Bits and Bytes

Computers "understand" binary (Ex. 10110010).

One bit is one digit of binary. So a bit can either be 0 or 1.

One byte is 8 bits.

One nibble is 4 bits or half a byte.

One word is the size of... complicated. You'll hear that a word is either 2 bytes or the size of the architecture (64 bits or 32 bits). I ran a quick experiment in C++ and have concluded that Windows treats a word as 2 bytes. So let's just go with: **a word is 2 bytes**.

A double word (DWORD) is twice the size of a word or 4 bytes. A quad word (QWORD) is four times the size of a word or 8 bytes.

Before we get into other data types, let's talk about signed vs unsigned. Signed numbers can be positive or negative. Unsigned is only positive numbers. You can remember this by thinking about how you would normally write positive and negative numbers. If you are using both positive and negative then you should put a sign in front of the negative number so you can tell them apart. If you are using only positive number then no sign is needed.

Some Data Type Sizes

- **Char** - 1 byte.
- ***Signed* int** - there are 16 bit, 32 bit, and 64 bit integers. 16 bit is -32,768 to 32,767 32 bit is -2,147,483,648 to 2,147,483,647 and 64 bit is -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807.
- ***Unsigned* int** - All bits can be used to represent a positive number meaning they go up to twice the number but only down to zero. For example: unsigned 32 bit int goes from 0 to 4,294,967,295. That is twice the signed maximum of 2,147,483,647 however it only goes down to 0.
- **Bool** - 1 byte. This may surprise you since a bool only needs 1 bit because it's either 1 or 0. The reason why it's a byte is because computers don't tend to work with individual bits. Instead they work with bytes. This is done to keep everything clean and eliminate as much confusion as possible.

For more data types go here: https://www.tutorialspoint.com/cprogramming/c_data_types.htm