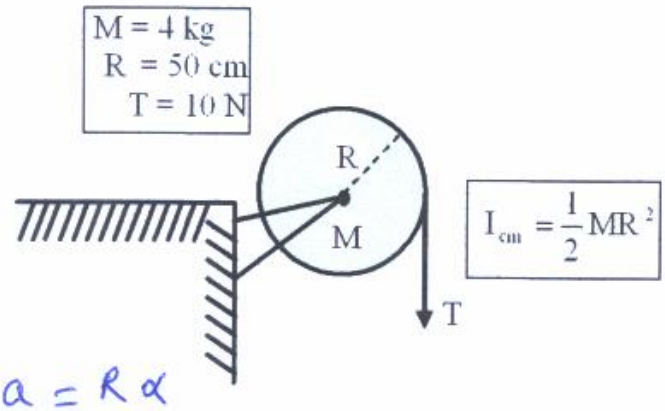
Key

Phys. 101 - Sec # 2 **(11)**

Name: ID # SN#

1- A uniform disk of radius 50 cm and mass 4 kg is mounted on a frictionless axle, as shown. A light cord is wrapped around the rim of the disk and a steady downward pull of 10 N is exerted on the cord. Find the tangential acceleration of a point on the rim of the disk.



$\tau = I\alpha$

$\alpha = \frac{\tau}{I}$ and $a = R\alpha$

$\alpha = \frac{TR}{\frac{1}{2}MR^2}$

$\Rightarrow a = R\alpha = R\,\frac{T}{\frac{1}{2}MR} = \frac{T}{\frac{1}{2}M} = \frac{10}{\frac{1}{2}\times 4} = 5\ \frac{m}{s^2}$ downward

2- A torque of 0.8 Nm applied to a pulley increases its angular speed from 45 rev/min to 180 rev/min in 3 seconds. Find the moment of inertia of the pulley.

$\tau = I\alpha \Rightarrow I = \frac{\tau}{\alpha}$

apply: $\omega = \omega_0 + \alpha t$ to get $\alpha = \frac{\omega - \omega_0}{t} = 4.7\ \frac{rad}{s^2}$

where $\omega_0 = \frac{45 \times 2\pi}{60} = 4.7\ \frac{rad}{s}$

$\omega = 18.8\ \frac{rad}{s}$.

$\Rightarrow I = \frac{\tau}{\alpha} = \left(\frac{0.8}{4.7}\right) = 0.17\ kg\,m^2$