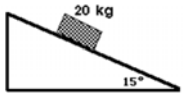
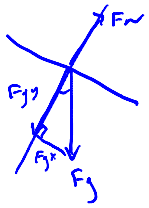
N2L ws #3

(1) 

$F_g = 196\,N$

a) 

b) $\sin 15 = \frac{F_{gx}}{196}$

$F_{gx} = 50.7\,N$

c) $\Sigma F_x = F_{gx} = F_{net} = ma$

$F_{gx} = ma$

$50.7\,N = (20\,kg)(a)$

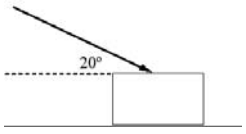
$[a = 2.54\,m/s^2]$

d) $\Delta x = 30\,m$, $a = 2.54\,m/s^2$, $v_i = 0$

$\Delta x = \frac{1}{2}a\Delta t^2 + v_i\Delta t$

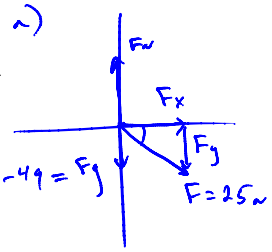
$30 = \frac{1}{2}(2.54)(\Delta t^2) + 0\Delta t$

$[\Delta t = 4.86\,s]$

(2) 

$m = 5\,kg$

$F_g = 49\,N$

a) 

b) $\cos 20 = \frac{F_x}{25}$

$[F_x = 23.49\,N]$

c) $\Sigma F_x = F_x = F_{net}$

$F_x = ma$

$23.49\,N = (5\,kg)a$

$[a = 4.7\,m/s^2]$

d) $\Sigma F_y = F_N + F_g + F_y = 0$

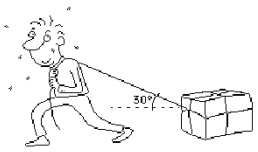
$\sin 20 = \frac{F_y}{25}$

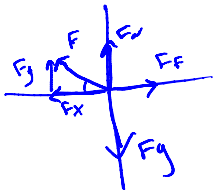
$F_y = 8.6$ (down)

$\Sigma F_y = F_N + (-49) + (-8.6) = 0$

$[F_N = 57.6\,N]$

(3)





$a = ?$ (so we 1st need F_{net})

$\Sigma F_y = F_g + F_N + F_y = 0$ → no acceleration in y-dir

$\Sigma F_x = F_x + F_f = F_{net}$

$F_{net} = ma$

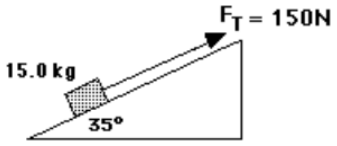
$\cos 30 = \frac{F_x}{75_N}$

$F_x = 346.4_N$

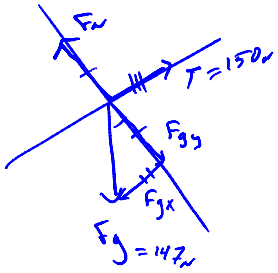
$-346.4_N + 75_N = (70_{kg})\,a$

$\boxed{a = -3.88\ m/s^2}$

(4)



$F_g = 147_N$



$\sin 35 = \frac{F_{gx}}{147}$

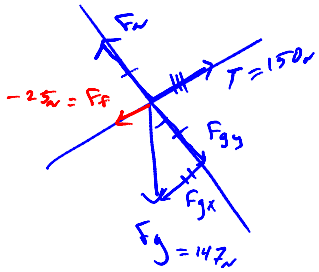
$F_{gx} = 84.3_N$ (to left)

$\Sigma F_x = F_{gx} + T = F_{net} = ma$

$-84.3_N + 150_N = (15_{kg})\,a$

$\boxed{a = 4.4\ m/s}$

(5) SAME, but now w/ 25_N Frictional Force.



$\Sigma F_x = F_f + F_{gx} + T = F_{net} = ma$

$(-25_N) + (-84.3_N) + (150_N) = (15_{kg})(a)$

$\boxed{a = 2.71\ m/s^2}$