

Measuring in the Science Laboratory

Improper measurements are of no value. Before making any measurements, be sure you know how to use and read the measuring instrument. This exercise will help you learn some measuring techniques.

Temperature

Temperature is measured with a thermometer. Do not try to shake the thermometer down before using it. When you measure the temperature of a liquid, leave the bulb of the thermometer completely below the surface of the liquid. Read the thermometer at eye level. Avoid letting the thermometer touch the bottom or sides of the container. Always support the thermometer carefully; do not allow it to fall over. CAUTION: If the thermometer should break, notify your teacher.

Length

Length is measured with a meterstick or a ruler. The meterstick is divided into 100 cm. Each centimeter is divided into 10 mm. In Figure 1 below, the distance shown by line *AB* is 11 mm, or 1.1 cm. If the end of the ruler is damaged, it may be better to measure between two inside marks on the ruler rather than starting at the zero mark.

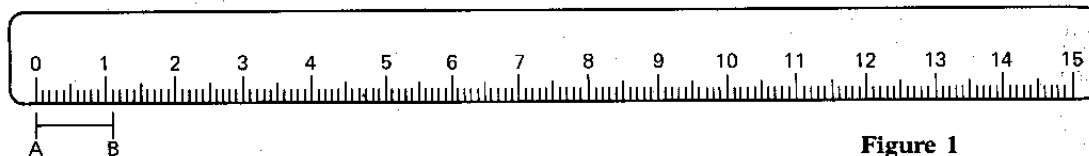


Figure 1

Measure each of the answer blanks below. Write its length in centimeters and millimeters.

A. _____

B. _____

C. _____

Volume

The volume of a liquid is measured with a graduate. Place the graduate on a level surface. The surface of the liquid should be at eye level. If the graduate is made of glass, the surface of the liquid will form a curve, or *meniscus*. The volume of the liquid is read from the bottom of the meniscus. Look at the graduate in Figure 2. What is the volume of liquid in the graduate? _____

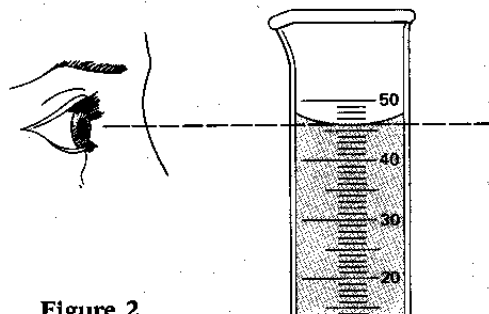


Figure 2

Lighting a Bunsen Burner

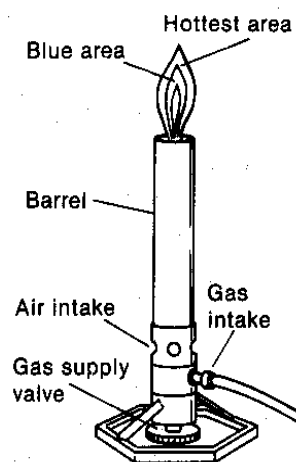
As part of laboratory activities, you will often be asked to light a Bunsen burner. The instructions in this activity will help you acquire this useful technique.

Materials

Bunsen burner; matches; apron; safety goggles

Procedure

1. Put on your apron and safety goggles. Tie back loose hair and roll up your sleeves.
2. Study the illustration of the Bunsen burner to become familiar with the parts of the burner. On the Bunsen burner you are working with, locate the gas-supply valve, gas intake, air intake, and barrel.
3. Check to make sure the hose of the Bunsen burner is in good condition. Connect the hose to the gas outlet on the lab table. Do not turn on the gas yet.
4. Light a match. Then *slowly* open the gas outlet partway. Hold the lighted match near the top edge of the burner until the gas ignites; do not hold the match directly over the burner. **CAUTION:** If you cannot light the burner or if the flame goes out, immediately turn off the gas outlet on the lab table. Then ask your teacher for assistance. Never leave the gas outlet on when there is no flame.
5. If the flame roars or blows itself out, there is too much air. To decrease the air supply, turn the barrel of the burner clockwise.
6. If the flame is yellow, there is not enough air. To increase the air supply, turn the barrel of the Bunsen burner counterclockwise.
7. The size of the flame can be adjusted with the gas-supply valve. Adjust the size and color of the flame until it is pale blue and burns quietly.



Conclusion

1. What do you do if, after turning on the gas supply, the burner will not light or the flame goes out? _____
2. What should you do if the flame is yellow? _____

Mass

Mass is measured with a balance. One common type of balance has a pan at one end and two or more beams extending away from the pan, ending in a pointer. The object is placed on the pan. The riders are then slid away from the pan along the beams until the pan is balanced and the pointer is at zero. Follow the procedures outlined below for using the balance.

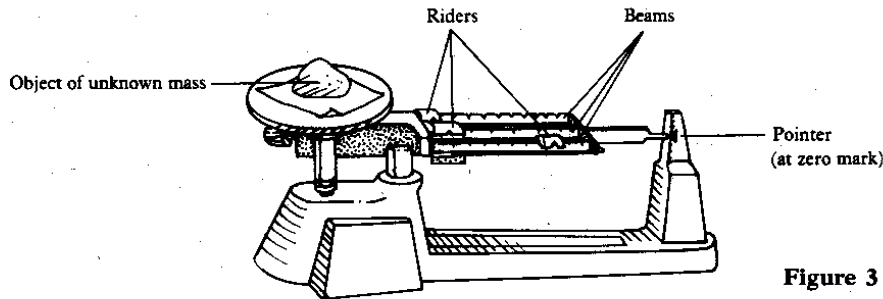


Figure 3

1. Slide all the riders to the zero point. Make sure the pointer swings freely and points to zero.
2. Never place hot objects on the pan. Chemicals should be weighed on paper or in a container. In that case, the mass of the empty paper or container must be measured first.
3. Determine the mass of a stone or other small object. First place the object on the pan. Slide the riders, one at a time, along the beams until the pointer moves from zero. Begin with the rider for the largest unit. If the beam is notched, make sure the rider slips into the notch. When the pointer moves below the zero mark, move the rider back one notch. Repeat this procedure with the smaller riders. When you get to the smallest rider, slide it until the pointer points to zero.
4. The mass of the object is the sum of the masses shown by all of the riders. The mass shown in Figure 4 below is 123.45 g. The hundredths are estimated values.

What is the mass of the object you measured? _____

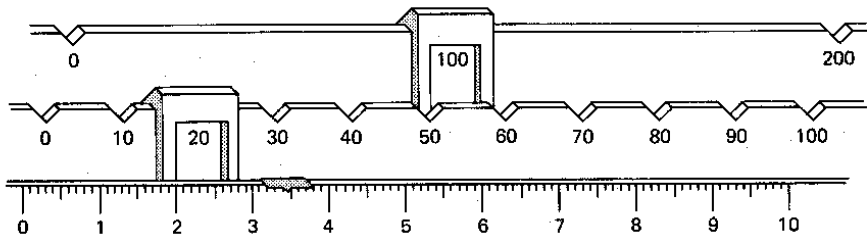


Figure 4