

Introduction to Trigonometric Ratios A.K.A. "SOHCAHTOA"

Today we are going to start looking at trigonometric, or "trig" functions. There are buttons for each of these functions on your calculator and you have probably noticed them before. Sin, Cos, and Tan are the buttons on your calculator that stand for Sine, Cosine, and Tangent.

Each of the functions represents a fraction that you can write using the sides of the triangle. Before you can write the fraction, you need to figure out which sides of the triangle you need to use. This brings us to what SOHCAHTOA stands for:

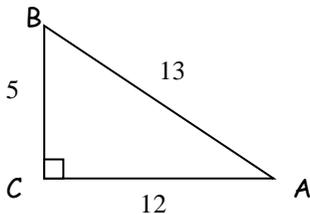
Sin **O**pposite **H**ypotenuse **C**os **A**djacent **H**ypotenuse **T**an **O**pposite **A**djacent

So how do we use this? SOHCAHTOA tells you which sides to use in relation to the angle you are looking at. There are a few steps to doing these problems.

1. Mark the angle you are looking at.
2. Label the sides *in relation to* the angle you are looking at. (opposite, adjacent, hypotenuse)
3. Circle the sides you are supposed to use to make that trig function (use SOHCAHTOA) to help you.
4. Decide which side goes on top of the fraction (numerator) and which goes on bottom of the fraction (denominator).
5. Write the fraction.

Here are a few examples:

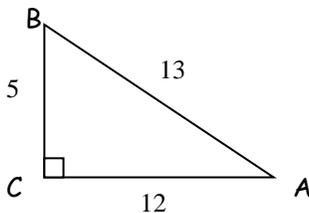
EX 1 Find sin A.



1. Mark angle A.
2. Label the sides in relation to angle A (opp, adj, hyp)
3. Circle the sides that we use for sin (opp, hyp)
4. Decide which side goes on top of the fraction (opp)
5. Write the fraction.

$$\sin A = \underline{\hspace{2cm}}$$

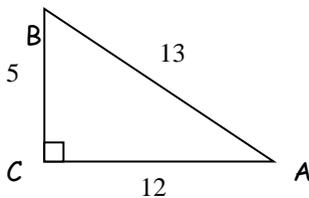
EX 2 Find cos B



1. Mark angle B.
2. Label the sides in relation to angle B (opp, adj, hyp)
3. Circle the sides that we use for cos (adj, hyp)
4. Decide which side goes on top of the fraction (adj)
5. Write the fraction.

$$\cos B = \underline{\hspace{2cm}}$$

EX 3 Find tan A



1. Mark angle A.
2. Label the sides in relation to angle A (opp, adj, hyp)
3. Circle the sides that we use for tan (opp, adj)
4. Decide which side goes on top of the fraction (opp)
5. Write the fraction.

$$\tan A = \underline{\hspace{2cm}}$$

You have learned what sin, cos, and tan mean. Each is a fraction you can write using the sides of a right triangle. But what if you don't know one of those sides? That is where the calculator can help you.

We are still going to use **SOHCAHTOA** to help us. But we need to practice using the calculator before we get to working any problems.

First you need to check that your calculator is in the right mode. It should be in *degrees* mode. Try entering $\sin 30^\circ$. If you get 0.5 you are in the right mode. Otherwise you need to change it.

After you are sure that you are in degrees mode we are ready to start. Your calculator has information stored into it for every possible angle measure. Enter each of these into your calculator:

1. $\cos 45^\circ$ _____ 2. $\sin 36^\circ$ _____ 3. $\tan 18^\circ$ _____ 4. $\sin 18^\circ$ _____

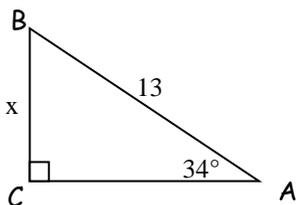
We could keep entering values all day and your calculator would know the answer. (But don't worry, we won't)

Now we will do a couple of examples of how to use the calculator to solve for a missing side. Here are the steps you need to use:

1. Mark the angle that you are going to use for this problem (usually the one that you are given - careful, **don't** use the right angle!)
2. Label the sides *in relation to* the angle that you are going to use (opposite, adjacent, hypotenuse)
3. Circle the sides you are going to use to make a trig function.
4. Decide which trig function you can make with those sides, either sin, cos, or tan.
5. Write the equation, using a variable for the missing side.
6. Solve the equation for the missing side. (using algebra steps)

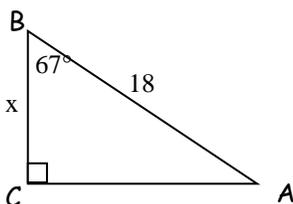
Here are a few examples:

EX 1 Find x.



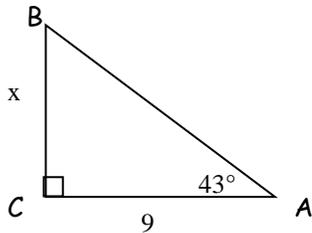
1. Mark angle A (since it is the one that we have a measure for)
2. Label the other two sides *in relation to* angle A (opp, hyp)
3. Circle these sides.
4. Decide which trig function you can make with **Opp, Hyp** (sin)
5. Write the equation, using the variable x for the missing side.
6. Solve the equation for x, using algebra.

EX 2 Find x.



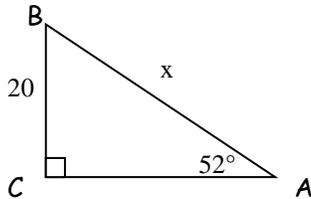
1. Mark angle B (since it is the one that we have a measure for)
2. Label the other two sides *in relation to* angle B (adj, hyp)
3. Circle these sides.
4. Decide which trig function you can make with **Adj, Hyp** (cos)
5. Write the equation, using the variable x for the missing side.
6. Solve the equation for x, using algebra.

EX 3 Find x .



1. Mark angle A (since it is the one that we have a measure for)
2. Label the other two sides *in relation to* angle A (opp, adj)
3. Circle these sides.
4. Decide which trig function you can make with **Opp, Adj** (tan)
5. Write the equation, using the variable x for the missing side.
6. Solve the equation for x , using algebra.

EX 4 Find x . (this one is a little different!)



1. Mark angle A (since it is the one we have a measure for)
2. Label the other two sides *in relation to* angle A (opp, hyp)
3. Circle these sides.
4. Decide which trig function you can make with **Opp, Hyp** (sin)
5. Write the equation, using the variable x for the missing side. Be careful here, this is different than the others. Where does x go?
6. Solve the equation for x , using algebra.

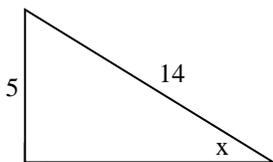
So far we have just used trig to find missing measures of sides. We can also use it to find missing angles when we know two of the sides. You are going to use your calculator a little differently to do this.

When we know the sides, but don't use the angle we have to tell our calculator that we want to know an angle measure. This is known as finding the INVERSE OF A TRIG RATIO. The way we do this is by pressing 2^{nd} , then either sin, cos, or tan. The calculator then tells us the degree measure. Here is how it works: (round to the nearest degree)

- | | | | |
|----------------------|-------------|----------------------|-------------|
| 1. $\sin A = 0.4226$ | $A =$ _____ | 2. $\cos B = 0.6691$ | $B =$ _____ |
| 3. $\tan R = 0.2679$ | $R =$ _____ | 4. $\sin Z = 0.8290$ | $Z =$ _____ |

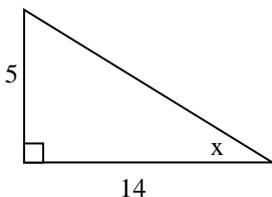
Here are a couple examples:

EX 1 Find the missing angle, " x "



1. Mark the angle that we are looking for, x .
2. Label the given sides *in relation to* x . (opp, hyp)
3. Decide which trig function goes with **Opp, Hyp** (sin)
4. Write out the trig function.
5. Use your calculator to tell you the degree measure.

EX 2 Find the missing angle, " x "



1. Mark the angle that we are looking for, x .
2. Label the sides *in relation to* x . (opp, adj)
3. Decide which trig function goes with **Opp, Adj** (tan)
4. Write out the trig function.
5. Use your calculator to tell you the degree measure.