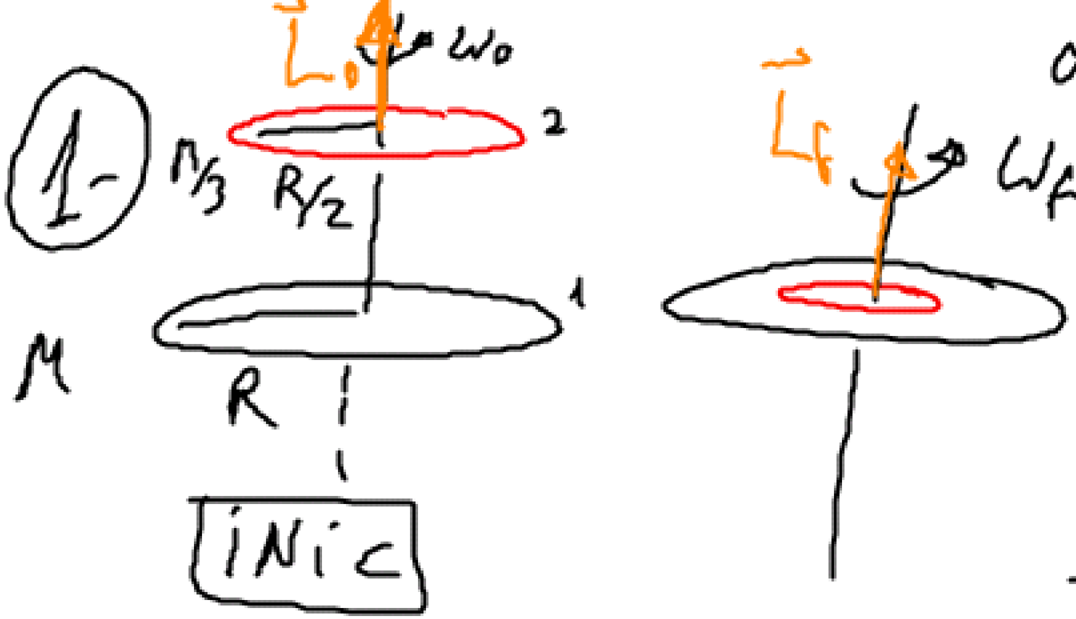
1-



a)

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

$$L = I\omega$$

$$\cancel{I_1 \cdot 0} + I_2 \cdot \omega_0 = I_f \omega_f$$

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

$$\omega_f = \frac{I_2}{I_f}\,\omega_0$$

$$I_2 = \frac{1}{2}\,\frac{M}{3}\left(\frac{R}{2}\right)^2 = \frac{1}{12} I_1$$

$$\boxed{\omega_f = \frac{1/12\,\cancel{I_1}\,\omega_0}{13/12\,\cancel{I_1}} = \frac{1}{13}\,\omega_0}$$

$$I_f = I_1 + I_2 = \left(1 + \frac{1}{12}\right) I_1 = \frac{13}{12} I_1$$

b) 1)

$$\boxed{\Delta E_{C_R} = E_{C_{R_f}} - E_{C_{R_0}}} = \frac{1}{13} E_{C_{R_0}} - E_{C_{R_0}} = -\frac{12}{13} E_{C_{R_0}}$$

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

$$= -\frac{\cancel{12}}{13} \cdot \frac{1}{\cancel{12}} \cdot \frac{1}{2} \cdot \frac{1}{2} M R^2 \omega_0^2 =$$

$$\boxed{= -\frac{1}{52} M R^2 \omega_0^2 \text{ J}}$$

$$E_{C_{R_0}} = \frac{1}{2} I_2 \omega_0^2 = \frac{1}{12} \left(\frac{1}{2} I_1 \omega_0^2 \right)$$

$$E_{C_{R_f}} = \frac{1}{2} (I_1 + I_2) \omega_f^2 = \frac{13}{12} \cdot \frac{1}{2} I_1 \left(\frac{1}{13} \omega_0 \right)^2 =$$

$$= \frac{1}{13 \cdot 12} \cdot \left(\frac{1}{2} I_1 \omega_0^2 \right)$$

$E_{C_{R_0}}$

b2)

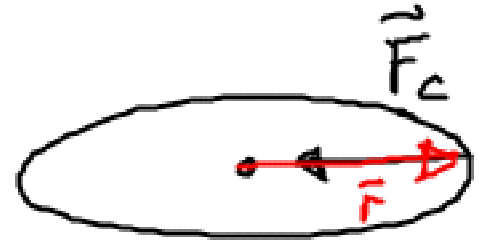
$$[E_c] = [I][\omega^2] = ML^2T^{-2}$$

$$[I] = ML^2$$

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

2-

a) F



$$\vec{F}_c = -F_c\,\hat{u}_r$$

$$\vec{r} = r\,\hat{u}_r$$

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

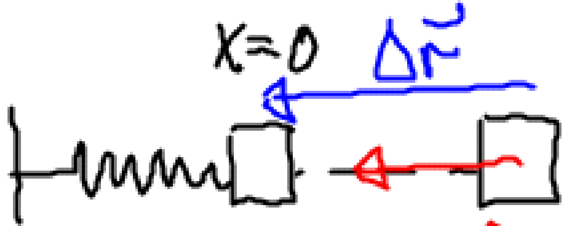
$$M = r\,F\,\cancel{\text{sen}\,180^\circ}^{\,0} = 0$$

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

MOD
DIR
SENT

b)

F



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

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

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

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

c) $m_1 = m_2$

$p_1 = 2p_2$

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

$E_{c_1} = \frac{p_1^2}{2m_1} = \frac{(2p_2)^2}{2m_2} = 4 \frac{p_2^2}{2m_2}$

E_{c_2}

$\vec{p}^{\,2} = \vec{p} \cdot \vec{p} = p \cdot p \cdot \cos 0 = p^2$

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

F

$\boxed{E_{c_2} = \frac{1}{4} E_{c_1}}$

1- $m = 100\,kg$; $\vec{r}(t) = (2t-5, -3t^3+4t, -2)\,m$

a) $$W = \int \vec{F} \cdot d\vec{r} = \int_0^2 \vec{F} \cdot \vec{v}\, dt =$$

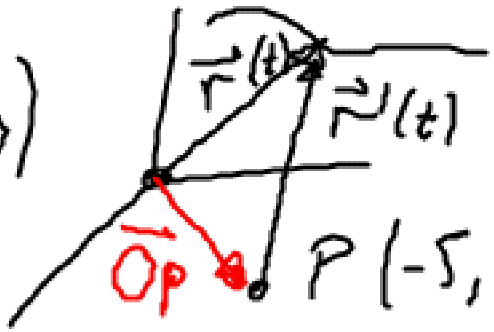
$$\vec{v} = \frac{d\vec{r}}{dt} = (2, -9t^2+4, 0)\,m/s$$

$$\vec{F} = \frac{d\vec{p}}{dt} = 100 \cdot (0, -18t, 0)\,N$$

$$= \int_0^2 \left(16200\, t^3 - 7200\, t\right) dt = \left(4050\, t^4 - 3600\, t^2\right)\Big|_0^2 =$$

$$= (64800 - 14400) - 0 = \boxed{50400 \text{ J}}$$

b)



$P(-5, 0, -2)\,m$

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

$$\vec{p}\,' = \vec{p}$$

$$\vec{L}' = \vec{r}\,' \times \vec{p} = 100 \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2t & -3t^3+4t & 0 \\ 2 & -9t^2+4 & 0 \end{vmatrix} = \boxed{(-1200t^3)\,\hat{k}\ \ Kg \cdot m^2 \cdot s^{-1}}$$

d) $\vec{M} = \dfrac{d\vec{L}}{dt} = \left(-3600\, t^2\right) \hat{k}$ $kg \cdot m^2/s^2$

No se cons. $\vec{L}$ pq. $\vec{M} \neq \vec{0}$

d) $E_c^{(2)} = \frac{1}{2} m \, v^2(2)$

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

$V^2(2) = 32^2 + 4$ m^2/s^2

1028

$E_c = \frac{1}{2} \cdot 100 \cdot 1028$

$\boxed{E_c = 51400 \text{ J}}$

No se conserva E_c.