Prime Factorisation

Prime factorisation is the process of breaking down a number into its prime factors. A prime factor is a number that is prime, and it divides the given number exactly without leaving any remainder. Prime factorisation involves writing a number as a product of prime numbers.

For example, to find the prime factorisation of 12, we break it down into prime numbers that multiply together to give 12.

Steps for Prime Factorisation

- Start with the smallest prime number, 2, and divide the number by 2 (if possible).
- If the number is not divisible by 2, move to the next prime number, 3, and continue dividing until the number cannot be divided further.
- Keep dividing the number by prime numbers until you are left with only prime numbers.
- The product of these prime numbers gives the prime factorisation.

Properties of Prime Factorisation

- Every whole number greater than 1 has a unique prime factorisation (except for the order of the factors).
- Prime factorisation helps in finding the greatest common divisor (GCD) and least common multiple (LCM) of numbers.
- Prime numbers are numbers greater than 1 that have only two factors: 1 and the number itself.

Example 1

Question: Find the prime factorisation of 18.

Solution:

Step 1: Start with the smallest prime number, 2.

$18 \div 2 = 9$.

Step 2: Next, divide 9 by 3 (since 9 is not divisible by 2).

$9 \div 3 = 3$.

Step 3: Now divide 3 by 3.

$3 \div 3 = 1$.

So, the prime factorisation of 18 is:

$18 = 2 \times 3 \times 3$ or 2×3^2.

Answer: The prime factorisation of 18 is 2×3^2.

Example 2

Question: Find the prime factorisation of 30.

Solution:

Step 1: Start with 2, the smallest prime number.

$30 \div 2 = 15$.

Step 2: Next, divide 15 by 3 (since 15 is not divisible by 2).

$15 \div 3 = 5$.

Step 3: Finally, 5 is a prime number, so we stop here.

So, the prime factorisation of 30 is:

$30 = 2 \times 3 \times 5$.

Answer: The prime factorisation of 30 is $2 \times 3 \times 5$.

Summary Points

- Prime factorisation involves breaking down a number into its prime factors.
- Every number has a unique prime factorisation.
- Prime numbers are numbers that can only be divided by 1 and themselves.
- Prime factorisation is helpful for finding GCD, LCM, and simplifying fractions.