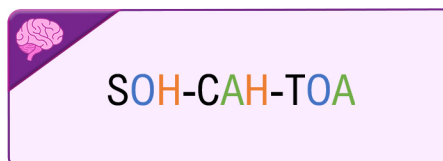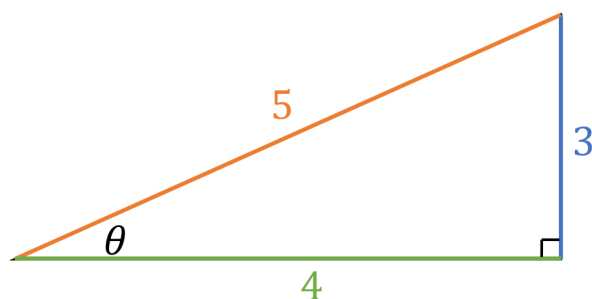# TOPIC: RIGHT TRIANGLE TRIGONOMETRY

Introduction to Trigonometric Functions

◆ **Trig Functions** relate _____ to side lengths in right triangles.

  ▸ The three main trig functions are Sine, Cosine, & Tangent which are _____.

5

3

θ

4

SOH-CAH-TOA

New	Trig Functions

SOH

$$\sin\theta = \frac{Opposite\ Side}{Hypotenuse}$$

$$\sin\theta = \frac{}{}$$

CAH

$$\cos\theta = \frac{Adjacent\ Side}{Hypotenuse}$$

$$\cos\theta = \frac{}{}$$

TOA

$$\tan\theta = \frac{Opposite\ Side}{Adjacent\ Side} = \frac{\sin\theta}{\cos\theta}$$

$$\tan\theta = \frac{}{}$$

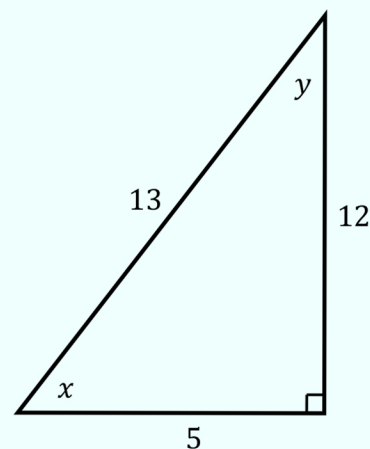**EXAMPLE**   Find the value of the trig function indicated, given the triangle.

(A) $\sin x$

(B) $\tan x$

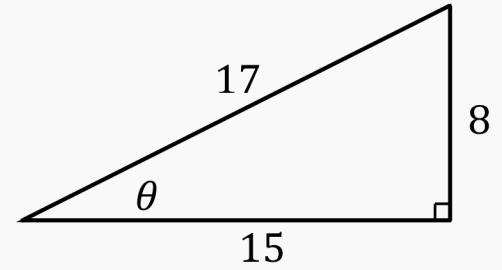**(C)** $\cos y$

y

13

12

x

5

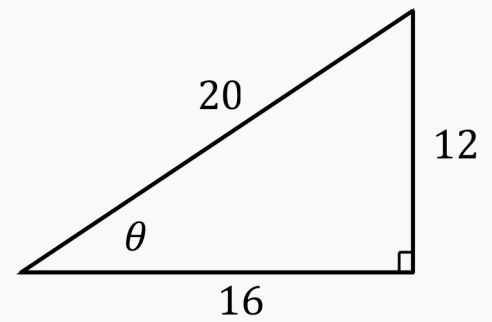# TOPIC: RIGHT TRIANGLE TRIGONOMETRY

PRACTICE   Given the right triangle below, evaluate $\cos(\theta)$.

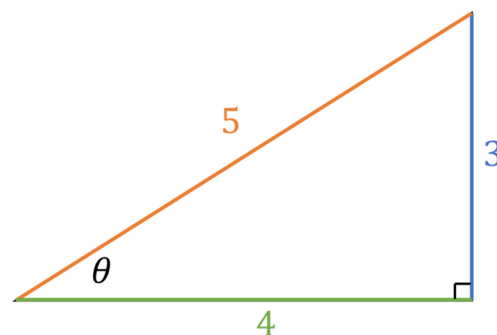**PRACTICE**   Given the right triangle below, evaluate $\tan(\theta)$.

TOPIC: RIGHT TRIANGLE TRIGONOMETRY

Introduction to Trigonometric Functions

◆ The other three trig functions are cosecant, secant, & cotangent.

  ▸ These are _____ of the other trig functions.

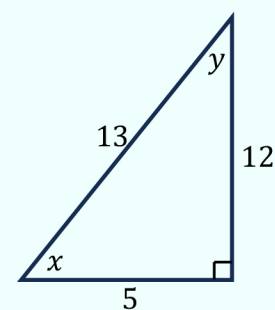| Recall ▶ **Trig Functions**	New ▶ **Reciprocal Identities**
$\sin\theta = \dfrac{Opp}{Hyp} = \dfrac{3}{5}$	$\csc\theta = \dfrac{1}{\theta} = \dfrac{Hyp}{Opp} = -$
$\cos\theta = \dfrac{Adj}{Hyp} = \dfrac{4}{5}$	$\sec\theta = \dfrac{1}{\theta} = \dfrac{Hyp}{Adj} = -$
$\tan\theta = \dfrac{Opp}{Adj} = \dfrac{3}{4}$	$\cot\theta = \dfrac{1}{\theta} = \dfrac{Adj}{Opp} = -$
$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$	$\cot\theta = \dfrac{}{}$

EXAMPLE Find the value of the trig function indicated, given the triangle.

(A) $\sec x$

(B) $\csc x$

(C) $\cot y$

TOPIC: RIGHT TRIANGLE TRIGONOMETRY

PRACTICE   If $\tan\theta = \frac{12}{5}$, find the values of the five other trigonometric functions. Rationalize the denominators if necessary.
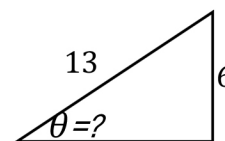
PRACTICE   If $\sin\theta = \frac{\sqrt{17}}{17}$, find the values of the five other trigonometric functions. Rationalize the denominators if necessary.

TOPIC: RIGHT TRIANGLE TRIGONOMETRY

Introduction to Inverse Trigonometric Functions

◆ For some problems, you will be *given* the value of trig function, & have to *find* the angle.

 ▸ You'll need the _____ of the trig function to find the angle.

13 6

$\theta = ?$

Recall	Exponents	New	Trig Functions
	x^2		$\sin(\theta)$
	Operation		*Operation*
$3 \xrightarrow{\hspace{2cm}} 3^2 = 9$		$30° \xrightarrow{\hspace{2cm}} \sin(30) = \dfrac{1}{2}$	
	Inverse		*Inverse*
	$\sqrt{x^2}$		$\sin^{-1}(\sin(\theta))$
The inverse _____ the operation.		The inverse trig function _____ the trig operation.	

◆ Inverse trig functions are also called "_____" functions, so sin $^{-1}(\theta)$ can also be written as "_____"

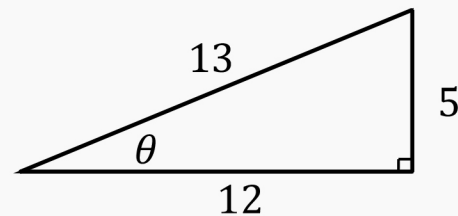| EXAMPLE	Write a trigonometric function to represent the angle θ.

13 6

θ
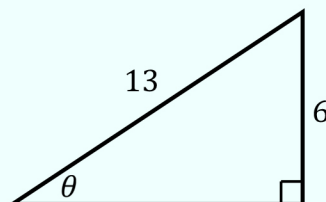
HOW TO: USING INVERSE TRIG TO FUNCTIONS FIND ANGLES

1) Choose a trig function which includes the correct _____ and sides

2) Write equation with the chosen trig function

3) Take the inverse on _____ sides to isolate the angle

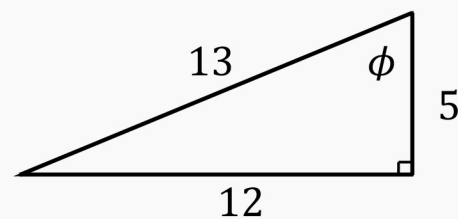# TOPIC: RIGHT TRIANGLE TRIGONOMETRY

PRACTICE Given the right triangle below, use the sine function to write a trigonometric expression for the missing angle θ.

PRACTICE Given the right triangle below, use the cosine function to write a trigonometric expression for the missing angle ϕ.

TOPIC: RIGHT TRIANGLE TRIGONOMETRY

How to Use a Calculator for Trig Functions

◆ For certain problems you will need to use a calculator to evaluate the function, rather than using fractions.

- ▸ For trig functions, use the **sin** **cos** and **tan** buttons on the calculator.

- ▸ Make sure your calculator is in the correct **MODE** (_____ or radian) when solving problems.

EXAMPLE   Find the value for each of the following trigonometric operations and round to the nearest tenth.

(A)	(B)	(C)	(D)
$\sin(37°)$	$\tan\left(\dfrac{2\pi}{15}\right)$	$\sec(50°)$	$\arctan\left(\dfrac{3}{4}\right) * degrees$
[RADIAN | DEGREE]	[RADIAN | DEGREE]	[RADIAN | DEGREE]	[RADIAN | DEGREE]

◆ For _____ trig functions press the **2nd** button, then the associated trig function.

TOPIC: RIGHT TRIANGLE TRIGONOMETRY

PRACTICE	What is the positive value of A in the interval $[0°, 90°)$ that will make the following statement true? Express the answer in four decimal places.

$\sin A = 0.9235$

PRACTICE	What is the positive value of P in the interval $[0°, 90°)$ that will make the following statement true? Express the answer in four decimal places.

$\cot P = 5.2371$

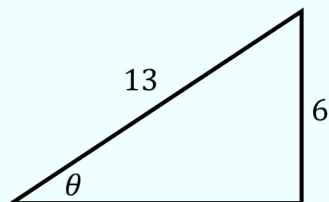| PRACTICE	What is the positive value of D in the interval $[0, \frac{\pi}{2})$ that will make the following statement true? Express the answer in four decimal places.

$\sec D = 3.2842$

TOPIC: RIGHT TRIANGLE TRIGONOMETRY

Determine the missing angle θ in degrees for the right triangle below (approximate your answer to 2 decimal places).

$$\theta = \sin^{-1}\left(\frac{6}{13}\right)$$

[RADIAN | DEGREE]

HOW TO: Using Inverse Trig Functions to Find Angles with Calculator

1) Chose a trig function which includes the correct **angles** and sides

2) Write equation with the chosen trig function

3) Take the inverse on **both** sides to isolate the angle

4) Press the **2nd** key, and the associated trig function to get the inverse trig function.

5) Approximate the inverse trig function using a calculator