Chapter 10 WS # 4 Pr: 2,4,5,7,12,21,23,44

## Problems

**2.** A potter's wheel moves uniformly from rest to an angular speed of 1.00 rev/s in 30.0 s. (a) Find its average angular acceleration in radians per second per second. (b) Would doubling the angular acceleration during the given period have doubled the final angular speed?

**4.** A bar on a hinge starts from rest and rotates with an angular acceleration $\alpha = 10 + 6t$, where $\alpha$ is in rad/s$^2$ and $t$ is in seconds. Determine the angle in radians through which the bar turns in the first 4.00 s.

**5.** W A wheel starts from rest and rotates with constant angular acceleration to reach an angular speed of 12.0 rad/s in 3.00 s. Find (a) the magnitude of the angular acceleration of the wheel and (b) the angle in radians through which it rotates in this time interval.

**7.** M An electric motor rotating a workshop grinding wheel at $1.00 \times 10^2$ rev/min is switched off. Assume the wheel has a constant negative angular acceleration of magnitude 2.00 rad/s$^2$. (a) How long does it take the grinding wheel to stop? (b) Through how many radians has the wheel turned during the time interval found in part (a)?

**12.** The tub of a washer goes into its spin cycle, starting from rest and gaining angular speed steadily for 8.00 s, at which time it is turning at 5.00 rev/s. At this point, the person doing the laundry opens the lid, and a safety switch turns off the washer. The tub smoothly slows to rest in 12.0 s. Through how many revolutions does the tub turn while it is in motion?

**21.** M A disk 8.00 cm in radius rotates at a constant rate of 1 200 rev/min about its central axis. Determine (a) its angular speed in radians per second, (b) the tangential speed at a point 3.00 cm from its center, (c) the radial acceleration of a point on the rim, and (d) the total distance a point on the rim moves in 2.00 s.

**23.** W A car traveling on a flat (unbanked), circular track accelerates uniformly from rest with a tangential acceleration of 1.70 m/s$^2$. The car makes it one-quarter of the way around the circle before it skids off the track. From these data, determine the coefficient of static friction between the car and the track.

**44.** W Rigid rods of negligible mass lying along the $y$ axis connect three particles (Fig. P10.44). The system rotates about the $x$ axis with an angular speed of 2.00 rad/s. Find (a) the moment of inertia about the $x$ axis, (b) the total rotational kinetic energy evaluated from $\frac{1}{2}I\omega^2$, (c) the tangential speed of each particle, and (d) the total kinetic energy evaluated from $\sum \frac{1}{2}m_i v_i^2$. (e) Compare the answers for kinetic energy in parts (a) and (b).

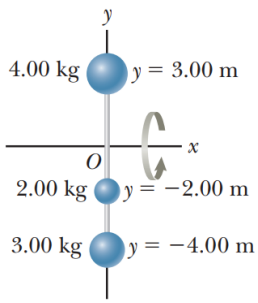


Figure P10.44

2) 0.209 rad/s$^2$ 4) 144 rad 5) 4.00 rad/s$^2$, 18.0 rad 7) 5.24s, 27.4rad 12) 50 rev
21) 126 rad/s, 3.77 m/s, 1.26 km/s^2, 20.1 m 23) 0.572 44) 92.0 kgm^2, 184 J, (6 – 4 – 8) m/s, 184 J