P#45a

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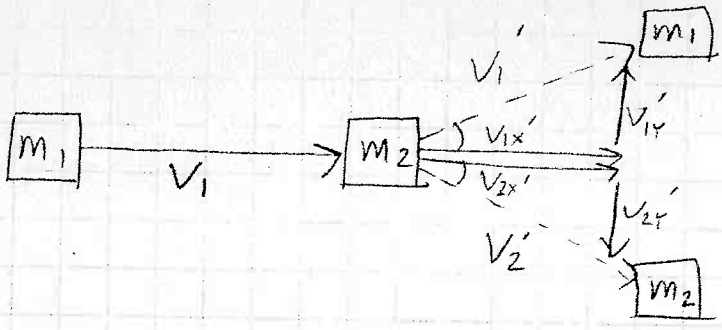
$m_1 = m_2$

$V_1 = 5.00\ m/s$

$\theta_1 = 0°$

$V_1' = 4.33\ m/s$

$\theta_1' = 30°$



In x direction:

$$p_{1x} + p_{2x} = p_{1x}' + p_{2x}'$$

$$m_1 v_{1x} + m_2 v_{2x} = m_1 v_{1x}' + m_2 v_{2x}'$$

$$m_1 \cdot (5.0\ m/s) + 0 = m_1 \cdot V_1' \cdot \cos\theta + m_2 \cdot V_{2x}'$$

$$5.0\ m/s = (4.33\ m/s) \cdot \cos 30° + V_{2x}'$$

$$V_{2x}' = 1.25\ m/s$$

In y direction:

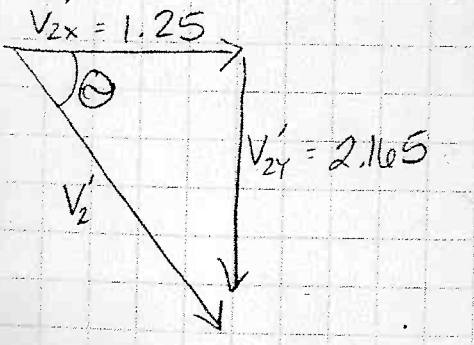
$$p_{1y} + p_{2y} = p_{1y}' + p_{2y}'$$

$$m_1 v_{1y} + m_2 v_{2y} = m_1 v_{1y}' + m_2 v_{2y}'$$

$$0 + 0 = V_1' \cdot \sin\theta + V_{2y}'$$

$$= (4.33\ m/s) \cdot \sin 30° + V_{2y}'$$

$$V_{2y}' = -2.165\ m/s$$



$$V_2' = \sqrt{V_{2x}'^2 + V_{2y}'^2}$$

$$= \sqrt{(1.25)^2 + (2.165)^2}$$

$$\boxed{V_2' = 2.5\ m/s}$$

$$\theta = \tan^{-1}\left(\frac{2.165}{1.25}\right)$$

$$\boxed{\theta = 60°}$$