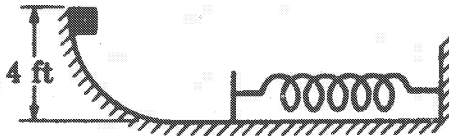


# PHYSICS 1030

## Homework #6

(Due Oct. 27, 2016)

1. If it takes 4.00 J of work to stretch a Hooke's-law spring 10.0 cm from its unstressed length, determine the extra work required to stretch it an additional 10.0 cm.
2. (Serway 7-55) A baseball outfielder throws a 0.150-kg baseball at a speed of 40.0 m/s and at an initial angle of  $30.0^\circ$  to the horizontal. What is the kinetic energy of the baseball at the highest point of its trajectory?
3. The figure below shows a frictionless track in the form of a quarter-circle of 4 ft radius, smoothly joined at the bottom of the circular track. A force of 1200 lb will compress this spring  $\frac{3}{4}$  ft. An object of weight 12.5 lb is released, with zero velocity, at the top of the track, and is brought to rest of the level surface by the spring. (a) What is the velocity of the object just before it hits the spring? (b) How far has the spring been compressed when the object comes to rest? (c) Let the potential energy be zero just before the object hits the spring. What is the total mechanical energy of the system when the object has compressed the spring 0.1 ft?



4. A small sphere of mass  $m$  is fastened to a weightless string of length 2 ft to form a pendulum. The pendulum is swinging so as to make a maximum angle of  $60^\circ$  with the vertical. (a) What is the velocity of the sphere when it passes through the vertical position? (b) What is the instantaneous acceleration when the pendulum is at its maximum deflection?
5. (Serway 8-6) A block of mass  $m = 5.00$  kg is released from point  $A$  and slides on the frictionless track shown in Figure P8.6 of the text. Determine (a) the block's speed at points  $B$  and  $C$  and (b) the net work done by the gravitational force on the block as it moves from point  $A$  to point  $C$ .

**6.** (Serway 8-12) A sled of mass  $m$  is given a kick on a frozen pond. The kick imparts to the sled an initial speed of 2.00 m/s. The coefficient of kinetic friction between sled and ice is 0.100. Use energy considerations to find the distance the sled moves before it stops.