



The Power of Calculator Software!

# App4Math

Zoom Math Starter Edition  
Version 4.00 User Guide

# App4Math

## Zoom Math Starter Edition

### Version 4.00 User Guide

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

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# Table of Contents

CHAPTER 1			
INTRODUCING ZOOM MATH			
"Features" not in Zoom Math	4	-- Typing Absolute Values	15
Zoom Math for Students	5	-- Typing Exponents	15
Zoom Math for Teachers and Tutors	5	-- Typing Scientific Notation	17
Zoom Math for Professionals	5	-- Typing Square, Cube & Other Roots	17
The Three Different Editions of Zoom Math	6	-- Typing Imaginary & Complex Numbers	18
-- App4Math	6	-- Typing Logarithms	18
-- Zoom Math 100	7	-- Typing Trigonometric Functions	18
-- Zoom Math 200	7	-- Typing Math Menu Functions	18
		-- Using Previous Answer in Calculations	18
		-- Retyping Previous Problems	19
		Editing Expressions	19
		Using Equations	20
		Viewing Answers	22
		Graphing Equations	22
		Showing Steps	23--
		The "ZOOM" Key	23
CHAPTER 2			
INSTALLING ZOOM MATH			
Installation Requirements	9		
Installing from Another Calculator	10		
Installing from Your Computer	11		
CHAPTER 3			
REGISTERING ZOOM MATH			
Registering Zoom Math	12	CHAPTER 5	
-- Upgrade to Zoom Math 100 for Free!	12	QUICK REFERENCE	
		Calculator Keys	24
		Frequently Asked Questions	27
CHAPTER 4			
USING ZOOM MATH			
Getting Started with Zoom Math	13	CHAPTER 6	
Typing Expressions	13	TECHNICAL NOTES	
-- Typing Negative Numbers	13	Program Limitations	28
-- Typing Letters (Variables)	14	Troubleshooting	28
-- Typing Pi ( $\pi$ )	14	Error Messages	29
-- Typing Fractions	14		
-- Typing Percentages	15		

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## Introducing Zoom Math™

Zoom Math.  
You'll wonder how  
you ever got along  
without it!

Zoom Math was invented by a math teacher who doesn't think you should have to be a rocket scientist to use a graphing calculator. Install Zoom Math on your TI-83 Plus or TI-84 Plus graphing calculator, and instantly your calculator becomes easy to use! Now you type math problems just the way they look in a textbook. Forget "Calculatorspeak." You won't need it. You'll wonder how you ever got along without Zoom Math!

### "Features" not in Zoom Math

Unlike other products, Zoom Math has...

#### No huge manual!

Margin tips like  
this one cover  
most of what you  
need to know.  
If the tip starts  
with "Zoom Faster!"  
it's a shortcut!

The TI-83 Plus Guidebook is hefty because many of the calculator's functions are difficult to explain. Your Zoom Math User Guide is lean and simple because the software works the way you expect. In fact, by just reading the helpful margin tips, you can get started immediately. Later, refer back to this guide if you need more detailed help. If questions come up, you can find answers fast in the Quick Reference chapter. You'll be a math expert in no time!

#### No complicated menus!

Just enter a  
problem, and  
Zoom Math does  
the math.

Zoom Math can solve many kinds of math problems, but it doesn't need to ask what kind of problem you're doing. Just type a problem and Zoom Math's SmartFunction™ will figure out what to do without pesky questions or tiresome menus. Even if the problem is a mix of several types of problems, Zoom Math does the math for you!

#### No weird key combinations!

Type a problem  
just the way it  
looks.

Zoom Math is so easy to use, you can focus on the math instead of trying to remember which keys to press. Without Zoom Math, to type  $a^5$ , you need to use the funky  $\wedge$  key. In Zoom Math, just type  $a$  then press **5**. In Zoom Math, you type problems the way they look!

#### No confusion!

The problem will  
look just right on  
your screen.

Even when you learn the weird key combinations, what you type won't look much like the problem in your textbook—unless you use Zoom Math. In Zoom Math, exponents always look like exponents. Fractions look like fractions. Variables are lowercase. Everything looks right on your calculator screen!

Zoom Math:  
Anyone can do  
math!

### It's a no-brainer!

The last time you did long division without a calculator was fifth grade. You wouldn't chop down a tree with your bare hands. Why would you even consider doing math the hard way? Supercharge any TI-Plus Series graphing calculator with Zoom Math. With a power tool like Zoom Math, anyone can do math!

## Zoom Math for Students

Zoom Math is  
allowed on the  
SAT and AP  
exams!

Zoom Math is a super learning tool for math students. You can check assignments by comparing to Zoom Math results. If you made a mistake, Zoom Math can help you figure out where you went wrong. If you are taking a more advanced math or engineering course, Zoom Math can handle routine calculations, saving you from careless errors and freeing you to focus on new material. Best of all, Zoom Math is allowed on the SAT and AP exams!

## Zoom Math for Teachers and Tutors

Your students will  
love Zoom Math  
because it brings a  
difficult subject  
easily within their  
reach.

Zoom Math is a wonderful tool for math teachers. Maybe you're tired of spending so much effort teaching students how to use their graphing calculators. Or maybe you have disallowed graphing calculators because they cause more problems than they solve. Now things have changed. With Zoom Math loaded onto their graphing calculators, students feel empowered because their calculators are suddenly easy to use. Suddenly math doesn't seem so hard!

Zoom Math is also a useful tool for preparing lessons and tests. When formulating exam questions, use Zoom Math to quickly verify answers. Also, Zoom Math works in conjunction with TI Connect and your desktop computer to capture expressions and equations, as formatted by Zoom Math, and then include them in a document for printing.

Best of all, Zoom Math is compatible with TI presentation technology, including TI-SmartView and TI-Navigator, so your entire class can follow along with you and Zoom Math.

## Zoom Math for Professionals

Zoom Math does  
for advanced math  
what calculators  
alone do for long  
division.

Zoom Math is a great tool for those who are no longer students, but need to perform math calculations on the job. If your profession requires math skills, you're not interested in the gory details. You just want quick, reliable solutions. Sure you could do long division on paper like your grandfather, but you'd much rather switch on a calculator and get dead-on, accurate answers in seconds. By solving math problems quickly and precisely, Zoom Math does for more advanced math what calculators did for long division!

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## The Four Editions of Zoom Math

This Zoom Math User Guide is for Zoom Math Starter Edition™, also known as App4Math™.

Zoom Math comes in four different editions, so that you only have to purchase the level of math help that you need. Zoom Math Starter Edition – App4Math is the introductory-level edition, and there are three advanced editions. Keep in mind that each higher-level edition can do everything the lower-level editions do, while adding more problem-solving capabilities designed to correspond with typical higher-level math courses taught in high school or college. In other words, if you are currently taking Pre-Algebra, but you know you will be taking Algebra 1 later, you can go ahead and purchase Zoom Math 200, because it will include all the problem-solving capabilities that help you in Pre-Algebra as well as the problem-solving capabilities you will need later when you take Algebra 1.

### App4Math

Try Zoom Math for no charge with App4Math.

The introductory-level edition of Zoom Math is Zoom Math Starter Edition, also known by the name App4Math. This edition is available free as a download from the Zoom Math website, [www.zoommath.com](http://www.zoommath.com), and now comes pre-installed on all TI-84 Plus Silver Edition calculators sold worldwide. Since App4Math is free proprietary software, we encourage you to transfer copies of App4Math to friends and classmates for them to use too. Zoom Math Starter Edition will appear on your calculator's list of Apps simply as App4Math. The Starter Edition of Zoom Math can perform calculations including:

- Pi ( $\pi$ )
- Fractions
- Percentages
- Absolute values
- Exponents
- Scientific notation
- Square roots, cube roots, and other roots
- Imaginary and complex numbers
- Logarithms
- Trigonometric functions
- The most commonly used Math Menu functions

App4Math also features the amazing ability to instantly change the mode of an answer. You can instantly display answers as either:

- Decimals (including instantly changing precision)
  - Fractions (including improper and mixed fractions)
  - Percentages
  - Scientific notation
  - Quotients with remainders
-

## Zoom Math 100

Even before you buy a Registration Key, the free download of Zoom Math 100 does more than App4Math!

The first advanced-level edition of Zoom Math is Zoom Math 100™. It will appear on your calculator's list of Apps as Zoom100. Zoom Math 100 can be downloaded and installed free of charge, but will be unregistered on your calculator until a Registration Key is purchased and entered.

Even before you purchase a Registration Key, Zoom Math 100 allows you to do everything App4Math does, plus a little bit of graphing, all for free. Purchase a Registration Key to unlock more graphing and to show calculations one step at a time.

Most calculator functions, even graphing, can be accomplished in Zoom Math when you upgrade to Zoom Math 100. And it shows steps!

Once you have purchased your Registration Key, you can unlock all the features of the software. In addition to doing everything that App4Math can do, Zoom Math 100 can also:

- Graph equations with easier equation entry than when you are not using Zoom Math
- Graph most equations that begin with “ $x =$ ” or “ $y =$ ”
- Graph lines in standard form, such as  $2x + 3y = 5$
- Graph lines faster than when you are not using Zoom Math
- Label the  $x$ - and  $y$ -axes for easier readability, like in a textbook
- Use the arrow keys to move the view of a graph
- Use **+** and **-** keys to zoom in and zoom out when viewing a graph
- Instantly snap to a graph quadrant by pressing the number of that quadrant
- Instantly return to the origin by pressing **0** (zero)
- Show solution steps for most problems

## Zoom Math 200

The free download of Zoom Math 200 is like App4Math, and also does some graphing and some algebra.

The second advanced-level edition of Zoom Math is Zoom Math 200™. It will appear on your calculator's list of Apps as Zoom200. Zoom Math 200 can be downloaded and installed free of charge, but will be unregistered on your calculator until a Registration Key is purchased and entered.

Even before you purchase a Registration Key, Zoom Math 200 allows you to do everything App4Math does, plus a little bit of graphing, and a little bit of algebra, all for free. Purchase a Registration Key to unlock more algebra, as well as the full graphing features from Zoom Math 100.

Factoring polynomials or solving quadratic equations is very easy with Zoom Math 200.

Once you have purchased your Registration Key, you can unlock all the features of the software. Zoom Math 200 will handle most equations up to and including those found in a typical Algebra 1 class. This means that in addition to doing everything that App4Math and Zoom Math 100 can do, Zoom Math 200 can also:

- Combine like terms
  - Simplify exponential expressions
  - Distribute and FOIL
  - Add, subtract, multiply and divide fractions containing variables
  - Simplify square roots, cube roots, and other radicals
  - Substitute out variables with known values
  - Solve multi-variable equations for a specific variable
-

- Solve systems of linear equations
- Add arithmetic sequences
- Factor polynomials
- Solve complicated fraction problems that involve factoring
- Divide polynomials
- Solve quadratic equations
- Solve equations that include square roots

### Zoom Math 300

Zoom Math 300 does everything that Zoom Math 200 can do, plus more Algebra 2 problems.

Zoom Math 300 can calculate the equation of a line.

Zoom Math 300 understands function notation, logarithms, summations, and combinations, permutations, and factorials.

The third advanced-level edition of Zoom Math is Zoom Math 300™. It will appear on your calculator's list of Apps as Zoom300. Zoom Math 300 can be downloaded and installed free of charge, but will be unregistered on your calculator until a Registration Key is purchased and entered.

Without a Registration Key, Zoom Math 300 can do everything App4Math does, plus a little bit of graphing and a little bit of algebra.

After you purchase a Registration Key, Zoom Math 300 can do everything Zoom Math 200 can do, and a few more things. Zoom Math 300 has some new Algebra 1 features. Zoom Math 300 can:

- Show more details when using the quadratic formula
- Show the steps of checking the answers of a rational equation or a radical equation
- Calculate the equation of a line through two given points
- Calculate the equation of a line with a given slope through a given point

With a Registration Key, Zoom Math 300 can also handle most equations found in a typical Algebra 2 class. This means that in addition to doing everything that Zoom Math 200 can do, Zoom Math 300 can also:

- Solve non-quadratic equations that are in quadratic form
- Understand function notation such as  $f(x)=3x+5$
- Calculate inverse functions
- Simplify, expand, and combine logarithms
- Solve logarithmic and exponential equations
- Evaluate expressions that use summation notation
- Add geometric sequences
- Convert repeating decimals to fractions
- Simplify expressions involving combinations, permutations, and factorials
- Find the equation of a parabola with a given vertex through a given point

We plan to create further advanced-level editions such as Zoom Math 400, but we have not yet announced a release date for any new products. Join our email list, and we will let you know when new products become available.

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# Installing Zoom Math

## Installation Requirements

Zoom Math Starter Edition now comes pre-installed on TI-84 Plus Silver Edition calculators. To check to be sure that your calculator has this App, press the **APPS** key. You should see an alphabetized list of Apps. Zoom Math Starter Edition is called App4Math on this list. If you already have App4Math, you can skip this section.

### CAUTION.

The finest software applications can cause inadvertent loss of data or other problems. It is possible that Zoom Math could crash and adversely affect the contents of your calculator's memory. If your calculator RAM contains programs or other important data, we recommend you either save a backup copy of this information to your PC using appropriate TI tools, or refrain from using Zoom Math. Likewise, if your calculator stops responding to keyboard input (locks up), and will not turn off and back on with the corresponding keys, simply remove the AAA batteries (not the lithium) for a few seconds. Upon reinstalling the batteries the calculator should respond normally. Few users keep data in RAM, and problems are unlikely, but caution is advised.

You can install Zoom Math from another calculator, or from your computer. Installing Zoom Math from another calculator is easier, but if you don't know someone who already uses Zoom Math, you will need to install it from your computer after downloading it from the Zoom Math website.

You need at least 32768 ARC (calculator memory) free to install Zoom Math Starter Edition. You may need to delete unused Apps to make room for this software. Whatever you choose to delete, you might want to try running an App before you delete it, just to be certain you don't need it. All the Apps that were pre-installed on your calculator are available free from the TI website, so if you later need something that you've deleted, you can always re-install it. Consult your TI guidebook for instructions on deleting an App and other procedures on managing memory.

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## Installing Zoom Math from Another Calculator

### Zoom Faster!

If someone else in your math class already uses Zoom Math, ask him to copy it onto your calculator.

1. Find a link cable and another calculator with Zoom Math already installed. On that calculator:
  - a. If Zoom Math is currently running, press **2nd QUIT**.
  - b. Press **2nd LINK**.
  - c. Press the down arrow repeatedly until you have selected **C:Apps...**, then press **ENTER**.
  - d. An alphabetical list of applications will appear. Select **\*App4Math APP**, then press **ENTER**.
  - e. Press **▶** once to highlight **TRANSMIT**. Do *not* press **ENTER** yet.
2. Connect the two calculators using the link cable.
3. On your calculator:
  - a. Press **2nd LINK**.
  - b. Press **▶** once to highlight **RECEIVE**.
  - c. Press **ENTER**.
4. Press **ENTER** on the transmitting calculator.
5. If you followed these steps and the link cable is working, your calculator should say, **Receiving... \*App4Math APP**. (Your calculator might say **Garbage collecting...** instead. If that happens, just be patient.)
6. Wait for your calculator to say, **Done**. Then press **2nd QUIT** on both calculators. App4Math is now on your calculator.
7. To run Zoom Math, press **APPS**. An alphabetical list of applications will appear. **App4Math** will be near the top of the list. Then highlight **App4Math** and press **ENTER**. As a shortcut, instead of pressing **APPS**, highlighting **App4Math** and pressing **ENTER**, you can just press **APPS** followed by the number that you see in front of **App4Math** on the list of Apps.

To run App4Math, press **APPS**, find App4Math, then press **ENTER**.

## Installing Zoom Math from Your Computer

### Zoom Faster!

If you know someone who already has Zoom Math on his calculator, copy it from his calculator instead.

1. Before you can install Zoom Math from your computer, you may need to update your calculator's OS or download the latest version of TI Connect. You can find step-by-step instructions at: <http://education.ti.com/educationportal/sites/US/nonProductSingle/download.html>
2. Follow the first 3 steps of the procedure on this web page, but don't do step 4. Instead, download "App4Math.8xk" onto your desktop. (The most up-to-date version of the program can be downloaded at: [www.zoommath.com/Downloads/](http://www.zoommath.com/Downloads/))
3. Make sure your calculator is on, and connected to your computer via the cable.
4. On your computer, run TI Connect.
5. Within TI Connect, run TI DeviceExplorer. A window should appear such as "TI-84 Plus - TI DeviceExplorer."
6. Drag App4Math.8xk onto "TI-84 Plus" (or whatever your calculator is) in the TI DeviceExplorer window. Another window should appear: "Transferring..."
7. Wait a while. Soon, you should see a progress bar indicating how much longer you'll have to wait, or an error message if something went wrong.
8. After your computer finishes transferring App4Math onto your calculator, click on the little + sign next to the word "Applications." You should see some Apps listed now, including **App4Math**.
9. If everything worked fine so far, then Zoom Math Starter Edition – App4Math is on your calculator now.
10. To run Zoom Math, press **APPS**. An alphabetical list of applications will appear. **App4Math** will be near the top of the list. Then highlight **App4Math** and press **ENTER**. As a shortcut, instead of pressing **APPS**, highlighting **App4Math** and pressing **ENTER**, you can just press **APPS** followed by the number that you see in front of **App4Math** on the list of Apps.

### Zoom Faster!

To run App4Math, press **APPS**, then its number on the Apps list.

## Registering Zoom Math

Zoom Math Starter Edition – App4Math is fully functional without entering a Registration Key. However, should you ever decide to upgrade to a higher-level edition of Zoom Math, be aware that all higher-level editions beyond the Starter Edition require the purchase of a Registration Key to unlock the full capabilities of the software. Unregistered copies of Zoom Math software can't solve all the problems that registered copies can solve, but they do allow you to use several free features of the software.

### Upgrade to Zoom Math 200 for Free!

Even before you purchase a Registration Key, Zoom Math 200 allows you to do everything App4Math does, plus a little bit of graphing and a little bit of algebra, all for free. Purchase a Registration Key to show step-by-step solutions to many beginning algebra problems. Visit [www.zoommath.com](http://www.zoommath.com) for more information on all advanced editions or to upgrade when you are ready.

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## Using Zoom Math

### Getting Started with Zoom Math

#### Zoom Faster!

To run App4Math, press **APPS**, then its number on the Apps list.

To run Zoom Math, press **APPS**. An alphabetical list of applications will appear. **App4Math** will be near the top of the list. Then highlight **App4Math** and press **ENTER**. As a shortcut, instead of pressing **APPS**, highlighting **App4Math** and pressing **ENTER**, you can just press **APPS** followed by the number that you see in front of **App4Math** on the list of Apps. (If you have a brand new TI-84 Plus Silver Edition with App4Math pre-installed, it will be easy to remember how to run App4Math. Just press **APPS** then **4**.)

Zoom Math begins with a title screen. Just wait a few moments and the title screen will go away on its own, or to avoid waiting, press any key to continue to the solution screen. The App4Math solution screen is a blank display with **Zoom App4Math** at the top. This is the main screen where you will type problems and get solutions.

Type a problem and then press **ENTER** for the answer.

To solve a problem, just type it exactly as it appears in a math textbook, and then press **ENTER**. If the problem is too long to fit on one line, type it normally, and Zoom Math will automatically wrap it to the next line. To correct anything that looks wrong, use the arrow keys to move the cursor to the offending spot, and then type the correction.

After you press **ENTER**, Zoom Math displays the answer in bold.

To exit Zoom Math, press **2nd QUIT**.

To exit Zoom Math, press **2nd QUIT**.

### Typing Expressions

Most expressions can be typed just the way they look.

In Zoom Math, mathematical expressions can be typed on the calculator screen in the same way you would type them on the home screen of the calculator if you were not using Zoom Math. However, in Zoom Math, mathematical expressions look more like they do in a textbook. And most expressions can also be typed just the way they look. Zoom Math also has some handy shortcuts that can make typing an expression easier and quicker than it would be if you were typing it on the home screen of the calculator.

### Typing Negative Numbers

In Zoom Math you can use either the **-** (minus) key or the **(-)** (negative) key to type a minus sign or a negative sign. These two keys are interchangeable in Zoom Math.

For clarity, when a negative sign follows an operator (+, −, ×, or ÷) Zoom Math will display the negative sign slightly smaller and slightly higher. For example, if you multiply six by negative three it will be displayed as  $6 \times ^{-}3$ . Similarly, if you subtract negative two from five, it will be displayed as  $5 - ^{-}2$ .

(Note: The positive sign acts in the same way. In other words, when it follows an operator, it is displayed slightly smaller and slightly higher.)

### Typing Letters (Variables)

To type a letter, press **ALPHA**, and then press the key with that green letter above it. You can type a capital letter by pressing **ALPHA ▲**, and then the letter. To switch back to lowercase letters, press **ALPHA ▼**. You should be aware, however, that the calculator treats uppercase and lowercase versions of the same letter as the same variable. The only exceptions to this rule are lowercase *e* and *i*, reserved constants which are treated differently than the variables represented by uppercase *E* and *I*.

To repeat letters you have already used, press **X,T,θ,n**. The first time you press **X,T,θ,n**, the first letter you typed in the current problem will appear again. If you double-click **X,T,θ,n**, the second letter you typed will appear. If you keep pressing **X,T,θ,n** repeatedly, Zoom Math will cycle through all the letters you have used in the current problem.

For example, if you already typed *nk* and now you want to type *2nk*, then you can just press **2**, then press **X,T,θ,n** once to get *n*, and then after a little pause, press **X,T,θ,n** twice quickly to get *k*. If you have not typed any letters yet, pressing **X,T,θ,n** will cause *x* to appear. Press **X,T,θ,n** twice quickly to get *y*, again quickly for *z*, again for *a*, then *b*, etc.

If you press **×** when you have not used any letters in the current problem session, Zoom Math will display the cross-shaped multiplication sign, ×. After you have typed a letter, Zoom Math will change every multiplication sign into the dot multiplication sign, •, so that you won't confuse the sign with the letter X. From that time on, the dot multiplication sign will remain in use until you end your problem session. (Exception: In scientific notation the cross-shaped sign is always used.)

### Typing Pi (π)

In Zoom Math, just as in the calculator's home screen, you can press **2nd π** (above the **^** key) to type π.

### Typing Fractions

To type the fraction  $\frac{1}{2}$ , just press **1 ÷ 2**, and Zoom Math will automatically create the fraction you want. You can type most fraction problems easily, without using arrow keys or parentheses. For example, to type  $\frac{1}{2} + \frac{1}{3}$ , press **1 ÷ 2 + 1 ÷ 3**.

#### Zoom Faster!

To repeat letters you've already used, press **X,T,θ,n**.

**π** is 2nd ^.

#### Zoom Faster!

To type a simple fraction, type the numerator, press **÷**, and then type the denominator.

(Note: When typing a fraction, if you begin the denominator by typing a number, any variable or operator (+, -, ×, or ÷) you type next will appear after the fraction. If you begin the denominator by typing a variable, any variable you type next will remain in the denominator, but any operator you type next will appear after the fraction. Before pressing another character, you can press ◀ to be sure to remain in the denominator, and you can press ▶ to be sure to exit the fraction.)

To type a complicated fraction, press  $\div$ , then use the arrow keys.

To type a complicated fraction, first press  $\div$ . Zoom Math will create an empty fraction. Type the numerator, then press ▼, and then type the denominator. After typing the denominator, press ▶ to exit the fraction.

For example, to type  $\frac{1+2}{7-4}$ , press  $\div$  **1 + 2 ▼ 7 - 4 ▶**.

Or you can type complicated fractions by using parentheses. So another way to type  $\frac{1+2}{7-4}$  is: **( 1 + 2 ) ÷ ( 7 - 4 )**.

**Zoom Faster!**  
Use ▶ to make a space when typing a mixed fraction.

To type the mixed fraction  $3\frac{1}{2}$ , type 3, then a space, then  $1 \div 2$ . To type the space press either ▶, or **ALPHA 0** (zero).

If you actually want the calculator to show a division sign, double-click  $\div$ , and Zoom Math will create a division sign instead of a fraction. So to type  $15 \div 3$ , you type **15**, double-click  $\div$ , and then press **3**.

If you already created a fraction and want a division sign instead, highlight the fraction bar and then press  $\div$ . Similarly, to change a  $\div$  sign back into a fraction, move the cursor to the  $\div$  sign and press  $\div$ .

To type a percent sign, press 2nd  $\div$ .

### Typing Percentages

To type a percent sign, press **2nd  $\div$** . For example, to type 50%, press **5 0 2nd  $\div$** .

To type absolute values use **{ and }**.

### Typing Absolute Values

To type absolute value symbols use the **{ }** (curly brace) keys that are above the **( )** (parentheses). In other words, press **2nd** followed by **(** for the left side of an absolute value and **2nd** followed by **)** for the right side of an absolute value. So to type  $|-6|$ , you would press **2nd ( - 6 2nd )**.

**Zoom Faster!**  
To type  $n^5$ , just press ALPHA n 5.

### Typing Exponents

Typing an exponent after a variable is very easy. To type  $n^5$ , just press **ALPHA n 5**. If you continue to type numbers they will remain in the exponent, so if you type **ALPHA n 1 2**, Zoom Math will display  $n^{12}$ .

You can also press  $\mathbf{x^2}$  to square any expression. For example, to type  $5^2$  you can press **5** and then  $\mathbf{x^2}$ . To type  $(3+1)^2$ , press **( 3 + 1 )  $\mathbf{x^2}$** .

(Note: If you use  $\mathbf{x^2}$  to square a variable, Zoom Math treats it as if you had just typed the variable and then pressed **2**. So even though pressing **3  $\mathbf{x^2}$  5** will display  $3^25$ , pressing **ALPHA n  $\mathbf{x^2}$  5** will display  $n^{25}$ .)

### Zoom Faster!

To type  $3^3$ , just double-click  $\mathbf{x^2}$ .

To create an exponent of three, double-click  $\mathbf{x^2}$ . Each time you press  $\mathbf{x^2}$  quickly, the exponent will increase by one. For example, to type  $5^3$ , you can press **5** and then double-click  $\mathbf{x^2}$ . For a power higher than 3, you can keep clicking  $\mathbf{x^2}$  until the exponent gets up to the number you want.

The  $\mathbf{x^1}$  key works the same way as the  $\mathbf{x^2}$  key. To type  $n^{-1}$ , press **ALPHA n  $\mathbf{x^1}$** . To type  $n^{-2}$ , double-click  $\mathbf{x^1}$ , and so on.

To type a complicated exponent use  $\wedge$  and the arrow keys or parentheses.

To use a variable in an exponent or type a more complicated exponent press  $\wedge$ , and then type the exponent. For example, to type  $2^n$ , press **2  $\wedge$  ALPHA n**.

After you type the first character in a complicated exponent, the cursor will appear to be partly below the exponent. If you press a number when the cursor is in this position, the number you typed will remain in the exponent. If you press an operator (**+**, **-**, **x**, or **÷**), Zoom Math will assume you are done typing the exponent, so the operator you typed will appear outside the exponent.

(Note: If you press a letter when the cursor is partly below the exponent, and the first character in the exponent was also a letter, then the letter you typed will remain in the exponent. But if you press a letter when the cursor is in this position, and the first character in the exponent was a number, then the letter you typed will appear outside the exponent.)

When the cursor is partly below the exponent, you can press  $\blacktriangleleft$  to move the cursor completely inside the exponent. At any time, you can press  $\blacktriangleright$  to move the cursor out of the exponent. For example, you can type  $2^{3+1} + 4$  by pressing **2  $\wedge$  3  $\blacktriangleleft$  + 1  $\blacktriangleright$  + 4**.

Or you can type complicated exponents by using parentheses. If the first key you press inside an exponent is **(**, then everything you type will remain inside the exponent until you press **)**. When you press **)**, both parentheses will disappear, and the cursor will move out of the exponent. So another way to type  $2^{3+1} + 4$  is: **2  $\wedge$  ( 3 + 1 ) + 4**.

When you create an exponent, Zoom Math inserts parentheses around the exponent's base if necessary. For example, if you type **n 3** and then press  $\mathbf{x^2}$ , Zoom Math will show  $(n^3)^2$ , not  $n^{3^2}$ .

If you type a minus sign followed by any exponent key,  $\mathbf{x^2}$ ,  $\mathbf{x^1}$ , or  $\wedge$ , then the minus sign is automatically pulled into the exponent. For example, one way to type  $n^{-2}$  is to press **ALPHA n -  $\mathbf{x^2}$** .



## Typing Scientific Notation

Type scientific notation with 2nd EE or 2nd 10<sup>x</sup>.

In the calculator's home screen, you can press **2nd EE** to write a number in scientific notation. In Zoom Math, you can still press **2nd EE**, or you can press **2nd 10<sup>x</sup>**. For example, to type  $3.5 \times 10^5$ , press **3 . 5 2nd 10<sup>x</sup> 5**. When you press **2nd 10<sup>x</sup>**, Zoom Math will automatically insert the correct symbols for "times 10 to the power of". After using either of these two methods, the cursor will be in the exponent and exponent typing rules will be in effect.

## Typing Square Roots, Cube Roots, and Other Roots

Type square roots the way they look.

You can type most square root problems easily, without using arrow keys or parentheses. For example, to type  $\sqrt{18} + \sqrt{8}$ , just press **2nd √ 1 8 + 2nd √ 8**.

### Zoom Faster!

To type a cube root, just double-click  $\sqrt{\phantom{x}}$ .

To type a cube root, press **2nd** and then rapidly double-click the  $\sqrt{\phantom{x}}$  key. The first time you press  $\sqrt{\phantom{x}}$ , you will get a square root. The second time you press it, the square root will change into a cube root. If you keep pressing  $\sqrt{\phantom{x}}$ , you will get a fourth root and above.

Or you can change a square root into a cube root by moving the cursor to where the 3 would go and pressing **3**. You can change a cube root back into a square root by highlighting the 3 and pressing **DEL**. You can switch between square roots and fourth roots or higher roots the same way.

After you type the first character inside a square root symbol, the cursor will appear to be partly inside the square root symbol and partly outside. If you press a letter or number when the cursor is in this position, the character you typed will remain inside the square root symbol. If you press an operator (**+**, **-**, **×**, or **÷**), Zoom Math will assume you are done typing the square root, so the character you typed will appear outside the square root symbol.

To type a complicated square root, use the arrow keys or parentheses.

When the cursor is partly inside the square root symbol, you can press **◀** to move the cursor completely inside the square root symbol. At any time, you can press **▶** to move the cursor out of the square root symbol. So, for example, you can type  $\sqrt{3+1} + 4$  by pressing **2nd √ 3 ◀ + 1 ▶ + 4**.

Or you can type complicated square roots by using parentheses. If the first key you press inside a square root is **(**, then everything you type will remain inside the square root until you press **)**. When you press **)**, both parentheses will disappear, and the cursor will move out of the square root symbol. So another way to type  $\sqrt{3+1} + 4$  is: **2nd √ ( 3 + 1 ) + 4**.

## Typing Imaginary and Complex Numbers

Type imaginary and complex numbers the way they look.

In Zoom Math, just as in the calculator's home screen, lowercase  $i$  always represents the square root of negative one, not a variable. So to type  $i$ , you can use **ALPHA I** and watch Zoom Math display imaginary and complex numbers just the way that they look in your textbook.

## Typing Logarithms

Type logarithmic functions the way they look.

Basic math functions work the same in Zoom Math as they do in the calculator's home screen. For example, you can press **LOG 5** to type  $\log(5)$  or **LN 3** to see the natural log function of 3 displayed as **ln(3)**. When typing functions, if you press **ENTER** before typing the right parenthesis, Zoom Math's SmartFunction™ will automatically supply the right parenthesis for you, if it is obvious that is what you intend.

In Zoom Math, just as in the calculator's home screen, lowercase  $e$  always represents the base of the natural logarithm, not a variable. So to type  $e$ , you can press **ALPHA E**. Since  $e^x$  is a commonly used function, you can also press **2nd e<sup>x</sup>** as an alternate way to press **ALPHA E** followed by an exponent.

## Typing Trigonometric Functions

Type trig functions the way they look.

Trig functions also work the same in Zoom Math as they do in the calculator's home screen. You can press **SIN**, **COS**, or **TAN** to see trig functions displayed as **sin(**, **cos(**, or **tan(**. Pressing **2nd** followed by **SIN<sup>-1</sup>**, **COS<sup>-1</sup>**, or **TAN<sup>-1</sup>** displays the inverse trig functions as **sin<sup>-1</sup>(**, **cos<sup>-1</sup>(**, or **tan<sup>-1</sup>(**.

Use 2nd ANGLE to change between degrees and radians.

You can change between degrees mode and radians mode by pressing **2nd ANGLE**. If you are using the TI-84 Plus C, the status line will always show whether you are in **DEGREE** or **RADIAN** mode. On any other calculator, the abbreviation **deg** or **rad** will appear in the top right corner of the screen after you type a trig function.

## Typing Math Menu Functions

Press MATH to use math menu functions.

There are many other functions that come with your TI calculator which are explained in the calculator's guidebook. The only ones available in Zoom Math are those in the Math Menu. These functions work the same way in Zoom Math as they do from the calculator's home screen, so press **MATH** to access the menu from which you can select functions.

## Using Previous Answer in Calculations

Use 2nd ANS to include your last answer in a new calculation.

If you want to use the answer that Zoom Math supplied in the previous problem as part of a new calculation, then you can do that easily using **2nd ANS**. When you press **2nd ANS** while typing a problem, Zoom Math will display **Ans**, which will represent the value of the previous answer.

For example, suppose you want to calculate the area of a circle with a circumference of 20. First you calculate the radius, which is the circumference divided by 2 times  $\pi$ . Try

it yourself: press **2 0 ÷ 2 ◀ 2nd  $\pi$  ENTER**. You may not see all the digits unless you press **▶** to increase your decimal precision, but if you do increase that as much as you can, you should get 3.183098862 as your answer. Next, you know that area is  $\pi$  times the radius squared. You calculated the radius in the last step, so now you can use **2nd ANS** to calculate the area, without needing to retype that long 10-digit answer. Press **2nd  $\pi$  2nd ANS  $x^2$** . The screen will display  $\pi(\text{Ans})^2$ . Press **ENTER** and you will have your solution.

Your calculator's home screen and Zoom Math both use **2nd ANS** the same way. So when you start Zoom Math, **Ans** will still contain whatever answer you last calculated in the calculator's home screen. And when you exit Zoom Math, whatever answer you last calculated within Zoom Math will still be available via **2nd ANS** in the calculator's home screen. (An exception to this is that when you start Zoom Math, if the value currently stored in **Ans** is not a real number or a complex number, then Zoom Math will set **Ans** to 0.)

### Retyping Previous Problems

You might want to retype a problem you've previously typed, so that you can modify it into a similar problem (see Editing Expressions below). Or you may want to evaluate an expression that you've just typed, but this time for a different value of  $x$  (see Using Equations below). To do this, you can go back and retrieve previous problems that you've typed. Starting from a blank line (not a blank screen—if you clear the screen this won't work) press **▲**. This will retype the previous problem you typed back onto the screen. Pressing **▲** again will retrieve the problem you typed before that, and so on. If you go too far, pressing **▼** will bring you back to the more recent problems.

#### Zoom Faster!

To retype a previous problem, start on a blank line and press **▲**.

To view previous problems, press **WINDOW**, and then use the arrow keys.

If you want to go back and look at previous lines you've typed, you can press the **WINDOW** key, and that will put you in a mode where you can scroll around. That is, you can then use the arrow keys to move the screen view to look at previous things you've typed.

### Editing Expressions

If you make a mistake, use the arrow keys to go back and make your correction.

If you make a typing mistake, use **◀** and **▶** to move the cursor to the location of the mistake. To jump to the beginning of the current line, press **2nd ◀**. To jump to the end of the current line, press **2nd ▶**. Use **▲** and **▼** to move the cursor between the numerator and denominator of a fraction.

If you type a problem that is too long to fit on one line, Zoom Math will usually break it into separate lines for you. If this happens, you must still use **◀** and **▶** to move the cursor, just as if the whole problem were displayed on one line.

If you type a 20-digit number or a fraction too wide for the screen, and Zoom Math cannot find a good place to insert a line break, then Zoom Math will automatically

scroll to the right so that your current typing will still stay on the screen. In such a case, you can use the **WINDOW** key followed by the **◀** key to move the screen view back to the left.

If you want to replace a character, move the cursor onto that character and type the new character. Or you can delete the character by pressing **DEL**. To insert characters, first press **2nd INS** to activate the insertion cursor. This cursor appears between two characters, not on top of a character. After you have inserted the desired characters, press **2nd INS** to deactivate the insertion cursor.

You can also use **DEL** as a backspace key as long as you are at the end of a line. So if you are at the very end of a line and hit **DEL** it will delete the previous character you just typed.

If you want to start over, press **CLEAR** to erase the current line. If the current line is already empty, press **CLEAR** to erase the whole screen.

To change a fraction bar into a  $\div$  sign, move the cursor onto the fraction bar and press  $\div$ . Zoom Math will insert parentheses around the former numerator and/or denominator if necessary. Similarly, to change a  $\div$  sign into a fraction, move the cursor to the  $\div$  sign and press  $\frac{\square}{\square}$ , and Zoom Math will remove parentheses if appropriate.

Here is an example of editing an expression. (Try following along on your calculator to see what happens.) Suppose you want to type  $\frac{1+2+3}{4+5}$ , but you forget to press  $\frac{\square}{\square}$  first to create a complicated fraction. You press **1 + 2 + 3  $\div$  4**. Then you notice something is wrong—the calculator says  $1 + 2 + \frac{3}{4}$ . To fix this, press **▲  $\div$**  to turn the fraction bar into a  $\div$  sign. Then press **2nd ◀ 2nd INS ( 2nd ▶ ◀ ◀ ) 2nd INS** to insert parentheses around the numerator. Finally, press  $\frac{\square}{\square}$  to change the  $\div$  sign back into a fraction bar. Because you inserted parentheses, Zoom Math now displays the numerator you wanted. Now you can press **▼ ▶** and finish typing the problem.

## Using Equations

To type an equals sign, press **Y=**.

Press the **Y=** key to type an equals sign. It is the upper left key, farthest to the left in the very top row on your calculator, directly underneath your screen.

Zoom Math Starter Edition – App4Math and Zoom Math Turbo Edition – Zoom Math 100 can't solve for variables. For example, you can't type  $x + 3 = 2x^2$  and expect to get a solution. If you need to solve for variables, consider upgrading to Zoom Math 200.

However there are two uses for the equals sign in App4Math. When you type your problem, Zoom Math's SmartFunction™ will figure out which of the two uses for the equals sign applies in the current problem.

Use the equals sign to assign values to variables.

Then you can evaluate expressions.

The first way to use an equals sign is to assign a value to a variable. If the left side of an equation is just one variable, SmartFunction™ will assign the value of the expression on the right side of the equation to that variable. For example, you can type  **$x = 3$  ENTER**, to assign the value 3 to  $x$ . (Don't forget you can use the  **$x, T, \theta, n$**  key as a shortcut to type  $x$ .) Then you can use that variable to evaluate an expression, or in other words see what happens when you plug the value of that variable into an expression. For example, if you need to evaluate  $2x^2$  when  $x = 3$ , type  **$x = 3$  ENTER** and then  **$2 x^2$  ENTER**.

If you want to evaluate an expression for several different values of  $x$ , you can continue by assigning a new value to  $x$ , then using **▲** to retrieve the expression you are evaluating. So to continue the above example, after you saw that  $2x^2$  is 18 when  $x = 3$ , now you want to know what it would be when  $x = 5$ . Type  **$x = 5$  ENTER**, and then press **▲** twice to retype  $2x^2$ . (The first time you press **▲** you will see the  $x = 5$  line again.) Now when you press **ENTER** you will see that  $2x^2$  is 50 when  $x = 5$ .

You can also assign a calculated value to a variable. For example, if you type  **$x = 3 + 2$  ENTER**, then from that point forward, until you change the value of  $x$ , it will represent the number 5. If the next thing you type is  **$x = x + 2$  ENTER**, the current value of  $x$  is used on the right side of the equation, and the new value of  $x$  becomes 7. Then typing  **$y = x$**  would assign the value 7 to  $y$  also, and so on.

If you forget what value is assigned to a variable, you can easily check by typing the variable and then pressing **ENTER**. Remember that the calculator treats uppercase and lowercase versions of the same letter as the same variable. So, for example,  $X$  and  $x$  will always represent exactly the same value.

Again, the exception to the above rule is that lowercase  $i$  and  $e$  are reserved constants ( $i$  is the square root of -1 and  $e$  is the base of a natural logarithm), so you may not assign any new value to them. However if you wish, you may assign values to uppercase  $I$  and  $E$ , and they can be used like any other variable without affecting the reserved constants.

You can also use the equals sign to evaluate equations.

The second way to use an equals sign is to evaluate an equation. If the left side of an equation is more than just one variable, SmartFunction™ will evaluate an equation to see if it is true or false. For example, if you type  **$x + 2 = 3$  ENTER**, Zoom Math will treat this as the question, "Does the current value of  $x$  plus 2 equal 3?" Zoom Math will give you a **true** or **false** answer.

Inequalities can also be evaluated.

You can also ask about comparisons using "less than", "greater than", "less than or equal to", and "greater than or equal to". To type "less than" ( $<$ ) press **ALPHA ◀**. "Greater than" ( $>$ ) is **ALPHA ▶**. "Less than or equal to" ( $\leq$ ) is **ALPHA ◀ Y=**. And "greater than or equal to" ( $\geq$ ) is **ALPHA ▶ Y=**. So for example, if you type  **$x = 3$  ENTER**, followed by  **$x^2$  ALPHA ◀ 10 ENTER**, Zoom Math will answer **true**, since  $x^2$  is 9, which is less than 10.

## Viewing Answers

Use **▶** and **◀** to change the decimal precision of an answer.

You can change the form of your answer quickly and easily in Zoom Math. Type  $16 \div 7$ , double-clicking  $\div$  to get a division sign, not a fraction: **16  $\div$   $\div$  7 ENTER**. You'll get an answer with three decimal places of accuracy. You can quickly increase the precision by pressing **▶** a few times, or move it back to fewer decimal places by pressing **◀** a few times. You can also change the answer to a fraction just by pressing  $\div$ , and you can change the form of the fraction to a mixed fraction by pressing  $\div$  again. If you used the division symbol (not a fraction) to divide a positive integer by a positive integer, then you can press  $\div$  a third time, and you will see the answer as a quotient with a remainder.

**Zoom Faster!**  
Use **MODE** to cycle through all possible answer modes.

There are a couple of other ways to display answers as well. To see your answer as a percentage, press **2nd  $\div$** . To see your answer in scientific notation, press **^**. (**2nd EE** and **2nd 10<sup>x</sup>** also display scientific notation.) Finally, to return to seeing your answer as a decimal, press the **.** (decimal point) key.

Whatever form of answer you end up in when you finish a problem will be your default form for the answer to your next problem. Of course, if you don't like the form of a new answer, it will now be easy for you to change it. If you forget how to get a specific form you're looking for, or just want to play with it for fun, you can use the **MODE** key to cycle through all the possible answer forms.

While you are viewing various forms of your answer, you are in answer mode. You enter answer mode by pressing any of the keys described above that can change the form of your answer. These keys are known collectively as mode keys. (The **◀** and **▶** keys are not included as mode keys, because they only change decimal precision, not the form of your answer.)

If you are in answer mode, but want to return to the problem you just typed instead of starting a new problem, just press **CLEAR** to clear the answer from the screen.

## Graphing Equations

Zoom Math Starter Edition cannot graph equations. If you need to graph an equation, you must exit Zoom Math (**2nd QUIT**) and graph the equation using your calculator's standard graphing ability as described in your calculator's guidebook. However all higher level editions beyond the Starter Edition do graph equations within Zoom Math, so you might want to consider upgrading to a more advanced edition if you think that you would benefit from seeing equations graphed the Zoom Math way. Visit [www.zoommath.com](http://www.zoommath.com) for more information on advanced editions or to upgrade when you are ready.

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## Showing Steps

Zoom Math Starter Edition does not show the steps it takes to reach a solution. However all higher level editions beyond the Starter Edition do show solution steps, so you might want to consider upgrading to a more advanced edition if you think that you would benefit from seeing how Zoom Math arrives at its solutions. Visit [www.zoommath.com](http://www.zoommath.com) for more information on advanced editions or to upgrade when you are ready.

## The "ZOOM" Key

Need more help?  
Press ZOOM.

Press **ZOOM** to go to the Zoom information screen. This screen tells which edition of Zoom Math is installed on your calculator and the version number of that edition.

From time to time, you may want to compare the version number of your copy of Zoom Math to the latest version listed on the Zoom Math website, to be sure you have installed the most recent update. Visit the Zoom Math Help Center at [www.zoommath.com/HelpCenter/](http://www.zoommath.com/HelpCenter/) for help using Zoom Math, to find the most recent update of Zoom Math, or to download the most recent version of this user guide.

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## Quick Reference

### Calculator Keys

#### Top Row Function Keys

<b>Y=</b>	Types an equals sign.
<b>WINDOW</b>	Enters <b>WINDOW</b> mode, which allows you to look at previous problems or an answer too large to fit on one screen. Press a second time to return to normal operation.
<b>ZOOM</b>	Displays the Zoom information screen.
<b>TRACE</b>	Not used.
<b>GRAPH</b>	Not used.

#### Arrow (Cursor) Keys

All	Navigate menu choices.
▲	Up arrow. Moves the cursor up from the denominator to the numerator of a fraction. Changes <b>ALPHA</b> cursor from lowercase to uppercase. Starting on a blank line, retypes previous problems sequentially beginning with most recent. In <b>WINDOW</b> mode, allows viewing of previous problems.
◀	Left arrow. Moves the cursor left. When typing a square root, fraction or exponent structure, ensures that the cursor remains in that structure. In answer mode, decreases decimal precision. In <b>WINDOW</b> mode, shows more of the answer on the left.
▶	Right arrow. Moves the cursor right. Types a space when creating a mixed fraction. When typing a square root, fraction or exponent structure, exits that structure. In answer mode, increases decimal precision. In <b>WINDOW</b> mode, shows more of the answer on the right.
▼	Down arrow. Moves the cursor down from the numerator to the denominator of a fraction. Changes <b>ALPHA</b> cursor from uppercase to lowercase. After using up arrow to retype previous problems and moving too far back, returns to retype more recent problems. In <b>WINDOW</b> mode, allows viewing of more recent problems.
2nd ◀	Moves cursor to the beginning of the current line.
2nd ▶	Moves cursor to the end of the current line.

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QUICK REFERENCE

Primary Function Keys

<b>2nd</b>	Activates the <b>2nd</b> cursor. Press again to deactivate the <b>2nd</b> cursor.
<b>MODE</b>	In answer mode, cycles between all possible ways to display an answer.
<b>DEL</b>	Deletes the character or symbol that the cursor is on. At the end of a line, works as a backspace to delete last character or symbol typed. When deleting a cube or higher root number, changes the structure to a square root.
<b>ALPHA</b>	Activates the <b>ALPHA</b> cursor. Press again to deactivate the <b>ALPHA</b> cursor.
<b>X,T,θ,n</b>	Retypes previously typed letters. Press once to retype the first letter you used in the current problem. Double-click to retype the second letter, press three times quickly for the third letter, and so on. After using your previously typed letters, or if you have not already typed a variable in the current problem, this key types $x$ , then $y$ , then $z$ , then goes to the start of the alphabet at $a$ , then $b$ , and so on.
<b>STAT</b>	Not used.
<b>MATH</b>	Accesses the “Math Menu” to select math menu functions.
<b>APPS</b>	When not in Zoom Math, press to get a list of Apps. From the list of Apps, select Zoom Math.
<b>PRGM</b>	Not used.
<b>VARS</b>	Not used.
<b>CLEAR</b>	Erases the current line. If the current line was already empty, erases the whole screen. In answer mode, clears the answer, allowing you to edit the problem again.
<b><math>x^{-1}</math></b>	Raises an expression to the power of negative one. Double-click to raise an expression to the power of negative two, press three times quickly to raise an expression to the power of negative three, and so on.
<b>SIN</b>	Press to type $\sin($ and enable cursor to enter argument for sine function.
<b>COS</b>	Press to type $\cos($ and enable cursor to enter argument for cosine function.
<b>TAN</b>	Press to type $\tan($ and enable cursor to enter argument for tangent function.
<b>^</b>	Press before entering a complicated exponent. In answer mode, displays answer in scientific notation.
<b><math>x^2</math></b>	Squares an expression. Double-click to cube an expression, press three times quickly to raise an expression to the power of four, and so on.
<b>,</b>	Types a comma.
<b>( and )</b>	Types parentheses.
<b>LOG</b>	Press to type $\log($ and enable cursor to enter argument for log function.
<b>LN</b>	Press to type $\ln($ and enable cursor to enter argument for natural log function.
<b>STO&gt;</b>	Not used.
<b>ON</b>	Press to tell Zoom Math to stop working on a long calculation.

QUICK REFERENCE

Operation Keys

$\div$	Creates a fraction. Double-click to type a division sign. If cursor is on fraction bar or division sign, toggles between the two. In answer mode, cycles between displaying answer as a fraction, mixed fraction, or quotient with remainder.
$\times$	Types a multiplication sign.
$-$	Types a minus/negative sign.
$+$	Types a plus/positive sign.
<b>ENTER</b>	Selects a menu choice. Moves to the next line when inputting a problem consisting of multiple lines within the solution screen. Solves a problem on the solution screen after input of the problem is complete.

Numeric Keys

<b>0</b> through <b>9</b>	Types the desired digit. A digit immediately following a letter will become an exponent.
.	Types a decimal point. In answer mode, displays answer as a decimal.
<b>(-)</b>	Types a minus/negative sign.

2nd Function Keys

Any **2nd** function keys not listed here are not used within Zoom Math.

<b>2nd QUIT</b>	Exits Zoom Math.
<b>2nd INS</b>	Activates the insertion cursor. Press again to deactivate the insertion cursor.
<b>2nd A-LOCK</b>	Locks keyboard so that the <b>ALPHA</b> cursor does not change back to the normal cursor until you press <b>ALPHA</b> .
<b>2nd ANGLE</b>	Changes trig functions between degrees and radians.
<b>2nd SIN<sup>-1</sup></b>	Press to type $\sin^{-1}()$ and enable cursor to enter argument for inverse sine function.
<b>2nd COS<sup>-1</sup></b>	Press to type $\cos^{-1}()$ and enable cursor to enter argument for inverse cosine function.
<b>2nd TAN<sup>-1</sup></b>	Press to type $\tan^{-1}()$ and enable cursor to enter argument for inverse tangent function.
<b>2nd <math>\pi</math></b>	Types $\pi$ (pi).
<b>2nd <math>\sqrt{\quad}</math></b>	Creates an empty square root symbol. Double-click to create a cube root, press three times quickly to create a fourth root, and so on.
<b>2nd EE</b>	Press to type $\times 10$ and enable cursor to enter exponent for scientific notation. In answer mode, displays answer in scientific notation.
<b>2nd {</b>	Types the left side of an absolute value symbol.
<b>2nd }</b>	Types the right side of an absolute value symbol.
<b>2nd 10<sup>x</sup></b>	Press to type $\times 10$ and enable cursor to enter exponent for scientific notation. In answer mode, displays answer in scientific notation.
<b>2nd e<sup>x</sup></b>	Press to type $e$ and enable cursor to enter exponent.
<b>2nd OFF</b>	Exits Zoom Math and turns calculator off.
<b>2nd <math>\div</math></b>	Types a percent sign. In answer mode displays answer as a percentage.
<b>2nd ANS</b>	Types <b>Ans</b> , which represents the value of the answer to the previous problem.

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## QUICK REFERENCE

### ALPHA Function Keys

Any **ALPHA** function keys not listed here are not used within Zoom Math.

<b>ALPHA ◀</b>	Types $<$ (less than).
<b>ALPHA ◀ Y=</b>	Types $\leq$ (less than or equal to).
<b>ALPHA ▶</b>	Types $>$ (greater than).
<b>ALPHA ▶ Y=</b>	Types $\geq$ (greater than or equal to).
<b>ALPHA A through Z</b>	Types the desired letter.
<b>ALPHA E</b>	Types $e$ (the reserved constant representing the base of the natural log).
<b>ALPHA I</b>	Types $i$ (the reserved constant representing the square root of -1).
<b>ALPHA 0 (zero)</b>	Types a space.

## Frequently Asked Questions

Visit [www.zoommath.com/HelpCenter/FAQ.php](http://www.zoommath.com/HelpCenter/FAQ.php) for a current list of frequently asked questions and their answers.

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## Technical Notes

### Program Limitations

You need at least 535 RAM free to start Zoom Math Starter Edition – App4Math. If you run App4Math with only 535-2582 RAM free, you will be warned that your memory is low. If you run App4Math with low memory, the program's performance may be substantially affected. For example, you may not be able to type a long problem, or scroll up to view or retype previous problems. If you have 2583 or more RAM free, App4Math will run normally with no warnings.

App4Math will run on the TI-Nspire with the 84-Plus keypad installed.

When you start App4Math, any Program named DELETEME is automatically deleted, and any AppVar named ZOOMTEMP is automatically deleted.

App4Math cannot handle lists. If you input a function that yields a list answer, App4Math will not display that answer.

### Troubleshooting

Everything seems to be locked up. What should I do?

If you tell it to, Zoom Math will try to perform an extra-lengthy calculation. For example, if you enter the function  $\text{randBin}(1000000,0.5)$ , you are essentially telling the calculator to flip a coin one million times. That would take a while. To cancel a long calculation, press **ON**. If that does not seem to be the issue, or you seem stuck in some other way, try pressing **2nd QUIT** to exit Zoom Math. If that doesn't work, you will have to remove the calculator's batteries for a few seconds. When you turn the calculator back on, the calculator will restart.

**CAUTION:** Restarting the calculator will delete any information in RAM. If your calculator's RAM contains important data or programs you created, we recommend you either save a copy (backup) of this information to your PC using appropriate TI tools, or refrain from using Zoom Math. Few users keep data in RAM, and problems are unlikely, but caution is advised.

I think I found a mistake. What should I do?

If you think Zoom Math gave you a wrong answer, or you think something else isn't working right, contact I.Q. Joe via our website, [www.zoommath.com/HelpCenter/ContactUs.php](http://www.zoommath.com/HelpCenter/ContactUs.php), and tell us what seems wrong.

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I need help. What should I do?

First, check this user guide under the topic related to your question or problem area. Second, check our Frequently Asked Questions at [www.zoommath.com/HelpCenter/](http://www.zoommath.com/HelpCenter/) where we may have already answered your question. If you still need help, your next step is to contact us via our website, [www.zoommath.com/HelpCenter/ContactUs.php](http://www.zoommath.com/HelpCenter/ContactUs.php), and we will gladly lend a hand.

## Error Messages

A left absolute value symbol in this problem is missing its corresponding right absolute value symbol.

Absolute value symbols must be used in left-right pairs. Be careful! The left absolute value symbol looks very similar to the right absolute value symbol, but it is not identical.

A left parenthesis in this problem is missing its corresponding right parenthesis. Parentheses must be used in left-right pairs.

A right absolute value symbol in this problem is missing its corresponding left absolute value symbol.

Absolute value symbols must be used in left-right pairs.

A right parenthesis in this problem is missing its corresponding left parenthesis. Parentheses must be used in left-right pairs.

Attention: If you continue making this problem more complicated, Zoom Math may have to restart.

This is a warning that you should not continue complicating a problem. It is usually caused by nesting expressions too deep, and could be triggered for example, by an excessive use of the left parenthesis.

Attention: If you stack this problem any higher, Zoom Math may have to restart.

This is a warning that you should not continue stacking a problem any higher. It is usually caused by stacking fractions or exponents excessively.

Attention: Memory is almost full, so if you keep typing, Zoom Math may have to exit.

This is a warning that you are running out of available RAM memory. It usually means available memory is low and/or an unusually long problem is being typed.

Attention: Memory is full, so Zoom Math must exit.

This is a warning that you have run out of available RAM memory. It usually means available memory was low and/or an unusually long problem was being typed. You will normally receive a warning before this interruption occurs.

Attention: RAM is almost full, so some features of Zoom Math may not work normally.

This warning occurs on startup and means you are trying to run Zoom Math with only 536-2582 RAM free. The program's performance may be substantially affected. For example, you may not be able to type a long problem, or scroll up to view or retype previous problems.

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Attention: Zoom Math has very little RAM available and may have to exit at any time. On startup, this warning can follow the warning that RAM is almost full and Zoom Math may not work normally. It means you are trying to run Zoom Math with such a small amount of RAM free that the program may have to exit and restart without giving you any further warning. If you do not see this message on startup, you should be able to type normal length problems, and you will be warned if you type something long enough to get close to using up your available RAM.

Attention: Zoom Math treats a lowercase letter and its uppercase form as the same variable. This is a warning that you have used the same letter in both lowercase and uppercase forms and should not expect them to be treated as two separate variables.

Error: A data type in this problem was incorrect. This usually means you typed a complex number in a function or equation where a complex number does not make sense. For example, you would get this error if you typed  **$2 < i$** .

Error: A number in this problem was too large to compute. This means that the answer to this problem, or even the value of an intermediate step needed to compute the answer to this problem, was  $10^{100}$  or more. For example, you would get this error if you typed  **$10 \wedge 100 - 10 \wedge 100$  ENTER**.

Error: A parameter in this problem was outside its function's domain. This usually means you used a number in a function where it just does not work. For example, you would get this error if you typed  **$0 \wedge 0$  ENTER**.

Error: Division by 0 is undefined.  
You cannot divide by zero.

Error: This problem contains a syntax error. This is a generic error message. It is most likely to occur if you used a comma where there should not be one. For example, you would get this error if you typed  **$1,2$  ENTER**.

Error: This problem contains an upper bound that is greater than or equal to the corresponding lower bound. (This message should read "less than or equal to", not "greater than or equal to", but it will say "greater" on your calculator. It will be fixed when App4Math is updated.) This means you used a math menu function requiring you to supply bounds, but you entered the bounds incorrectly. For example, you would get this error if you used the fMin function to type **fMin( $x^2, x, 2, 1$ ) ENTER**.

Error: This problem has become too complicated, so Zoom Math must restart. This is usually caused by nesting expressions too deep, and could be triggered for example, by an excessive use of the left parenthesis. You will normally receive a warning before this error occurs.

Error: This problem is too tall to fit on the screen, so Zoom Math must restart. This is usually caused by stacking fractions or exponents excessively. You will normally receive a warning before this error occurs.

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Error: You terminated this calculation by pressing ON.

This means you pressed **ON** to tell Zoom Math to stop working on a calculation that was taking too long.

Error: You used a function without supplying the correct number of parameters.

This means you input a function without typing the right number of parameters. For example, you would get this error if you used the fMin function to type **fMin(x<sup>2</sup>) ENTER**.

Error: Zoom Math cannot calculate the answer to this problem.

This is a generic error message. It is most likely to occur if you used the solve function (option 5 in the Math Menu) in a way that an answer cannot be calculated.

Error: Zoom Math cannot display the answer to this problem.

This means you input a function that yields a list answer. Zoom Math cannot handle lists. For example, you would get this error if you used the rand function to type **rand(5) ENTER**.

Error: Zoom Math has corrupted RAM. Please visit the website [errors.app4math.com](http://errors.app4math.com).

You should never see this error, but if you do see it, something unusual may be going on. If your calculator does not behave normally, try taking out the batteries for a while. If that does not work, visit <http://errors.app4math.com> for more instructions on how to reset your calculator.

Error (#): Zoom Math must restart. Please visit the webpage [errors.app4math.com](http://errors.app4math.com).

You should never see this error, but if you do see it, something unusual may be going on. Please visit <http://errors.app4math.com> to see if this is a known issue. If this is not a known issue, you can report it by contacting I.Q. Joe via our website, [www.zoommath.com/HelpCenter/ContactUs.php](http://www.zoommath.com/HelpCenter/ContactUs.php).

Lowercase e is a constant, so you cannot change its value.

This means you tried to assign a value to the variable  $e$ . You cannot use  $e$  as a variable, because it is reserved for use as a constant representing the base of the natural logarithm.

Lowercase i is a constant, so you cannot change its value.

This means you tried to assign a value to the variable  $i$ . You cannot use  $i$  as a variable, because it is reserved for use as a constant representing the square root of -1.

Not enough RAM is available to run Zoom Math.

This means you do not have at least 535 RAM free to run Zoom Math.

This problem contains an extra decimal point.

This means a number you typed has an extra decimal point. For example, you would get this error if you typed **1.2.3 ENTER**.

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## TECHNICAL NOTES

This problem contains an extra space.

This means a number you typed has an extra space. Usually this occurs when you forget to complete a mixed fraction. For example, you would get this error if you typed **1 \_ 2** as part of a problem when you meant to type **1 \_ 2 ÷ 3**.

This problem seems to be missing a number.

This usually means you typed an operation or function without supplying a number to be acted upon. For example, you would get this error if you typed **1 + ENTER** or if you used the **fMax** function, but typed **fMax() ENTER**.

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