

Solving Linear Inequalities Using a TI-89

Before you begin, clear all previously saved variables and functions, set the graph mode and viewing window.

$$\text{Solve: } 4x + 7 > 2x - 3$$

Algebraically:

$$\begin{aligned} 4x + 7 &> 2x - 3 \\ 2x &> -10 \\ x &> -5 \\ (-5, \infty) \end{aligned}$$

Again, there are two ways to solve a linear inequality graphically: **Using Root and Using Intersection**

Graphically: Using Zero (Root)

Rewrite the inequality with 0 on one side.

$$4x + 7 - 2x + 3 > 0$$

Let Y1 equal the left side of the inequality.

$$\begin{aligned} \text{Diamond } Y= \\ Y1 = 4x + 7 - 2x + 3 \end{aligned}$$

Then graph.

Diamond Graph

The solution set for **> inequalities** is the set of all x-values for which the graph is **above** the x-axis.

The solution set for **< inequalities** is the set of all x-values for which the graph is **below** the x-axis.

Find the x-intercept (zero)

F5: Math

2: Zero

Lower Bound: - move cursor to the left of the x intercept

Enter

Upper Bound: - move cursor to the right of the x intercept
Enter

The coordinates of the x-intercept are given at the bottom of the screen: (-5, 0)

The graph is above the x-axis for x values greater than -5.

The solution is $(-5, \infty)$.

(This is the other method.)

Graphically: Using Intersection

The inequality will either be $Y1 < Y2$ or $Y1 > Y2$. Graph $Y1$ and $Y2$ on the same screen.

If $Y1 < Y2$ determine on what interval $Y1$ is **below** $Y2$.

If $Y1 > Y2$ determine on what interval $Y1$ is **above** $Y2$.

Solve: $4x + 7 > 2x - 3$

Diamond Y=
(Clear functions)

$$Y1 = 4x + 7$$

$$Y2 = 2x - 3$$

Diamond Graph

Change viewing window to see intersection

Diamond Window

$$x_{\min} = -10 \quad y_{\min} = -20$$

$$x_{\max} = 1 \quad y_{\max} = 1$$

$$x_{\text{scl}} = 1 \quad y_{\text{scl}} = 1$$

Diamond Graph

F5: Math

5 Intersection

1st Curve: (The cursor should be blinking on one line and the equation number will appear in the upper right hand corner of the window. If you can't see the cursor, use the left or right arrows to bring it into view.)

Enter

2nd Curve: (The cursor should move to the next line and the number will change to 2)

Enter

Lower Bound: - move cursor to the left of the intersection using the left or right arrow keys

Enter

Upper Bound: - move cursor to the right of the intersection using the right arrow

Enter

The calculator shows the intersection is at $(-5, -13)$.

Y1 is above Y2 to the right of the point of intersection. Therefore, $4x + 7 > 2x - 3$ for the interval $(-5, \infty)$.