Decimal Number System:

Base 10 → A single digit can take 10 values - 0 to 9.

Position of each digit in a decimal number represents a different power of 10.

Eg: $342 = 3 \times 100 + 4 \times 10 + 2 \times 1 = 3 \times 10^{2} + 4 \times 10^{6} + 2 \times 10^{6}$ 2563 = 2×1000 +5×100+6×10 +3×1 $= 2 \times 10^3 + 5 \times 10^2 + 6 \times 10^4 + 3 \times 10^4$

Binary Number System:

- Used in digital electronics and computing.
 Two digits 0 & 1.

$$110 \rightarrow 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = \underline{6}$$

$$\frac{1011}{c2} \rightarrow 1 \times 2^{3} + 0 \times 2^{2} + 1 \times 2^{1} + 1 \times 2^{\circ} : 11$$

Binary - Decimal Conversion:

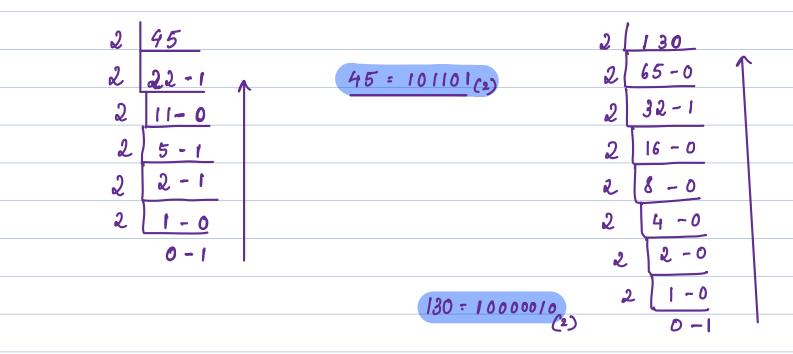
1. Convert the binary number 1/01 to a decimal number.

1101 → 1×2³ + 1×2² +0 + 1×2° = 13

2. Convert 1010/12 to a decimal number.

$$\frac{43210}{10101} = 1\times2^{4} + 1\times2^{2} + 1\times2^{0} = 21$$

Decimal - Binary Conversion:



Addition Of Decimal Numbers:

$$8 + 3 = 1$$

Addition Of Binary Numbers:

Bitwise Operators: 0 1 13 + 15 1111 Bit - O or 1. 1101 + 1111 11100 OFF -> 0 ON -> 1 And operation (%) 18081=0 $0 \times 0 \rightarrow 0$ 1 4 1 4 1 = 1 $0 k l \rightarrow 0$ I if only all bits are set. $|K| \rightarrow |$ OR (1) 010 -0 I if any of the bits are set. 1 0 --> 1 NOT (!) ! 0 -> 1 11-0 0011 0001 1100 0001 0000 0000 XOR (^) Exclusive OR $x ^o \rightarrow x$ 1011 0000 1 1 -> 0 $X^{\Lambda}X \rightarrow$ 1011 $1 \stackrel{a}{=} 0 \rightarrow 1$ [1,3,7,5,1,3,5] → 1 0001 -1 0011-3 $0 \quad 0 \rightarrow 0$ 010100 0010 101101 1!1001 → 57 Break = 8:12 AM

```
Binary Representation Of Negative Numbers:
                                                         int \rightarrow 32
         7 6 5 4 3 2 1
        0000 010 1
                                                     1111 1011
1st stip
                                                     0000 0101
                                                    0000 00000
flip → 11111010 - (1)
2nd slip. 0000 0001
(1)+1 11111011 -> 2's complement
               0000 \ 0011 \rightarrow 1111 \ 1100 \rightarrow 1111 \ 1101 \rightarrow -3
                                                     8 bili
                                                        Signed Unliger
       1010 1111 - 0101 0000
                              2 - 10000000
     8 bits \rightarrow signed int \rightarrow 2^{8-1}-1
                                                   -27
     32 bits \rightarrow signed int \rightarrow 2^{32-1}-1
                                               - 2<sup>31</sup>
- 2<sup>63</sup>
     64 bits \rightarrow signed int \rightarrow 2^{63} - 1
                                                  - 2<sup>N-1</sup>
     N \rightarrow 2^{N-1}-1
           N : -2^{N-1} \rightarrow 2^{N-1} - 1
```

Range Of Data Types:

8 bits
$$\Rightarrow$$
 signed int $\Rightarrow 2^{8-1} - 1$ -2^{7}
32 bits \Rightarrow signed int $\Rightarrow 2^{32-1} - 1$ -2^{31}
64 bits \Rightarrow signed int $\Rightarrow 2^{63} - 1$ -2^{63}
N, $\Rightarrow 2^{N-1} - 1$ -2^{N-1}

$$N : -2^{N-1} \rightarrow 2^{N-1}-1$$

Importance Of Constraints: int $\rightarrow -2^{31}$ to $2^{31}-1$ 0 ≤ A[i] ≤ 105 int - signed. 1 ≤ A.size ≤ 106 $2^{10} \rightarrow 1024$ $2^{30} - \frac{0}{10^{3}}$ 1. The or not $=(10^3)^2 = 10^9$ 2. Data Typu to be used.

