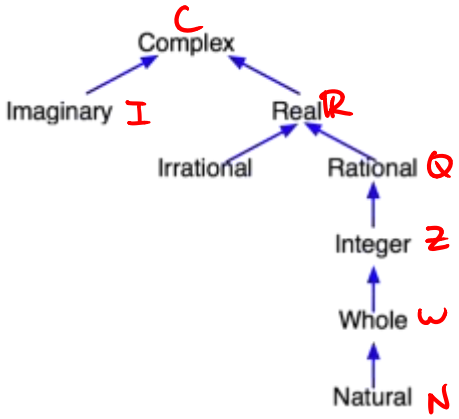
1.1
Notes

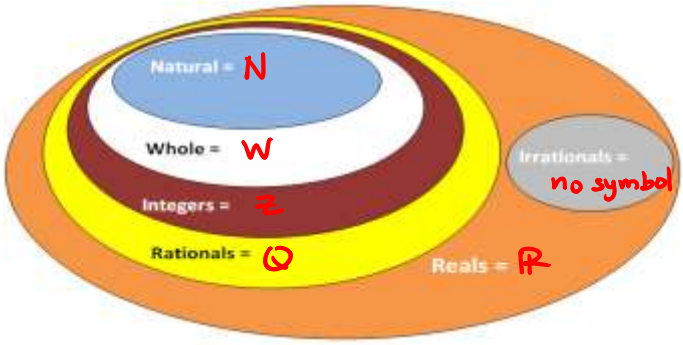
# SETS OF REAL NUMBERS

**OBJECTIVES:** 1) Classify real numbers
2) Use interval notation

## REAL NUMBERS:

Any number that can be expressed in decimal form; any number found on the number line.




## DEFINITIONS

**Imaginary Numbers:** A non-real number $3i$

**Counting/Natural Numbers:** Counting numbers without 0 $\{1, 2, 3, \ldots\}$

**Wholes Numbers:** Counting numbers with 0 $\{0, 1, 2, 3, \ldots\}$

**Integers:** Whole numbers AND negative numbers $\{\ldots -3, -2, -1, 0, 1, 2, 3 \ldots\}$

**Rational Numbers:** Any number that can be expressed as a ratio of two integers ex: $0,\ 1.53,\ -17/2$

**Irrational Numbers:** Non-repeating and non-terminating decimals ex: $\sqrt{2}, \sqrt{3}, \sqrt{5}$

**Transcendental Numbers:** An irrational number represented with a symbol $\pi, e$

**Examples:** Name the sets of numbers each number belongs to:

**1)** $-\frac{2}{3}$ $\mathbb{R}, \mathbb{Q}$

**2)** $\sqrt{121}$ $\mathbb{R}, \mathbb{Q}, \mathbb{Z}, \mathbb{W}, \mathbb{N}$

**3)** $9.\overline{9}$ $\mathbb{R}, \mathbb{Q}$

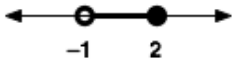
**4)** $\sqrt{6}$ $\mathbb{R}$, irrational

**5)** $-22.79$ $\mathbb{R}, \mathbb{Q}$

**6)** $\sqrt{-4}$ $\mathbb{I}$ (imaginary)

**INTERVAL NOTATION:** A method used to define a set of numbers. Usually, this is used to describe a certain span or group of spans of numbers along an axis, such as an x-axis. However, this notation can be used to describe any group of numbers.

For example, consider the set of numbers shown on each number line below:





**OLD**

Inequality: $-1 < x \leq 2$ $-1 \leq x < 2$

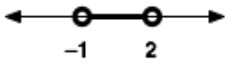
**NEW**

Interval notation: $(-1, 2]$ $[-1, 2)$

Diagram:



**OPEN INTERVAL:** Does not include its endpoints $(a, b)$




**CLOSED INTERVAL:** Includes both endpoints $[a, b]$


## UNBOUNDED INTERVAL:

**Graph the following on a number line and write in inequality notation.**

1) $(-\infty, 5]$

$x \leq 5$


2) $(3, \infty)$

$x > 3$

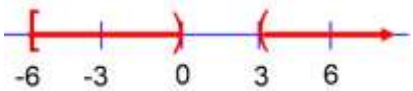

## MORE THAN ONE INTERVAL

**Rewrite using interval notation.**

3) $x < -1$ *or* $x \geq 2$

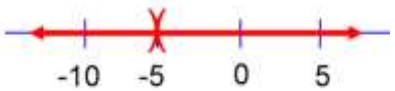
$(-\infty, -1) \cup [2, \infty)$

4)




$[-6, 0) \cup (3, \infty)$

5)




$(-\infty, -5) \cup (-5, \infty)$