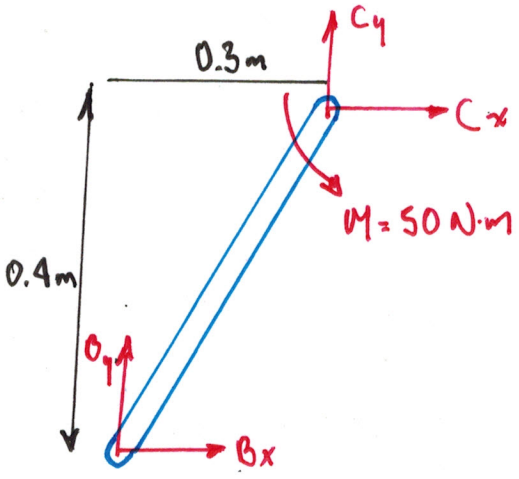
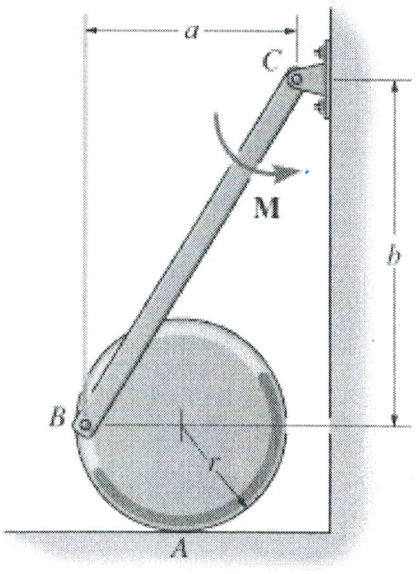
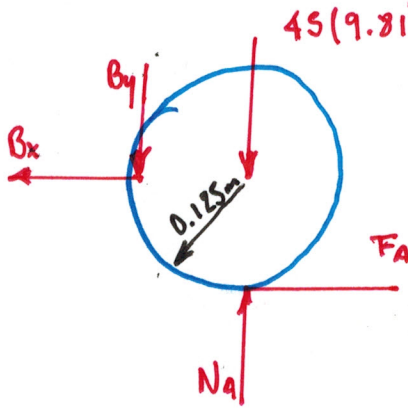
The disk of mass m_o rests on the surface for which the coefficient of static friction is μ_A. Determine the friction force at A.



$M = 50$ Nm
$m_o = 45$ kg
$\mu_A = 0.15$
$a = 300$ mm
$b = 400$ mm
$r = 125$ mm





$\Sigma M_C = 0$ (using bar FBD)

$B_x(0.4) - B_y(0.3) + 50 = 0$ (1)

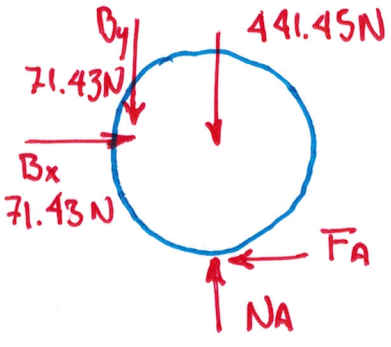
$\Sigma M_A = 0$ (using disc FBD)

$B_x(0.125) + B_y(0.125) = 0$ $B_x = -B_y$ (2)

$-B_y(0.4) - B_y(0.3) + 50 = 0$

$\frac{50}{0.7} = B_y$ $B_y = 71.43$ N $\Longrightarrow$ $B_x = -B_y = -71.43$ N

From the disc FBD



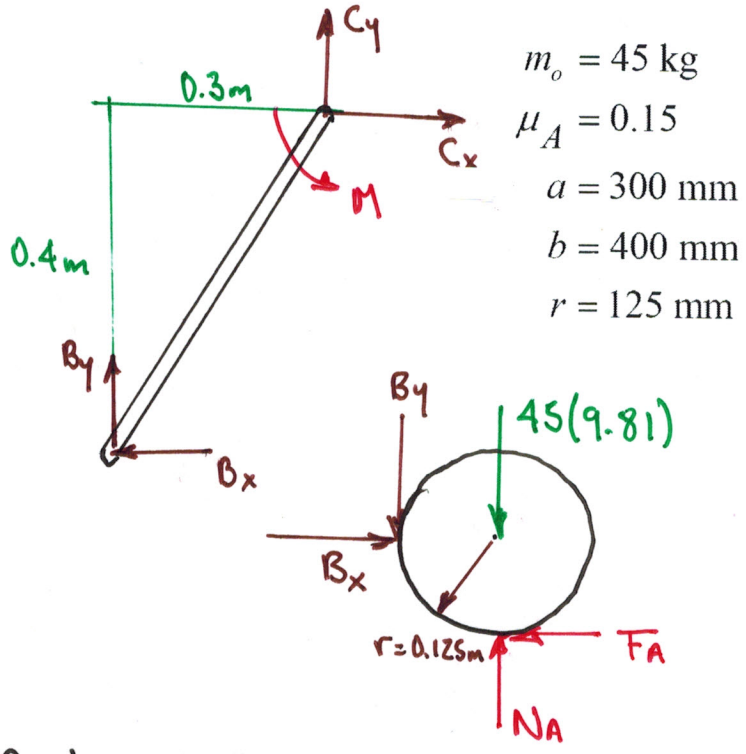
$\Sigma F_x = 0$ $B_x - F_A = 0$ $F_A = 71.43$ N

$\Sigma F_y = 0$ $N_A - B_y - 441.45 = 0$

$N_A = 512.88$ N

$F_A \leq \mu_A N_A = 0.15(512.88) = 76.93$ N Disc in static equilibrium

The disk of mass m_o rests on the surface for which the coefficient of static friction is μ_A. Determine the magnitude of the moment M needed to cause the disc to spin.



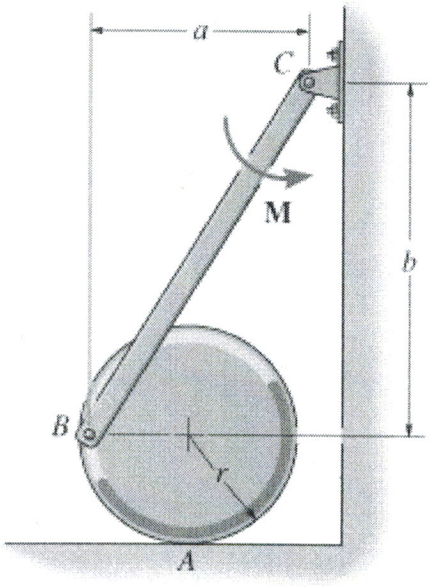
$m_o = 45$ kg

$\mu_A = 0.15$

$a = 300$ mm

$b = 400$ mm

$r = 125$ mm



Since we are dealing with impending motion $F_A = \mu_A N_A$.

Analazing Disc (4 eqs. in 4 unknowns)

$\Sigma F_x = 0$ $\quad -0.15N_A + B_x = 0$ (1)

$\Sigma F_y = 0$ $\quad N_A - B_y - 441.5 = 0$ (2)

$\Sigma M_A = 0$ $\quad 0.125B_y - 0.125B_x = 0$ (3) $\quad B_y = B_x$

$\therefore -0.15N_A + N_A = 441.5$ $\quad N_A = 519.4$ N

$B_x = B_y = 0.15(519.4) = 77.91$ N

Analyzing bar

$\Sigma M_C = 0$ $\quad M - B_y(0.3) - B_x(0.4) = 0$

$M = 77.91(0.7) = 54.54$ N·m