# Sect 1.1 - Reading and Writing Whole Numbers

Objective a: Understanding place value and period.

In this chapter, we will be working with the set of **Whole Numbers**. The whole numbers are defined to consist of the set of counting numbers, 1, 2, 3, 4, 5, 6, ... etc. and the number 0:

**Whole Numbers:** {0, 1, 2, 3, 4, 5, ... }

A number like 3,796,214,085 is written in **standard form**; each digit has a different value depending upon its location in the number. The value of the location of the digit is called the **place value** of the number. The place value of a particular digit is ten times the place value of the digit immediately to the right of it (i.e., it takes 10 ones to make a ten, it takes 10 tens to make a hundred, it takes 10 hundreds to make a thousand, etc.). The place value of each digit in 3,796,214,085 is given below:

| **3,** | **7** | **9** | **6,** | **2** | **1** | **4,** | **0** | **8** | **5** |
|---|---|---|---|---|---|---|---|---|---|
| BILLIONS | HUNDRED MILLIONS | TEN MILLIONS | MILLIONS | HUNDRED THOUSANDS | TEN THOUSANDS | THOUSANDS | HUNDREDS | TENS | ONES |

Notice that commas are also used to separate the digits into groups of three. These groups are called **periods**. The digits 085 are in the ones period, 214 are in the thousands period, 796 are in the millions period, and 3 is in the billions period. We use periods to help us to write numbers in words by writing the number in each period followed by the name of the period (except of the ones period). So, for 3,796,214,085, we would write and say it as:

Three **billion**, seven hundred ninety-six **million**, two hundred fourteen **thousand**, eighty-five.

Let's try some examples.

**Determine the place value of the digit 7 in each whole number:**

Ex. 1 78,643
Solution:
The 7 is located in the ten thousands place.

Ex. 2 8,097,456,202
Solution:
The 7 is located in the millions place.

Ex. 3 9,832,078
Solution:
The 7 is located in the tens place.

Objective b: Writing whole numbers in expanded form.

In the number 34,678, the digit six is located in the hundreds place. This means that the six represents 600. Likewise, the digit four is in the thousands place, so it represents 4000. We can do this for each digit:
3 corresponds to 3 ten-thousands 4 corresponds to 4 thousands
6 corresponds to 6 hundreds 7 corresponds to 7 tens
8 corresponds to 8 ones
If we then write the number as the sum (addition) of these representations, this will give us the number in **expanded form**. So, 34,678 in expanded form is: 3 ten-thousands + 4 thousands + 6 hundreds + 7 tens + 8 ones

**Write the following numbers in expanded form:**

Ex. 4 56,893
Solution:
The answer is 5 ten-thousands + 6 thousands + 8 hundreds + 9 tens + 3 ones.

Ex. 5 85,073,102
Solution:
The answer is 8 ten-millions + 5 millions + 7 ten-thousands + 3 thousands + 1 hundred + 2 ones.

**Write each whole number in standard form:**

Ex. 6 20,000,000 + 90,000 + 5,000 + 400 + 30 + 8

Solution:

The answer is 20,095,438.

**Write each number in standard form:**

Ex. 7 Five million, seven hundred fifteen thousand, ninety-two.

Solution:

5,715,092

Ex. 8 Seventy-six million, sixty-seven thousand, four hundred three.

Solution:

76,067,403

Objective c: Writing Numbers in Words.

To write numbers in words, starting with the leftmost period, we will write the number in each period followed by the period name (except for the ones period).

**Write each number in words:**

Ex 9 37,560,895

Solution:

Thirty-seven million, five hundred sixty thousand, eight hundred ninety-five.

Ex. 10 401,007,602

Solution:

Four hundred one million, seven thousand, six hundred two.

Ex. 11 In 2009, the Federal Government passed a $787 billion economic stimulus plan. Write this number in standard form.

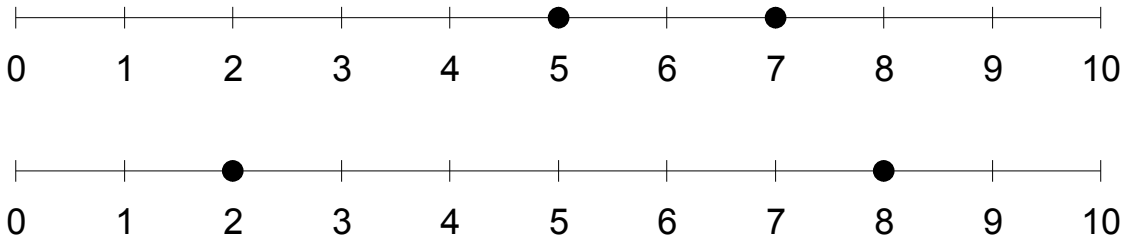
Solution:

$787 billion = $787,000,000,000

Note: If a baseball player earned $10,000,000 a year, it would take him or her 78,700 years to equal $787 billion in salary!

Objective d: The Number Line and Order.

In Mathematics, if we want to say that "7 is greater than 5," we write $7 > 5$. Similarly, if we want to say that "2 is less than 8," we write $2 < 8$. These symbols are called inequality symbols. Think of the inequality symbol as a mouth that wants to eat the larger number. If we graph these numbers on a number line, we would get:



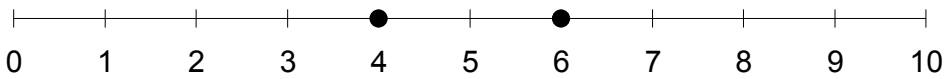

Notice that $7 > 5$ means that 7 is to the right of 5 on the number line and $2 < 8$ means that 2 is to the left of 8 on the number line.

**Fill in the blank with the symbol < or >:**

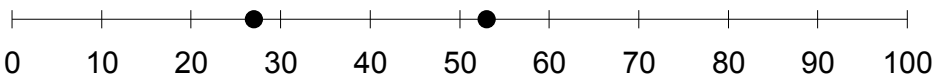
Ex. 12a 4 6 Ex. 12b 53 27
Ex. 12c 9 8 Ex. 12d 78 89

Solution:
We can visualize each of these solutions on a number line, though we will need to modify the scale we use:

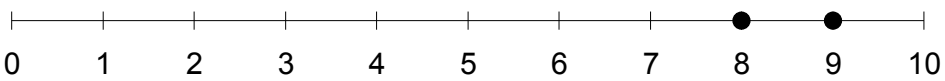
a) $4 < 6$




b) $53 > 27$




c) $9 > 8$




d) $78 < 89$