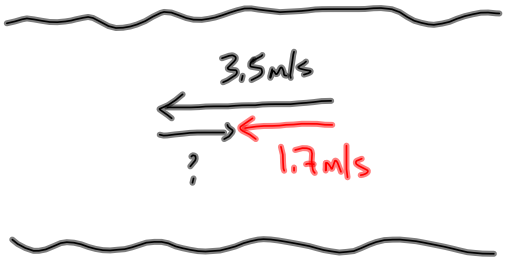
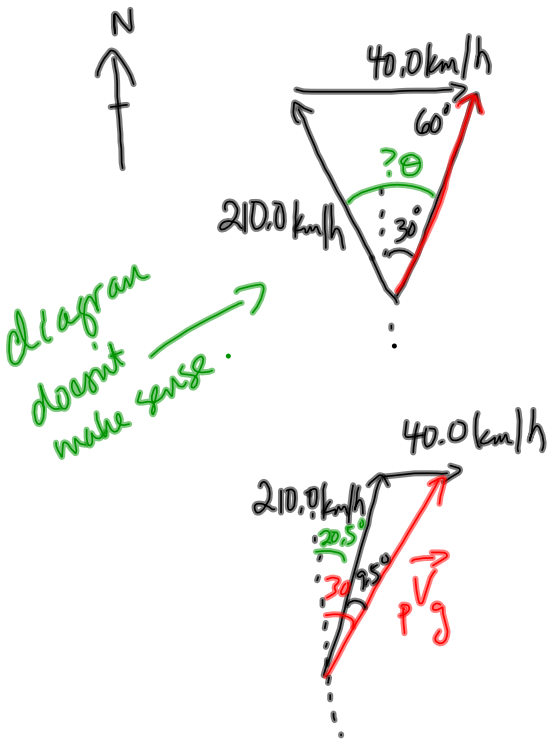
Relative Motion (PP110)

21.



23.



$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{40.0}{\sin\theta} = \frac{210.0}{\sin 60^\circ}$$

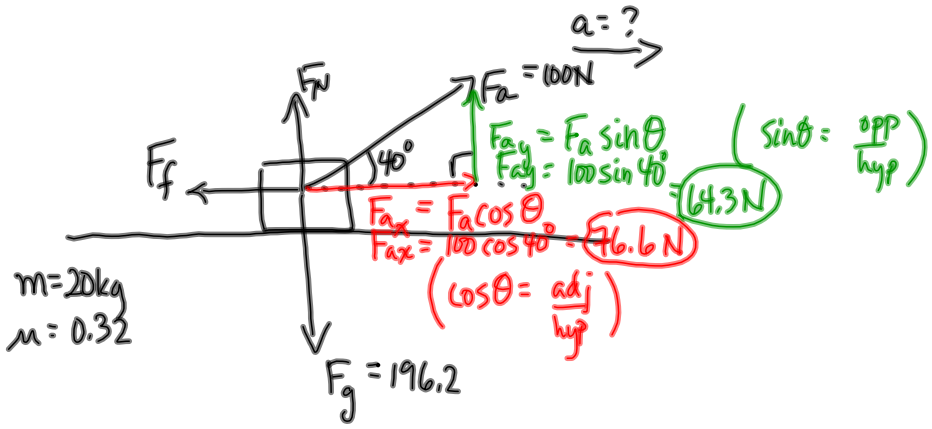
$$\sin\theta = \frac{40.0\sin 60^\circ}{210.0}$$

$$\theta \doteq 9.5^\circ$$

a) the pilot must head [N20.5°E]

Forces at Angles

SP (FOP Sheet)



vertically: $F_N + F_{ay} = F_g$

$F_N = F_g - F_{ay}$

$F_N = 196.2N - 64.3N$

$F_N = 131.9N$

* $F_N < F_g$ when pulling up at an angle.

$\therefore F_f = \mu F_N$

$F_f = 0.32(131.9N)$

$F_f = 42.2N$

$\vec{F}_{net} = m\vec{a}$

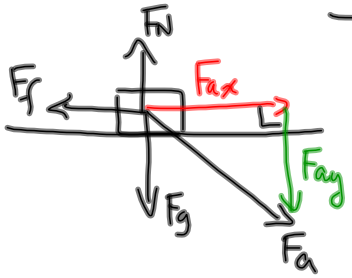
$F_{ax} - F_f = ma$

$76.6N - 42.2N = (20kg)a$

$34.4N = (20kg)a$

$a = 1.7 m/s^2$

What if you were pushing down at an angle?



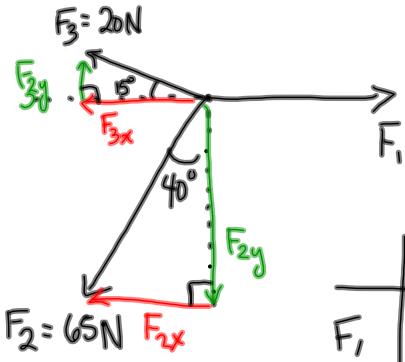
vertically:

$F_N = F_g + F_{ay}$

* This increases the normal force.

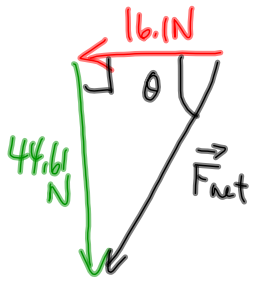
MP 1/464 - A 3-Way Tug of War

Bird's Eye View



	x	y
F_1	45N	0N
F_2	$-65\sin 40° = -41.78N$	$-65\cos 40° = -49.79N$
F_3	$-20\cos 15° = -19.32N$	$+20\sin 15° = +5.18N$
F_{net}	$-16.1N$	$-44.61N$

$\sin 40° = \frac{F_{2x}}{65N}$



$c^2 = a^2 + b^2$

$c^2 = (16.1)^2 + (44.61)^2$

$c \doteq 47.4\ N$

$\tan\theta = \frac{opp}{adj}$

$\tan\theta = \frac{44.61}{16.1}$

$\theta = \tan^{-1}\left(\frac{44.61}{16.1}\right)$

$\theta \doteq 70°$

$\vec{F}_{net} = 47N\ [W\ 70°\ S]$

$\vec{a} = \frac{\vec{F}_{net}}{m} \quad \left(\vec{F}_{net} = m\vec{a}\right)$

$\vec{a} = \frac{47N\ [W\ 70°\ S]}{65kg}$

$\vec{a} \doteq 0.72\ m/s^2\ [W\ 70°\ S]$

TO DO:

FAP Sheet (Forces at Angles)