- Forza gravitazionale (massa)
- Forza elettromagnetica (carica) } F. elettrodebole
- Forza debole: $n \to p^+ + e^- + \nu_e$
- Forza forte

$$\bar{F}(\text{parametri}) = m\bar{a}$$

$$\bar{F} = 0 \Rightarrow \bar{a} = 0 \Rightarrow \bar{v} = \text{cost}$$

$$\bar{F} = \text{cost} \Rightarrow \bar{a} = \text{cost} \quad \triangleleft \text{ equazione vettoriale}$$

$$\bar{F} = \bar{F}(t) \Rightarrow \bar{a} = \bar{a}(t)$$

$$\bar{F}(t) = m\bar{a} = m\bar{a}_T + m\bar{a}_N = m\frac{dv}{dt}\bar{u}_T + m\frac{v^2}{R}\bar{u}_N =$$

$$= \bar{F}_T + \bar{F}_N$$

$$\bar{F}_T = m\frac{dv}{dt}\bar{u}_T \quad \triangleleft \text{ forza tangenziale}$$

$$\bar{F}_N = m\frac{v^2}{R}\bar{u}_N \quad \triangleleft \text{ forza centripeta}$$

Forza peso $\quad \bar{P} = m\bar{a} \qquad \bar{a} = \bar{g}$

$\bar{g}$ ↓ $\qquad g = |\bar{g}| = 9.81 \ m/s^2$

$$\boxed{\bar{P} = m\bar{g}}$$

peso / massa

$P \rightarrow$ forza $\quad (N)$

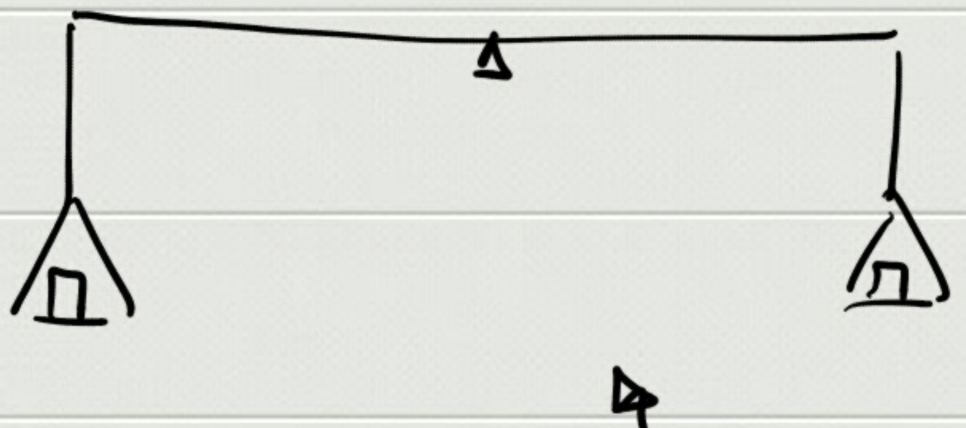
$m \rightarrow$ massa $\quad (kg)$

$P \propto m$

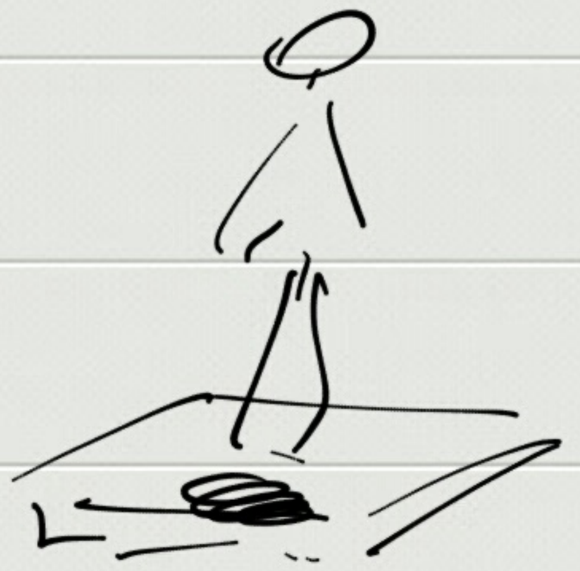
$m = 1 kg \quad g = 9.81 \ m/s^2 \Rightarrow \quad P = 9.8 \ N$

$1 \ kgf = 1 \ kgp = 9.8 \ N$

$= 1 \ kgf \ / \ 1 \ kgp$

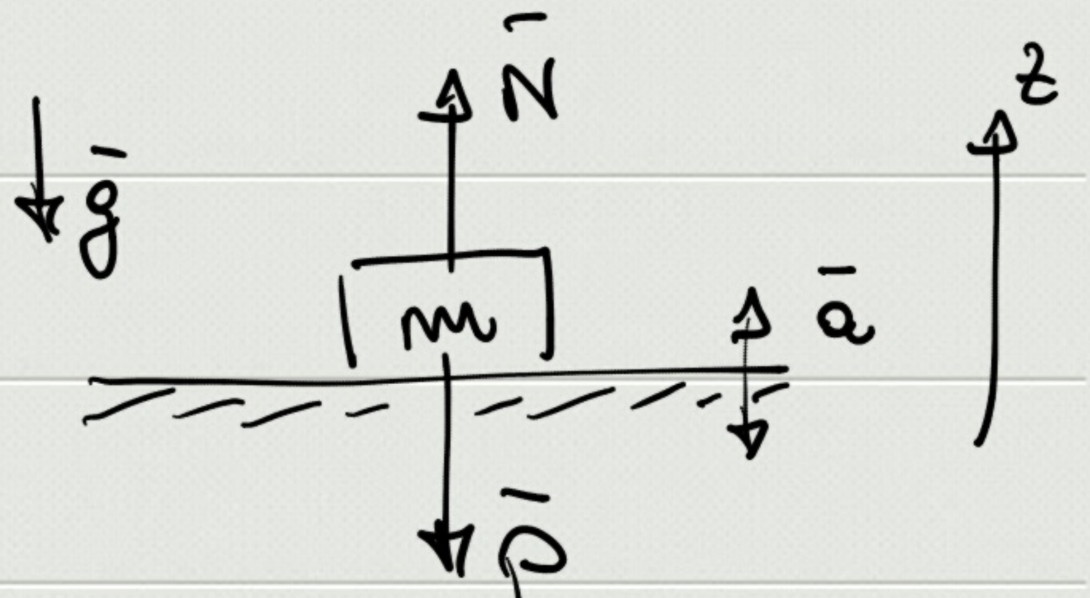


misura massa



↑ peso (forza)

$\bar{P} = m\bar{g}$ $\quad \bar{g} = -g\,\bar{u}_z$



$$\bar{P} + \bar{N} = m\bar{a} \Rightarrow \boxed{\bar{N} = m\bar{a} - \bar{P} = m(\bar{a} - \bar{g})}$$

- $a = 0 \Rightarrow \boxed{\bar{N}_0 = -m\bar{g}}$ $\quad \uparrow \bar{N}_0$

- $\bar{a} = -a\,\bar{u}_z$ $\quad \downarrow \bar{a}$ $\quad (a > 0)$ $\quad a < g$

$$\Rightarrow \bar{N}_1 = m\left(\overset{<0}{-a}\,\bar{u}_z + g\,\bar{u}_z\right) = m(g-a)\,\bar{u}_z \qquad \uparrow \bar{N}_1$$

$$|\bar{N}_1| < |\bar{N}_0|$$

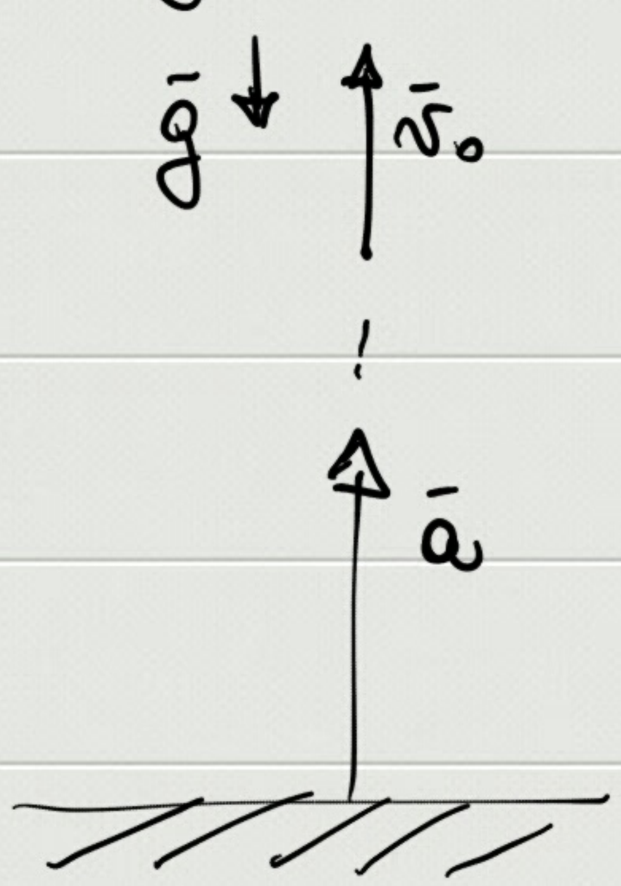
- $\bar{a} = a\,\bar{u}_z$ $\quad \uparrow \bar{a}$ $\quad (a > 0)$

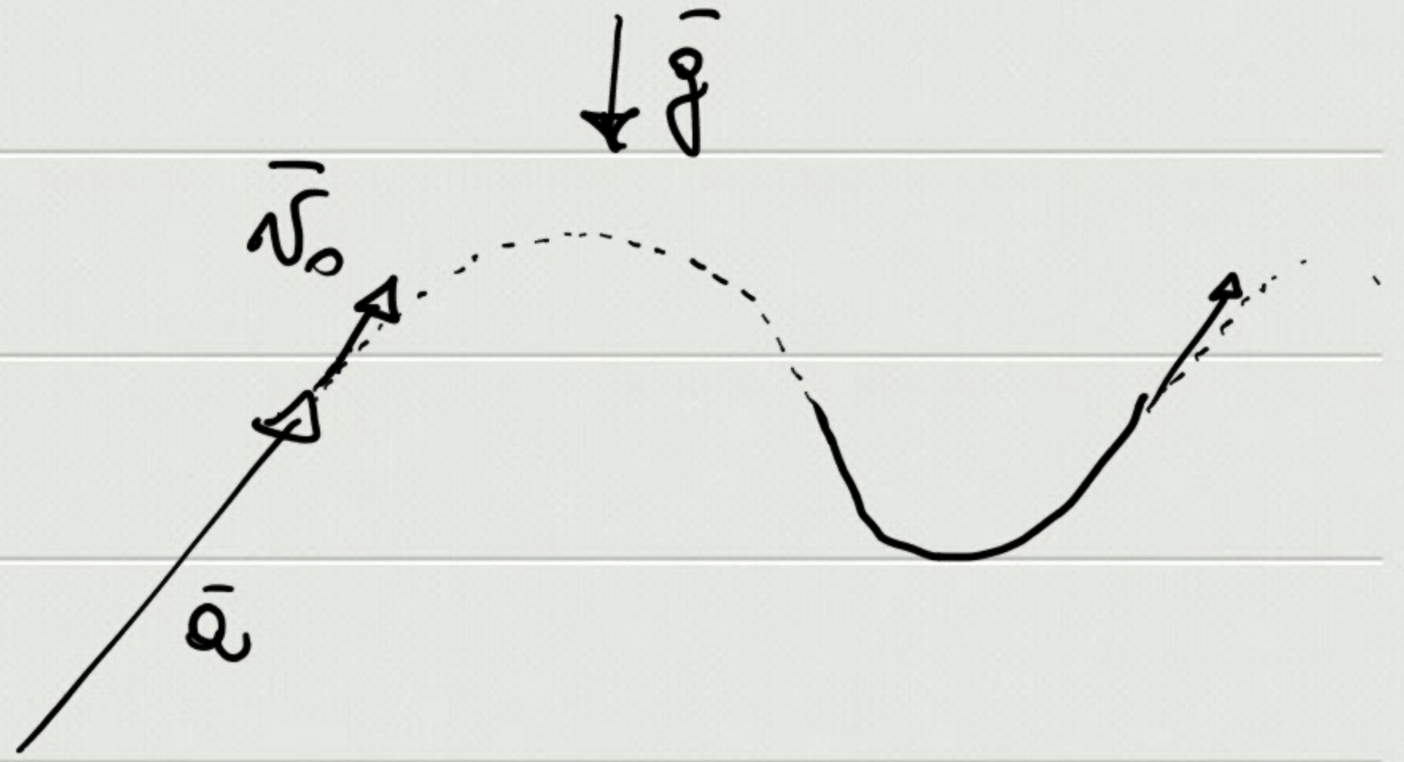
$$\Rightarrow \bar{N}_2 = m\left(\overset{>0}{a}\,\bar{u}_z + g\,\bar{u}_z\right) = m(g+a)\,\bar{u}_z \qquad \uparrow \bar{N}_2$$

$$|\bar{N}_2| > |\bar{N}_0|$$

N → sensazione di peso!

$-\bar{a} = \bar{a}_1 \quad \Rightarrow \quad \bar{N}_3 = 0$





$-\bar{a} = -a\,\bar{v}_t \quad | \quad a > g$

$\downarrow \bar{a}$

$\bar{N}_4 = m\left(-a\,\bar{v}_t + g\,\bar{v}_t\right) = m\left(-a+g\right)\bar{v}_t$

0

$\downarrow \bar{N}_4$