

## What's an inequality?

- **Is a range of values,**  
rather than ONE set number
- An algebraic relation showing that a quantity is greater than or less than another quantity.

**An equation that uses  
>, <, ≥, or ≤  
instead of  
=**

### ● Inequality Notations:

(see more [possible notation forms](#))

$a > b$  ; a is strictly greater than b

$a < b$  ; a is strictly less than b

*Note:*  $a > b$  and  $a < b$  are called "**strict inequalities**".

$a \geq b$  ; a is greater than or equal to b

$a \leq b$  ; a is less than or equal to b

$a \neq b$  ; a is not equal to b

*Hint:* The "open" (larger) part of the inequality symbol always faces the larger quantity.

## Solving a Linear Inequality

- 1) Simplify the algebraic expression on each side.
- 2) Use the addition property of inequality to collect all the variable terms on one side and all the constant terms on the other side.
- 3) Use the multiplication property of inequality to isolate the variable and solve. *Reverse the sense of the inequality when multiplying or dividing both sides by a negative number.*
- 4) Express the solution set in set-builder or interval notation and graph the solution set on a number line.

Inequality	Interval Notation	Graph
$-1 < x < 3$	$(-1, 3)$	
$-1 \leq x \leq 3$	$[-1, 3]$	
$-1 < x \leq 3$	$(-1, 3]$	
$-1 \leq x < 3$	$[-1, 3)$	
$x < 3$	$(-\infty, 3)$	
$x \leq 3$	$(-\infty, 3]$	
$x > -1$	$(-1, \infty)$	
$x \geq -1$	$[-1, \infty)$	

Example: Solve the following inequality. Represent the solution on a number line and write down the corresponding interval notation.

$$5x - 3 \geq -18$$

$$5x \geq -18 + 3$$

$$\frac{5x}{5} \geq \frac{-15}{5}$$

$$\therefore x \geq -3$$

$$x \in [-3; \infty)$$

### Practice Exercise

Determine the values of  $x$  and represent the answers both graphically and in interval notation.

- a.  $3x + 4 \leq 5x - 8$
- b.  $-2x + 5 > 6$
- c.  $2x + 5 \geq 5$
- d.  $x - 6 < 4$
- e.  $-4x + 1 \leq 2$
- f.  $5 - 6x \geq 2x$
- g.  $x - 6 > 9x - 2$
- h.  $-x + 3 \leq 2$
- i.  $x - 8 < 2x + 5$
- j.  $-2x + 3 > 10$