Newton's laws

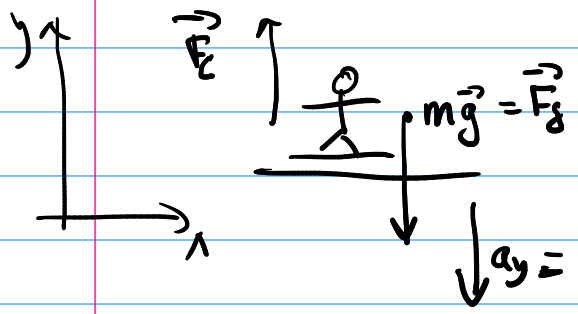
1st If net force acting on an object is zero then it will maintain its velocity.

There are reference frames where above is true. we call them **inertial** ref. frames

2nd $\vec{a} \sim \vec{F} \Rightarrow \boxed{\vec{a} = \frac{\vec{F}_{net}}{m}}$ ← mass

Weight is force: [lb] $\boxed{1\,lb \approx 4.45\,N}$ Force $N = \frac{kg \cdot m}{s^2}$

$\vec{F}_g = m\vec{g}$

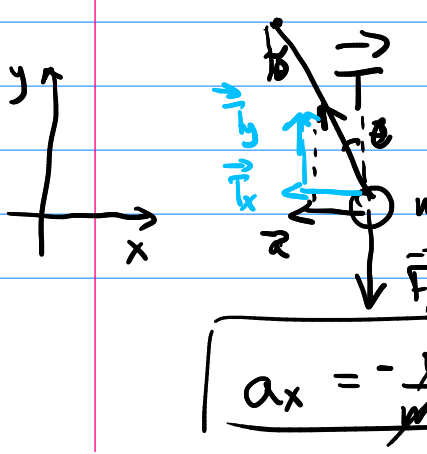


$m\vec{a} = \vec{F}_{net} = \vec{F}_c + m\vec{g}$

y: $ma_y = 0 = F_c - mg$

$a_y = -g$ $\quad ma_y = m(-g) = F_c - mg$

$\Rightarrow F_c = 0$



$m\vec{a} = \vec{F}_{net} = \sum \vec{F}_i = \vec{T} + m\vec{g}$

x: $ma_x = -T\sin\theta + 0 \Rightarrow T = -\frac{ma_x}{\sin\theta}$

y: $ma_y = T\cos\theta - mg = 0$

$-\frac{ma_x}{\sin\theta}\cos\theta - mg = 0$

$\boxed{a_x = -\frac{m}{m} g \frac{\sin\theta}{\cos\theta} = -g\tan\theta}$

3rd action = reaction

If 1st object exerts a force on a 2nd object, the 2nd object acts on 1st with the same by magnitude and opposite in direction force.