

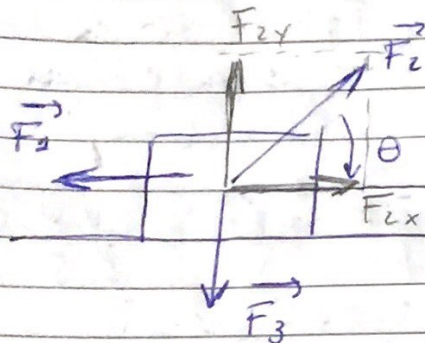
data
fecha 27.04.21

D S T Q Q S S
D L M M J V S

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FÍSICA - 2021 - I - SIST. DE INFORMAÇÃO
LISTA EXERCÍCIOS - CAP. 7 - EN. CINÉTICA/TRABALHO

13 -



$$d = -3,0 \text{ m}$$

$$|\vec{F}_1| = 5 \text{ N}$$

$$|\vec{F}_2| = 9 \text{ N}$$

$$|\vec{F}_3| = 3 \text{ N}$$

$$\theta = 60^\circ$$

$$a) W_T = W_1 + W_2 + W_3$$

$$W_T = \vec{F}_1 \cdot \vec{d} + \vec{F}_2 \cdot \vec{d} + \vec{F}_3 \cdot \vec{d}$$

$$W_T = 5 \cdot \cos 0 \cdot (-3) + F_2 \cdot \cos 0 \cdot (-3) + F_{2y} \cdot \cos 90 \cdot 3 + F_3 \cdot \cos 90 \cdot 3$$

$$W_T = +15 + 9 \cdot \cos 60^\circ \cdot (-3) = 15 - \frac{27}{2} = \frac{30 - 27}{2}$$

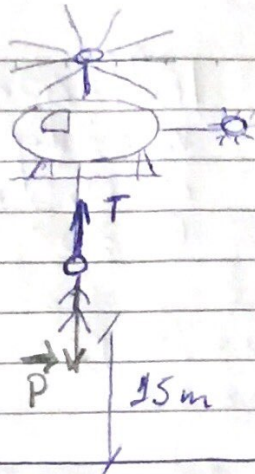
$$W_T = \frac{3}{2} = 1,5 \text{ J}$$

b) Aumenta em 1,5 J pois.

$$K_f - K_i = W$$

$$K_f - K_i = (1,5 > 0)$$

17-



$$m_2 = 72 \text{ kg}$$

$$|\vec{a}_2| = g/10$$

$$T - P = m \cdot a$$

$$T = m \cdot a + m \cdot g$$

$$T = m (a + g)$$

$$T = m (g + g/10)$$

$$T = m \left(\frac{11g}{10} \right)$$

a)

$$W = T \cdot d = m \left(\frac{11g}{10} \right) \cdot h$$

$$W = 72 \left(\frac{11 \cdot 9,8}{10} \right) \cdot 15 = 11.642,40 \text{ J}$$

b)

$$W_g = \vec{P} \cdot \vec{h} = m \cdot g \cdot h \cdot \cos 180^\circ =$$

$$= 72 \cdot 9,8 \cdot 15 = -10.584 \text{ J}$$

c)

$$K_f = \frac{1}{2} m v_f^2$$

$$v_f^2 = v_0^2 + 2a \cdot \Delta s \Rightarrow v_f^2 = \frac{g}{5} \cdot 15 = 3g$$

$$v_f^2 = 3 \cdot 9,8 = 29,4$$

$$K_f = \frac{1}{2} m v_f^2 = \frac{1}{2} \cdot 72 \cdot 29,4 = 1058,4 \text{ J}$$

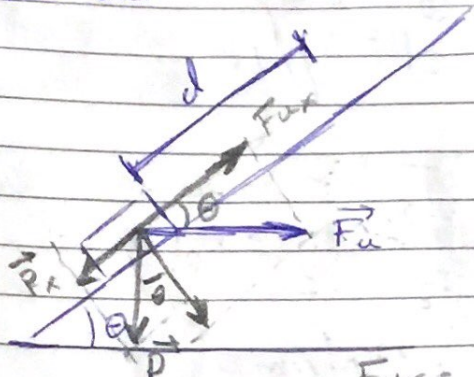
d)

$$v_f^2 = 29,4 \Rightarrow v_f = \sqrt{29,4} \approx 5,42 \text{ m/s}$$

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20 -



$$|\vec{F}_u| = 20 \text{ N}$$

$$m = 3 \text{ kg}$$

$$d = 0,5 \text{ m}$$

$$\theta = 30^\circ$$

$$\vec{F}_e = \vec{F}_{ux} + \vec{P}_x$$

$$F_e = F_{ux} - P_x$$

$$F_{ux} = |\vec{F}_u| \cdot \cos 30^\circ = \frac{20 \cdot \sqrt{3}}{2} = 10\sqrt{3} \text{ N}$$

$$P_x = |\vec{P}| \cdot \sin 30^\circ =$$

$$3 \cdot 9,8 \cdot 1/2 = 14,7 \text{ N}$$

$$F_e = 10\sqrt{3} - 14,7 \approx 2,62 \text{ N}$$

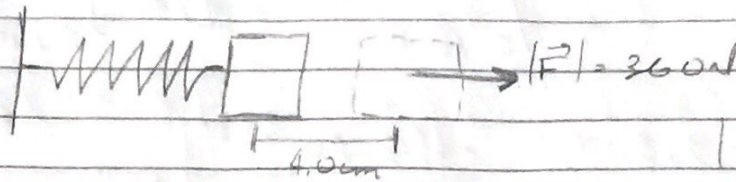
$$a) W_e = F_e \cdot d \cdot \cos 0 = 2,62 \cdot 0,5 = \boxed{1,31 \text{ J}}$$

$$W_M = M \cdot \cos 90^\circ = \boxed{0 \text{ J}}$$

$$b) W_R = K_f - K_i \rightarrow 0$$

$$W_R = K_f = \boxed{1,31 \text{ J}}$$

27 -



$$F = -K \cdot x$$

$$-360 = -K \cdot (0.04)$$

$$K = \frac{360}{4 \cdot 10^{-2}} = 90 \cdot 10^2 =$$

$$9 \cdot 10^3 \text{ N/m}$$

$$a) W = \int_{5 \cdot 10^{-2}}^{3 \cdot 10^{-2}} -Kx dx = -K \int_{5 \cdot 10^{-2}}^{3 \cdot 10^{-2}} x dx =$$

$$-K \left[\frac{x^2}{2} \right]_{5 \cdot 10^{-2}}^{3 \cdot 10^{-2}} = -K \left[\frac{(0.03)^2}{2} - \frac{(0.05)^2}{2} \right] = -4000 \cdot \left[\frac{-16 \cdot 10^{-4}}{2} \right] =$$

$$-4000 (-8 \cdot 10^{-4}) = \boxed{7.27}$$

$$b) W = \int_{5 \cdot 10^{-2}}^{-3 \cdot 10^{-2}} -Kx dx = -K \int_{5 \cdot 10^{-2}}^{-3 \cdot 10^{-2}} x dx = -K \left[\frac{x^2}{2} \right]_{5 \cdot 10^{-2}}^{-3 \cdot 10^{-2}} =$$

$$-4000 \left[\frac{-16 \cdot 10^{-4}}{2} \right] = \boxed{7.27}$$

$$c) W = \int_{5 \cdot 10^{-2}}^{-5 \cdot 10^{-2}} -Kx dx = -K \int_{5 \cdot 10^{-2}}^{-5 \cdot 10^{-2}} x dx = -K \left[\frac{x^2}{2} \right]_{5 \cdot 10^{-2}}^{-5 \cdot 10^{-2}} =$$

$$W = -4000 \left[\frac{0}{2} \right] = \boxed{0}$$

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$$d) W = \int_{5 \cdot 10^{-2}}^{-4 \cdot 10^{-2}} -Kx dx = -K \left[\frac{x^2}{2} \right]_{5 \cdot 10^{-2}}^{-4 \cdot 10^{-2}} =$$

$$W = -4000 \left[\frac{(-4 \cdot 10^{-2})^2}{2} - \frac{(5 \cdot 10^{-2})^2}{2} \right]$$

$$= -4000 \left[\frac{81 \cdot 10^{-4}}{2} - \frac{25 \cdot 10^{-4}}{2} \right] =$$

$$= -4000 (28 \cdot 10^{-4}) = \underline{\underline{-25,2 J}}$$

39 - m = 2 kg u_s = 6 m/s²

a) W = (área de 0 a 4 m) · m · u_s

$$W = \left(\frac{6 \cdot 1}{2} + 3 \cdot 6 \right) \cdot 2 = \underline{\underline{42 J}}$$

$$b) W = \left[\left(2 \left(\frac{6 \cdot 1}{2} \right) + 3 \cdot 6 \right) - \left(\left(\frac{6 \cdot 1}{2} \right) + 6 \cdot 1 \right) \right] 2$$

$$W = [6 + 18 - 3 - 6] 2 = \underline{\underline{30 J}}$$

$$c) W = W_0^7 + W_1^8 = \left[\left(2 \left(\frac{6 \cdot 1}{2} \right) + 3 \cdot 6 \right) - 2 \left(\left(\frac{6 \cdot 1}{2} \right) + 6 \cdot 1 \right) \right] 2 =$$

$$[6 + 18 - 6 - 12] 2 = 6 \cdot 2 = \underline{\underline{12 J}}$$

$$d) W = K_f - K_i^0 \Rightarrow W = K_f$$

$$42 = \frac{1}{2} m \cdot V^2 \Rightarrow V = \sqrt{42} \approx 6,48 \text{ m/s}$$

sentido positivo, direção horizontal.

$$e) W = K_f - K_i^0 \Rightarrow W = K_f$$

$$30 = \frac{1}{2} m \cdot V^2 \Rightarrow V = \sqrt{30} \approx 5,47 \text{ m/s}$$

sentido positivo, direção horizontal

$$f) W = K_f - K_i^0 \Rightarrow W = K_f$$

$$12 = \frac{1}{2} m \cdot V^2 \Rightarrow V = \sqrt{12} \approx 3,46 \text{ m/s}$$

sentido positivo, direção horizontal

49 - $m = 4 \text{ kg}$

$$\vec{d}_i = (0,5 \text{ m}) \hat{i} + (0,75 \text{ m}) \hat{j} + (0,2 \text{ m}) \hat{k} \quad t=0$$

$$\vec{d}_f = (7,5 \text{ m}) \hat{i} + (12,0 \text{ m}) \hat{j} + (7,2 \text{ m}) \hat{k} \quad t=12 \text{ s}$$

$$\vec{F} = (2,00 \text{ N}) \hat{i} + (4,00 \text{ N}) \hat{j} + (6,00 \text{ N}) \hat{k}$$

a) $\vec{W} = \vec{F} \cdot \vec{d}$

$$\vec{d} = (7,0 \text{ m}) \hat{i} + (11,25 \text{ m}) \hat{j} + (7,0 \text{ m}) \hat{k}$$

$$\vec{W} = \vec{F} \cdot \vec{d} = 14 + 45 + 42 = \underline{101 \text{ J}}$$

b) $P = \frac{\Delta W}{\Delta t} = \frac{101}{12} \approx \underline{8,416 \text{ W}}$