Basic Concept, Shortcuts with Examples on Number System

Q1) The pairs of numbers which are relatively prime to each other is

1) (68, 85) 2) (65, 91) 3) (92, 85) 4) (102, 153)

Solution: H.C.F.(92, 85) = 1 i.e. 92, 85 are relatively prime to each other.

Q2) The sum of four consecutive even numbers is 284. What would be the smallest number?

1) 72 2) 74 3) 68 4) 66

Solution: Let four consecutive even numbers be $x, x+2, x+4, x+6$

$$x + x + 2 + x + 4 + x + 6 = 284$$

On solving, $x = 68$

Q3) Sum of first 15 multiples of 8 is

1) 960 2) 660 3) 1200 4) 1060

Solution: First 15 multiples of 8 are 8, 16, 24, 32, --- 120

So, 8 (1, 2, 3, --- 15)

Sum = $8\left[\frac{n(n+1)}{2}\right] = 8\left[\frac{15(16)}{2}\right] = 960$

Q4) The product of four consecutive natural numbers plus one is

1) a non-square 2) always sum of two square numbers

3) a square 4) None of these

Solution: Product of four consecutive natural numbers plus one is always a square.

Example: Let us suppose 4 consecutive natural numbers i.e. 1, 2, 3, 4.

So, $(1 \times 2 \times 3 \times 4) + 1 = 25$ i.e. a perfect square.

Example: Let us suppose 4 consecutive natural numbers i.e. 2, 3, 4, 5.

So, $(2 \times 3 \times 4 \times 5) + 1 = 121$ i.e. a perfect square.

Q5) How many rational numbers are there between 1 and 1000?

1) 998 2) 999 3) 1000 4) Infinite

Solution: There can be infinite rational numbers are there between 1 and 1000.

Q6) Which of the following numbers is divisible by 11?

1) 45678940 2) 54857266 3) 87524398 4) 93455120

Solution: 93455120

Sum of digits at even places = 3 + 5 + 1 + 0 = 9

Sum of digits at odd places = 9 + 4 + 5 + 2 = 20

Difference = 20 – 9 = 11. So, it is divisible by 11.

Q7) $19^5 + 21^5$ is divisible by

1) Only 10 2) Only 20 3) Only 10 and 20 4) Neither 10 nor 20

Solution: $a^n + b^n$ is divisible by $a + b$ if n is odd.

So, $19^5 + 21^5$ is divisible by $9 + 21 = 40$, here n is odd.

As, $19^5 + 21^5$ is divisible by 40 so, $19^5 + 21^5$ is divisible by 10 and 20.

Q8) If n is a whole number greater than 1, then $n^2(n^2 - 1)$ is always divisible by

1) 12 2) 24 3) 48 4) 60

Solution: Put n = 2 so, $n^2(n^2 - 1) = 12$ i.e. by 12.

Q9) Consider the following statements

A) 7710312401 is divisible by 11.

B) 173 is a prime number.

Which of the statements given above is/are correct?

1) Only A 2) Only B 3) Both A and B 4) Neither A nor B

Solution:

A. Sum of digits at even places = 7 + 0 + 1 + 4 + 1 = 13

Sum of digits at odd places = 7 + 1 + 3 + 2 + 0 = 13

Difference = 13 – 13 = 0. So, it is divisible by 11.

B. We have to divide 173 by all the prime number from 2 to 13. It is not divisible by 2, 3, 5, 7, 11, 13. So, is a prime number.

Q10) If k is a positive integer, then every square integer is of the form

1) Only 4k 2) 4k or 4k + 3 3) 4k + 1 or 4k + 3 4) 4k or 4k + 1

Solution: If k is a positive integer, then every square integer is of the form 4k or 4k + 1.

Q11) Every prime number of the form 3k + 1 can be represented in the form 6m + 1 (where k, m are integers), when

1) k is odd 2) k is even 3) k can be both odd and even

4) No such form is possible

Solution: This is only true when k is odd.