Indian Place-Value Chart

Crores			Lakhs		Thousands		Ones		
HC	TC	C	TL	L	TTh	Th	H	T	O
1	0	0	0	0	0	0	0	0	0

100 crore = 100,00,00,000

International Place-Value Chart

Billions	Millions			Thousands			Ones		
B	HM	TM	M	HTh	TTh	Th	H	T	O
1	0	0	0	0	0	0	0	0	0

1 billion = 1,000,000,000

100 crore = 1 billion

Indian System

Crores			Lakhs		Thousands		Ones		
Hundred Crores	Ten Crores	Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
100,00,00,000 10 Digits	10,00,00,000 9 Digits	1,00,00,000 8 Digits	10,00,000 7 Digits	1,00,000 6 Digits	10,000 5 Digits	1,000 4 Digits	100 3 Digits	10 2 Digits	1 1 Digit

International System

Billions			Millions			Thousands			Ones		
Hundred Billions	Ten Billions	Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
100,000,000,000 12 Digits	10,000,000,000 11 Digits	1,000,000,000 10 Digits	100,000,000 9 Digits	10,000,000 8 Digits	1,000,000 7 Digits	100,000 6 Digits	10,000 5 Digits	1,000 4 Digits	100 3 Digits	10 2 Digits	1 1 Digit

Indian System	International System
1,00,000 = One lakh	100,000 = One hundred thousand
10,00,000 = Ten lakh	1,000,000 = One million
1,00,00,000 = One crore	10,000,000 = Ten million
10,00,00,000 = Ten crore	100,000,000 = One hundred million
100,00,00,000 = One hundred crore	1,000,000,000 = One billion

In this way, we can go on counting up to bigger and bigger numbers. All counting numbers are known as **natural numbers**. All counting numbers, along with zero, are known as **whole numbers**.

Example 1: Write the numeral 4736804109 by inserting commas to separate periods in both the systems.

Indian System

HC	TC	C	TL	L	TTh	Th	H	T	O
4	7	3	6	8	0	4	1	0	9

Write: 473,68,04,109

Read: Four hundred seventy-three crore, sixty-eight lakh, four thousand, one hundred nine

International System

B	HM	TM	M	HTh	TTh	Th	H	T	O
4	7	3	6	8	0	4	1	0	9

Write: 4,736,804,109

Read: Four billion, seven hundred thirty-six million, eight hundred four thousand, one hundred nine

Example 2: Write the numeral 3426071269 in both the systems of numeration.

Indian System

HC	TC	C	TL	L	TTh	Th	H	T	O
3	4	2	6	0	7	1	2	6	9

Write: 342,60,71,269

Read: Three hundred forty-two crore, sixty lakh, seventy-one thousand, two hundred sixty-nine

International System

B	HM	TM	M	HTh	TTh	Th	H	T	O
3	4	2	6	0	7	1	2	6	9

Write: 3,426,071,269

Read: Three billion, four hundred twenty-six million, seventy-one thousand, two hundred sixty-nine

By convention, the Indian place-value chart goes up to the crores period.

For the purpose of learning, we will follow the Indian place-value system in this book.

> The smallest 11-digit number in the Indian place-value chart is 1000 crore = 1000,00,00,000
> The smallest 11-digit number in the international place-value chart is 10 billion = 10,000,000,000
> The smallest 12-digit number in the Indian place-value chart is 10,000 crore = 10000,00,00,000
> The smallest 12-digit number in the international place-value chart is 100 billion = 100,000,000,000

Example 3: What is the place value of the digit 4 in 3,42,33,870 in the Indian place-value system?

The digit 4 is in the ten lakhs place. Thus, its place value is 40,00,000.

Moving up in Place Value Charts

To move up to larger place values in a place-value chart, each place value is successively multiplied by 10.

$1 = O$

$1 \times 10 = T$

$1 \times 10 \times 10 = H$

$1 \times 10 \times 10 \times 10 = Th$

Try This!

Fill in the boxes.

$1 \times 10 \times 10 \times 10 \times 10 = \boxed{TTh}$

$1 \times 10 \times 10 \times 10 \times 10 \times 10 = \boxed{}$

$1 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = \boxed{}$

$1 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = \boxed{}$

Let us learn about conversions.

7 ones × 100 = 7 hundred

9 lakh × 100 = 9 crore

9 thousand × 10,000 = 9 crore

9 crore ÷ 10,000 = 9 thousand

9 lakh ÷ 100 = 9 thousand

Remember

• To move up to larger place values in a place-value chart, successive place values are multiplied by 10.
• To move down to smaller values in a place-value chart, successive place values are divided by 10.

Expanded Form

Now that we know the place values of large numbers up to 10 digits, we can write the numbers in the expanded form as follows. Let us write 38,63,72,925 in expanded form.

38,63,72,925 = 30,00,00,000 + 8,00,00,000 + 60,00,000 + 3,00,000 + 70,000 + 2,000 + 900 + 20 + 5

In words, it is read as 'thirty-eight crore, sixty-three lakh, seventy-two thousand, nine hundred twenty-five'.

Exercise 1.1

1. Separate the periods by inserting commas according to the two systems of numeration. One has been done for you.

S. no.	Number	Indian System	International System
(a)	108717	1,08,717	108,717

(b) 1360   (c) 51743   (d) 866715   (e) 2300652   (f) 65821689

(g) 10000000   (h) 356324219   (i) 7438892105   (j) 1010101010   (k) 8936510741

2. Write the following numbers in the Indian place-value chart.

S. no.	Number	Crores			Lakhs		Thousands		Ones		
		HC	TC	C	TL	L	TTh	Th	H	T	O
(a)	78637										
(b)	892107										
(c)	6318917										
(d)	3264589										
(e)	111111111										
(f)	17439247										
(g)	20000000										
(h)	146037507										
(i)	271002090										
(j)	6890423180										

3. Write the following numbers in the international place-value chart.

S. no.	Number	Billions		Millions			Thousands			Ones		
		TB	B	HM	TM	M	HTh	TTh	Th	H	T	O
(a)	68946											
(b)	713894											
(c)	2017847											
(d)	79417608											
(e)	51015200											
(f)	600000000											
(g)	123456789											
(h)	246813570											
(i)	113344557											
(j)	18888888888											

4. Observe the periods and then write the relevant number system and the number in words.

S. no.	Number	System	Number in Words
(a)	4,278,445,106	International	Four billion, two hundred seventy-eight million, four hundred forty-five thousand, one hundred six
(b)	1,58,63,572	Indian	One crore, fifty-eight lakh, sixty-three thousand, five hundred seventy-two

(c) 1,73,405   (d) 808,808   (e) 600,000   (f) 9,00,000   (g) 91,21,555

(h) 3,604,879   (i) 67,478,214   (j) 8,71,08,413   (k) 101,10,10,100   (l) 5,635,780,946

5. Fill in the blanks to complete the conversions.
   (a) 3 ones × 1,00,000 = 3 lakh
   (b) 7 hundred × _____ = 70 lakh
   (c) 1 lakh × _____ = 10 lakh
   (d) 4 thousand × _____ = 4 crore
   (e) 6 lakh × _____ = 6 crore
   (f) 8 crore ÷ _____ = 8 lakh
   (g) 2 crore ÷ _____ = 2 thousand
   (h) 5 lakh ÷ _____ = 5 one
   (i) 3 thousand ÷ _____ = 3 ten
   (j) 1 crore ÷ _____ = 1 one

6. What is the place value of 1 in each of the following numerals?
   (a) 81,32,604
   (b) 63,91,754
   (c) 21,88,94,047
   (d) 17,86,93,206
   (e) 41,29,00,000
   (f) 100,00,00,000

7. Write the expanded form of the following numbers.
   (a) 6,86,794
   (b) 5,70,104
   (c) 8,08,080
   (d) 57,42,500
   (e) 79,50,005
   (f) 3,86,27,394
   (g) 58,73,49,715
   (h) 90,00,10,120
   (i) 300,53,73,233
   (j) 306,78,55,612

8. Fill in the blanks.
   (a) __Greatest__ 5-digit number + 1 = Smallest 6-digit number
   (b) _____ 6-digit number + 1 = Smallest 7-digit number
   (c) Greatest 8-digit number + 1 = _____ 9-digit number
   (d) Smallest _____ digit number −1 = Greatest 8-digit number
   (e) Smallest 8-digit number − 1 = _____ 7-digit number

COMPARISON OF LARGE NUMBERS

When we compare two numbers, we know that the number with more digits is the greater number. If both the numbers have the same number of digits, then the number with the greater digit in the largest place value is the greater number. Before comparing large numbers, let us learn about successors and predecessors.

Successors and Predecessors

The successor of a given number is 1 more than the given number. The predecessor of a given number is 1 less than the given number.

Let us find out the successor and predecessor of the following numbers: 38,26,940; 3,00,00,000 and 99,99,99,999.

Predecessor (Number − 1)	Number	Successor (Number + 1)
38,26,939	38,26,940	38,26,941
2,99,99,999	3,00,00,000	3,00,00,001
99,99,99,998	99,99,99,999	100,00,00,000

Comparing Numbers

Recall the rules for comparison of numbers.

1. The number with more digits is the greater number.
2. If both numbers have equal number of digits, then the number that has greater digit in the largest place is the greater number.

Example 4: Let us compare the numbers 9,89,89,898 and 9,89,98,989.

Write the numbers in the place-value chart. Circle the greater digit in the largest place value.

C	TL	L	TTh	Th	H	T	O
9	8	9	8	9	8	9	8
9	8	9	⑨	8	9	8	9

1. Both the numbers are 8-digit numbers.
2. Looking at the numbers from left to right, the first three digits are the same. The first circled digit is 9 in the TTh column of the second number. Compare the place values of the digits at this place for both the numbers.

As 90,000 > 80,000

9,89,98,989 > 9,89,89,898

Ascending and Descending Orders

Example 5: Arrange the following numbers in ascending order:

1,21,21,211   12,12,12,121   2,12,12,121   11,22,11,222   22,11,22,111

First, write the numbers in the place-value chart.

1. Begin with the two 8-digit numbers: 1,21,21,211 and 2,12,12,121.
2. Compare the digits at the crores place: 1,21,21,211 and 2,12,12,121.
   Value at crores place in 1,21,21,211 is 1,00,00,000.
   Value at crores place in 2,12,12,121 is 2,00,00,000.
   So, the smallest number is 1,21,21,211.

Crores		Lakhs		Thousands		Ones		
TC	C	TL	L	TTh	Th	H	T	O
	1	2	1	2	1	2	1	1
1	2	1	2	1	2	1	2	1
	2	1	2	1	2	1	2	1
1	1	2	2	1	1	2	2	2
2	2	1	1	2	2	1	1	1

3. Compare the digits at the ten crores and crores places of the remaining 9-digit numbers:
   1 ②,12,12,121
   1 ①,22,11,222
   2 2,11,22,111

The largest number out of these three is 22,11,22,111 and the smallest is 11,22,11,222. Thus, the given five numbers in ascending order are:

1,21,21,211; 2,12,12,121; 11,22,11,222; 12,12,12,121; 22,11,22,111

Example 6: Arrange the 10 digits 3, 2, 6, 7, 8, 4, 0, 1, 9, 5 to make the greatest and the smallest 10-digit numbers possible without repetition of digits.

As repetition of digits is not allowed, starting from the left, we write the greatest digit available and follow up with smaller digits successively to make the greatest 10-digit number possible, i.e., 987,65,43,210.

To write the smallest 10-digit number, starting from the left, we write the smallest digit available and follow up with greater digits successively. But if we begin with 0, the number 0123456789 will be a 9-digit number. So, we start with the next smallest digit available, which is 1 in this example, and write 0 next to it to make the smallest 10-digit number possible, i.e., 102,34,56,789.

Try This!

Write the following digits on the train coaches such that it forms the smallest possible 9-digit number. The digits are:

5   6   0   4   3   7   8   1   2

Only one digit can be written on each coach.
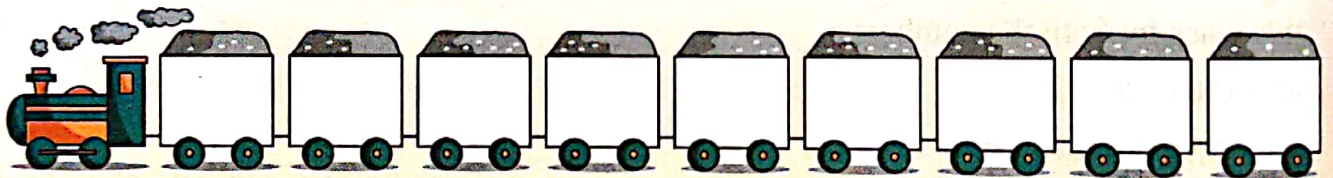
ROUNDING NUMBERS

Manisha measured her height as 128 cm 6 mm but her brother measured it as 128 cm 8 mm. However, the teacher told her that she would not get the accurate measure. She can consider her approximate height as 128 cm.

When someone asks your age, what would you reply? 11 years or 11 years 5 months or 11 years 5 months 10 days or even correct to hours. The accuracy you like to talk about your age can go up to even seconds. But is it useful? Now consider the distance between your house and your school. Your estimated distance can be in metres or kilometres depending on how far your school is. So depending on the requirement, we consider a suitable unit vis-á-vis accuracy. Mathematically, we call it rounding off to the level of accuracy. For example, your actual age may be 11 years 5 months and 10 days which can be rounded off to 11 years. Similarly, your school may actually be 2 km and 342 m away. But, we can simply say 2 km (as accuracy to kilometre would suffice).

A number is rounded off to get an approximate number, which means that it is 'about' or 'close to' the exact number.

To round off a number to the nearest desired place value, we should consider the digit at the next lower place value and compare it with 5.

Then, observe the following rules:

- If the digit at the lower place value is less than 5, we round off the given number by **rounding down**, i.e., by keeping the digit at the desired place same and writing '0' in all the lower place values.
- If the digit at the lower place value is equal to or greater than 5, we round off the given number by **rounding up**, i.e., by adding 1 to the digit at the desired place value and writing '0' in all the lower place values.

This will become clear from the examples that follow.

Rounding Off to the Nearest Ten

To round off to the nearest ten, we compare the digit at the ones place with 5. If the digit at ones place is less than 5, we round off the number by replacing the digit in the ones place by 0. This is rounding down.

Example 7: Round off each of the following numbers to the nearest ten.

Number	Digit in ones place	Rounded Down to
371	1 < 5 (Rounded down)	370
2584	4 < 5 (Rounded down)	2580

Try This!

Round off the following to the nearest ten.
(a) 563   (b) 789
(c) 4674   (d) 8015

If the digit in the ones place lies from 5 to 9, we round off the number by increasing the digit at tens place by 1 and writing 0 in the ones place. This is rounding up.

Number	Digit in ones place	Rounded Up to
619	9 > 5 (Rounded up)	620
7645	5 = 5 (Rounded up)	7650

Rounding Off to the Nearest Hundred

To round off numbers to the nearest hundred, we compare the digit at the tens place with 5. If the digit in the tens place is less than 5, we replace the digits in the tens and ones places by two zeros.

Try This!

Round off the following to the nearest hundred.
(a) 7215   (b) 169543
(c) 5163   (d) 816488

Example 8: Round off each of the following numbers to the nearest hundred.

Number	Digit in tens place	Rounded Down to
6749	4 < 5 (Rounded down)	6700
906815	1 < 5 (Rounded down)	906800

If the digit in the tens place lies from 5 to 9, we round off the number by adding 1 to the digit at hundreds place and writing zeros in the tens and ones places.

Number	Digit in tens place	Rounded Up to
2151	5 = 5 (Rounded up)	2200
105360	6 > 5 (Rounded up)	105400

Rounding Off to the Nearest Thousand

To round off numbers to the nearest thousand, we compare the digit at hundreds place with 5. If the digit in the hundreds place is less than 5, we replace the digits in the hundreds, tens and ones places by three zeros.

Example 9: Round off each of the following numbers to the nearest thousand.

Number	Digit in hundreds place	Rounded Up to
6199	1 < 5 (Rounded down)	6000
78435	4 < 5 (Rounded down)	78000
106370	3 < 5 (Rounded down)	106000

If the digit in the hundreds place lies from 5 to 9, we round up the number by adding 1 to the digit at the thousands place and writing zeros in the hundreds, tens and ones places.

Number	Digit in hundreds place	Rounded Down to
331729	7 > 5 (Rounded up)	332000
2963840	8 > 5 (Rounded up)	2964000

Try This!

Round off the following to the nearest thousand.
(a) 7239   (b) 156785
(c) 117422   (d) 98164500

Exercise 1.2

1. Complete the following series of numbers by writing the successors.

6,49,38,214	6,49,38,215	**6,49,38,216**	**6,49,38,217**	**6,49,38,218**
1,86,92,217	1,86,92,218			
9,99,99,993	9,99,99,994			
22,43,68,796	22,43,68,797			
38,62,99,998	38,62,99,999			
99,99,99,996	99,99,99,997			

2. Complete the following series of numbers by writing the predecessors.

2,39,48,134	**2,39,48,135**	**2,39,48,136**	2,39,48,137	2,39,48,138
			6,54,79,299	6,54,79,300
			45,07,34,004	45,07,34,005
			88,70,47,232	88,70,47,233
			1,00,00,003	1,00,00,004
			33,00,00,001	33,00,00,002

3. Fill in the boxes with > or < signs to compare the numbers.

(a) 68,71,23,142 ☐ 6,87,123   (b) 22,87,13,297 ☐ 22,88,13,297

(c) 41,14,41,141 ☐ 14,41,14,414   (d) 238,46,70,193 ☐ 23,84,67,019

(e) 387,21,09,564 ☐ 387,20,19,564   (f) 110,01,01,000 ☐ 110,10,10,000

(g) 53,28,365 ☐ 53,28,356   (h) 89,89,89,989 ☐ 89,98,89,989

(i) 101,01,01,101 ☐ 101,10,10,101   (j) 101,01,01,010 ☐ 101,10,10,010

4. Arrange the following numerals in ascending order.
   (a) 6,66,666; 666,66,66,666; 6,66,66,666; 66,66,66,666
   (b) 94,38,179; 76,47,178; 23,15,452; 85,77,139; 76,72,399
   (c) 8,38,38,383; 8,83,83,838; 3,88,33,888; 3,33,88,333; 8,88,33,888
   (d) 28,65,478; 28,56,748; 28,65,748; 28,56,478; 28,65,874
   (e) 101,01,01,101; 101,10,10,101; 101,01,00,101; 101,01,11,101; 101,00,01,101

5. Arrange the following numerals in descending order.
   (a) 5,55,555; 55,555; 7,77,777; 11,11,11,111; 9,99,99,999
   (b) 62,88,175; 81,75,496; 80,16,732; 62,97,193; 81,75,486
   (c) 21,21,21,212; 12,12,12,121; 22,11,22,111; 11,22,11,222; 21,12,21,121; 12,21,12,212
   (d) 3,56,73,492; 3,65,73,492; 3,65,73,942; 3,56,73,942; 3,56,73,429
   (e) 898,89,89,898; 989,98,98,989; 898,98,98,989; 989,89,89,898; 889,88,99,898

6. Make the greatest 8-digit number possible without repetition of the given digits.
   (a) 4, 2, 6, 0, 3, 7, 5, 1   (b) 6, 3, 5, 1, 8, 2, 7, 4   (c) 7, 4, 2, 6, 5, 3, 9, 8

7. Arrange the digits to make the greatest and the smallest 5-digit numbers possible without repetition of digits.
   (a) 6, 3, 8, 2, 4   (b) 4, 7, 2, 9, 1   (c) 0, 3, 5, 2, 6

8. Round off the following numbers to the nearest ten.
   (a) 87,293   (b) 63,421   (c) 77,347   (d) 89,288   (e) 63,708   (f) 44,689

9. Round off the following numbers to the nearest hundred.
   (a) 57,435   (b) 68,729   (c) 33,787   (d) 42,391   (e) 84,576   (f) 73,291

10. Round off the following numbers to the nearest thousand.
    (a) 63,421   (b) 70,499   (c) 86,728   (d) 94,677   (e) 89,199   (f) 25,909

LARGE ROMAN NUMERALS

In Class IV, we have learnt how the Roman symbols I, V and X were used to write the Roman numerals for numbers 1 to 39. There is no Roman symbol to represent the digit 0. The values of the symbols are added or subtracted to find the values of the Roman numerals. Let us recapitulate the seven basic symbols and the rules for combining or repeating these symbols to write Roman numerals.

Symbols	I	V	X	L	C	D	M
Hindu-Arabic equivalent	1	5	10	50	100	500	1000