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The Power of Calculator Software!

# Zoom Math 400

Version 1.00 Upgrade Manual  
for people who used Zoom Math 300

# Zoom Math 400

## Version 1.00 Upgrade Manual

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[www.zoommath.com](http://www.zoommath.com)

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# Upgrading to Zoom400

## New Features in Zoom Math 400

Zoom Math 400 can solve lots of complicated trigonometry problems.

You can type trig problems they way they look. For example, instead of typing  $\sin(30)$ , just type  $\sin 30^\circ$ .

Without a Registration Key, Zoom Math 400 can do all the same things that Zoom Math 300 can do without a Registration Key. After you buy a Registration Key, Zoom Math 400 can solve many Trigonometry problems. With Zoom Math 400, you can:

- Type trig problems the way they look, without extra parentheses.
- Easily type angles in degrees or radians, without complicated menus.
- Type  $\csc$ ,  $\sec$ , and  $\cot$ .
- Simplify complicated trigonometric expressions.
- Solve equations that include trig functions.
- Show step-by-step proofs of trig identities using **TRACE**.
- Solve triangles using the Law of Sines or the Law of Cosines.
- Calculate the points where two nonlinear equations intersect.
- Define a recursive sequence and calculate a term in the sequence.

## Installing Zoom Math 400

If you need help installing Zoom400, visit [zoommath.com](http://zoommath.com).

If you already installed Zoom Math 300 on your calculator, then you probably know how to install Zoom Math 400.

Zoom400 is a larger App than Zoom300, so even if you delete Zoom300 from your calculator, you might need to delete another App or two to make room for Zoom400. You will need at least 98304 ARC FREE to install Zoom400 on your calculator. If you don't know how to delete Apps from your calculator, or if you have any other problem with installation, visit [zoommath.com](http://zoommath.com) for more help, or leave a message at 888-ZOOM-APP.

## Registering Zoom Math 400

If you already bought Zoom200 or Zoom300, you'll get an automatic discount on Zoom400.

To buy a Zoom400 Registration Key, visit [zoommath.com](http://zoommath.com). To buy a Registration Key you will need your calculator's zCode. You can find your calculator's zCode by running Zoom400 and pressing the **ZOOM** key.

Does your calculator already have a registered copy of Zoom Math 200 or 300? If so, then you will automatically get a discount on your Zoom Math 400 Registration Key. You'll see how much your Registration Key costs before you check out.

After you buy a Registration Key, run Zoom400 on your calculator. Go to the main Zoom Math 400 calculations screen and press **ZOOM ENTER**. You will see ten blank spaces where you can type your 10-digit Registration Key. If your registration is successful, you will see a message saying, "Now all the features of Zoom Math 400 are unlocked!"

## New Features in Zoom400

Answers to some of the examples in this chapter are in decimal. Other answers are in exact answer mode. If you get an answer that's in a different form than our answer in an example, press **MODE** to switch formats. To round off an answer to fewer decimal places, press **◀**.

### Typing Trigonometric Problems

To type a degrees symbol, double-click **^**.

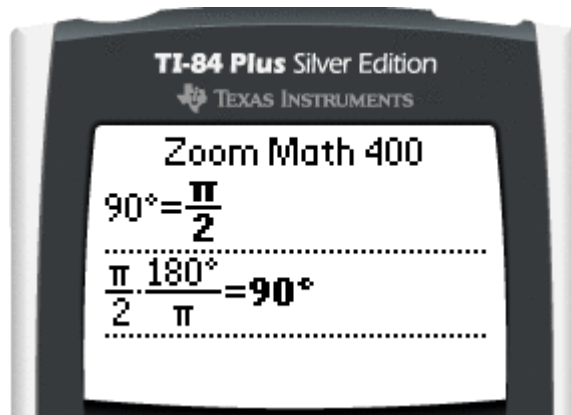
If you've ever tried to type a sine in Zoom Math 300 or if you've ever tried to type it in the calculator's home screen without Zoom Math, then you know that ordinarily when you press **SIN** the calculator doesn't just say **sin**; it adds an extra left parenthesis. In Zoom Math 400, when you press the key that says **SIN**, all you get is the word **sin**; there's no extra parenthesis. You can type problems involving sin, cos, and tan the way they look.

Also, if you want to type an angle in degrees in the calculator's normal operating system, you have to make sure the calculator is in degrees mode. In Zoom Math, you just type the angle the way it looks. If you want to calculate the sine of 30 degrees, you don't type **sin(30)**; you type **sin 30°**.

To type a degrees symbol, double-click **^**.

Don't forget the degrees symbol! In Zoom Math if you type **SIN 3 0 ENTER** without a degrees symbol, then Zoom Math will calculate the sine of 30 radians. That's probably not what you want.

If you want to convert degrees to radians, just type the number of degrees and press **ENTER**. If you want to convert radians to degrees, you will have to type the number of radians multiplied by  $\frac{180^\circ}{\pi}$ .



To type  $\csc$ , press 2nd SIN.

Zoom400 understands  $\csc$ ,  $\sec$ , and  $\cot$ . To type  $\csc$ , press **2nd SIN**; to type  $\sec$ , press **2nd COS**; and to type  $\cot$ , press **2nd TAN**.

To type  $\sec$ , press 2nd COS.

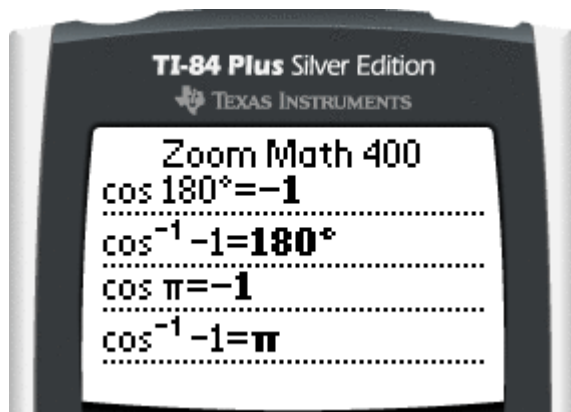
If you look at the keys on your calculator, it looks like pressing **2nd SIN** would not type  $\csc$ ; it looks like it would type  $\sin^{-1}$ . But that's not how it works in Zoom Math 400. In Zoom Math 400, pressing **2nd SIN** will give you  $\csc$ . If you actually want to type  $\sin^{-1}$ , press **SIN** and then  $x^{-1}$ . To get  $\cos^{-1}$  or  $\tan^{-1}$ , press **COS** or **TAN** and then  $x^{-1}$ .

To type  $\cot$ , press 2nd TAN.

To type  $\sin^{-1}$ , press SIN  $x^{-1}$ .

When you type a problem like  $\cos^{-1} -1$ , you might want the answer in degrees, or you might want it in radians. Zoom400 doesn't know for sure which one you want, so Zoom400 will try to figure it out based on the previous problems you typed. If the last problem you typed had degrees in it, then Zoom Math will give an answer in degrees. If the last problem you typed had radians in it, then Zoom Math will give an answer in radians. This screenshot shows how you can switch between degrees mode and radians mode, just by typing problems that include degrees or radians.

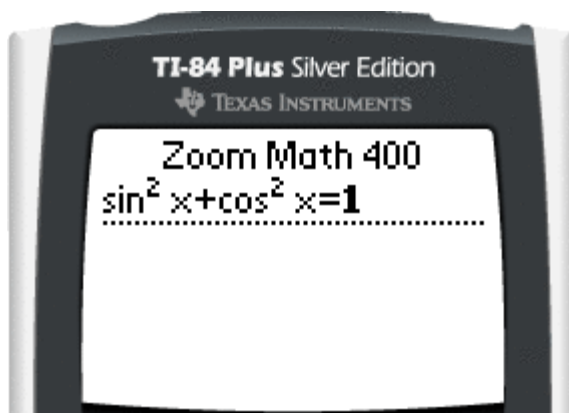
If an answer could be in degrees or radians, Zoom Math will decide which way to answer based on the last problem you typed.



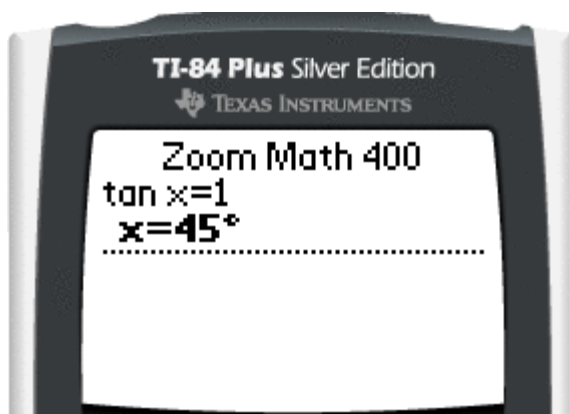
## Trigonometric Expressions, Equations, and Proofs

Zoom400 can simplify trigonometric expressions by using trig identities.

Zoom Math 400 can simplify trig expressions, solve trig equations, and prove trig identities.

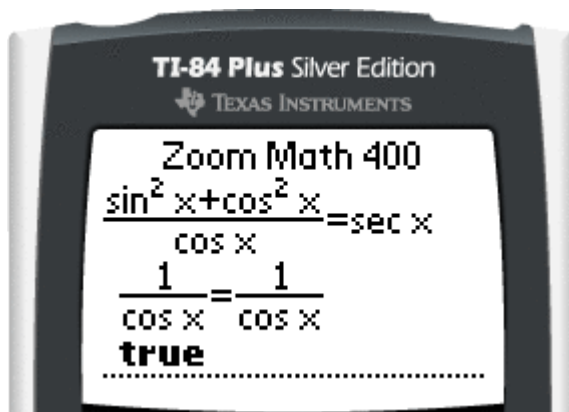


Zoom400 can also solve equations that involve trig functions. When a trig equation has multiple answers, Zoom Math 400 will usually give only one answer. For example, entering the problem  $\tan x = 1$  will result in the answer  $45^\circ$ , but not the answer  $225^\circ$  or the answer  $405^\circ$ .



Zoom400 can also do trig proofs. If you type  $\frac{\sin^2 x + \cos^2 x}{\cos x} = \sec x$  and press

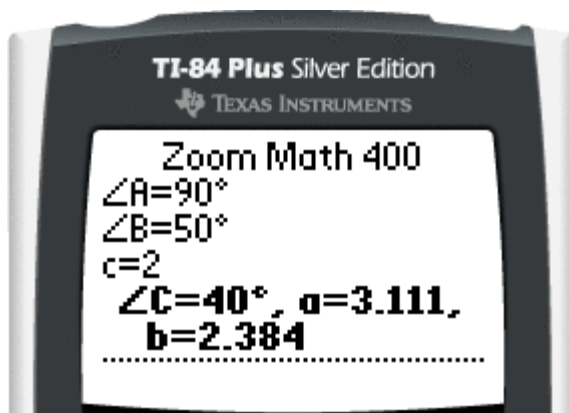
**ENTER**, Zoom 400 will just say **true**. But if you press **TRACE** to show each step, Zoom Math will show *why* it is true for all values of  $x$ .



## Solving Triangles

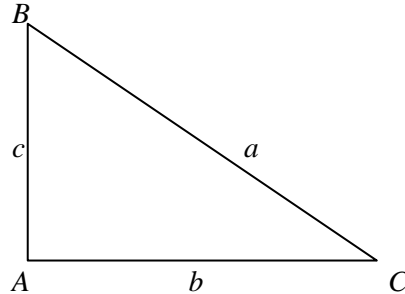
Once you type enough information about a triangle, Zoom Math 400 will solve the triangle.

Zoom Math can solve triangles if you give it enough information. For example, if you know two angles of a triangle and one of the side lengths, then you can type that information into Zoom Math, and Zoom Math will calculate the other angle and the other two side lengths for you.





In some textbooks, if you have a  $\triangle ABC$  then each side is labeled with the same letter as the opposite angle, like in the diagram below. Zoom Math expects you to use lowercase letters to refer to side lengths, like the triangle in the diagram.



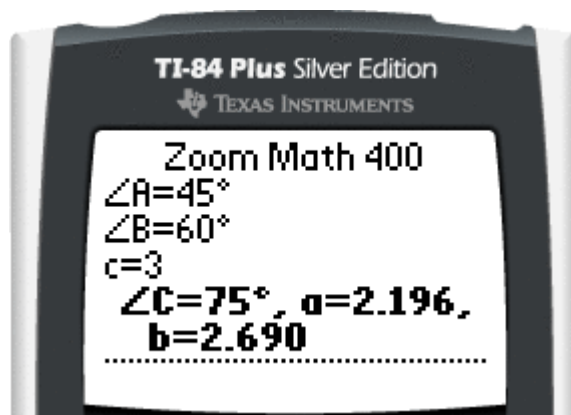
(Some textbooks write the length of a side opposite  $\angle C$  as  $AB$ . Don't type  $AB$  in Zoom Math. Type  $c$  instead.)

To type an angle, press 2nd ANGLE. Then type the letter.

To type an angle, press **2nd ANGLE**. (**ANGLE** is the **2nd** function of the **APPS** key.) If you press **ALPHA** right after you type an angle symbol, Zoom Math will automatically switch to uppercase mode for that letter. (This is probably what you expect anyway – angles are always written with capital letters.)

For example, if you want to type  $\angle A = 45^\circ$ ,  $\angle B = 60^\circ$ ,  $c = 3$ , press:

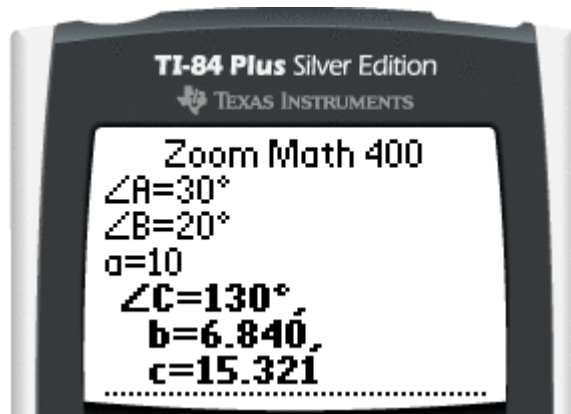
**2nd ANGLE ALPHA A = 4 5 ^^ ENTER**  
**2nd ANGLE ALPHA B = 6 0 ^^ ENTER**  
**ALPHA c = 3 ENTER.**



These three equations give Zoom Math enough information to solve the triangle. After you type the third equation, Zoom Math will think for a while, and then Zoom Math will tell you what the other angle and the other two sides of the triangle are.

Zoom Math can solve triangles, but it can't solve parallelograms or any other geometric shapes. Don't try to type information about any other shape.

Sometimes you can give Zoom Math enough information to solve a triangle without actually telling Zoom Math all of the letters that are in the triangle. For example, if you say  $\angle A = 30^\circ$ ,  $\angle B = 20^\circ$ ,  $a = 10$ , then Zoom Math has enough information to solve the triangle, but Zoom Math doesn't know all the letters that are involved yet. The triangle is  $A$ ,  $B$ , and something else. When this happens, Zoom Math will guess another letter and give you the answer using that letter. For example, if you use the letters  $A$  and  $B$ , Zoom Math will guess that the other letter of the triangle is  $C$ .



After you type the lengths of three sides of a triangle, Zoom Math won't solve the triangle until you type the name of an angle.

If you know the three sides of a triangle and you want Zoom Math to calculate the angles, you'll have to specifically ask for an angle.

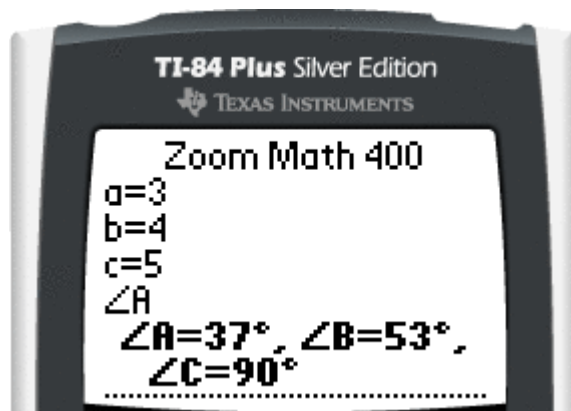
After you type:

$$a = 3$$

$$b = 4$$

$$c = 5$$

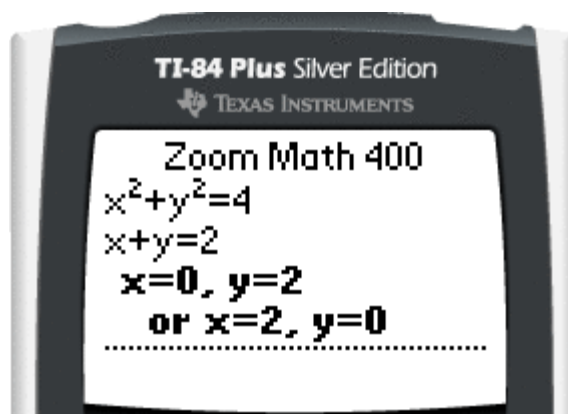
Zoom Math won't be sure yet that this is a triangle problem. Just type **ANGLE A ENTER**. Then Zoom Math will calculate the value of  $\angle A$ , and also the values of  $\angle B$  and  $\angle C$ .



## Systems of Nonlinear Equations

To solve a system of nonlinear equations, press **ENTER** after typing each line.

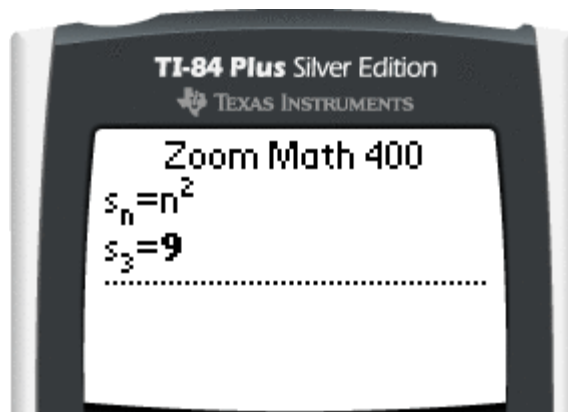
Zoom400 can find the points of intersection of two circles, or of a line and a circle. Simply type the first equation, press **ENTER**, and then type the second equation. If Zoom Math 400 can solve the system of equations, then it will. This might take a very long time. Zoom Math is very slow on these problems, especially if you **TRACE** each step.



## Sequence Definitions

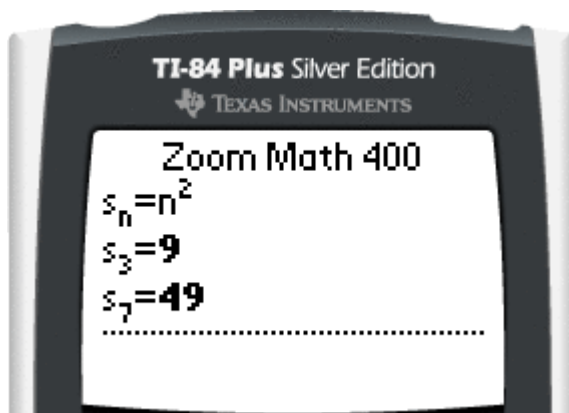
To type a subscript, press the down arrow.

Zoom Math 400 understands definitions of sequences. For example, if you tell it that  $s_n = n^2$ , then when you type  $s_3$ , it will get the answer 9. To type a subscript, press the down arrow. (If you're in the top of a fraction, press the decimal point key first.)

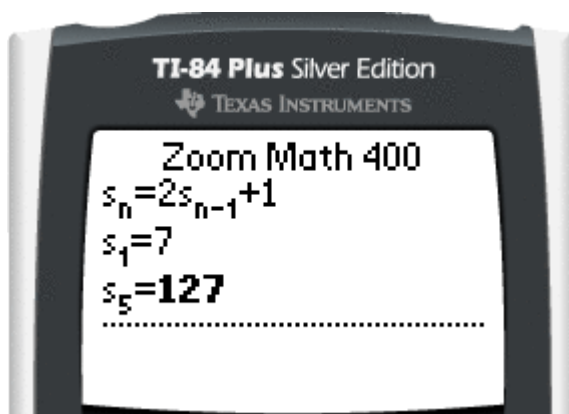


To type the example above, you would press **s ▼ n = n 2 ENTER**, then **s ▼ 3 ENTER**. When you press **ENTER** the second time Zoom Math will display the answer 9.

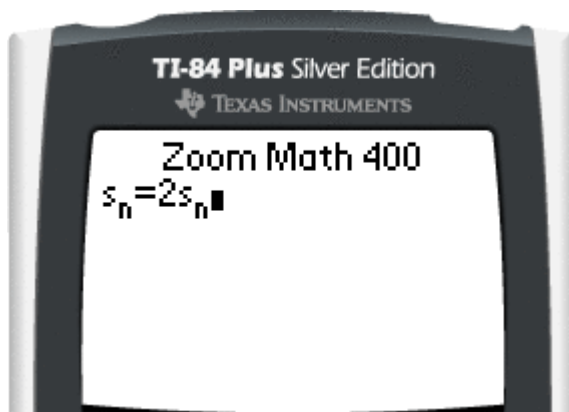
If you want to find a different term in the same sequence, press **ENTER** to go on to the next line, and then press **DEL** to delete the dotted line. Now you can type  $s_7$ , and Zoom Math will understand that this is part of the same problem.



Zoom400 even understands recursive sequence definitions.



When you want to type  $s_{n-1}$ , be careful. After you type the letter  $n$ , the cursor looks like it's partly inside the subscript and partly outside the subscript.



To put the minus sign in the subscript, you must press the left arrow first. Then you can finish typing the subscript.

You can use **TRACE** to show the steps of solving a recursive sequence, but the steps may be a little different than you would expect. Most people would calculate  $s_2$ , then  $s_3$ , then  $s_4$ , and then  $s_5$ . When Zoom Math calculates the value of  $s_5$ , Zoom Math works backwards. Don't worry; the Zoom Math way of solving the problem is still correct.