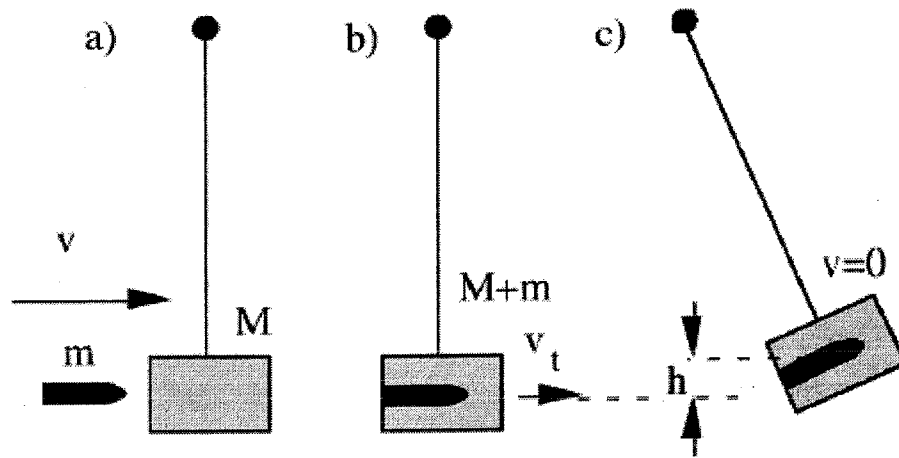


Physics 12 Section 7-6 Inelastic Collisions

1. In inelastic collisions momentum is conserved while kinetic energy is not. After the collision the total mechanical energy of the system is conserved.
2. The ballistic pendulum is a classic case of an inelastic collision.



$$P_{\text{before}} = mv$$

$$P_{\text{after}} = (M + m)v_t$$

Conservation of momentum states:

$$P_{\text{before}} = P_{\text{after}}$$

$$mv = (M + m)v_t$$

$$v = \frac{(M + m)v_t}{m}$$

The total mechanical energy of the system after the collision remains constant:

$$\Delta KE + \Delta PE = 0$$

$$KE_2 - KE_1 + PE_2 - PE_1 = 0$$

$$KE_2 + PE_2 = KE_1 + PE_1$$

$$KE_1 + PE_1 = KE_2 + PE_2$$

$$KE_1 + 0 = 0 + PE_2$$

$$\frac{1}{2} (M + m)v_{\uparrow}^2 = (M + m)gh$$

$$\frac{1}{2} v_{\uparrow}^2 = gh$$

$$v_{\uparrow}^2 = 2gh$$

$$v_{\uparrow} = \sqrt{2gh}$$

3. Combining the momentum and energy equations:

$$v = \frac{(M + m) \sqrt{2gh}}{m}$$

4. A 10g golf ball strikes a 5kg watermelon at 100m/s. The watermelon is suspended by a cable. What is the resulting height of the combination (golf ball and melon)?