Number System

Various types of numbers:

1. **Natural Numbers:** counting numbers are called natural numbers.

   1, 2 , 3, 4,……. are all natural numbers.

2. **Whole numbers:** All counting numbers, together with 0, form the set of whole numbers.

   0, 1, 2, 3, 4, …… are all whole numbers.

3. **Integers:** All counting numbers, zero and negative of counting numbers form the set of integers.

Thus ……., -3, -2, -1, 0, 1, 2, 3, ……..are all integers

Set of positive integers = {1, 2, 3, 4, ……..}

Set of negative integers = {-1, -2, -3, -4,……}

Set of non negative integers = {0, 1, 2, 3, 4, ……..}

4. **Even numbers:** A counting number divisible by 2 is called an even number.

Thus 0, 2, 4, 6, 8, …. are all even numbers

5. **Odd numbers:** A counting number not divisible by 2 is called an odd number

Thus 1, 3, 5, 7, 9, 11, …… are all odd numbers

6. **Prime numbers:** A counting number is called a prime number if it has exactly two factors, namely itself and 1.

All prime numbers less than 100 are:

2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61,67,71,73,79,83,89,97

7. Composite Numbers: All counting numbers which are not prime are called composite numbers.

A composite number has more than 2 factors.

8. Perfect numbers: A number, the sum of whose factors (except the number itself), is equal to the number, is called perfect number. Eg. 6,28,496

The factors of 6 are 1,2,3 and 6 And 1+2+3=6

The factors of 28 are 1,2,4,7,14 and 28

And 1+2+4+7+14=28

9. Co-primes (or Relative primes):

Two numbers whose H.C.F. is 1 are called co-prime numbers.

Ex. 2,3 are co prime number

10. Twin primes: Two prime numbers whose difference is 2 are called twin-primes

Ex (3,5), (5,7), (11,13) are pairs of twin prime numbers.

11. Rational numbers: numbers which can be expressed in the form p/q where p and q are integers and $q \neq 0$ are called rational numbers.

Ex. 1/8, -8/11, 5 2/3, …

12. Irrational numbers: Numbers which when expressed in decimal would be in non-terminating and non-repeating form are called irrational numbers.

Ex. $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{7}, \pi, e, \ldots\ldots$

Find the unit digit in the product 81 × 82 × 83 × … × 89.

- For finding the last digit of 81*82*83*84*85*86*87*88*89
- you need to take all last digits and multiply as there is no use in taking tens digit.
- You can see 5*2=10,4*5=20, etc. So the last digit must be zero.
- the last digit which will come from the multiplication of all the number.
  In this case:
  1*2*3*4*5*6*7*8*9=362880
- Here the last digit is 0 so the last digit of number coming from the multiplication of all the number will be 0.

Find the unit's digit of $(264)^{102}+264^{103}$

$264^{102} + 264^{103} = 4^{102} + 4^{103}4^2$ gives units' digit 6

4^{102} = gives unit's digit 6

4^{103} gives unit's digit 6*4 = 4

So 6+4 gives 0 as unit's digit

What is the unit's digit in the product $2467^{153} * 341^{72}$?

(A) 0
(B) 1
(C) 2
(D) 7
(E) 9

Unit digit of $2467^{153} * 341^{72}$ is same as unit digit of $7^{153} * 1^{72}$
$= 7^{153}$
$= 7^{4*38+1}$ (Since cyclicity of 7 is 4)
$= 7^{1}$
$= 7$