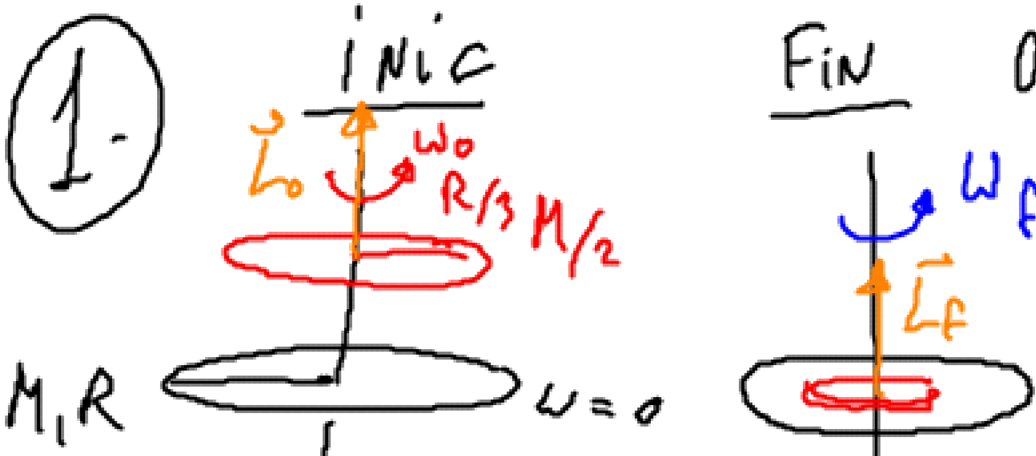
1.



a)

$$\boxed{\vec{L}_0 = \vec{L}_f}$$

$$\boxed{L = I\omega}$$

Dir y sent. $\vec{L}$ se conservan.

$$I_0 \omega_0 = I_f \omega_f$$

$$I_1 \cdot 0 + I_2 \cdot \omega_0 = (I_1 + I_2)\omega_f$$

$$\omega_f = \frac{I_2}{I_1 + I_2}\omega_0 = \frac{\cancel{1/18}\ \cancel{I_1}}{\cancel{19/18}\ \cancel{I_1}}\omega_0$$

$$\boxed{\omega_f = 1/19\ \omega_0}$$

$$I_2 = \frac{1}{2}\left(\frac{M}{2}\right)\left(\frac{R}{3}\right)^2 = \frac{1}{18} I_1$$

$$I_1 = \frac{1}{2} M R^2$$

$$I_f = I_1 + I_2 = \left(1 + \frac{1}{18}\right) I_1 = \frac{19}{18} I_1$$

b1) $\boxed{E_{C_R} = \frac{1}{2} I \omega^2}$

$$E_{C_{R_0}} = \frac{1}{2} I_2 \omega_0^2 = \frac{1}{18}\left(\frac{1}{2} I_1 \omega_0^2\right) = \frac{1}{18}\left(\frac{1}{2} \cdot \frac{1}{2} M R^2 \omega_0^2\right)$$

$$\frac{1}{19} E_{C_{R_0}}$$

$$E_{C_{R_f}} = \frac{1}{2}(I_1 + I_2)\omega_f^2 = \frac{1}{2}\left(\frac{19}{18} I_1\right)\left(\frac{1}{19}\omega_0\right)^2 = \frac{1}{19}\left(\frac{1}{18} \cdot \frac{1}{2} I_1 \omega_0^2\right)$$

$$\Delta E_{C_R} = E_{C_{R_f}} - E_{C_{R_0}} = \left(\frac{1}{19} - 1\right) E_{C_{R_0}} = \underline{-\frac{18}{19} E_{C_{R_0}}}$$

$$\Delta E_{C_R} = -\frac{\cancel{18}}{19} \cdot \frac{1}{\cancel{18}}\left(\frac{1}{4} M R^2 \omega_0^2\right) = \boxed{-\frac{1}{76} M R^2 \omega_0^2 \ \mathrm{J}}$$

b)

$$[\delta_{CR}] = [I] \cdot [\omega^2] = \boxed{ML^2T^{-2}}$$

$$[I] = ML^2$$

$$[\omega] = T^{-1}$$

2- a) F SE CONSERVA $\vec{L}$

$$\vec{F}_c = -F_c \cdot \hat{u}_r \qquad \vec{M} = \vec{r} \times \vec{F}$$

$$\vec{r} = r \cdot \hat{u}_r \qquad \vec{M} = \vec{0}$$

$$M = r\,F\,\text{sen}\,180°$$

$$\frac{d\vec{L}}{dt} = \vec{M} = \vec{0}$$

$$\rightarrow \vec{L} = \vec{cte}$$

(DIR
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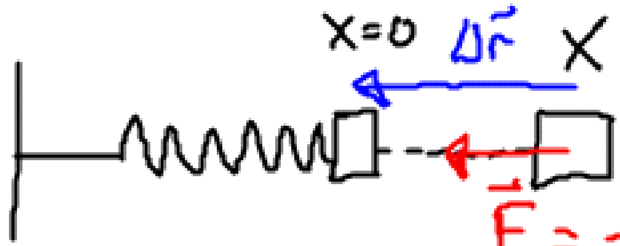
MÓDULO)

b) F



$$d\vec{r} = -dx\,\hat{i}$$

$$\vec{F} = -Kx \cdot \hat{i}$$

Casi

$$W = \int \vec{F}\cdot d\vec{r} = \int_x^0 Kx \cdot dx = \frac{1}{2}Kx^2 \Big|_x^0 = \underbrace{-\frac{1}{2}Kx^2}_{E_p}$$

$$\boxed{W = -\Delta E_p}$$

c) $m_1 = m_2$

$E_c = \frac{1}{2} m v^2 = \frac{p^2}{2m}$

$p_1 = \frac{1}{2} p_2$

$$E_{c_1} = \frac{p_1^2}{2m_1} = \frac{\left(\frac{1}{2} p_2\right)^2}{2m_2} = \frac{1}{4} \underbrace{\frac{p_2^2}{2m_2}}_{E_{c_2}}$$

F

$$\boxed{E_{c_2} = 4 E_{c_1}}$$

PROBLEMA 1

$m = 10\,kg \qquad \vec{r}(t) = (3t^3 - 4t, -2, -2t+5)\,m$

a) $$W = \int \vec{F} \cdot d\vec{r} = \int_0^2 \vec{F} \cdot \vec{v} \cdot dt = \int_0^2 (1620t^3 - 720t)\,dt$$

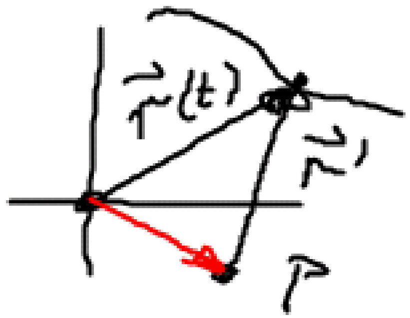
$$\vec{v} = \frac{d\vec{r}}{dt} \rightarrow d\vec{r} = \vec{v} \cdot dt = (9t^2 - 4, 0, -2)\,dt$$

$$\vec{v} = (9t^2 - 4, 0, -2)\,m/s$$

$$\vec{F} = \frac{d\vec{p}}{dt} = 10 \cdot (18t, 0, 0) = (180t, 0, 0)\,N$$

$$=\left(405t^4-360t^2\right)\Big|_0^2=(6480-1440)-0=\boxed{5040\ \mathrm{J}}$$

b)



$$P=(0,-2,-5)\ \mathrm{m}$$

$$\vec{r}\,'=\vec{r}-\vec{OP}=(3t^3-4t,0,-2t+10)\ \mathrm{m}$$

$$\vec{p}\,'=\vec{p}=10\,(9t^2-4,0,-2)\ \mathrm{kg\cdot m/s}$$

$$\vec{L}\,'=\vec{r}\,'\times\vec{p}=10\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ & \vec{r}\,' & \\ & \vec{v} & \end{vmatrix}=(-120t^3+900t^2-400)\,\hat{j}\ \mathrm{kg\cdot m^2/s}$$

c) $\vec{M} = \dfrac{d\vec{L}}{dt} = (-360t^2 + 1800t)\,\hat{j}$ $Kg \cdot m^2/s^2$

NO SE CONSERVA, $\vec{M} \neq \vec{0} \Rightarrow \vec{L}(t)$

d) $E_c = \dfrac{1}{2} m v^2 = \dfrac{1}{2} \cdot 10 \cdot 1028 = \boxed{5140\ J}$

$\vec{V}^2 = V \cdot V = V^2$

$\vec{V}(2) = (32, 0, -2)$

$V^2(2) = 1028\ m^2/s^2$

$E_c(t)$

NO SE CONS.