

00100011

35

196

'#'

'D'

Binary - Base 2

Place value

2721

$\frac{2}{10^3}$ $\frac{7}{10^2}$ $\frac{2}{10^1}$ $\frac{1}{10^0}$
1000 100 10 1

0 0 1 0 0 0 1 1
 $\frac{0}{2^7}$ $\frac{0}{2^6}$ $\frac{1}{2^5}$ $\frac{0}{2^4}$ $\frac{0}{2^3}$ $\frac{0}{2^2}$ $\frac{1}{2^1}$ $\frac{1}{2^0}$
128 64 32 16 8 4 2 1

$$32 + 2 + 1 = 35$$

0000 $\frac{1001}{8+1=9}$

00010101
 $16+4+1=21$

01101101
 $64+32+16+4+1=109$

$$6-4=2-2=0$$

$$18-16=2-2=0$$

... 32 16 8 4 2 1

00010101
... 32 16 8 4 2 1

$$51-32=19-16=3-2=1-1=0$$

$\frac{0}{128}$ $\frac{0}{64}$ $\frac{1}{32}$ $\frac{1}{16}$ $\frac{0}{8}$ $\frac{0}{4}$ $\frac{1}{2}$ $\frac{1}{1}$

18 ÷ 2 = 9 R 0
9 ÷ 2 = 4 R 1
4 ÷ 2 = 2 R 0
2 ÷ 2 = 1 R 0
1 ÷ 2 = 0 R 1

low

R 1

R 0

R 0

R 1

high

00010010

$$\begin{array}{rcl}
 51 \div 2 & = & 25 \quad R1 \quad R:14 \\
 25 \div 2 & = & 12 \quad R1 \\
 12 \div 2 & = & 6 \quad R0 \\
 6 \div 2 & = & 3 \quad R0 \\
 3 \div 2 & = & 1 \quad R1 \\
 1 \div 2 & = & 0 \quad R1
 \end{array}$$

Left

00110011
 $\uparrow \qquad \qquad \uparrow$
 High Low
 ORDER ORDER
 BIT BIT

$$11111111_2 = 255_{10}$$

Hexadecimal

Base 16

0	1	2	3	...	9	A	B	C	D	E	F
						10	11	12	13	14	15

$\frac{0}{16^3}$	$\frac{1}{16^2}$	$\frac{B}{16^1}$	$\frac{E}{16^0}$
4096	256	16	1

$$\begin{array}{rcl}
 14 \times 1 & = & 14 \\
 11 \times 16 & = & 176 \\
 1 \times 256 & = & 256 \\
 \hline
 & & 446
 \end{array}$$

0000 - 0
 0001 - 1
 0010 - 2
 0011 - 3
 0100 - 4
 0101 - 5
 0110 - 6
 0111 - 7

1000 - 8
 1001 - 9
 1010 - A
 1011 - B
 1100 - C
 1101 - D
 1110 - E
 1111 - F

000 | 0010 = 18

1 2

0011 | 0011 33

↓ ↓
9B7A₁₆

1001 1011 0111 1010₂
↑ ↑

Base 8
Octal

ASCII / Unicode

EBCDIC