Q #2,4,8 & P# 2,4,8,12

Q2

F_1 - 12 N

t_1 - 2.0s

m_1 - 1m

$(V_1)_i$ - 0 m/s "from rest"

F_2 - 15N

t_2 - 3.0s

m_2 - 2m

$(V_2)_i$ - 0 m/s

$$\Delta p = J$$

F t

$$(V_1)_f = \frac{(12N)(2.0s)}{m}$$

$$(V_1)_f = \frac{24\ N \cdot s}{m}$$

$$(V_2)_f = \frac{(15N)(3.0s)}{2m}$$

$$\frac{45\ N \cdot s}{2m}$$

$$(V_2)_f = \frac{22.5\ N \cdot s}{m}$$

Object #1 has greater speed

☆ Object 2 had more "time" and it was more "Massive"

Q #4

$$\Delta x = \frac{1}{2} a_x (\Delta t)^2$$

m_1 - m kg

m_2 - 4m kg

F - equal (pretend 2N)

x - 1m

$$\Delta t = \sqrt{\frac{2(\Delta x)}{a_x}}$$

$$= \sqrt{\frac{2(1m)}{a_x}} \longleftarrow \frac{F}{m} \text{ pretend } \frac{2}{1} = 2$$

Puck 1

$$= \sqrt{\frac{2(1m)}{2m/s^2}}$$

$$= \sqrt{1}$$

$$= 1 s$$

$$= \sqrt{\frac{2(1)}{a_x}} \longleftarrow \frac{F}{m} \text{ pretend } \frac{2}{4} = 0.5$$

Puck 2

$$= \sqrt{\frac{2(1)}{0.5}}$$

$$= \sqrt{4}$$

$$= 2s$$

a) Puck 2

b) $p = \underset{\text{same}}{F}\,\underset{2x}{(t)}$

Smaller puck = less momentum

★ larger puck = greater momentum

Q#8

☆ impulse same w/ or w/out crumple zone

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

same

decrease w/crumple zone

w/crumple zone = more time

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

P #2

m - ~~57g~~ 0.057kg

v_f - 45m/s

v_i - 0 m/s

Δp - ?

$$\Delta p = p_f - p_i = p_f = m(v_f)$$

$$J = m(v_f - v_i)$$

$$= 0.057\,kg\,(45m/s - 0m/s)$$

$$= 0.057(45)$$

$$\boxed{= 2.565\ kg \cdot m/s}$$

P #4

J_x = area under the $f_x(t)$ curve between t_i and t_f

$$6.0\ N \cdot S = \frac{1}{2}(f_{max})(8ms)$$

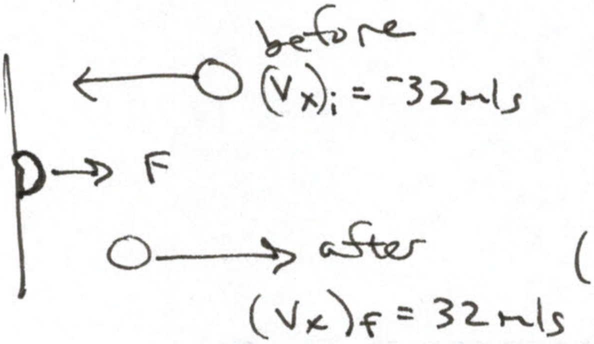
$$\boxed{F_{max} = 1500N}$$

or Impulsive force linear function of time

$$0.5\,F_{max}(6ms) + 0.5\,F_{max}(2ms)$$

$$F_{max} = 1500N$$

P #8



$$(\underset{m\ \ v}{P_f})_x = (\underset{m\ \ v}{P_i})_x + J_x$$

$$(0.06\text{kg})(32\text{m/s}) = (0.06\text{kg})(-32\text{m/s}) + \text{area under force graph}$$

m - ~~60g~~ 0.06kg

v_i - 32m/s

F_{max} - ?

$$\text{area under force graph} = \frac{1}{2}F_{max}(0.002s) + F_{max}(0.002s) + \frac{1}{2}F_{max}(0.002s) = (0.004s)F_{max}$$

$$F_{max} = \frac{(0.06\text{kg})(32\text{m/s}) + (0.06\text{kg})(32\text{m/s})}{0.004s}$$

$$\frac{3.84}{0.004}$$

$$\boxed{F_{max} = 960N}$$

P #12

m - ~~145g~~ 0.145kg

V_i - 15m/s

V_f - $^-20$m/s

t - ~~1.5ms~~ 0.0015s

a) $J_x = \underset{m \quad v}{(p_x)_f} - \underset{m \quad v}{(p_x)_i}$

$(0.145\text{kg})(^-20\text{m/s}) - (0.145\text{kg})(15\text{m/s})$

$^-2.9 \quad - \quad 2.175$

$^-5.075 \text{ kg}\cdot\text{m/s}$

b) $(F_x)_{avg} = \dfrac{J_x}{\Delta t}$

$$\frac{-5.075 \text{ kg}\cdot\text{m/s}}{0.0015\text{s}}$$

$$\boxed{= {}^-3400\text{N}}$$