Adding and Subtracting Rational Numbers

Positive and Negative

+ and **+** : Add the two numbers. The result will be positive.

$$4 + 6 = 10$$

- and **-** : Add the two numbers. The result will be negative

$$(-7) - 7 = (-7) + (-7) = (-14)$$

+ and **-** : Subtract the two numbers. The new number will be positive if the larger number was positive, and negative if the larger number was negative.

$$6 - 9 = 6 + (-9) = -3$$

$$9 - 6 = 3$$

9 is bigger than 6, and 9 is negative. So the answer also has to be negative.

Decimals

Line up the decimal points and add or subtract.

9.78 + 3.51

$$\begin{array}{r} 9.78 \\ +\ 3.51 \\ \hline 13.29 \end{array}$$

10.42 - 2

$$\begin{array}{r} 10.42 \\ -\ \ 2.00 \\ \hline 8.42 \end{array}$$

Mixed Numbers

Turn mixed numbers into improper fractions.

$$4\frac{2}{5} = \frac{(4)(5)+2}{5} = \frac{20+2}{5} = \frac{22}{5}$$

Fractions with Common Denominators

Add or subtract the numerators (top of fraction). The denominator (bottom of fraction) remains the same. Reduce if necessary.

$$\frac{2}{3} + \frac{1}{3} = \frac{3}{3} = 1 \qquad \frac{5}{12} + \frac{5}{12} = \frac{10}{12} = \frac{10 \div 2}{12 \div 2} = \frac{5}{6}$$

Fractions without Common Denominators

First, find the common denominator. Change the denominators of the fractions to the common denominator by multiplying; multiply the numerator by the same number. Add or subtract as above.

$$\frac{5}{6} + \frac{1}{4}$$

The least common denominator (LCD) is 12: (6)(2) = 12 and (4)(3) = 12. Other common denominators are possible, including (6)(4) = 24.

$$\frac{(2)5}{(2)6} + \frac{1(3)}{4(3)} = \frac{10}{12} + \frac{3}{12} = \frac{13}{12} = 1\frac{1}{12}$$

Multiplying Rational Numbers

Positive and Negative

+ and **+** : Multiply the numbers. The result will be positive.

$$(3)(12) = 36$$

- and **-** : Multiply the numbers. The result will be positive

$$(-4)(-5) = 20$$

+ and **-** : Multiply the numbers. The result will be negative.

$$(6)(-10) = (-60)$$
$$(-4)(11) = (-44)$$

Multiplying Decimals

Multiply, ignoring the decimal points. The answer will have the same number of decimal points as the original numbers combined.

2 decimal places → 3.12

1 decimal place → $\times 4.2$

$$624$$
$$+12480$$

3 decimal places → 13.104

Mixed Numbers

Turn mixed numbers into improper fractions.

$$4\frac{2}{5} = \frac{(4)(5)+2}{5} = \frac{20+2}{5} = \frac{22}{5}$$

Multiplying Fractions

Multiply across — multiply the numerators and denominator separately. Reduce if necessary.

$$\frac{4}{7} * \frac{9}{16} = \frac{(4)(9)}{(7)(16)} = \frac{36}{112} = \frac{36 \div 4}{112 \div 4} = \frac{9}{28}$$

Multiplying Fractions: Cross-Reduce

When multiplying *only*, you may reduce before multiplying across. This may be done by rearranging the fractions.

$$\frac{4}{7} * \frac{9}{16} = \frac{9}{7} * \frac{4}{16} = \frac{9}{7} * \frac{4 \div 4}{4 \div 16} = \frac{9}{7} * \frac{1}{4} = \frac{(9)(1)}{(7)(4)} = \frac{9}{28}$$

Note that this can *only* be done when multiplying!!!!!!!! You may *not* rearrange fractions when adding, subtracting, or dividing!
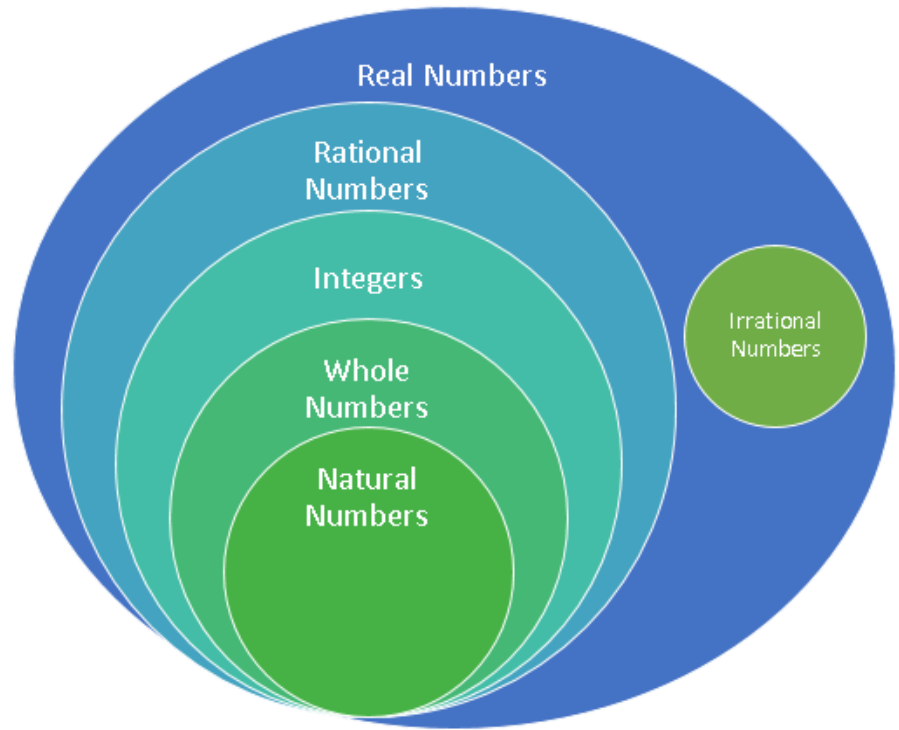
ALGEBRA 1: CORNELL NOTES

Topic: Sets of Numbers	Name: Mrs. Rowland
	Date:
	Period:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
	Math is its own language
Set	a group of things
	Examples: a set of oranges; a set of golf clubs; a set of numbers
	Numbers are grouped into sets
Natural Numbers	The numbers we count with: 1, 2, 3, 4, … Symbol is $\mathbb{N}$
Whole Numbers	The natural numbers and 0: 0, 1, 2, 3, 4… Symbol is $\mathbb{W}$
Integers	Positive and negative whole numbers: $\ldots-2, -1, 0, 1, 2\ldots$ Symbol $\mathbb{Z}$
Rational Numbers	Numbers that can be written as a fraction of integers. Decimals end or repeat. Symbol $\mathbb{Q}$
	Examples: $\frac{2}{3}, 7, \frac{1}{7}, 4.\overline{54}, 2.1876578, \sqrt{25}$
Irrational Numbers	Numbers that can't be written as a fraction of integers. Decimals do not end or repeat. Symbol $\mathbb{I}$
	Examples: $\pi, \sqrt{5}, \sqrt{17}, \sqrt[3]{20}, e, 4-\sqrt{3}$
Real Numbers	All rational and irrational numbers. Symbol is $\mathbb{R}$

Summary:
Numbers can be grouped in sets. Natural numbers are the counting numbers. Whole numbers are 0 and as the natural numbers. Integers are positive and negative whole numbers. Rational numbers can be written as a fraction of integers; irrational numbers cannot. All these are part of the real numbers.