See TI-Nspire™ Handbook on pages 415–422.

6-8 Technology: Graph Systems of Inequalities

Objective To use a handheld to graph a system of linear inequalities

► You can use a graph to solve a system of linear inequalities.

Use a handheld to graph the system: $\begin{cases} x + y < 9 \\ 2x + y \geq 14 \end{cases}$

First, solve each inequality for y.

$x + y < 9$

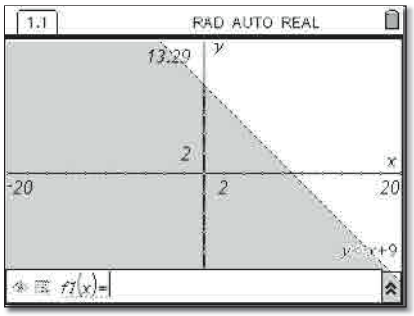
$y < -x + 9$ ← Use the Subtraction Property of Inequality.

$2x + y \geq 14$

$y \geq -2x + 14$ ← Use the Subtraction Property of Inequality.

Step 1 Press ⌂. Then choose 2 to select **Graphs & Geometry**.

Step 2 Use the clear key to delete the equals sign. Input $< -x + 9$, then press enter to graph the inequality.



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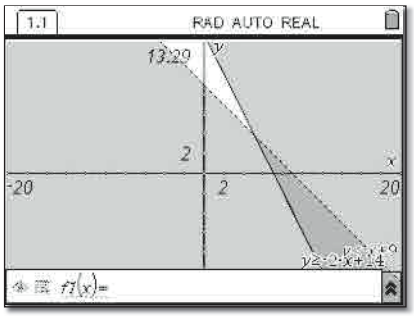
Step 3 Use the clear key to delete the equals sign. Input $\geq -2x + 14$, then press enter to graph the inequality. Use ctrl > to enter the inequality symbol.

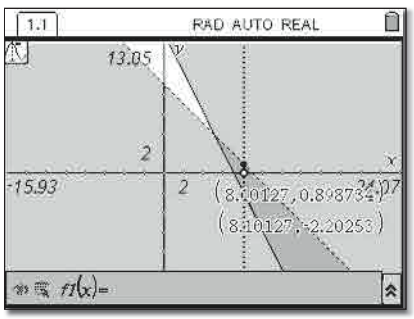


The solution to the system of inequalities is the shaded region where the two graphs overlap.

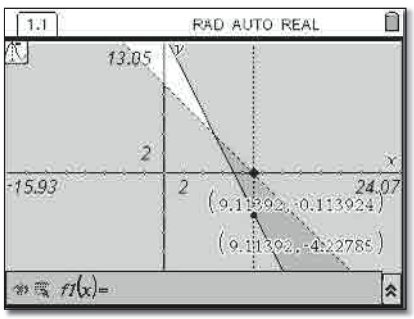
► You can use the **Trace** command to name two points that are part of a system's solution set.

Step 4 Press menu. Select **Trace**, and then choose **Graph Trace**.

Step 5 Press ▼ to select both lines. Then press ▶ to move along the lines. Choose a test point that is part of the solution set. (8, 0) is one point.



Step 6 Continue to press ▶ to choose another test point. The point (9, −1) is also in the solution set.



So two points that *appear* to be part of the solution are (8, 0) and (9, −1).

* Window setting adjusted to fit graph

Since you cannot verify a solution set to a system using a graph, you can use the chosen test points to check the solution algebraically.

Try: $(8, 0)$

$x + y < 9$ $\quad$ $2x + y \geq 14$

$8 + 0 \overset{?}{<} 9$ $\quad$ $2(8) + 0 \overset{?}{\geq} 14$

$8 < 9$ ✓ $\quad$ $16 \geq 14$ ✓

Try: $(9, -1)$

$x + y < 9$ $\quad$ $2x + y \geq 14$

$9 + -1 \overset{?}{<} 9$ $\quad$ $2(9) + -1 \overset{?}{\geq} 14$

$8 < 9$ ✓ $\quad$ $17 \geq 14$ ✓

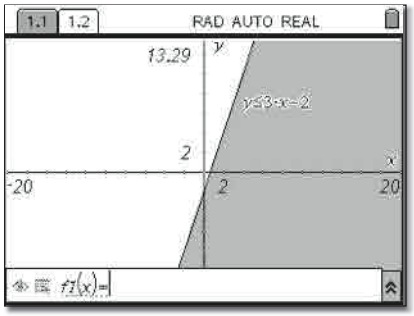
So $(8, 0)$ and $(9, -1)$ are part of the solution set for the inequality.

Example

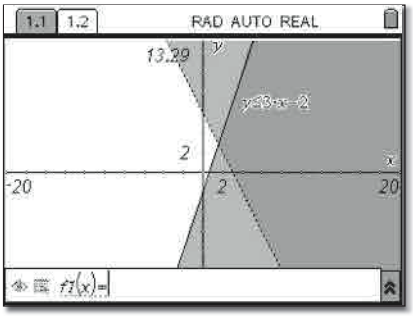
1 Use a handheld to graph the system. $\begin{cases} y \leq 3x - 2 \\ y > -2x + 6 \end{cases}$

Step 1 Press [home]. Then choose [2] to select **Graphs & Geometry**.

Step 2 Use the [clear] key to delete the equals sign. Input $\leq 3x - 2$. Use [ctrl] [<] to enter the inequality symbol. Press [≈ enter] to graph the first inequality.



Step 3 Use the [clear] key to delete the equals sign. Input $> -2x + 6$, then press [≈ enter] to graph the second inequality.



Looking at the graph, the points $(5, 0)$ and $(6, 0)$ *appear* to be part of the solution set. Choose test points and check the solution set.

Try: $(5, 0)$

$y \leq 3x - 2$ $\quad$ $y > -2x + 6$

$0 \overset{?}{\leq} 3(5) - 2$ $\quad$ $0 \overset{?}{>} -2(5) + 6$

$0 \leq 13$ ✓ $\quad$ $0 > -4$ ✓

Try: $(6, 0)$

$y \leq 3x - 2$ $\quad$ $y > -2x + 6$

$0 \overset{?}{\leq} 3(6) - 2$ $\quad$ $0 \overset{?}{>} -2(6) + 6$

$0 \leq 16$ ✓ $\quad$ $0 > -6$ ✓

Try These

Use a handheld to graph the system. Then name two points that are part of the solution set.

1. $\begin{cases} y > 5x \\ y \geq 5x - 4 \end{cases}$ $\quad$ **2.** $\begin{cases} -4x + y > 8 \\ x + 4y > 8 \end{cases}$ $\quad$ **3.** $\begin{cases} x - 3y < 15 \\ -6x - 8y \leq -12 \end{cases}$

4. Discuss and Write Graph the system $\begin{cases} y \geq 5x + 3 \\ y < 5x - 4 \end{cases}$ using a handheld. Describe and explain the result.

Go to PRACTICE BOOK Lesson 6-8 for exercise sets.