# Pendulum Lab

Purpose:
The purpose of this lab is to investigate the periodic motion of an object suspended from a string, forming a simple pendulum. Do the amplitude of the motion, the mass of the object, and/or the length of the string affect the period of the motion? Unlike the other labs, this one has deliberately been left free-form to allow you to decide on experimental matters yourself, and think critically about the physical situation.

Experimental Set-up:
Use a long string hung from a rod as shown in the illustration below. Use a long rod clamped to the table to allow a long string length. Since the object of this exercise is to find what variables have an effect on the period of the pendulum, you will use a stopwatch and measure twenty swings of the pendulum for each variation that you choose. Remember whenever you perform one variation, all of the others must be held constant.

Clearly the variations you have to choose from are the mass of the pendulum bob, the amplitude (the distance you pull the bob back to start the pendulum swinging), and the length of the string. As with other experiments you have conducted, plotting the period as a function of these quantities will give you information about the relationship between the period and whatever variations you choose (plot the period on the Y-axis). Construct tables to organize your data using Excel, as you have with previous experiments. Determine how the amplitude of the motion (θ, the angle you pull back the bob to, to begin the motion), the mass of the bob (M), and the length of the string (L) affect the period of the motion. Make sure to use a wide range of values.
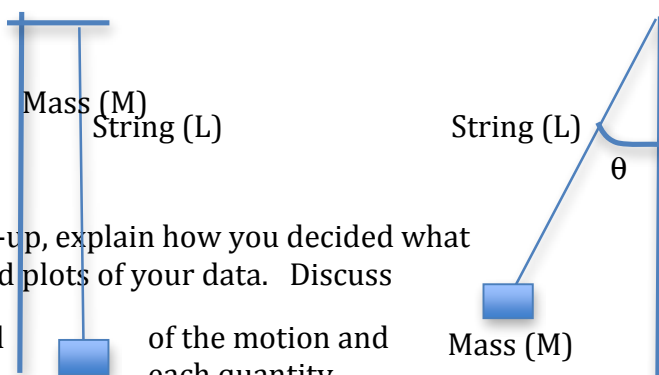
In your lab write-up, explain how you decided what data to collect and include tables and plots of your data. Discuss how each quantity affects the period of the motion and describe how you determined how each quantity affects the period of the motion. What are the limitations of your measurements (e.g. how could your experiment be improved)? How do your results compare with the commonly accepted relationships?

Pendulum Lab Grading Rubric:

Item	Criterion	Points Possible	Points Earned

Amplitude	Data - table	1	
	Data - plot	1	
	Discussion – determination of effect on period	3	
Mass	Data - table	1	
	Data - plot	1	
	Discussion – determination of effect on period	3	
String length	Data - table	1	
	Data - plot	1	
	Discussion – determination of effect on period	3	
Overall	Discussion – limitations of measurement	3	
	Discussion – comparison with commonly accepted relationships	2	
Total		20	