

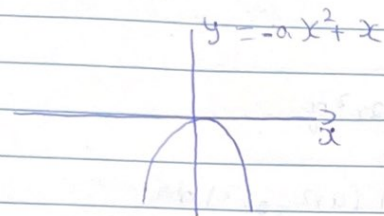
Dilem Carlos e Marquês

Trabalho extra - física 1

1. a)

$$\begin{cases} x = cz \\ y = cz(1 - \beta z) \end{cases} \Leftrightarrow \begin{cases} z = x/c \\ y = x/c(1 - \beta x/c) \end{cases} \Leftrightarrow \begin{cases} z = x/c \\ y = x(1 - \beta x/c) \end{cases}$$

$$\begin{cases} y = x - \beta x^2/c \end{cases} \Leftrightarrow \begin{cases} y = -\beta x^2/c + x \end{cases} \quad y = -\frac{\beta x^2}{c} + x$$



$a < 0$  seja  $a = \frac{\beta}{c}$

1. b)  $v_x(t) = \frac{dx(t)}{dt} = c$

$$v_y(t) = \frac{dy}{dt} = \frac{d(cz - \beta z^2)}{dt} = c - 2\beta ct$$

$v_x = c \text{ m/s}$

$v_y = c \text{ m/s} = 2\beta ct \text{ m/s}$

$$|v| = v_x^2 + v_y^2$$

$$|v| = c^2 + (c - 2\beta ct)^2$$

$$|v| = c^2 + c^2 - 4c\beta ct + (2\beta ct)^2$$

$$|v| = c^2 + c^2 - 4c\beta ct + 4\beta^2 c^2 t^2$$

$$|v| = 2c^2 - 4c\beta ct + 4\beta^2 c^2 t^2$$

$$|v| = 2c^2 (1 - 2\beta t + 2\beta^2 t^2) \text{ m/s}$$

c)  $\sigma = \frac{v^2}{c^2}$

$$dx = 0.4$$

$$\sigma = \frac{2e^2 \cdot (1 - Bt + z^2 t^2)}{-Bt}$$

$$\sigma = \frac{2e(1 - Bt + z^2 t^2)}{B}$$

2. a)

$$ds^2 = dx^2 + dy^2$$

$$ds^2 = dx^2 + 2dx \cdot t$$

$$F = 2xy \cdot i^2 + y^2 y = 2x(2xy + x^2) = 4x^2 y + 2x^2 y$$

$$W = \int F \cdot ds^2 = \int (4x^2 y + x^2 y) \cdot ds^2 = \int (4x^2 + x^2) dx$$

$$W = \int (6x^2) dx = 2t^3 + c$$

$$W = 2(2^3) - 2(0^3) = 16$$

$$y = 2x \quad \text{ou} \quad W = 16$$

$$b) W_y = \int F \cdot dy = \int (x^2 - 2y) \cdot (dy) = \int x^2 dy$$

$$W_y = x^2 y + c$$

$$W_y = x^2(4) - x^2(0) = 4x^2$$

no valor x

$$W_x = \int F \cdot dx = \int (2xy + y) \cdot (dx) = \int 2xy dx$$

$$W_x = x^2 y + c$$

$$W_x = (2^2 y + 10^2) y = 4y$$

$$W_z = W_y + W_x = 4x^2 + 4y$$

$$W_y = 4(0)^2 + 4(0) = 0$$

$$W_x = 4(0)^2 + 4 + 16 = 32$$

c) et força não é conservativa.

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3.

$$a) \frac{m \cdot v^2}{R} = N$$

$$v = \frac{R}{2} \cdot \cos 60^\circ$$

$$F_{PA} = F_{PB}$$

$$v = \frac{R}{2} \cdot \frac{1}{2}$$

$$m g h_A = \frac{m \cdot v^2}{2}$$

$$v = \frac{R}{4} = \frac{0,02}{4} = 0,005$$

$$v^2 = 2 g h_A$$

$$v = \frac{m \cdot 2 g h_A}{R} \Rightarrow$$

b).

$$N = \frac{2 m g h_A}{R}$$

$$N = \frac{2 \cdot 0,5 \cdot 10 \cdot 0,08}{0,005} = \frac{1 \cdot 10 \cdot 0,08}{0,005} = \frac{8}{0,005} = 1600$$

4. a)  $F_B = m \cdot a_{cm}$

$$\frac{F_B}{m} = a_{cm} \quad \text{ou} \quad a_{cm} = \sum \frac{F_M}{M}$$

$$F_B = \dots = 0,1 \text{ cm}$$

$$m_A + m_B + m_C$$

$$0,1 \text{ cm} = \frac{(0,2 \text{ cm})}{dt}$$

$$F_B = M \vec{a}_{cm}$$

$$10 = M \vec{a}_{cm}$$

$$\vec{a}_{cm} = \frac{10}{M}$$



b)

$$M_{em} = \frac{M d v_{em}}{dt}$$

$$0,1 \text{ em} = \frac{d v_{em}^2}{dt}$$

$$\frac{10}{m} = \frac{d v_{em}^2}{dt}$$

$$\int \frac{10}{M} dt = \int d v_{em}$$

$$\frac{10}{M} \int_0^t dt = \int_0^{v_{em}} d v_{em}$$

$$\frac{10}{2M} t^2 = v_{em} \Big|_0^{v_{em}}$$

$$\frac{5}{M} t^2 = v_{em} \quad v_{em} = \frac{5}{M} t^2$$

4. d)

$$0_{em} \Delta v_{em} = \frac{m_a \cdot v_a + m_b \cdot v_b + m_c \cdot v_c}{m_a + m_b + m_c}$$

$$= 0,5 \cdot (-40) i + 0,3 (38 \cos 55^\circ i + 38 \sin 55^\circ j)$$

$$= 0,2 \cdot 81,92 \cos 55^\circ j + 81,92 j \cdot m \cdot 35 \cdot 10,5 +$$

0,3 + 0,2

$$= -20 i + 6,54 j + 9,34 j - 13,4 i - 9,4 j$$

$$= 26,86 i + 0,06 j$$