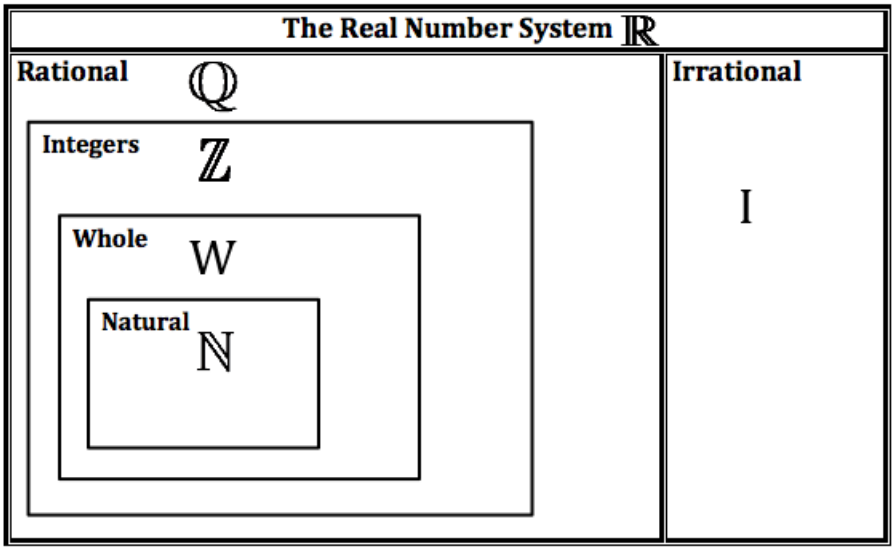
Pre-AP Algebra II
Notes Day #5
Classification of Numbers



Natural Numbers (ℕ): $\{1, 2, 3, \ldots\}$

Whole Numbers (W): $\{0, 1, 2, 3, \ldots\}$

Integers (ℤ): $\{\ldots -3, -2, -1, 0, 1, 2, 3, \ldots\}$

Rational Numbers (ℚ): All numbers that can be written as the ratio of two integers. The decimal form is either a terminating or repeating decimal.

Examples: $\frac{7}{5}$, $-\frac{3}{2}$, 0, .3, -1.2, $.\overline{3}$, 9

Irrational Numbers (I): The decimal form of the number neither terminates nor repeats.

Examples: $\sqrt{3}$, $\sqrt{7}$, π, e

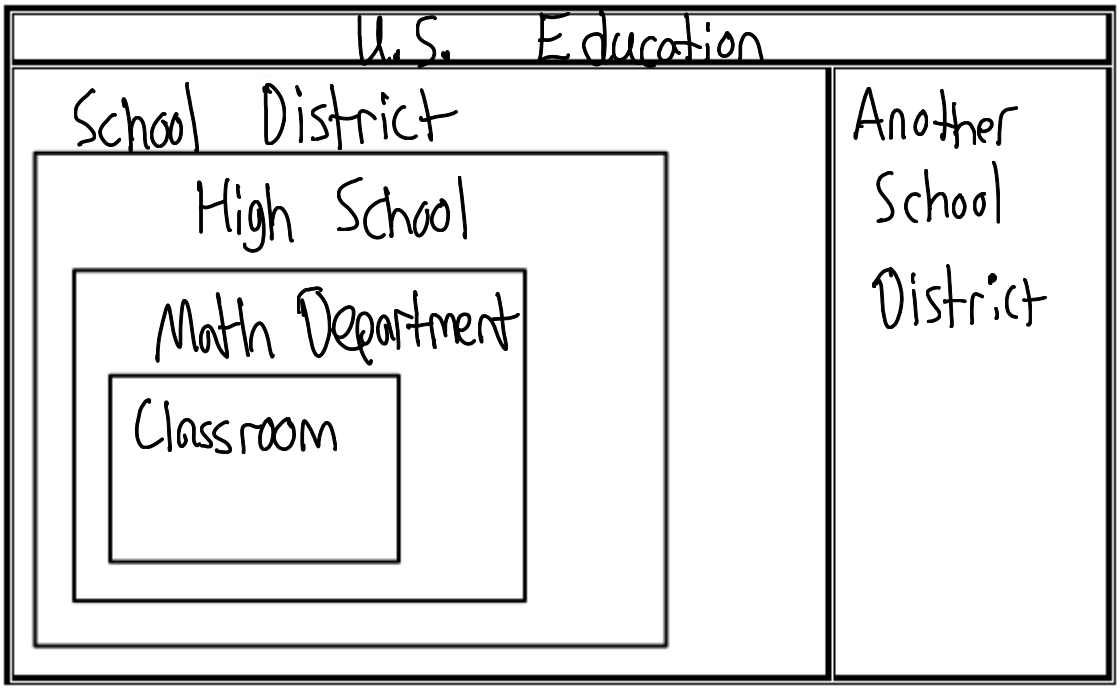
Real Numbers (ℝ): The set that combines all the previous number sets together.

Notice the way the number system you are hopefully familiar with is constructed. It starts with the simplest representation of numbers in the natural numbers. Each new classification adds on to the existing set with an additional set of numbers. The whole numbers for instance add the number zero and the integers add negative numbers.

Each new set moving out from the natural number therefore contains all of the numbers in the previous set with the exception of irrational numbers. It follows as a result that any natural number is also a whole number, integer, rational number, and real number.

Standard notation represents the set of natural numbers, integers, rational numbers, and real numbers with a capital letter in double-struck font. There is no standard convention for representing the set of irrational numbers or whole numbers. Authors may sometimes define their own conventions for a text, such as representing irrational numbers as I, $\mathbb{R}/\mathbb{Q}$, or $\mathbb{R} - \mathbb{Q}$.

It may help to consider an analogy to the number system in classifying our classroom within the context of the much larger field of education in American society.



Directions: **List all sets of numbers to which each number belongs.**

Ex. 1: -23

Z, Q, R

Ex. 2: $\sqrt{50}$

I, R

Ex. 3: $-\frac{4}{9}$

Q, R

Ex. 4: $\sqrt{9} = 3$

N, W, Z, Q, R

Ex. 5: 8.23

Q, R

Ex. 6: 0

W, Z, Q, R

Ex. 7: $\frac{3}{3} = 1$

N, W, Z, Q, R

Ex. 8: ~~0~~ $(\sqrt{5})^2 = 5$

N, W, Z, Q, R

Ex. 9: e

I, R