GUIA 7

1) ***Arena***

$$\Delta P = (m.V)_2 - (m.V)_1 = 10^{-8} Kg.V$$

↳ $V=0$ dado que parte del reposo

Dado que $J = \frac{5}{10000}$ N.s :

$$J = \Delta p$$

$$\frac{5}{10000} Kg.\frac{m}{s^2}.s = \frac{1}{100000000} kg.V$$

$$\boxed{50000 \frac{m}{s} = V} \rightarrow \text{Velocidad final}$$

Por lo tanto:

$$\boxed{\Delta p = 10^{-8} Kg . 50000 \frac{m}{s} = \frac{1}{2000}}$$

Por otra parte

$$\boxed{E_c = \frac{m.V^2}{2}} = \frac{1}{100000000} Kg . \left(\frac{50000}{\sqrt{2}} \frac{m}{s}\right)^2 = \frac{2500000000}{100000000} \frac{Kg.m^2}{s^4} = 25 \frac{Kg.m^2}{s^4}$$

Hielo

$$\Delta p = (m.V)_2 - (m.V)_1 = 10^{-3} Kg.V$$

↳ $V=0$ dado que parte del reposo

Dado que $J = \frac{5}{10000}\ N.s$:

$$J = \Delta p$$

$$\frac{5}{10000}\ kg.\frac{m}{s} = \frac{1}{}\ kg.V$$

$$\boxed{\frac{1}{2}\ \frac{m}{s} = V}$$

Por lo tanto:

$$\Delta p = 10^{-3}\ kg . \frac{1}{2}\ \frac{m}{s}$$

$$\boxed{\Delta p = \frac{1}{2000}\ kg.\frac{m}{s}}$$

Por otra parte:

$$E_c = \frac{m.V^2}{2}$$

$$E_c = \frac{1}{1000}\ kg . \frac{1}{4}\ \frac{m^2}{s^2}$$

$$\boxed{E_c = \frac{1}{4000}\ kg.\frac{m^2}{s^2}}$$

Automóvil

$$\Delta P = (m.V)_2 - (m.V)_1 = 10^3\ kg . V$$

$\hookrightarrow V = 0$ dado que parte del reposo

Dado que $J = \frac{5}{10000}\ N.s$:

$$J = \Delta P$$

$$\frac{5}{10000} \cdot Kg \cdot \frac{m}{s} = 1000\,Kg \cdot V$$

$$\boxed{\frac{1}{2000000} \frac{m}{s} = V}$$

Por lo tanto:

$$\Delta P = 10^3 Kg \cdot \frac{1}{2000000} \frac{m}{s}$$

$$\boxed{\Delta P = \frac{1}{2000} Kg \cdot \frac{m}{s}}$$

Por otra parte:

$$E_c = \frac{m \cdot V^2}{2} \Rightarrow E_c = 10^3 Kg \cdot \frac{1}{4000000000000} \frac{m}{s} \Rightarrow \boxed{E_c = 4 \cdot 10^{-9} Kg \cdot \frac{m}{s}}$$

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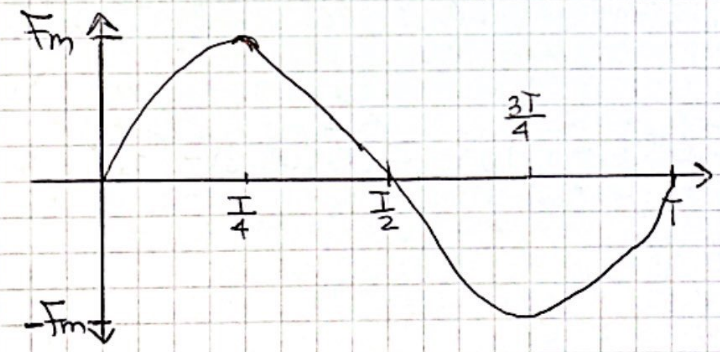


a) $\frac{d\vec{P}}{dt} = \vec{F} \Rightarrow d\vec{P} = \vec{F} \cdot dt \Rightarrow \Delta \vec{P} = \int_0^T \vec{F}\,dt$

$$= \int_0^T Fm \cdot \sin\left(\frac{2\pi \cdot t}{T}\right) dt = Fm \int_0^T \sin\left(\frac{2\pi \cdot t}{T}\right) dt = Fm \cdot \left(-\frac{T}{2\pi} \cdot \cos\left(\frac{2\pi \cdot t}{T}\right)\right)\Bigg|_0^T$$

$$= -\frac{Fm \cdot T}{2\pi} \cdot \cos\left(\frac{2\pi \cdot T}{T}\right) + \frac{Fm \cdot T}{2\pi}$$

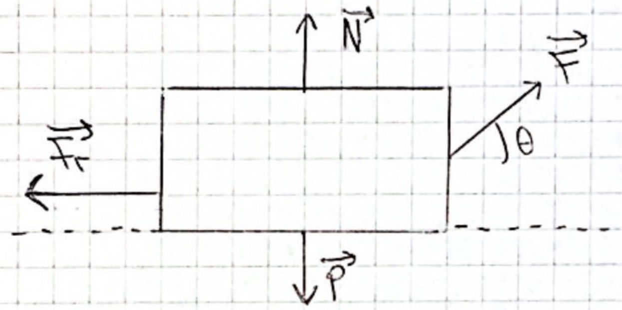
b) $P\left(\frac{T}{2}\right) - P(0) = \left(-\frac{F_m.T}{2\pi}\cdot\cos(\pi) + \frac{F_m.T}{2\pi}\right) - \left(-\frac{F_m.T}{2\pi}.\cos(0) + \frac{F_m.T}{2\pi}\right)$

$= \frac{F_m.T}{2\pi} + \frac{F_m.T}{2\pi} - \frac{F_m.T}{2\pi} = \boxed{\frac{F_m.T}{2\pi}}$

c) $\Delta p = P(T) - P(0) = \left(-\frac{F_m.T}{2\pi}.\cos(2\pi) + \frac{F_m.T}{2\pi}\right) - \left(-\frac{F_m.T}{2\pi}.\cos(0) + \frac{F_m.T}{2\pi}\right)$

$= 0 - 0 = 0$

3



X

$-F_r + F.\cos(\theta) = m\,a_x$ ①

Y

$N - P + F.\sin(\theta) = 0$

a)

Dado que no hay desplazamiento en y calculamos trabajo en x:

$W_x = \int_0^x \sum F_x \, dx = \int_0^x (F.\cos(\theta) - F_r)\,dx = (F.\cos(\theta) - F_r).x \Big|_0^x$

$= (F.\cos(\theta) - F_r)\,x$

Es decir:

$Ec_f - \underbrace{Ec_i}_{\substack{=0 \text{ dado que} \\ \text{parte del reposo}}} = (F.\cos(\theta) - F_r)\,x$

$Ec_f = (F.\cos(\theta) - F_r)\,x$

$$\frac{mv^2}{2} = (F \cdot \cos(\theta) - F_r)\, x \implies \boxed{V = \pm\sqrt{\frac{2x}{m}(F \cdot \cos(\theta) - F_r)}}$$

b) Por ①:

$$a_x = \frac{F \cdot \cos(\theta) - F_r}{m} \quad ②$$

$$V_x = \frac{(F \cdot \cos(\theta) - F_r)}{m} \cdot t$$

$$\boxed{X_x = \frac{(F \cdot \cos(\theta) - F_r)}{2m} \cdot t^2}$$

c) Por ② $a=0$:

$$0 = \frac{F \cdot \cos(\theta) - F_r}{m}$$

$$\frac{F_r}{m} = \frac{F \cdot \cos(\theta)}{m}$$

$$\boxed{\frac{F_r}{\cos(\theta)} = F}$$