

Case I System

- Total mechanical energy stays the same
 - Transformation
 - Transfers

Total Energy Doesn't Change

$$E = KE + PE$$

Kinetic energy
 E_K K

Potential energy U
 E_p

$$E_i = E_f$$

$$KE_i + PE_i = KE_f + PE_f$$

$$KE_i + PE_{gi} + PE_{si} = KE_f + PE_{gf} + PE_{sf}$$

$$KE_i + PE_{gi} + PE_{si} = KE_f + PE_{gf} + PE_{sf}$$

$$\frac{1}{2} m v_i^2 + m g h_i + \frac{1}{2} k x_i^2 = \frac{1}{2} m v_f^2 + m g h_f + \frac{1}{2} k x_f^2$$