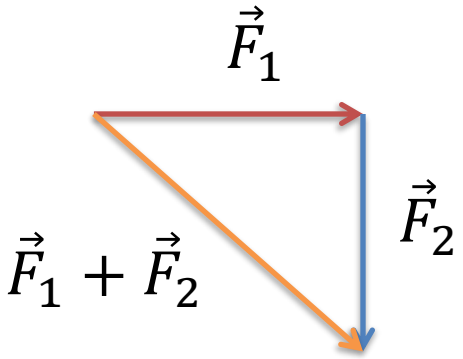
Newton's Laws. Net Force

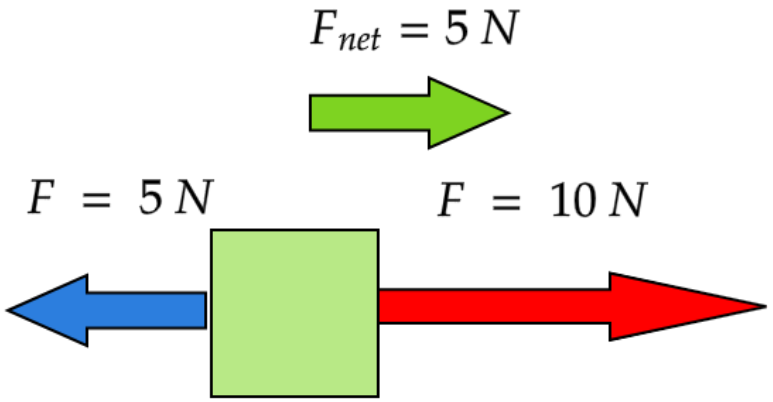
Net Force

$$\vec{F}_{net} = \vec{F}_1 + \vec{F}_2 + \cdots$$



Newton's second law

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



Net force is 5 N to the right,
the block moves to the right
as if only one force of 5 N acted
to the right

Newton's Laws. Gravity Force

Gravity Force (Weight):

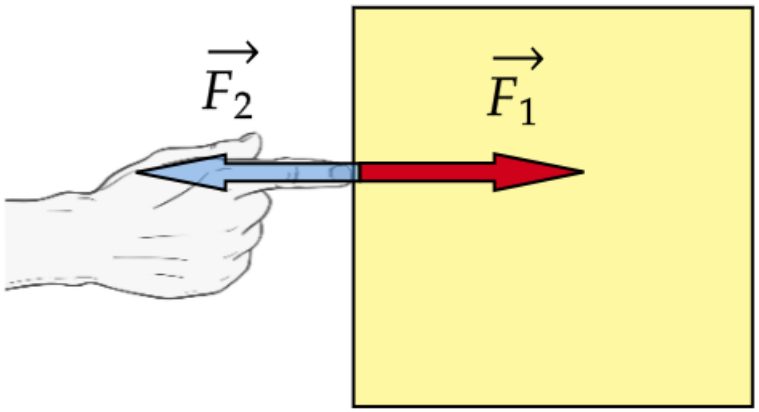
$$\vec{W} = m_{grav} \cdot \vec{g}$$

Equivalence principle:

$$m_{grav} = m_{inertial} = m$$

Newton's third law:

For any action there is an equal and opposite reaction



$$\vec{F}_2 = -\vec{F}_1$$

Homework 8

Problem 1.
The gravity force on the surface of the Moon is about 6 times less than this on the Earth. What will happen with your weight and mass on the Moon?

Problem 2.
You pull upwards a $2\ kg$ brick with a force of $30\ N$. Find the acceleration of the brick.

Problem 3.
Imagine that instead of the equivalence principle, the following relation holds: $m_{grav} = 2 * m_{inertial}$. If the Earth's gravitational field is the same and $\mathrm{g} = 10\,\frac{m}{s^2}$, what would the acceleration a_{free} of a free-falling object be?

Problem 4* (bonus problem).
A block is attached to the cart using four ropes, as shown in the picture. Forces of tension in the horizontal ropes are $T_1 = 21\ N$, $T_2 = 36\ N$ and in vertical ones are $T_3 = 30\ N$, $T_4 = 60\ N$, free fall acceleration is $\mathrm{g} = 10\,\frac{m}{s^2}$.
What is the acceleration of the cart?