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f: 113

Trabalho de Apoio

1. $x(t) = ct$

$y(t) = ct(1 - \beta t)$

a) $t = \frac{x}{c}$ $\quad y(x) = \left(\frac{x}{c}\right)\left[1 - \beta\left(\frac{x}{c}\right)\right]$

$$= \frac{x}{c} - \frac{\beta x^2}{c^2}$$

b) $\frac{dx}{dt} = c$ $\quad$ e $\quad \frac{dy}{dt} = c(1 - 2\beta t)$

$$|v(t)| = \sqrt{\left(\frac{dx}{dt}\right)^2} + \sqrt{\left(\frac{dy}{dt}\right)^2}$$

$$|v(t)| = \sqrt{c^2 + c^2(1 - 2\beta t)^2}$$

$$= \sqrt{2c^2 - 4c^2\beta t + 4c^2\beta^2 t^2}$$

c) $r = \sqrt{(x^2 + y^2)}$

$r = \sqrt{ct^2 + ct(1 - \beta t)^2}$

$r = \sqrt{2c^2t^2 - 2c^2\beta t^3 + c^2\beta^2 t^2}$

Digitalizada com CamScanner

2- $\vec{F} = 2xy\vec{i} + x^2\vec{j}$

$A(0;0)$

$B(2;4)$

$$W = \int \vec{F} \cdot dr$$

a) $y = 2x$

$dr = dx\vec{i} + 2dx\vec{j}$

$$W = \int (2x\vec{i} + x^2) \cdot (dx\vec{i} + 2\,dx\,\vec{j})$$

$$\int (2x\,dx + 2x^2\,dx)$$

$$\int 2x\,dx + \int 2x^2\,dx$$

$$= 2^2 + \left(\frac{2}{3}\right) \cdot 2^3 - 0$$

$$= 4 + \left(\frac{16}{3}\right) - 0$$

$$= \frac{12}{3} + \frac{16}{3}$$

$$= \frac{28}{3} = 9{,}3\ J$$

b) $y(0,4)$ $x(2;4)$

$dr = 0i + dy\,j$

$W = \int (2xi + x^2 j)(0i + dy\,j)$

$= \int x^2\,dy$

$= x^2\,y \big|_0^4$

$= 2^2 \cdot 4 - 0$

$= 16J$

$W = \int (2xi + x^2 j)(dxi + 0j)$

$W = \int 2x\,dx$

$W = x^2 \big|_0^2$

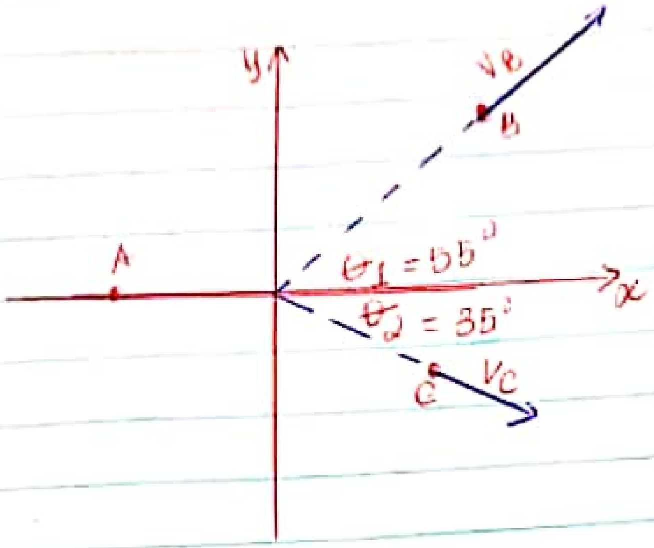
$= 4J$

$WT = 16 + 4$

$WT = 20J$

e) $W_i \neq W_2$
$9,3 \neq 20 \Rightarrow$ o trabalho varia com a trajetória então ela não é conservativa

4 -



a) $a_{cm} = 0$

b) $v_{cm} = \dfrac{m_A \cdot v_A + m_B \cdot v_B + m_C \cdot v_C}{m_A + m_B + m_C}$

$v_{cm} = \dfrac{0,50 \cdot 40 + 0,30 \cdot 38,24 + 0,20 \cdot 81,92}{0,50 + 0,30 + 0,20}$

$v_{cm} = 47,8 \text{ m/s}$

c) $x_{cm} = \dfrac{m_A \cdot y_A + m_B \cdot y_B + m_C \cdot y_C}{m_A + m_B + m_C}$

$x_{cm} = \dfrac{0,50 \cdot 0 + 0,30 \cdot 0 + 0,20 \cdot 0}{0,50 + 0,30 + 0,20}$

$x_{cm} = 0 \text{ m}$