07-02 Simple Harmonic Motion Lab ***Name:*** _____

Objective:

- Find the spring constant
- Measure and calculate the period of oscillation

Materials:

- Spring
- Mass set (enough to stretch the spring)
- Stand to hang spring on
- Stopwatch
- Ruler
- Meterstick

Procedure:

1. Recall that in lab 02-04 you learned that springs have a linear relationship between force and distance stretched.
   a. Complete the table by hanging the masses from the spring and measuring the length of the spring.

Mass	50 g	70 g	90 g	110 g	130 g
Weight (N)					
Length (m)					

   b. Graph the points and find the best fitting line. (Use a calculator or Vernier Graphical Analysis app)
   c. The equation is $F = k\Delta x$, so the slope is the spring constant, k. k = _____
2. Amplitude and the period of oscillation for the spring.
   a. Reattach the 70-g weight to the spring. Gently pull the weight down and release letting it bounce up and down. Measure the time it takes for 10 complete bounces. Repeat 3 times each with a different amplitude.
      i. T_1 = _____
      ii. T_2 = _____
      iii. T_3 = _____
   b. Does it appear the amplitude has a large effect on the period of oscillation? Explain. _____
3. Find the period of oscillation for the spring.
   a. Gently pull the 70-g weight down and release letting it bounce up and down. Measure the time it takes for 10 complete bounces. Repeat 3 times and take the average.
      i. T_1 = _____
      ii. T_2 = _____
      iii. T_3 = _____
      iv. T_{Ave} = _____
   b. Divide by 10 to find the time for one complete bounce. This is the experimental period. T = _____
   c. The book suggests that $T = 2\pi\sqrt{\frac{m}{k}}$. Calculate this period. This is the theoretical period. T = _____
   d. Find the percent error with your experiment (an error of less than 5% is desirable).
   %error = _____

$$\%\ error = \frac{|experimental - theoretical|}{theoretical} \times 100\%$$

   e. What are some sources of error for your experiment?