Large Numbers

- **Indian place value chart for a 9-digit number:**

Period	**Crores**		**Lakhs**		**Thousands**		**Ones**		
Place	T.C	C	T.L	L	T.Th	Th	H	T	O

- **International place value chart for a 9 digit number:**

Period	**Millions**			**Thousands**			**Ones**		
Place	H.M	T.M	M	H.Th	T.Th	Th	H	T	O

1 million = 10 Lacks

10 million = 1 crore

100 million = 10 crores

- **Inserting commas:**

A comma is inserted after each period in both the systems of numeration.

1 lakh =1,00,000

1 million = 1,000,000

- **Place value of a digit:**

e.g., in 7308, 7 is in the thousands place.

So, its place value is 7000.

- **Face value of a digit:**

Face value of a digit is the value of the digit itself.

In 7308, face value of 7 is 7.

In 390876, 9 is in ten thousands place.

So, its place value is 90000.

Its face value is 9.

- **Expanded form of a number:**

A number written as the sum of the place values of its digits is said to be in its expanded form.

e.g., 90, 63, 52, 146

= 900000000 + 0 + 6000000 + 300000 + 50000 + 2000 +100 +40+6

- **Comparing numbers:**

(a) Count the number of digits of the numbers to be compared. The number with more number of digits is greater and that with less number of digits is smaller.

e.g., 10612 >621

(b) If the number of digits is equal, compare the values of the digits from left to right in both the numbers.

e.g., 4261 >4216.

- **Fundamental operations:**

The four basic mathematical operations are addition (+), subtraction (-), multiplication (x) and division (-).

- **Addition:**

The numbers that are added are called addends. The number obtained on adding two numbers is called sum-

When any number is added to '0', the sum is the number itself.

e.g., 0+6=6

The sum of two numbers is always greater than each of the addends (provided none of the addends is "O")

- **Subtraction:**

The greater number in subtraction is called minuend. The smaller number being subtracted is called subtrahend. The number obtained on subtraction is called difference.

When '0' is subtracted from a number, the difference is the number itself.

e.g., 15−0=15

- **Multiplication:**

Factor × Factor = Product

Multiplicand × Multiplier = Product

When any number is multiplied by 1, the product is the number itself.

e.g., 92 × 1 = 92

When any number is multiplied by 0, the product is zero.

e.g., 61 × 0 = 0

- **Division:**

e.g.,

```
6) 12 (2
  −12
  ---
   0
  ---
```

6 is divisor; 12 is dividend; 2 is quotient; and 0 is remainder.

- **Verification:**

Dividend = Divisor × Quotient + Remainder

'0' divided by any number is '0'.

e.g., 0 -5=0

Division by 0 is not defined.

Any number divided by '1' is the number itself.

e.g., 19 - 1 =19

- **Divisibility Tests:**

Test by 2:

A number is divisible by 2 if it has 0, 2, 4, 6 or 8 in its ones place.

e.g., 70342

The digit in the ones place of 70342 is 2.

∴ 70342 is divisible by 2.

Test by 3:

A number is divisible by 3 if the sum of the digits in the number is divisible by 3.

e.g., 654

6 + 5 +4 = 15 is divisible by 3.

So, 654 is divisible by 3.

Test by 4:

A number is divisible by 4 if the number formed by the digits in its ones and tens places is divisible by 4.

e.g., 6732

Since 32 is divisible by 4, 6732 is divisible by 4.

Test by 5:

A number is divisible by 5 if it has 0 or 5 in its ones place.

e.g., 7100; 31625 etc., are divisible by 5.

Test by 6:

A number is divisible by 6 if it is divisible by both 2 and 3.

e.g., 171312

In 171312, the digit in ones place is 2. So, 171312 is divisible by 2.

1+7+1+3+1+2= 15 is divisible by 3.

So, 171312 is divisible by 3.

Hence, 171312 is divisible by 6.

Test by 8:

A number is divisible by 8 if the number formed by the digits in its ones, tens and hundreds places is divisible by 8.

e.g., 74168

168 is divisible by 8. So, 74168 is divisible by 8.

Test by 9:

A number is divisible by 9 if the sum of its digits is divisible by 9.

e.g., 345285

3+4+5+2+8+5= 27 is divisible by 9.

So, 345285 is divisible by 9.

Test by 10:

A number is divisible by 10 if the digit in the ones place is 0.

e.g., 84310

The ones digit in 84310 is 0. So, it is divisible by 10.

Test by 11:

A number is divisible by 11 if the difference of sums of digits in the event and odd places is 0 or a multiple of 11.

e.g., 75354312

5+5+3+2=15

7+3+4+1=15

15-15=0

So, the number is divisible by 11.

- **Rounding numbers:**

(a) To the nearest ten:

Step 1: If the digit in the ones place is 0, 1, 2, 3 or 4, replace it by zero.

Step 2: If the digit in the ones place is 5, 6, 7, 8 or 9, replace it by zero and increase the digit in the tens place by 1.

(b) To the nearest hundred:

Step 1: If the digit in the tens place is 0, 1, 2, 3 or 4, replace the digits in tens and ones place by zeroes.

Step 2: If the digit in the tens place is 5, 6, 7, 8 or 9, replace the digits in tens and ones places by zeroes and increase the digit in the hundreds place by 1.

(c) To the nearest thousand:

Step 1: If the digit in the hundreds place is 0, 1, 2, 3 or 4, replace the digits in the hundreds, tens and ones places by zeroes.

Step 2: If the digit in the hundreds place is 5, 6, 7, 8 or 9, replace the digits in the hundreds, tens and ones places by zeroes and increase the digit in the thousands place by 1.

Place to which a number is to be estimated	Place the digit to be considered	Value of the digit considered	What must be done?	Examples
10	Ones	0-4	Replaces ones digit with 0.	114; 4<5; So, 144 rounded to the nearest 10 is 140.
		5-9	Replaces ones digit with 0. Add 1 to tens digit.	147; 7>5; So, 177 rounded to the nearest 10 is 180.
100	Tens	0-4	Replace ones and tens digits with 0.	1137; 3<5; So, 1137 rounded to the nearest 100 is 1300.
		5-9	Replace ones and tens digits with 0. Add 1 to hundreds digit.	1268; 6>5; So, 1268 rounded to the nearest 100 is 1300.
1000	Hundreds	0-4	Replace ones, tens and hundreds digits with 0.	5472; 4>5; So, 5472 rounded to the nearest 1000 is 5000.
		5-9	Replace ones, tens and hundreds digits with 0. Add 1 to thousands digit.	2734; 7>5; So, 2734 rounded to the nearest 1000 is 3000.

- **Roman Numerals:**

The digits 0, 1, 2, ... 9 were first used by the Hindus and then the Arabs. So, these digits are called Hindu-Arabic numerals.

Romans used the Roman Numeration system.

It has 7 symbols called Roman Numerals.

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

Note: There is no symbol for zero and no place value in the Roman system.

- **Rules for writing Roman Numerals:**

(a) If a smaller numeral is written after a larger numeral, their values are added.

e.g., (i) VIII =5+1+1=8

(ii) LX=50+10=60

(b) If a smaller numeral is written before a larger numeral, its value is subtracted from that of the larger numeral.

e.g., (i) IX=10-1=9

(ii) XL =50-10 =40

(c) Repetition of a numeral means addition.

e.g., (i) XXX =10+10+10 =30

(ii) CCC=100+100+100=300

(d) If a smaller numeral is placed between two larger numerals, the value of the smaller numeral is subtracted from the value of the larger numeral following it.

e.g., (i) XIX = 10 + (10 - 1) = 10 + 9 = 19 (and not 10 + 1 + 10 = 21)

(ii) CXL = 100 + (50 - 10) = 100 + 40 = 140 (and not 100 +10+50 =160)

- **Remember:**

(a) V is never repeated.

(b) V can never be subtracted from X.

(c) I can be subtracted only from V and X.

- **Numerical Expression**

Expressions written using numerals and symbols are called numerical expressions.

BODMAS: The rule for evaluating expressions is **BODMAS** rule, which gives the order in which an expression is to be evaluated. If BODMAS rule is not used, different answers are obtained by different persons.

We use DMAS rule to simplify the numerical expressions.

D - Division

M - Multiplication

A - Addition

S – Subtraction