Basics of Using the TI-84 Graphing Calculator

2nd Key

To access a function written in blue above the calculator keys, you must press [2nd] to access the function.

On/Off

To turn the calculator on, press the [ON] key in the lower left hand corner of your calculator.

To turn the calculator off, press [2nd] [ON].

Lightening/Darkening

Sometimes, your calculator screen may appear blank, but you may not need a new battery. You may just need to darken your screen.

To darken your screen, press [2nd] and hold down the up arrow [▲] until the screen is as dark as you want. (If you let go of the arrow, then you must repeat this process.)

To lighten your screen, press [2nd] and hold down [▼] until the screen is a light as you want. (If you let go of the arrow, then you must repeat this process.)
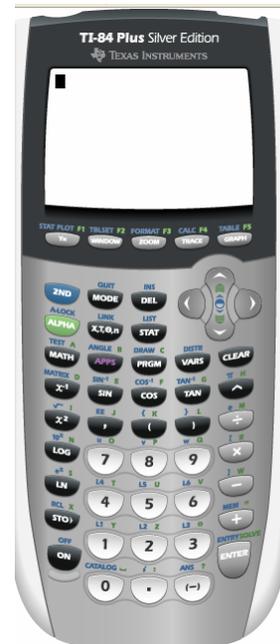
Mode
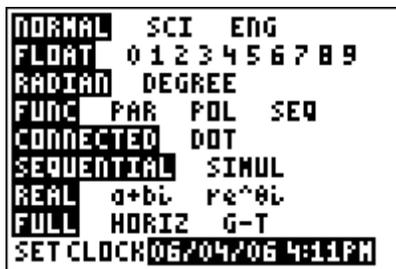
The MODE screen allows you to change various calculator settings. Press [MODE] and you will see a screen similar to the one below. Use the arrow keys and the [ENTER] key to change the settings.

```
NORMAL  SCI  ENG
FLOAT  0123456789
RADIAN  DEGREE
FUNC  PAR  POL  SEQ
CONNECTED  DOT
SEQUENTIAL  SIMUL
REAL  a+bi  re^θi
FULL  HORIZ  G-T
SET CLOCK 06/04/06 4:11PM
```

Typically leave on "Normal." SCI = scientific notation. ENG = engineering form.
FLOAT = the calculator will determine the appropriate number of decimal places to display. In Precalculus, you may need to change between Radian and Degree mode.
Typically you want to keep your calculator in FUNC (Function) mode to graph y as a function of x. In DOT mode, the calculator will plot points on the graph, rather than connecting the points.

You can set the calculator to show all numbers as REAL or imaginary.
You can divide your view screen by choosing HORIZ (graph & home screen), or G-T (graph & table).

The settings you see on the screen above are the default settings.

Arithmetic

It's important to keep the Order of Operations in mind when entering arithmetic expressions in the calculator.

Parentheses

Example. Use your calculator to compute $\dfrac{3-5}{4-2}+5$.

Answer: You must use parentheses to enclose the numerator and denominator of the fraction:

[( ] [3] [−] [5] [ )] [÷] [( ] [4] [−] [2] [ )] [+] [5] [ENTER] (Answer: 4)

Fractions

Your calculator can express answers in fraction form! You must choose the FRAC (fraction) command by pressing [MATH] then [1].

Example. Use your calculator to compute $\frac{2}{3}+\frac{5}{7}-6$ and express your answer in fraction form.

Answer: [2] [÷] [3] [+] [5] [÷] [7] [−] [6] [MATH] [1] [ENTER] **(Answer: -97/21)**

Using the negative symbol vs. subtraction sign

Use the negative symbol [(-)] (found below the [3] key) if you are simply writing a negative number. Use the subtraction key, [−], if you are subtracting a value from another value.

Example. Use your calculator to compute $-\frac{3}{2}-4$.

Answer: Notice that 3/2 is a negative number, so we must use the negative key to denote that. We are subtracting 4 from -3/2, so we will use the subtraction key to subtract 4.

[(-)] [3] [÷] [2] [−] [4] [MATH] [1] [ENTER] **(Answer: -11/2)**

Exponents

Use the carat key, [^], to express that a value is being raised to an exponent.

Example. Evaluate 12^4.

Answer: First, you enter the base of the expression. Second, you press the carat key, and whatever value follows the carat will be the exponent.

[1] [2] [^] [4] [ENTER] **(Answer: 20736)**

Note: You can press [x^2] **after typing in the base if you want to raise a value to the second power. However,** the carat key will work for any exponent.

Square Root

Press [2nd] [x^2] to obtain the square-root function. Make certain that everything under the radical is enclosed in parentheses. The calculator will automatically give you the first parenthesis.

Example. Evaluate $\sqrt{35+1}-7$.

Answer: Only 35+1 is under the radical, so that is the portion that must be enclosed in parentheses.

[2nd] [x^2] [3] [5] [+] [1] [)] [−] [7] [ENTER] **(Answer: -1)**

Cube Root

The cube root is found by first pressing the [MATH] key and then pressing [4].

Radical with Index > 3

The calculator does not have a specific function for radical terms with an index larger than 3. So, you will use the x-th root function in these cases. This root can be found by pressing [MATH] and then [5].

Example. Evaluate $\sqrt[5]{31+1}$.

Answer: The x-th root command does not provide an opening parenthesis like the other radical functions, so make certain to enter the parentheses yourself. Your first step is to type the index, 5, in the home screen. You then select the x-th root command:

`5` `MATH` `5` `(` `3` `1` `+` `1` `)` `ENTER` **(Answer: 2)**

General Calculator Tips

* To retrieve the previous lines, press `2nd` `ENTER` repeatedly.

* To clear the screen or a line of data, press `CLEAR` .

* To delete a value without deleting an entire line of data, use your arrow keys to move the cursor over the value you want to delete, and then press `DEL` . (Similarly, you can insert a value into a line of data by pressing `2nd` `DEL` to access the INS (insert) function.)

Graphing

Suppose we want to graph the function $y = x^2$.

* Press `Y=` to enter the function in the calculator to be graphed. The `X,T,θ,n` key should be used to enter the variable x.

* To adjust the viewing window, press `WINDOW` .
Xmin = smallest x-value that will appear on the graph
Xmax = largest x-value that will appear on the graph
Xscl = the number of units represented by each tick-mark on the x-axis
Ymin = smallest y-value that will appear on the graph
Ymax = largest y-value that will appear on the graph
Yscl = the number of units represented by each tick-mark on the y-axis
The screen on the right shows the "Standard Window."

```
WINDOW
 Xmin=-10
 Xmax=10
 Xscl=1
 Ymin=-10
 Ymax=10
 Yscl=1
 Xres=1
```

After you enter your function in `Y=` , press `GRAPH` to view your graph!

Evaluating Functions

Suppose we have $f(x) = -2x^2 + 5x - 7$ and we want to find $f(3)$. (In other words, we want to plug in the value of 3 for all of the x's.) The calculator can do this several different ways.

Table

1. Enter the function in `Y=` : `Y=` `(-)` `2` `X,T,θ,n` `x²` `+` `5` `X,T,θ,n` `—` `7` .

2. Adjust the table settings if needed: Press `2nd` `WINDOW` to access the TBLSET menu. You need to make sure that the Independent variable (x-value) is on "Ask" so that the calculator will ask you to enter the x-value and the Dependent variable (y-value) is on "Auto" so the calculator will automatically give you the y-value. (Use the arrows and the enter key to change the values if necessary.) Your screen should look like the one shown on the right.

```
TABLE SETUP
 TblStart=0
 ΔTbl=1
 Indpnt: Auto ASK
 Depend: AUTO Ask
```

```
 X  │ Y1 │
 3  │ -10│
```

3. Now, go to the Table by pressing `2nd` `GRAPH` . Press `3` to enter in the x-value of 3 and then press enter. The function value should appear in the Y1 column **(Answer: -10).**

```
X=3
```

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Function Notation

We can enter a notation similar to $f(3)$ in the homescreen of the calculator. We stored our function in Y1 in the calculator. Therefore, our expression will look like: Y1(3).

1. Enter the function to be evaluated in [Y=]. (You may still have the function entered from the previous example.)

2. Quit and go back to the homescreen by pressing [2nd] [MODE].

3. Enter Y1 in the homescreen by pressing the following: [VARS] [▶] [1] [1]. Y1 should now appear in the homescreen.

4. Now, write the expression in function notation by adding: [(] [3] [)]. Press [ENTER] **and you should yield the value -10, just like when using the Table.**

So now, you know some of the basics of using your TI-84 graphing calculator. To learn about more functions of the TI-84, visit this website: http://www.prenhall.com/esm/app/calc_v2/ and select the link for TI-83. (The TI-84 and TI-83 have many of the same functions.)

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