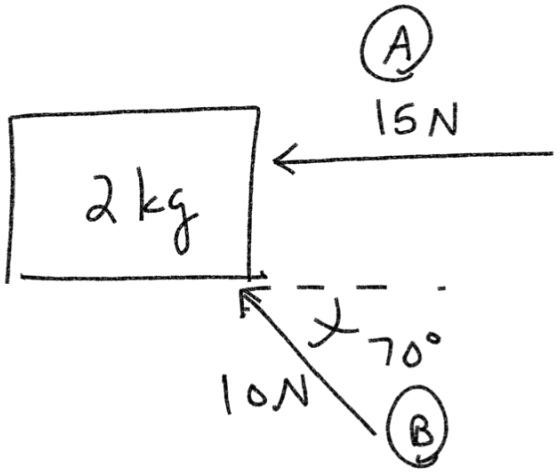
M-GP General Physics Week 25 4/1

a) Find F_{net}

b) Find acceleration.



Components

	x	y
A	$-15N$	0
B	$-10\cos 70°$	$10\sin 70$

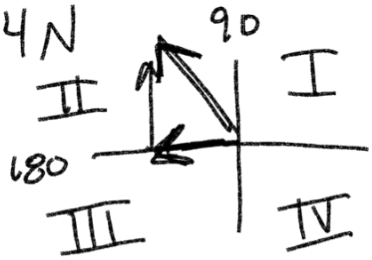
total $-15N$

$+ \quad -3.4N$

$-18.4N$

Magnitude

$9.4N$



$r = \sqrt{x^2 + y^2}$

$r = \sqrt{(-18.4)^2 + (9.4)^2} = 20.7N$

$\theta = \tan^{-1}\frac{y}{x} = \tan^{-1}\frac{9.4}{-18.4} = -27.1$

$+180$

$153°$

$F_{net} = 20.7N, 153°$

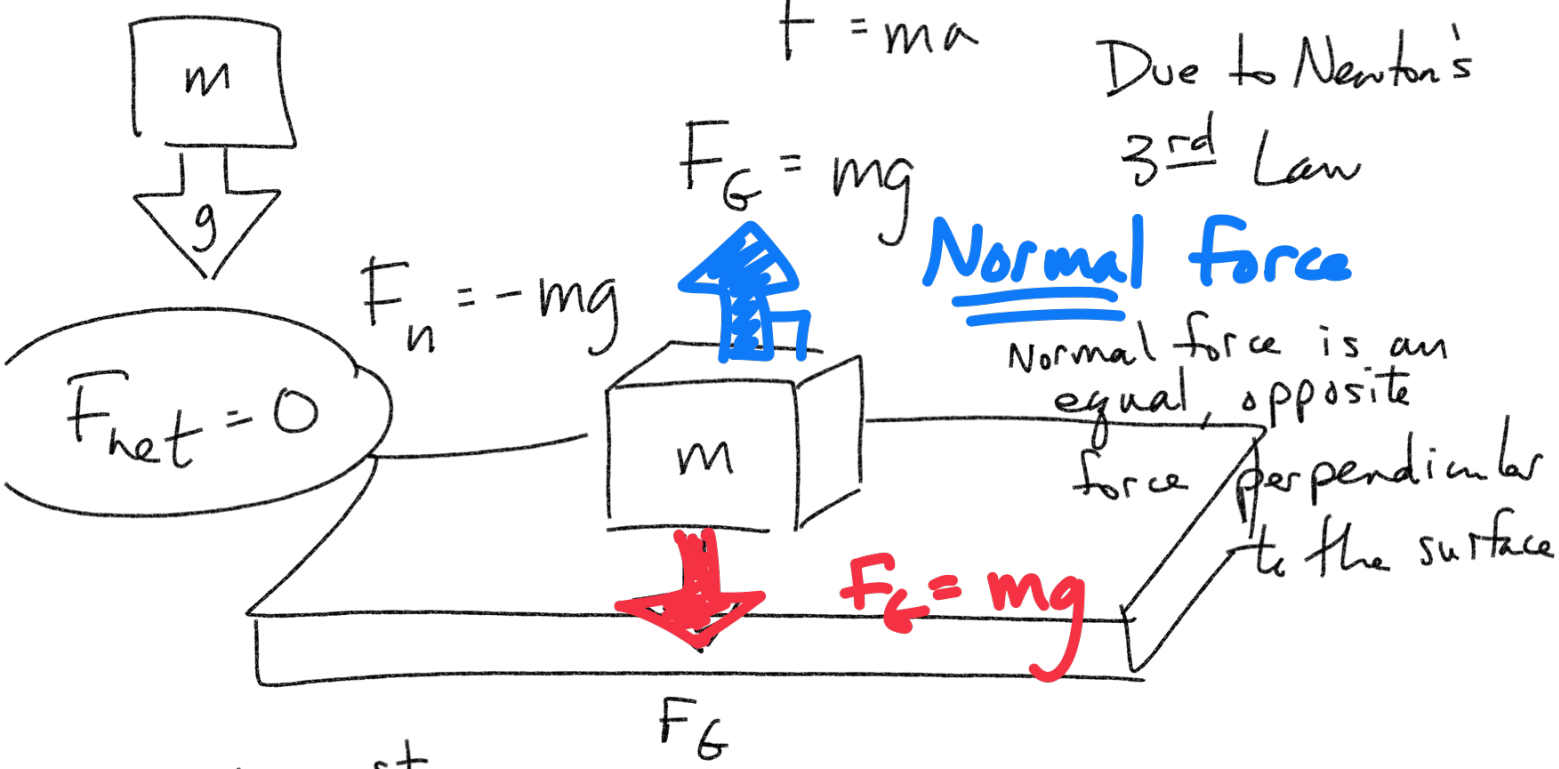
$a = \frac{F}{m}$

$= \frac{20.7N}{2kg} =$

$10.3 m/s^2, 153°$

According to Newton's 2nd Law

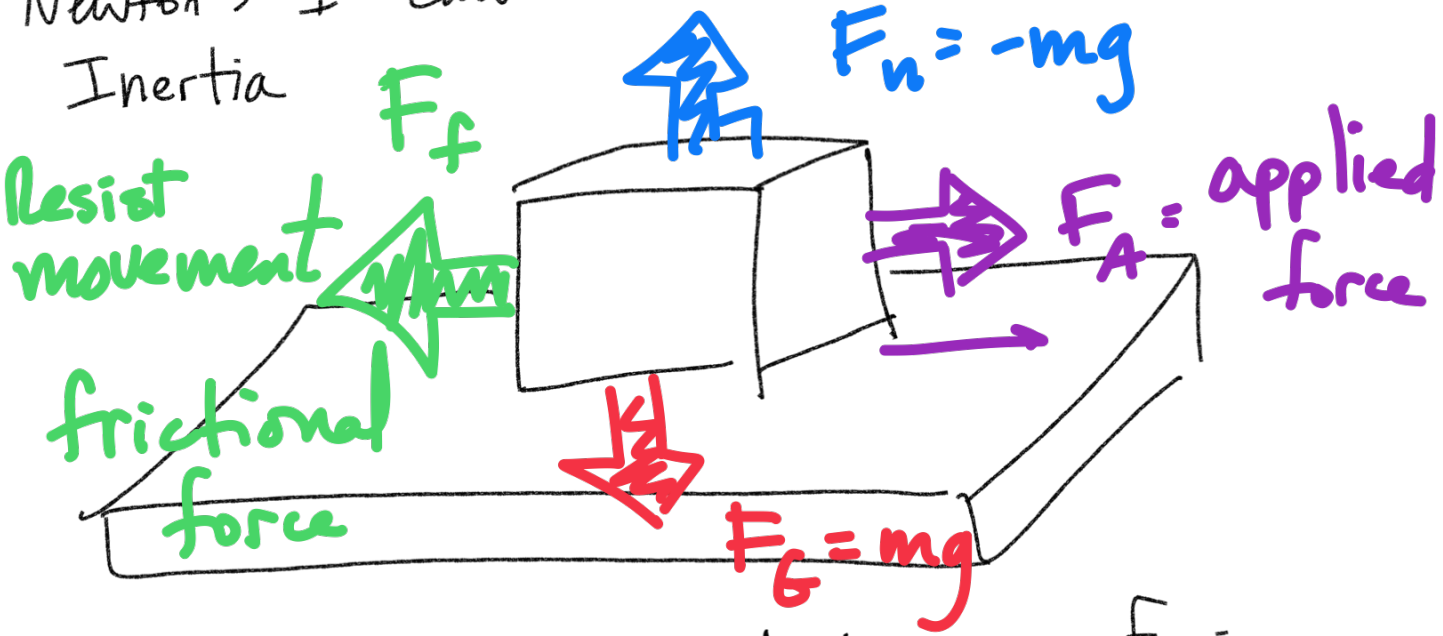
$F = ma$



Due to Newton's 3rd Law

Newton's 1st Law

Inertia



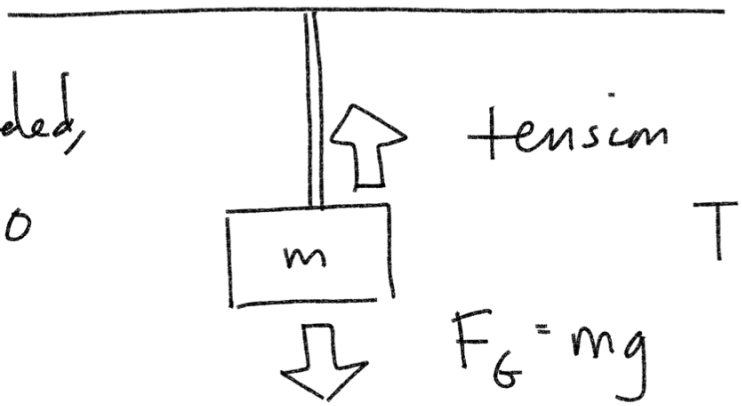
Inertia is proportional to mass $F_f = \mu mg$

friction is proportional to mass

$\mu \rightarrow$ coefficient of friction

$0 \rightarrow 1$

Rated up to 15 kN



if suspended, $F_{net} = 0$

tension

$T = -mg$

$F_G = mg$

$T = 15000\,N$

How big?

$2.2\,lbs = 1\,kg$

$g = -9.8\,m/s^2$

$T = -mg$

$15000 = -mg$

$$\frac{15000}{9.8} = \frac{+(+9.8\,m/s^2)m}{9.8}$$

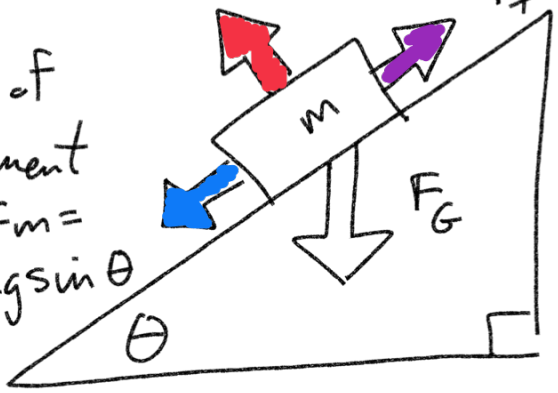
$m = 1530\,kg * 2.2 = \boxed{3,370\,lbs}$

Inclined Plane

$F_n = -mg\cos\theta$ $F_f = \mu F_n$

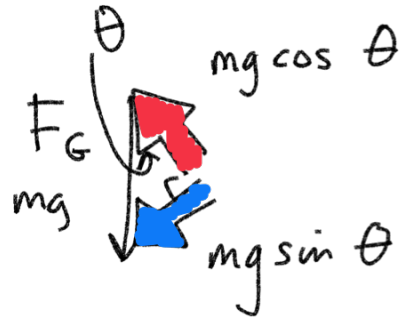
Normal force

$F_f = -\mu mg\cos\theta$

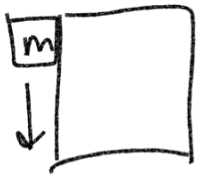


F_m = force of movement

$F_m = mg\sin\theta$



$\theta = 90°$

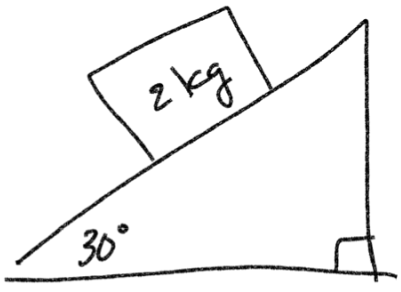


$\sin 90° = 1$ $\quad \frac{mg\sin\theta}{mg}$ $\quad F_G = mg$

$F_{n_{movement}} = mg\sin\theta$

$F_n > F_f$ block moves $\quad F_n = -mg\cos\theta$

$F_n < F_f$ block static $\quad F_f = -\mu mg\cos\theta$



$F_N = ?$

$\mu = 0$ "frictionless plane"

$F_N = -mg\cos\theta$ ($\sqrt{3}/2$)

$= (2\,kg)(9.8\,m/s^2)(\cos 30°)$

$= 16.97\,N$

$F_n = mg\sin\theta$

$(2\,kg)(-9.8\,m/s^2)(\sin 30°)$

$= -9.8\,N$

acceleration of block

$a = \frac{F}{m} = \frac{-9.8N}{2\,kg} = \boxed{-4.9\,m/s^2}$