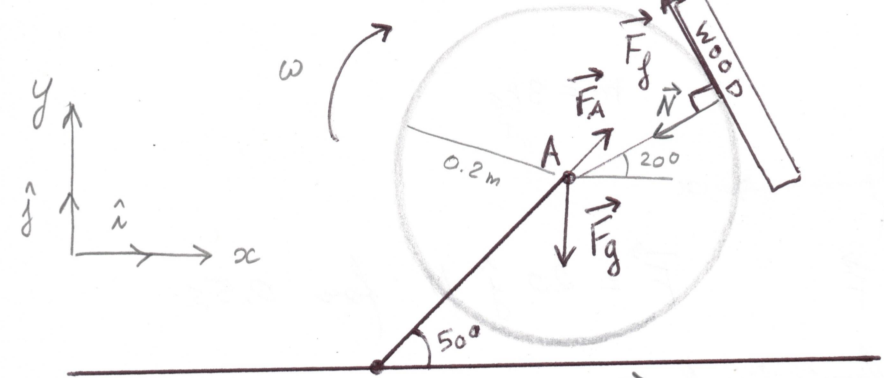

$m = 2\,kg \qquad r = 0.2\ m$

$\omega = 1500\,RPM$

$= 1500 \cdot \frac{2\pi}{60}$

$= 157.08\ rad/s$

$\vec{F}_f = -F_f \sin(20)\,\hat{\imath} + F_f \cos(20)\,\hat{\jmath}$

$\vec{F}_A = F_A \cos(50)\,\hat{\imath} + F_A \sin(50)\,\hat{\jmath}$

$\vec{F}_g = m\vec{g} = -mg\,\hat{\jmath}$

$\vec{N} = -N\cos(20)\,\hat{\imath} - N\sin(20)\,\hat{\jmath}$

Principle of linear impulse and momentum:

Vertical: $+\uparrow \qquad m\cancel{(V_{Ay})_1}^{\,0} + \sum \int_{t_1}^{t_2} F_y\,dt = m\cancel{(V_{Ay})_2}^{\,0}$

$t_2\left(F_A \sin 50 + F_f \cos 20 - mg - N\sin(20)\right) = 0$

$F_A \sin 50 + 50\cos 20 - 2(9.81) - N\sin(20) = 0 \qquad (1)$

Horizontal: $+\rightarrow \qquad m\cancel{(V_{Ax})_1}^{\,0} + \sum \int_{t}^{t_2} F_x\,dt = m\cancel{(V_{Ax})_2}^{\,0}$

$t_2\left(F_A \cos(50) - F_f \sin(20) - N\cos(20)\right) = 0$

$F_A \cos(50) - 50\sin(20) - N\cos(20) = 0. \qquad (2)$

$(1),(2) \rightarrow \boxed{F_A = -63.13\,N,} \quad N = -61.38\,N$

Principle of Angular impulse and momentum:

$I_A\omega_1 + \sum \int_{t_1}^{t_2} M_A\,dt = \cancel{I_A\omega_2}^{\,0}$

$I_A = \frac{1}{2}mr^2 = 0.04\ kg\,m^2 \qquad \omega_1 = 157.08\ rad/s$

$-(0.04)(157.08) + (0.2)(50)\,t_2 = 0$

$\boxed{t_2 = 0.6283\,s}$