Work and Energy III-1

Rock Climber (1): Energy conservation.

$$E = m\,g\,h = \frac{k}{2}\,x^2\,, \qquad h = ??? \neq L!\,.$$

Loop the Loop (2):

$E_A =$ Difference of the potential energies.

Downward acceleration:

$$a = \frac{v^2}{R}\,, \quad E_A = \frac{m}{2}\,v^2\,.$$

Minimum height:

$$h_{\mathsf{min}}\,g\,M = E_{\rm potential}(A) + E_{\rm kinetic}(A) \quad \text{with} \quad g = \frac{v^2}{R}\,.$$

Work and Energy III-2

Ball on a Swing (3):

1. Find v_x from kinetic energy, then $R = v\,t$ with t from $g\,t^2/2 = h$.
2. $v = \sqrt{v_x^2 + v_y^2}$.

Block and Loop the Loop (4):

$W = E_{\text{kinetic}} - E_{\text{potential}}$ with $E_{\text{kinetic}} > 0$.

Swinging Ball (5):

1. v from kinetic energy. 2. v from new kinetic energy at $2r$.

Trunk up an Incline (6):

$$P_I = P\,\cos(\theta)\,, \quad W = P_I\,d\,, \quad F_N = P\,sin(\theta) + m\,g\,\cos(\theta)\,,$$
$$W_\mu = -F_\mu\,d\,, \quad W_g = \ldots\ .$$