System Conversions

(Binary , octal and Hexadecimal) to Decimal :

For binary number :

Ex : $(11010 . 101)_2 = 1(2)^4+1(2)^3+ 0(2)^2+ 1(2)^1+ 0(2)^0+ 1(2)^{-1}+ 0(2)^{-2}+1(2)^{-3}$ =

$16+8+2+0.5+0.125 = (26.625)_{10}$

For octal number :

Ex: $(613.24)_8 = 6(8)^2 +1(8)^1+3(8)^0+2(8)^{-1} + 4(8)^{-2}$ =

$384 + 8 + 3 + 0.25 + 0.0625 = (395.3125)_{10}$

For hexadecimal :

Ex: $(5A.E)_{16} =5(16)^1+ A(16)^0+ E(16)^{-1}$ =

$5(16)+10(16)+ 14(16)^{-1} = 80+10+0.875 = (90.875)_{10}$

Decimal to (Binary , octal and Hexadecimal) :

1- To Binary :

Ex: $(353)_{10} = (?)_2$

		الباقي	
353	2	1	← **LSB**
176	2	0	
88	2	0	
44	2	0	
22	2	0	
11	2	1	
5	2	1	
2	2	0	
1	2	1	← **MSB**
0			

$(353)_{10} = (101100001)_2$

H.W.: $(49302)_{10} = (?)_2$
$(10010)_{10} = (?)_2$

EX: $(0.65625)_{10} = (?)_2$

0.65625
_____ 2 x
[1] ← 1.31250
اول مرتبه بعد الفارزه
0.31250
_____ 2 x
[0] ← 0.62500
_____ 2 x
[1] ← 1.250
_____ 2 x
[0] ← 0.50
_____ 2 x
[1] ← 1.0

$(0.65625)_{10} = (0.10101)_2$

H.W.: $(0.8134)_{10} = (?)_2$
$(741.528)_{10} = (?)_2$

2- to Octal :

EX : $(254.75)_{10} = (?)_8$

		الباقي	
254	8	6 ⟶	**LSB**
31	8	7	
3	8	3	
0			

0.75
_____ 8 x
[6] ← 6.00

$(254.75)_{10} = (376.6)_8$

H.W. : $(3070.446)_{10} = (?)_8$
$(7706.77)_{10} = (?)_8$

3- to Hexadecimal :

EX: $(567.1875)_{10} = (?)_{16}$

567	16	7	← **LSB**
35	16	3	
2	16	2	
0			

0.1875
16 x
3 ← 3.0000

$(567.1875)_{10} = (237.3)_{16}$

H.W. $(1005.36)_{10} = (?)_{16}$
$(3987.055)_{10} = (?)_{16}$

Binary , Octal and Hexadecimal conversion(fast method) :

EX:

1 2 7 5 4 3 Octal
1 0 1 0 1 1 1 1 0 1 1 0 0 0 1 1 Binary
A F 6 3 Hexadecimal

$=(44899)_{decimal}$ how !

EX:

2 1 4 4 3 5 Octal
1 0 0 0 1 1 0 0 1 0 0 0 1 1 1 0 1 Binary
1 1 9 1 D Hexadecimal

H.w:

$(1011100011)_B = (?)_0 = (?)_H$
$(AF31C)_H = (?)_O = (?)_B$
$(37012)_{0=} (?)_B = (?)_H$