Mechanics

Momentum

- product of mass of object + its velocity
- $p = mv \rightarrow kg \cdot m \cdot s^{-1} \rightarrow$ vector
- change in momentum

$$\triangle p = mv_f - mv_i$$

- Resultant force accelerates/slows object
- Newton 2 in terms of momentum

$$F_{res} = \frac{mv_f - mv_i}{\triangle t}$$

- Law of conservation of momentum:

In a closed system the total linear momentum before collision = total linear momentum after collision in size an direction in a closed system.

$$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$$

- Resultant force:

The resultant force of 2/more forces invading an object is the single force that has the same effect on the object than the effect on the object of all the forces together.

- Closed system:

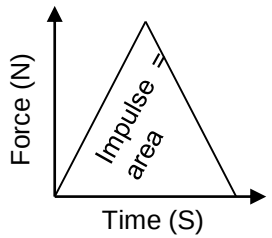
System that experiences no forces, only internal forces are active.

Tension in a rope

- Force a rope exercises onto an object, symbol = T
- Always a pull force
- Tension in a rope is the same everywhere

Impulse

- Is the product of the force and the time the force is working in.
- Impulse = $F_{res} \triangle t$
  ∴ Impulse = $\triangle p$
- unit : N · S
- vector amount
  ∴ size + direction
- area below force-time graph gives us the impulse on the object and thus also the change in momentum.



Newton + Angular levels

- Newton 1

An object will be in a stationary position or stay in a straight line with a constant velocity unless an external force work in onto it.

- Static friction = no movement

$$f = U_S F_N$$

- Kinetic friction = surface glides over one another

$$f = U_K F_N$$

- Static always < as max kinetic friction
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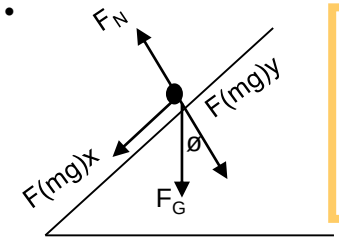

F(mg)y = mg cos ø
F(mg)x = mg sin ø
U_S = tan ø
└ static friction coefficient

- Newton 2

The acceleration of an object is always in the direction of the resultant force. The acceleration is directly even to the net force and inversely even to the mass of the object