Elastic Potential Energy

Mr. Drouet

Objectives

- Use Hooke's Law to determine the elastic force on an object.
- Calculate a system's elastic potential energy (PE_e).

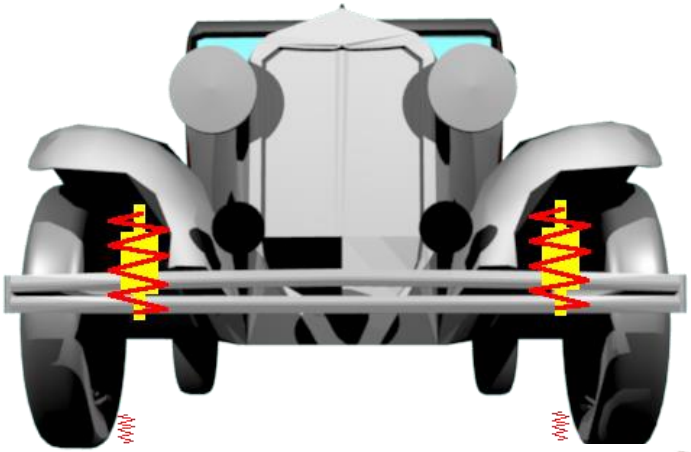
Springs and Elastic bands

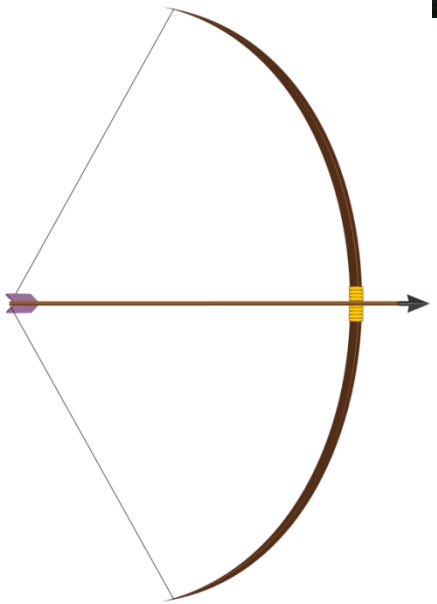
Elastic potential Energy

- Another way to store Mechanical Energy is by stretching or compressing springs.
- This form of potential energy is called

  elastic potential energy (PE_e)
- This type of potential energy that is stored by springs, rubber-bands, bows, etc.
- To understand this form of potential energy, we must first talk about springs.

Where can springs be found?





Hooke's Law

- The more you stretch or compress a spring, the greater the force of the spring.
- All springs compress or stretch differently

$$F_s = -kx$$

- F_s is the force of the spring (N)
- k is the spring constant (in N/m)
- x is the displacement from equilibrium position

Hooke's Law Sample

- A load of 45N attached to a spring that is hanging vertically stretches the spring 0.14 m. What is the spring constant?

Spring Potential

- So what does this tell us about elastic potential energy?
- Elastic potential energy must also have to do with both the spring constant (k) and the displacement (Δx) of the spring.
- The more a spring stretches or compresses the more potential energy it stores.
- The higher the spring constant (k) the more potential energy is stored.

Spring Potential

- k = spring constant
- Δ x = displacement from rest position

$$PEspring = \frac{1}{2} k \bullet (\Delta x)^2$$

Spring Sample

- How much energy does a spring store (k= 100 N/m) when it is stretched 0.5 meters?

- How about if it is compressed 0.5 meters?