

Uniform Circular Motion

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Part 1: Experimental Determination of Mass – Data

NOTE: Please *ignore* any mass values written on the rubber stopper. Part of the purpose of this lab is to determine that value. You will not need to enter the value written on the stopper for any reason. (And there's no guarantee it's correct.)

Complete the table below.

Table 1

Trial	T (s)	L (m)	m_h (kg)
1			
2			
3			
4			
5			

Part 1: Experimental Determination of Mass – Calculations

Complete the table below using values from Table 1 for your calculations.

Table 2

Trial	a_c (m/s^2)	$m_h g$ (N)
1		
2		
3		
4		
5		

Note that $m_h g$ provides the tension in the cord (because the hanging mass is approximately motionless and thus in equilibrium), so if the stopper is swinging in an approximately horizontal circle, the tension value, $m_h g$, will be the centripetal force, F_c . You can use the values of F_c and a_c to determine the mass of the stopper.

What is the experimental value of M_s , the mass of the stopper, from the slope of the graph of $m_h g$ versus a_c ? See *Linear Regression* if you need help with this calculation and the lab manual if you're unsure of which equation is relevant.

Part 2: An Alternate Method – Data and Calculations

Perform one more trial, making sure that you have a way of determining the angle, θ . (See the lab manual for details.)

What is the magnitude of the angle formed by the string relative to the horizontal during this trial?

Based on this angle, what is the mass of the stopper? Details about this calculation are in the lab manual.

Analysis

What is the percent difference between the two values of M_s ?

What factors may contribute to the difference in these two values?

Based on the assumptions made and possible sources of error, as well as the accuracy of the data collection methods, which value do you feel is likely to be more accurate? Why?