DPP – 09

CLASS – 10^{th}

TOPIC – FUNDAMENTAL THEOREM OF ARITHMETIC

Q.1 Express each of the following integers as a product of its prime.

(i) 420

(ii) 468

(iii) 945

(iv) 7325

Q.2 Determine the prime factorisation of each of the following positive integers:

(i) 20570

(ii) 58500

(iii) 45470971

Q.3 Explain why $7\times11\times13+13$ and $7\times6\times5\times4\times3\times2\times1+5$ are composite numbers.

Q.4 Check whether 6^n can end with the digit 0 for any natural number n.

Q.5 Explain why $3\times5\times7+7$ is a composite number.

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TOPIC – FUNDAMENTAL THEOREM OF ARITHMETIC

Sol.1 (i) 420

2	420
2	210
5	105
7	21
3	3
	1

$420 = 2 \times 2 \times 3 \times 5 \times 7$

$\therefore 420 = 2^2 \times 3 \times 5 \times 7$

(ii) 468

2	468
2	234
3	117
3	39
13	13
	1

$468 = 2 \times 2 \times 3 \times 3 \times 13$

$\therefore 468 = 2^2 \times 3^2 \times 13$

(iii) 945

5	945
3	189
3	63
3	21
7	7
	1

$945 = 3 \times 3 \times 3 \times 5 \times 7$

$\therefore 945 = 3^3 \times 5 \times 7$

(iv) 7325

5	7325
5	1465
293	293
	1

$7325=5\times5\times\times293$

$\therefore 7325=5^2\times293$

Sol.2 (i)

5	20570
2	4114
11	2057
11	187
17	17
	1

$205770=2\times5\times11\times11\times17$

$\therefore 205770=2\times5\times11^2\times17$

(ii)

5	58500
5	11700
5	2340
2	468
2	234
3	117
3	39
13	13
	1

$58500=2\times2\times3\times3\times5\times5\times5\times13$

$\therefore 58500=2^2\times3^{2\times}5^3\times13$

(iii)

7	45470971
7	6495853
13	927979
13	71383
17	5491
17	323
19	19
	1

$45470971 = 7 \times 7 \times 13 \times 13 \times 17 \times 17 \times 19$

$\therefore 45470971 = 7^2 \times 13^2 \times 17^2 \times 19$.

Sol.3 So, basically, there are two types of numbers, i.e., prime numbers and composite numbers.

Understanding that,

Prime numbers are those numbers having 1 and the number itself as factors.

And composite numbers are those numbers having factors other than 1 and itself.

It's seen that,

$7 \times 11 \times 13 + 13 = 13 \times (7 \times 11 + 1)$ [taking 13 out as common]

$= 13 \times (77 + 1)$

$= 13 \times 78$

$= 13 \times 13 \times 6$

So, the given expression has 6 and 13 as its factors. Therefore, we can conclude that it is a composite number.

Similarly,

$7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5 = 5 \times (7 \times 6 \times 4 \times 3 \times 2 \times 1 + 1)$ [taking 5 out- common]

$= 5 \times (1008 + 1)$

$= 5 \times 1009$

Since 1009 is a prime number, the given expression has 5 and 1009 as its factors other than 1 and the number itself. Hence, it is a composite number.

Sol.4 In order to check whether 6^n can end with the digit 0 for any natural number n, let us find the factors of 6.

It's seen that the factors of 6 are 2 and 3.

So, $6^n = (2 \times 3)^n$

$6^n = 2^n \times 3^n$

Since the prime factorisation of 6 does not contain 5 and 2 as its factor together, we can conclude that 6^n can never end with the digit 0 for any natural number n.

Sol.5 Basically, there are two types of numbers, i.e., prime numbers and composite numbers.

Understanding that,

Prime numbers are those numbers having 1 and the number itself as factors.

And composite numbers are those numbers having factors other than 1 and itself.

It's seen that,

$3 \times 5 \times 7 + 7 = 7 \times (3 \times 5 + 1) = 7 \times (15 + 1) = 7 \times 16$

Since the given expression has 7 and 16 as its factors, we can conclude that it is a composite number.