Section 5.2 Trigonometric Functions

hypotenuse

side
opposite θ

C □ θ

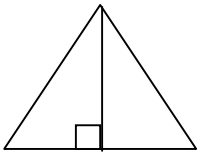
side adjacent θ

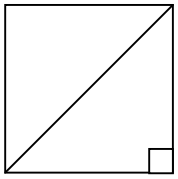
$\sin\theta = \frac{opposite}{hypotenuse}$ $\cos\theta = \frac{adjacent}{hypotenuse}$ $\tan\theta = \frac{opposite}{adjacent}$

Reciprocal functions:

$\csc\theta = \frac{hypotenuse}{opposite}$ $\sec\theta = \frac{hypotenuse}{adjacent}$ $\cot\theta = \frac{adjacent}{opposite}$

SPECIAL TRIANGLES AND THEIR TRIG FUNCTION VALUES





$\sin 30° = \sin\frac{\pi}{6} =$ $\cos 30° = \cos\frac{\pi}{6} =$ $\tan 30° = \tan\frac{\pi}{6} =$

Reciprocal function values:

$\sin 60° = \sin\frac{\pi}{3} =$ $\cos 60° = \cos\frac{\pi}{3} =$ $\tan 60° = \tan\frac{\pi}{3} =$

Reciprocal function values:

$\sin 45° = \sin\frac{\pi}{4} =$ $\cos 45° = \cos\frac{\pi}{4} =$ $\tan 45° = \tan\frac{\pi}{4} =$

Reciprocal function values:

Example 1: Find $(2\sin 30°)(\sec 45°)$.

Example 2: Find $2\csc \frac{\pi}{3} - \cot \frac{\pi}{3}$.

SIMILAR TRIANGLES & CIRCLES

Any two right triangles with one corresponding angle congruent will be similar to one another.

What will be true of the trig function values for corresponding angles?

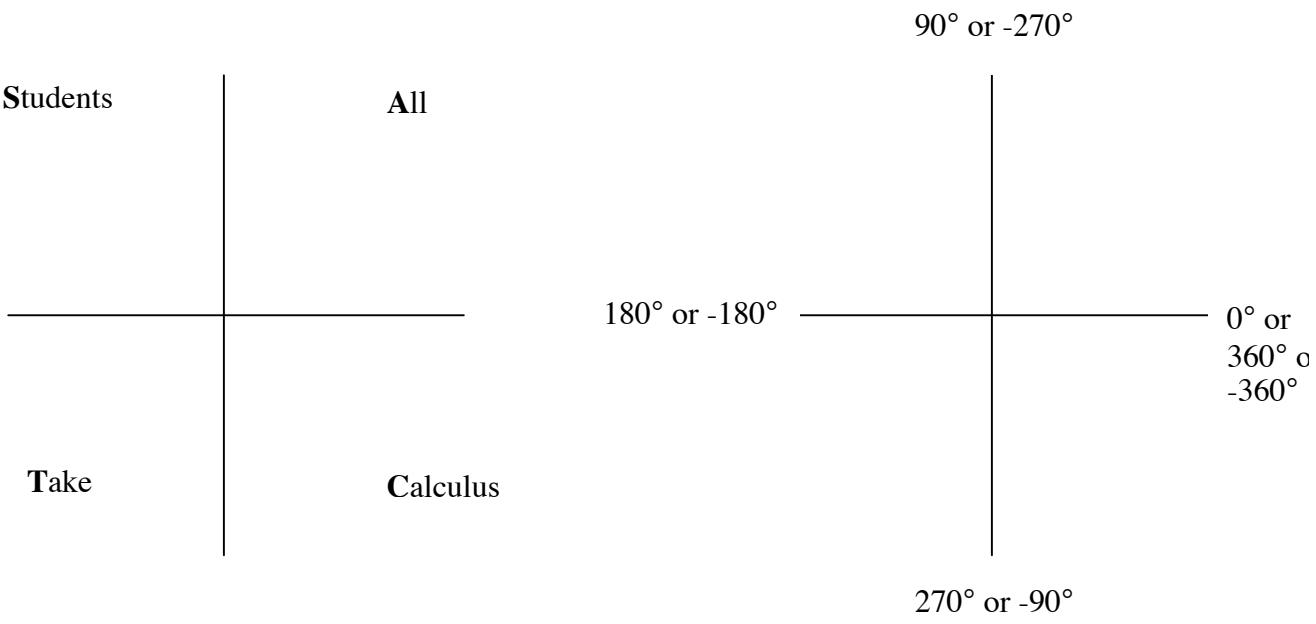
TRIG FUNCTION DEFINITIONS FOR θ

(x,y) is a point on the terminal side of θ, r = distance from (0,0) to (x,y), $x^2 + y^2 = r^2$
(note: r is always positive)

$\sin \theta =$	$\cos \theta =$	$\tan \theta =$
$\csc \theta =$	$\sec \theta =$	$\cot \theta =$

Example 3

A) If (-4, 3) is a point on the terminal side of an angle θ, find the exact value of all trig functions of θ.
B) If (-4, -3) is a point on the terminal side of an angle θ, find the exact value of all trig functions of θ.
C) If (4, -3) is a point on the terminal side of an angle θ, find the exact value of all trig functions of θ.



UNIT CIRCLE

The "unit circle" is the circle centered at (0,0) with radius = 1 unit. Given θ, an angle in standard position, let us define all the trig function values of θ using the point, (x,y), on the terminal side of θ that also lies on the unit circle:

sin θ = cos θ = tan θ =

csc θ = sec θ = cot θ =

USE THE UNIT CIRCLE TO FIND TRIG FUNCTION VALUES FOR θ = 0, ± π/2, ±π, ± 3π/2, 2π

θ =	0 or 2π	π/2 or –3π/2	π or –π	3π/2 or –π/2
sin θ				
cos θ				
tan θ				
csc θ				
sec θ				
cot θ				

MEMORIZE QUADRANT I UNIT CIRCLE VALUES FOR SPECIAL ANGLES

REFERENCE ANGLES AND EXTENDING DEFINITION OF TRIG FUNCTIONS

A reference angle for θ is the positive acute angle θ' formed between the terminal side of θ and the x-axis.

Example 4:

A) What is the reference angle for $-210°$?
B) What is the reference angle for $(5\pi/6)$?
C) What is the reference angle for $420°$?
D) What is the reference angle for $(-2\pi/3)$?
E) What is the reference angle for $(11\pi/4)$?

USE REFERENCE ANGLES AND THE UNIT CIRCLE TO FIND TRIG FUNCTION VALUES FOR ANGLES IN QUADRANTS II, III, AND IV

Example 5 Find each of the following:

A) $\cos 11\pi/4$

B) $\tan (-2\pi/3)$

C) $\sec (5\pi/6)$

D) $\csc (11\pi/6)$

REMEMBER: For all trig functions, the trig value of $\theta = \pm$ trig value of θ'.