

Applications of Radian Measure

The formula $\theta = \frac{s}{r}$ also gives us a formula for **arc length**: $s = \theta r$. (Note that θ is in radians.)

Ex 1.

A circle has radius 15.6 cm. Find the length of the arc intercepted by a central angle having each of the following measures.

$$\frac{7\pi}{8}$$

$$132^\circ$$

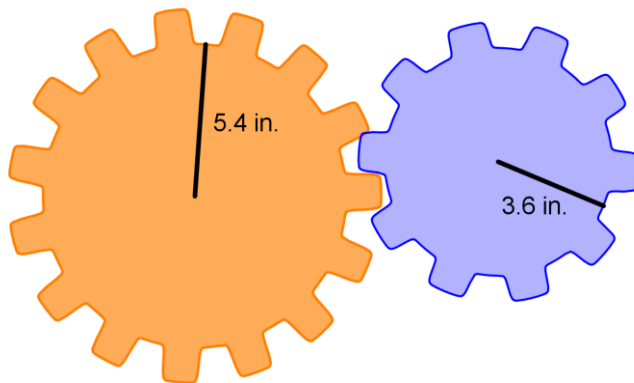
Ex 2.

Given the following latitudes, find the distance in kilometers between each pair of cities, assuming they lie on the same north-south line. Use $r = 6400$ km for the radius of Earth.

Los Angeles, 34°N , and Reno, 40°N .

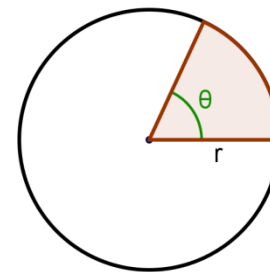
Ex 3.

Two gears are aligned so that the smaller gear drives the larger one (see below). If the smaller gear rotates 150° , how many degrees will the larger gear rotate?



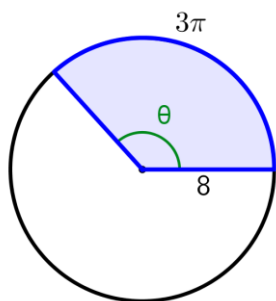
The **area of a sector** is: $\frac{\theta}{2\pi} \cdot \pi r^2 = \frac{1}{2} r^2 \theta$

Here, θ is in radians and r is the radius of the circle.



Ex 4.

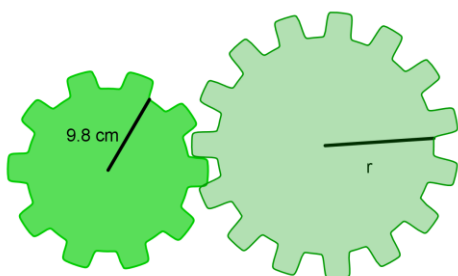
Find the area of a sector with radius 8 and arc length 3π (shown below).



Practice

1. A circle has radius 7.64 ft. Find the length of the arc intercepted by a central angle of measure 235° .

2. Find the radius of the larger wheel in the figure if the smaller wheel rotates 50.0° when the larger wheel rotates 30.0° .



3. Find the area of a sector of a circle having radius $r = 59.8$ km and central angle $\theta = 125^\circ$.

Q: What goes around the world but stays in a corner?