MAT 12 CLASS NOTES

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Contents

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]

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

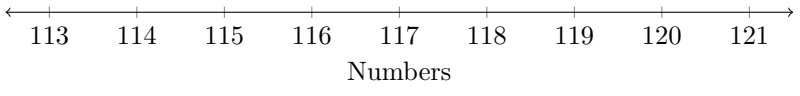
1.8 Rational Number

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.



[1] Two is the only even prime number.

[2] π is probably the most famous irrational number.

2 Examples: Types of Numbers

$$\sqrt{81} = 9$$
$$\sqrt{49} = 7$$
$$\sqrt{25} = 5$$
$$\sqrt{NegativeNumber} = NOTREAL$$

[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 additoin when reading a Math problem.

- Add
- Sum
- Total
- Increase
- Plus

[3] Imaginary Numbers are for another lesson.

3.2 Subtracting

Same as addition, these are words to recognoze when reading a word problen 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.

$$\frac{3}{5}$$

4.1 Reducing Fractions

Common Multiple.

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

- 2 = (2,4,6,8,10,12,...)
- 4 = (4,8,12,16,20,24,...)

Common Factor.

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

2 is the Greatest Common Factor.

$$\frac{8}{24} = \frac{8 \div 8}{24 \div 8} = \frac{1}{3} \tag{2}$$

4.2 Simple Fractions

- Proper: Numerator is smaller than denominator.
  - $\frac{3}{4}$
  - $\frac{1}{2}$
- Improper: Numerator ia larger than Denominator.
  - $\frac{4}{3}$
  - $\frac{2}{1}$

4.3 Complex Fractions

- Mixed Numbers:

$$3\frac{2}{5} \tag{3}$$

  - Turning Mixed Numbers into an Improper Fraction:

$$W\frac{N}{D} = D \times W + N = \text{Improper Fraction}$$

- Decimals: 3.5, 5.975

4.4 Dividing Fractions

- Reciprocal "multiplicative inverse"

$$\frac{A}{B} \div \frac{N}{D} = \frac{A}{B} \times \frac{D}{B}$$

-

$$\begin{aligned} 10 \div 10 &= 1 \\ 10 \div 5 &= 2 \\ 10 \div 2 &= 5 \\ 10 \div 1 &= 10 \\ 10 \div \frac{1}{2} &= 20 \\ 10 \div \frac{1}{5} &= 50 \\ 10 \div \frac{1}{10} &= 100 \\ 10 \div 20 &= \frac{1}{2} \\ 10 \div 30 &= \frac{1}{3} \end{aligned} \tag{4}$$

5 Examples: Fractions

$$\frac{10+7}{0} = \frac{17}{0} \tag{5}$$

- Anything Divided by Zero will always be Zero.

5.1 Adding Fractions

- $$\frac{2}{5} + \frac{3}{5} = 1 \tag{6}$$
- Same Denominator.
$$\frac{5}{8} + \frac{1}{8} = \frac{6}{8} = \frac{3}{4} \tag{7}$$
- $$\frac{8}{5} + 2\frac{1}{5}(= INTO >)\frac{8}{5} + \frac{11}{5}(= EQUALS =)\frac{19}{5}(= OR >)3\frac{4}{5} \tag{8}$$
- Different Denominator.
$$\frac{1}{2} + \frac{1}{5} = \text{Find LCM} \tag{9}$$
- $2 = 2, 4, 6, 8, 10...$
- $5 = 5, 10, 15... = 10$
$$\frac{5}{10} + \frac{2}{10} = \frac{7}{5}\text{Cannot be Reduced} \tag{10}$$

5.2 Subtracting Fractions

- Most of the steps for Subtraction are similar to Addition:
- Ex: 1
$$\frac{8}{13} - \frac{1}{13} = \frac{7}{13} \tag{11}$$
- Ex: 2
$$\frac{5}{8} - \frac{3}{8} = \frac{2}{8} \tag{12}$$
- Ex: 3
$$\frac{7}{9} - \frac{2}{3}(= INTO >)\frac{7}{9} - \frac{6}{9} = \frac{1}{9} \tag{13}$$
$$\tag{14}$$
- Ex: 4

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)

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

6 Exponents

- An exponent is a quantity representing the power to which a given number or expression is to be raised, usually expressed as a raised symbol beside the number or expression (e.g., 3 in 23 = 2 x 2 x 2).
- $$(\frac{2}{5})^3(= INTO >)(\frac{2}{5}) \times (\frac{2}{5}) \times (\frac{2}{5}) = \frac{8}{125}(\text{No GCF, Cannot be Reduced}) \tag{15}$$
  - Base = $\frac{N=2}{D=3}$
  - Exponent(power) = 3
- $$(\frac{4}{9})^2(= INTO >)(\frac{4}{9}) \times (\frac{4}{9}) = \frac{16}{81}(\text{No GCF}) \tag{16}$$

- $$(\frac{2}{8})^3 (= INTO >)(\frac{2}{8}) \times (\frac{2}{8}) \times (\frac{2}{8}) = \frac{1}{64} \tag{17}$$

  – OR: Reduce First

$$(\frac{1}{4})(= INTO >)(\frac{1}{4}) \times (\frac{1}{4}) \times (\frac{1}{4}) = \frac{1}{64} \tag{18}$$

7 Prime Factors

- A Prime Factor is...

7.1 Ugh I'm Sleepy...