

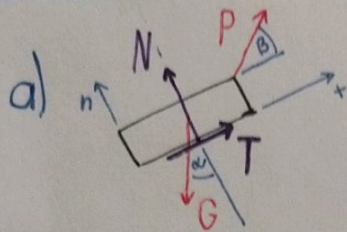
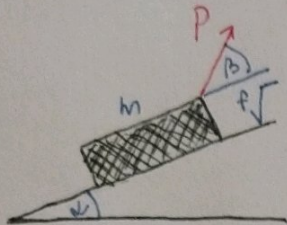
Příklad 1

- deska na rampě,  $m=50\text{ kg}$ ,  $\alpha=30^\circ$ ,  $f=0,2$ ,  $\beta=20^\circ$

U: a) velikost síly  $P$ , aby deska nesklouzla

b) — " —

se deska dala do pohybu vzhůru



$$t: -G \sin \alpha + P \cos \beta + T = 0 \quad (1)$$

$$n: -G \cos \alpha + N + P \sin \beta = 0 \quad (2)$$

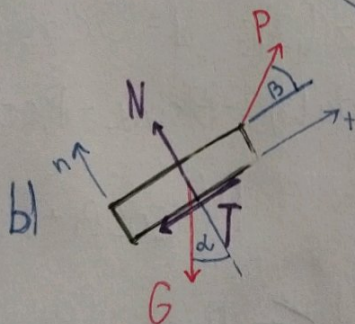
$$T = fN \quad (3)$$

$$z(1): P = \frac{G \sin \alpha - T}{\cos \beta} \approx \underline{\underline{184 \text{ N}}}$$

$$\text{do (2): } -G \cos \alpha + N + \frac{G \sin \alpha - fN}{\cos \beta} \sin \beta = 0$$

$$-G \cos \alpha + N + G \sin \alpha \tan \beta - fN \tan \beta = 0$$

$$N = \frac{G(\cos \alpha - \sin \alpha \tan \beta)}{1 - f \tan \beta} \approx \underline{\underline{362 \text{ N}}}$$



$$t: -G \sin \alpha - T + P \cos \beta = 0 \quad (1)$$

$$n: -G \cos \alpha + N + P \sin \beta = 0 \quad (2)$$

$$T = fN \quad (3)$$

$$P = \frac{T + G \sin \alpha}{\cos \beta} \approx \underline{\underline{328 \text{ N}}}$$

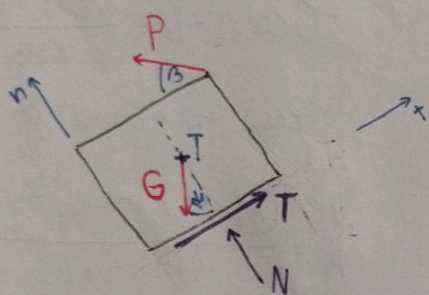
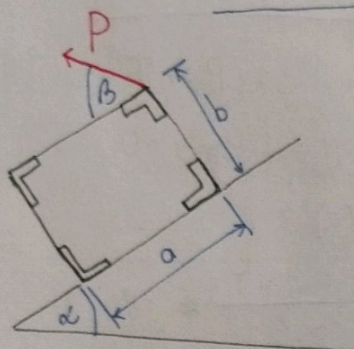
$$-G \cos \alpha + N + \sin \beta \frac{fN}{\cos \beta} + \sin \beta \frac{G \sin \alpha}{\cos \beta} = 0$$

$$N(1 + f \tan \beta) = G \cos \alpha - G \sin \alpha \tan \beta$$

$$N = \frac{G(\cos \alpha - \sin \alpha \tan \beta)}{1 + f \tan \beta} \approx \underline{\underline{313 \text{ N}}}$$

Příklad 2 - bedna s kováním,  $m = 30 \text{ kg}$ ,  $a = 0,9 \text{ m}$ ,  $b = 0,6 \text{ m}$ ,  $\alpha = 20^\circ$   
 $f = 0,5$ ,  $\beta = 20^\circ$

U: max. velikost síly  $P$ , tak aby zůstala soustava v rovnováze  
 — || — pro  $b = 1,5 \text{ m}$



$$t: -G \sin \alpha - P \cos \beta + T = 0 \quad (1)$$

$$n: -G \cos \alpha + P \sin \beta + N = 0 \quad (2)$$

$$T = fN \quad (3)$$

$$\text{z (2): } N = G \cos \alpha - P \sin \beta$$

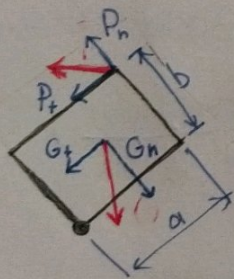
$$\text{do (1): } -G \sin \alpha - P \cos \beta + fG \cos \alpha - fP \sin \beta = 0$$

$$P(\cos \beta + f \sin \beta) = G(f \cos \alpha - \sin \alpha)$$

a)

Při  $P > 33,9 \text{ N}$  se bedna začne pohybovat.  $\Leftarrow P = mg \frac{f \cos \alpha - \sin \alpha}{f \sin \beta + \cos \beta} = \underline{\underline{33,9 \text{ N}}}$

b) pro  $b = 1,5 \text{ m}$  ... kdy dojde k přetočení kolem levé spodní hrany?



$$M_P + M_G = 0$$

$$P_t b + P_n a + G_t \frac{b}{2} - G_n \frac{a}{2} = 0$$

$$P \cos \beta b + P \sin \beta a + mg \sin \alpha \frac{b}{2} - mg \cos \alpha \frac{a}{2} = 0$$

$$P = mg \frac{-\frac{b}{2} \sin \alpha + \frac{a}{2} \cos \alpha}{b \cos \beta + a \sin \beta} = \underline{\underline{28,5 \text{ N}}}$$

Pro  $P > 28,5 \text{ N}$  dojde k převržení.