g. **NEVER transfer liquids and solids directly on the pan**. Remove the weighing container from the balance, transfer the substance to the container, and make the measurement.
h. **NEVER weigh hot objects** – allow them to cool to room temperature before weighing to prevent error.
i. **Regardless of the temperature of the object to be massed, it is a good idea to place the object into the balance compartment, but not on the pan, and to wait a minute or two for the object to reach thermal equilibrium with the balance before making your measurement**.
j. **ALWAYS record masses directly in to your lab notebook**, and not on a piece of scratch paper. Use your lab notebook as a tray to carry objects to and from the balance room.
k. **Once the mass of a container or object has been recorded from the balance, do not touch the container or object with your fingers.** Fingerprints will change the mass and make your result inaccurate. Rather, once an object or container has been massed on the balance, handle it with forceps, crucible tongs, or a paper towel.

2. Operation of the Balance

a. First check that the balance reads 0.0000 g. If it does not, press the "tare" bar/button on the front of the balance and wait until the display is zeroed.
b. Once the balance is zeroed, place the object of interest on the pan, close the sliding doors, wait a moment, and read the mass.
c. Record the mass directly into your lab notebook.
d. Do not press anyother buttons on the balance unless instructed to do so.

3. Comparison Between Graduated Cylinder and Graduated and Volumetric Pipets

First, you will use a 100 mL graduated cylinder to measure 5 mL of water; then you will weigh and record the mass of the sample.

Mark three capped weighing vials as 1, 2, and 3 using a grease pencil.

Zero the balance, place a capped weighing vial on the balance, and record the mass. Remove your vial from the balance and pour in your water sample from your 100 mL graduated cylinder. **Don't ever transfer liquids to containers while they are on the balance!** Place the vial back in the balance, and record the mass of the water and vial. **This technique is known as *weighing by difference.*** Dump the water down the sink and repeat the steps in this paragraph two more times so you have three masses. The 100 mL graduated cylinder has a ***precision*** of 0.5 mL, and is read to the nearest 0.1 mL. This means that even though you were careful to place the bottom of the meniscus at 5.0 mL, the **true** volume is between 4.5 and 5.5 mL. How will this affect the mass of the water sample?

Calculate the density of the water for each trial. The volume in your calculation will be 5.0 mL but the masses will differ from trial to trial.

Repeat the experiment above, but use the 10 mL graduated pipet in place of the 100 mL graduated cylinder. Note that one does NOT let all of the liquid run out the tip of the graduated pipet – your instructor will show you how to use this device, and you should practice pipetting prior to making your measurements. You should once again perform three trials. Record the masses in your lab notebook. Note that the 10 mL graduated pipet has a ***precision*** of 0.1 mL. Again, the graduated pipet is read to the nearest 0.01 mL, and here, the volumes will be in the range 4.90 – 5.10 mL.

Again, calculate the density of the water for each trial. The volume will be 5.00 mL in your calculations. Do the masses have as large a 'spread' as with the 100 mL graduated cylinder?