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Compound Inequalities

Unit 3 Lesson 6

COMPOUND INEQUALITIES

Students will be able to:

write and solve compound inequalities
containing the word ***AND*** or ***OR*** and
graph their solution sets.

Key Vocabulary:

- Compound Inequalities
- Intersection
- Union

COMPOUND INEQUALITIES

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

COMPOUND INEQUALITIES

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.

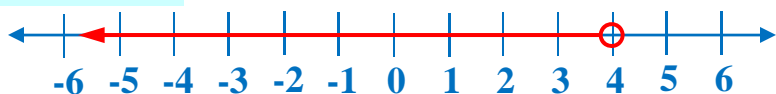
Graph: The **INTERSECTION** of the graphs of two inequalities. It can be found by graphing each inequality and then determining where the graphs overlap.

COMPOUND INEQUALITIES

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

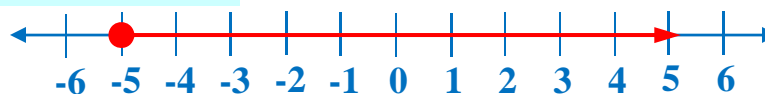
Example: Graph the solution set of $x < 4$ and $x \geq -5$.

$$x < 4$$

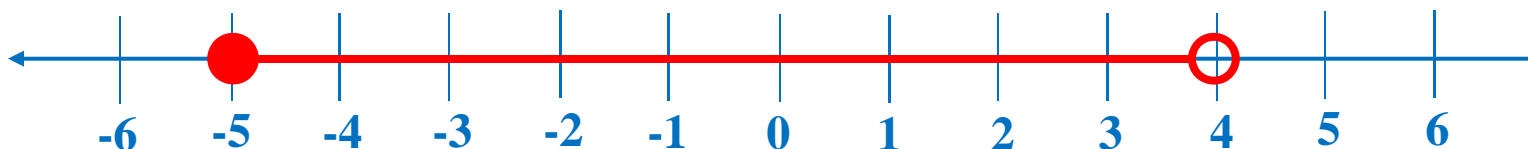


$$x \geq -5$$

$$-5 \leq x$$



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



COMPOUND INEQUALITIES

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**.

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

COMPOUND INEQUALITIES

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.

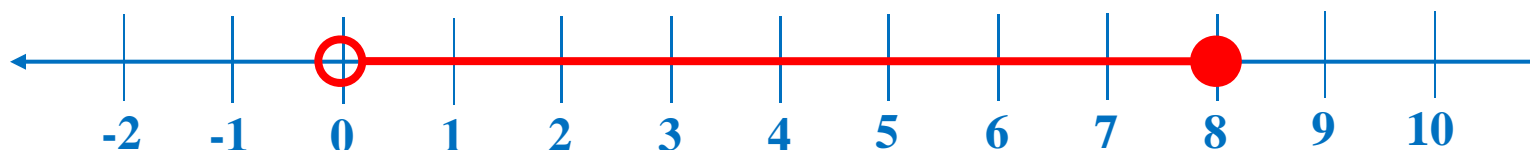
$$x > 0$$

$$0 < x$$

$$x \leq 8$$



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



COMPOUND INEQUALITIES

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

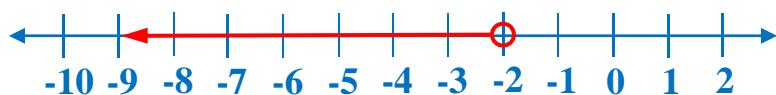
B. All real numbers that are less than -2 and greater than -9 .

COMPOUND INEQUALITIES

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

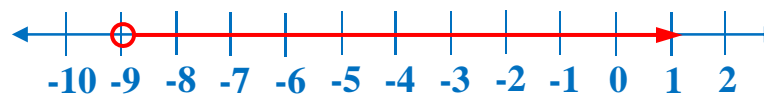
B. All real numbers that are less than -2 and greater than -9 .

$$x < -2$$

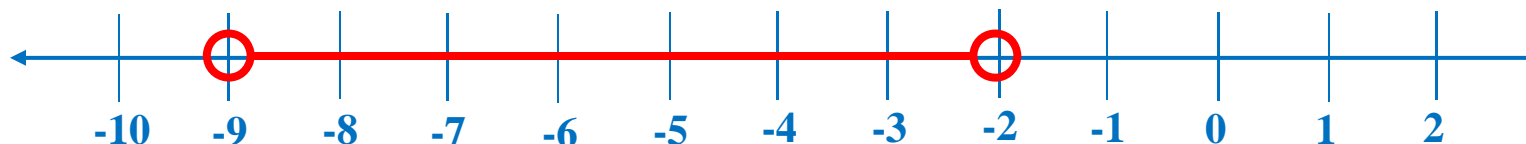


$$x > -9$$

$$-9 < x$$



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



COMPOUND INEQUALITIES

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.

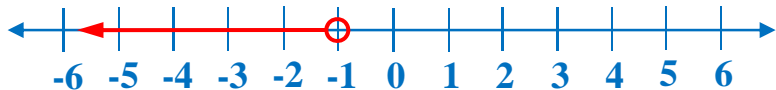
Graph: The **UNION** of the graphs of two inequalities. It can be found by graphing each inequality.

COMPOUND INEQUALITIES

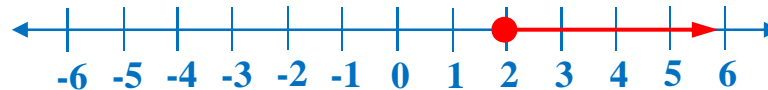
Inequalities containing **OR** is true only if one or both of the inequalities are true.

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

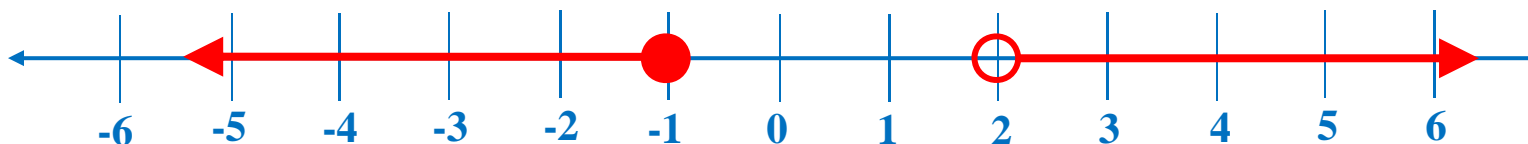
$$x \leq -1$$



$$x > 2$$



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



COMPOUND INEQUALITIES

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

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

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

COMPOUND INEQUALITIES

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

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

$$x - 9 \leq 2x - 4 \quad \text{or} \quad 2x - 4 > x - 5$$

$$x - x - 9 \leq 2x - x - 4 \quad \text{or} \quad 2x - x - 4 > x - x - 5$$

$$-9 \leq x - 4 \quad \text{or} \quad x - 4 > -5$$

$$-9 + 4 \leq x - 4 + 4 \quad \text{or} \quad x - 4 + 4 > -5 + 4$$

$$-5 \leq x$$

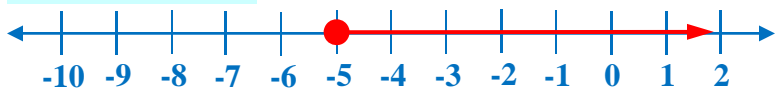
$$x > -1$$

COMPOUND INEQUALITIES

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

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

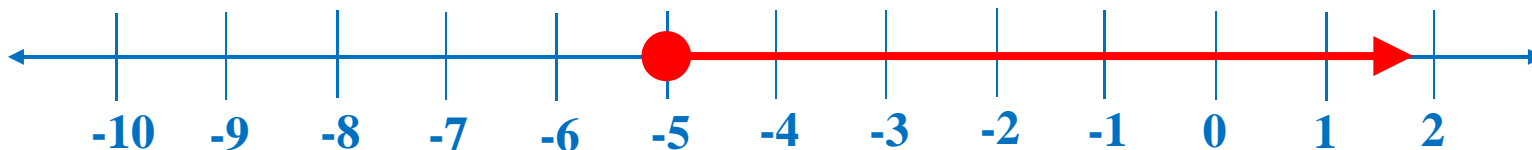
$$-5 \leq x$$



$$x < -1$$



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



COMPOUND INEQUALITIES

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

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

COMPOUND INEQUALITIES

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

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

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

$$x > -2$$

$$x > 3$$

COMPOUND INEQUALITIES

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

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

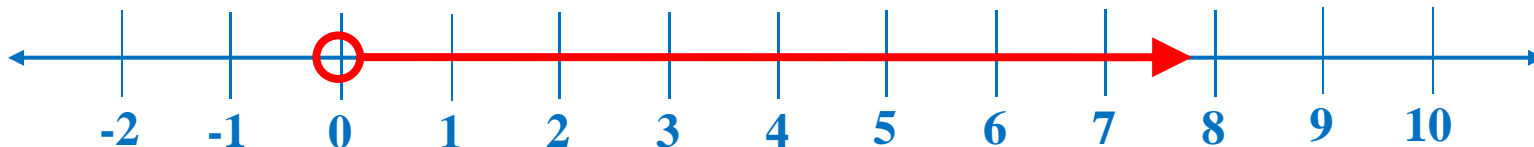
$$x > -2$$



$$x > 3$$



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



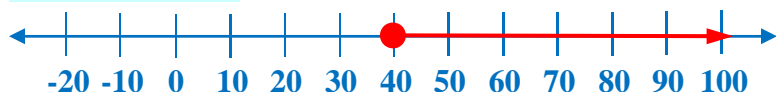
COMPOUND INEQUALITIES

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.

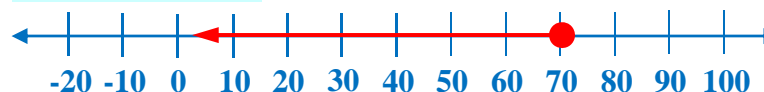
COMPOUND INEQUALITIES

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.

$$x \geq 40$$



$$x \leq 70$$



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

