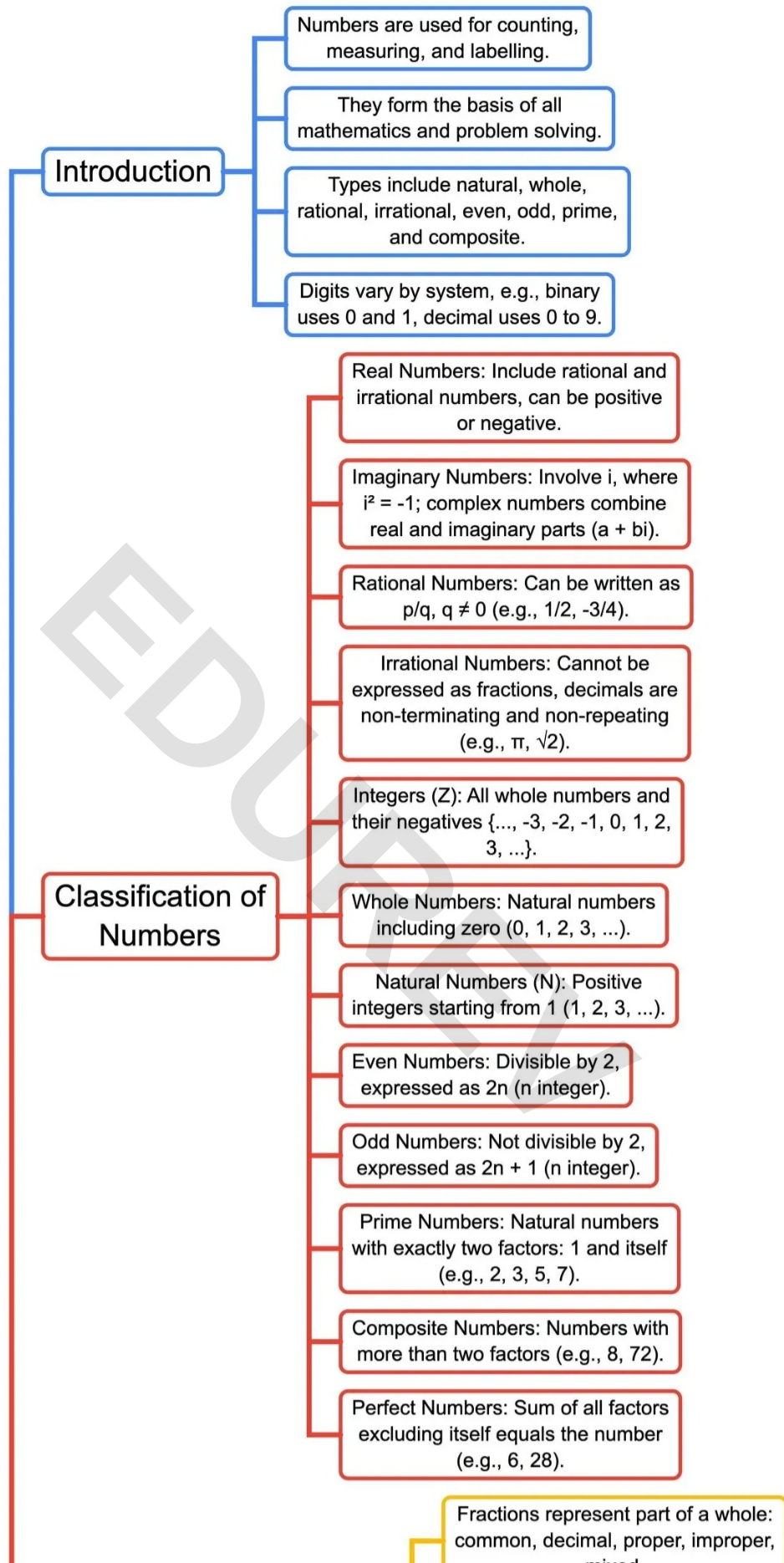


Mind Map: Number System



Numbers

Fractions and Decimals

Decimal Numbers: Numbers with decimal points; can be terminating or non-terminating.

Conversion of recurring decimals to fractions uses formulas based on repeating digits.

Number Line

A straight line representing numbers extending infinitely in both directions.

Distance between points is the subtraction of smaller from larger number.

Example: Distance between 7 and -4 is 11.

Divisibility

A number x is divisible by y if dividing x by y leaves no remainder.

General form: $\text{Dividend} = \text{Quotient} \times \text{Divisor} + \text{Remainder}$, where $0 \leq \text{Remainder} < \text{Divisor}$.

Divisibility Rules:

1: All numbers divisible.

2: Last digit even (0,2,4,6,8).

3: Sum of digits divisible by 3.

4: Last two digits divisible by 4.

5: Last digit 0 or 5.

6: Divisible by 2 and 3.

7: Subtract twice last digit from remaining number repeatedly.

8: Last three digits divisible by 8.

9: Sum of digits divisible by 9.

10: Last digit 0.

11: Difference of sum of alternate digits divisible by 11.

12: Divisible by 3 and 4.

13: Add four times last digit to remaining number repeatedly.

Properties of Numbers

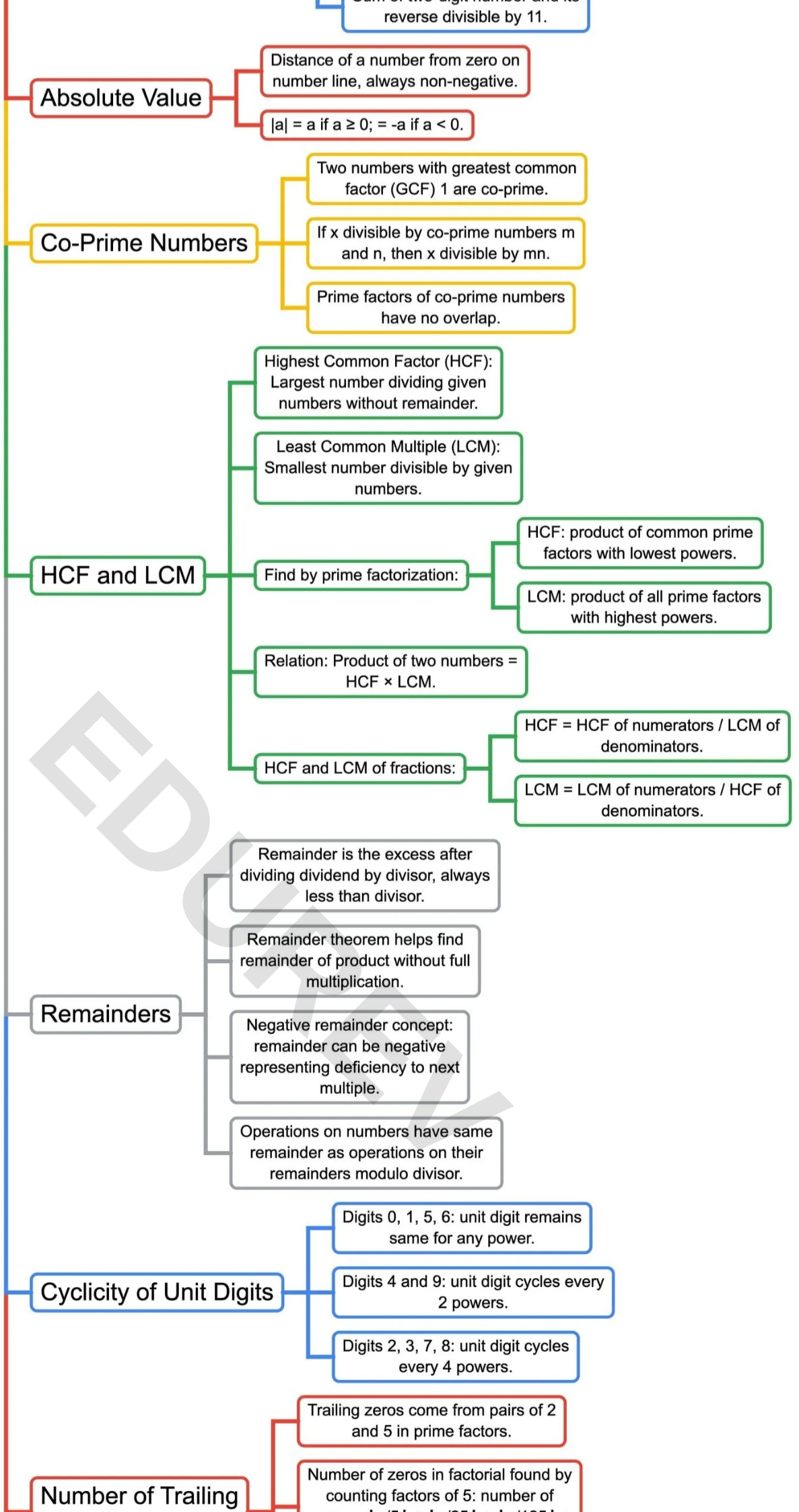
Unit digit of a power repeats cyclically based on the base digit.

Number of zeros at the end of factorial depends on number of 5s in prime factors.

Digital root: Sum digits repeatedly till single digit remains.

Product of 3 consecutive natural numbers divisible by 6; if first is even, divisible by 24.

Sum of two-digit number and its



Zeros

$$\text{zeros} = \lfloor n/5 \rfloor + \lfloor n/25 \rfloor + \lfloor n/125 \rfloor + \dots$$

Number of zeros increases at multiples of 5, with jumps at powers of 5.

Base Systems

Decimal (Base 10): digits 0-9, place values powers of 10.

Binary (Base 2): digits 0 and 1, place values powers of 2.

Octal (Base 8): digits 0-7, place values powers of 8.

Hexadecimal (Base 16): digits 0-9 and A-F (10-15), place values powers of 16.

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