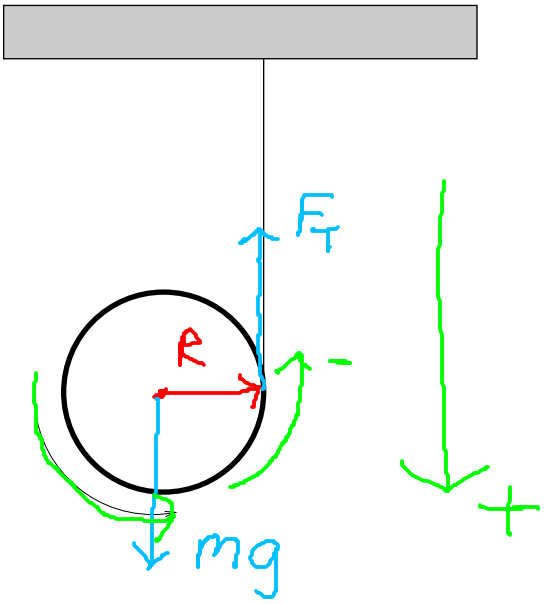
Quiz 6 – PH241 **Name**_____ ☐ **Pledged**

$\vec{F}_{net} = m\vec{a}$ $\vec{\tau}_{net} = I\vec{\alpha}$ $a = R\alpha$ $\tau = RF\sin\theta$
$I_{cylinder} = \frac{1}{2}MR^2$ $g = 9.81 m/s^2$

A cylinder, attached to a string is allowed to fall. The cylinder has a mass of .65 kg and a radius of 12 cm.
Show all work, draw force diagrams and torque diagrams, set up coordinate system, etc.

(A) What is the tension in the string?

(B) What is the acceleration of the spinning mass?



Forces

① $ma = mg - F_T$

③ $a = R\alpha$

torques

② $I\alpha = RF_T$

② $\frac{Ia}{R^2} = F_T$

① $ma = mg - \frac{Ia}{R^2}$

$(m + \frac{1}{2}m)a = mg$

$\frac{3}{2}a = g$

So $a = \frac{2}{3}g = 6.54 m/s^2$

② $F_T = Ia/R^2$

$F_T = \frac{1}{2}ma$

$F_T = \frac{1}{2}(.65kg)(6.53 m/s^2)$

$= 2.1 N$