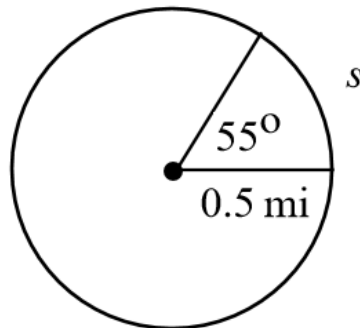


Exercise 330

A car is racing along a circular track with diameter of 1 mi. A trainer standing in the center of the circle marks his progress every 5 sec. After 5 sec, the trainer has to turn 55° to keep up with the car. How fast is the car traveling?

Solution

Draw a picture of the circular track and label the given and unknown quantities.



The arclength s that the car travels is

$$\begin{aligned} s &= r\theta \\ &= (0.5 \text{ mi}) \left(\frac{55^\circ}{180^\circ} \pi \right) \\ &= \frac{11\pi}{72} \\ &\approx 0.5 \text{ mi.} \end{aligned}$$

The speed of the car is this distance divided by the time it took to travel this far.

$$\begin{aligned} v &= \frac{d}{t} \\ &= \frac{\frac{11\pi}{72} \text{ mi}}{5 \text{ s}} \\ &= \frac{11\pi}{360} \frac{\text{mi}}{\text{s}} \\ &= \frac{11\pi}{360} \frac{\text{mi}}{\text{s}} \times \frac{60 \text{ s}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} \\ &= 110\pi \frac{\text{mi}}{\text{hr}} \\ &\approx 346 \frac{\text{mi}}{\text{hr}} \end{aligned}$$