Fondamenti di fisica generale

adalberto.sciubba@uniroma1.it

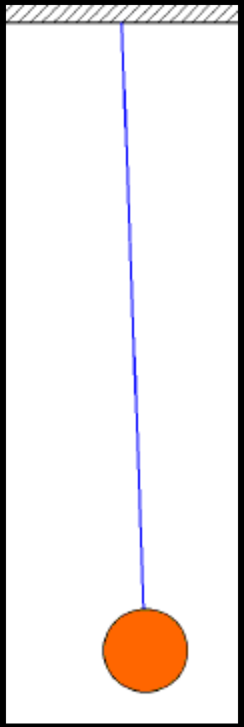
Mercoledì 3 novembre 2021

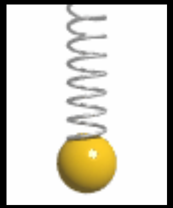
12:00-13:00

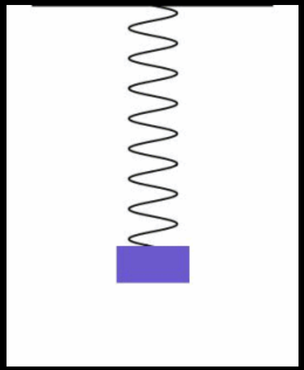
in AULA

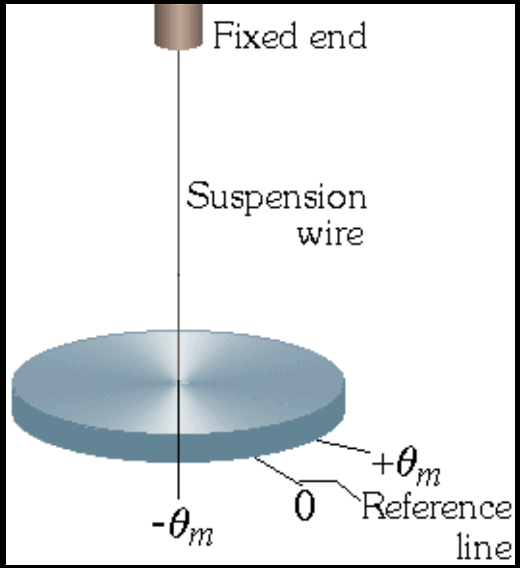
LEZ 3

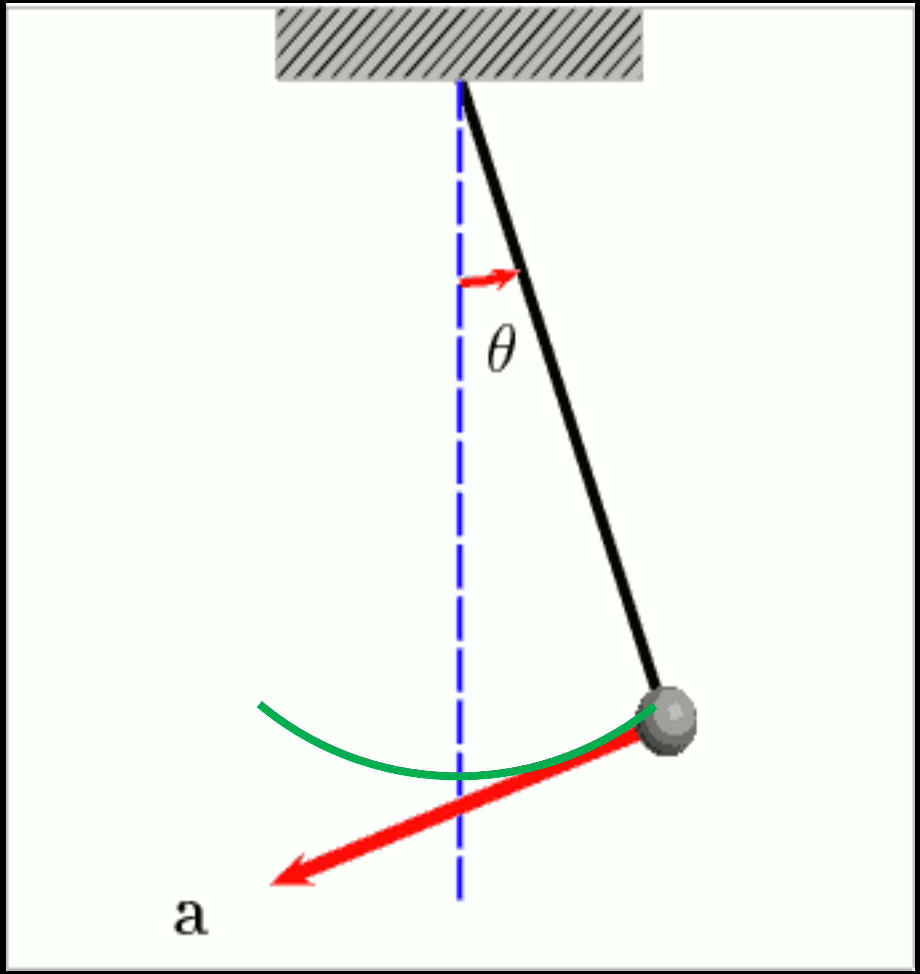
MOTO ARMONICO



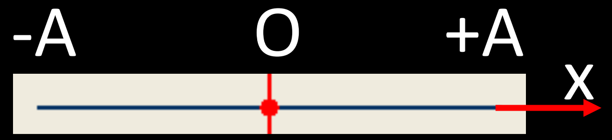






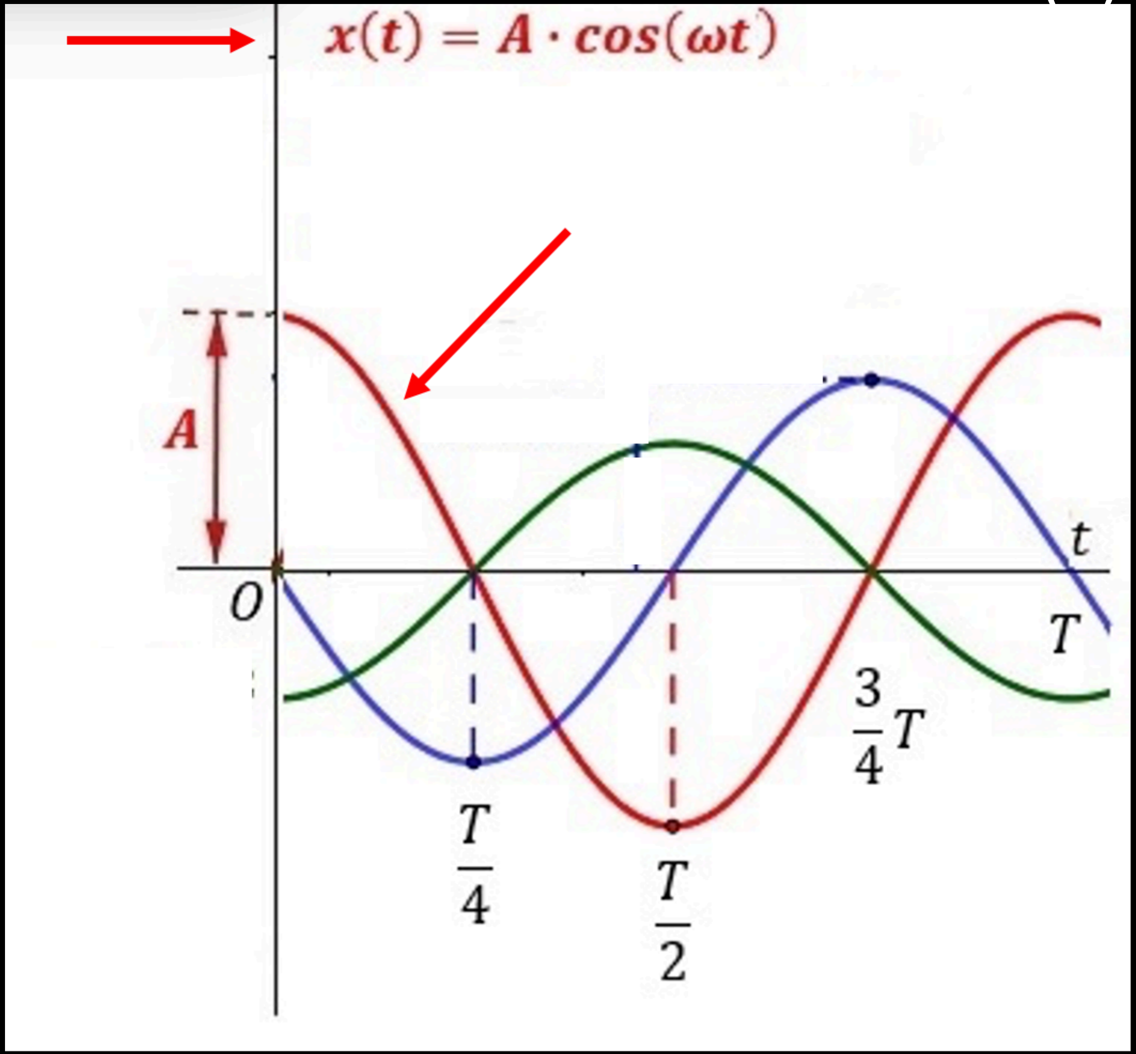


MOTO ARMONICO



POSIZIONE

se x(0) = A allora $x(t) = A\cos(\omega t) = A\sin(\omega t + \pi/2)$



$$\omega = \frac{2\pi}{T}$$

$$\omega \frac{T}{4} = \frac{2\pi}{4} = \frac{\pi}{2}$$

$$\omega \frac{T}{2} = \frac{2\pi}{2} = \pi$$

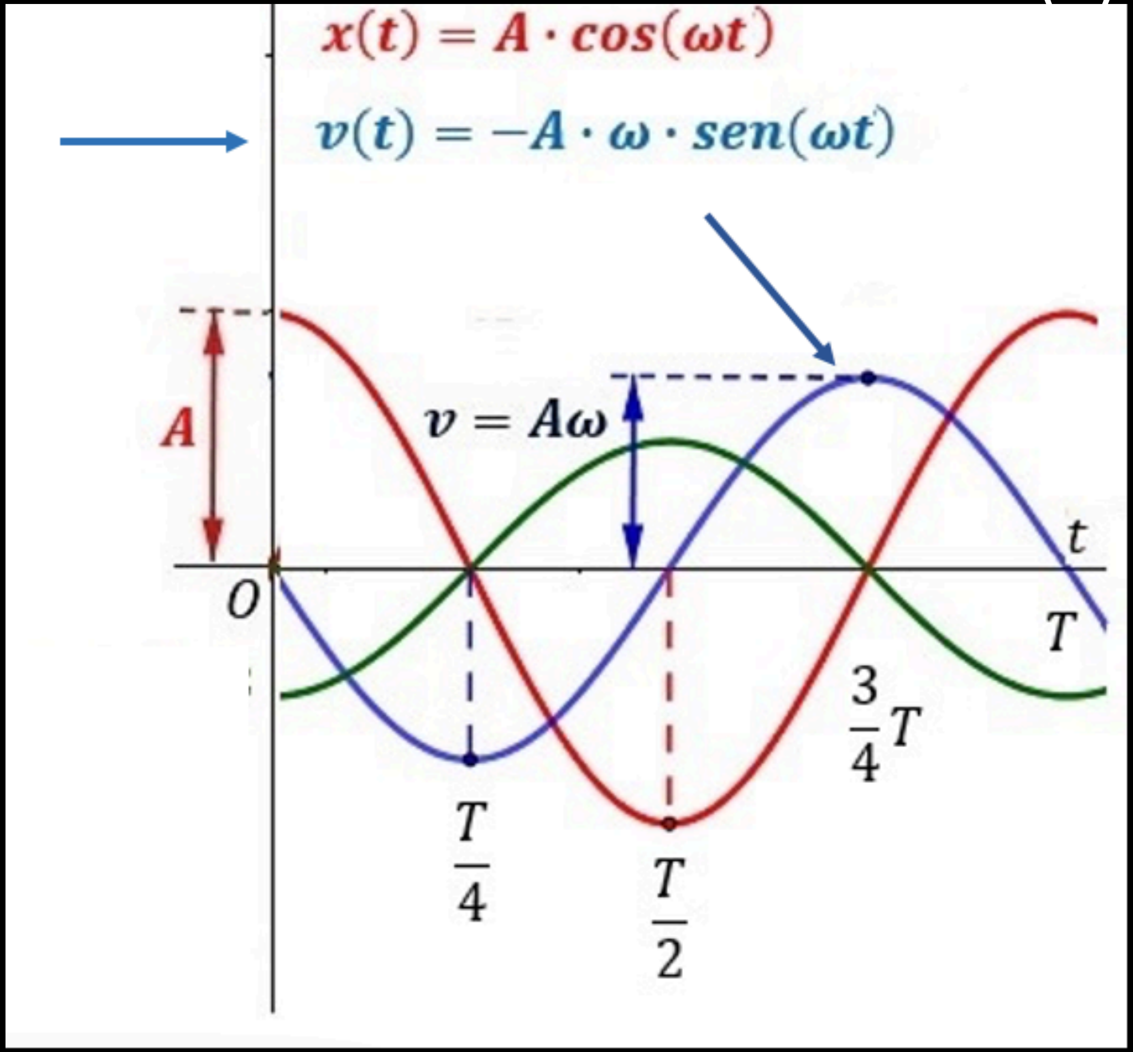
$$\omega \frac{3}{4}T = \frac{3}{4}2\pi = \frac{3}{2}\pi$$

$$\omega T = 2\pi$$

MOTO ARMONICO

VELOCITA'

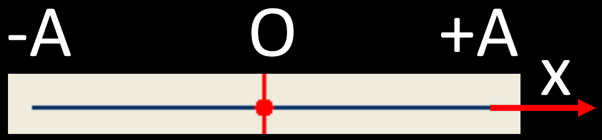
se $x(0) = A$ allora $x(t) = A\cos(\omega t)$



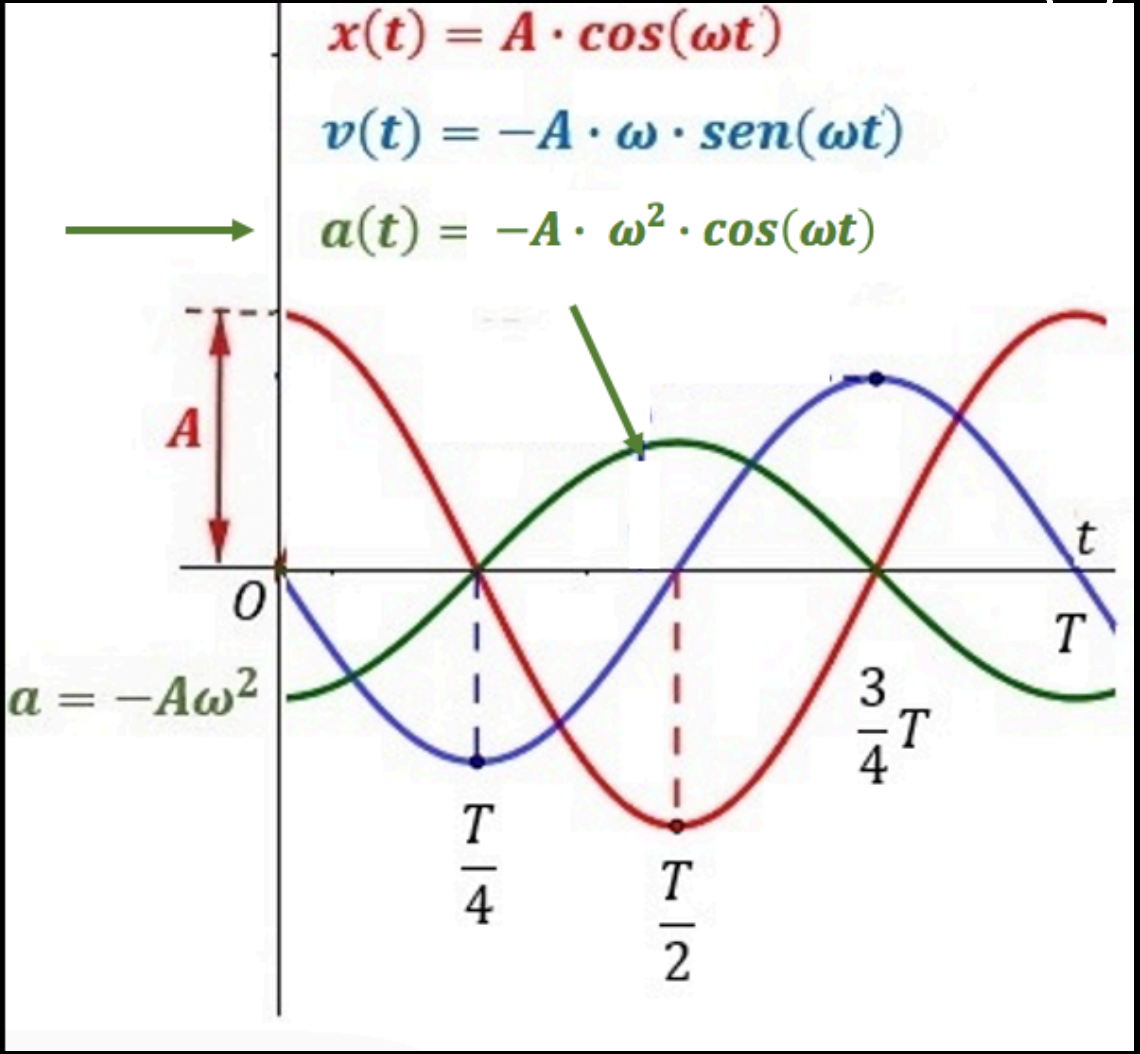
$$v(t) = \frac{dx}{dt} = -A\,\omega\,\sin(\omega t)$$

MOTO ARMONICO

ACCELERAZIONE



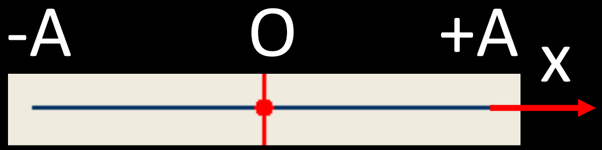
se x(0) = A allora $x(t) = A\cos(\omega t)$

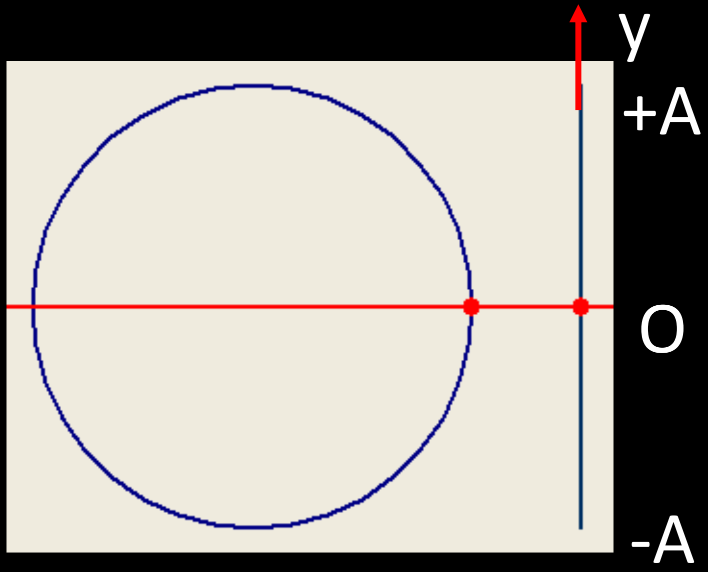


$$v(t) = \frac{dx}{dt} = -A\,\omega\,\sin(\omega t)$$

$$a(t) = \frac{dv}{dt} = -A\,\omega^2\cos(\omega t)$$

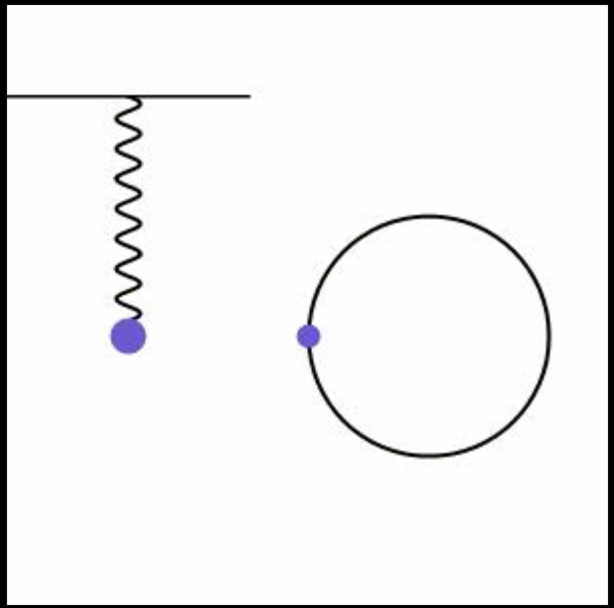
MOTO ARMONICO E MOTO CIRCOLARE

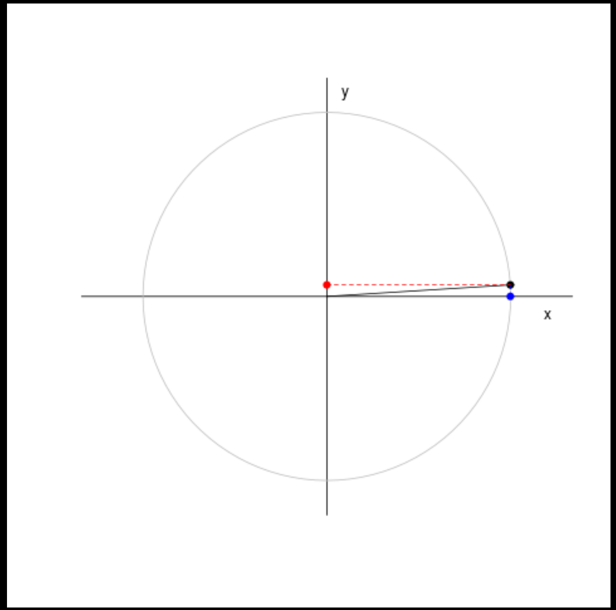


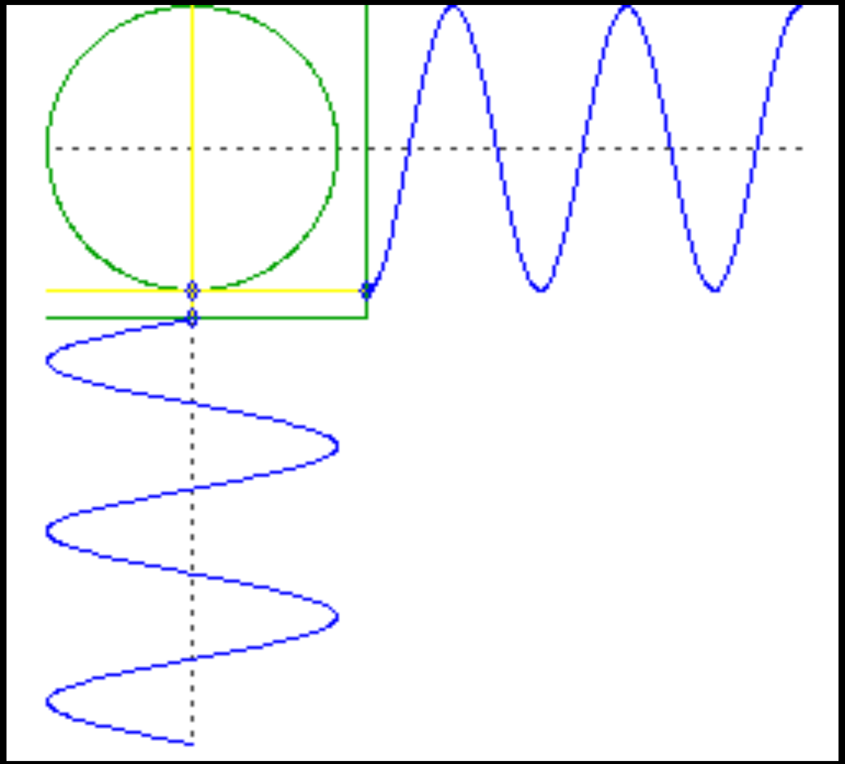


ω pulsazione $2\pi/T$

ω velocità angolare v/R







MOTO ARMONICO

- $x(t) = A\cos(\omega t + \varphi)$
- $v_x(t) = \frac{dx}{dt} = -A\omega\sin(\omega t + \varphi)$
- $a_x(t) = \frac{dv_x}{dt} = \frac{d}{dt}\frac{dx}{dt} = \frac{d^2x}{dt^2} = -A\omega^2\cos(\omega t + \varphi) = -\omega^2 x(t)$
- $\frac{d^2x}{dt^2} + \omega^2 x = 0$

$$\frac{d^2u(t)}{dt^2} + \omega^2 u(t) = 0 \leftrightarrow u(t) \text{ armonica di periodo } T = \frac{2\pi}{\omega}$$

- $y(t) = A\sin(\omega t + \varphi)$
- $v_y(t) = \frac{dy}{dt} = A\omega\cos(\omega t + \varphi)$
- $a_y(t) = \frac{dv_y}{dt} = \frac{d}{dt}\frac{dy}{dt} = \frac{d^2y}{dt^2} = -A\omega^2\sin(\omega t + \varphi) = -\omega^2 y(t)$
- $\frac{d^2y}{dt^2} + \omega^2 y = 0$

MOTO ARMONICO E MOTO CIRCOLARE UNIFORME

- $x(t) = R\cos(\omega t + \varphi)$
- $v_x(t) = -R\omega\sin(\omega t + \varphi)$
- $a_x(t) = -R\omega^2\cos(\omega t + \varphi)$

- $y(t) = R\sin(\omega t + \varphi)$
- $v_y(t) = R\omega\cos(\omega t + \varphi)$
- $a_y(t) = -R\omega^2\sin(\omega t + \varphi)$

- $x^2(t) + y^2(t) = [R\cos(\omega t + \varphi)]^2 + [R\sin(\omega t + \varphi)]^2 = R^2$
- $v^2(t) = v_x^2(t) + v_y^2(t) = [-R\omega\sin(\omega t + \varphi)]^2 + [R\omega\cos(\omega t + \varphi)]^2 = [\omega R]^2$
- $a^2(t) = a_x^2(t) + a_y^2(t) = [-R\omega^2\cos(\omega t + \varphi)]^2 + [-R\omega^2\sin(\omega t + \varphi)]^2 = [\omega^2 R]^2$

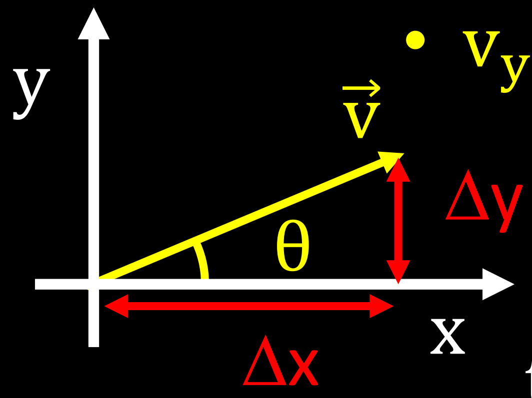
$v(t) = \omega R$ — velocità costante

$a(t) = \omega^2 R = v^2/R$ — accelerazione centripeta

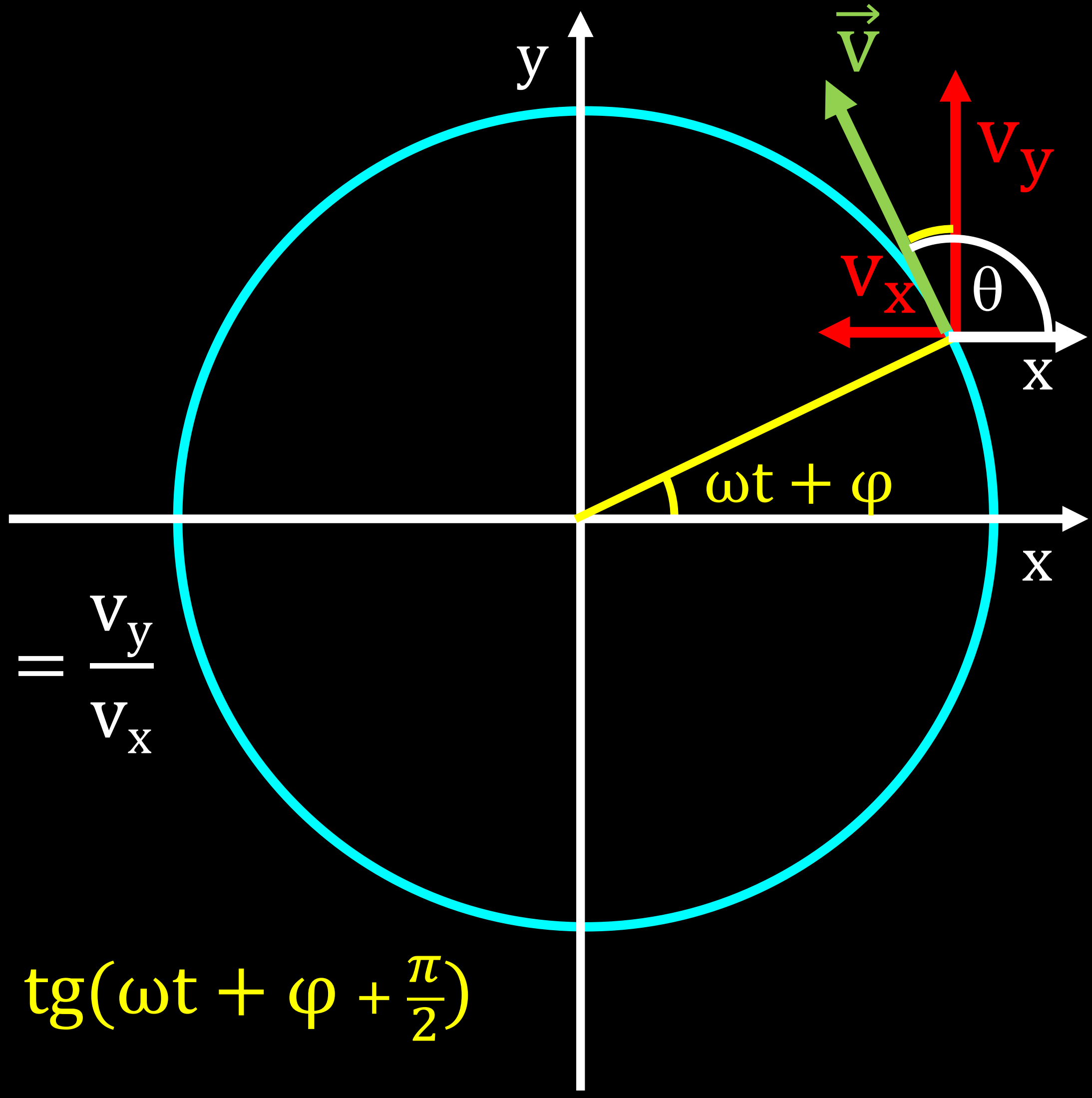
MOTO ARMONICO E MOTO CIRCOLARE UNIFORME

- $x(t) = R\cos(\omega t + \varphi)$
- $v_x(t) = -R\omega\sin(\omega t + \varphi)$

- $y(t) = R\sin(\omega t + \varphi)$
- $v_y(t) = R\omega\cos(\omega t + \varphi)$



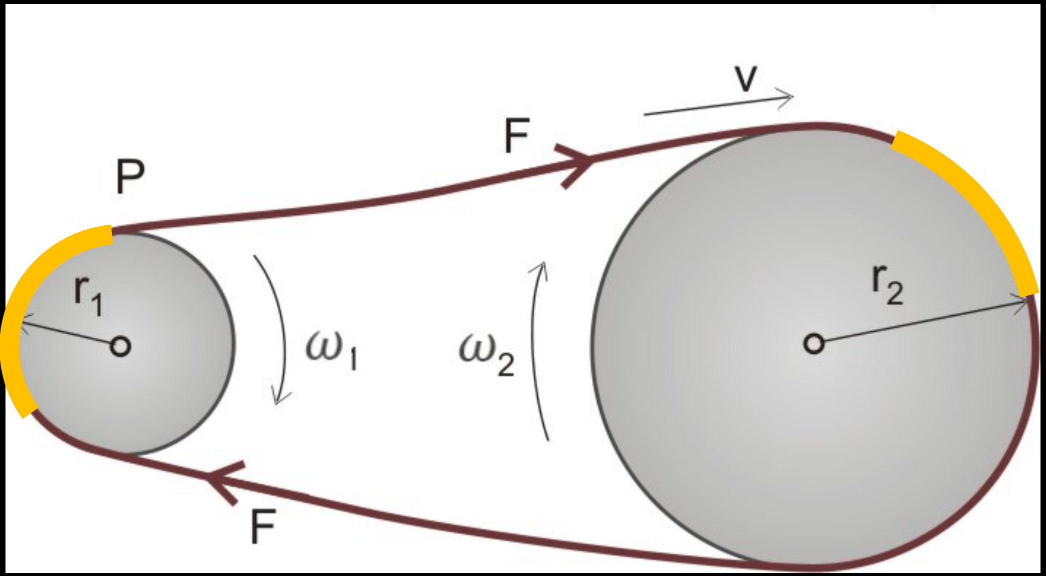
$$tg(\theta) = \frac{\Delta y}{\Delta x} = \frac{dy}{dx} = \frac{dy}{dt}\frac{dt}{dx} = \frac{v_y}{v_x}$$

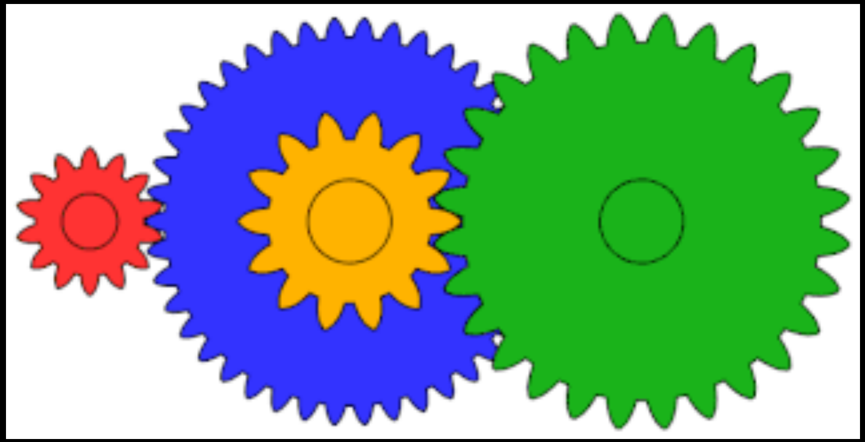


$$\frac{v_y}{v_x} = \frac{R\omega\cos(\omega t + \varphi)}{-R\omega\sin(\omega t + \varphi)} = -\,cotg(\omega t + \varphi) = tg(\omega t + \varphi + \frac{\pi}{2})$$

MOTO CIRCOLARE cinghia/catena

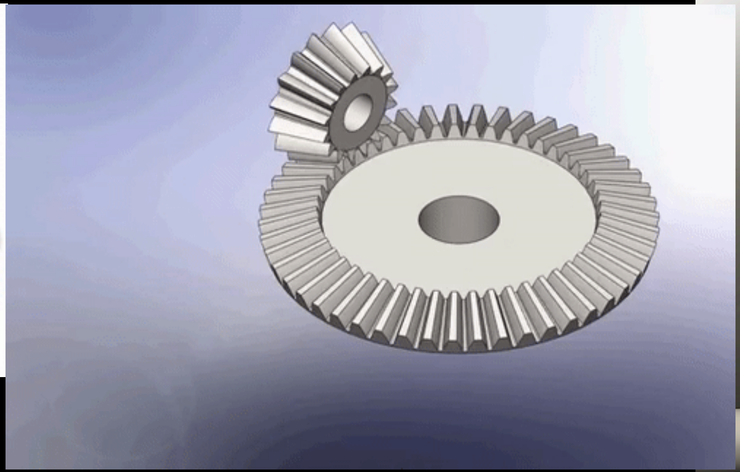
TRASMISSIONE MOTO

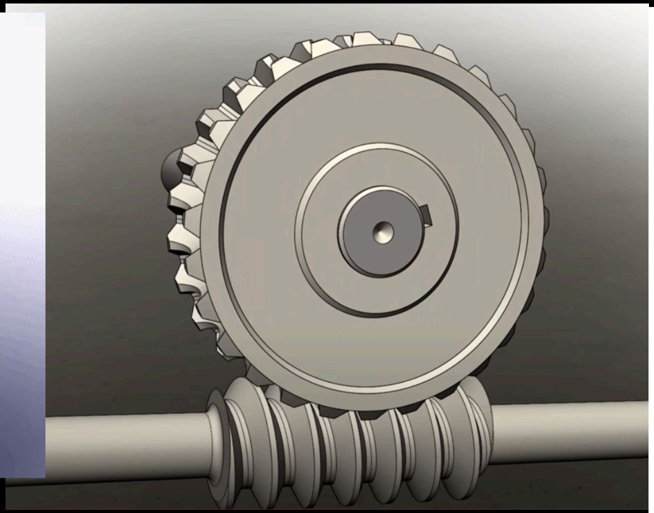


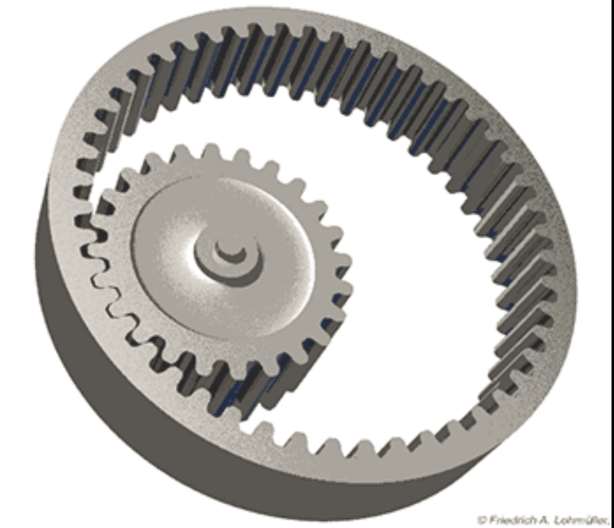


$$s = \theta_1 r_1 = \theta_2 r_2 \qquad v = \omega_1 r_1 = \omega_2 r_2$$

ingranaggi

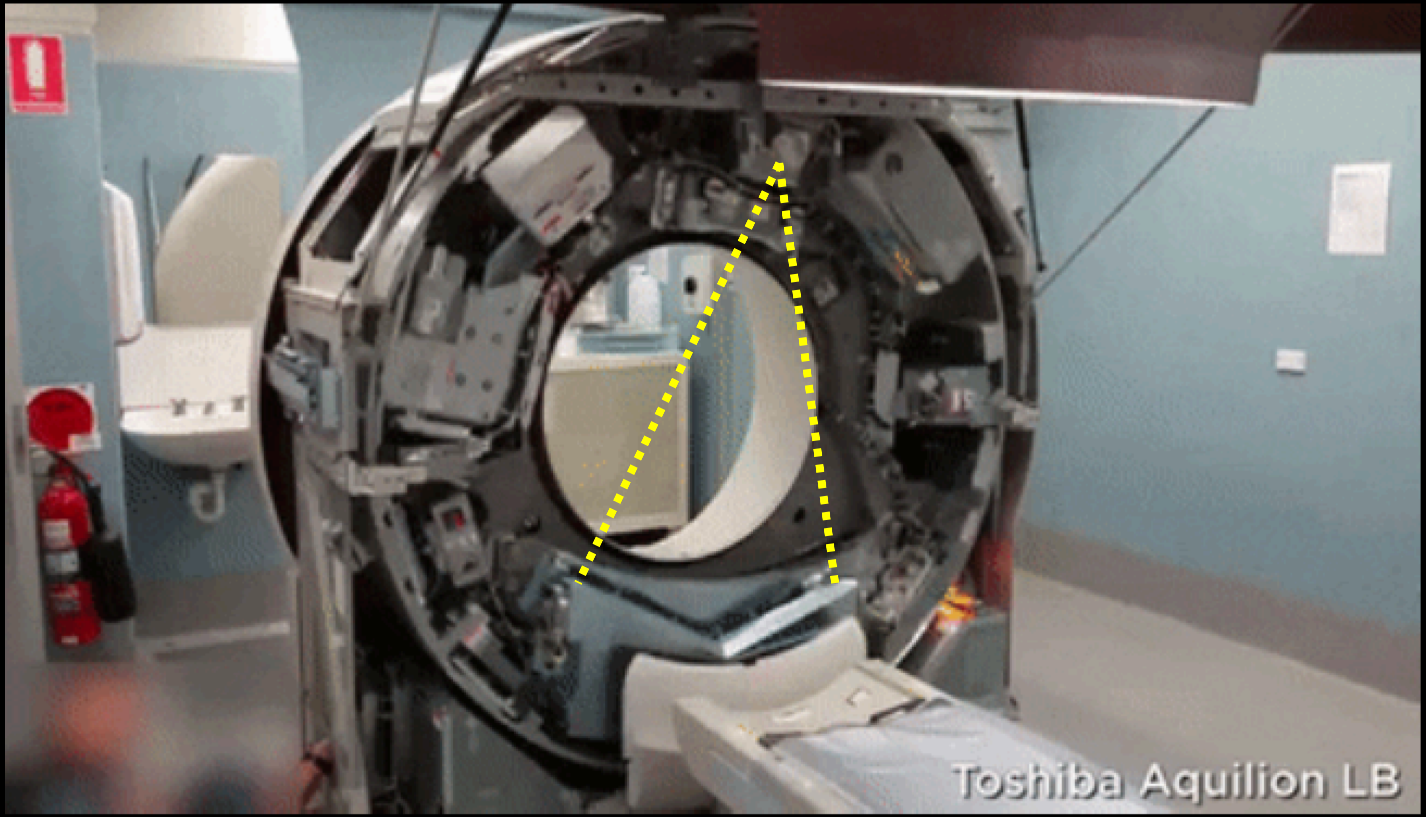






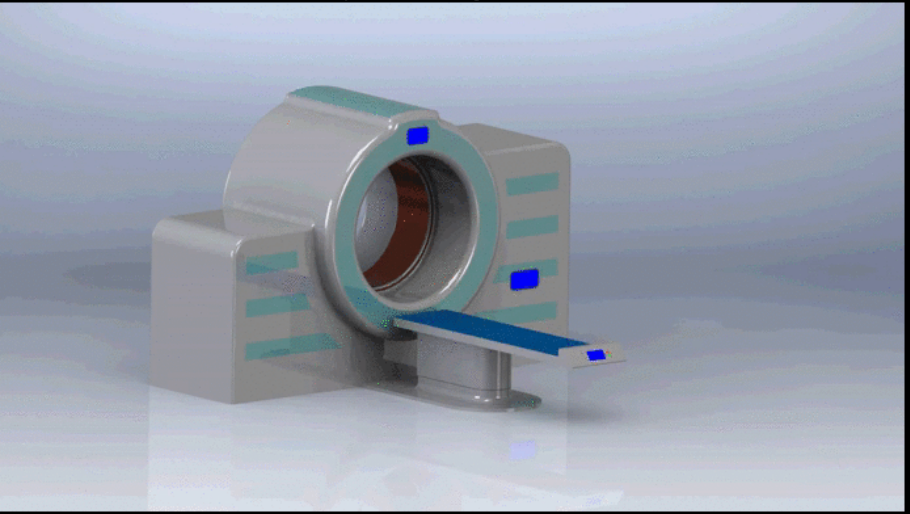
MOTO LINEARE - MOTO CIRCOLARE

https://gifer.com/en/Fb9T



https://www.youtube.com/watch?v=8HX8jyCg6eg

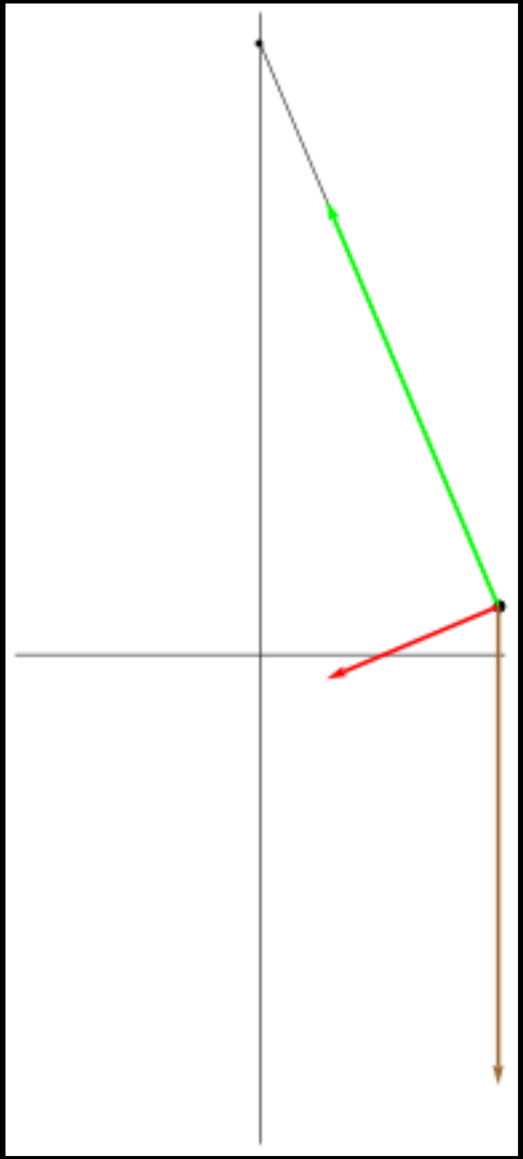
TAC (RX)



https://grabcad.com/library/mri-magnetic-resonance-imaging-1

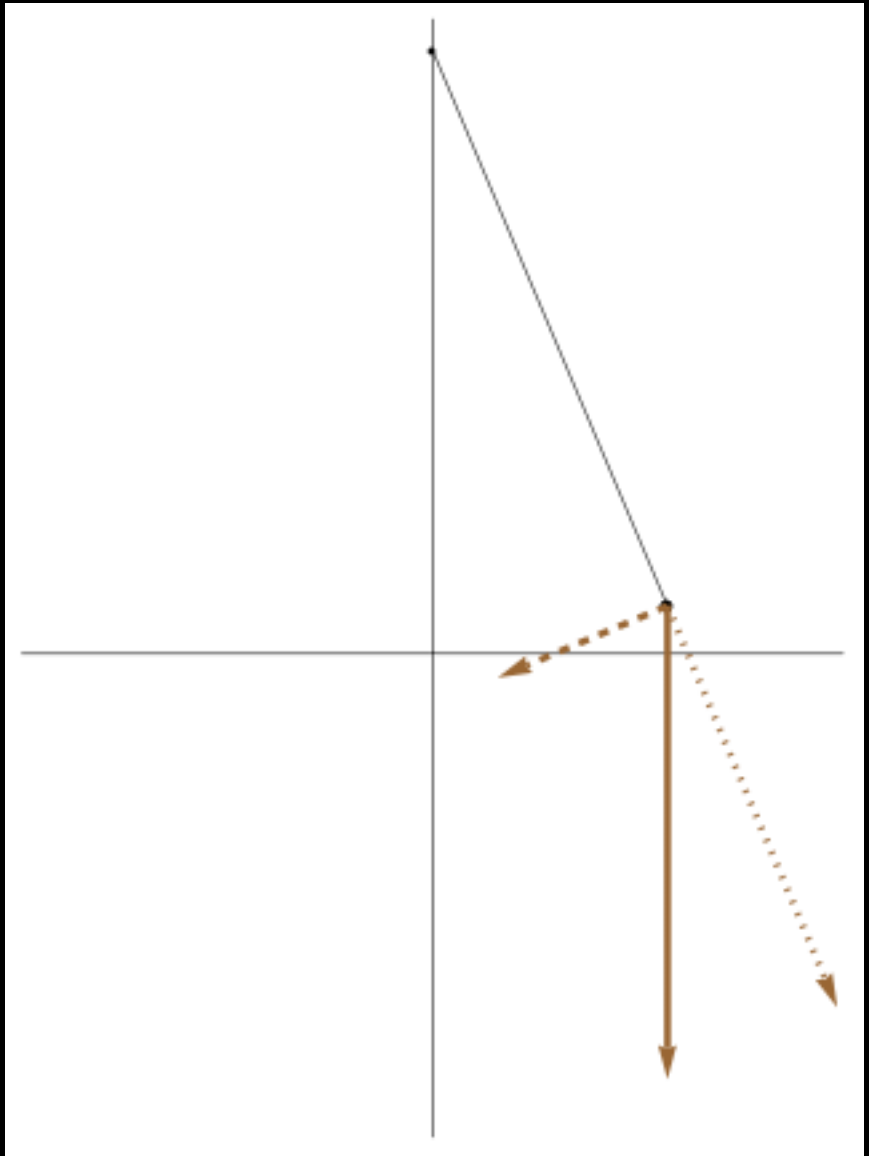
MOTO ARMONICO

PENDOLO



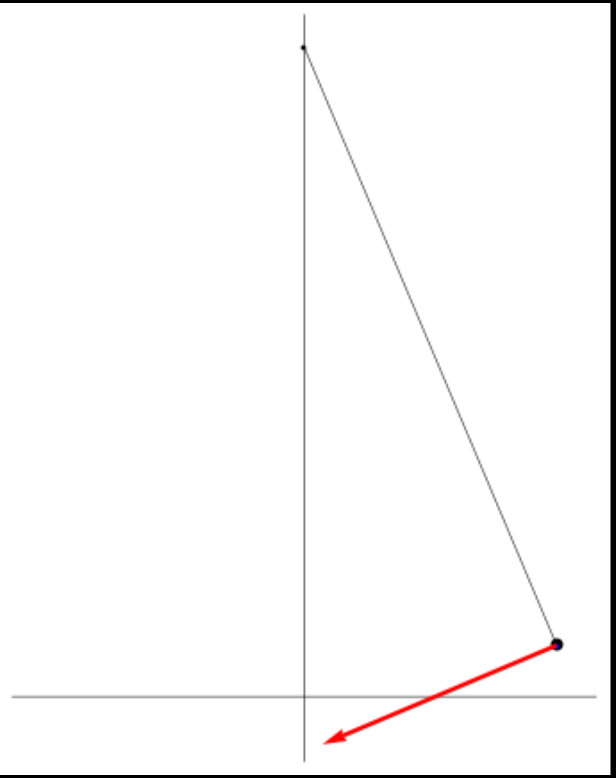
accelerazione

peso



scomposizione forza

tensione filo



accelerazione

velocità

$$\vec{F} = m\,\vec{a} \rightarrow \vec{a} \,//\, \vec{F}$$

Fondamenti di fisica generale

adalberto.sciubba@uniroma1.it

Mercoledì 3 novembre 2021
14:00-15:00
asincrona
(meet.google.com/khp-neqs-kgd)

LEZ 3A

adalberto.sciubba@uniroma1.it

Lunedì 8 novembre 2021

Correzione esercizi

15:00-16:00

SINCRONA

meet.google.com/**khp-neqs-kgd**

LEZ 3S

adalberto.sciubba@uniroma1.it

Mercoledì 10 novembre 2021

12:00-13:00

in AULA

LEZ 4