

BITS, NIBBLES, AND BYTES

We briefly covered the length of the number. The length of a binary number is the amount of *1*'s and *0*'s it has.

Common binary number lengths

Binary values are often grouped into a common length of *1*'s and *0*'s, this number of digits is called the **length** of a number. Common bit-lengths of binary numbers include bits, nibbles, and bytes (hungry yet?). Each *1* or *0* in a binary number is called a **bit**. From there, a group of 4 bits is called a **nibble**, and 8-bits makes a **byte**.

Bytes are a pretty common buzzword when working in binary. Processors are all built to work with a set length of bits, which is usually this length is a multiple of a byte: 8, 16, 32, 64, etc.

To sum it up:

Length	Name	Example
1	Bit	0
4	Nibble	1011
8	Byte	10110101

Word is another length buzzword that gets thrown out from time-to-time. Word is much less yummy sounding and much more ambiguous. The length of a word is usually dependent on the architecture of a processor. It could be 16-bits, 32, 64, or even more.

Padding with leading zeros

You might see binary values represented in bytes (or more), even if making a number 8-bits-long requires adding **leading zeros**. Leading zeros are one or more 0's added to the left of the most-significant 1-bit in a number. You usually don't see leading zeros in a decimal number: 007 don't tell you any more about the value of a number 7 (it might say something else).

Leading zeros aren't required on binary values, but they do help present information about the bit-length of a number. For example, you may see the number 1 printed as 00000001, just to tell you we're working within the realm of a byte. Both numbers represent the same value, however, the number with seven 0's in front adds information about the bit-length of a value.

Source: <https://learn.sparkfun.com/tutorials/binary>