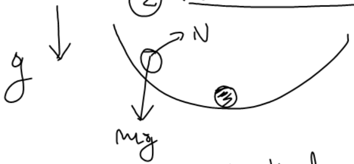
Una forma "típica" de movimiento son las OSCILACIONES

M.A.S. $\in$ OSCILACIONES

MOV. OSCILATORIO : → ① COND. EQUILIBRIO

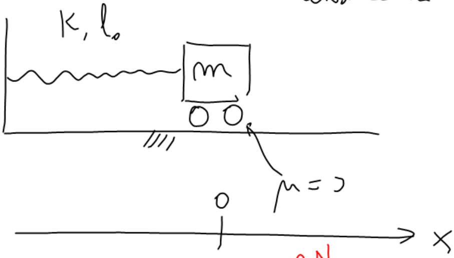
② FUERZA RESTITUTIVA ($mg \sin\alpha$)

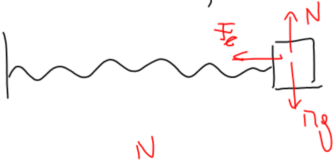


③ La partícula tenga "inercia"

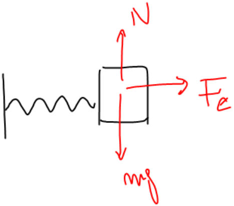
Ejemplo:

COND. EQUIL: Resorte en largo natural





$$|\vec{F}_e| = K\cdot\delta = K\cdot x$$



$$F_e = -Kx$$ ✓

2° Ley:

$$m \cdot a_x = -Kx$$

$$\frac{d^2x}{dt^2} = \boxed{\ddot{x} = -\frac{K}{m} \cdot x}$$

Se busca: $x(t)$ t.q. $\ddot{x} = -\frac{K}{m} \cdot x$

Sol:

$$x(t) = E\cos(\omega t)$$

$$x(t) = B\sin(\omega t)$$

$$x(t) = E\cos(\omega t) + B\operatorname{sen}(\omega t)$$

$$\underline{x(t) = A\cos(\omega t + \phi)}$$

$$x(t) = A\cos(\omega t + \phi)$$

$$\boxed{\ddot{x} = -\frac{k}{m} \cdot x}$$

$$\dot{x}(t) = -A\omega \operatorname{sen}(\omega t + \phi)$$

$$\ddot{x}(t) = -A\omega^2 \cos(\omega t + \phi)$$

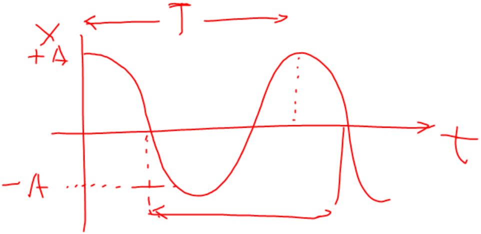
$$M \Longrightarrow \boxed{\omega^2 = \frac{k}{m}}$$

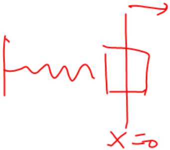
$$x(t) = A\cos(\omega t + \phi) \Longrightarrow$$ MOV. ARM. SIMPLE (MAS)

A, ϕ : ?

$$X = A \cos(\omega t + \phi)$$

Caso ①: $\phi = 0$ (fase) $x(t) = A\cos(\omega t)$





A: Amplitud

Depende de la CI

Un ciclo se cumple en $\omega t = 0$ y $\omega T = 2\pi$

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

$$x = A\cos(\omega t + \phi)$$

A: Amplitud $\longleftrightarrow$ C.I.

ϕ: fase $\longleftrightarrow$ C.I.

ω: frec. angular $\longleftrightarrow$ SISTEMA $\quad \omega = \sqrt{\frac{K}{m}}$

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

$$\dot{x}(t) = -\omega A \operatorname{sen}(\omega t + \phi)$$

$$\ddot{x}(t) = -\omega^2 A\cos(\omega t + \phi)$$

$$x = A\cos(\omega t + \phi)$$

sol → $\ddot{x} = -\frac{K}{m} \cdot x$

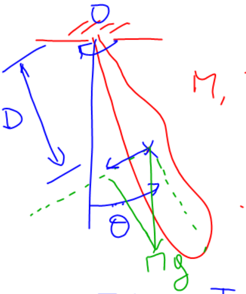
$$\ddot{x} = -\omega^2 x$$

$$\ddot{z} = -\omega^2 z$$

$$\ddot{\theta} = -\omega^2 \theta$$

→ MAS →

$$\theta(t) = \theta_0 \cos(\omega t + \phi)$$



M, I_{cm} X: CM

D: Dist CM – O

$$\sum \tau_o = I_o \cdot \alpha = I_o \cdot \ddot{\theta}$$

$$- Mg \sin\theta \cdot D = I_o \cdot \ddot{\theta}$$

$$\ddot{\theta} = - \frac{MgD}{I_o} \sin\theta$$

MAS ??

$$\ddot{\theta} = -\frac{Mg \cdot D}{I_0} \operatorname{sen} \theta$$

↳ NO ES MAS

Sin embargo para θ "pequeño"

$$\operatorname{sen} \theta \sim \theta$$

$$\rightarrow \quad \ddot{\theta} = -\frac{Mg \cdot D}{I_0} \theta \rightarrow \text{MAS}$$

$$\boxed{\omega^2 = \frac{Mg\,D}{I_0}}$$

$$\theta(t) = \theta_0 \cos(\omega t + \phi)$$