

TI-83

Topic #12 – Graphing Relations that are not Functions

Task #1: Graph the relation $-2x^2 + y^2 + 8 = 0$.

Strategy : To graph a function, we normally press $\boxed{\text{Y=}}$ and type the formula for the function (for example: $Y1 = 6x^5 - 5$). In our case, however, the relation is not given to us in the form $y = \dots$. So we need to solve the equation for y to get it in the proper form.

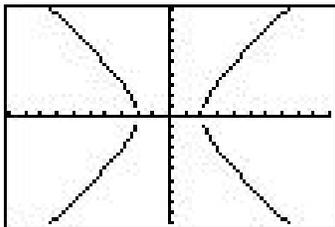
$$-2x^2 + y^2 + 8 = 0$$

$$y^2 = 2x^2 - 8$$

The square root property says that we get rid of the square root on the y -term by taking the positive and negative square root of the other side of the equation:

$$y = \pm\sqrt{2x^2 - 8}$$

This actually defines two functions: $Y1 = \sqrt{2x^2 - 8}$ and $Y2 = -\sqrt{2x^2 - 8}$. Our relation consists of these two functions. To graph the relation, enter the two functions at $Y1$ and $Y2$ and use a standard window to display the graph.



Press $\boxed{\text{TRACE}}$ and use your right and left arrow keys to move along the upper half of the graph. Notice that when $x = 0$, there is no y -value, meaning that the function $Y1 = \sqrt{2x^2 - 8}$ is undefined for $x = 0$ (since we get a negative number under the radical). Press the down arrow key. You will notice that you are now tracing the lower half of the graph. The function in the upper left corner of the screen indicates which function you are tracing.

There is one major problem with our current graph. Notice that the calculator has not connected the upper half of the graph to the lower half. Recall from task #1 of topic #11 that we have discussed two ways to correct this problem. In our case, using zoom decimal will work. Use zoom decimal and set up your window with the following y -values:

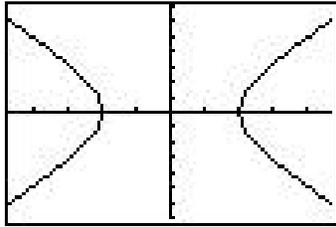
$$Y_{\min} = -7$$

$$Y_{\max} = 7$$

$$Y_{\text{scl}} = 1$$

We can now see that the two halves should really be connected.

Conclusion: Your graph should look identical to this:



You try: Graph the relation $8x^2 + 2y^2 = 16$

Conclusion

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