Potential Energy

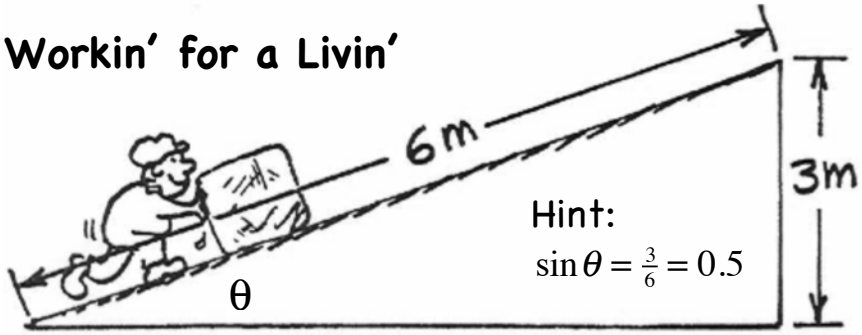
Pre-Class Questions

Problem Set (due next time)
Ch 7 – 25, 30, 31, 35

Lecture Outline

1. Work and Potential Energy
2. Gravitational Potential Energy
3. Spring Potential Energy
4. Other Forms of Energy

Workin' for a Livin'



The worker pushes a block of ice 6m up an incline.

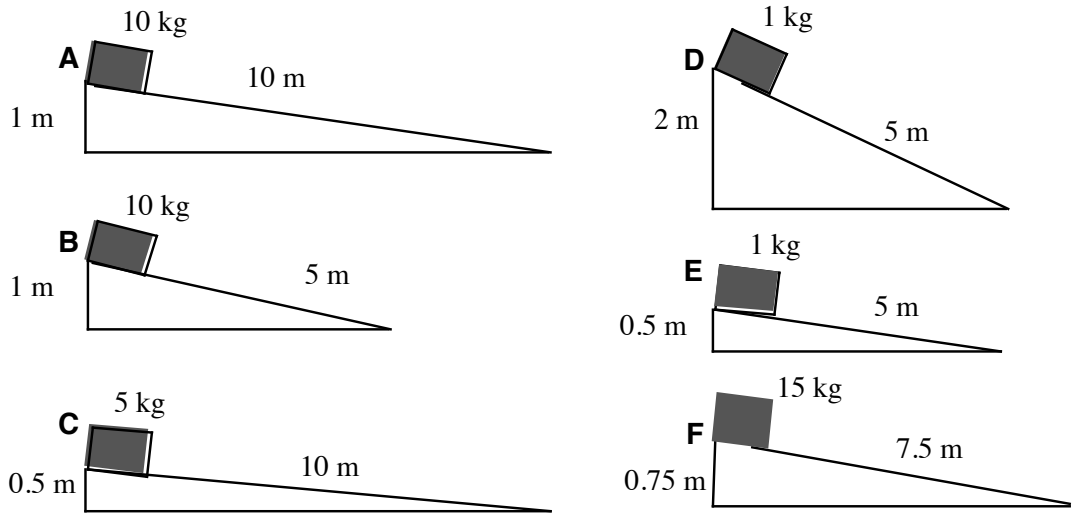
1. Draw the free body diagram for the block.
2. Find the component of the gravitational force along the incline.
3. Find the work done by gravity on the block of ice.
4. Find the change in gravitational potential energy of the block of ice.

Suppose the worker just lifted the block straight upward 3m.

1. Draw the free body diagram for the block of ice.
2. Find the vertical component of the gravitational force along the motion.
3. Find the work done by gravity on the block of ice.
4. Find the change in gravitational potential energy of the block of ice.

Example 1: Before the Annual Pumpkin Drop a 7.00kg pumpkin sits on the edge of Butte Hall 62.0m above the ground. Find the change in the gravitational energy as it falls to the ground.

Rank, in order from greatest to least, the change in gravitational potential energy of the sliding masses from the top of the incline to the bottom of the incline. All surfaces are frictionless. All masses start from rest at the top of the incline.



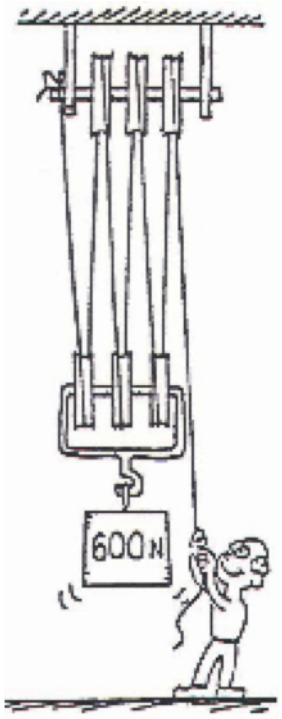
Greatest 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ Least

Or, all masses will have the same change in gravitational potential energy. _____

Please carefully explain your reasoning.

Example 2: A spring (k=8000N/m) is compressed 5.0cm and a 50g ball is placed at the end and the spring is released. Find the potential energy stored in the spring when the ball is (a)initially place at the end, (b)the spring is halfway uncompressed, and (c)when the spring is again uncompressed.

Example 3: A 5.00N weight is hung on a spring that drops a maximum of 1.02m. Find the spring constant.



Joe lifts the 600N weight by doing 60J of work.

The energy to do the work came from _____.

The energy for that came from _____.

The energy for that came from _____.

The energy for that came from _____.

The energy for that came from _____.

The energy for that came from _____.

The energy for that came from _____.

The energy for that came from _____.

Lecture 17- Summary

The Definition of Potential Energy $\Delta U = -W$

Gravitational Potential Energy $U_g = mgy$

Spring Potential Energy $U_s = \frac{1}{2}kx^2$

Energy seems to change forms but the total amount stays fixed.