

# Binary Number System Mini Lesson

20min

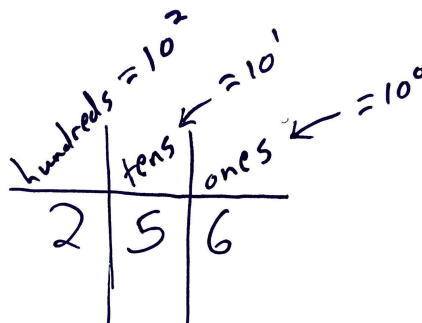
## Lesson Abstract

Computers store data using the Binary Number System, which only uses zeroes and ones. There are only two digits in the binary number system, so it is referred to as Base-2. Binary digits are also known as “bits”. How can we represent words and numbers using just zeroes and ones?! In this lesson, we will hone our counting, matching and sequencing skills as well as creating binary flashcards to take home for practice.

- What number system are we most familiar with and we seem to use the most?
  - Decimal number system
    - uses a **Base-10** numbering system
      - [0,1, 2, 3, 4, 5, 6, 7, 8, 9]
- For example, let's take a look at this number:

2 5 6

This number is the same as saying 2 hundreds + 5 tens + 6 ones.



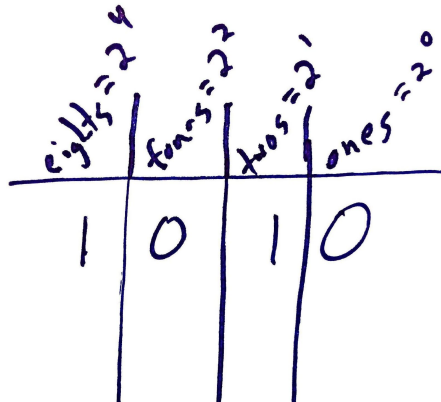
Above, we have divided each digit in its own column to illustrate what place they are in: the 'ones place', the 'tens place', the 'hundreds place'. We notice that each place is **ten** times greater than the digit to the right.

- The number system computers use to store information:

- Binary Number System
  - uses **Base-2** numbering system
    - [0,1]
- For example, let's look at a number in binary:

1 0 1 0

This is the same as 1 eight + 0 fours + 1 two + 0 ones.



Just as in the decimal number we looked at before; in the binary number, we have divided each digit in its own column to illustrate what place they are in: the 'ones place', the 'tens place', the 'hundreds place'. We notice that each place is **two** times greater than the digit to the right.

Below, shows the places in binary sequentially (start from right, at  $2^0$  and go left).

256 128 64 32 16 8 4 2 1  
2 2 2 2 2 2 2 2 2

Count to eight in Binary:

Binary →	0	1	10	11	100	101	110	111	1000
			← 0 ones ← 1 two ones	← 1 two ones ← 0 ones	← 0 ones ← 0 ones ← 0 ones	← 0 ones ← 0 ones ← 0 ones	← 0 ones ← 0 ones ← 0 ones	← 0 ones ← 0 ones ← 0 ones	← 0 ones ← 0 ones ← 0 ones ← 0 ones
Decimal →	0	0	00	000	0000	00000	000000	0000000	00000000
	0	1	2	3	4	5	6	7	8

Above, counting to eight is compared between binary and decimal number system. The arrows help distinguish what place each digit is in.