4.2 Homework

Perform each conversion. Round approximate answers to the nearest tenth.

1. $30 \text{ rev/min} = $ _____ rad/min

2. $150 \text{ rev/sec} = $ _____ rev/hr

3. $180 \text{ rev/sec} = $ _____ rad/hr

4. $3000 \text{ rad/hr} = $ _____ rev/sec

5. $45 \text{ mph} = $ _____ ft/sec

A windmill for generating electricity like the one shown at the right has a blade that is 30 feet long. Depending on the wind, it rotates at various velocities. In each case, find the angular velocity in rad/sec (to the nearest tenth) and the linear velocity in miles/hr for a point on the tip of the blade.


6. 500 rev/sec

7. $20,000 \text{ rev/day}$

8. Determine the linear velocity in miles/hour for a point on the edge of a saw blade with a diameter of 6 inches if the blade is rotating at 2700 revolutions per minute.

9. Find the linear velocity in miles per hour of the tip of a 20-inch lawnmower blade spinning at 2800 rev/min.

10. The blade on a table saw rotates at 3450 revolutions per minute. How much faster (in ft/sec) does a 12-in-diameter blade strike a piece of wood than a 10-in-diameter blade?

11. If a car runs over a nail at 55 mi/hr and the nail is lodged in the tire tread 13 in. from the center of the wheel, then what is the angular velocity of the nail in radians per hour?

12. A belt connects two pulleys with radii 3 in. and 5 in. as shown in the accompanying diagram. The velocity of point *A* on the belt is 10 ft/sec. What is the linear velocity (ft/sec) and the angular velocity (rad/sec) for point *B*? What is the linear velocity (ft/sec) and the angular velocity (rad/sec) for point *C*?
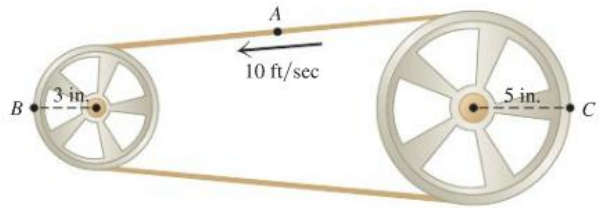
   Hint: Every point on the belt is moving at the same speed.