Conservation of Energy: Systems

Conservation of Energy

$$U_0 + K_0 = U + K$$

$$U_g = mgH$$

$$U_s = \frac{1}{2}kx^2$$

$$K = \frac{1}{2}mv^2$$

- When there are no non-conservative forces acting, the total amount of mechanical energy in a system is conserved.
- You can treat all objects as part of the system. Energy is conserved for the entire system.

$$E_{top} = E_{bottom}$$

Ex: A mass m starts from rest and slides a distance d down a frictionless incline of angle θ. While sliding, it contacts an unstressed spring of negligible mass. The mass slides an additional distance x as it is brought momentarily to rest by compression of the spring (of force constant k). Find the initial separation d between the masses.

Ex: A 250 kg mass is attached (and held in place) to the bottom of an unstressed spring with spring constant k = 50 N/m. The mass is then dropped.

How far does it drop before coming to rest momentarily?

What is its maximum speed?