

The decimal number 117 in binary is 0111 0101. Let's see how we convert numbers from decimal to binary.

1. Write out the column titles for each of the digits of binary:

128	64	32	16	8	4	2	1

2. Now compare the number you are converting with each digit. If it is greater then put a 1 in the column and take the number of the column from the number you are looking for. So 117 is less than 128, so we need 0 in the 128 column:

128	64	32	16	8	4	2	1
0							

3. 117 is greater than 64, so we need 1 in the 64 column.  $117 - 64 = 53$ . So we are now looking for 53 in the remaining numbers.

128	64	32	16	8	4	2	1
0	1						

4. We need a 1 in the 32s column. This will leave  $53 - 32 = 21$ . 16 goes into 21 so we can include a 1 in that column leaving just 5.

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

5. Now we are looking for 5. The 8s column is too big so we put a 0 in it. 4 will go into 5 so put a 1 in it leaving just 1.

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

6. Finally, we just need to convert 1, so we put a 0 in the 2s column and a 1 in the 1s column.

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

Now read the numbers in each column to get the answer: **0111 0101**

Any number in decimal can be converted to a binary number. However, if we try to convert a number greater than 255 into an 8 bit number we won't be able to as we don't have a 256 column in an 8 bit number. Computers often use 16, 32 or even 64 bit numbers to allow you to store bigger numbers.

The biggest decimal number you can store with a 16 bit number is:

$$2^{32} - 1 = 2 * 2 - 1 = 65536 - 1 = \mathbf{65535}$$