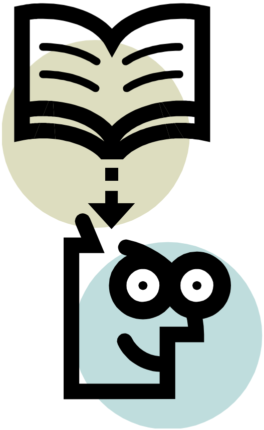


GENERAL APTITUDE

Trainer : Sujata Mohite

Email:sujata.mohite@sunbeaminfo.com

Aptitude

- Key to success
  - A. Problem Recognition
  - B. Speed
  - C. Practice

Aptitude – Important Topics

A. Quantitative-

- Average
- Percentage
- Profit & Loss
- time & Work
- Speed, time & distance

B. Reasoning -

- Seating Arrangement
- Blood Relations
- Analogy
- Coding-Decoding

Aptitude – Important Topics

C. English –

- Articles
- Passive and Active voice
- Prepositions
- Synonyms
- Antonyms
- Idioms and Phrases

BASIC MATHS

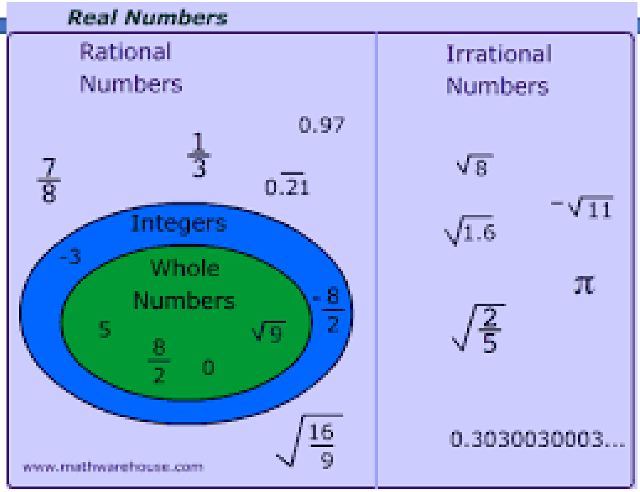
- Tables at least from 1-20
- Squares from 1-25
- Prime numbers from 1-100
- Divisibility rules for 1-20
- Methods for typical multiplications & divisions
- Methods for finding HCF & LCM
- Methods for finding squares & square roots

Numbers

Real

Complex (a+bi)

A complex number is a number that can be expressed in the form a + bi, where a and b are real numbers, and i is a solution of the equation $x^2 = -1$. Because no real number satisfies this equation, i is called an imaginary number



Rational (-2, ¾, 2.25,)

Irrational (√2, 3.14159….)

Integers (∞…,-2,-1,0,1,2….∞)

Fractions (2/5, 4/3, 3 1/3)

Whole Nos

(0,1,2,3.. ∞)

Negative Nos (∞ ..-2,-1)

Proper Fractions

(2/5, 3/7..)

Improper Fractions

(4/3, 8/7..)

Mixed Fractions

(3 ⅔, 4 ⅓..)

Natural Nos (1,2,3… ∞)

Zero (0)

Prime Nos

Composite Nos

(3 distinct factors)

Basic Mathematical Operations

- BODMAS
- B - Bracket ( ) , { }, [ ]
- O - Order
- D - Division
- M - Multiplication
- A - Addition
- S - Subtraction.

SUM OF NATURAL NUMBERS

- **Rule 1 :** Sum of first n natural numbers = $\frac{n(n+1)}{2}$

  e.g. sum of 1 to 74 =74 x (74+1)/2 = 2775.

- **Rule 2 :** Sum of first n odd numbers = n^2

  e.g. sum of first seven odd numbers

= (1+3+5+7+9+11+13) = 49 = 7^2.

- **Rule 3** : Sum of first n even numbers = n **(n+1)** .

  e.g. sum of first 9 even numbers

  = (2+4+6+8+10+12+14+16+18) = 90

  = 9 (9+1) = 9 x10 = 90

SUM OF NATURAL NUMBERS

- **Rule 4 :** Sum of squares of first n natural numbers = $\frac{n(n+1)(2n+1)}{6}$

  e.g. sum of squares of first 8 natural numbers

  = (1 + 4 + 9 + 16 + 25 + 36 + 49 + 64) = 204

  = 8 (8+1)(16+1)/ 6 = 8 x 9 x 17 / 6 = 204

- **Rule 5 :** Sum of cubes of first n natural numbers = $[n(n+1)/2]^2$

e.g. sum of cubes of first 4 natural numbers

= (1 + 8 + 27 + 64) = 100

= $[4(4+1)/2]^2$ = 100

MULTIPLICATION

1. To multiply by 9, 99, 999….

Place as many zeroes to the right of multiplicand as there are 9s and subtract the multiplicand itself.

e.g. 26234 x 999 = ?

```
   26234000
-     26234
   26207766
```

Multiples

- Multiples of number are obtained by multiplying that number by natural numbers.

e.g. Multiples of 3 are 3, 6, 9, 12, ……

If we want to find no of multiples of 6 less than 255

255 / 6 = 42 (remainder 3) So there are 42 such multiples.

DIVISION

- DIVISION by ZERO is NOT POSSIBLE
- If two numbers are divisible by a number then their sum & difference is also divisible by the number.
- E.g. For 63 is divisible by 9. 27 is also divisible by 9.
- So 63 + 27 = 90 is also divisible by 9
- And 63 – 27 = 36 is also divisible by 9

DIVISIBILITY RULES

- 2 : Unit place is even or zero(last digit should be divisible by 2)
- 3 : Sum of the digits is divisible by 3. e.g : 324
- 4 : Last 2 digits are divisible by 4 or last 2 digits are 0. e.g : 324
- 5 : Unit digit is 5 or 0
- **6 : Divisible by co primes 2 & 3.** e.g : 324
- 8 : Number formed by last 3 digits is divisible by 8 or last 3 digits are 0. e.g : 1088
- 9 : Sum of all digits is divisible by 9. e.g : 324
- 10: Units digit is 0.
- 11 : Difference between sum of digits in odd & even places should either be zero or divisible by 11

e.g: 8283

e.g : 918071

DIVISIBILITY RULES

- **12 : Divisible by co primes 3 & 4** e.g : 324
- **14 : Divisible by co primes 2 & 7**
- **15** : **Divisible by co primes 3 & 5**
- **16 :** No formed by last 4 digits divisible by 16/ last 4 digits 0.
- **18 : Divisible by co primes 2 & 9**
- 20 : Units digit 0 & tens digit is even.

DIVISIBILITY RULES

- 7 : The difference between the two alternate groups taking 3 digits at a time should either be zero or multiple of 7.

  - 550500006

  - 7370356

- 13 : The difference between the two alternate groups taking 3 digits at a time should either be zero or multiple of 13.

  - 200174

PROPERTIES OF DIVISIBILITY

- **To find a number completely divisible by another :**

A) **Greatest 'n' digit number exactly divisible by a Number :**

Method : By subtracting the remainder

e.g a) Greatest 3 digit number divisible by 13

Greatest 3 digit number = 999. 999/13 gives remainder 11.

999-11 = 988 = Greatest 3 digit number divisible by 13

B) **Least 'n' digit number exactly divisible by a Number :**

Method : By adding the (divisor – remainder)

b) Least 3 digit number divisible by 13

Least 3 digit number = 100. 100/13 gives remainder 9

100 + (13 – 9) = 104 = Least 3 digit number divisible by 13

PRIME NUMBERS

- A number that is divisible only by itself and 1 (e.g. 2, 3, 5, 7, 11).
- There are 25 prime numbers between 1 - 100
- 1 is neither prime nor composite number.
- 2 is the only prime number which is even.
- A number having more than 2 factors is a composite number
- Find prime numbers between 101 and 200??
- There are 21 prime numbers between 101 - 200

Co-Prime

- When two numbers (they may not be prime) do not have any common factor other than one between them they are called co-prime or relatively prime.

- It is obvious that two prime numbers are always co-prime. e.g : 17 and 23

- Two composite numbers can also be co-prime. e.g: 16 & 25 do not have any common factor other than one.
- Similarly 84 and 65 do not have any common factor and hence are co-prime.

Prime Number

Q. Find whether 467 is prime or not

Step 1 : Sq root of 467→ Between 21 (441) and 22 (484)

Step 2 : 467 is not divisible by 2, 3, 5, 7, 11, 13, 17, 19. Next prime is 23 which exceeds the square limit.

Therefore 467 is prime.

Prime Number

Q. Which of the following is a prime number?

A. 303 B. 477 C. 113 D. None of these

Ans : C

Numbers(Assignment)

Which of the following is the output of 57 x 57 + 43 x 43 + 2 x 57 x 43 ?

A. 10000 B. 5700 C. 4300 D. 1000

Ans : A

Numbers(Assignment)

Q. Which of the following is the output of 6894 x 99 ?

A. 685506 B. 682506 C. 683506 D. 684506

Ans: B

Numbers(Assignment)

Q. What is the unit digit in 584 x 428 x 667 x 213 ?

A. 2 B. 3 C. 4 D. 5

Ans: A

HCF & LCM

HCF / GCF / GCM

- HCF of two or more numbers is the greatest / largest / highest/biggest number which can divide those two or more numbers exactly.

Factors of 6 : 1, 2, 3, 6

Factors of 8 : 1, 2, 4, 8

Common 1 & 2 Highest & Common 2

- **LCM**
- The LCM of two or more numbers is the smallest / lowest / least number which is exactly divisible by those two or more numbers.

Multiples of 6 : 6, 12, 18, 24, 30, 36, 42, 48, 54,…

Multiples of 8 : 8, 16, 24, 32, 40, 48, 56, 64….

Common 24, 48, …. Lowest & common 24

HCF (Factorization method)

- Eg. HCF for 136, 144, 168

2	136	144	168
2	68	72	84
2	34	36	42
	17	18	21

NO FURTHER COMMON FACTOR

So HCF = 2 x 2 x 2 = 8

Note : HCF is always <= the smallest of given nos

HCF (Factorization method)(Assignment)

- HCF of 54,72,126 (factorization method)

A. 21 B. 18 C. 36 D. 54

Ans : B

HCF (Difference Method)

- Find HCF of 203,319

Keep smaller here

- (203, 319)
- (116,203)
- (87,116)
- (29,87)
- (29,58)
- (29,29)

HCF =29

HCF (Difference Method)(Assignment)

- HCF of 161,253 (difference method)

A. 27 B. 18 C. 23 D. 17

Ans : C

HCF (Difference Method)

- Find HCF of 84,125
- (84,125)
- (41,84)
- (41,43)
- (2,41)
- (2,39)

- If nothing is common then HCF =1 and numbers are said to be co prime numbers.

HCF & LCM

Q. Find the greatest number which can divide 284, 698 &1618 leaving the same remainder 8 in each case?

A. 36 B. 46 C. 56 D. 43.

Soln-

Remainder 8 → (numbers – 8) would be exactly divisible.

→284-8 = 276

→698-8 = 690

→1618-8 = 1610

→Greatest number dividing above 3 = HCF(276, 690, 1610) (difference method)

→HCF = 46

Ans B

HCF & LCM

Q. Find the greatest number which can divide 62, 132 & 237 leaving the same remainder in each case?

A. 35 B. 46 C. 56 D. 43.

Soln

If two numbers a & b are divisible by a number n then

→ Their difference (a-b) is also divisible by n.

→132-62 = 70

→237-132 = 105

→237-62 = 175

→Greatest number dividing above 3 = HCF(70, 105, 175)

→HCF = 35

Ans A

HCF & LCM

Q. Find the largest number such that 43,65,108 are divisible by that number and we get the remainder as 1,2,3 respectively each case?

A. 21 B. 27 C.42 D. 63

Soln:

43 – 1 = 42

65 – 2 = 63

108 – 3 = 105

HCF(42,63,105)

Ans : A

HCF & LCM(Assignment)

Q. Find the greatest number which can divide 62, 132 & 237 leaving the same remainder in each case?

A. 35 B. 46 C. 56 D. 43.

Ans : A

Try at your end

HCF & LCM(Assignment)

Q. Find largest number such that if 45,68 and 113 are divided by that number we get the remainder as 1,2 and 3 respectively.

A. 21 B. 22 C. 26 D. 24

Ans: B

HCF & LCM(Assignment)

Q. Find the greatest number which can divide 41, 131 & 77 leaving the same remainder in each case?

A. 28 B. 18 C. 36 D. 24

Ans : B

LCM

- Eg. LCM for 18, 28, 108, 105

2	18	28	108	105
2	9	14	54	105
3	9	7	27	105
3	3	7	9	35
3	1	7	3	35
5	1	7	1	35
7	1	7	1	7
Till all quotients are 1	1	1	1	1

So LCM = 2 x 2 x 3 x 3 x 3 x 5 x 7 = 3780

Note : LCM is always >= the greatest of given nos

LCM(Assignment)

- LCM for 12,24,20

A. 210 B. 180 C. 120 D. 144

Ans : C

LCM (Assignment)

Q. Find LCM of 72,125

A. 9000 B. 1200 C. 1000 D. 800

Ans : A

Rules to Remember

- Product of two given numbers is equal to the

  product of their HCF & LCM

  A x B = HCF(A,B) x LCM(A,B)

- If a, b, c are three numbers that divide a number n to leave the same remainder r, the smallest value of 'n' is

  n = (LCM of a, b, c) + r   e.g 3,4,5 & rem 1

LCM

Q. Find LCM of 147 & 231

- As we know,
- HCF X LCM = product
- Find HCF by difference method
- Put in the formula,
- 21 x LCM = (147 x 231)
- 1617

LCM

Q. Find LCM of 84 and 125

- As they are co-prime numbers the product is the LCM because HCF =1 (for co-primes)
- HCF x LCM = product
- 1   x LCM = 84 x 125
- LCM = 10500

LCM

- Find the least number which when divided by 12,15,24 leaves a remainder of 5 in each case
- Soln:
- Find LCM(12,15,24) = ?

- LCM = 120

- In an LCM problem, if remainder is common then,

  Result = LCM + common remainder
  = 120+5 = 125

LCM

Q. Find the smallest number which when divided by 20,36,45 leaves a remainder 15,31 and 40 respectively.

- Soln:
- Find LCM(20,36,45)
- In LCM problem , if difference is common(constant) then,
- Result = LCM – Common difference

• 20	36	45	5
• 15	31	40	

- Result = 180 -5

  = 175

LCM

Q. Four numbers are in the ratio of 10: 12 : 15 : 18. If their HCF is 3, then find their LCM.

A. 420 B. 540 C. 620 D. 680

Ans : B

LCM

Q. Find the least number which when divided by 5,6,7 and 8 leaves a reminder of 3 but when divided by 9 leaves no remainder.

A. 1677 B. 2523 C. 3363 D. 1683

Ans: D

LCM(Assignment)

Q. Find the least number which when divided by 12,15,40 leaves a remainder of 5 in each case

A. 120 B. 125 C. 130 D. 140

Ans : B

LCM(Assignment)

Q. If the product of two numbers is 324 and their HCF is 3, then their LCM will be = ?

A. 972 B. 327 C. 321 D. 108

Ans: D

LCM(Assignment)

Q. Three number are in the ratio of 3 : 4 : 5 and their L.C.M. is 2400. Their H.C.F. is:

A. 40 B. 80 C. 120 D. 200

Ans: A

LCM(Assignment)

Q. Find the least number which when divided by 16,18,20 and 25 leaves a reminder of 4 but when divided by 7 leaves no remainder.

A. 17004 B. 18000 C. 18002 D. 18004

Ans: D

Rules to Remember

- **Fractions :**

LCM = LCM of Numerators / HCF of Denominators

HCF = HCF of Numerators / LCM of Denominators

LCM of 25/12 & 35/18

LCM = 175/6

HCF of 25/12 & 35/18

HCF = 5/36

HCF & LCM Fractions(Assignment)

- Find HCF & LCM of 5/9 and 25/36
- Ans : HCF = 5/36 and LCM = 25/9

Properties of Square Numbers

- A square can't end with odd number of zeroes

- A square can't end with 2, 3, 7 or 8.

1	2	3	4	5
6	7	8	9	0

- Square of odd no. is odd & even no. is even

Squares

Q. What is the smallest number you need to multiply 1944 with to make it a perfect square?

- A. 9 B. 6 C. 4 D. 12
- **Soln**
- 1944 $= 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3$
- $= 2^3 \times 3^5$
- Perfect square always has even powers of its prime factors
- So to make it perfect square multiplication by
- $2 \times 3 = 6$
- $1944 \times 6 = 11664$(which is a perfect square of 108)
- **Ans B**

Squares

Q. A man plants his orchard with 15876 trees & arranges them so that there are as many rows as there are trees in each row. How many rows does the orchard have?

A. 124 B. 134 C. 126 D. 136

- **Soln**
- No of trees = No. of rows x no of trees/row
- 15876 = n x n
- n = √15876
- n = √9 x 1764
- = √9 x 9 x 196
  = ?
  = 9 x 14
  =126
- **Ans C**

Squares(Assignment)

Q. Find a positive number x, such that the difference between the square of this number and 21 is the same as the product of 4 times the number?

A. 9 B. 27 C. 7 D. 13

- **Ans : C**

Progression

- **Arithmetic Progression :**
- If quantities increase or decrease by a common difference then they are said to be in AP e.g. 3, 5, 7, 9,11,….
- If a is first term, d is the common difference, l is the last term then
- General form : a, a+d, a+2d, a+3d,…,a+(n-1)d
- n^{th} term Tn = a + (n-1)d , **n = 1, 2, ..**
- Sum of first n terms Sn = n/2 [2a + (n-1)d]

  = n/2 (a + l)

Progression

- Prove that the sum Sn of n terms of an Arithmetic Progress (A.P.) whose first term ‘a’ and common difference ‘d’ is
- S = n/2[2a + (n - 1)d]
- Or, S = n/2[a + l], where l = last term = a + (n - 1)d
- **Proof:**
- a , a+d , a+2d , a+3d,…….., a(n-2)d ,a(n-1)d, as l = last term
- a , a+d , a+2d , a+3d,…….., l-d ,l
- S = a + a+d + a+2d + a+3d + …….. + l-d + l ---------------------1
- Writing equation 1 in reverse order(sum remains same even if we write in reverse order)
- S = l + l-d + l-2d + l-3d + …….. + a+d + a---------------------2
- Adding equation 1 and 2
- 2S = (a + l) + (a + l) + (a + l) + --------- +(a + l) + (a + l)
- So for n terms,
- 2S = n(a + l)
- S = $\frac{n}{2}$ (a + l)

Progression

- What is the difference between arithmetic progression and geometric progression?
- A sequence is a set of numbers, called terms, arranged in some particular order. An arithmetic sequence is a sequence with the difference between two consecutive terms constant. The difference is called the common difference. A geometric sequence is a sequence with the ratio between two consecutive terms constant.

Progression

Q. The sum of all two digit numbers divisible by 3 is

A. 550 B. 1550 C. 1665 D. 1680

Soln

Two digit numbers divisible by 3 are :

12, 15, 18, 21, ……., 96, 99.

This is an A.P. with a = 12, d = 3, l=99

Let n be the number of terms.

Last term = a + (n-1)d

99 = 12 + (n-1)x3

3n = 90 , n = 30

Sum = n/2 (a + l) = 30/2 x (12+99)

= 1665

Ans C

Progression

Q. Find the sum of all natural numbers between 10 and 200 which are divisible by 7

A. 2835 B. 2865 C. 2678 D. 2646

Soln:

Two digit numbers divisible by 3 are :

14, 21, 28, 35, ……, , 196.

This is an A.P. with a = 14, d = 7, l=196

Last term = a + (n-1)d

196= 14 + (n-1)x7

196-14 = (n-1)x7

n-1 = 26

n=27

Sum = n/2 (a + l)

= 27/2 x (14+196)

= 27 × 210 /2

= 27 × 105

= 2835

Progression(Assignment)

Q. Find the sum of the series 3,8,13,18, …….,93

A. 912 B. 925 C. 998 D. 936

Ans : A

Progression

- **Geometric Progression** :
- If quantities increase or decrease by a constant factor then they are said to be in GP e.g. 4, 8, 16, 32, …..
- If a is first term, r is the common ratio, then
- General form : $a, ar, ar^2, ar^3,……, ar^{n-1}$
- n^{th} term $Tn = ar^{(n-1)}$
- Sum of first n terms $Sn = a(r^n -1)/(r-1)$

Geometric Progression of n terms :

- To prove that the sum of first n terms of the Geometric Progression whose first term 'a' and common ratio 'r' is given by-
- $S = a + ar + ar^2 + ar^3 + ar^4 + \ldots\ldots\ldots\ldots + ar^{n-1}$ -------------- 1
- Multiply both sides of this equation by r
- $Sr = ar + ar^2 + ar^3 + ar^4 + \ldots\ldots\ldots\ldots + ar^{n-1} + ar^n$ -------------- 2

- - - - - - -

- Eq 2 - Eq 1
- $Sr - S = ar^n - a$
- $S(r - 1) = a(r^n - 1)$
- $S = \dfrac{a(r^n - 1)}{(r - 1)}$

Geometric Progression

Q. Find the 10th term of the series: 4,16, 64, 256, 1024, ….

A. 4^{10} B. 4^{8} C. 4^{9} D. 1022480

Soln:

The given series is in geometric progression

Where a = 4, r = 4

So $T10 = a \times r^{(10-1)}$

$= 4 \times 4^{(10-1)}$

$= 4^{10}$

Ans A

THANK YOU