

1. kol. 2022

2.) $m = 10 \text{ kg}$

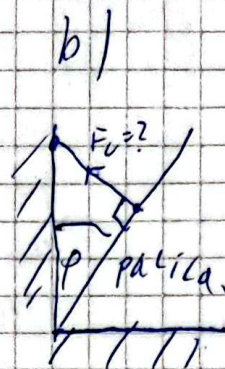
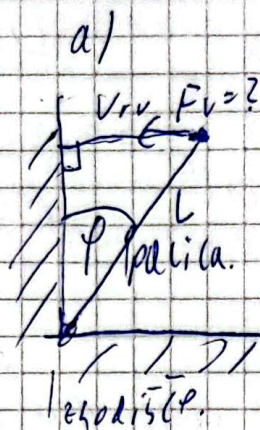
$$\varphi = 50^\circ$$

a) $F = ?$

b) $F = ?$

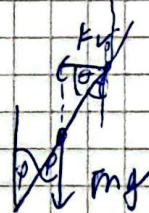
c) $\alpha = 2$ $L = 2 \text{ m}$

d) $L = 2 \text{ m}$, $W_k = ?$



a): statika: $\vec{M} = 0$

$$M = \vec{r} \times \vec{F}$$



M_g

$$|\vec{M}_g| = \frac{L}{2} \cdot \sin \varphi \cdot mg$$

$$\theta = \pi - \varphi$$

$$|\vec{M}_g| = |\vec{M}_v|$$

$$|\vec{M}_v| = F_v \cdot L \cdot \sin \theta = F_v \cdot L \cdot \cos \varphi$$

$$F_v \cdot L \cdot \cos \varphi = \frac{L}{2} \sin \varphi mg$$

$$F_v = \frac{mg}{2} \cdot \tan \varphi$$

$$x = b \cdot \cos \varphi = L \cos^2 \varphi$$

b/



$$b = L \cdot \cos \varphi$$

$\vec{M}_g$ enak kot prej

$$\vec{M}_v = x \cdot F_v \cos \varphi$$

$$F_v = \frac{mg}{2} \tan \varphi \cdot \frac{1}{\cos^2 \varphi}$$

$$F_v \cdot \cos^2 \varphi = \frac{mg}{2} \tan \varphi$$

c)

vruloprevelm:

$$\vec{M} = \frac{d\vec{p}}{dt} = J\alpha$$

$$M = \frac{7}{2} l \sin \varphi \cdot mg$$

$$J = \frac{1}{3} m l^2$$

pauc
v krajisu

$$\alpha(\varphi) = \frac{\frac{7}{2} l \sin \varphi \cdot g}{\frac{1}{3} m l^2} = \frac{3}{2} g \frac{\sin \varphi}{l}$$

$$d) \quad \alpha(\varphi) = \frac{dw}{dt} \cdot \frac{d\varphi}{dw}$$

$$\int_{\varphi_0}^{\frac{\pi}{2}} \alpha \cdot d\varphi = \int_0^w dw$$

$$\frac{3}{2} \frac{g}{l} \int_{\varphi_0}^{\frac{\pi}{2}} \sin \varphi d\varphi = \frac{w^2}{2}$$

$$\frac{3}{2} \frac{g}{l} (\cos \varphi_0 - \cos \frac{\pi}{2}) = \frac{w^2}{2}$$

$$w = \sqrt{\frac{3g}{l} \cos \varphi_0}$$

Na vodoravni tirusi brez trenja giblje vozilek z $m_0 = 1 \text{ kg}$.

Na vozilek deluje v navpični smeri, takad i telesar se nabere

v vozilku vsak sekundo $0,1 \text{ kg}$ vol e. Vozilek pospešuje $F = 0,5 \text{ N}$.

V vodoravni smeri $v(t = 10 \text{ s}) = ?$ Vozilek je razčlen

hitrost, koloje masa enaka 2 kg

miroval.

$$m_0 = 1 \text{ kg}$$

$$F = 0,5 \text{ N}$$

$$v_0 = 0$$

$$\phi_m = 0,1 \frac{\text{kg}}{\text{s}} = \frac{dm}{dt}$$

$$v(t = 10 \text{ s}) = ?$$

$$F = \frac{dG}{dt} = \frac{d(mv)}{dt} = v \frac{dm}{dt} + m \frac{dv}{dt} =$$

$$F = v \phi_m + m \frac{dv}{dt}$$

$$F - v \phi_m = m \frac{dv}{dt}; m = m_0 + \phi_m t$$

$$\int_0^t \frac{dt}{m} = \int_0^v \frac{1}{F - v \phi_m} dv$$

$$u = m_0 + \phi_m t$$

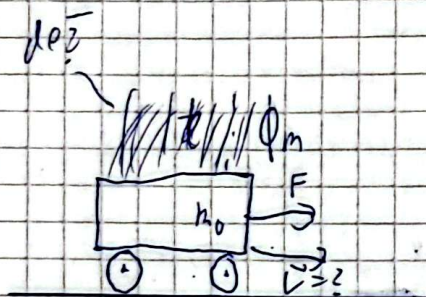
$$du = \phi_m dt$$

$$dt = \frac{du}{\phi_m}$$

$$\int_{m_0}^{m_0 + \phi_m t} \frac{dt}{u} = \int_0^v \frac{du}{F - v \phi_m}$$

$$w = F - v \phi_m$$

$$dw = -\phi_m dv$$



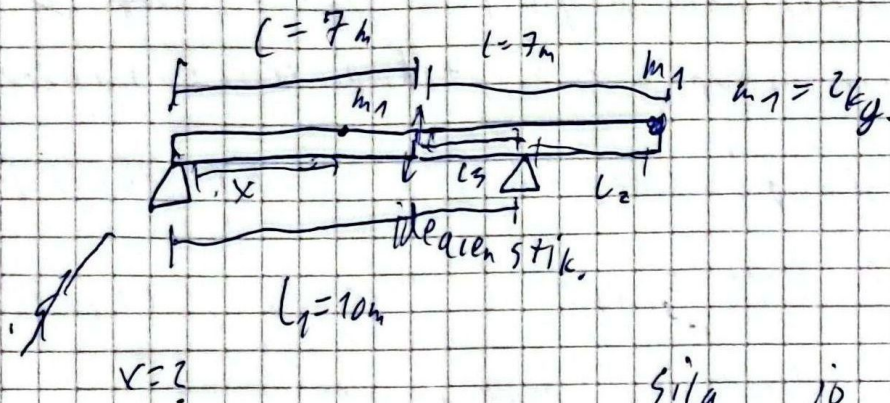
$$v = \frac{F}{\phi_m} \left(1 - \frac{m_0}{m_0 + \phi_m t} \right)$$

$$\ln \left(\frac{m_0 + \phi_m t}{m_0} \right) = \ln \left(\frac{F}{F - v \phi_m} \right) / \phi_m$$

$$\frac{m_0 + \phi_m t}{m_0} = \frac{F}{F - v \phi_m}$$

$$F - v \phi_m = \frac{F m_0}{m_0 + \phi_m t}$$

3.



$$1. \text{deska: } m_1 x = l \cdot F_1$$

$$2. \text{deska: } F_1 \cdot l_3 = m_1 g \cdot l_2$$

$$F_1 = \frac{m_1 g l_2}{l_3}$$

$$m_1 g x = l \cdot \frac{m_1 g l_2}{l_3}$$

$$x = l \cdot \frac{l_2}{l_3}$$

Če imamo palice kot narisane na skici, takrat sta palici
 1 in 2 v idealni stiki, na kakšni razdalji x
 moramo postaviti utež 1, da bo sistem v ravnovesju?