:- Binary Number System :-

Decimal Number to Binary :-

2	42	0
2	21	1
2	10	0
2	5	1
2	2	0
2	1	1
	0	

$(42)_{10} = (101010)_2$

2	50	0
2	25	1
2	12	0
2	6	0
2	3	1
2	1	1
	0	

$(50)_{10} = (110010)_2$

Short trick :-

N 32 16 8 4 2 1

Now for 48 (Less than 64)

↳ .... ~~64~~ 32 16 8 4 2 1

1 1 0 0 0 0

$(48)_{10} = (110000)_2$

Just add the number to get 48 & which you add put "1" else "0"

42

↳ ~~64~~ 32 16 8 4 2 1

1 0 1 0 1 0

$(42)_{10} = (101010)_2$

Binary to Decimal :-

1 0 1 0 1 0

$2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 32 + 0 + 8 + 0 + 2 + 0$

↳ 42

Short Trick

N 128 64 32 16 8 4 2 1

For 1 0 1 0 1 0

32 16 8 4 2 1

↳ 32 + 8 + 2 = 42

Just add which has "1" & ignore "0"

Some Common Binary Numbers

0 → 00
1 → 01
2 → 10
3 → 11
4 → 100
5 → 101
6 → 110
7 → 111
8 → 1000
9 → 1001
10 → 1010

Binary Number addition

0 + 0 = 0
0 + 1 = 1
1 + 0 = 1
1 + 1 = 10

Two's Compliment

Given number = -(10)

① 1010
② 01010 → Most significant Bit ↳ 0 +ve, 1 -ve
③ 10101
+1
10110

Steps ↓
① Convert to binary
② Prefix with 0
③ 1's Compliment (flip) 1 → 0 & 0 → 1
④ add +1

So $(-10)_{10} = (10110)_2$ ← Binary to Decimal

Now decimal to binary of -ve $(10110)_2$

Steps ↓
① 2's Compliment ↳ 1's + 1

10110
01001
+1
01010 → $(1010)_{2's} = (10)_{10}$