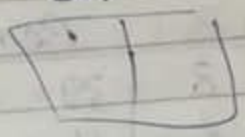
* Convert From decimal To Hexa

الجدول



① $(120)_{10}$

		Reminder
16 |	120	8 ↑
16 |	7	7 ↑

$(78)_{16}$ →

② $(1000)_{10}$

		Reminder	
16 |	1000	8	8
16 |	62	14 ↑	E
16 |	3	3 ↑	3

$(3E8)_{16}$ →

③ $(43.125)_{10}$ → Fraction

		Reminder	
16 |	43	11 ↑	B
16 |	2	2 ↑	2

$(2B)_{16}$ →

$(43)_{10} = (2B)_{16}$

$(43.125)_{10} = (2B.2)_{16}$

$.125 * 16 = 2.0$

$(.125)_{10} = (.2)_{16}$

* Convert From Hexa To octal

→ Steps:

1 - Convert From Hexa To Binary

2 - Convert from Binary To octal

① $(56A)_{16}$

الخطوه الاولى

5	6	A
0101	0110	1010

$(0101\ 0110\ 1010)$

$(010101101010)_2$

الخطوه الثانيه

$(010101101010)_2$

010	101	101	010
2	5	5	2

$(56A)_{16} = (2552)_8$

② $(45.6C)_{16}$

الخطوه الاولى

4	5	.	6	C
0100	0101		0110	1100

(01000101)

$(1000101)_2$

$(45)_{16} = (1000101)_2$

$(.6C)_{16} = (.01101100)_2$

$(45.6C)_{16} = (1000101.01101100)_2$

الخطوه الثانيه

$(1000101.01101100)_2$

$(1000101)_2$

001	000	101
1	0	5

$(45)_{16} = (105)_8$

$(.01101100)_2$

011	011
3	3

$(.6C)_{16} = (.33)_8$

$(45.6C)_{16} = (105.33)_8$

* Convert From Binary To hexadecimal

① $(1010110110)_2$

0010	1011	0110
8421	8421	8421
0+0+2+1	8+0+2+1	0+4+2+0
2	11	6
2	B	6

$(2B6)_{16}$

الطريقه التانيه انه ياخد كل اربع ارقام Binary ويشوف ايه الرقم الـ hexa بتاعهم

binary	dec	Hex
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	10	A
1011	11	B
1100	12	C
1101	13	D
1110	14	E
1111	15	F

② $(1010101011.1001)_2$

0010	1010	1011	.1001
0010	1010	1001	1001
8421	8421	8421	8421
0+0+2+0	8+0+2+0	8+0+0+1	8+0+0+1
2	10	11	9
2	A	B	

2AB

$(1010101011.1001)_2 = (2AB.9)_{16}$

Conversion

Binary

* Convert From Binary To decimal

① $(1010111)_2$

1	0	1	0	1	1	1
2^6	2^5	2^4	2^3	2^2	2^1	2^0

$64 + 0 + 16 + 0 + 4 + 2 + 1$

87

$(1010111)_2 = (87)_{10}$

② $(10100.101)_2$ → Fraction

1	0	1	.	0	0
2^4	2^3	2^2	.	2^1	2^0

$16 + 0 + 4 + 0 + 0$

20

$(10100)_2 = (20)_{10}$

1	0	1
2^{-1}	2^{-2}	2^{-3}

$.5 + 0 + .125$

$.625$

$(.101)_2 = (.625)_{10}$

$(10100.101)_2 = (20.625)_{10}$

ملحوظة

① Binary, octal, Hexa $\xrightarrow{\times \text{ base}}$ decimal
$\xleftarrow{\text{reminder}}$

② oct, Hex $\rightleftharpoons$ binary (مرتبات)

③ octal $\rightleftharpoons$ Hexa (binary)

* Convert From octal To Hexa

→ Steps =

1- Convert from octal To Binary

2- Convert from Binary To Hexa

① $(753)_8$

الخطوه الأولى

7	5	3
111	101	011

$(111\ 101\ 011)_2$

الخطوه الثانيه

$(111101011)_2$

0001	1110	1011
1	E	B

$(753)_8 = (1EB)_{16}$

② $(325.67)_8$

الخطوه الأولى

3	2	5
011	010	101

$(011\ 010\ 101)_2$

6	7
110	111

$(110\ 111)_2$

$(325.67)_8 = (011010101 . 110111)_2$

الخطوه الثانيه

$(011010101)_2$

1101	0101
D	5

$(325)_8 = (D5)_{16}$

$(.110111)_2$

1101	1100
D	C

$(.67)_8 = (DC)_{16}$

$(325.67)_8 = (D5.DC)_{16}$

* Convert From Hex To decimal

① (3A)16

3	A
3	10
16^1	16^0
3*16	10*1
48 +	10 = 58

(3A)16 = (58)10

② (1BD)16

1	B	D
1	11	13
16^2	16^1	16^0
1*256	16*11	13*1
256 +	176 +	13 = 445

(1BD)16 = (445)10

③ (05.21)16 ⇒ Fraction

D	5	2	1
13	5	2	1
16^1	16^0	16^{-1}	16^{-2}
B*16	5*1	2*.0625	1*.00391
208 +	5 = 213	.125 +	.00391 = .12589

(05.21)16 = (213.12589)10

Conversions

dec ↕ bin
Hex ↕ bin
oct ↕ bin

dec ↕ Hex
dec ↕ oct

Hex ⟷ oct (via bin)

dec = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 — base 10
hex : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F — base 16
oct : 0, 1, 2, 3, 4, 5, 6, 7 — base 8
bin : 0, 1 — base 2

dec → bin

① 123

64	32	16	8	4	2	1
1	1	1	1	0	1	1

② 10110 (16 8 4 2 1) — bin → dec

16+4+2 = 22

③ Hex → bin

B6
‖ 6

hex برقم 4bits كل

11	6
8421	8421
1011	0110

$(10110110)_2$

④ bin → Hex

8421		
0001	1001	1110
1	9	14

19F

Hexadecimal

* Convert from Hexa To Binary

① $(5B)_{16}$

5	B
0101	1011

$(0101\ 1011)_2$

$(5B)_{16} = (1011011)_2$

② $(12C.A5)_{16}$ → Fraction

1	2	C
0001	0010	1100

$(0001\ 0010\ 1100)$

$(100101100)_2$

A	5
1010	0101

(10100101)

$(12C)_{16} = (100101100)_2$

$(A5)_{16} = (10100101)_2$

$(12C.A5)_{16} = (100101100.10100101)_2$

⑤ oct → bin

125

4	2	1
0	0	1

4	2	1
0	1	0

4	2	1
1	0	1

$(1010101)_2$

bin → oct

1111101

001 110 101

1 6 5

$(165)_8$

⑥ Hex → dec

16^2 16^1 16^0

8 7F

$8*16^2+7*16+15 = (2175)_{10}$

⑦ oct → dec

10^2 10^1 10^0

102

8^2 8^1 8^0

752

$7*8^2+5*8+2$

$(490)_{10}$

⑧ dec → Hex

		reminder
16 |	123	11 ↑
16 |	7	7

$(7B)_{16}$

⑨ dec → oct

		reminder
8 |	123	3
8 |	15	7 ↑
8 |	1	1

$(173)_8$

* Convert From Binary To octal

الطريقة الثانية

0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

① $(010110110)_2$

010110110

010	110	110
0 1 0	1 1 0	1 1 0
4 2 1	4 2 1	4 2 1
0+2+0	4+2+0	4+2+0
2	6	6

266

$(010110110)_2 = (266)_8$

Decimal

* Convert From decimal To Binary

① $(156)_{10}$

		Reminder
2	156	0
2	78	0
2	39	1
2	19	1
2	9	1
2	4	0
2	2	0
2	1	1

$(10011100)_2$