NAME _____ DATE _____ PERIOD _____

Study Guide

Basic Trigonometric Identities

You can use the **trigonometric identities** to help find the values of trigonometric functions.

Example 1 **If $\sin\theta = \frac{3}{5}$, find $\tan\theta$.**

Use two identities to relate $\sin\theta$ and $\tan\theta$.

$\sin^2\theta + \cos^2\theta = 1$ *Pythagorean identity*

$\left(\frac{3}{5}\right)^2 + \cos^2\theta = 1$ *Substitute $\frac{3}{5}$ for $\sin\theta$.*

$\cos^2\theta = \frac{16}{25}$

$\cos\theta = \pm\sqrt{\frac{16}{25}}$ or $\pm\frac{4}{5}$

Now find $\tan\theta$.

$\tan\theta = \frac{\sin\theta}{\cos\theta}$ *Quotient identity*

$\tan\theta = \frac{\frac{3}{5}}{\pm\frac{4}{5}}$

$\tan\theta = \pm\frac{3}{4}$

To determine the sign of a function value, use the **symmetry identities** for sine and cosine. To use these identities with radian measure, replace 180° with π and 360° with 2π.

Case 1:	$\sin(A + 360k°) = \sin A$	$\cos(A + 360k°) = \cos A$
Case 2:	$\sin[A + 180°(2k - 1)] = -\sin A$	$\cos[A + 180°(2k - 1)] = -\cos A$
Case 3:	$\sin(360k° - A) = -\sin A$	$\cos(360k° - A) = \cos A$
Case 4:	$\sin[180°(2k - 1) - A] = \sin A$	$\cos[180°(2k - 1) - A] = -\cos A$

Example 2 Express $\tan\frac{11\pi}{3}$ as a trigonometric function of an angle in Quadrant I.

The sum of $\frac{11\pi}{3}$ and $\frac{\pi}{3}$, which is $\frac{12\pi}{3}$ or 4π, is a multiple of 2π.

$\frac{11\pi}{3} = 2(2\pi) - \frac{\pi}{3}$ *Case 3, with $A = \frac{\pi}{3}$ and $k = 2$*

$\tan\frac{11\pi}{3} = \frac{\sin\frac{11\pi}{3}}{\cos\frac{11\pi}{3}}$ *Quotient identity*

$= \frac{\sin\left[2(2\pi) - \frac{\pi}{3}\right]}{\cos\left[2(2\pi) - \frac{\pi}{3}\right]}$

$= \frac{-\sin\frac{\pi}{3}}{\cos\frac{\pi}{3}}$ *Symmetry identities*

$= -\tan\frac{\pi}{3}$ *Quotient identity*