Free Body Diagrams (FBD)

LT:
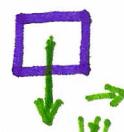
- Represent forces as vectors
- Determine the net (resultant) force

Examples of forces and FBD

① Weight $= W = F_G$

$$\boxed{W = m \cdot g} \rightarrow \text{acceleration of}$$
$$\text{gravity}$$
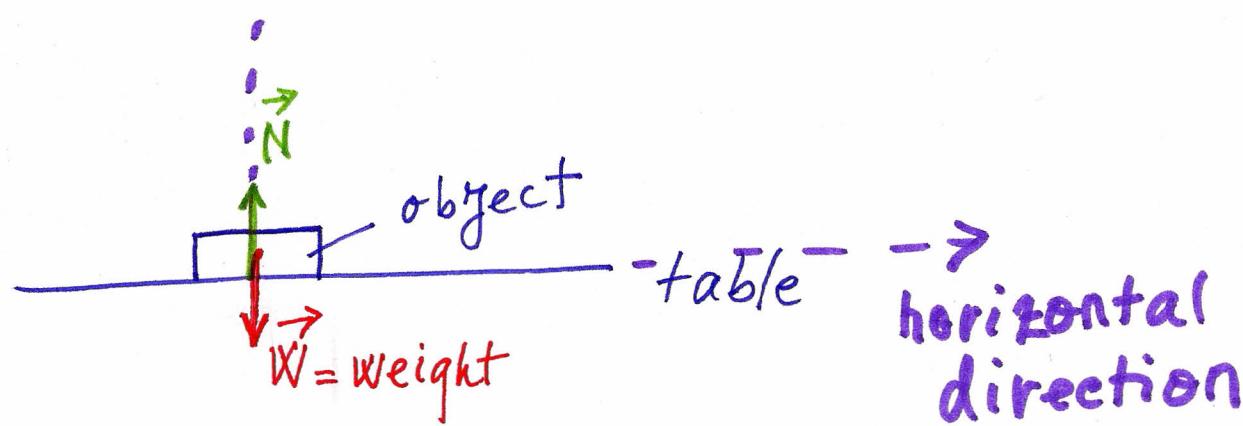
$\downarrow$ mass

$\vec{W}$ (weight vector)

$F_N = N =$ Normal force = the force perpendicular to the contact surface

$_1$vertical direction

$\vec{N}$

object

$-$table$-$ $\rightarrow$

$\vec{W} =$ weight

horizontal direction
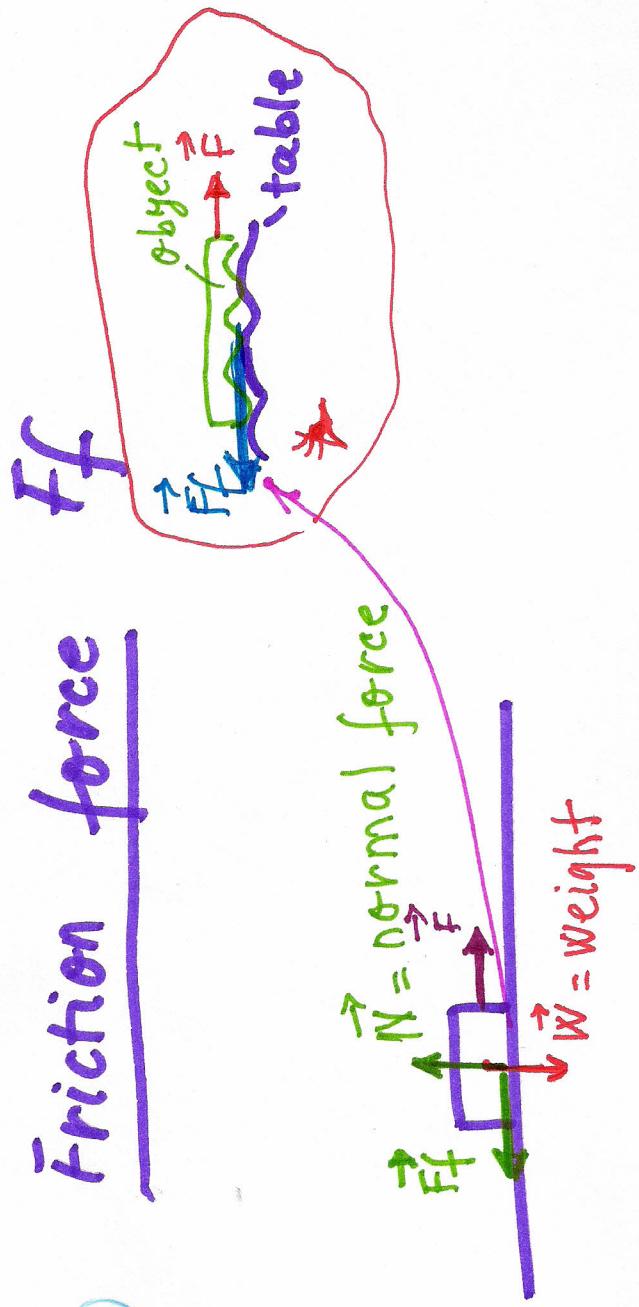
The object is at rest (equilibrium) on the vertical direction **if and only if** the total force (net, resultant) on that direction is equal with zero.

normal = $\boxed{N = W}$ = weight

These vectors $(\vec{N}, \vec{W})$ have the same size, but opposite directions.　　= 2 =

③

friction force F_f

object
$\vec{F}$
table
$\vec{F_f}$

$\vec{N}$ = normal force
$\vec{F}$
$\vec{W}$ = weight
$\vec{F_f}$
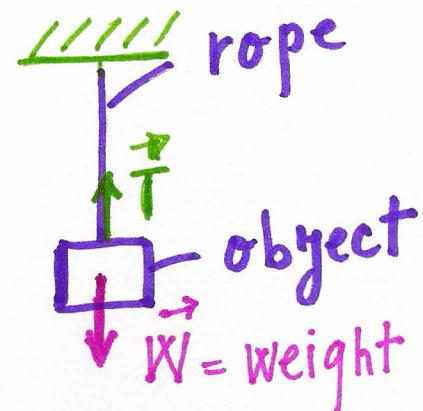
$N = W$

F_f = friction force that resist motion

$$F_f = \mu \cdot N$$

μ = friction coefficient =
= number which depends
on the quality of the
contact surface

= 3 =

Tension force $= T = F_T$

rope

$\vec{T}$

object

$\vec{W} = $ weight

The object is at equilibrium if and only if the net force is equal with zero.

$$\boxed{T = W}$$