WKst - Intro Momentum + Impulse
AP Physics - Unit 5

(1) Given:

$m = 40\ kg$ Impulse $= F\Delta t = ?$

$V_i = 18\ m/s$ North

$V_f = 22\ m/s$ South

Soln: $F\Delta t = \Delta P$

$= m(V_f - V_i) = (0.40\ kg)(-22\ m/s - 18\ m/s)$

$F\Delta t = -16\ kg \cdot m/s$ or $16\ kg \cdot m/s$ South

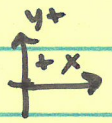
(2) Given:

$m = 0.50\ kg$

$F = +3.00\ N$

$\Delta t = 1.50\ s$

$V_i = 0\ m/s$



A) $V_f = ?$

$F\Delta t = mV_f - mV_i$ ($V_i = 0$)

$V_f = \frac{F\Delta t}{m} = \frac{(3.00\ N)(1.50\ s)}{0.50\ kg}$

$V_f = 9.0\ m/s$ Right

B) $V_f = V_i = +9.0\ m/s$

$F = 4.00\ N$ Left $= -4.00\ N$

$\Delta t = 3.0\ s$

$V_f = ?$

$F\Delta t = \Delta P = mV_f - mV_i$

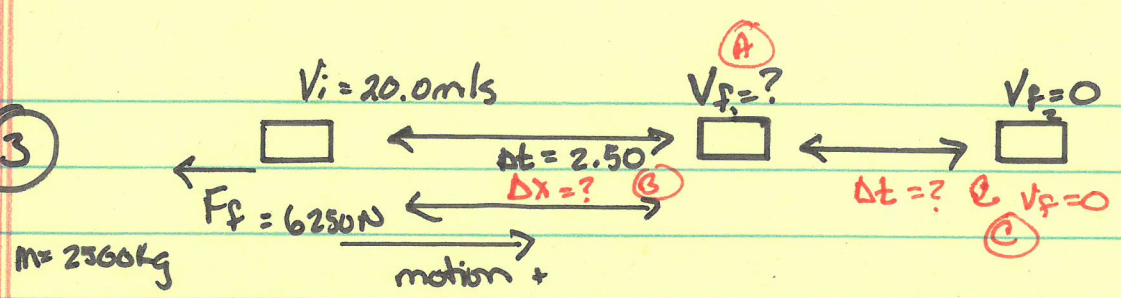
$V_f - V_i = \frac{F\Delta t}{m}$

$V_f = \frac{F\Delta t}{m} + V_i$

$= \frac{(-4.00\ N)(3.00\ s)}{0.50\ kg} + 9.0\ m/s$

$V_f = 15\ m/s$ or $15\ m/s$ Left

(3)



(A) $V_{f_1} = ?$

$F\Delta t = \Delta P = mV_{f_1} - mV_i$

$V_f - V_i = \frac{F\Delta t}{m}$

$V_f = \frac{F\Delta t}{m} + V_i$

$= \frac{(-6250\,N)(2.50\,s)}{2500\,kg} + 20.0\,m/s$

$V_f = 14\,m/s$ North

(B) $\Delta x = ?$

$\Delta x = \frac{1}{2}(V_i + V_f)\Delta t$

$= \frac{1}{2}(20.0 + 14\,m/s)(2.50\,s)$

$\Delta x = 43\,m$ North

(C) $\Delta t = ?$ till $V_f = 0$

$F\Delta t = mV_f - mV_i$

$\Delta t = \frac{-mV_i}{F}$

$= -\frac{(2500\,kg)(20.0\,m/s)}{-6250\,N}$

$\Delta t = 8.0\,s$