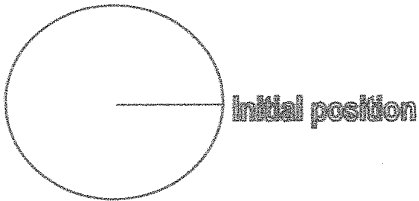


9. Suppose that the wheel pictured below rotates in a counterclockwise manner at 1 revolution per 16 seconds. Suppose that the radius of the wheel is 44in .



- (a) Find the angular and linear speed of the wheel. Write your answer as an exact value.

(5 pts each)

$$\omega = \frac{1 \text{ rev}}{16 \text{ sec}} \cdot 2\pi \text{ rad} = \frac{\pi \text{ rad}}{8 \text{ sec}}$$

Angular speed:

$$\boxed{\frac{\pi \text{ rad}}{8 \text{ sec}}}$$

$$v = r\omega = 44 \cdot \frac{\pi}{8} = \frac{11\pi \text{ in}}{8 \text{ sec}}$$

Linear speed:

$$\boxed{\frac{11\pi \text{ in}}{8 \text{ sec}}}$$

- (b) What is the exact area of the sector made by rotating the wheel from the initial position in 10 seconds?  $\theta = 2\pi \cdot \frac{10}{16} = \frac{5\pi}{4}$

(5 pts)

$$A = \frac{1}{2} r^2 \theta = \frac{1}{2} (44)^2 \cdot \frac{5\pi}{4} = \frac{\overset{22}{\cancel{44}} \cdot \overset{11}{\cancel{44}} \cdot 5\pi}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{4}}} = \boxed{1210\pi \text{ in}^2}$$

- (c) What is the exact length of the arc made by rotating the wheel from the initial position in 10 seconds?

(5 pts)

$$s = r\theta = 44 \cdot \frac{5\pi}{4} = \boxed{55\pi \text{ in}}$$