

Quiz # 7 Ch. 10

Name: _____

ID # _____

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1- A disk is rotating about an axel through its center O when two forces $F_1 = 10\text{ N}$ and $F_2 = 15\text{ N}$ are applied on it as shown in the Figure. The moment of inertia of the disk about O is $0.036\text{ kg}\cdot\text{m}^2$. If the system starts from rest, find the angular speed at time = 3 s.

$\omega_o = 0$

$$\omega_f = \omega_o + \alpha t$$

$$\omega_f = \alpha t$$

$$\omega_f = (33.3)(3)$$

$$= 100 \frac{\text{rad}}{\text{s}}$$

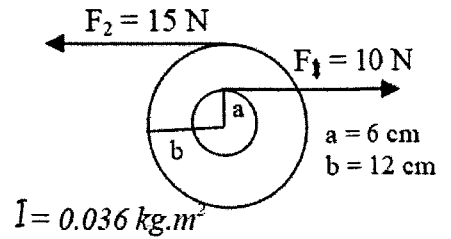
find α

$$\tau_{\text{net}} = I \alpha$$

$$F_2 b - F_1 a = I \alpha$$

$$\alpha = \frac{15(0.12) - 10(0.06)}{0.036}$$

$$\alpha = 33.3 \frac{\text{rad}}{\text{s}^2}$$



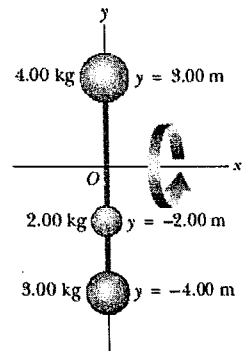
2- Rigid rods of negligible mass lying along the y axis connect three particles. If the system rotates about the x axis with an angular speed of 2 rad/s , find the total kinetic energy of the system.

$$K = \frac{1}{2} I \omega^2$$

$$= \frac{1}{2} (4(3)^2 + 2(2)^2 + 3(4)^2) (2)^2$$

$$= \frac{1}{2} (48 + 8 + 36) 4$$

$$= 2(92) = \boxed{184\text{ J}}$$



3- A wheel with a moment of inertia of $5.0\text{ kg}\cdot\text{m}^2$ and a radius of 0.25 m rotates about a fixed axis perpendicular to the wheel and through its center as shown in the figure. A force of 2 N is applied tangentially to the rim. As the wheel rotates through one revolution, what is the work done by the force?

$$\Delta\theta = 2\pi \text{ rad.}$$

$$W = \tau \Delta\theta$$

$$= FR \Delta\theta = 2(0.25) 2\pi$$

$$= \pi = \boxed{3.14\text{ J}}$$

