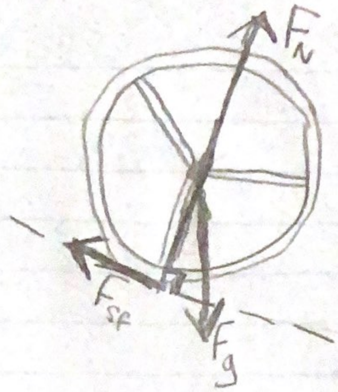
Sean Gray

a. i.



ii. Since $\alpha = \frac{\Delta\omega}{\Delta t}$ and $\therefore$ $\Delta\omega = \alpha\Delta t$, ω, angular velocity, is changed by α, angular acceleration and since $\Sigma\tau = I\alpha$, $\alpha = \Sigma\tau / I$, and $\tau = rF\sin\theta$, $\Delta\omega = \Sigma(rF\sin\theta)\cdot\Delta t / I$. Δt and I are constants for each force over a period of time $\therefore$ since $r = 0$ for F_g and $\theta = \pi$ rad for F_N, and $\sin\pi = 0$, τ_N and τ_g both $= 0$. Since $r \neq 0$ for F_{sf} and $\theta = \pi/2$ for F_{sf}, $\tau_{sf} \neq 0$.

The force of static friction, F_{sf} causes a change in angular velocity, $\Delta\omega$, with respect to its center of mass.

b. Since $\Sigma F = Ma = F_{g\ \text{component}} - F_{sf} = Mg\sin\theta - 0.4Mg\sin\theta = 0.6Mg\sin\theta$

$a = 0.6g\sin\theta$

c. i. Since the block of ice has negligible friction, it's final speed, $\|v_f\|$ will be the greatest. Since $\Sigma F = Ma = F_g - F_{sf}$, with $< F_{sf}$, $> a$

<u>X Block</u>

ii. Since the block is not rotating and both start with the same PE, more of the block's KE is linear since none is rotational, causing there to be a greater linear speed, $\|v\|$ since $KE = \frac{1}{2}Mv^2$.