Binary Number System (0 & 1)

- No. system that computers use (transistor) — on = 1, off = 1
- data & instructions represented using binary.

Deca system (Decimal):

10^4	10^3	10^2	10^1	10^0	
10 000	1000	100	10	1	
0	0	0	0	9	: 9_{10}

Binary System:

2^4	2^3	2^2	2^1	2^0	
16	8	4	2	1	← 8 + 1
0	1	0	0	1	: $9_{10} \equiv 1001_2$
1	0	1	0	1	: $21_{10} \equiv 10101_2$

Hexa system: 0 - 9, A (10), B (11), C (12), D (13), E (14), F (15)

16^4	16^3	16^2	16^1	16^0	
65536	4096	256	16	1	
	A	0	5	F	: $(10 \cdot 4096) + (5 \cdot 16) + (15 \cdot 1) = 41055_{10} \equiv A05F_{16}$

Given $60530_{10} = EC72_{16}$

Binary to Decimal:

$1011010_2 = 2^6 + 2^4 + 2^3 + 2^1 = 90_{10}$

Decimal to Binary: Draw table.

$296_{10} =$

512	256	128	64	32	16	8	4	2	1
	1	0	0	1	0	1	0	0	0_2

Practice

1) $45_{10} = 101101_2$

32	16	8	4	2	1
1	0	1	1	0	1

2) $1011_2 = 2^3 + 2^1 + 2^0$

$= 11_{10}$