

PHY2048 Spring 2018 Homework # 3

Prof. Douglas H. Laurence

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

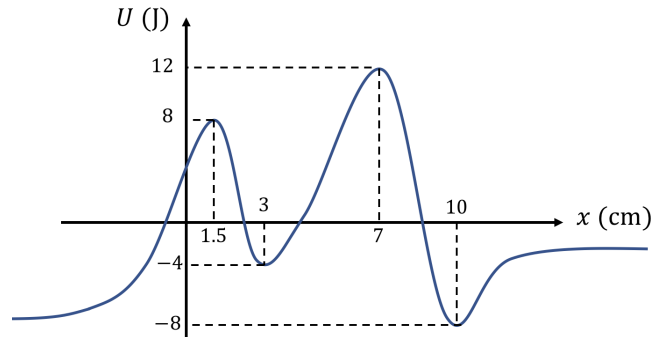
Abstract

In this homework assignment, you'll be solving problems dealing with Energy Physics (chapters 7 and 8 in Ohanian). This homework set is due **Wednesday, March 21**.

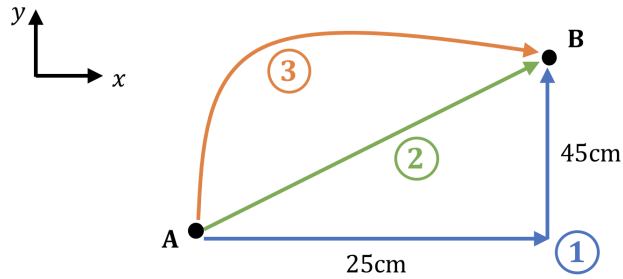
1. The following force

$$\vec{F} = (3x^2 - 2x^3)\hat{i} + (-1.2x + 3.4x^3)\hat{j}$$

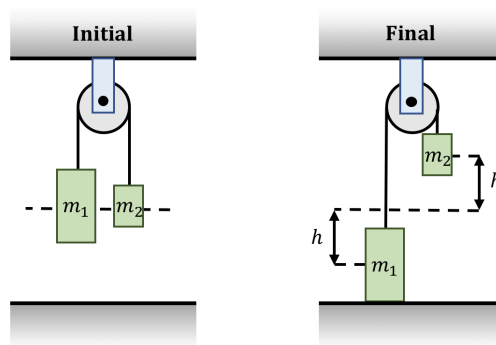
is applied on a 3.2kg box, which slides 1.5m across a horizontal surface. How much work is done by the force? Assume that the numeric coefficients of each term in \vec{F} have the appropriate SI units, and that the box moves in the $+x$ direction along the horizontal surface.



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 $E = 9\text{J}$, describe the object's motion.
 - (c) If the object starts from $x = 3\text{cm}$ with an energy $E = 5\text{J}$, describe the object's motion.
 - (d) If the object starts from $x = -\infty$ with an energy $E = 9\text{J}$, how fast is the object going at $x = 3\text{cm}$?



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 1200kg 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 $m_1 = 250\text{g}$ and one of mass $m_2 = 100\text{g}$, 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 $h = 12\text{cm}$?