R 37 Binary to Decimal Conversions - Reading

In everyday Maths we use the decimal system of counting which is also known as base 10. Look at how it works for the number 217:

100	10	1
2	1	7

The number 217 means:
2*100 +
1*10 +
7*1
217

Each column to the left has the value of 10 times the previous column.

Computers use binary which can contain only 0 or 1. This is also known as base 2. Each column to the left has 2 times the value of the previous column. To convert the number 11011001 from binary to decimal do the following process:

1. Put the column titles in for each column:

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

2. Add each of the column titles with a 1 in it:

= 128 + 64 + 16 + 8 + 1 = 217

We can add a subscript to numbers to show which base we are using. We also put a space after every four digits of binary to make it easier to read. For example:

$217_{10} = 1101\ 1001_2$

This means 217 in base 10 equals 1101 1001 in base 2.

We can place as many leading zeros to a number as we like. So 0001 = 1. Because computers store numbers of a certain length, like 8 bits, we often use leading zeros. 32 stored as an 8 bit number would be:

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

32_{10} = 0010 0000 as an 8 bit number