

Compound Inequalities Guide Notes

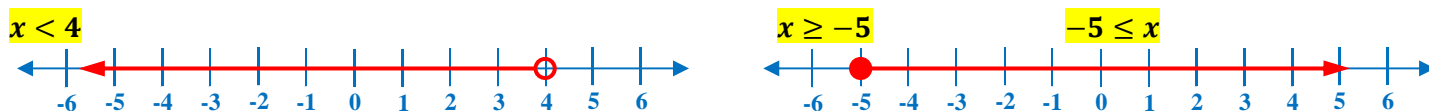
COMPOUND INEQUALITIES consists of two inequalities connected by **AND** or **OR**.

Inequalities containing **AND** is true only if both inequalities are true.

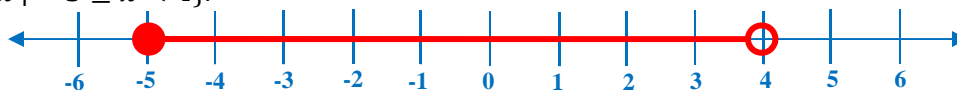
Solution: The solution of the compound inequality containing **AND** is a solution of **both** inequalities.

Graph: The **INTERSECTION** of the graphs of two inequalities. It can be found by graphing each inequality and then determining where the graphs overlap.

Example: Graph the solution set of $x < 4$ and $x \geq -5$.



The solution set is $\{x \mid -5 \leq x < 4\}$.



Sample Problem 1: Write an inequality that represents the set of numbers and graph the inequality.

A. All real numbers that are greater than zero and less than or equal to 8.



The solution set is $\{x \mid 0 < x \leq 8\}$.



B. All real numbers that are less than -2 and greater than -9.



The solution set is $\{x \mid -9 < x < -2\}$



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Inequalities containing **OR** is true only if one or both of the inequalities are true.

Solution: The solution of the compound inequality containing **OR** is a solution of **either** inequality, not necessarily both.

Graph: The **UNION** of the graphs of two inequalities. It can be found by graphing each inequality.

Example: Graph the solution set of $x \leq -1$ or $x > 2$.

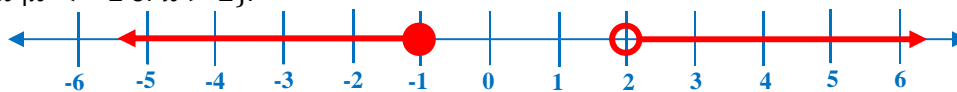
$$x \leq -1$$



$$x > 2$$



The solution set is $\{x \mid x < -1 \text{ or } x > 2\}$.



Sample Problem 2: Solve each inequality and graph the solution set.

A. $x - 9 \leq 2x - 4$ or $2x - 4 > x - 5$

$$x - 9 \leq 2x - 4$$

or

$$2x - 4 > x - 5$$

$$x - x - 9 \leq 2x - x - 4$$

or

$$2x - x - 4 > x - x - 5$$

$$-9 \leq x - 4$$

or

$$x - 4 > -5$$

$$-9 + 4 \leq x - 4 + 4$$

or

$$x - 4 + 4 > -5 + 4$$

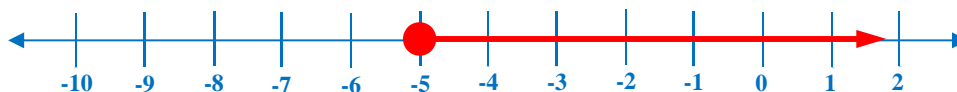
$$-5 \leq x$$



$$x > -1$$



The solution set is $\{x \mid x \geq -5\}$



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B. $5 - 3x < 11$ or $-18 < 3 - 7x$

$$5 - 3x < 11$$

or

$$-18 < 3 - 7x$$

$$5 - 5 - 3x < 11 - 5$$

or

$$-18 - 3 < 3 - 3 - 7x$$

$$-3x > 6$$

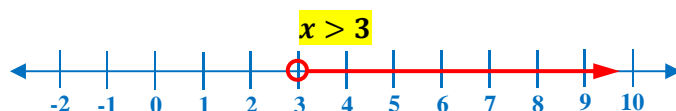
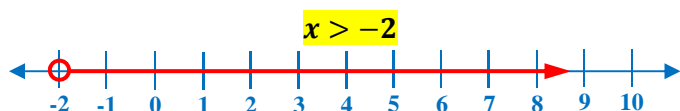
or

$$-21 < -7x$$

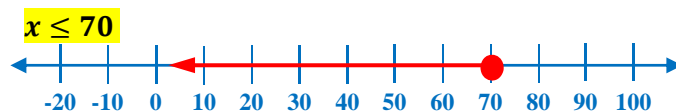
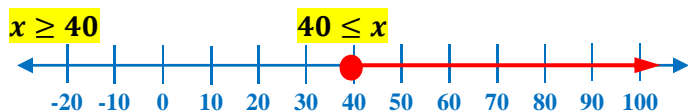
$$\frac{-3x}{-3} > \frac{6}{-3}$$

or

$$\frac{-21}{-7} > \frac{-7x}{-7}$$

The solution set is $\{x \mid x > -2\}$.

Sample Problem 3: On an interstate highway, the minimum and maximum speed limit is 40 mph and 70 mph, respectively. Write and graph the compound inequality that describes the speed at which a vehicle should maintain.

The solution set is $\{x \mid 40 \leq x \leq 70\}$ 