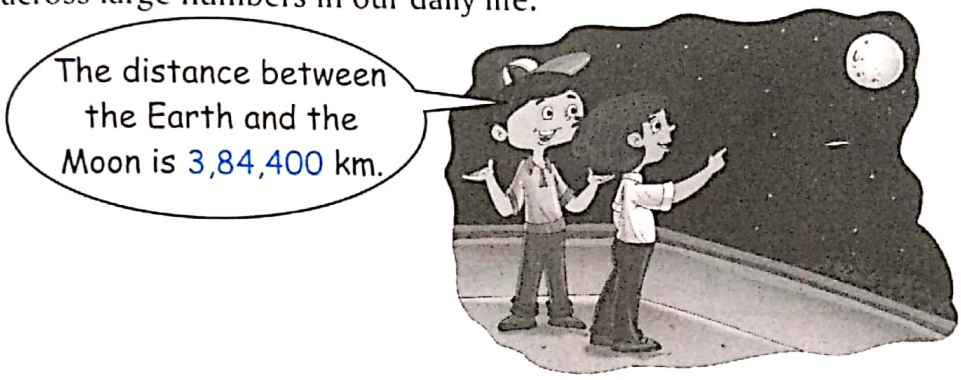
1 Numbers and Numeration

Use **Cordova Smart Class Software** on the **smart board** in class to learn about numbers and numeration.

We come across large numbers in our daily life.



We have already learnt numbers up to lakhs in Class IV. Let us recall.

Exercise-1

Do you remember ....

1. (a) The greatest 5-digit number is ..... .
   (b) The smallest 6-digit number is ..... .
2. **Write the numbers in figures :**
   (a) Twenty-three thousand one hundred ten
   (b) Fifty thousand five hundred forty-four
   (c) Sixty-eight thousand three hundred five
   (d) Seventy-nine thousand seven hundred ninety-seven
   (e) One lakh thirty-eight thousand four hundred
   (f) Four lakh fifty-seven thousand seven hundred eight
3. **Write the number names :**
   (a) 27,538 (b) 7,09,123 (c) 18,678
   (d) 3,25,173 (e) 54,005 (f) 43,725
4. **Write in expanded form :**
   (a) 43,345 (b) 67,193 (c) 1,25,317
   (d) 33,453 (e) 78,290 (f) 5,43,179

5. Use correct sign <, > or = :

(a) 69,123 ☐ 67,297 (b) 15,395 ☐ 15,395

(c) 5,61,179 ☐ 6,61,179 (d) 48,535 ☐ 48,355

(e) 7,03,135 ☐ 7,02,135 (f) 6,73,495 ☐ 6,37,495

6. Fill in the missing numbers :

(a) 3,13,472 ☐ ☐ ☐ 3,13,476

(b) 63,175 ☐ ☐ ☐ 63,179

(c) 17,290 ☐ ☐ ☐ 17,294

(d) ☐ 38,897 ☐ ☐ 38,900

7. Write the place value of the underlined digit in each of the following numbers :

(a) 7̲2,375 (b) 28,5̲90 (c) 1̲,35,400

(d) 4̲9,173 (e) 33,6̲79 (f) 57,175̲

8. Rewrite in ascending order :

(a) 73,293 | 73,923 | 37,923 | 37,293 | 73,392

(b) 1,23,456 | 1,32,456 | 1,23,546 | 1,23,564 | 1,23,654

9. Rewrite in descending order :

(a) 34,173 | 43,731 | 43,137 | 34,371 | 43,317

(b) 5,46,290 | 5,46,029 | 5,46,209 | 5,64,209 | 5,64,290

10. Form the smallest and greatest 6-digit numbers using the digits 1, 2, 0, 4, 9, 6 each only once.

11. Fill in the blanks :

(a) 1 lakh = ☐ thousands

(b) 10 thousands = ☐ hundreds

(c) 1 lakh = ☐ hundreds

(d) 1 thousand = ☐ hundreds

Numbers beyond 9,99,999

We have already learnt that the greatest 6-digit number = 9,99,999.

We read it as 'Nine lakh ninety-nine thousand nine hundred ninety-nine'.

9,99,999 + 1 = 10,00,000 = Smallest 7-digit number

We read it as 'ten lakh'.

20,00,000 is read as 'twenty lakh'.
80,00,000 is read as 'eighty lakh'.

Now the greatest 7-digit number is 99,99,999.

We read it as 'ninety-nine lakh ninety-nine thousand nine hundred ninety-nine'.

99,99,999 + 1 = 1,00,00,000 = Smallest 8-digit number

We read it as 'one crore'.

3,00,00,000 is read as 'three crore'.
9,00,00,000 is read as 'nine crore'.

The greatest 8-digit number is 9,99,99, 999.

We read it as 'Nine crore ninety-nine lakh ninety-nine thousand nine hundred ninety-nine'.

9,99,99,999 + 1 = 10,00,00,000 = Smallest 9-digit number

We read it as 'ten crore'.

40,00,00,000 is read as'forty crore'.
80,00,00,000 is read as'eighty crore'.

Indian Place Value System

Period	Crores		Lakhs		Thousands		Ones		
Places	TC	C	TL	L	TTh	Th	H	T	O
1,00,000 (one lakh)				1	0	0	0	0	0
10,00,000 (ten lakh)			1	0	0	0	0	0	0
1,00,00,000 (one crore)		1	0	0	0	0	0	0	0
10,00,00,000 (ten crore)	1	0	0	0	0	0	0	0	0

In this system, there are nine places grouped into four periods.

Crores	Lakhs	Thousands	Ones

We start from the **ones period** and move left to the **thousands period**, **lakhs period** and finally **crores period**. The ones period has three places whereas the thousands, lakhs and crores periods have two places each.

Reading and Writing a Number

While reading a number in the Indian system, all the digits in the same period are read together and the name of the period (except the ones) is read along with them.

While writing a number in the Indian system, we usually put a comma after every period to separate the periods. This helps us read the number easily.

Example 1 : Write the following in words :

(a) 24,57,175 (b) 7,31,23,058

Solution : Let us arrange the digits in the Indian place value chart as follows :

Crores		Lakhs		Thousands		Ones		
TC	C	TL	L	TTh	Th	H	T	O
		2	4	5	7	1	7	5
	7	3	1	2	3	0	5	8

(a) Twenty-four lakh fifty-seven thousand one hundred seventy-five.

(b) Seven crore thirty-one lakh twenty-three thousand fifty-eight.

Example 2 : Write in figures :

Three crore fifteen lakh seventy-two thousand three hundred five.

Solution : We make four periods and write the digits in the respective places from the number name.

C		L		Th		O	
0	3	1	5	7	2	3	0	5

The required number is 3,15,72,305.

International Place Value System

Period	Millions			Thousands			Ones		
Places	HM	TM	M	HTh	TTh	Th	H	T	O
100,000 (Hundred thousand)				1	0	0	0	0	0
1,000,000 (One million)			1	0	0	0	0	0	0
10,000,000 (Ten million)		1	0	0	0	0	0	0	0
100,000,000 (Hundred million)	1	0	0	0	0	0	0	0	0

In the International system, we have nine places grouped into three periods.

Millions	Thousands	Ones

We start from the **ones** period and move left to the **thousands** period and finally the **millions** period. Each period has three places.

Example 1 : Write the following in words :

(a) 1,235,178 (b) 18,357,099

Solution : Let us arrange the digits in the International place value chart.

Millions			Thousands			Ones		
HM	TM	M	HTh	TTh	Th	H	T	O
		1	2	3	5	1	7	8
	1	8	3	5	7	0	9	9

(a) One million two hundred thirty-five thousand one hundred seventy-eight.

(b) Eighteen million three hundred fifty-seven thousand ninety-nine.

Example 2 : Write in figures :

(a) Three hundred five million twenty-three thousand forty-five.

(b) Forty-seven million one hundred forty-five thousand four hundred seventy-two.

Solution : We make three periods and write the digits in the respective places as per the International place value chart.

Millions			Thousands			Ones		
HM	TM	M	HTh	TTh	Th	H	T	O
3	0	5	0	2	3	0	4	5
	4	7	1	4	5	4	7	2

The numbers are : (a) 305,023,045 (b) 47,145,472

Comparison between Indian and International Place Value System

Let us make a comparison between the Indian and International place value systems.

Crores		Lakhs		Thousands		Ones			
Ten Crores 10,00,00,000	Crores 1,00,00,000	Ten Lakhs 10,00,000	Lakhs 1,00,000	Ten Thousands 10,000	Thousands 1000	Hundreds 100	Tens 10	Ones 1	Indian System
Hundred Millions 100,000,000	Ten Millions 10,000,000	Millions 1,000,000	Hundred Thousands 100,000	Ten Thousands 10,000	Thousands 1000	Hundreds 100	Tens 10	Ones 1	International System
Millions			Thousands			Ones			

We see that,

1. 10 crore = 100 million
2. 1 crore = 10 million
3. 10 lakh = 1 million
4. 1 lakh = 100 thousand

Exercise-2

Use Cordova Smart Class Software on the smart board in class to do Exercise.

1. Write each of the following numbers in words in Indian place value system :
   (a) 4,83,745 (b) 12,36,356 (c) 38,56,989
   (d) 2,25,37,188 (e) 5,67,33,888 (f) 53,49,38,125
2. Write each of the following numbers in words in International place value system :
   (a) 2,896,450 (b) 5,300,649 (c) 40,500,179
   (d) 98,256,188 (e) 123,453,536 (f) 256,545,198
3. Write the following in figures :
   (a) Two million seven hundred forty-three thousand one hundred forty-nine
   (b) Seven crore five lakh forty-seven thousand five hundred five
   (c) Fifty-six crore fifty-five lakh fifty-four thousand five hundred thirty-two
   (d) Twenty-two million two hundred forty thousand seven hundred eighty-three
   (e) Seventy-one crore eighty-six lakh forty-seven thousand one hundred five
   (f) One hundred five million four thousand nine hundred ninety-nine
4. Rewrite the following numbers in Indian system :
   (a) 3,891,402 (b) 42,187,005 (c) 67,210,200
   (d) 7,000,274 (e) 149,531,030 (f) 97,999,897
5. Rewrite the following numbers in International system :
   (a) 8,12,415 (b) 15,03,469 (c) 73,47,149
   (d) 85,73,111 (e) 11,12,23,345 (f) 19,23,43,560

Face value and Place value

Face value of a digit in a number is the digit itself, whatever place it occupies in the number.

Examples : (a) The face value of 7 is 7.
(b) The face value of 3 is 3.

Place value of a digit in a number depends on the place it occupies in the number.

> Place value of a digit in a number
> = Face value × value of the place it occupies in the place value chart

Remember :
The place value of 0 is always zero irrespective of the place it occupies.

Expanded Form

Consider the number 31,23,456.

The place value of each digit of the number is given by :

TL	L	T Th	Th	H	T	O
3	1	2	3	4	5	6

$6 \times 1 = 6 = 6$ ones

$5 \times 10 = 50 = 5$ tens

$4 \times 100 = 400 = 4$ hundreds

$3 \times 1000 = 3000 = 3$ thousands

$2 \times 10{,}000 = 20{,}000 = 20$ thousands

$1 \times 1{,}00{,}000 = 1{,}00{,}000 = 1$ lakh

$3 \times 10{,}00{,}000 = 30{,}00{,}000 = 30$ lakhs

Thus, $31{,}23{,}456 = 3 \times 10{,}00{,}000 + 1 \times 1{,}00{,}000 + 2 \times 10{,}000 + 3 \times 1000 + 4 \times 100 + 5 \times 10 + 6 \times 1$

$= 30{,}00{,}000 + 1{,}00{,}000 + 20{,}000 + 3000 + 400 + 50 + 6$

This is the expanded form of the number 31,23,456.

Expanded form of a number is the sum of the place values of its digits.

Example 1 : Write the place value of 3 in each of the following numbers :

(a) 7,32,456 (b) 1,23,45,578 (c) 3,11,85,246

Solution : Let us arrange the given numbers in the place value chart.

Number	TC	C	TL	L	TTh	Th	H	T	O
7,32,456				7	3	2	4	5	6
1,23,45,578		1	2	3	4	5	5	7	8
11,85,346		3	1	1	8	5	2	4	6

(a) Place value of 3 in 7,32,456 $= 3 \times 10{,}000 = 30{,}000$

(b) Place value of 3 in 1,23,45,578 $= 3 \times 1{,}00{,}000 = 3{,}00{,}000$

(c) Place value of 3 in 3,11,85,246 $= 3 \times 1{,}00{,}00{,}000 = 3{,}00{,}00{,}000.$

Example 2 : Find the difference of the place values of two 5s in 35,12,510.

Solution : Place value of 1st 5 at the hundreds place $= 5 \times 100 = 500$

Place value of 2nd 5 at the lakhs place $= 5 \times 1{,}00{,}000 = 5{,}00{,}000$

Difference $= 5{,}00{,}000 - 500 = 4{,}99{,}500$

Example 3 : Write the expanded form of 38,20,782.

Solution :

TL	L	TTh	Th	H	T	O
3	8	2	0	7	8	2

$2 \times 1 = 2$

$8 \times 10 = 80$

$7 \times 100 = 700$

$0 \times 1000 = 0$

$2 \times 10,000 = 20,000$

$8 \times 1,00,000 = 8,00,000$

$3 \times 10,00,000 = 30,00,000$

So, 38,20,782 = 30,00,000 + 8,00,000 + 20,000 + 700 + 80 + 2.

Exercise-3

Use **Cordova Smart Class Software** on the **smart board** in class to do Exercise.

1. **Find the place value of :**
   (a) 3 in 8,35,182 (b) 4 in 36,48,37,111 (c) 6 in 6,82,32,175
   (d) 0 in 2,05,35,317 (e) 7 in 20,07,05,004 (f) 5 in 7,06,25,320
2. Find the difference in the place values of two 8s in the number 25,83,82,127.
3. Find the sum of the place values of three 9s in the number 19,29,029.
4. Find the product of the place value and face value of 7 in the number 33,75,103.
5. **Write the expanded form of each of the following numbers :**
   (a) 75,56,063 (b) 35,82,189 (c) 12,35,17,989
   (d) 81,12,633 (e) 28,35,17,893 (f) 6,78,45,631
6. **Write the following numbers in short form :**
   (a) 8,00,00,000 + 70,00,000 + 6,00,000 + 50,000 + 4,000 + 300 + 20 + 1
   (b) 10,00,00,000 + 20,00,000 + 30,000 + 400 + 5
   (c) 60,00,000 + 9,00,000 + 10,000 + 5,000 + 400 + 60 + 5
   (d) 7,00,00,000 + 80,00,000 + 40,000 + 200 + 3
   (e) 10,00,00,000 + 40,00,000 + 20,000 + 700 + 7
   (f) 80,00,000 + 7,00,000 + 50,000 + 3,000 + 40 + 4

Successor and Predecessor of a Number

The successor of a given number is 1 more than the number.
It comes just after the given number.
The predecessor of a given number is 1 less than the number.
It comes just before the given number.

Successor = Number + 1
Predecessor = Number - 1

Predecessor	Number	Successor
2,92,327	2,92,328	2,92,329
9,99,998	9,99,999	10,00,000
15,23,45,110	15,23,45,111	15,23,45,112
24,57,21,199	24,57,21,200	24,57,21,201

Comparison of Numbers

1. **When the two numbers have different number of digits :**

The number with more digits is greater.

Example : Compare 2,34,789 and 34,78,917.

C	TL	L	T Th	Th	H	T	O	
		2	3	4	7	8	9	6 digits
	3	4	7	8	9	1	7	7 digits

Thus, 2,34,789 < 34,78,917.

2. **When the two numbers have the same number of digits :**

We start comparing the digits from the leftmost place in both numbers. The number with the greater digit in the same place is greater.

Example : Compare 15,97,285 and 15,98,285.

C	TL	L	T Th	Th	H	T	O	
	1	5	9	7	2	8	5	7 digits
	1	5	9	8	2	8	5	7 digits

Both are 7-digit numbers. We start from the leftmost place and compare the digits of the two numbers.

7 thousands < 8 thousands

Thus, 15,97,285 < 15,98,285.

Ascending and Descending Order

Ascending order means arranging numbers from smallest to greatest.

Descending order means arranging numbers from greatest to smallest.

Example : Arrange the following numbers in ascending and descending order :

4,256,127 ; 4,266,137 ; 4,267,128 ; 4,257,179

Solution : We first write the numbers in the place value chart.

HM	TM	M	HTh	TTh	Th	H	T	O
		4	2	5	6	1	2	7
		4	2	6	6	1	3	7
		4	2	6	7	1	2	8
		4	2	5	7	1	7	9

Comparing the numbers, we write the numbers in ascending order as follows :

4,256,127 < 4,257,179 < 4,266,137 < 4,267,128

The numbers in descending order are as follows :

4,267,128 > 4,266,137 > 4,257,179 > 4,256,127

Exercise-4

Use Cordova Smart Class Software on the smart board in class to do Exercise.

1. Write the predecessor and successor of the following numbers :

   (a) 7,861,070 (b) 11,257,890 (c) 18,251,200

   (d) 91,81,87,999 (e) 6,789,989 (f) 59,69,79,899

2. Compare the numbers using > , < or = :

   (a) 3,75,412 ☐ 3,57,412 (b) 35,621,717 ☐ 35,621,716

   (c) 1,756,215 ☐ 1,756,315 (d) 9,99,899 ☐ 9,99,998

3. Arrange the following numbers in ascending order :

   (a) 21,15,005 ; 21,51,005 ; 21,51,500 ; 21,15,500

   (b) 5,903,563 ; 5,093,563 ; 5,390,563 ; 5,039,563

   (c) 11,12,13,145 ; 11,21,13,145 ; 11,12,31,154 ; 11,12,31,145

4. Arrange the following numbers in descending order :

(a) 43,006,789 ; 43,060,789 ; 43,600,789 ; 43,600,879

(b) 7,431,865 ; 7,134,865 ; 7,314,865 ; 7,413,865

(c) 11,28,35,989 ; 12,28,35,989 ; 11,82,35,989 ; 12,28,53,989

Formation of Greatest and Smallest Numbers

To get the **greatest** number, we arrange the given digits in **descending order**.

To get the **smallest** number, we arrange the given digits in **ascending order**.

Example 1 : Write the greatest and the smallest 7-digit numbers using 4, 7, 6, 1, 3, 5 and 9. (without repeating the digits).

Solution : Arranging the digits in descending order, we get 9, 7, 6, 5, 4, 3, 1.

The greatest number is 97,65,431.

Arranging the digits in ascending order, we get 1, 3, 4, 5, 6, 7, 9.

The smallest number is 13,45,679.

Example 2 : Write the greatest and the smallest 7-digit numbers using the digits 1, 2, 3, 5, 7 and 9. (You may repeat a digit).

Solution : Arranging the digits in descending order, we get 9, 7, 5, 3, 2, 1.

Here, greatest digit is 9, so, we shall repeat it to make the greatest number.

The greatest 7-digit number is 99,75,321.

Arranging the digits in ascending order, we get 1, 2, 3, 5, 7, 9.

Here, smallest digit is 1, so, we shall repeat it to make the smallest number.

The smallest 7-digit number is 11,23,579.

Exercise-5

Use **Cordova Smart Class Software** on the **smart board** in class to do Exercise.

1. **Write the smallest and greatest 7-digit numbers (without repeating a digit) using the following digits :**

   (a) 5, 4, 3, 7, 1, 0, 2 **(b)** 9, 8, 3, 4, 5, 2, 7

2. **Write the greatest and smallest 7-digit numbers (you may repeat a digit) using the following digits :**

   (a) 4, 3, 0, 5, 9, 8 **(b)** 2, 6, 7, 1, 3, 8

HOTS Question

Form the smallest and greatest 9-digit numbers using three different digits.