

Lab #5: Conservation of Energy

Lab due Thursday, October 12, 2006!

Lab due to Dr. Weaver

Theory:

1. If a various weights are hung from a spring (as discussed in class). Show that the amount the string is stretched is

$$L_o = \frac{Mg}{k}$$

1. A weight of mass M is now *dropped* from an unstretched spring with spring constant k . Show that maximum amount the spring is stretched is

$$L = 2\frac{Mg}{k} = 2L_o$$

Experiment: The goal of this is to verify these relations.

1. First hang the 50g, 100g, 150g, 200g, 250g weights and measure how much the spring stretches. Use the graphical program to plot stretch length versus mass. It should look like a line. Argue that the slope of this line is $\frac{g}{k}$. Use this to determine k by fitting the line. Using this k , the amount that you expect the string to stretch when dropped with a 150g weight is

$$L_{\text{theory}} =$$

2. Now drop a 150g mass from the spring as demonstrated in class. Adjust the rod height until the weight just barely reaches the floor. Then you can measure L_{exp} , i.e. how much the spring is stretched by the process of dropping the mass.
3. Find is the percent difference between the measured value of and your theoretical expectation of

$$\% \text{Error} = \frac{|L_{\text{exp}} - L_{\text{theory}}|}{L_{\text{theory}}}.$$