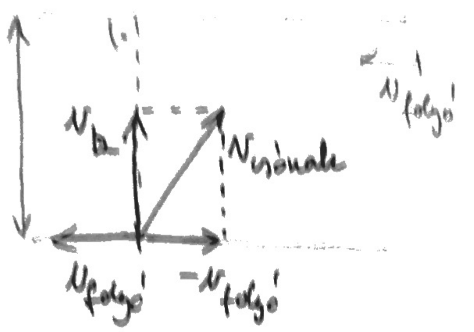
Pót ZH, számolásos feladatok.

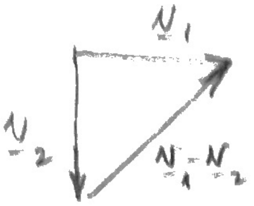


$$v_\perp = \sqrt{v_{csónak}^2 - v_{folyó}^2} = 2\,\frac{m}{s}$$

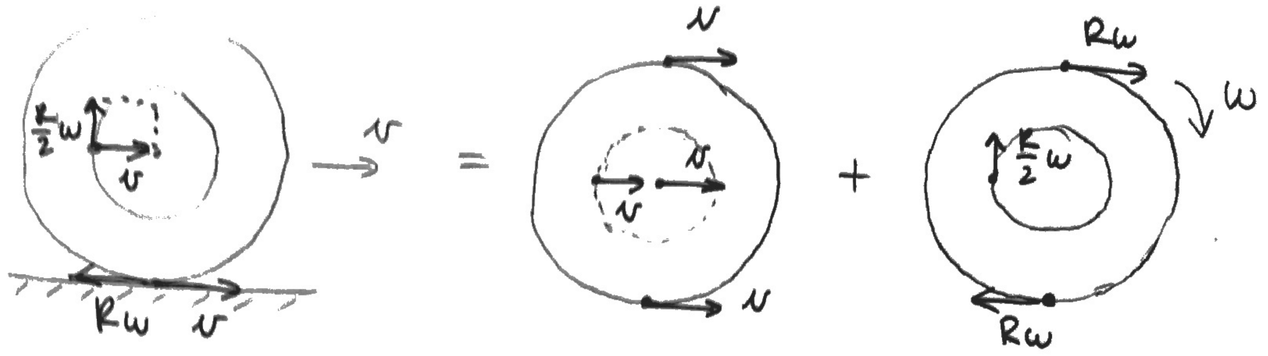
$$t = \frac{d}{v_\perp} = \frac{100\text{ m}}{2\,\frac{m}{s}} = \underline{\underline{50\text{ s}}}.$$

A görbe alatti terület:

$$s = 2\text{ s}\cdot 3\,\frac{m}{s} + 4\text{ s}\cdot\frac{3\,\frac{m}{s}+7\,\frac{m}{s}}{2} + 2\text{ s}\cdot\frac{7\,\frac{m}{s}}{2} = \underline{\underline{33\text{ m}}}$$



$$\left.\begin{aligned} \underline{r}_1(t) &= \underline{v}_1 t + \frac{1}{2} g t^2 \\ \underline{r}_2(t) &= \underline{v}_2 t + \frac{1}{2} g t^2 \end{aligned}\right\} |\Delta \underline{r}| = |\underline{r}_1 - \underline{r}_2| = \underbrace{|\underline{v}_1 - \underline{v}_2|}_{\sqrt{2}\,v_0}\cdot t = \underline{\underline{42{,}4\text{ m}}}$$



Forgó és haladó mozgás szuperpozíciója $\longrightarrow$ $v = R\omega$

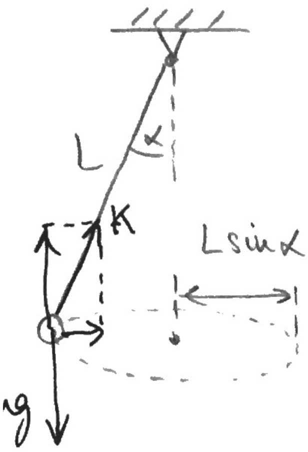
$$v_P = \sqrt{v^2 + \left(\frac{R\omega}{2}\right)^2} = v\sqrt{1+\left(\frac{1}{2}\right)^2} = \underline{\underline{\frac{\sqrt{5}}{2}\,v}}$$

Kezdetben csak tangenciális gyorsulás: $a_t = R\cdot\beta = \text{állandó}.$

Később centripetális gyorsulás is lesz: $a_{cp} = R\omega^2 = R\beta^2 t^2$

Az eredő:

$$a = \sqrt{a_t^2 + a_{cp}^2} = R\sqrt{\beta^2 + \beta^4 t^4} = R\beta\underbrace{\sqrt{1+\beta^2 t^4}}_{=2} \rightarrow t = \sqrt[4]{\frac{3}{\beta^2}} = \underline{\underline{1{,}8}}$$

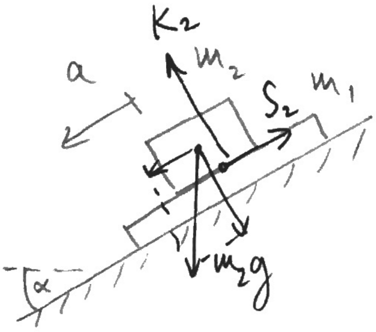


$$\left.\begin{aligned} K\cos\alpha - mg &= 0 \\ K\sin\alpha &= m\underbrace{(L\sin\alpha)\cdot\omega^2}_{a_{cp}} \end{aligned}\right\} \quad \omega = \sqrt{\frac{g\tan\alpha}{L\sin\alpha}} = \sqrt{\frac{g}{L\cos\alpha}}$$

periódusidő: $T = \frac{2\pi}{\omega} \rightarrow \omega = \frac{2\pi}{T}$

Tehát:

$$\cos\alpha = \frac{T^2}{4\pi^2}\cdot\frac{g}{L} = 0{,}507 \rightarrow \underline{\underline{\alpha = 59{,}6^\circ}}$$



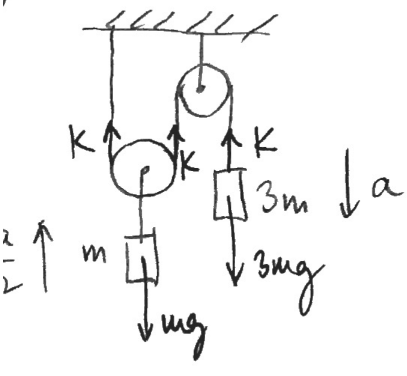
Ha a testek nem csúsznak meg, akkor a gyorsulásuk $g(\sin\alpha - \mu\cos\alpha) = a$.

Az m_2 tömegű testre a mozgásegyenlet:

$$\left.\begin{aligned} K_2 - m_2 g\cos\alpha &= 0 \\ m_2 g\sin\alpha - S_2 &= m_2 a \end{aligned}\right\}$$

a megcsúszás határán $\mu_2 = \frac{S_2}{K_2} = \frac{g\sin\alpha - a}{g\cos\alpha} = \mu$.

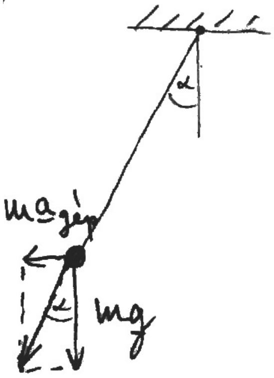
Tehát $\underline{\underline{\mu_2 = \mu = 0{,}3}}$ kell legyen.



A mozgásegyenletek:

$$\left.\begin{aligned} 3mg - K &= 3ma \\ 2K - mg &= m\frac{a}{2} \end{aligned}\right\} \quad 5\cancel{m}g = \frac{13}{2}\cancel{m}a$$

$$\underline{\underline{a = \frac{10}{13}g}}$$



$$\tan\alpha = \frac{a_{gép}}{g} \rightarrow a_{gép} = g\tan\alpha$$

$$t = \frac{\Delta v}{a_{gép}} = \frac{v}{a_{gép}} = \frac{v}{g\tan\alpha} = \frac{\frac{300}{3{,}6}\ \frac{m}{s}}{10\frac{m}{s^2}\cdot\tan 15^\circ} = \underline{\underline{31{,}1\ s}}$$