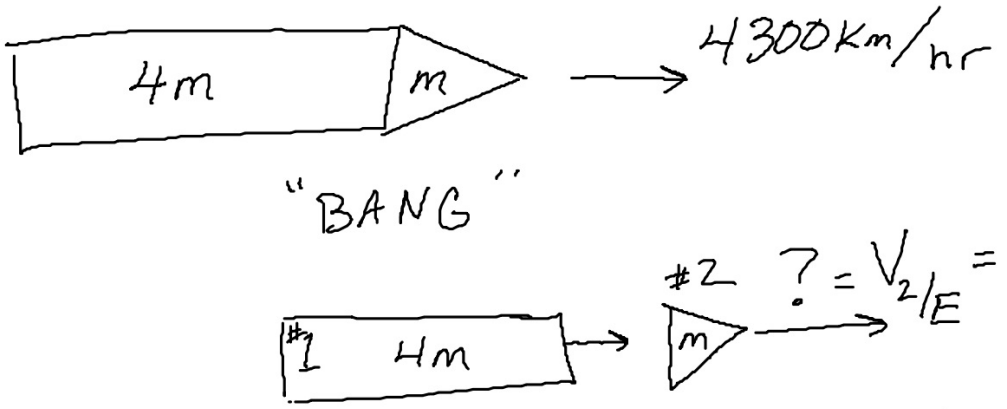
40.



For the "BANG", $\Sigma F_{ext} = 0$, so $\vec{P}_0 = \vec{P}_f$

$$(5m)V_0 = (4m)V_{1/E} + (m)V_{2/E}$$

$$V_{1/E} = V_{1/2} + V_{2/E}$$

$$= -82 + V_{2/E}$$

$$5m\left(\frac{4300}{3.6}\right) = 4m\left(\frac{-82 + V_{2/E}}{3.6}\right) + m\left(\frac{V_{2/E}}{3.6}\right)$$

$$5(4300) = 4\left(-82 + V_{2/E}\right) + V_{2/E}$$

$$21500 = -328 + 4V_{2/E} + V_{2/E}$$

$$21828 = 5V_{2/E}$$

$$4366 \frac{km}{hr} = V_{2/E}$$

46. $V_0 = ?$ $\sum F_{ext} = 0$ so $\vec{P}_0 = \vec{P}_f$

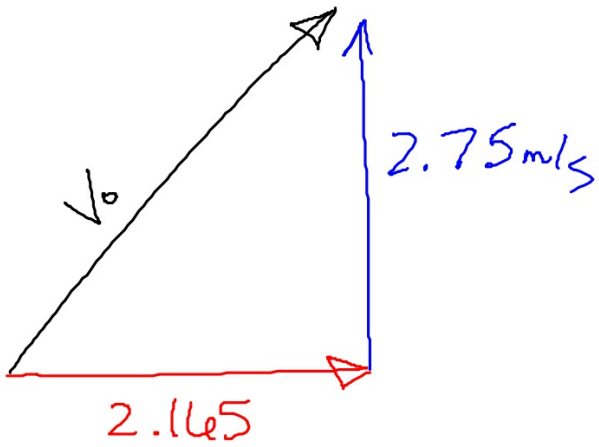
either:

$$M V_{com} = m_1 V_{1_f} + m_2 V_{2_f} \quad \text{or} \quad M V_0 = m_1 V_{1_f} + m_2 V_{2_f}$$

$$(4) V_0 = (2)\left(0\hat{i} + 3\,m/s\,\hat{j}\right) + (2)\left(4.33\,m/s\,\hat{i} + 2.5\,m/s\,\hat{j}\right)$$

$$4\,V_0 = \left(8.66\hat{i} + 11\hat{j}\right) kg\,m/s$$

$$V_0 = 2.165\,m/s\,\hat{i} + 2.75\,m/s\,\hat{j}$$



$V_0 = 3.5 m/s$ (just magnitude)