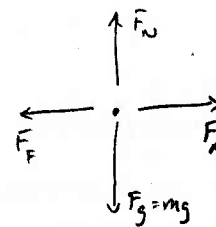


$$\mu_k = \frac{F_f}{F_N} = \frac{400.0}{1760} = .227$$

②  $m = 1.35 \text{ kg}$   
 $\mu_k = .30$



$$\Sigma F_x = F_A + F_f = ma_x$$

$$a_x = 0 \text{ m/s}^2$$

$$F_A + F_f = 0$$

$$F_A = -F_f$$

$$= \mu_k mg$$

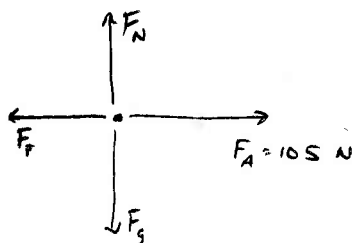
$$= (.30)(1.3)(9.80)$$

$$= 4.0 \text{ N}$$

③  $a_x = 3.0 \text{ m/s}^2$

$$F_A = 105 \text{ N}$$

$$m = 20.0 \text{ kg}$$



$$\Sigma F_x = F_A + F_f = ma$$

$$F_f = ma - F_A$$

$$= (20.0)(3.0) - 105$$

$$= 60. - 105$$

$$F_f = -45$$

$$\Sigma F_y = F_N + F_g = ma_y$$

$$F_N = -F_g$$

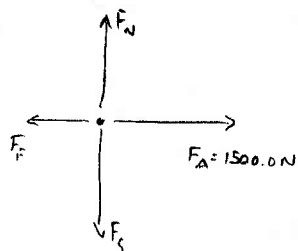
$$= -(20.0)(9.80)$$

$$= 196 \text{ N}$$

$$\mu_k = \frac{F_f}{F_N} = \frac{45}{196}$$

$$= .23$$

④



$$\Sigma F_x = F_A + F_f = ma_x$$

$$a_x = \frac{F_A + F_f}{m} = \frac{1500.0 + (-490.0)}{200.0} = 5.050 \text{ m/s}^2$$

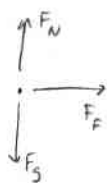
$$F_f = \mu F_N \quad F_N = F_g$$

$$= \mu_k mg$$

$$= (.250)(200.0)(9.80)$$

$$= 490. \text{ N}$$

⑤



$$\Sigma F_x = F_f = ma_x$$

$$F_f = (100.0)(3.70)$$

$$= 370. \text{ N}$$

$$F_f = \mu F_N$$

$$= \mu mg$$

$$\mu = \frac{F_f}{mg} = \frac{370.}{(100.0)(9.80)} = .378$$

$$\Sigma F_y = F_N + F_g + F_{Py} = ma_y \quad a_y = 0 \text{ m/s}^2$$

$$F_N = -F_g - F_{Py}$$

$$= -(75.0)(9.80) - (-43.3)$$

$$= 735 + 43.3$$

$$= 778 \text{ N}$$

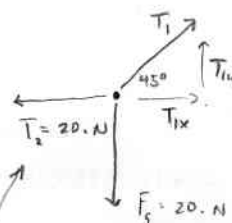
$$\Sigma F_x = F_{Ax} + F_f = ma_x \quad a_x = 0 \text{ m/s}^2$$

$$F_f = -F_{Px}$$

$$= -25.0 \text{ N}$$

$$\mu_k = \frac{25.0}{778} = .032$$

⑥



$$\Sigma F_y = T_{1y} + F_g = ma_y \quad a_y = 0 \text{ m/s}^2$$

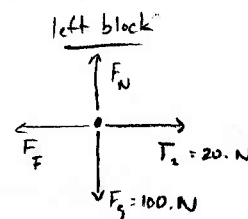
$$T_{1y} = -F_g$$

$$= -(-20.)$$

$$= 20. \text{ N}$$

$$T_{1x} = \frac{T_{1y}}{\tan 45^\circ} = \frac{20.}{\tan 45^\circ} = 20. \text{ N}$$

If  $T_{1x} = 20. \text{ N}$ , then by 3rd Law  $T_2 = 20. \text{ N}$



$$\Sigma F_x = T_2 + F_f = ma_x \quad a_x = 0$$

$$F_f = -T_2$$

$$= -20. \text{ N}$$

b) Max friction on A is

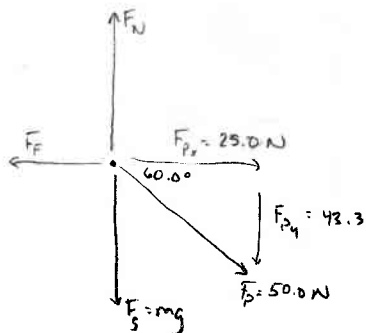
$$F_f = \mu_s F_N$$

$$= (.30)(100.) = 30. \text{ N}$$

Using same logic as a)

$$W = 30. \text{ N}$$

⑦



$$\Sigma F_x = F_{Ax} + F_f = ma_x \quad a_x = 0 \text{ m/s}^2$$

$$F_f = -F_{Px}$$

$$= -25.0 \text{ N}$$

$$\mu_k = \frac{25.0}{778} = .032$$

$$\Sigma F_x = F_f = ma_x$$

$$a_x = \frac{F_f}{m} = \frac{\mu_s mg}{m}$$

$$= (.300)(9.80)$$

$$= 2.94 \text{ m/s}^2$$

⑧

$$m = 4.00 \text{ kg}$$

$$F_A = 85.0 \text{ N}$$

$$\mu_k = ?$$

$$a_x = 6.00 \text{ m/s}^2$$

$$\Sigma F_x = F_{Ax} + F_f = ma_x$$

$$F_f = ma_x - F_{Ax}$$

$$F_f = (4.00)(6.00) - 48.8$$

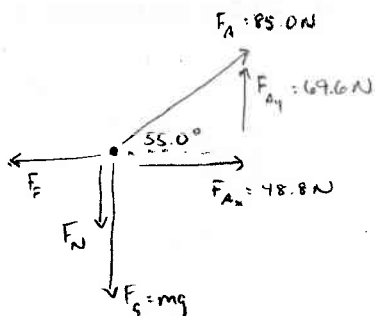
$$= -24.8 \text{ N}$$

$$\Sigma F_y = F_{Ay} + F_N + F_g = ma_y \quad a_y = 0 \text{ m/s}^2$$

$$F_N = -F_{Ay} - (-F_g)$$

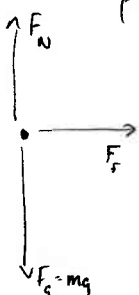
$$= -30.4 \text{ N}$$

$$\mu_k = \frac{24.8}{30.4} = .816$$



⑨  $m = 35 \text{ kg}$   
 $\mu_s = .310$

b)



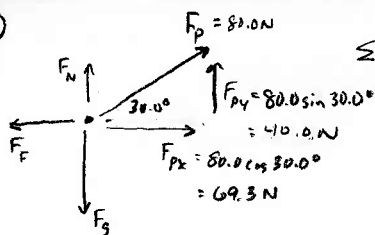
$$\Sigma F_x = F_f = ma_x$$

$$a_x = \frac{F_f}{m} = \frac{\mu_s mg}{m}$$

$$= (.300)(9.80)$$

$$= 2.94 \text{ m/s}^2$$

10.



$$\sum F_x = F_{Px} + F_F = ma_x \quad a_x = 0 \text{ m/s}^2$$

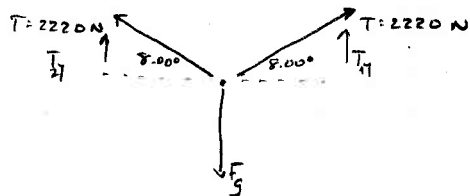
$$F_F = -F_{Px} \\ = -69.3 \text{ N}$$

$$\sum F_y = F_N + F_{Py} + F_g = ma_y \quad a_y = 0 \text{ m/s}^2$$

$$F_N = -F_{Py} - F_g \quad F_g = mg = (20.0)(9.80) = 196 \text{ N} \\ = -40.0 - (-196) \\ = 156 \text{ N}$$

$$\mu_k = \frac{F_F}{F_N} = \frac{69.3}{156} = \boxed{.444}$$

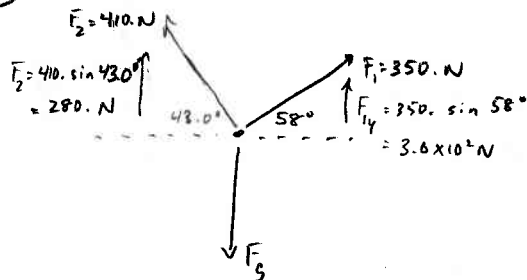
11.



$$\sum F_y = T_y + T_y + F_g = ma_y \quad a_y = 0 \text{ m/s}^2$$

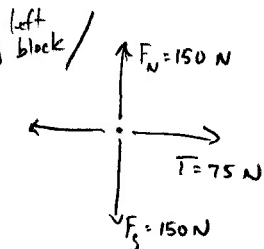
$$F_g = -2T_y \\ = -2(2220 \sin 8.00^\circ) \\ = \boxed{-618 \text{ N}}$$

22.

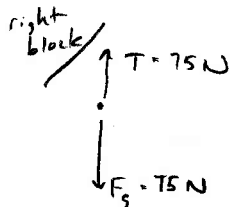


$$F_{1y} + F_{2y} = 280 + 3.0 \times 10^2 = \boxed{5.8 \times 10^2 \text{ N}}$$

26.



a)  $\boxed{F_F = 75 \text{ N}}$



b)  $F_N = 150 \text{ N}$

$$\mu_s = \frac{F_F}{F_N} = \frac{75 \text{ N}}{150 \text{ N}} = \boxed{.50}$$