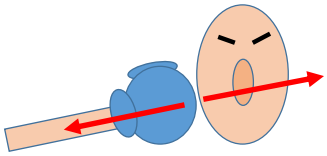
Newton's third law

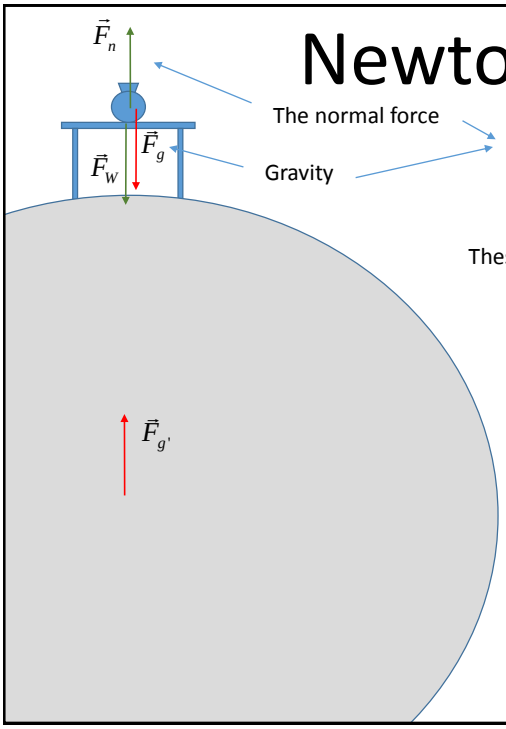
When object 1 exerts a force on object 2, object 2 simultaneously exerts a force equal in magnitude and opposite in direction on object 1.

Ex Boxer punches face:



Car that drives: tire pushes the ground backwards, the ground pushes the tire (car) forwards:

Newton's third law



The normal force

Gravity

Equal and opposite: cancel each other out.

But? This is not the case with action-reaction forces?

These do not form a action-reaction pair! Because they work on the same object!

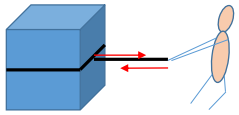
The reactional force of gravity on the vase, is the force with which the vase attracts the earth.

The reactional force of the normal force on the vase, is the force with which the vase pushes on the table: its weight.

Newton's third law

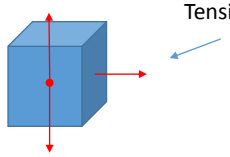
Tension

A man pulls at a box with 75N, the box pulls at the man with 75N



Study the motion: regard the box as a free body: study the forces acting on the box

Tension in rope: 75N



The normal force and gravity cancel each other out: no acceleration in vertical direction.

Max and Hanne are each standing on a skateboard, next to each other, skateboards on one line. Max pushes Hanne so both move away from each other. Calculate Hanne's speed, when you know that Max has a mass of 75 kg, Hann 50 kg and Max obtains a speed of 2 m/s in the 2 seconds he pushes Hanne.

$$G: m_m = 75kg; m_h = 50kg; v_{0m} = v_{0h} = 0\frac{m}{s}; v_m = 2{,}0\frac{m}{s}; t = 2{,}0s; F: v_h\,?$$

$$S: v_m = a_m.t + v_{0m}$$

$$a_m = \frac{v_m - v_{0m}}{t} \qquad a_m = \frac{2{,}0\frac{m}{s} - 0}{2{,}0s} = 1{,}0\frac{m}{s^2}$$

$$F_m = m_m.a_m = 75kg.1{,}0\frac{m}{s^2} = 75N \qquad F_m = F_h$$

$$F_h = m_h.a_h \qquad a_h = \frac{F_h}{m_h} = \frac{75N}{50kg} = 1{,}5\frac{m}{s^2}$$

$$v_h = a_h.t + v_{0h} \qquad v_h = 1{,}5\frac{m}{s^2}.2s + 0 = 3{,}0\frac{m}{s}$$