M-6: Uniform Circular Motion   Name_____
Lab Worksheet   **Group member names**_____

This sheet is the lab document your TA will use to score your lab. It is to be turned in at the end of lab. To receive full credit you must use complete sentences and explain your reasoning clearly.

Follow all the instructions as given in the lab manual and the extra instructions given here. Mostly these extra instructions are about error analysis so read pages 10-13 in your lab manual. The numbered items do correspond to the same numbered items in your lab manual. Only do the experiment for one bob, either brass or aluminum.

1) Have each member of your group measure **only one mass** several times. Do you get the same exact value each time? Yes____No____   Write down the value and its uncertainty in the box below. If your measurements differ then find the average and standard deviation. If they do not differ assume an uncertainty at next decimal place.

object	mass	δ
Brass Bob		
Al. Bob		

2) **Dynamic measurement of the force:** Record the rotation frequencies from the in the table below. Slowly increase the speed to the correct value, record the frequency, increase the speed further, slowly decrease the speed to the correct value, repeat till the table is filled. Try to take readings when the reflected light is half covered.
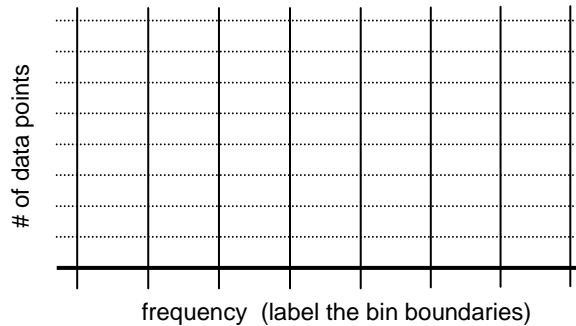
trial	f (Hz) Slowly increasing	f (Hz) Slowly decreasing	Average f (Hz) each pair	Average f (Hz) (calculate)	Std. Dev. (calculate)	Std. Dev of the Mean
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Fill in the histogram below using the data in the middle column above. You will need to select (and label) an appropriate bin width so that the data is spread out across the histogram.


frequency (label the bin boundaries)

Sketch a curve through the data and estimate the half-width at half the maximum value. Is this a normal distribution?

3) **Static measurement of the force:** Follow the instructions in the lab manual and fill in the table on the next page. The manual says to record r but also record the mass.

4) We are after two things, the force supplied by the spring and the radius of the uniform circular motion. Make 10 **independent** measurements of the mass, finding the average and standard deviation. Each group member should make one measurement of the radius them agree on its uncertainty. Enter your data in the table below and fill in the histogram at right. Sketch a curve through the data and estimate the half-width at half the maximum value. Is this a normal distribution?

trial	Force (mg)	Average Force	Std. Dev.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

force (label the bin boundaries)
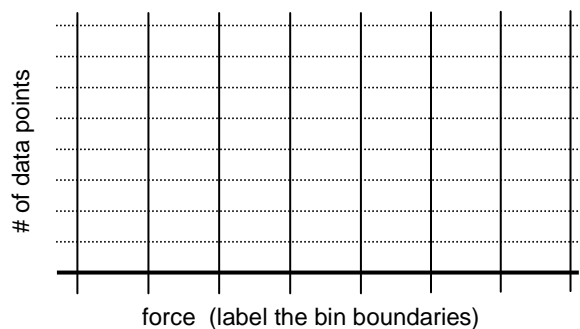
5) Compute the centripetal force and its error using the error propagation technique on page 13 of your lab manual. Make a sketch like that on the histograms that shows the distribution with the standard deviation marking the points (left and right) of the half-width at half maximum. Label the graph and show your calculations below and on the next page.

6) Does the data support the theory? Answer by comparing the distribution in the calculated force to that of the measured force.