

## Number

A number is a mathematical object used to count, measure, and also label.



## Comparing Numbers

1. Compare 4978 and 5643.

5643 is greater than 4978 as the digit at the thousands place in 5643 is greater than that in 4978.

2. Compare 9364 and 7924.

9364 is greater than 7924 as it has a greater digit at the thousands place as compared to 7924, which has a smaller digit at the thousands place.

## Special case

3. Compare 56321 and 56843

Here, we will start by checking from the thousand's place. As the digit 5 at ten thousand's place is the same for both numbers, so we will move forward and see the thousands place. The digit 6 is also the same so we will again move on further to check the hundreds place.

The digit at the hundreds place in 56843 is greater than that in 56321

Thus 56843 is greater than 56321

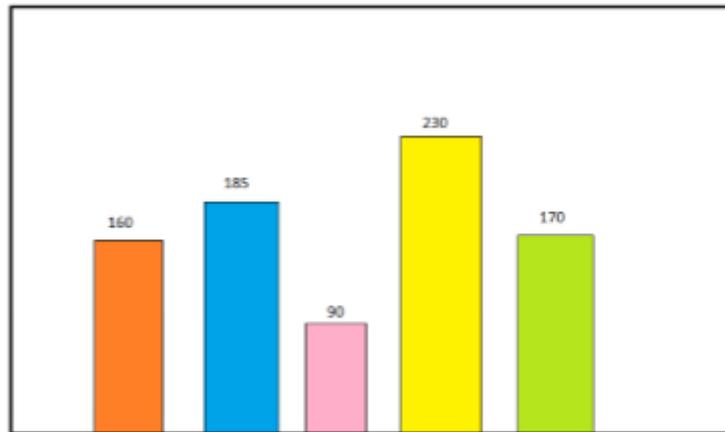
## Proper Order

- If we arrange the numbers from the smallest to the greatest then it is said to be in Ascending order.

- If we arrange the numbers from the greatest to the smallest then it is said to be in Descending order.

Example

Arrange the following heights in ascending and descending order.



Ascending order –  $90 < 160 < 170 < 185 < 230$

Descending order –  $230 > 185 > 170 > 160 > 90$

## Number Formations

Form the largest and the smallest possible numbers using 3,8,1,5 without repetition

The largest number will be formed by arranging the given numbers in descending order – 8531

The smallest number will be formed by arranging the given numbers in ascending order – 1358

## Introducing 10,000

99 is the greatest 2-digit number.

999 is the greatest 3-digit number

9999 is the greatest 4-digit number

## Observation

- If we add 1 to the greatest single-digit number then we get the smallest 2-digit number  
( $9 + 1 = 10$ )
- If we add 1 to the greatest 2- digit number then we get the smallest 3-digit number  
( $99 + 1 = 100$ )
- If we add 1 to the greatest 3-digit number then we get the smallest 4-digit number  
( $999 + 1 = 1000$ )

Moving forward, all the above situations are the same as adding 1 to the greatest 4-digit number is the same as the smallest 5-digit number. ( $9999 + 1 = 10,000$ ), and it is known as ten thousand.

## Place Value

It refers to the positional notation which defines a digit's position.

### Example

6931

Here, 1 is at one's place, 3 is at ten's place, 9 is at hundred's place and 6 is at thousand's place

## Expanded form

It refers to expanding the number to know the value of each digit.

### Example

$$\begin{aligned} 6821 &= 6000 + 800 + 20 + 1 \\ &= 6 \times 1000 + 8 \times 100 + 2 \times 10 + 1 \times 1 \end{aligned}$$

## Introducing 1,00,000

According to the above pattern, if we add 1 to the greatest 5-digit number then we will get the smallest 6-digit number

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

This number is known as one lakh.

## Larger Numbers

To get larger numbers, we will follow the same pattern.

We will get the smallest 7-digit number if we add one more to the greatest 6-digit number, which is called Ten Lakh.

Proceeding further, if we add 1 to the greatest 7-digit number then we will get the smallest 8-digit number which is called One Crore.

## Remark

1 hundred = 10 tens

1 thousand = 10 hundreds

= 100 tens

1 lakh = 100 thousands

= 1000 hundreds

1 crore = 100 lakhs

= 10,000 thousands

Pattern

$9 + 1 = 10$

$99 + 1 = 100$

$999 + 1 = 1000$

$9,999 + 1 = 10,000$

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

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

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

## Reading and Writing Large Numbers

We can identify the digits in one's place, ten's place and hundred's place in a number by writing them under the tables O, T, and H.

AS:

Crores		Lakhs		Thousands		Ones		
Ten Crores (TC)	Crores (C)	Ten Lakhs (TL)	Lakhs (L)	Ten Thousands (TTh)	Thousands (Th)	Hundred's (H)	Tens (T)	Ones (O)
(10, 00, 00, 000)	(1,00,00,00 0)	(10, 00, 000)	(1,00,000 )	(10,000)	(1000)	(100)	(10)	(1)

## Example

Represent the number 5,21,05,747

Periods	Crores		Lakhs		Thousands		Ones		
Places	TC	C	TL	L	T-TH	TH	H	T	O
	Ten Crores 10,00,00,000	Crores 1,00,00,000	Ten Lakhs 10,00,000	Lakhs 1,00,000	Ten Thousands 10,000	Thousands 1,000	Hundreds 100	Tens 10	Ones 1
	0	5	2	1	0	5	7	4	7
	<b>= 5,21,05,747</b>								
	Five crore, twenty one lakh, five thousand, seven hundred forty seven								

## Use of Commas

We use commas in large numbers to ease reading and writing. In our Indian System of Numeration, we use ones, tens, hundreds, thousands, lakhs, and crores.

We use the first comma after hundreds place which is three digits from the right. The second comma comes after two digits i.e. five digits from the right. The third comma comes after another two digits which is seven digits from the right and so on.

## Example

5,44,12,940

Remark: We do not use commas while writing number names.

## International System of Numeration

Millions			Thousands			Ones		
Hundred Million	Ten Million	Million	Hundred Thousand	Ten Thousand	Thousands	Hundred	Tens	Ones
100,000,00	10,000,00	1,000,00	100,000	10,000	1,000	100	10	1
0	0	0						

## Example

341,697,832

Expanded form:  $3 \times 100,000,000 + 4 \times 10,000,000 + 1 \times 1,000,000 + 6 \times 100,000 + 9 \times 10,000 + 7 \times 1,000 + 8 \times 100 + 3 \times 10 + 2 \times 1$

Remark: If we have to express the numbers larger than a million then we use billion, according to the International System of Numeration:

1 billion = 1000 million

Large Numbers in Practice

10 millimeters = 1 centimeter

1 meter = 100 centimeters

= 1000 millimeters

1 kilometer = 1000 meters

1 kilogram = 1000 grams.

1 gram = 1000 milligrams

1 litre = 1000 millilitres

1 litre = 1000 millilitres

Let's Solve Some Problems

Example: 1

To fill an order, the factory dyed 336 yards of silk in yellow and 37 yards in pink. How many yards of silk did it dye for that order?

Solution:

Yards of yellow silk = 336

Yards of pink silk = 37

Total yards of silk dyed = Yards of yellow silk + Yards of pink silk

=  $336 + 37$

= 373

Thus, 373 yards of silk were dyed for the order.

Example: 2

There are 8797 children in a town, 6989 go to school. How many children do not go to school?

Solution:

Total children = 8797

Children who go to school = 6989

Children who do not go to school = Total children – Children who go to school

$$= 8797 - 6989$$

$$= 1808$$

Thus 1808 children of the town do not go to school.

Example: 3

There are 24 folders and each has 56 sheets of paper inside them. How many sheets of paper are there altogether?

Solution:

$$\begin{array}{r} 56 \\ \times 24 \\ \hline 224 \\ + 1120 \\ \hline 1344 \end{array}$$

Thus there are 1344 sheets of paper altogether.

Example: 4

\$5,876 is distributed equally among 26 men. How much money will each person get?

Solution:

Money received by 26 men = 5876

Money received by one man =  $5876 \div 26$

$$\begin{array}{r} 226 \\ 26 \overline{) 5876} \\ \underline{- 52} \phantom{00} \\ 67 \phantom{0} \\ \underline{- 52} \phantom{0} \\ 156 \\ \underline{- 156} \\ 0 \end{array}$$

Thus each man got \$226.

Estimation

It is a rough calculation of value. We use estimations when we have to deal with large numbers and for quick calculations.

Estimating to the nearest tens by rounding off

$7\underline{3}8 \rightarrow 740$

If the digit in the one's place is:

5 or higher, round tens place up

4 or lower, leave tens place as it is

Firstly to estimate we need to see where does the number lies.

Here 38 lie between 30 and 40

Secondly, we will see if it is 5 or higher.

Yes, it is higher than 5 i.e. 38

Thus, the number 738 is rounded off to 740.

Estimating to the nearest hundreds by rounding off

Round off the number 867 nearest to the hundreds.

It lies between 800 and 900

Now we have to check for ten's place. If it is greater than 50 then we will round it off to the upper side and if it is less than 50 then we will round it off on the lower side.

It is 67, which is greater than 50 and is closer to 900.

Thus 867 is rounded off to 900

Estimating to the nearest thousands by rounding off

The numbers from 1 to 499 are rounded off to 0 as they are nearer to 0, and the numbers from 501 to 999 are rounded off to 1000 as they are nearer to 1000.

And 500 is always rounded off to 1000.

Example

Round off the number 7690 nearest to thousands.

It lies between 7000 and 8000, and is closer to 8000

Thus 7690 is rounded off to 8000.

To estimate sum or difference

Estimate:  $3,210 + 12,884$

Solution

3,210 will be rounded off to 3000.

12,884 will be rounded off to 13000.

$$\text{Sum} = 3000 + 13000$$

$$\text{Estimated solution} = 16000$$

$$\begin{aligned}\text{Actual solution} &= 3,210 + 12\,884 \\ &= 16,094\end{aligned}$$

To estimate products

$$\text{Estimate: } 73 \times 18$$

Solution

73 will be rounded off to 70

18 will be rounded off to 20

$$\text{Product} = 70 \times 20$$

$$\text{Estimated solution} = 1400$$

$$\begin{aligned}\text{Actual solution} &= 73 \times 18 \\ &= 1314\end{aligned}$$

Using Brackets

We use brackets to indicate that the numbers inside should be treated as a different number and thus the bracket should be solved first.

Example

$$\begin{aligned}8 + 2 &= 8 + 10 \\ &= 18\end{aligned}$$

Whereas if we use brackets

$$\begin{aligned}(8 + 2) \times 5 &= 10 \\ &= 50\end{aligned}$$

Expanding brackets

Brackets help in systematic calculation.

Example

$$\begin{aligned}3 \times 109 &= 3 \times (100 + 9) \\ &= 3 \times 100 + 3 \times 9 \\ &= 300 + 27 \\ &= 327\end{aligned}$$

## Roman Numerals

Numbers in this system are represented by combinations of letters from Latin alphabets.

1 - I	40 - XL
2 - II	50 - L
3 - III	60 - LX
4 - IV	70 - LXX
5 - V	80 - LXXX
6 - VI	90 - XC
7 - VII	100 - C
8 - VIII	101 - CI
9 - IX	150 - CL
10 - X	200 - CC
20 - XX	500 - D
21 - XXI	800 - DCCC
30 - XXX	1000 - M

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

Rules:

a. If we repeat a symbol, its value will be added as many times as it occurs:

Example

II is equal to 2

XX is 20

XXX is 30.

b. We cannot repeat a symbol more than three times and some symbols like V, L and D can never be repeated.

c. If we write a symbol of lesser value to the right of a symbol of larger value then its value will be added to the value of the greater symbol.

VI = 5 + 1 = 6, XII = 10 + 2 = 12 and LXV = 50 + 10 + 5 = 65.

d. If we write a symbol of lesser value to the left of a symbol of larger value then its value will be subtracted from the value of the greater symbol.

IV = 5 - 1 = 4, IX = 10 - 1 = 9 XL = 50 - 10 = 40, XC = 100 - 10 = 90.

e. The symbols V, L and D can never be subtracted so they are never written to the left of a symbol of greater value. We can subtract the symbol "I" from V and X only and the symbol X from L, M, and C only.