Binary Numbers

- The **binary** number system is a way of representing numbers using only 0 and 1 as symbols. Numbers from this system are called binary numbers.
- Often numbers are constructed using a combination of the following ten symbols.

$$0, 1, 2, 3, 4, 5, 6, 7, 8, 9$$

. We call these numbers decimal numbers.

- It is possible to represent a decimal number as a binary numbers, and vice versa.

Binary Numbers in Computing

For computers, binary numbers are great stuff because:

- They are simple to work with – no big addition tables and multiplication tables to learn, just do the same things over and over, very fast.
- They just use two values of voltage, magnetism, or other signal, which makes the hardware easier to design and less prone to mechanical errors.

Base of a Number System

- The base of a number system is the number of symbols that that system uses. The binary number system has a base of 2. The decimal number system has a base of 10.
- There are other number systems. Two systems commonly used in computer sciences it the octal system (base 8) , and the hexadecimal number sytem (base 16).

Base of a number System

- To clarify which number system is being used, the convention is to write the base as a subscript.
- The decimal number 5 is represented as 101 in the binary system.

$$5_{10} = 101_2$$

- We will show how to determine the binary equivalents of decimal numbers shortly.