General Inequalities

Objective A: To solve general inequalities

Solving inequalities frequently requires the application of both the Addition and the Multiplication Properties of Inequalities.

Example 1:

Solve: $4y - 3 \geq 6y + 5$

$4y - 3 \geq 6y + 5$

$4y - 6y - 3 \geq 6y - 6y + 5$

$-2y - 3 \geq 5$ **Subtract 6y from each side of the inequality.**

$-2y - 3 + 3 \geq 5 + 3$ **Simplify.**

$-2y \geq 8$ **Add 3 to each side of the inequality.**

$-2y/-2 \leq 8/-2$ **Simplify. Divide each side of the inequality by –2 inequality symbol must be reversed.**

$y \leq -4$

Example 2:

Solve: $7x - 3 \leq 3x + 17$

$7x - 3 \leq 3x + 17$

$7x - 3x - 3 \leq 3x - 3x + 17$

$4x - 3 \leq 17$

$4x - 3 + 3 \leq 17 + 3$

$4x \leq 20$

$4x/4 \leq 20/4$

$x \leq 5$

Example 3:

Solve: $3(3 - 2x) \geq -5x - 2(3 - x)$

$9 - 6x \geq -5x - 6 + 2x$

$9 - 6x \geq -5x - 6 + 2x$

$9 - 6x + 3x \geq -3x + 3x - 6$

$9 - 3x \geq -6$

$9 - 9 - 3x \geq -6 - 9$

$-3x \geq -15$

$-3x/-3 \leq -15/-3$

$x \leq 5$

Objective B: To solve applications problems

A rectangle is 10 ft. wide and (2x + 4) ft. long. Express as an integer the maximum length of the rectangle when the area is less than 200 ft.^{2}. (The area of a rectangle is equal to its length times its width.)

Strategy

To find the maximum length:

- Replace the variable in the area formula by the given values and solve for x.
- Replace the variable in the expression 2x + 4 with the value found for x.

Solution

Length times width	is less than	200 ft^2

$$10(2x + 4) < 200$$
$$20x + 40 < 200$$
$$20x + 40 - 40 < 200 - 40$$
$$20x < 160$$
$$20x/20 < 160/20$$
$$x < 8$$

The length is (2x + 4) ft.

Because $x < 8$, $2x + 4 < 2(8) + 4 = 20$.

Since the length must be less than 20 ft., and must be an integer, the maximum length is 19 ft.