

Bases

Dec	Hex	Bin
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	a	1010
11	b	1011
12	c	1100
13	d	1101
14	e	1110
15	f	1111

Powers of 2

$2^0 = 1$
$2^1 = 2$
$2^2 = 4$
$2^3 = 8$
$2^4 = 16$
$2^5 = 32$
$2^6 = 64$
$2^7 = 128$
$2^8 = 256$
$2^9 = 512$

Hexadecimal

- Base-16 numbering system (1 nibble = 4 bits)
- More human readable than lines of bits
- Examples: $123_{10} = 01111001_2 = 0x79$
 $0xca = 11001010_2 = 202_{10}$

Number to Name

- Factor out prefix so power of 10
 $2^{x+y} = 2^x \cdot 2^y$ (so $y = 10, 20, 30, \dots$)
- Calculate/remember base
(base name) 2^y
- Lookup/remember prefix
(base name) (prefix name)

Name to Number

- Figure out power of base
(base name) (prefix name)
- Figure out power of prefix
 2^x *(prefix name)*
- Multiply terms
 $2^x \cdot 2^y = 2^{x+y} = 2^z$

What if number is not a power of 2?

- Can approximate by rounding to nearest power of 2, and then converting.
- If calculating minimum number of bits, round up to nearest power of 2.

Tips

- $2^{10} = 1,024 \sim 1000 = 10^3$
- Memorize/Learn: bases, powers of 2, order of prefix names
- IEC prefixes just change everything after first 2 letters to 'bi'

Prefixes

SI			IEC		
Name	Abbr	Factor	Name	Abbr	Factor
Kilo	K	10^3	Kibi	Ki	$2^{10} = 1,024$
Mega	M	10^6	Mebi	Mi	$2^{20} = 1,048,576$
Giga	G	10^9	Gibi	Gi	$2^{30} = 1,073,741,824$
Tera	T	10^{12}	Tebi	Ti	$2^{40} = 1,099,511,627,776$
Peta	P	10^{15}	Pebi	Pi	$2^{50} = 1,125,899,906,842,624$
Exa	E	10^{18}	Exbi	Ei	$2^{60} = 1,152,921,504,606,846,976$
Zetta	Z	10^{21}	Zebi	Zi	$2^{70} = 1,180,591,620,717,411,303,424$
Yotta	Y	10^{24}	Yobi	Yi	$2^{80} = 1,208,925,819,614,629,174,706,176$