KEY

Unit 1 Day 1 Notes

Number Sets & Closure

PART I: NUMBER SYSTEMS

REAL #s

Natural (or Counting) Numbers: 1, 2, 3, 4, …

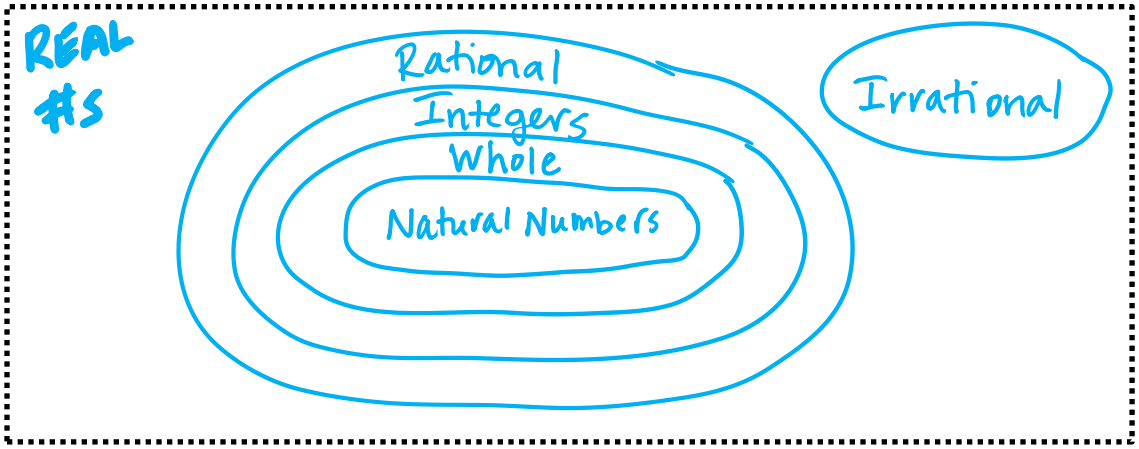
Whole Numbers: 0, 1, 2, 3, …

Integers: …-2, -1, 0, 1, 2, …

Rational Numbers: $-\frac{1}{2}$, 5, .3, $2\frac{3}{7}$, $1.\overline{3} = 1\frac{1}{3} = \frac{4}{3}$ (terminating decimal or a repeating decimal)

Irrational Numbers: π, $\sqrt{3}$, $-\sqrt{7}$

And a picture to sum it all up!



Classify the following numbers by placing a check in the column to which groups they belong. 1.5^{27}

Number	Counting Number	Whole Number	Integer	Rational Number	Irrational Number
5	✓	✓	✓	✓	
0.4				✓	
$\sqrt{64} = 8$	✓	✓	✓	✓	
$-2\frac{2}{3}$				✓	
$\sqrt{27}$					✓
0		✓	✓	✓	

Match the sets of numbers.

c	1	Whole Numbers
e	2	Integers
d	3	Positive Integers
a	4	Negative Integers
b	5	Rational Numbers

a. -1, -2, -3, -4,...

b. $\frac{1}{2}, 0.6, -\frac{8}{3}, 5 \ldots$

c. 0, 1, 2, 3, 4, ...

d. 1, 2, 3, 4, ...

e. -4, -3, -2, -1, 0, 1, 2, 3, 4, ...

You try!

1. Name a # that is an integer but not whole.

2. Name a # that is rational but not counting.

3. Name a # that is counting but not whole.

4. *TRUE* or *FALSE*: All whole #s are integers.

5. *TRUE* or *FALSE*: All integers are whole #s.

6. *TRUE* or *FALSE*: Every real # is rational.

PART II: CLOSURE

A **set** has **closure** under an **operation** if the operation is performed on **elements** of the set and the result is in the original set. Say What?!!?! OK, we need to define some terms.

Set: list of #s **Operation**: × ÷ + − **Elements**: parts of the set

Let's look at an example of Closure: **Integer + Integer =** integer

So we would say that integers are CLOSED under addition because we can pick ANY two integers and add them and we end up with another integer.

BIG IDEA! If we want to say that a statement is false we need to provide a counterexample.

Example: Are **natural** numbers **closed** under **subtraction**? ? natural − natural = natural ?

True Example:

$5 - 3 = 2$ ✱

Counter-Example:

$2 - 5 = -3$

↑ NOT NATURAL ☹

So **natural** numbers are ***not*** **closed** under **subtraction.**

Your turn!

Decide with your partner if the following statements are *TRUE* or *FALSE*. If it is false, provide a counter-example.

Integers are closed under **multiplication**.

Int • Int = Int ?

true

Rationals are closed under **multiplication.**

true

Integers are closed under **division.**

$7 \div 5 = \frac{7}{5}$ false

↑ not an integer

Whole numbers are closed under **division.**

$8 \div 17 = \frac{8}{17}$ false

↑ not a whole number