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# NUMBER SYSTEM

## FORMULAE & TRICKS

FOR ALL BANKING AND  
GOVERNMENT EXAMS

Quantitative Aptitude is one of the very important sections in almost every exam that a candidate may come across (Bank, Insurance, SSC, RRB, etc.). Quantitative Ability checks a candidate's capability on handling the number, remembering the formula, application of shortcut tricks, etc. But it has been often heard that people find Quant section the toughest which eventually affects the candidate's preparation. To make this fear wash out we are coming out with an e-book on the topic-wise formulas and shortcut tricks that will help you all in cracking a question and eventually the section with much higher efficiency.

We are going to start with Number system today as it is the most basic topic that has its application in the long run in almost all sections of Quant like Arithmetic, Calculus, Advanced, Mensuration, etc. Number System forms the basic tile for the understanding of concepts in mathematics. You will find the usage of mentioned formulas here to be very prominent when you prepare for any Banking, Insurance, SSC exam.

I hope this e-book helps you in long run and you grasp the formulas with ease and understanding.



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## Number System is divided into 4 parts:

1. Classification
2. Divisibility Test
3. Division and Remainder Rules
4. Sum Rules

In this e-book we will look into some tricks that will make the solving of the questions involving number system easy.

## TRICKS TO REMEMBER FOR NUMBER SYSTEM:

### 1. Classification

Types	Description
Natural Numbers	all counting numbers ( 1,2,3,4,5.... $\infty$ )
Whole Numbers	natural number + zero( 0,1,2,3,4,5... $\infty$ )
Integers	All whole numbers including Negative number + Positive number( $\infty$ .....-4,-3,-2,-1,0,1,2,3,4,5.... $\infty$ )
Even & Odd Numbers	All whole number divisible by 2 is Even (0,2,4,6,8,10,12..... $\infty$ ) and which does not divide by 2 are Odd (1,3,5,7,9,11,13,15,17,19.... $\infty$ )
Prime Numbers	It can be positive or negative except 1, if the number is not divisible by any number except the number itself.(2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61.... $\infty$ )
Composite Numbers	Natural numbers which are not prime.
Co-Prime	Two natural number a and b are said to be co-prime if their HCF is 1.

### 2. Divisibility

Numbers	IF A Number
Divisible by 2	End with 0,2,4,6,8 are divisible by 2
Divisible by 3	Sum of its digits is divisible by 3
Divisible by 4	Last two digit divisible by 4
Divisible by 5	Ends with 0 or 5
Divisible by 6	Divides by Both 2 & 3
Divisible by 8	Last 3 digit divide by 8
Divisible by 10	End with 0
Divisible by 11	[Sum of its digit in odd places-Sum of its digits in even places]= 0 or multiple of 11
Divisible by 12	[The number must be divisible by 3 and 4]

Divisible by 13	[Multiply last digit with 4 and add it to remaining number in given number, result must be divisible by 13]
Divisible by 14	[The number must be divisible by 2 and 7. Because 2 and 7 are prime factors of 14.]
Divisible by 15	[The number should be divisible by 3 and 5. Because 3 and 5 are prime factors of 15.]
Divisible by 16	[The number formed by last four digits in given number must be divisible by 16.]
Divisible by 17	[Multiply last digit with 5 and subtract it from remaining number in given number, result must be divisible by 17]
Divisible by 18	[The number should be divisible by 2 and 9]
Divisible by 19	[Multiply last digit with 2 and add it to remaining number in given number, result must be divisible by 19]
Divisible by 20	[The number formed by last two digits in given number must be divisible by 20.]

### 3. Division & Remainder Rules

A very basic formula for division rules is:

$$\text{dividend} = (\text{divisor} \times \text{quotient}) + \text{remainder}$$

or

$$\text{divisor} = [(\text{dividend}) - (\text{remainder})] / \text{quotient}$$

This could be mathematically written in another way:

$$\Rightarrow x = kq + r \text{ where } (x = \text{dividend}, k = \text{divisor}, q = \text{quotient}, r = \text{remainder}).$$




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#### 4. Sum Rules:

- Sum of first  $n$  natural numbers =  $\frac{n(n+1)}{2}$
- Sum of square of first  $n$  natural numbers =  $\frac{n(n+1)(2n+1)}{6}$
- Sum of cubes of first  $n$  natural numbers =  $\left(\frac{n(n+1)}{2}\right)^2$
- Sum of first  $n$  odd numbers =  $n^2$
- Sum of first  $n$  even numbers =  $n(n+1)$

Now we will look into basic mathematical formulas that help in solving the Number System questions very frequently.

1.  $(a + b)(a - b) = (a^2 - b^2)$
2.  $(a + b)^2 = (a^2 + b^2 + 2ab)$
3.  $(a - b)^2 = (a^2 + b^2 - 2ab)$
4.  $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
5.  $(a^3 + b^3) = (a + b)(a^2 - ab + b^2)$
6.  $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$
7.  $(a^3 + b^3 + c^3 - 3abc) = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$
8.  $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
9.  $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$



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