Phys100 Assignment Cover Sheet

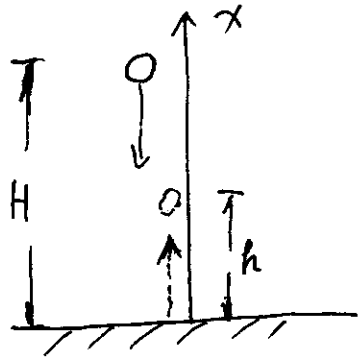
First Name:_____ Last Name:_____ Mark:_____

Student ID:_____ Computing ID:_____ Date:_____

Phys100 Written Assignment #8

Due Wed March 14, 2007, 9:00AM

1. A 50 g marble is dropped from rest onto the floor 2.0 m below. If the marble bounces straight upward to a height of 1.0 m, what is the magnitude of the impulse delivered to the marble by the floor?



[Solution].

Magnitude of Impulse = x-comp. of $\vec{I} = I_x$.

$$I_x = p_{xf} - p_{xi} = m v_{xf} - m v_{xi}$$
$$= m(v_{xf} - v_{xi})$$

where v_{xi} = velocity just before hitting the ground.

v_{xf} = velocity just after hitting the ground.

ME is conserved for the falling of marble. (before collision)

$$mgH = \frac{1}{2} m v_i^2 \quad (E_i = E_f) \Rightarrow v_i = \sqrt{2gH}$$

ME is conserved for the moving up of marble (after collision)

$$\frac{1}{2} m v_f^2 = mgh \Rightarrow v_f = \sqrt{2gh}.$$

$$\therefore I_x = m\left(\sqrt{2gh} - (-\sqrt{2gH})\right) = m\sqrt{2g}\left(\sqrt{h} + \sqrt{H}\right)$$

$$= (0.50)\left[\sqrt{2(9.8)(1)} + \sqrt{2(9.8)(2)}\right] = 0.534 \text{ kg·m/s}$$

$$= 0.534 \text{ N·s}.$$