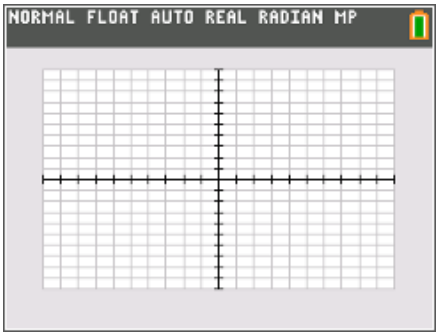
Part 1 – Systems of Linear Equations

Graph the following equations. Draw your graph on the screen at the right.

$y = -2x$

$y = x + 3$

$y = 5$



Find the intersection points of each vertex of the triangle formed. Press [2nd] [trace] [calc] and select **Intersect** to find the intersection points. Make sure to select the correct equations each time using the [▲] and [▼] keys accordingly.

Label each equation and each intersection point on the graph above.

1. Identify the systems of equations and their solution(s).

System 1: { _____ _____ Solution(s): _____

System 2: { _____ _____ Solution(s): _____

System 3: { _____ _____ Solution(s): _____

2. Can the point (2, 5) be a solution to the system $\begin{cases} y = -2x \\ y = x + 3 \end{cases}$? Explain your reasoning.

3. Where is the point (0, 4) in relation to the triangle? Is this point a solution to any of the three systems? Explain your reasoning.

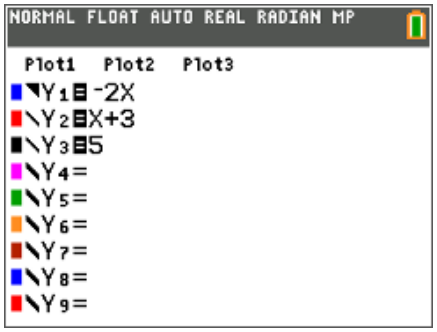
4. How many solutions does each system listed in Problem 1 have?

5. Are any of the intersection points solutions to the system of equations $\begin{cases} y = -2x \\ y = x + 3 \\ y = 5 \end{cases}$?

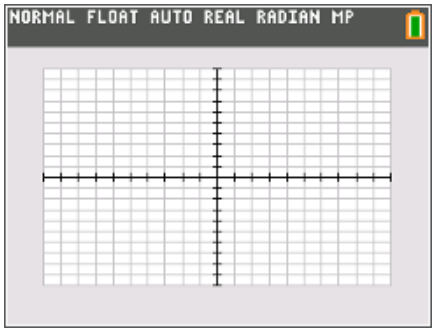
Part 2 – System of Linear Inequalities

Change the ◥ symbol (to the left of **Y1**, **Y2**, and **Y3**) to ◣ or ◥ (by pressing enter) for each equation until the darkest shaded region forms a triangle.

This will change the equations to inequalities with ≤ or ≥ symbols.

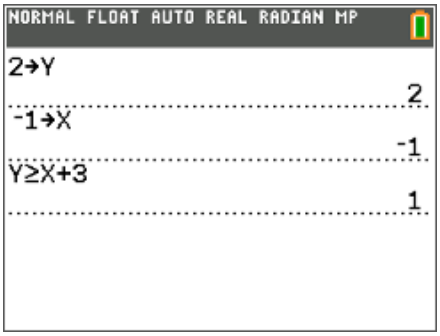


Draw your modified graph of the inequalities on the screen at the right. Label each equation and each intersection point.



Use the Home Screen to test each vertex in each inequality.

The first entry at the right shows storing the *x*- and *y*-coordinates of the first vertex. The second entry tests the point in the inequality. The calculator returns **1** if the inequality is **true** and **0** if the inequality is **false**.



6. How many of the vertices of the triangle are solutions to the system?

7. Test points inside the triangle as well. How many solutions are there to the system?

8. If the inequalities of the system were changed to < and >, how many of the vertices would be solutions?

9. What differences in the solutions did you find between systems of linear equations representing a triangle and a system of linear inequalities representing a triangle?