

2.5 NOTES - Solving Compound Linear Inequalities

LESSON 2.5 **LEARNING GOALS:**

Solving Compound Inequalities

1) Solve compound linear inequalities and graph their solutions.

Common Core State Standards
HSA-CE.A.1, HSA-REI.B.3

BELLWORK#1: Solve and graph the inequality.

$$2 > 3x + 11$$

$$\begin{array}{ccc} -11 & & -11 \\ \hline \frac{-9}{3} & > & \frac{3x}{3} \\ \hline -3 & > & x \\ \hline & & x < -3 \end{array}$$

BELLWORK#2: What are some numbers that are less than 6 but greater than -1?

5, 0, 3.5, 0.2, etc...

The solution set is all numbers BETWEEN -1 and 6.

BELLWORK#3: What are some numbers that are greater than 6 but less than -1?

7, 8, 10, etc. and -2, -3, -10, etc.

The solution set is all numbers BEYOND -1 and 6.

LESSON 2.5 - Solving Compound Inequalities

- In previous lessons, we worked with inequalities that have only one bound, meaning that the solutions were either greater than or less than a number.

EXAMPLE: $x < 6$.

- In today's lesson, we will explore **COMPOUND INEQUALITIES** which are inequalities that have two bounds.
- There are two types of compound inequalities: "and" and "or".

COMPOUND INEQUALITIES

- "AND" COMPOUND INEQUALITIES:** The solution will be in between two numbers, and the graph will look like this:

EXAMPLE: $-3 < x < 8$

- To solve an "and" compound inequality, isolate the variable between the two inequality signs, then graph the solution.
- The answer should ALWAYS be written with "less than" or "less than or equal to" signs, and the variable should ALWAYS be in the middle.

$-3 < x < 8$	$8 > x > -3$	$-3 > x < 8$	$-3 < 8 < x$
Yes!	NO!	NO!	NO!

2.5 NOTES - Solving Compound Linear Inequalities

COMPOUND INEQUALITIES

• **"OR" COMPOUND INEQUALITIES:** The solution will be on either side of two numbers, and the graph will look like this:

EXAMPLE: $x \leq -2$ or $x > 4$ 

• To solve an "or" compound inequality, solve each inequality separately, then graph the solution.

• The answer should ALWAYS be written with the "less than" or "less than or equal to" inequality first, then the word "or", then the "greater than" or "greater than or equal to" inequality last.

$x \leq -2$ or $x > 4$ $x \leq -2$ $x > 4$ $x > 4$ or $x \leq -2$

Yes!

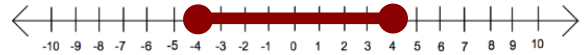
NO!

NO!

Solve the inequality and graph the solution.

$$\frac{-10}{2} \leq \frac{2x}{2} \leq \frac{8}{2}$$

$$-5 \leq x \leq 4$$



Solve the inequality and graph the solution.

$$\frac{-3}{3} < \frac{3x}{3} < \frac{27}{3}$$

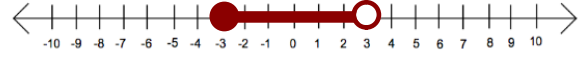
$$-1 < x < 9$$



Solve the inequality and graph the solution.

$$\frac{2}{-5} \leq \frac{x+5}{-5} \leq \frac{8}{-5}$$

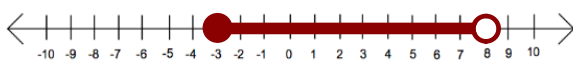
$$-3 \leq x < 3$$



Solve the inequality and graph the solution.

$$\frac{-10}{+7} \leq \frac{x-7}{+7} < \frac{1}{+7}$$

$$-3 \leq x < 8$$

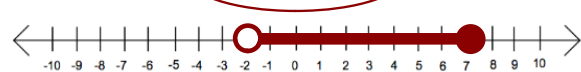


Solve the inequality and graph the solution.

$$\frac{5}{-9} < \frac{2x+9}{-9} \leq \frac{23}{-9}$$

$$\frac{-4}{2} < \frac{2x}{2} \leq \frac{14}{2}$$

$$-2 < x \leq 7$$



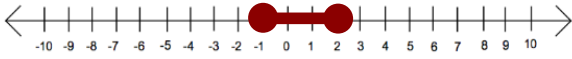
2.5 NOTES - Solving Compound Linear Inequalities

Solve the inequality and graph the solution.

$$\begin{array}{ccc} -9 & \leq & 3x - 6 & \leq & 0 \\ +6 & & +6 & & +6 \end{array}$$

$$\frac{-3}{3} \leq \frac{3x}{3} \leq \frac{6}{3}$$

$$-1 \leq x \leq 2$$

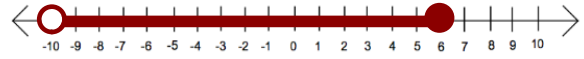


Solve the inequality and graph the solution.

$$\begin{array}{ccc} -55 & < & 15 + 7x & \leq & 57 \\ -15 & & -15 & & -15 \end{array}$$

$$\frac{-70}{7} < \frac{7x}{7} \leq \frac{42}{7}$$

$$-10 < x \leq 6$$



Solve the inequality and graph the solution.

$$\begin{array}{ccc} -13 & < & -5x + 2 & < & 12 \\ -2 & & -2 & & -2 \end{array}$$

$$\frac{-15}{-5} < \frac{-5x}{-5} < \frac{10}{-5}$$

$$3 > x > -2$$

$$-2 < x < 3$$



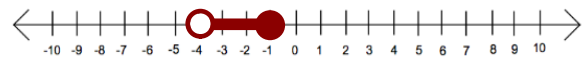
Solve the inequality and graph the solution.

$$\begin{array}{ccc} 10 & \leq & 6 - 4x & < & 22 \\ -6 & & -6 & & -6 \end{array}$$

$$\frac{4}{-4} \leq \frac{-4x}{-4} < \frac{16}{-4}$$

$$-1 \geq x > -4$$

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



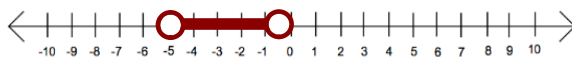
Solve the inequality and graph the solution.

$$\begin{array}{ccc} 8 & < & 7 - 2x & < & 17 \\ -7 & & -7 & & -7 \end{array}$$

$$\frac{1}{-2} < \frac{-2x}{-2} < \frac{10}{-2}$$

$$-\frac{1}{2} > x > -5$$

$$-5 < x < -\frac{1}{2}$$

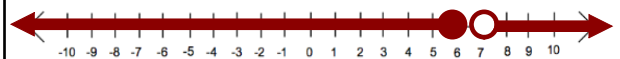


Solve the inequality and graph the solution.

$$\begin{array}{ccc} x - 4 & \leq & 2 & \text{ or } & x - 5 & > & 2 \\ +4 & & +4 & & +5 & & +5 \end{array}$$

$$x \leq 6 \quad \text{or} \quad x > 7$$

$$x \leq 6 \text{ or } x > 7$$



2.5 NOTES - Solving Compound Linear Inequalities

Solve the inequality and graph the solution.

$$x + 7 < 4 \quad \text{or} \quad x + 10 > 13$$

$$\begin{array}{r} -7 \quad -7 \\ x < -3 \end{array} \quad \begin{array}{r} -10 \quad -10 \\ x > 3 \end{array}$$

$$x < -3 \quad \text{or} \quad x > 3$$



Solve the inequality and graph the solution.

$$2x + 7 < 3 \quad \text{or} \quad 8x - 3 \geq 5$$

$$\begin{array}{r} -7 \quad -7 \\ 2x < -4 \end{array} \quad \begin{array}{r} +3 \quad +3 \\ 8x \geq 8 \end{array}$$

$$\begin{array}{r} x < -2 \\ x \geq 1 \end{array}$$

$$x < -2 \quad \text{or} \quad x \geq 1$$



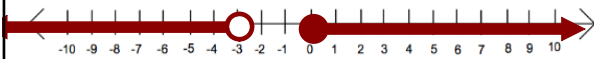
Solve the inequality and graph the solution.

$$6x - 10 < -22 \quad \text{or} \quad 7x - 6 > 15$$

$$\begin{array}{r} +10 \quad +10 \\ 6x < -12 \end{array} \quad \begin{array}{r} +6 \quad +6 \\ 7x > 21 \end{array}$$

$$\begin{array}{r} x < -2 \\ x > 3 \end{array}$$

$$x < -2 \quad \text{or} \quad x > 3$$



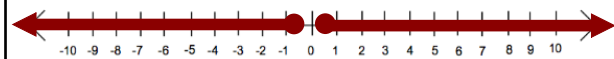
Solve the inequality and graph the solution.

$$3x + 11 \leq 9 \quad \text{or} \quad 5x - 1 \geq 8$$

$$\begin{array}{r} -11 \quad -11 \\ 3x \leq -2 \end{array} \quad \begin{array}{r} +1 \quad +1 \\ 5x \geq 9 \end{array}$$

$$\begin{array}{r} x \leq -\frac{2}{3} \\ x \geq \frac{5}{9} \end{array}$$

$$x \leq -\frac{2}{3} \quad \text{or} \quad x \geq \frac{5}{9}$$



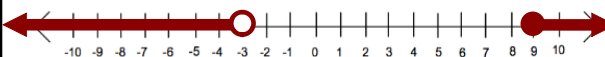
Solve the inequality and graph the solution.

$$-2x + 13 \leq -5 \quad \text{or} \quad -8x - 15 > 9$$

$$\begin{array}{r} -13 \quad -13 \\ -2x \leq -18 \end{array} \quad \begin{array}{r} +15 \quad +15 \\ -8x > 24 \end{array}$$

$$\begin{array}{r} -2 \\ x \geq 9 \end{array} \quad \begin{array}{r} -8 \\ x < -3 \end{array}$$

$$x < -3 \quad \text{or} \quad x \geq 9$$



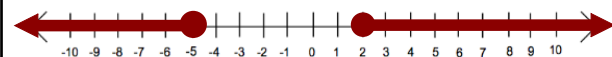
Solve the inequality and graph the solution.

$$1 - 2x \leq -3 \quad \text{or} \quad 3 - x \geq 8$$

$$\begin{array}{r} -1 \quad -1 \\ -2x \leq -4 \end{array} \quad \begin{array}{r} -3 \quad -3 \\ -x \geq 5 \end{array}$$

$$\begin{array}{r} x \geq 2 \\ x \leq -5 \end{array}$$

$$x \leq -5 \quad \text{or} \quad x \geq 2$$



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Solve the inequality and graph the solution.

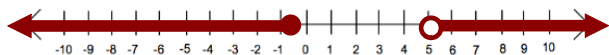
$$\begin{array}{r} -7x + 1 < -34 & \text{or} & -6x - 13 \geq -9 \\ -1 & & +13 & +13 \end{array}$$

$$\begin{array}{r} -7x < -35 & & -6x \geq 4 \\ -7 & & -6 & -6 \end{array}$$

$$x > 5$$

$$x \leq -\frac{2}{3}$$

$$x \leq -\frac{2}{3} \text{ or } x > 5$$



HOMEWORK:

2.5 Worksheet - Solving Compound Linear Inequalities