PHYSICS IN MOTION
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Unit 4G
Spring Potential Energy
Energy in a Spring Lab

Name:

Date:

The force applied by a spring differs from other forces in that it is not constant. Hooke's law states that the greater the distance over which a spring is stretched or compressed, the greater the force that spring applies. This lab will explore Hooke's law and how a spring stores energy.

Materials:

- spring
- spring scale
- ruler

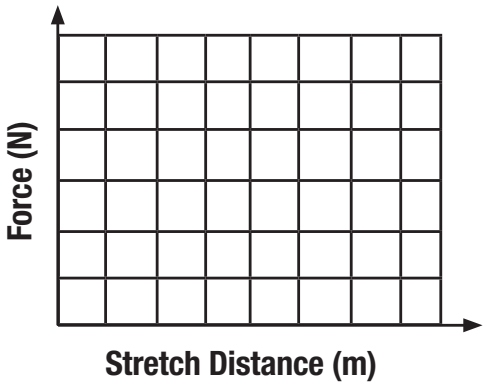
Procedure:

- Lay the spring horizontally on a table, next to the ruler.
- Stretch the spring by various distances, measuring the amount of force required for each distance.

Stretch Distance (m)	Force (N)
0.01	
0.02	
0.03	
0.04	
0.05	
0.06	
0.07	
0.08	
0.09	
0.10	

Analysis:

Graph force versus stretch distance on the axes below:



questions continued on next page

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Questions to consider:

1. Calculate the slope of the line of best fit in the graph above: $\frac{y_2 - y_1}{x_2 - x_1}$ = slope

2. What shape does the line of best fit make with the horizontal and vertical axes?

3. What is the formula for the area of this shape?

4. Find the area between the line of best fit and the horizontal axis.

5. What does the slope of the line of best fit on your graph represent? Hint: Check your units.

6. Is there a linear relationship between the force and the stretch distance? Based on this conclusion, does your spring follow Hooke's law?

7. The area of a triangle (A) is equal to one-half the base (b) times the height (h).

   a. What quantity is the height of your triangle? Make this substitution into your area equation.

   b. What quantity is the base of your triangle? Make this substitution into your area equation.

   c. If your spring follows Hooke's law, the spring force is equal to kx. Substitute this into the equation.

   d. Based on your answers above, what is the equation for area? What quantity is the area of your triangle?