Physics 1C
Worksheet #18
Conservation of Energy   Name: ______________________

$W = F \cdot x = Fx\cos\theta$ $P = \frac{W}{t} = Fv$ $W = \Delta K$ 1 hp = 746 Watts

Kinetic Energy: $K = \frac{1}{2}mv^2$ Gravitational Potential Energy: $U = mgh$

Conservation of Energy: $U_o + K_o = U_f + K_f$

1. A 80 kg firefighter climbs flight of stairs 6 meter high in 10 seconds.

   a) How much work is required by the firefighter?

   b) How much power does the firefighter produce in climbing the flight of stairs? Express answer in Watts and horsepower.

2. A 50 kg gorilla is sitting on the limb of a tree 4 meters above the ground.

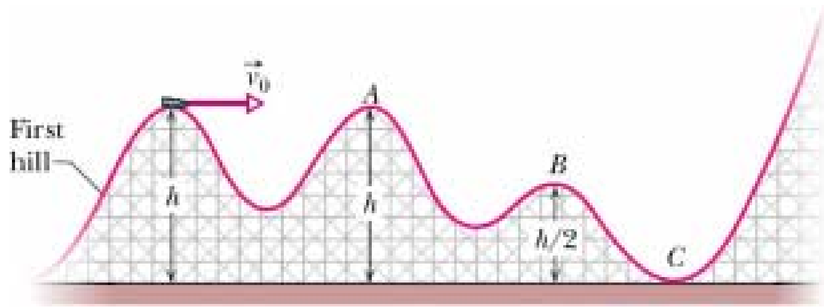
   a) Find the Gravitational Potential Energy (U) of the gorilla sitting in the tree.

   b) The gorilla jumps down from the tree limb to the ground. Use the conservation of energy to find the velocity of the gorilla just before hitting the ground.

   c) Use the conservation of energy to explain why the total energy (Potential + Kinetic) of the gorilla is 1960 J at 1.35 m above the ground.

   d) The gorilla, feeling exuberant, throws a 140 g banana straight up in the air from the ground with an initial energy of 20 J. How high will the banana travel up?

3. A 100 kg roller coaster comes over the first hill at 2 m/sec (v_o). The height of the first hill (h) is 20 meters. See roller diagram belc



a) Use the conservation of energy to find the velocity of the roller coaster at point A.

b) Use the conservation of energy to find the Kinetic Energy (K) of the roller coaster at point B.

c) Use the conservation of energy to find the Kinetic Energy (K) of the roller coaster at point C.

d) Use the conservation of energy to find velocity of the roller coaster at point C.

e) Use the conservation of energy to find velocity of the roller coaster at point B.

f) Use the conservation of energy to find how high the roller will climb the last hill.

Answers:

1. a) 4704 J b) 470 W, .63 hp
2. a) 1960 J b) 8.85 m/sec d) 14.6 m
3. a) 2 m/sec b) 10,000 J c) 19,800 J d) 19.9 m/sec e) 14.1 m/sec f) 20.2 m