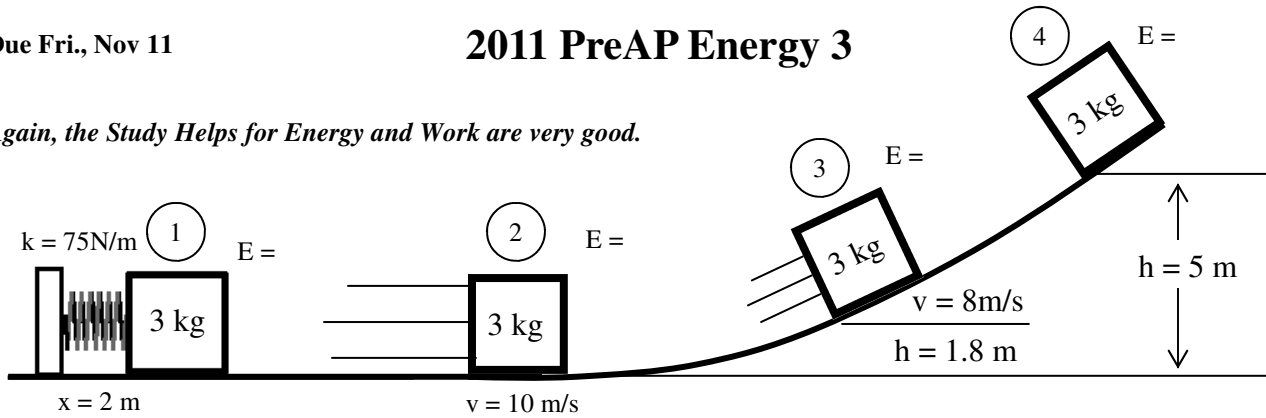


# 2011 PreAP Energy 3

Again, the Study Helps for Energy and Work are very good.



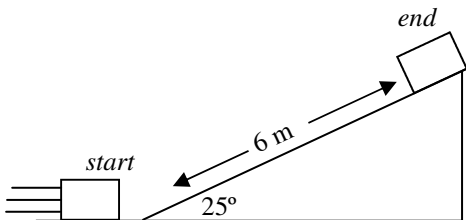
1. A 3 kg object is against a compressed spring. When released the object moves up a ramp until it stops. Assume there is no friction on the surface and use  $g = 10 \text{ m/s}^2$ .
  - A. What kind of energy does the object have at  
 Position 1: \_\_\_\_\_ Position 2: \_\_\_\_\_ Position 3: \_\_\_\_\_ Position 4: \_\_\_\_\_
  - B. Label the above diagram with the kind of energy or energies it has at each position.
  - C. Calculate the energy at position 1: \_\_\_\_\_
  - D. Calculate the energy at position 2: \_\_\_\_\_
  - E. \* Calculate the total energy at position 3: \_\_\_\_\_
  - F. Calculate the energy at position 4: \_\_\_\_\_
  - G. Label the amount of energy at each position on the diagram above.
  - H. How does the energy compare at each position?
  - I. The energy of the object is not gained or lost, just t\_\_\_\_\_.
  - J. So does the energy of the system change?
  - K. If there was absolutely no friction on the surface or in the spring, how long would the mass go up and back?
  - L. If there was friction, how would the final height of the object change?

*If the energy of an object is just changing kinds, like above, the energy of the system stays the same and no work is done. To change the energy of system requires an outside force like friction, which does work on the object.*

2. +W, -W, or no Work (0)?
 

A. _____ When the energy is just transferred.	H. _____ An object at rest on a hill.
B. _____ When an object loses energy.	I. _____ Compressing a spring.
C. _____ When an object gains energy.	J. _____ Sitting on an object.
D. _____ When energy doesn't change.	K. _____ Lowering an object down to the ground.
E. _____ An object slows down.	L. _____ Speeding up an object.
F. _____ An object is raised up.	M. _____ Friction acting on an object.
G. _____ An object rolls down a hill.	N. _____ Holding onto an object.

3. A 2 kg object moves up a 6 m long ramp, which is tilted at an angle of  $25^\circ$ .



- A. What kind of energy did it start with?
- B. What kind of energy did it end up with?
- C. \*Calculate its final energy (*remembering that h is vertical*).
- D. If there is no friction on the ramp, how much kinetic energy did it have at the bottom?
- E. \*Calculate what velocity it must have had at the bottom of the ramp.

*2010 Energy 3—p3*

Q1E:  $E_{\text{total}} = KE + PE.$

Q3C:  $PE = mgh = 2(10)(6)\sin 25^\circ = 50.7 \text{ Joules}$     Q3E:  $KE = 50.7 \text{ Joules}, v = 7.1 \text{ m/s}$