Decimal Numbers.

10^3 10^2 10^1 10^0

1 6

Thousand Hundred Ten ones

Octal Numbers

1 7 6

8^2 8^1 8^0

Binary Numbers

0, 1

1 0 1 0

2^3 2^2 2^1 2^0

Hexa Numbers

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

A, B, C, D, E, F

1 2 F E

16^3 16^2 16^1 16^0

Binary to decimal

① $(10101)_2 = (?)_{10}$

$2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0$

$= 1 \quad 0 \quad 1 \quad 0 \quad 1$

$= 1\times2^4 + 0\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0$

$= 1\times16 + 0\times8 + 1\times4 + 0\times2 + 1$

$= 16 + 0 + 4 + 0 + 1$

$= 21$

Octal to Decimal

① $(2057)_8 = (?)_{10}$

$8^3 \quad 8^2 \quad 8^1 \quad 8^0$

$= 2 \quad 0 \quad 5 \quad 7$

$= 2\times8^3 + 0\times8^2 + 5\times8^1 + 7\times8^0$

$= 2\times512 + 0 + 5\times8 + 7$

$= 1024 + 40 + 7$

$= (1071)_{10}$

③ Hexa to decimal

① $(1AF)_{16} = (?)_{10}$

$16^2 \quad 16^1 \quad 16^0$

$= 1 \quad A \quad F$

$= 1\times16^2 + A\times16^1 + F\times16^0$

$= 256 + 10\times16^1 + 15\times16^0$

$= 256 + 160 + 15$

$= (431)_{10}$

$(1AF)_{16} = (431)_{10}$

Binary / Octal / Hexa → Decimal

multiplication

Decimal to Binary

① $(13)_{10} = (?)_2$

2	13
2	6
2	3

1 ↑

$(1101)_2$

② $(48)_{10} = (?)_2 = (110000)_2$

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

1

$(110000)_2$

② Decimal to Octal

① $(952)_{10} = (?)_8$

8	952	
8	119	0
8	14	7
8	1	6
		1

$(1670)_8$

② $(208)_{10} = (?)_8$

8	208	
8	26	0
	3	2
		3

$(320)_8$

(3) Decimal to Hexa

(1) $(254)_{10} = (?)$

254
15

15 → F, 14 → E

$= (FE)_{16}$

★ Conversion shortcuts

(1) $(0101101101)_2 = (?)_8$

2 8

(2) $(100101101011) = (?)_{16}$

9 11

(9 6 B)

(3) $(562)_8$ $(?)_2$

5 6 2

101 110 010 → $(101110010)_2$

(4) $(2AB)_{16} = (?)_2$

2 A B

$(0010\ 1010\ 1011)_2$

$(341)_8 = (?)_2$

3 4 1

$(011\ 100\ 001)_2$

Saturday, December 31, 2022 3:37 PM

Conversion of fractional Number.

$2^{-1} = 0.5$
$2^{-2} = 0.25$
$2^{-3} = 0.125$

(110.101)

$= 1\ 1\ 0 \cdot 1\ 0\ 1$ (with place values $2^2\ 2^1\ 2^0 \cdot 2^{-1}\ 2^{-2}\ 2^{-3}$)

$= 1\times2^2 + 1\times2^1 + 0\times2^0 \cdot 1\times2^{-1} + 0\times2^{-2} + 1\times2^{-3}$

$= 4 + 2 \cdot 1\times0.5 + 0\times0.25 + 1\times0.125$

$\cdot 625$

$= (6.625)_{10}$

$8^{-1} = 0.125$
$8^{-2} = 0.0156$
$8^{-3} = 0.0019$

② $(127.54)_8 = (?)_{10}$

$= 1\times8^2 + 2\times8^1 + 7\times8^0 \cdot 5\times8^{-1} + 4\times8^{-2}$

$= (87.6874)_{10}$

⊛ Binary Divison

```
        0101 → 5
   110 )100001
       -000↓
        1000
       - 110↓
        00100
        - 000↓
          1001
         - 110
          011
```

TTO