FLINN SCIENTIFIC

Name_____

Hooke's Law Worksheet

Observations

Hooke's law:

Harmonic motion:

Force Data Table

Elastic Material	Hanging Mass	Material Length		Stretch Distance	Spring Constant
		Initial	Final		
Rubber band					
Rubber band					
Rubber band					
Spring					
Spring					
Spring					

Oscillation Data Table

Material	Hanging Mass	Oscillations in 10 Seconds
Rubber band	300 g	
Rubber band	300 g	
Rubber band	300 g	
Spring	50 g	
Spring	50 g	
Spring	50 g	

Calculations and Post-Lab Questions *(Use a separate sheet of paper to answer the following questions.)*

1. Calculate the stretch distance for each trial by subtracting the final length by the initial length. Record the results in the Force Data Table.
2. Graph the stretch distance versus the hanging mass (force) for both the rubber band and the spring. Which stretchable material appears to follow the linear, straight-line relationship expressed by Hooke's law? Support your answer.
3. Calculate the magnitude of the spring constant for both the rubber band and spring for each hanging mass. Note: Convert grams to kilograms, centimeters to meters, and use 9.8 m/s^2 for the acceleration due to gravity constant, g. How "constant" are the spring constants for each material?
4. How did the oscillations of the rubber band compare to the oscillations of the spring?
5. Calculate the average number of oscillations in 10 seconds for both the rubber band and the spring, and then calculate the average frequency of the oscillations by dividing the average number of oscillations by the time.
6. Use the average frequencies calculated in Question 5, and Equation 5 to calculate the spring constant for both the rubber band and the spring. Note: Convert grams to kilograms.
7. How do "spring constants" of the rubber band and spring compare for both experiments? Explain any discrepancies.
8. True or False
   a. The force exerted by any stretchable material remains constant as the material is stretched.
   b. The spring constant unit, N/m, can also be represented as kg/s^2.
9. Use Equation 4 from the *Background* section to predict how increasing the hanging mass would effect the frequency of an oscillating spring. Write your prediction as an "If/then" statement.

Advanced Post-Lab Question

10. Explain why one stretchable material would show linear stretching properties, following Hooke's law, better than another.