

### Denary to Binary (and vice versa)

eg, 49 in binary

128	64	32	16	8	4	2	1
0	0	1	1	0	0	0	1

### Binary shift

left shift by 1 = \* 2

eg, left shift by 1: 00101010 (42)

128	64	32	16	8	4	2	1
0	1	0	1	0	1	0	0

= (84)

right shift by 1 = / 2

eg, right shift by 1: 00101110 (46)

128	64	32	16	8	4	2	1
0	0	0	1	0	1	1	1

= (23)

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### Hexadecimal to Binary (and vice versa)

Hexadecimal is base 16 (0-9 & A-F (10-15))

eg, D7 in binary

convert into hexadecimal to denary

D	7
/	\
14	7

convert denary into nibbles

/	\
1110	0111
\	/
11100111	

### Denary to Hexadecimal

(one way is to convert to binary and split into nibbles)

eg, 103 in Hexadecimal

128	64	32	16	8	4	2	1
0	1	1	0	0	1	1	1

  

	/				\			
8	4	2	1		8	4	2	1
0	1	1	0		0	1	1	1
			\		/			
			6			7		

= 67

### Hexadecimal to denary

(one way is to convert to binary (like above) then to denary) or to use the 16s table shown below

eg, F4 in denary

16 (16 <sup>1</sup> )	1 (16 <sup>0</sup> )
F	4

(remember F = 15)

(15 x 16) + (4 x 1) = 244

### Binary Addition

0 + 0 + 0 = 0  
 0 + 0 + 1 = 1  
 0 + 1 + 1 = 10  
 1 + 1 + 1 = 11