1. kol 2023

3. nal.

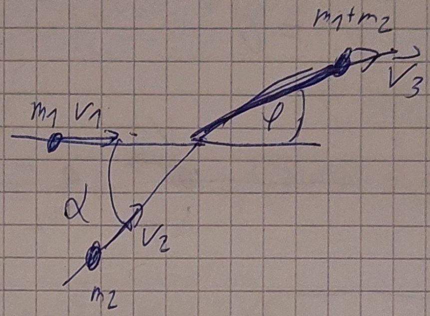
$m_1 = 100t$

$v_1 = 10 \frac{m}{s}$

$m_2 = 500t$

$v_2 = 1 \frac{m}{s}$

$\alpha = 60°$ sprimek



a) $\varphi = ?$

b) $v_3 = ?$

① delimo z ②

$\frac{①}{②} \Rightarrow tg\varphi = \frac{m_2 \sin\alpha v_2}{m_1 v_1 + m_2 v_2 \cos\alpha}$

Ohranitev GK:

① y: $m_2 \cdot \sin\alpha v_2 = (m_1 + m_2) v_3 \sin\varphi$

② x: $m_1 v_1 + m_2 v_2 \cos\alpha = (m_1 + m_2) v_3 \cos\varphi$

iz ① izrazimo v_3

$\cancel{\frac{①}{②} = tg\varphi = m_2 \sin\alpha v_2}$

$$v_3 = \frac{m_2 \sin\alpha v_2}{\sin\varphi (m_1 + m_2)}$$

vstavimo v ②

$$m_1 v_1 + m_2 v_2 \cos\alpha = \cancel{(m_1 + m_2)} \cdot \frac{m_2 \sin\alpha v_2}{\sin\varphi \cancel{(m_1 + m_2)}} \cdot \cos\varphi$$

$$\Rightarrow tg\varphi = \frac{m_2 \sin\alpha v_2}{m_1 v_1 + m_2 v_2 \cos\alpha}$$

ko poznamo φ

~~rešimo ①~~

vstavimo v izraz za v_3

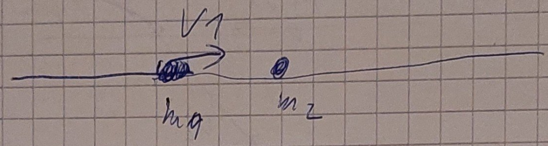
$\cancel{v_3} =$

2\. 2. Izpit 2024 14.2. 2. nal.

2\.

$m_1 = 2\,kg \quad m_2 = 5\,kg$

$v_1 = 15\,\frac{m}{s} \quad v_2 = 0$



a) Prožen trk v_1^k in v_2^k ?

b) Neprožen trk $v_3 = ?$

b) Ohranitev GK:

$$m_1 v_1 = (m_1 + m_2) v_3$$

$$v_3 = \frac{m_1 v_1}{(m_1 + m_2)}$$

a) Ohranitev GK:

$$m_1 v_1 = m_1 v_1^k + m_2 v_2^k \quad /: m_1$$

Ohranitev W_k

$$\mu = \frac{m_2}{m_1}$$

$$\frac{m_1 v_1^2}{2} = \frac{m_1 {v_1^k}^2}{2} + \frac{m_2 {v_2^k}^2}{2} \quad /: m_1$$

$$v_1 = v_1^k + \mu v_2^k$$

$$v_2^k = \frac{v_1 - v_1^k}{\mu}$$

$$\frac{v_1^2}{2} = \frac{{v_1^k}^2}{2} + \frac{\mu {v_2^k}^2}{2}$$

$$\frac{v_1^2}{\cancel{2}} = \frac{v_1^{k^2}}{\cancel{2}} + \frac{\cancel{\mu}(v_1 - v_1^k)^2}{2\mu^{\cancel{2}}}$$

$$v_1^2 = v_1^{k^2} + \frac{1}{\mu}(v_1^2 - 2v_1v_1^k + v_1^{k^2})$$

$$v_1^{k^2}(1+\frac{1}{\mu}) - \frac{1}{\mu}2v_1v_1^k + v_1^2(\frac{1}{\mu}-1) = 0 \quad /\cdot\mu$$

$$\cancel{v_1^k = \frac{2\mu v_1 \pm \sqrt{4\mu^2v_1^2 - 4(1+\mu)(\mu-1)v_1^2}}{2(1+\mu)}}$$

$$\cancel{v_1^k = \frac{\mu v_1 \pm \sqrt{\mu^2v_1^2 - \mu^2v_1^2 + v_1^2}}{(1+\mu)}}$$

$$\cancel{v_1^k = \frac{\mu v_1 \pm v_1}{1+\mu}}$$

$$\cancel{v_1^k = \frac{\frac{m_2}{m_1} v_1 \pm v_1}{1 + \frac{m_2}{m_1}}} \quad /\cdot m_1$$

$$\cancel{v_1^k = \frac{m_2 \pm m_1}{m_1+m_2} v_1}$$

$$v_1^{k^2}(\mu+1) - 2v_1v_1^k + v_1^2(1-\mu) = 0$$

$$v_1^k = \frac{\cancel{2}v_1 \pm \sqrt{\cancel{4}v_1^2 - \cancel{4}(\mu+1)(1-\mu)v_1^2}}{\cancel{2}(\mu+1)}$$

$$\cancel{v_1^k = v_1 \pm \sqrt{v_1^2}}$$

$$v_1^k = \frac{v_1 \pm \sqrt{v_1^2 - v_1^2 + \mu^2 v_1}}{\mu+1}$$

$$v_1^k = \frac{v_1 \pm \mu v_1}{\mu+1} \quad /\cdot m_1$$

$$v_1^k = \frac{m_1 \pm m_2}{m_1+m_2} v_1$$

$+ = ?$

$\hookrightarrow$ telo oz. $m_2 = \infty$

odboj z enako hitrostjo

$$v_1^k = \frac{m_1 - m_2}{m_1+m_2} v_1$$

$$v_2^k = \frac{v_1 - \frac{v_1 \pm \mu v_1}{\mu+1}}{\mu} = \frac{1 - \frac{1+\mu}{\mu+1}}{\mu} v_1 \quad \S\cdot m_1$$

$$\cancel{v_2^k = \frac{m_1 - \frac{m_1 - m_2}{m_2 + m_1}}{m_2} v_1 = \frac{m_1(m_2 + m_2 \; m_1^2 + m_1 m_2 - m_1 + m_2}{m_2^2 + m_1 m_2} v_1}$$

$$\cancel{v_2^k = \frac{m_1 v_1 - \frac{m_1 - m_2}{m_1 + m_2} v_1}{m_2} = m_1 \quad v_1}$$

$$m_1 v_1 = m_1 v_1^k + m_2 v_2^k$$

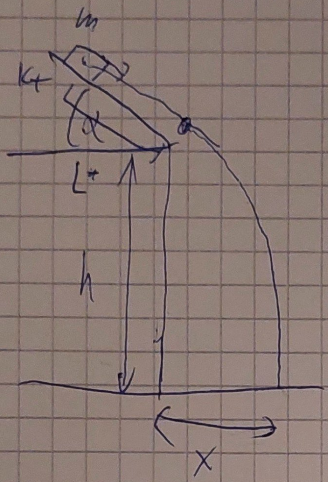
$$v_2^k = \frac{m_1 v_1 - m_1 v_1^k}{m_2}$$

$$v_2^k = \frac{m_1 v_1 - \frac{m_1^2 - m_1 m_2}{m_2 + m_1} v_1}{m_2}$$

$$v_2^k = \frac{\cancel{m_1^2} + m_1 m_2 - \cancel{m_1^2} + m_1 m_2}{m_2^2 + m_1 m_2} v_1 \quad / : m_2$$

$$v_2^k = \frac{2 m_1}{m_1 + m_2} v_1$$

kol/izpit 2024/25



$m = 5kg$

$kt = 0,3$

$\alpha = 30^0$

$h = 10m$

$L = 2m.$

voziček miruje na strehi, ko ga ~~izr~~ zdrsne.

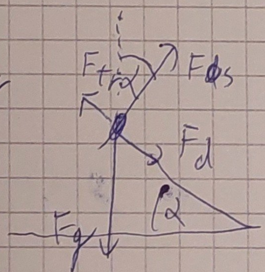
postreni drsi 2m na to pa prostopada.

a) v(na robu strehe) = ?

b) x = ?

2.N.Z. v sistemu na klancu.

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



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

$\perp: \quad mg\cos\alpha + F_{ds} = 0$

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

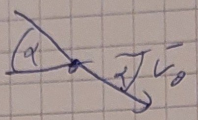
$a = \frac{dv}{dt} \cdot \frac{dr}{dr}$, $\frac{dr}{dt} = v$

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

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

$v = \sqrt{2ar}$

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

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

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