Topic: IM2 – 1.3 (N – 1) Rational & Irrational Numbers	**Standard(s):** N.RN.3	Notes
Essential Question: How can I identify and classify numbers within the Real Number System?		

Questions / Big Ideas

Key Terms

Closed Sets / Closure - When you can perform any operation on any of the numbers in the set and this action results in a number that is also in the same set.

Terminates (Ends) – A finite number of digits.

- Ex. 15, 4.75, -2, 10493.01, 400, 3.33, etc.
- Closed under addition, subtraction, multiplication, & division (division by zero is not defined).

Repeating (Patterns) - Infinite decimals that repeat single digits or blocks of digits.

- Ex. 9.2324, $9.\overline{3}$, $87.\overline{435}$, etc.

Real Numbers - Set of rational numbers AND irrational numbers.

- Closed under addition, subtraction, multiplication, & division (division by zero is not defined).

Natural Numbers (Counting Numbers) - Set of numbers used to count objects.

- Ex. 1, 2, 3, 4, 5…
- Closed under addition & multiplication

Whole Numbers - Set of natural numbers and the number 0

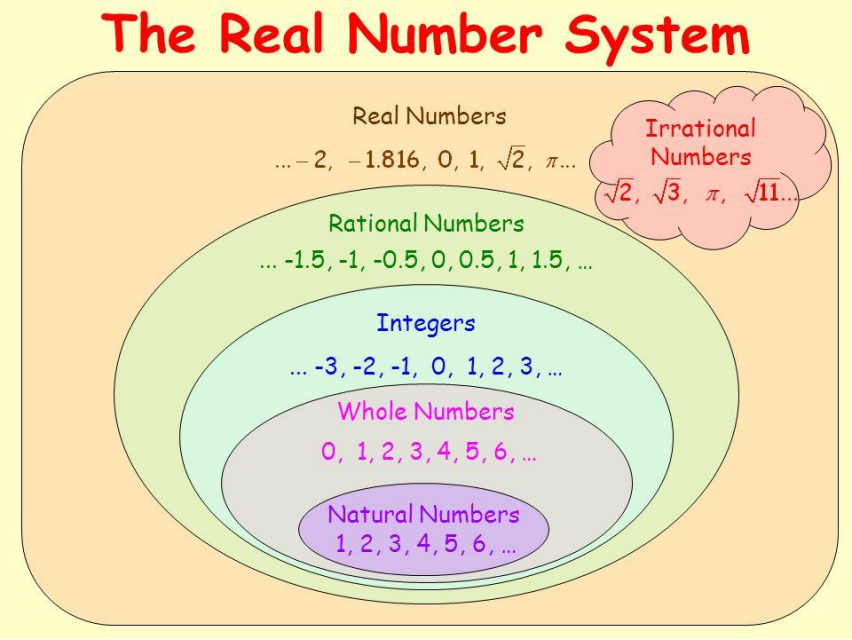
- Ex. **0**, 1, 2, 3, 4, 5…
- Closed under addition & multiplication

Integers - Set of whole numbers and their opposites.

- Ex. ...-3, -2, -1, 0, 1, 2, 3, 4…
- Closed under addition, multiplication, & subtraction

Rational Numbers - All numbers that can be written as a/b, where a and b are integers.

- These numbers will terminate (end) or repeat (in a pattern).
- They can be written as fractions (with *integers* in the numerator and denominator).
- Ex. $\frac{7}{1}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{10}, \frac{7}{11}, \frac{7}{\sqrt{64}}, \frac{2^4}{\sqrt[4]{81}}, etc.$

Questions / Big Ideas	*Irrational Numbers* - All numbers that cannot be written as a/b, where a and b are integers. • Ex. $\sqrt{2}, \pi, 6\sqrt{5}, -3\sqrt{10}, \ 20\pi$ • These numbers are often approximated by a decimal or fraction. • They have an infinite number of *non-repeating* decimal places. • They have no exact numerical representation. • Not closed under any operation. **Irrational Sums & Products** The sum of two irrational terms is irrational. • Ex. $4\sqrt{5} + \ 3\sqrt{2} = 13.1869 \ldots$ The product of two irrational numbers is SOMETIMES irrational. • Ex. $\sqrt{2} \bullet \sqrt{5} = \sqrt{10} = 3.162277660, so\ it\ is\ Irrational$ • Ex. $\sqrt{2} \bullet \sqrt{8} = \sqrt{16} = 4, so\ it\ is\ Rational$  **Guided Practice** 1. The set of all numbers on the number line are called _____ _____. 2. A number that has an equivalent terminating or repeating decimal is called a(n) _____. 3. A number that has an infinite decimal and is non-repeating is called a(n) _____. 4. Any number that can be written as a fraction of integers is a(n) _____ _____.

Questions / Big Ideas

5. Using the information in the math notes box above, and a calculator, classify each of the following numbers:

#	Decimal Type			Number Classification	
Number	*Terminating*	*Repeating*	*Neither*	*Rational*	*Irrational*
$\frac{4}{7}$					
$\sqrt{30}$					
$\frac{21}{\sqrt{16}}$					
$\sqrt{6.25}$					
2π					
$\frac{5}{\pi}$					
$4\sqrt{13}$					
8.5					
$\frac{6}{8^2}$					
$\frac{\sqrt[5]{32}}{6}$					

Summary: _____

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