Quiz No. 06 (2014 Summer)

PHYS 203A: College Physics

Date: 2014 Jul 11

(Name) (Signature)

1. (**10 points.**) A person lifts a 3.0 kg block a vertical distance 1.4 m and then carries the block horizontally a distance 17.4 m. Determine the work done by force of gravity in this process.

2. (**10 points.**) A block weighing mg slides down a *frictionless* incline. The block starts from rest and has a speed v at the bottom. What is the (vertical) height of the incline? Write the answer in terms of the variables m, g, and v.

3. (**20 points.**) A flight attendant pulls her 60.0 N flight bag a distance of 153 m along a level airport floor at a constant speed. The force she exerts is 35.0 N at an angle of 50.0° above the horizontal.

   (a) What is the work done by the force exerted by the attendant on the flight bag?

   (b) What is the work done by the normal force on the flight bag?

   (c) What is the work done by the force of gravity on the flight bag?

   (d) What is the work done by the force of friction on the flight bag?

4. (**10 points.**) A projectile of mass 0.600 kg is shot straight up with an initial speed of 18.0 m/s.

   (a) How high would it go if there were no air resistance?

   (b) If the projectile rises to a maximum height of only 14.2 m, what is the amount of work done by the average force due to air resistance?

   (c) Determine the magnitude of the average force due to air resistance in (4b).

5. (**10 points.**) A car, starting from rest, accelerates in the $+x$ direction. It has a mass of 1.45×10^3 kg and maintains an acceleration of $+4.60\,\mathrm{m/s^2}$ for 6.00 s. Assuming that a single horizontal force accelerates the vehicle determine the average power generated by this force.

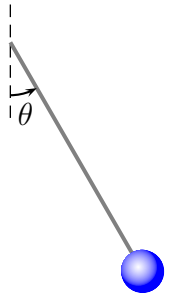

Figure 1: Problem 6.

6. (**20 points.**) Figure 1 shows a thin rod, of length $L = 2.5\,\mathrm{m}$ and negligible mass, that can pivot about one end to rotate in a vertical circle. A heavy ball of mass $m = 4.5\,\mathrm{kg}$ is attached to the other end. The rod is pulled aside through an angle $\theta = 30°$ and released with velocity $v = 0$. Answer the following questions assuming the ball is at its lowest point. (Hint: The height h it drops is given by $h = L(1 - \cos\theta)$.)

   (a) How much work does its weight do on the ball?

   (b) What is the change in the gravitational potential energy of the ball Earth system?

   (c) What is the kinetic energy of the ball at its lowest point?

   (d) What is the velocity of the ball at its lowest point?

   (e) If mass m were doubled, would the velocity of the ball at its lowest point increase, decrease, or remain same?