Intervals and Interval Notation

Intervals

A Finite Interval is a set of real numbers that lie between two points, called endpoints.
An Infinite Interval is a set of real numbers in which at least one endpoint is missing.

To describe intervals, we use brackets or parentheses.

Brackets and Parentheses in the Intervals

Brackets **[ ]** indicate that the endpoints belong (are included) to the interval.
Parentheses **( )** indicate that the endpoints do not belong (are not included) to the interval.

Finite Intervals

Interval	Description	Set-Builder Notation	Graph
$[a, b]$	The set of real numbers between a and b inclusive.	$\{x \mid a \leq x \leq b\}$	
(a, b)	The set of real numbers between a and b.	$\{x \mid a < x < b\}$	
$[a, b)$	The set of real numbers greater than or equal to a and less than b.	$\{x \mid a \leq x < b\}$	
$(a, b]$	The set of real numbers greater than a and less than or equal to b.	$\{x \mid a < x \leq b\}$	

Infinite Intervals

Interval	Description	Set-Builder Notation	Graph
$[a, \infty)$	The set of real numbers greater than or equal to a.	$\{x \mid x \geq a\}$	
(a, ∞)	The set of real numbers greater than a.	$\{x \mid x > a\}$	
$(-\infty, b)$	The set of real numbers less than b.	$\{x \mid x < b\}$	
$(-\infty, b]$	The set of real numbers less than or equal to b.	$\{x \mid x \leq b\}$	
$(-\infty, \infty)$	The set of all the real numbers.	$\{x \mid x \in R\}$	

Note:

Let $[2,7)$ be a finite interval.
The bracket shows that number 2 is included, and the parenthesis shows that number 7 is not included.

So, how many numbers does this interval contain?

If we say, that the interval contains 5 numbers: 2, 3, 4, 5, 6, we will be wrong, because by definition, an interval is a set of real numbers, and the real numbers include the integers, as well as the fractions and the decimals.

So, from 2 up to 7 there are infinitely many numbers (when we count the integers, fractions and decimals).