SOLVING INEQUALITIES To solve a linear inequality in one variable, you isolate the variable using transformations that produce **equivalent inequalities**, which are inequalities that have the same solutions as the original inequality.

KEY CONCEPT *For Your Notebook*

Transformations That Produce Equivalent Inequalities

Transformation applied to inequality	Original inequality	Equivalent inequality
Add the same number to each side.	$x - 7 < 4$	$x < 11$
Subtract the same number from each side.	$x + 3 \geq -1$	$x \geq -4$
Multiply each side by the same *positive* number.	$\frac{1}{2}x > 10$	$x > 20$
Divide each side by the same *positive* number.	$5x \leq 15$	$x \leq 3$
Multiply each side by the same *negative* number and *reverse* the inequality.	$-x < 17$	$x > -17$
Divide each side by the same *negative* number and *reverse* the inequality.	$-9x \geq 45$	$x \leq -5$

EXAMPLE 3 Solve an inequality with a variable on one side

FAIR You have $50 to spend at a county fair. You spend $20 for admission. You want to play a game that costs $1.50. Describe the possible numbers of times you can play the game.

ANOTHER WAY
For alternative methods for solving the problem in Example 3, turn to page 48 for the **Problem Solving Workshop**.

Solution

STEP 1 **Write** a verbal model. Then write an inequality.

Admission fee (dollars)	+	Cost per game (dollars/game)	·	Number of games (games)	≤	Amount you can spend (dollars)
20	+	**1.50**	·	g	≤	**50**

An inequality is $20 + 1.5g \leq 50$.

STEP 2 **Solve** the inequality.

$20 + 1.5g \leq 50$ **Write inequality.**

$1.5g \leq 30$ **Subtract 20 from each side.**

$g \leq 20$ **Divide each side by 1.5.**

▶ You can play the game 20 times or fewer.

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