

Real Numbers

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1 Types of Numbers

1.1 Whole Numbers

$(0, 1, 2, 3, 4)$

1.2 Natural Numbers

These are also known as "counting numbers".

$(1, 2, 3, 4...)$

1.3 Integers

Any whole number that does not have decimal or fractional part.

$(-3, -2, -1, 0, 1, 2, 3, 4...)$

1.4 Even Numbers

These numbers can be easily divisible by two.

$(2, 4, 6, 8...)$

1.5 Odd numbers

Number NOT easily divisible by two.

$(1, 3, 5, 7...)$

1.6 Prime Number

Numbers that are only evenly divisible by themselves or one.¹

$(2, 3, 5, 7, 11, 13, 17, 19, 23...)$

1.7 Irrational Number

A decimal number that goes on forever and does not repeat.²

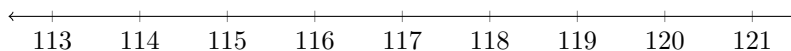
$(3.1415926..., \sqrt{2})$

1.8 Rational Number

The opposite of an irrational number. These numbers will eventually end or start repeating.

$(3.5, 3.33333...)$

1.9 Number Line



All real numbers can be found on the number line.

Numbers

¹Two is the only even prime number.

² π is probably the most famous irrational number.

2 Examples: Types of Numbers

$$\sqrt{81} = 9$$

$$\sqrt{49} = 7$$

$$\sqrt{25} = 5$$

$$\sqrt{\textit{NegativeNumber}} = \textit{NOTREAL}$$

3

2.1 Simplify

$$6 \times (7 - 4) \div 3 + 8 - 3$$

$$6 \times (3) \div 3 + 8 - 3$$

$$18 \div 3 + 8 - 3$$

$$6 \div 3 + 8 - 3$$

$$6 \div 8 - 3$$

$$14 - 3$$

$$11$$

2.2 Round the Numeral

- 85,379
 - Nearest Thousands Place: 85,000
 - Nearest Tens Place: 85,380

2.3 Expanded Notation

- This is the Standard Form: 85,379.
- This is the Expanded Notation:

$$80,000$$

$$5,000$$

$$300$$

$$70$$

$$9$$

3 Word Problems

3.1 Adding

These are words that you will want to recognize as addition when reading a Math problem.

- Add
- Sum
- Total
- Increase
- Plus

³Imaginary Numbers are for another lesson.

3.2 Subtracting

Same as addition, these are words to recognize when reading a word problem dealing with subtraction.

- Subtract
- Minus
- Decrease
- Take Away
- Less than
- from

3.3 Multiply

Words that point to multiplication.

- Product
- Times
- Of

3.4 Dividing

Words to be recognized when one needs to divide.

- Divisible
- Divide
- Division
- Quotient
- Into
- Per

4 Fractions

These are part of a whole.

$$\frac{3}{5} \tag{1}$$

4.1 Reducing Fractions

Common Multiple.

$$\frac{2 \div 2}{4 \div 2} = \frac{1}{2} \tag{2}$$

- $2 = (2, 4, 6, 8, 10, 12, \dots)$
- $4 = (4, 8, 12, 16, 20, 24, \dots)$

Common Factor.

- $2 = 1, 2$
- $4 = 1, 2, 4$

2 is the Greatest Common Factor.

$$\frac{8}{24} = \frac{8 \div 8}{24 \div 8} = \frac{1}{3} \tag{3}$$

4.2 Simple Fractions

- Proper: Numerator is smaller than denominator.

$$\frac{3}{4} \quad (4)$$

$$\frac{1}{2} \quad (5)$$

- Improper: Numerator is larger than denominator.

$$\frac{4}{3} \quad (6)$$

$$\frac{2}{1} \quad (7)$$

4.3 Complex Fractions

- Mixed Numbers:

$$3\frac{2}{5} \quad (8)$$

- Turning Mixed Numbers into an improper Fraction:

$$W\frac{N}{D} = D \times W + N = ImproperFraction \quad (9)$$

- Decimals: 3.5, 5.975

4.4 Dividing Fractions

- Reciprocal "multiplicative inverse"

$$\frac{A}{B} \div \frac{N}{D} = \frac{A}{B} \times \frac{D}{B} \quad (10)$$

•

$$\begin{aligned} 10 \div 10 &= 1 \\ 10 \div 5 &= 2 \\ 10 \div 2 &= 5 \\ 10 \div 1 &= 10 \\ 10 \div \frac{1}{2} &= 20 \\ 10 \div \frac{1}{5} &= 50 \\ 10 \div \frac{1}{10} &= 100 \\ 10 \div 20 &= \frac{1}{2} \\ 10 \div 30 &= \frac{1}{3} \end{aligned} \quad (11)$$

5 Examples: Fractions

$$\frac{10 + 7}{0} = \frac{17}{0} \quad (12)$$

- Anything Divided by Zero will always be Zero.

5.1 Adding Fractions

-

$$\frac{2}{5} + \frac{3}{5} = 1 \quad (13)$$

- Same Denominator.

$$\frac{5}{8} + \frac{1}{8} = \frac{6}{8} = \frac{3}{4} \quad (14)$$

-

$$\frac{8}{5} + 2\frac{1}{5} (= INTO >) \frac{8}{5} + \frac{11}{5} (= EQUALS =) \frac{19}{5} (= OR >) 3\frac{4}{5} \quad (15)$$

- Different Denominator.

$$\frac{1}{2} + \frac{1}{5} = \text{Find LCM} \quad (16)$$

- 2 = 2, 4, 6, 8, 10...

- 5 = 5, 10, 15... = 10

$$\frac{5}{10} + \frac{2}{10} = \frac{7}{10} \text{ Cannot be Reduced} \quad (17)$$

5.2 Subtracting Fractions

- Most of the steps for Subtraction are similar to Addition:

- Ex: 1

$$\frac{8}{13} - \frac{1}{13} = \frac{7}{13} \quad (18)$$

- Ex: 2

$$\frac{5}{8} - \frac{3}{8} = \frac{2}{8} \quad (19)$$

- Ex: 3

$$\frac{7}{9} - \frac{2}{3} (= INTO >) \frac{7}{9} - \frac{6}{9} = \frac{1}{9} \quad (20)$$

- Ex:

First turn mixed number into improper fraction.

$$8\frac{1}{2} - 3\frac{2}{5} (= INTO >)$$

LCM: (2=2,4,6,8,10...), (5=5,10,15...)

$$\frac{17 \times 5}{2 \times 5} - \frac{17 \times 2}{5 \times 2} (= INTO >) \frac{85}{10} - \frac{34}{10} (= EQUALS >) \frac{51}{10}$$

This answer can be turned into a Proper Fraction (Mixed Number)

$$= 5\frac{1}{10}$$