Graphing Functions and Their Inverses Discovery Activity

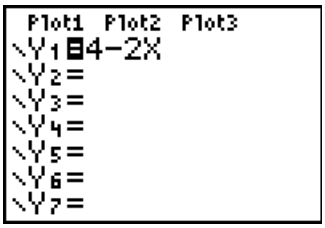
In this activity, you will use your TI-83 graphing calculator to graph functions and their inverses on the same plane and find their intersection. Throughout this guide, there will be questions to answer about the graphs of the equations. Make sure you answer all of the questions!

The first equation we are going to work with is $4x + 2y = 8$.

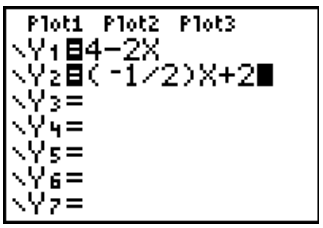
Its inverse it the equation $y = \frac{-1}{2}x + 2$.

To begin, turn on your calculator. Press É.
Then press □.

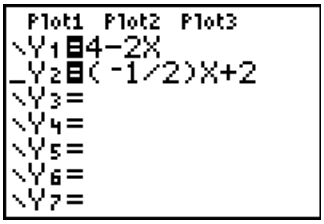
In the Y1 spot, type $4 - 2x$.
To enter this equation, type the following keys:
¶ [1] Á □



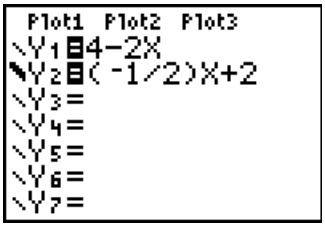
In Y_2, input $(-1/2)x + 2$.
Type the equation in using the following keys:
£ Ì À ¥ Á ¤ □ Ã Á
Make sure you use the parenthesis
and the appropriate negative sign.



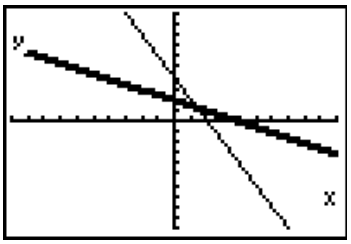
In the Y_2 equation, move the cursor all the way to the left.
The line should be flashing.



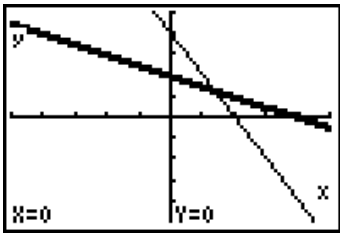
Hit Í until the bold line is displayed.
Use the line that looks like this➔.
Your screen should now look like this.



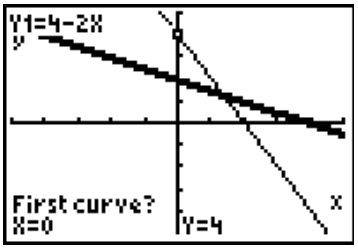
Now hit the s button.
Both of the equations should now appear in the same xy-coordinate plane.



Zoom in using the q button.
In the Zoom menu, press Á to `Zoom In`.
Then press Í



Now we will find the intersection of the two lines.
Press yr to get to/.
Then select · `intersect` from the menu.
Your screen will now appear like this



On the first line, select a point on the line.
PressÍ. Do the same for the second line and pressÍ. Now it asks you for a guess of where the intersection is. Get the cursor as close to the intersection as possible. Then pressÍ.
The x and y values should now appear.

What is the coordinate of the intersection? **(,)**

What do you see about the relationship of the lines on the left side of the intersection to the lines on the right side of the intersection?

Using the coordinate of the intersection, write the equation of a line in which that point lies.

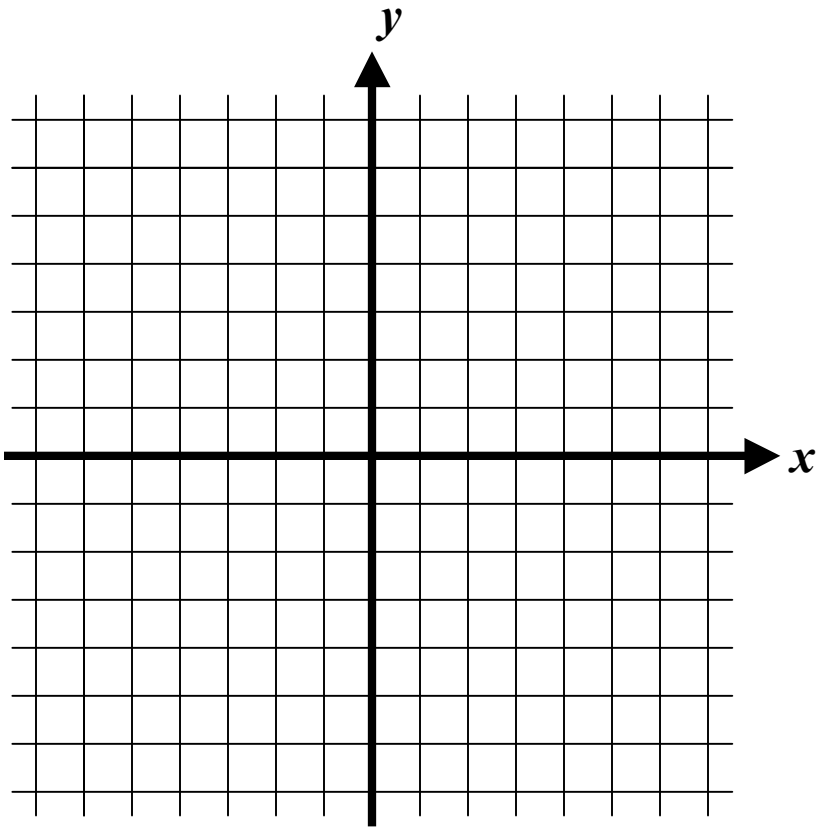
$y =$

Now I would like you to repeat the steps for the following two equations. Make sure you answer all of the questions. When asked to graph the lines, use different colors for each graph and label them. **SINCE YOU ARE ONLY CHANGING THE YI AND Y2 VALUES, YOU DO NOT NEED TO ZOOM IN AGAIN!**

$3x - y = 5$

1. **What is the inverse of $3x - y = 5$?**

2. **Graph each line on the following coordinate plane after you have zoomed in on the calculator. Make sure you label each graph!**



3. **What is the coordinate of the intersection? (,)**

4. **What do you see about the relationship of the lines on the left side of the intersection to the lines on the right side of the intersection?**

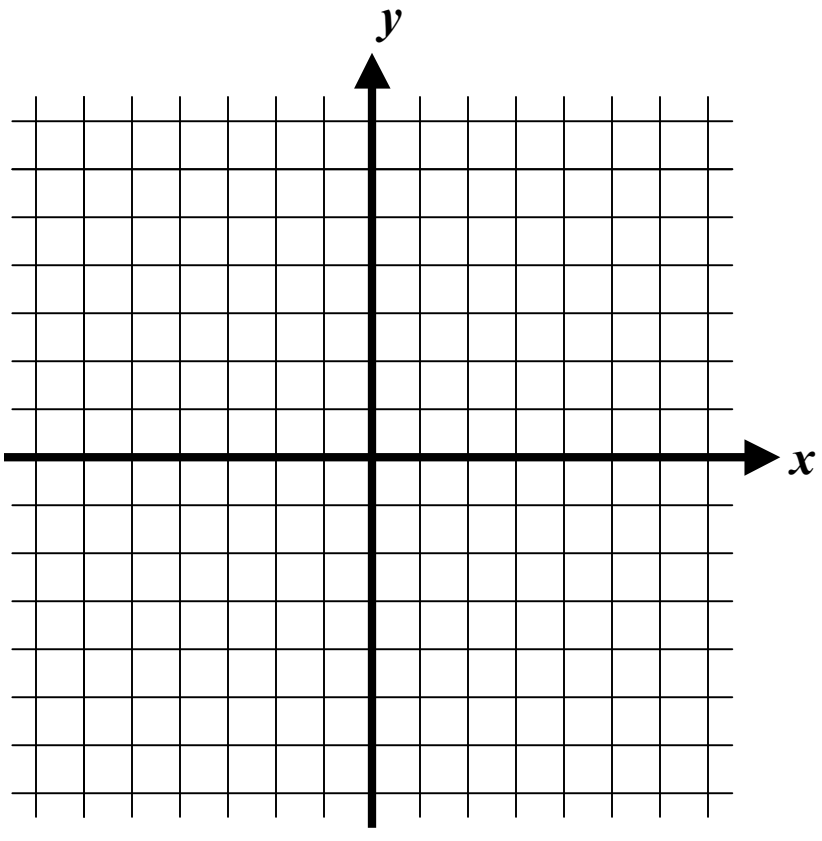
5. **Using the coordinate of the intersection, write the equation of a line in which that point lies.**

   $y =$

$-7x + 3y = -5$

6. **What is the inverse of** $-7x + 3y = -5$ **?**

7. **Graph each line on the following coordinate plane after you have zoomed in on the calculator. Make sure you label each graph!**



8. **What is the coordinate of the intersection? (,)**

9. **What do you see about the relationship of the lines on the left side of the intersection to the lines on the right side of the intersection?**

10. **Using the coordinate of the intersection, write the equation of a line in which that point lies.**

    $y =$

11. **How do you find the intersection of two lines by hand? Use one of the three equations we used as an example.**

12. **What do you notice about all of the points of intersection for the three functions and inverses we examined today?**

13. **What line could all three points of intersection lie on?**

    $y =$

14. **What can you conclude about the graphs of functions and their inverses with respect to the equation from the question above?**