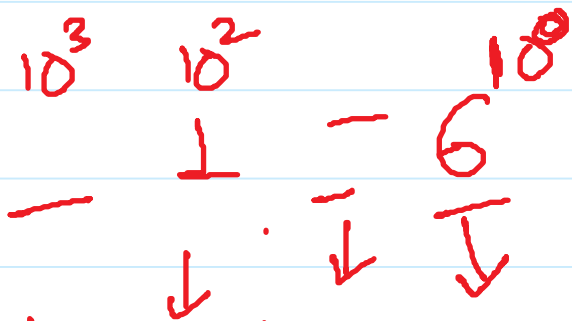
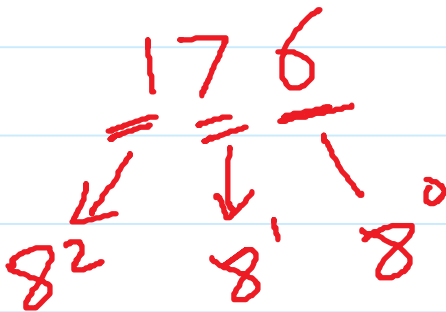


Decimal Numbers.



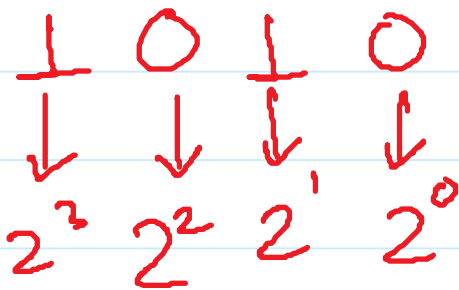
Thousand    Hundred    ten    ones

Octal Numbers



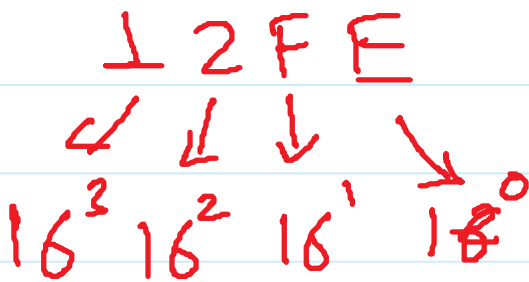
Binary Numbers

0, 1



Hexa Numbers

0, 1, 2, 3, 4, 5, 6, 7, 8, 9  
A, B, C, D, E, F



## Binary to decimal

$$\textcircled{1} (10101)_2 = (?)_{10}$$

$$= \overset{2^4}{1} \overset{2^3}{0} \overset{2^2}{1} \overset{2^1}{0} \overset{2^0}{1}$$

$$= 1 \times 2^4 + 0 \times 2^3 + \cancel{1 \times 2^2} + 0 \times 2^1 + 1 \times 2^0$$

$$= 1 \times 16 + 0 \times 8 + 1 \times 4 + 0 \times 2 + 1$$

$$= 16 + \cancel{0} + 4 + 0 + 1$$

$$= \underline{21}$$

## Octal to Decimal

$$\textcircled{1} (2057)_8 = (?)_{10}$$

$$= \overset{8^3}{2} \overset{8^2}{0} \overset{8^1}{5} \overset{8^0}{7}$$

$$= 2 \times 8^3 + 0 \times 8^2 + 5 \times 8^1 + 7 \times 8^0$$

$$= 2 \times 512 + 0 + \underline{5 \times 8} + 7$$

$$= 1024 + 40 + 7$$

$$= (1071)_{10}$$

## Hexa to decimal

$$\textcircled{1} (1AF)_{16} = (?)_{10}$$

$$= \overset{16^2}{1} \overset{16^1}{A} \overset{16^0}{F}$$

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

$$= 1 \times 16^2 + A \times 16^1 + F \times 16^0$$

$$= 256 + 10 \times 16 + 15 \times 16^0$$

$$= 256 + 160 + 15$$

$$= \underline{(431)}_{10}$$

Binary/Octal/Hexa  $\rightarrow$  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

$(110000)_2$

# Decimal to Octal

①  $(952)_{10} = (?)_8$

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

$(1670)_8$

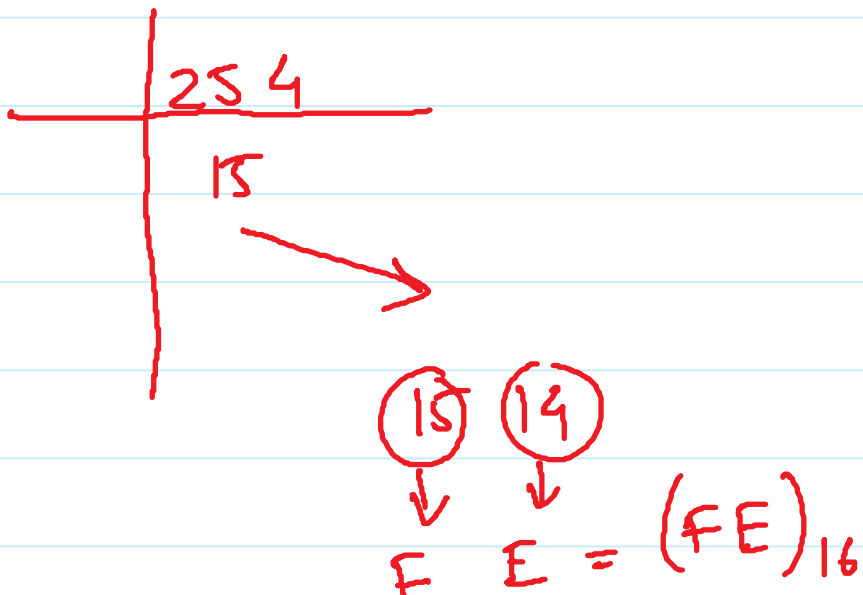
②  $(208)_{10} = (?)_8$

8	208	
8	26	0
	3	2
		3

$(320)_8$

### ③ Decimal to Hexa

①  $(254)_{10} = (?)$



### \* Conversion shortcuts

①  $(\underline{010110101})_2 = (\underline{?})_8$

$\downarrow$                        $\downarrow$   
 2                      8

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

$\swarrow$                        $\swarrow$   
 9                      11  
 (96B)

③  $(562)_8 = (?)_2$

5   6   2  
101 110 010  $\Rightarrow$   $(101110010)_2$

④  $(2AB)_{16} = (?)_2$

2   A   B  
0010 1010 1011  
 $(001010101011)_2$

$(341)_8 = (?)_2$

3   4   1  
011 100 001  
 $(011100001)_2$

# Conversion of fractional Number.

$$\begin{aligned} 2^{-1} &= 0.5 \\ 2^{-2} &= 0.25 \\ 2^{-3} &= 0.125 \end{aligned}$$

$$(110.\underline{101})_{2^{\begin{smallmatrix} -1 & -2 & -3 \\ 2 & 2 & 2 \end{smallmatrix}}}$$

$$= \begin{matrix} 2^2 & 2^1 & 2^0 \\ 1 & 1 & 0 \end{matrix}$$

$$= 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$$

$$= 4 + 2$$

$$=$$

$$(6.625)_{10}$$

$$\bullet \begin{matrix} 2^{-2} & 2^{-3} \\ 1 & 0 & 1 \end{matrix}$$

$$\bullet 1 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3}$$

$$\bullet 1 \times 0.5 + 0 \times 0.25 + 1 \times 0.125$$

$$\bullet 0.625$$

$$\textcircled{2} (127.54)_8 = (?)_{10}$$

$$\begin{aligned} 8^{-1} &= 0.125 \\ 8^{-2} &= 0.0156 \\ 8^{-3} &= 0.0019 \end{aligned}$$

$$= 1 \times 8^2 + 2 \times 8^1 + 7 \times 8^0 + 5 \times 8^{-1} + 4 \times 8^{-2}$$

$$= (87.6874)_{10}$$

## ★ Binary Divison

$$\begin{array}{r} 0101 \rightarrow 5 \\ 110 \overline{) 100001} \\ \underline{-000} \phantom{00} \\ 1000 \phantom{00} \\ \underline{-110} \phantom{00} \\ 00100 \phantom{00} \\ \underline{-000} \phantom{00} \\ 1001 \phantom{00} \\ \underline{-110} \phantom{00} \\ 111 \phantom{00} \end{array}$$

110