PHYS 211 Homework Assignment

Chapter 8

Problem 1 A spring gun shoots out a plastic ball at speed v_0. The spring is then compressed by twice the distance it was on the first shot. By what factor is the ball's speed increased? Explain.

Problem 2 There is a race that goes from the bottom of Death Valley (85 m below sea level) up to the top of nearby Mt Whitney (4420 m above sea level). What is the change in the gravitational potential energy of a 65 kg racer?

Problem 3 A cannon tilted up at a 30° angle above the horizontal fires a cannon ball at 80 m/s from atop a 10 m high fortress wall. What is the ball's impact speed on the ground below?

Problem 4 A 50 g ice cube can slide without friction up and down a 30° incline. The ice cube is pressed against a spring with spring constant 25 N/m at the bottom of the slope. If the cube is compressed against the spring by 10 cm and then released,

(a) What distance will it travel up the slope before reversing direction?

(b) After the cube slides back down, what will be its speed (right before it hits the spring)?

(c) How far will the ice cube compress the spring when it comes back down?

Problem 5 A 1000 kg safe is 2.0 m above a heavy duty spring when the rope holding the safe breaks. The safe hits the spring and compresses it 50 cm. What is the spring constant?