Algebra 1R
Unit 1 – Day 1 Notes

Name _____

Exploring Real Numbers - Definitions

★ Real Numbers:
Consist of both rational and irrational numbers

ex: $\frac{2}{3}$, $.\overline{3}$, $\sqrt{9}$

★ Rational Numbers:
- Can be written as a fraction
- repeating or terminating decimal

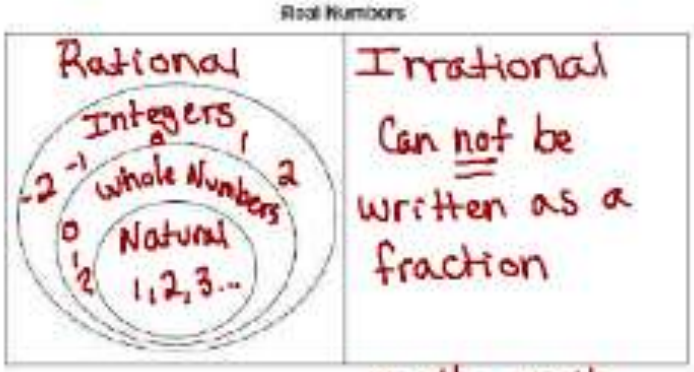
★ Irrational Numbers:
Can not be written as a fraction

ex: π, $\sqrt{5}$, 1.121314

Natural (Counting) Numbers:
ex: 1, 2, 3, 4, 5...

★ Whole Numbers: natural #'s and 0
ex: 0, 1, 2, 3, 4...

★ Integers: whole #'s and their negatives
ex: ...-2, -1, 0, 1, 2...



* #, math, enter, enter

Exploring Closure

Closure: A set is closed if and only if the operation on two elements of the set produces another element of the set.

**If an element outside the set is produced, the operation is NOT closed.

Identify whether each given number set is closed or not closed under the operations addition, subtraction, multiplication, and division. Explain your reasoning.

	Addition	Subtraction	Multiplication	Division
The set of Natural Numbers $1, 2, 3, 4 \ldots$	Closed	Not Closed $4-4=0$ (0 is not natural, it is a whole #)	Closed	Not Closed $\frac{3}{4} = .75$ (not natural)
The set of Integers $0, 1, 2, 3, 4$ $-1, -2, -3, -4$	Closed	Closed	Closed	Not Closed $\frac{-4}{5} = -.8$ (not an integer)
The set of Rational Numbers (written as fraction, repeat or ending dec.)	Closed	closed	closed	Closed
The set of Real Numbers (rational and irrational)	Closed	closed	closed	closed
The set of Whole Numbers $0, 1, 2, 3$	Closed	Not Closed ex: $5-10=-5$ (not a whole #)	Closed	Not Closed ex: $\frac{3}{2}=1.5$ (not a whole #)
The set of Irrational Numbers (Can Not be written as fraction)	Not Closed $\pi+\pi=0$ (rational)	Not Closed $\pi-\pi=0$ (rational)	Not closed $\sqrt{3}\cdot\sqrt{3}=3$ (rational)	Not Closed $\frac{\pi}{\pi}=1$ (rational)

Properties of Real Numbers

1. Commutative Property: Change Order

   Addition: $5 + 7 =$ 7+5 Multiplication: $4 \cdot 2 =$ 2·4

2. Associative Property: "All Stay Same Order"

   Addition: $(6 + 3) + 7 =$ 6+(3+7) Multiplication: $(4 \cdot 9)5 =$ 4·(9·5)

3. Identity Property: what # can you add/multiply by and not change the Starting #

   Addition: $2 + \boxed{0} =$ 2 Multiplication: $2 \cdot \boxed{1} =$ 2

4. Inverse Property: want the identity as the answer

   Addition: $4 + -4 =$ 0 (opposites) Multiplication: $3 \cdot \frac{1}{3} =$ 1 (reciprocals) $\frac{a}{b} \cdot \frac{b}{a} = \frac{1}{1}$

5. Distributive Property: multiply the outside by each term inside

   Addition: $a(b + c) = ab + ac$ Subtraction: $a(b - c) = ab - ac$

Examples

Name the property that each illustrates.

1. $9 + 7 = 7 + 9$ — Commutative Property of Addition
2. $(8 \cdot 4) \cdot 3 = 8 \cdot (4 \cdot 3)$ — Associative Property of Multiplication
3. $3 + 0 = 3$ — Additive Identity or Identity Property of Addition
4. $np = pn$ — Commutative Property of Multiplication