**Fundamental theorem of arithmetic**

The Fundamental Theorem of Arithmetic, also known as the Unique Factorization Theorem, states that every positive integer greater than 1 can be expressed as a unique product of prime numbers (or prime factors), up to the order of the factors.

Here are the key points about the Fundamental Theorem of Arithmetic:

1. Prime Factorization: Every positive integer greater than 1 can be written as a unique product of prime numbers. For example, the number 12 can be expressed as 2 × 2 × 3, where 2 and 3 are prime numbers. The prime factorization of a number provides a unique representation of that number in terms of its prime factors.
2. Uniqueness: The prime factorization of a number is unique, meaning that there is only one way to express a given number as a product of prime factors, up to the order of the factors. For example, the prime factorization of 12 is 2 × 2 × 3, and there is no other way to express 12 as a product of prime factors.
3. Composite Numbers: Composite numbers, which are positive integers greater than 1 that are not prime, can be expressed as a product of prime factors. For example, the composite number 20 can be written as 2 × 2 × 5.
4. Fundamental Building Blocks: Prime numbers are considered the fundamental building blocks of integers. Every positive integer can be decomposed into its prime factors, which are indivisible and cannot be further factored into smaller integers.
5. Applications: The Fundamental Theorem of Arithmetic has applications in various areas of mathematics, particularly in number theory, algebra, and cryptography. It forms the basis for several algorithms, such as primality testing, greatest common divisor calculations, and modular exponentiation.

The Fundamental Theorem of Arithmetic is a foundational concept in number theory and plays a crucial role in understanding the properties of integers. It provides a fundamental tool for factorization, divisibility, and the study of prime numbers. The theorem's significance extends to practical applications in mathematics and related fields.