

# Number System

Decimal: 124121

Digits 0-9

0 1 2 3...

10 20

-Each place is increase by a power of 10 (1,10,100,1000...)

$$12 = 1 * 10^1 + 2 * 10^0$$

$$321 = 3 * 10^2 + 2 * 10^1 + 1 * 10^0$$

Binary: 0b01011

Digits 0/1

Decimal = Binary

$$0 = 0$$

$$1 = 1$$

$$2 = 10$$

$$3 = 11$$

$$4 = 100$$

-Each place is increased by a power of 2 ( 1,2,4,8,16...)

$$100 = 1 * 2^2 + 0 * 2^1 + 0 * 2^0$$

Adding

10

+01

=11

11

+10

=101

Multiplication

11

\*10

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0

+110

= 110

Hexadecimal: 0x1F3

Digits 0-F (A = 10, B = 11, C = 12, D = 13, E = 14, F = 15)

Decimal = Hex

0 = 0x0

9 = 0x9

10 = 0xA

15 = 0xF

21 = 0x15 = 1 \* 16<sup>1</sup> + 5 \* 16<sup>0</sup>

Conversion Between Binary and Hexadecimal

-4 digits of binary numbers can be represented by 1 digit in hexadecimal

0b1111 = 15

0b 0001 0101 = 0x15

0x26 = 0b 0010 0110