The Gen X Series

MATHS OLYMPIAD 4

Useful for Maths Olympiads Conducted at School, National & International Levels

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Strictly According to the Latest Syllabus of Maths Olympiad

V&S PUBLISHERS

Published by:



V&S PUBLISHERS

F-2/16, Ansari road, Daryaganj, New Delhi-110002
☎ 23240026, 23240027 • *Fax:* 011-23240028
Email: info@vspublishers.com • *Website:* www.vspublishers.com
Online Brandstore: ***amazon.in/vspublishers***

Regional Office : Hyderabad
5-1-707/1, Brij Bhawan (Beside Central Bank of India
Lane) Bank Street, Koti, Hyderabad - 500 095
☎ 040-24737290
E-mail: vspublishershyd@gmail.com

Branch Office : Mumbai
Jaywant Industrial Estate, 1st Floor–108, Tardeo Road
Opposite Sobo Central Mall, Mumbai – 400 034
☎ 022-23510736
E-mail: vspublishersmum@gmail.com

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ISBN 978-93-505795-5-8
5 **New Edition**

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Printed at : Param Offsetters, Okhla, New Delhi–110020

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The New Edition of this Maths Olympiad Class 4 is written in a Guide like pattern with images and illustrations at every step & is divided into different sections. Each chapter comes with Basic Theory and Solved Examples. Multiple Choice Questions with their Answer Keys and Solutions are liberally included. In order to help students become aware of and to simulate the actual exam conditions, a bunch of OMR Sheets have been enclosed with the book as well.

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We wish you All The Best!

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SECTION 1
MATHEMATICAL REASONING

Number System

1

Learning Objectives

In this chapter, students will learn about:

- Numbers (Numerals) and Number Names
- 5-digit and 6-digit Numbers
- Place Value and Face Value
- Comparing Numbers
- Successor and Predecessor
- Ascending and Descending Order
- Even and Odd Number
- Expanded Form of Numbers
- Forming Numbers
- Rounding Numbers

Numbers (Numerals)

We use numbers in each and every sphere of our life. Large numbers are often used in monetary transactions in businesses, banks, etc. Total number of schools in a city, total number of students in a university are all examples of large numbers.

Number Names

Let us have a look at the table given below:

Number	Number Name
1	One
10	Ten
100	One hundred
1000	One thousand
10000	Ten thousand
100000	One lakh
1000000	Ten lakh

Numbers shown in the table are based on Indian System of numeration. As the number increases, it becomes larger and larger.

As we know there are ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. Numbers are written using these digits. These digits are called ones. The numerals formed by the digits 0, 1, 2, 3, 4, ... are known as Hindu-Arabic numbers. This system is popular world-wide.

Numeral system is a way of counting and naming number. Number is an idea whereas the symbols used to represent the numbers are called numerals.

5-digit Numbers

9999 is the largest 4-digit number. If we add 1 to it, it will give us the smallest 5-digit number.

6-digit Numbers

We know that 99,999 is the greatest 5-digit number. If we add 1 to it, it will give us the smallest 6-digit number.

Place Value

Place value of a digit depends on its position in the number. As the digit moves to the left, its value increases. The face value of a digit in a number is the value of digit itself.

Indian Number System

Lakhs Period		Thousands Period		Ones Period		
Ten Lakhs (TL)	Lakhs (L)	Ten Thousands (TTh)	Thousands (Th)	Hundreds (H)	Tens (T)	Ones (O)

The place value chart has been separated into three groups: Ones period – It has three places: Hundreds, tens and ones. Thousands period – It has two places: Ten thousands and thousands.

Lakhs period – It has two places: Ten lakhs and lakhs.

Interntional Number System

Thousands period			Ones period		
Hundred Thousands (HTh)	Ten Thousands (TTh)	Thousands (TTh)	Hundreds (H)	Tens (T)	Ones (0)

Use of Commas

(i) If we write the number without using the place values chart, we use comma to separate the periods. Let us take an example: 4,57,283

(ii) In the Indian number system, first comma is used when the ones period is complete.

(iii) Second comma is used when thousands period is complete. Next comma is used to separate thousands and lakhs period.

(iv) In the International number system, put a comma after every three digits, starting from the right.

Comparing Numbers

The number which has more number of digits is greater.

For example, 855267 is greater than 28572.

(i) If two numbers have the same number of digits and the extreme left digits are also the same, then compare the next digits to the right and so on.

For example, 34291 is greater than 33203.

(ii) If two numbers have the same number of digits, then the number with bigger digit on the extreme left is greater. For example, 573235 is greater than 358496.

Successor and Predecessor

(i) The number that comes just after a given number is called its successor.

Example: Write the successor of the following numbers.

578, 284, 999

Solution:

Number	Successor
578	579
284	285
999	1000

(ii) The successor of a number is obtained by adding 1 to that number.

(iii) The number that comes just before a particular number is called its predecessor.

Example: Write the predecessor of the following numbers.

178, 195, 285

Solution:

Number	Predecessor
178	177
195	194
285	284

(iv) Clearly the predecessor of a number is obtained by subtracting 1 from the given number.

Note: Zero has no predecessor.

Ascending and Descending Order

Arranging the given numbers from the smallest to the greatest is called the ascending order or increasing order.

Example: Arrange the following numbers in ascending order.

4572, 5132, 4698, 8455

Solution: All the given numbers are 4-digit numbers. So, on comparing their thousands place we get, $4 < 5 < 8$

But thousands place of 4572 and 4698 are same. So on comparing their hundreds place we get,

$5 < 6$

$\Rightarrow$ $4572 < 4698$

Hence, $4572 < 4698 < 5132 < 8455$

$\therefore$ Ascending order is 4572, 4698, 5132, 8455

Arranging the given number from the greatest to the smallest is called the descending order or decreasing order.

Example: Arrange the following numbers in descending order.

5431, 3451, 5231, 4531

Solution: All the given numbers are 4-digit numbers so, on comparing their thousands place we get,

$5 > 4 > 3$

But thousands place of 5431 and 5231 are same. So, on comparing their hundreds place we get,

$4 > 2$

$\Rightarrow$ $5431 > 5231$

Hence, $5431 > 5231 > 4531 > 3451$

$\therefore$ Decreasing order is 5431, 5231, 4531, 3451.

Even and Odd Number

Even numbers

In an even number, the digits in the ones place is 0, 2, 4, 6 or 8.

Odd numbers

In an odd number, the digits in the ones place is 1, 3, 5, 7 or 9.

Expanded Form of Numbers

Example: Write the expanded form of 99999.

Solution:

99999 = 9 ten thousands + 9 thousands + 9 hundreds + 9 tens + 9 ones

$= 9 \times 10000 + 9 \times 1000 + 9 \times 100 + 9 \times 10 + 9 \times 1$

$= 90000 + 9000 + 900 + 90 + 9$

Forming Numbers

(i) To form the greatest 5-digit or 6-digit number using all the digits, arrange the digits in decreasing order.

(ii) To form the smallest 5-digit or 6-digit number using all the digits, arrange the digits in increasing order.

Example: Write the greatest and smallest 5-digit numbers using the digits 7, 2, 3, 5, 9.

Solution: Greatest number = 97532

Smallest number = 23579

Rounding Numbers

Rounding off to the nearest 10.

To round off a number to the nearest 10, we round the given number to the closest multiple of 10.

Rounding off to the nearest 100.

To round off a number to the nearest hundred, we round the given number to the closest multiple of 100.

Rounding off to the nearest 1000.

To round off a number to the nearest 1000, we round the given number to the closest multiple of 1000.

Multiple Choice Questions

1. 99,999 is the greatest _____ digit number.
   (a) 5 (b) 4
   (c) 3 (d) 2
2. Place value of 5 in 5,43,621 is _____.
   (a) 500000 (b) 5000
   (c) 50 (d) 5
3. Smallest 6-digit number is _____.
   (a) 10,0001 (b) 1,00,000
   (c) 9,99,999 (d) 99,999
4. $300000 + 20000 + 4000 + 200 + 2 =$ _____
   (a) 3,24,202 (b) 3,42,222
   (c) 2,34,222 (d) 3,22,432
5. Ones period includes.
   (a) Hundreds
   (b) Thousands
   (c) Ten thousands
   (d) Lakhs
6. The difference between the place values of '9' and '3' in 43549 is _____.
   (a) 2991 (b) 291
   (c) 2990 (d) 29900
7. Smallest six-digit number having 2 at hundred's place is ____.
   (a) 321201 (b) 301761
   (c) 331201 (d) 300111
8. Pick the odd one out.
   (a) Hundreds (b) Tens
   (c) Ones (d) Lakhs
9. We use _____ to separate the periods.
   (a) Comma (b) Full stop
   (c) Brackets (d) Hyphen
10. 4,37,283 is a _____ number.
    (a) 4-digit (b) 5-digit
    (c) 6-digit (d) 7-digit
11. The descending order of 12432, 12342, 12234, 12324 is _____.
    (a) 12324, 12432, 13342, 12234
    (b) 12432, 12342, 12324, 12234
    (c) 12234, 12324, 12342, 12432
    (d) 12432, 12324, 12342, 12234
12. Ten lakhs comes in _____ period.
    (a) Thousands (b) Lakhs
    (c) Ones (d) Hundreds
13. Pick odd one out.
    (a) 6, 34, 231 (b) 1, 34, 345
    (c) 1, 34, 655 (d) 23,456
14. 1 hundred thousands = _____
    (a) 1 Lakh (b) 10 Lakh
    (c) 100 Lakh (d) 1000 Lakh
15. Ninety-two thousands three hundred forty-five is same as _____.
    (a) 92, 435 (b) 90, 453
    (c) 92, 145 (d) 92, 345
16. 3,44,567 has _____ lakhs.
    (a) 3 (b) 4
    (c) 5 (d) 6
17. What is the estimated value of 735 nearest to 100?
    (a) 730 (b) 700
    (c) 800 (d) 750
18. What is the expanded form of 39,524?
    (a) 30000 + 9000 + 500 + 20 + 4
    (b) 3000 + 900 + 500 + 20 + 4
    (c) 30000 + 9000 + 500 + 20
    (d) 30000 + 9000 + 20 + 4
19. If 3256 is rounded off to the nearest ___, the answer will be 3000.
    (a) Tens (b) Thousands
    (c) Hundreds (d) None of these

20. Difference between smallest 5-digit number and smallest 4-digit number is _____.
    (a) 90000 (b) 1000
    (c) 9000 (d) 10000

21. The price of a car is 411140. What is the rounded off price of the car to the nearest 100?
    (a) 411130 (b) 411100
    (c) 411200 (d) 411150

22. The costs of three computers are ₹ 25,351, ₹ 25,400, and ₹ 30,251. What is the least cost of the computer?
    (a) ₹ 29,451 (b) ₹ 25,400
    (c) ₹ 30,251 (d) ₹ 25,351

23. Ravi has got five thousand nine hundreds rupees in a lottery. What is the figure value of this amount?
    (a) 590 (b) 5900
    (c) 5090 (d) 5009

24. A city has a population of 894710. Rounded off the population 894710 to the nearest 1000 is.
    (a) 894000 (b) 894700
    (c) 895000 (d) 894600

25. Sneha has 4 slips containing these four numbers.

    93543 72411 23456 43517

    She wants to know which one out of these numbers contains 4 at tens place. Help her to find it.
    (a) 72411 (b) 93543
    (c) 43517 (d) 23456



Roman Numerals

2

Learning Objectives:

In this chapter, students will learn about:

- Roman Symbols
- Uses of Roman Symbols

Roman numbers are used widely in our daily life. The most important and common example is watches and clocks with Roman numbers on it. Roman numerals are used to number different volumes of a book, classroom in a school and questions in a question paper or exercise.



Roman Symbols

There are seven symbols used in this system which are as follows:

I, V, X, L, C, D and M

Value of the Roman symbols

Each symbol has a corresponding value:

Roman Symbol		
I	stands for	1
V	stands for	5
X	stands for	10
L	stands for	50
C	stands for	100
D	stands for	500
M	stands for	1000

Note: There is no symbol for zero in the Roman numeral system.

Rules to form Roman Numerals

1. When certain Roman numerals are repeated, the value of the resulting numeral is equal to their sum.
   III = 1 + 1 + 1 = 3
   XX = 10 + 10 = 20
2. Roman numerals read from left to right, larger values to the left and work to the smaller values on the right.
3. If a lesser numeral is before a greater number, the lesser is always subtracted from the greater numeral. For example,
   IV = 5 – 1 = 4
4. If a lesser numeral is after a greater numeral, the two numerals are added. For example, VI = 5 + 1 = 6
5. I and V can only modify up to X. For example, 49 is not written as IL, rather you first write 40 as XL and then write 9 as IX. Put them together as 49 = 40 + 9 = XLIX.
6. X and L can only modify up to C. For example, 490 is not written as XD. First you write 400 as CD and then you write 90 as XC. Put them together as
   490 = 400 + 90 = CDXC.
7. C and D can only modify up to M. For example, 950 is not written as LM, rather

you first write 900 as CM and then add L for 50. So, 950 = CML.

Note:

(i) V, L and D can not be repeated.

(ii) No roman numeral can come together more than three times. It is wrong to write IIII = 4.

(iii) The symbol V can never be written on the left of any greater value symbol.

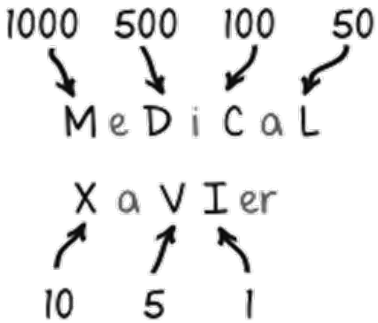
Shortcuts to Problem Solving

1. An accurate way to write the Roman numbers is to first take the thousands, hundreds, tens and ones.

   For example, to write 1999 in Roman numeral, first write one thousand as M, nine hundred as CM, ninety as XC, nine as IX. Combine all these: MCMXCIX

2. Develop a mnemonic device to remember the order of Roman numerals.

   Think 'MeDiCaLXaVIer'. It has the Roman numerals in order from 1000 to 1.



   Another common mnemonic like 'I Value Xylo-phones Like Cows Dig Milk' puts the Roman numerals I, V, X, L, C, D and M in order from smallest to largest. If you have problem only in remembering larger numbers, it may help you to remember that 'C' is equivalent to 'century' and 'M' is equivalent to 'millennium': 100 and 1000, respectively.

3. Write the six pairs of subtractive Roman numeral on a notecard along with their equivalents in Roman numerals, 'IV' is equal to 4, 'IX' is equal to 9, 'XL' is equal to 40, 'XC' is equal to 90, 'CD' is equal to 400 and 'CM' is equal to 900. These are called 'subtractive' because the first letter is "subtracted" from the second. Keep the notecard visible at all times so you know to recognize these pairs when they appear.

Example: Shraddha wants to convert her friend's year of birth (1989) into roman numbers. Can you help her to do so?

Solution: Break 1989 into 1000, 900, 80 and 9, then do each conversion.

1000 = M 900 = CM

80 = LXXX 9 = IX

So, 1989 = 1000 + 900 + 80 + 9 = MCMLXXXIX

Multiple Choice Questions

1. Romans used the numbers for trading and _____.
   (a) Commerce
   (b) Finance
   (c) Law
   (d) Exporting
2. Addition is only applicable when the first symbol is _____ than the second, third.
   (a) Greater
   (b) Smaller
   (c) Equal
   (d) Greater than equal to
3. **Statement A:** When the principle of addition is used, a symbol can be used only three times.

   Statement B: When the principle of addition is used, a symbol can be used only 1 time.
   (a) A is correct
   (b) B is correct
   (c) Both are correct
   (d) Both are incorrect
4. Pick the odd one out.
   V, IV, X, XI, VIIII.
   (a) IV (b) XI
   (c) V (d) VIIII
5. Pick the odd one out.
   I, V, X, L, C, D, N.
   (a) X (b) I
   (c) C (d) N
6. Roman numbers don't have symbol for _____.
   (a) Zero (b) One
   (c) Two (d) Three
7. When a symbol appears after larger symbol, it is _____
   (a) Added
   (b) Subtracted
   (c) Multiplied
   (d) Divided
8. Subtraction is only applicable when the first symbol is _____ than the second one.
   (a) Less
   (b) More
   (c) Equal to
   (d) Less than equal to
9. Convert CVI into numbers.
   (a) 100 (b) 105
   (c) 106 (d) 110
10. Convert 1400 into numbers.
    (a) MCD (b) MC
    (c) MD (d) M
11. Convert MXVI into numbers.
    (a) 1016 (b) 101
    (c) 1006 (d) 1000
12. Pick the odd one out.
    C, XL, LXXXX
    (a) C
    (b) XL
    (c) LXXXX
    (d) None of these
13. MMLXIII – CDLXXXVI is equal to.
    (a) MDLXXVII
    (b) MDLXXVI
    (c) MDLXV
    (d) MDLXVIII
14. DCCCLIX + XXVII + DCCCXLII =?
    (a) MDCCXXVI
    (b) MDCCXXVIII
    (c) MDCXXVII
    (d) MDCCXXVII