

Work and Energy II-1

Kinetic Energy (1):

$$E_k^{\text{final}} = E_k^{\text{initial}} + \text{Work} .$$

Hydro Electric Plant (2):

$$W = m g h, \quad \text{kWh} = 1000 \times 3600 \text{ J} .$$

Block Sliding into Spring (3): Energy conservation!

$$W = m g h = \frac{1}{2} k x^2 .$$

Toy Sled (4): Energy conservation again. Then

$$\Delta v = \mu_k g \Delta t, \quad x = v_{\text{average}} t .$$

Work and Energy II-2

Two Segments Ramp (5):

$$\sin(\alpha) = \frac{h/2}{L_1}, \quad \sin(\theta) = \frac{h/2}{L_2}, \quad W_i = m g \mu_k L_i \cos(\text{angle}_i) \quad (i = 1, 2).$$

Vertical Spring (6): Again, use energy conservation!

Curved Bowl (7):

$$m g h_{\min} = F_{\mu} L.$$