8. A floor polisher has a rotating disk of radius 15 cm. The disk rotates at a constant angular velocity of 1.4 rev/s and is covered with a soft material that does the polishing. An operator holds the polisher in one place for 45 s, in order to buff an especially scuffed area of the floor. How far (in meters) does a spot on the outer edge of the disk move during this time?

40. The earth orbits the sun once a year (3.16×10^7 s) in a nearly circular orbit of radius 1.50×10^{11} m. With respect to the sun, determine (a) the angular speed of the earth, (b) the tangential speed of the earth, and (c) the magnitude and direction of the earth’s centripetal acceleration.

42. Interactive LearningWare 8.2 at [www.wiley.com/college/cutnell](http://www.wiley.com/college/cutnell) (6th Ed. Student Companion Site) provides a review of the concepts that are important in this problem. A race car, starting from rest, travels around a circular turn of radius 23.5 m. At a certain instant, the car is still accelerating, and its angular speed is 0.571 rad/s. At this time, the total acceleration (centripetal plus tangential) makes an angle of 35° with respect to the radius. (The situation is similar to that in Figure 8.15b.) What is the magnitude of the total acceleration?

46. An automobile tire has a radius of 0.330 m, and its center moves forward with a linear speed of v = 15.0 m/s. (a) Determine the angular speed of the wheel. (b) Relative to the axle, what is the tangential speed of a point located 0.175 m from the axle?