WELCOME BACK!!!

Today, we begin Numbers, Relations and Functions 10! ("NRF")

1.   **Classroom Rules**
2.   **Course Outline / Academic Incentives**
3.   **Grade 9 / 10 Math Help Centre**
4.   **Handouts - Return Publication Request**
5.   **Unit 1 - Chapter 4: "Roots and Powers"**

WHAT'S THE POINT OF TODAY'S LESSON?

We will begin working on the NRF 10 Specific Curriculum Outcome (SCO) "Algebra and Numbers 2" OR "AN2" which states:

"Demonstrate an understanding of irrational numbers by representing, identifying, simplifying and ordering irrational numbers."

What does THAT mean???

SCO AN2 means that we will:
* **represent the relationships among the subsets of the real numbers (N, W, I, Q, $\overline{Q}$) using a graphic organizer**
* **identify irrational numbers in a group of numbers based on their specific properties**
* **express radicals ($\sqrt{}$) as mixed radicals in simplest form [especially square roots ($\sqrt{48}$) and cube roots ($\sqrt[3]{54}$)]**
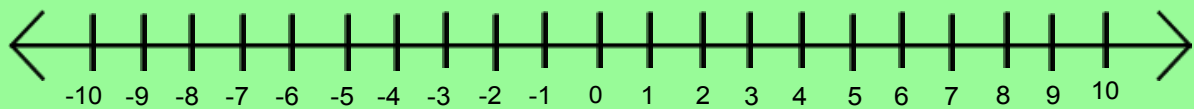* **compare and order (largest vs smallest) irrational numbers**

THE NUMBER

SYSTEM

π

$\dfrac{1}{8}$

0

$\sqrt{7}$

$0.3333333\ldots$

$1, 2, 3, 4, 5, 6\ldots$

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

Number Systems

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

Whole Numbers (ω) - $\{0, 1, 2, 3 \ldots\}$

Integers (I) - $\{\ldots -2, -1, 1, 2 \ldots\}$

Rational Numbers (Q) - as a decimal they terminate (0.5) or repeat ($0.\overline{6}$). They can be written as fractions

Irrational numbers ($\bar{Q}$) - do not terminate or repeat $\pi, \sqrt{15}$

Real numbers (R) - $Q \cup \bar{Q}$

Imaginary Numbers (i) $\rightarrow \sqrt{-9} = 3i$

THE NUMBER SYSTEM

W =	Whole Numbers	I =	Integers
$\overline{Q}$ =	Irrational Numbers	R =	Real Numbers
N =	Natural Numbers	Q =	Rational Numbers

EXAMPLES:

W: 0, 1, 2, 3, ...

$\overline{Q}$: π (3.141592...), $\sqrt{3}$,   1.23456738... , $\sqrt{15}$, ...

N: 1, 2, 3, ...

I: ...-3, -2, -1, 0, 1, 2, 3, ...

R: $-\dfrac{1}{2}$, $\sqrt{15}$,   0 , -3 , 3 , π (3.141592) , ...

Q: $\dfrac{1}{2}$, $-\dfrac{1}{2}$, $\dfrac{11}{3}$,   0.2 ,   -0.2 , 3 ,   -3 , 0 , ...

THE NUMBER SYSTEM

N - NATURAL NUMBERS
All positive non-zero numbers; in other words, all positive numbers. This does <u>not</u> include zero. These are the numbers we use to count.
Ex: 1, 2, 3, 4, 5, …

W - WHOLE NUMBERS
All positive numbers as well as zero. The whole number set expands upon the natural number set to include zero.
Ex: 0, 1, 2, 3, 4, 5, …

I - INTEGERS
All positive and negative numbers as well as zero. Integers expand upon the whole number set to include negative numbers.
Ex: … , -3, -2, -1, 0, 1, 2, 3, …

Q - RATIONAL NUMBERS
A number that can be expressed as the quotient of two integers; in other words, a rational number is any number that can be expressed as a fraction. (The denominator cannot be 0.)

Ex: 0.2 , -0.2 , 0.$\overline{3}$, 4 , -4 , 0 , ½ , -½ , $\sqrt{4}$, $\sqrt{9}$ …
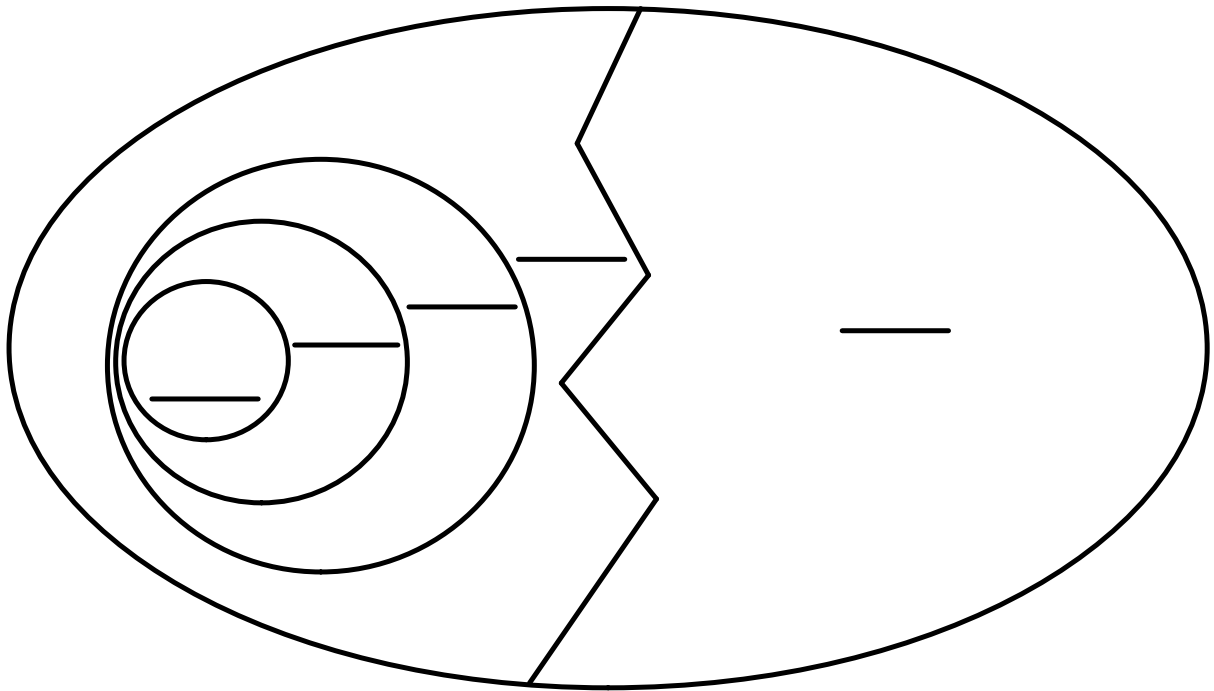
$\overline{Q}$ - IRRATIONAL NUMBERS
A number that cannot be expressed as a quotient of integers; in other words, an irrational number is any number that cannot be expressed as a fraction. This includes all non-terminating and non-repeating decimals.

Ex: π (3.141592…) , 1.23456738… , $\sqrt{15}$, - π , …
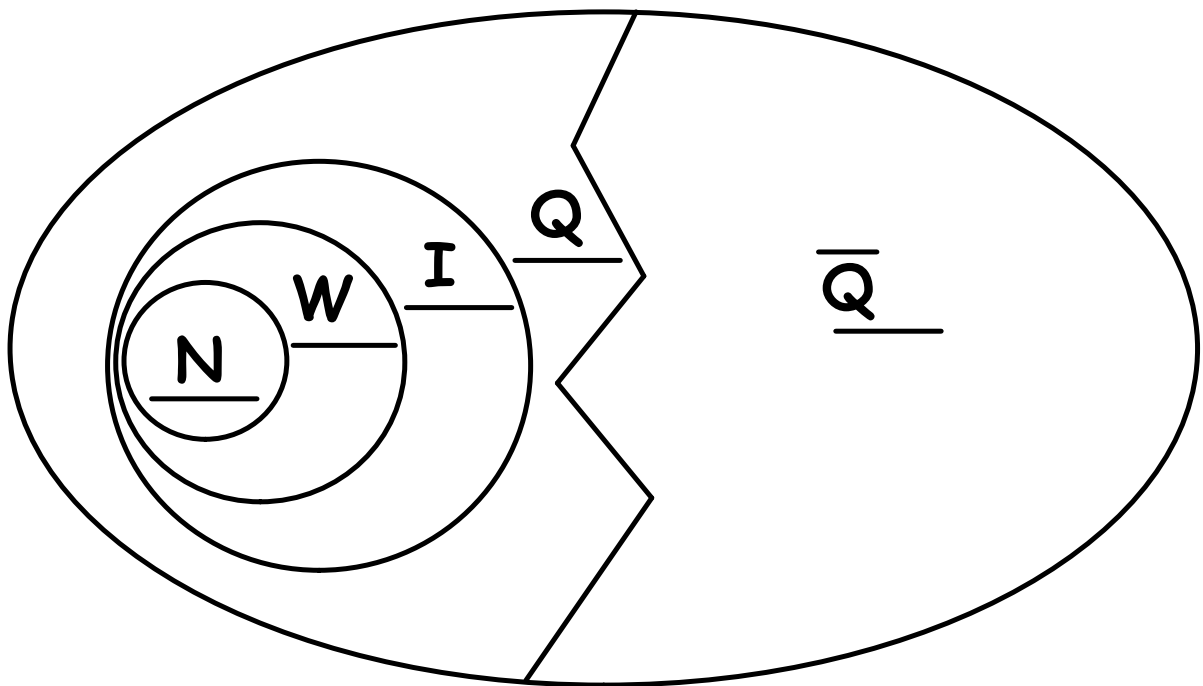
R - REAL NUMBERS
All rational and irrational numbers.

TITLE: _____

TITLE: **R**

"The quotient of two integers":

$$\frac{a}{b}, b \neq 0$$

Which number groups do the following numbers belong to? (NOTE: Every number belongs to AT LEAST 2 number groups.)

1. 2 N, W, I, Q, R

2. -3

3. $\dfrac{1}{4}$

4. π

5. $\sqrt{15}$

6. -0.9

7. $\sqrt{25}$

8. 0

TRUE or FALSE:

1. ALL integers are rational numbers.

2. ALL natural numbers are whole numbers.

3. ALL rational numbers are natural numbers.

4. ALL integers are irrational numbers.

CONCEPT REINFORCEMENT
(my way of saying "HOMEWORK")

Study your notes on the number system for tomorrow's quiz!