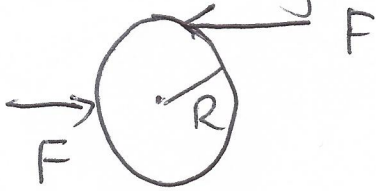


Physics - Torque

10. 2 forces of magnitude 50 N acts on a cylinder of radius 4 m and mass 6.25 kg. The cylinder which is initially at rest sits on a frictionless surface. After 1s, the velocity and angular velocity of cylinder are what?



Answer: $F_1 = F_2 = 50\text{ N}$ $R = 4\text{ m}$ $m = 6.25\text{ kg}$ $t = 1\text{ s}$
 $\omega_i = 0$ $v_i = 0$ $\omega_f = ?$ $v_f = ?$

Part 1: Forces

$$\sum F = ma$$

$$F_2 - F_1 = ma \Rightarrow 0 = (6.25)a$$

$$\Rightarrow a = 0$$

$$\Rightarrow \boxed{v_f = 0 \text{ m/s}}$$

Part 2: Torques

$$\sum \tau = I\alpha$$

$$F_1 R = \frac{1}{2} MR^2 \alpha$$

$$\Rightarrow \alpha = \frac{2F_1}{MR}$$
$$= \frac{2(50)}{6.25(4)}$$
$$= 4 \text{ rad/s}^2$$



$$I = \frac{1}{2} MR^2$$

Plug into

$$\omega_f = \omega_i + \alpha t$$

$$= (4)(1)$$

$$= \boxed{4 \text{ rad/s}}$$