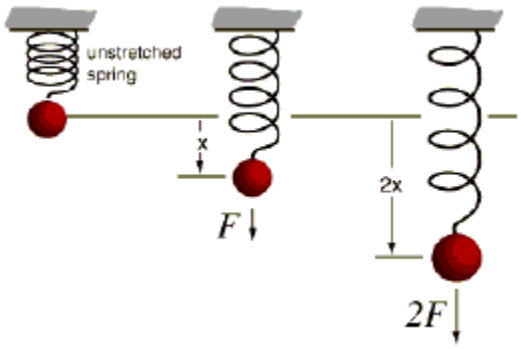
Name:_____

Chapter 5- Forces **Regents Physics**

Hooke's Law (Spring Force)



Naturally, when a force is applied to a string, the string either gets longer or shorter. The **compression** or **elongation** of a spring is the change in spring length from its equilibrium position when a force is applied to it. Its **equilibrium** position is the **unstretched length** of the spring.

Provided the elastic limit of the spring is not exceeded (otherwise the spring breaks!), the **compression or elongation of a spring is directly proportional to the applied force.** Therefore, if the force applied is **doubled**, then the elongation or compression of the string is **doubled**. This relationship is called **Hooke's Law**:

$$F_s = kx$$

In the equation, **k** is the **spring constant** (units of **N/m**). **x** is the elongation or compression **from the unstretched length**. **x** is usually given in **centimeters** so make sure to **convert to meters!**

For Example:

1.) The unstretched length of a certain spring is 20 cm. If the length of the spring is stretched out to 50 cm, determine the elongation of the spring in meters.

2.) The spring constant of a certain spring is 40 N/m. If the elongation of the spring is 0.3 meters, determine the force applied to the spring.

3.) A force of 10 Newtons is applied to a spring with a spring constant of 30 N/m. Determine the elongation of the spring.

4.) A mass of 4 kg is hung from a spring. If the spring's elongation is 0.6 meters, determine the spring constant of the spring. **(Hint: what creates the force?)**