

Monday, February 10, 2014

Lab #1: Stretching of a Coil Spring

Problem: what is the relationship between the stretch of a coil spring and the mass suspended from it?

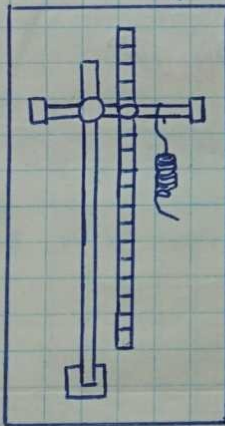
Hypothesis: It is predicted that as more mass is suspended from the coil spring, the coil spring will stretch more. It is predicted that this relationship will be linear.

Materials: a coil spring, a metre stick, various hook masses, support stand and clamps

Method:

1. Set up materials as shown.
2. Measure the length of the coil spring and record it in the chart below as the initial length.
3. Add one 100 g mass to the spring and read the length of the stretched spring.
4. Calculate the difference in length and record this value in the chart below as the length of the stretch of the spring.
5. Continue adding masses up to a total of 800 g, recording the length of the stretch after each addition.
6. Plot the data on a graph (Stretch - Mass Relationship) and calculate the slope.

Diagram:



Safety:

- Be careful not to cut yourself on the coil spring.
- Wear closed-toed shoes.
- Make sure the apparatus is securely set up.

Observation Chart:

Mass (g)	0	100	200	300	400	500	600	700	800
Stretch (cm)	0	13.4	19.8	25.2	31.1	36.7	42.6	N/A	N/A
Length (cm)	30.5	43.9	50.3	55.7	61.6	67.2	73.1	N/A	N/A

Sample calculation: stretch = Final length - Initial length

Conclusion (s):

The hypothesis was correct and as more mass was suspended from the coil spring, the coil spring stretched more and became longer. The relationship between the mass and stretch was also linear.

Concluding Questions:

1. Write the variation statement and derive the equation on the graph. (on graph)
2. Name two methods that would enable you to predict the stretch of the spring for any mass. Two methods that would enable you to predict the stretch of the spring for any mass by using graphical ^{interpolation} extrapolation and by using an analytical equation.
3. Using these two methods, extrapolate the stretch of the spring when the mass is 1050 g. (on graph)

Discussion:

One source of error from this lab was that it was difficult to accurately measure the length of the coil spring, since the metre stick was not completely straight and ^{was} not placed right next to the coil spring. Another source of error was that the retort stand was not tall enough, which disabled the experiment from going up to 800 g.

The first source of error could have been ^{improved} ~~improved~~ by having a retort stand with a metre stick clamped to it that ^{was} able to move closer or farther from an object being suspended. The second source of error could have been improved by choosing a retort stand that taller and not as short.