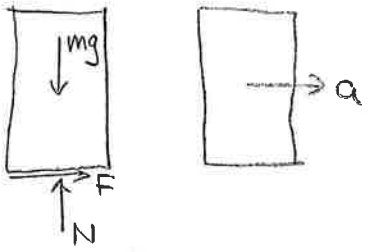
Seminariepass 21

1. Glidning:



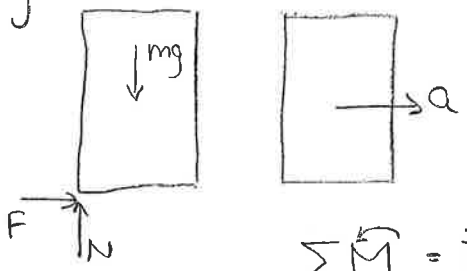
$(\uparrow)\ N - mg = 0 \Rightarrow N = mg$

$(\rightarrow)\ F = ma$

$F = F_{max} = \mu_s N = \mu_s mg$ $\Rightarrow \mu_s mg = ma$

$a = \mu_s g = 5{,}89\ m/s^2$

Stjälpning:



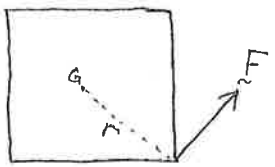
$(\uparrow)\ N - mg = 0 \Rightarrow N = mg$

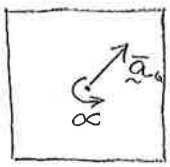
$(\rightarrow)\ F = ma$

$\sum \overset{\curvearrowleft}{M}_G = \bar{I}\alpha = 0 \Rightarrow F \cdot \frac{h}{2} - N \cdot \frac{b}{2} = 0$

$\Rightarrow mah - mgb = 0 \Rightarrow a = \frac{b}{h} g = 4{,}91\ m/s^2$: stjälpning först

2.





$\sum \underset{\sim}{F} = m \underset{\sim}{a}$

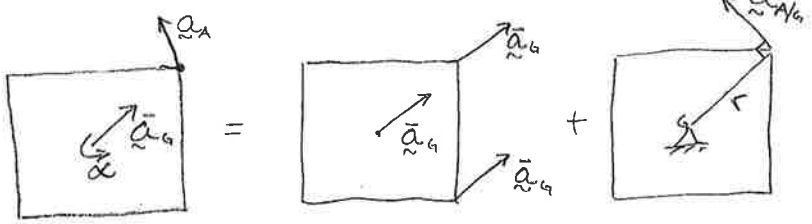
$(\nearrow)\ F = m\bar{a} \Rightarrow \bar{a} = \frac{120}{6} = 20\ m/s^2$

$\sum M_G = \bar{I}\alpha$

$r \cdot F = \frac{1}{12} m(a^2 + b^2)\alpha$ $\qquad r = \frac{1}{2}\sqrt{0{,}2^2 + 0{,}2^2} = 0{,}141\ m$

$I = \frac{1}{12} \cdot 6(0{,}2^2 + 0{,}2^2) = 0{,}04\ kg \cdot m^2$

$\alpha = \frac{0{,}141 \cdot 120}{0{,}04} = 424\ rad/s^2$



$a_{A/G} = a_{A/G,s} = \alpha r = 60\ m/s^2$

$\underset{\sim}{a}_{A/G} = (-60\cos 45°,\ 60\sin 45°,\ 0)\ m/s^2$

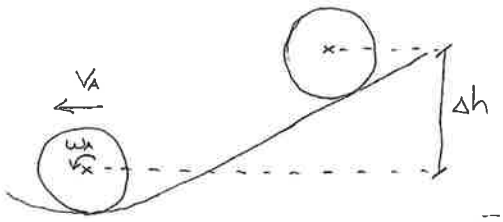
$\underset{\sim}{\bar{a}}_G = (20\sin 45°,\ 20\cos 45°,\ 0)\ m/s$

$\underset{\sim}{a}_A = \underset{\sim}{\bar{a}}_G + \underset{\sim}{a}_{A/G} = (-60\cos 45° + 20\sin 45°,\ 60\sin 45° + 20\cos 45°,\ 0) =$

$= (-28{,}3,\ 56{,}6,\ 0)\ m/s^2 \Rightarrow a_A = 63{,}2\ m/s^2$

sem. 21 forts

3.



$$W = \Delta T + \Delta V_e = 0$$

$$\Delta T = \frac{1}{2} m(\bar{V}_A^2 - \bar{V}_B^2) + \frac{1}{2} \bar{I}(\omega_A^2 - \omega_B^2)$$

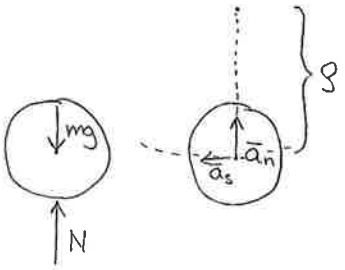
$$\Delta V_e = mg(h_A - h_B)$$

$$\bar{I} = m k_o^2 = 100 \cdot 0{,}1^2 = 1{,}0 \text{ kgm}^2 \quad , \omega = \frac{\bar{V}}{r}$$

$$\frac{1}{2} \cdot 100 \left(\bar{V}_A^2 - 0{,}6^2\right) + \frac{1}{2} \cdot 1{,}0 \cdot \left(\left(\frac{\bar{V}_A}{0{,}15}\right)^2 - \left(\frac{0{,}6}{0{,}15}\right)^2\right) - 100g \cdot 0{,}210 = 0$$

$$\bar{V}_A^2 \left(50 + \frac{0{,}5}{0{,}15^2}\right) = 100g \cdot 0{,}210 + 50 \cdot 0{,}6^2 + 0{,}5 \cdot \left(\frac{0{,}6}{0{,}15}\right)^2$$

$$\Rightarrow \quad \bar{V}_A = 1{,}79 \text{ m/s}^2$$



tyngdpunktsacc.

$$(\uparrow) \quad N - mg = m\bar{a}_n \quad , \bar{a}_n = \frac{\bar{V}_A^2}{\rho}$$

$$N = mg + m\frac{\bar{V}_A^2}{\rho} = 100g + 100\frac{1{,}79^2}{0{,}6 - 0{,}15} = \underline{1695 \text{ N}}$$