POTENTIAL ENERGY SAMPLE PROBLEMS

1. A 90 kg rock climber first climbs 45 m upward to the top edge of a quarry, then from the top descents 85 m to the bottom.
    a. Find the potential energy of the climber at the edge and the bottom, using the initial height as the reference level.
    b. Repeat using the bottom of the quarry as the reference level.
    c. How do your answers differ? … how are they the same?

2. A 50 kg shell is shot from a cannon at the Earth's surface to a height of 400 m.
    a. What is the gravitational potential energy with respect to the Earth's surface when it is at this height?
    b. What is the change in potential energy when the shell falls to a height of 200 m?

3. A person with weight of 630 N climbs up a ladder to a height of 5 m. What is the increase in potential energy from the ground to this height?

4. A pendulum is constructed from a 7.26 kg bowling ball hanging on a 2.5 m long rope. The ball is pulled back until the rope makes a 45° angle with the vertical.
    a. What is the potential energy of the ball?
    b. What reference did you use in you calculation?

5. A spring that is initially 30 cm long at it equilibrium position is squished to only 10 cm. If it has a spring constant of 200 N/m,
    a. how much energy is stored in it.
    b. If it were stretched to 40 cm instead, how much energy would be stored now?

6. A bow with a spring constant of 1000 N/m is pulled back 15 cm. If it were instead pulled back to 30 cm, how much more energy would be stored in the situation?

7. A mass on a spring is bouncing back and forth horizontally on a table. It has a spring constant of 15 N/m and the total length that it travels back and forth (from far left to far right) is 40 cm. Calculate
    a. The potential energy at the far left
    b. The potential energy at the far right
    c. The potential energy in the middle
    d. The potential energy ½ way from the middle to the right