Conservation of Energy Practice Problems

1. A 2500 kg rollercoaster begins from the top of a 100 m high hill. Friction is negligible. Determine the following:

A) Its speed at the bottom of the first hill.

B) Its speed at the top of the second hill if the second hill is 45 m high.

C) The kinetic, potential, and mechanical energy at each point. (top first, bottom first, top second)

D) How would the answers to A and B differ if friction were considered?

2. A slightshot has a spring constant of 400 N/m. It is stretched 25 cm to project a 150 gram pebble. Determine the following:

A) The potential energy of the slingshot when stretched.

B) The velocity of the pebble when launched.

C) The height the pebble would reach if it was shot vertically.

3. A bowling ball is rolling on a frictionless, level surface with a velocity of 12 m/s. Determine how far it will roll up an incline before coming to rest. (hint: you do not need to know the mass or angle of incline)

4. A spring is compressed in order to launch a 1800 kg rollercoaster. The spring has a spring constant of 25,000 N/m. Frictionless. Determine the following:

A) Speed of the rollercoaster when launched.

B) The maximum height of the first hill.

C) What modification must be made to make it to the top of the first hill if friction is considered?

5. A children's toy (m = 75 g) is spring loaded. When fully compressed 4.0 cm the toy will reach a maximum launch height of 1.2 m. Determine the following:

A) The spring constant of the toy

B) The launch velocity of the toy

C) What effect would compressing the toy only 2.0 cm have on the answers to A and B. Explain, but don't calculate new answers.