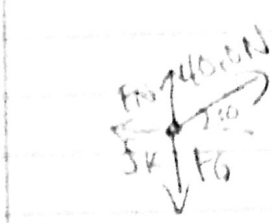
Class problem

7)



b) $\Sigma F_x = 40.0N\cos 30 - f_k$

$\Sigma F_y = 40.0N\sin 30 + F_N - F_G = 0$ ← F in all components

$40.20N + F_N - (10kg)(9.81m/s^2) = 0$

$F_N = 78.1N$

$f_k = \mu_k F_N$

$= (0.1)(78.1N) = 7.81N$

$\Sigma F_x = 34.6N - 7.81N = 26.8N$

$\Sigma F_x = ma_x \rightarrow a_x = \boxed{2.68 m/s^2}$

c) push downward: same deal, but now $40.0N\sin 30$ is negative b/c push down

$F_N = 118.1N$

$f_k = 11.8N$

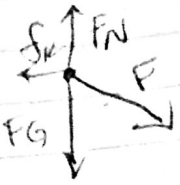
$\Sigma F_x = 34.6N - 11.8N = 22.8N$

$\boxed{a_x = 2.28 m/s^2}$

d) pull is easier. more accel, less force

Ch. 4 #s 28, 41, 48

a)



b) $\Sigma F_x = F\cos\theta - f_K = ma_x = 0$

$f_K = (88.0\,N)\cos 45 = \boxed{62.2\,N}$

c) $\Sigma F_y = F_N - F_G - F\sin\theta = ma_y = 0$

$F_N = F_G + F\sin\theta = (14.5\,kg)(9.81\,m/s^2) + (88.0\,N)(\sin 45) = \boxed{204\,N}$

d) $\text{acceleration} = \frac{\Delta v}{\Delta t} = \frac{1.5\,m/s}{2.5\,s} = 0.60\,m/s^2$

$\Sigma F_x = ma_x$

$F\cos\theta - f_K = ma_x$

$F\cos 45 - 62.2\,N = (14.5\,kg)(0.60\,m/s^2)$, $\boxed{F = 100\,N}$

41) $\Sigma F_x = F - \mu_s F_N = 0$

$\Sigma F_y = F_N - mg = 0$

$F_N = mg$

$F = \mu_s mg$

$8.0\,N = \mu_s (2.0\,kg)(9.8\,m/s^2)$ $\boxed{\mu_s = 0.41}$

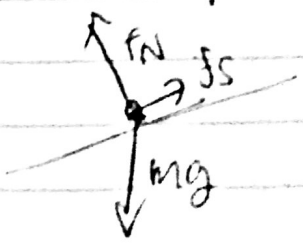
48) If car doesn't skid, friction is static. Static friction force is max. just b

$\Sigma F_{\parallel} = mg\sin\theta_{max} - \mu_s F_N = 0$ (parallel)

$\Sigma F_{\perp} = F_N - mg\cos\theta_{max} = 0$ (perpendicular)

$F_N = mg\cos\theta_{max}$

car slips



$mg\sin\theta_{max} - \mu_s mg\cos\theta_{max} = 0$

$mg\sin\theta_{max} = \mu_s mg\cos\theta_{max}$

$\mu_s = \frac{\sin\theta_{max}}{\cos\theta_{max}} = \tan\theta_{max} = 0.15$

$\theta_{max} = \tan^{-1}(0.15) = \boxed{5.5°}$ barrier is safe