- Decimal (base 10): $456_{10} = 4 \times 10^2 + 5 \times 10^1 + 6 \times 10^0$
  $\{0, 1, \ldots 9\}$
- Binary (base 2): $0110_2 = 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 6_{10}$
  $\{0, 1\}$
- Octal (base 8): $125_8 = 1 \times 8^2 + 2 \times 8^1 + 5 \times 8^0 = 85_{10}$
  $\{0, 1, \ldots 7\}$
- Hex (base 16): $10A_{16}$ $1 \times 16^2 + 0 \times 16^1 + 10 \times 16^0$

  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
                      A B C D E F $= 256 + 10 = 266$

- **Decimal → Binary**

  - $27_{10} =$ $27/2 = 1$
    $13/2 = 1$
    $6/2 = 0$ $11011 = 0001\ 1011$
    $3/2 = 1$ B_{16}
    $1/2 = 1$

  $27/8 = 3$
  $3/8 = 3$
  33_8

  $\boxed{27_{10} = 0001\ 1011_2 = 1B_{16} = 33_8}$

  0 0 1 0   1 0 1 0$_2 =$ $1 \times 2^1 + 1 \times 2^3 + 1 \times 2^5 = 42_{10}$

  $= \begin{array}{l} 101 = 5_8 \\ 010 = 2_8 \end{array} \Big\} 52_8$

  $= 2A_{16}$

  Range $= 0 \to 2^8 - 1 = 255$

  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

$\underset{3}{1111}\ \underset{7}{111}\ \underset{4}{1100}$

$= 374_8$

FC_{16}

$\begin{array}{r} 0000\ 0011 \\ 1 \\ + \\ \hline 0000\ 0100 \end{array} = 4_{10}$

$-1 \times 2^{N-1} = -128$
$1 \times 2^{N-1} - 1 = 127$

A = 1110 1000

Find -A:

$$+ \quad \frac{0001 \ 0111}{1}$$
$$\frac{}{0001 \ 1000} = 1 \times 2^4 + 1 \times 2^3 = 24_{10}$$

A = 1010 b
B = 0011 b } A + B =

$$+ \quad \frac{\boxed{0}010 \atop 1010}{0011}$$
$$\frac{}{1101}$$

C = 0
V = 0 $(C_4 \oplus C_3)$
N = 1
Z = 0

• Decimal Fraction to Binary

0.47 → binary

0.47 × 2 = 0.94   0
0.94 × 2 = 1.88   1
0.88 × 2 = 1.76   1

0.76

0.47 × 2

3.703125_{10} → Binary

3/2 = 1
1/2 = 1

11.

0.703125 × 2 = 1.40625 = 1
0.40625 × 2 = 0.8125 = 0
0.8125 × 2 = 1.6241 = 1
0.6241   = 1.2482 = 1
0.2482   = 0.4964 = 0
0.4928 × 2   = 1.4856 = 1
.9856 × 2   = 1.9712 = 1
             = 1