2022 1. kol.

5. nal.

$l = 750\,m$

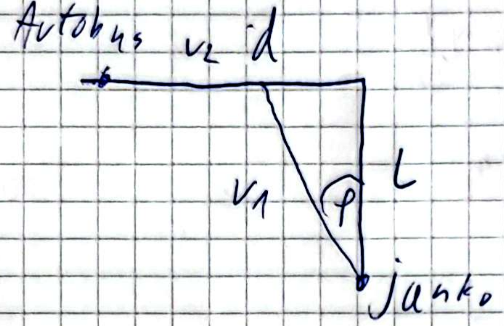
$d = 2500\,m$

$v_1 = 1\frac{m}{s}$

$v_2 = 2\frac{m}{s}$

$\varphi = ?$

t



Pod katerim kotom mora iti, da bo najhitreje na postaji.

$$t_1 = \frac{l}{v_1 \cos\varphi}$$

$$t_2 = \frac{d - l\,tg\varphi}{2v_1}$$

$$t = \frac{l}{v_1 \cos\varphi} + \frac{d - l\,tg\varphi}{2v_1}$$

za minimum:

$$0 = \frac{dt}{d\varphi} = \frac{l}{v_1}\frac{\sin\varphi}{\cos^2\varphi} - \frac{l}{2v_1}\cdot\frac{1}{\cos^2\varphi}$$

$$0 = \frac{2l\sin\varphi - l}{2v_1\cos^2\varphi} \Rightarrow 2\sin\varphi - 1 = 0$$

$$\sin\varphi = \frac{1}{2}$$

$$\varphi = \frac{\pi}{6} = 30^\circ$$

7. kol. 2021

4. $L = 1\,m$

$m_1 = 1\,kg$

$m_2 = 1\,kg$

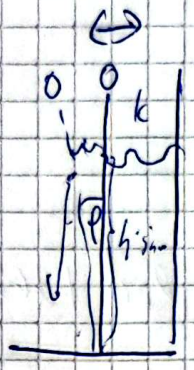
$k = 1\,\frac{N}{cm}$

$h = 0{,}8\,m$

$\omega = 0{,}5\,Hz$

$x(1s) = ?$

$\omega = ?$



V. Z. $\vec{M} = J\alpha$

$$J = \frac{1}{3} m_1 L^2 + m_2 L^2$$

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

$$\vec{M}_{vz} = kh^2 \ddot{\varphi} \sin\varphi \qquad x = h\cdot\sin\varphi$$

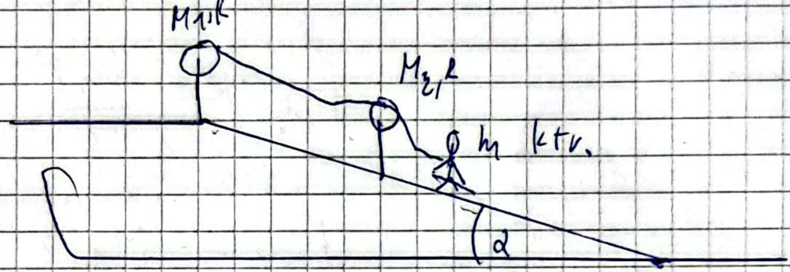
$$-kh^2\varphi + mg\frac{L}{2}\varphi = J\ddot{\varphi}$$

$$\ddot{\varphi} + \left(kh^2 - mg\frac{L}{2}\right)\varphi = 0$$

$$\omega^2 = kh^2 - mg\frac{L}{2}$$

2023/24 1. kol.

4. Smučar z maso $m=90kg$ se vozi z vlečnico po pobočju z naklonom $\alpha=15°$. Vlečnica se ustavi in smučar začne drseti po hribu navzdol. Vlečnica je sestavljena iz tanke jeklenice, ki poteka preko dveh valjastih škripcev – enega na vrhu hriba z $M_1=340kg$ in $R=1m$ in enega tik pred smučarjem z $M_2=200kg$ $R=1m$. S kolikšnim pospeškom smučar zdrsi po hribu? $k_{tr}=0{,}01$, jeklenica je vzporedna s tlemi.



$M_1=340kg$

$M_2=200kg$

$m=90kg$

$\alpha=15°$

$R=1m$

$k_{tr}=0{,}01$

$a=?$

$t(s=50m)=?$

Sile na smučarja:

~~$ma=$~~ $\sum_i \vec{F}_i = ma$

~~F_{vzp}~~ $F_{\parallel}=mg\sin\alpha$

$F_{gy}=mg$ } ti dve se pokrajšata.

$F_{\perp}=mg\cdot\cos\alpha$

F_{vr}

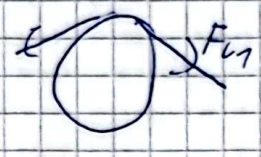
$F_{tr}=k_{tr}mg\cos\alpha$

$ma=mg\sin\alpha-F_{vr}-F_{tr}$

2. škripec $\sum \vec{M}_i = J_2 \alpha_2$

$M_1 = F_{v1} \cdot R$

$M_2 = F_{v2} \cdot R$



1. škripec

~~$F_{v2} \cdot R = J_1 \alpha_1$~~ $F_{v2} \cdot R = J_1 \alpha_1$

Vrvica se ne razteza

$\Rightarrow \quad \alpha_2 \cdot R = \alpha_1 R = a$

Imamo enačbe:

$$F_{v2} \cdot R = \frac{M_1 R^2}{2} \cdot \frac{a}{R}$$

$$F_{v2} = \frac{M_1 a}{2}$$

$$R F_{v1} - R \frac{M_1 a}{2} = J_2 \frac{M_2}{2} R^2 \frac{a}{R}$$

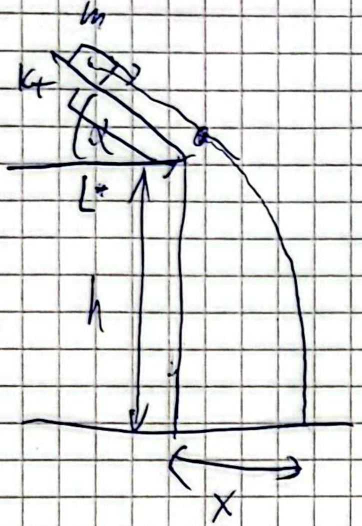
$$F_{v1} = \frac{M_2}{2} a \left(M_1 + M_2\right)$$

$$m a = mg \sin\alpha - k_{tr} mg \cos\alpha - \frac{a}{2}\left(M_1 + M_2\right)$$

a) $$a = \frac{mg \sin\alpha - k_{tr} mg \cos\alpha}{m + \frac{M_1 + M_2}{2}}$$

b) $s = \frac{1}{2} a t^2 \Rightarrow t = \sqrt{\frac{2s}{a}}$

kol/izpit 2024/25



$m = 5kg$

$kt = 0,3$

$\alpha = 30^0$

$h = 10m$

$L = 2m.$

Vozicek mirujeno strehi, iz koga ~~izr~~ zdrsne.

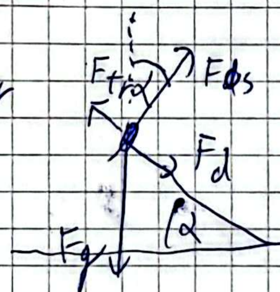
Po strehi drsi 2m nato pa prosto pada.

a) v(na robu strehe) = ?

b) x = ?

2. N.Z. v sistemu na klancu.

$F_{tr} = F_N \cdot k_{tr}$



$\parallel: \; mg \cdot \sin\alpha - mg\cos\alpha \cdot k_{tr} = ma$

$\perp: \; mg\cos\alpha + F_{Ds} = 0$

$a = mg(\sin\alpha - \cos\alpha \, k_t)$

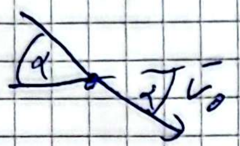
$a = \frac{dv}{dt} \cdot \frac{dr}{dr}$, $\frac{dr}{dt} = v$

$\int_0^{ar} a\,dr = \int_0^v v\,dv$

$ar = \frac{v^2}{2}$

$v = \sqrt{2ar}$

b) $v_0 = \sqrt{2ak}$



$v_{0x} = v_0 \cos\alpha$

$v_{0y} = v_0 \sin\alpha$

$0 = -v_0 \sin\alpha\, t - \frac{g t^2}{2} + h$

$\frac{g}{2} t^2 + v_0 \sin\alpha\, t - h = 0$

$t_{1,2} = \frac{-v_0 \sin\alpha \pm \sqrt{v_0^2 \sin^2\alpha + 2gh}}{g}$ Z - bi dobili negativni čas

$t = \frac{v_0 \sin\alpha + \sqrt{v_0^2 \sin^2\alpha + 2gh}}{g}$

$x = v_{0x} \cdot t$