Hook's low

1- Using the apparatus in front of you, what would happen to the spring if you hang some weights on it? Take off these weights, what do you notice?

2- What this feature of the spring called? Does it have limits?

3- What do we call these weights and the reaction corresponding to it?

4- What are the forces that act on the spring?

5- Hang 5 different weights on the spring and record the corresponding displacement of the spring, then take corresponding displacement every time.

6- Draw a graph of your tabulated result and calculate the slope of the straight line.

7- Can you conclude an equation for this experiments

8- Describe in words what the spring constant tells you about a spring?

9- Using graph, can you find elongation corresponding to mass hanging equal 35g. ?

10- Using graph, calculate the force that make 5.3cm elongation when act to spring?

11- Is there a difference in the spring force when the spring is compressed instead of stretched?

Hook's low

Objects that quickly regain their original shape after being deformed by a force, with the molecules or atoms of their material returning to the initial state of stable equilibrium, often obey Hook's law.

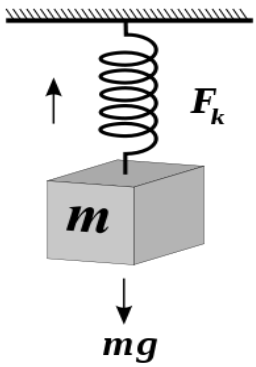
In mechanics, and physics, **Hook's law** of elasticity is an approximation that states that the extension of a spring is in direct proportion with the load applied to it. Many materials obey this law as long as the load does not exceed the material's elastic limit. Materials for which Hook's law is a useful approximation are known as linear-elastic or "Hookean" materials. Hook's law in simple terms says that strain is directly proportional to stress.

The spring equation

The most commonly encountered form of Hook's law is probably the *spring equation*, which relates the force exerted by a spring to the distance it is stretched by a *spring constant*, *k*, measured in force per length, Mathematically, Hook's law states that

$$F = -kx$$

The negative sign indicates that the force exerted by the spring is in direct opposition to the direction of displacement. It is called a "restoring force", as it tends to restore the system to equilibrium, (for example, when a spring is stretched to the left, it pulls back to the right).



where

x: is the displacement of the spring's end from its equilibrium position (a distance, in SI units: m);

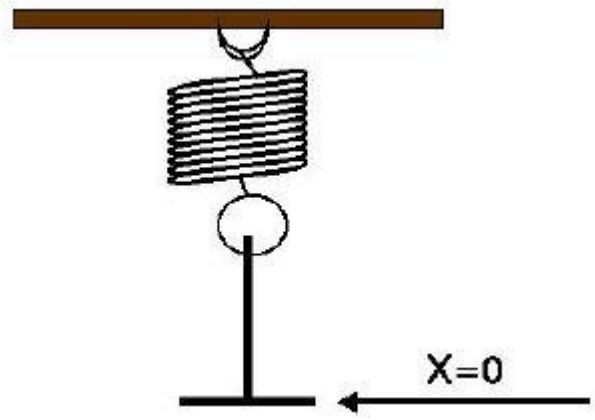
F: is the restoring force exerted by the material (in SI units: N or $kg \cdot m \cdot s^{-2}$); and

k is a constant called the *rate* or *spring constant* (in SI units: $N \cdot m^{-1}$ or $kg \cdot s^{-2}$).

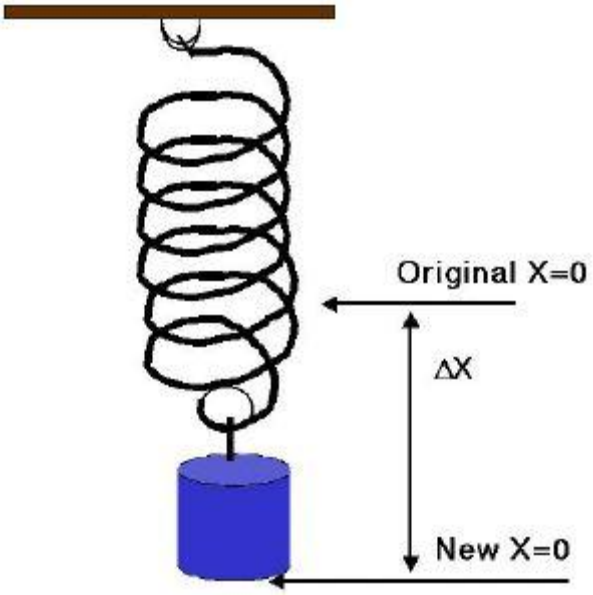
When this holds, the behavior is said to be *linear*. If shown on a graph, the line should show a direct variation. There is a negative sign on the right hand side of the equation because the restoring force always acts in the opposite direction of the displacement (for example, when a spring is stretched to the left, it pulls back to the right).

Description

For spring that hangs vertically, the equilibrium position is the position of the end of the spring and weight hanger as they hang in a relaxed state. The position is pointed to by the horizontal arrow in the figure below.



The equilibrium position of a hanging spring can be changed by adding weights to the hanger. The force on the spring stretches it by a distance x given by Hook's law F=-kx. This situation is shown in the figure below.



If more weight is added to the spring it will stretch even more and rests at a new equilibrium position.