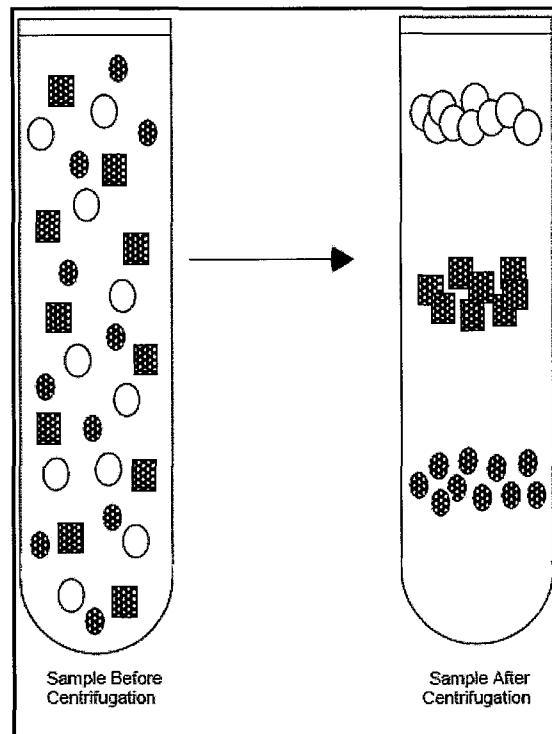
1. Measure the **length** of your lab table in centimeters.
2. Convert this measurement to meters.
3. Measure the diameter of the hockey puck in centimeters.
4. Convert this measurement to millimeters.
5. Do you think millimeters are an accurate measure to use when determining the length of objects viewed in a compound microscope? Explain your answer.
6. Using the text at your station, what SI measurement does a scientist typically use when determining the size of images viewed in a microscope?
7. How does this measure compare to the millimeter measure you use on your centimeter ruler?

Station IV: Comparing Compound and Dissecting Microscopes

1. Look carefully at both microscopes. Describe at least **three** differences you observe between these two microscopes.
2. View the specimen slide set up for you under the compound light microscope. Describe the image you see (include details)
3. Now view the specimen placed under the dissecting microscope. Describe what you see (include details)
4. Although the two specimens viewed under these two microscopes are very different, you can ascertain some very important differences from viewing these objects.
 - a. How did the image differ from the image in the compound light microscope?
 - b. Did the image differ from the object in the dissecting microscope?
 - c. Compare the magnifications of both microscopes.
 - d. How did the type of view differ between the two microscopes?

Station V: Separating particles by using a Ultracentrifuge

1. When your doctor draws your blood for analysis, the blood is placed in a closed tube and spun in an ultracentrifuge to separate the blood cells and other parts of the blood from one another by their densities.
2. Examine the diagram below and determine which shapes are the least dense and which are the densest. Explain your answer.

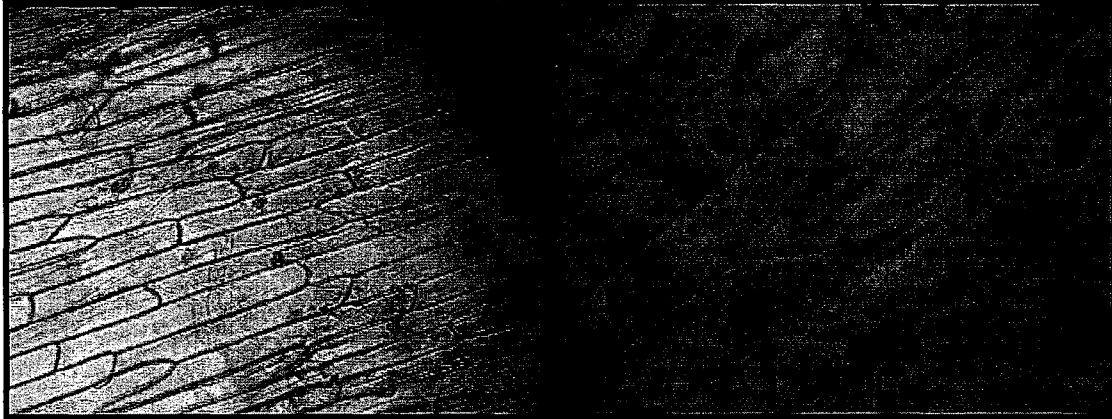


Station VI: Staining Microscopic Specimens

1. Examine the two images of onion cells as viewed through a compound light microscope below. Describe how Image 1 differs from Image 2.

Image 1

Image 2



2. In which picture are the cells stained? Explain your answer.

Analysis and Conclusions:

1. Which scale (triple beam balance or electronic balance) provides a more accurate measure of the mass of the block? **Explain your answer.**
2. When measuring with a graduated cylinder, why do you always read the bottom of the meniscus at eye level?
3. Discuss the similarities and differences between the compound light and dissecting microscopes. Your answer can be in the form of a chart if this is help in organizing your answer.
4. Describe the possible advantage of separating blood cells and other particles by centrifugation when analyzing someone's blood.
5. Why do you think stains are advantageous when viewing certain specimens in a compound light microscope? (Use the pictures from Station VI to help with your answer).



When handing in your lab, remember to **STAPLE** this sheet **UNDER** you lab answers.