Laboratory Investigation Name _____

Chemistry: Form L1.1A Date _____ Period _____

Using a Balance

PROBLEM

Are measurements made on a balance free of error?

INTRODUCTION

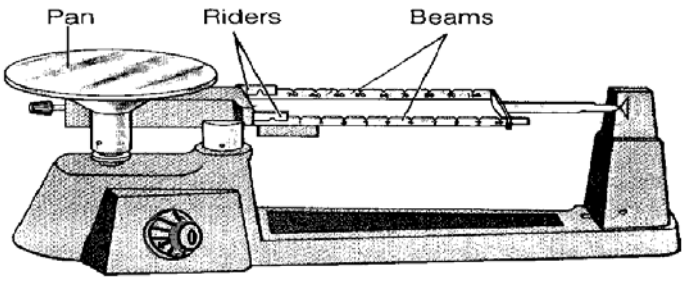
A balance is used to measure mass. Mass is measured in metric or S.I. units called ***grams***. Like other measurement instruments, the balance does a better job helping us to describe the properties of an object than the senses alone. But the balance is not perfect. In this laboratory investigation, you will learn how to use a balance to measure mass. You will measure the average mass of a penny in a sample of ten pennies by two different methods. Then you will compare the results to see if they are the same. In this way, you will check the accuracy of your measurements.

MATERIALS (*per group*)

Balance; 10 pennies

PROCEDURE

1. Zero your balance by sliding all the riders (the weights on the beams) to their zero points and turning the dial to zero. The pointer should swing freely and point to zero. If it does not, the zero can be adjusted by turning the adjustment knob near the pan until the pointer points to zero.



2. Measure the mass of a penny by placing it on the pan of the balance so that the pointer swings away from its zero point. Slide the riders along the beam one at a time and turn the dial until the pointer swings back to zero. Begin with the largest rider first. Move the rider one notch at a time until the pointer swings below zero. Then move the rider back one notch. Repeat the procedure with the smaller riders until the smallest rider is in place. Then turn the dial until the pointer swings to zero. Record the result in the data table for *Method 1* on the next page.

3. Measure and record the masses of each of the remaining nine pennies one penny at a time following the procedure in step 2 until the masses of all ten pennies have been measured and recorded.

4. Calculate the average mass of a penny by adding up the individual masses and dividing by ten. This is the average mass by *Method 1*.

5. Measure the mass of all ten pennies together. Use the same ten pennies you used earlier. Record the total mass of the ten pennies in the data table for *Method 2* on the next page.

6. Calculate the average mass of a penny by dividing the total mass of the ten pennies measured together by ten. This is *Method 2*.

OBSERVATIONS

Method 1

Penny	Mass
1st	
2nd	
3rd	
4th	
5th	
6th	
7th	
8th	
9th	
10th	
TOTAL	
AVERAGE	

Method 2

Mass of ten pennies measured together . . . . . _____

Average mass of a penny . . . . . _____

CONCLUSIONS

1. Would you expect the average mass of a penny to be the same whether it is calculated by *Method 1* or *Method 2*? Explain. _____

2. Were the average masses of a penny as determined by *Method 1* and by *Method 2* the same? If not, was the difference large or small? _____

3. Why might the average mass of penny as determined by *Method 1* differ from the average mass of penny as determined by *Method 2*? _____

4. An object has a mass of 3.14159 g. If it were placed on the pan of your balance, what would you measure the mass to be? Which part of your measurement would be estimated?

5. What are some possible causes of error of measurement using the balance? _____