BS IT 1 2024 - 2025

NUM TALK: EXPLORING NUMBER SYSTEMS

UNDERSTANDING THE FOUNDATIONS AND APPLICATIONS OF NUMBER SYSTEMS

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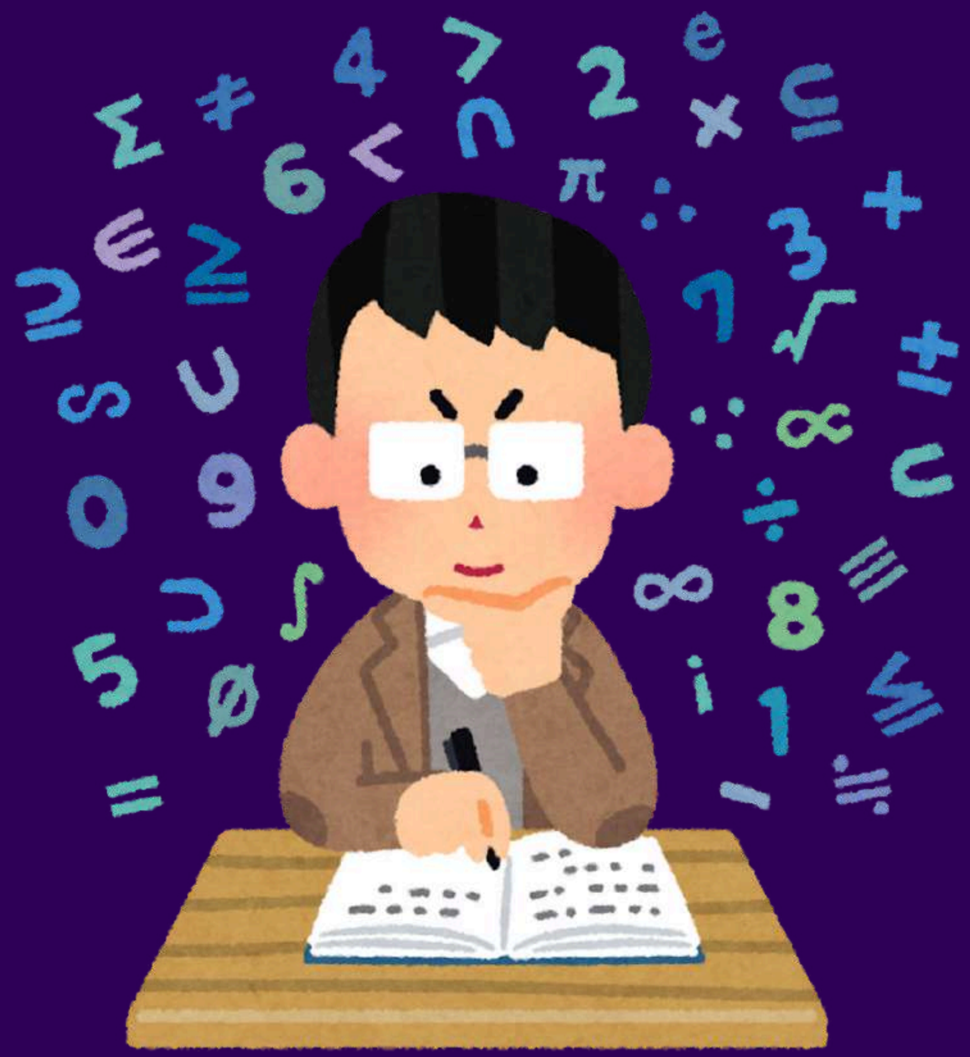
NUMBER SYSTEMS

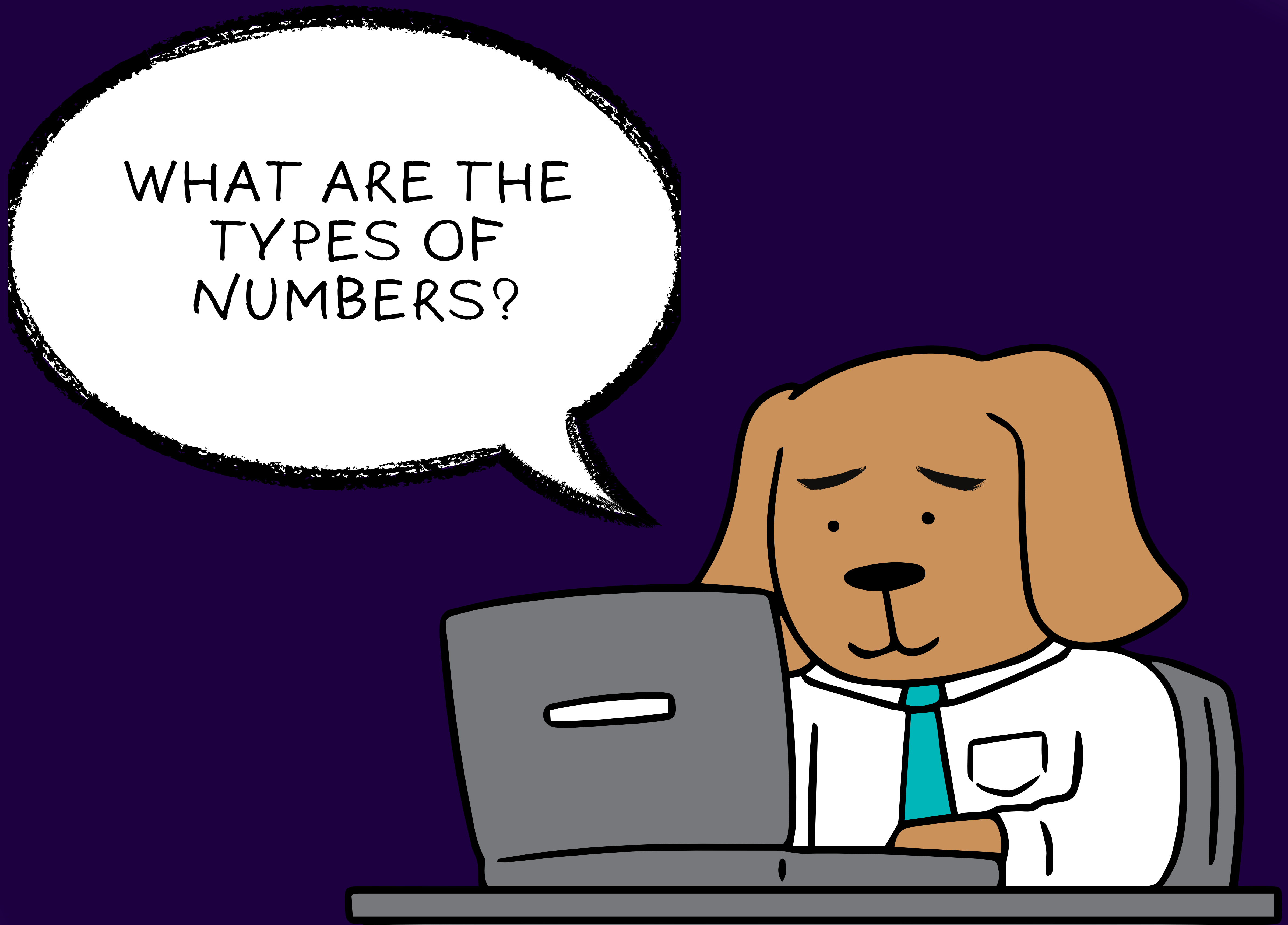
(a system to represent or express numbers)



It is the mathematical notation for representing numbers of a given set by using digits or other symbols in a consistent manner (Admin, 2023). It provides a unique representation of every number and represents the arithmetic and algebraic structure of the figures. It also allows us to operate arithmetic operations like addition, subtraction, multiplication and division.

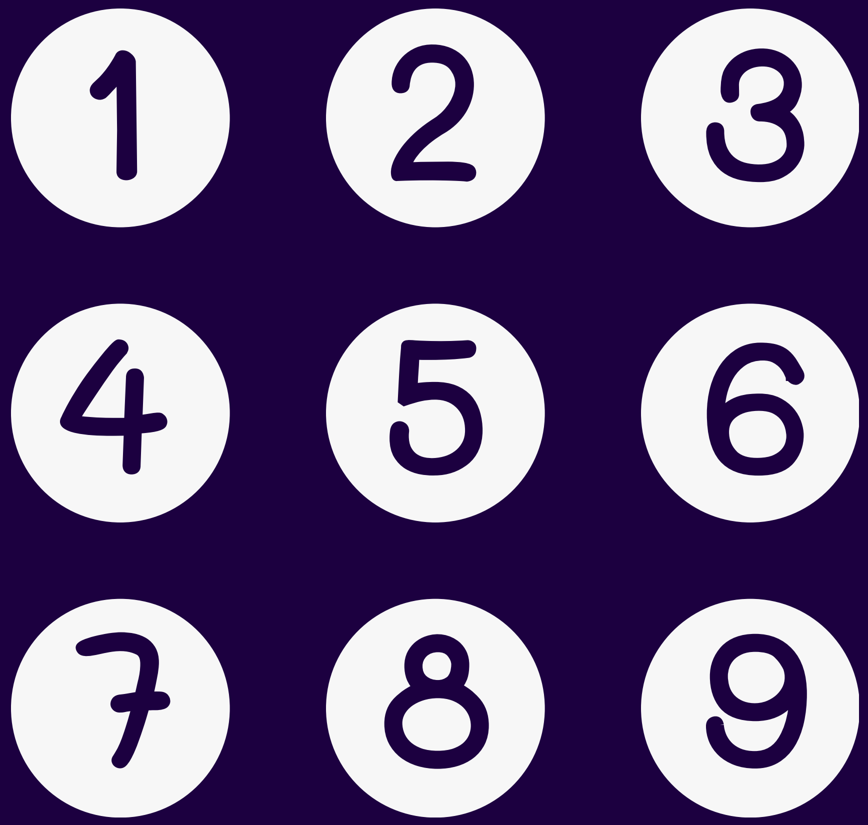
The value of any digit in a number can be determined by:

- The digit
- Its position in the number
- The base of the number system


WHAT ARE THE TYPES OF NUMBERS?

NATURAL NUMBERS

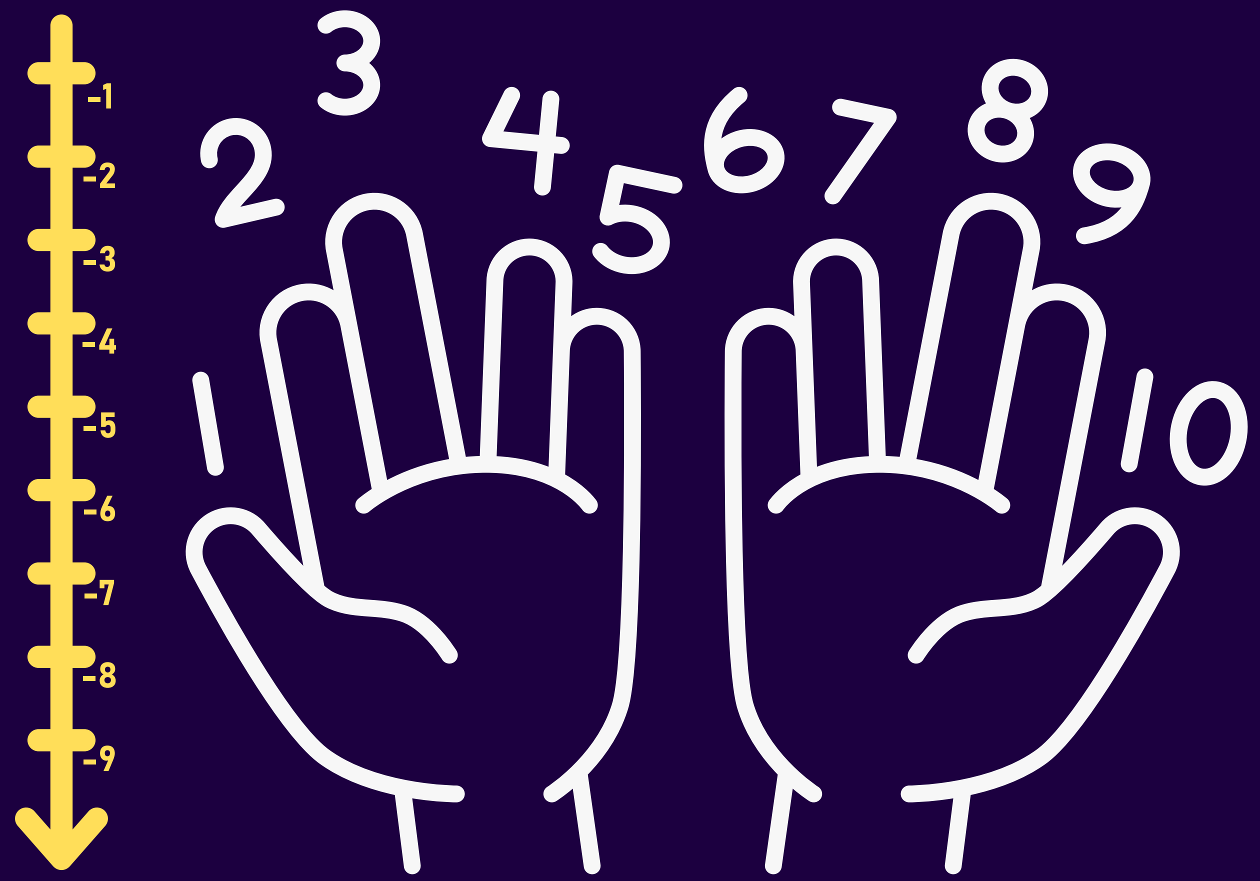
(all the positive integers from 1 until infinity.)



any number in the set of positive integers {1, 2, 3...} and sometimes zero (McDonough, 2024). The term natural likely refers to humanity's innate understanding and use of positive discrete values. Sometimes called "counting numbers," natural numbers predate recorded history, as it is believed that prehistoric humans had some sense of determining differences in quantities. Whether zero is considered a natural number differs across definitions, and there is no general consensus on its inclusion or exclusion from the set.

NEGATIVE NUMBERS

(all the negative integers from -1 until negative infinity.)

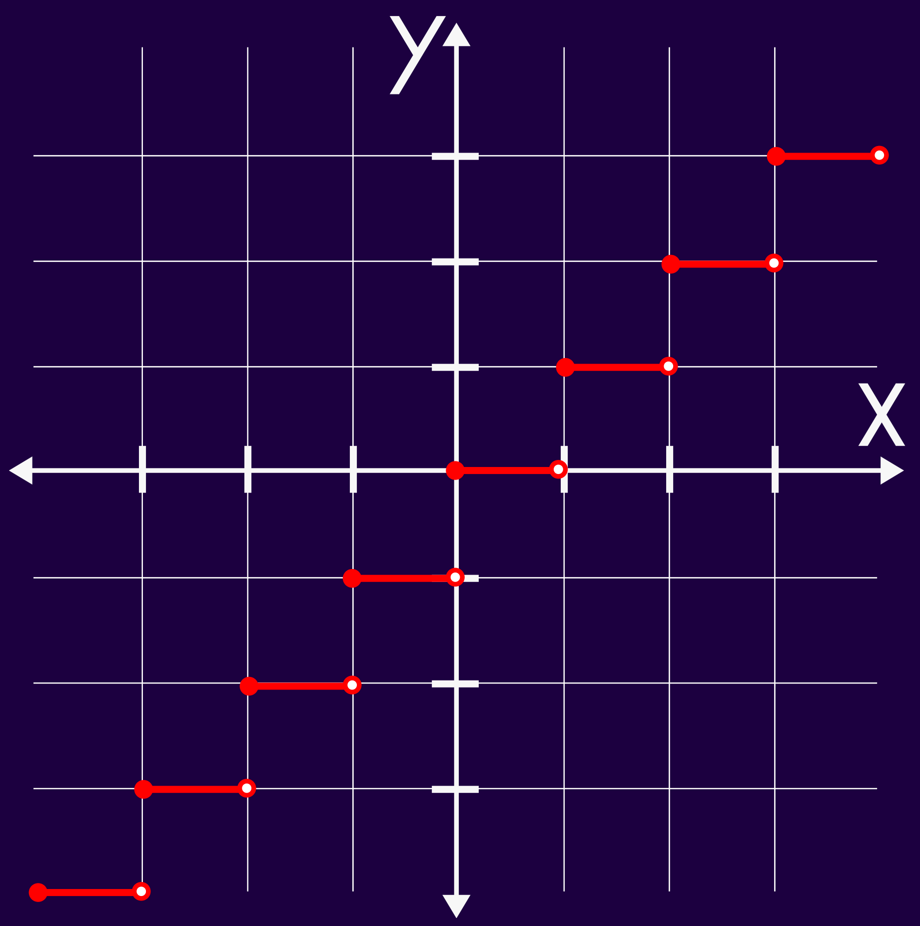


A negative number is a number whose value is always less than zero and it has a minus (-) sign before it. On a number line, negative numbers are represented on the left side of zero. For example, -6 and -15 are negative numbers.

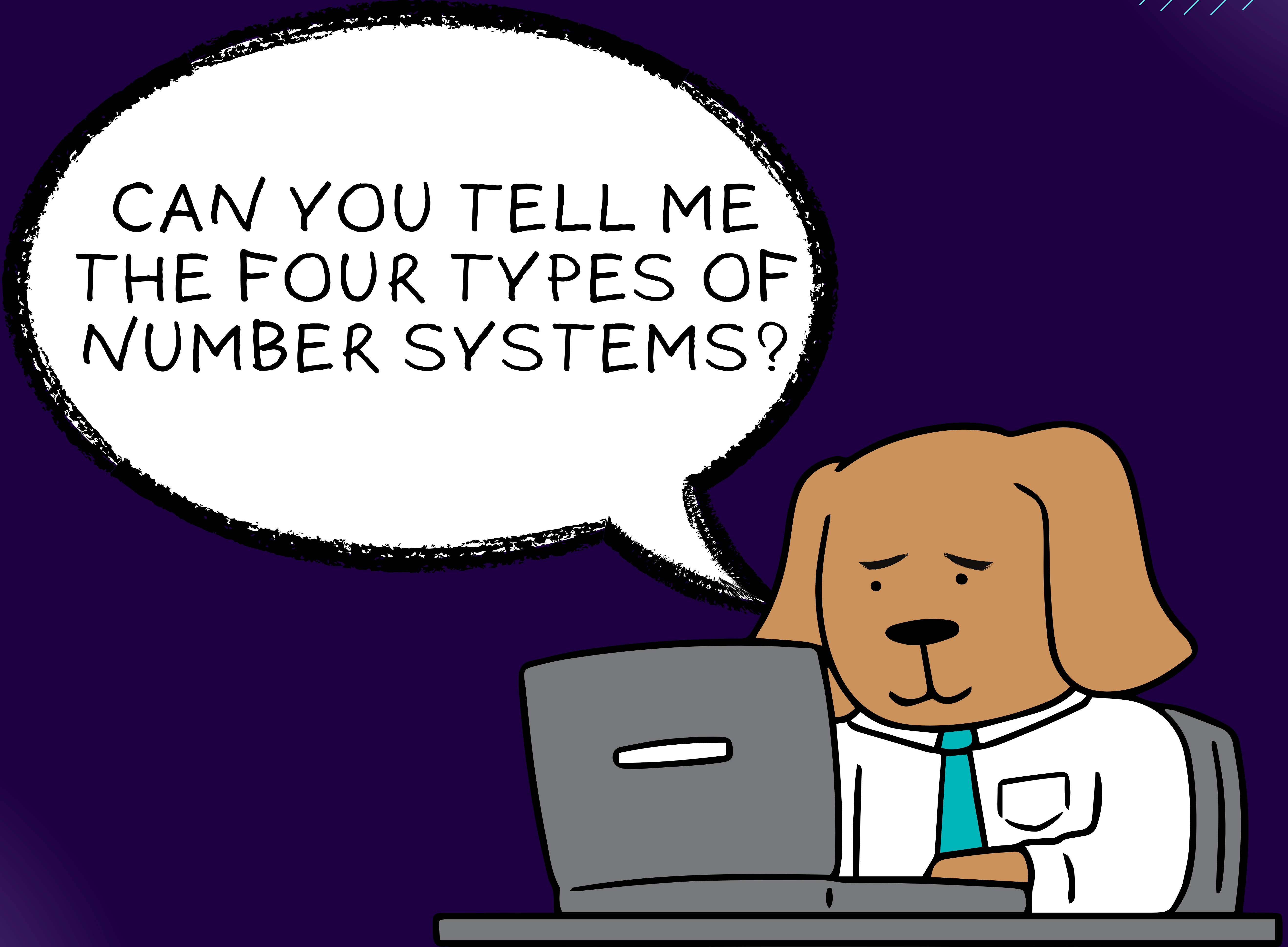
Negative integers, however, are numbers that have a value less than zero. They do not include fractions or decimals. For example, -7, -10 are negative integers ("Negative Numbers," n.d.).

INTEGERS

(any number that is not a fraction or decimal)

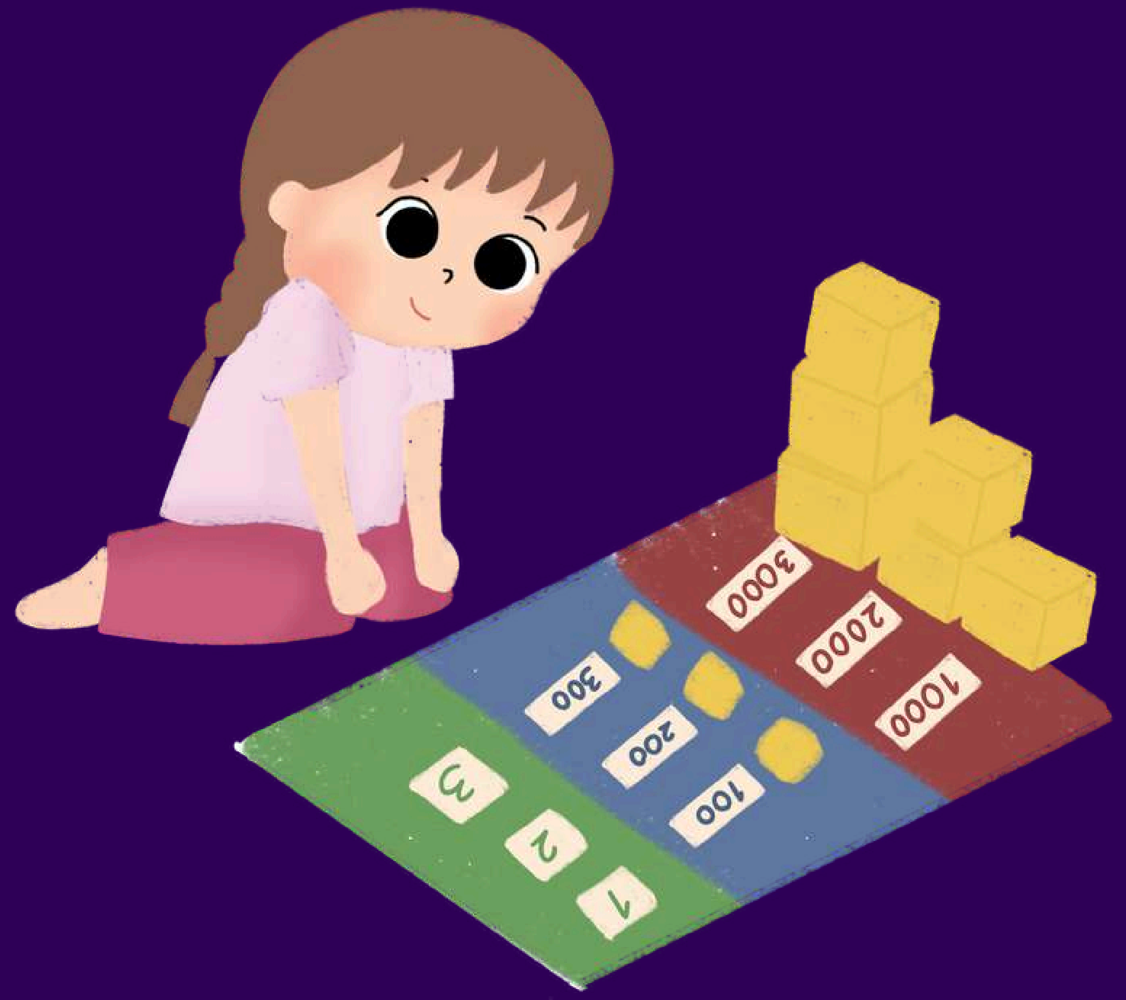


whole-valued positive or negative number or 0 ("What is an integer?" n.d.). The integers are generated from the set of counting numbers 1, 2, 3,... and the operation of subtraction. When a counting number is subtracted from itself, the result is zero; for example, 4 − 4 = 0. When a larger number is subtracted from a smaller number, the result is a negative whole number; for example, 2 − 3 = −1. In this way, every integer can be derived from the counting numbers, resulting in a set of numbers closed under the operation of subtraction


CAN YOU TELL ME THE FOUR TYPES OF NUMBER SYSTEMS?

DECIMAL

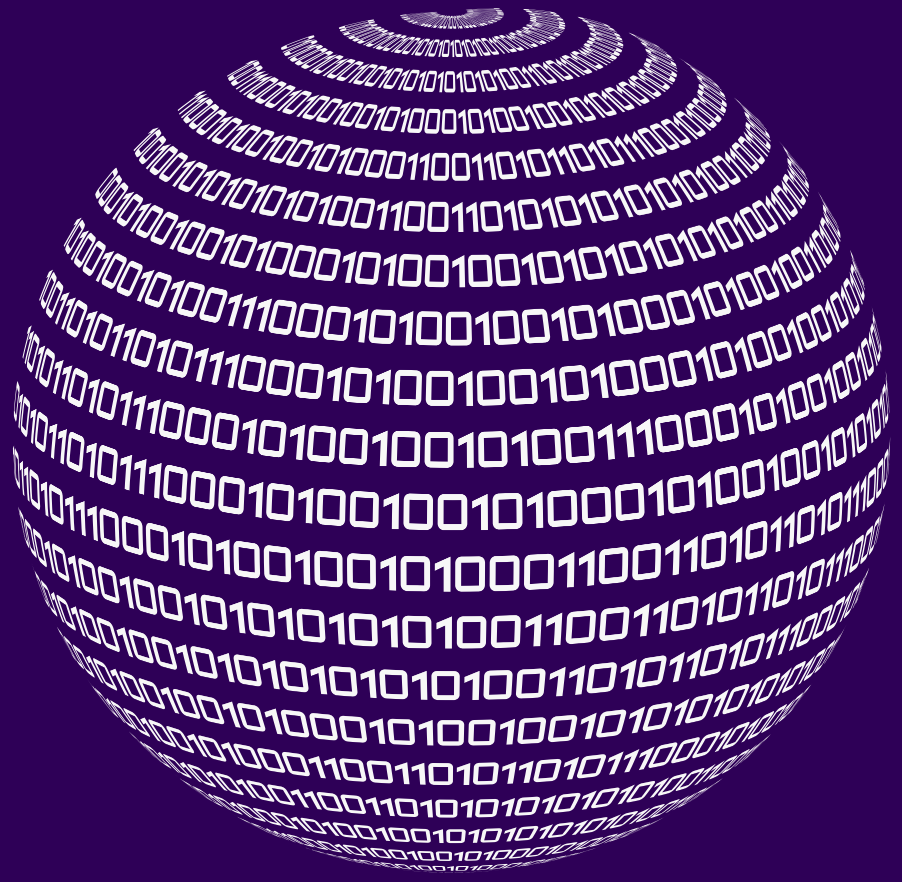
(positional numeral system employing 10 as the base)



Decimal in mathematics, positional numeral system employing 10 as the base and requiring 10 different numerals, the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (The Editors of Encyclopaedia Britannica, 1998b). It also requires a dot (decimal point) to represent decimal fractions. In this scheme, the numerals used in denoting a number take different place values depending upon position. In a base-10 system the number 543.21 represents the sum (5 × 102) + (4 × 101) + (3 × 100) + (2 × 10−1) + (1 × 10−2).

BINARY

(binary: 0,1)



Binary number system, in mathematics, positional numeral system employing 2 as the base and so requiring only two different symbols for its digits, 0 and 1, instead of the usual 10 different symbols needed in the decimal system. The numbers from 0 to 10 are thus in binary 0, 1, 10, 11, 100, 101, 110, 111, 1000, 1001, and 1010 (The Editors of Encyclopaedia Britannica, 1998a).

SIGNIFICANCE

The importance of the binary system to information theory and computer technology derives mainly from the compact and reliable manner in which 0s and 1s can be represented in electromechanical devices with two states—such as "on-off," "open-closed," or "go–no go."

OCTAL

(octal: 0, 1, 2, 3, 4, 5, 6, 7)

8

A number system with base 8 is called an octal number system. The position of every digit has a value which is a power of 8. A number in the octal number system is represented with the number 8 at the base, like 512_8 , 56_8, etc.

SIGNIFICANCE

The octal number system is widely used in computer application sectors and digital numbering systems. The octal number is also used in the aviation sector in the form of a code. (Jafar & Jafar, 2024)

The octal system is similar to the hexadecimal system because they are both easily converted to binary, where octal is equal to three-digit binary and hexadecimal is equal to four-digit binary (Jafar & Jafar, 2024).

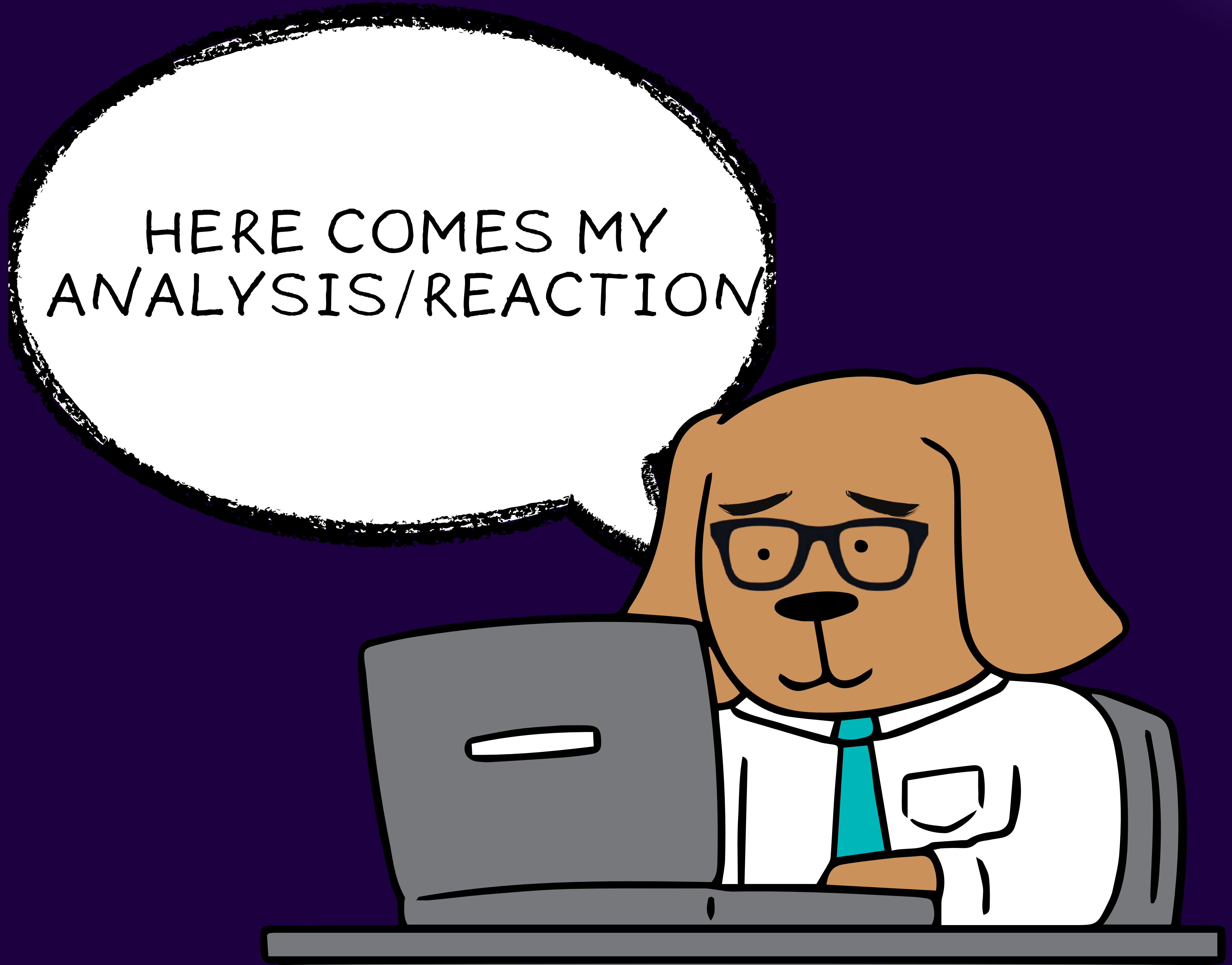
HEXADECIMAL

(hexadecimal: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E and F.)

The base of a hexadecimal system is 16. It used 16 symbols given by 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F to represent all the numbers. To represent the numbers 0-9, we simply use the same digits. To represent 10-15, we use the letters A-F. The place values in the hexadecimal number system are expressed in terms of powers of 16 (Jafar & Jafar, 2023).

SIGNIFICANCE

Hexadecimal to binary conversion involves converting each hexadecimal digit into its corresponding 4-bit binary representation. Hexadecimal system is particularly useful in computer systems, as it allows for easier readability and more concise representation of large binary numbers.


HERE COMES MY ANALYSIS/REACTION

ANALYSIS/REACTION

As I learned more about number systems, I realized how important they are in the field of computing and information technology. Initially, I assumed number systems were just different ways of representing numbers. However, my research indicated that they are crucial for how computers understand and process data. A number system is a systematic method of expressing numbers using a set of symbols or digits, and it is essential in anything from fundamental arithmetic to advanced computer design.

I realized that different number systems serve distinct functions. Binary, for example, employs only two digits (0 and 1) and is important in computing because 0s and 1s may be reliably represented by devices in two states: on/off and open/closed. Decimal, on the other hand, is the most familiar base-10 system. It uses 10 digits (0-9) and a decimal point to express fractions, with place values changing dependent on powers of 10. Hexadecimal, which uses 16 symbols (0-9 and A-F), is commonly used in computing for a more compact representation of binary data, as each hex digit corresponds to a 4-bit binary value. Octal, which is based on 8 digits (0-7), is also popular in industries such as aviation and digital systems due to its ease of conversion to binary.

ANALYSIS/REACTION

Understanding these number systems revealed their practical applications. Binary is the fundamental language of computers, allowing for efficient data processing; hexadecimal simplifies binary representation, making tasks such as memory addressing more readable for programmers. Decimal is essential for human connection in daily work. Meanwhile, octal's strong association with binary and use in specific sectors such as aviation highlight its importance in specialized applications.

Recognizing the significance of number systems has expanded my understanding of how computers operate. Each system improves distinct parts of computing, ranging from binary-driven internal logic to the human-readable convenience of decimal and hexadecimal numbers. This has reaffirmed my belief in the need of understanding these systems, which serve as the language through which computers interact and work.

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