

# What is a number system?

How do we define it?

## Examples

- One digit
- Tally

1		6	
2		7	
3		8	
4		9	
5		10	

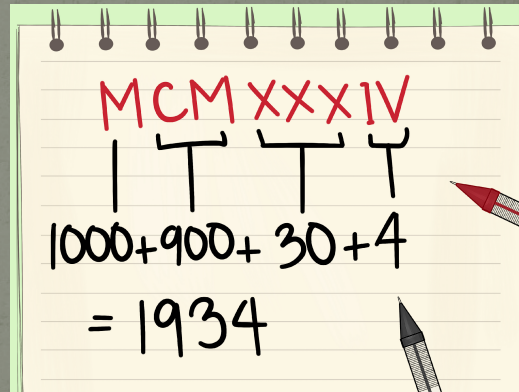
# Examples

● 7 Digits

● Roman

Number

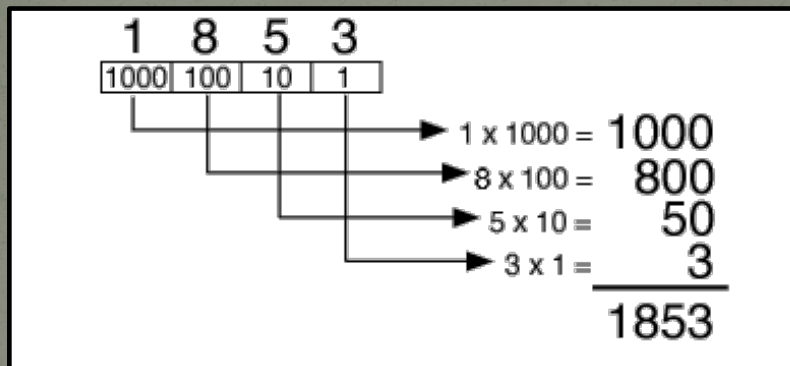
Symbol	Value
I	1
V	5
X	10
L	50
C	100
D	500
M	1000



# Examples

● Base 10 – Decimal

● 10 digits { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 }



## 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 }

## 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

## So in Binary....

The columns are base 2 !

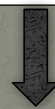
$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
16	8	4	2	1

## Convert from Binary

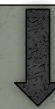
● What is the number  $110_2$  in decimal?

The subscript 2 indicates the base!

32	16	8	4	2	1
			1	1	0



4



2

$$4+2 = 6$$

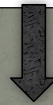
# Convert from Binary

● What is the number  $10101_2$  in decimal?

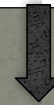
32	16	8	4	2	1
	1	0	1	0	1



16



4



1

$$16+4+1 = 21$$

# Binary

● Examples

Binary	Decimal
0	0
1	1
10	2
11	3

## 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?