Compound Inequalities

Compound inequalities are a combination of 2 or more inequalities that are combined using AND, OR or the inequality is BETWEEN 2 numbers.

We will practice an example of each type!

"AND" Compound Inequalities:

$$x + 6 > 3 \text{ and } 7x < 14$$

The key to solving the "AND" compound inequalities is to solve each inequality SEPARATELY before combining the solutions at the end.

Let's follow this key to solve these inequalities!

$$
\begin{array}{ccc}
x + 6 > 3 & \text{and} & \dfrac{7x}{7} < \dfrac{14}{7} \\
\underline{-6 \ -6} & & \\
x > -3 & \text{and} & x < 2
\end{array}
$$

$$-3 < x < 2$$

If you were graphing this inequality on a number line, it would be a line segment between -3 and 2 with OPEN circles at both -3 and 2.

"OR" Compound Inequalities:

$$x - 4 \leq 12 \text{ or } \dfrac{x}{6} \geq 3$$

The key to solving the "OR" compound inequalities is to solve each inequality SEPARATELY before putting OR between the solutions of each inequality.

$$x - 4 \leq 12 \qquad \text{or} \qquad 6 \cdot \frac{x}{6} \geq 3 \cdot 6$$
$$\underline{+4 \quad +4}$$
$$x \leq 16 \qquad \text{or} \qquad x \geq 18$$

If you were graphing these solutions on a number line, there would be a CLOSED CIRCLE at 16 with a line extending LEFT and there would be a CLOSED CIRCLE at 18 with a second line extending RIGHT.

"BETWEEN" Compound Inequalities:

$$5 < x < 9$$

Split this compound inequality into 2 SEPARATE inequalities, switching the 1ST inequality (the variable, number, and sign).

$$x > 5 \qquad \text{and} \qquad x < 9$$

If you were graphing these inequalities on a number line, it would be a LINE SEGMENT with OPEN CIRCLES at 5 and 9.

Tips for Solving Problems:

1. For each of the types of compound inequalities, make sure to separate it into 2 inequalities so you can solve each separately to get the solutions for the compound inequality.

2. For AND and OR compound inequalities, you are mainly following the same steps but for BETWEEN compound inequalities, make sure to FLIP the 1st inequality you get out of the 2 present (for instance, in $9 < x < 10$, the 1st inequality is $9 < x$. Flip the variable, number and sign to get $x > 9$) before solving for the solutions.

3. Make sure you know how to solve one and two-step inequalities before this lesson! Also do not forget the rule where you FLIP the inequality sign when you MULTIPLY or DIVIDE by the same. A NEGATIVE number on both sides of the inequality.