EXAMPLE 4 Solve an inequality with a variable on both sides

Solve $5x + 2 > 7x - 4$. Then graph the solution.

$5x + 2 > 7x - 4$ — Write original inequality.

$-2x + 2 > -4$ — Subtract $7x$ from each side.

$-2x > -6$ — Subtract 2 from each side.

$x < 3$ — Divide each side by -2 and reverse the inequality.

▶ The solutions are all real numbers less than 3. The graph is shown below.

AVOID ERRORS

Don't forget to reverse the inequality symbol if you multiply or divide each side of an inequality by a negative number.

✓ GUIDED PRACTICE for Examples 3 and 4

Solve the inequality. Then graph the solution.

5. $4x + 9 < 25$ **6.** $1 - 3x \geq -14$ **7.** $5x - 7 \leq 6x$ **8.** $3 - x > x - 9$

EXAMPLE 5 Solve an "and" compound inequality

Solve $-4 < 6x - 10 \leq 14$. Then graph the solution.

$-4 < 6x - 10 \leq 14$ — Write original inequality.

$-4 + 10 < 6x - 10 + 10 \leq 14 + 10$ — Add 10 to each expression.

$6 < 6x \leq 24$ — Simplify.

$1 < x \leq 4$ — Divide each expression by 6.

▶ The solutions are all real numbers greater than 1 and less than or equal to 4. The graph is shown below.

EXAMPLE 6 Solve an "or" compound inequality

Solve $3x + 5 \leq 11$ or $5x - 7 \geq 23$. Then graph the solution.

Solution

A solution of this compound inequality is a solution of *either* of its parts.

First Inequality		Second Inequality	
$3x + 5 \leq 11$	Write first inequality.	$5x - 7 \geq 23$	Write second inequality.
$3x \leq 6$	Subtract 5 from each side.	$5x \geq 30$	Add 7 to each side.
$x \leq 2$	Divide each side by 3.	$x \geq 6$	Divide each side by 5.

▶ The graph is shown below. The solutions are all real numbers **less than or equal to 2** or **greater than or equal to 6**.