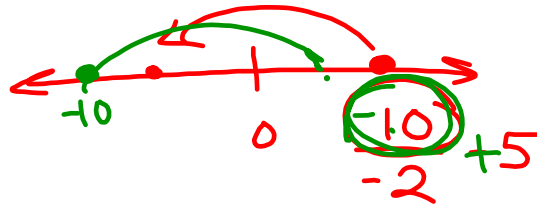


# Chapter 1C Inequalities

- solving inequalities
- solving compound inequalities
- A.CED.1
- A.CED.3



## Solving Inequalities

- use inverse operations to isolate the variable.
  - > multiplication/division of a negative number "flips" the inequality.
  - > easier when variable is kept on the left side  $x < 5$
- usually a range of solutions, more than 1 answer.  $5 > x$
- use # line as a visual aide, then write in set-builder or interval notation.

Inequality	Number Line	Set-builder Notation	Interval Notation
$x < 3$		$\{x \mid x < 3\}$	$(-\infty, 3)$
$x \leq 3$		$\{x \mid x \leq 3\}$	$(-\infty, 3]$
$x > 3$		$\{x \mid x > 3\}$	$(3, +\infty)$
$x \geq 3$		$\{x \mid x \geq 3\}$	$[3, +\infty)$



(lowest, highest]

$\{ \}$   
 $( )$   
 $[ ]$   
 $[ )$   
 $( ]$

Examples: Solve the following inequalities. Show the answers on the number line and give answers in set-builder and interval notation.

1.  $2x - 5 < 6x + 3$

$$\begin{aligned} & \cancel{-6x+5} - \cancel{6x+5} \\ & -4x < 8 \\ & \frac{-4x}{-4} < \frac{8}{-4} \quad (\text{flips}) \\ & x > -2 \end{aligned}$$

$\{x \mid x > -2\}$

$(-2, +\infty)$

2.  $-6x + 1 \geq 37$

$$\begin{aligned} & -6x \geq 36 \\ & \frac{-6x}{-6} \geq \frac{36}{-6} \\ & x \leq -6 \end{aligned}$$

$\{x \mid x \leq -6\}$

$(-\infty, -6]$

**Key Concept** "And" Compound Inequalities

- Words** A compound inequality containing the word *and* is true if and only if *both* inequalities are true.
- Example**  $x \geq -1$   
 $x < 2$   
 $x \geq -1$  and  $x < 2$

(overlap)

**Key Concept** "Or" Compound Inequalities

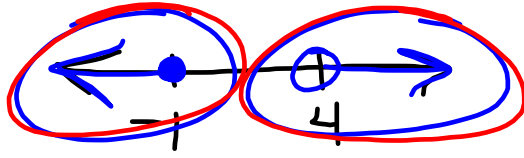
- Words** A compound inequality containing the word *or* is true if one or more of the inequalities is true.
- Example**  $x \leq 1$   
 $x > 4$   
 $x \leq 1$  or  $x > 4$

"or" everything

**Examples:** Solve the following compound inequalities. Graph the solutions on a number and write the solutions in both set builder notation and interval notation.

1.  $y - 3 > 1$  or  $y + 2 \leq 1$

$$\begin{array}{r} +3 \ +3 \\ \hline y > 4 \end{array}$$

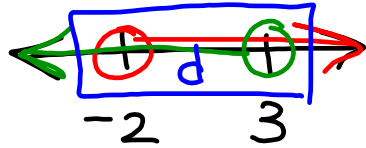
$$\begin{array}{r} -2 \ -2 \\ \hline y \leq -1 \end{array}$$


$\{y \mid y \leq -1 \text{ or } y > 4\}$

$(-\infty, -1] \cup (4, +\infty)$

**Examples:** Solve the following compound inequalities. Graph the solutions on a number and write the solutions in both set builder notation and interval notation.

2.  $3 < d + 5 < 8$



$$3 < d + 5$$

$$d + 5 > 3$$

$$d > -2$$

$$d + 5 < 8$$

$$d < 3$$

$\{d \mid -2 < d < 3\}$

$(-2, 3)$

## *Special Case Inequalities*

- $x > 3$  or  $x < 7$   $\longleftrightarrow$
- $x > 7$  and  $x < 3$   $\longleftrightarrow$
- $x > 3$  or  $x < 3$   $\longleftrightarrow$
- $x \geq 3$  and  $x \leq 3$   $\longleftrightarrow$

