Work and PE

1. A boy wants to lift a 50kg mass a distance of 1.5 m.
   a. What minimum force must he apply?
   b. What work must he apply in order to raise it the required amount?
   c. He realizes he is not strong enough and can only exert a maximum force of 400 N. He sets up an incline. What displacement must he have in order to have the same work done and thereby give the same amount of potential energy?
   d. What angle must he set the incline at in order to succeed?

2. A large number of slaves were needed to raise huge blocks of limestone that had masses of 3000kg, to build the Pyramids of Giza. What force did they need to apply if they raised it 1 meter for every 10 meters displaced. Assume their method of removing friction was very effective.

3. A man uses a ramp to raise a 100kg barrel onto a truck. If the he applies 500 N, and the ramp is 2m in length, how high is the truck floor?

4. A coconut falls out of a tree 12.0 m above the ground and hits a bystander 3.00 m tall on the top of the head. It bounces back up 1.50 m before falling to the ground. If the mass of the coconut is 2.00 kg, calculate the potential energy of the coconut relative to the ground at each of the following sites:

   a. while it is still in the tree,
   b. when it hits the bystander on the head,
   c. when it bounces up to its maximum height,
   d. when it lands on the ground,
   e. when it rolls into a groundhog hole, and falls 2.50 m to the bottom of the hole.