ALGEBRA I ACTIVITY 9:
INTRODUCING THE PARABOLA
TIalgebra.com

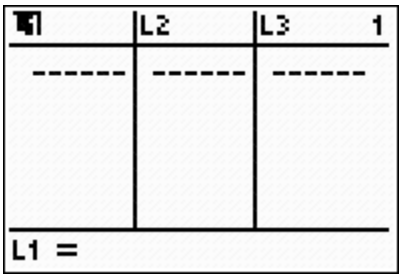
ACTIVITY OVERVIEW:
In this activity we will

- Calculate x^2 for x from -10 to 10.
- Plot the points from the table. Examine the graph and its properties.
- Graph the function in [Y=] and use the table and graph to determine when x^2 has a specified value.

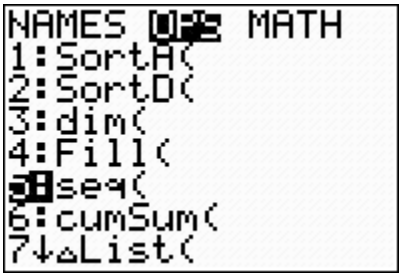
X	X^2

Draw a table. Enter the integers from -10 to 10 in the x column. Use mental math to fill the y column as x^2.

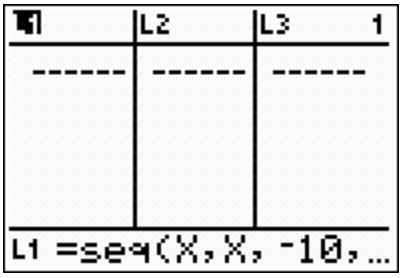
Press [STAT] [ENTER]. Press [▲] to the top of **L1**.



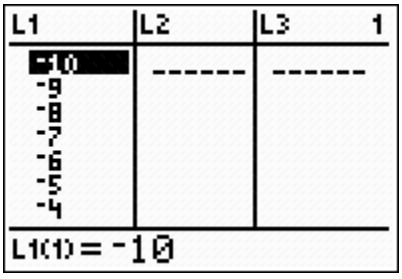
To enter the integers from -10 to 10 in L1 quickly, press [2nd] [STAT] to access the **LIST** menus. Press [▶] to list **OPS**. Select **5:seq(** by pressing [5] or by scrolling down and pressing [ENTER].



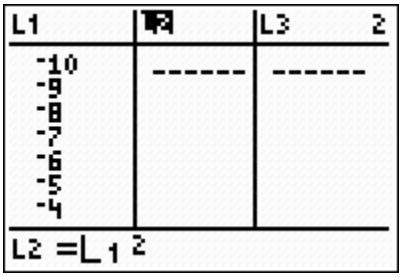
This will paste the command at the bottom of L1. You will now enter a command that will complete the lists. Press [X,T,Θ,n] [,] [X,T,Θ,n] [,] [(-)] [1] [0] [,] [1] [0] [,] [1] [)]. This is instructing the calculator to use the expression x, evaluated for variable x, for values from -10 to 10, counting by 1's.



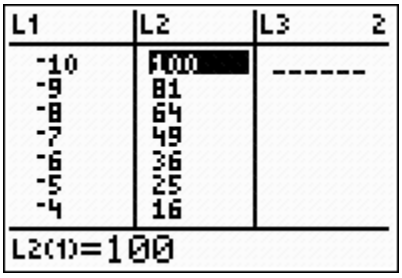
Press [ENTER].



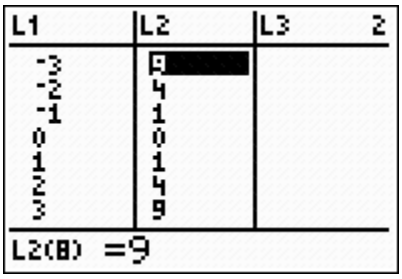
Arrow to the top of **L2**. Define **L2** as **L1** squared by pressing [2nd][1][x^2].



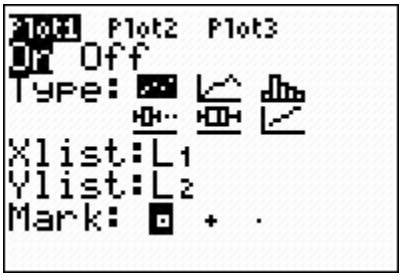
Press [ENTER].



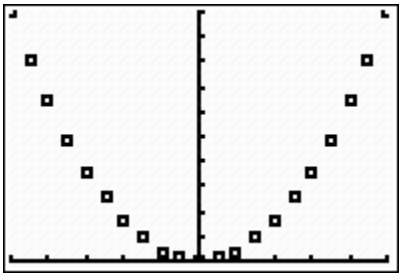
Scroll down the lists. Examine the entries before and after (0, 0). What appears to be happening? Examine your largest and smallest values for **L1** and **L2** in preparation for setting a window.



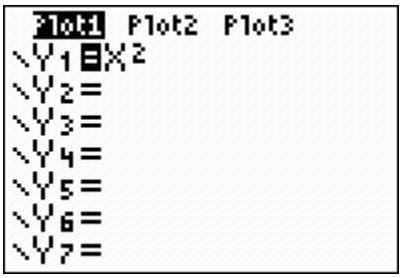
Press [WINDOW]. Set the window to [-10, 10, 1, 0, 100, 10]. Press [2nd][Y=][1] to select Plot 1. Press [ENTER] to turn Plot 1 **On**. All other settings will remain the default settings.



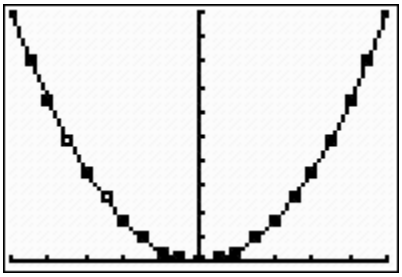
Press [GRAPH]. Describe the shape of the plot. What is happening on each side of the points (0, 0)? From examining the plot, do you thing $y = x^2$ is a function? How will the graph of $y = x^2$ compare to the plot? Using the plot and the lists, can you determine what value of x will be squared to give 17.64? or 42.25? Why or why not?



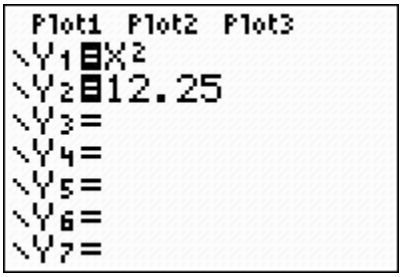
Compare the plot to the graph $y = x^2$. Press [Y=]. Enter [X,T,Θ,*n*][x^2] for $\mathbf{Y_1}$.



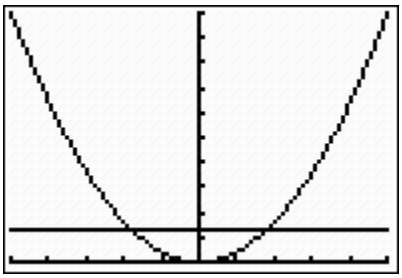
Press GRAPH. How might the graph of the function be more useful than the plot?



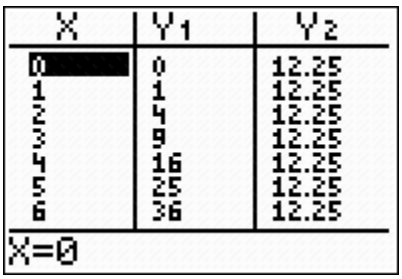
What square will have the area of 12.25 square units? In other words, for what value of *x* will *y* be 12.25? Return to Y=. Arrow up to Plot1 and press ENTER to turn it off (it will no longer be darkened). Enter 12.25 into $\mathbf{Y_2}$ as shown.



Press GRAPH. How does this picture relate to the question "for what value of *x* will *y* be 12.25?" Use trace if desired to estimate when *y* = 12.25

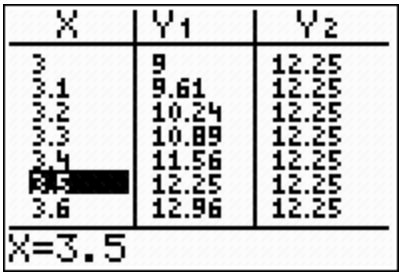


Press 2nd GRAPH to examine the table. Between what values of **X** will $\mathbf{Y_1}$ be 12.25?

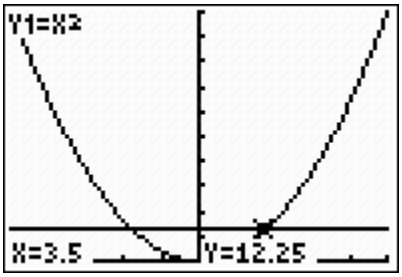


To narrow in on that portion of the table, press 2nd WINDOW. Change the **TblStart** to 3 and the change in the table (**ΔTbl**) to 0.1.

Press 2nd GRAPH to examine the table again. For what value of **X** will $\mathbf{Y_1}$ be 12.25? Do you think this is the only place it will happen?

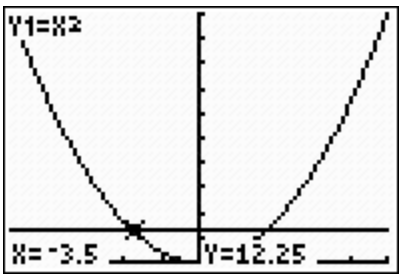


Press GRAPH. Press TRACE. When in trace mode it is possible to type in values for *x* to have the cursor jump directly to that point. Type 3 . 5 ENTER. Based on this picture, for what other value of *x* do you think *y* = 12.25?



Type (-) 3 . 5 ENTER. Which point(s) answer the questions below:

For what value(s) of *x* will *y* be 12.25?
What square(s) will have the area of 12.25 square units?



Examine these calculations. What do they tell you about the relationship between squaring and finding the square root?