PHY2053 Spring 2018 Homework # 3

Prof. Douglas H. Laurence

Department of Physical Sciences, Broward College, Davie, FL 33314.

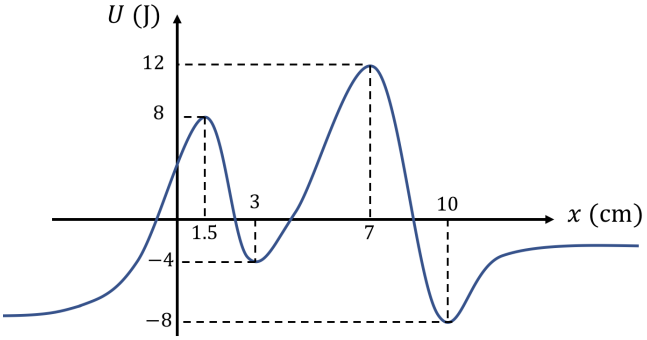
Abstract

In this homework assignment, you'll be solving problems dealing with Energy Physics (chapters 7 and 8 in Walker). This homework set is due **Tuesday, March 20**.

1. A 2kg box is pushed across a horizontal surface with a force of 20N, at an angle of 10^o above the horizontal. If the surface has a coefficient of kinetic friction of $\mu_k = 0.35$, and the box is pushed a distance of 8.5m,

   (a) How much work is done by each force?

   (b) If the box started at 5 m/s, what is the final speed of the box?



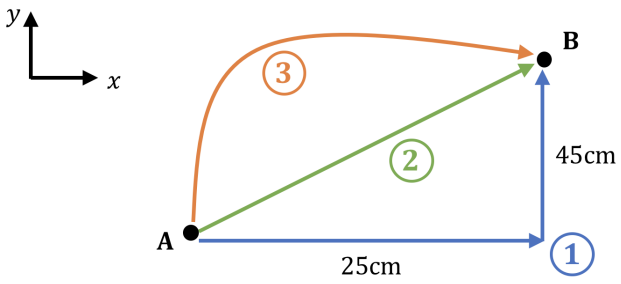
2. Consider a 3.5kg object under the influence of the potential energy graphed in the figure above.

   (a) List all stable and unstable equilibrium points.

   (b) If the object starts from $x = -\infty$ with an energy $E = 9$J, describe the object's motion.

   (c) If the object starts from $x = 3$cm with an energy $E = 5$J, describe the object's motion.

   (d) If the object starts from $x = -\infty$ with an energy $E = 9$J, how fast is the object going at $x = 3$cm?



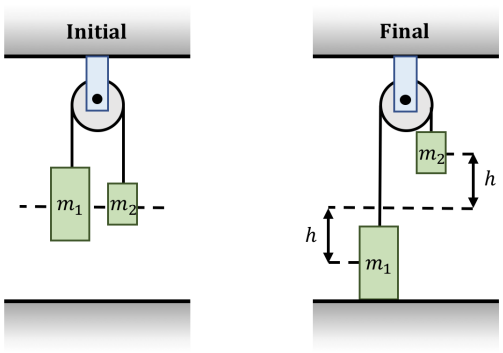
3. Consider moving a 3kg mass along one of three possible paths, as shown in the figure above. What is the work done by gravity along each path?

4. A 350g ball is dropped from a height of 24cm, bouncing off of the floor. If the ball loses 20% of its total energy in the bounce, to what height does the ball bounce back up to?

5. A car drives up a 20m hill, starting at 8 m/s and reaching the top at 10 m/s.

   (a) How much work was done by gravity during this trip?

   (b) Assuming no air resistance, how much work was done by the car's engine?



6. In the above figure is an Atwood machine: a machine composed of two blocks, one of mass $m_1 = 250$g and one of mass $m_2 = 100$g, a massless rope and a massless pulley. If the two masses are released from rest as shown in the figure, at what speed does m_1 hit the ground after falling some $h = 12$cm?