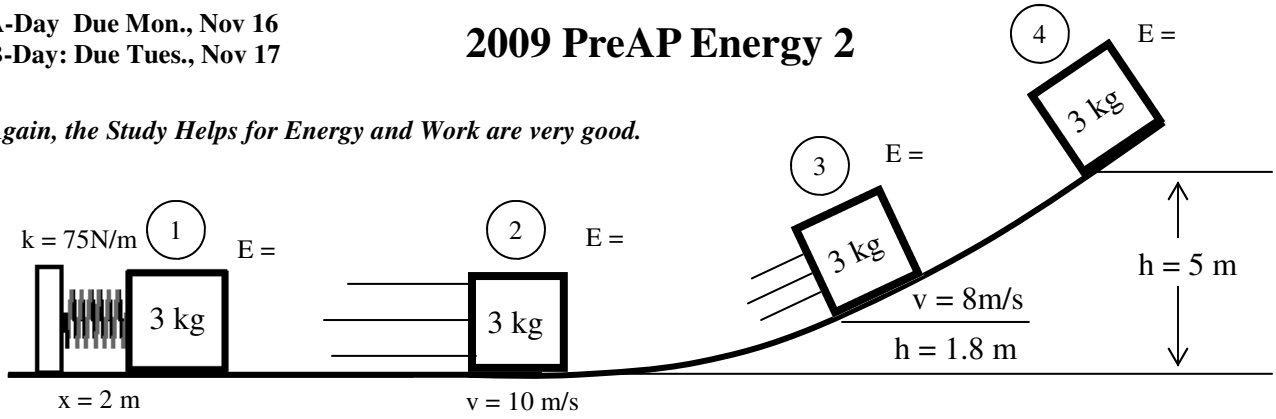
A-Day Due Mon., Nov 16
B-Day: Due Tues., Nov 17

2009 PreAP Energy 2

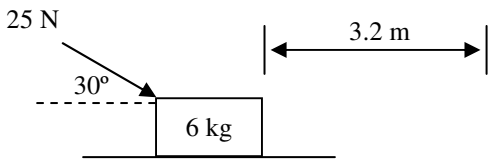
Again, the Study Helps for Energy and Work are very good.



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.
   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 it has at each position.
   C. Calculate the energy at position 1:
   D. Calculate the energy at position2:
   E. Calculate the 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 to different kinds, the energy of the system stays the same. To change the energy of system requires an outside force like friction, which is work.

2. +W, –W, or no Work?
   A. _____When the energy is just transferred.
   B. _____When an object loses energy.
   C. _____When an object gains energy.
   D. _____When energy doesn't change.
   E. _____An object slows down.
   F. _____An object is raised up.
   G. _____An object rolls down a hill.
   H. ____ An object at rest on a hill.
   I. ____ Compressing a spring.
   J. ____ Sitting on an object.
   K. ____ Lowering an object down to the ground.
   L. ____ Speeding up an object.
   M. ____ Friction acting on an object.
   N. ____ Holding onto an object.



3. A 25 N force pushes a box 3.2 meters at an angle of 30º to the table
   A. Is it the x or y-component that moves the object?
   B. Calculate the work done by this force.
   C. What kind of energy does the object gain?
   D. How much energy does it have afterwards?
   E. Calculate the final speed of the object.

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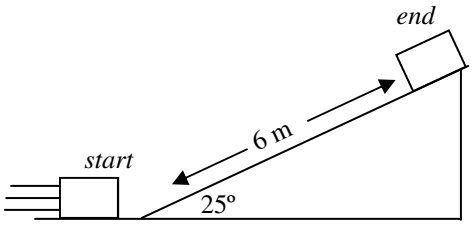
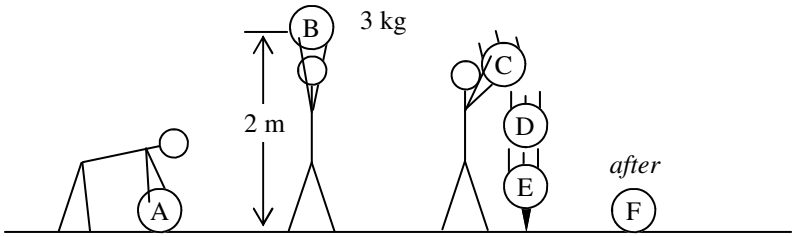


4. A 2 kg object moves up a 6 m long ramp, which is tilted at an angle of 25º.
   A. What kind of energy did it start with?
   B. What kind of energy did it end up with?
   C. Calculate its final energy.

   D. If there is no friction on the ramp, how much kinetic energy did it have at the bottom?

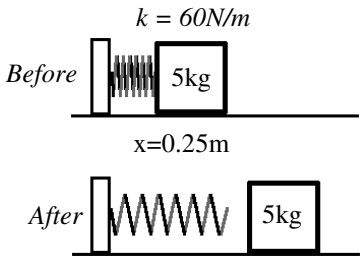


5. Slim Jim lifts a 3kg ball from the ground. He lifts it above his head and drops it onto a spike.
   A. What kind of energy does the ball have:
   At A: At B:
   At C: At D:
   At E: At F:

   B. Calculate the energy the object has at position B.

   C. How much energy must the object have at E just before it hits the spike?

   D. Where does all the energy go?



6. A 5kg object compresses a spring 0.25m.
   A. Calculate the energy it has when the spring is compressed.

   B. What kind of energy does the object have when released?

   C. If there was no friction on the surface, how much energy does the mass have after released?

   D. Calculate the velocity of the object afterwards.

Using the "Energy Transfer" notes:

7. How fast you transfer energy to an object is called:

8. Motor A has a rating of 300 W. Motor B has a rating of 200 W.
   A. Which motor is more powerful?
   B. How long would it take Motor A to do 6000 J of work?

   C. How long would it take Motor B to do 6000 J of work?

   D. Which motor did the work quicker?
   E. Which motor did more work?

9. True or false (and why)?: "*A more powerful object does more work.*"

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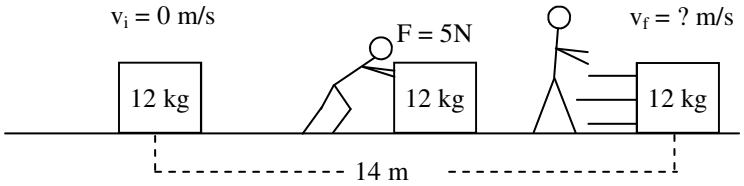
Using the "Conservation of Energy" notes, let's start to learn how to write Conservation of Energy equations. You already know the summation symbol (Σ). Now we are going to use it with energy.

Conservation of Energy: $\Sigma E_{before} \pm W_{external} = \Sigma E_{after}$



$$\Sigma E_{before} \pm W_{external} = \Sigma E_{after}$$

Input types of E:

Substitute formulas:

Put in numbers:

Solve for v:

10. Slim Jim pushes a 15kg object. He uses 5N for 14m.
    A. What kind of energy does it have before?
    B. Does the object gain or lose energy?
    C. What kind of energy does it have after?
    D. Put the information from A-C into the Law of Conservation of Energy.
    E. Substitute the equations for each kind of energy.
    F. Put in the numbers from above and solve for the final velocity of the object.

For this next section there is a study help.

11. Match the Conservation of energy equations at the right with the following situations.

1.	Ek −W = Ek	A. ___	An object is thrown into the air. Find how high it goes.
2.	Ep = Ep + Ek	B. ___	An object at rest is moved.
3.	Ek = Ep	C. ___	A moving object slows down due to friction.
4.	Ek −W = 0	D. ___	An object is dropped. How fast is it going part way down?
5.	PEel = Ek + Ep	E. ___	A spring is compressed.
6.	0 + W = Ek	F. ___	A compressed spring shoots an object into the air.
7.	0 + W = PEel	G. ___	A moving object is stopped.

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