CHAPTER 1

KNOWING OUR NUMBERS

OBJECTIVE

In this chapter the students will be able to explore

(a) large numbers upto 8 digits.

(b) Indian and International system of numeration.

(c) comparison of numbers.

(d) estimation of large numbers.

(e) Roman numerals.

WARM UP!!

1. Number name for 1,08,209

   ....

2. 10,000 + 5,000 + 60 + 5 =

   ....

3. Smallest 6-digit number is

   ....

4. Sum of place value and face value of 5 in 2569830 is

   ....

5. 1 lakh = ... (in International system)

6. Successor of 60999 is ....

7. How many millimetres make a metre?

   ....

8. Round off 75086 to nearest 10. ....

9. LXXIV = ... (in Hindi-Arabic Numeral)

10. 92 = ... (in Roman Numeral)

INTRODUCTION

COUNTING NUMBERS

In our earlier classes, we have dealt with counting numbers 1, 2, 3, 4, ... etc. **These counting numbers are called** natural numbers. They continue into infinity.

WHOLE NUMBERS

The natural numbers together with '0' are called the whole numbers. 0, 1, 2, 3, ... etc. are called whole numbers.

Zero is the only whole number that is not a counting number.

DIGITS : To represent any number we use ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. These ten symbols are called digits or figures.

NUMERAL : A group of digits denoting a number is called a numeral e.g., 432, 1849, 1008 etc.

NOTATION : Writing a number in figures is called notation.

NUMERATION : Writing a number in words is called numeration.

> **Did you know?**
>
> **Infinity ∞**
>
> Counting numbers have no end.
> They go on forever.
> This is called infinity.
> It has a special symbol.
>
> ∞

METHODS OF NUMERATION

(a) Indian System   (used usually in India)

(b) International System   (used all over the world)

PLACE VALUE CHART

Place value chart helps us in reading and writing numbers. It is more useful in the case of large numbers.

Place value chart for writing the numbers in Indian system or Decimal system is :

Place Value Chart (Indian System)

Thousands	Hundreds	Tens	Ones
(Th)	(H)	(T)	(O)
1000	100	10	1

This system is also called 'The Hindu Arabic System'.

LET'S EXTEND OUR NUMBERS

We can extend any number to a larger number by finding its successor.

LARGEST					SMALLEST
(1-digit number)	9	+ 1	=	10	
(2-digit number)	99	+ 1	=	100	(2-digit number)
(3-digit number)	999	+ 1	=	1000	(3-digit number)
(4-digit number)	9999	+ 1	=	10000	(4-digit number)
(5-digit number)	99999	+ 1	=	100000	(5-digit number)
(6-digit number)	999999	+ 1	=	1000000	(6-digit number)
(7-digit number)	9999999	+ 1	=	10000000	(7-digit number)
					(8-digit number)

REMEMBER :

Successor of any number is obtained by adding 1 to it.

Predecessor of any number is obtained by subtracting 1 from it.

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We observe from the above pattern that we may extend our numbers to any extent by naming

    least   6-digit number as lakh

    least   7-digit number as ten lakh

    least   8-digit number as crore

and so on.

By doing so, the place value chart in Indian system, looks like :

(i) Place Value Chart (Indian System)

Periods	Crores		Lakhs		Thousands		Ones		
Places	Ten Crores	Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
	TC	C	TL	L	T.Th	Th	H	T	O
Places (in Figures)	100000000	10000000	1000000	100000	10000	1000	100	10	1
(1)				2	9	3	0	2	5
(2)		9	2	5	3	7	3	8	5
(3)	2	7	5	0	6	8	1	4	2

Example 1 : Insert commas suitably and write the names according to Indian system of Numeration. Also write its expanded form :

(a) 293025   (b) 92537385   (c) 275068142

Solution :   (a) 293025 $\rightarrow$ 2, 93, 025 (L, Th, O)

    Two lakh ninety three thousand twenty five

Expanded form : 2,00,000 + 90,000 + 3,000 + 20 + 5

        OR

    2 × 1,00,000 + 9 × 10,000 + 3 × 1000 + 2 × 10 + 5 × 1

    We do not write the place value of '0'.

(b) 92537385 $\rightarrow$ 9, 25, 37, 385 (C, L, Th, O)

    Nine crore twenty five lakh thirty seven thousand three hundred eighty five.

Expanded form : 9,00,00000 + 20,00,000 + 5,00,000 + 30,000 + 7,000 + 300 + 80 + 5

        OR

    9 × 1,00,00,000 + 2 × 10,00,000 + 5 × 1,00,000 + 3 × 10,000 + 7 × 1,000 + 3 × 100 + 8 × 10 + 5 × 1

(c) 275068142 $\rightarrow$ 27, 50, 68, 142 (C, L, Th, O)

    Twenty seven crore fifty lakh sixty eight thousand one hundred forty two.

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Expanded form :   20,00,00,000 + 7,00,00,000 + 50,00,000 + 60,000 + 8,000 + 100 + 40 + 2

OR

2 × 10,00,00,000 + 7 × 1,00,00,000 + 5 × 10,00,000 + 6 × 10,000 + 8 × 1,000

+ 1 × 100 + 4 × 10 + 2 × 1

(ii) Place Value Chart (International System)

Periods	Billions	Millions			Thousands			Ones		
Places	—	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundred	Tens	Ones
(In Fig.)		H.M.	T.M.	M	H.Th	T.Th	Th	H	T	O
Places	—	100000000	10000000	1000000	100000	10000	1000	100	10	1
(a)					2	9	3	0	2	5
(b)		9	2	5	3	7	3	8	5	
(c)	2	7	5	0	6	8	1	4	2	

Example 2 : Mark the periods in International System of numeration and write the number names. Also write its expanded form :

(a) 293025   (b)   92537385   (c)   275068142

Solution :   (a) 293025 → 293, 025 (Th O)

Two hundred ninety three thousand twenty five.

Expanded form :   200,000 + 90,000 + 3,000 + 20 + 5

OR

2 × 100,000 + 9 × 10,000 + 3 × 1,000 + 2 × 10 + 5 × 1

(b) 92537385 → 92, 537, 385 (M Th O)

Ninety two million five hundred thirty seven thousand three hundred eighty five.

Expanded form :   90,000,000 + 2,000,000 + 500,000 + 30,000 + 7,000 + 300 + 80 + 5

OR

9 × 10,000,000 + 2 × 1,000,000 + 5 × 100,000 + 3 × 10,000 + 7 × 1000 + 3 × 100

+ 8 × 10 + 5 × 1

(c) 275068142 → 275, 068, 142 (M Th O)

Two hundred seventy five million sixty eight thousand one hundred forty two.

Expanded form : 200,000,000 + 70,000,000 + 5,000,000 + 60,000 + 8,000 + 100 + 40 + 2

OR

2 × 100,000,000 + 7 × 10,000,000 + 5 × 1,000,000 + 6 × 10,000 + 8 × 1000 + 1 × 100

+ 4 × 10 + 2 × 1

REMEMBER !!

Use of Commas

1. Commas are used in reading and writing large numbers.
2. We do not use commas while writing number names.
3. Commas are used only to mark periods.
4. **In Indian System of Numeration**, first comma comes after hundred's place (**3 digits from the right**). The next comma comes after every 2 digits.
5. In **International System of Numeration**, comma comes after every **3 digits from the right**.

Example 3 : Express 239876506 in both the systems of numeration. (Indian and International System

Solution :

Indian System		T.C.	C	T.L.	L	T.th	Th	H	T	O
		2	3	9	8	7	6	5	0	6
International System		H.M	T.M.	M.	H.Th	T.Th	Th	H	T	O

Common

Indian System : Twenty three crore ninety eight lakh seventy six thousand five hundred six.

International System : Two hundred thirty nine million eight hundred seventy six thousand five hundred six.

Example 4 : Write the number in short form (Observe the system of numeration carefully) :

(a) 60,00,000 + 4,00,000 + 70,000 + 3,000 + 200 + 50 + 1

(b) 20,00,000 + 40,000 + 300 + 60 + 9

(c) 9,000,000 + 800,000 + 40,000 + 2,000 + 300 + 50 + 7

(d) 700,000 + 800 + 80 + 3

Solution : The position of commas indicates that (a) and (b) part is written in Indian System and (c) and (d) part is written in International system

	T.L	L	T.Th	Th	H	T	O		
(a)	6	4,	7	3,	2	5	1	=	64,73,251
(b)	2	0,	4	0,	3	6	9	=	20,40,369

(No digit in 'L' and 'Th' column hence, write 0)

	M	H.Th	T.Th	Th	H	T	O		
(c)	9,	8	4	2,	3	5	7	=	9,842,357
(d)		7	0	0,	8	8	3	=	700,883

(No digit in 'T.Th' and 'Th' column hence, write 0)

Example 5 : How many thousands make a lakh?

Solution :

$$\frac{1\,0\,0\,\cancel{0}\,\cancel{0}\,\cancel{0}}{1\,\cancel{0}\,\cancel{0}\,\cancel{0}} = \frac{1\ lakh}{1\ thousand}$$

= 100 thousands make a lakh.

Example 6 : How many thousands make a million ?

Solution :

$$\frac{1\,0\,0\,0\,0\,0\,0}{1\,0\,0\,0} = \frac{1\ million}{1\ thousand}$$

= 1000 thousands make a million.

INTERESTING...

1 Million has 6 zeros

M	I	L	L	I	O	N
1	0	0	0	0	0	0

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Example 7 : How many 4-digit numbers are there in all?

SSolution :

Greatest 4-digit number	= 9999
Greatest 3-digit number	= - 999
4-digit numbers in all	= 9000

Hence, there are 9000 numbers in all of 4-digits.

OR

Greatest 4-digit number	= 9999
Smallest 4-digit number	= -1000
4-digit numbers in all	= 8999 + 1 = 9000

Hence, there are 9000 numbers in all of 4-digits.

OBSERVE!

There are in all

- 9 numbers of 1-digit
- 90 numbers of 2-digits
- 900 numbers of 3-digits
- 9000 numbers of 4-digits

CAN YOU SEE A PATTERN!

Example 8 : Write the greatest and smallest numbers of 4-digits, using each digit only once.

(a) 3, 5, 4, 8

(b) 7, 0, 8, 5

Solution :

(a) Using the digits 3, 5, 4, 8 only once,
greatest 4-digit number = 8543
smallest 4-digit number = 3458

(b) Using the digits 7, 0, 8, 5 only once,
greatest 4-digit number = 8750
smallest 4-digit number = 5078

[NOTE : 0578 is a 3-digit number]

Example 9 : Write the greatest and smallest 6-digit numbers with 4-different digits.

Solution :

(a) Greatest 4 (different) digits are 9, 8, 7 and 6
Hence, greatest 6-digit number with 4-different digits is 9,99,876

(b) Smallest 4 (different) digits are 0, 1, 2, and 3
Hence, smallest 6-digit number with 4-different digits is 1,00,023

(NOTE : The number cannot begin with the digit '0')

Example 10 : Write the greatest and smallest 4-digit numbers by using any one digit twice:

(a) 4, 8, 9

(b) 4, 0, 6

Solution :

(a) Using digits 4, 8 and 9
Greatest 4-digit number = 9984
Smallest 4-digit number = 4489

(b) Using digits 4, 0 and 6
Greatest 4-digit number = 6640
Smallest 4-digit number = 4006

Example 11 : Write the greatest and smallest 4-digit numbers using different digits with

(a) digit 8 in ten's place.

(b) digit 6 in hundred's place.

Solution :

(a)

	Th	H	(T)	O
Greatest	9	7	8	6
Smallest	1	0	8	2

(b)

	Th	(H)	T	O
Greatest	9	6	8	7
Smallest	1	6	0	2

PLACE, PLACE VALUE AND FACE VALUE

REMEMBER!!

★ In a number, the place of a digit is decided by its position.

★ The face value of a digit is the digit itself.

★ The place value of a digit is the product of the place and its face value.

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NOTE : To write the value of any digit, check the system of numeration used. (Indian or International)

Example 12 Write the place, face value and place value of the coloured digits of number 18906523 in Indian system.

Solution :

18906523

Place = tens
F.V. = 2
P.V. = 2 tens or 20

Place = ten thousand
F.V. = 0
P.V. = 0

Place = ten lakh
F.V. = 8
P.V. = 8 ten lakh
or 80 lakh or 80,00,000

EXERCISE : 1.1

1. Write the number names of the following in (i) Indian system and (ii) International system :
   (a) 451730   (b) 9340001   (c) 70707971

2. Place commas correctly and write the numerals for the following :
   (a) Ninety-seven lakh fifty-three thousand fifteen
   (b) Seventy-three crore five lakh eighty-five thousand three hundred five
   (c) Sixty-two lakh eight
   (d) Six million seven hundred eighty-two thousand two hundred six
   (e) Six hundred sixty-six million six hundred thousand sixty-six

3. In each of the following, write the place value of the underlined digit :
   (a) 73,02,549   (b) 123,456,789   (c) 10,265,930

4. Write the following numbers in expanded form :
   (a) 6,89,205   (b) 153,968   (c) 7,058,109

5. Write the corresponding numeral for each of the following numbers :
   (a) $9 \times 10,000 + 2 \times 1,000 + 9 \times 100 + 5 \times 10 + 9 \times 1$
   (b) $5 \times 1,00,000 + 8 \times 10,000 + 6 \times 100 + 7 \times 10 + 5 \times 1$
   (c) $7 \times 1,000,000 + 6 \times 100,000 + 8 \times 10,000 + 9 \times 1,000 + 6 \times 10 + 5 \times 1$

6. Find the sum of the face value and place value of digit 3 in the number 93278

7. Write all 3-digit numbers using 1, 3, 8 only once.

8. Using the digits, given below (only once) make the greatest and smallest numbers of 4-digits :
   (a) 4, 9, 2, 3   (b) 1, 6, 0, 9

9. Write the greatest and smallest 4-digit numbers by using any one digit twice :
   (a) 6, 0, 9   (b) 1, 8, 5

10. Write the greatet and smallest 4-digit number using different digits with
   (a) digit 7 in 'hundred's place   (b) digit 1 in thousand's place.

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11. Write the greatest and smallest 5-digit number having three different digits.

12. How many 7-digit numbers are there in all ?

13. How many numbers will be there from 10000 to 99999 ?

14. Fill in the blanks :

 (a) 1 crore = ... lakhs   (b) 1 crore = ... ten lakhs

 (c) .... lakhs = 1 million   (d) .... millions = 1 crore

 (e) 1 lakh = ... ten thousands   (f) .... ten millions = 1 billion

COMPARISON OF NUMBERS

 Procedure to compare two numbers :

Rule 1 : Count the number of digits in the numbers.

Example 13 : Compare 3,79,827 and 64,508

Solution :   3,79,827   → 6 digits

      64,508   → 5 digits

      Hence, 3,79,827 > 64,508

Rule 2 : If the number of digits is same in both the numbers, start comparing the digits from left to right (→)

Example 14 : Compare 57,864 and 70,483

Solution :   57,864   70,483   (5 digits in each)

      Since 5 < 7

      ∴ 57,864 < 70,483

Note : The number with more digits is greater.

REMEMBER!!

<	>
is less than	is greater than
≤	≥
is less than or equal to	is greater than or equal to

Did you know??

The symbols > and < were introduced by the English astronomer and mathematician Thomas Harriot. He was born in 1560 and was educated at Oxford. He served as a tutor to Sir Walter Raleigh and was appointed by him to the office of surveyor with the second expedition to Virginia.

Example 15 : Compare 2,37,752 and 2,37,786

Solution :   L TTh Th H T O   L TTh Th H T O

      2, 3 7, 7 5 2   2, 3 7, 7 8 6   (6 digits in each)

      Digits in L, TTh, Th and H place are equal, so compare the digits in ten's place.

      Since 5 < 8

      ∴ 2,37,752 < 2,37,786

Comparison can also be done by writing the numbers one below the other in the place value chart.
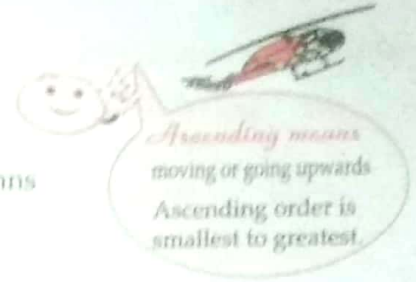
8

Example 16 : Compare 7912384 and 7916015

Solution : 7912384 and 7916015

TT	T	H	Th	Th	H	T	O
7	9	1			3	8	4
7	9	1			0	1	5

} Compare the columns from left to right

Ascending means moving or going upwards. Ascending order is smallest to greatest.

Since 2 < 6

∴ 7912384 < 7916015

Example 17 : Arrange in ascending order :

74678, 2725821, 2364, 2748920

Solution : 74678, 2725821, 2364, 2748920

TT	T	H	Th	Th	H	T	O			
		7	4	6	7	8	—	5 digit number	—	②
2	7		5	8	2	1	—	7 digit number	—	③
		2	3	6	4	—	4 digit number (smallest)	—	①
2	7		8	9	2	0	—	7 digit number	—	④

Ascending order 2364 < 74678 < 2725821 < 2748920

[However, you can also order the numbers just by marking commas and comparing mentally]

Example 18 : Arrange in descending order :

42130; 42580; 125631; 2810837; 56943

Mark periods : 42,130; 42,580; 1,25,631; 28,10,837; 56,943;

　　　　　① 　　　② 　　　④ 　　　⑤ 　　　③

Descending means coming down. Descending order is greatest to smallest.

Descending order : 5 > 4 > 3 > 2 > 1

28,10,837 > 1,25,631 > 56,943 > 42,580 > 42,130
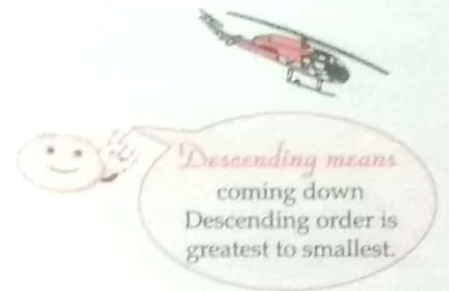
EXERCISE : 1.2

1. Put the appropriate symbol (>, <, =) in each of the following boxes :

    (a) 7895 ☐ 25430   (b) 92378 ☐ 54490

    (c) 81293 ☐ 82102   (d) 543186 ☐ 543701

2. Arrange the following in ascending order :

    (a) 17704; 99999; 100000; 30506; 9807

    (b) 298106; 256101; 3978106; 101028; 582956

    (c) 9801076; 9950166; 801235; 4689432; 90681

3. Arrange the following in descending order :

    (a) 23704; 822704; 9999; 6217; 10216

    (b) 498765; 203187; 489675; 478965; 302156

    (c) 203666; 109999; 880001; 705691; 583216

WORD PROBLEMS ON NUMBER OPERATIONS

Example 19 : On a particular day John had ₹ 27,23,716 in his saving bank account. He withdrew ₹ 12,08,417 from his account. Find the balance in his account after withdrawal.

Solution :

Amount in his account = ₹ 27,23,716

Amount withdrawn = – ₹ 12,08,417
_____

Balance in the account = ₹ 15,15,299 (Subtracting)

Example 20 : Mohamad Ali spent the following amounts in 2006 under various heads :

Electricity bill = ₹ 8,13,142

Water charges = ₹ 4,375

Cooking gas = ₹ 3,540

Find the total amount spent by him under these heads.

Solution :

Amount spent on electricity bill = ₹ 8,13,142

Amount spent on water charges = ₹ 4,375

Amount spent on cooking gas = + ₹ 3,540
_____

Total Amount spent = ₹ 8,21,057 (Adding)

Example 21 : A cabinet maker needs 72 m long board for making one cabinet. How many cabinets can he make by using 17496 m long board ?

Solution :

Total length of the board = 17496 m

Length of the board
required for one cabinet = 72 m

∴ Number of cabinets
he can make = 17496 ÷ 72 = 243

```
        243
    72)17496 (
        144
        ___
        309
        288
        ___
        216
        216
        ___
          ×
```

Example 22 : Population of a village in 2006 was 7,32,568. If the number of males in this village was 4,19,439, then find the number of 'females' it had.

Solution :

Total Population = 7,32,568

Number of males = – 4,19,439 (Subtract)
_____

∴ Number of females = 3,13,129

Example 23 : A printer printed 1,23,865 copies of a book containing 69 pages. Find the total number of pages printed by the printer.

Solution :

Number of books printed = 1,23,865

Number of pages in 1 book = 69

∴ Number of pages in 1,23,865 books = 123865 × 69 = 8546685

Total number of pages printed = 85,46,685

CONVERSION OF UNITS OF LENGTH AND MASS

In metric system of measurement units for measuring length are : kilometre (km), hectometre (hm), decametre (dam), metre (m), decimetre (dm), centimetre (cm), millimetre (mm).

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For example :

We measure the length of the book in cm. The thickness of a note-book is measured in mm. The distance between two cities is measured in km and so on.

These units are related as follows :

Table

Higher	1 km	=	10 hm	Lower
to	1 hm	=	10 dam	to
	1 dam	=	10 m	
Lower	1 m	=	10 dm	Higher
(Multiply)	1 dm	=	10 cm	(Divide)
	1 cm	=	10 mm	

REMEMBER!!

For converting a measure in terms of next lower unit, we multiply the given quantity with 10. Similarly, for converting a unit from next to next lower unit we multiply with 100 and so on.

km → hm → dam , m → dm → cm → mm

↓ ↓ ↓ ↓ ↓ ↓

10 10 10 10 10 10

(a) 1 km = 1000 m (Move 3 steps to your right from km)

(b) 1 m = 100 cm (Move 2 steps to your right from m)

(c) 1 cm = 10 mm

(d) 1 m = 1000 mm

Similarly, in metric system, units for measuring mass (or weight) are kilogram (kg), hectorgram (hg), decagram (dag), gram (g), decigram (dg), centigram (cg), milligram (mg).

For example :

We measure wheat or rice in kg. The weight of a notebook is measured in grams. The weight of a medicine tablet is measured in mg and so on.

For converting a higher unit to lower unit, rule stated for units of length holds good for units of mass also.

Hence,

1 kg = 1000 gm

1 gm = 1000 mg

In metric system, the units for measuring capacity is kl, hl, dal, l, dl, cl and ml.

Litres (l) is used to measure large amounts of liquids such as, petrol, milk.

Millilitres (ml) is used to measure small amount of liquids like medicine syrup, perfumes etc.

Example 24 : Shilpa bought 12 m 50 cm cloth of one kind and 17 m 25 cm cloth of another kind. Find the total length of the cloth bought by Shilpa.

Solution :

Length of the first kind of cloth	=	12 m	50 cm
Length of the second kind of cloth	= +	17 m	25 cm
∴ Total cloth bought	=	29 m	75 cm

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Example 25 : Hardeep bought 55 m 40 cm cloth from a shop. She used 43 m 75 cm for making curtains. How much cloth was left ?

Solution :

Cloth bought	=	55 m 40 cm
Cloth used for curtains	=	43 m 75 cm
∴ Cloth left over	=	55 m 40 cm – 43 m 75 cm
	=	11 m 65 cm

Example 26 : A shopkeeper has 500 kg of sugar. He sells 45 kg sugar on each day. Find how much sugar was left after the sale of 8 days.

Solution :

Sugar sold on 1 day	=	45 kg
Sugar sold in 8 days	=	(8 × 45) kg = 360 kg
Sugar left with the shopkeeper	=	500 kg – 360 kg = 140 kg

Example 27 : Saurav runs 2 km 125 m every day. How much distance will he run in 25 days ?

Solution :

$$
\begin{array}{r}
2\ 1\ 2\ 5 \text{ m} \\
\times\quad\ 2\ 5 \\
\hline
1\ 0\ 6\ 2\ 5 \\
4\ 2\ 5\ 0\ 0 \\
\hline
5\ 3\ 1\ 2\ 5 \text{ m}
\end{array}
$$

∴ Total distance = 53 km 125 m.

Example 28 : A tailor has 61 m 60 cm cloth. He stitched 14 dresses with that cloth. How much cloth was used for stitching one dress ?

Solution :

$$
\begin{array}{r}
440 \text{ cm} \\
14\overline{)6160 \text{ cm}(} \\
\underline{56}\ \ \ \\
56\ \ \\
\underline{56}\ \ \\
\times\ \ \\
\end{array}
$$

∴ Cloth used for one dress = 4 m 40 cm

EXERCISE : 1.3

1. A truck is carrying 5 drums containing 459 kg, 695 kg, 437 kg, 456 kg and 724 kg of cement. Find the total weight of cement being carried by the truck.

2. Attendance Board of a School, on a particular day indicated that 3516 students were present, 213 were absent and 59 were on leave. Find the total number of students in the school.

3. Actual price of a car is ₹7,59,268. The dealer gives a discount of ₹21,162 for making cash payment. Find the price paid by Sidhant who purchased the car on cash.

4. A shopkeeper had 60 kg of apples with him in the morning of a particular day. During the day time he could sell 43 kg 750 g. Find the quantity of apples left with him.

5. Amitabh is 1 m 78 cm tall. His wife is 23 cm shorter than him. Find his wife's height.

6. If one sofa set costs ₹94,320 then find the cost of 32 sofa sets.

7. 1 metre curtain cloth costs ₹549. If Sushma purchased 284 m of this cloth, find the amount to be paid by her for the same.

8. If a milk booth sells 223 litres of milk every day, find the total quantity of milk sold by the booth in the month of April, 2006.

9. If 73 workers earned ₹1062880 in one month, then find the monthly earning of each worker.

10. A uniform manufacturer had 152 m 25 cm of cloth for stitching shirts. If 1 m 75 cm is required for stitching one shirt, then find the number of shirts that can be stitched by using the cloth available with him.

11. Risha multiplied 2356 by 54 instead of multiplying by 45. By how much was her answer greater than the correct answer?   (Hint : Do you need to do both the multiplications?)

ESTIMATION

Estimation plays an important role in our daily life. Before going to market, we prepare a list of items to be purchased. We make an estimate of the total expenditure of those items. It enables us to carry enough money to make the payments for the purchases.

Sometimes in our daily life, for making the calculations easier, we use approximations. A sensible approximation or guess of the size of a quantity, length or weight etc., is called estimation. Estimation saves our time and energy in dealing with day to day problems of life.

Let us take an example to clarify the idea of estimation.

Suppose Mumtaz purchased sugar worth ₹38, tea leaves worth ₹52 and powder milk for ₹109 from a shopkeeper. She wanted to save her time in making the payment, without doing the formal computation.

She quickly estimates the total price to be ₹200 by taking

₹38 to 40 for sugar

₹52 to 50 for tea leaves

₹109 to 110 for milk powder

and calculating mentally the sum of 40, 50 and 110 to be 200

Now, Let's see what is the actual price of the three items,

Price of sugar   = ₹38
Price of tea leaves   = ₹52
Price of powder milk = ₹109
Total Price   = ₹199

This amount is very near to the estimated cost of ₹200

Thus, if she gives ₹200 to the shopkeeper, even before he calculates the actual cost, the shopkeeper will not take more time to return ₹1. This will save Mumtaz's time.

Estimating Numbers by Rounding Off

Let us now discuss the rules for estimating the numbers by rounding off to the nearest tens, hundreds, etc.

Rule 1 : Rounding to the Nearest Tens

Consider the number 14 on the number line. It lies between 10 and 20. We observe that the gap between the numbers 14 and 10 is less than the gap between the numbers 14 and 20 i.e., the number 14 is nearer to 10 than 20. Thus, we round off the number 14 to 10 to the nearest 10.

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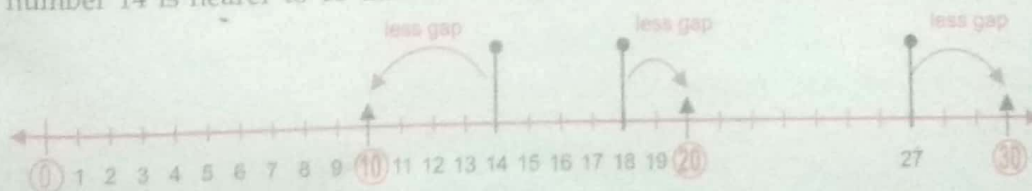
Again, consider the number 18. It also lies between 10 and 20. Here, the gap between 18 and 20 is less than the gap between 18 and 10 i.e., 18 is nearer to 20 than 10. Thus, we round off the number 18 to 20, to the nearest tens. Similarly, the number 27 is rounded off to the nearest 30. Similarly, the numbers 1, 2, 3, 4 are rounded off to 0 whereas the numbers 6, 7, 8, 9 are rounded off to 10. It is an accepted practice that 5, which is equidistant from 0 and 10 is rounded off to 10. Similarly, 15 is rounded off to 20 and 25 is rounded off to 30 and so on.

Procedure to round off a number to the nearest ten :

Step 1. Consider the one's digit of the given number.

Step 2. If it is less than 5 then replace one's digit by 0, keeping the other digit as they were.

Step 3. If it is 5 or more than 5, then replace one's digit by 0, and increase the ten's digit by one.

The number obtained after step 2 or 3 will be the nearest (representative) number or nearest estimated number.

Rule 2 : Procedure to Round off a Number to the Nearest Hundred
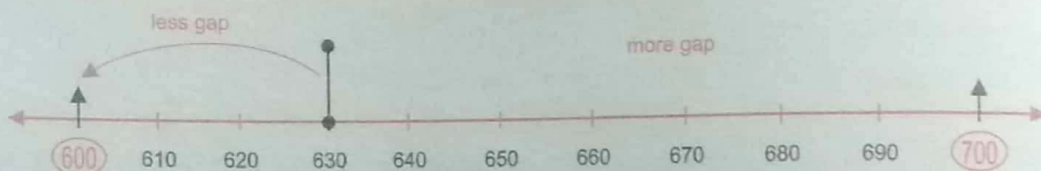
Step 1. Consider the ten's digit of the given number.

Step 2. If it is less than 5, then replace each of the ten's and one's digits by 0, keeping the other digits as they were.

e.g., 630 is closer to 600 than to 700. Hence, 630 is rounded off to 600.

Step 3. If it is 5 or more than 5 then replace each of the ten's and one's digits by zeros and increase the hundred's digit by one.

The number obtained after step 2 or 3 will be the nearest (representative) number or nearest estimated number.

Rule 3 : Procedure to Round off a Number to the Nearest Thousand
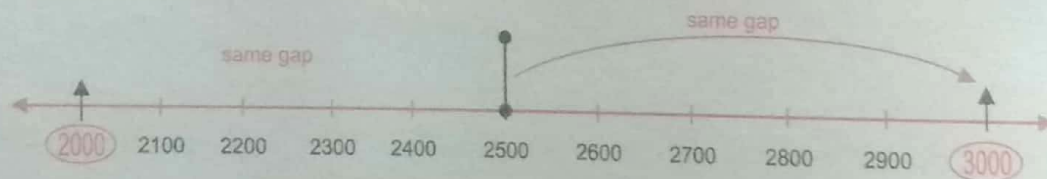
Step 1. Consider the hundred's digit of the given number.

Step 2. If it is less than 5 then replace each of the hundred's, ten's and one's digits by 0, keeping the other digits as they were.

e.g., 2500 is equidistant from 2000 and 3000. Hence, 2500 is rounded off to 3000.

Step 3. If it is 5 or more than 5 then replace each of hundred's, ten's and one's digits by zero and increase the thousand's digit by one.

The number obtained after step 2 or 3 will be the nearest (representative) number or nearest estimated number.

Now let us consider some examples of estimation.

Example 29 : Write the estimated number for the following by rounding to the nearest tens :

(a) 63   (b) 348   (c) 9   (d) 6841

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Solution :

(a) Since here digit at one's place is 3, which is less than 5.

∴ Estimated number = 60

(c) One's digit = 9 > 5

∴ Estimated number = 10

(b) One's digit = 8 > 5

∴ Estimated number = 350

(d) One's digit = 1 < 5

∴ Estimated number = 6,840

Example 30 : Write the estimated value of the following numbers to the nearest hundreds :

(a) 95788   (b) 602345   (c) 23758   (d) 10906

Solution :

(a) Ten's digit = 8 > 5

∴ Estimated Value of 95788 = 95800

(c) Ten's digit = 5

∴ Estimated number = 23800

(b) Ten's digit = 4 < 5

∴ Estimated number = 602300

(d) Ten's digit = 0 < 5

∴ Estimated number = 10900

Example 31 : Write the estimated value of the following numbers by rounding to the nearest thousands :

(a) 8372   (b) 982   (c) 34568   (d) 27089

Solution :

(a) Hundred's digit = 3 < 5

∴ Estimated number = 8000

(c) Hundred's digit = 5

∴ Estimated number = 35000

(b) Hundred's digit = 9 > 5

∴ Estimated number = 1000

(d) Hundred's digit = 0 < 5

∴ Estimated number = 27000

EXERCISE : 1.4

1. Write the estimated value of each of the following to the nearest ten :
   (a) 293   (b) 38   (c) 7951   (d) 56385

2. Write the estimated value of each of the following to the nearest hundred :
   (a) 452   (b) 5764   (c) 18112   (d) 98292

3. Write the estimated value of each of the following to the nearest thousand :
   (a) 5828   (b) 891   (c) 26392   (d) 18725

4. Rounding off each of the following to the nearest ten thousand, find the estimated values :
   (a) 16526   (b) 25430   (c) 45860   (d) 268743

Estimating Sum or Difference

There are many situations when we need to find the answers quickly. For example, when we go to the market, we need to estimate the expenditure or when we plan for a party we need to estimate the guests and the amount that would be spent in the party.

Let us now estimate the sum and difference of two or more numbers by making use of the concept of rounding off the numbers. Let us explain this by taking some examples.

Example 32 : Estimate : 87 + 34

Solution : Round off to nearest tens

87 rounds off to   90

34 rounds off to   30

Estimated sum = 120

Example 33 : Find a rough estimate of 6822 + 585. Also find a closer estimate.

Solution : Rough Estimate = 7000 + 1000 = 8000

(Rounding off to nearest thousands)

For closer estimate, we round off to nearest hundreds.

6822 rounds off to 6800

585 rounds off to 600

Estimated sum = 6800 + 600 = 7400. This is closer to the actual sum.

Example 34 : Estimate : 4563 + 2039 + 7325. Also find the actual sum.

Solution : Round off to nearest thousands

4563 rounds off to 5000

2039 rounds off to 2000

7325 rounds off to 7000

Estimated Sum = 5000 + 2000 + 7000 = 14000

Actual Sum : 4563 + 2039 + 7330 = 13927

Thus, the actual sum is very close to the estimated sum.

Example 35 : Estimate 78 - 52. Find the actual difference also.

Solution : Rounding off the given numbers to the nearest tens, we have 80 and 50

∴ Estimated difference of 78 and 52 = 80 - 50 = 30

Actual difference = 78 - 52 = 26.

Example 36 : Estimate 53999 - 45712

Solution : Rough estimate :

(Rounding off to nearest ten-thousands)

$$50,000 - 50,000 = 0$$

which is MEANINGLESS.

Hence, round off to nearest thousands

53,999 rounds off to 54,000

45,712 rounds off to 46,000

Estimated difference = 54,000 - 46,000 = 8000

Example 37 : Estimate 54860 - 54610

Solution : Round off to nearest thousands,

50,000 - 50,000 = 0 (MEANINGLESS)

Hence, Round off to nearest hundreds

Estimated difference = 54900 - 54600 = 300

Hence, we need to be careful in estimating the given numbers.

Example 38 : Estimate 6552 - 547 by rounding off the numbers to their greatest places. Also find the closer estimate.

Solution : The greatest place in 6552 is thousand's place, whereas the greatest place in 547 is hundred's place.

Rounding off to the nearest thousand   6552 = 7000

Rounding off the nearest hundred   547 = 500

∴ Estimated difference = 7000 - 500 = 6500

For closer estimate, we round off to the nearest hundred

Rounding off to the nearest hundred   6552 = 6600

Rounding off to the nearest hundred   547 =   500

∴ Estimated difference = 6600 – 500 = 6100

This is a better and more closer estimate.

EXERCISE : 1.5

1. Estimate each of the following sums :
   (a) 325 + 587   (b) 478 + 325   (c) 5649 + 218   (d) 7215 + 6542

2. Give a rough estimate and also a closer estimate of the following sums :
   (a) 215 + 799   (b) 355 + 4358   (c) 8305 + 6587   (d) 38390 + 95461

3. Estimate the following differences :
   (a) 2757 – 385   (b) 9200 – 5621   (c) 9726 – 256   (d) 985 – 620

4. Give a rough estimate and also a closer estimate of the following :
   (a) 6315 – 386   (b) 7825 – 2578   (c) 47,193 – 31,285   (d) 2, 85,132 – 38, 176

Estimating Product or Quotient

1. To estimate the product of numbers, **each number is rounded off to the greatest place** i.e., if a number contains 2 digits, round it off to the nearest 10 and if it contains three digits then to the nearest 100 so on and then multiply. For example, in 28 × 224, 28 is rounded off to 30 and 224 is rounded off to 200.

2. **1-digit number is not rounded off.** For example, in 4 × 85, if we round off 4 to 0 and 85 to 100 then the product is 0, which is not meaningful.

3. To estimate quotient, we first round off the divisor and dividend and then divide.

Let us now consider some examples.

Example 39 : Estimate 58 × 23

Solution :   Rounding off given numbers to the nearest tens, we have

                  Estimated product = 60 × 20 = 1200

Example 40 : Estimate 97 × 432

Solution :   97 is estimated to 100 and 432 is estimated to 400

                  ∴ Estimated product = 100 × 400 = 40000

Example 41 : Estimate the product 825 × 6

Solution :   Here, 825 is rounded off to 800

                  ∴ 6 is rounded off to 6

                  ∴ Estimated product = 800 × 6 = 4800

REMEMBER!
1-digit number is not to be rounded off.

Example 42 : Estimate the quotient 78 ÷ 24

Solution :   78 is rounded off to 80 and 24 is rounded off to 20

                  For finding the estimated quotient, consider 80 ÷ 20 or 8 ÷ 2 = 4

                  Thus, estimated quotient = 4

Example 43 : Estimate the quotient $475 \div 71$

Solution : 475 is rounded off to 500 and 71 is rounded off to 70.

To find the estimated quotient, consider $500 \div 70$ or $50 \div 7 = 7$

Thus, the estimated quotient = 7

Example 44 : Estimate the quotient $4428 \div 329$

Solution : 4428 is rounded off to 4000

329 is rounded off to 300

To find the estimated sum, consider $4000 \div 300$ or $40 \div 3 = 13$

∴ Estimated quotient = 13

EXERCISE : 1.6

1. Estimate each of the following products :

   (a) 87×54 (b) 16×24 (c) 466×115 (d) 287×825

   (e) 789×325 (f) 78×241

2. Estimate the quotient of each of the following :

   (a) $65 \div 29$ (b) $95 \div 32$ (c) $86 \div 26$ (d) $2608 \div 62$

   (e) $126 \div 14$ (f) $7605 \div 186$

ROMAN NUMERALS

The system of Roman numerals is one of the oldest numeral systems and is still in common use. We use these numerals in framing the timetable of classes, awarding ranks, numbers on clock-faces etc.

There are 7 basic symbols used for writing any numeral in Roman-system :

Hindu-Arabic Numerals	1	5	10	50	100	500	1000
Roman Numerals	I	V	X	L	C	D	M or K

Using these symbols

Using these symbols, we may write any number in Roman numerals, by following the rules given below :

Rule 1 : If a symbol is repeated in Roman numerals then its value is added as many times as it appears.

REMEMBER!

(i) No symbol in Roman numerals is repeated more than three times ;

(ii) Symbols V, L and D are never repeated ;

(iii) Only I, X, C or M can be repeated.

For example,

II	$= (1 + 1)$	$= 2$
III	$= (1 + 1 + 1)$	$= 3$
XXX	$= (10 + 10 + 10)$	$= 30$
CC	$= (100 + 100)$	$= 200$

Rule 2 : If a symbol of smaller value is written to the right of a symbol of greater value then its value is added to the value of greater symbol.

For example,
$$VI = (5 + 1) = 6$$
$$VIII = (5 + 1 + 1 + 1) = 8$$
$$XII = (10 + 1 + 1) = 12$$
$$XV = (10 + 5) = 15$$
$$LX = (50 + 10) = 60$$
$$LXV = (50 + 10 + 5) = 65$$

Rule 3 : If a symbol of smaller value is written to the left of a symbol of greater value then its value is subtracted from the value of the greater symbol.

REMEMBER!

(i) V, L and D are never written on the left of a symbol of higher value i.e., V, L and can never be subtracted;

(ii) I can be subtracted from X and V only;

(iii) X can be subtracted from L and C only;

(iv) C can be subtracted from D and M only.

(v) A smaller symbol can be subtracted from a greater symbol just one time.

For example,
$$IV = (5 - 1) = 4$$
$$IX = (10 - 1) = 9$$
$$XL = (50 - 10) = 40$$
$$XC = (100 - 10) = 90$$
$$CD = (500 - 100) = 400$$
$$CM = (1000 - 100) = 900$$

Rule 4 : If a smaller numeral is placed between two greater numerals then it is always subtracted from the greater numeral immediately following it.

For example,
$$XIV = 10 + (5 - 1) = 14$$
$$XIX = 10 + (10 - 1) = 19$$
$$CXIV = 100 + 10 + (5 - 1) = 114$$

Rule 5 : If a bar is placed over a numeral then it is multiplied by 1000.

For example, $\overline{V} = 5000, \overline{X} = 10000$ and $\overline{L} = 50000$.

Example 45 : For each of the following Arabic Hindu numerals, write the corresponding Roman numeral:

(i) 16   (ii) 24   (iii) 49   (iv) 58   (v) 99   (vi) 498

Solution :

(i) 16 = 10 + 6 = XVI

(ii) 24 = 20 + 4 = XXIV

(iii) 49 = 40 + 9 = (50 – 10) + 9 = XLIX

(iv) 58 = 50 + 8 = LVIII

(v) 99 = 90 + 9 = (100 – 10) + 9 = XCIX

(vi) 498 = 400 + 90 + 8 = CDXCVIII

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Example 46 : Write each of the following Roman numerals in Hindu-Arabic numeral :

(i) XXIV (ii) XLVI (iii) LXXIV (iv) XCVII (v) CXXIV
(vi) CCCLIX

Solution :
(i) XXIV = XX + IV = 20 + 4 = 24
(ii) XLVI = XL + VI = (50 – 10) + 6 = 46
(iii) LXXIV = L + XX + IV = 50 + 20 + 4 = 74
(iv) XCVII = XC + VII = (100 – 10) + 7 = 97
(v) CXXIV = C + XX + IV = 100 + 20 + 4 = 124
(vi) CCCLIX = CCC + L + IX = 300 + 50 + 9 = 359

Example 47 : Classify the following Roman numerals as meaningful or meaningless. Justify your answer :

(i) LXIV (ii) LXXXX (iii) LVV (iv) DDXV (v) VXII
(vi) LCXV (vii) XLVI (viii) CXLVII (ix) CDLXVI (x) LVXII

Solution :
(i) LXIV = L + X + IV = 50 + 10 + 4 = 64
So, LXIV is meaningful.
(ii) LXXXX is meaningless as X can never be repeated more than three times.
(iii) LVV is meaningless as V can never be repeated.
(iv) DDXV is meaningless because D can never be repeated.
(v) VXII is meaningless as V can never be subtracted.
(vi) LCXV is meaningless as L can never be subtracted.
(vii) XLVI = XL + VI = 40 + 6 = 46
So, it is meaningful.
(viii) CXLVII = C + XL + VII = 100 + 40 + 7 = 147
So, it is meaningful.
(ix) CDLXVI = CD + L + X + VI = 400 + 50 + 10 + 6 = 466
So, it is meaningful.
(x) LVXII is meaningless as V cannot be written to the left of a symbol of greater value.

EXERCISE : 1.7

1. For each of the following Arabic-Hindu numerals, write the corresponding Roman numeral :
(a) 59 (b) 98 (c) 324 (d) 447 (e) 210

2. Write each of the following Roman numerals in Hindu-Arabic numeral :
(a) LXIX (b) XLVIII (c) XCIV (d) CCXLIX (e) CXLI

3. Classify the following Roman numerals as meaningful or meaningless. Also justify your answers giving reasons.
(a) DCVX (b) LXIIII (c) CDLXV (d) MVXVI (e) LXXXX

4. Match the same numerals from the columns A and B, given below :

A
(a) 14
(b) 57
(c) 104
(d) 264

B
(i) CIV
(ii) XIV
(iii) CCLXIV
(iv) LVII

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TO SUM UP

1. The counting numbers 1, 2, 3, . . . are called natural numbers.
2. The natural numbers along with '0' are called whole numbers e.g., 0, 1, 2, 3, . . .
3. Successor of any number is obtained by adding 1 to it.
4. Predecessor of any number is obtained by subtracting 1 from it.
5. 'Commas' are used in reading and writing large numbers. Commas are not used while writing number names.
6. The face value of a digit is the digit itself.
7. The place value of a digit is the product of the place and its face value.
8. Numbers can be arranged in ascending or descending order.
   - Ascending means smaller to larger
   - Descending means larger to smaller
9. An approximation or guess of the size of a quantity, length or weight etc. is called estimation.
10. There are 7 basic symbols to represent numbers of Hindu-Arabic system in Roman system :

Hindu Arabic Numbers	1	5	10	50	100	500	1000
Roman Numerals	I	V	X	L	C	D	M or K

Sharpen Your Mind

I. Multiple Choice Questions

Choose the correct alternative :

1. How many times does the digit 8 occur between 1 and 100?
   - (a) 5
   - (b) 10
   - (c) 20
   - (d) 9

2. Express 91 as a Roman Numeral
   - (a) XIC
   - (b) LXXXXI
   - (c) XCI
   - (d) IXC

3. How many thousands make a lakh?
   - (a) 10
   - (b) 100
   - (c) 1000
   - (d) None of these.

4. How many centimetres make a metre?
   - (a) 10
   - (b) 100
   - (c) 1000
   - (d) 10000

5. Estimate the sum 249 + 396
   - (a) 700
   - (b) 500
   - (c) 400
   - (d) 600

6. No symbol in Roman numerals is repeated for more than _____ times.
   - (a) two
   - (b) three
   - (c) four
   - (d) five.

7. The Hindu-Arabic numeral for LXXVI is
   - (a) 76
   - (b) 74
   - (c) 56
   - (d) 84

8. Which of the following Roman numeral is meaningless?
   - (a) LVV
   - (b) XCIV
   - (c) LXV
   - (d) CXIV

9. The greatest 5-digit number using the digits 6, 7, 8 is
   - (a) 88768
   - (b) 87687
   - (c) 88876
   - (d) 88776

10. The place value of a digit increases when it moves two places to the left.
    - (a) 10 times
    - (b) 100 times
    - (c) 1000 times
    - (d) $\frac{1}{100}$ times.

II. Fill in the Blanks :

1. The greatest 3-digit number + 1 = _____
2. The numeral for fifty six crore seventy five is _____
3. Estimated value of 679 to the nearest hundred is _____
4. 23m 5 cm = _____ cm
5. _____ milligrams make one kilogram.

III. True or False

1. The symbol I can be subtracted from V and X only.
2. 100 lakh make a million.
3. Face value of 6 in 68195 is 6.
4. Smallest 5-digit number with 3 different digits is 11023.
5. The successor of greatest 3-digit number is 1000.

IV. Match the Following :

- (a) LXIX
- (b) XCIX
- (c) XCVI
- (d) CXXIV
- (e) CM
- (i) 900
- (ii) 124
- (iii) 99
- (iv) 69
- (v) 96

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Chapter Assessment

M.M. : 30 marks

SECTION A : Short Answer Questions (2 marks)   **5 × 2 = 10 marks**

1. Write the following numbers as numerals
   (a) Four crore thirty nine lakh twenty eight thousand twelve.
   (b) Five million four hundred sixteen thousand.

2. Write the following numbers in standard form
   (a) 7,00,000 + 80,000 + 3,000 + 20 + 9   (b) 6,00,000 + 5,00,000 + 20,000 + 8

3. Arrange the following numbers in ascending order.
   10009; 23407; 10399; 2341; 99999

4. Write 4 consective whole numbers succeeding 1099.

5. How many 5-digit numbers are there in all?

SECTION B : Short Answer Questions (3 marks)   **4 × 3 = 12 marks**

1. Find the product of the place value of two 8's in 98080.

2. Form the largest and the smallest numbers using each of the digits 3, 5, 7, 8, 0 only once and find their difference.

3. 45,783 people went to see a cricket match. Round off this number to the nearest thousand. If 1465 more people join in, find the rough estimation of the total people at the stadium.

4. Nikita rode her bicycle 0·3 km in 3 minutes. At the same rate, how long would it take her to side 1 km?

SECTION C : Long Answer Questions (4 marks)   **2 × 4 = 8 marks**

1. Give the approximate value by estimating
   (a) 62 × 48   (b) 2789 ÷ 63

2. Write the roman numeral for the following Hindu-Arbic numerals.
   (a) 1091   (b) 495

CHALLENGING QUESTIONS

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1. Use each of the numbers 1, 2, 3, 10, 11, 12, 19, 20, 21 once only. Put them into boxes so that they add up to 33 in every direction.

2. While reading Hindustan Times, I find that page no. 13 is missing. The back page is numbered 28, the other missing pages are _____, _____ and _____.