Chapter 10

1. (a) Find the angular speed of the Earth's rotation about its axis. (b) How does this rotation affect the shape of the Earth?

Ans:

2. A dentist's drill starts from rest. After 3.20 s of constant angular acceleration, it turns at a rate of 2.51×10^4 rev/min. (a) Find the drill's angular acceleration. (b) Determine the angle (in radians) through which the drill rotates during this period.

Ans:

3. A car accelerates uniformly from rest and reaches a speed of 22.0 m/s in 9.00 s. Assuming the diameter of a tire is 58.0 cm, (a) find the number of revolutions the tire makes during this motion, assuming that no slipping occurs. (b) What is the final angular speed of a tire in revolutions per second?

Ans:

4. Find the net torque on the wheel in Figure P10.27 about the axle through *O*, taking *a* = 10.0 cm and *b* = 25.0 cm.

Ans:

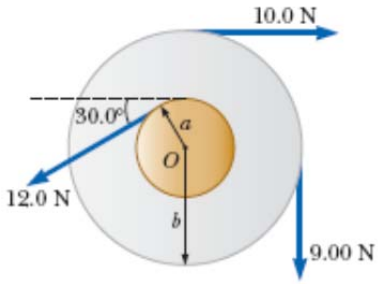

Figure P10.27

5. A 150-kg merry-go-round in the shape of a uniform, solid, horizontal disk of radius 1.50 m is set in motion by wrapping a rope about the rim of the disk and pulling on the rope. What constant force must be exerted on the rope to bring the merry-go-round from rest to an angular speed of 0.500 rev/s in 2.00 s?

Ans:

Chapter 11

1. The displacement vectors 42.0 cm at 15.0° and 23.0 cm at 65.0° both start from the origin and form two sides of a parallelogram. Both angles are measured counterclockwise from the *x* axis. (a) Find the area of the parallelogram. (b) Find the length of its longer diagonal.

Ans:

2. The position vector of a particle of mass 2.00 kg as a function of time is given by $\vec{\mathbf{r}} = \left(6.00\hat{\mathbf{i}} + 5.00t\hat{\mathbf{j}}\right)$, where $\vec{\mathbf{r}}$ is in meters and *t* is in seconds. Determine the angular momentum of the particle about the origin as a function of time.

Ans:

3. A uniform solid disk of mass *m* = 3.00 kg and radius *r* = 0.200 m rotates about a fixed axis perpendicular to its face with angular frequency 6.00 rad/s. Calculate the magnitude of the angular momentum of the disk when the axis of rotation (a) passes through its center of mass and (b) passes through a point midway between the center and the rim.

Ans:

4. A playground merry-go-round of radius *R* = 2.00 m has a moment of inertia *I* = 250 kg · m^2 and is rotating at 10.0 rev/min about a frictionless, vertical axle. Facing the axle, a 25.0-kg child hops onto the merry-go-round and manages to sit down on the edge. What is the new angular speed of the merry-go-round?

Ans: