

By studying this lesson, you will be able to,

- know the place value corresponding to the position of each digit in a whole number,
- know the value represented by each digit in a whole number and
- read and write numbers up to the billions period.

2.1 Place value

When writing numbers, we most often use the **Hindu-Arabic number system**. In this system, the ten digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are used to write numbers.

When writing **numbers from zero up to nine**, we write one digit in **one position**. As an example, the number three is written as 3 using a digit. That is, **one position** is used to write 3. The greatest number which can be written using only one position is 9.

The number which is one greater than nine is ten. Each number **from ten up to ninety nine** is written using either two distinct digits or one digit twice using **two positions**.

As an example, the number ten is written as 10 using digits. The number ninety nine is written as 99 using digits. That is, the numbers 10 and 99 are written using two positions.

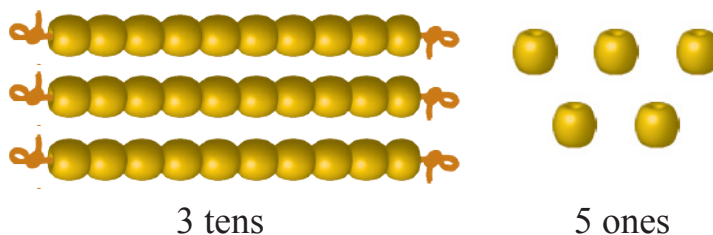
Now, let us consider a couple of numbers written using the digits 3 and 5 in two positions.

When the digits 3 and 5 are written as 35, the number is “thirty five”. When the digits 3 and 5 are written as 53, the number is “fifty three”.

That is, the numbers obtained are different to each other according to the positions of the digits 3 and 5.

Now, let us describe the place value corresponding to the position of each digit in a number and the value represented by each of the digit.

- Using thirty five beads, if chains containing ten beads each are made by threading the beads, there will be three chains of ten beads each, with five beads remaining.



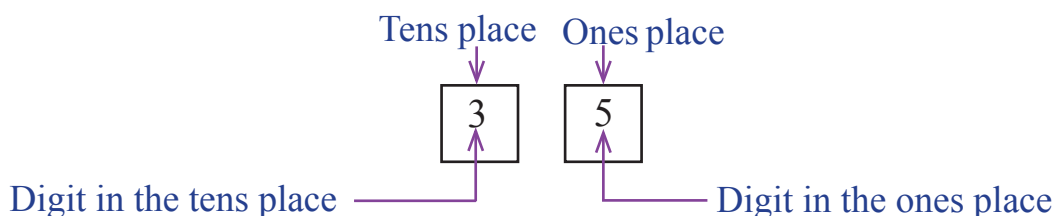
The thirty five beads can be separated into three sets of ten beads each and five sets of one bead each.

That is, Thirty five = 3 tens + 5 ones = 35

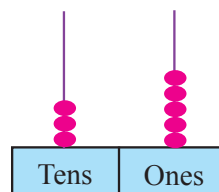
According to the above explanation, the 5 in 35 represents 5 ones. The position which 5 occupies is the '**ones place**'. The place value of the position occupied by the digit 5 is taken as 1.

The 3 in 35 represents 3 tens. The position which 3 occupies is the '**tens place**'. The place value of the position that the digit 3 occupies is 10.

In the following figure, each position has been marked using a square, and the position of each digit of 35 has been indicated.



Let us represent 35 on an abacus.





We learnt that $35 = 3 \text{ tens} + 5 \text{ ones}$.
In the same manner,

$$\begin{aligned} 53 &= 5 \text{ tens} + 3 \text{ ones} = 50 + 3, \\ 65 &= 6 \text{ tens} + 5 \text{ ones} = 60 + 5 \\ \text{and } 99 &= 9 \text{ tens} + 9 \text{ ones} = 90 + 9 \end{aligned}$$

That is, there is a value represented by a digit in a number, according to the position of the digit.

Now, let us find the value represented by each digit of 35.
The value represented by 3 in the number $35 = 3 \text{ tens} = 30$
The value represented by 5 in the number $35 = 5 \text{ ones} = 5$

The maximum value that can be represented by a digit in the ones place is 9.
The maximum value that can be represented by a digit in the tens place is 90.

The maximum number of counters that can be placed on a single rod of an abacus is 9.

Example 1			
Number	Digit	Name of the position of the digit	Value represented by the digit
45	4	Tens place	40
45	5	Ones place	5
30	0	Ones place	0

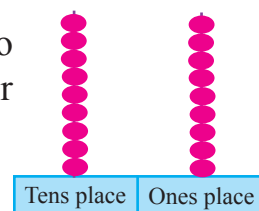
Exercise 2.1

(1) Complete the following table.

Number	Digit in the ones place	Digit in the tens place	Value represented by the digit in the ones place	Value represented by the digit in the tens place
63				
76				
40				
88				

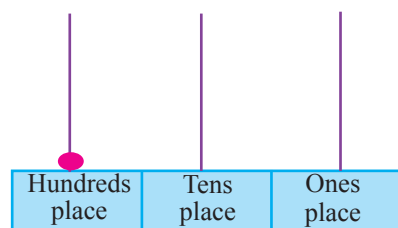
2.2 Place value described further

The greatest number that can be written using two positions is 99. It has 9 tens and 9 ones. The number which is one greater than 99 is hundred.



The tens place and ones place are not sufficient to write the number hundred in digits. Hence the place value corresponding to the position to the left of the tens place is taken as 100 and that position is named as the **hundreds place**.

Therefore hundred is written using three positions as 100.



Number	Hundreds	Tens	Ones
100	1	0	0



Now let us look at numbers which are written by using digits in **three positions**.

Several numbers which can be formed using the digits 2, 4 and 5 are given below. Consider the ways of using 5 in these numbers.

24 <u>5</u>	Two hundred forty <u>five</u>
254	Two hundred <u>fifty</u> four
<u>5</u> 24	<u>Five hundred</u> twenty four

In 245, the digit 5 is in the ones place.

The value represented by 5 in $245 = 5 \text{ ones} = 5$

In 254, the digit 5 is in the tens place.

The value represented by 5 in $254 = 5 \text{ tens} = 50$

In 524, the digit 5 is in the hundreds place.

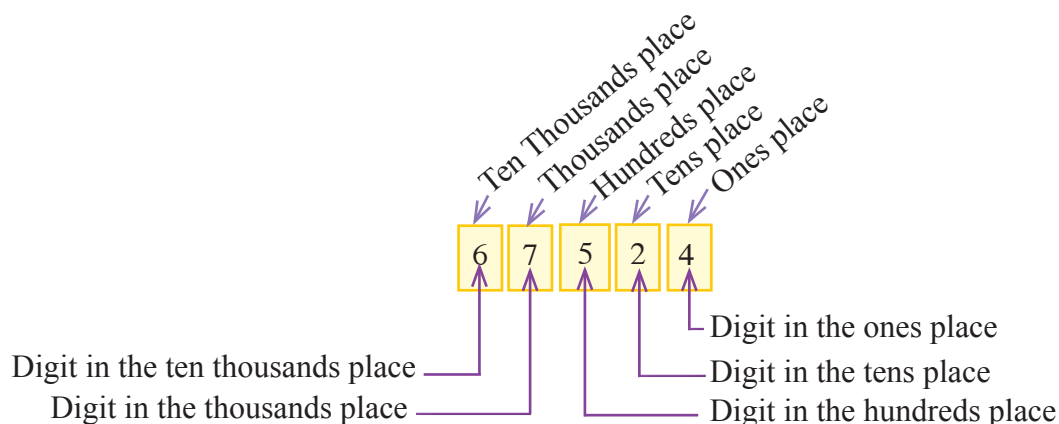
The value represented by 5 in $524 = 5 \text{ hundreds} = 500$

It is clear that the value represented by 5 in the above numbers vary according to the position of 5.

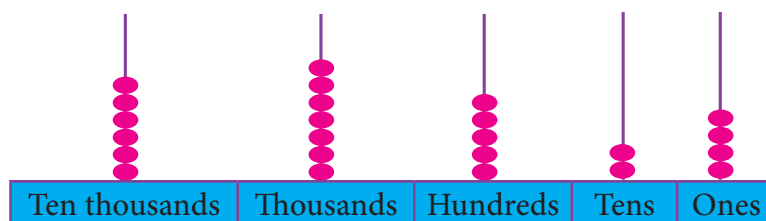
The place value corresponding to the position of each digit in a number from right to left is respectively 1, 10, 100, 1000, 10000 etc.

Accordingly, when two successive digits of a number are considered, the place value corresponding to the position of the digit on the left is ten times the place value corresponding to the position of the digit on the right.

Now, let us name the positions that each of the digits 2, 4, 5, 6 and 7 occupies in the number 67524 by writing these digits in five positions.



Let us represent 67524 on an abacus.



$$67524 = 6 \text{ ten thousands} + 7 \text{ thousands} + 5 \text{ hundreds} + 2 \text{ tens} + 4 \text{ ones}$$

Let us now consider the value represented by each digit in the number 67524.

4 is in the ones place of 67524. The value represented by 4 is 4.

2 is in the tens place of 67524. The value represented by 2 is 20.

5 is in the hundreds place of 67524. The value represented by 5 is 500.

7 is in the thousands place of 67524. The value represented by 7 is 7000.

6 is in the ten thousands place of 67524. The value represented by 6 is 60000.

Example 1

Write down the value represented by each digit in the number 5968.

The value represented by 8 in 5968 = 8 ones = 8

The value represented by 6 in 5968 = 6 tens = 60

The value represented by 9 in 5968 = 9 hundreds = 900

The value represented by 5 in 5968 = 5 thousands = 5000

Exercise 2.2

(1) In the number 99601,

- (i) what is the value represented by 9, which is positioned fourth from the right?
- (ii) what is the place value corresponding to the position of 0?
- (iii) what is the value represented by 0?
- (iv) what is the value represented by 9, which is positioned fifth from the right?

(2) Complete the following table.

Number	Digit	Name of the position of the digit	Value represented by the digit
7940	9		
8095	9		
4568	5		
1273	7		
34856	5		
94512	4		
94512	5		
19085	1		
19085	0		
5436	5		

(3) Write down all the numbers of three positions, that can be written using each of the digits 4, 5 and 8 exactly once. For each of these numbers, write down the place value corresponding to the position of 8 and the value represented by 8.

- (4) Using each of the digits 2, 4, 5 and 9 exactly once, write down,
- the largest possible number of four positions and the value represented by each digit in that number.
 - the smallest possible number of four positions and the value represented by each digit in that number.

2.3 Periods of numbers

The total number of students studying in several schools from grade 6 to 11 is 2836696.

See whether you can read the number of students given in the above statement. How numbers such as the above are read and written in words is described below.

Let us consider the number 2836696.

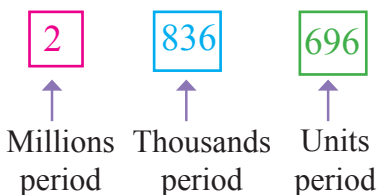
Let us write this number by separating it into groups of three starting from the ones place, as given below.

2 836 696

A group separated in the above manner is known as a **period of numbers or number zone**.

In this separation, the number of positions with digits in the last period, that is, the leftmost period, may be less than three. Only the digit 2 is in the last period of the above number.

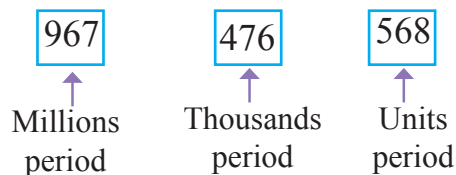
Let us name the periods of this number as follows.



This number is read as **two** million **eight hundred thirty six** thousand **six hundred and ninety six**.

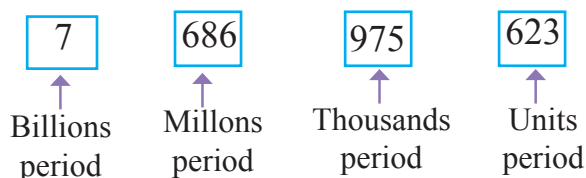
Now, let us consider how the number 967476568 is read.

Let us first separate this number into periods from right to left as follows.



This number is read as **nine hundred sixty seven** million **four hundred seventy six** thousand **five hundred and sixty eight**.

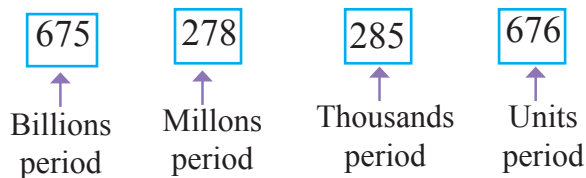
Let us also consider how the number 7686975623 is read. Let us first separate it into periods.



The period which comes after the millions period is named as the **billions period**.

This number is read as **seven** billion **six hundred eighty six** million **nine hundred seventy five** thousand **six hundred and twenty three**.

To find out how the number 675278285676 is read, let us separate it into periods as follows.



This number is read as six hundred seventy five billion two hundred seventy eight million two hundred eighty five thousand six hundred and seventy six.

Writing a number in this manner by separating it into groups of three positions, starting from the ones place and moving towards the represent the number in standard form.

When writing a number in standard form, a small space is left between two periods to separate and identify the periods.

By writing a number in standard form, it can easily be read, and an idea can be obtained about its magnitude.

Note

In some instances, to separate the periods, a comma is written between the periods instead of the small space.

General form	Standard form
2854375	2 854 375
43529644	43 529 644
204007800	204 007 800
8430000000	8 430 000 000

The following table provides several examples of how numbers are read. The way of writing them in words is also the same.

Number	Period			How the number is read /written in words
	Millions	Thousands	Units	
63 276		63	276	Sixty three thousand two hundred seventy six
654 378		654	378	Six hundred fifty four thousand three hundred seventy eight
2 000 375	2	000	375	Two million three hundred seventy five
43 001 000	43	001	000	Forty three million one thousand
204 007 800	204	007	800	Two hundred four million seven thousand eight hundred



The way of reading a number or writing a number in words is known as the **name of the number**.

In most financial documents, the amount is written down in words.

For extra knowledge

Number	Name of the number	Other names used
100 000	Hundred thousand	Lakh
1 000 000	Million	Ten lakhs
10 000 000	Ten million	Crore
100 000 000	Hundred million	Ten crores



Activity 1

(1) Fill in the blanks in the following table.

Number	Name of the number
63 465	
71 005	
125 368	
300 300	
2 178 525 348	
.....	Three million eight hundred thousand two hundred.
.....	Seven billion two hundred fifty million twenty.
.....	Eight billion eight.

Exercise 2.3

(1) Write down each of the following numbers in standard form.

- (i) 72350
 (ii) 55000
 (iii) 27201125
- (iv) 300001279
 (v) 299000001
 (vi) 21345699

- (2) Write down each of the following numbers which have been separated into periods in words.

	Period				The number in words
	Billions	Millions	Thousands	Units	
(i)	10	040	500	000	
(ii)	4	750	050	000	
(iii)	1	010	100	500	
(iv)	75	004	350	050	

- (3) Write down each of the following numbers in standard form and then write them in the table separated into periods.

- (i) 76735 (ii) 864657 (iii) 2769812
 (iv) 47867619 (v) 763156561 (vi) 6746971256
 (vii) 2765231

Number	Period				The number in words
	Billions	Millions	Thousands	Units	

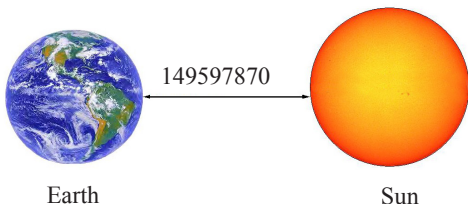
- (4) Write down each of the following numbers in standard form and write down the name of the number as well.

- (i) 50800435000 (ii) 43050800500 (iii) 585000430
 (iv) 300001283 (v) 299000003 (vi) 272000023
 (vii) 100200030000 (viii) 553000000 (ix) 47000005

(5) Write the following numbers, which have been given in words in standard form.

- (i) Four hundred five thousand
- (ii) Three hundred twenty five thousand five hundred
- (iii) Four million eight hundred thousand
- (iv) Six billion sixty million
- (v) Eighteen million twenty four thousand fifty

(6)



The distance between the earth and the sun is 149597870 in kilometers. Write this number in standard form and write it in words too.

(7) A businessman plans to deposit Rs 15006500 in a bank. How does he write this amount in word on a bank slip?

Miscellaneous Exercise

(1) Write down each of the following numbers by expanding in terms of the place value as shown in the example.

Example:

$$6745 = 6 \text{ thousands} + 7 \text{ hundreds} + 4 \text{ tens} + 5 \text{ ones}$$

- (i) 24 (ii) 40 (iii) 546 (iv) 7163 (v) 92651

(2) Complete the following table.

	Number	Digit	Place value of the digit	Value represented by the digit
(i)	80 341	3		
(ii)	64 592	9		
(iii)	200 450	2		
(iv)	185 340	8		
(v)	4 500 000	4		

- 
- (3) Using each of the digits 8, 6, 5, 3 and 1 exactly once, write down
- the largest possible number of four positions and the value represented by 3 in the number.
 - the smallest possible number of four positions and the value represented by 3 in the number.
- (4) Write the following numbers in standard form and write also how they are read.
- | | | |
|-----------------|----------------|-----------------|
| (i) 450050 | (ii) 37504537 | (iii) 212345699 |
| (iv) 8432109640 | (v) 2003040050 | (vi) 143021000 |
- (5) What is the smallest number that can be written using three different digits, which has the millions period as its last period? Write this number in words too.
- (6) What is the greatest number, which has the billions period as its last period? Write this number in words too.

Summary

- The place value corresponding to the position of each digit in a number from right to left is respectively 1, 10, 100, 1000, 10000 etc.
- The value represented by each digit in a number is decided according to the position of the digit in the number.
- It is convenient to read and write a number in words, when that number is written in standard form.