Prime Factorisation

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Prime Factorization is the process of expressing a number as the product of its prime factors.

Prime numbers are numbers that have only two factors: 1 and itself.

It is useful in finding LCM (Least Common Multiple), HCF (Highest Common Factor), and simplifying fractions.

1. Methods of Prime Factorization

A. Factor Tree Method

Break the number into two factors and continue factorizing until only prime numbers remain.

Example: Find the prime factors of 48

Prime Factorization of $48 = 2 \times 2 \times 2 \times 2 \times 3$ ($2^4 \times 3$)

B. Division Method

- i. Start with the smallest prime number (2, 3, 5, etc.) and divide the number.
- ii. Keep dividing until you get 1.

Example: Find the prime factorization of 72

- 72 ÷ 2 = 36
- 36 ÷ 2 = 18
- 18 ÷ 2 = 9
- 9÷3=3
- 3÷3=1

Prime Factorization of $72 = 2 \times 2 \times 2 \times 3 \times 3 (2^3 \times 3^2)$

2. Properties of Prime Factorization

- i. Every number has a unique prime factorization (except for order).
- ii. Prime factorization consists only of prime numbers.
- iii. The smallest prime factor of any even number is always 2.
- iv. Used in finding LCM and HCF.
- v. Can be done using either the Factor Tree or Division Method.

3. Prime Factorization Importance:

Helps in LCM (Least Common Multiple) and HCF (Highest Common Factor) calculations.

Used in reducing fractions to their simplest form.

Helps in solving real-life problems like sharing and grouping objects.