Interval Notation

∞ means infinity. Infinity ∞ is NOT a number; you can not do arithmetic with ∞ .
Infinity ∞ is a concept that means "can grow large without bound"
− ∞ "negative infinity" means "can grow large negative without bound.
We use ∞ as the right endpoint in interval notation when the interval has no number as its upper bound.
We use − ∞ as the left endpoint in interval notation when the interval has no number as its lower bound.

Parentheses indicate that the endpoint of the interval is not included in the interval. Parentheses correspond to > and < symbols An "endpoint" of ∞ or − ∞ always has a parentheses.	Set Notation using Inequalities	Interval Notation
	{ x such that x > −2}	(−2, ∞)
	{ x such that x < 0 }	(−∞, 0)
	{ x such that 1 < x < 5 }	(1, 5)
	the set of all real numbers	(−∞, ∞)

Square Brackets indicate that the endpoint of the interval is included in the interval. Square brackets correspond to ≥ and ≤ symbols	Set Notation using Inequalities	Interval Notation
	{ x such that x ≤ 5 }	(− ∞, 5]
	{ x such that x ≥ 7 }	[7, ∞)
	{ x such that −3 ≤ x ≤ 9 }	[−3, 9]

one endpoint included and one endpoint excluded	Set Notation using Inequalities	Interval Notation
	{ x such that −3 < x ≤ 9 }	(−3, 9]
	{ x such that −3 ≤ x < 9 }	[−3, 9)

If a variable may be in one of several intervals, the intervals can be joined (united) using a union symbol ∪, which means OR mathematically	Set Notation using Inequalities	Interval Notation
	{ x such that x < −2 or x > 2 }	(−∞, −2) ∪ (2, ∞)
	{ x such that 2 ≤ x < 4 or 7 < x ≤ 9 }	[2, 4) ∪ (7, 9]
	{ x such that 2 ≤ x < 4 or x > 8 }	[2, 4) ∪ (8, ∞)

A union symbol can be used to unite two or more intervals that have a "hole" of a single number in between them	Set Notation using Inequalities	Interval Notation
	{ x such that x ≠ 6 } *is the same as the set* { x such that x < 6 or x > 6 }	(−∞, 6) ∪ (6, ∞)
	{ x such that x ≠ −1 and x ≠ 4 } is *the same as the set* { x such that x < −1 **or** −1 < x < 4 **or** x > 4}	(−∞, −1) ∪ (−1, 4) ∪ (4, ∞)

The words "such that" mean "that satisfy the following condition or conditions" and are often denoted using the symbol | or :

Practice Problems for Interval Notation:
Express the following inequalities using interval notation:

1. {x such that x ≤ − 10 }   2. {x such that x < 3 }   3. {x such that x > 6 }

4. {x such that x ≥ −1/2 }   5. {x such that 2 < x < 5 }   6. {x such that −12 ≤ x ≤ −3 }

7. {x such that −17 < x ≤ 24 }   8. {x such that 125 ≤ x < 400 }   9. {x such that x ≠ − 0.40 }

10. {x : x ≠ − 2 and x ≠ 2 }   11. {x : x < − 4 or x ≥ 3}   12. {x : x ≤ 7 or 10 < x < 12)

Answers to practice problems:

1. $(-\infty, -10\,]$
2. $(-\infty, 3)$
3. $(\,6, \infty\,)$
4. $[\,-1/2, \infty\,)$
5. $(\,2, 5\,)$
6. $[-12, -3\,]$
7. $(\,-17, 24\,]$
8. $[125, 400)$
9. $(\,-\infty,\,-0.40\,) \cup (-0.40,\ \infty\,)$
10. $(\,-\infty,\,-2) \cup (-2,\ 2\,) \cup (2,\ \infty\,)$
11. $(\,-\infty,\,-4) \cup [3,\ \infty\,)$
12. $(\,-\infty,\,7\,] \cup (10,\ 12\,)$