

Day 7 – Solving Compound Inequalities – Notes

Review: Take each compound inequality and separate into two inequalities using AND.

a. $2 < x < 8$

$x > 2$ and $x < 8$

b. $-4 \leq x < -1$

$x \geq -4$ and $x < -1$

c. $-3 < x \leq 4$

$x > -3$ and $x \leq 4$

Solving Compound Inequalities with OR

When solving equations that are written in OR form, you will simply just solve each inequality. You want to find solutions that will satisfy EITHER inequality.

Solve and graph each compound inequality.

Example 1: $\frac{2x}{2} \leq \frac{6}{2}$ OR $\frac{3x}{3} > \frac{15}{3}$
 $x \leq 3$ or $x > 5$



Example 2: $3x + 2 < -7$ OR $-4x + 5 < 1$
 $\frac{3x}{3} < \frac{-9}{3}$ $\frac{-4x}{-4} < \frac{-4}{-4} \div \text{by } -$
 $x < -3$ OR $x > 1$

Solving Compound Inequalities with AND

When solving compound inequalities involving AND, there are two methods you can use to solve (separating the inequalities or working on all three parts).

Example 1: Solve and graph the following inequality: $6 < x - 6 \leq 9$

Separating the Inequalities	Working on All Three Parts
$\begin{array}{l} 6 < x - 6 \quad \text{and} \quad x - 6 \leq 9 \\ +6 \quad +6 \quad \quad \quad +6 \quad +6 \\ \hline 12 < x \quad \text{and} \quad x \leq 15 \\ \hline \boxed{12 < x \leq 15} \end{array}$	$\begin{array}{l} 6 < x - 6 \leq 9 \\ +6 \quad +6 \quad +6 \\ \hline \boxed{12 < x \leq 15} \end{array}$

Example 2: Solve and graph the following inequality: $-3 < 2x + 7 < 11$

Separating the Inequalities	Working on All Three Parts
$\begin{array}{r} -3 < 2x + 7 \text{ and } 2x + 7 < 11 \\ -7 \quad -7 \quad \quad -7 \quad -7 \\ \hline -10 < 2x \quad \quad 2x < 4 \\ \frac{-10}{2} < \frac{2x}{2} \quad \quad \frac{2x}{2} < \frac{4}{2} \\ -5 < x \text{ and } x < 2 \\ \boxed{-5 < x < 2} \end{array}$	$\begin{array}{r} -3 < 2x + 7 < 11 \\ -7 \quad -7 \quad -7 \\ \hline -10 < 2x < 4 \\ \frac{-10}{2} < \frac{2x}{2} < \frac{4}{2} \\ \boxed{-5 < x < 2} \end{array}$

Example 3: Solve and graph the following inequality: $-4 \leq -3x + 1 < 12$

Separating the Inequalities	Working on All Three Parts
$\begin{array}{r} -4 \leq -3x + 1 \text{ and } -3x + 1 < 12 \\ -1 \quad -1 \quad \quad -1 \quad -1 \\ \hline -5 \leq -3x \quad \quad -3x < 11 \\ \frac{-5}{-3} \geq \frac{-3x}{-3} \quad \quad \frac{-3x}{-3} < \frac{11}{-3} \\ \frac{5}{3} \geq x \text{ rewrite} \quad \quad x > -\frac{11}{3} \\ x \leq \frac{5}{3} \\ \boxed{-\frac{11}{3} < x < \frac{5}{3}} \end{array}$	$\begin{array}{r} -4 \leq -3x + 1 < 12 \\ -1 \quad -1 \quad -1 \\ \hline -5 \leq -3x < 11 \\ \frac{-5}{-3} \geq \frac{-3x}{-3} < \frac{11}{-3} \quad \div \text{ by } - \\ \frac{5}{3} \geq x > -\frac{11}{3} \quad \text{smallest to biggest!} \\ \boxed{-\frac{11}{3} < x \leq \frac{5}{3}} \end{array}$