3 Conversions Between Hexadecimal and Decimal Numbers

Given a hexadecimal number $h_n h_{n-1} h_{n-2} \ldots h_2 h_1 h_0$, the equivalent decimal value is

$$h_n \times 16^n + h_{n-1} \times 16^{n-1} + h_{n-2} \times 16^{n-2} + \ldots + h_2 \times 16^2 + h_1 \times 16^1 + h_0 \times 16^0$$

Here are some examples of converting hexadecimal numbers to decimals:

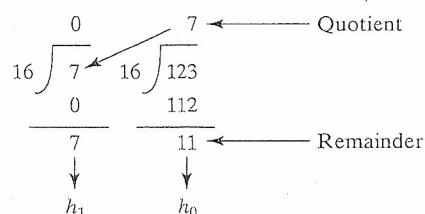| Hexadecimal	Conversion Formula	Decimal
7F	$7 \times 16^1 + 15 \times 16^0$	127
FFFF	$15 \times 16^3 + 15 \times 16^2 + 15 \times 16^1 + 15 \times 16^0$	65535
431	$4 \times 16^2 + 3 \times 16^1 + 1 \times 16^0$	1073

To convert a decimal number d to a hexadecimal number is to find the hexadecimal digits $h_n, h_{n-1}, h_{n-2}, \ldots, h_2, h_1,$ and h_0 such that

$$d = h_n \times 16^n + h_{n-1} \times 16^{n-1} + h_{n-2} \times 16^{n-2} + \ldots + h_2 \times 16^2$$
$$+ h_1 \times 16^1 + h_0 \times 16^0$$

These numbers can be found by successively dividing d by 16 until the quotient is 0. The remainders are $h_0, h_1, h_2, \ldots, h_{n-2}, h_{n-1},$ and h_n.

For example, the decimal number 123 is 7B in hexadecimal. The conversion is done as follows:

4 Conversions Between Binary and Hexadecimal Numbers

To convert a hexadecimal to a binary number, simply convert each digit in the hexadecimal number into a four-digit binary number, using Table 1.

For example, the hexadecimal number 7B is 1111011, where 7 is 111 in binary, and B is 1011 in binary.

To convert a binary number to a hexadecimal, convert every four binary digits from right to left in the binary number into a hexadecimal number.

For example, the binary number 1110001101 is 38D, since 1101 is D, 1000 is 8, and 11 is 3, as shown below.