

Section 4.2 Trigonometric Functions: The Unit Circle

Objective: In this lesson you learned how to identify a unit circle and its relationship to real numbers.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

Unit circle

Period

I. The Unit Circle (Page 274)

As the real number line is wrapped around the unit circle, each real number t corresponds to . . .

The real number 2π corresponds to the point _____ on the unit circle.

Each real number t also corresponds to a _____ (in standard position) whose radian measure is t . With this interpretation of t , the arc length formula $s = r\theta$ (with $r = 1$) indicates that . . .

What you should learn

How to identify a unit circle and its relationship to real numbers

II. The Trigonometric Functions (Pages 275–276)

The coordinates x and y are two functions of the real variable t . These coordinates can be used to define six trigonometric functions of t . List the abbreviation for each trigonometric function.

Sine _____ **Cosecant** _____

Cosine _____ **Secant** _____

Tangent _____ **Cotangent** _____

What you should learn

How to evaluate trigonometric functions using the unit circle

Let t be a real number and let (x, y) be the point on the unit circle corresponding to t . Complete the following definitions of the trigonometric functions:

$$\sin t = \underline{\hspace{2cm}} \qquad \cos t = \underline{\hspace{2cm}}$$

$$\tan t = \underline{\hspace{2cm}} \qquad \cot t = \underline{\hspace{2cm}}$$

$$\sec t = \underline{\hspace{2cm}} \qquad \csc t = \underline{\hspace{2cm}}$$

The cosecant function is the reciprocal of the _____ function. The cotangent function is the reciprocal of the _____ function. The secant function is the reciprocal of the _____ function.

Complete the following table showing the correspondence between the real number t and the point (x, y) on the unit circle when the unit circle is divided into eight equal arcs.

t	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$
x								
y								

Complete the following table showing the correspondence between the real number t and the point (x, y) on the unit circle when the unit circle is divided into 12 equal arcs.

t	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$
x												
y												

Example : Find the following:

$$(a) \cos \frac{\pi}{3} \qquad (b) \tan \frac{3\pi}{4} \qquad (c) \csc \frac{7\pi}{6}$$

III. Domain and Period of Sine and Cosine (Pages 277–278)

The sine function's domain is _____,
and its range is _____.

What you should learn
How to use the domain and period to evaluate sine and cosine functions

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The cosine function's domain is _____,
and its range is _____.

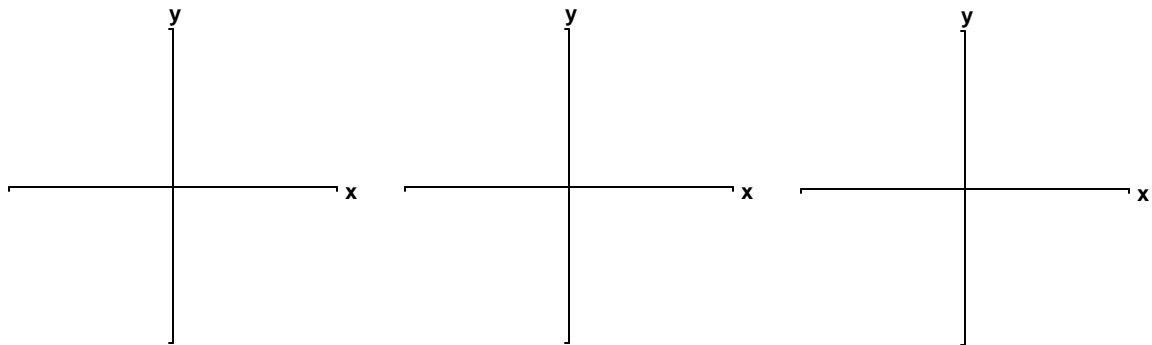
The period of the sine function is _____. The
period of the cosine function is _____.

Which trigonometric functions are even functions?

Which trigonometric functions are odd functions?

Example : Evaluate $\sin \frac{31\pi}{6}$

Example : Use a calculator to evaluate (a) $\tan 4\pi/3$, and
(b) $\cos 3$.



Homework Assignment

Page(s)

Exercises

