Lesson 1 – Number Sets & Set Notation

Math 2 Honors – Mr Santowski

Lesson Objectives

- Classify numbers according to the number sets
- Recognize, interpret, and use both set notation and interval notation to describe sets of discrete or continuous numbers

Fast Five

- Is 3x > 4x?
- Interpret what this algebraic statement really means
- Outline a strategy you can use to solve the problem
- Explain your solution

(A) Number Sets

- **Natural numbers** (N) are positive counting numbers. Natural numbers do not have any decimals and they cannot be fractions. The natural numbers are {1,2,3,4,5,...}
- **Whole numbers** (W) are positive counting numbers AND 0. The whole numbers are {0,1,2,3,4,5,...}
- **Integers** (I or Z) are the positive and negative counting numbers and 0. Integers do not contain decimals and they cannot be fractions.
- {Whole numbers} is a subset of {Integers}. The Integers are {...-5,-4,-3,-2,-1,0,1,2,3,4,5,...}

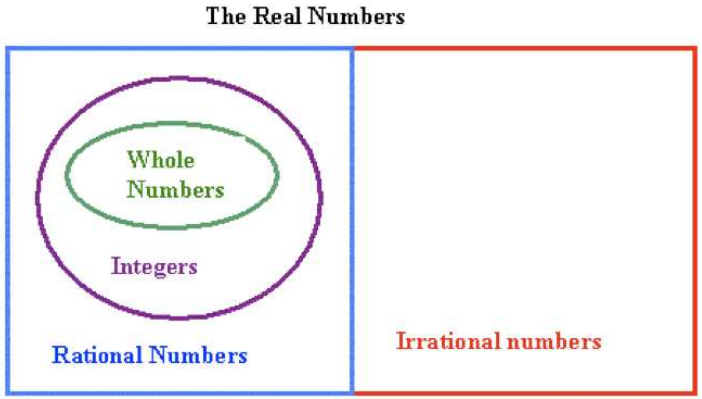
(A) Number Sets

- Rational numbers are any number that can be expressed as a ratio of two integers (a ratio being one number placed over another with a "/" in between-we will examine this more thoroughly in the unit on fractions) .
- {integers} is a subset of {Rational numbers} The Rational numbers include decimals, and fractions.
- The irrational numbers are any number that cannot be expressed as a ratio of two integers
- Examples include π , e and radicals

(A) Number Sets

- Finally (for now), The Real numbers encompass everything
- {Real numbers}={Rational numbers} together with {Irrational numbers}.

(A) Number Sets – The Visual Summation



(B) Revisiting the Fast Five

- Now back to our question ➔ is 3x > 4x if x is a whole number? (if x ε **W**)
- Now back to our question ➔ is 3x > 4x if x is an integer? (if x ε **I**)
- Now back to our question ➔ is 3x > 4x if x is a real number? (if x ε **R**)

(C) Set and Interval Notation

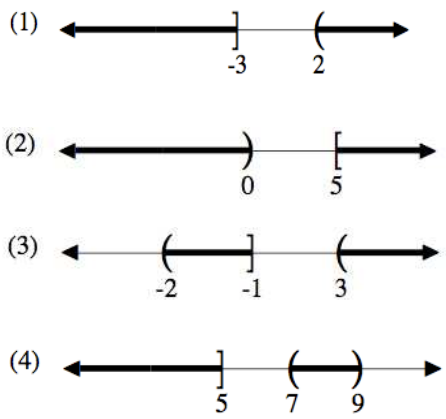
- We now need to find a way to communicate the set of numbers that we are interested in working with in the context of algebraic equations.
- We will present four ways to represent a set of numbers

(C) Set and Interval Notation

- You are given the following descriptions of sets:
  - (i) The set of all real numbers less than or equal to 3.
  - (ii) The set of all integers less than or equal to 3.
  - (iii) The set of all whole numbers greater than or equal to 4 and less than 8.
  - (iv) The set of all real numbers between 12 and 8, including 12 but not including 8.
  - (v) The set of all real numbers either greater than 6 or between, but not equal to, -3 and -2.
- We will represent each of these sets in (i) set notation, (ii) interval notation, (iii) graphically as number lines

(C) Set and Interval Notation

- Now, you are given a set of numbers in a graphic representation (as a number line). Express each set in:
- (i) set notation,
- (ii) in interval notation,
- (iii) as a verbal description:



(D) Presentation Methods

- As a summary, you should now see that there are 4 different, yet equivalent manners in which a solution can be presented or 4 ways in which a problem can be approached.
- These 4 manners are:
  - (1) Numeric
  - (2) Graphic
  - (3) Algebraic
  - (4) Verbal

Links for Help

- Sets: SETS OF NUMBERS & THEIR PROPERTIES by Martin Selditch
- Sets: Number Sets Quiz from Maths Online

Homework

- See worksheet at Worksheet Interval notation Solutions
- See worksheet at Worksheet on Inequalities & Notations
- Attempt the online quiz at this website: Number Sets Quiz from Maths Online