#83

$m = 3.00\,kg$

$F = 6.00\,N$

$\Delta t = 10.0\,s$

(i) $\Delta p =$ ____ $\frac{kg\,m}{s}$ (Ns)

(ii) $\Delta V =$ ____ $\frac{m}{s}$

(i) $\Delta p = F\Delta t$

$= (6.00\,N)(10.0\,s)$

$\boxed{\Delta p = 60.0\,Ns}$

(i) $\frac{\Delta p}{m} = \frac{m\Delta V}{m}$

$\Delta V = \frac{\Delta p}{m}$

$= \frac{(60.0)\,\frac{kg\,m}{s}}{3.00\,kg}$

$\boxed{\Delta V = 20.0\,\frac{m}{s}}$

#84

$m = 625\,kg$

$V_i = 10.0\,\frac{m}{s}$

$V_f = 44.0\,\frac{m}{s}$

$\Delta t = 68.0\,s$

(a) $\Delta p =$ ____

(b) $F =$ ____

(a) $\Delta p = m(V_f - V_i)$

$= 625\,kg\,(44.0 - 10.0)\,\frac{m}{s}$

$= 21250\,\frac{kg\,m}{s}$

$\Delta p = 21300\,\frac{kg\,m}{s}$

$\Delta p = 2.13 \times 10^4\,\frac{kg\,m}{s}$

$\frac{\Delta p}{\Delta t} = \frac{F\Delta t}{\Delta t}$

(b) $F = \frac{\Delta p}{\Delta t}$

$F = \frac{21300\,Ns}{68.0\,s}$

$F = 312.5\,N$

$\boxed{F = 313\,N}$

#85

$m = 845\,kg$

$v_i = 0.00\frac{m}{s}$ (@ rest)

$v_f = 100\frac{km}{h}$ *convert* $\left\{ \frac{100\,km}{h} \cdot \frac{1000\,m}{1\,km} \cdot \frac{1\,h}{3600\,s} = 27.7\frac{m}{s} \right.$

$\Delta t = 0.90\,s$

(a) $\Delta p = m(v_f - v_i)$

$= 845\,kg\,(27.7 - 0.00)\frac{m}{s}$

$= 23472\,\frac{kg\,m}{s} \approx 23500\,\frac{kg\,m}{s}$

$\Delta p = 23500\,\frac{kg\,m}{s} = 2.35 \times 10^4\,\frac{kg\,m}{s}$

(b) $\frac{\Delta p}{\Delta t} = \frac{F\Delta t}{\Delta t}$

$F = \frac{\Delta p}{\Delta t} = \frac{23500\,N}{0.90\,s}$

$F = 26{,}000$

#86 C ⇒ puck D ⇒ jacket

$m_C = 0.115\,kg$

$m_D = 0.365\,kg$

$v_{Ci} = 35.0\frac{m}{s}$

$v_{Di} = 0.00\frac{m}{s}$

stick together

$v_{Cf} = v_{Df} = v_f$

$m_C v_{Ci} + m_D v_{Di} = m_C v_{Cf} + m_D v_{Df}$

$m_C v_{Ci} + m_D v_{Di} = m_C v_f + m_D v_f$

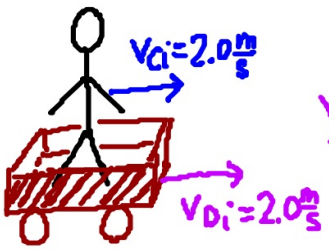
$\frac{m_C v_{Ci} + m_D v_{Di}}{(m_C + m_D)} = v_f \frac{(m_C + m_D)}{(m_C + m_D)}$

$\frac{(0.115\,kg)(35.0\frac{m}{s}) + (.365\,kg)(0.00\frac{m}{s})}{(0.115\,kg + 0.365\,kg)} = v_f$

$v_f = 8.39\frac{m}{s}$

#87 woman ⇒ C, cart ⇒ D (-) West ⟷ East (+)

(a) Before



After

$m_C = 50.0\,kg$

$m_D = 10.0\,kg$

$v_{Ci} = 2.0\frac{m}{s}$, East

$v_{Di} = 2.0\frac{m}{s}$, East

$v_{Cf} = 7.0\frac{m}{s}$, East

$v_{Df} = \_\_\_\_\frac{m}{s}$, ____

unknown

(b) $m_C v_{Ci} + m_D v_{Di} = m_C v_{Cf} + m_D v_{Df}$

$$v_{Df} = \frac{m_C v_{Ci} + m_D v_{Di} - m_C v_{Cf}}{m_D}$$

$v_{Df} = -23\frac{m}{s}$ or $23\frac{m}{s}$, West