

EXAMPLE 3 Solve a multi-step inequality**ANOTHER WAY**

You can also solve the inequality by subtracting 17 and $6x$ from each side, as follows:

$$6x - 7 > 2x + 17$$

$$6x - 24 > 2x$$

$$-24 > -4x$$

$$6 < x$$

The inequality $6 < x$ is equivalent to $x > 6$.

Solve $6x - 7 > 2x + 17$. Graph your solution.

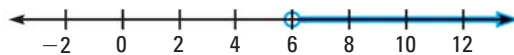
$$6x - 7 > 2x + 17 \quad \text{Write original inequality.}$$

$$6x > 2x + 24 \quad \text{Add 7 to each side.}$$

$$4x > 24 \quad \text{Subtract 2x from each side.}$$

$$x > 6 \quad \text{Divide each side by 4.}$$

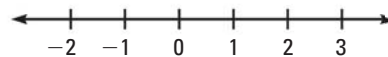
► The solutions are all real numbers greater than 6.



NUMBER OF SOLUTIONS If an inequality is equivalent to an inequality that is true, such as $-3 < 0$, then the solutions of the inequality are *all real numbers*. If an inequality is equivalent to an inequality that is false, such as $4 < -1$, then the inequality has *no solution*.



Graph of an inequality whose solutions are all real numbers



Graph of an inequality that has no solution

EXAMPLE 4 Identify the number of solutions of an inequality

Solve the inequality, if possible.

a. $14x + 5 < 7(2x - 3)$

b. $12x - 1 > 6(2x - 1)$

Solution

a. $14x + 5 < 7(2x - 3)$ Write original inequality.

$$14x + 5 < 14x - 21 \quad \text{Distributive property}$$

$$5 < -21 \quad \text{Subtract 14x from each side.}$$

► There are no solutions because $5 < -21$ is false.

b. $12x - 1 > 6(2x - 1)$ Write original inequality.

$$12x - 1 > 12x - 6 \quad \text{Distributive property}$$

$$-1 > -6 \quad \text{Subtract 12x from each side.}$$

► All real numbers are solutions because $-1 > -6$ is true.

**GUIDED PRACTICE** for Examples 3 and 4

Solve the inequality, if possible. Graph your solution.

4. $5x - 12 \leq 3x - 4$

5. $5(m + 5) < 5m + 17$

6. $1 - 8s \leq -4(2s - 1)$