Binary (0-1)

25_{10} $\quad b_4 \cdot 2^4 + b_3 \cdot 2^3 + b_2 \cdot 2^2 + b_1 \cdot 2^1 + b_0 \cdot 2^0$

$2 \cdot 10^1 + 5 \cdot 10^0$

$b_4 2^3 + b_3 2^2 + b_2 2^1 + b_1 2^0 + b_0 2^{-1}$

$25/2 = 12.5$ $\quad$ 1

$12/2 = 6.0$ $\quad$ 1

$6/2 = 3.0$ $\quad$ 0

$3/2 = 1.5$ $\quad$ 0

$1/2 = 0.5$ $\quad$ 1

16 8 4 2 1

11001_2

$16 + 8 + 1 = 25_{10}$

53_{10}

32

21

16

5

64 32 16 8 4 2 1

$0\ 1\ 1\ 0\ 1\ 0\ 1_2$

Hexadecimal

$$h_2 \cdot 16^2 + h_1 \cdot 16^1 + h_0 16^0$$

$$b_{11} 2^{11} \cdots + b_8 2^8 + b_7 2^7 \cdots + b_4 2^4 + b_3 2^3 \cdots + b_0 \cdot 2^0$$

$$(b_{11} \quad b_8) 2^8 + (b_7 \quad b_4) 2^4 + (b_3 \quad b_0) 2^0$$

16^2 16^1 16^0

0 1 ... 9 A B ... F | 0-9 A-F

0000 0001 ... 1001 1010 1011 ... 1111

C prog

B0000 0011 0101 1100

= 0x035C;

---

carry ←

$$\begin{array}{r} {}^{1}{}^{0} \\ 285 \\ +\ 133 \\ \hline 418 \end{array}$$

```
 0000  0100      4
 1111  1011
+0000  0001
-----------
 1111  1100     -4
```

```
 0000  1100     12
 1111  1100     -4
-----------
1 0000 1000      8
```

2's Comp. Operation → 2's Comp Represent

```
int x;  // Sixteen bit signed
        32767 ↔ -32768

unsigned int y; // 16 bit
        0 → 65535

unsigned long Tmr; // 32-bit
        0 - 4.2... billon
```