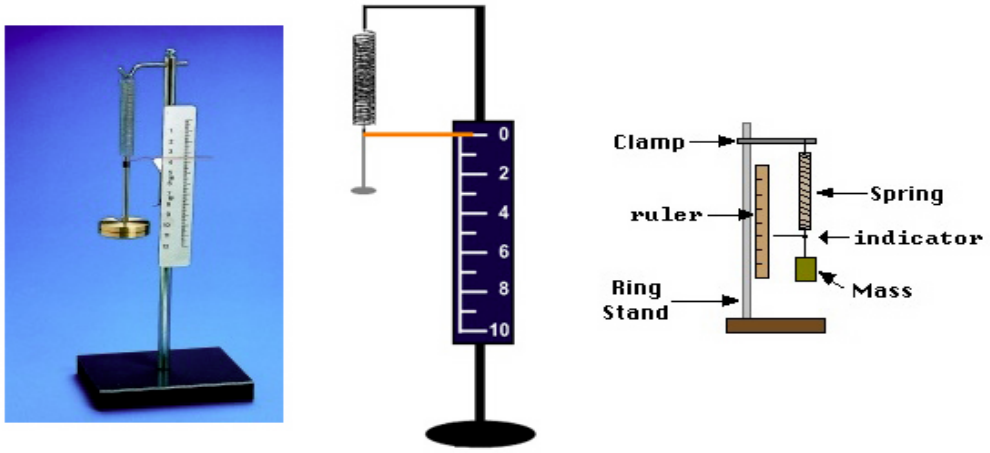
LAB 13: HOOKE'S LAW

Name _____ Period_____

We can quantify what a spring can do with the spring constant. The spring constant is a measure of how stiff the spring is. The larger the spring constant is, the more force that is necessary to stretch or compress it. If you force a spring to compress, it will resist that compression and try to restore itself to its equilibrium position. We can measure this by the simple equation known as Hooke's Law:

$$F = kx$$

F is the force applied to the spring in newtons (N)
k is the spring constant measured in newtons per meter (N/m)
x is the distance the spring is stretched from its equilibrium position in meters (m)



The Hooke's Law Apparatus

PROCEDURE:

Setup the Hooke's Law apparatus as shown in the picture. Set the attached ruler so that when no mass is on the spring, the indicator reads 0. During this lab, the spring should not be stretched beyond its limit. Always carefully add mass, and **do not stretch the spring beyond its elastic limit!** Mass is measured in grams (g).

1. Be sure the pointer is on 0.

2. Place a small mass on the pan so that the pointer moves down *approximately* 1 cm.

3. Record the mass in grams and the scale reading to the nearest 0.1 cm in the table below for **Trial 1.**

4. For the next four trials, increase the masses until the last mass deflects the pointer to about its fullest reading. **DO NOT exceed the limit of the scale!!** Record the masses in grams and the scale readings to the nearest 0.1 cm in the table below.

Trial	Mass (g)	Scale (cm)	Force (N)	Scale (m)	Spring Constant (N/m)	Deviation (N/m)	Percent Error
1							
2							
3							
4							
5							

5. Convert the masses from grams to forces in newtons using the formula: **N = (g)(0.01N/g),** Hup, Two, Three, Four! Enter in the table.

6. Convert the centimeters into meters using the formula: **m = cm/100cm/m.** Hup, Two, Three, Four! Enter in the table.

7. Calculate the ***Spring Constant*** for each trial using the formula: **SC = N/m.** Hup, Two, Three, Four! Enter in the table.

8. Calculate the ***Average Spring Constant*** by adding up all five and dividing by 5. Enter here: _____ N/m.

9. Calculate the ***Deviation from the Average*** by taking the difference between the Spring Constants for each trial and and the Average Spring Constant and enter in the table.

10. Calculate the ***Percentage Error*** for each trial by assuming that the ***Average Spring Constant*** is the ***Accepted Value***. Use the formula:

Percentage Error = Deviation/Accepted Value X 100%

QUESTIONS:

1. What may cause error in your results?

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2. How can more precision be added to this apparatus?

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3. What happens if you overstretch a spring? Will that affect your results? Explain.

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4. On the back, **graph *force versus the scale (stretched length).*** What does the slope represent?

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5. This experiment is an application of Hooke's Law. Give examples of other types of elasticity to which this law applies.

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6. Write a **Critique** for this lab.