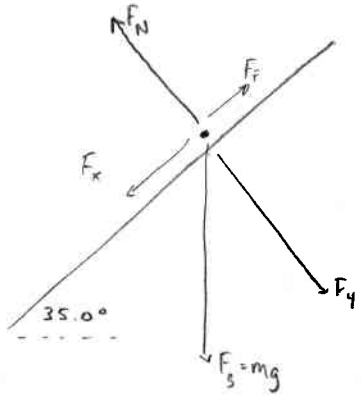
W/S #4 Odds

3.



$\Sigma F_x = F_x + F_F = ma_x$ $\quad \Sigma F_y = F_N + F_y = ma_y \quad a_y = 0\ m/s^2$

$a_x = \frac{F_x + F_F}{m}$ $\quad F_N = -F_y$

$F_x = mg \sin\theta$ $\quad = -mg\cos\theta$

$= (3.00)(9.80)\sin 35.0°$ $\quad = -(3.00)(9.80)(\cos 35.0°)$

$= 16.9\ N$ $\quad = 24.1\ N$

$F_F = \mu_k F_N$

$= (.30)(24.1)$

$= 7.2\ N$

$a_x = \frac{-16.9 + 7.2}{3.00}$

$= -3.17\ m/s^2$

$v_i = 0\ m/s$

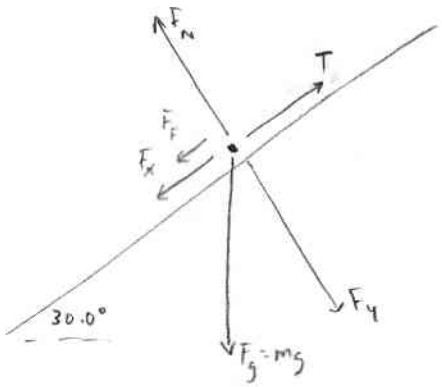
$\Delta t = ?$

$\Delta d = 4.75\ m$

$\Delta t = \sqrt{\frac{2\Delta d}{a}}$

$t = 1.73\ s$

5.



$\Sigma F_x = T + F_x + F_F = ma_x \quad a_x = .800\ m/s^2$

$T = ma_x - F_x - F_F$

$F_x = mg \sin\theta$

$= (205)(9.80)\sin 30.0°$

$= 1.00 \times 10^3\ N$

$T = (205)(.800) - (1.00\times10^3) - (-1570)$

$T = 2730\ N$

$F_N = mg\cos\theta$

$= (205)(9.80)\cos 30.0°$

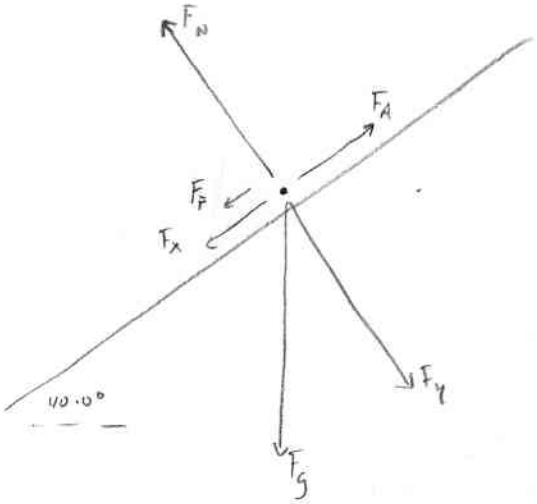
$= 1740\ N$

$F_F = \mu_k F_N$

$= (.900)(1740)$

$= 1570\ N$

7.



$\Sigma F_x = F_A + F_x + F_F = ma_x \quad a_x = 0\ m/s^2$

$F_A = -F_x - F_F$

$F_x = mg \sin\theta$

$= (60.0)(9.80)\sin 40.0°$

$= 378\ N$

a) $F_A = -(-378) - (-225)$

$F_A = 603\ N$

$\Sigma F_y = F_N + F_y = ma_y \quad a_y = 0\ m/s^2$

$F_N = -F_y$

$= mg\cos\theta$

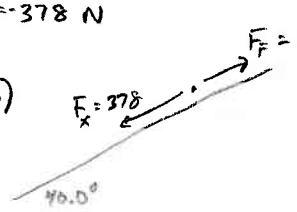
$= 450\ N$

$F_F = \mu_k F_N$

$= (.500)(450)$

$= 225\ N$

b)



$\Sigma F_x = F_x + F_F = ma_x$

$a_x = \frac{F_x + F_F}{m} = \frac{-378 + 225}{60.0}$

$= -2.55\ m/s^2$

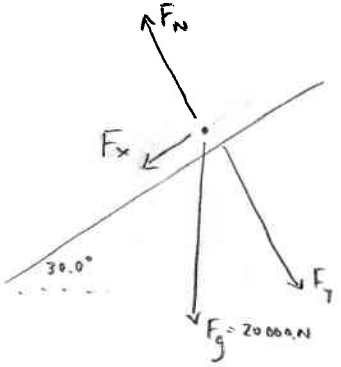
$v_i > 0$

$v_f = 7.50\ m/s$

$a = -2.55\ m/s^2$

$\Delta d =$ $\quad \Delta d = 11.0\ m$

1,



$F_x = mg \sin\theta$

$= (20\,000.) \sin 30.0°$

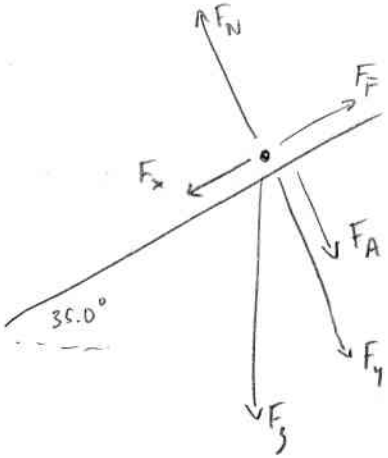
$= 10,000$

$F_x < 12\,000.\,N$

car remains at rest

9.

$\mu_s = .300$



$F_x = mg \sin\theta$

$= (3.00)(9.80) \sin 35.0°$

$= 16.9\,N$

To prevent crate from sliding the F_F needs to equal F_x. This requires a normal force of

$$F_N = \frac{F_F}{\mu_s} = \frac{16.9}{.300} = 56.3N$$

$\sum F_y = F_N + F_A + F_y = ma_y \quad a_y = 0\,m/s^2$

$F_y = mg \cos\theta$

$= (3.00)(9.80) \cos 35.0°$

$= 24.1\,N$

$F_A = -F_N - F_y$

$= -(56.3) - (-24.1)$

$= -32.2\,N$