

Section Overview

Solving Two-Step and Multi-Step Inequalities

Lessons 3-4, 3-5

Why? Multi-step inequalities can be used to solve problems in geometry and consumer economics.

Simplify Both Sides Before Solving

$$\begin{aligned} 3x - 4 &> -2 + 7 \\ 3x - 4 &> 5 \\ \frac{+4}{+4} \quad \frac{+4}{+4} & \\ \underline{3x} &> \underline{9} \\ \frac{3x}{3} &> \frac{9}{3} \\ x &> 3 \end{aligned}$$

Collect Variable Terms on One Side

$$\begin{aligned} 2x + 9 &\geq x - 5 \\ \frac{-x}{-x} \quad \frac{-x}{-x} & \\ \underline{x + 9} &\geq \underline{-5} \\ \frac{-9}{-9} \quad \frac{-9}{-9} & \\ \underline{x} &\geq \underline{-14} \end{aligned}$$

Identity

$$\begin{aligned} x + 9 &> x + 4 \\ \frac{-x}{-x} \quad \frac{-x}{-x} & \\ \underline{9} &> \underline{4} \end{aligned}$$

Always true

All real numbers are solutions.

Contradiction

$$\begin{aligned} x + 8 &\leq x + 3 \\ \frac{-x}{-x} \quad \frac{-x}{-x} & \\ \underline{8} &< \underline{3} \end{aligned}$$

Never true

There are no solutions.

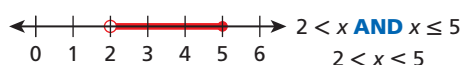
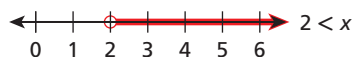
Solving Compound Inequalities

Lesson 3-6

Why? Compound inequalities can be used to describe an acceptable range of values.

$$\begin{aligned} 6 &< x + 4 \leq 9 \\ 6 &< x + 4 \quad \text{AND} \quad x + 4 \leq 9 \\ \frac{-4}{-4} \quad \frac{-4}{-4} & \\ \underline{2} &< x \quad \text{AND} \quad x \leq \underline{5} \end{aligned}$$

The solution is the **intersection** of the two inequalities.



$$\begin{aligned} x - 7 &\geq -5 \quad \text{OR} \quad x + 2 < -1 \\ \frac{+7}{+7} \quad \frac{+7}{+7} & \\ \underline{x} &\geq \underline{2} \quad \text{OR} \quad x < \underline{-3} \end{aligned}$$

The solution is the **union** of the two inequalities.

