NAME: _____

Elastic Forces Investigation

Score: _____/20

Part I

Purpose: To determine the relationship between the force applied to a spring and the distance it stretches.

Procedure:

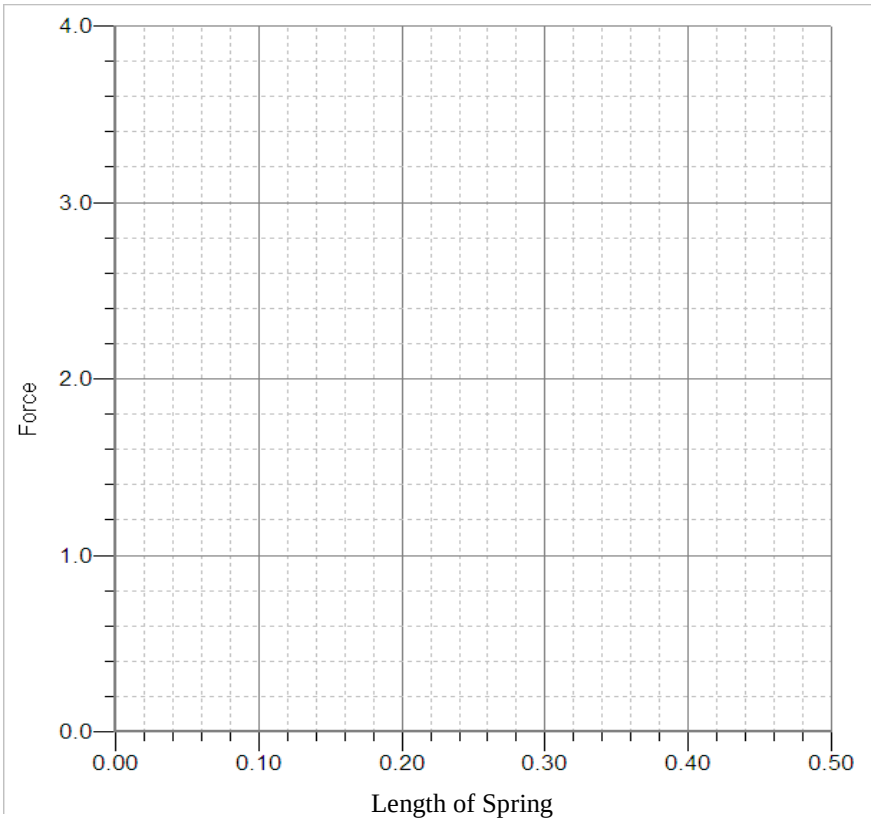
1. Obtain a variety of masses, a stand and an elastic band and a spring from the side counter.
1. Hook a spring or elastic to the stand and measure it's unstretched length.
2. Add a mass to the spring and record the mass value and length of spring in the table below.
3. Repeat for the various masses and springs (elastics).

Observation:

Object: _____

Mass (g)	Mass (kg)	F_g	Length of Spring (m)	Distance Stretched (m)
No mass				
50				
100				
150				
200				
250				

Plot Fg vs Length of Spring for the above points. Calculate the slope of the line. Include units



What is the value of the x-intercept from the graph?

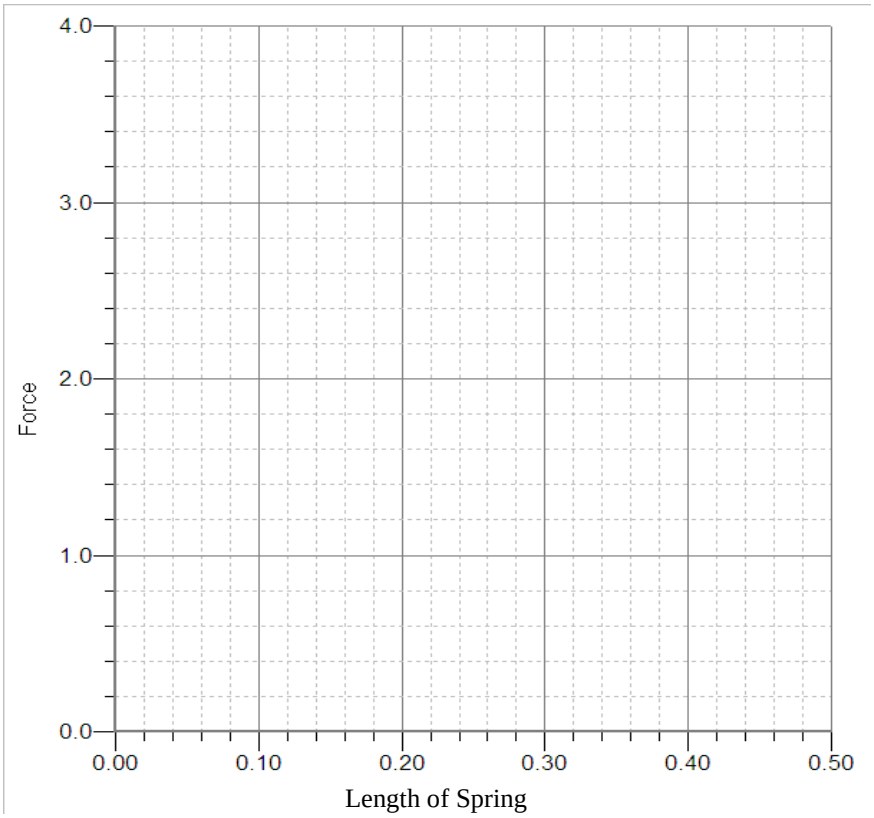
_____

What is the unstretched length of the spring? _____

Object: _____

Mass (g)	Mass (kg)	F_g	Length of Spring (m)	Distance Stretched (m)
No mass				
50				
100				
150				
200				
250				

Plot Fg vs Length of Spring for the above points. Calculate the slope of the line. Include units



What is the value of the x-intercept from the graph?

_____

What is the unstretched length of the spring? _____

Analysis:

1. Based on the graphs and the values in the above tables what does the x-intercept represent?

2. When the hanging force is doubled, how should the stretched length changed?

3. What could be some possible sources of error?

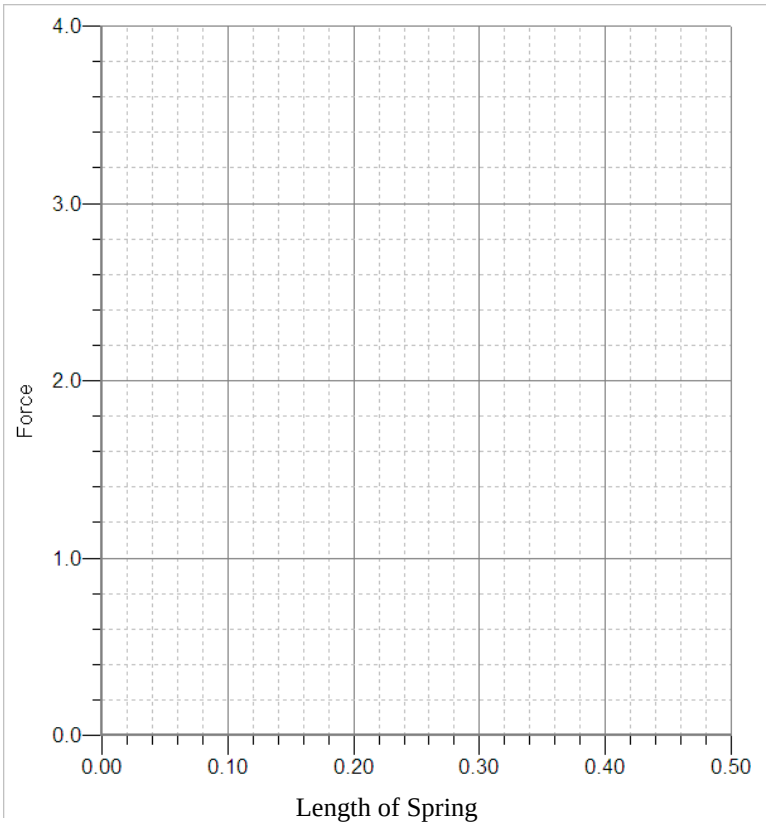
Part II

Getting Started:

1. Go to the PHET web site http://phet.colorado.edu/web-pages/simulations-base.html
4. Click on the Masses and Springs simulation.
5. Move the ruler beside spring #3. Make sure spring softness is set in the *middle*.
6. Place the weights below on the end of spring #3 and fill in the data table below.

Mass (g)	Mass (kg)	F_g	Length of Spring (m)	Distance Stretched (m)
No mass				
50				
100				
250				

1. Plot Fg vs Length of Spring for the above points. Calculate the slope of the line. Include units



2. Using Hooke's Law (Force = elasticity x distance) calculate the elasticity of spring #3 for three values in the above table. Find the average value. Show your work.

3. How does the slope of the line in #1 compare to the values in #2?

4. What is the value of the x-intercept from the above graph? _____ Based on the graph and the values in the above table what does the x-intercept represent?

5. Set the stiffness of spring #3 to "*hard*".
6. Fill in the data table below.

Mass (g)	Mass (kg)	F_g	Distance spring stretched (cm)	(m)
50				
100				
250				

7. Using Hooke's Law calculate the elasticity of spring #3 now.

8. Reset spring #3 stiffness to the middle setting. Using spring #3, Hooke's Law, and the spring constant from #2, calculate the mass (g) of each of the unknown barrels. Remember: force (weight) = elasticity x distance stretched

Green	Brown	Red

9. Would you expect spring #3 to stretch more or less on the moon? Why? Try it out and see!

10. Use the 100g mass & the elasticity for spring #3 to determine the value of 'g' on Planet X.