# CHAPTER 1 NUMBERS AND NOTATION

***Specific outcomes***

- Read and write numbers in words and figures up to billion.
- State the meaning and value of the digit in the given number.
- Write the given set of numbers in ascending and descending order.
- Identify Roman Numeration System.
- Order Roman Numerals.
- Convert from Arabic Numerals to Roman Numerals and vice versa.

## CONCISE INFORMATION

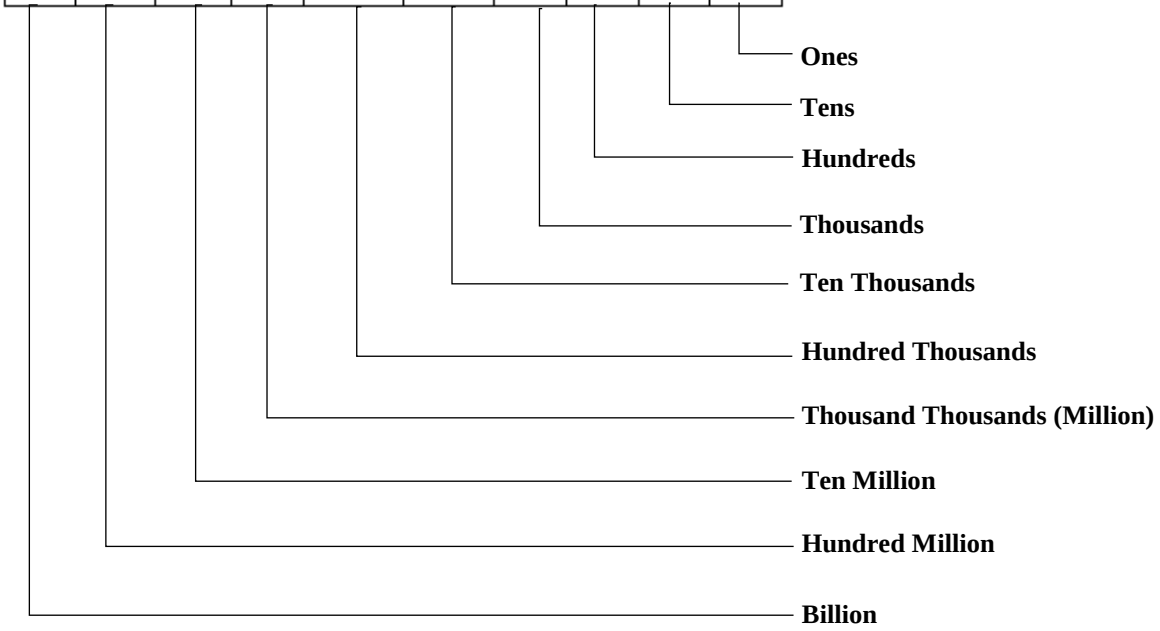
### A. NOTATION AND NUMERATION

- Notation means reading of numbers.
- Numeration means writing of numbers.

### B. READING AND WRITING NUMBERS IN WORDS

PLACE VALUE

| B | HM | TM | M | HTM | TTH | TH | H | T | O |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 0 | 7 | 4 | 4 | 1 | 0 | 6 | 7 | 2 |



The number shown by the place value above can be written in words as:

***Three billion, seventy-four million, four hundred ten thousand, six hundred seventy-two.***

## B. WRITING NUMBERS IN NUMERALS

***Example 1***

Write the following in numerals:

One billion, seven hundred twenty million, thirty-two thousand, five hundred thirty-two.

***Solution***

Proceed as follows:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | 3 | 0 | 0 | 0 | 0 |
| | | | | | | | 2 | 0 | 0 | 0 |
| | | | | | | | | 5 | 0 | 0 |
| | | | | | | | | | 3 | 0 |
| + | | | | | | | | | | 2 |
| | 1 | 7 | 2 | 0 | 0 | 3 | 2 | 5 | 3 | 2 |

**= 1 720 032 532**

## C. MEANING AND VALUE OF THE DIGIT IN A NUMBER

***Example 2***

(i) What is the meaning of the underlined digit in the following number?
7̲2 754
└——— **Ten thousand**

(ii) What is the value of the underlined digit in the following number?
7̲2 754
└——— $7 \times 10\,000 = \mathbf{70\,000}$

## D. ORDERING OF NUMBERS

***Example 3***

(i) Arrange the following numbers in order of size beginning with the smallest.
5 005, 50 500, 505, 5002

**Solution**
**505, 5 002, 5 005, 50 500**

(ii) Arrange the following numbers in order of size beginning with the largest.
2 100, 2 226, 1 666, 1 200

**Solution**
**2 226, 2 100, 1 666, 1 200**

## E. NUMERATION SYSTEM

**Concise information**

Numeration system is a system of writing numbers. There are different numeration systems which were invented long ago. Some of these include:

### (i) The Egyptian Numeration System

This numeration system was invented about 3400BC. In this system, only two principles were used. Namely; repetition and addition.

The following were the symbols used

I = one, ∩ = ten

***Examples***

3 = I I I , 6 = I I I I I I , 10 = ∩ , 12 = ∩ I I ,

35 = ∩ ∩ ∩ I I I I I

### (ii) The Babylonian Numeration System

This numeration system was invented in the Middle East about 3000 BC. It was advancement on the previous numeration system because it had a place value. The symbols used in this numeration system were;

▽ = 1, ∠ = 10

***Example:*** 43 = ∠ ∠ ∠ ∠ ▽ ▽ ▽

### (iii) Hindu – Arabic Numeration System

This is the present-day numeration system which we use. It has its origin from the Hindus in India, and then the Arabs improved upon it. Hence the name **'Hindu – Arabic'.**

The present-day numeration system has ten basic symbols called digits.

These are; **0, 1, 2, 3, 4, 5, 6, 7, 8** and **9**.

You can therefore write any number using the digits above.

**(iv) <u>The Roman Numeration System</u>**

This numeration system was invented by the Roman nation more than 2 000 years ago. It is easy to see that the Romans used letters when they wrote their numbers. They used both subtraction and addition principles to write their numerals. The table below gives the meaning of seven important letters which the Romans used in their numerals. If you can remember this table you know nearly everything you need to know about the meaning of Roman numerals.

| **Roman Numerals** | ***I*** | ***V*** | ***X*** | ***L*** | ***C*** | ***D*** | ***M*** |
|---|---|---|---|---|---|---|---|
| **Arabic Numerals** | **1** | **5** | **10** | **50** | **100** | **500** | **1000** |

**IMPORTANT RULES TO OBSERVE**

(i) When the letter for the smaller number is on the ***right*** of the letter for the bigger number, then the bigger number is made ***more*** by the smaller number.

***Example 4***

VI = 5 + 1 = 6

VIII = 5 + 1 + 1 + 1 = 8

XVI = 10 + 5 + 1 = 16

MC = 1 000 + 100 = 1 100

LIV = 50 + 4 = 54

(ii) When the letter for the smaller number is on the ***left*** of the letter for the bigger number, then the bigger number is made ***less*** by the smaller number.

***Example 5***

IV = 5 – 1 = 4

CM = 1 000 – 100 = 900

XL = 50 – 10 = 40

CD = 500 – 100 = 400

(iii) When writing the numbers, **<u>do not</u>** repeat the same letter more than three times.

**F. ORDERING OF ROMAN NUMBERS**

***Example 6***

(i) Arrange the following Roman numerals in order of size beginning with the smallest.
CD, CMXL, XVIII, LXVI, DIV, XC

**Solution**

**XVIII, XC, LXVI, CD, DIV, CMXL**

(ii) Arrange the following Roman numerals in order of size beginning with the largest.
XXXIV, MCMVI, DCCLXXVII, XXIX, CCCXXIII, MIV

**Solution**

**MCMVI, MIV, DCCLXXVII, CCCXXIII, XXXIV, XXIX**

## G. CONVERSIONS

| *Roman numerals* | ***I*** | ***V*** | ***X*** | ***L*** | ***C*** | ***D*** | ***M*** |
|---|---|---|---|---|---|---|---|
| *Arabic numerals* | **1** | **5** | **10** | **50** | **100** | **500** | **1000** |

**Example 7**

1. Write the number 1 978 in Roman numeral.

***Solution***

Think like this;

1 000 = M
900 = CM
70 = LXX
8 = VIII

Write the Roman numeral in a descending order as follows:

**MCMLXXVIII**

2. Write in Arabic numerals DCCCLXXXIV

**Solution**

Think like this;

D = 500
CCC = 300
L = 50
XXX = 30
IV = 4

Write the Arabic numeral by adding as follows:

$500 + 300 + 50 + 30 + 4 = \mathbf{884}$