Number Bases

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

IEC Prefixes

Name	Abbr	Factor
Kibi	Ki	2^{10} = 1,024
mebi	Mi	2^{20} = 1,048,576
gibi	Gi	2^{30} = 1,073,741,824
tebi	Ti	2^{40} = 1,099,511,627,776
pebi	Pi	2^{50} = 1,125,899,906,842,624
exbi	Ei	2^{60} = 1,152,921,504,606,846,976
Zebi	Zi	2^{70} = 1,180,591,620,717,411,303,424
yobi	Yi	2^{80} = 1,208,925,819,614,629,174,706,176

Exercises

1) Fill in the following table **(implicit unsigned interpretation, since we hadn't done signs yet):**

Decimal	Binary	Hex
31	0b0001 1111	0x1F
27	0b0001 1011	0x1B
17	0b0001 0001	0x11
127	0b0111 1111	0x7f
202	0b1100 1010	0xCA
255	0b1111 1111	0xFF

2) The Koozbanian language has 768 distinct symbols. What is the minimum number of bits needed to represent every symbol?
Ten! 2^9=512 isn't enough, so we need 2^{10}=1024.

3) Represent the following values in IEC format:

2^{18} **256 Kibi** 2^3 **8** 2^{43} **8 Tebi** 2^{20} **1 Mebi**

4) Your awesome new computer has 1.5 TiB of byte-addressed memory (1.5Ti possible addresses). How many bits are needed to represent every address?
With 41 bits we can represent 2^{41} = 2 TebiThings, which is necessary to represent so many addresses.