The Power of Calculator Software!

Zoom Math 200

Version 3.01 User Guide

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Table of Contents

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 **^** 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!

It's a no-brainer!

Zoom Math: Anyone can do math!

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!

The Three Different Editions of Zoom Math

This Zoom Math User Guide is for Zoom Math 200™.

Zoom Math comes in three 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 two 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 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.

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, 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 ( )
- 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 Turbo Edition™, also known by the name Zoom Math 100™. It will appear on your calculator's list of Apps simply 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 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

Further advanced-level editions are planned, but are not yet in development.

Need some problem-solving capabilities that are not available in the edition you own? You can download an upgrade (when available) at www.zoommath.com. At zoommath.com, you can also purchase Registration Keys and find information about when these upgrades become available.

Chapter

2

Installing Zoom Math

Installation Requirements

> **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 49152 ARC (calculator memory) free to install Zoom Math 200. 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.

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 ***Zoom200 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… *Zoom200 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. Zoom Math 200 is now on your calculator.

To run Zoom Math 200, press APPS, find Zoom200, then press ENTER.

7. To run Zoom Math, press **APPS**. An alphabetical list of applications will appear. (This will be a very long list on some calculators.) **Zoom200** will be near the bottom of the list. Press ▲ to skip to the bottom of the list. Then highlight **Zoom200** and 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 "Zoom200.8xk" onto your desktop.
(The most up-to-date version of the program can be downloaded at:
http://www.zoommath.com/downloads.html)

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 Zoom200.8xk 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 Zoom200 onto your calculator, click on the little + sign next to the word "Applications." You should see some Apps listed now, including **Zoom200**.

9. If everything worked fine so far, then Zoom Math 200 is on your calculator now.

To run Zoom Math 200, press APPS, find Zoom200, then press ENTER.

8. To run Zoom Math, press **APPS**. An alphabetical list of applications will appear. (This will be a very long list on some calculators.) **Zoom200** will be near the bottom of the list. Press ▲ to skip to the bottom of the list. Then highlight **Zoom200** and press **ENTER**.

Chapter

3

Registering Zoom Math

App4Math, the Zoom Math Starter Edition, is the only edition of Zoom Math that is fully functional without entering a Registration Key. Zoom Math 200 and all of the other advanced-level editions of Zoom Math require the purchase of a Registration Key to unlock the full capabilities of the software. Visit www.zoommath.com for more information on advanced editions or to upgrade when you are ready.

Limitations of Unregistered Zoom Math

Unregistered Zoom Math 200 can solve some beginning algebra problems and includes the following free features:

- All the features and functionality found in Zoom Math Starter Edition – App4Math (see page 3)
- All of the free features found in Zoom Math 100 (see page 4)
- Substitute out variables with known values
- Solve simple problems involving exponents and powers
- Combine like terms
- Solve problems using the distributive property and FOIL
- Simplify square roots and other radicals

Anyone can use these features without purchasing a Registration Key.

Register your Zoom Math 200 to solve most Algebra 1 problems and see solution steps!

Zoom Math 200 can solve most Algebra 1 problems and includes the following protected features:

- All of the protected features found in Zoom Math 100 (see page 4)
- Solve linear equations and inequalities
- Solve systems of linear equations
- Factor polynomials
- Solve quadratic equations
- Divide polynomials
- Solve radical equations
- Add arithmetic sequences
- Show step-by-step solutions

You must purchase and enter a Registration Key before you will be able to use these features.

Finding Your Calculator's zCode™

Press ZOOM to find the zCode for your calculator.

To register Zoom Math, you will need the zCode that is unique to your calculator. To find your calculator's zCode, run Zoom Math, and then go to the Zoom information screen by pressing **ZOOM**. Your zCode will be 12 letters separated into three groups. Example: "tpnv-ftby-ttth". Once you have purchased your Registration Key, press **ENTER** to continue to the registration screen where you can enter the Key.

Purchasing Your Registration Key

Installing Zoom Math on your calculator gives you access to the free features of Zoom Math. Entering your Registration Key unlocks the protected features of Zoom Math. (Of course you will still have access to the free features too.)

To unlock more features, purchase a registration key at zoommath.com.

To purchase a Registration Key for your edition of Zoom Math, visit the Zoom Math website at: http://www.zoommath.com/register.html.

On the registration page, enter your calculator's zCode in the box labeled "zCode".

Select which edition of Zoom Math you are registering.

If you have a coupon or voucher, enter that code in the appropriate box now.

Click the "Continue" button and complete your purchase via PayPal. When your payment has cleared with PayPal, your Registration Key will be automatically e-mailed to you from zoomhelp@gmail.com. We recommend that you add this address to your address book to prevent your Registration Key message from being filtered as spam. The Registration Key will be a 10-digit number, and for security reasons will be e-mailed to the address that your PayPal account used for payment.

Please note that an "eCheck Payment" usually takes four business days to clear, but other payments typically clear immediately. If you have not received your Registration Key within 24 hours (or seven days when paying by eCheck), first check your spam filters to be sure the message was not misfiled, and then contact Zoom Math via our website, www.zoommath.com/contact.html.

Entering Your Registration Key

Press ZOOM then ENTER before entering your Registration Key.

To enter your Registration Key, start from the Zoom information screen which shows the zCode for your calculator. If you are not already on that screen, be sure Zoom Math is running, then press **ZOOM**. From the Zoom information screen, just press **ENTER** to get to the registration screen. On the registration screen you can input your 10-digit Registration Key. Input your Key and then press **ENTER**. Zoom Math will restart with the features you unlocked now available.

You won't have to enter the Registration Key ever again, unless for some reason your flash memory is cleared. (This usually doesn't happen even when you change the batteries.) We recommend that you write down your Registration Key just in case, but Zoom Math can provide you with your Registration Key again if you ever lose it.

Using Zoom Math

Getting Started with Zoom Math

To run Zoom Math 200, press APPS, find Zoom200, and press ENTER.

To run Zoom Math 200, press **APPS**. An alphabetical list of applications will appear. (This will be a very long list on some calculators.) **Zoom200** will be near the bottom of the list. Press ▲ to skip to the bottom of the list. (On the TI-84 Plus Silver Edition, **ALPHA Z** will get you to the bottom of the list even faster.) Then highlight **Zoom200** and press **ENTER**.

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 Zoom Math 200 solution screen is a blank display with **Zoom Math 200** 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.

Zoom Math 200 can perform most calculations that you would normally use a calculator for, and it can also solve most problems you would encounter in a typical Algebra 1 textbook.

So for example, if the problem you want to solve does not include an equation or inequality, then all you need to do is type the problem (see Typing Expressions below) and then press **ENTER**. Zoom Math will supply the equals sign as part of the answer. This is how you would solve the following types of problems:
- Substituting out variables with known values
- Combining like terms
- Distributing
- Simplifying square roots and other radicals
- Factoring polynomials
- Dividing polynomials
- Adding arithmetic sequences

If the problem you want to solve involves algebraic equations or inequalities, again, you simply type the problem (see Using Equations below) and press **ENTER** after each line of the problem. This is how you would solve the following types of problems:

- Linear equations and inequalities
- Systems of linear equations
- Quadratic equations
- Radical equations

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 × ⁻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 ▼**.

New & Improved! Zoom Math 200 treats uppercase and lowercase letters as separate variables.

In the calculator's home screen, and in Zoom App4Math and Zoom Math 100, uppercase and lowercase versions of the same letter are treated as the same variable. But in order to give you improved flexibility, Zoom Math 200 treats uppercase and lowercase versions of the same letter as two different variables which can have different values. As with App4Math and Zoom Math 100, lowercase *e* and *i* are reserved constants and cannot be used as variables.

Zoom Faster!
To repeat letters you've already used, press X,T,Θ,n.

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 2*nk*, 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 ( )

is 2nd ^.

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

Typing Fractions

Zoom Faster!
To type a simple fraction, type the numerator, press ÷, and then type the denominator.

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 $\frac{1}{2} + \frac{1}{x}$, press **1 ÷ 2 + 1 ÷ x**.

(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 ÷, then use the arrow keys.

To type a complicated fraction, first press **÷**. 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 $\frac{x+2}{y-4}$, press **÷ x + 2 ▼ y − 4 ►**.

Or you can type complicated fractions by using parentheses. So another way to type $\frac{x+2}{y-4}$ is: **(x + 2) ÷ (y − 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 ÷ 2. To type the space press either ▶, or **ALPHA 0** (zero).

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

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

To type a percent sign, press 2nd ÷.

Typing Percentages
To type a percent sign, press **2nd ÷**. For example, to type 50%, press **5 0 2nd ÷**.

Typing Absolute Values
To type absolute values use { and }.
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)**.

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}.

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

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

(Note: If you use **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 x^2 5** will display $3^2 5$, pressing **ALPHA *n* x^2 5** will display n^{25}.)

Zoom Faster!
To type ^{3}, just double-click x^2.

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

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

To type a complicated exponent use ^ and the arrow keys or parentheses.

To use a variable in an exponent or type a more complicated exponent press **^**, and then type the exponent. For example, to type 2^n, press **2 ^ 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 (**+**, **−**, **×**, 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 ◄ to move the cursor completely inside the exponent. At any time, you can press ► to move the cursor out of the exponent. For example, you can type $2^{3+1}+4$ by pressing **2 ^ 3 ◄ + 1 ► + 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 ^ (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 ***x²***, Zoom Math will show $(n^3)^2$, not $n^{3\,2}$.

If you type a minus sign followed by any exponent key, ***x²***, ***x⁻¹***, or **^**, then the minus sign is automatically pulled into the exponent. For example, one way to type n^{-2} is to press **ALPHA *n* − *x²***.

Typing Scientific Notation

Type scientific notation with 2nd EE or 2nd 10ˣ.

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 10ˣ**. For example, to type 3.5×10^5, press **3 . 5 2nd 10ˣ 5**. When you press **2nd 10ˣ**, 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 $\sqrt{\ }$.

To type a cube root, press **2nd** and then rapidly double-click the $\sqrt{\ }$ key. The first time you press $\sqrt{\ }$, 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 $\sqrt{\ }$, 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 $\sqrt{x+1}+4$ by pressing **2nd** $\sqrt{\ }$ **X** ◄ **+ 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 $\sqrt{x+1}+4$ is: **2nd** $\sqrt{\ }$ **(X + 1) + 4**.

Typing Arithmetic Sequences

Zoom Faster!
Use ... **to replace the middle terms of an arithmetic sequence.**

To add up a long arithmetic sequence, instead of typing all of the middle terms, you can type **...** by pressing the decimal point three times. Be sure to include at least the first two terms and the last term. And make sure the **...** is between two plus signs.

For example, to add up all the integers from 1 to 100, type **1 + 2 + ... + 100**. To add up all of the even integers between n and 100, type **n + (n + 2) + ... + 100**.

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

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^x** as an alternate way to press **ALPHA E** followed by an exponent.

Typing Trigonometric Functions

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^{-1}**, **COS^{-1}**, or **TAN^{-1}** displays the inverse trig functions as **sin^{-1}(**, **cos^{-1}(**, or **tan^{-1}(**.

One special thing to take note of is how to change between degrees and radians. Once you have typed a trig function you'll see an indicator in the upper right hand corner of the screen to tell you if you are in degrees (**deg**) or radians (**rad**). To change between the two, press **2nd ANGLE**.

Typing 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

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   . Try it yourself: press **2 0 ÷ 2 ◄ 2nd   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   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**

2nd ANS x^2. The screen will display   **(Ans)**^{2}. Press **ENTER** and you will have your solution.

If you round off an answer by pressing the arrow keys, then Ans will still contain the exact value of the answer, not the rounded-off value.

If a problem's answer involves more than one number, or if the answer is a word such as **false**, then that answer will not be saved. For example, after you type the problem $2(x + y)$, Ans is $2x + 2y$. If the next problem you type is $x^2 + 5x = 6$, then Zoom Math 200 will say $x = -6$ **or** $x = 1$, but Ans will still be $2x + 2y$.

When you first run Zoom Math 200, Ans will not contain any value until you have typed a problem. After you exit Zoom Math 200, Ans in the calculator's home screen will not contain the answer to the last problem you typed in Zoom Math 200.

Retyping Previous Problems

Zoom Faster!
To retype a previous problem, start on a blank line and press ▲.

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 lines 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 line you typed back onto the screen. Pressing ▲ again will retrieve the line you typed before that, and so on. If you go too far, pressing ▼ will bring you back to the more recent lines.

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 ÷ sign, move the cursor onto the fraction bar and press ÷. Zoom Math will insert parentheses around the former numerator and/or denominator if necessary. Similarly, to change a ÷ sign into a fraction, move the cursor to the ÷ sign and press **÷**, 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 $\dfrac{1+2+3}{4+5}$, but you forget to press **÷** first to create a complicated fraction. You press **1 + 2 + 3 ÷ 4**. Then you notice something is wrong—the calculator says $1+2+\dfrac{3}{4}$. To fix this, press ▲ **÷** to turn the fraction bar into a ÷ sign. Then press **2nd ◄ 2nd INS (2nd ► ◄ ◄) 2nd INS** to insert parentheses around the numerator. Finally, press **÷** to change the ÷ 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. To help with graphing, pressing **Y=** at the beginning of a line types $y=$.

There are four uses for the equals sign in Zoom Math 100. When you type your problem, Zoom Math's SmartFunction™ will figure out which of the four uses for the equals sign applies in the current problem.

Use the equals sign to assign values to variables.

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,Θ,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**.

Then you can evaluate expressions.

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.

To prevent variables from being cleared, delete the problem divider after solving a problem.

Zoom Math 200 will try to determine when you are finished with a problem, and will then print a dotted line as a problem divider. After a problem divider, Zoom Math 200 does not pay any attention to the variable values from the previous problem, so if you want to continue using those values, then you should delete the problem divider by immediately pressing **DEL**.

Remember that unlike the calculator's home screen, App4Math, and Zoom Math 100, Zoom Math 200 treats uppercase and lowercase versions of the same letter as two different variables. So, for example, *X* and *x* will *NOT* represent exactly the same value, unless you assign the same value to each separately.

If you want to know the current value assigned to a variable, you can easily check at any point in a problem by typing the variable as a new line, and then pressing **ENTER**.

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 you have already assigned values to variables in the current problem, and now type a line where 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 have already assigned a value to *x* and then 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" (≤) is **ALPHA ◄ Y=**. And "greater than or equal to" (≥) 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.

When evaluating equations or inequalities, the expression evaluated must contain only one relational operator, and it must not be within parentheses, within fractions or within anything else.

The third way to use an equals sign is to graph equations. See "Graphing Equations" below.

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

The fourth way to use an equals sign is to solve algebraic equations. If the problem you want to solve involves algebraic equations or inequalities, again, you simply type the problem and press **ENTER** after each line of the problem. This is how you would solve the following types of problems:

- Linear equations and inequalities
- Systems of linear equations
- Quadratic equations
- Radical equations

Please note that with these types of problems, Zoom Math will use SmartFunction to figure out when you have completed the problem. For example, Zoom Math knows that if you want to find the values of two variables, you need to have two equations. So if you type something like $x + y = 5$ and press **ENTER**, Zoom Math will not give you an answer. Instead, Zoom Math will wait for you to type a second equation involving x and y. After you enter the second equation, Zoom Math will give you the answer.

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 ÷ 7, double-clicking ÷ to get a division sign, not a fraction: **16 ÷ ÷ 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 ÷, and you can change the form of the fraction to a mixed fraction by pressing ÷ again. If you used the division symbol (not a fraction) to divide a positive integer by a positive integer, then you can press ÷ 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 ÷**. To see your answer in scientific notation, press **^**. (**2nd EE** and **2nd 10ˣ** 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.

Unexpected Answers

Want an answer in a different form? Try retyping the answer you got.

Sometimes Zoom Math 200 will give you an answer that is correct, but is not the answer you expected. For example, if you type $x^2 + 2x + 3x + 6$, then Zoom Math 200 will add the like terms $2x$ and $3x$, giving you the answer $x^2 + 5x + 6$. That's a correct answer. But what if you wanted Zoom Math to factor?

When Zoom Math 200 gives you an answer in a different form than you expected, try typing the answer back into Zoom Math. For example, if you get the answer $x^2 + 5x + 6$, but you were expecting a factored answer, then just go on to the next problem and type $x^2 + 5x + 6$. This time Zoom Math will factor, giving you the answer $(x + 2)(x + 3)$.

Graphing Equations

To graph, press GRAPH instead of ENTER.

In Zoom Math, you can graph equations using the same keystroke sequence that you would use in the calculator's home screen. For example, to graph the line $y = 2x$ in Zoom Math, just type **Y= 2 *X* GRAPH**.

Zoom Faster!
Let Zoom type the *y*= for you!

In Zoom Math, you don't actually need to type the $y =$ part. Just type an expression, such as $x + 2$, and then press **GRAPH**. Zoom Math will automatically insert the $y =$ for you and then graph the equation.

Register your Zoom Math 100 to graph complicated equations.

If Zoom Math is unregistered on your calculator, you will only be able to graph very simple equations. If you have registered Zoom Math on your calculator, you will be able to graph more complicated equations. For example, an unregistered copy of Zoom Math can graph the equation $y = 2x$ or the equation $y = x + 3$, but not the equation $y = 2x + 3$.

When you press **GRAPH** Zoom Math will graph all of the equations you typed since the last problem divider. Problem dividers take the form of a dotted line across your screen. If you are on a blank line immediately following a problem divider, Zoom Math will graph all of the equations you typed between that divider and the previous problem divider. Also, if you are on a blank line immediately after a problem divider, pressing **DEL** will get rid of the problem divider. If you want to insert a problem divider where Zoom Math has not put one, you can press **ENTER** at the start of a blank line.

If you want to graph more than one equation, then press **ENTER** after you type each equation until you get to the last equation. On the last equation that you want to graph, press **GRAPH** instead of **ENTER**. For example, if you want to graph the equations $y = x + 1$ and $y = x + 2$, type **Y= _x_ + 1 ENTER Y= _x_ + 2 GRAPH**.

Remember, if you type two linear equations involving x and y, then Zoom Math 200 will use algebra to calculate the values of x and y where those two lines intersect. After Zoom Math 200 calculates the answer, it prints a problem divider.

So if you want to graph three linear equations on the same screen, you can expect Zoom Math 200 to interrupt with a calculated answer after you type the second equation. Just ignore this answer, press **ENTER** to go on to the next line, and then press **DEL** to delete the problem divider. Now type the third equation and press **GRAPH**. Zoom Math 200 will graph all three linear equations on the same screen, ignoring the calculated answer to the first two equations.

For example, if you want to graph the three equations $y = x + 1$, $y = x + 2$, and $y = x + 3$, then after you type the second equation, Zoom Math 200 will display the solution for the first two equations you typed: **_x_=1, _y_=2**. Press **ENTER** to go on to the next line, press **DEL** to delete the problem divider, and then type the third equation and press **GRAPH**.

In general, Zoom Math 200 will only graph equations that begin with $x =$ or $y =$. However, Zoom Math 200 can also graph simple linear equations that are not solved for x or y. For example, Zoom Math 200 can graph the linear equation $2x + y = 3$.

You can use **Ans** in an equation that you graph. (Press **2nd ANS** to type **Ans**.) For example, if you typed **2 + 2 ENTER**, you will get the answer **4**. On the next line if you type **Y= _x_ + ANS GRAPH**, then that will have the same effect as if you typed **Y= _x_ + 4 GRAPH**.

If you type an equation that Zoom Math cannot graph, then you might get an error message or Zoom Math might just show you graphing axes without a graphed equation on them. For example; if you type **Y=** *y* **+** *y* **GRAPH**, then Zoom Math will give you an error message. If you type **Y=** *x* **÷ 0 GRAPH**, then Zoom Math will just show you an empty graph. If you try to graph more than one equation at a time, then Zoom Math may give you an error message for one of the equations but go ahead and show you the graph of the other equations which do not contain errors.

Viewing Graphs

The Zoom Math graphing screen features *x*- and *y*-axes which are labeled numerically in order to make it easier to read the graph.

Use ◄, ►, ▲, ▼, + and − to view graphs.

If you want to get a better view of a graph you can use the arrow keys to move the graph. Press the **+** key to zoom in for a closer view of a graph. Press the **−** key to zoom out. If you move very far away from the origin, or if you zoom very far in or very far out, then Zoom Math may not label the axes anymore.

Zoom Faster!
Press 0 to jump to the origin or a quadrant number to jump to that quadrant.

To quickly view a particular quadrant of the graph, press the number of that quadrant. For example, to jump to quadrant I, press **1**. To return to the origin press **0** (zero).

When you are finished viewing a graph and want to return to the solution screen, press **GRAPH**, **ENTER** or **CLEAR**. Zoom Math will automatically insert a problem divider after the equations you just graphed, in preparation for your next problem.

Even though a problem divider is inserted when you return to the solution screen, it is still easy to go back to the graph you just viewed. Just press **GRAPH** while you are on a blank line immediately following the problem divider. Also, if you are on a blank line immediately after a problem divider, pressing **DEL** will get rid of the problem divider.

In certain cases, some tick marks will not be labeled if that would make the graph harder to read. For example, if you graph the parabola $y = x^2$, the number two on the *y*-axis will not be labeled, because the label would appear right on top of the graph of the parabola. If you want to see the missing labels, press **MODE** to make all the graph labels appear. Press **MODE** again to return to the normal graph mode.

At this time Zoom Math graphing does not have **WINDOW**, **TRACE** or **2nd CALC** features. If there is a graphing feature that you want Zoom Math to include in the future, feel free to contact us via our website, www.zoommath.com/contact.html.

Showing Steps

To show steps, press TRACE instead of ENTER.

To see the steps of a solution, press **TRACE** instead of **ENTER**. The first time you press **TRACE**, the calculator will show you the first step. To go on to the next step, press either **TRACE** or ►. To go back a step, press ◄. If you want to see a more detailed

step, press ▲; or if you want to see less detail, press ▼. To erase all the steps and return to the problem you typed, press **CLEAR**. To see all remaining steps and go on to the next problem, press **ENTER**.

While you are in **TRACE** mode, you cannot change the way steps look with the **MODE** key. Once you see the bold answer to your problem, you are ready to enter answer mode. Then you can press any mode key to enter answer mode and change the way your answer is displayed.

If you have reached answer mode after being in **TRACE** mode, you must press a mode key before you can use ◄ or ► to change your answer's decimal precision. If you do not press a mode key first, pressing ◄ or ► will keep you in **TRACE** mode.

If you have pressed a mode key to enter answer mode, you can return to **TRACE** mode by pressing **TRACE** again. You might want to do this in order to be able to use ◄ again to back up a step, instead of to change the decimal precision of your answer.

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, the version number of that edition, and your calculator's unique zCode, used in registering Zoom Math.

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/help.html 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.

Chapter

5

Quick Reference

Calculator Keys

Top Row Function Keys

Y= Types an equals sign. Types *y* = when beginning a line.

WINDOW Enters **WINDOW** 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.

ZOOM Displays the Zoom information screen.

TRACE Shows the first step of a solution. Press again for each additional step, until the answer is reached.

GRAPH Graphs one or more equations. If you are already viewing a graph, returns you to the solution screen.

Arrow (Cursor) Keys

All Navigate menu choices.

▲ Up arrow. Moves the cursor up from the denominator to the numerator of a fraction. Changes **ALPHA** cursor from lowercase to uppercase. Starting on a blank line, retypes previous lines sequentially beginning with most recent. In **WINDOW** mode, allows viewing of previous problems. In **GRAPH** mode, moves your view of the graph up. In **TRACE** mode, shows a more detailed step.

◄ 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 **WINDOW** mode, shows more of the answer on the left. In **GRAPH** mode, moves your view of the graph to the left. In **TRACE** mode, goes back one step.

► 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 **WINDOW** mode, shows more of the answer on the right. In **GRAPH** mode, moves your view of the graph to the right. In **TRACE** mode, shows the next step.

▼ Down arrow. Moves the cursor down from the numerator to the denominator of a fraction. Changes **ALPHA** cursor from uppercase to lowercase. After using up arrow to retype previous lines and moving too far back, returns to retype more recent lines. In **WINDOW** mode, allows viewing of more recent problems. In **GRAPH** mode, moves your view of the graph down. In **TRACE** mode, shows less detail.

2nd ◄ Moves cursor to the beginning of the current line.

2nd ► Moves cursor to the end of the current line.

Primary Function Keys

2nd	Activates the **2nd** cursor. Press again to deactivate the **2nd** cursor.
MODE	In answer mode, cycles between all possible ways to display an answer. In **GRAPH** mode, turns on and off labels that clash with the equation(s) graphed.
DEL	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. When on a blank line immediately following a problem divider, deletes the problem divider.
ALPHA	Activates the **ALPHA** cursor. Press again to deactivate the **ALPHA** cursor.
X,T,Θ,*n*	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.
STAT	Not used.
MATH	Accesses the "Math Menu" to select math menu functions.
APPS	When not in Zoom Math, press to get a list of Apps. From the list of Apps, select Zoom Math.
PRGM	Not used.
VARS	Not used.
CLEAR	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. In **GRAPH** mode, returns you to the solution screen. In **TRACE** mode, erases all solution steps and returns you to the original problem.
x^{-1}	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.
SIN	Press to type sin(and enable cursor to enter argument for sine function.
COS	Press to type cos(and enable cursor to enter argument for cosine function.
TAN	Press to type tan(and enable cursor to enter argument for tangent function.
^	Press before entering a complicated exponent. In answer mode, displays answer in scientific notation.
x^2	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.
,	Types a comma.
(and)	Types parentheses.
LOG	Press to type log(and enable cursor to enter argument for log function.
LN	Press to type ln(and enable cursor to enter argument for natural log function.
STO>	Not used.
ON	Press to tell Zoom Math to stop working on a long calculation.

Operation Keys

÷	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.
×	Types a multiplication sign.
−	Types a minus/negative sign. In **GRAPH** mode, zooms out your view of the graph.
+	Types a plus/positive sign. In **GRAPH** mode, zooms in your view of the graph.
ENTER	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. At the start of a blank line, inserts a problem divider if one is not already present. In **GRAPH** mode, returns you to the solution screen. In **TRACE** mode, shows all remaining steps including the solution.

Numeric Keys

0 through **9**	Types the desired digit. A digit immediately following a letter will become an exponent.
0	In **GRAPH** mode, centers your view of the graph to the origin.
1 through **4**	In **GRAPH** mode, jumps your view of the graph to the respective quadrant.
.	Types a decimal point. In answer mode, displays answer as a decimal.
(−)	Types a minus/negative sign.

2nd Function Keys

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

2nd QUIT	Exits Zoom Math.
2nd INS	Activates the insertion cursor. Press again to deactivate the insertion cursor.
2nd A-LOCK	Locks keyboard so that the **ALPHA** cursor does not change back to the normal cursor until you press **ALPHA**.
2nd ANGLE	Changes trig functions between degrees and radians.
2nd SIN⁻¹	Press to type $\sin^{-1}($ and enable cursor to enter argument for inverse sine function.
2nd COS⁻¹	Press to type $\cos^{-1}($ and enable cursor to enter argument for inverse cosine function.
2nd TAN⁻¹	Press to type $\tan^{-1}($ and enable cursor to enter argument for inverse tangent function.
2nd	Types (pi).
2nd √	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.
2nd EE	Press to type ×10 and enable cursor to enter exponent for scientific notation. In answer mode, displays answer in scientific notation.
2nd {	Types the left side of an absolute value symbol.
2nd }	Types the right side of an absolute value symbol.
2nd 10ˣ	Press to type ×10 and enable cursor to enter exponent for scientific notation. In answer mode, displays answer in scientific notation.
2nd eˣ	Press to type *e* and enable cursor to enter exponent.
2nd OFF	Exits Zoom Math and turns calculator off.
2nd ÷	Types a percent sign. In answer mode displays answer as a percentage.
2nd ANS	Types **Ans**, which represents the value of the answer to the previous problem.

ALPHA Function Keys

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

ALPHA ◄	Types < (less than).
ALPHA ◄ Y=	Types ≤ (less than or equal to).
ALPHA ►	Types > (greater than).
ALPHA ► Y=	Types ≥ (greater than or equal to).
ALPHA A through **Z**	Types the desired letter.
ALPHA E	Types *e* (the reserved constant representing the base of the natural log).
ALPHA I	Types *i* (the reserved constant representing the square root of -1).
ALPHA 0 (zero)	Types a space.

Frequently Asked Questions

Visit www.zoommath.com/faq.html for a current list of frequently asked questions and their answers.

Chapter

6

Technical Notes

Program Limitations

You need at least 535 RAM free to start Zoom Math 200. If you run Zoom Math 200 with only 535-2582 RAM free, you will be warned that your memory is low. If you run Zoom Math 200 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, Zoom Math 200 will run normally with no warnings.

Zoom Math 200 will run on the TI-Nspire with the 84-Plus keypad installed.

When you start Zoom Math 200, any Program named DELETEME is automatically deleted, and any AppVar named ZOOMTEMP is automatically deleted. Zoom Math 200 also reserves the right to delete any Program variable called DELME###, where ### stands for a 3-digit number—such as DELME001.

Zoom Math 200 cannot handle lists. If you input a function that yields a list answer, Zoom Math will not display that answer in most cases. The function rand is a special case. In the TI home screen, rand(5) means a list of five random decimal numbers. But in Zoom Math 200, rand(5) means one random decimal number multiplied by five instead.

Zoom Math 200 cannot graph equations which include any of the following Math Menu functions: rand, randInt, randNorm, and randBin.

Zoom Math 200 cannot graph more than 16 equations at once.

Zoom Math 200 does not show every step when solving a rational equation or a radical equation. Zoom Math 200 can solve rational equations and radical equations, but Zoom Math 200 does not show every step of these solutions. If you type a rational equation that has an extraneous solution, then Zoom Math 200 will show most of the steps of the solution, but at the very end of the problem, Zoom Math 200 will eliminate the extraneous solution without showing why. If you type a radical equation, then Zoom Math 200 will show every step until it is time to square both sides of the equation, and then Zoom Math will skip straight to the answer.

Zoom Math 200 sometimes assumes that radicands are positive. **This can lead to a wrong answer.** Zoom Math 200 is designed to handle Algebra 1 problems. Ordinarily, Algebra 1 problems do not involve negative radicands, so Zoom Math 200 generally assumes that radicands

are positive. For example, if you type $\sqrt{x}\sqrt{y}$, then Zoom Math 200 says $\sqrt{x}\sqrt{y} = \sqrt{xy}$. This equation is usually correct, but if *x* and *y* are both negative, then it is incorrect.

Zoom Math 200 cannot store answers that are extremely long and complicated. If an answer is so complicated that it takes up several lines on the screen, then Zoom Math 200 may not be able to store the answer in Ans.

Zoom Math 200 cannot substitute out variables that are within Math Menu functions. Do not type a variable within a Math Menu function, except when the variable is required by the function. For example, Zoom Math 200 can simplify fMin(2*x*, *x*, 0, 1) because the second parameter of the fMin function must be a variable. But Zoom Math 200 cannot simplify fMin(2*y*, *x*, 0, 1), since the value for *y* is not defined within this function.

Zoom Math 200 cannot calculate a Math Menu function that contains Ans. For example, Zoom Math 200 cannot calculate round(Ans).

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 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/contact.html, and tell us what seems wrong.

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/help.html where we may have already answered your question. If you still need help, your next step is to contact I.Q. Joe via our website, www.zoommath.com/contact.html, and we will gladly lend a hand.

TECHNICAL NOTES

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 Registration Key must contain exactly ten digits.
This means you tried to enter a Registration Key that was either too short or too long.

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.

Ans does not have a stored value.
This means you tried to use the **ANS** key, but no previous answer is currently stored there.

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 restart.
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 restart.
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.

Attention: Zoom Math has very little RAM available and may have to restart 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 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.

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 ^ 100 − 10 ^ 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 ^ 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 less than or equal to the corresponding lower bound.
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.

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.

TECHNICAL NOTES

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^2) 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.zoommath.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.zoommath.com for more instructions on how to reset your calculator.

Error: Zoom Math must restart. Please visit errors.zoommath.com (unless you typed a very complicated problem).
In attempting to solve this problem, Zoom Math exceeded an internal limit on how complicated a solution can be. Ordinarily, you can only get this error message if you type an amazingly long and complicated problem. If you see this message after typing an ordinary problem, then Zoom Math did something wrong. Please visit http://errors.zoommath.com to notify us of this error.

Error (#): Zoom Math must restart. Please visit the webpage errors.zoommath.com.
You should never see this error, but if you do see it, something unusual may be going on. Please visit http://errors.zoommath.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/contact.html.

In Zoom Math, a relation cannot be part of a larger expression.
This means you used more than one relational operator in an expression or else you included a relational operator within parentheses, within a fraction or within something else.

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.

That's not the correct Registration Key for this calculator.

You entered an incorrect Registration Key. Most likely, you have typed in your Registration Key incorrectly, so try again, after verifying that you have typed the correct sequence of digits. If it still does not work, contact I.Q. Joe via our website, www.zoommath.com/contact.html.

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**.

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**.

Until you register, Zoom Math 200 can only graph equations that are very simple.

In general, only very short equations can be graphed without registering Zoom Math 200. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math 200 cannot show the steps of a solution.

This means you have tried to show solution steps by pressing the **TRACE** key, even though you have not yet registered Zoom Math 200. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math cannot divide polynomials.

This means you have tried to solve a problem involving polynomial division, even though you have not yet registered Zoom Math 200. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math cannot factor polynomials, so this answer may not be completely simplified.

This means you have tried to solve a problem involving factoring polynomials. While unregistered, Zoom Math 200 will simplify an expression as much as it can without factoring, but you need to register Zoom Math 200 if you want it to factor polynomials. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math cannot solve an equation for a variable.

This means you have tried to solve an equation for a variable, even though you have not yet registered Zoom Math 200. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math cannot solve equations.

This means you have tried to solve an equation, even though you have not yet registered Zoom Math 200. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math cannot solve inequalities.
This means you have tried to solve an inequality, even though you have not yet registered Zoom Math 200. To register, press **ZOOM** and follow directions.

Until you register, Zoom Math cannot solve systems of equations.
This means you have tried to solve a system of equations, even though you have not yet registered Zoom Math 200. To register, press **ZOOM** and follow directions.

Zoom Math 200 cannot simplify that expression.
This means you have entered an expression that cannot be simplified by Zoom Math 200. For example, simplifying the expression you entered may require a higher level of math than Zoom Math 200 understands.

Zoom Math 200 cannot solve that equation.
This means you have entered an equation that cannot be solved by Zoom Math 200. For example, solving the equation you entered may require a higher level of math than Zoom Math 200 understands.

Zoom Math 200 cannot solve that inequality.
This means you have entered an inequality that cannot be solved by Zoom Math 200. For example, solving the inequality you entered may require a higher level of math than Zoom Math 200 understands.

Zoom Math cannot display a graph with this level of precision, so Zoom Math will now reset to the default position.
Zoom Math cannot calculate numbers with more than a certain amount of significant digits. This message may appear if you move the graph very far from the origin, or zoom very far in or out, or some combination of moving the graph and zooming in or out.

Zoom Math cannot graph an equation unless it is solved for *x* or *y*, or it is a simple linear equation.
If you wish to graph an equation, it must begin with "$x =$," or "$y =$," or else be a simple linear equation.

Zoom Math cannot graph an equation which contains rand.
Zoom Math cannot graph equations which include any of the following Math Menu functions: rand, randInt, randNorm, and randBin.

Zoom Math cannot graph an equation which does not include *x* or *y*.
If you wish to graph an equation, it must include either the variable x, or the variable y, or both.

Zoom Math cannot graph more than 16 equations, so only the first 16 equations you typed will be graphed.
Zoom Math can graph up to 16 equations at once, but no more than that.