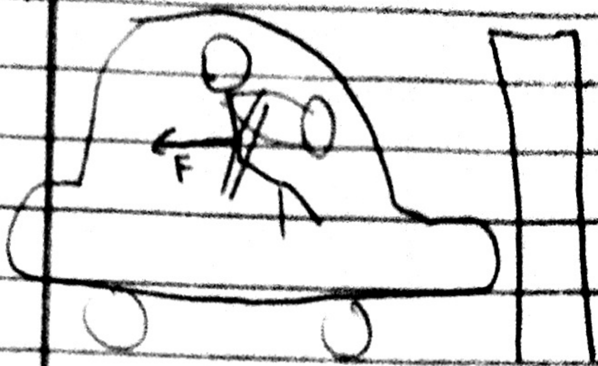
1.



$V_o = 25\ m/s$
$m_o = 75\ kg$
$t = 0.1s$

$P_o = M_o \times V_o$
$P_o = (75\ kg) \times (25\ m/s)$
$P_o = 1,875\ kg\,m/s$

$P_f = M_f \times V_f$
$P_f = 75\ kg \times 0\ m/s$
$P_f = 0$

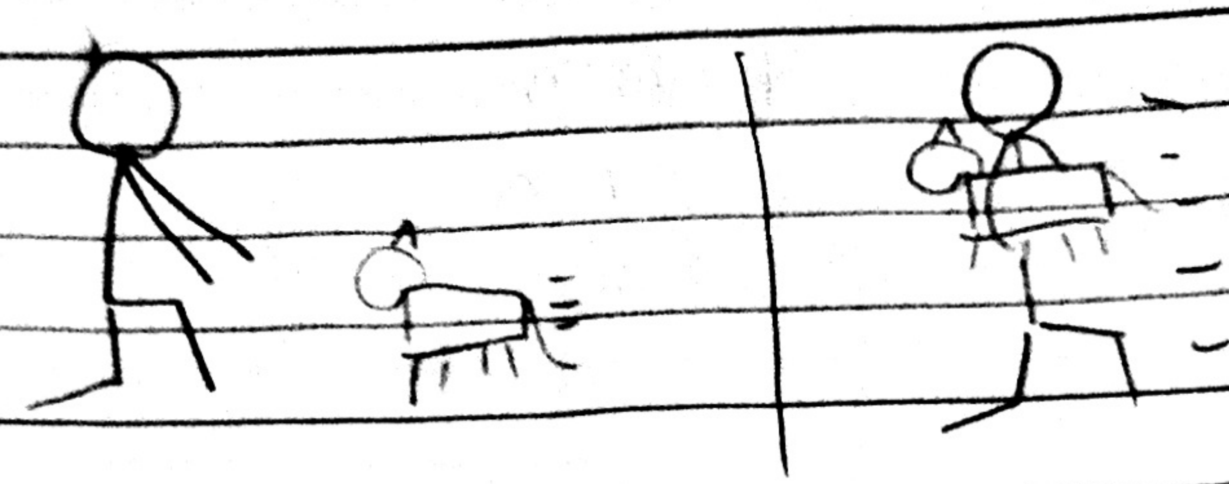
Impulse, defined as the product of the average force acting on the object and the time the force acts it also equals how much an objects momentum changes.

$I = F(t) = \nabla P$

$\nabla P = P_f - P_o$
$\nabla P = -1,875\ kg\,m/s$

$F(t) = -1875\ kg\,m/s$
$F = -\frac{1875}{0.1s}$

$F = -18,750\ N$



Perfectly inelastic collision

$P_o = \cancel{P_{os}} + P_{od}$

$P_{od} = M_d V_{od}$

$P_{od} = (15 kg) \times (3 m/s)$

$\boxed{P_{od} = 45 kg\,m/s}$

$P_o = 45 kg\,m/s \ (-x)$

$P_f = P_o$

$P_f = (M_s + M_d) \cdot V_f$

$P_f = (40 kg + 15 kg) \cdot V_f$

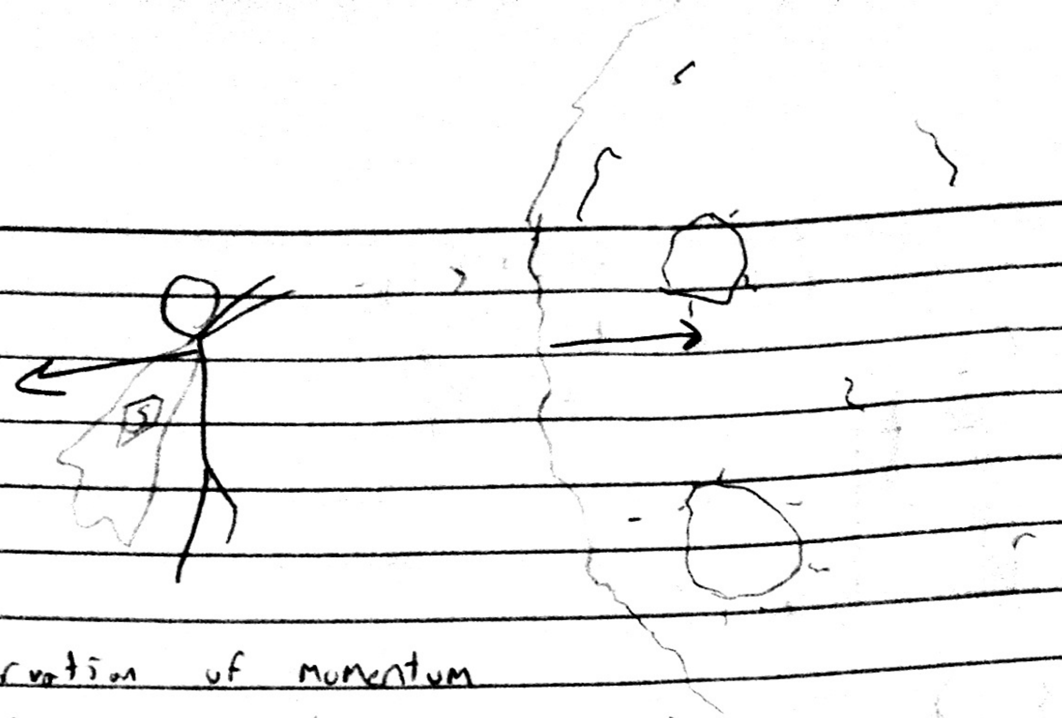
$P_f = 55 kg \cdot V_f$

$45 kg\,m/s \ (-x) = 55 kg \cdot V_f$

$V_f = \frac{45 kg\,m/s}{55 kg}$

$\boxed{V_f = 0.818 m/s \ (-x)}$

3.



Conservation of momentum
actual mass of superman and asteroid
don't matter.

$m_a = 1{,}000\, m_s$
$V_{os} = 0\ m/s$
$V_{oa} = 0\ m/s$
$V_{fa} = 800\ m/s$

$P_o = P_{os} + P_{oa}$

$\boxed{P_o = 0}$

$P_f = (m_a \cdot V_{fa}) + (m_s \cdot V_{fs})$

$P_f = (1000 m_s \cdot 800\ m/s) + (m_s \cdot V_{fs})$
$(1000 m_s \cdot 800\ m/s) = -(m_s \cdot V_{fs})$
$800{,}000 m_s\ m/s = -V_{fs} m_s$

$800{,}000\ m/s = -V_{fs}$
$\boxed{V_{fs} = -800{,}000\ m/s}$