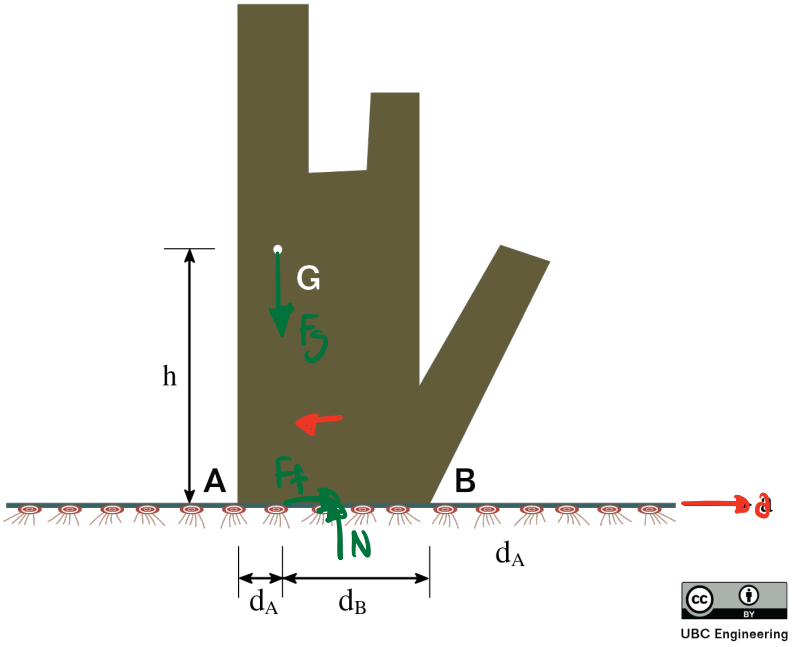
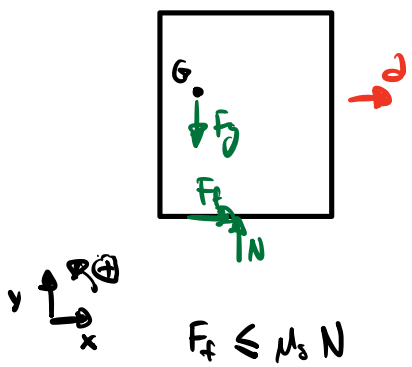
Your friend is once again trying to move their mom's modern art sculpture by dragging a rug underneath it. Will the statue tip or slip first? Determine the magnitude of the acceleration needed for both tipping and slipping. The statue has a mass of $m = 80kg$ and has a radius of gyration $k_G = 0.8m$. The coefficient of static and kinetic friction are determined to be $\mu_s = 0.25$ and $\mu_K = 0.2$ respectively.
Assume there is no friction between the rug and the ground.
The center of gravity G is found a height $h = 1.5m$ and is a horizontal distance $d_A = 0.1m$ from point A. Point B is a horizontal distance $d_B = 0.35m$ away from the center of gravity.



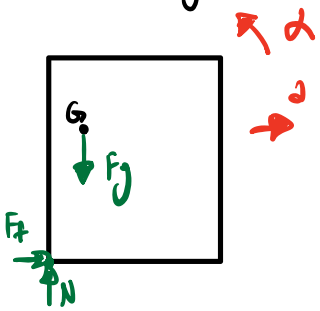
Case #1 Slipping



$F_f \leq \mu_s N$

$\alpha = 0$

Case #2 Tipping



$\alpha = 0$

$\sum F_x = ma_x \Rightarrow F_f = ma$

$\sum F_y = 0 \Rightarrow N - mg = 0$

$F_f = \mu_s N$

$N = (80\text{kg})(9.81\ \text{m/s}^2) = 784.8\text{N}$

$\therefore F_f = 0.25(784.8\text{N}) = 196.2\text{N}$

$\therefore a = \frac{196.2\text{N}}{80\text{kg}} = 2.45\ \text{m/s}^2$

$\sum F_x = ma_x \Rightarrow F_f = ma$

$\sum F_y = 0 \Rightarrow N - mg = 0$

$\sum M_G = I_G\alpha \Rightarrow F_f(1.5\text{m}) - N(0.1\text{m}) = I_G\cancel{\alpha}^{\,0}$

$F_f = \frac{(80\text{kg})(9.81\ \text{m/s}^2)(0.1\text{m})}{(1.5\text{m})}$

$F_f = 32.32\text{N}$

$a = \frac{32.32\text{N}}{80\text{kg}} = 0.65\ \text{m/s}^2$

Since $a_{tipping} < a_{slipping} \Rightarrow$ System tips first

$$\boxed{a = 0.65\ \text{m/s}^2}$$