TEXAS INSTRUMENTS

Getting Started with the TI-84 Plus T Graphing Calculator

This guidebook applies to software version 5.1. To obtain the latest version of the documentation, go to *education.ti.com/go/download*.

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Using Your TI-84 Plus T Graphing Calculator

The TI-84 Plus T graphing calculator comes with a USB cable, plenty of storage and operating memory. It includes software applications (Apps) to help you perform pre-algebra, calculus, and science calculations.

Key Features

- **Familiar TI-84 Plus graphing calculator functionality**
    - Same menu structure and navigation as the TI-84 Plus
    - Built-in MathPrint™ functionality to input and view math symbols, formulas, and a fraction template

- **Essential Functions**
    - Cartesian and Sequence Graphing
    - Parametric and Polar Graphing
    - Numeric Table of Values
    - Statistics and Distributions
    - Numeric Solver
    - TI-Basic Programming
    - Matrix Computations

- **Built-in Applications (Apps)**
    - Extend the functionality of your calculator:
        - Cabri™ Jr
        - CellSheet™
        - Conic Graphing
        - Vernier EasyData™
        - Inequality Graphing
        - Periodic Table
        - Polynomial Root Finder and Simultaneous Equation Solver
        - Probability Simulations
        - Science Tools
        - Transformation Graphing
        - Language Localization Apps

- **Exam Mode and Exam LED**
    - The TI-84 Plus T contains an exam mode setting with an exam LED feature.

Use this guide to learn more about these features and other essential tools of your TI-84 Plus T graphing calculator.

Keyboard Basics

This section covers basic graphing calculator settings and explains how to navigate the home screen and menus.

Turning the TI-84 Plus T On and Off

This section covers basic on and off features for your graphing calculator.

Turning the Graphing Calculator On

Press [on].

An information screen displays:

```
PRESS ALPHA F1-F4
   TO LOCATE
 SHORTCUT MENUS.
1: DO NOT SHOW AGAIN
2: CONTINUE
```

- Press [1] to continue to the home screen but not see this information screen the next time you press [on].

  -or-

- Press [2] to continue to the home screen.

  Note: Any entry from this information screen will take you to the home screen (a blank screen).

The information screen shows the following for information purposes only. You must go to the home screen before you can complete the following.

- Press [alpha] [f1] - [f4] to locate shortcut menus.

  Note: This message also displays when you reset RAM.

Turning the Graphing Calculator Off

Press [2nd] [off].

- The Constant Memory™ function retains settings and memory, and clears any error condition.
- Press [▲] (if the home screen is blank), to scroll through the calculator history.
- If you turn off the TI-84 Plus T and connect it to another graphing calculator or personal computer, any communication will "wake" it up.

Automatic Power Down™ (APD™)

- To prolong battery-life, APD™ automatically turns the TI-84 Plus T off after about three minutes of inactivity.

- If APD™ turns the graphing calculator off, it will return as you left it, including the display, cursor, and any error.

Note: To prolong battery-life, turn off Exam Mode after an exam and make sure the Exam LED is not blinking. (See section on Exam Mode and Exam LED.)

Using the TI-84 Plus T Keyboard

This section describes the functions of specific keys on the graphing calculator keyboard.

TI-84 Plus T Keyboard

❶ **Graph/Plot Setup Keys** allow access to interactive graphing features.

❷ **Editing Keys** allow you to edit expressions and values.

❸ **Math and Statistics Keys** display menus that access math, statistics, and other basic functions.

❹ **Scientific Keys** allow access to the capabilities of a standard scientific calculator—including trigonometric functions.

❺ **Number Keys** allow you to enter numbers.

❻ **Common Math Functions** allow you to divide, multiply, subtract, and add.

Function Keys

❶ 2nd   Access the second function printed to the left above each key.

❷ alpha   Access the third function printed to the right above each key.

❸ alpha   Access shortcut menus for
[f1] -   fraction templates, n/d, quick
[f4]   matrix entry, select **MATH** menus, and **VARS** menu functions.
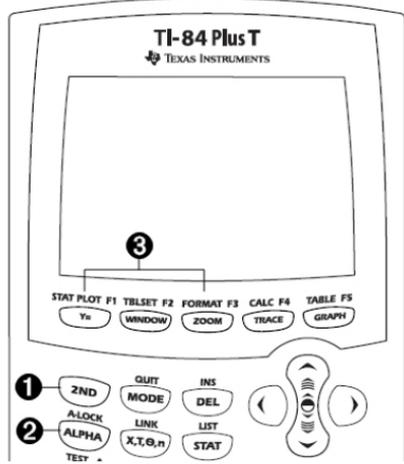
Using the Function Keys

Primary Function	The function appears on the key. **Ex:** to display the **MATH** menu, press math.
Secondary Function	The function appears above the key in the same color as the 2nd key. When you press the 2nd key, the key name printed above the other key becomes active for the next keystroke. **Ex:** to display the **TEST** menu, press 2nd and then math. The flashing cursor becomes ⬛ when you press 2nd. ⬛ may also appear in the status bar.
Third Function	The function appears above the key in the same color as the alpha key. The third function allows you to enter alphabetic characters and special symbols, and to access [solve] and shortcut menus. **Ex:** to display the letter **A**, press alpha and then math. To enter several alphabetic characters in a row, press 2nd [A-lock] to lock the alpha key in the ON position and avoid having to repeatedly press alpha. Press alpha again to unlock it. The flashing cursor becomes ⬛ when you press alpha. ⬛ may also appear in the upper right-hand corner of the screen.

Setting the Display Contrast

This section covers how to set the display brightness and explains automatic dimming.

Adjusting the Display Contrast

You can adjust the display contrast to suit your viewing angle and lighting conditions.

To adjust the contrast, follow these steps.

▶ Press ⟦2nd⟧ ⟦▾⟧ to darken the screen one level at a time.

▶ Press ⟦2nd⟧ ⟦▴⟧ to lighten the screen one level at a time.

The TI-84 Plus T retains the contrast setting in memory when it is turned off.

Using the Home Screen

Use the home screen to enter instructions and evaluate expressions. Answers appear on the same screen. Most calculations are stored in home screen history. Press ⏶ and ⏷ to scroll through the entry history and paste the entries or answers to the current entry line.

$$\sqrt{3^2+4^2}$$
$$5$$
$$\tfrac{1}{2}+\tfrac{3}{5}$$
$$\tfrac{11}{10}$$

$$|\text{-}25-9|$$
$$34$$
$$\tfrac{d}{dx}(x^2)\big|_{x=2}$$
$$4$$

Enter a calculation.

Press 2nd [quit] from any screen until you get back to the home screen.

Press 2nd [√] **3** x² + **4** x² ▶ + **6** enter

$$\sqrt{3^2+4^2}+6$$
$$11$$

Note: When you are in a MathPrint™ template, the cursor turns into a right arrow ▶ to indicate that you must press ▶ to get out of the template before you continue entering the calculation.

$$\sqrt{3^2+4^2}▶$$

Displaying Entries and Answers

Mode settings control how the TI-84 Plus T interprets expressions and displays answers. Press mode to switch between classic entries and MathPrint™ mode. This guide focuses on MathPrint™ Mode, but may reference some classic entries.

MathPrint™ Mode

- If an expression exceeds one line, it may scroll off the screen (on the home screen or the Y=screen). Press ▶ to see the entire expression.

  Tip: Press the cursor without pressing 2nd to move the cursor along the line.

- An arrow appears to the left of an answer if it scrolls off the screen. Press ▶ and ◀ before you enter another expression to display the entire answer.

Classic Entries	MathPrint™
1/2	$\frac{1}{2}$
sqrt (5)	$\sqrt{5}$
nDerive (x^2, x, 1)	$\frac{d}{dx}\left(x^2\right)\mid x=1$
Some input areas in MathPrint™ mode only support classic entries. Ex: 2nd [tablset]	

MathPrint™ (default)
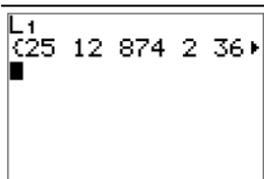
L₁ {25 12 874 2 36 ▶ ■	Entry Answer (Scrolls)
$\frac{11}{2}$*X³+5.2X+3.8X▶ 2.786666667	Entry (Scrolls) Answer
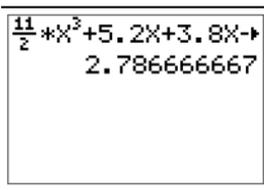
Scrolling Through the Home Screen History

If all lines of the display are full, text scrolls off the top of the display.

You can scroll up through previous entries and answers on the home screen, even if you have cleared the screen. When you find an entry or answer that you want to use, you can select it and paste it (press enter) on the current entry line.

Note: List and matrix answers cannot be copied and pasted to the new entry line. However, you can copy the list or matrix command to the new entry line and execute the command again to display the answer.

▶   Press ▲ or ▼ to move the cursor to the entry or answer you want to copy and then press enter.

   The TI-84 Plus T highlights the entry the cursor is on to help you select your desired choice.
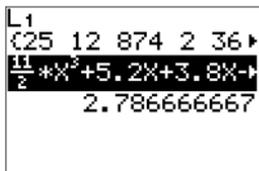
   The entry or answer that you copied is automatically pasted on the current input line at the cursor location.

   Note: If the cursor is in a MathPrint™ expression, such as the denominator of a fraction, press alpha ▲ to move the cursor out of the expression and then move the cursor to the entry or answer you want to copy to that location in the MathPrint™ template.

▶   Press clear or del to delete an entry/answer pair. After an entry/answer pair has been deleted, it cannot be displayed or recalled again.

Returning to the Home Screen

To return to the home screen from any other screen, press 2nd [quit] until you get back to home screen.

Using Shortcut Menus

❶ alpha [f1]
Opens FRAC menu.

❷ alpha [f2]
Opens FUNC menu.

❸ alpha [f3]
Opens MTRX menu.
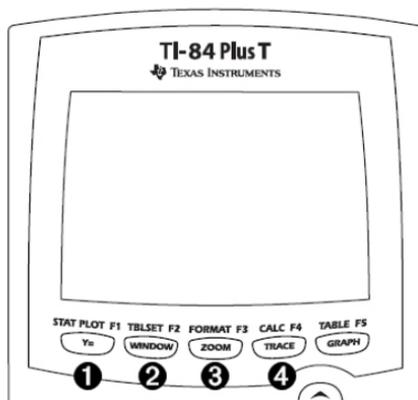
❹ alpha [f4]
Opens VARS menu.

Shortcut menus allow quick access to the following:

[f1]   Templates to enter fractions, and to toggle between whole and mixed fractions, and fractions and decimals.

[f2]   Selected functions from the MATH MATH and MATH NUM menus as you would see them in a textbook, when in MathPrint™ mode. Functions include absolute value, numeric differentiation, numeric integration, summation, and log base n.

[f3]   Quick MathPrint™ matrix entry, when available.

[f4]   Names of function variables such as Y1 from the VARS Y-VARS menu.

To open a shortcut menu, press alpha plus the corresponding F-key: [f1] for FRAC, [f2] for FUNC, [f3] for MTRX, and [f4] for YVAR.

To select a menu item:
-either-

▸   Press the number corresponding to the item.

-or-

▸   Use the arrow keys to move the cursor to the appropriate line and then press enter.

You can select all shortcut menu items except matrix templates using standard menus. For example, you can choose the summation template from several places:

FUNC shortcut menu
alpha [f2]

```
1: abs(
2 Σ(
3: nDeriv(
4: fnInt(
5: logBASE(
FRAC FUNC MTRX YVAR
```

math MATH menu

```
MATH NUM CPX PRB
6↑fMin(
7:fMax(
8:nDeriv(
9:fnInt(
0 summation Σ(
A:logBASE(
B:Solver…
```
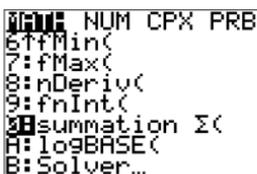
The shortcut menus are available to use where input is allowed. If the calculator is in Classic mode, or if a screen is displayed that does not support MathPrint™ display, entries will be displayed in Classic mode. The MTRX menu is only available in MathPrint™ mode on the home screen and in the Y= editor.

Note: Shortcut menus may not be available if alpha plus F-key combinations are used while an application is running.

Display Cursors

The cursor may change to indicate what will happen when you press the next key or when you select the next menu item to be pasted as a character.

Note: The second cursor █ and alpha cursor █ may appear on the status bar, depending on the context.

Cursor	Appearance	Effect of Next Keystroke
Entry	Solid rectangle ■	This is the default cursor. Enter characters at this cursor; this overrides any existing character.
Insert	Underline __	Press [2nd] [ins] for this cursor. Enter characters in front of the cursor location.
Second	Reverse arrow █	This allows you to enter a 2nd character or complete a 2nd operation.
Alpha	Reverse A █	An alpha character is entered, **SOLVE** is executed, or shortcut menus are displayed.
Full	Checkerboard rectangle ▦	No entry; the maximum characters are entered at a prompt or memory is full. Also indicates the limit of the allowed MathPrint™ mode levels.
MathPrint™	Right arrow ▶	The cursor moves to either the next part of the template or out of the template. Press the right arrow to move out of all MathPrint™ templates before entering the remaining terms in an expression.

If you press [alpha] during an insertion, the cursor becomes an underlined **A (A)**. If you press [2nd] during an insertion, the underlined cursors becomes an underlined ↑ (↑).

Note: If you highlight a small character such as a colon or a comma and then press [alpha] or [2nd], the cursor does not change because the cursor width is too narrow.

Busy Indicator

When the TI-84 Plus T is calculating or graphing, a vertical moving line is displayed as a busy indicator in the top-right corner of the screen. When you pause a graph or a program, the busy indicator becomes a vertical moving dotted line.

Working with Menus

You can access TI-84 Plus T commands using menus.

Displaying a Menu

- When you press a key to display a menu, that menu temporarily replaces the screen where you are working.
- **Ex:** press [math] to display the **MATH** menu.
- After you select an item from a menu, the screen where you are working usually displays again.

Moving from One Menu to Another

Some keys access more than one menu. When you press such a key, the names of all accessible menus are displayed on the top line. When you highlight a menu name, the items in that menu are displayed. Press ▶ and ◀ to highlight each menu name.

Note: FRAC shortcut menu items are found in the FRAC menu, and are also found on the MATH NUM menu. FUNC shortcut menu items are also found on the MATH MATH menu.

```
MATH NUM CPX PRB
1▌abs(
2:round(
3:iPart(
4:fPart(
5:int(
6:min(
7↓max(
```

Scrolling a Menu

To scroll down the menu items, press ▼. To scroll up the menu items, press ▲.

To page down six menu items at a time, press [alpha] ▼. To page up six menu items at a time, press [alpha] ▲.

To go to the last menu item directly from the first menu item, press ▲. To go to the first menu item directly from the last menu item, press ▼.

Selecting an Item from a Menu

You can select an item from a menu in two ways.

Press the number or letter of the item you want to select. The cursor can be anywhere on the menu, and the item you select does not need to be displayed on the screen.

```
MATH NUM CPX PRB
1▌abs(
2:round(
3:iPart(
4:fPart(
5:int(
6:min(
7↓max(
```

-or-

Press ▼ or ▲ to move the cursor to the item you want, and then press [enter].

Leaving a Menu without Making a Selection

You can leave a menu without making a selection in these two ways.

- Press [2nd] [quit] to return to the home screen.

-or-

• Press clear to return to the previous screen.

Using Menus

When you press a key or key combination to display a menu, one or more menu names appear on the top line of the screen.

• The menu name on the left side of the top line is highlighted. Up to seven items in that menu are displayed, beginning with item 1, which also is highlighted.

• A number or letter identifies each item's place in the menu. The order is 1 through 9, then 0, then A, B, C. Once number and letter options are exhausted, the item number or letter area will be blank. Select these items using the arrow keys.

• When the menu continues beyond the displayed items, a down arrow (↓) replaces the colon next to the last displayed item.

• When a menu item ends in an ellipsis (**…**), the item displays a secondary menu, editor, or wizard when you select it.

• When an asterisk (*) appears to the left of a menu item, that item is stored in user data archive. You must move other files (displayed with an asterisk) from archive to RAM in the MEM menu to use those files in the calculator.

MATH Menus

The following are the MATH menus.

```
MATH NUM CPX PRB      MATH NUM CPX PRB
1:▶Frac               1:abs(
2:▶Dec                2:round(
3:³                   3:iPart(
4:³√(                 4:fPart(
5:ˣ√                  5:int(
6:fMin(               6:min(
7↓fMax(               7↓max(
```

```
MATH NUM CPX PRB      MATH NUM CPX PRB
7:fMax(               8:lcm(
8:nDeriv(             9:gcd(
9:fnInt(              0:remainder(
0:summation Σ(        A:▶n/d◀▶Un/d
A:logBASE(            B:▶F◀▶D
B:Solver…             C:Un/d
                      D:n/d
```

Scroll down when you see the (↓) to see the whole menu.

```
MATH NUM CPX PRB      MATH NUM CPX PRB
1:conj(               1:rand
2:real(               2:nPr
3:imag(               3:nCr
4:angle(              4:!
5:abs(                5:randInt(
6:▶Rect               6:randNorm(
7:▶Polar              7↓randBin(
```

```
MATH NUM CPX PRB
2:nPr
3:nCr
4:!
5:randInt(
6:randNorm(
7:randBin(
8:randIntNoRep(
```

Setting Up the Calculator Modes

Mode settings control how the calculator displays and interprets:

• Answers

• Elements of lists and matrices

• Graphs

• Language settings

• Numbers

Setting Modes

To set calculator modes, press mode.
The following menu appears on your screen:

```
NORMAL  SCI  ENG          ↑BACK↑
FLOAT  0123456789     MATHPRINT  CLASSIC
RADIAN  DEGREE        Rad  Un∕d
FUNC  PAR  POL  SEQ   ANSWERS: AUTO  DEC
CONNECTED  DOT        GOTO FORMAT GRAPH: NO  YES
SEQUENTIAL  SIMUL     STAT DIAGNOSTICS: OFF  ON
REAL  a+bi  re^θi     STAT WIZARDS: ON  OFF
FULL  HORIZ  G-T      SET CLOCK 08/21/15 7:49PM
        ↓NEXT↓
```

Mode settings control how the calculator displays and interprets:

Answers	Language settings
Elements of lists and matrices	Numbers
Graphs	

Note: The Constant Memory™ feature retains mode settings when the unit is turned off.

Changing Mode Settings

To change mode settings, follow these steps:

1. Press ▼ or ▲ to move the cursor to the line of the setting that you want to change.

2. Press ▶ or ◀ to move the cursor across the line to the desired setting.

3. Press enter to select a setting.

MATHPRINT™ CLASSIC

MATHPRINT™mode displays most inputs and outputs the way they are shown in

textbooks, such as $\frac{1}{2}+\frac{3}{4}$ and .

CLASSIC mode displays expressions and answers as if written on one line, such as 1**/**2 + 3**/**4. (Fraction bars appear as thick lines. A division operation will appear as a thin slash mark.)

Note:

- Some areas in **MATHPRINT**™ mode display in classic (one line) formats.
- If you switch between these modes, most entries (except matrix calculations) will be preserved.

NORMAL   SCI   ENG

Answers are displayed in standard formats when the calculation or setting forces a decimal result on the calculator.

Notation for 12345.67	Decimal answer displays as:
NORMAL 12345.67 Retains the decimal notation up to limits of the calculator display and memory.	12345.67
SCI (Scientific 1.234567×10^{4}) One digit to the left of the decimal with the appropriate power of 10 to the right of *E.	1.234567E4
ENG (Engineering) 12.34567×10^{3} Up to three digits before the decimal and the power of 10 (to the right of E) is a multiple of three.	12.34567E3

Note:

The keypad contains $\boxed{\text{2nd}}$ $\boxed{\text{EE}}$, which displays as E on the calculator. *This E in the display stands for "x10" and the number entered after E becomes the power of 10. The calculator notation, E, designates the "x10" part of the number without using extra parentheses. The calculator then follows the order of operations as expected when using SCI or ENG notation. This notation, E, is not typically accepted on homework and exams, and written results should use the standard notation, for example, the 1.234567×10^{4}.

If you select **NORMAL** notation, but the answer cannot display in 10 digits (or the absolute value is less than .001), the TI-84 Plus T expresses the answer in scientific notation.

FLOAT 0 1 2 3 4 5 6 7 8 9

FLOAT (floating) decimal mode displays up to 10 digits, plus the sign and decimal. **FLOAT** will display in the status bar.

Selecting **0123456789** specifies the number of digits (0 through 9) to display to the right of the decimal for decimal answers. FIX# will display in the status bar.

The decimal setting applies to **NORMAL, SCI, and ENG** notation modes.

The decimal setting applies to these numbers, with respect to the **ANSWER** mode setting:

- An answer displayed on the home screen
- Coordinates on a graph
- The **Tangent(** DRAW instruction equation of the line, x, and **dy/dx** values
- Results of calculated operations
- The regression equation stored after the execution of a regression model

---

RADIAN   DEGREE

Angle modes control how the calculator interprets angle values in trigonometric functions and polar/rectangular conversions. The **RADIAN** or **DEGREE** setting will display in the status bar.

RADIAN mode interprets angle values as radians. Answers display in radians.

DEGREE mode interprets angle values as degrees. Answers display in degrees. Polar complex number arguments are always interpreted in radians.

FUNCTION   PARAMETRIC   POLAR   SEQ

Graphing modes define the graphing parameters.

FUNCTION graphing mode plots functions, where Y is a function of X.

PARAMETRIC graphing mode plots relations, where X and Y are functions of T.

POLAR graphing mode plots functions, where **r** is a function of θ.

SEQUENCE graphing mode plots sequences.Three sequences are available: u, v, and w as functions of n.

CONNECTED   DOT

Line Style:	Graphs as:
CONNECTED	Connected plotting mode draws a line conecting each point calculated for the selected functions.
DOT	Dot plotting mode plots only the calculated points of the selected functions.

SEQUENTIAL   SIMUL

SEQUENTIAL graphing-order mode evaluates and plots one function completely before the next function is evaluated and plotted.

SIMUL (simultaneous) graphing-order mode evaluates and plots all selected functions for a single value of X and then evaluates and plots them for the next value of X.

Note: Regardless of which graphing mode is selected, the calculator will sequentially graph all stat plots before it graphs any functions.

REAL   a+b*i*   re^(θ*i*)

REAL mode does not display complex results unless complex numbers are entered as input.

Two complex modes display complex results.

- **a+b*i*** (rectangular complex mode) displays complex numbers in the form a+b*i*.
- **re^(θ*i*)** (polar complex mode) displays complex numbers in the form **re^(θ*i*)**.

Note: The TI-84 Plus T does not support a complex number as a value in a fraction numerator and denominator.

FULL   HORIZONTAL   GRAPH-TABLE

FULL screen mode uses the entire screen to display a graph or edit screen.

Each split-screen mode displays two screens simultaneously.

- **HORIZONTAL** mode displays the current graph on the top half of the screen; it displays the home screen or an editor on the bottom half.
- **GRAPH-TABLE** mode displays the current graph on the left half of the screen; it displays the table screen on the right half.
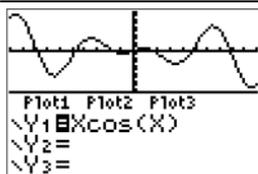
Horizontal
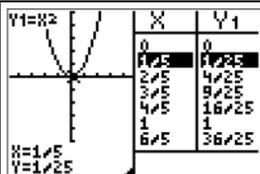
Graph-Table

FRACTION TYPE: n/d   Un/d

n/d displays results as a simple fraction. Fractions may contain a maximum of six digits in the numerator; the value of the denominator may not exceed 9999.

Un/d displays results as a mixed number, if applicable. **U, n,** and **d** must be all be integers. If **U** is a non-integer, the result may be converted **U n/d**. If **n** or **d** is a non-integer, a syntax error is displayed. The whole number, numerator, and denominator may each contain a maximum of three digits.

ANSWERS: AUTO   DEC

AUTO displays answers in a similar format as the input. For example, if a fraction is entered in an expression, the answer will be in fraction form, if possible. If a decimal appears in the expression, the output will be a decimal number.

DEC displays answers as integers or decimal numbers.

Note: The **ANSWERS** mode setting also affects how values in sequences, lists, and tables are displayed. You can also convert values from decimal to fraction or fraction to decimal using ▶**FRAC**, ▶**DEC**, and ▶**F**◀ ▶**D** located in the **FRAC** shortcut menu.

STAT DIAGNOSTICS: OFF   ON

OFF displays a statistical regression calculation *without* the correlation coefficient (r) or the coefficient of determination (r^2).

ON displays a statistical regression calculation *with* the correlation coefficient (r), and the coefficient of determination (r^2), as appropriate.

STAT WIZARDS: ON   OFF

ON: Selection of menu items in **MATH PROB, STAT, CALC, DISTR DISTR, DISTR DRAW** and **seq(** in LIST OPS displays a screen which provides syntax help (wizard) for the entry of required and optional arguments into the command or function. The function or command will paste the entered arguments to the Home Screen history or to most other locations where the cursor is available for input. Some calculations will compute directly from the wizard. If a command or function is accessed from [catalog] the command or function will paste without wizard support.

OFF: The function or command will paste to the cursor location with no syntax help (wizard).

SET CLOCK

Use the clock to set the time and date, select the clock display format, and turn the clock on and off. The clock is turned on by default and is accessed from the mode screen.

Displaying the Clock Settings

Press mode.

Press ▲ ▲ to move the cursor to **SET CLOCK**.

Press enter to change clock settings.
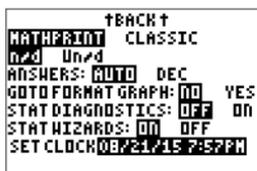
Note: You may have to reset the clock if your battery power runs out.
See education.ti.com for future updates on the battery and battery preservation features.

Note: You can turn off the clock using ClockOff and Clock On in Catalog.

Using the Special Character Set

The TI-84 Plus T **CATALOG** provides an item called **CHARACTER** if the Language Localizer App is running. You will find this item listed after several English commands in **CATALOG.** You can use this item to access special characters and accent marks for display messages and text strings that you want to store to a variable. You cannot use them in variable names.

Press 2nd [catalog] to display the **CATALOG**.

Note: If running a Language Localizer App, a **CHARACTER** editor is listed after any commands that remain in English.

Press ENTER to display the **CHARACTER** screen.

Accent marks appear in the menus at the bottom of the screen.
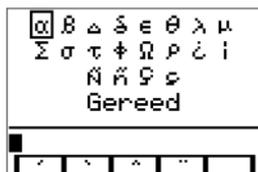
You can:

Select a special character:

Press ◄, ►, ▼, or ▲ to move the box to the special character that you want to use in a message or text string.

Press ENTER to place the character on the edit line.

Press ◄, ►, ▼, or ▲ to move the box to **Done**.

Press ENTER to paste the contents of the edit line to the previous screen.

-or-

Add an accent mark to a character:

Press the function key ([F1], [f2], [F3], [F4], or [F5]) immediately above the accent mark to select it. The ALPHA uppercase mode is automatically turned on. To change to lowercase, press ALPHA.

Press the key associated with the alpha character that you want to accent, for example, [A] (above math). The accented character is displayed in the edit line.

Press ◄, ►, ▼, or ▲ to move the box to **Done**.

Press ENTER to paste the contents of the edit line to the previous screen.

Evaluating Expressions

An expression is a group of

- numbers,
- variables,
- functions and their arguments,

    -or-

- a combination of these elements.

An expression evaluates to a single answer.

On the TI-84 Plus T, you enter an expression in the same order as you would write it on paper. For example: πR^2 is an expression.

Order of Operations

The TI-84 Plus T uses an order of operations system called Equation Operating System (EOS™), which

- defines the order in which functions in expressions are entered and evaluated

    -and-

- allows you to enter numbers and functions in a simple, straightforward sequence.

EOS™ evaluates the functions in an expression in this order:

Order	Function
1	Functions that precede the argument, such as **sin(** or **log(**
2	Functions that are entered after the argument, such as 2, -1, !, °, r, and conversions
3	Powers and roots, such as 2^5 or $_5{}^x\sqrt{32}$
4	Permutations (**nPr**) and combinations (**nCr**)
5	Multiplication, implied multiplication, and division
6	Addition and subtraction
7	Relational functions, such as > **or**
8	Logic operator **and**
9	Logic operators **or** and **xor**

Note: Within a priority level, EOS™ evaluates functions from left to right. Calculations within parentheses are evaluated first. A number in scientific or engineering notation, 2.34E6, is interpreted as (2.3×10^6) with parentheses so the number remains the correct value during the EOS™ calculation.

Implied Multiplication

The TI-84 Plus T recognizes implied multiplication, so you do not need to press ⊠ to express multiplication in all cases. For example, the TI-84 Plus T interprets **2π**, **4sin (46)**, **5(1+2)**, and **(2✻5)7** as implied multiplication.

Note: TI-84 Plus T implied multiplication rules differ from those of some other graphing calculators. For example, the TI-84 Plus T evaluates **1/2X** as **(1/2)X**, while some graphing calculators may evaluate **1/2X** as **1/(2X).**

Parentheses

The TI-84 Plus T completes all calculations inside a pair of parentheses first. For example, in the expression **4(1+2)**, EOS™ first evaluates the portion inside the parentheses, 1+2, and then multiplies the answer, 3, by 4.

Negation

To enter a negative number, use the negation key. Press ⊡ and then enter the number. On the TI-84 Plus T, negation is in the third level in the EOS™ hierarchy. Functions in the first level, such as squaring, are evaluated before negation.

Example: $^-x^2$, evaluates to a negative number (or 0). Use parentheses to square a negative number.

Note: Use the ⊟ key for subtraction and the ⊡ key for negation. If you press ⊟ to enter a negative number, as in **9** ⊠ ⊟ **7**, or if you press ⊡ to indicate subtraction, as in **9** ⊡ **7**, an error occurs. If you press alpha **A** ⊡ alpha **B**, it is interpreted as implied multiplication (**A**)(⁻**B**).

Entering Expressions and Instructions

You can use an expression on the home screen to calculate an answer. In most places where a value is required, you can use an expression to enter a value.

```
(1/3)²
        .1111111111
1²
3
             1
             9
■
```

```
WINDOW
 Xmin=-10
 Xmax=10
 Xscl=1
 Ymin=-10
 Ymax=10
 Yscl=1
↓Xres=1
```
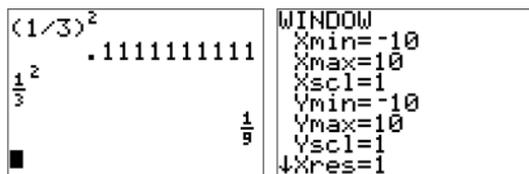
Entering an Expression

To create an expression, you enter numbers, variables, and functions using the keyboard and menus. An expression is evaluated when you press enter, regardless of the cursor location. The entire expression is evaluated according to EOS™ rules, and the answer is displayed according to the mode setting for Answer.

Note: Most TI-84 Plus T functions and operations are symbols comprising several characters. You must enter the symbol from the keyboard or a menu; do not spell it out. For example, to calculate the log of 45, you must press log **45**. Do not enter the letters **L**, **O**, and **G**. If you enter **LOG**, the TI-84 Plus T interprets the entry as implied multiplication of the variables **L**, **O**, and **G**.

To enter a matrix name:

1. Press 2nd [matrix].

    The Matrix Names menu appears.

2. Press the number on the keypad that corresponds with the desired Matrix Name.
    Ex: Press 1 for [A] as shown.

```
NAMES MATH EDIT
1:[A]
2:[B]
3:[C]
4:[D]
5:[E]
6:[F]
7↓[G]
```
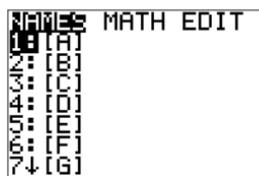
Note: In MathPrint™ mode, press ▶ to get out of the MathPrint™ template and continue entering the expression.

Calculate $3.76 \div (\text{-}7.9 + \sqrt{5}) + 2 \log 45$.

MathPrint™	Classic
3 . **76** ÷ ((-) **7** . **9** + 2nd [√] **5** ▶) enter **Note:** The ▶ is a notable keystroke difference as compared to Classic.	**3** . **76** ÷ ((-) **7** . **9** + 2nd [√] **5**)) enter

```
3.76/(-7.9+√5)
        -.6638497752
■
```

```
3.76/(-7.9+√(5))
        -.6638497752
```

Multiple Entries on a Line

To enter two or more expressions or instructions on a line, separate them with colons (alpha [:]). All instructions are stored together in last entry (ENTRY).

```
5→A:2→B:A/B
            2.5
■
```

Entering a Number in Scientific Notation

1. Enter the part of the number that precedes the exponent. This value can be an expression.

2. Press 2nd [EE]. E is pasted to the cursor location.

3. Enter the exponent, which can be one or two digits.

   Notes:

- If the exponent is negative, press (-), and then enter the exponent.

- E stands for "x10" and the calculator interprets the entire number as $(1.23.45 \times 10^{-2})$ as if it was entered with parentheses.

```
123.45E-2
          1.2345
```

When you enter a number in scientific notation, the TI-84 Plus T does not automatically display answers in scientific or engineering notation. The mode settings and the size of the number determine the display format.

Functions

A function returns a value. For example, **log(** and **sin(** are functions. In general, the first letter of each function is lowercase. Most functions take at least one argument, as indicated by an open parenthesis following the name. For example, **sin(** requires one argument, **sin (**value).

Instructions

An instruction (command) initiates an action on the calculator. For example, **ClrDraw** is an instruction to the calculator to clear drawn elements from a graph. Instructions cannot be used in expressions. In general, the first letter of each instruction name is uppercase. Some instructions take more than one argument, as indicated by an open parenthesis at the end of the name. For example, on the TI-84 Plus T, **Circle(** requires three arguments: **Circle(**X**,**Y**,**$radius$**)**.

Interrupting a Calculation

To interrupt a calculation or graph in progress, which is indicated by the busy indicator in the status bar, press $\boxed{\text{on}}$.

When you interrupt a calculation, a menu is displayed.

• To return to the home screen, select **1:Quit**.

• To go to the location of the interruption, select **2:Goto**.

When you interrupt a graph, a partial graph is displayed.

• To return to the home screen, press $\boxed{\text{clear}}$ or any non-graphing key.

• To restart graphing, press a graphing key or select a graphing instruction.

TI-84 Plus T Edit Keys

Keystrokes	Result
$\boxed{\blacktriangleright}$ or $\boxed{\blacktriangleleft}$	Moves the cursor within an expression; these keys repeat if held down on the keypad.
$\boxed{\blacktriangle}$ or $\boxed{\blacktriangledown}$	Moves the cursor from line to line within an expression that occupies more than one line; these keys repeat if held down on the keypad.
	Moves the cursor from term to term within an expression in MathPrint™ mode; these keys repeat if held down on the keypad.
	On the home screen, scrolls through the history of entries and answers.
$\boxed{\text{2nd}}$ $\boxed{\blacktriangleleft}$	Moves the cursor to the beginning of an expression.
$\boxed{\text{2nd}}$ $\boxed{\blacktriangleright}$	Moves the cursor to the end of an expression.
$\boxed{\text{alpha}}$ $\boxed{\blacktriangle}$	Moves the cursor out of a MathPrint™ expression and up into history on the home screen.
	Moves the cursor from a MathPrint™ expression to the previous Y-var in the Y=editor.
$\boxed{\text{alpha}}$ $\boxed{\blacktriangledown}$	Moves the cursor from a MathPrint™ expression to the next Y-var in the Y=editor.
$\boxed{\text{enter}}$	Evaluates an expression or executes an instruction.
$\boxed{\text{clear}}$	Clears the current line on a line with text on the home screen.
	Clears everything on the home screen on a blank line on the home screen. This does not clear the history of your entries and answers.
	Press $\boxed{\blacktriangle}$ to see the history.

Keystrokes	Result
	Use Clear Entries* followed by `clear` if you wish to delete all home screen entries. *Clear Entries is found in [catalog]. Clears the expression or value where the cursor is located in an editor; it does not store a zero.
`del`	Deletes a character at the cursor; this key repeats if held down on the keypad.
`2nd` `del`	Changes the cursor to an underline (__); inserts characters in front of the underline cursor; to end insertion, press `2nd` [ins] or press ◀, ▲, ▶, or ▼.
`2nd`	Changes the cursor or status bar indicator to **∎**; the next keystroke performs a **2nd** function (displayed above a key and to the left); to cancel **2nd**, press `2nd` again.
`alpha`	Changes the cursor or status bar indicator to **𝗮**; the next keystroke performs a third function of that key (displayed above a key and to the right) or accesses a shortcut menu. To cancel `alpha`, press `alpha` or press ◀, ▲, ▶, or ▼.
`2nd` [A-lock]	Changes the cursor to **𝗮**; sets alpha-lock; subsequent keystrokes access the third functions of the keys pressed; to cancel alpha-lock, press `alpha`. If you are prompted to enter a name such as for a group or a program, alpha-lock is set automatically. **Note**: The TI-84 Plus T does not automatically set alpha-lock for entries that require list names.
`X,T,θ,n`	Pastes an X in **Function** mode, a T in **Parametric** mode, a θ in **Polar** mode, or an n in **Seq** mode with one keystroke.

Working with Graphs

This section covers how to change color options on a graph, how to draw points on a graph, and how to insert an image as a background on a graph.

Using the Graph Screen

The examples below show how to set up the graph of a function. Here, the mode is set to FUNCTION and the default settings are assumed.

Enter an equation in the Y= editor.

Press $\boxed{Y=}$.

Press $\boxed{(-)}$ $\boxed{X,T,\theta,n}$ $\boxed{x^2}$ $\boxed{+}$ **6.**

Press $\boxed{zoom}$ to select pre-set graph windows. Press $\boxed{zoom}$ **6:ZStandard**.

Press [graph].
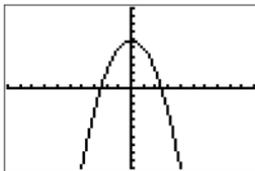
Press [trace] and use arrow keys to trace along the graph.
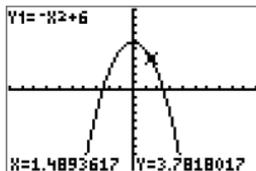
Press [2] to jump to X=2.
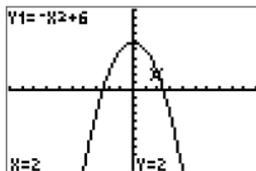
Note: Use the **CALCULATE** menu ([2nd] [calc]) to find minimum or maximum of functions and more.

```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```

Working with Matrices

You can enter matrices using the matrix editor on your graphing calculator. For example, you can perform the following operations on matrices:

- Addition
- Division
- Elementary Row Operations
- Inverses
- Multiplication
- Subtraction

To Use the Matrix Editor

1. Press [2nd] [matrix].
2. Press ▶ to navigate to the EDIT submenu.
3. Select from one of 10 allowed matrix variable names [A] – [J].
4. Enter the dimension of the matrix, then enter values in each matrix cell.

Note: Once in the editor, use the arrow keys to navigate between cells.

Example:

Matrix [C] as a 3x3 matrix is now in memory.

```
NAMES MATH EDIT
1:[A]
2:[B]
3■[C]
4:[D]
5:[E]
6:[F]
7↓[G]
```

```
MATRIX[C] 3 ×3
[ 1/2    -5     3/4  ]
[ -5     2.5    4/5  ]
[ 4      -2     1    ]


1,1=1/2
```
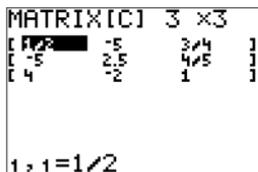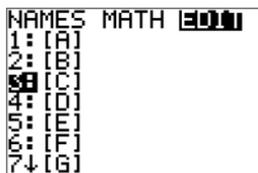
To Perform a Calculation with a Matrix

1. Press [2nd] [quit] to the go to the Home Screen.
2. Press [2nd] [matrix] use the MATH submenu to select a matrix command.
3. Use the NAMES submenu to paste the matrix name.

   Note: A matrix name, such as [C], is a special character and can ONLY be pasted for a calculation from the [matrix] NAMES menu and not typed from the calculator keypad.

Example:

To find the determinant of [C] as entered above:

▸ Use the [matrix] MATH menu to paste the

- 1: det(command

-and-

- [matrix] NAMES 3: [C]

as matrix variables to the Home Screen.

```
NAMES MATH EDIT
1⯀det(
2:T
3:dim(
4:Fill(
5:identity(
6:randM(
7↓augment(
```

```
NAMES MATH EDIT
1:[A]
2:[B]
⯀[C]   3×3
4:[D]
5:[E]
6:[F]
7↓[G]
```

```
det([C])
            -38.95
```

Note: Remember that you cannot type in a matrix name from the calculator keypad.
Use the [MATRIX] NAMES menu to paste a matrix name.

Working with Probability and Statistics

This section covers probability and statistics commands.

- Probability commands deal with random numbers, which are generated by algorithms on the calculator.
- Statistics commands allow you to create lists of data, then plot or analyze that data.

Working with Probability

You can find probability commands in the math PROB submenu. Probability commands deal with random numbers, which are generated by algorithms on the calculator.

Example:

To generate a set of five random integers between 10 and 25 (inclusive):

1. Press math, then press ▶ until you highlight **PROB**.
2. Press ▼ until you highlight **5: randInt(**, then enter.

```
MATH NUM CPX PRB
1:rand
2:nPr
3:nCr
4:!
5█randInt(
6:randNorm(
7↓randBin(
```

3. Enter the correct syntax for this command: **randInt**(lower, upper, number of integers). Press enter.
4. Press enter again to see the random set of integers.

```
randInt(1,25,5)
 {24 23 4 13 11}
```

Note: With each rand execution, the TI-84 Plus T generates the same random-number sequence for a given seed value. The TI-84 Plus T factory-set seed value for rand is 0. To generate a different random-number sequence, store any nonzero seed value to rand. To restore the factory-set seed value, store 0 to rand, or reset the defaults by going to 2nd [mem] **7:Reset...**.

Note: The seed value also affects **randInt(**, **randNorm(**, and **randBin(** instructions.

Working with Statistics

You can find statistics commands in the stat menu. You can create lists of data, then plot or analyze that data using the statistics commands.

You can use the following statistics functions:

Description	Keys
Best fit equations (regressions) stat CALC menu	stat ▶ ▲ ▼
Define and store up to three stat plot definitions	2nd [stat plot]
Distributions	2nd [distr]
List-based statistical analysis 2nd [list]MATH menu	2nd [list] ▶ ▶
Logistic and sine regression analysis stat CALC menu	stat ▶ ▲ ▼
One- and two-variable analysis stat CALC menu	stat ▶ 1 and stat ▶ 2
Statistical tests stat TEST menu	stat ▶ ▶

Inferential Statistics

You can perform 16 hypothesis tests and confidence intervals and 15 distribution functions. You can display hypothesis test results graphically or numerically.

To enter lists of data:

1. Press stat.
2. Select **1: Edit** in the **EDIT** submenu, then enter.

```
EDIT CALC TESTS
1▪Edit…
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
```
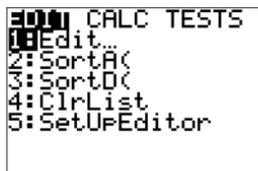
3. Enter your data into list columns.

Note: Once in the list editor, use the arrow keys to enter the data in the lists. L1 – L6 are built-in list names.

L1	L2	L3	1
1/2	1	------	
3/4	1.5		
7/8	1.75		
------	------		

L1(1)=1/2

To plot this data:

4. Press [2nd] [stat plot].

5. Press **1: Plot1** (to set up a scatter plot for L1 and L2), then [enter].


```
       2-Var Stats
Xlist:L1
Ylist:L2
FreqList:
Calculate
```

6. Press [◄] to highlight **On**. Press [enter].


```
Plot1 Plot2 Plot3
On Off
Type: ⬛ ⟋ ⬛⬛
      ⬛⬛ ⬛⬛ ⟋
Xlist:L1
Ylist:L2
Mark: ⬛ + ·
```

7. Press [zoom] to automatically set up a graphing window for your data.

8. Press **9: ZoomStat** to see the graph.

9. Press [trace] and arrow keys to trace on the plot.


```
P1:L1,L2
                        ⬛

                ⬛



 ⬛
X=1/2        Y=1
```
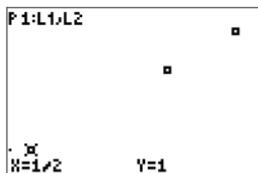
Note: You can plot your statistics data in these ways:

- Scatter plot
- xyLine
- Histogram
- Regular or Modified box-and-whisker plot
- Normal probability plot

To find the two variable statistics for L1 and L2:

1. Press stat.

2. Press ▶ to highlight **CALC**.

3. Press ▼ until you highlight **2:2-Var Stats**, then enter.

```
EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

4. Press ▼ until you highlight **Calculate**, then enter.

```
    2-Var Stats
Xlist:L1
Ylist:L2
FreqList:
Calculate
```

▶ The screen will display the variable statistics.

```
STAT PLOTS
1:Plot1…Off
   L1   L2
2:Plot2…Off
   L1   L2
3:Plot3…Off
   L1   L2
4↓PlotsOff
```

Working with Variables

You can enter and use several types of data, including real and complex numbers, matrices, lists, functions, stat plots, graph databases, graph pictures, and strings.

Using Variable Names

Variables and Defined Items

You can enter and use several types of data, including real and complex numbers, matrices, lists, functions, stat plots, graph databases, graph pictures, and strings.

The TI-84 Plus T uses assigned names for variables and other items saved in memory. For lists, you also can create your own five-character names.

Variable Type	Names
Real numbers (including fractions)	**A**, **B**, **...** , **Z,** θ
Complex numbers	**A**, **B**, **...** , **Z,** θ
Matrices	[**A**], [**B**], [**C**], **...** , [**J**] To enter a matrix name: Press [2nd] [matrix]. The Matrix Names menu appears. Press the number on the keypad that corresponds with the desired Matrix Name. Ex: Press 1 for [A] as shown below. NAMES MATH EDIT **1:** [A] 2: [B] 3: [C] 4: [D] 5: [E] 6: [F] 7↓[G]
Lists*	**L1**, **L2**, **L3**, **L4**, **L5**, **L6**, and user-defined names
Functions	**Y1**, **Y2**, **...** , **Y9**, **Y0**
Parametric equations	**X1T** and **Y1T**, **...** , **X6T** and **Y6T**
Polar functions	**r1**, **r2**, **r3**, **r4**, **r5**, **r6**
Sequence functions	**u**, **v**, **w**
Stat plots	Plot1, Plot2, Plot3
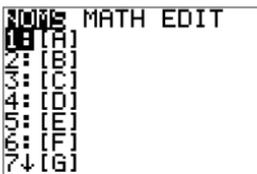
Variable Type	Names
Graphical databases	**GDB1**, **GDB2**, **...** , **GDB9, GDB0** Save current equations from Y= and Window settings to re-use.
Pictures	**Pic1**, **Pic2**, **...** , **Pic9**, **Pic0**
Strings	**Str1**, **Str2**, **...** , **Str9**, **Str0**
Apps	Applications
AppVars	Application variables
Groups	Grouped variables Save a group of calculator files for sharing or to re-use when setting up a classroom.
System variables	**Xmin**, **Xmax**, and others

* Once a list contains a complex number, it is designated as a complex list. To change a list to Real numbers, delete the list and enter the Real values.

Notes about Variables

- You can create as many list names as memory will allow.

- Programs have user-defined names and share memory with variables.

- From the home screen or from a program, you can store to matrices, lists, strings, and system variables such as **Xmax**, **TblStart**, and all **Y=** functions.

- From an editor, you can store to matrices, lists, and **Y=** functions.

- From the home screen, a program, or an editor, you can store a value to a matrix element or a list element.

- You can use **DRAW STO** menu items to store and recall Pic Vars.

- Although most variables can be archived, system variables including r, T, X, Y, and θ cannot be archived.

- Apps are independent applications that are built-in the TI-84 Plus T. Apps cannot be deleted. Additional Apps cannot be loaded.

Storing Variable Values

Storing Values in a Variable

Values are stored to and recalled from memory using variable names. When you evaluate an expression that contains a variable name, the graphing calculator substitutes the value currently stored in that variable.

To store a value to a variable from the home screen or a program using the $\boxed{\text{sto→}}$ key, begin on a blank line and follow these steps.

1. Enter the value you want to store. The value can be an expression.

2. Press $\boxed{\text{sto→}}$.

   → is copied to the cursor location.

3. Press $\boxed{\text{alpha}}$ and then the letter of the variable to which you want to store the value.

4. Press $\boxed{\text{enter}}$. The graphing calculator evaluates the expression and stores the value to the variable.

```
5+8³→Q
              517
```
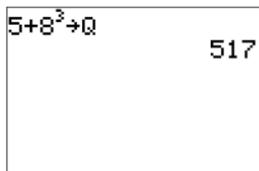
Displaying a Variable Value

To display the value of a variable, enter the variable name on a blank line on the home screen, and then press $\boxed{\text{enter}}$.

```
Q
              517
```

Archiving Variables (Archive, Unarchive)

You can store variables in the TI-84 Plus T user data archive, a protected area of memory separate from RAM. The user data archive lets you:

- Store data, programs, applications or any other variables to a safe location where they cannot be edited or deleted inadvertently.

- Create additional free RAM by archiving variables.

By archiving variables that you do not need to edit frequently, you can free up RAM for applications that may require additional memory.

The graphing calculator places an asterisk (✱)to the left of archived variables. You cannot edit or execute archived variables. You can only see and unarchive them.

Example:

If you archive a list named **L1**, you will see that it exists in memory. However, if you select and paste the name **L1** to the home screen, it will not appear on the home screen. You must unarchive it in order to see its contents and edit it.

Recalling Variable Values

Using Recall (RCL)

To recall and copy variable contents to the current cursor location, follow these steps. To leave **RCL**, press [clear].

1. Press [2nd] [rcl]. **RCL** and the edit cursor are displayed on the bottom line of the screen.

2. Enter the name of the variable in one of the following ways:

    • Press [alpha] and then the letter of the variable.

    • Press [2nd] [list], and then select the name of the list, or press [2nd] [L1] or [L2], and so forth.

    • Press [2nd] [matrix], and then select the name of the matrix.

    • Press [vars] to display the **VARS** menu or [vars] [▶] to display the **VARS Y-VARS** menu; then select the type and then the name of the variable or function.

    • Press [alpha] [f4] to display the YVAR shortcut menu, then select the name of the function.

    The variable name you selected is displayed on the bottom line and the cursor disappears.

```
100+




Rcl Q
```
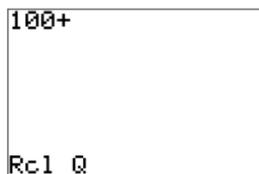
3. Press [enter]. The variable contents are inserted where the cursor was located before you began these steps.

```
100+517■



```
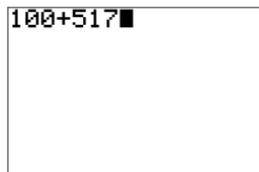
Notes:

• You can edit the characters pasted to the expression without affecting the value in memory.

• You can use **Rcl** in the Y= editor to paste a current function to a new YVar to avoid retyping long expressions.

Solving Equations

Press `math` **B:Solver…** to access the built-in numeric solver and the pre-loaded polynomial and systems of equations solver, PlySmlt2 App.

```
EQUATION SOLVER    2X²-7X-15=0
eqn:0=2X²-7X-15   ▪X=5
                    bound={0,10}
                   ▪left-rt=0
```

Numeric Solver

Steps for the Numeric Solver

1. Enter your equation as 0=expression and press `enter`.

2. Place the cursor on the variable to solve.

   - For this example, the variable is X with stored value 5.

3. Enter a value for the variable close to your estimate of the solution.

   - If needed, look at the graph or table of your equation to know the approximate location of the solution(s).

   - (Advanced) Bound – {-1E99, 1E99} represents the calculator version of the Real Number line: $\{-1 \times 10^{99}, 1 \times 10^{99}\}$. You can change this interval to be close to where you estimate the solution especially if you expect multiple solutions such as for a quadratic equation.

   - For many textbook problems, you probably will not have to change this line. ·

4. Press the [`alpha` (`enter`)] find the calculator's numeric solution.

   - The solution will be marked with a small square next to the variable.

   - The line "left-rt=0" gives the expression evaluated at the calculated solution. "left-rt=0" implies the equation "0=eqn" is satisfied by the solution. If "left-rt" is not zero, the value can be interpreted to tell you if the calculated solution is close to the solution.

```
a₂x²+a₁x+a₀=0       a₂x²+a₁x+a₀=0
 a₂ =2               x₁ ▪5
 a₁ =-7              x₂ =-3/2
 a₀ =-15

[MAIN][MODE][CLR][LOAD][SOLVE]  [MAIN][MODE][COEF][STO][◄F◄▶]
```
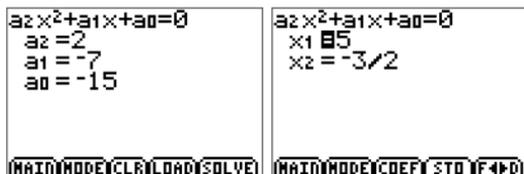
Polynomial Solver

System of Equations Solver

Managing Calculator Files

Transferring the OS/Apps from Calculator to Calculator

You can transfer the operating system (OS) and built-in Apps from one calculator to another using a USB unit-to-unit cable. You must have all factory-loaded Apps on the sending calculator prior to this transfer. If any Apps have been deleted from a TI-84 Plus T, you cannot send the OS/Apps unit-to-unit from that TI-84 Plus T. You will have to download the correct TI-84 Plus T OS (with Apps) file for the TI-84 Plus T at education.ti.com/go/download. Then use TI Connect CE to load the complete OS/Apps file to the TI-84 Plus T.

If the sending TI-84 Plus T has all of the original Apps on the calculator, connect the two calculators by firmly inserting the USB cable ends into the calculators. The USB port is located on the top of the calculator.

Note: Make sure the four AAA batteries in your TI-84 Plus T are not low prior to sending an OS/App. A warning screen displays when batteries are too low for transfers.

Receiving calculator: [2nd] [link] [▶] [enter]	SEND **RECEIVE** **1:** Receive
When you press [enter], the graphing calculator displays the message **Waiting...**	Waiting...
Sending calculator: [2nd] [link] [▲] [▲] [enter]	**SEND** RECEIVE 9↑Complex… 0:Y-Vars… A:String… B:AppVars… C:Group… D:SendId **E:**SendOS/Apps

Compatibility with Graphing Calculators

- AppVars and TI-Basic Programs should be reviewed for use after the transfer between the TI-84 Plus T family of graphing calculators. Some AppVars may not setup an App as expected. Some of the TI-Basic Programs will need to be modified due to the difference in screen resolution and new commands.

- TI-Basic Programs created using commands available only in the latest OS version will not transfer to graphing calculators with an earlier OS version.

Exam Mode and Exam LED

Battery Management Prior to an Exam

The TI-84 Plus T uses 4 AAA batteries.

TI recommends that you:

- Use new batteries for an exam
- Bring an extra set of new batteries to the exam
- You cannot enter exam mode if the graphing calculator is in a low or critically-low battery state

Low Battery

If the battery is low:

- A low-battery warning screen will display when you turn on the graphing calculator
- Replace your batteries

Critically-Low Battery

If the battery is critically low:

- A low-battery message may flash on the Home Screen
- The calculator will turn off
- Replace your batteries

Entering Exam Mode

You may not set this calculator in exam mode unless you are instructed by the examiner.

1. Turn the calculator off (alpha on).
2. Press and hold +, enter, on.
3. Press **OK** on each screen to place calculator in exam mode.
- Exam LED will blink amber.

To turn LED off and re-enable files after the exam, link (via unit-to-unit cable) to another calculator and send a list. You can also connect to a computer and use TI Connect™ CE to drag a file off. To do this, click on the TI Connect ™ CE window, then drag the file back on to your calculator to turn off the exam LED.

You should turn the exam LED off after the exam to preserve your battery.

Using Press-to-Test Mode

- Press-to-Test is a three-key sequence to place the TI-84 Plus T in the allowed state for an exam.
- You may only set the calculator in exam mode when you are instructed by the examiner.

- The Exam LED will blink amber when you have properly set the calculator up for the exam.

- Press-to-Test Mode:

  - Deletes all RAM and selected Archive files

  - Does not disable Apps from the TI-developed built-in Apps list below (as long as they have not been deleted prior to going into Press-to-Test)

  - Disables TI-Basic Programs and does not allow programming

    - Conic Graphing

    - Inequality Graphing

    - Polynomial Root Finder and Simultaneous Equation Solver

    - Equation Solver

    - Language Localization Apps

See the "Using Applications" section for more information on Apps.

To use Press-to-Test:

1. With the calculator turned **OFF**, press and hold $+$, enter, and on.

2. Release all three keys. (The **RESET OPTIONS** screen displays.)

3. Select **OK**.

4. Press any key.

▶ In memory management ([2nd] [mem] **Mem Mgmt/Del**), disabled files will display with the not equal sign.

Notes:

The TI-84 Plus T is in exam mode when the LED is blinking amber.

You can take the TI-84 Plus T out of exam mode using the following methods:

- Link a calculator to a calculator (via the unit-to-unit cable), and then transfer any file(s) by pressing [2nd] [Link] **SEND/RECEIVE**.

  -or-

- Send a calculator file from the computer using TI Connect™ CE.

Note: To preserve battery life, take your calculator out of Press-to-Test after the exam.

Using Applications (Apps)

Press $\boxed{\text{apps}}$ to see the complete list of built-in applications on the TI-84 Plus T.

• Cabri™ Jr.

• CellSheet™ App

• Conic Graphing

• Vernier EasyData™ App

• Inequality Graphing

• Periodic Table

• Polynomial Root Finder and Simultaneous Equation Solver

• Probability Simulations

• Science Tools

• Transformation Graphing

• Language Localization Apps

These applications are built-in on your TI-84 Plus T. You cannot load additional Apps.

Apps can be deleted using Memory Management in $\boxed{\text{mem}}$ if needed for exams.

To replace any deleted Apps, you will have to reload the full OS/Apps file, which you can find at education.ti.com/go/download.You will need TI Connect™ CE software to reload the OS/Apps on the calculator. You can transfer the OS and built-in Apps unit-to-unit from another TI-84 Plus T, but only if the sending calculator has the complete set of built-in Apps.

Cabri™ Jr. App

Construct, analyze, and transform mathematical models and geometric diagrams on your TI graphing calculator. You can:

• Perform analytic, transformational, and Euclidean geometric functions

• Build geometric constructions interactively with points, a set of points for locus, lines, polygons, circles, and other basic geometric objects

• Alter geometric objects on the fly to see patterns, make conjectures, and draw conclusions

CellSheet™ App

Combines spreadsheet functionality with the power of a graphing calculator.

Create cell formulas and use built-in functions.

Cells can contain:

• Integers

• Real numbers

- Formulas
- Variables
- Text and numeric strings
- Functions

Each spreadsheet contains 999 rows and 26 columns. The amount of data you can enter is limited only by the available RAM.

- Store (x,y) coordinate pairs to lists for viewing and optimizing functions for linear programming.

Conic Graphing App

Presents equations in function, parametric, or polar form and provides a simple way to graph the four conic shapes:

- Ellipse
- Circle
- Parabola
- Hyperbola

Enter the required parameters to graph, trace, or solve for the conic's characteristic.

Inequality Graphing App

Gives you new features for graphing equations and inequalities and evaluating the relationship between them. You can:

- Enter inequalities using relation symbols
- Graph inequalities and shade the union and intersection regions
- Enter inequalities (vertical lines only) in an X=editor
- Trace points of interest (such as intersections) between relations
- Store (x,y) coordinate pairs to lists for viewing and optimizing functions for linear programming.

Periodic Table App

Provides a graphical representation of the elements of the Periodic Table. This application allows you to:

- Observe and explore the Periodic Table of the Elements
- Find property data and useful information about the known elements
- Sort the elements by atomic number, alphabetically by name, or alphabetically by symbol
- Identify groups of elements by region (noble gasses, halogens, etc.) and block (p-, d-, s- and f-)
- Export property data to lists for further analysis
- Graph the major properties (atomic radii, electronegativities, etc.) against atomic number to illustrate the periodic nature of the elements.

Polynomial Root Finder and Simultaneous Equation Editor App

This application:

- Calculates the roots (zeros) of polynomials of degree 1 through 10 with a convenient, easy-to-use interface.
- Allows you to store solutions into lists, load a list into the application for polynomial coefficients, and store the polynomial to a Y-Var to graph after quitting the App.
- Finds solutions to systems of linear equations.
- Allows you to load matrices containing the coefficients of linear systems, and identify whether a given system has a unique solution, an infinite number of solutions, or no solution.

Probability Simulation App

Explore probability theory with interactive animation that simulates the rolling of dice and tossing of coins, and generates random numbers on your calculator. Options include:

- Bar Graph
- Table of trials data
- Settings for specifying numbers of trials
- Ways to collect data
- Weighting

In addition, students can export data for further exploration.

Science Tools App

Science Tools allows you to perform unit conversions on your calculator. App elements include:

- Significant Figures Calculator
- Constants and Conversions
- Data and Graph Wizard
- Vector Calculator

Vernier EasyData™ App

Use EasyData™ App from Vernier Software & Technology to explore your world. The EasyData™ App auto-launches data collection when used with Vernier EasyTemp™ sensor, and loads built-in experiments for every supported Vernier sensor.

Using Accessories

This section covers how to use:

- TI computer software
- TI Charging Station CE
- TI rechargeable batteries

Using the TI-SmartView™ CE

The TI-SmartView™ CE software allows you to display a TI graphing calculator for your entire classroom. With TI-SmartView™ CE software, you can:

- View the history of your key press entries.
- Capture and save screen shots to use in other documents as you investigate a math or science concept.
- Use the View^3™ pane to show three additional screens simultaneously.

The TI-SmartView™ CE software includes two workspaces:

Calculator Emulator: allows you to perform calculations and view answers as you would on a physical calculator

Emulator Explorer: allows you to manage calculator content

- Use TI-SmartView™ CE for the TI-84 family of graphing calculators

-or-

- Use TI-SmartView™ for the TI-84 family of graphing calculators

- Choose the TI-84 Plus emulator from the list of calculators in TI-SmartView™

Using TI Connect™ CE

The TI Connect™ CE software makes exchanging information between your graphing calculator and your computer quick and easy.

The TI Connect™ CE software includes three workspaces:

Calculator Explorer: allows you to manage calculator content

Screen Capture: allows you to manage screen captures

Program Editor: allows you to work with data variables

Battery Information

The TI-84 Plus T uses five batteries:

• Four AAA alkaline batteries

-plus-

• One LR44 Alkaline 1.5 V backup battery (or equivalent)
  - The backup battery provides auxiliary power to retain memory while you replace the AAA batteries.

When to Replace the Batteries

When the battery voltage level drops below a usable level, the TI-84 Plus T:

Displays this message when you turn on the unit.

```
Your batteries
are low.

Recommend
change of
batteries.
```
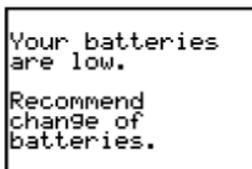
Message A

Displays this message when you attempt to download an application.

```
Batteries
are low.
Change is
required.
```
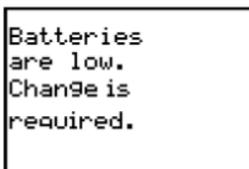
Message B

• After you first see **Message A**, you can expect the batteries to function for about one to two weeks, depending on how often you use the graphing calculator. (This one- to two-week period is based on tests with alkaline batteries; the performance of other types of batteries may vary.)

• If you see **Message B**, you must replace the batteries immediately to successfully download an application.

Note: Replace the backup battery every three or four years.

Effects of Replacing the Batteries

• Do not remove both types of batteries (AAA and the backup battery) at the same time.

• Do not allow the batteries to lose power completely.

If you follow these guidelines and the steps for replacing the batteries, you can replace either type of battery without losing any information in memory.

Battery Precautions

Take these precautions when replacing batteries:

• Do not leave batteries within reach of children.

• Do not mix new and used batteries.

- Do not mix brands (or types within brands) of batteries.
- Do not mix rechargeable and non-rechargeable batteries.
- Install batteries according to polarity (+ and N) diagrams.
- Do not place non-rechargeable batteries in a battery recharger.
- Properly dispose of used batteries immediately.
- Do not leave them within the reach of children.
- Do not incinerate or dismantle batteries.

Replacing the Batteries

To replace the batteries, follow these steps:

1. **Turn off the graphing calculator**
    - Turn off the graphing calculator: 2nd [off].
    - Replace the slide cover over the keyboard to avoid inadvertently turning on the graphing calculator.
    - Turn the back of the unit toward you.

2. **Remove the battery cover**
    - Hold the graphing calculator upright.
    - Push downward on the latch on the top of the battery cover.
    - Pull the cover toward you.

3. **Replace either type of battery**

    Note: To avoid loss of information stored in memory, you must turn off the graphing calculator. Do not remove the AAA batteries and the backup battery simultaneously.

    To replace the AAA alkaline batteries:

    - Remove all four discharged AAA batteries.
    - Install new ones according to the polarity (+ and N) diagram in the battery compartment.
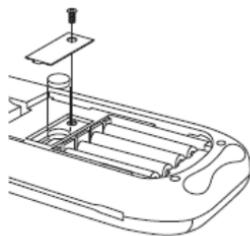
    To replace the backup battery:

    - Remove the screw from the backup battery cover.

- Remove the cover.
- Install the new battery, + side up.
- Replace the cover and secure it with the screw.

Note: Use a LR44 Alkaline 1.5 V backup battery (or equivalent).

4. **Replace the backup battery compartment cover**
   a) Turn the graphing calculator on.
   b) Adjust the display contrast, if necessary, by pressing $\boxed{\text{2nd}}$, $\boxed{\blacktriangle}$, or $\boxed{\blacktriangledown}$.

Diagnosing and Correcting Error Conditions

The TI-84 Plus T detects errors while performing these tasks:

- Evaluating an expression
- Executing an instruction
- Plotting a graph
- Storing a value

1. Determine the error. The error screens give helpful hints about what may have happened, but the errors are not always fully explained.
2. Correct the expression.

Diagnosing an Error

When the TI-84 Plus T detects an error, it returns an error message with a short description.
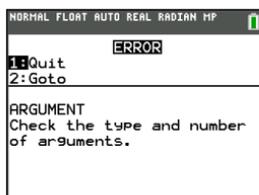
1:Quit	Displays the home screen
2:Goto	Displays the previous screen with the cursor at or near the error location

Note: If a syntax error occurs in the contents of a Y= function during program execution, then the **2:Goto** option returns to the Y= editor, not to the program.

Correcting an Error

To correct an error, follow these steps.

1. Note the error type (ERROR:error type).
2. Select **2:Goto** (if it is available).The previous screen is displayed with the cursor at or near the error location.
3. Determine the error. The error screens give helpful hints about what may have happened, but the errors are not always fully explained.
4. Correct the expression.

General Information

Texas Instruments Support and Service

Home Page:	education.ti.com
International Information:	education.ti.com/international
E-mail inquiries:	ti-cares@ti.com
TI-Cares Customer Support Worldwide:	education.ti.com/support/worldwide
KnowledgeBase (English only):	education.ti.com/support

Service and Warranty Information

For information about the length and terms of the warranty or about product service, refer to the warranty statement enclosed with this product or contact your local Texas Instruments retailer/distributor.

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