

Lesson 8: Linear Inequalities

In this lesson, you will solve linear inequalities in one and two variables. You will also graph linear inequalities in two variables.

Solving Linear Inequalities in One Variable

To solve linear inequalities ($>$, $<$, \leq , or \geq), follow the same processes as for solving linear equations. If you multiply or divide both sides of the inequality by a negative number, you must switch the direction of the inequality sign.

Example

Solve for x : $\frac{x}{5} + 6 > 15$

$$\frac{x}{5} + 6 > 15 \quad (\text{Subtract 6 from both sides.})$$

$$\frac{x}{5} > 9 \quad (\text{Multiply both sides by 5.})$$

$$x > 45$$

Check your solution by substituting any value that satisfies your solution for x in the original inequality, then simplify.

$$\frac{x}{5} + 6 > 15$$

$$\frac{48}{5} + 6 > 15$$

$$15.6 > 15 \quad (\text{This is a true statement.})$$

The solution is $x > 45$.

Example

Solve for x : $-3x - 3 \leq 4x + 39$

$$-3x - 3 \leq 4x + 39 \quad (\text{Add 3 to and subtract } 4x \text{ from both sides.})$$

$$-7x \leq 42 \quad (\text{Divide both sides by } -7.)$$

$$x \geq -6 \quad (\text{Switch the direction of the sign.})$$

Check your solution.

$$-3x - 3 \leq 4x + 39$$

$$-3 \cdot (-3) - 3 \leq 4 \cdot (-3) + 39$$

$$6 \leq 27 \quad (\text{This is a true statement.})$$

The solution is $x \geq -6$.

Practice

DIRECTIONS: For Numbers 1 through 12, solve each linear inequality and check your solution.

1 $3x + 13 \leq 4$

2 $-\frac{1}{2}w + 4 > -3$

3 $36.4 + 1.2a \geq 44.44$

4 $-6.7 - 10.5h < -25.6$

5 $\frac{2}{3}z - \frac{1}{6} \leq \frac{1}{2} - \frac{1}{6}z$

6 $-8(c - 2) > 40$

7 $4(2s + 3) > 5(s - 6)$

8 $6 - 5y + 15 \leq 2y - y$

9 $2 - 3(t + 5) \geq 6(2t - 8)$

10 $-4.2g + 6.04 < -5.56 + 7.4g$

11 $-\frac{1}{4}w + 1\frac{1}{3} \geq \frac{1}{3}\left(w + \frac{1}{2}\right)$

12 $-2(4 - 7t) < -6(3t + 4)$