



Number System

There are four number systems used in Computer.

- > Decimal Number System $(0-9)_{10}$
- > Binary Number System $(0-1)_2$
- > Octal Number System $(0-7)_8$
- > Hexadecimal Number System $(0-F)_{16}$

↓

1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
									1	1	1	1	1	1
									10	11	12	13	14	15

* Number System Conversion

- > Decimal to Binary
- > Decimal to Octal
- > Decimal to Hexadecimal

- > Binary to Decimal
- > Octal to Decimal
- > Hexadecimal to Decimal

- > Octal to Binary
- > Binary to Octal

> Hexadecimal to Binary
> Binary to Hexadecimal

> Octal to Hexadecimal
> Hexadecimal to Octal

* Decimal to Binary

$$(97)_{10} = (1100001)_2$$

2	97	
2	48	1
2	24	0
2	12	0
2	6	0
2	3	0
	1	1

$$(1100001)_2$$

$$(25)_{10} = (11001)_2$$

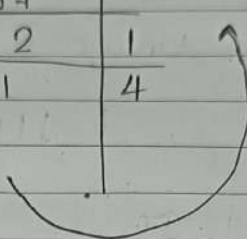
2	25	
2	12	1
2	6	0
2	3	0
	1	1

$$(11001)_2$$

★ Decimal to Octal

$$(97)_{10} = (141)_8$$

8	97	
8	12	1
	1	4

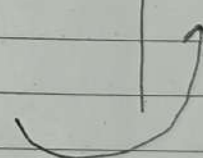


$$(141)_8$$

★ Decimal to Hexadecimal

$$(97)_{10} = (61)_{16}$$

16	97	
	81	6
		1



$$(61)_{16}$$

* Binary to Decimal

$$(1100001)_2 = (97)_{10}$$

$$\begin{array}{rcccccccc}
 & & & +2^5 & +2^4 & +2^3 & +2^2 & +2^1 & +2^0 \\
 & & & +64 & +32 & +16 & +8 & +4 & +2 & +1 \\
 & & & \times & \times & \times & \times & \times & \times & \times \\
 & & & 1 & 1 & 0 & 0 & 0 & 0 & 1
 \end{array}$$

$$64 + 32 + 0 + 0 + 0 + 0 + 1$$

$$= 97 \text{ Ans}$$

* Octal to Decimal

$$(141)_8 = (97)_{10}$$

$$\begin{array}{rccccccc}
 & & & +8^5 & +8^4 & +8^3 & +8^2 & +8^1 & +8^0 \\
 & & & +512 & +64 & +8 & +1
 \end{array}$$

$$\begin{array}{ccc}
 \times & \times & \times \\
 1 & 4 & 1
 \end{array}$$

$$\begin{array}{ccc}
 \downarrow & \downarrow & \downarrow
 \end{array}$$

$$64 + 32 + 1$$

$$= 97$$

Ans

★ Hexadecimal to decimal

$$(61)_{16} = (97)_{10}$$

$$= \dots + 16^3 + 16^2 + 16^1 + 16^0$$

$$256 + 16 + 1$$

$$\times \quad \times$$

$$6 \quad 1$$

$$\downarrow \quad \downarrow$$

$$96 + 1$$

$$= 97$$

Ans

★ Binary to Octal

$$(1100001)_2 = (141)_8$$

$$2^2 + 2^1 + 2^0$$

$$4 + 2 + 1$$

$$00110001$$

$$\overline{421} \quad \overline{421} \quad \overline{421}$$

$$0 \times 4 + 0 \times 2 + 1 \times 1$$

$$1$$

$$1 \times 4 + 0 \times 2 + 0 \times 1$$

$$4$$

$$0 \times 4 + 0 \times 2 + 1 \times 1$$

$$1$$

$$= 141$$

* Octal to Binary

$$(141)_8 = (1100001)_2$$

Octal \rightarrow (0-7)

$$0 \rightarrow 000$$

$$1 \rightarrow 001$$

$$2 \rightarrow 010$$

$$3 \rightarrow 011$$

$$4 \rightarrow 100$$

$$5 \rightarrow 101$$

$$6 \rightarrow 110$$

$$7 \rightarrow 111$$

$$\begin{array}{ccc} 1 & 4 & 1 \\ \hline 001 & 100 & 001 \end{array}$$

$$(1100001)_2 \text{ Ans}$$

* Hexadecimal to Binary

$$(61)_{16} = (1100001)_2$$

8 4 2 1

6 1

0110 0001(1100001)₂

	0	→	0000
1	1	→	0000
2	2	→	0010
3	3	→	0011
4	4	→	0100
5	5	→	0101
6	6	→	0110
7	7	→	0111
8	8	→	1000
9	9	→	1001
10	A	→	1010
11	B	→	1011
12	C	→	1100
13	D	→	1101
14	E	→	1110
	F	→	1111

$$(61)_{16} \quad \text{---} \quad (1100001)_2$$

$$6 \rightarrow 0110$$

$$1 \rightarrow 0001$$

$$01100001$$

$$(1100001)_2$$

★ Binary to Hexadecimal

$$(1100001)_2 \quad \text{---} \quad (61)_{16}$$

$$\begin{array}{r} 01100001 \\ \hline 8421 \quad 8421 \end{array}$$

$$0 \times 8 + 1 \times 4 + 1 \times 2 + 0 \times 1$$

$$0 + 4 + 2 + 0$$

$$6$$

$$0 \times 8 + 0 \times 4 + 0 \times 2 + 1 \times 1$$

$$0 + 0 + 0 + 1$$

$$1$$

$$= 61$$

* Octal to Hexadecimal

$(141)_8 \rightarrow (61)_{16}$

0	- 000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

1 4 1
1 \rightarrow 001
4 \rightarrow 100
1 \rightarrow 001

001100001

$(1100001)_2$

01100001

8421 8421

$$0 \times 8 + 1 \times 4 + 1 \times 2 + 0 \times 1$$

$$0 + 4 + 2 + 0$$

6

$$0 \times 8 + 0 \times 4 + 0 \times 2 + 1 \times 1$$

$$0 + 0 + 0 + 1$$

1

$= (61)_{16} \text{ Ans}$

✱

Hexadecimal to Octal

$$(61)_{16} \longrightarrow (141)_8$$

6 1

$$6 \rightarrow 0110$$

$$1 \rightarrow 0001$$

$$(1100001)_2$$

$$\begin{array}{r} 001100001 \\ \hline 421 \quad 421 \quad 421 \end{array}$$

$$0 \times 4 + 0 \times 2 + 1 \times 1 \quad 0 \times 4 + 0 \times 2 + 0 \times 1 \quad 0 \times 4 + 0 \times 2 + 1 \times 1$$

$$0 + 0 + 1$$

$$4 + 0 + 0$$

$$0 + 0 + 1$$

$$(141)_8$$