

## Section 1 / Hexadecimal

Hex is only lightly covered here because there is a very good chance you are already familiar with the concept.

The TL;DR is: Hex is base sixteen. Hex is useful because being base 16, each hex digit represents 4 bits and just two hex digits completely indicates the 8 bits in a byte. Hex digits run from 0 through 9 and then A through F. Example: decimal 255 is hex FF.

### Numbers in Base 10

You already know that each digit in a base 10 number is added to a power of 10. The first digit is added to 10 to the 0. The second digit is added to 10 to the 1 and so on.

### Numbers in Base 2

#### Integers

Binary is the same thing except with powers of 2.

The first (least significant) digit is added to 2 to the 0. The second is added to 2 to the 1 and so on.

#### Floats

Floats are more complicated but in rough terms the digits are raised to negative powers of 2. See Section 2 for more detailed information.

### Number in Base 16 - Hexadecimal

Hex numbers work the same way as binary and decimal except there are more than 10 values for each digit. We draft the letter A through F to mean the values 10 through 15.

Hex is a handy way of describing binary numbers with much less effort.

### Octal - Numbers in Base 8

We don't speak of such things.

More seriously, base 8, or octal, is used far less than hex (permission bits in Linux is one place where it is used) in CS because it doesn't naturally encode into a single byte. Two hex digits perfectly since in a byte but two octal digits is 6 bits... too small and three octal digits is 9 bits... too big. Goldilocks does not approve.

## Printing Hex

With `printf()` use `%x`.

With `iostream` use the modifier `hex` but note this is sticky. It will remain active until switched back to `dec`.

## The REAL Reason We Love Hex

You can spell stuff with hex.

Hex Value	Notes
DEADBEEF	Found frequently in MC68K code especially Amiga
8BADFOOD	Found for similar reasons but on Apple products
DEADDEAD	Associated with the Blue Screen of Death
F003BA11	Used by undergraduates everywhere
COEDBABE	Used by misogynists everywhere
B16B00B5	Used by misogynists at Microsoft