

UNIT I

Number Systems

Chapters

Numbers

Playing with Numbers

HCF and LCM

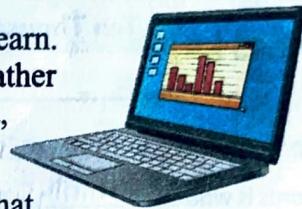
Whole Numbers

Integers

Fractions

Decimals

Computers have revolutionized the way we communicate, work, and learn. They have influenced almost all fields of human activity including weather forecasting, space technology, agriculture, financial institutions, media, medicine, air traffic control, and more.



C-7.1

Sahil is a technology enthusiast. He recently came across a blog post that talked about how computers use the 'binary system' to perform a variety of tasks with incredible speed and accuracy. This made him very curious, and he wanted to find out more.

He discovered that while we use ten digits (0–9), to represent different numbers, a computer uses only two digits, **0** and **1**, to represent every piece of information we work with on a computer: numbers, text, pictures, etc. The first 10 numbers as understood by a computer in binary form are: 0, 1, 10, 11, 100, 101, 110, 111, 1000, 1001, and 1010.

Sahil also found that place values in the binary system are different from the ones we have studied so far (ones, tens, hundreds, and so on). The binary place value system has a ones place, a twos place, a fours places, and so on. To find the decimal number that has a binary representation of **10101010**, we will multiply each digit with its place value in the binary system and then add these products.

	64×2	32×2	16×2	8×2	4×2	2×2	1×2
128	64	32	16	8	4	2	1
1	0	1	0	1	0	1	0

Did you notice that the value of a place gets increased by a factor of 2 in the binary system, unlike the decimal number system where the place values increase by a factor of 10.

$$\begin{aligned}10101010 &= 1 \times 128 + 0 \times 64 + 1 \times 32 + 0 \times 16 + 1 \times 8 + 0 \times 4 + 1 \times 2 + 0 \times 1 \\&= 128 + 0 + 32 + 0 + 8 + 0 + 2 + 0 = 128 + 32 + 8 + 2 = 170\end{aligned}$$

LET'S SOLVE

Given below are the binary representations for three different 3-digit numbers, together forming a 9-digit number. Find this 9-digit number and write it in words as per the International System of Numeration.

10100011

10000001

10010110

Were you able to solve the question? Let us study the concepts of place value and International System of Numeration in the upcoming chapters and come back to find the answer to this question.





Numbers

05/06/2024

LOOKING BACK



96,451

Ten Thousands	Thousands	Hundreds	Tens	Ones
9	6	4	5	1

1. Expanded form of 96,451 is 90000 + 6000 + 400 + 50 + 1.
2. 96,451 in words is written as ninety six thousand, four hundred & one.
3. Successor of 96,451 is 96,452.
4. 1000 less than 96,451 is 95,451.
5. Smallest 5-digit number formed using all the digits of the number 96,451 is 14,569.

NUMBERS IN DAILY LIFE

C-1.1

The numbers used by us in our daily life are written using the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.

These are known as **digits** and this number system is called the **Hindu-Arabic number system**.

The numbers used for counting are 1, 2, 3, 4, This collection of numbers is called the **counting numbers**, also known as the set of **natural numbers** (represented by N). The smallest counting number or natural number is 1. There is no greatest natural number as the set of natural numbers extends infinitely.

Natural numbers, $N = 1, 2, 3, \dots$

If 0 is included in the set of natural numbers, it becomes the set of **whole numbers**, represented by W.

Whole numbers, $W = 0, 1, 2, 3, \dots$

Thus, 0 is the smallest whole number. Every natural number is a whole number; but 0 is the only whole number which is not a natural number.

There is another number system called the **Roman numeral system** in which the symbols I, V, X, L, C, D, and M are used to represent numbers.

Roman Numerals = I, II, III, IV, V, VI, ...

We will learn about the Roman numeral system in detail later in this chapter.

Big Numbers

In a school, the students of class VI decided to find out how big one million (1,000,000) is. They planned to collect one million matchsticks. Usually a match box contains 50 matchsticks. 10 of these boxes are packed as one packet. So a packet of matchboxes contains 500 matchsticks. The students calculated and found out that they needed 2000 such packets of matchboxes to have 1 million matchsticks. The class made it a school project and asked all the 1000 students to participate in the project by bringing 2 packets of matchboxes (1000 matchsticks). They arranged 2000 packets as an exhibition of a million matchsticks. Imagine the size of this one million!

$1000 \text{ students} \times 1000 \text{ matchsticks each} = 1,000,000$. It was an enjoyable experience for the whole school to see how big 1 million is. Even many parents came to see this one million!!

Here are some real-life examples:

- Population of the world is around 8 billion written out as 8,000,000,000.
- Approximate speed of light is 1080 million km per hour or 1,080,000,000 km per hour.

Small Numbers

We know the length of one metre.

In comparison, $1 \text{ mm} = \frac{1}{1000} \text{ m} = \frac{1}{1,000,000} \text{ km}$.

You now know the length of a millimetre.

$\frac{1}{1,000,000}$ of a millimetre is known as a nanometre which is equal to $\frac{1}{1,000,000,000}$ of a metre.

6-, 7-, 8- AND 9-DIGIT NUMBERS

We know that

$$999 + 1 = 1000; 9999 + 1 = 10,000$$

C-1.1

The largest 5-digit number is 99,999. On adding 1 to 99,999, we get the smallest 6-digit number.
 $99,999 + 1 = 1,00,000$

The new number 1,00,000 which comes just after 99,999 is read as *one lakh*.

For example, take a 6-digit number 3,45,678.

It is read as three lakh forty-five thousand six hundred seventy-eight.

The largest 6-digit number is 9,99,999. On adding 1 to 9,99,999, we get the smallest 7-digit number.

$$9,99,999 + 1 = 10,00,000$$

The new number 10,00,000 which comes just after 9,99,999 is read as *ten lakh*.

For example, take a 7-digit number 34,12,652.

It is read as thirty-four lakh twelve thousand six hundred fifty-two.

The largest 7-digit number is 99,99,999. On adding 1 to 99,99,999, we get the smallest 8-digit number.

$$99,99,999 + 1 = 1,00,00,000$$

The new number 1,00,00,000 is the smallest 8-digit number which is read as *one crore*.

An 8-digit number like 5,20,13,275 is read as five crore twenty lakh thirteen thousand two hundred seventy-five.

The largest 8-digit number is 9,99,99,999. On adding 1 to 9,99,99,999, we get the smallest 9-digit number. $9,99,99,999 + 1 = 10,00,00,000$; which is read as *ten crore*.

A 9-digit number like 60,57,12,809 is read as sixty crore fifty-seven lakh twelve thousand eight hundred nine.

Place Value

The basis of our number system is place value. With the help of ten numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 we can write any big number. It is the place value which gives value to a number.

The place value of a digit in a given number is the value of the digit because of the place or the position of the digit in the number.

For example, consider the number 7,58,92,134.

Let us write this number in Indian Place Value chart.

Each letter indicates the name of the corresponding place value.

C	T L	L	T T h	T h	H	T	O
7	5	8	9	2	1	3	4

Each digit is written in its corresponding place value.

The place value of digit 4 in this number is $4 \times 1 = 4$ ones = 4.

The place value of the digit 3 in this number is $3 \times 10 = 30$.

The place value of the digit 1 in this number is $1 \times 100 = 100$.

The place value of the digit 2 in this number is $2 \times 1000 = 2000$.

The place value of 9 is $9 \times 10,000 = 90,000$ and the value of the place is ten thousands.

The place value of 8 is $8 \times 1,00,000 = 8,00,000$ and the value of the place is lakhs.

The place value of 5 is $5 \times 10,00,000 = 50,00,000$ and the value of the place is ten lakhs.

The place value of 7 is $7 \times 1,00,00,000 = 7,00,00,000$ and the value of the place is crores.

In words, the number 7,58,92,134 is read and written as seven crore fifty-eight lakh ninety-two thousand one hundred thirty-four.

Remember

- * The place value of 0 is always 0, irrespective of its position in the number.

Face Value

The face value of a digit in a number remains the same irrespective of its place or position in the number.



For example, the face value of 2 in the numbers 3245, 24,790, and 12,40,365 is always 2.

Expanded Notation

A number is said to be written in expanded notation when it is expressed in terms of the place values of all its digits.

We have seen how the number 7,58,92,134 is formed. In expanded notation, it is written as

$$7,58,92,134 = 7,00,00,000 + 50,00,000 + 8,00,000 \\ + 90,000 + 2000 + 100 + 30 + 4.$$

Indian System of Numeration

You must have noticed that while writing large numbers, we use commas. This makes the reading and writing of big numbers easier.

Consider the number 76,58,92,134 for example.

- The first three digits on the right of the number form the ones period.
Thus, 134 in the number 76,58,92,134 comes in the ones period. Introduce a comma to the left of this part of the number to show 134 as the ones period.
- The next two digits to the left of the ones period form the thousands period and thus include thousands and ten thousands. 92 in 76,58,92,134 represents the thousands period.
- All the periods to the left of the ones period have only two digits. 58 in 76,58,92,134 represents the lakhs period which includes lakhs and ten lakhs.
- So we put a comma to distinguish the thousands and lakhs periods.
- The next two digits will represent crores which includes crores and ten crores. 76 in 76,58,92,134 represents the crores period. As before, a comma is used to distinguish the lakhs and the crores periods.

In the International system, the periods are different and we will be learning that later in this chapter.

Example 1: Write the place value of the coloured digit in each of the following.

- a. 2,68,481 b. 83,29,576
- c. 4,30,976 d. 23,74,658

Solution:

- a. The place value of 6 in 2,68,481 is $6 \times \text{value of the place} = 6 \times 10,000 = 60,000$
- b. The value of 5 in 83,29,576 is $5 \times 100 = 500$.

- c. The value of 0 in 4,30,976 is $0 \times 1000 = 0$. This tells us about the absence of the thousands place in the number.

- d. The place value of 2 in 23,74,658 is $2 \times 10,00,000 = 20,00,000$.

Example 2: Find the difference between the face value and place value of the digit 8 in 38954.

Solution: The face value of 8 in 38954 = 8
The place value of 8 in 38954 = $8 \times 1000 = 8000$
Their difference = $8000 - 8 = 7992$

Example 3: Write the following numbers in expanded form.

- a. 5,36,704 b. 6,32,96,723 c. 24,00,505

Solution:

- a. $5,00,000 + 30,000 + 6000 + 700 + 4$
- b. $6,00,00,000 + 30,00,000 + 2,00,000 + 90,000 + 6000 + 700 + 20 + 3$
- c. $20,00,000 + 4,00,000 + 500 + 5$

Example 4: Express the following in standard numeral form.

- a. $7,00,000 + 80,000 + 4000 + 400 + 8$
- b. $80,00,000 + 40,000 + 3000 + 20$
- c. $6,00,00,000 + 50,000 + 800 + 5$

Solution:

- a. $7,00,000 + 80,000 + 4000 + 400 + 8 = 7,84,408$
- b. $80,00,000 + 40,000 + 3000 + 20 = 80,43,020$
- c. $6,00,00,000 + 50,000 + 800 + 5 = 6,00,50,805$

Example 5: Express the following numbers in words.

- a. 5,76,897 b. 56,83,765
- c. 8,76,98,456 d. 45,00,56,006

Solution:

- a. 5,76,897 = Five lakh seventy-six thousand eight hundred ninety-seven
- b. 56,83,765 = Fifty-six lakh eighty-three thousand seven hundred sixty-five
- c. 8,76,98,456 = Eight crore seventy-six lakh ninety-eight thousand four hundred fifty-six
- d. 45,00,56,006 = Forty-five crore fifty-six thousand six

Example 6: Express the following numbers in figures.

- a. Eight lakh thirty-six thousand sixty-three
- b. Eighty-five lakh forty-eight thousand twenty-six
- c. Five crore five lakh eighty-eight thousand eight

Solution:

- Eight lakh thirty-six thousand sixty-three
= 8,36,063
- Eighty-five lakh forty-eight thousand twenty-six
= 85,48,026
- Five crore five lakh eighty-eight thousand eight
= 5,05,88,008

Example 7: Insert commas appropriately in the following numbers as per the Indian system of numeration.

- 1234567
- 12345678

Solution: In the Indian system,

- 1234567 is written as 12,34,567.
- 12345678 is written as 1,23,45,678.

Exercise 1A

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- Express the following in the standard numeral form.

- $6,00,00,000 + 50,00,000 + 7,00,000 + 40,000 + 3000 + 600 + 80 + 3 = 6,57,43,683$
- $5,00,000 + 40,000 + 7000 + 800 + 60 + 4 = 5,47,864$
- $30,00,000 + 2,00,000 + 40,000 + 8000 + 700 + 2 = 32,48,702$
- $40,00,000 + 60,000 + 3000 + 60 + 8 = 40,63,068$
- $7,00,00,000 + 40,000 + 400 + 9 = 7,00,40,409$
- $3,00,00,000 + 7,00,000 + 800 + 5 = 3,07,00,805$
- $40,00,000 + 7,00,000 + 60 + 3 = 47,00,063$
- $8,00,00,000 + 4,00,000 + 70,000 + 600 + 40 + 7 = 8,04,70,647$

- Write the following numbers in expanded form.

- | | | | |
|--------------|--------------|--------------|----------------|
| a. 67,43,859 | b. 4,32,087 | c. 23,80,043 | d. 3,12,45,678 |
| e. 6,54,837 | f. 78,50,005 | g. 75,06,080 | h. 7,32,80,054 |

- State the place value of the coloured digit in each of the following numbers.

- | | | | |
|------------------------|---------------------------|------------------------------|---------------------|
| a. 4,57,832 = 800 ✓ | b. 85,93,061 - 60 ✓ | c. 4,32,75,945 = 4,000,000 ✓ | d. 54,985 = 1,000 ✓ |
| e. 1,92,837 = 90,000 ✓ | f. 48,79,614 = 8,00,000 ✓ | g. 3,54,78,463 = 50,00,000 ✓ | h. 6,57,298 = 8 ✓ |

- Express the following in numerals.

- Five lakh forty thousand six hundred fifty = 5,40,650
- Fifteen lakh thirty-six thousand four hundred thirty-nine = 15,36,439
- Five crore fifty-four lakh twenty-seven thousand eight hundred sixty-nine = 5,54,27,869
- Six crore five lakh forty-three thousand sixty-five = 6,05,43,65
- Eighty-three lakh forty-four thousand seven = 83,44,007
- Seventy-eight lakh six thousand five hundred six = 78,06,506
- Eight crore seven lakh eighty-six thousand sixty-eight = 8,07,86,086
- Four crore seven hundred 1,00,00,700

- Write the following numbers in words.

- | | | | |
|--------------|----------------|----------------|----------------|
| a. 6,87,354 | b. 6,80,636 | c. 40,49,974 | d. 48,32,742 |
| e. 30,70,007 | f. 5,33,74,006 | g. 6,54,83,009 | h. 5,04,90,705 |

- Insert commas appropriately in the following numbers as per the Indian system of numeration.

- | | | | |
|-----------|--------------|-------------|--------------|
| a. 542867 | b. 97,53,110 | c. 3691,215 | d. 24681,012 |
|-----------|--------------|-------------|--------------|

- Find the difference between the place value and face value of the digit 9 in 459326.

COMPARING AND ORDERING NUMBERS

C-1.1

When two different numbers are given, there can be only one possibility. Either one of them is greater than the other or one of them is smaller than the other. Two different numbers can never have the same value and thus be equal. When a series of different numbers is given, none of them can be equal to another in the series. Hence they all have different values. When we arrange these numbers from the smallest to the largest number in that order, we are arranging the numbers in *ascending order*. When we arrange a given set of numbers from the largest to the smallest in that order, we are arranging the numbers in the *descending order*.

Successor of a number is the number obtained by adding 1 to the number.

Predecessor of a number is the number obtained by subtracting 1 from the number.

$$\text{Successor of } 1000 = 1000 + 1 = 1001$$

$$\text{Predecessor of } 1000 = 1000 - 1 = 999$$

Example 8: Arrange the following numbers in ascending order.

a. 24,68,487; 7,89,540; 1,34,53,879;

78,989; 4807

b. 7,86,978; 5,86,298; 5,46,789;

5,89,979; 4,65,948

Solution:

a. The number with more digits is the bigger number. So, more the number of digits in a number, higher is the value of the number. Similarly, lesser the number of digits in a number, the lower is the value of the number.

Therefore,

24,68,487

7 digits

7,89,540

6 digits

1,34,53,879

8 digits

78,989

5 digits

4807

4 digits

The given numbers in ascending order (from smallest to greatest) are 4807 (4 digits); 78,989 (5 digits); 7,89,540 (6 digits); 24,68,487 (7 digits) and 1,34,53,879 (8 digits)

b. 7,86,978; 5,86,298; 5,46,789; 5,89,979; 4,65,948
Here all the numbers have the same number of digits. Now start from the left and compare

the digits until you find two digits which are different.

The highest value of the place in all these numbers is lakhs. 4 which represents 4 lakhs is the smallest as all the others represent 5 lakhs or 7 lakhs. Hence, the smallest number is 4,65,948. 7 in 7,86,978 stands for 7 lakh and is the greatest number in the set while all the other numbers are starting with 5 lakhs. Now look at the place value of the next digit to the right which, in the remaining three numbers, is 80 thousand and 40 thousand. Hence 5,46,789 is the second smallest among these. Two numbers are left. Look at the next digit to the right of ten thousands place. In 5,86,298 and 5,89,979, 6 represents 6000 and 9 represents 9000. It is easy to see that 6000 is less than 9000. Hence, 5,86,298 is smaller than 5,89,979.

Hence, the ascending order is 4,65,948; 5,46,789; 5,86,298; 5,89,979 and 7,86,978.

Example 9: Arrange the following numbers in descending order.

6,78,56,467; 34,76,967; 9897; 56,94,543; 56,92,743

Solution: 6,78,56,467 has 8 digits while 9897 has four digits and all the other numbers have seven digits. So the biggest number is 6,78,56,467 and the smallest is 9897. Among the other numbers 34,76,967 is the smallest as it is between thirty lakhs and forty lakhs. Numbers 56,94,543 and 56,92,743, are the same up to 56 lakh 90 thousand. The next digits to the right representing the thousands are 4 and 2, respectively with values 4000 and 2000. Hence, 56,92,743 is smaller than 56,94,543. So, the numbers in descending order are 6,78,56,467; 56,94,543; 56,92,743; 34,76,967; 9897.

Try This!

1. Arrange in ascending order.
89,97,684; 98,97,684; 89,97,585; 98,97,686;
8,98,684

2. Arrange in descending order.
52,76,201; 52,67,201; 5,20,671; 62,52,021;
61,52,021

Example 10: Find the smallest 6-digit natural number:

- a. ending in 9.
- b. having four different digits.

Solution:

- a. The smallest 6-digit natural number ending in 9 = 100009.
 b. The smallest 6-digit natural number having four different digits = 100023.

Example 11: How many 8-digit numbers are there in all?

Solution: Largest 8-digit number = 9,99,99,999;

Largest 7-digit number = 99,99,999

Therefore, the total number of 8-digit numbers

$$= (9,99,99,999 - 99,99,999) = 9,00,00,000$$

Thus, there are nine crore 8-digit numbers in all.

Example 12: 512 is a three-digit number. Here the place value of 5 is 500 and that of 2 is 2. If we interchange the positions of 5 and 2, will the place values of 5 and 2 change? What will be the new place values of 5 and 2?

Solution: Yes, the place values of 5 and 2 will change because on interchanging the positions of 5 and 2 we will get the number 215. Here, the new place value of 2 is 200 and that of 5 is 5.

Example 13: How many 3-digit numbers can be formed using the digits 1, 2, and 3 where repetition of digits is not allowed? Arrange the numbers formed in both ascending and descending order.

Solution: The smallest 3-digit number that can be formed using the digits 1, 2, and 3 is 123.

On interchanging the position of the digits we get the numbers 213, 312, 231, 321, and 132. Thus, we can form 6 three-digit numbers using the digits 1, 2, and 3 without repetition of digits.

Ascending order: 123, 132, 213, 231, 312, 321

Descending order: 321, 312, 231, 213, 132, 123

Significance of Zeros in a Number

- The zeros to the left of the first non-zero digit in a number have no value or they are not significant. For example, the numbers 395, 0395, 00395, and 000395 all have same value which is 395. This is because the zeros to the left of 3 represent only zero place values and the actual value of each of the numbers starts from the digit 3 which has a place value of 300.
- Any zero or zeros to the right of any non-zero number are significant. For example, the numbers 50, 500, and 5000 are not of the same value because they represent 5 tens, 5 hundreds, and 5 thousands, respectively. Here, the zeros simply hold the place to give us the place value of 5 in each case.
- The zeros between any two non-zero numbers are significant. For example, in the number 70,050, all the zeros are significant. The digit 5 gets the place value of 50 because of the zero in the ones place. The digit 7 gets the place value of 70000 because of the four digits after it.

Exercise 1B

07/06/2024

1. Compare the given pairs of numbers using $>$, $<$, or $=$.

a. $5,98,567 \underline{>} 98,476$

b. $4,56,98,786 \underline{>} 97,89,999$

c. $1,23,457 \underline{<} 6,87,987$

d. $13,78,654 \underline{>} 13,76,689$

e. $2,34,645 \underline{<} 5,86,576$

f. $9,03,412 \underline{<} 9,13,689$

2. Arrange the following in ascending order.

a. 8,28,867; 80,25,957; 7,80,643; 1,56,34,123

b. 2,35,927; 3,95,327; 2,23,927; 3,72,227

c. 39,54,068; 25,45,068; 28,68,054; 76,43,090

d. 9,64,90,365; 8,93,40,294; 8,53,60,295; 9,45,04,949

Application-Based Questions

- Write the greatest 7-digit number having four different digits.
- How many 6-digit numbers are there in all?
- Write all the 3-digit numbers that can be formed using the digits 4, 5, and 6 without repetition of digits. Arrange the numbers formed in descending order.

INTERNATIONAL SYSTEM OF NUMERATION

C-1.1

We have already seen the way we name numbers in the Indian system and how we write numbers using commas.

Any 5-digit number, the place value being ten thousand, is read and written in the same way in both the Indian and International systems of numeration. For example 87,654 is read as eighty-seven thousand six hundred fifty-four in both the systems and written in the same way. But the numbers with more than five digits are named and written differently.

In the International system, a 6-digit number 787654 is written as 787,654 having two periods of three digits each. The first period of three digits (654) represents the ones period and the comma is inserted after three digits from the right. Thereafter, all the periods in the International system are also of three digits.

The above number 787,654 is read as seven hundred eighty-seven thousand six hundred fifty-four. In the International system, the first three digits (from the right) form the ones period, the next three digits represent the thousands period, next three digits represent millions, the fourth period represents billions and so on. Each period in the International system consists of 3 places.

Number	Number of digits	Indian system	International system
1-9	1	ones period	9
10-99	2	ones period	99
100-999	3	ones period	999
1000-9999	4	thousands period	9999
10,000-99,999	5	thousands period	99,999
100000-999999	6	lakhs period	999,999
1000000-9999999	7	lakhs period	9,999,999
10000000-99999999	8	crores period	99,999,999
100000000-999999999	9	crores period	999,999,999

$$\begin{aligned}1000 \text{ ones} &= 1000 \times 1 = 1 \text{ thousand} \\1000 \text{ thousands} &= 1000 \times 1000 = 1 \text{ million} \\1000 \text{ millions} &= 1000 \times 1000 \times 1000 = 1 \text{ billion}\end{aligned}$$

Indian and International Systems: Comparison

Up to 5 digits, the numbers are expressed in both the systems in the same way.

Beyond 5 digits, the way of representation of a number is different in Indian and International systems as:

- In the Indian system of numeration, starting from the right, the first period is the ones period consisting of three places—ones, tens, and hundreds. The other periods to the left of the ones period have two place values each.
- In the International system of numeration, all periods have three place values each.

Consider the number 452157.

In the Indian system of numeration 4,52,157 is Four lakh fifty-two thousand one hundred fifty-seven.

In the International system of numeration 452,157 is Four hundred fifty-two thousand one hundred fifty-seven.

Thousands		Ones			Number name	
TTh	Th	H	T	O	Indian and International Systems	
			5		five	
		2	5		twenty-five	
		3	2	5	three hundred twenty-five	
	4	3	2	5	four thousand three hundred twenty-five	
6	4	3	2	5	sixty-four thousand three hundred twenty-five	

Indian System of Numeration

Period →	Crores		Lakhs		Thousands		Ones	
Place value →	Ten Crores	10,00,00,000	Ten Lakhs	1,00,00,000	Ten Thousands	100,000	Tens	Ones
Number of digits →	9 Digits	8 Digits	7 Digits	6 Digits	5 Digits	4 Digits	3 Digits	2 Digits
100,000,000	Hundred Billions	12 Digits	10,000,000,000	Ten Billions	11 Digits	1,000,000,000	Billions	10 Digits
100,000,000	Hundred Millions	9 Digits	100,000,000	Hundred Millions	8 Digits	10,000,000	Ten Millions	7 Digits
100,000,000	Ten Millions	7 Digits	1,000,000	Ten Millions	6 Digits	1,000,000	Millions	5 Digits
100,000,000	Millions	6 Digits	100,000	Hundred Thousands	5 Digits	10,000	Hundreds	4 Digits
100,000,000	Hundred Thousands	5 Digits	10,000	Ten Thousands	4 Digits	1000	Thousands	3 Digits
100,000,000	Ten Thousands	4 Digits	1000	Thousands	3 Digits	100	Hundreds	2 Digits
100,000,000	Thousands	3 Digits	100	Hundreds	2 Digits	10	Tens	1 Digit
100,000,000	Hundreds	2 Digits	10	Tens	1 Digit	1	Ones	1 Digit

International System of Numeration

Billions	Millions	Thousands	Ones
100,000,000	10,000,000	1000	1
100,000,000	10,000,000	100	10
100,000,000	10,000,000	10	1
100,000,000	10,000,000	1	1

Conversions

1 lakh = 1,00,000 = 100,000 = one hundred thousand

10 lakh = 10,00,000 = 1,000,000 = one million

1 crore = 1,00,00,000 = 10,000,000 = 10 million

100 crore = 1,00,00,00,000 = 1,000,000,000

= 1000 million = 1 billion

Common Mistakes!

- ★ 100 million = 1 crore ✗
- 100 million = 10 crore ✓
- ★ 1 billion = 100 lakh ✗
- 1 billion = 100 crore ✓
- ★ 10 billion = 100 million ✗
- 10 billion = 10,000 million ✓

Solution:

Indian system	International system
a. 56,709; Fifty-six thousand seven hundred nine	56,709; Fifty-six thousand seven hundred nine
b. 6,42,958; Six lakh forty-two thousand nine hundred fifty-eight	642,958; Six hundred forty-two thousand nine hundred fifty-eight
c. 5,93,57,258; Five crore ninety-three lakh fifty-seven thousand two hundred fifty-eight	59,357,258; Fifty-nine million three hundred fifty-seven thousand two hundred fifty-eight
d. 38,59,27,473; Thirty-eight crore fifty-nine lakh twenty-seven thousand four hundred seventy-three	385,927,473; Three hundred eighty-five million nine hundred twenty-seven thousand four hundred seventy-three

Example 14: Express the following numbers in the Indian and International system of numeration and write them in words.

- a. 56709 b. 642958
c. 59357258 d. 385927473

Try This!

- How many digits are there in 10 crores?
- What is the equivalent place value of ten lakhs in the International system of numeration?
- Place commas and write the number name of 3658942 using the Indian and International systems of numeration.

Exercise 1C

10/06/2024

- Express the following numbers in the International system using periods and write them in words.
 - 648295825
 - 59379356
 - 345000
 - 6483476
 - 4087392132
 - 5930086
 - 400050008
 - 50829600
- Express the following numbers in the Indian system using periods and write them in words.
 - 23447146
 - 8800886
 - 5439760
 - 45023444
 - 93870042
 - 1000643
 - 56354238
 - 20333040

Application-Based Questions

- How many lakhs make a million? = 10 Lakhs
- How many millions make a billion? = 1,000 Million

CONVERSION OF UNITS - LENGTH, MASS, AND CAPACITY

C-1.1

In our daily life we use measurements of length, mass, and capacity.

Length Measurements

For measurement of length we use millimetre (mm), centimetre (cm), metre (m), and kilometre (km).

A kilometre is equal to 1000 metres. Each metre is equal to 100 centimetres and each centimetre is equal to 10 millimetres.

$$1 \text{ kilometre} = 1000 \text{ metres}$$

$$\begin{aligned} &= 100,000 \text{ (hundred thousand)} \\ &\quad \text{centimetres} \\ &= 1,000,000 \text{ (one million) millimetres} \end{aligned}$$

$$\text{So, } 1 \text{ km} > 1 \text{ m} > 1 \text{ cm} > 1 \text{ mm}$$

Mass Measurements

One kilogram (kg) is equal to 1000 grams (g) and one gram is equal to 1000 milligrams (mg).

$$\begin{aligned} 1 \text{ kilogram} &= 1000 \text{ grams} \\ &= 1000 \times 1000 \text{ milligrams} \\ &= 1,000,000 \text{ (one million) milligrams} \end{aligned}$$

$$\text{So, } 1 \text{ kg} > 1 \text{ g} > 1 \text{ mg}$$

Capacity Measurements

1 kilolitre (kl) is equal to 1000 litres (l) and one litre is equal to 1000 millilitres (ml).

$$\begin{aligned} 1 \text{ kilolitre} &= 1000 \text{ litres} \\ &= 1000 \times 1000 \text{ millilitres} \\ &= 1,000,000 \text{ (one million) millilitres} \end{aligned}$$

$$\text{So, } 1 \text{ kl} > 1 \text{ l} > 1 \text{ ml}$$

Remember

- | | |
|-----------------|-----------------|
| ★ 1000 mm = 1 m | ★ 1000 m = 1 km |
| ★ 1000 ml = 1 l | ★ 1000 l = 1 kl |
| ★ 1000 g = 1 kg | ★ 1000 mg = 1 g |

Example 15: Convert and compare.

- 8 cm or 20 mm
- 43 kg or 47,000 mg
- 15 kl or 15,000,000 ml

Solutions:

- $8 \text{ cm} = 80 \text{ mm}$. Since, $80 \text{ mm} > 20 \text{ mm}$.
Therefore, $8 \text{ cm} > 20 \text{ mm}$.
- $43 \text{ kg} = 43,000,000 \text{ mg}$
Since, $43,000,000 \text{ mg} > 47,000 \text{ mg}$.
Hence, $43 \text{ kg} > 47,000 \text{ mg}$.
- $1 \text{ kl} = 1,000,000 \text{ ml}$
Since, $15 \text{ kl} = 15,000,000 \text{ ml}$.
Hence, $15 \text{ kl} = 15,000,000 \text{ ml}$.

Exercise 1D

12/06/2024

1. Compare using $>$, $<$, or $=$.

- a. $8\text{ m} < 850\text{ cm}$
- b. $4\text{ cm} < 450\text{ mm}$
- c. $3\text{ km} > 3000\text{ mm}$
- d. $5000\text{ cm} > 5\text{ m}$
- e. $780\text{ g} < 78\text{ kg}$
- f. $85000\text{ mg} \approx 85\text{ g}$
- g. $4000\text{ g} < 30\text{ kg}$
- h. $3.5\text{ kg} > 350\text{ g}$
- i. $5\ell > 500\text{ ml}$
- j. $3\text{ kl} = 3,000,000\text{ ml}$
- k. $5000\text{ ml} < 20\ell$
- l. $2000\ell \approx 2\text{ kl}$

C-1.1

USE OF ESTIMATION

You must have come across news headlines involving large numbers. For example, '50,000 people participated in the marathon.' '1 lakh people watched the match in the stadium.' We also see and read news about disasters, strikes, bandhs, etc. For example, '80 crore rupees lost due to the fire.' '9 lakh people evacuated.' 'The loss due to lockdowns is 1 crore rupees.'

The numbers mentioned above do not represent the exact number of people or rupees. They are only speaking of a nearest value.

In earlier classes we have learnt rounding up of numbers. Rounding of numbers is an approximation. This means that when we speak of 50,000 people, what we really mean is the crowd was between 45,000 and 55,000.

This rounding up helps us to get approximate answers in addition, subtraction, multiplication, and division.

Example 16: Round to the nearest tens to carry out the operations.

Solution:

a. $46 + 51$

46 is rounded up to 50, and 51 is rounded down to 50.

So, $46 + 51$ is approximately $50 + 50 = 100$.

The actual answer is $(4 - 1) = 3$ less than $100 = 97$.

Hence, 100 is the approximate answer.

The symbol ' \approx ' stands for 'approximately equal to'.

b. $89 - 32 \approx 90 - 30 = 60$ (approximate answer)

c. $48 \times 8 \approx 50 \times 8 = 400$ (approximate answer)

d. $89 \div 5 \approx 90 \div 5 = 18$ (approximate answer)

When we need to add, subtract, multiply, or divide large numbers, estimation or approximation is of great help to us to get the nearest or the approximate answer quickly and easily.

Add/subtract	Round off	Estimate	Actual
a. $37 + 43$	$40 + 40$	80	80
b. $56 - 27$	$60 - 30$	30	29

Example 17: Find the approximate value of $3847 + 8348$.

Solution: When we round up 3847 and 8348 to the nearest thousand, we get 4000 and 8000, respectively. The sum of 4000 and 8000 is 12,000. So the correct answer is in the range of 12,000.

In practical life, this may be the only information required even though the correct answer is 12,195. Suppose ₹3847 and ₹8348 are the costs of a chair and a table, respectively. If a friend asked you the amount you paid for these two items, you need not add the exact cost of each. You can say that it cost you around ₹12,000.

When we are making the arrangements for a party, the approximate number of people expected for the party and the approximate quantity of each item required per person are considered. Similarly, the quantity of things to be purchased for a party, the amount of cement to be purchased to construct a wall, the amount of paint to be bought to paint a house are all approximations.

Example 18: Find the approximate value of $9423 - 3284$.

Solution: Both 9423 and 3284 are rounded down to the nearest 1000. So, $9000 - 3000 = 6000$.

Example 19: Find the approximate value of 673×7 .

Solution: $600 \times 7 = 4200$; $700 \times 7 = 4900$

Here, we know that the answer is between 600×7 and 700×7 , i.e., between 4200 and 4900. As 673 is closer to 700 than 600, 673×7 is closer to 4900 than 4200. This kind of thinking can bring us closer to the actual answer.

Similarly, 834×9 is between $800 \times 9 = 7200$ and $900 \times 9 = 8100$, but it is closer to 7200 as 834 is closer to 800 than 900.

Example 20: Multiply and give the approximate answer.

Solution:

- a. 37×68 is rounded off to $40 \times 70 = 2800$.

We can easily see that the actual answer will be a little less than 2800.

- b. $93 \times 48 \approx 90 \times 50 = 4500$. Since 93 is reduced to 90 and 48 is increased to 50, the approximate answer is very close to the actual answer.

Exercise 1E

12/06/2024

	Add	Round off	Estimate	Actual
a.	$47 + 68$	$50+70$	120	115
b.	$67 + 43$	$70+40$	110	110
c.	$47 + 43$	$50+40$	90	90
d.	$44 + 66$	$40+70$	100	110
e.	$77 + 83$	$80+80$	160	160
f.	$34 + 71$	$30+70$	100	105
g.	$63 + 78$	$60+80$	140	141
h.	$89 + 24$	$90+20$	110	113
i.	$34 + 67$	$30+70$	100	101
j.	$78 + 84$	$80+80$	160	162

	Subtract	Round off	Estimate	Actual
a.	$88 - 35$	$90 - 40$	50	53
b.	$85 - 38$	$90 - 40$	50	47
c.	$43 - 22$	$40 - 20$	20	21
d.	$78 - 39$	$80 - 40$	40	39
e.	$47 - 23$	$50 - 20$	30	24
f.	$76 - 28$	$80 - 30$	50	48
g.	$94 - 37$	$90 - 40$	50	57
h.	$67 - 39$	$70 - 40$	30	28
i.	$84 - 37$	$80 - 40$	40	47
j.	$93 - 49$	$90 - 50$	40	44

- c. $74 \times 44 \approx 70 \times 40 = 2800$. Since 74 and 44 are reduced to 70 and 40, respectively, the actual answer will be a little more than the estimation.

- d. $327 \times 47 \approx 300 \times 50 = 15,000$

(approximate answer)

Try This!

1. Round off 9876 to the nearest 10, 100, and 1000.
2. Round off each number to the nearest 100 and then multiply. 6543×987

	Multiply	Round off	Estimate	Actual
a.	39×8	40×8	320	312
b.	53×8	50×8	400	424
c.	91×4	90×4	360	364
d.	82×4	80×4	320	328
e.	73×7	70×7	490	511
f.	69×6	70×6	420	414
g.	36×4	40×4	160	144
h.	63×4	60×4	240	252
i.	74×7	70×7	490	518
j.	76×7	80×7	560	532

4. Solve and give the approximate value in thousands.

- $3654 + 4983$
- $4804 + 7324$
- $9346 + 8146$
- $2894 + 6794$
- $1863 - 1454$
- $8794 - 2368$
- $7006 - 3864$
- $7743 - 2167$
- $2314 + 7125$
- $8914 - 7825$

5. Multiply and give the approximate answer.

- 49×67
- 93×87
- 79×43
- 28×52
- 347×49
- 812×68
- 489×31
- 292×312
- 491×421
- 659×721

Mental Maths

PA

- I am a two-digit number above 50. The sum of my digits is 12. And the difference of my digits is 4. Who am I?
- I am a two-digit number below 50. The sum of the digits is 13. The product of the digits is 36. Who am I?
- Each of the letters in the English alphabet in the addition problem is a digit of a number.
What could be the highest numerical value of 'k' in the problem?
- I am a two-digit number. The sum and product of my digits are the same. Who am I?
- How many two-digit numbers can be formed using the numerals 7, 8, and 0 where repetition of digits is allowed?

a b c d
+ p q r s

k l m n o

ROMAN NUMERALS

C-1.4

One of the earliest systems of writing numerals is the Roman Numeral System.

This system is still in use in many places. For example, some clock faces show hours in Roman numerals; we use Roman numerals to write a numbered list; etc.



Unlike the Hindu-Arabic Numeral System, Roman Numeral System uses seven basic symbols to represent different numbers. The symbols are as follows:

Roman symbol	I	V	X	L	C	D	M
Hindu-Arabic Number	1	5	10	50	100	500	1000

Rules to form Roman Numerals

We can form different Roman numerals using the symbols and the following rules.

Rule 1: If a symbol is repeated one after the other, its value is added as many times as it occurs.

For example,

$$III = 1 + 1 + 1 = 3 \quad XX = 10 + 10 = 20$$

Rule 2: The symbols I, X, C, and M can be repeated up to a maximum of three times. For example,

$$I = 1, II = 2, III = 3$$

$$X = 10, XX = 20, XXX = 30$$

$$C = 100, CC = 200, CCC = 300$$

$$M = 1000, MM = 2000, MMM = 3000$$

Rule 3: The symbols V, L, and D (i.e. 5, 50, and 500, respectively) can never be repeated in a Roman numeral.

Rule 4: If a symbol with a smaller value is written to the right of a symbol with a greater value, then its value is added to the value of the greater symbol.

For example,

$$XII = 10 + 2 = 12, LX = 50 + 10 = 60,$$

$$DCCCX = 500 + 300 + 10 = 810,$$

$$VI = 5 + 1 = 6, XI = 10 + 1 = 11,$$

$$DC = 500 + 100 = 600$$

Rule 5: If a symbol with a smaller value is written to the left of a symbol with a larger value, then its value is subtracted from the value of the greater symbol. For example,

$$IV = 5 - 1 = 4, IX = 10 - 1 = 9,$$

$$CD = 500 - 100 = 400$$

Rule 6:

- The symbols V, L, and D are never written to the left of a symbol of greater value, i.e., V, L, and D are never subtracted.

- I can be subtracted from V and X only.
- X can be subtracted from L and C only.
- C can be subtracted from D and M only.

Rule 7:

a. If the value of the symbols from left to right decreases or remains the same, we add the value of the symbols. For example, CLVI = $100 + 50 + 6 = 156$, MCXXIII = $1000 + 100 = 10 + 10 + 1 + 1 = 1123$

b. If the value of the symbols from left to right increases, we subtract the symbol with a lower value from the symbol with a greater value. For example, CM = $1000 - 100 = 900$, XC = $100 - 10 = 90$, CMVI = $1000 - 100 + 5 + 1 = 906$

Rule 8: A bar over any numeral means that the numeral is multiplied by 1000. For example, $\bar{I}V = 4 \times 1000 = 4000$, $\bar{X} = 10 \times 1000 = 10,000$.

Example 21: Express the given Roman numerals as Hindu-Arabic numerals.

- LXV
- CD
- MCMXC

Solution:

a. As the value of the symbols decreases from left to right, we will add the values of the symbols. Thus, LXV = $50 + 10 + 5 = 65$.

b. As the value of the symbols increases from left to right, we will subtract the symbol of lower value from the symbol with higher value. Thus, CD = $500 - 100 = 400$

c. MCMXC = $1000 + (1000 - 100) + (100 - 10) = 1000 + 900 + 90 = 1990$

Example 22: Write the equivalent Roman numerals for the following Hindu-Arabic numerals.

- 236
- 389
- 499
- 1978

Solution:

a. $236 = 200 + 30 + 6 = CCXXXVI$

b. $389 = 300 + 80 + 9 = CCCLXXXIX$

c. $499 = 400 + 90 + 9 = CDXCIX$

d. $1978 = 1000 + 900 + 70 + 8 = MCMLXXVIII$

Example 23: Write the equivalent Hindu-Arabic numerals for the following Roman numerals.

- XCIX
- XLVI
- DCCXLI
- CMXCVI

Solution:

a. $XCIX = (100 - 10) + 9 = 99$

b. $XLVI = (50 - 10) + (5 + 1) = 46$

c. $DCCXLI = 500 + 200 + (50 - 10) + 1 = 741$

d. $CMXCVI = (1000 - 100) + (100 - 10) + (5 + 1) = 996$

Example 24: Give reasons to justify how each of the following is meaningless.

- a. CCCC b. VM c. XMV d. XXLL

Solution:

- a. The symbol C can be repeated up to a maximum of 3 times. Thus, CCCC is meaningless.
- b. The symbol V is never written to the left of a symbol with greater value, i.e., V is never subtracted. Thus, VM is meaningless.

- c. X can only be subtracted from L and C. That's why XMV is meaningless.
- d. The symbol L can never be repeated. Thus, XXLL is meaningless.

Common Mistake!

Repeating symbols

- * $615 = 500 + 100 + 5 + 5 + 5 = DCVV$
- $615 = 500 + 100 + 10 + 5 = DCXV$
- * $410 = 100 + 100 + 100 + 100 + 10 = CCCCCX$
- $410 = 500 - 100 + 10 = CDX$

Exercise 1 F

13/06/2024

1. Write the equivalent Roman numerals for the following Hindu-Arabic numerals.
 - a. 15 b. 21 c. 25 d. 29 e. 38 f. 42 g. 47 h. 51 i. 62 j. 74
 - k. 83 l. 91 m. 95 n. 97 o. 99 p. 123 q. 395 r. 265 s. 900 t. 1100
2. Write the equivalent Hindu-Arabic numerals for the following Roman numerals.
 - a. $\text{XXIII} = 23$ b. $\text{XXXI} = 31$ c. $\text{XL} = 40$ d. $\text{XLIV} = 44$ e. $\text{LIV} = 54$
 - f. $\text{LXIII} = 63$ g. $\text{LXXVI} = 74$ h. $\text{LXXXI} = 81$ i. $\text{LXXXV} = 85$ j. $\text{XC} = 90$
 - k. $\text{XCIV} = 94$ l. $\text{XCVIII} = 98$ m. $\text{CCX} = 210$ n. $\text{CD} = 400$ o. $\text{DCC} = 700$
3. Which of the following are meaningless? Give reasons to justify your answer.
 - a. XVI b. XVV c. LXV d. VCX

V can't be
repeated

V can't be
subtracted

I can't be
subtracted

WORD PROBLEMS

C-1.1

The very purpose of learning mathematics is not merely to do the operations in mathematics, but to solve various problems that we face in daily life. Just knowing the processes of addition, subtraction, multiplication, division, etc., is of no use unless we are able to analyse the situations and problems that we face and decide to use the appropriate operation as and when needed. This needs the understanding of the problem solving strategies.

Problem Solving

Steps involved in problem solving are:

1. Understand the problem situation. This needs reading the problem as many times as required so that you can state the problem in your own words.
2. Collect the facts given in the problem.
3. Identify what needs to be found out or what you are looking for in the problem.
4. Find the relationship between the given facts.

5. Formulate a mathematical expression or statement connecting the necessary facts given.
6. Solve the expression.
7. Express the answer in the correct units, as required.
8. Check the correctness of the answer by substituting it in the equation formed in step 5.

Example 25: Find the length of a barbed wire to go round three times the boundary of a rectangular field 28 m long and 22 m wide.

Solution: First we have to collect the information given.

Given: Rectangular field with length = 28 m and width = 22 m.

To find: The length of the barbed wire required to go round three times the boundary of the rectangular field. First we need to find the length of the wire required to go round the boundary of the field once, i.e., the perimeter of the field and then multiply by 3 to get the required length of wire.

Perimeter of the rectangular field

$$= 28 \text{ m} + 28 \text{ m} + 22 \text{ m} + 22 \text{ m}$$

$$= 2 \times (28 \text{ m} + 22 \text{ m}) = 2 \times 50 \text{ m} = 100 \text{ m}$$

Required length of the wire = $3 \times 100 \text{ m} = 300 \text{ m}$

Thus, 300 m of barbed wire is required.

Example 26: During a cricket match, the number of people who came to see the match was 6250. The ticket was priced at ₹500 each. The total collection from the ticket sale was ₹30,55,000. Some people were invitees and they were given free tickets. How many invitees were there?

Solution: Total number of spectators = 6250

$$\text{Ticket price} = ₹500$$

$$\text{Total collection} = ₹30,55,000$$

$$\text{Tickets sold} = ₹30,55,000 \div ₹500 = 6110$$

$$\therefore \text{Free tickets given} = 6250 - 6110 = 140$$

So, there were 140 invitees.



Look at another situation. A florist makes a bouquet using 12 roses, 7 carnations, and 11 marigolds. If Aarush buys 5 identical bouquets for a school function, how many flowers did he purchase?

One way to calculate is $5 \times 12 \text{ roses} + 5 \times 7 \text{ carnations} + 5 \times 11 \text{ marigolds} = 60 + 35 + 55 = 150$.

The other way to calculate is $5 \times (12 + 7 + 11) = 5 \times 30 = 150$. When we used brackets to put all the flowers in a bouquet, the calculation became easier.

When using brackets to solve a problem, remember to put similar items in the brackets as we have seen in the given situations where the number of pastries were bracketed in the first situation and the number of flowers were bracketed in the second situation.

When we have to solve a problem involving a pair of brackets, solve the part of the problem that is inside the brackets first. There are many problems in which we may have to use many types of brackets. Such problems will be dealt with later.

Example 27: The length and breadth of a field are 450 metres and 250 metres respectively. A boundary wall is to be built around the field. One metre length of the wall requires 200 bricks. How many bricks should be purchased for building the boundary wall?

Solution: The given facts are:

length of the wall = 450 m;

breadth of the wall = 250 m; and

bricks needed for one metre length of the wall = 200 bricks

To find: Total bricks required for the boundary wall.

For this we need to find the length of the boundary wall. This is equal to the perimeter of the field.

Perimeter of the field = 2 length + 2 breadth
= 2(Length + Breadth) = 2(450 + 250) m = 1400 m

Each metre length of the wall needs 200 bricks.

So the total bricks to be purchased =

$$2(450 + 250) \times 200 = 1400 \times 200 = 2,80,000 \text{ bricks.}$$

Thus, 2,80,000 bricks should be purchased for the wall.

Exercise 1 G

1. Simplify.

a. $6 \times (10 + 8)$

d. $58 + (105 + 220)$

b. $15 + (44 - 21)$

e. $252 - (305 - 135)$

c. $14 \times (20 - 8)$

f. $100 \times (20 + 120)$

Application-Based Questions

2. On Monday, the number of spectators for two football matches were 36,731 and 38,953, respectively. On Tuesday the number of spectators for two football matches were 39,246 and 36,842, respectively. On which day were the number of spectators more and by how much?
3. A pharmaceutical company produces 24,800 capsules of a particular medicine in a day. The company packs 800 capsules in a small container and charges ₹400 per container. If all the capsules produced on a particular day are sold, what will be the collection in terms of rupees?
4. During the launch of a new book, the publisher gave away 30 copies of the book as complimentary copies to the students who were present at the launch and the remaining were purchased for ₹500 each. If the total collection on that day was ₹7,35,000, find the total number of books that were given out on that day.
5. A truck carries 65 boxes. Each of these boxes contains 80 smaller packages. Each of these smaller packages contains 15 toy soldiers. How many toy soldiers are being carried in the truck?
6. The capacity of a water tank in a housing colony is 64 kilolitres. This is sufficient for 80 households in the colony for 4 days. What is the average quantity of water used per day per household in litres?
7. At a bakery, if a cookie needs 8 g of ingredients, how many cookies can be made with their stock of 44.4 kg of ingredients?
8. A cross-country relay race was arranged between the two towns of Usmanpur and Rampur. Each participant ran 750 m with a flag and handed over the flag to the next runner in the relay. If 62 participants in a team ran this distance from the starting point to the finishing point, what is the total distance travelled by them? Give the answer in kilometres.
9. A shirt manufacturing unit with 40 identical machines, can produce 14,560 shirts in a day. How many shirts will it produce in 30 days? If one of the machines is not used for all 30 days, how many less shirts will be produced at the end of the month?

Project

Find the following information and express these numbers in the Indian system of numeration.

- a. The distance between the Sun and the Earth.
- b. The length of the longest river on Earth.
- c. The height of the tallest mountain peak on Earth.
- d. The speed of light.
- e. The diameter of the Earth.



Higher Order Thinking Skills

1. Rashid went to a book exhibition stall and asked the manager for a salesman job for the 7 days of the exhibition. The manager offered him the job. The manager offered Rashid two options: Option 1 was ₹1000 for seven days and Option 2 was ₹10 for the first day, ₹20 for the second day, ₹40 for the third day and so on, doubling the wage of the previous day for seven days. Rashid was in a fix. Which choice is more profitable and by how much?
2. A farmer planted a lotus plant in the village pond. One fine day, to the happiness of the villagers, one lotus flower bloomed. The next day they saw two flowers. The third day four flowers were seen. Every day they saw double the number of flowers than the previous day. On the 30th day, the villagers found that half of the pond was filled with lotus flowers. How many days more will it take for the pond to completely fill with lotus flowers? In how many days the pond would have been filled up to a quarter with lotus flowers?





Multiple Choice Questions

1. How many zeros are there in a crore?
 - 5
 - 6
 - 7
 - 8**
 2. Which number represents the symbol MDCXCIX?
 - 1499
 - 1999
 - 1599
 - 1699**
- Practice Time**
3. Write the following numbers in expanded notation.
 - 2,84,231
 - 52,11,568
 - 6,04,18,517
 - 8,91,81,213**
 4. Write the following in the standard numeral form.
 - $9,00,000 + 70,000 + 8000 + 300 + 40 + 2 = 9,78,342$
 - $30,00,000 + 6,00,000 + 20,000 + 3000 + 40 + 7 = 36,23,047$
 - $7,00,00,000 + 1,00,000 + 30,000 + 20 + 6 = 7,01,30,026$
 - $3,00,00,000 + 4000 + 300 + 1 = 3,00,041,301$
 5. State the place values of the coloured digits.
 - 14,**12**,326 = 2,000
 - 61,**13**,617 = 10,000
 - 7,28,05,**821** = 20
 - 4,81,00,219** = 4,00,00,000
 6. Write the following numbers as numerals.
 - Sixty-two lakh forty-five thousand six hundred thirty-five = **62,45,635**
 - Nine crore fifty-eight lakh sixty-one thousand eighty-nine = **9,58,61,089**
 7. Insert commas in the following numerals according to the Indian system.
 - 413615128
 - 61,84,153**
 - 790012900
 8. Insert commas in the following numerals according to the International system.
 - 814213416
 - 92813241**
 - 5008120035
 9. Give the approximate value by estimating.
 - $3228 + 572 \approx 3800$
 - $8010 - 2507 \approx 5503$
 - $32 \times 58 \approx 1850$
 - $108 \times 47 \approx 5076$
 10. Write the equivalent Roman numeral for each of the following Hindu-Arabic numerals.
 - 46 = **XVI**
 - 90 = **XC**
 - 120 = **CXX**
 - 150 = **CX**
 - 260 = **CCLX**
 - 350 = **CCCL**
 - 480 = **CDLXXX**
 - 950 = **CM**
 11. The population of a district was 22,41,289 two years ago. If the population of the village increased by 48,000 in two years, what is the present population?
 12. A salesman goes from Delhi to Bengaluru which are about 2175 km apart. A day later, he goes to Chennai which is about 346 km away. The next week he retraces his journey. How much distance does he travel in all?
 13. A potter made 4080 *diyas* in the month of September. If he made the same number of *diyas* each day, how many *diyas* did he make in a week?
 14. How many 5-digit numbers are there in all?
 15. Find the difference between the largest and the smallest 5-digit numbers that can be formed using the digits 0, 8, and 9 without repetition of the digits 8 and 9.

Case-Study Based Question

16. According to some available statistics, the number of people who spoke the following languages in a given year was:
- | | | |
|--------------------|-------------------|------------------|
| Assamese: 13079696 | Hindi: 337272114. | Konkani: 1760607 |
|--------------------|-------------------|------------------|
- Write the above numbers according to the Indian and International systems of numeration.
 - Write the above numbers in words according to the Indian system of numeration.
 - Write the above numbers in words according to the International system of numeration.

Creative Thinking

Sushma bought some fabric and paid ₹2640 for it. When she came home, she measured the length of the fabric and found that it was half metre less in length than what the shopkeeper had told her. She found that she is at a loss of ₹220 because of this. What is the length of the fabric she brought home?

Everyday Maths

- Mayank's father owns a fruit juice shop in a busy market. In the month of July, he sold 5 kl 680 l of juice. Next month he sold 6 kl 370 l of juice. Find how much juice in all did he sell in the two months.
- A large housing complex has 27 towers. Among these, 16 towers have 14 floors and the remaining towers have 22 floors. Each floor has 8 flats. Find the total number of flats in the housing complex.

Cross-Curricular Connect



C-10.1

(Science) The distance between the Earth and the Sun makes life possible on Earth. If the Earth was closer to Sun, life on Earth would have burnt from the heat of the Sun and if it was farther away from the Sun, life would freeze because of lack of heat. The table shows the distance of some planets from the Sun.

Planet	Jupiter	Venus	Earth	Mars	Mercury
Distance (in km)	778,000,000	108,000,000	150,000,000	228,000,000	58,000,000

Use the above information to answer the following.

- Arrange the planets in ascending order based on their distance from the Sun.
- Write the distance of Mars from the Sun in the Indian system of numeration.
- Express the distance of Venus from the Sun in expanded form.
- Is the distance between Mars and Earth greater than the distance between Earth and Venus?

Being Indian



Rajasthani handicrafts and handloom are famous all over the world. Created by tying fabrics and then dyeing them in a resist-dye method, the *leheriya* and *bandhani* textiles are iconic among Rajasthan's traditional crafts. While *bandhani* designs are mostly floral or geometric, *leheriya* fabrics have diagonal lines that look like waves. The colours that are mostly used in this technique are red, yellow, blue, black, and green. After dyeing, *bandhani* appears in various patterns like waves, dots, stripes, and squares. Ratna is a local crafts person and sells *bandhani* fabric at ₹105 per metre and *leheriya* fabric at ₹95 per metre. If in a particular week she sold 185 m of each fabric, then find the total money she earned.

ARYABHATA

C-9.2

Aryabhata, a great mathematician and astronomer, was born in 475 C.E. during the Gupta dynasty in Pataliputra, present day Bihar, India. He explored mathematics, astronomy, and their correlation in his books *Aryabhatiya* and *Arya-Siddhanta*. Aryabhata is known to have introduced zero in the decimal place value system. Aryabhata gave the approximate value of pi up to 2 decimal places, 3.14. The first satellite built by India was also named after him.