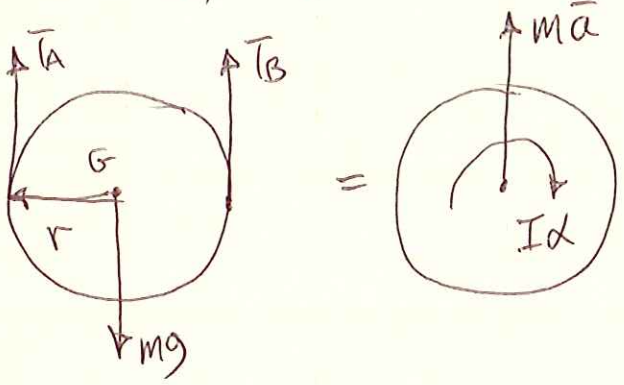
PROB. 16-56

$T_A = 14^N$, $T_B = 12^N$, $r = 0.08^m$, $k = 0.07^m$, $m = 3^{kg}$

FIND a_A, a_B



$\Sigma F_y = ma_y$: $T_A + T_B - mg = m\bar{a}$, $\bar{a} = \frac{1}{m}(T_A + T_B) - g$

$\Sigma \vec{M}_G = \Sigma(\vec{M}_G)_{EFF}$ $+\circlearrowleft$: $-rT_A + rT_B = -I\alpha$

$\alpha = \frac{r}{I}(T_A - T_B)$, $I = k^2 m$, $\alpha = \frac{r}{k^2 m} \cdot (T_A - T_B)$

$a_A = \bar{a} + r\alpha = \frac{1}{m}(T_A + T_B) - g + \frac{r^2}{k^2 m}(T_A - T_B)$

$$a_A = \frac{1}{(3^{kg})} \cdot (14 + 12^N) - \left(9.81 \tfrac{m}{s^2}\right) + \frac{(0.08^m)^2}{(0.07^m)^2 (3^{kg})} \cdot (14 - 12^N)$$

$$\boxed{a_A = -0.2726 \tfrac{m}{s^2} \downarrow}$$

$a_B = \bar{a} - r\alpha = \frac{1}{m}(T_A + T_B) - g - \left(\frac{r^2}{k^2 m}\right)(T_A - T_B)$

$$a_B = \frac{1}{(3^{kg})} \cdot (14 + 12^N) - \left(9.81 \tfrac{m}{s^2}\right) - \frac{(0.08^m)^2}{(0.07^m)^2 (3^{kg})} \cdot (14 - 12^N)$$

$$\boxed{a_B = -2.014 \tfrac{m}{s^2} \downarrow}$$