

6-3 Study Guide and Intervention

Solving Multi-Step Inequalities

Solve Multi-Step Inequalities To solve linear inequalities involving more than one operation, undo the operations in reverse of the order of operations, just as you would solve an equation with more than one operation.

Example 1

Solve $6x - 4 \leq 2x + 12$.

$$\begin{array}{ll} 6x - 4 \leq 2x + 12 & \text{Original inequality} \\ 6x - 4 - 2x \leq 2x + 12 - 2x & \text{Subtract } 2x \text{ from} \\ & \text{each side.} \\ 4x - 4 \leq 12 & \text{Simplify.} \\ 4x - 4 + 4 \leq 12 + 4 & \text{Add 4 to each side.} \\ 4x \leq 16 & \text{Simplify.} \\ \frac{4x}{4} \leq \frac{16}{4} & \text{Divide each side by 4.} \\ x \leq 4 & \text{Simplify.} \end{array}$$

The solution is $\{x \mid x \leq 4\}$.

Example 2

Solve $3a - 15 > 4 + 5a$.

$$\begin{array}{ll} 3a - 15 > 4 + 5a & \text{Original inequality} \\ 3a - 15 - 5a > 4 + 5a - 5a & \text{Subtract } 5a \text{ from} \\ & \text{each side.} \\ -2a - 15 > 4 & \text{Simplify.} \\ -2a - 15 + 15 > 4 + 15 & \text{Add 15 to each side.} \\ -2a > 19 & \text{Simplify.} \\ \frac{-2a}{-2} < \frac{19}{-2} & \text{Divide each side by } -2 \\ & \text{and change } > \text{ to } < . \\ a < -9\frac{1}{2} & \text{Simplify.} \end{array}$$

The solution is $\left\{a \mid a < -9\frac{1}{2}\right\}$.

Exercises

Solve each inequality. Then check your solution.

1. $11y + 13 \geq -1$

2. $8n - 10 < 6 - 2n$

3. $\frac{q}{7} + 1 > -5$

4. $6n + 12 < 8 + 8n$

5. $-12 - d > -12 + 4d$

6. $5r - 6 > 8r - 18$

7. $\frac{-3x + 6}{2} \leq 12$

8. $7.3y - 14.4 > 4.9y$

9. $-8m - 3 < 18 - m$

10. $-4y - 10 > 19 - 2y$

11. $9n - 24n + 45 > 0$

12. $\frac{4x - 2}{5} \geq -4$

Define a variable, write an inequality, and solve each problem. Then check your solution.

13. Negative three times a number plus four is no more than the number minus eight.

14. One fourth of a number decreased by three is at least two.

15. The sum of twelve and a number is no greater than the sum of twice the number and -8 .