

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 bar, the cursor, on the screen.

<p>If instead you see                  a black screen                  unchanged                  anything else</p>	<p><u>Press</u>  <b>2nd</b> - repeatedly until you see something.  <b>ON</b> again. If that doesn't work, press <b>2nd +</b> repeatedly until you see something.                  ♦ <b>HOME</b> until you see the flashing bar.</p>
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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 **ENTER** key has **ENTRY** in yellow and  $\approx$  in green above the key.

<u>color</u>	<u>position</u>	<u>accessed</u>	<u>example</u>
white	on the key	just press the key	the key <b>X</b> prints the multiplication symbol, "*".
yellow	above the key	press <b>2nd</b> first	<b>2nd MATH</b> displays the <b>MATH</b> menu. Press <b>ESC</b> to get rid of it.
green	above or to the right of the key (TI-89 only)	press ♦ first	♦ <b>Y=</b> takes you to the function editor.
purple	above the key	press <b>ALPHA</b> first	<b>ALPHA O</b> prints the upper case letter O.

Cursor modes:

bar	regular insert mode
rectangle	regular type-over mode

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

General

,  
**2nd**  
**A,B,...,Z**  
**ALPHA** (TI89 only)  
**ANS**  
**CLEAR**  
 cursor keys (◀▶▶▼)  
**DEL**  
**EE**  
**ENTER**  
**ENTRY**  
**ESC**  
**F1,F2,F3,...,F8**  
**INS**  
**MODE**  
**ON , OFF**  
**STO▶**

Primary Operation

separating parameters  
 accesses the yellow functions above a key  
 names of variables  
 accesses the purple characters  
 prints the variable **ANS**, which contains the previous answer  
 clears the command line  
 moves the cursor left, right, up and down respectively  
 deletes the character under the cursor  
 for scientific notation  
 executes a command  
 recalls the previous command  
 exits a menu or screen  
 menu keys  
 sets the cursor to insert mode(this is the default mode of the cursor)  
 to change the settings on the calculator  
 turns the calculator on and off respectively  
 stores a number into a variable

menu

**CATALOG**  
**CUSTOM**  
**MATH**  
**MEM**  
**VAR-LINK**

Primary Operation

accesses commands and variables  
 your own menu you can customize, but you have to write a program  
 math functions not on the keys  
 memory status  
 variable manager

<u>functions</u>	<u>prints</u>	<u>Primary Operation</u>
+,-,X,÷	+, -, *, /	add, subtract, multiply, and divide respectively
^	^	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,...,9	0,1,2,...,9	digits
$\pi$	$\pi$	the number pi $\approx$ 3.14159..
$e^x$	e^(	natural exponential function
LN	ln(	natural logarithm
$x^{-1}$	-1	reciprocal
$x^2$	2	square function

Note: The TI-89/92 doesn't have a general root function. You have to use exponential forms, i.e. cube root of 7= $7^{(1/3)}$ .

#### Contrast adjustment:

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

If the screen is too light or too dark adjust it by pressing **2nd -** to lighten it or **2nd +** to darken it.

#### Batteries:

Watch for the low battery symbol, "BATT" reversed, in the lower right corner of the screen.

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	<b>6 + 4</b>	6+4	10
2-3 · 4	<b>2 - 3 X 4</b>	2-3*4	-10
$(-3)^3$	<b>( (-) 3 ) ^ 3</b>	$(-3)^3$	-27
$3^5 - 4^2$	<b>( 3 ^ 5 - 4 ^ 2 ) ÷ 8</b>	$(3^5-4^2)/8$	28.375
<b>8</b>			

#### 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, " $\sqrt{\quad} 4(9)$ " 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 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.

Press **ENTER**.

The command will appear with the cursor where it detected the error.

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

The calculator returns "531441".

#### *Example 2* Changing characters.

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 between the 8 and the \* by pressing ◀ 4 times.

Press ← twice to delete the 2 and 8.

Type 82 and press **ENTER**.

The calculator returns "378882".

#### *Example 3* Changing the previous command.

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

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

The calculator returns "-1".

Move the cursor after the first subtraction sign by pressing ◀ ▶ ▶ ▶ ▶.

Replace - with + by typing ← +.

Press **ENTER**.

The calculator returns "-1/2" .

#### *Example 4* Inserting.

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

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

Type + **ENTER**.

The calculator returns "79".

#### *Example 5* Deleting.

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

Move the cursor to the right of the + sign by pressing ◀ ◀ ◀.

To delete the character to the left the cursor press ←.

Press **ENTER**.

The calculator returns "5162".

### The Catalog:

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

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.

**2nd ▲** or **2nd ▼** to move by pages up or down.

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

Hence, to find the command **rand** press **R**. Now **rand(** should be third 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.

Press **ESC** 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:

TI-89| 7 STO► ALPHA A ENTER

TI-92| 7 STO► 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:

TI-89| 2 ALPHA A + 4 ENTER

TI-92| 2 A + 4 ENTER.

The calculator will return "18".

To delete a variable, enter the var-link menu by pressing **2nd VAR-LINK**.

Highlight the variable to delete using the ▼ .

Make sure the arrow is on the variable you want to delete. Then press ← ENTER.

It is now erased. Press **ESC** to return to the home screen.

Note: When storing variables on the TI-89, you must press **ALPHA** before the variable's name.

In fact, in the above example, if you don't press **ALPHA** after **STO►** , you will get "=" instead of "A" because you aren't in Alpha mode.

Variable names can be up to 8 characters long.

The calculator is not case sensitive. That means,  $a=A$ .

Some names are reserved by the calculator, i.e. commands and functions.

### Math Menu:

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

First let's enter the math menu. Press **2nd MATH**. The only submenu of interest to College Algebra is the Num(bers) submenu.

#### *The number submenu:*

Press **1:Number** to enter the number submenu.

**abs( number )**: returns the absolute value of a number.

Ex. 2:**abs( (-) 6.8 ) ENTER** returns "6.8".

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

Ex. 3:**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. 4:**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. 5:**fPart( 35.78 ) ENTER** returns ".78".

### Complex numbers:

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**.

2. The calculator returns "46-i".

Note: On tests always use standard form,  $a+bi$ , not the calculator's notation.

### 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 are:

Exponential format (**NORMAL, SCIENTIFIC, ENGINEERING**)

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

Display Digits (**FIX 0, FIX 1, ..., FIX 12, FLOAT, FLOAT 1, FLOAT 2, ..., FLOAT 12**)

- : Sets how many decimals to round to (for 0.25)

FIX 0	0	( zero decimals )
FIX 1	.3	( one decimal )
FIX 2	.25	( two decimals )
FIX 3	.250	( three decimals )
FIX 4	.2500	( four decimals )
FIX 5	.25000	( five decimals )
FIX 6	.250000	( six decimals )
FIX 7	.2500000	( seven decimals )
FIX 8	.25000000	( eight decimals )
FIX 9	.250000000	( nine decimals )
FIX 10	.2500000000	( ten decimals )
FIX 11	.25000000000	( eleven decimals )
FLOAT	.25	( all the decimals up to 11 )
FLOAT 1	.3	( one decimal )
FLOAT 2	.25	( two decimals )
FLOAT 3	.25	( three decimals )
FLOAT 4	.25	( four decimals )
FLOAT 5	.25	( five decimals )
FLOAT 6	.25	( six decimals )
FLOAT 7	.25	( seven decimals )
FLOAT 8	.25	( eight decimals )
FLOAT 9	.25	( nine decimals )
FLOAT 10	.25	( ten decimals )
FLOAT 11	.25	( eleven decimals )
FLOAT 12	.25	( twelve decimals )

To change a setting, press ▼ until the cursor is on the line you want to change or F1 or F2 to change pages. For example, press ▼ twice to change the number of decimals displayed.

Press ► to bring up the list of options. Then press ▼ to place the cursor on the desired option. Press **ENTER ENTER** to make the change.

To exit the mode screen, press **ENTER** to save changes or **ESC** to exit without making changes.

### Scientific Notation:

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

$3.4 \times 10^{60}$  is printed on the calculator as "3.4E60".

When scientific notation is asked for on tests and homework, use standard scientific notation,  $5 \times 10^{-3}$ .