Questão 11 — Pedro Paulo 2C

a)

$F_{amortecedor} \Rightarrow \vec{D} = -c\,\vec{v}$

$q < 0$

$F_{elétrica} \Rightarrow \vec{F} = q\,\vec{E}$

$c > 0$

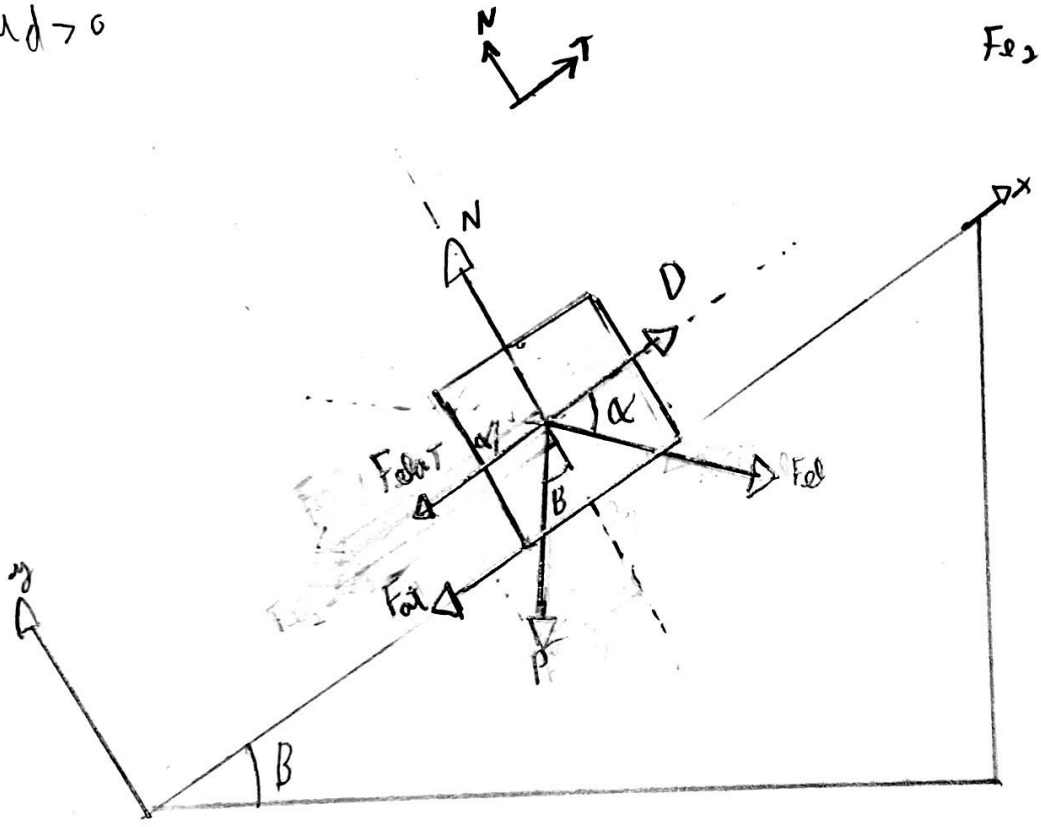
F_{el} = Força elétrica

F_{el_1} = Força elástica mola K_1

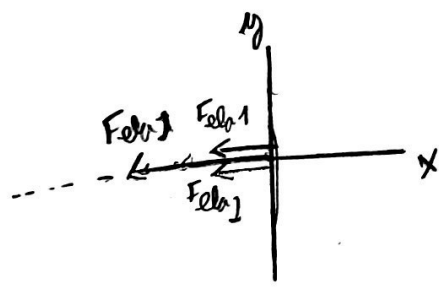
F_{el_2} = Força elástica mola K_2

$F_{el_T} = F_{el_1} + F_{el_2}$

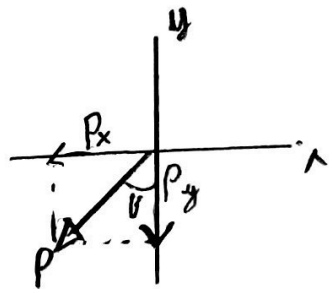
$\mu_d > 0$



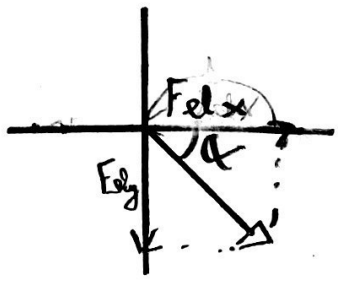
Força elástica



Força peso



Força elétrica



b)

$$\vec{F_R} = \hat{x}(D + F_{el}\cdot\cos\alpha + F_{at} - F_{elast} - P\cdot\operatorname{sen}\beta) + \hat{N}(N - P\cdot\cos\beta - F_{el}\cdot\operatorname{sen}\alpha)$$

$$\vec{F_R} = \hat{x}\left[\left(-c\cdot\frac{dx}{dT} + q\cdot E\cdot\cos\alpha - (\mu_d\cdot N) - K_1\cdot(x-l_0) - K_2\cdot(x-l_0) - m\cdot g\cdot\operatorname{sen}\beta\right) + \right.$$

$$\left. \hat{N}(N - m\cdot g\cdot\cos\beta - q\cdot E\operatorname{sen}\alpha)\right]$$

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c)

$$\vec{F}_{contacto} = \vec{N} + \vec{F}_{at}$$

$$\vec{F}_{contacto} = \hat{N}\cdot N + \mu_d\cdot N\cdot\hat{T}$$

$$R_x = D + F_{el}\cdot\cos\alpha - F_{at} - F_{elast} - P\cdot\operatorname{sen}\beta$$

$$R_y = (N - P\cdot\cos\beta - F_{el}\cdot\operatorname{sen}\alpha)$$

d)

para $T=0$

$x = x_0$

$y = 0$

$v_x = 0$

$v_y = 0$

$$\frac{dx}{dT} = v_x$$

$$\frac{dy}{dT} = v_y$$

$$\frac{dv_x}{dT} = \frac{R_x}{m}$$

$$\frac{dv_y}{dT} = \frac{R_y}{m}$$

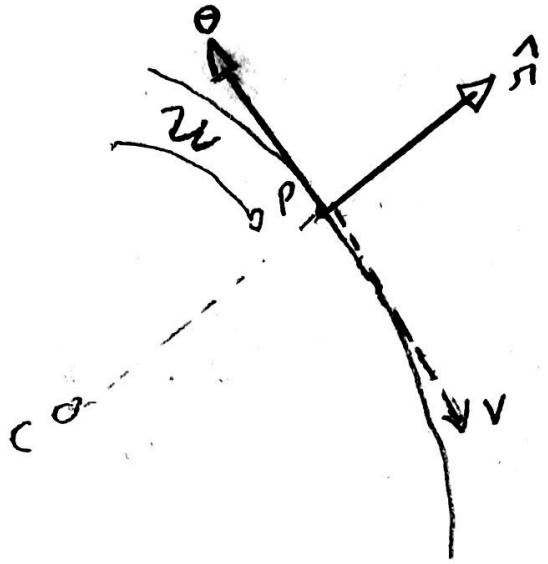
2)

a)

$m = 250$

$R = 120$

$V = 20$



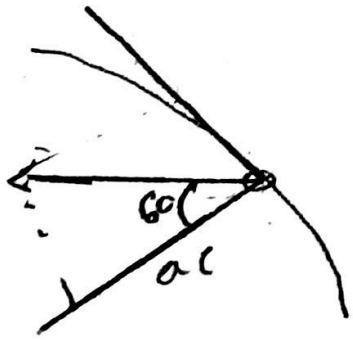
b)

$$V = \frac{72}{3{,}6}$$

$$V = 20 \text{ m/s}$$

$$\vec{V} = -20\,\hat{\theta} \text{ m/s}$$

c)



$\vec{a}_T =$

$\vec{a}_c = -\frac{V^2}{r} \cdot \hat{n}$

$\vec{a}_c = -\left(\frac{400}{120}\right) \cdot \hat{n}$

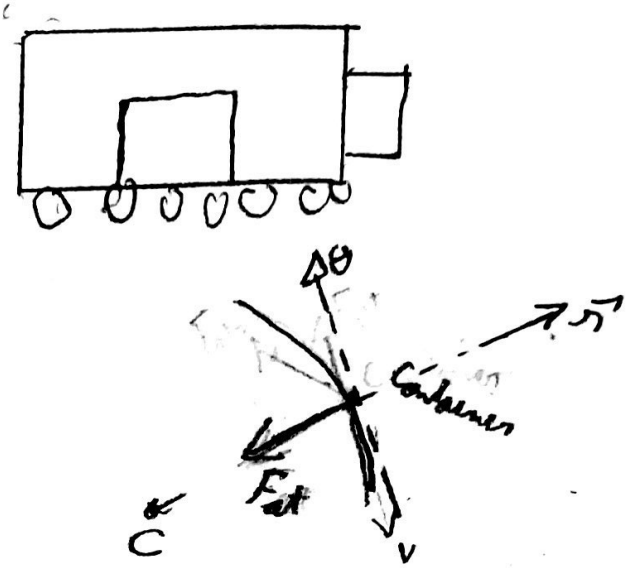
$\vec{a}_c = -\left(\frac{10}{3}\right) \cdot \hat{n}$

$\vec{a} = -\frac{10}{3} \cdot \cos 60$

$\vec{a} = -\frac{10}{3} \cdot \frac{1}{2} = -\frac{5}{3} = -1,6666 \ m/s^2$

d) O movimento é retardado, uma vez que a taxa de variação da intensidade do vetor velocidade no momento retratado é menor que zero, prendo assim, o corpo está com aceleração negativa.

a)



Já que em repouso

$$P = N$$

$$250N = 250 \cdot 10 = 2500\,N$$

$$|\vec{F}_{at}| = |m \cdot 2500|$$

$$F_{at} = -2500 \cdot m \cdot \hat{n}$$

a)

extra)

$|\vec{F_{at}}| = 2500 \cdot 0,8$

$|\vec{F_{at}}| = 2000\ N$

$F_{rc} > F_{at}$ derrapa

$m \cdot a_c = 2000$

$250 \cdot a_c = 2000$

$a_c = 8$

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

$8 = \frac{v^2}{120}$

$v^2 = 960$

$|\vec{v}| = +30,98\ m/s$

R: A velocidade máxima é de 30,98 m/s