Newtons Laws

Monday, 26 August 2024 9:33 PM

Displacement : s

time : Δt

velocity $v = \frac{s}{\Delta t}$ (速度)

acceleration $a = \frac{v}{\Delta t}$ (加速)

Our goal Today: find $\boxed{a}$

Free body diagram : how difference forces act on an object.

Weight & mass :

m Mass (kg) = How heavy you are

DOESN'T Change no matter where you go.

W Weight (N) = Force exerted due to mass and gravity

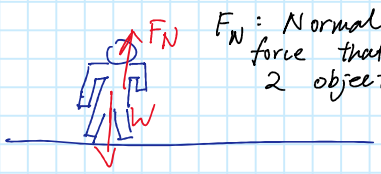
force

$W = mg$ (kg)

$a \cdot b \cdot c = abc$

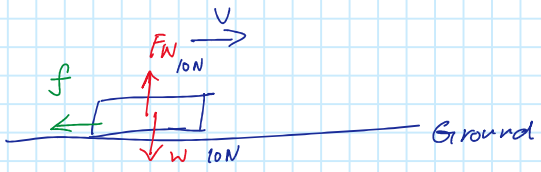
g on earth $= 9.81\ ms^{-2}$

1 Newton $= 1\ kg\ ms^{-2}$



F_N : Normal reaction force

force that is exerted when 2 objects are in contact with each other.



Arrow big $\leftrightarrow$ Force big

f : friction (摩擦摩力)

$f = \mu \cdot F_N$

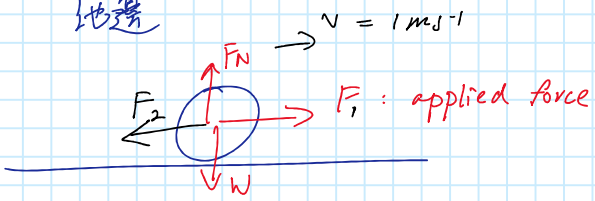
(mu) dependent on surface.

Concrete ~ 0.8

Ice ~ 0.05

Ex. $\rightarrow$ $v = 1\ ms^{-1}$

地面 Ice ~ 0.05



If all forces cancel out
= No net forces / No resultant force.

Newton's 1st law:

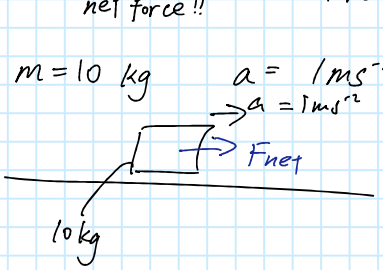
An object with no net force acting on it stays at rest or moves at a constant velocity.

Newton 2nd law:

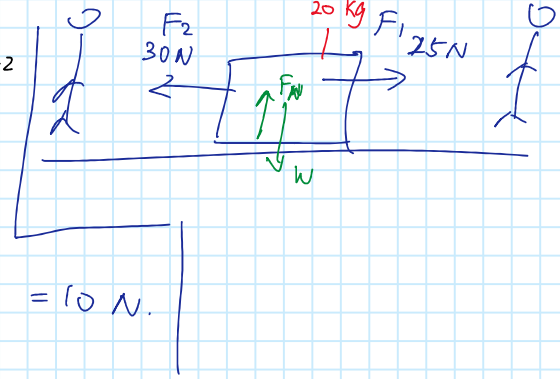
The net force acting on an object is proportional to its acceleration and mass.

$F_{net} = ma$ (m: Mass, a: acceleration)

net force !!



$F_{net} = (m)(a) = (0.1) = 10$ N.



$F_{net} = 30 - 25 = 5$ N to the left

$F_{net} = ma$

$5 = (20)a$

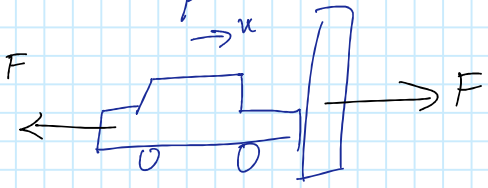
$a = \frac{5}{20} = \frac{1}{4}$

$= 0.25$ ms⁻²

Newton 3rd law

作用力 和反作用力.

All forces exist in action and reaction pairs.



Car crashes into wall

① The wall falls over
② The car stops

Property

- ~~En op~~ 2 forces are in opposite direction
- ~~Same~~ Same magnitude (一樣強度)

- ~~Act~~ Same magnetude (一樣強度)
- Act on different objects