Number System

A system in which we deal with different types of number is termed as 'number system'. Numbers (Numerals), which are the symbolical representation in mathematical language are the base of Mathematics. In Hindu-Arabic system, ten digits (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) are used to represent any number.

Numeration Systems

Numeration means expressing a number in words. We express numbers in two ways. *These two systems of numeration are*

1. Indian system **2.** International system

Indian/Hindu-Arabic System

Periods	Crore		Lakhs		Thousands		Units		
Values	Ten Crore 10,00,00,000	Crore 1,00,00,000	Ten Lakh 10,00,000	Lakh 1,00,000	Ten Thousand 10,000	Thousand 1,000	Hundred 100	Ten 10	One 1
Numeral	4	3	2	5	2	3	7	1	6

To read the number name, we normally read number alongwith periods except in the case of digits in the ones period. The above numeral is written as 43, 25, 23, 716. It is read as forty three crore twenty five lakh twenty three thousand seven hundred sixteen.

International System

Periods	Million			Thousands			Units		
Values	Hundred Million 100,000,000	Ten Million 10,000,000	Million 1,000,000	Hundred Thousand 100,000	Ten Thousand 10,000	Thousand 1,000	Hundred 100	Ten 10	One 1
Numeral	4	3	2	5	2	3	7	1	6

It is most commonly used system in the world. In this system given numeral is written as 432, 523, 716. It is read as four hundred thirty two million five hundred twenty three thousand seven hundred sixteen.

Example 1 Write in words : 95,876

(a) Ninety five thousand eight hundred sixty seven
(b) Ninety five thousand eight hundred seventy six
(c) Nine thousand five hundred eighty seven six
(d) Ninety five thousand seven hundred eighty six

Sol. *(b)* The numeral is written as 95,876. It is read as ninety five thousand eight hundred seventy six.

Example 2 Write in figures : Seventy thousand three hundred sixty four.

(a) 70364 (b) 73064
(c) 73046 (d) 70346

Sol. *(a)* It is written as 70364.

Types of Numbers

Natural Numbers Numbers 1, 2, 3, 4, 5, ... etc, which are used for counting are called natural numbers.

☞ The number zero (0) is not a natural number.

Whole Numbers All natural numbers together with 0 (zero) are called whole numbers. Thus, 0, 1, 2, 3, 4, ..., etc., are whole numbers.

☞ 0 is the smallest whole number.

Prime Numbers A number greater than 1 which cannot be divided by any other number except 1 and itself, is called a prime number, e.g. 2, 3, 5, 7, 11, 13, 17 etc.

☞ 2 is the least prime number.

Composite Numbers A positive integer that has atleast one divisor other than 1 and itself is called a composite number, e.g. 4, 6, 8, 9 are all composite numbers.

☞ (i) 1 is neither prime nor composite.
(ii) 4 is the smallest composite number.

Even Numbers Those numbers which are divisible by 2 are known as even numbers, e.g. 2, 4, 6, 8, 10 etc.

☞ 2 is the smallest even number.

Odd Numbers Numbers which are not divisible by 2 are called odd numbers e.g. 1, 3, 5, 7, 9, 11, 13 etc.

☞ 1 is the smallest odd number.

Helping Tips

- Sum of any 2, 4, 6, ... odd numbers must be an even number.
- Sum of any 3, 5, 7, ... odd numbers must be an odd number.
- Difference of any 2 odd numbers must be an even number.

Tests of Divisibility

By 2 If the last digit of a number is either 2, 4, 6, 8 or 0, the number is divisible by 2, e.g. 242, 306, 488, 500.

By 3 If the sum of the digits of a number is divisible by 3, the number is divisible by 3, e.g. 243, 2427, 3456.

e.g. 243 $\Rightarrow \frac{2+4+3}{3} = \frac{9}{3} = 3$

So, 243 is divisible by 3.

By 4 If the last two digits of a number are divisible by 4 or 100, the number is divisible by 4, e.g. 1424, 1500, 1748.

e.g. 1424

Dividing the last two digits by 4, we get, $\frac{24}{4} = 6$

So, 1424, is divisible by 4.

By 5 If the last digit of a number is either 5 or 0, the number is divisible by 5, e.g. 375, 3460, 6575.

By 9 If the sum of the digits of a number is divisible by 9, the number is divisible by 9.

e.g. 243, 3438, 4554, etc.

e.g. 243

According to divisibility test, $\frac{2+4+3}{9} = \frac{9}{9} = 1$

So, 243 is divisible by 9.

By 10 If the last digit of a number is 0, the number is divisible by 10, e.g. 540, 1860, 2370.

Important Formulae

- Dividend = Divisor × Quotient + Remainder
- $\text{Divisor} = \frac{\text{Dividend} - \text{Remainder}}{\text{Quotient}}$
- $\text{Quotient} = \frac{\text{Dividend} - \text{Remainder}}{\text{Divisor}}$

Example 3 On dividing 18270 by a certain number, the quotient is 186 and the remainder is 42. Find the divisor.

(a) 99 (b) 91 (c) 98 (d) 100

Sol. *(c)* Divisor $= \frac{\text{Dividend} - \text{Remainder}}{\text{Quotient}}$

$= \frac{18270 - 42}{186} = \frac{18228}{186} = 98$

Place Value and Face Value in a Given Number

Place value of unit digit = (Unit digit) × 1

Place value of tens digit = (Tens digit) × 10

Place value of hundreds digit

= (Hundreds digit) × 100

Place value of thousands digit

= (Thousands digit) × 1000 and so on.

In a numeral, the face value of a digit is the value of the digit itself irrespective of its place in the numeral.

Example 4 Find the place value and face value of 3 in the number 53974.

(a) 300, 3 (b) 30, 3000

(c) 3000, 3 (d) 30000, 300

Sol. *(c)* The place value of $3 = 3 \times 1000 = 3000$

The face value of 3 = 3

The face value of a digit in a number is the value of digit itself.

Example 5 What is the place value of 8 and 7 in the number 86754?

(a) 8000, 700 (b) 80000, 7000

(c) 800, 7000 (d) 80000, 700

Sol. *(d)* Place value of $8 = 8 \times 10000 = 80000$

Place value of $7 = 7 \times 100 = 700$

How to write greatest *n*-digit number?

Since, we know that 9 is the greatest digit given to all digits in Hindu-Arabic system, hence 9 is the only digit which can be used to form the greatest number.

2 digit If we want to write two digit greatest number, we must write 9 twice, i.e. 99

3 digit If we want to write three digit greatest number, we must write 9 thrice, i.e. 999.

4 digit If we want to write four digit greatest number, we must write 9 four times, i.e. 9999 and so on.

How to write smallest *n*-digit number?

Since, we know that 0 is the smallest and 1 is the second smallest to all digits in Hindu-Arabic system. So, 1 and 0 are the only digits which can be used to form the smallest number and 1 must be placed before 0, since occurrence of 0 at first place has no meaning due to its face value.

2 digit If we want to write two digit smallest number, we must write 1 at first place and thereafter single 0 must be placed.

i.e. 10

3 digit If we want to write three digit smallest number, we must write 1 at first place and thereafter double 0 must be placed.

i.e. 100

4 digit If we want to write four digit smallest number, we must write 1 at first place and thereafter triple 0 must be placed.

i.e. 1000 and so on.

Example 6 The greatest 8-digit number with given digits 3, 5, 1, 2, 2, 7, 0 and 4 is

(a) 75432210 (b) 75432201

(c) 75432021 (d) 75430221

Sol. *(a)* The greatest 8-digit number = 75432210.

Example 7 Which of the following is smallest three digit number?

(a) 900 (b) 100 (c) 999 (d) 990

Sol. *(b)* The smallest number of three digit will be 100.

Approximate Value

Sometimes, we face the conditions, where we have to depend on approximate values.

e.g. If we are celebrating a party in our home, then we arrange the party for approximate number of guests. Suppose, in a particular month, a person's expenditure is ₹ 1976, he can assume it to be ₹ 2000.

Example 8 The approximate value of 25986 is

(a) 25000 (b) 25500 (c) 26000 (d) 26500

Sol. *(c)* Here, $986 \approx 1000$ (Let)

$\therefore \quad 25000 + 1000 = 26000$

Roman Numbers

The numbers which we use are called 'Arabic Numbers' but sometimes we use the another system for writing numbers called Roman System.

Mostly, Roman numbers are used to denote the class standard and position (rank) of a candidate, in faces of clocks, in page numbering etc.

The letters used in roman numbers are
I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000

Roman Numbers Chart

Roman	Arabic	Roman	Arabic
I	1	XIX	19
II	2	XX	20
III	3	XXX	30
IV	4	XL	40
V	5	L	50
VI	6	LXXV	75
VII	7	XC	90
VIII	8	C	100
IX	9	D	500

Roman Numbers Chart

Roman	Arabic	Roman	Arabic
X	10	DI	501
XI	11	DXXX	530
XII	12	DL	550
XIII	13	DCCVII	707
XIV	14	DCCCXC	890
XV	15	CM	900
XVI	16	MD	1500
XVII	17	MDCCC	1800
XVIII	18	MM	2000

Example 9 Number 51 write in Roman number.
(a) XL (b) LI
(c) LX (d) LII

Sol. *(b)* In Roman number L = 50; I = 1
So, 51 = LI

Practice Exercise

1. Write in words (International System) : 243, 183, 017
   (a) Two hundred forty three million one hundred eighty three thousand seventeen
   (b) Two hundred forty million thirty one hundred eighty thousand seventeen
   (c) Two hundred forty three million one hundred eighty three thousand seventy one
   (d) Twenty five hundred thirty one million eighty three thousand seventeen

2. Write the numeral (International System) : Two hundred twenty five million five hundred thousand seven hundred eighty three.
   (a) 225, 570, 783 (b) 225, 500, 783
   (c) 225, 583, 000 (d) 200, 225, 783

3. Write in the numeral : Three crore fifty one lakh two thousand sixty one.
   (a) 3, 51, 02, 061 (b) 3, 52, 02, 061
   (c) 3, 51, 20, 061 (d) 3, 51, 02, 016

4. How many prime numbers between 1 and 15?
   (a) 5 (b) 8
   (c) 7 (d) 6

5. The sum of all even numbers below 10 is
   (a) 20 (b) 10
   (c) 19 (d) 24

6. Which one of the following statements is true?
   (a) All even numbers are composite numbers
   (b) All odd numbers are prime numbers
   (c) There are infinite prime numbers
   (d) A prime number can be written as the product of more than two natural number

7. Which of the following numbers is divisible by 3?
   (a) 687 (b) 340 (c) 712 (d) 551

8. 7386032 is divisible by
   (a) 3 (b) 4
   (c) 9 (d) 11

9. Which one of the following numbers is divisible by 9?
   (a) 7532458 (b) 6812348
   (c) 6234588 (d) 4701828

10. On dividing a number by 9, the quotient is 12 and remainder is 7. Find the number.
    (a) 116 (b) 115
    (c) 120 (d) 125

11. If Divisor = 132, Quotient = 29, Remainder = 12. Find the dividend.
(a) 3480 (b) 3840 (c) 3540 (d) 3380

12. If Dividend = 19587, Divisor = 156, Remainder = 87. Find the quotient.
(a) 150 (b) 75 (c) 125 (d) 110

13. Find the place value of 9 in the number 9063.
(a) 90000 (b) 9800 (c) 9000 (d) 9999

14. Find the difference of place values of 6 in the number 568976.
(a) 54999 (b) 59499
(c) 59949 (d) 59994

15. The sum of face value of 3 in 6231, 6321 and 3621 is
(a) 3033 (b) 9 (c) 3330 (d) 3333

16. Find the difference between the largest and least number of five digits.
(a) 99999 (b) 98999 (c) 89899 (d) 89999

17. What is the difference between largest number of four digits and least number of three digits?
(a) 9899 (b) 9989
(c) 9998 (d) 8999

18. The greatest number of five digit which starts from 8 and ends with 7 is
(a) 89997 (b) 88997
(c) 88887 (d) 87987

19. The sum of the greatest and smallest number of 3 digits is
(a) 1099 (b) 1100 (c) 1999 (d) 1090

20. Find the largest number which can be formed by 5, 7, 8, 6.
(a) 8765 (b) 7865 (c) 8756 (d) 7856

21. Find the smallest number which can be formed by 3, 8, 7, 9.
(a) 8973 (b) 3789 (c) 9783 (d) 7398

22. Choose the correct option, if numbers 806, 860, 086, 260 and 800 are arranged in ascending order
(a) 086, 806, 860, 800, 260
(b) 800, 860, 086, 260, 806
(c) 086, 260, 800, 806, 860
(d) 800, 806, 860, 086, 260

23. The smallest even number formed by using the digits 1, 2, 3, 4 and 5 is
(a) 12345 (b) 12435 (c) 12354 (d) 12453

24. 4152 rounded off to the nearest thousand is
(a) 4000 (b) 5000 (c) 4500 (d) 5500

25. Number 2185 in Roman number.
(a) MMCLXXXV (b) MMMCLXXV
(c) MMCLXXIV (d) MMCLXXXVI

26. In number 97580, if the digits 7 and 5 interchange their places, the difference between the original and the new number is
(a) 1800 (b) 1080 (c) 1008 (d) 1000

Answers

1	(a)	2	(b)	3	(a)	4	(d)	5	(a)	6	(c)	7	(a)	8	(b)	9	(c)	10	(b)
11	(b)	12	(c)	13	(c)	14	(d)	15	(b)	16	(d)	17	(a)	18	(a)	19	(a)	20	(a)
21	(b)	22	(c)	23	(c)	24	(a)	25	(a)	26	(a)								

Hints & Solutions

1. Two hundred forty three million one hundred eighty three thousand seventeen.

2. 225,500,783

3. 3, 51,02,061

4. Prime numbers between 1 and 15 = 2, 3, 5, 7, 11, 13.
So, total number of prime numbers = six.

5. ∵ All even numbers below 10 are 2, 4, 6, 8
∴ Sum = (2 + 4 + 6 + 8) = 20

6. There are infinite prime numbers.

7. For a number to be divisible by 3, its sum of digits must be divisible by 3.
Here, $687 = \frac{6+8+7}{3} = \frac{21}{3} = 7$
∴ 687 is divisible by 3.

8. The given number is 7386032.
The sum of the digits
$= 7 + 3 + 8 + 6 + 0 + 3 + 2 = 29$
and 29 is not divisible by 3, 9 and 11.
But, last two digits of a number is 32 which is divisible by 4.
Hence, the given number is divisible by 4.

9. By option (c), Sum of digits of number 6234588
$= 6+2+3+4+5+8+8 = 36$
Which is divisible by 9.
Hence, the number is divisible by 9.

10. Number = (Divisor × Quotient) + Remainder
$= 9\times12+7 = 108+7 = 115$

11. Dividend = Divisor × Quotient + Remainder
$= 132\times29+12 = 3828+12 = 3840$

12. $\text{Quotient} = \dfrac{\text{Dividend} - \text{Remainder}}{\text{Divisor}}$
$= \dfrac{19587-87}{156} = \dfrac{19500}{156} = 125$

13. 9063
$3\times1=3$
$6\times10=60$
$0\times100=0$
$9\times1000=9000$
$\therefore$ Place value of $9 = 9\times1000 = 9000$

14. 568976
$6\times1 = 6$
$6\times10000 = 60000$
$\therefore$ Required difference $= 60000-6$
$= 59994$

15. Required value $= 3+3+3 = 9$

16. Largest number of five digits = 99999
Least number of five digits = 10000
So, difference $= 99999-10000 = 89999$

17. Largest number of four digits = 9999
Least number of three digits = 100
$\therefore$ Difference $= 9999-100 = 9899$

18. 89997 is the required number.

19. $\because$ Greatest number of 3 digits = 999
Smallest number of 3 digits = 100
$\therefore$ Sum $= (999+100) = 1099$

20. Largest number = 8765

21. Smallest number formed by 3, 8, 7, 9 will be 3789.

22. Required order = 086,260,800,806,860

23. $\therefore$ Required even number = 12354

24. 4152 rounded off to the nearest thousand is 4000.

25. 2185 = MMCLXXXV

26. $\because$ Original number = 97580
New number = 95780
$\therefore$ Difference $= 97580-95780 = 1800$

Try Yourself

1) Write the number '78921092' in International system.
(a) Seventy eight lakh ninety two thousand ten hundred and ninety two
(b) Seven crore eighty nine lakh twenty one thousand and ninety two
(c) Seventy eight million nine hundred twenty one thousand and ninety two
(d) Seven crore eighty nine lakh twenty one thousand and ninety two

2) Which one of the following numbers is divisible by 3?
(a) 2876423 (b) 9866003 (c) 2345678 (d) 4006020

3) Dividend = 100400, Quotient = 392, Remainder = 48, Divisor = ?
(a) 126 (b) 226 (c) 256 (d) 258

4) Find the sum of place and face values of 8 in 43836.
(a) 88 (b) 808 (c) 880 (d) 888

5) The difference between the largest 5-digit number and the smallest 3-digit number is
(a) 99899 (b) 89999 (c) 99890 (d) 98899

6) The number 49532 rounded off to the nearest thousand is
(a) 41000 (b) 50000 (c) 49000 (d) 49500

7) Write the following four numbers in descending order
1. 4203567 2. 4203657
3. 4203756 4. 4203675
(a) 1, 2, 3, 4 (b) 3, 4, 2, 1
(c) 1, 2, 4, 3 (d) 3, 2, 4, 1

8) In the given number 890436, if you write 0 in place of 4, by how much the resulting number be less than the given number?
(a) 40 (b) 400 (c) 436 (d) 36

9) Write 73 as a Roman numeral.
(a) VIXIX (b) LXXIII (c) LXXXX (d) LXIII

10) Write XIX as a number.
(a) 20 (b) 18 (c) 19 (d) 16

Answers

1	*(c)*	2	*(d)*	3	*(c)*	4	*(b)*	5	*(a)*
6	*(b)*	7	*(b)*	8	*(b)*	9	*(b)*	10	*(c)*