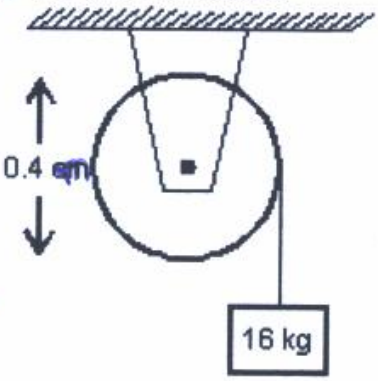
Key

Phys. 101 - Sec # 1 **(Ch. 11)**

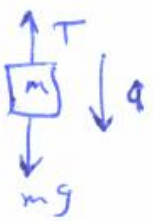
Name: ID # SN#

1- A 16 kg block is attached to a cord that is wrapped around the rim of a flywheel of diameter 0.40 m and hangs vertically, as shown. The rotational inertia of the flywheel is 0.50 kgm^2. When the block is released and the cord unwinds, what is the acceleration of the block?



$F_{net} = ma$

$mg - T = ma$ ①



$\tau_{net} = I\alpha$

$TR = I\frac{a}{R}$

$T = I\frac{a}{R^2}$ ②

Solve ① & ② to get:

$mg - I\frac{a}{R^2} = ma$

$\Rightarrow a\left(m + \frac{I}{R^2}\right) = mg$

$a = \frac{mg}{\left(m + \frac{I}{R^2}\right)} = \frac{16(9.8)}{\left(16 + \frac{0.5}{(0.2)^2}\right)}$

$= \frac{156.8}{28.5} = \boxed{5.5\ \frac{m}{s^2}}$ ↓

2- The rotational inertia of a disk about its axis is 0.70 kgm2. When a 2.0 kg weight is added to its rim, 0.40 m from the axis, what is its rotational inertia?

$I_c = 0.70\ kg\,m^2$

$I = I_c + mr^2 = 0.70 + (2.0)(0.40)^2$

$= \boxed{1.02\ kg\,m^2}$