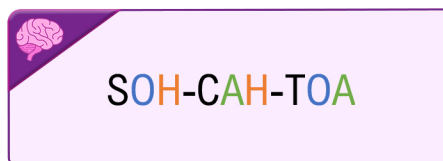
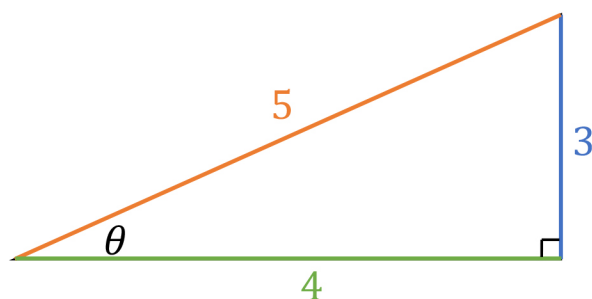


TOPIC: RIGHT TRIANGLE TRIGONOMETRY

Introduction to Trigonometric Functions

- ◆ **Trig Functions** relate _____ to side lengths in right triangles.
- ▶ The three main trig functions are Sine, Cosine, & Tangent which are _____.



New

Trig Functions

SOH

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

$$\sin \theta = \text{---}$$

CAH

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

$$\cos \theta = \text{---}$$

TOA

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

$$\tan \theta = \text{---}$$

EXAMPLE

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

(A)

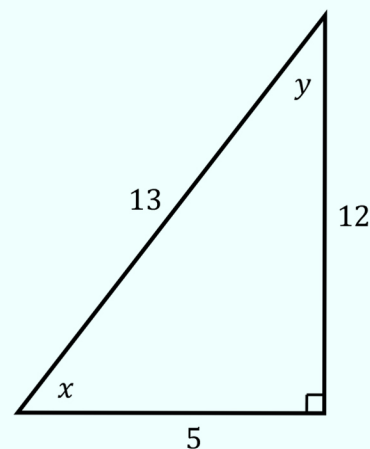
$$\sin x$$

(B)

$$\tan x$$

(C)

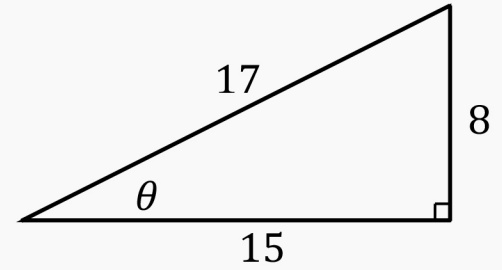
$$\cos y$$



TOPIC: RIGHT TRIANGLE TRIGONOMETRY

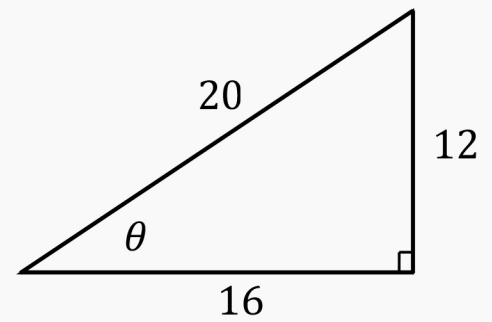
PRACTICE

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



PRACTICE

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



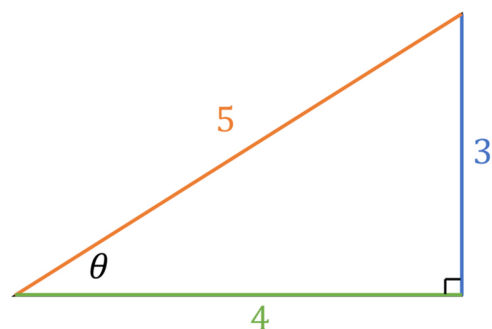
TOPIC: RIGHT TRIANGLE TRIGONOMETRY

Fundamental Trigonometric Identities

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

► These are _____ of the other trig functions.

Recall	Trig Functions	New	Reciprocal Identities
	$\sin \theta = \frac{\text{Opp}}{\text{Hyp}} = \frac{3}{5}$		$\csc \theta = \frac{1}{\sin \theta} = \frac{\text{Hyp}}{\text{Opp}} = \frac{5}{3}$
	$\cos \theta = \frac{\text{Adj}}{\text{Hyp}} = \frac{4}{5}$		$\sec \theta = \frac{1}{\cos \theta} = \frac{\text{Hyp}}{\text{Adj}} = \frac{5}{4}$
	$\tan \theta = \frac{\text{Opp}}{\text{Adj}} = \frac{3}{4}$		$\cot \theta = \frac{1}{\tan \theta} = \frac{\text{Adj}}{\text{Opp}} = \frac{4}{3}$
	$\tan \theta = \frac{\sin \theta}{\cos \theta}$		$\cot \theta = \frac{\cos \theta}{\sin \theta}$



EXAMPLE

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

(A)

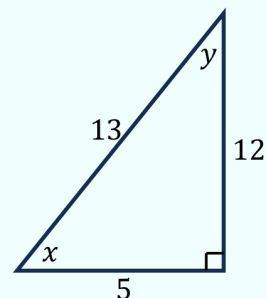
$\sec x$

(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

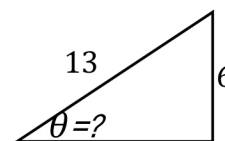
If $\sin \theta = \frac{\sqrt{17}}{17}$, find the values of the five other trigonometric functions. Rationalize the denominators if necessary.

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.

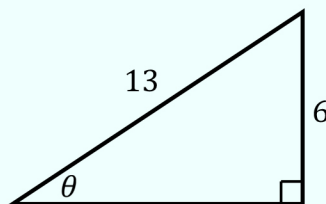


Recall	Exponents	New	Trig Functions
	$\begin{array}{c} x^2 \\ \text{Operation} \\ 3 \xrightarrow{\quad} 3^2 = 9 \\ \text{Inverse} \\ \sqrt{x^2} \end{array}$ The inverse _____ the operation.		$\begin{array}{c} \sin(\theta) \\ \text{Operation} \\ 30^\circ \xrightarrow{\quad} \sin(30) = \frac{1}{2} \\ \text{Inverse} \\ \sin^{-1}(\sin(\theta)) \end{array}$ 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 .



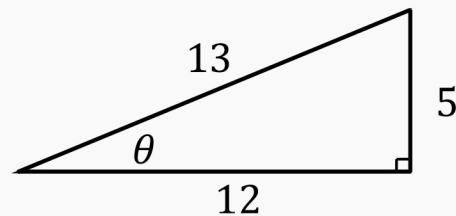
HOW TO: USING INVERSE TRIG TO FUNCTIONS FIND ANGLES

- 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

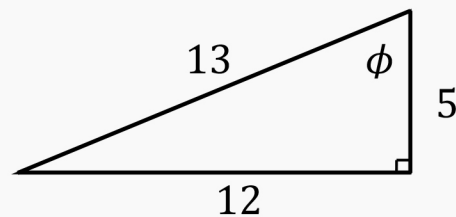
PRACTICE

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)

$$\sin(37^\circ)$$

[Radian | Degree]

(B)

$$\tan\left(\frac{2\pi}{15}\right)$$

[Radian | Degree]

(C)

$$\sec(50^\circ)$$

[Radian | Degree]

(D)

$$\arctan\left(\frac{3}{4}\right) * \text{degrees}$$

[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 $[0^\circ, 90^\circ)$ 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 $[0^\circ, 90^\circ)$ 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.

$$\sec D = 3.2842$$

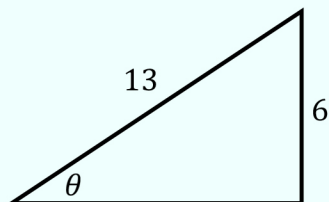
TOPIC: RIGHT TRIANGLE TRIGONOMETRY

EXAMPLE

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