

Turning it on and off:

To turn the calculator on, press the **ON** key in the lower left corner.
 You should now see a flashing rectangle, the cursor, on the screen.

If instead you see Press

a black screen **2nd** \blacktriangledown repeatedly until you see something.
 unchanged **ON** again. If that doesn't work, press **2nd** \blacktriangle repeatedly until you see something.
 anything else **EXIT** until you see the flashing rectangle.

To turn the calculator off, press **2nd OFF**. The calculator will turn itself off if left unattended.
 In such instances, the calculator will come back on in the state it turned off in. While if you turn it off, it will come on at the home screen.

The Keys:

First notice that many of the keys have writing not only on them but above them. For example, the **X** key has [in yellow and the letter **R** in green above the key.

<u>writing color</u>	<u>position</u>	<u>accessed</u>	<u>example</u>
white	on the key	just press the key	the key X prints the multiplication symbol, "*"
yellow	above the key	press 2nd first	2nd [prints an open bracket, "[".
green	above the key	press ALPHA first	ALPHA R prints the upper case letter R. There is no way to print lower case letters from the keypad on the TI-83.

Cursor modes:

rectangle	regular type-over mode
underline	regular insert mode
arrow-up	ready for a 2nd (yellow) function
capital A	ready to print a capital (green) letter

Keys of interest to College Algebra(look for them as you read)

<u>General</u>	<u>Primary Operation</u>
,	separating parameters
2nd	accesses the yellow functions above a key
A,B,...,Z	names of variables
ALPHA	accesses the green characters, in upper case, above a key
ANS	prints the variable ANS, which contains the previous answer
CALC	perform mathematical calculations on a graph
CATALOG	accesses a list commands
CLEAR	clears the command line or the home screen
cursor keys ($\blacktriangleleft\blacktriangleright$)	moves the cursor left, right, up and down respectively and adjusting screen brightness
DEL	deletes the character under the cursor
EE	for scientific notation
ENTER	executes a command
ENTRY	recalls the previous command
FORMAT	graphing mode screen
INS	sets the cursor to insert mode
MATH	math functions not on the keys
MEM	memory status and delete variables
MODE	to change the settings on the calculator
ON , OFF	turns the calculator on and off respectively
QUIT	exits a menu or screen
STO▶	stores a number into a variable
TRACE	enter trace mode for a graph
WINDOW	edit graphing window
X,T,θ,n	prints the variable X,T, θ ,n depending on one of the mode settings
Y=	function editor for graphing
ZOOM	change graphing window in certain ways

<u>functions</u>	<u>prints</u>	<u>Primary Operation</u>
$+, -, \times, \div$	$+, -, *, /$	add, subtract, multiply, and divide respectively
\wedge	\wedge	exponent, "raised to the power of"
$\sqrt{\quad}$	$\sqrt{\quad}$	square root :see p4 for general root function
$(,)$	$(,)$	grouping :DON'T use [] or {} for grouping
$(-)$	$-$	negative sign
$.$	$.$	decimal point
$0, 1, 2, \dots, 9$	$0, 1, 2, \dots, 9$	digits
π	π	the number pi $\approx 3.14159\dots$
10^x	10^\wedge	common exponential function
e^x	e^\wedge	natural exponential function
LOG	log	common logarithm
LN	ln	natural logarithm
x^{-1}	-1	reciprocal
x^2	2	square function

Contrast adjustment and batteries:

As the batteries become weaker, you will have to adjust the screen's brightness.

If the screen is to light or to dark adjust it by pressing **2nd ▼** to lighten it or **2nd ▲** to darken it. Important: when doing this, watch the upper right corner. A number will appear briefly. When it gets to 8, you will need to replace the AAA batteries soon. When it gets to 9, replace them immediately.

As long as you only change the AAA batteries, without changing the lithium ones, memory will be retained. If you replace the AAA batteries when suggested, you should never have to touch the lithium batteries at least not for years. But if you let the AAA batteries go dead, the calculator will pull power from the lithium batteries, shortening their life.

Entering Commands:

To perform basic arithmetic, type in the expression on the command line and press **ENTER**.

<u>To evaluate</u>	<u>type</u>	<u>prints as</u>	<u>Answer</u>
$6 + 4$	6 + 4	6+4	10
$2-3 \cdot 4$	2 - 3 X 4	2-3*4	-10
$(-3)^3$	((-) 3) ^ 3	$(-3)^3$	-27
$\frac{3^5 - 4^2}{8}$	(3 ^ 5 - 4 x^2) ÷ 8	$(3^5-4^2)/8$	28.375

Most common errors:

Order of operation: Notice how the last example needed parenthesis even though they were not in the original expression. This is because without them, the division would have been done before the subtraction.

Also, functions like $\sqrt{\quad}$ and **abs** are done before most other operations. Thus, " $\sqrt{4(9)}$ " will return "18" since it will do the square root of 4 then multiply that by 9.
The wrong minus sign: Subtractions must be done with **-** key in the right most columns of keys. While negative numbers are entered with the **(-)** key at the bottom of the keys. Though using **-** instead of **(-)** will likely lead to an error, using **(-)** for **-** won't. It will be treated as a multiplication by -1.

Note: The calculator keeps the last answer in the variable ANS. So if you want to take the square root of the last answer, press **2nd $\sqrt{\quad}$ 2nd ANS ENTER**.

If you press **ENTER** without a command, it performs the previous command again.

If you want to add 5 to the last answer, you can just type **+ 5 ENTER** and the calculator will print "Ans+5" and the new answer.

Editing a command:

No matter how much experience or knowledge we may have, errors are going to happen. And, after the third attempt at typing the same command, you'll want to learn to edit.

Example 1 Dealing with an error.

First type **(- 9) ^ 6** . Note the wrong minus sign.

Press **ENTER**

The calculator will tell you that a syntax error has occurred and gives you the options **GOTO** and **QUIT**.

Press **2**

The command will appear at the top of the screen with the cursor where it detected the error.

To make the correction, type **(-) ENTER**.

The calculator returns "531441".

Example 2 Typing over the command.

Type **528 X 651**. Don't press **ENTER**.

But, I meant to multiply 582 by 651.

Instead of retyping the whole command, move the cursor on top of the 2 by pressing **◀** 6 times.

Type **82** on top of the 28 and press **ENTER**.

The calculator returns "378882".

Example 3 Changing the previous command.

Type **((-) 3 - 2nd √ 3x²-4x 2 x 1)) ÷ (2 x 2) ENTER**. Note, this is one of the

solutions to $2x^2 + 3x + 1 = 0$

The calculator returns "-1".

Instead of retyping the entire command again to get the other solution, press **2nd ENTRY** to recall the command and edit it.

Move the cursor on top of the first subtraction sign by pressing **▲ ◀ ◀**.

Replace - with + by typing +.

Press **ENTER**.

The calculator returns "-.5" .

Example 4 Inserting.

Type 745. Don't press **ENTER**.

To turn this into 74+5, first press **◀** .

Enter insert mode by pressing **2nd INS**. Now the cursor has changed to an underline and anything typed will be put between the 4 and 5.

Type **+ ENTER**.

The calculator returns "79".

Example 5 Deleting.

Type **58 + X 89**. Don't press **ENTER**.

Move the cursor on top of the + sign by pressing **◀ ◀ ◀ ◀**.

To delete the character under the cursor press **DEL**.

Press **ENTER**.

The calculator returns "5162".

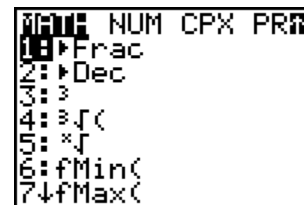
Menus:

Since having all of the calculator's operations accessible directly from the keyboard means that it would need at least twice the number of keys, many of the calculator's functions are in the full screen menus. For instance, the only root function you will find on the keyboard is the square root function, $\sqrt{\quad}$. To get to the general root function, we must first enter the math menu by pressing

MATH. The bottom of the screen should look like:

Across the top are the different submenus. You can change submenus by pressing **◀** or **▶**. Try it, but make sure you return to the MATH submenu before going to the next paragraph.

Below the top line are the entries for that submenu. Because there is a **↓** beside the "7", there are more options to this submenu. To see the other items press **▼** to scroll through them, but make sure you are back to the top of the math submenu before reading the next paragraph.



You will see "**x** $\sqrt{\quad}$ " about half way down the screen beside the "5:". To select it you can either:

Press **▼▼▼▼** to put the cursor on the item I want

Or, press **5** since there is a 5 beside it.

Do either one of these.

You should now see the screen to the right. It printed "Ans" before the root symbol because it is expecting a number before it. Press **CLEAR**.

So if I wanted to do the 4th root of 6, type **4 MATH 5: $\sqrt[4]{\quad}$ 6 ENTER**. The answer is 1.56508458.



Note, if you want to retype a item, You must enter the menu and submenu every time you need to type it.

The Catalog:

Some functions and commands are found more easily in the catalog. To enter the catalog press **2nd CATATALOG**.

You should now see a list of commands and functions. You can move through the list by pressing

▲ or **▼** to move item by item up or down.

the first letter in green to go to the start of the command beginning (without the **ALPHA** key) with that letter.

Hence, to find the command **rand** press **R**. Now **rand** should be second down the screen. To get the command on the home screen, move the pointer, the arrow on the left of the screen, down until it is pointing at the command **rand** by pressing **▼**. Then, press **ENTER**. You'll be returned to the home screen and **rand** will now be on the command line.

If you press **ENTER** now, the calculator will print a random number between 0 and 1. Try it. Press **ENTER** a couple of times. Each time you'll get a different number.

NOTES: Symbols are at the bottom of the list.

A fast way to get to the bottom of the list is pressing **A ▲**. The **A** isn't needed if you are already at the top of the catalog.

The TI-83 will return to the top on the catalog each time you enter it.

Press **QUIT** or **CLEAR** to exit the catalog without selecting a function.

Variables:

The calculator doesn't store numbers in memory like a scientific calculator. Instead, it stores them in variables like computers.

To store a number into a variable, for example storing 7 in A, type **7 STO▶ ALPHA A ENTER**.

It will print as "7 → A" and "7" will be returned as the answer.

To use a variable, type the variable name where you would put it's number. For instance, to evaluate $2A+4$ for $A=7$ entered earlier, type **2 ALPHA A + 4 ENTER**. The calculator will return "18"

To delete a variable, enter the memory menu by pressing **2nd MEM**.

Then select **2:Mem Mgmt/Del... 2:REAL**.

Warning it is easy to delete the wrong variable, So your keep your fingers away from the ENTER key until you're ready

Put the arrow on the variable to delete using the **▼** or **F1:PAGE ↓**.

Make sure the arrow is on the variable you want to delete. Then press **ENTER**. Pressing **ENTER** again will deselect the variable so that it won't be deleted.

Press **QUIT** to return to the home screen.

It is now erased.

Note: Variable names can be up to 8 characters long.

Math Menu:

In the math menu are functions not found on the keys.

First let's enter the math menu. Press **MATH**. The only 2 submenus of interest to College Algebra are Num(ber) and Math.

The math submenu:

number ▶Frac: tries to convert a number to a fraction.

Ex. **1.5 MATH 1:▶Frac ENTER** returns "3/2".

$\sqrt[3]{\text{radicand}}$: is the 3rd root function.

Ex. **MATH 4: $\sqrt[3]{(-) 64}$) ENTER** returns the 3rd root of -64, "-4".

index $\sqrt[x]{\text{radicand}}$: is the general nth root function.

Ex. **4 MATH 5: $\sqrt[x]{81}$ ENTER** returns the 4th root of 81, "3".

The number submenu:

abs number: returns the absolute value of a number.

Ex. **MATH ▶ 1:abs((-) 6.8 ENTER** returns "6.8".

round(number, # of decimals): rounds a number to the specified number of decimals.

Ex. **MATH ▶ 2:round 3.23456 , 2) ENTER** returns "3.23".

iPart number: returns the integer part, the digits to the left of the decimal point, of a number.

Ex. **MATH ▶ 3:iPart 35.78 ENTER** returns "35".

fPart number: returns the fractional part, the digits to the right of the decimal point, of a number.

Ex. **MATH ▶ 4:fPart 35.78 ENTER** returns ".78".

int number: returns the greatest integer less than or equal to a number. Also, referred to as the bracket function.

Ex. **MATH ▶ 5:int (-) 3.5 ENTER** returns "-4".

Mode Settings:

Press **MODE**.

You'll get a screen with of settings for how the calculator behaves. The only ones of interest to College Algebra that do not deal with graphing are:

Normal Sci Eng : Sets whether the calculator returns (for 56945)
normal notation | 56945
scientific notation | 5.6945E4 (See below)
engineering notation | 56.945E3 (not used in MAC1105)

Float 012345678901 : Sets how many decimals to round to (for 0.25)
Float | .25 (all the decimals up to 11)
1st 0 | 0 (zero decimals)
1st 1 | .3 (one decimal)
2 | .25 (two decimals)
3 | .250 (three decimals)
4 | .2500 (four decimals)
5 | .25000 (five decimals)
6 | .250000 (six decimals)
7 | .2500000 (seven decimals)
8 | .25000000 (eight decimals)
9 | .250000000 (nine decimals)

Real a+bi re^θi : Sets the calculator to real or a complex mode.
| for example, $\sqrt{-4}$

Real | an error
a+bi | 2i
re^θi | 2e^(1.570796327i) :Not used in this class.

The ones that deal with graphing will be on a later handout.
As for the rest, they should all be set to the left most setting.

To change a setting, press \blacktriangledown until the cursor is on the line you want to change. For example, press once to change the number of decimals displayed.

Press \blacktriangleright until the cursor is on the new setting.

i.e. move the cursor to the 2.

Press **ENTER** to make the change.

If you followed the example, your calculator will now print all numbers rounded to the hundredths.

To change it back, enter the mode screen, move the cursor on the word FLOAT, and press **ENTER**.

To exit the mode screen, press **2nd QUIT** or **CLEAR**.

Complex numbers:

Put your calculator in a+bi mode for this section. See the section above to see how to do this.

Type $\sqrt{-1}$ **(-)** **1** **) ENTER**. The calculator returns "i".

The calculator can add, subtract, etc. complex numbers just like real numbers.

Example 1. multiply (2+5i) by (3-8i)

1. Type **(2 + 5 2nd i) X (3 - 8 2nd i) ENTER**. Make sure you use the yellow italic *i* over the decimal point key and not green I over the square key.

2. The calculator returns "46-i".

Example 2. Raise -8 to the 2/3 power.

0. First, let's get the answer by hand.

$$(-8)^{2/3} = (\sqrt[3]{-8})^2 = (-2)^2 = 4.$$

1. Ok now type **((-) 8) ^ (2 ÷ 3) ENTER**.

2. The TI-83 will return "4".

Scientific Notation:

The calculator uses a version of scientific notation used on many computers.

3.4X10⁶ is printed on the calculator as "3.4E6".

To enter 7.84X10⁵, type **7.84 2nd EE 5 ENTER**. It will print as "7.84E5" and return "784000". You can also type **7.84 X 10 ^ 5 ENTER**.

When the calculator is set to NORMAL, see MODE above, the calculator will print any number that has more than 12 digits (i.e 0.00000000000005=5X10⁻¹⁵) in its version of scientific notation (5E-15).

When scientific notation is asked for on tests and homework, use standard scientific notation, 5X10⁻³.