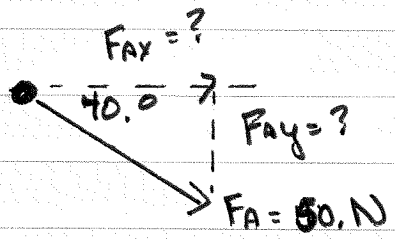
AP Physics - Unit 2
WKST: Forces @ Angles

1) Given Components?



Soln:

$F_{Ax} = F_A \cos\theta$

$= 50.N \cos 40.$

$F_{Ax} = 38$ N west

$F_{Ay} = F_A \sin\theta$

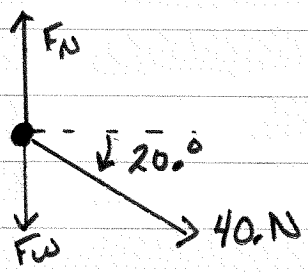
$= 50.N \sin 40.$

$F_{Ay} = 32$ N South

2) Given:

$a = ?$

$m = 20.\ kg$



Soln: $F = ma$

$\Sigma F_x = F_x = ma_x$

$F_x = F\cos\theta$

$F\cos\theta = ma_x$

$a_x = \frac{F\cos\theta}{m} = \frac{40.N \cos 20.°}{20.\ kg}$

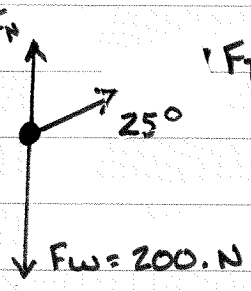
$a = 1.9\ m/s^2$ west

3) Given:

A) $a_x = ?$

B) Ice strong enough?

$F_n = ?$



$F_T = 70.N$

Soln: $\Sigma F_x = ma$

$F_T \cos\theta = ma$

$a = \frac{F_T \cos\theta}{m}$

$= \frac{(70.N)(\cos 25.°)}{20.4\ kg}$

$a = 3.1\ m/s^2$ west

weight $= mg$

$m = \frac{w}{g} = \frac{200.N}{9.8\ m/s^2}$

$m = 20.4\ kg$

Wkst: Forces at Angles

3) cont: $\Sigma F_y = F_N - F_w + F_T \sin\phi \overset{?}{=} m\cancel{a}^{0}$

$F_N = -F_T \sin\phi + F_w$

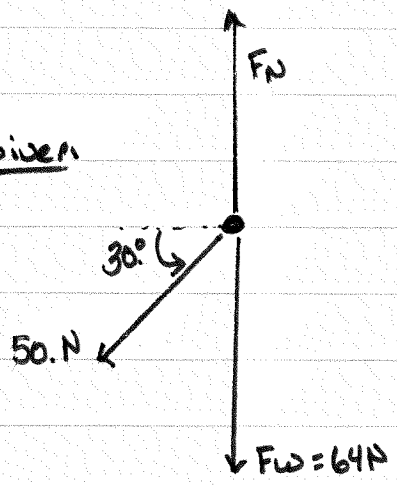
$= -70.N \sin 25^\circ + 200.N$

$= -30.N + 200.N$

$F_N = 170.N$ Amount ice needs to Push up

Sled is 200.N ∴ Sled Breaks Through Ice

4) Given



$a = ?$

Force on wheels?

Soln:

$\Sigma F_x = -F_T \cos\phi \overset{?}{=} ma$

$w = mg$

$m = \frac{w}{g} = \frac{64N}{9.8\,m/s}$

$m = 6.5kg$

$a = \frac{-F_T \cos\phi}{m}$

$a = \frac{-50.N \cos 30^\circ}{6.5\,kg}$

$a = 6.7\,m/s^2$ to East

$\Sigma F_y = F_n - F_w - F_T \sin\phi \overset{?}{=} m\cancel{a}^{0}$

$F_N = F_w + F_T \sin\phi$

$= 64N + 50.^\circ \sin 30.^\circ$

$= 64N + 25N$

$F_N = 89N$

force on All the wheels