# Chapter 7 - Potential Energy and Energy Conservation

**Physics 206**

**Group 1 Problems:**
**Problem 1:**

$$W = -43840 \text{ J}$$

**Problem 2:**

$$\text{a) } W_{person} = mgd\sin\theta$$

$$\text{b) } P = \frac{mgd\sin\theta}{60}$$

**Problem 3:**

$$F_N = \frac{mv_0^2 + 2mgd}{R} + mg$$

**Problem 4:**

$$\text{a) } v^2 = 2gy_0\left(1 - \frac{\mu}{\tan\theta}\right)$$

$$\text{b) } v^2 = 2gd(\sin\theta - \mu\cos\theta)$$

**Problem 5:**

$$v = \sqrt{\frac{2(m_B - m_A)gh}{m_A + m_B}}$$

**Group 2 Problems:**
**Problem 6:**

$$(x, y) = \left(+6, -\frac{2}{3}\right) \text{ and } \left(-6, +\frac{2}{3}\right)$$

**Problem 7:**

$$k = 3800 \text{ N/m}$$

**Problem 8:**

$$\mu = \frac{v_0^2}{2gd\cos\theta} - \tan\theta$$

**Problem 9:**

$$y_{max} = h + \frac{\left(\frac{kx_0^2}{m} - 2gh\right)\sin^2\theta}{2g}$$

**Problem 10:**

$$\text{a) } v = \sqrt{\frac{560}{12.0}} = 6.83 \text{ m/s}$$

$$\text{c) } d = 5.27 \text{ m}$$

$$\text{d) } W_f = -120 \text{ J}$$

**Group 3 Problems:**
**Problem 11:**

$$t = \frac{X}{\mu g}\sqrt{\frac{k}{m}}$$

$$\theta = 50 \text{ degrees right of vertical moving CW}$$

**Problem 12:**

$$\text{a) } x = \sqrt{\frac{5mgR}{k}}$$

$$\text{b) } d = \frac{5R}{2(\sin\theta + \mu\cos\theta)}$$

**Problem 13:**

$$\Delta x = 2\sqrt{h_2(h_1 - h_2)}$$

**Problem 14:**

$$v = \sqrt{\frac{kL^2}{4m}\left(\sqrt{13 - 12\cos\theta} - 1\right)^2 + 2gL(1 - \cos\theta)}$$

**Problem 15:**

$$v = 1.78 \text{ m/s}$$