

## Review of Work, Energy + Power

Work:  $W = F_{\parallel} \Delta d$

$$W = F \Delta d \cos \theta$$

Situations where  $W = 0$

$$W = \text{area under } F\text{-}d \text{ graph}$$

\* max work  $\theta = 0$   
 negative work  $\theta = 180^\circ$   
 zero work  $\theta = 90^\circ$

Mechanical Energy: Kinetic Energy  $E_k = \frac{1}{2}mv^2$

Gravitational Potential Energy:  $E_g = mgh$

Elastic Potential Energy:  $E_e = \frac{1}{2}kx^2$

(Hooke's Law:  $F_a = kx$ )

Work-Energy Theorem:  $W = \Delta E$

Power:  $P = \frac{W}{\Delta t}$

Efficiency:  $\text{Efficiency} = \frac{E_o}{E_I} \times 100\%$

Conservation of Mechanical Energy:

$$E_{\text{total}} = E'_{\text{total}}$$

$$E_k + E_g + E_e = E'_k + E'_g + E'_e$$

(neglecting any non-conservative forces  
 like friction or air resistance)