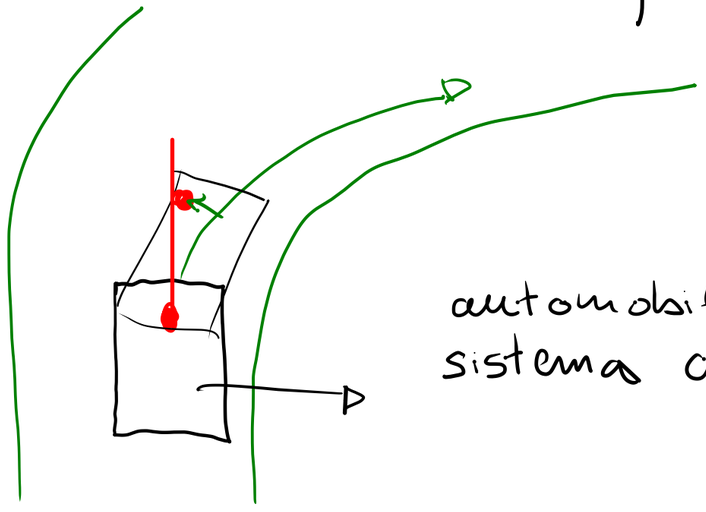
DINAMICA

FORZA → Deformazione di un corpo vincolato
FORZA → Movimento di un corpo libero

I PRINCIPIO ("Principio d'Inerzia")

In assenza di forze esterne, un corpo persevera nello stato di quiete o di moto rettilineo uniforme

vista dall'alto:



Sistema di riferimento INERZIALE → in cui vale il principio d'inerzia

automobile sistema di riferimento NON inerziale

II PRINCIPIO (legge fondamentale della dinamica)

In un sistema inerziale, $\boxed{\sum \vec{F} = m\vec{a}}$

- $\sum \vec{F}$: risultante delle forze
- m: massa (inerziale)
- $\vec{a}$: accelerazione

$|\vec{F}| = 1\,N$ se impartisce ad $|\vec{a}| = 1\ m/s^2$ $m = 1\ kg$

$1\,N = 1\,kg \cdot 1\,\frac{m}{s^2} = kg\,\frac{m}{s^2}$ SI

$1\,dyne = 1\,g\ 1\,\frac{cm}{s^2} = \frac{10^{-3}\,kg \cdot 10^{-2}\,m}{s^2} = 10^{-5}\,N$ cgs

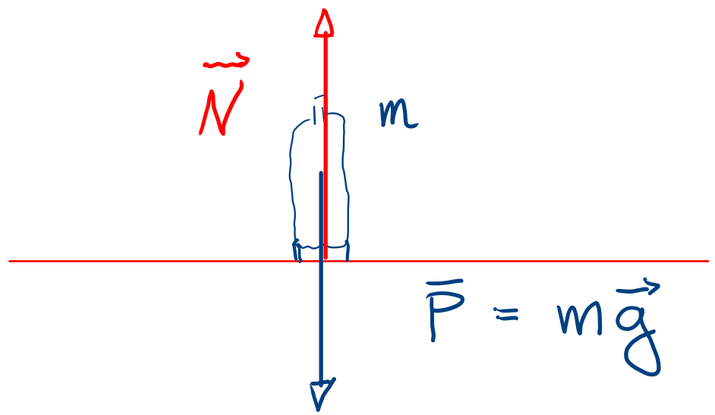
1 dina

III PRINCIPIO ("Azione e Reazione")

Dati due corpi, 1 e 2, sia $\vec{F}_{12}$ la forza esercitata da 1 sul corpo 2

Allora esiste $\vec{F}_{21}$ esercitata da 2 sul corpo 1 e

$$\vec{F}_{21} = -\vec{F}_{12}$$



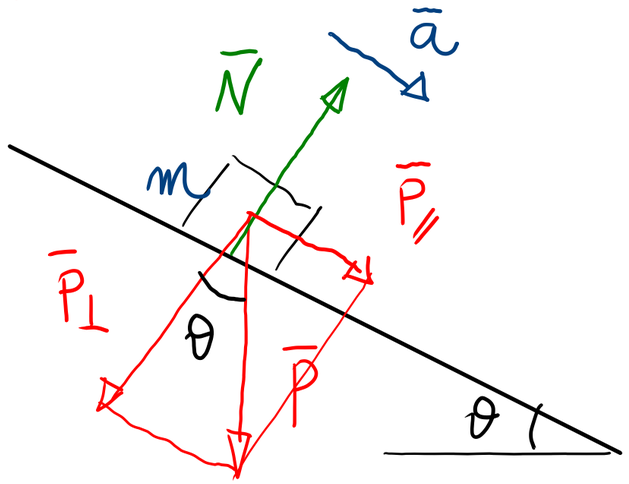
sistema inerziale

bottiglia ferma $\quad \bar{a} = 0$

<u>II principio:</u> $\quad \bar{a} = 0 \quad \Rightarrow \quad \Sigma \bar{F} = 0$

$$\bar{P} + \bar{N} = 0$$

PIANO INCLINATO



$$\bar{P} = mg$$

$$\bar{P}_\perp = mg\cos\theta$$

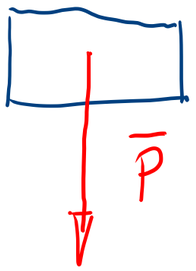
$$\bar{P}_{//} = mg\,\text{sen}\,\theta$$

$\bar{N} = -\bar{P}_\perp$ reazione vincolare

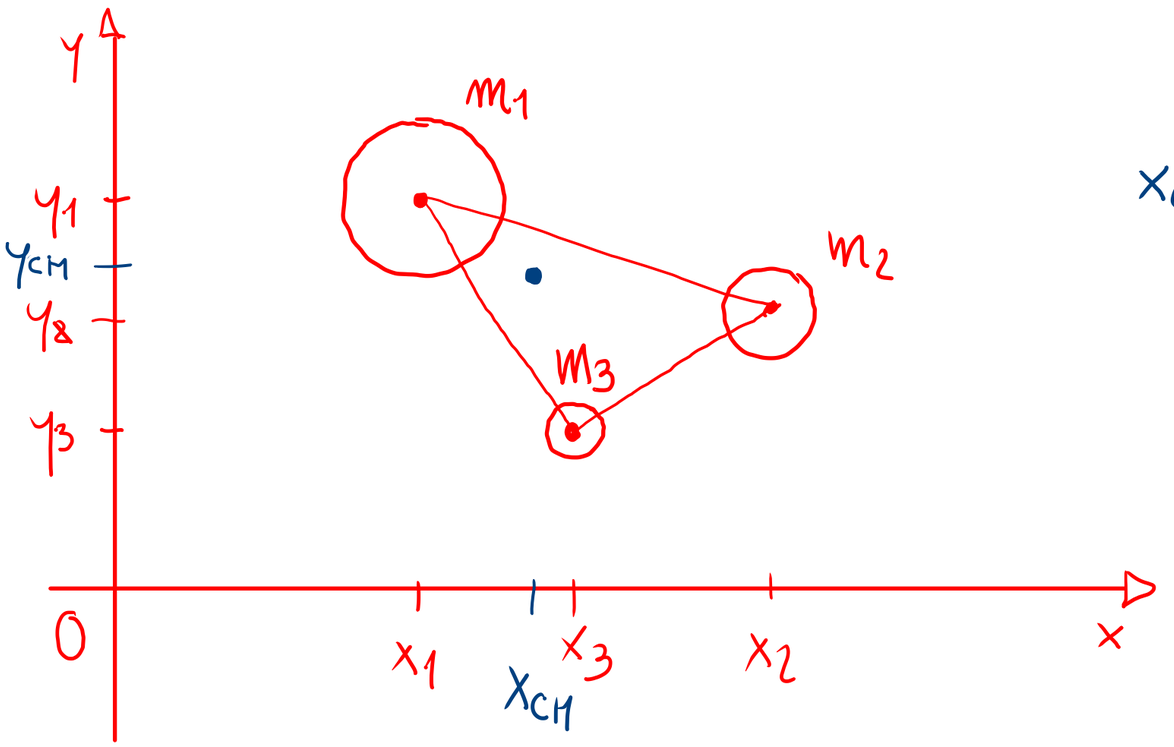
$$\bar{a} = \frac{\bar{P}_{//}}{m}$$

$$|\bar{a}| = \frac{|\bar{P}_{//}|}{m} = \frac{mg\,\text{sen}\,\theta}{m} = g\,\text{sen}\,\theta < g$$

BARICENTRO



in generale coincide col centro geometrico (se m è uniformemente distribuita)



$$x_{CM} = \frac{x_1 m_1 + x_2 m_2 + x_3 m_3}{m_1 + m_2 + m_3}$$

$$= \frac{\sum_i x_i m_i}{\sum_i m_i}$$

$$y_{CM} = \frac{\sum_i y_i m_i}{\sum_i m_i}$$

SPINTA DI ARCHIMEDE

$1\,m = 10\,dm$

$1\,m^3 = (1\,m)^3$

$= (10\,dm)^3$

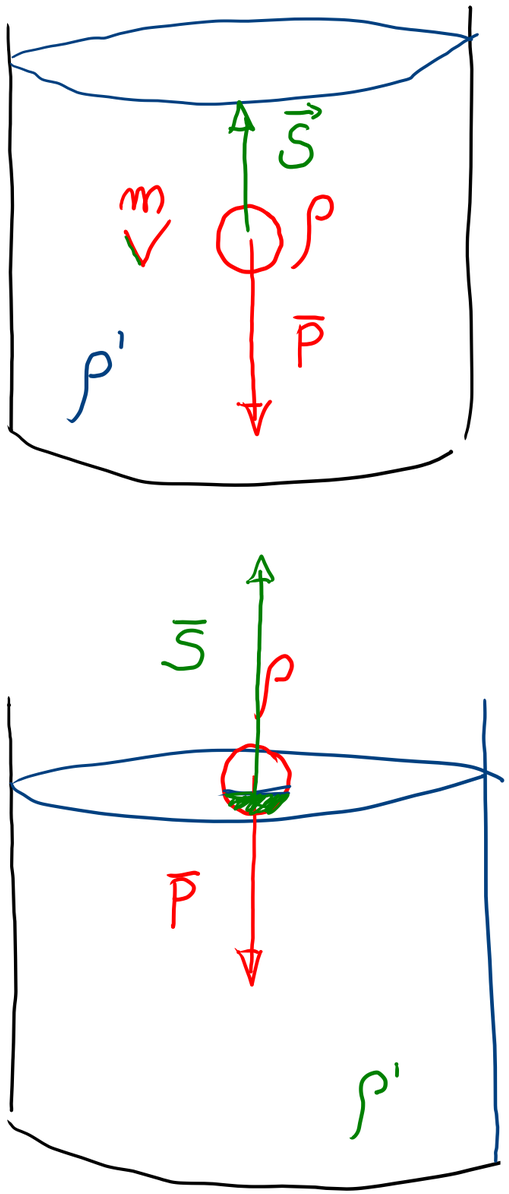
$= 10^3\,dm^3$

DENSITÀ

$$\rho = \frac{m}{V}$$

$$[\rho] = \frac{[M]}{[L]^3}$$

SI $\frac{kg}{m^3}$ cgs $\frac{g}{cm^3}$



$$\vec{P} = m\vec{g} = \rho V \vec{g}$$

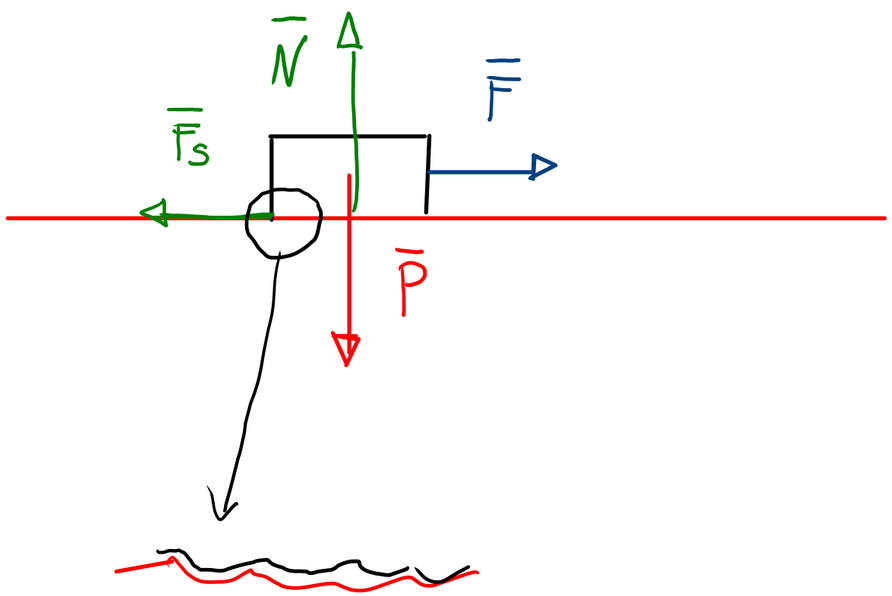
$$\vec{S} = -\rho' V \vec{g}$$

$\rho > \rho'$ ↓ affonda

$\rho = \rho'$ =

$\rho < \rho'$ ↑ galleggia

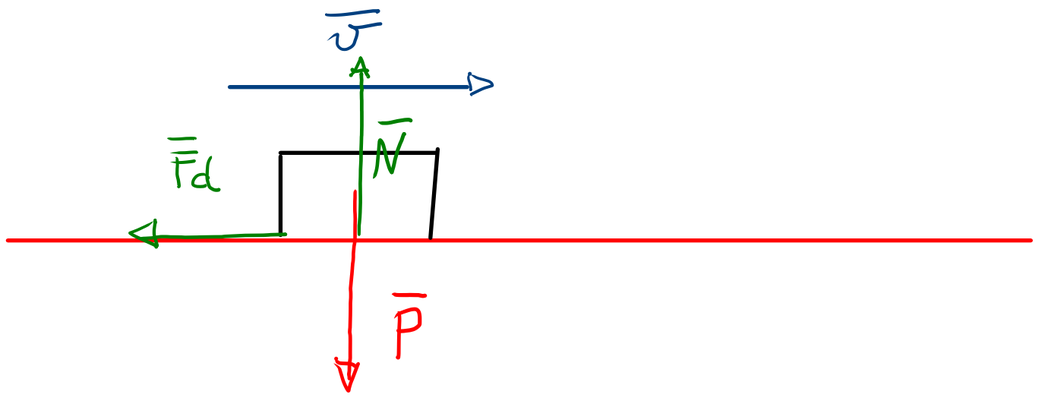
FORZA D'ATTRITO STATICO



$$F_{S,max} = \mu_S N$$

μ_S: coefficiente di attrito statico

FORZA DI ATTRITO DINAMICO

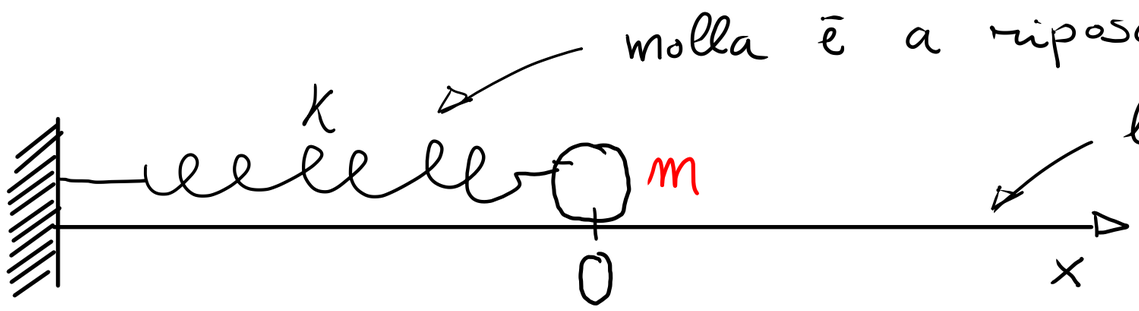


$$F_d = \mu_d N$$

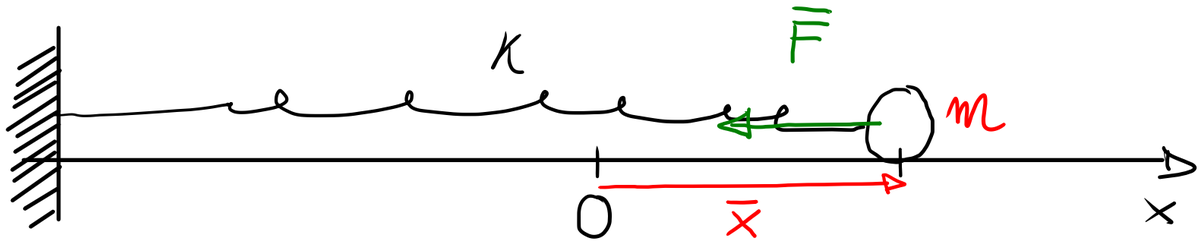
coefficiente di attrito dinamico

$$\mu_d \leq \mu_s \leq 1$$

FORZA ELASTICA



$$[k] = \frac{N}{m} \qquad \sim 10^3 \frac{N}{m}$$



$$|\bar{F}| = k|\bar{x}|$$

legge di Hooke

$$\boxed{\bar{F} = -k\bar{x}}$$

$$\begin{cases} F = -kx \\ F = ma \end{cases}$$

$$a = -\frac{k}{m}x$$

$$a - \omega^2 x$$

moto armonico con

$$\omega = \sqrt{\frac{k}{m}} \qquad \nu = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$$

$$T = 2\pi\sqrt{\frac{m}{k}}$$