

Angular Velocity

Solve the following problems

1. If a person turns 1.5 radians in 3 seconds what is the angular velocity?
2. If a windmill rotates at 14 radians per second. What is its angular displacement in 30 seconds?
3. If cars tire is 20 radians per second how many complete rotations does it do each second?
4. (Walker, p. 300, #3) Find the angular speed of **(a)** the minute hand and **(b)** the hour hand of the famous clock in London, England, that rings the bell known as Big Ben.
5. (Walker, p. 300, #4) Express the angular velocity of the second hand on a clock in the following units: **(a)** rev/hr and **(b)** deg/min and **(c)** rad/s.
6. (Walker, p. 300, #5) List the following in order of increasing angular speed: an automobile tire rotating at 2.00×10^3 deg / s, an electric drill rotating at 400.0 rev/min, and an airplane propeller rotating at 40.0 rad/s.

7. (Walker, p. 300, #6) A spot of paint on a bicycle tire moves in a circular path of radius 0.33 m. When the spot has traveled a linear distance of 1.95 m, through what angle has the tire rotated? Give your answer in radians.
8. (Walker, p. 300, #7) One of the most studied objects in the sky is the Crab nebula, the remains of a supernova explosion observed by the Chinese in 1054. In 1968 it was discovered that a pulsar—a rapidly rotating neutron star that emits a pulse of radio waves with each revolution—lies near the center of the Crab nebula. The period of this pulsar is 33 ms. What is the angular speed (in rad/s) of the Crab nebula pulsar?
9. (Walker, p. 300, #8) Find the angular speed of the Earth as it spins about its axis. Give your result in rad/s.
10. (Walker, p. 300, #9) What is the angular speed (in rev/min) of the Earth as it orbits about the Sun?
11. (Walker, p. 301, #10) A 3.5-inch floppy disk in a computer rotates with a period of 2.00×10^{-1} s. What is (a) the angular speed of the disk and (b) the linear speed of a point on the rim of the disk? (c) Does a point near the center of the disk have an angular speed that is greater than, less than, or the same as the angular speed found in part (a)? Explain. (Note: A 3.5-inch floppy disk is 3.5 inches in diameter.)