

data
fecha 16.04.21

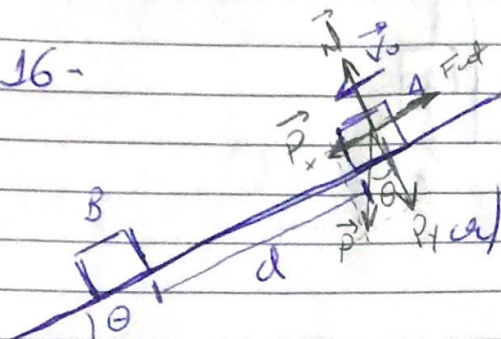
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Física - 2021-1 - SIST DE INFORMAÇÃO

LISTA EXERCÍCIOS - CAP. 6 - FORÇA E MOV. II

16-



$$\theta = 12^\circ$$

$$v_0 = 18 \text{ m/s} \quad d = 24 \text{ m}$$

$$P_y = P \cdot \cos \theta = 11$$

$$F_{at} = \mu_c \cdot 11 = 0,6 \cdot \cos 12 \cdot P$$

$$F_{at} - P_x = m \cdot a$$

$$0,6 \cdot \cos 12 \cdot m \cdot g - \sin 12 \cdot m \cdot g = m \cdot a$$

$$a = g(0,6 \cos 12 - \sin 12)$$

$$v^2 = v_0^2 + 2a \cdot d$$

$$v^2 = 18^2 + 2g(0,6 \cos 12 - \sin 12) \cdot 24$$

$$v^2 = 324 - 19,6(0,3789) \cdot 24$$

$$v^2 = 324 - 178,27$$

$$v \approx 12,07 \text{ m/s}$$

17)

$$v^2 = 324 - 19,6(0,1 \cdot \cos 12 - \sin 12) \cdot 24$$

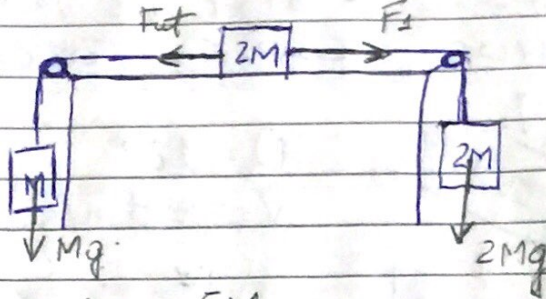
$$v^2 = 324 - 19,6(-0,11) \cdot 24$$

$$v^2 = 325,784$$

$$v \approx 18,05 \text{ m/s}$$

25-

$$|\vec{a}| = 0,5 \text{ m/s}^2$$



$$F_R = m \cdot a = 5M \cdot a$$

$$a = \frac{F_R}{5M} = 0,5$$

$$F_{at} = \mu \cdot N = \mu \cdot 2M \cdot g$$

$$\vec{F}_g + \vec{F}_{at} = \vec{F}_R$$

$$(2Mg - Mg) - \mu 2Mg = 5M \cdot a$$

$$Mg - \mu 2Mg = 5M \cdot a$$

$$g - 2\mu g = 5a \Rightarrow$$

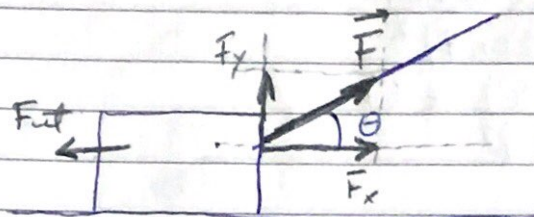
$$g(1 - 2\mu) = 5a \Rightarrow 1 - 2\mu = \frac{5a}{g}$$

$$2\mu = \frac{1 - 5a}{g}$$

$$2\mu = 1 - \frac{(-2,5)}{9,8} \Rightarrow \mu \approx 0,3724$$

32- $P = 180 \text{ N}$ $\mu_e = 0,42$

a) $\theta = 42^\circ$



$$F_y = |\vec{F}| \cdot \sin \theta$$

$$F_x = |\vec{F}| \cdot \cos \theta$$

$$N = P - F_y = mg - F \cdot \sin \theta$$

$$\vec{F}_{fr} + \vec{F}_x = 0$$

$$\mu (mg - F \cdot \sin \theta) - F \cdot \cos \theta = 0$$

$$\mu mg - F \sin \theta \mu = F \cos \theta$$

$$\mu F \sin \theta + F \cos \theta = \mu mg$$

$$F (\mu \sin \theta + \cos \theta) = \mu mg$$

$$F = \frac{\mu mg}{\mu \sin \theta + \cos \theta} = \frac{0,42 \cdot 180}{0,42 \cdot \sin 42 + \cos 42}$$

$$F = \frac{75,6}{2,024} \approx 37,36 \text{ N}$$

b) $\vec{F}_x + \vec{F}_{fr} = 0$ $|\vec{F}| \cdot \cos \theta - \mu \cdot (mg - |\vec{F}| \cdot \sin \theta) = 0$

$$F \cdot \cos \theta - \mu mg + \mu F \cdot \sin \theta = 0$$

$$F \cos \theta + \mu F \sin \theta = \mu mg$$

$$F (\cos \theta + \mu \sin \theta) = \mu mg \Rightarrow \frac{180 \mu}{\cos \theta + \mu \sin \theta}$$

$$F = \frac{75,6}{\cos 42 + 0,42 \sin 42}$$

$$c) F = \frac{75,6}{\cos \theta + 0,42 \sin \theta}$$

$$F' = \frac{-75,6(-\sin \theta + 0,42 \cos \theta)}{(\cos \theta - 0,42 \sin \theta)^2} = 0$$

$$F' = \frac{75,6(\sin \theta - 0,42 \cos \theta)}{(\cos \theta + 0,42 \sin \theta)^2} = 0$$

$$\sin \theta - 0,42 \cos \theta = 0$$

$$\sin \theta = 0,42 \cos \theta$$

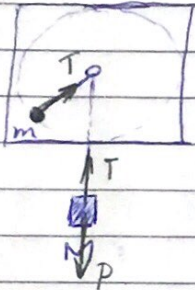
$$\tan \theta = 0,42$$

$$\theta = \arctan(0,42) \Rightarrow \theta \approx 22,78^\circ$$

$$d) F = \frac{75,6}{\cos 22,78 + 0,42 \sin 22,78}$$

$$F = \frac{75,6}{1,0846} \approx 69,70 \text{ N}$$

55- $m = 1,5 \text{ kg}$ $r = 20 \text{ cm}$ $M = 2,5 \text{ kg}$



$$T = P = M \cdot g$$

$$\frac{m \cdot v^2}{R} = T = M \cdot g$$

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

$$v^2 = \sqrt{\frac{M \cdot g \cdot R}{m}} = \sqrt{\frac{2,5 \cdot 9,8 \cdot 0,2}{1,5}}$$

$$v \approx 1,8 \text{ m/s}$$