

Name_____ Date_____ Period_____

Spring Lab

The purpose of this lab is to determine the relationship between the force and the amount of stretch of a spring.

Procedure:

1. Place force measurement device on its side and press the "tare" button.
2. Attach the spring to sensor and gently pull the spring horizontally using the tip of a pencil. Make sure you are drawing a straight line with the pencil.
3. Measure the length of the line drawn and record the amount of force required to stretch the spring.
4. Repeat steps 1-3 for 5 differing lengths. Be careful to not overstretch the spring.
5. Repeat steps 1-3 for 2 additional springs.

Data:

Color of Spring	Force (N)	Δx (cm)	Δx (m)
Red			
Black			
Green			

Evaluation of Data:

Graph your data using Graphical Analysis. Put Δx (m) on the x-axis and Force (N) on the y-axis. Record the slope and y-intercept for each spring below (be sure to include units):

Red: Slope _____ y-intercept _____

Black: Slope _____ y-intercept _____

Green: Slope _____ y-intercept _____

1. Develop a mathematical model for each spring. Start with $y=mx+b$ and be sure to label which model goes with which spring.
 2. Use the 5% Rule to determine if the y-intercept is significant to this relationship? Show your work below.
 3. Describe how each spring feels:
 - a. When you first start pulling it. Rank each spring from easiest to hardest to pull. What evidence do you have that would support these rankings?

- b. As you continue to stretch it. Rank each spring from easiest to hardest to continue. What evidence do you have that would support these rankings?
4. If you exerted 2.5 N on the red spring, how far would it stretch? Show your work.
5. How much force is required to stretch your spring .25 m? Show your work.
6. Why was it important to pull the spring horizontally on the force sensor?

Conclusion

Use complete sentences to answer the following questions.

7. What does the slope of the F vs. Δx graph represent?
8. What does the y-intercept the F vs. Δx graph represent?
9. What is the general model that describes the relationship between force and stretch length? What does each variable represent?
10. What does the area underneath the F vs. Δx graph represent?
11. On the graph below, sketch the F vs. Δx relationships for 2 different springs. Spring 1 is easy to begin pulling, but gets harder as you continue stretching it. Spring 2 is hard to begin pulling, but is relatively easy as you continue stretching. Label each spring and explain your answer in the space to the right of the graph.

