

**Ex :** A **340 gm** cart moving on a frictionless track at **1.2 m/s** strikes a second cart of unknown mass at rest. The collision is elastic. After the collision, the first cart continues in its original direction at **0.66 m/s**.

The principles involved are:

**Conservation of Momentum** and  
**Conservation of Kinetic Energy.**

a). What is the mass of the second cart?

$$m_2 = \left( \frac{v_{1i} - v_{1f}}{v_{1i} + v_{1f}} \right) m_1 = 99 \text{ gm}$$

2). What is  $v_{2f}$ ?

$$v_{2f} = \left( \frac{2 \cdot 340 \text{ gm}}{340 \text{ gm} + 99 \text{ gm}} \right) 1.2 \text{ m/s} = 1.9 \text{ m/s}$$

3). What is the speed of the two cart CM?

$$v_{CM} = \left( \frac{340 \text{ gm}}{340 \text{ gm} + 99 \text{ gm}} \right) 1.2 \text{ m/s} = 0.93 \text{ m/s}$$