

Learn to Program With Graphing Calculators

Programming (or *coding*) is a vital skill for engineering, computer science, math, science, and to simply learn to think more logically. Graphing calculators are a perfect tool for getting started: almost every high school student has one, everything you need is built-in, and coding on calculators is fun and easy.

Cemetech (<https://www.cemetech.net>) is a community to learn to program on calculators, computers, or microcontrollers, build electronics, and show off your projects. This quick-start guide will show you the basics for programming with a calculator.

Getting Started

What you'll need: Any calculator with "TI-83 Plus" or TI-84 Plus" in the name. That's it!

Resources: Cemetech forum and chat for help and questions:

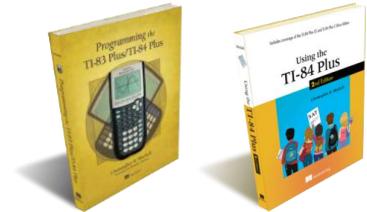
<https://www.cemetech.net>

Programming the TI-83 Plus/TI-84 Plus book:

<http://cemete.ch/book>

Using the TI-84 Plus book:

<http://cemete.ch/book2>



Your First Program: HELLO, WORLD

In almost every programming language, "Hello, World" is the first program a new programmer creates. It displays the text "HELLO, WORLD" on the screen. Here's how you can make it:

1. Press **(PRGM)**, then **(▶)** **(▶)** to get to **NEW**. Press **(ENTER)**.
2. Type in the name for your program (**HIWORLD**). Since Alpha-Lock (**(A)**) is already on, just hit the keys with the letters H, I, W, O, R, L, and D above them.
3. Press **(ENTER)**, and you will be presented with a new, blank program.
4. Press **(PRGM)** **(▶)** to get to the I/O (Input/Output) tab of the Program Commands menu. Choose 3:Disp to paste Disp into your program.
5. Type "**HELLO, WORLD**" by pressing **(2nd)** **(ALPHA)** to turn on Alpha-Lock, then pressing the keys that have the letters you want above them. The quotation mark (") is on the **(+)** key.
6. Quit to the homescreen by pressing **(2nd)** **(MODE)**. Press **(PRGM)** again, use the arrow to move your cursor to **HIWORLD**, and press **(ENTER)** to paste **prgmHIWORLD** to the homescreen. Press **(ENTER)** again to instruct your calculator to run the program.

```
NORMAL FLOAT AUTO REAL RADIAN MP
PROGRAM
Name=HIWORLD
```

```
NORMAL FLOAT AUTO REAL RADIAN MP
PROGRAM:HIWORLD
:Disp "HELLO, WORLD"
```

```
NORMAL FLOAT AUTO REAL RADIAN MP
prgmHIWORLD
HELLO, WORLD
..... Done
█
```

Quick-Start Reference

The following is just a taste of the many commands available for programming in TI-BASIC. For a full list and much more information on how to program, check out *Programming the TI-83 Plus/TI-84 Plus* (<http://cemete.ch/book>) or come ask questions at <https://www.cemetech.net/forum>.

Input and Output:

Access these commands via  .

ClrHome: Clears the homescreen

Disp: Displays text, numbers, and more. For example, `Disp 1+1` Or `Disp "HELLO"`.

Prompt X: Asks the user for a value, and stores it into variable `x`. Works with variables (`A-Z`), strings (`str0-str9`), and more.

Input "MASS=", X: Displays `MASS=` on the screen, asks the user for a value, and stores it into `x`. Works like `Prompt`.

Output (R,C,"VALUE"): Displays `VALUE` at row `R`, column `C` on the homescreen. On black-and-white calculators, there 8 rows, 1-8, and 16 columns, 1-16. On color-screen calculators, there are 10 rows and 26 columns. Works with text, numbers, and more. For example,
`Output(1,1,X)` Or
`Output(4,3,"CALCULATOR")`.

Pause : Pause the program and wait for the user to press .

Program Flow Control and Variables

Access these commands via .

->: The  key types `->`, which stores a new value to a variable. Example: `3+A->X`

If <condition>: Runs the next line of code if condition. For example, `IF X=3` runs the next line of code if `x=3`, or skips it if `x≠3`. Example:
`IF X<0`
`Disp "X IS NEGATIVE"`
 (=, ≠, <, >, ≤, and ≥ are in  )

Then/End: Let `If <condition>` run or skip more than one line of code. The code to be run or skipped goes between `Then` and `End`.

For (X,<start>,<end>,<step>): Count from `x=<start>` to `X=<end>`, adding `<step>` to `x` each time. Code between `For` and an `End` command is run each time.

Other useful control flow commands:

- **Else:** With `If`, `Then`, and `End`, run alternative code instead of skipping to `End` when the condition is false.
- **While:** Repeat a block of code *while* a condition remains true.
- **Repeat:** Repeat a block of code *until* a condition becomes true.

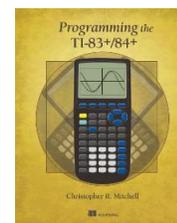
More Example Programs

Quadratic Solver

```
PROGRAM:QUAD
:Prompt A,B,C
:If B2-4AC<0
:Then
:Disp "IMAG ROOTS"
:Else
:Disp (B+√(B2-4AC))/(2A)
:Disp (B-√(B2-4AC))/(2A)
:End
```

Guessing Game

```
PROGRAM:GUESS
:randInt(1,50)->N
:0->N
:Repeat G=X
:Input "GUESS",G
:N+1->N
:If X>G
:Disp "TOO HIGH"
:If X<G
:Disp "TOO LOW"
:End
:Disp "GOOD JOB!"
:Disp N,"GUESSES"
```



Learn how to think like a programmer, how these and 30,000 available TI-BASIC programs work, and how to make your own:

Programming the TI-83 Plus/TI-84 Plus
 Christopher R. Mitchell
 Manning Publications, 2012
<http://cemete.ch/book>
<http://amzn.com/1617290777/>