

What is a number system?

How do we define it?

1

Examples

- One digit
- Tally

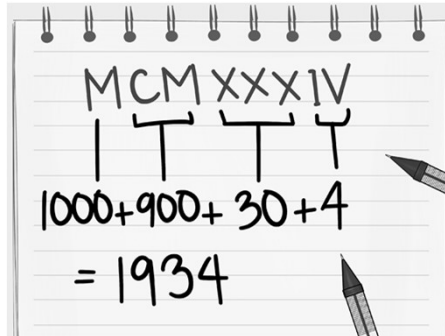
1		6	
2		7	
3		8	
4		9	
5		10	

2

Examples

- 7 Digits
- Roman Numerals

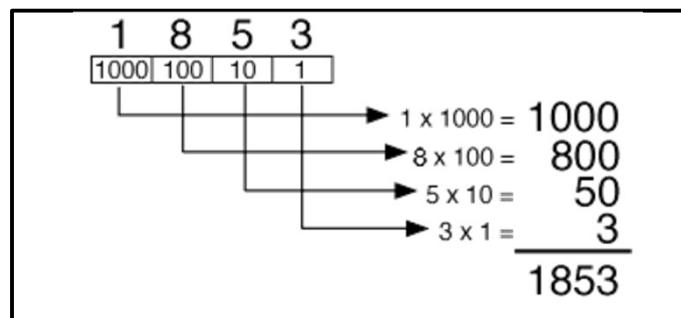
Symbol	Value
I	1
V	5
X	10
L	50
C	100
D	500
M	1000



3

Examples

- Base 10 – Decimal
- 10 digits { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 }



4

And a NEW ONE!

- Binary
- Important, since circuits can only differentiate between ON and OFF [one (1) and zero (0)]
- Based on only 2 digits { 0, 1 }

5

How does it work?

In decimal, the columns go like this

10^4	10^3	10^2	10^1	10^0
10000	1000	100	10	1

Notice: Base 10 - columns are powers of 10

6

So in Binary....

The columns are base 2 !

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


7

Convert from Binary

● What is the number 110_2 in decimal?

The subscript 2 indicates the base!

32	16	8	4	2	1
			1	1	0


 4 2
 $4 + 2 = 6$

8

Convert from Binary

● What is the number 10101_2 in decimal?

32	16	8	4	2	1
	1	0	1	0	1

$16 + 4 + 1 = 21$

9

Binary

● Examples

Binary	Decimal
0	0
1	1
10	2
11	3

10

Exercises:

1. Convert each of the binary values below to decimal.

a) 11010 b) 10001 c) 11111 d) 100010

2. Convert each of the binary values below to decimal. Can you find a pattern?

a) 101010 b) 1010100 c) 10101000 d) 101010000

3. In defining a colour in html, the component colours are given as a value from 0 to 255 for each of Red/Green/Blue. How many bytes of data does this take per pixel?