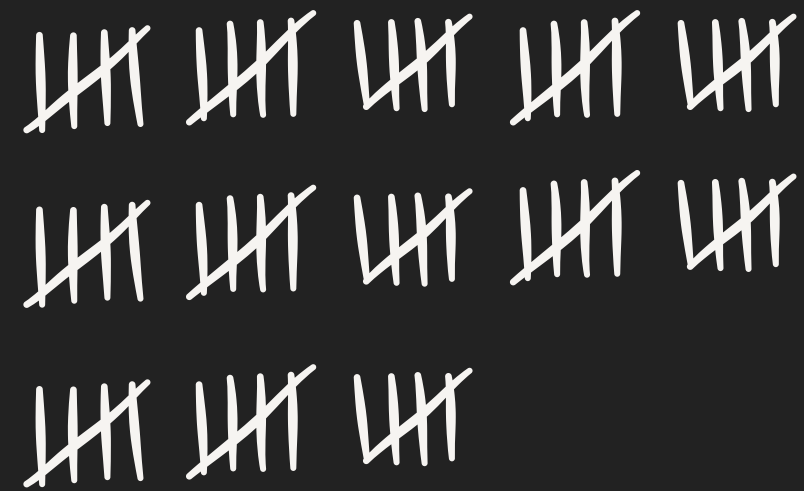


Number Conversion Systems ↘

PORTFOLIO #3

PRESENTED BY:

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What are Number Systems



what

- Number systems are methods of representing numbers.
- Digits and symbols are used to represent numbers in different ways.
- It is a writing system for expressing numbers, using mathematical notations to represent numbers in a set

why

- It made big numbers easier to represent and solve, making calculations easier
- It was invented to keep track of things, in the past and the present.

how

- Number systems are made in context of a set of numbers.
- An example for which is binary which is 1 and 0 representing the set of values of 2 raised to the power of n

Brief History ↘

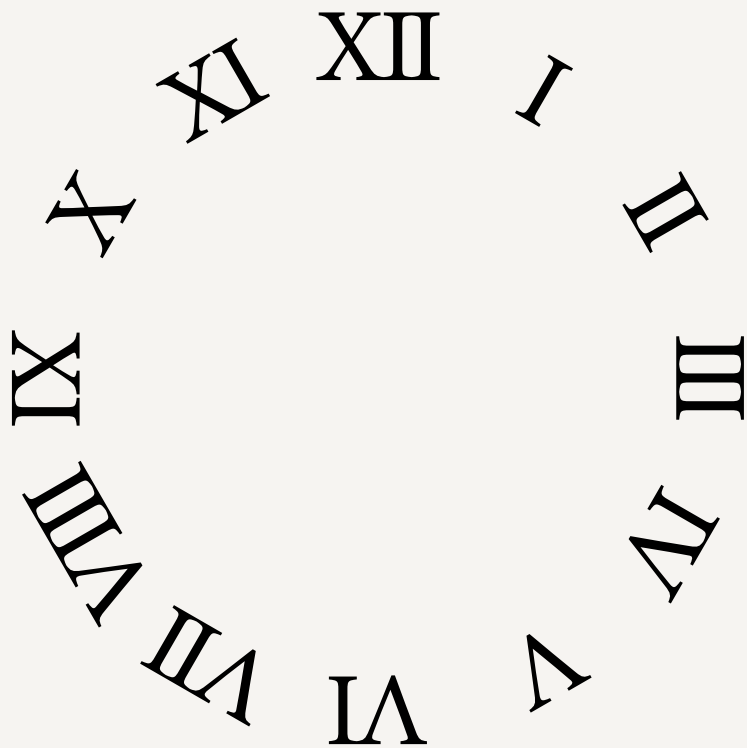
The Ishango Bone from Africa about 25,000 years old.



Tally Marks

- These are the earliest forms of number systems known and made by man

Roman numerals is said to have begun in about the 9th century B.C.



Roman Numerals

- An additive system made by the Romans to quantify number by representing it through symbols.

Egyptian and Babylonians number system of whole numbers

1	10	10^2	10^3	10^4	10^5	10^6	10^7
vertical stroke	heal bone, vault	snare coil of rope	lotus flower	bent finger	burbot fish, Tadpole	kneeling figure with raised arms, Heh-god	Sun

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
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E

- Egyptians made a base 10 and Baylonians base 60 system with whole numbers and positive rational numbers.

what makes a number system

properties of a number system

Commutative Property

The order of numbers in addition and multiplication doesn't affect the result. Not true for subtraction and division.

Associative Property

Grouping of numbers doesn't change the result in addition and multiplication.

Distributive Property

Multiplication can be applied to a sum or difference by distributing the multiplication across each part.

Identity Propert

Adding 0 or multiplying by 1 keeps the original number unchanged.

Types of number systems ↘

10

Decimal

01
10

Binary

0010
1101

Hexadecimal

010
101

Octal

0, 1, 2, 3, 4, 5, 6,
7, 8, 9,

BASE 10 NUMBER SYSTEM

- The position of every digit has a weight which is a power of 10.
- Had the most important role in the development of science and technology

THOUSANDS	HUNDREDS	TENS	ONES		TENTHS	HUNDRETHS	THOUSANDTHS
1	2	3	4	.	1	2	3

$$10^n \times 2 \text{ for example}$$

Positional Number
representation(N) x Number

 **Decimal System**

Octal System ↘

4 2 1
 2^2 2^1 2^0
001

(for octal to decimal)

$8^n \times 2$ for example

Positional Number
representation(N) x Number

BASE 8 NUMBER SYSTEM

- A number system with its base as “eight”
- Mainly used in computer programming.
- Each digit has a weight 8 times greater than the previous one

**0, 1, 2, 3, 4, 5, 6,
7,**

8	4	2	1
2^3	2^2	2^1	2^0
1	1	0	1

(for hexadecimal to decimal)

$16^n \times 2$ for example

Positional Number
representation(N) x Number

0, 1, 2, 3, 4, 5, 6,
7, 8, 9, 10, A, B,
C, D, E, F

BASE 16 NUMBER SYSTEM

- A base 16 numeral system that is used in diverse fields typically in computing and electronics
- Each digit has a weight 16 times greater than the previous one

Hexadecimal System

BASE 2 NUMBER SYSTEM

- A number system with its base as “two”
- The two symbols namely “one” and “two” represent the state of a transistor
- Current passes through the transistor when it reads 1
- Each 1 and 0 in this system is called a bit

0, 1

Binary System


32	16	8	4	2	1
2^5	2^4	2^3	2^2	2^1	2^0
1	0	1	0	0	1

(for octal to decimal)

$2^n \times 1$ for example

Positional Number
representation(N) x Number

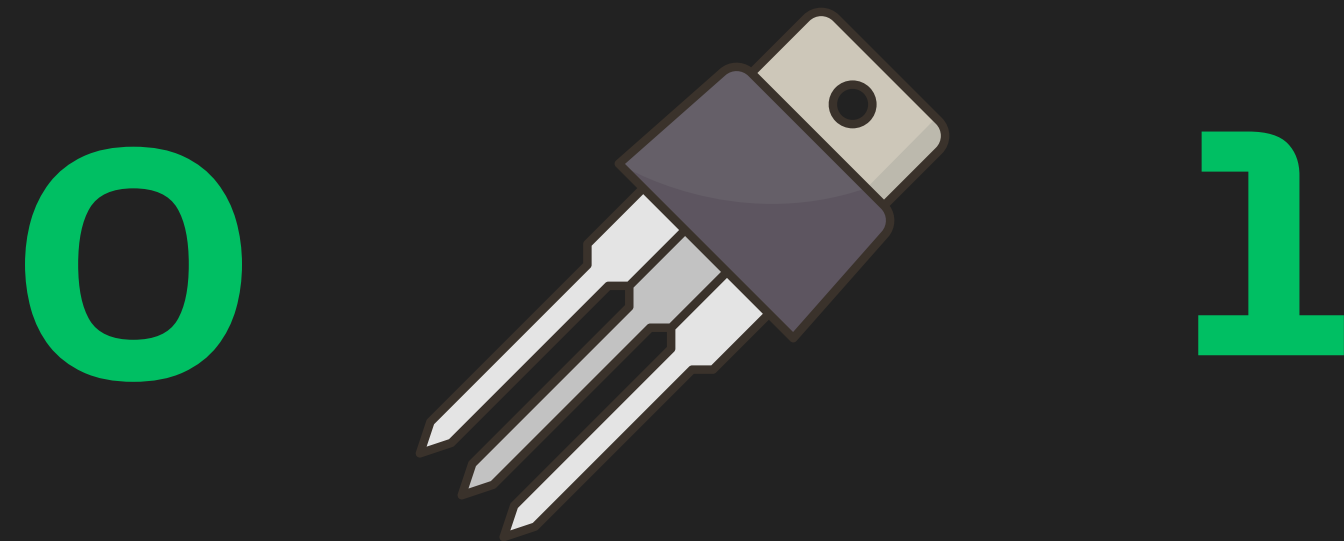
What is the significance of these number systems



One common use for these number systems

- for Computing, mainly in computers

To understand this we need to understand how transistors work



- The state “1” means on, letting the current pass through. That is what our computers read.
- Consequently the number 0 means off.
- Billions of transistors are present in our computers

What is the significance of these number systems ↘

Decimal

- Used in almost everything we do daily from buying groceries, looking at the time, everything is measured with this number system

Hexadecimal

- Used for Web Security
- Can represent numbers in the least amount of characters
- Easily processed by computers, making companies use this number system

Octal

- Used in aviation, in the form of codes
- Uses lesser number of digits compared to decimal making it easier to compute

Binary

- This is the language computers use.
- Enables device to store access and control information directed to the CPU

Reflection:

Humans have come a long way in our ways of measuring or quantifying things. It is definitely fascinating to think that from tally marks we have made systems to count even the physically unquantifiable things. We surpassed even our limitations by designing these devices like computers to further extend the bounds of what can be counted and processed.

Thinking about it as far as the caveman times it feels that the discovery of these ways to quantify things was inevitable as I could not imagine ever thinking about it if I were a caveman. Forward to notable civilizations like Romans and Egyptians where they sought greater ways to represent numbers and make forth the beautiful buildings that persevered throughout history

When the Hindu Arabic numeral system was established which led to our current numeral system the decimal system, society just boomed, following the discoveries of the Pythagorean theorem, Fibonacci Sequence, and the Golden ratio. The numeral system led us not only to modern civilization but also to information about how the world and everything around us is designed. That is it is not random patterns that make up our world.

These number systems have become a fundamental element for the progression of humanity, making possible the invention of many amazing things ranging from different fields of engineering, architecture, and even design. Some may have been sources for destruction like nukes, and the like but most of the invention has paved us a way to where we are right now.

Hexadecimal, octal, binary, and decimal are the most known number systems right now, however with the rate at which computers are progressing far larger systems will probably be developed, and come with it are new marvels of technology which will shape our future

Reflecting on it now, it can be a double-edged sword these numbers, but not by itself. It becomes dangerous and prosperous depending on which hands effectively maneuver it. In conclusion, without these number systems things would look very different to what it is now

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