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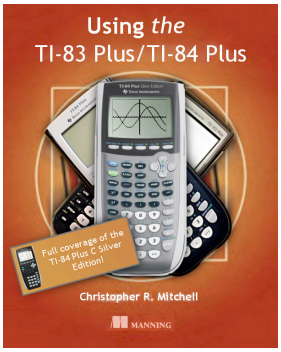

Using the TI-83 Plus/TI-84 Plus
By Christopher R. Mitchell

Your graphing calculator is, first and foremost, a calculator. It can graph, calculate statistics and calculus, and run programs, but its primary job is to be great at math. The core of your calculator is the homescreen, the 8-row, 16-column area where you type math equations and read out the results. This article, based on chapter 2 from Using TI-83 Plus/TI-84 Plus, gets you started performing math on the homescreen through a couple of examples.

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Examples of Homescreen Math Functions

Your calculator contains tons of functions. Although the word has many meanings, I mean something very specific by *function*: A word, followed by an opening parenthesis. For example, `abs(` is a function that you use to find an absolute value, and `Circle(` is used to draw a circle. Part of any function are one or more *arguments*, numbers, or mathematical expressions separated by parentheses, shown in figure 1. You can even *nest* functions by putting them inside each other, also shown in figure 1.

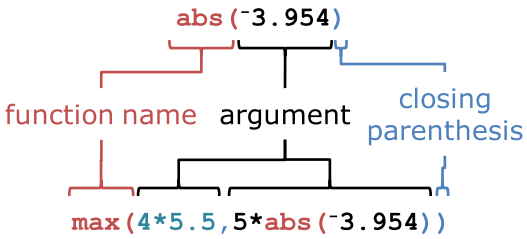

Figure 1 A simple function with one argument (top) and a two-argument function with a nested function (bottom). On the top, `abs(` is the name of the function, ⁻3.954 is the single argument, and the closing parenthesis matches the opening parenthesis that is part of the function name. On the bottom, the two arguments to the `max(` function are `4*5.5` and `5*abs(⁻3.954)`, which itself is a function with an argument. Notice that the arguments are separated by a comma. On MathPrint calculators, the `abs` function is represented by vertical bars `|like this|` instead of by `abs(`.

To get you started with using functions, let's look at three specific examples. Two demonstrate items from the Num tab of the MATH menu, while the third shows the sine function on the SIN key. As always, the best way to get a feel for this new skill is to work through the examples on your own calculator2.

Let's first play with the `lcm(` function, which, as you might expect, calculates the lowest common multiple of two numbers.

Finding the lowest common multiple of two numbers

As you may have learned in a math class, the lowest common multiple (LCM) of two numbers *a* and *b* is the smallest number that is both a multiple of A and a multiple of B. Since it's mathematically very simple but perhaps time-consuming to find such a number, you can put your calculator to work to figure it out. You could work through each multiple of *a* (*a*, 2*a*, 3*a*, 4*a*, …) and manually test if each multiple is also a multiple of *b* until you find the LCM, or you could just let your calculator do it. Figure 2 shows three screenshots from this process.

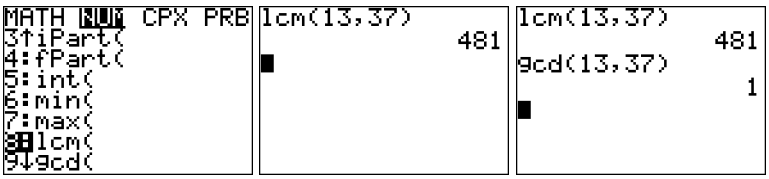

Figure 2 Finding the lowest common multiple (LCM) of two numbers. The Num tab of the Math menu (accessed by pressing [MATH] and then the right arrow key once) contains the lcm(and gcd(functions. Hit [ENTER] on lcm(, then type the two numbers to find the LCM of with a comma in between. You also need to close the opening parenthesis, then hit [ENTER]. On the right side, checking the Greatest Common Divisor of the two numbers.

Since the LCM is calculated from two numbers, it stands to reason that the `lcm(` function would take two arguments. We'll find the `lcm(` function, paste it to the homescreen, type the two arguments, and then calculate the result. First, press TEST A MATH. As you might have noticed, most of the general-purpose functions you'll use are in the TEST A MATH menu, although more specialized functions are in menus such as the Matrix, Stats, and Vars menus. Press the ▶ button once to move to the Num (Number) tab (notice how it changes to white text on a black background?), then move the cursor down to `8:lcm(` and press ENTRY SOLVE ENTER to paste it. Alternatively, you could just press the 8 key.

Now you need to type the two arguments. Enter your first number, such as `13`, type a comma with EE J ,, then enter the second number, such as `37`. As you can see, I'm assuming that you're getting more comfortable with your calculator, and that I don't have to tell you to press L1 Y 1 L3 Θ 3 to type the number `13`. After your second number, type a) L) to close the `lcm(` function.

Press ENTRY SOLVE ENTER and read off the result! 481 is indeed the LCM of 13 and 37, as figure 2.14 shows, as 13*37=481. The LCM of *a* and *b* is not always *a***b*, for example when *a*=4, *b*=2, and their LCM is 4, but in this case the LCM of *a* and *b* is indeed *a***b*. Feel free to try some other pairs of numbers: you can press 2ND ENTRY SOLVE ENTER to get the equation back, then use INS DEL and the insert mode to change the arguments.

Want to get the greatest common divisor (GCD) of the two numbers instead? Select the `gcd(` function from the Num tab of the Math menu and use that instead. The right-hand screenshot in figure 2 shows that your calculator knows 1 is the GCD of 13 and 37.

Another useful function in the Num menu is `round(`. Let's work with that next.

Rounding a number

`round(` is an unusual function in that it can take either one or two arguments. The one-argument version is more useful when you're programming TI-BASIC on your calculator than for math, so you shouldn't worry about it too much for now (check out the first line on the right side of figure 3). We'll use the two argument version: `round(number, decimal places)`, which rounds `number` to `decimal places`. If you add the `decimal places` argument, you must specify between 0 and 9 decimal places; anything else will make the calculator produce an ERR:DOMAIN error.

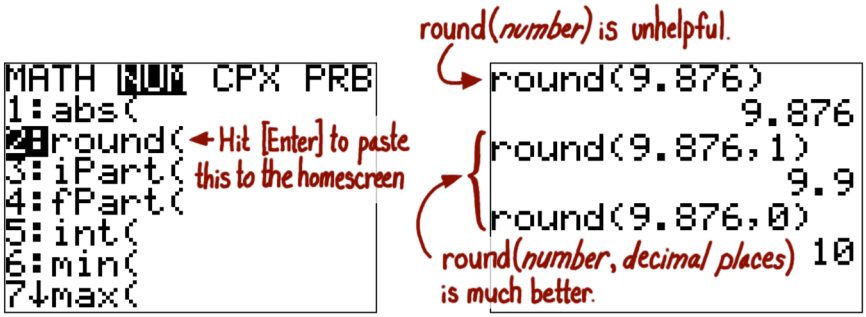

Figure 3 Using the round() command from the Num tab of the Math menu to round a number. round(*number*) doesn't do much, but you can add a second argument that tells the calculator how many decimal places to round to. If you ask for 0 decimal places, it rounds to the nearest integer.

If you went through the LCM example, this one should be easy. Go to the Math menu, move to the Num tab, and choose `2:round(`. If you don't know how to do any of that, review the previous example. Once you paste `round(` to the homescreen, add the two arguments. First type the number that you want to round, then a comma, then how many decimal places you want to round the number to. If you round to 0 decimal places, you'll round to the nearest integer (like 9.876 to 10, as figure 3 shows). If you round to 1 decimal place, you'll get one decimal place.

How about tossing some trigonometry into the mix? Let's take a look at how you can calculate the sine of an angle in radians or in degrees with the `sin(` function.

Finding the sine of a number

It shouldn't be a surprise to you that your calculator is good at trigonometry, considering the SIN, COS, and TAN keys prominently centered on its keypad. These are among the few functions that you don't need to go into a menu to find. You simply press one of those keys, add the number (or expression) for the angle to take the sine, cosine, or tangent of, and then add a closing parenthesis. Let's try with `sin(`.

You can either take the sine of angles in degrees, as in the center of figure 4, or you can work with angles in radians, as at right in figure 4. If you just put the number by itself, the calculator will have no way to guess if you're dealing with degree or radian angles. The way it decides is a setting in the Mode menu. Press the MODE key and look for the line that says "`RADIAN DEGREE`". Whichever word is in white text on a black background is the current mode. In radian mode, all angles are assumed to be radians, while in degree mode, all angles are assumed to be degrees. You can also explicitly tell the calculator if you're entering a radian or degree angle, regardless of the mode.

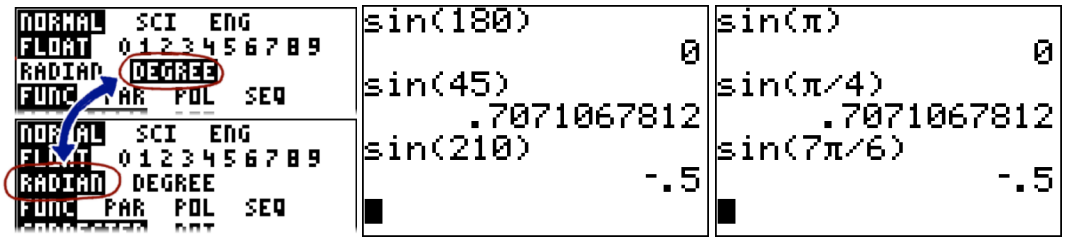

Figure 4 Calculating the sine of various angles with your calculator. The middle screenshot uses angles in degrees, and the right-hand screenshot uses angles in radians. The left side shows how to use the Mode menu, accessed with the [MODE] key, to switch between degree and Radian mode.

Switch into the mode of your choice in the Mode menu by using the arrow keys to move the cursor over `RADIAN` or `DEGREE` and pressing enter. Leave the Mode menu by pressing 2ND MODE (Quit), and then try out the `sin(` function. You can try with degree angles like 180, 45, and 210, or their radian equivalents, π, π/4, and 7π/6 (or any

other angles that catch your fancy). You can also try out the cosine (

) and tangent (

) functions if you want.

Summary

You have gotten a taste of using your TI-83 Plus or TI-84 Plus graphing calculator for math. You saw how to use functions through a few examples, and you learned how to use the calculator's keypad to find functions and edit calculations. Although you have now seen quite a few functions in action, you have barely uncovered all of the functions your calculator has available. Tap into *Using TI-83 Plus/TI-84 Plus* for even more goodies like these.

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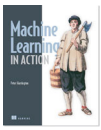

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