Numbers

</> Number System

- ✔ A number system is a collection of different numbers or digits.

> **Basic Formulas:**

- ✔ $(a+b)(a-b) = (a^2 - b^2)$
- ✔ $(a+b)^2 = (a^2 + b^2 + 2ab)$
- ✔ $(a-b)^2 = (a^2 + b^2 - 2ab)$
- ✔ $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
- ✔ $(a^3 + b^3) = (a+b)(a^2 - ab + b^2)$
- ✔ $(a^3 - b^3) = (a-b)(a^2 + ab + b^2)$
- ✔ $(a^3 + b^3 + c^3 - 3abc) = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ac)$
- ✔ When $a+b+c = 0$, then $a^3 + b^3 + c^3 = 3abc$.

</> Numbers

</> Introduction

- ✔ Natural number(N): { 1,2,3 _____infinity}
- ✔ Whole number(W) :{0 ,1,2,3,_____ infinity}
- ✔ Integer(Z) = {- infinity ,_____ -3,-2 -1,0,1,2,3,_____infinity}
- ✔ Positive integers ={ 1,2,3,4 _____infinity}
- ✔ Negative integers ={ - infinity _____ -3, -2, -1 }
- ✔ Rational numbers(Q): { P/q, p , q }
- ✔ Irrational numbers(Q'):{those that are not of form p/q or don't belong to Q}
- ✔ Even numbers : form of even numbers 2n
- ✔ O dd numbers : form of odd numbers --

  2n -1 (Where n is Natural Number)

  2n+1 (Where n is Natural Number)
- ✔ Prime numbers:These are the numbers having 1 and itself only as factors.
- ✔ Twin-prime number : If the difference between any two prime numbers is 2, those are said to be twin prime numbers Ex: (3,5) (11,13) (17,19)(19,21) (41,43)(59,61) (71,73) ----7 pairs of twin prime numbers
- ✔ Co –prime number: Any two numbers which have no common factor except for 1 are called co-prime numbers.
- ✔ Ex: Factors of 8 are:1,2,4,8 Factors of 15 are: 1,3,5,15

  Since both 8 and 15 have only 1 as a common factor, they are Co-prime.
- ✔ Any two consecutive numbers are also co-primes. Any two numbers having HCF as 1 are co-prime numbers. Any two prime numbers are also co-prime.
- ✔ Composite numbers: Numbers having more than two factors are called composite numbers. Ex: Factors of 4: 1 , 2 , 4
- ✔ Except 1 & prime numbers, all the remaining numbers are composite numbers. Ex:

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</> Divisibility Rules

- ✔ Divisibility rules help to find whether a given number is exactly divisible by another number, without leaving any remainder. Some of these rules are as follows.The first column shows the number with which the given number is to be checked for divisibility.
- ✔ 2-the unit digit should be even (or)zero.
- ✔ 3- the sum of the digits of the number should be divisible by 3.
- ✔ 4-the last two digits should be divisible by 4.
- ✔ 5-the unit digit should be either 0 (or) 5.
- ✔ 6-the number should be divisible by 2 & 3.
- ✔ 7-the difference between" the double of unit digit and remaining digits" is either 0 (or) multiple of 7.
- ✔ 8- the last 3 digits should be divisible by 8.
- ✔ 9-the sum of digits of number should be divisible by 9.
- ✔ 11-the difference between" sum of odd place digits and the sum of even place digits" is either 0 (or) multiple of 11.
- ✔ 12-the numbers should follow the both 3 & 4 divisibility rules.
- ✔ 13-the sum of 4 times the unit digit and the remaining digits should be a multiple of 13.
- ✔ 14-the number should be divisible by 2 as well as 7.
- ✔ 15- the number should be divisible by 3 as well as 5.
- ✔ 16-the last digit should be divisible by 4.
- ✔ 17- 1.multiply the last digit by 5.

  2.subtract it from the rest and if the answer is divisible by 17 then the number is divisible by 17 as well.
- ✔ 18- the numbers should follow both 2 & 9 divisibility rules
- ✔ 19 -1.double the last digit.

  2. Add the rest of the number until you get two or three-digit number, if this number is divisible by 19, the given number is divisible by 19.
- ✔ 21- The number should be divisible by 3 & 7.
- ✔ 24- The number should be divisible by 3 & 8.
- ✔ 91- The number should divisible by 7 & 13.
- ✔ 99- The number should be divisible by 9 & 11.
- ✔ **Place & face value** : Place Value and Face Value: Place value is the position value of the digit in a number-tens, hundreds, thousands, etc.

- ✔ Face Value is the digit itself in a given number.

Ex: In number 3562: the place value of 5 is 100 and face value is 5.

</> Unit Digit

- ✔ **Case (1)** : If the base value unit digit of a number is 0,1,5, 6 then the unit digit of the number multiplied with an exponent will be 0, 1, 5, 6 respectively.
- ✔ **Case (2)** : If the base value unit digit of a number is 2,3,7,8, the power value is divided by 4 and the remainders are 0,1,2,3
- ✔ Then unit digit of Number = [base value unit digit] ^{R}
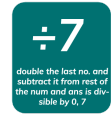
- ✔ Ex : (217) ^{315} 315/4 = 3 = Remainder

  Unit digit = (7) ^{3} = 343 So 3 is the unit digit
- ✔ **Case (3)** : If the base value unit digit of a number is 4, if exponent 'n' is odd, then unit digit of the obtained number will be 4 and if 'n' is even then the unit digit will be even.
- ✔ Similarly, if the base value unit digit is 9, if 'n' is odd, the unit digit will be 9 and if it is even, then the unit digit will be 1.

</> Factors Of Numbers

- ✔ **Factor** : Any number which can divide a given number without leaving a remainder is called a factor of the given number.
- ✔ Ex:Factors of 10 -> 10 is exactly divisible by 1, 2, 5, 10.
- ✔ Factors of any number: First convert the given number to the form:$2^x*3^y*4^z$(through Factorization)
- ✔ Find the no of factors : (x+1)(y+1)(z+1)
- ✔ Find the number of factors excluding 1 and itself: [(x+1)(y+1)(z+1)-2]
- ✔ Find the no of Pair of factors: No of factors/2

❯ Example -1

Question 1. Find the number of factors of 12?

Answer : 6

Explanation : $12=2^2*3^1 =2^x3^y$
Total number of factors of 12 =(2+1)(1+1)=3*2=6 ,{(x+1) (y+1)}

Aptitude Math Calculator

$$(x+1)(y+1)$$

Solve   Evaluate

Simplify ⌄

$$(x + 1)(y + 1)$$

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Show Step-By-Step

❯ Example -2

Practice: Solve 4*8/2 of 2 + (15-3) =?

Answer : 20 **Explanation :** By the rule of BODMAS (bracket,of,division,multiplication,addition,substraction)
4*8/(2 of 2) +(15-3)=4*8/(2 of 2)+12
=4*8* ¼ +12
= 8+12=20

Aptitude Math Calculator

Click on the below equation to solve

Example for Question 2: 4*8/(2of\ 2)+(15-3)

$$4*8/(2of\ 2)+(15-3)$$ SOLVE

Solve   Step-By-Step

Simplify ⌄