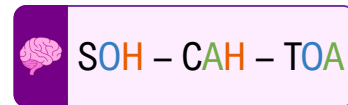
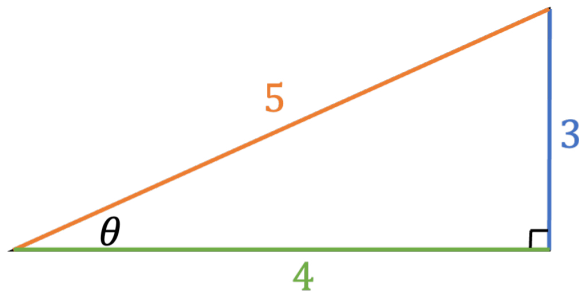


TOPIC: TRIGONOMETRY

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

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

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

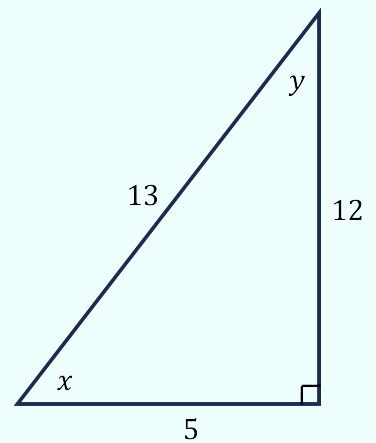
EXAMPLE

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

(A) $\sin x$

(B) $\tan x$

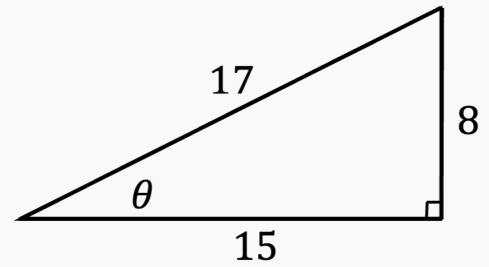
(C) $\cos y$



TOPIC: TRIGONOMETRY

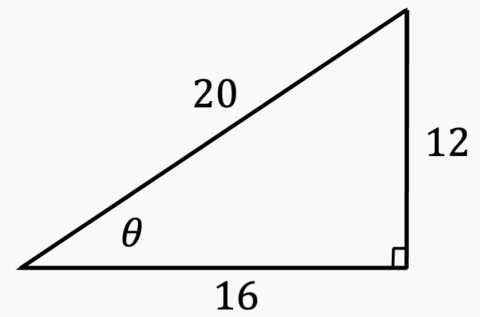
PRACTICE

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



PRACTICE

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



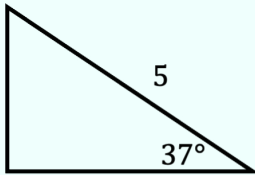
TOPIC: TRIGONOMETRY

Finding Missing Side Lengths

◆ If given one _____ & one _____, find missing side lengths using trig equations & Pythagorean Theorem.

EXAMPLE

Find all side lengths of the given triangle.



HOW TO SOLVE: RIGHT TRIANGLES (GIVEN 1 SIDE & 1 ANGLE)

1) Find other angle using $\angle B = 90^\circ - \angle A$

2) Choose a trig function so

$$\text{any trig}(\angle A) = \frac{\text{given side}}{x} \quad \text{or}$$

$$\text{any trig}(\angle A) = \frac{x}{\text{given side}}$$

3) Solve equation for x (2nd side length)

4) Use Pythagorean Theorem to find 3rd side

Recall

$$a^2 + b^2 = c^2$$



SOH – CAH – TOA

PRACTICE

A right triangle with an angle of 31° has a hypotenuse of 10. Calculate the side of the triangle opposite to the 31° angle (y), and the side adjacent to the 31° angle (x). Round your answer to 3 decimal places.

TOPIC: TRIGONOMETRY

EXAMPLE

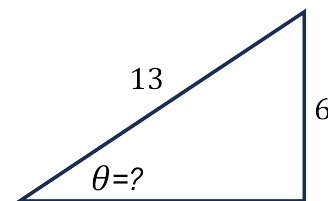
The Grand Lighthouse on a coastal cliff stands 288 m tall and is positioned approximately 2.3 km inland from the shore of the sea. A seafarer on a sailboat directly in front of the lighthouse observes the top of the structure and records the angle of elevation as 3.4° . Determine the distance (in kilometers) of the sailboat from the coastline to two decimal places.

TOPIC: 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.

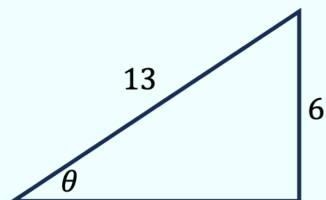


Recall	Exponents	New	Trig Functions
	$\begin{array}{c} x^2 \\ \text{Operation} \\ 3 \xrightarrow{\quad} 3^2 = 9 \\ \text{Inverse} \\ \sqrt{x^2} \end{array}$ The inverse _____ the operation.		$\begin{array}{c} \sin(\theta) \\ \text{Operation} \\ 30^\circ \xrightarrow{\quad} \sin(30) = \frac{1}{2} \\ \text{Inverse}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



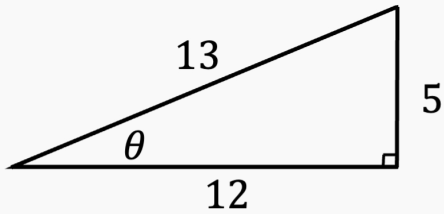
HOW TO: USE INVERSE TRIG FUNCTIONS TO FIND ANGLES

- 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: TRIGONOMETRY

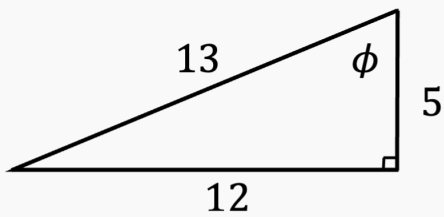
PRACTICE

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: TRIGONOMETRY

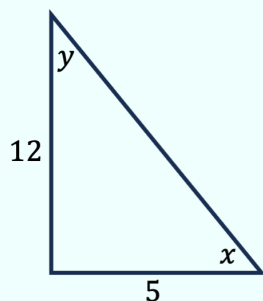
Finding Missing Angles

◆ If you're given 2+ _____ lengths of a triangle, find the missing angle(s) using trig & inverse trig equations.

EXAMPLE

Find all angles of the given triangle.

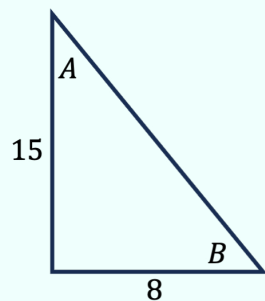
(A)



HOW TO SOLVE: RIGHT TRIANGLES (GIVEN 2+ SIDES)

- 1) If missing a side, use Pythagorean theorem
- 2) For ANY non- 90° angle, write the trig equation with the known sides
- 3) Take the inverse trig fn of each side of eqn & solve for $\angle$
- 4) Find other angle using $\angle B = 90^\circ - \angle A$

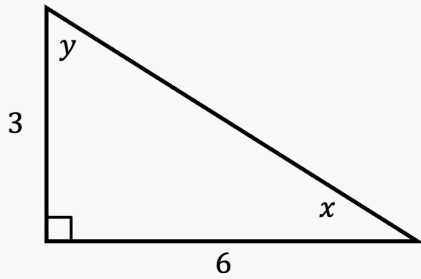
(B)



TOPIC: TRIGONOMETRY

PRACTICE

Given the right triangle below, calculate all missing angles in degrees (round your answer to 3 decimal places).



EXAMPLE

A hiking path can be traced from a mountain range (at an elevation of 6500 feet) to a scenic viewpoint in a canyon (at an elevation of 4300 feet). The path spans 4400 feet. Determine the angle of inclination of the hiking path.