



# Linear inequalities

## Solving linear inequalities

Solving linear **inequalities** is similar to solving linear **equations** except we need to be careful with the direction of the inequality sign. Our solution will be a set of values of  $x$ .

**Example:**  $1 - 2x \leq 7$   
 $-2x \leq 6$   
 $\frac{-2x}{-2} \geq \frac{6}{-2}$   
 $x \geq -3$

Note: If there is division or multiplication by a negative number you must flip the inequality sign.

This can be written in interval notation as  $[-3, \infty)$ .

Inequality notation	In words	Interval notation	Line graph
$x < a$	$x$ is less than $a$	$(-\infty, a)$	
$x \leq a$	$x$ is less than or equal to $a$	$(-\infty, a]$	
$x > a$	$x$ is greater than $a$	$(a, \infty)$	
$x \geq a$	$x$ is greater than or equal to $a$	$[a, \infty)$	
$a < x < b$	$x$ is between $a$ and $b$ (exclusive)	$(a, b)$	
$a \leq x \leq b$	$x$ is between $a$ and $b$ (inclusive)	$[a, b]$	
$a < x \leq b$	$x$ is greater than $a$ and less than or equal to $b$	$(a, b]$	
$a \leq x < b$	$x$ is greater than or equal to $a$ and less than $b$	$[a, b)$	
Compound Inequalities	AND, the intersection of sets, i.e. contains only elements common to both sets, the overlap	$\cap$	$x > -3$ and $x \leq 0$  Solution: $(-3, 0]$
	OR, the union of sets i.e. contains all the elements from both sets	$\cup$	$x > -3$ or $x \leq 0$  Solution: $(-\infty, \infty)$

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