

Fundamental Theorem of Arithmetic

Chapter 1: Real Numbers · Topic 2

Key Concept

This theorem is used to efficiently find the HCF and LCM of numbers using prime factorisation: HCF is the product of the smallest powers of common prime factors, while LCM is the product of the highest powers of all prime factors present in either number. It's also used to prove that numbers like $\sqrt{2}$ are irrational, through a proof by contradiction that relies on this theorem's guarantee of unique prime factorisation.

Quick Revision Notes

- Fundamental Theorem of Arithmetic: every composite number is a unique product of primes.
- This uniqueness holds regardless of the order the prime factors are written in.
- Used to find HCF (smallest common prime powers) and LCM (highest prime powers) efficiently.
- Also used in proofs, like proving $\sqrt{2}$ is irrational.

Practice Questions

- 1 Express 156 as a product of its prime factors.
- 2 Find the HCF and LCM of 24 and 36 using prime factorisation.
- 3 Explain how the Fundamental Theorem of Arithmetic helps prove that $\sqrt{2}$ is irrational.