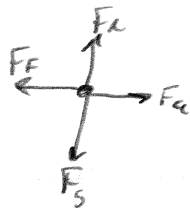



Phy

Dynamics: Motion & Force WS

1) 

$F = 225 \text{ N}$
 $a = 2.20 \text{ m/s}^2$
 $m = ?$

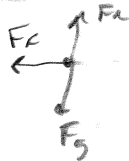
$$m = \frac{F}{a} = \frac{225 \text{ N}}{2.20 \text{ m/s}^2} = 102 \text{ kg}$$

2) $0 \rightarrow v$ 

$m = 90 \text{ g} = .0090 \text{ kg}$
 $a = 1000 \text{ g/s}^2 = 9.8 \times 10^4 \text{ m/s}^2$

$$F = ma = (.0090 \text{ kg})(9.8 \times 10^4 \text{ m/s}^2)$$

$$F = 880 \text{ N}$$

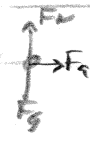
3) $0 \rightarrow v +$ 

$m = 1200 \text{ kg}$
 $\Delta t = 7.0 \text{ s}$
 $v_0 = 90 \text{ km/h} = 25 \text{ m/s}$
 $F = ?$

$$a = \frac{\Delta v}{\Delta t} = \frac{0 \text{ m/s} - 25 \text{ m/s}}{7.0 \text{ s}} = -3.57 \text{ m/s}^2$$

$$F = ma = (1200 \text{ kg})(-3.57 \text{ m/s}^2) = -4284 \text{ N}$$

$$F = -4300 \text{ N}$$

4) $0 \rightarrow v$ 

$m = 1050 \text{ kg}$
 $a = 1.20 \text{ m/s}^2$
 $F = ?$

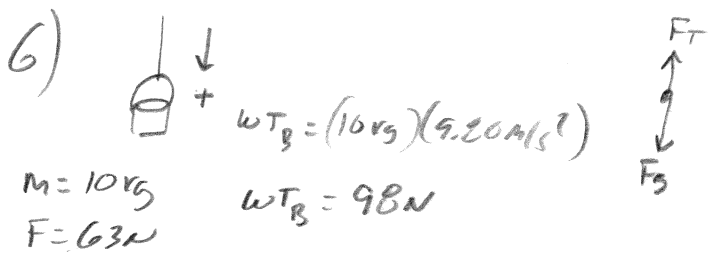
$$F = ma = (1050 \text{ kg})(1.20 \text{ m/s}^2)$$

$$F = 1260 \text{ N}$$

5) $0 \rightarrow 0$ $v^2 = v_0^2 + 2a \Delta d$

$m = .140 \text{ kg}$
 $v_0 = 45.0 \text{ m/s}$
 $\Delta d = 11.0 \text{ cm} = .110 \text{ m}$
 $F = ?$

$$a = \frac{v^2 - v_0^2}{2\Delta d} = \frac{0 \text{ m/s}^2 - (45.0 \text{ m/s})^2}{2(.110 \text{ m})} = 9204 \text{ m/s}^2$$
$$F = ma = (.140 \text{ kg})(9204 \text{ m/s}^2)$$
$$F = 1288 \text{ N} =$$
$$F = 1290 \text{ N}$$



$$W_{Tg} = (10 \text{ kg})(9.80 \text{ m/s}^2)$$

$$m = 10 \text{ kg}$$

$$F = 63 \text{ N}$$

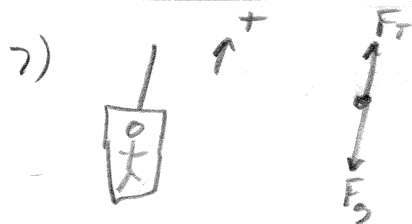
$$W_{Tg} = 98 \text{ N}$$

$$\Sigma F = ma$$

$$F_T + F_g = ma$$

$$a = \frac{F_T + F_g}{m}$$

$$a = \frac{98 \text{ N} + (-63 \text{ N})}{10 \text{ kg}} = 3.5 \text{ m/s down}$$



$$F_{MAX} = F_g + Fa$$

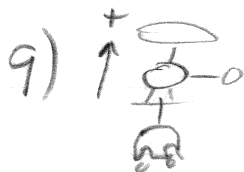
$$F_{MAX} = Mg + ma$$

$$m = 2100 \text{ kg}$$

$$F_{MAX} = 21750 \text{ N}$$

$$a = \frac{F_{MAX} - mg}{m} = \frac{21750 \text{ kg} - (2100 \text{ kg})(9.80 \text{ m/s}^2)}{2100 \text{ kg}}$$

$$a = 0.5571 \text{ m/s}^2 \quad a = 0.56 \text{ m/s}^2$$



$$F_{E_{total}} = F_g + Fa$$

$$F_E = Mg + ma$$

(A)

$$F_T = F_g + Fa$$

$$F_T = Mg + ma$$

$$= (6500 \text{ kg} + 1200 \text{ kg})(9.80 \text{ m/s}^2) + (6500 \text{ kg} + 1200 \text{ kg})(.60 \text{ m/s}^2)$$

$$F_{Total} = 80080 \text{ N}$$

$$F_T = 8.0 \times 10^4 \text{ N}$$

$$M_H = 6500 \text{ kg}$$

$$m_c = 1200 \text{ kg}$$

$$v_0 = .60 \text{ m/s}^2$$

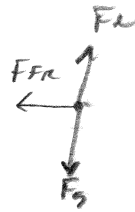
(B) $F_T = F_g + Fa$

$$F_T = Mg + Ma = M(g+a) = (1200 \text{ kg})(9.80 \text{ m/s}^2 + .60 \text{ m/s}^2)$$

$$F_T = 12480 \text{ N}$$

$$F_T = 12000 \text{ N}$$

PHYSICS: Dynamics: Motion & Force WS



$$v_0 = 4.0 \text{ m/s}$$

$$\mu = \frac{F_f}{F_N} = \frac{Ma}{Mg} = \frac{a}{g} = \dots$$

$$\mu_k = .20$$

$$\Delta d = ?$$

$$a = \mu g = (.20)(9.80 \text{ m/s}^2)$$

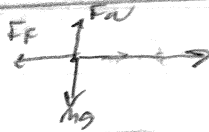
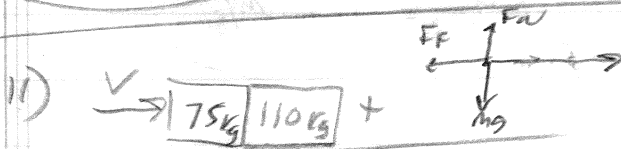
$$a = 1.96 \text{ m/s}^2$$

$$a = 1.96 \text{ m/s}^2$$

$$v^2 = v_0^2 + 2a\Delta d$$

$$\Delta d = \frac{v^2 - v_0^2}{2a} = \frac{(0 \text{ m/s})^2 - (4.0 \text{ m/s})^2}{2(-1.96 \text{ m/s}^2)} = 4.08 \text{ m}$$

$$\Delta d = 4.1 \text{ m}$$



$$\mu_k = .15$$

$$F_f = \mu F_N = (.15)(185 \text{ kg})(9.80 \text{ m/s}^2)$$

$$F_a = 730 \text{ N}$$

$$F_f = 271.9 \text{ N}$$

$$\Sigma F = ma$$

$$a = \frac{\Sigma F}{m} = \frac{730 \text{ N} + (-271.9 \text{ N})}{(185 \text{ kg})} = 2.476 \text{ m/s}^2 = 2.5 \text{ m/s}^2$$



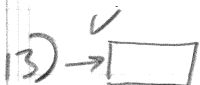
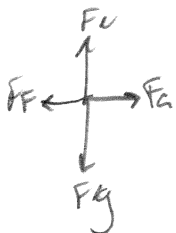
$$\mu_s = \frac{F_f}{F_N} = \frac{Ma}{Mg}$$

$$a = \mu_s g = (.75)(9.80 \text{ m/s}^2)$$

$$\mu = .75$$

$$a = -7.35 \text{ m/s}^2$$

$$a = -7.4 \text{ m/s}^2$$



$$\mu_k = .30$$

$$F_a = F_f = \mu F_N = (.30)(35 \text{ kg})(9.80 \text{ m/s}^2) = 102.9 \text{ N}$$

$$m = 35 \text{ kg}$$

$$F_a = 1.0 \times 10^2 \text{ N}$$

14) $F = ?$
 $k = 95 \text{ N/m}$
 $x = .25 \text{ m}$

$$F = -kx$$

$$F = -(-.25 \text{ m})(95 \text{ N/m})$$

$$F = 23.75 \text{ N} = 24 \text{ N}$$

15) $x = 12 \text{ cm} = .12 \text{ m}$
 $F = 24 \text{ N}$
 $K = ?$

$$F = -kx$$

$$k = -\frac{F}{x} = -\frac{-24 \text{ N}}{.12 \text{ m}} = 200 \text{ N/m} = 2.0 \times 10^2 \text{ N/m}$$

16) $L = 36.9 \text{ cm} = .369 \text{ m}$
 $T = 1.22 \text{ s}$
 $g = ?$

$$T = 2\pi \sqrt{\frac{L}{g}}$$

$$g = \left(\frac{2\pi}{T}\right)^2 L$$

$$g = \left(\frac{2\pi}{1.22 \text{ s}}\right)^2 \cdot .369 \text{ m} = 9.79 \text{ m/s}^2$$