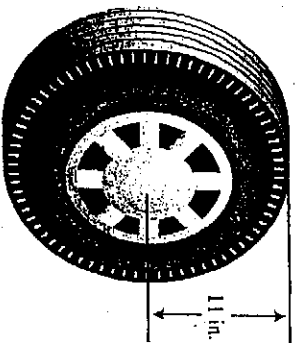
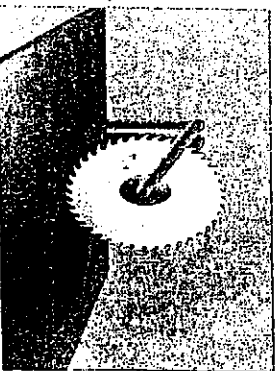


40. **Automobile Design** The wheel (including the tire) of a sports car under development by one of the Big Three auto companies has an 11-inch radius. What would be the car's speed in miles per hour if its wheels are turning at 800 rpm?



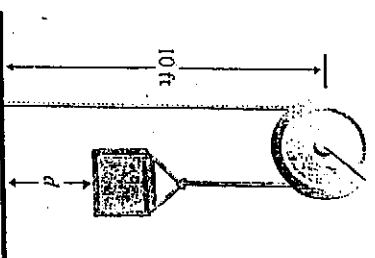
41. **Bicycle Racing** Cathy Nguyen races on a bicycle with 13-inch-radius wheels. When she is traveling at a speed of 44 ft/sec, how many revolutions per minute are her wheels making?
42. **Tool Design** A radial arm saw has a circular cutting blade with a diameter of 10 inches. It spins at 2000 rpm. If there are 12 cutting teeth per inch on the cutting blade, how many teeth cross the cutting surface each second?



43. **Navigation** Sketch a diagram of a ship on the given course.
 (a) 35° (b) 128° (c) 310°
44. **Navigation** The captain of the tourist boat Julia out of Oak Harbor follows a 38° course for 2 miles and then changes to a 47° course for the next 4 miles. Draw a sketch of this trip.
45. **Navigation** Points A and B are 357 nautical miles apart. How far apart are A and B in statute miles?
46. **Navigation** Points C and D are 895 statute miles apart. How far apart are C and D in nautical miles?
47. **Designing a Sports Complex** Example 4 describes how lanes 1 and 2 compare in length around one turn of a track. Find the differences in the lengths of these lanes around one turn of the same track.
 (a) Lanes 5 and 6 (b) Lanes 1 and 6
48. **Mechanical Engineering** A simple pulley with the given radius r used to lift heavy objects is positioned 10 feet above

ground level. Given that the pulley rotates θ° , determine the height to which the object is lifted.

- (a) $r = 4$ in., $\theta = 720^\circ$ (b) $r = 2$ ft, $\theta = 180^\circ$



49. **Foucault Pendulum** In 1851 the French physicist Jean Foucault used a pendulum to demonstrate the earth's rotation. There are now over 30 Foucault pendulum displays in the United States. The Foucault pendulum at the Smithsonian Institution in Washington, D.C., consists of a large brass ball suspended by a thin 52-foot cable. If the ball swings through an angle of 1° , how far does it travel?

50. **Group Activity Air Conditioning Belt** The belt on an automobile air conditioner connects metal wheels with radii $r = 4$ cm and $R = 7$ cm. The angular speed of the larger wheel is 120 rpm.
 (a) What is the angular speed of the larger wheel in radians per second?
 (b) What is the linear speed of the belt in centimeters per second?
 (c) What is the angular speed of the smaller wheel in radians per second?
51. **Group Activity Ship's Propeller** The propellers of the *Amazon Paradise* have a radius of 1.2 m. At full throttle the propellers turn at 135 rpm.
 (a) What is the angular speed of a propeller blade in radians per second?
 (b) What is the linear speed of the tip of the propeller blade in meters per second?
 (c) What is the linear speed (in meters per second) of a point on a blade halfway between the center of the propeller and the tip of the blade?

Explorations

Table 4.1 shows the latitude-longitude locations of several U.S. cities. Latitude is measured from the equator. Longitude is