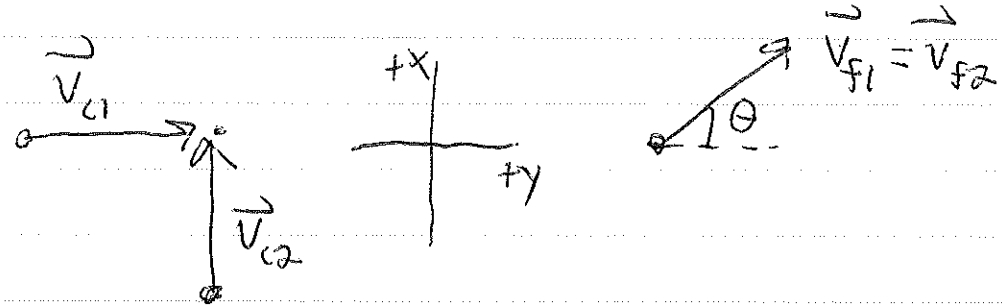
Chapter 11

1a $\vec{v}_{f1} = \vec{v}_{f2}$ $\quad m_1 = 3m_2$

$v_{i1} = 1.00\ m/s \quad v_{i2} = 5.00\ m/s \quad v_{f1} = ? \quad v_{f2} = ?$

1b 2-D motion. Ignore the 3rd dimension.
Treat the objects are particles.
Assume isolated system. No external forces
Conservation of Momentum.
Inelastic Collision

2a (before) (after)



2b $\vec{p} = m\vec{v}$ $\quad \vec{p}_{i1} + \vec{p}_{i2} = \vec{p}_{f1} + \vec{p}_{f2}$

3a p_x: $m_1 v_{i1} + 0 = m_1 v_f \cos\theta + m_2 v_f \cos\theta$

p_y: $0 + m_2 v_{i2} = m_1 v_f \sin\theta + m_2 v_f \sin\theta$

p_x: $3m_2(1.00) = 3m_2 v_f \cos\theta + m_2 v_f \cos\theta = 4m_2 v_f \cos\theta$

$v_f \cos\theta = 0.750$

P_y: $m_2(5.00) = 3m_2 v_f \sin\theta + m_2 v_f \sin\theta = 4m_2 v_f \sin\theta$

$v_f \sin\theta = 1.25$

$$v_f = \sqrt{(v_f \sin\theta)^2 + (v_f \cos\theta)^2} = \sqrt{(5/4)^2 + (3/4)^2}$$

$$v_f = \frac{\sqrt{34}}{4} = 1.46 \text{ m/s}$$

4a The units are correct and they balance.
The answer is reasonable because it is between 1.00 m/s and 5.00 m/s.