## Getting Started on the TI-89 - Graphing, Tables, and More!

1. Press MODE. You should always check to see how your calculator is set up. Use the arrow $\mathbf{v}$ and the arrow $>$ to highlight a setting. Press ENTER to select a setting. Set your screen to look like the screens below. Use F1, F2, and F3 to see the three screen. Press ENTER to SAVE.


Example: Take a piece of paper and crush it into a ball. Throw it up and over from your left hand to your right hand. Watch the path of the paper ball in the air. What path does the paper follow? There is a function that takes on this shape! Given a bit more information about your toss, velocity of your throw, angle of toss, your height..., we could find that equation. We will use the function $f(x)=x(24-x)$ for now. $f(x)$ is the height of the ball and $x$ will measure the distance between our hands in cm .

3. To enter a function, press green $\leqslant \mathbf{Y}=$. Highlight yl and press ENTER. Type in the function you see at the left. Press ENTER. Notice that y1 is now selected. (Notice that there are X, Y, Z, and T keys to speed up your entry. )
4. Set up the viewing area. This one is set up for you. Press green $\leqslant$ WINDOW. Use the arrow keys to change your window values. Xscl and Yscl are the distance between the tick marks on the axes. (Later, investigate ZOOM!)
5. Now press green $\leqslant$ GRAPH. If you need to change the window, press WINDOW and make the changes. This window shows more than the physical problem. Always ask, "Is this what I expected to see?" Does this look like your paper ball toss?

6. Press F3 TRACE. Notice the flashing cursor and the values at the bottom of the screen. Use $\boldsymbol{4}$ and to move the cursor on the graph. Notice the $\mathbf{1}$ on the upper right hand corner of the screen. That tells you that this is $\mathrm{Y}_{1}$.
(Press F3 TRACE and arrow OR press F3 TRACE and then ENTER a number to go to any value!)
7. Now we will set up to look at the numbers.

To set up a table of values:
Press green $\downarrow$ TblSet. TblMin is the start of the table. $\Delta$ Tbl is the increment. (Read delta table.) Use the arrow keys to set the values given at the left. Press ENTER to SAVE.
8. Press green $\downarrow$ TABLE. Use the arrow keys to see more values. How far apart are the left and right hands for this toss?
9. How can you use this table feature to find the maximum height of the ball? Try it. Go back and change the TblSet screen to search for a maximum.
10. Press green $\$$ GRAPH to return to the graph. To find a particular value of a function, press F5, 1:Value. Find $f(6)$. Press 6 and then ENTER. Is this answer reasonable?



Example: Now, you toss your paper ball again. This time you are at the base of a hill. Toss your ball up the hill. Where does it land? How high did it go? What shapes are we working with?

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11. Enter another function, $\mathrm{f}(\mathrm{x})=6 \mathrm{x}$. This will be our hill.
Press green $\downarrow \mathbf{Y}=$. Arrow to y 2 , press ENTER, type in $\mathrm{y}_{2}$, press ENTER.


## 12. Press green $\downarrow$ GRAPH.

Is this what you expected to see? $\qquad$ Where is the point where your paper ball hit the hill? Write a guess here.

13. Where does the ball hit the hill? Find where the functions intersect. Press 55 Math. Press 5 for 5:Intersection. The cursor appears. Notice that the cursor is on $\mathrm{y}_{1}$ (the 1 in the upper right corner). Arrow near the intersection and press ENTER.

14. The cursor jumped to the second function. Notice the 2 in the upper right corner. Press ENTER.
15. Arrow to a lower bound near the intersection you want to find and press ENTER. Then arrow to an upper bound. Press ENTER to see the intersection. An approximation to the intersection is at the bottom of the screen. This one is exact. Verify using algebra. What your guess close? $\qquad$



16. How high did your toss go above the level ground? Write your guess here. $\qquad$ Find the maximum value of $\mathrm{Y}_{1}$ on the window given. Press F5 Math.
Press 4:maximum.
17. Again, you will be asked to give some information about the location of the maximum. First arrow to a lower bound. This should be an x value which has an output smaller than the maximum. Press ENTER. For the upper bound, arrow past the maximum and press ENTER to give an x value which has an output value bigger than the maximum. The maximum is given at the bottom of the screen. This is the height above the level ground. Was your guess close?

18. Try this: Find the maximum height that the ball reached above the hill. How does this question differ from what was found above?

