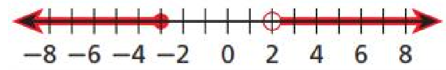
Compound Statement

- made up of more than one equation or inequality.

Disjunction

- a compound statement that uses the word ***or***. For set builder and interval notation, we use the symbol, Ć.
- A disjunction is true if and only if at least one of its parts is true.

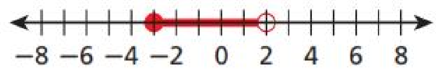


Disjunction: $x \le -3$ **OR** $x > 2$
Set builder notation: $\{x \mid x \le -3 \cup x > 2\}$
Interval notation: $(-\infty, -3] \cup (2, \infty)$

Conjunction

- a compound statement that uses the word ***and***. For set builder and interval notation, we use the symbol, ą.
- A conjunction is true if and only if all of its parts are true.
- Conjunctions can be written as a single statement as shown.

$x \ge -3$ **AND** $x < 2$ can be written as $-3 \le x < 2$



Ex. 1) Solve each compound inequality. Write the solution set in inequality, set builder and interval notation. Then graph the solution set. Use colored pencils.

a) $x + 3 \le 2$ **OR** $3x > 9$

Inequality:
Set builder notation:
Interval notation:

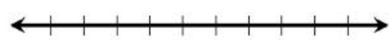
b) $-2x < 8$ **AND** $x - 3 \le 2$

Inequality:
Set builder notation:
Interval notation:

c) $x + 3 > 7$ **OR** $3x \ge 18$

Inequality:
Set builder notation:
Interval notation:

d) $2x - 5 > 3$ **OR** $3x - 2 < 13$



Inequality:
Set builder notation:
Interval notation:

e) $3x + 3 < 6$ **AND** $2x - 3 > 5$

Inequality:
Set builder notation:
Interval notation:

f) $3x + 4 \le 10$ **AND** $-2x - 8 > 2$

Inequality:
Set builder notation:
Interval notation:

Absolute Value

- Recall that the **absolute value** of a number x, written as $|x|$, is the distance from x to zero on the number line. Because absolute value represents distance without regard to direction, the absolute value of any real number is **nonnegative**.

Absolute Value

WORDS	NUMBERS	ALGEBRA
The absolute value of a real number x, $\lvert x\rvert$, is equal to its distance from zero on a number line.	$\lvert 5\rvert = 5$ $\lvert -5\rvert = 5$	$\lvert x\rvert = \begin{cases} x \text{ if } x \geq 0 \\ -x \text{ if } x < 0 \end{cases}$

Ex. 2) Find the solution.

a) $|x| = 3$ b) $|x| < 3$ c) $|x| > 3$

The solutions of $|x| = 3$ are the two points that are 3 units from zero. The solution is a **disjunction**: $x = -3$ **OR** $x = 3$.

The solutions of $|x| < 3$ are the points that are less than 3 units from zero. The solution is a **conjunction**: $-3 < x < 3$.

The solutions of $|x| > 3$ are the points that are more than 3 units from zero. The solution is a **disjunction**: $x < -3$ **OR** $x > 3$.

Absolute-Value Equations and Inequalities

For all real numbers x and all positive real numbers a:

$\lvert x\rvert = a$	$\lvert x\rvert < a$	$\lvert x\rvert > a$
$x = -a$ OR $x = a$	$x > -a$ AND $x < a$ $-a < x < a$	$x < -a$ OR $x > a$

Ex. 3) Solve each equation.

a) $|2x-4| = 12$ b) $3|4w-1| - 5 = 10$ c) $2|3x+7| = -5$

Extraneous Solution

- A solution of an equation derived from an original equation that is not a solution of the original equation.

Ex. 4) Solve each equation. Check for extraneous solutions.

a) $|2x+5| = 3x+4$ b) $|2x+3| = 3x+2$ c) $|3x+5| = 5x+2$

Solving an Absolute-Value Inequality

1) Isolate the absolute-value inequality, if necessary.
2) Rewrite the absolute-value expression as a compound inequality.
3) Solve each part of the compound inequality for the value of the variable.

Ex. 5) Solve each inequality. Then graph the solution set.

a) $|2x+1| > 5$ b) $|4x| + 16 > 8$ c) $-2|x+5| > 10$ d) $\frac{|3x-9|}{2} \leq 12$