

Name:

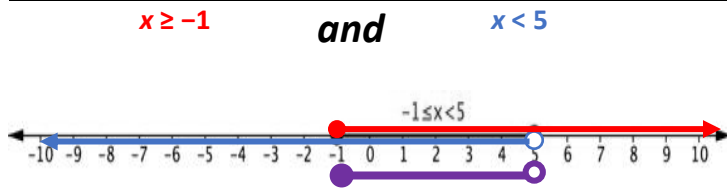
Date:

Period:

Compound Inequalities: A **compound inequality** is an inequality that combines two simple inequalities. They can be in the form of "AND" or "OR".

### Compound Inequalities in the Form of "and"

The solution occurs when **both** inequalities are true at the same time

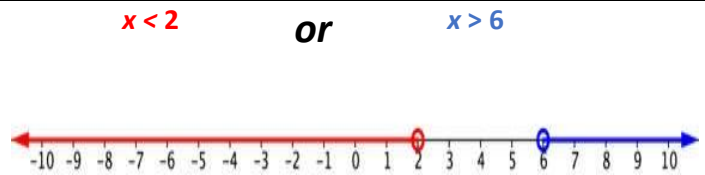


The **solution** is where the two graphs **overlap**.

Since the solution is between  $-1$  and  $5$ , including  $-1$ , rewrite the answer as  $-1 \leq x < 5$ .

### Compound Inequalities in the Form of "or"

The solution occurs when **either** of the inequalities is true



The **solution** is all the values of  $x$  that are **either less than 2 or greater than 6**.

**open circle at 2, shaded left**

**open circle on 6, shaded right**

Decide whether the provided number is a solution. Circle YES or NO, then explain why or why not?

- |   |                       |     |    |
|---|-----------------------|-----|----|
| 1. Is 8 a solution to the compound inequality:<br>Explain:    | $x > 5$ AND $x < 10$  | YES | NO |
| 2. Is 18 a solution to the compound inequality:<br>Explain:   | $x < -15$ OR $x > 15$ | YES | NO |
| 3. Is $-2$ a solution to the compound inequality:<br>Explain: | $-2 \leq x < 3$       | YES | NO |
| 4. Is $-5$ a solution to the compound inequality:<br>Explain: | $-10 < x < -5$        | YES | NO |
| 5. Is 7 a solution to the compound inequality:<br>Explain:    | $-4 < x < 4$          | YES | NO |
| 6. Is 4 a solution to the compound inequality:<br>Explain:    | $x < -3$ OR $x > 6$   | YES | NO |
| 7. Is 14 a solution to the compound inequality:<br>Explain:   | $0 < x < 15$          | YES | NO |
| 8. Is $-9$ a solution to the compound inequality:<br>Explain: | $x < -7$ OR $x > 7$   | YES | NO |

## Solving Compound Inequalities Involving AND

Example 1:

$$4 \leq x + 2 \leq 8$$

$$4 \leq x + 2$$

$$\underline{-2 \quad -2}$$

$$2 \leq x$$

Separate and solve as TWO Inequalities

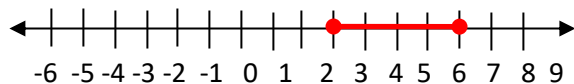
The answer can be written and graphed as a compound inequality

$$2 \leq x \leq 6$$

$$x + 2 \leq 8$$

$$\underline{-2 \quad -2}$$

$$x \leq 6$$



Graph them both on one number line...**NOTE: "AND" problems must work in BOTH inequalities to be true**

Example 2:

$$-5 \leq 2x + 3 < 9$$

$$-5 \leq 2x + 3$$

$$\underline{-3 \quad -3}$$

$$\underline{-8 \leq 2x}$$

$$\frac{2}{2} \quad \frac{2}{2}$$

$$-4 \leq x$$

Separate and solve as TWO Inequalities

The answer can be written and graphed as a compound inequality

$$-4 \leq x < 3$$

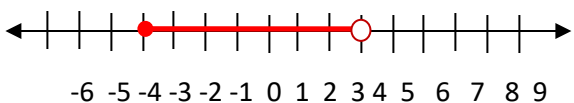
$$2x + 3 < 9$$

$$\underline{-3 \quad -3}$$

$$\underline{2x < 6}$$

$$\frac{2}{2} \quad \frac{2}{2}$$

$$x < 3$$



Graph them both on one number line...**NOTE: "AND" problems must work in BOTH inequalities to be true**

## Solving Compound Inequalities Involving OR

Example 3:

$$-4 + a > 1 \text{ OR } -4 + a < -3$$

$$-4 + a > 1$$

$$\underline{+4 \quad +4}$$

$$a > 5$$

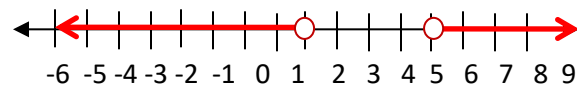
Separate and solve as TWO Inequalities

$$a > 5 \text{ OR } a < 1$$

$$-4 + a < -3$$

$$\underline{+4 \quad +4}$$

$$a < 1$$



Graph them both on one number line...**NOTE: "OR" problems must work in one OR the other**

Example 4:

$$2x \leq 6 \text{ OR } 3x > 12$$

$$\underline{2x \leq 6}$$

$$\frac{2}{2} \quad \frac{2}{2}$$

$$x \leq 3$$

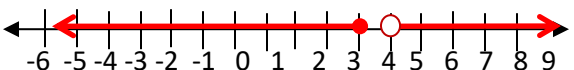
Separate and solve as TWO Inequalities

$$x \leq 3 \text{ OR } x > 4$$

$$\underline{3x > 12}$$

$$\frac{3}{3} \quad \frac{3}{3}$$

$$x > 4$$



Graph them both on one number line...**NOTE: "OR" problems must work in one OR the other**

You Try...Solve and graph your solution on a number line:

1.  $-9 < x - 10 < -5$

2.  $-4 \leq 3n + 5 < 11$

3.  $2 + r < 12 \text{ OR } r + 5 > 19$

4.  $7x \geq 21 \text{ OR } 2x < -2$