Épreuve de section européenne

What Is The Best Number?

This is not a question with a definite answer, as the quality of a number is a matter of opinion and not facts. Many numbers have unique characteristics that make them particularly interesting and useful, and depending on your expectations, any of them might be considered to be the best one.

According to Sheldon, a character of the TV show The Big Bang Theory, the best number is 73. 73 is the 21st prime number. A prime number is a natural number greater than 1 that has no divisors, except 1 and itself. Its mirror 37 is the 12th prime number, and 12 is also the mirror of 21, which is the product of 7 and 3.

But it's not finished. When you convert 73 in binary, the magic continues. A number in binary is represented with only the digits 0 and 1 and the successive units are the powers of 2. In binary, 73 is 1 0 0 1 0 0 1. It is a palindrome, backwards it also gives 1 0 0 1 0 0 1. Notice that there are 7 digits, 3 of them being the digit 1.

You will find below a method to convert a natural number in binary. Here is an example with the number 43:

Instructions	Rest	Power of 2	Binary
Find out the greatest power of 2 that will fit into the number and subtract it from the number.	**43** 43 − 32 = **11**	$2^5 = 32$	**1**
Move to the next lower power of two. If it fits into the rest, write a 1 and subtract the power of 2 from the rest. Else, write a 0. Repeat the operation.	**11** <u>11 < 16</u>	$2^4 = 16$	1 **0**
	11 11 − 8 = **3**	$2^3 = 8$	1 0 **1**
	3 <u>3 < 4</u>	$2^2 = 4$	1 0 1 **0**
	3 3 − 2 = **1**	$2^1 = 2$	1 0 1 0 **1**
	1 1 − 1 = **0**	$2^0 = 1$	1 0 1 0 1 **1**
The conversion is done when the rest is equal to 0.			**1 0 1 0 1 1**

From *The Big Bang Theory*

Questions

1. Do you think that there is a best number? Give examples of famous ones. Do you have a favourite number?
2. Explain why Sheldon thinks that 73 is the best number.
3. Prove that the conversion of 73 in binary gives 1 0 0 1 0 0 1.
4. Explain what a palindrome is; do you know an English word which is a palindrome?