

More Angular Velocity Problems

Math 130

1. A wheel has circumference of 100 feet, and its rotational velocity is 24 RPM (24 revolutions per minute).
 - (a) Find its angular velocity, expressed in both radians per second and degrees per second.
 - i. In twenty minutes:
 - (A) how many revolutions does it make?
 - (B) through what angle in degrees does it turn?
 - (b) Find the linear speed around the wheel of a point on its rim.
 - i. In one hour, how many miles will a point on the rim of the wheel end up travelling?
2. A ferris wheel has circumference of 25 feet. A point on the outer edge moves around the wheel at a rate of 4π feet per second.
 - (a) Find its angular velocity, expressed in three ways: (i) radians per second; (ii) RPM; and (iii) degrees per second.
 - (b) How long does it take for one revolution (a full circle)?
 - (c) Through what angle—expressed both in radians and in degrees—does it turn in 10 seconds?
3. A circular gear is turning so that a point on the rim is travelling at the rate of 7 feet per second. The radius of the gear is $2/\pi$ feet.
 - (a) Find the angular velocity in three different units: (i) radians per second; (ii) revolutions per minute; and (iii) degrees per second.
 - (b) How long does this gear take to make one revolution?
4. A circular screw is turning at a rate of 120 RPM (revolutions per minute), while a point on the outer edge of the screw is moving around the circle at a rate of 4 inches per second.
Find the radius of the screw.

Answers follow.

Answers.

1. (a) 0.8π radians per second, and 144 degrees per second.
 - i. 480 revolutions; $144(60)20 = 2880(60)$ degrees, which is also 480 times 360° and that equals $12 \cdot 12 \cdot 12 \cdot 10 \cdot 10$ or $12^3 \times 100 = 1728 \times 100 = 172,800^\circ$. (This is just one hundred great grosses.)
- (b) 40 feet per second.
 - i. $\frac{300}{11}$ miles, which is approximately 27.27 miles.
2. (a) Ans.: $\frac{4\pi}{25}$ radians per second; 4.8 RPM; and 28.8° per second.
 - (b) 12.5 seconds.
 - (c) 1.6π radians, which is equal to 288° .
3. (a) Ans.: 3.5π radians per second; 105 RPM; 630° /second.
 - (b) $4/7$ seconds. That is about 0.5714 seconds.
4. $1/\pi$ inches ≈ 0.3183 inches.