Physics Name:

Force and Acceleration - Hooke's Law (20 pts.) Date:

Background: In 1678, Robert Hooke announced the invention of the spring scale and the relationship for elastic materials that is now known as Hooke's Law. When an object is acted upon by a force, it can be compressed, stretched or bent. If when the force is removed, the object returns to its original shape, it is said to be elastic. Solids that do not return to their original configuration once they have been distorted are categorized as plastics.

In this lab you will study the force law for springs known as Hooke's Law.
According to Newton's Second Law force is equal to mass multiplied by acceleration ($F=ma$). For a spring hanging from a ring stand with a mass attached: $F = mg$ where g = acceleration due to gravity. The force can also be expressed in terms of a proportionality constant multiplied by the distance the spring is stretched: $F = kx$ where x = the distance the spring is stretched. Setting these two equations equal to each other gives $kx = mg$. Solving this for k gives: $k = mg/x$ where k = the spring constant.

Objective: Plan and conduct an investigation that determines the relationship between the force exerted on a spring and the amount it stretches. Analyze data collected and determine the spring constant.

Procedure (3 points):
- describe (steps) what is to be done/measured
- create a simple diagram

Data (4 points):
- create a table on a sheet of graph paper and attach
- include displacement, mass, acceleration, force

Analysis:
- graph of data on separate sheet (4 points)
- calculate the spring constant (k) of the spring tested.
  Show mathematical strategy/evidence.(4 points)

Conclusion: (5 points)
Describe in your own terms what "spring constant. How does a large value or a small value relate to permanent deformation of the object? (Use the back of the page if required)