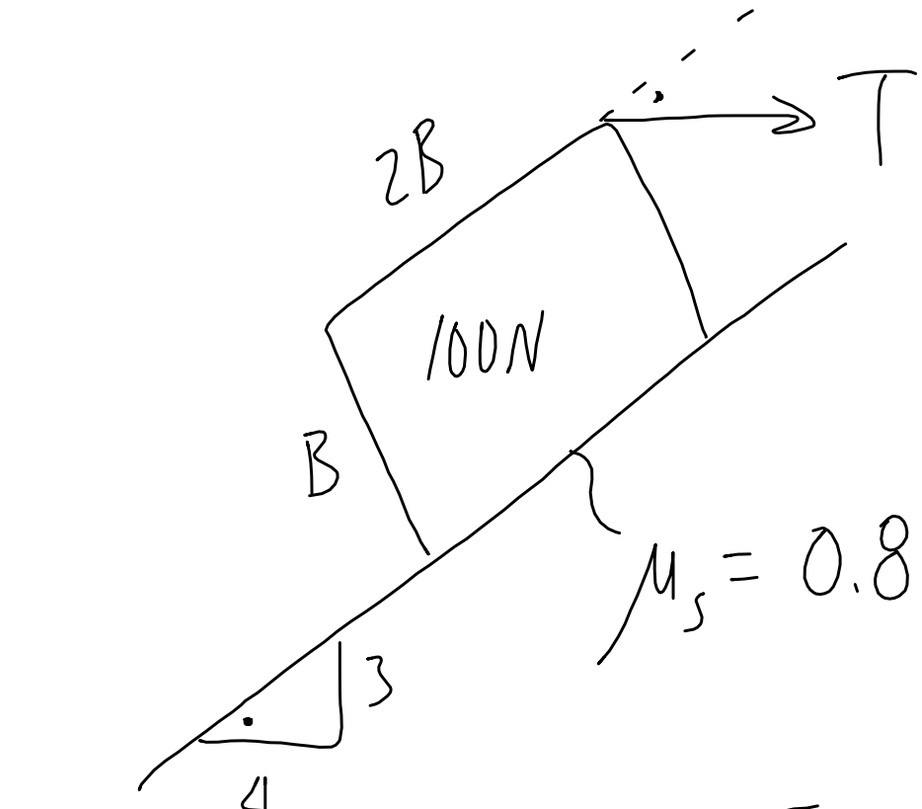
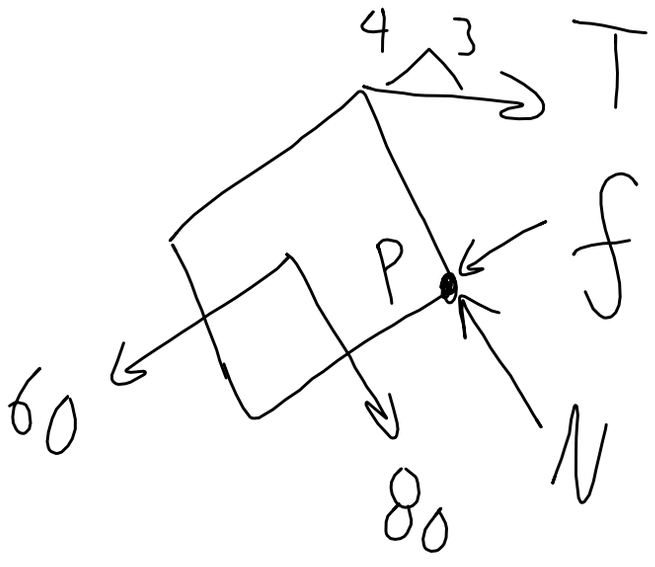


What is T_{min} for impending motion?

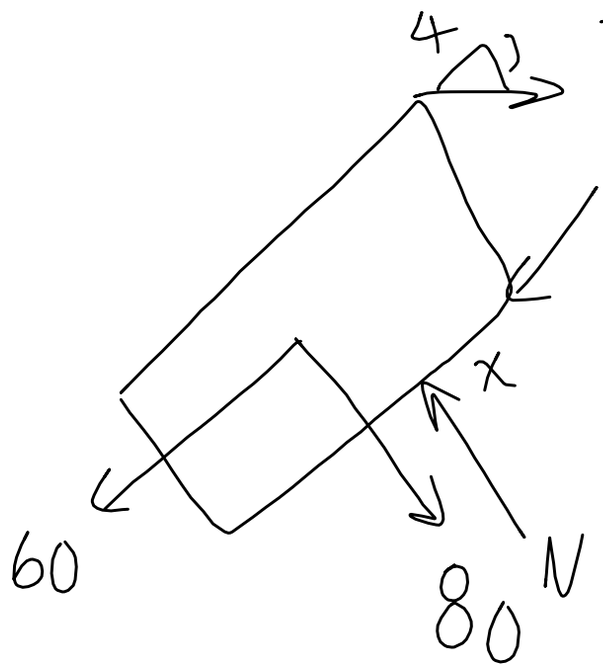
(1) Assume it tips



$$+\circlearrowleft \sum M_P = 60\left(\frac{B}{2}\right) + 80(B) - T\left(\frac{4}{5}\right)B = 0$$

$$T = 137.5\ N$$

② Assume it slips

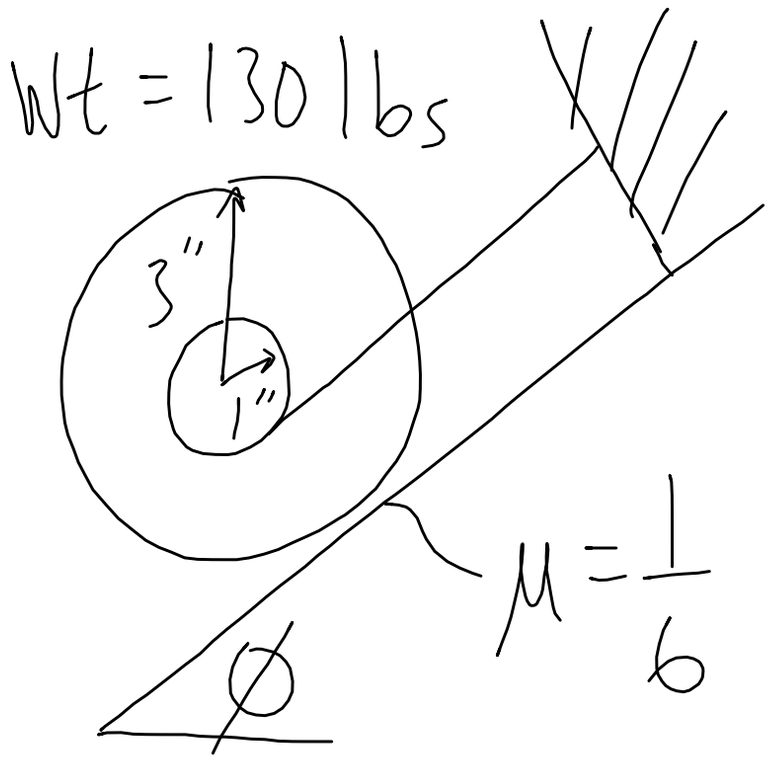


$+\nearrow \Sigma F = T\left(\frac{4}{5}\right) - 60 - .8N = 0$

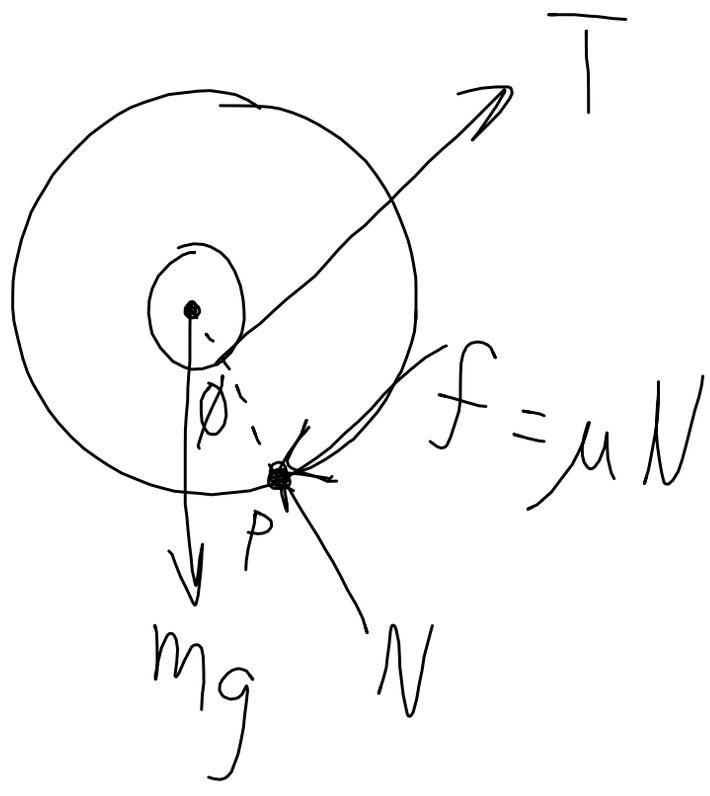
$+\uparrow \Sigma F = N - 80 - T\left(\frac{3}{5}\right) = 0$

$T\left(\frac{4}{5}\right) - 60 - .8\left[80 + T\left(\frac{3}{5}\right)\right] = 0$

$T = 388\ N$



At what angle ϕ will spool move?



$+\circlearrowleft \sum M_p = 130 \sin\phi\,(3)$

$-T(2) = 0$

$T = 195 \sin\phi$

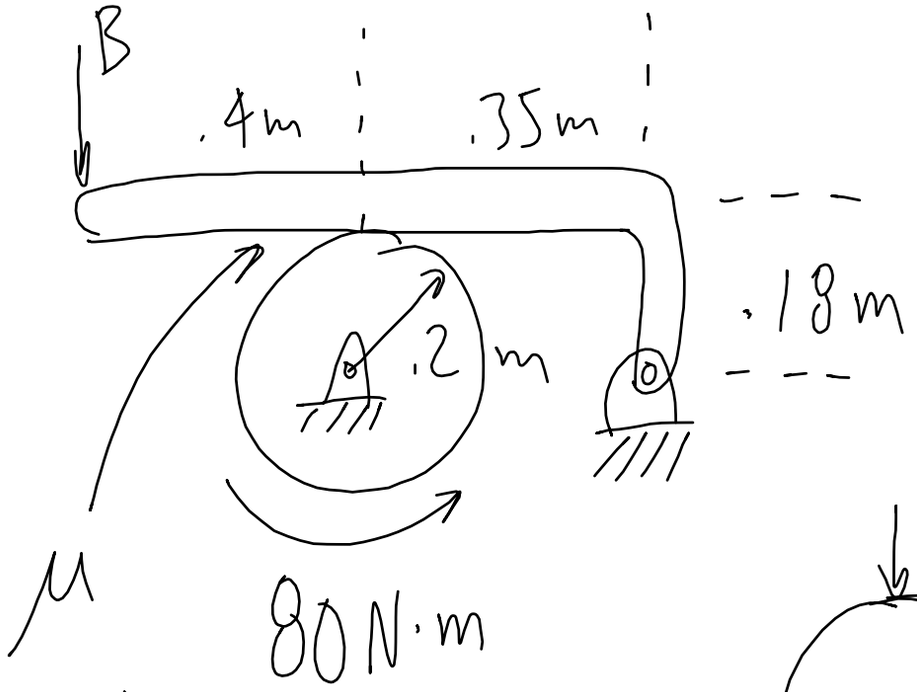
$$+\nearrow \sum F = T - \frac{N}{6} - 130\sin\phi = 0$$

$$+\nwarrow \sum F = N - 130\cos\phi = 0 \implies N = 130\cos\phi$$

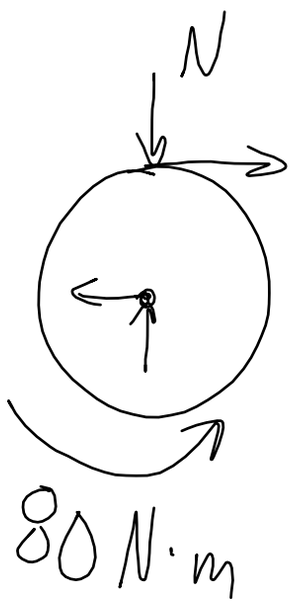
$$195\sin\phi - \frac{130\cos\phi}{6} - 130\sin\phi = 0$$

$$65\sin\phi = \frac{130}{6}\cos\phi$$

$$\tan\phi = \frac{130}{6(65)} \quad \phi = 18.4^\circ$$

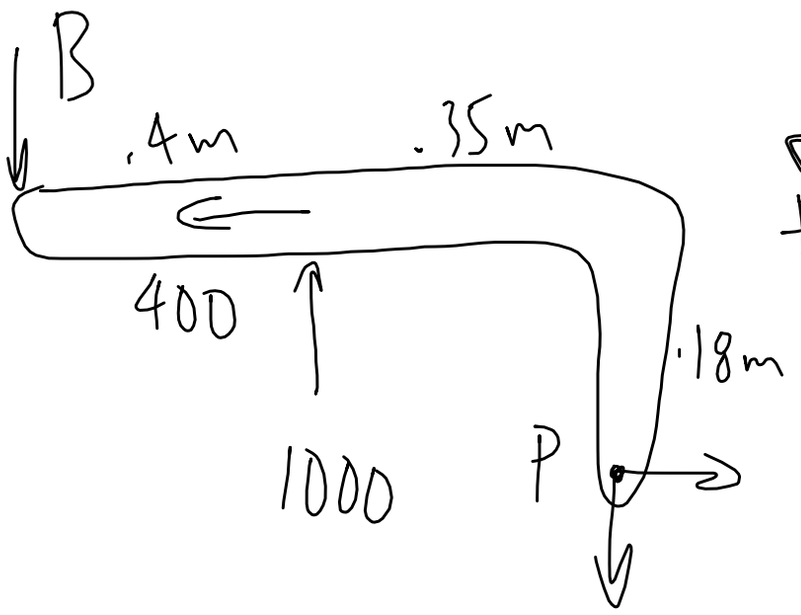


What is B_{min} to prevent slipping?



$$+\circlearrowleft \Sigma M_{center} = 80 - .4N(.2) = 0$$

$$N = 1000 \text{ N}$$



$$+\circlearrowleft \sum M_P = B(.75) + 400(.18) - 1000(.35) = 0$$

$$B = 371\ N$$