Solve Compound Inequalities

MATHEMATICAL PRACTICES

Use appropriate tools strategically.

QUESTION How can you use a graphing calculator to display the solutions of a compound inequality?

EXAMPLE Display the solutions of a compound inequality on a graphing calculator

Display the solutions of $12 \leq 3x \leq 21$ on a graphing calculator.
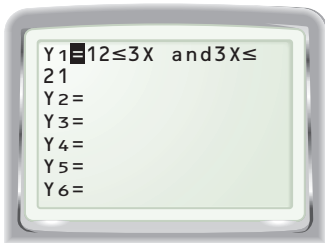
STEP 1 *Rewrite inequality*

Rewrite $12 \leq 3x \leq 21$ as two separate inequalities joined by *and*.

$12 \leq 3x \leq 21$ **Write original inequality.**

$12 \leq 3x$ *and* $3x \leq 21$ **Write as two inequalities joined by *and*.**

STEP 2 *Enter inequalities*

Press **Y=** and enter the two inequalities, as shown. Inequality signs can be found in the TEST menu, and *and* and *or* can be found in the LOGIC menu.

STEP 3 *Display solutions*

Press **GRAPH** to display the solutions of $12 \leq 3x$ *and* $3x \leq 21$. For each value of x that makes the inequality true, the calculator assigns a value of 1 to y and plots the point $(x, 1)$. For each value of x that makes the inequality false, the calculator assigns a value of 0 to y and plots the point $(x, 0)$.
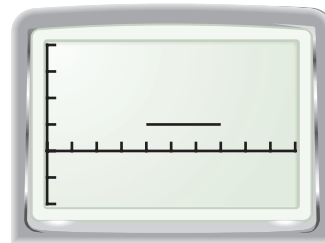
The screen in Step 3 shows the graph of $y = 1$ over the interval $4 \leq x \leq 7$. This suggests that the solutions are all real numbers greater than or equal to 4 *and* less than or equal to 7.

DRAW CONCLUSIONS

1. Display the solutions of $12 < 3x < 21$ on a graphing calculator. Then compare the graph of $12 < 3x < 21$ with the graph of $12 \leq 3x \leq 21$.

2. When displaying the solutions of an inequality on a graphing calculator, how do you know which inequality symbols you should use in your solution?

Display the solutions of the inequality on a graphing calculator.

3. $9 \leq 3x \leq 21$

4. $4 < 4x < 8$

5. $2 \leq \frac{1}{4}x \leq 12$

6. $-6x > 18$ *or* $9x > 45$

7. $4x \leq 18$ *or* $5x \geq 25$

8. $8x \leq 16$ *or* $3x \geq 30$