6-1

Study Guide

Angles and Radian Measure

An angle of one complete revolution can be represented either by 360° or by 2π radians. Thus, the following formulas can be used to relate degree and **radian** measures.

Degree/Radian Conversion Formulas	1 radian = $\frac{180}{\pi}$ degrees or about 57.3° 1 degree = $\frac{\pi}{180}$ radians or about 0.017 radian

Example 1 **a. Change 36° to radian measure in terms of π.**
b. Change $-\frac{17\pi}{3}$ radians to degree measure.

a. $36° = 36° \times \frac{\pi}{180°}$
$= \frac{\pi}{5}$

b. $-\frac{17\pi}{3} = -\frac{17\pi}{3} \times \frac{180°}{\pi}$
$= -1020°$

Example 2 **Evaluate $\sin \frac{3\pi}{4}$.**

The reference angle for $\frac{3\pi}{4}$ is $\frac{\pi}{4}$. Since $\frac{\pi}{4} = 45°$, the terminal side of the angle intersects the unit circle at a point with coordinates of $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$. Because the terminal side of $\frac{3\pi}{4}$ lies in Quadrant II, the x-coordinate is negative and the y-coordinate is positive. Therefore, $\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$.

Example 3 **Given a central angle of 147°, find the length of its intercepted arc in a circle of radius 10 centimeters. Round to the nearest tenth.**

First convert the measure of the central angle from degrees to radians.

$147° = 147° \times \frac{\pi}{180°}$ *1 degree* $= \frac{\pi}{180°}$
$= \frac{49\pi}{60}$

Then find the length of the arc.

$s = r\theta$ *Formula for the length of an arc*

$s = 10\left(\frac{49\pi}{60}\right)$ $r = 10,\ \theta = \frac{49\pi}{60}$

$s \approx 25.65634$

The length of the arc is about 25.7 cm.