Number Systems

NUMBER SYSTEM

Work with the
world of numbers

Content

- TYPES OF NUMBERS
- Conversion of a decimal number to fraction
- DIVIDIBILITY RULE
- POWER CYCLE
- REMAINDER THEOREM
- FACTORS AND MULTIPLES
- i) Number of factors
- ii) Sum of factors
- iii) Product of factors
- HCF & LCM
- AP & GP

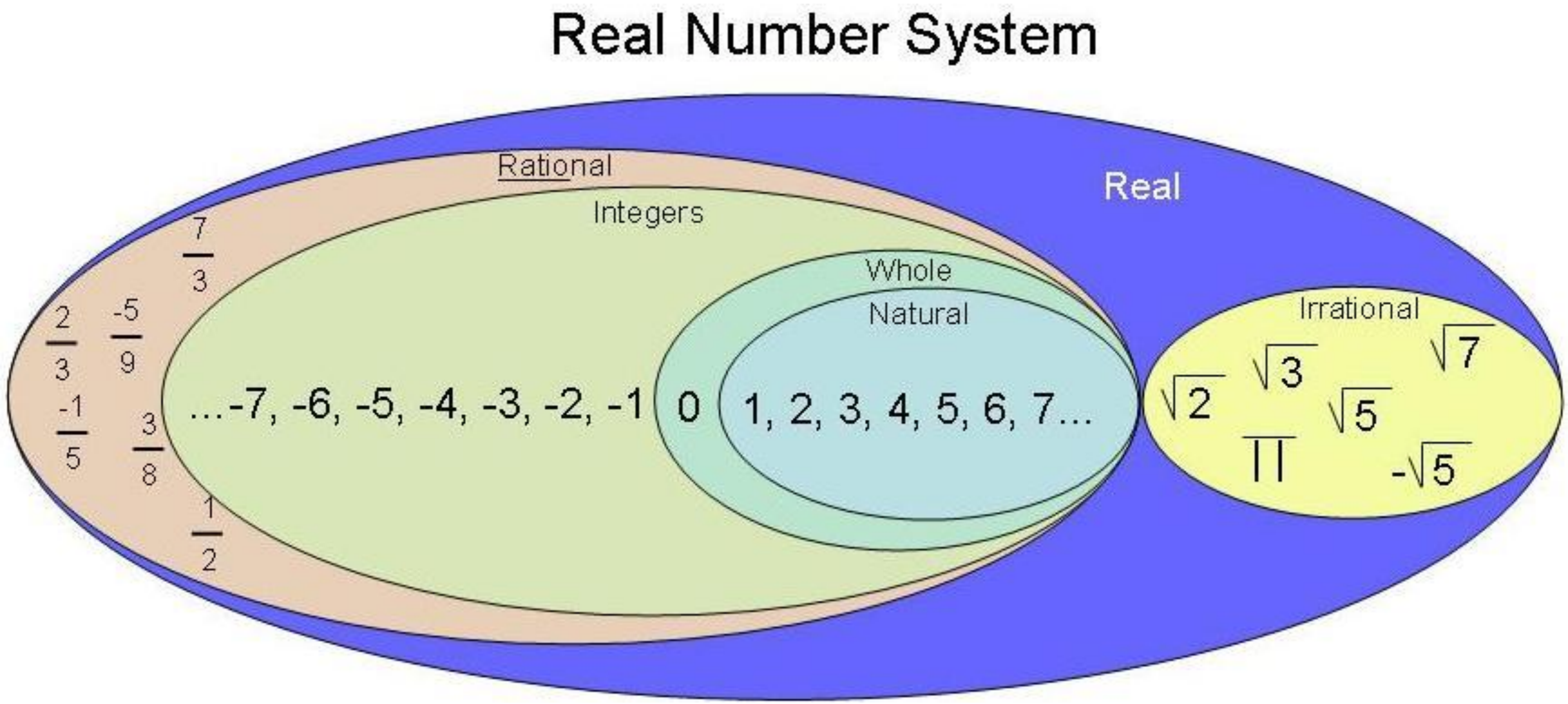
Face Value and Place value

4567

Face Value of 4 = 4
Face Value of 5 = 5
Face Value of 6 = 6
Face Value of 7 = 7

Place Value of 4 = 4000
Place Value of 5 = 500
Place Value of 6 = 60
Place Value of 7 = 7

1. Types of numbers



- **Complex Numbers (a+ib)**
  - **Real Numbers**
    - **Decimal**
      - Terminating
      - Non Terminating, Repeating
      - Non Terminating, Non Repeating
    - **Integers**
      - Positive (+1,+2,+3)
      - Zero
      - Negative (-1,-2,-3 etc.)
  - **Imaginary Numbers** ($i = \sqrt{-1}$)

Real Numbers : All numbers which can be represented on number line are called Real numbers. Or we can say that all numbers from -infinity to +infinity are called Real numbers.

Decimal Numbers: Decimal Numbers are classified into 3 categories.

1.Terminating Decimals (e.g. 0.5, 0.2, 1.5 etc.)

2.Non terminating but repeating decimals (e.g. 0.3333......)

3.Non Terminating and non repeating (∏ , √2 ,√3)

First two decimal number's type are Rational Number and third type is Irrational.

Rational Numbers : All numbers which can be written in the form of p/q , where $q \neq 0$ are called Rational Numbers. All other numbers are Irrational.

0.5 = 5/10 , So terminating decimals are Rational Numbers.
0.333333......=1/3 , So Non terminating but repeating decimals are also Rational.
But Non terminating and non repeating decimals are Irrational numbers.

Note: Here one should know that value of ∏ is not 22/7 which we generally use for our convenience.

Rational no. b/w a and b = $(ak+b)/(k+1)$

Irrational no. b/w a and b = $\sqrt{ab}$, ...

Positive Integers: Positive integers can be categories in many ways.

1. **Prime numbers**: Numbers having exactly two factors are called prime numbers. They have factors as 1 and the number itself. e.g. 2, 3, 5 etc.

2. **Composite Numbers**: Numbers having more than two factors are called composite numbers. e.g. 4, 6, 8

3. **Neither Prime nor composite: 1** is neither prime nor composite as it has only one factor.

- **2** is the smallest Prime number and the only prime number which is even.

Even number: Numbers divisible by 2 are even numbers. e.g. 2,4,6,8 etc.

Odd numbers: Numbers not divisible by 2 are odd numbers.

Co-Prime numbers: Set of two numbers having HCF=1 e.g. (2,3) , (5,7) etc.

Perfect number: If the sum of all the factors of a number (excluding that number) is equal to that number. Then that number is called perfect number.

E.g. 6= 1, 2, 3, 6 adding factor sum=1+2+3=6

Important rules related to Even and Odd numbers:

odd ± odd = even;
even ± even = even;
even ± odd = odd

odd × odd = odd;
even × even = even;
even × odd = even.

odd$^{\text{(any number)}}$ = odd
even$^{\text{(any number)}}$ = even

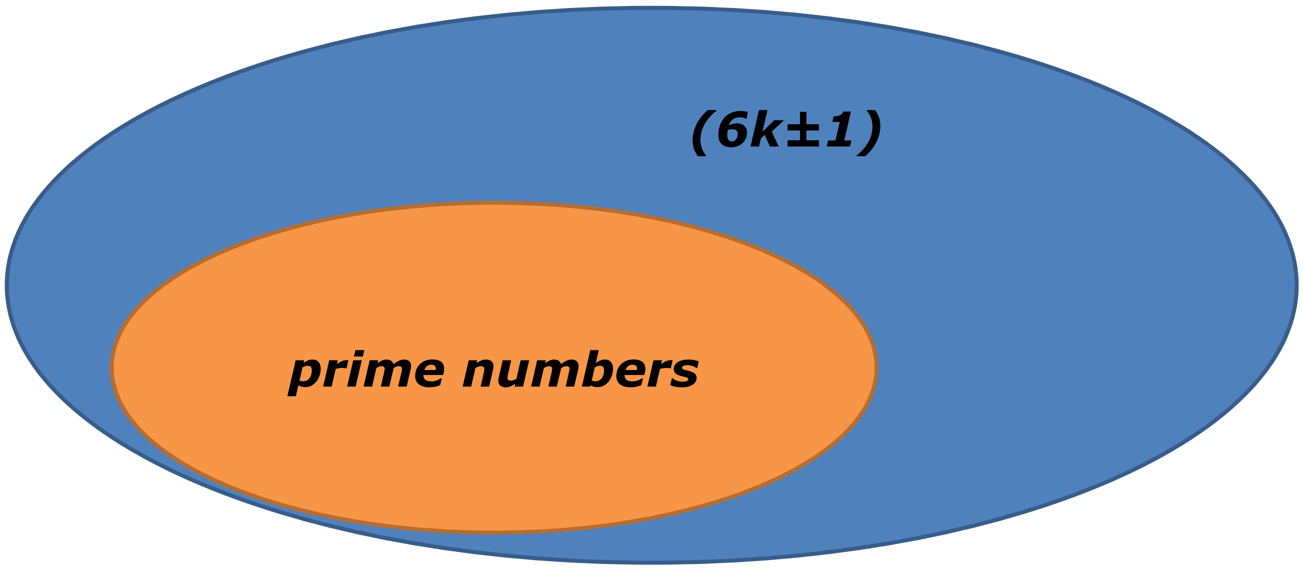
1.i) How to find if a number is prime or not?

N is a prime number if it is not divisible by numbers lesser than √N.

Example: 191 is a prime number since it is not divisible by 2, 3, 5, 7, 11 and 13 [numbers less than √191 (≈14)].

***Note: Prime numbers** will always be in the form **(6k±1)** where k= 1, 2, 3....*

But not all (6k±1) will be a prime number.



1.ii) Conversion of a decimal number to fraction:

Example:

$3.\overline{713} =$

Solution:

$$3.\overline{713} = 3 + \frac{713}{999} = \frac{2997 + 713}{999} = \frac{3710}{999}$$

Example:

$12.3\overline{45}=$

Solution:

Here only 45 are recurring.

Therefore, $12.3\overline{45} = 12 + \frac{345 - 3}{990} = 12 + \frac{342}{990} = 12 + \frac{38}{110} = 12 + \frac{19}{55} = \frac{679}{55}$

Q. Convert 0.2333333333……………. into P/Q

A . 23/90
B. 7/30
C. 21/30
D. 5/6

Ans- B

Q. Convert 37.565656565656…………… into P/Q

2. Divisibility Rules

Divisibility rule of 2 : Numbers which ends with even number or zero is always divisible by 2.

Example: 122, 246, 230, 458 etc.

Divisibility rule of 3 : A number is divisible by 3 if sum of it's digit is divisible by 3.

Example: 1296, 342, etc.

1296, Sum of digits=1+2+9+6=18, which is divisible by 3.

Divisibility rule of 4: If the last two digit of a number are divisible by 4 or numbers ending with two or more zeros then that number is divisible by 4.

Example: 2332, 1240, 2500, 816000, etc. are divisible by 4.

Divisibility rule of 6: Now 6 is a composite number and whenever we discuss the divisibility rule of a composite number then we break that composite number into it's two Co-Prime factors. For example 6 has (2,3) as it's Co-Prime factors.

If a number is divisible by both 2 and 3 it means that number is also divisible by 6.

Example: 612, 2532, 5250 etc.

Divisibility rule of 8: A number is divisible by 8, if it's last three digits

Divisibility rule of 9 : If sum of all digits of a number is divisible by 9, the number is also divisible by 9.

Example: 1296, 369, 1440, 25254 etc.

Divisibility rule of 10: if a number is ending with 0, it is divisible by 10.

Example : 1220, 320, 2500, 450 etc.

Divisibility rule of 12: Again it is a composite number whose two Co-Prime factors are (3,4)

We can say that if a number is divisible by 3 and 4 both then that number is also divisible by 12.

Example : 468, 1152, 1020 etc.

Any other numbers can be written in terms of the numbers whose divisibility is already known.

Example: 15 = 3 x 5

18 = 2 x 9

33 = 3 x 11

Note: The numbers expressed should be co-prime (i.e., the HCF of the two numbers should be 1)

Example: 40 = 4 x 10 is wrong because HCF(4,10) is 2.

∴ 40 = 5 x 8 because HCF(5,8) is 1.

Question: If number 1792N is divisible by 2. How many values N can take?

[A] 4

[B] 5

[C] 3

[D] 6

Ans - B

Question: What should come in place of x if 563x5 is divisible by 9?

[A] 7

[B] 8

[C] 9

[D] 2

Ans - B

Question: For what values of P number 345472P34 is exactly divisible by 9.

[A] 3

[B] 4

[C] 6

[D] 7

Ans - B

Question: For what values of N number 9724N is exactly divisible by 6.

[A] 2 & 8

[B] 4 & 6

[C] 2 & 6

[D] 6 & 8

Ans - A

Divisibility rule of 11 : A number is divisible by 11 if the difference between the sum of digits at odd places and sum of digits at even places is either 0 or divisible by 11.

Example: 10593, 9372 etc.

For 10593

(Sum of digits at odd places) - (Sum of digits at even places) = (3+5+1)-(9+0)=9-9 =0

For 9372

(2+3)-(9+7) = 5-16 = -11 which is divisible by 11.

Question: For what values of N number 857N32 is exactly divisible by 11.

[A] 1

[B] 0

[C] 3

[D] 4

Ans - B

Question: What should come in place x if 4857x is divisible by 88?

[A] 6

[B] 8

[C] 2

[D] 4

Ans - A

Unit Digit Concept

Right most digit of a number is called Unit digit.

For e.g. 278 X 623 what will be the unit digit?

Unit digit questions can be asked in two ways:

1. Simple Product type Questions

e.g. What will be the unit digit of 123 X 456 X 789.

2**. Power Type Questions**

e.g. Find the unit digit of (127)^23

It can also be the mixture of both.

We can categories in three category:

1. Numbers ending with (0, 1, 5, 6)
2. Numbers ending with (4,9)
3. Numbers ending with (2,3,7,8)

Each category follow a certain rule.

1. **Numbers ending with (0, 1, 5, 6) :** Any number ending with 0, 1, 5, 6 raised to power any number (Except 0) will always have same number at unit place respectively.

For e.g. (2350)^234, (531)^34, (245)^321, (776)^321

2. Numbers ending with (4 and 9) : Cyclicity of 4 and 9 is 2. It means their unit digit repeats after every 2 powers. So we can say

4^Odd = 4 at unit place
4^ Even = 6 at unit place

9^Odd = 9 at unit place
9^ Even = 1 at unit place

3. Numbers ending with (2,3,7,8) : All numbers have cyclicity of 4, it means after every 4^{th} power the unit digit pattern will be same.

In these type of questions we will divide the power by cyclicity (i.e. 4) so that we will know how many cycles have been completed and we will try to find remainder. And unit digit will be (2,3,7,8)^**Rem**

Note: If remainder is zero then we take highest power of that cycle which is 4. or we can say (2,3,7,8)^**4**

	Power			
Base	1	2	3	4
2	2	4	8	6
3	3	9	7	1
7	7	9	3	1
8	8	4	2	6
4	4	6		
9	9	1		

Number	Cyclicity
1	1
2	4
3	4
4	2
5	1
6	1
7	4
8	4
9	2
10	1

Choose the nth value in the cycle if the remainder is n except for the last value whose remainder should be 0.

Example 2: What is the unit digit of (123)^42?

The unit digit pattern of 3 repeats four times. So find the remainder when the power value is divided by 4.

42/4= R(**2**)

2nd value in 3 cycle is 9.

∴ Unit digit of (123)^42 is 9

Q) What is the unit digit of $(127)^{223}$

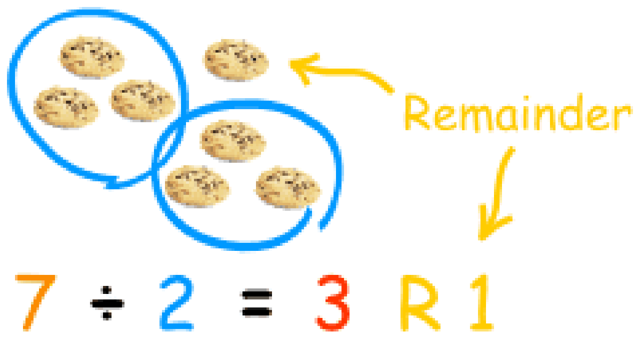
A) 7 B) 9 C) 3 D) 1

Ans- C

4. Remainder theorem

Type 1: *Numerator in terms of powers*

The remainder pattern should be found starting from the power of 1. The same procedure should be followed as done in the unit digit concept.



Example: What is the remainder when 2^202 is divided by 7?

2^1/7 = R(2)
2^2/7= R(4)
2^3/7 = R(1)

The next three remainder values will be the same. i.e., The remainder pattern is 2,4,1, 2,4,1, 2,4,1.....

The size of the pattern is 3.

Now divide the power by number of repeating values (3) to choose the remainder.

Choose the nth value in the cycle if the remainder is n except for the last value whose remainder should be 0.

202/3 = R(**1**).

The 1^{st} value in the cycle is 2.

Note: *While finding the remainder pattern if the remainder becomes 1, then the process can be stopped as the it will always repeat after 1.*

∴ 2^202/7 = R(2)

Note: *While finding the remainder pattern if the remainder becomes 1, then the process can be stopped as the it will always repeat after 1.*

Type 2: *Different numerator values*

Replace each of the values of the numerator by its remainder when divided by the denominator and simplify.

Example: What is the remainder when 13 x 14 x 16 is divided by 6.

13/6 = R(1) ∴ replace 13 by 1

Similarly replace 14 and 16 by 2 and 4 respectively.

∴ (13 x 14 x 16)/6 = (1 x 2 x 4)/6

= 8/6

= R(2)

Note: *Do not cancel any numerator value with the denominator value as the remainder will differ.*

R(6/4) ≠ R(3/2)

6/4 = R(2)

But 3/2 = R(1)

Q) What is the remainder when 3 to the power 7 is divided by 8?

A)3
B)4
C)5
D)7
E)None

Ans- A

Q) Remainder when 17^23 is divided by 16?

A)1

B)2

C)3

D)4

Ans- A

Q) Remainder when 35^113 is divided by 9?

A)1

B)8

C)3

D)4

Ans- B

Q) Remainder when 2^33 is divided by 9?

A)1
B)4
C)8
D)5

Ans- C

Q) Remainder when 2^99 is divided by 10?

A)1

B)4

C)2

D)8

Ans- D

Q) Remainder when 5^500 is divided by 500?

A)125

B)1

C)5

D)250

Ans- A

5. Factors

Factors of a number are the values that divides the number completely.

Example: Factors of 10 are 1, 2, 5 and 10.

Multiple of a number is the product of that number and any other whole number.

Example: multiples of 10 are 10, 20, 30,…..

Factors

i) Total Number of Factors
ii) Sum of Factors
iii) Number of Odd Factors
iv) Number of Even Factors
v) The number of ways of writing a number N as a product of two number
vi) The number of ways of writing a number N as a product of two co-prime numbers

5.i) Total Number of factors:

- Take any number "N" and it is to be covert into **product of prime numbers** (*Prime factorization*) i.e
- $N = A^p \times B^q \times C^r$ here A, B , C are prime numbers and p, q, and r were respective powers of that prime numbers.
- **Total numbers of factors for " N "**= $(p + 1)(q +1)(r +1)$.

- **Example:** 3600

- **Step 1:** Prime factorize the given number
- $3600 = 36 \times 100$
- $= 6^2 \times 10^2$
- $= 2^2 \times 3^2 \times 2^2 \times 5^2$
- $= 2^4 \times 3^2 \times 5^2$

- **Step 2:** Add 1 to the powers and multiply.
- $(4+1) \times (2+1) \times (2+1)$
- $= 5 \times 3 \times 3$
- $= 45$
- ∴ Number of factors of 3600 is 45.

Q) Find the number of factors of 144?

A) 15 B) 12 C) 8 D) none

Ans- A

Q) Find the number of factors of 14400?

A) 24 B) 54 C) 63 D) none

Ans- C

Q) Find the number of factors of 120?

A) 15　　B) 16　　C) 12　　D) none

Ans- B

5.ii) Sum of factors:

Example: 45

Step 1: Prime factorize the given number

45 = 3^2 x 5^1

Step 2: Split each prime factor as sum of every distinct factors.

(3^0 + 3^1 + 3^2) x (5^0 + 5^1)

The following result will be the sum of the factors

= 78

Q) find the sum of factors of 98?

A) 161 B) 171 C) 160 D) none

Ans- B

Q) find the sum of factors of 300?

A) 768 B) 868 C) 860 D) none

Ans- B

5.iii) Number of ODD factors:

Example: 4500

- 4500 = 45 x 100 = 9 x 5 x 10 x 10 = 3 x 3 x 5 x 5 x 2 x 5 x 2
- 4500 = $2^2 \times 3^2 \times 5^3$ Here consider A = 2 , B = 3 , C = 5 , p= 2 , q = 2 and r = 3
- Here identifying that odd number are 3 and 5
- Numbers of odd factors of number 4500 = (q + 1) (r + 1) = 3 x 4 = 12

  Note: Do not consider even prime factor

5.iv) Number of Even factors:

Numbers of even factors of number = Total number of factors – Numbers of odd factors

Example: 4500

- 4500 = 45 x 100 = 9 x 5 x 10 x 10 = 3 x 3 x 5 x 5 x 2 x 5 x 2
- 4500 = $2^2 \times 3^2 \times 5^3$ Here consider A = 2 , B = 3 , C = 5 , p= 2 , q = 2 and r = 3
- Here identifying that odd number are 3 and 5
- Numbers of odd factors of number 4500 = (q + 1) (r + 1) = 3 x 4 = 12
- Total number of factors = (p + 1)(q +1)(r +1) = 3 x 3 x 4 =36
- **Numbers of even factors of number = Total number of factors – Numbers of odd factors = 36 – 12 = 24**

Note: Do not add 1 in the power of the even prime factor

Q) How many factors of $2^4 * 5^3 * 7^4$ are odd numbers?

A) 100 B) 99 C) 20 D) 24

Ans- C

Q) How many factors of 360 are odd numbers?

A) 24 B) 6 C) 18 D) 12

Ans- B

Q) Number $N = 2^6 * 5^5 * 7^6 * 10^7$; how many factors of N are even numbers?

A) 1183 B) 1200 C) 1050 D) 840

Ans- A

Q) How many factors of 120 are even numbers?

A) 4 B) 16 C) 18 D) 12

Ans - D

5.v) The number of ways of writing a number N as a product of two number *:*

The number of ways of writing a number as a product of two number = $[(p+1).(q+1).(r+1)\ldots]/2$

Example:

Find no. of ways of writing 140 as a product of two numbers

The prime factorization of 140 = $2^2 \times 5 \times 7$

number of ways = $(3*2*2)/2 = 6$

Note: If the total number of factors are odd then Product of two number= (total factors+1)/2

5.vi) The number of ways of writing a number N as a product of two co-prime numbers:

- **The number of ways of writing a number N as a product of two co-prime numbers** = $2^{(n-1)}$
  where n=the number of prime factors of a number.

Example:

The prime factorization of 60 = $2^2 \times 3 \times 5$

The no of ways of writing 60 as a product of two co - primes = $2^{(3-1)} = 4$

Q) Find no. of ways of writing 120 as a product of two numbers

A) 8 B) 4 C) 9 D) none

Ans- A

Q) Find no. of ways of writing 144 as a product of two numbers

A) 7 B) 8 C) 9 D) none

Ans- B

Q) Find no. of ways of writing 120 as a product of two co-prime numbers

A) 3 B) 4 C) 8 D) none

Ans- B

Q) How many factors of 21600 are perfect square?

A) 12 B) 10 C) 6 D) none

Ans- A

Q) How many factors of 21600 are perfect cube?

A) 5　　B) 4　　C) 6　　D) none

Ans- B

Q) find the sum of Odd factors of 360?

A) 61 B) 78 C) 1092 D) none

Ans- B

Q) find the sum of Even factors of 360?

A) 1170 B) 78 C) 1092 D) none

Ans- C

Factors will occur in pairs for the numbers except perfect squares.

Example 1: A non perfect square number- 10

1 x 10 = 10

2 x 5 = 10

‘∴ Factors of 10 are 1, 2, 5 and 10.

Non perfect squares *will have* ***even number of factors***

Example 2: A perfect square number- 16

1 x 16 = 16
2 x 8 = 16
4^2 = 16
∴ Factors of 16 are 1, 2, 4, 8 and 16.

*Every **perfect square** will have **odd number of factors** because its square root number will pair with itself.*

This has odd number of factors because 4 will pair with itself.

*Every **perfect square** will have **odd number of factors** because its square root number will pair with itself.*

Example 3: A prime square number- 49

The factors of 49 are 1, 7 and 49.

Prime square number *will have exactly* ***3 factors*** *(1, that number itself and square root of that number).*

If ***N*** *is a* ***prime square number*** *then the* ***factors are 1, N and √N.***

Q) If 11^2, 3^4 and 2^5 are the factors of a x 12^7 x 17^6 x 21^5 then what is the minimum possible value of a?

Number of Trailing Zeroes

Number of trailing zeroes in a Product or Expression

- Number of trailing zeroes is going to be the power of 2 or 5, whichever is lesser.

- Or maximum pairs of (**2 x 5**)

Example: **Find the number of zeros in $2^{150} \times 5^{234} \times 3^{160}$**

Number of trailing zeroes in a factorial (n!)

- Number of trailing zeroes in n! = Highest power of 5 in n!

Example: Find the number of Zeroes in 50!

Q. How many zeros are there in 100!?

a) 24 b) 97 c) 121 d) none

Ans- A

Q) Find the number of zeros in 75!

a) 16 b) 18 c) 20 d) 21

Ans- B

Q)Find the number of zeros in 255!

a) 63 b) 52 c) 62 d) 65

Ans- A

Q) Find the number of zeros at end of

5 x 10 x 15 x 20 x 25 x 30 x 35…………… x 240 x 245 x 250

a) 53 b) 62 c) 47 d) none

Ans- C

Q) Find the number of zeros in 100! + 200!

a) 24 b) 49 c) 73 d) none

Ans- A

Q) Find the number of zeros in 100! * 200!

a) 24 b) 49 c) 73 d) none

Ans- C

6. HCF & LCM

- The greatest number that will exactly divide a, b and c is **HCF(a, b, c)**.

- The greatest number that will divide a, b and c leaving remainder of x, y and z respectively is **HCF(a-x, b-y, c-z)**.

- The greatest remainder which when it divides a, b and c will leave the same remainder in each case is **HCF(a-b, b-c, c-a)**.

- The least number which is exactly divisible by a, b and c is **LCM(a, b, c)**.

- The least number which when divided by a, b and c leaves the same reminder r in each case is **LCM(a, b, c) + r**.

- The least number which when divided by a, b and c leaves the remainder x, y and z respectively is **LCM(a, b, c) – K**.
This is possible only if a-x = b-y = c-z = K.

FINDING THE H.C.F. OF BIG NUMBERS

For larger numbers you can use the following method:

Step 1 Find all prime factors of both numbers.

Step 2 Write both numbers as a multiplication of prime numbers.

Step 3 Find which factors are repeating in both numbers and multiply them to get H.C.F

FINDING L.C.M. OF BIG NUMBERS

Step 1 Find all the prime factors of both numbers.

Step 2 Multiply all the prime factors of the larger number by those prime factors of the smaller number that are not already included

Important formulae:

$$LCM(a,b) = \frac{a \times b}{HCF(a,b)}$$

- Product of Two numbers = LCM X HCF
- HCF of fractions = $\frac{HCF\ OF\ numerators}{LCM\ OF\ denominators}$
- LCM of fractions = $\frac{LCM\ of\ numerators}{HCF\ of\ denominators}$

Q) Find the lowest common multiple of 24, 36 and 40.

A) 120 B) 240 C) 360 D) 480

Ans- C

Q) The least number which is exactly divisible by 8, 16, 40 and 80 is:

A) 16 B) 120 C) 80 D) none

Ans- C

Q) Find the highest common factor of 36 and 84.

A) 4　　B) 6　　C) 12　　D) 18

Or, The greatest number that will exactly divide 36 and 84 is:

Ans- C

Q) The greatest possible length which can be used to measure exactly the lengths 7 m, 3 m 85 cm, 12 m 95 cm is:

A) 15 B) 25 C) 35 D) 42

Ans- C

Q) Four bells ring at an interval 3min, 4min, 5min and 6 minutes respectively. If all the four bells ring at 9am first, when will it ring again?

Ans- 10 AM

Q) The H.C.F. of two numbers is 11 and their L.C.M. is 7700. If one of the numbers is 275, then the other is:

A)308
B)310
C)312
D)None

Ans- A

Q) The H.C.F of 9/10, 12/25, 18/35, and 21/40 is?

A)3/1400
B)5/1400
C)7/1400
D)None

Ans- A

Q) Which of the following fraction is the largest? 7/8, 13/16, 31/40, 63/80

A)7/8
B)13/16
C)31/40
D)63/80

Ans- A

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

Q) The ratio of two numbers is 3 : 4 and their H.C.F. is 4. Their L.C.M. is:

A) 12 B) 16 C) 24 D) 48

Ans- D

Q) The least number, which when divided by 12, 15, 20 and 54 leaves in each case a remainder of 8 is:

A) 504 B) 536 C) 544 D) 548

Ans- D

Q) Find the smallest number, which when divided by 3, 4 and 5 leaves remainder 1, 2 and 3 respectively?

A) 60 B) 53 C) 58 D) none

Ans- C

Q) The greatest number which on dividing 1657 and 2037 leaves remainders 6 and 5 respectively, is:

A) 123 B) 127 C) 235 D) 305

Ans- B

Q) Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.

A) 4 B) 7 C) 9 D) 13

Ans- A

Q) The product of two numbers is 4107. If the H.C.F. of these numbers is 37, then the greater number is:

A) 101 B) 107 C) 111 D) 185

Ans- C

Q) The product of two numbers is 2028 and their H.C.F. is 13. The number of such pairs is:

A) 1 B) 2 C) 3 D) 4

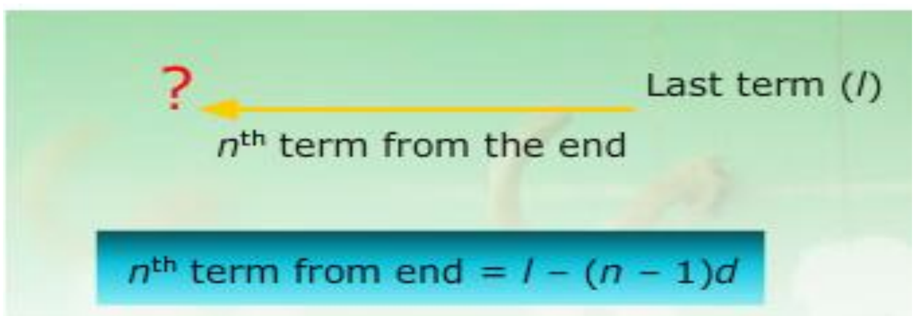
Ans- B

ARITHMETIC PROGRESSION

An Arithmetic Progression (A.P.) is a sequence in which the difference between any two consecutive terms is constant.

Let a = first term, d = common difference

- Then nth term $a_n = a + (n - 1)d$



Sum of an A.P

The sum of n terms of an A.P. whose first term is a and common difference is d, is given by

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

The sum of n terms of an A.P. whose first term is a and last term is l is given by the formula:

$$S_n = \frac{n}{2}\left[a + l\right]$$

AM (Arithmetic mean)

If a, b, c are in AP then the arithmetic mean is given by

$b = (a+c)/2$

Inserting AM

To insert k means between a and b the formula for common difference is given by

$d = (b-a) / (k+1)$

For example: Insert 4 AM's between 4 and 34

$d = (34 - 4) / (4+1)$

$= 30/5$

$= 6$

$\therefore$ The means are $4+6=10$

$10+6=16$

$16+6=22$

$22+6=28$

Q) 1,3,5, 7, …….. Which term of this AP is 55?

A) 25th B) 26th C) 27th D) 28th

Ans-D

Q) Find the 15^{th} term of the series 20,15,10,……..

A) -45 B) -50 C) -55 D) 0

Ans-B

Q)How many terms are there in the AP 20, 25, 30, …….. 130?

A) 21 B) 22 C) 23 D) 24

Ans-C

Q) Find the sum of the series 5,8,11,…….. 221

A) 8249 B) 8239 C) 7886 D) 9000

Ans- A

Q) Find the sum of all 2-digit numbers, which are exactly divisible by 9?

A) 525 B) 565 C) 575 D) 585

Ans-D

Q) Find the first term of an AP whose 8^{th} and 12^{th} terms are 39 and 59 respectively?

A) 3　　B) 4　　C) 5　　D) 6

Ans-B

GEOMETRIC PROGRESSION

A geometric sequence are powers r^k of a fixed number r, such as 2^k and 3^k. The general form of a geometric sequence is

The n-th term of a geometric sequence with initial value a and common ratio r is given by

$$a_n = a\,r^{n-1}.$$

Such a geometric sequence also follows the recursive relation

$a_n = r\,a_{n-1}$ for every integer $n \geq 1$.

General term of a GP is $T_n = ar^{n-1}$

Sum of first n terms of G.P:

a. $S_n = \dfrac{a(r^n - 1)}{r - 1}$ where $r > 1$

b. $S_n = \dfrac{a(1 - r^n)}{1 - r}$ where $r < 1$

c. $S_n = na$ where $r = 1$

Sum of infinite G.P:

If a G.P. has **infinite terms** and **$-1 < r < 1$ or $|x| < 1$**,

Sum of infinite G.P is $S_\infty = \dfrac{a}{1 - r}$.

GM (Geometric mean)

If a, b, c are in GP Then the GM is given by

$b = \sqrt{ac}$

Inserting GM

To insert k means between a and b the formula for common ratio is given by

$r = (b/a)^{(1/(k+1))}$

For example: Insert 4 GM's between 2 and 486

$r = (486/2)^{(1/(4+1))}$

$= (243)^{(1/5)}$

$= 3$

$\therefore$ the means are $2 \times 3 = 6$

$6 \times 3 = 18$

$18 \times 3 = 54$

$54 \times 3 = 162$

Q) How many terms are there in the sequence 5, 20, 80, 320, …….. 20480?

A) 5 B) 6 C) 7 D) 8

Ans-C

Q) If the first and fifth term of a GP are 16 and 81 respectively then find the fourth term?

A) 18 B) 24 C) 36 D) 54

Ans-D

Q) Find the sum of the series 2, 4, 8, 16…. 256.

A)510 B) 1020 C) 520 D) none

Ans-A

Next Class Averages