Physics 101-Rec
Quiz # 8

Instructor: Dr. Mekki

Name: Key Id#: Sect.#:

A t = 0, the motor of a wheel of radius R = 20 cm, rotating at 30 rev/min, is turned off. It slows down uniformly and stops after 2.0 minutes.

(a) What is the angular acceleration of the wheel?

$$\omega = 30 \times \frac{2\pi}{60} = 3.14 \text{ rad/s}$$

$$\omega = \omega_0 + \alpha t \Rightarrow \alpha = \frac{\omega - \omega_0}{t} = -\frac{3.14}{2 \times 60}$$

$$\alpha = -0.026 \text{ rad/s}^2$$

(b) Through how many rotations has the wheel turned during this time?

$$\Delta\theta = \omega_0 t + \frac{1}{2}\alpha t^2$$

$$= (3.14)(2 \times 60) + \frac{1}{2}(-0.026)(2 \times 60)^2$$

$$= 189.6 \text{ rad}$$

$$\Delta\theta = 30 \text{ revolutions}$$

(c) What is the tangential acceleration of a point on the rim of the wheel?

$$a_t = \alpha r = (0.026)(0.2) = 5.2 \times 10^{-3} \text{ m/s}^2$$