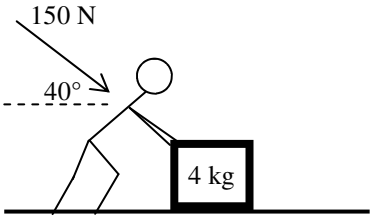
Due Wed., Nov 27

2012 PreAP Energy 7

From now on I strongly suggest that you write your Conservation of Energy equation for each problem. It tells you "stuff". I assume, now, that you can all write them. See the Energy Study Helps, if you need more help.



1. A 20 kg object is pushed by a 150N force acting at 40° to the ground.
   A. * How much work is done on the object after 8 m?

   B. How fast is the object moving after 8m?

2. A 4 kg object is moving 2 m/s when it is pushed by a 5 N force for 7 m along a level surface. How fast is it going afterwards?

3. A 100 N object is at rest on the ground. It is lifted up 8 m.
   A. Is 100N the mass or the weight of the object?
   So, N is a force or mg in mgh, already…
   B. * How much work was done to lift the object?

   C. How much gravitational potential energy does it gain?

   D. * How long would it take a 400 W motor to lift it?

4. Let's learn to break up a unit, the joule:
   A. Write the basic equation for work:
   B. * Substitute in what "F" equals (*and don't get angry*):
   C. Substitute in the units for each one and combine like terms.
   D. * So, what does a joule equal in the most basic units?

5. Using what you just found, give the units of power using only basic units.

6. A 5 kg mass is at rest on a level surface. It is pushed until it reaches 12 m/s in 8 seconds.
   A. How much work was done on the object? (*Set up your Conservation of Energy equation, first.*)

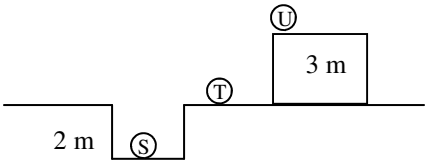
   B. How much power was used to push the object?

7. For each of the following, is work being done (*and why or why not*)?
   A. ____ A person holds a book in their hands for 20 minutes.
   B. ____ A force pushes down on a table.
   C. ____ A person pushes a sled across the snow.
   D. ____ * Gravity keeping the moon moving around the earth.

   Definition: Mechanical energy = any PE or KE.

8. A 6 kg box is moving 8 m/s when it slides over a 3 m long patch of sandpaper. Afterwards the box is moving 3 m/s.
   A. How much mechanical energy did it lose?

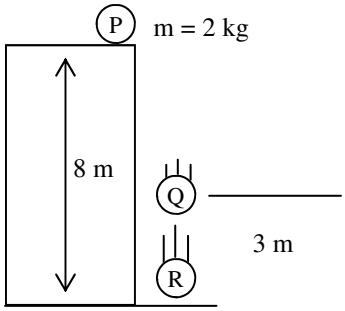
   B. Where was the energy "lost" and what did it become?



9. Three identical 1 kg objects are placed as shown in the diagram.
   A. Since object T is sitting on the ground, how much potential energy does it have?
   B. How much potential energy does object U have relative to the middle object?

      This is how much work would be done to lift U to this point.
   C. If T is at h = 0 m, then object S is at h = _____. (below 0)
   D. * What is the potential energy of object S relative to the ground?

Object S is in a hole, so it would take energy to lift it out. This is how an object can have <u>negative potential energy</u> and why we usually ASSUME that we have defined PE = 0J at the ground. But PE can be defined anywhere. Let's see how that could be helpful...



10. A ball is dropped from 8 m. How fast is it going 3 m above the ground?
    A. If we define point Q as our reference point (h = 0 m), how far did it drop?
    B. * Calculate its speed at point Q.

1A) 919J 3B) 800 J 3D) 2 sec 4B) W = mad 4D) kgm^2/s^3 7D) No (figure out why)
9D) mgh = 1(10)(−2) = −20 J 10B) 10 m/s