LLEIS NEWTON

1. tot sistema en repòs o en MRU: $\Sigma \vec{F} = 0$
2. tot sistema amb a: $\Sigma \vec{F} = m \cdot a$
3. força acció – reacció:

Llei Gravitació Universal

$F = \frac{G \cdot M \cdot m}{r^2}$

$G = 6{,}67 \cdot 10^{-11}$ (N·m²/kg²)

F. FREGAMENT

$F_f = \mu \cdot N$ (N)

μ_e estático

μ_c cinético

ENERGIAS

$E_c = \frac{1}{2} \cdot m \cdot v^2$ (J)

$E_p = m \cdot g \cdot h$ (J)

$E_m = E_C + E_P$ (J) (constante)

Fneta = sumatori

$P = \frac{Ep}{t}$ $P = \frac{W}{t} = F * v$

MRU

a · cosα

a · sin α

$\overrightarrow{V_m} = \frac{\Delta \vec{r}}{\Delta t}$

MRUA

$a = \frac{\Delta v}{\Delta t}$ (m/s²)

$v^2 - {v_o}^2 = 2 \cdot a \cdot X$

$v = v_o + a \cdot \Delta t$

$x = x_o + v_o \cdot \Delta t + \frac{1}{2} \cdot a \cdot \Delta t^2$

VECTORS

mòdul: $v = |\vec{v}| = \sqrt{{v_x}^2 + {v_y}^2}$

direcció: $cos\alpha = \frac{v_x}{v}$

$\cos \alpha = \frac{\vec{v} \cdot \vec{u}}{|\vec{v}| \cdot |\vec{u}|}$

E.Potencial MOLLA

$E_p = \frac{1}{2} \cdot k \cdot y^2$ (J = N·m)

$P = m \cdot g$ (N)

$g = 9{,}81$ (m/s²)

$N = P_y$ (N) ⊥ superficie

$1\ volta = 2\pi\ rad$

1 rev/s = 2π rad/s

Quantitat moviment

$\vec{p} = m \cdot \vec{v}$ (N·s = kg·m·s⁻¹)

$\vec{a} = 0 = \frac{d\vec{v}}{dt} \Rightarrow \vec{v} = const. = \frac{d\vec{x}}{dt}$

$x = x_o + vt$ [1 dim]

MCUA

$a_n = \frac{v^2}{r} = w^2 \cdot r$ (m/s²)

const $a_t = \frac{d|\vec{v}|}{dt} = \sqrt{{a_t}^2 + {a_n}^2}$ (m/s²)

$\vec{a}_i = \frac{d\vec{v}}{dt}$

MCU

$v = w \cdot r$ (m/s)

$v = \frac{\Delta S}{\Delta t}$

$w_m = \frac{\Delta \varphi}{\Delta t}$ (rad/s)

$r = \frac{\Delta S}{\Delta \varphi} = \frac{v}{w}$

$\omega = \frac{v}{R}$

$w = \sqrt{\frac{g}{l}}$

at = 0

an = const

$\varphi = \varphi_o + w \cdot \Delta t$ (rad)

$S = S_o + v \cdot \Delta t$ (m)

M. PARABÒLIC (caiguda lliure)

eix x: v constant

eix y: a = 9,81 m/s²

$y = y_o + v_{oy} t - \frac{1}{2} g t^2$

$v_y = v_{oy} - gt$

$x = v_{ox} t$

Descomponiendo la velocidad inicial:

$\begin{cases} V_{0x} = V_0 \cos\theta \\ V_{0y} = V_0 \text{sen}\theta \end{cases}$

MHS

Ff = 0; A constant; Em constant

Llei de Hooke: $F = -k \cdot \Delta y$ (N) (N/m)

$K = \frac{m*g}{x}$

$\varphi = w \cdot t$ (º)

$y = A \cdot \sin(w \cdot t + \varphi_o)$ (m)

$x = A \cdot \cos(w \cdot t + \varphi_o)$ (m)

$a = \frac{v^2}{r}$

$\omega^2 = \frac{k}{m}$, $\omega = \sqrt{\frac{k}{m}}$

$v = \frac{dy}{dt} = A \cdot w \cdot \cos(w \cdot t + \varphi_o)$ (m/s)

t = 0 ⟹ cos(φ) = 1 ⟹ φ =

$v = w \cdot \sqrt{A^2 - y^2}$ (m/s)

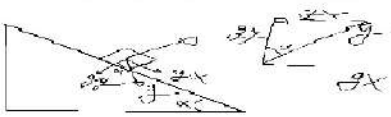
$a = \frac{dv}{dt} = -A \cdot w^2 \cdot \sin(w \cdot t + \varphi_o)$ (m/s²)

$v_{max} = A \cdot w$ $a_{max} = -A \cdot w^2$

$E = E_c + E_p$ (J = N·m)

$E_c = \frac{1}{2} \cdot m \cdot v^2$ (J = N·m) $E_p = \frac{1}{2} \cdot k \cdot y^2$ (J = N·m)

Si canvia el r la T i w es mantenen const



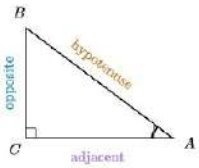
N = g * cos(alpha) * m

$\frac{a}{\text{sen}\alpha} = \frac{b}{\text{sen}\beta} = \frac{c}{\text{sen}\gamma}$

$\sin(\angle A) = \frac{\text{opposite}}{\text{hypotenuse}}$

$\cos(\angle A) = \frac{\text{adjacent}}{\text{hypotenuse}}$

$\tan(\angle A) = \frac{\text{opposite}}{\text{adjacent}}$



$T = \frac{2\pi R}{v}$

Període: $T = \frac{2\pi}{w}$ (s)

Freqüència: $f = \frac{1}{T}$ (Hz)

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

Forces conservatives
- Gravitacionals
- Elastiques
- Electriques

TREBALL

$W = \vec{F} \cdot \vec{r} = F \cdot r \cdot \cos\alpha$ (J)

$W_{TOTAL} = \Delta E_c$

$W_{F.CONS.} = -\Delta E_P$

$W_{F.NO\ CONS.} = \Delta E_c + \Delta E_p$