

Comparing Base Two and Base Ten Systems

Learning about a base two system will help you understand how a base system works.

Base 2 System	Base 10 System
<p>In a base two system each column is worth 2 times the previous column. We have a ones column, twos column, a fours column and so forth. The columns would be worth:</p> <p>128,64,32,16,8,4,2,1</p>	<p>Just like in our base 10 system where we have a ones column, a tens column, a hundreds column and each column is worth:</p> <p>1,000, 100, 10, 1</p>
<p>Which is the same as:</p> <p>$2^7, 2^6, 2^5, 2^4, 2^3, 2^2, 2^1, 2^0$</p>	<p>Just like our base 10 system can be represented as:</p> <p>$10^3, 10^2, 10^1, 10^0$</p>
<p>And the same as:</p> <p>$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2, 2 \times 2 \times 2 \times 2 \times 2 \times 2, 2 \times 2 \times 2 \times 2 \times 2, 2 \times 2 \times 2 \times 2, 2 \times 2 \times 2, 2 \times 2, 2 \times 1, 1$</p>	<p>Just like 1,000 is $10 \times 10 \times 10$ and 100 is 10×10</p>
<p>There are only two digits in a base two system. They are 1 and 0.</p>	<p>There are ten digits in a base ten system. They are 9,8,7,6,5,4,3,2,1,0</p>
<p>The number ten is represented as:</p> <p>1010</p> <p>The first 1 is in the eights column and is therefore worth 8.</p> <p>There is nothing in the fours column. The twos column has a 1.</p> <p>The ones column has nothing. Think of it as $8 + 0 + 2 + 0 = 10$</p>	<p>The number ten is represented as:</p> <p>10</p> <p>Because the 1 is in the tens column and nothing is in the ones column.</p> <p>Think of it is $10 + 0 = 10$</p>
<p>The number seventeen is represented as:</p> <p>10001</p> <p>Because $16 + 0 + 0 + 0 + 1 = 17$</p>	<p>The number seventeen is represented as:</p> <p>17</p> <p>Because $10 + 7 = 17$</p>
<p>A base two system is called binary. It is the language of computers because computers can only recognize two things. Whether there is an electrical impulse (represented as 1) or no electrical impulse (represented as 0).</p>	<p>A base 10 system is called decimal. We have 10 fingers so for humans a decimal system is easily visible.</p>

Practice Writing in Binary

Example:

Write 35

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

$$32+2+1=35$$

So it is written.

100011 (Remember to use 0's as place holders!)

Write 73

128	64	32	16	8	4	2	1

73 in binary is _____

Write 138

128	64	32	16	8	4	2	1

138 in binary is _____

Write 177

128	64	32	16	8	4	2	1

177 in binary is _____