Introduction to Real Numbers and Sets

Objective A: Using Inequality and Absolute Value Symbols with Real Numbers

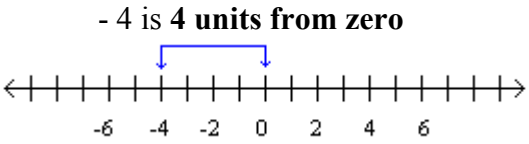
Definitions:

- Set: It is a collection of objects that we call elements.

Numbers Classification:

- Natural (N): It is comprised by all nonzero positive numbers.
- Whole (W): Included all positive numbers and zero.
- Integers: It includes Whole numbers plus negative numbers.
- Rational(R): Numbers that include the division of two integer numbers.
- Irrational (I): Numbers that have decimal representation that neither terminate nor repeat.
- Real Numbers: Rational and Irrational Numbers.

The Absolute Value of a number is its distance from zero on the number line. Its symbol is | |.



Note: | -4 | = 4

Objective B: To Write Sets Using the Roster Method and Set-Builder Notation

1. Roster Method: It consists of writing a set, which encloses the list of the elements of the set in braces.

   EX: {0,1,2,3,…} Infinite Sets
   {-4,-3,0,2,3} Finite Sets.
   { } or ø Empty Set or Null Set.

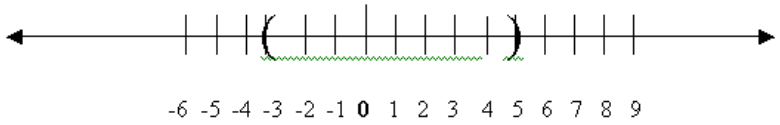
2. Set-Builder Notation: The numbers are written in terms of a reference variable, and in terms of an inequality notation.

   EX: Write a set of integers that are greater than -3 and smaller than 5.

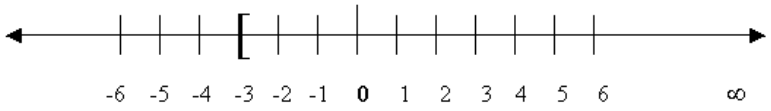
   $\{X \mid -3 < X < 5, X \in \text{integers}\}$

- Graphing: Numbers can be also be graphed on the real number line.

  Graph of $\{X \mid -3 < X < 5, X \in \text{integers}\}$.



  Graph of $\{X \mid X \geq -3, X \in \text{integers}\}$.



Objective C: To Perform Operations on Sets and Write Sets in Interval Notation

- Union: Union of Sets are written as $A \cup B$. It includes set of all elements that belong to either set A or set B.

  EX: Given A = {2,3,4}, and B = {-5,-2,3,4}. The Union of A and B:

  $A \cup B = \{ -5,-2,2,3,4\}$

- Intersection of Two Sets: Written $A \cap B$, is the set of all elements that are common to both set A and B.

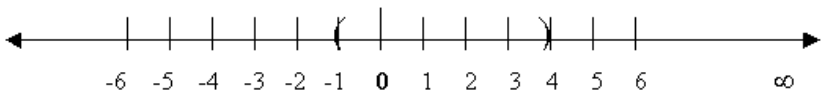
  EX: Given A = {2,3,4}, and B = {-5,-2,3,4}. The Intersection of A and B:

  $A \cap B = \{3,4\}$.

There are two different notations in which sets can be expressed:

1. Graph:

   Ex: Graph $\{x \mid x > -1\} \cap \{x \mid x < 4\}$



   Some Sets can be expressed using interval notation:

2. Sets can be also be expressed using **Interval notation.**

	Set Notation	Interval Notation
EX:	$\{ x \mid -3 < x < 2\}$	$(-3,2)$
	$\{x \mid -3 \leq x \leq 2\}$	$[-3,2]$

Objective D: To Use Venn Diagrams

Definitions:

Subset: Symbolized by $\subseteq$, it indicates that a certain smaller set of numbers is included in a bigger set of numbers.

EX: Let A = { 1,3,5,7,13}, and B = {odd numbers}.

Because every element of set A is also element of B, then $A \subseteq B$.

Every set is a subset of itself.

Empty set: A set that doesn't have any elements.

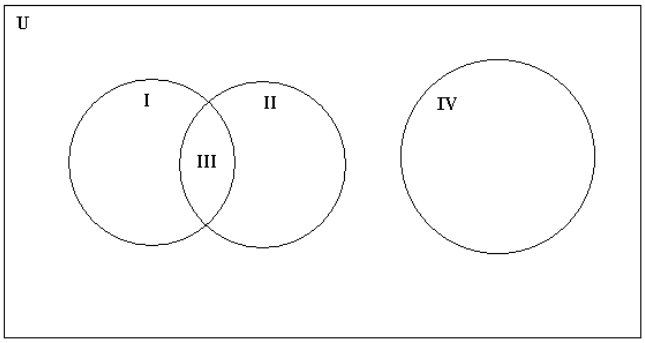
The empty set and the entire set are subsets of any set!

Universal Set: It is the set of all elements that are studied.

Ex: If we study students at San Antonio College, then the universal set is all the students that are taking classes at San Antonio College.

Venn Diagram: A visual exhibit showing the universal set and its various subsets.

EX:



Set I:	Students that are taking a Math Class
Set II:	Students that are taking a Geography Class.
Set III:	Students that are taking a Math and a Geography class ($I \cap II$)
Set IV:	Students that are taking a History Class.
Set (I-III):	Students that are taking only Math.
Set (II-III):	Students that are taking only Geography.
Empty Set	($I \cap IV$ or $II \cap IV$).
Universal Set:	All the students.