P #41a

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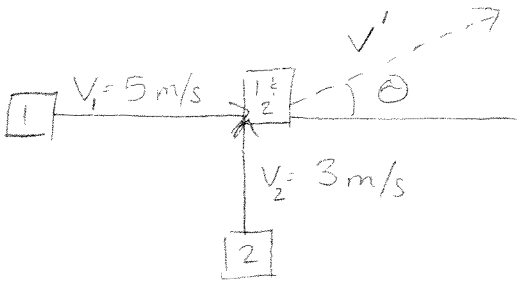
$m_1 = 90\ kg$
$v_1 = 5.0\ m/s$, east

$m_2 = 95\ kg$
$v_2 = 3.0\ m/s$, north

$v' = ?$



x direction: $p_{1x} + p_{2x} = p_x'$

$m_1 \cdot v_{1x} + m_2 \cdot v_{2x} = (m_1 + m_2) \cdot v_x'$

$v_{1x} = 5.0\ m/s$
$v_{2x} = 0\ m/s$

$(90\ kg)(5.0\ m/s) + (95\ kg)(0\ m/s) = (90\ kg + 95\ kg) \cdot v_x'$

$v_x' = 2.43\ m/s$

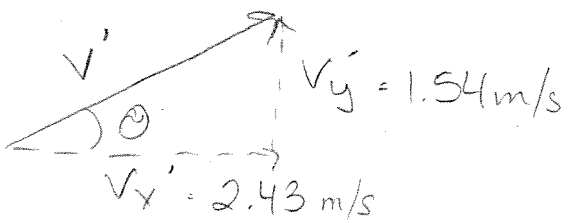
y direction: $m_1 \cdot v_{1y} + m_2 \cdot v_{2y} = (m_1 + m_2) \cdot v_y'$

$v_{1y} = 0\ m/s$
$v_{2y} = 3\ m/s$

$(90\ kg)(0\ m/s) + (95\ kg)(3\ m/s) = (90\ kg + 95\ kg) \cdot v_y'$

$v_y' = 1.54\ m/s$

From trigonometry:



Find v'

$v_x'^2 + v_y'^2 = v'^2$

$(2.43\ m/s)^2 + (1.54\ m/s)^2 = v'^2$

$\boxed{v' = 2.9\ m/s}$

Find θ

$\tan\theta = \frac{v_y'}{v_x'} = \frac{1.54\ m/s}{2.43\ m/s}$

$\boxed{\theta = 32°}$