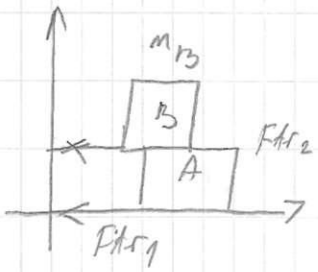
3. AUDITORNE

1. ZAD.

$m_A = m_B$

$= 10\,kg$



$\mu = 0{,}25$ $\quad N_2$

$F_{tr_2} = \underbrace{m_B \cdot G}_{N_2} \cdot \mu$

$F_{tr_1} = \underbrace{(m_B + m_A)}_{N_1} g\mu$

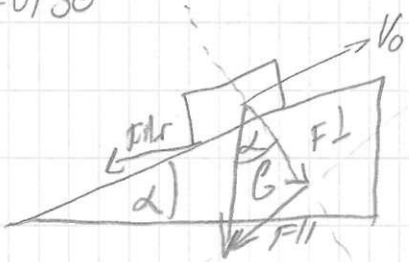
$F = F_{tr_1} + F_{tr_2} = (2m_B + m_A) g\mu = 736\,N$

2. ZAD Dječak gura kutiju kosinu. Put koji prede kutija?

$\alpha = 20^\circ$

$v_0 = 3\,m/s$

$\mu = 0{,}35$



$F_{||} = mg\sin\alpha$

$F_{tr} = \mu \cdot m \cdot g \cdot \cos\alpha$

$a = F_{||} - F_{||} + F_{tr} = m \cdot g(\sin\alpha + \mu\cos\alpha)$

$a = g(\sin\alpha + \mu\cos\alpha)$

$v = \int a\,dt \qquad s = \int v\,dt$

$v = v_0 - \int g(\sin\alpha + \mu\cos\alpha)\,dt$

$= -g(\sin\alpha + \mu\cos\alpha)t + v_0 = 0$

$\Rightarrow t = \dfrac{v_0}{g(\sin\alpha + \mu\cos\alpha)} = 0{,}466\,s$

$$s = v_0 t - \frac{at^2}{2} = v_0 t - \frac{g(\sin\alpha + \mu\cos\alpha)}{2} t^2$$

$$= 0{,}65\ \text{m}$$

(3) Ugaona brzina lopte opada s vremenom po zakonu $\omega(t) = \omega_0 e^{-At}$, nakon 5 s ugaona brzina padne na 60%. Koeficijent otpora srazmeran je brzini.

$\omega(t) = \omega_0 e^{-At}$

$\omega(5\text{s}) = 0{,}6\,\omega_0$

$\alpha(5\text{s}) = ?$

$a_\tau(5\text{s}) = ?$

$\omega_0 = 3{,}14\ \text{s}^{-1}$

$R = 0{,}5\ \text{m}$

$\omega(t = 5\text{s}) = \omega_0 e^{-A \cdot 5\text{s}} = 0{,}6\,\omega_0$

$e^{-A5\text{s}} = 0{,}6 \quad /\ln$

$-A5\text{s} = \ln(0{,}6) = \ln(\ldots)$

$A = \frac{\ln(\ldots)}{5\text{s}}$

$\alpha(t) = \frac{d\omega(t)}{dt} = \omega_0 (-A) e^{-At} = -A\,\omega(t)$

$a(t) = \alpha(t) \cdot R = -A\,\omega(t) \cdot R$

$a_{uk} = \sqrt{a_t^2 + a_r^2}$ $\quad F_g = \frac{mv^2}{R}$ $\quad m \cdot g = \frac{mv^2}{R}$

$a_r = \frac{v^2}{R} = \omega^2 \cdot R$ $\quad a = \frac{v^2}{R}$

$a_t^2 = A^2 \omega^2 R^2$

$a_r^2 = (\omega^2 R)^2$

$a_{uk} = 1,48\ m/s^2$

(4.) Najmanji polumjer zakrivljenosti zavoja na cesti koji automobil može svladati brzinom 100 km/h bez proklizavanja

$v = 100\ km/h$

$\mu = 0,6$

$R_{min} = ?$

$F_{tr} = m \cdot g \cdot \mu$

$F_{cf} = \frac{mv^2}{R_{min}}$

$m \cdot g \cdot \mu = \frac{mv^2}{R_{min}}$

$R_{min} = \frac{v^2}{g \cdot \mu} = 157,3\ m$

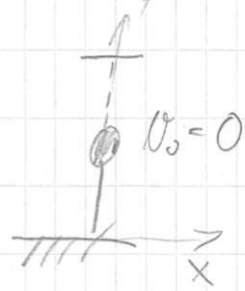
1) 

$\vec{F_R} = m \cdot \vec{a}$

$X: 0 = m \cdot a_x \rightarrow a_x = 0 \rightarrow v_x = \text{konst.}$

$Y: -F_g = m \cdot a_y$ poč. mjest. $\rightarrow 0$

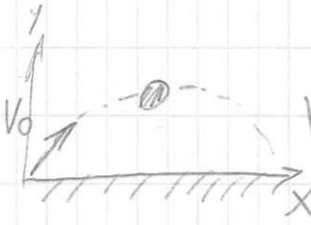
$-m \cdot g = m \cdot a_y \rightarrow a_y = -g$

2) 

$\vec{F_R} = m \cdot \vec{a}$

3) 

$\vec{F_R} = m \cdot \vec{a}$

4) 

$\vec{F_R} = m \cdot \vec{a}$

$X: 0 = m \cdot a_x \rightarrow a_x = 0$ $v_x = \text{const.} = v_0 \cos\alpha$

$Y: -F_g = m \cdot a_y$

$-m \cdot g = m \cdot a_y$

$a_y = -g$

① Koord. sustav

② III. Newton-ov zakon

③ Poč. mjesta

④ Zakon sile koja djeluje $\vec{F_g} = m \cdot \vec{g}$

$\vec{F_g} = G \dfrac{m \cdot M_z}{R_z^2} \rightarrow \vec{g}$