name_____

ID# _____

Experiment 7

The Pendulum

L	Mass	T(20 cycles)	T (one cycle)

L	θ_0	T(20 cycles)	T (one cycle)

L	T_{20}	T	T^2

slope = _____ **% error =** _____

g = _____ **show equations and calculations:**

(8 points)

The total energy in a swinging pendulum is constant if you neglect the small amount lost to air resistance and friction. The sum of its kinetic and potential energies must then be constant, even though kinetic and potential energies change. At the height of its swing the pendulum has zero kinetic energy and maximun potential energy. The opposite is true at the bottom of the swing.

If you increase the pendulum's amplitude the period will not change very much. What will have to change? Can the pendulum ever have a larger amplitude on one side of its swing? Can a pendulum move so that the bob does not hang straight down at the bottom of its swing? Why or why not?

Questions

1. Did changing the mass seem to have any effect on the period of the pendulum?
   (2 points)

2. Did changing θ_o, the maximum angle, have any effect on the period?
   (2 points)

3. If all your measurements for L were a little to long, how would you value for g be affected? What type of error would that be?
   (3 points)

4. A grandfather clock uses a pendulum made of a rod with a weight that can be moved up or down to control how fast the hands move. What should you do if the clock is running too slowly?
   (2 points)

5. If you took a pendulum away from the earth's surface to a place where the acceleration of gravity is only a quarter of what it is in the lab ($g' = g/4$), what should the period be for $L = 1$ m?
(3 points)