1. A 0.4-kg mass m_1 moves at 3 m/s in the positive direction on a flat 1-dimensional air track. It approaches a stationary mass m_2 of 0.8 kg. They collide and separate again, with the velocity of mass m_2 after the collision 1.6 m/s in the positive direction.
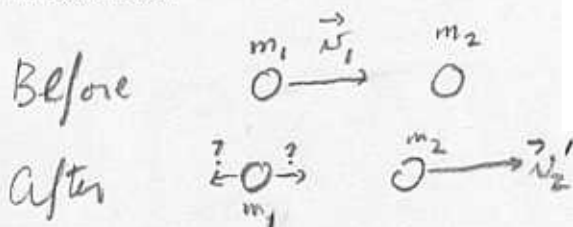
A. (5 pts) What is the velocity of mass m_1 after the collision?

**(a) –0.20 m/s.

(b) +0.05 m/s.

(c) –12 m/s.

(d) zero.

Before $\quad m_1 \overset{\vec{v}_1}{\underset{}{O\rightarrow}} \quad m_2 \; O$

after $\quad \overset{?}{\underset{m_1}{\overset{\leftarrow}{O}\rightarrow}} \quad \overset{m_2}{O}\longrightarrow \vec{v}_2'$

$$m_1 \vec{v}_1 + m_2 \cdot 0 = m_1 \vec{v}_1' + m_2 \vec{v}_2'$$

solve for this — 1-D so
1 eq.

$$v_1' = \frac{m_1 v_1 - m_2 v_2'}{m_1} = v_2' - \frac{m_2}{m} v_1$$

$$= (3 m/s) - \frac{0.8 kg}{0.4 kg}(1.6)$$

$$= -0.2 \; m/s$$

B. (5 pts) Is this collision elastic or inelastic?

(a) elastic.

**(b) inelastic.

(c) Not enough information to tell.

The only way to tell is to calculate

$K_{init} + K_{final}$.

$$K_{init} = \frac{1}{2} m_1 v_1^2$$

$$K_{final} = \frac{1}{2} m_1 v_1'^2 + \frac{1}{2} m_2 v_2'^2$$

$\Big\}$ all known.

Not hard to show
the one unequal $\Rightarrow$ inelastic.