CodeHS

Binary Conversions

Corresponding Material
Number Systems

Discussion
There are a lot of different number systems that are used in computer science. There have also been different number systems used in the past such as the Maya Number System and the Babylonian Number System. All number systems have a base. The most common is the decimal system with base ten. Two other systems that are used by computers are the binary system with base two and the hexadecimal system with base sixteen.

Binary to Decimal

Example:

Binary	1	0	0	1	1	0	0	1
Base	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Math	1 x 128	0 x 64	0 x 32	1 x 16	1 x 8	0 x 4	0 x 2	1 x 1
Decimal	128	0	0	16	8	0	0	1

Answer: 128 + 16 + 8 + 1 = 153

Exercise:

Binary	1	1	0	0	1	1	0	1
Base	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Math								
Decimal								

Answer:

Decimal to Binary

Example:

Starting Number: 172

Decimal	172	44	44	12	12	4	0	0
Base	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Math	172 ÷ 128	44 ÷ 64	44 ÷ 32	12 ÷ 16	12 ÷ 8	4 ÷ 4	0 ÷ 2	0 ÷ 1
Divides?	Yes 172 - 128 = **44**	No **44**	Yes 44 - 32 = **12**	No **12**	Yes 12 - 8 = **4**	Yes 4 - 4 = **0**	No **0**	No **0**
Binary	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**0**

Answer: 1010 1100

Exercise:

Starting Number: 210

Decimal	210	82	18	18	2	2	2	0
Base	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Math								
Divides?								
Binary								

Answer:

Further Practice:

Decimal	Binary
250	
	1010 1010
87	
	0111 1100
99	