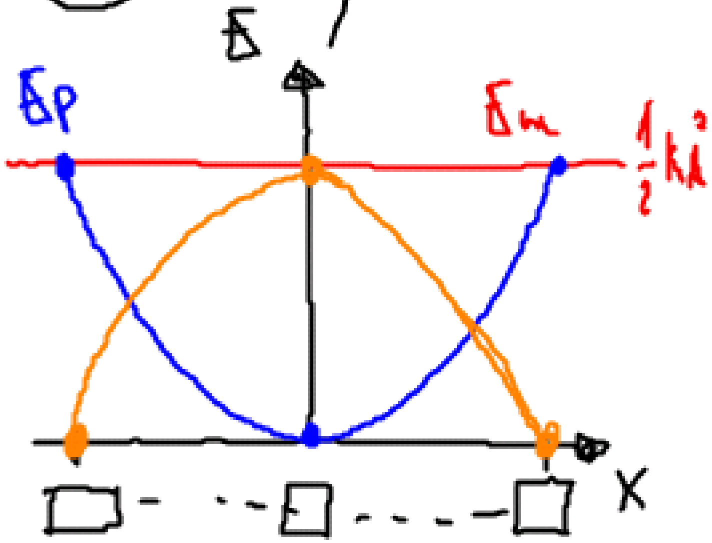
$$x(t) = A\,\text{sen}\,(\omega t + \varphi_0)$$

1- a) M.A.S. es un mov. periódico unidimensional



$x=-A$	$x=0$	$x=A$
$E_p=\frac{1}{2}kA^2$	$E_p=0$	$E_p=\frac{1}{2}kA^2$
$V=0$	$V_{máx}=A\omega$	$V=0$
$E_c=0$	$E_c=\frac{1}{2}kA^2$	$E_c=0$

$$E_c = \frac{1}{2} m v^2 = \frac{1}{2}\, \overbrace{m\, A^2\, \omega^2}^{K} \cos^2(\omega t + \varphi_0)$$

$$E_p = \frac{1}{2} K x^2 = \frac{1}{2} K A^2 \,\text{sen}^2(\omega t + \varphi_0)$$

$$E_m = E_c + E_p = \frac{1}{2} K A^2 \left[\underbrace{\text{sen}^2(\quad) + \cos^2(\quad)}_{1}\right]$$

$$\boxed{E_m = \frac{1}{2} K A^2} = \underline{cte}$$

b)

$$E_m = \frac{1}{2} K A^2$$

$$E'_m = \frac{1}{2} K A'^2$$

$$\boxed{\omega = \sqrt{K/m}}$$

$$\omega = \omega'$$

$$E'_m = 3 E_m$$

$$\cancel{\frac{1}{2}} K A'^2 = 3 \cdot \cancel{\frac{1}{2}} K A^2$$

$$\boxed{A' = \sqrt{3}\, A}$$

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

$$f = \frac{1}{T}$$

NO VARÍAN

Son indeps. de A

(E_m)

$$v = \frac{dx}{dt} = A\omega \cos(\omega t + \varphi_0)$$

$$v_{máx} = A\omega \qquad v'_{máx} = A'\omega = \sqrt{3} A\omega$$

$$\boxed{v'_{máx} = \sqrt{3}\, v_{máx}}$$

2-

a) $\boxed{\frac{d\vec{L}}{dt} = \vec{M}}$

EL CAMBIO INSTANTÁNEO DEL MOM. ANGULAR CON RESPECTO AL TIEMPO ES IGUAL AL MOM. DE LA FUERZA.

Demo:

$$\boxed{\vec{L} = \vec{r} \times \vec{p}}$$

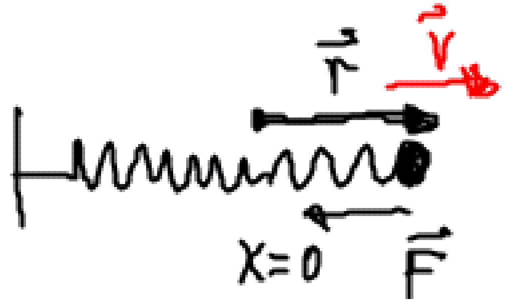
$$\frac{d\vec{L}}{dt} = \frac{d(\vec{r} \times \vec{p})}{dt} = \overbrace{\frac{d\vec{r}}{dt}}^{\vec{V}} \times \vec{p} + \vec{r} \times \overbrace{\frac{d\vec{p}}{dt}}^{\vec{F}} =$$

$$= \cancelto{0}{\vec{V} \times \vec{p}} + \vec{r} \times \vec{F} = \boxed{\vec{M}}$$

$\vec{p} = m\vec{v}$

$\vec{p} \parallel \vec{v}$

b)



$$\vec{M} = \vec{r} \times \vec{F} = \vec{0}$$

$$\vec{r} \parallel \vec{F} \quad (180°)$$

$$\boxed{\vec{F} = -K\vec{r}}$$

$$\frac{d\vec{L}}{dt} = \vec{0} \Rightarrow \boxed{\vec{L} = \vec{cte}}$$

$$\vec{L} = \vec{r} \times \vec{p} = \vec{0}$$

$$\vec{r} \parallel \vec{v}$$

3- a)

i) Giro $\rightarrow$ $L_0 = L_f$

$$I_0 w_0 = I_f w_f$$

Si disminuye $I \Rightarrow$ aumenta w

$$I = \int r^2 \, dm$$ (disminuye r entonces dism. I)

ii) No aumenta, disminuye

iii) $E_{c_R} = I w^2 \Rightarrow \boxed{E_{c_{R_f}} > E_{c_{R_0}}}$

b)

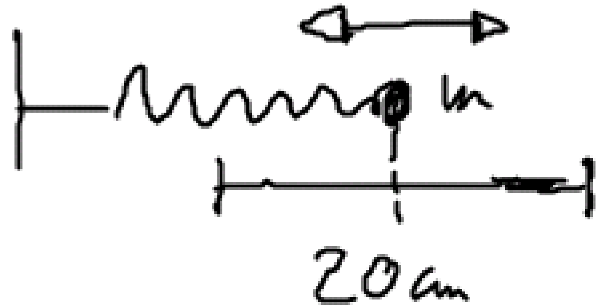
i) V , DEFINICIÓN $\boxed{\Delta E_m = 0}$

ii) F $W = \int \vec{F} \cdot d\vec{r} = \Delta E_c$

iii) V $W = \int_A^B \vec{F} \cdot d\vec{r} = -\Delta E_p$ NO DEPENDE DEL CAMINO

$W_I = W_{II}$

4-



$A = 10\,cm$

a) $T = 5\,s$

$m = 1\,Kg$

Supongo $\varphi_0 = 0\,rad$

$$\boxed{\omega = \frac{2\pi}{T} = \frac{2\pi}{5}\,rad/s}$$

$$X(t) = A\,\text{sen}(\omega t + \cancel{\varphi_0}) \quad 0$$

$$\boxed{X(t) = 0{,}1\,\text{sen}\left(\frac{2\pi}{5}t\right)\,m}$$

$$V(t) = A\omega\cos(\omega t)$$

$$\boxed{V(t) = 0{,}13\cos\left(\frac{2\pi}{5}t\right)\,m/s}$$

$$a(t) = -A\omega^2\,\text{sen}(\omega t)$$

$$\boxed{a(t) = -0{,}16\,\text{sen}\left(\frac{2\pi}{5}t\right)\,m/s^2}$$

$V_{máx} = A\omega = \boxed{0,13\ m/s}$ $\left(\cos\left(\frac{2\pi}{5}t\right) = 1\right)$

$a_{máx} = \boxed{0,16\ m/s^2}$ $\left(\operatorname{sen}\left(\frac{2\pi}{5}\right) = -1\right)$

b) $\begin{cases} E_c = 3E_p \\ E_m = E_c + E_p = \frac{1}{2}KA^2 \end{cases}$

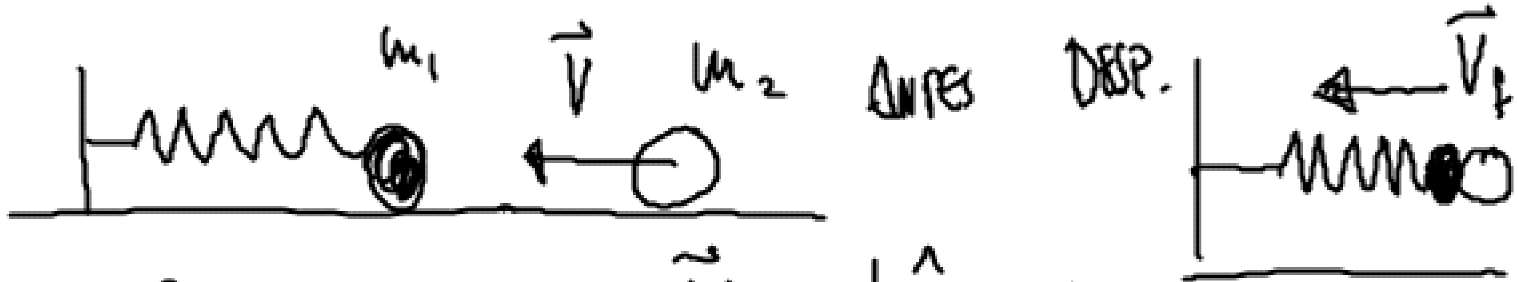
$4E_p = \frac{1}{2}KA^2$

$4\left(\cancel{\frac{1}{2}}\cancel{K}x^2\right) = \cancel{\frac{1}{2}}\cancel{K}A^2$

$x = \sqrt{A^2/4} = \pm\frac{A}{2}$

$\boxed{x = \pm 5\,cm}$

5-



$m_1 = 200\,g = 0{,}2\,kg$ $\quad$ $\vec{V} = -4\,\hat{i}\ m/s$

$m_2 = 600\,g = 0{,}6\,kg$

a) $\boxed{\vec{P}_0 = \vec{P}_f} \Rightarrow m_2 \vec{V} = (m_1 + m_2)\vec{V}_f$

$$\boxed{\vec{V}_f = -3\hat{i}\ m/s}$$

CHOQUE $\rightarrow$ $\Delta E_m = E_{c_f} - E_{c_0} = \boxed{-1{,}2\ J}$

b) Compresión $\boxed{\text{Máxima}}$ (sin pérdidas)

$$E_{c_f} = E_{p_{elast.}}$$

$$\frac{1}{2}(m_1 + m_2)v_f^2 = \frac{1}{2}Kx^2$$

$$\boxed{X = -0,12\,m}$$