

Introduction to Real Numbers

Key Concepts:

- Euclid's Division Algorithm
- Fundamental Theorem of Arithmetic
- Irrational Numbers
- Divisibility Properties
- Decimal Expansion
- Rational Numbers

Important Definitions:

- Euclid's Division Algorithm: a method for dividing one integer by another to find the quotient and remainder
- Fundamental Theorem of Arithmetic: every composite number can be expressed as a product of primes in a unique way
- Irrational Number: a real number that cannot be expressed as a finite decimal or fraction

Examples:

- The decimal expansion of $1/2$ is 0.5, which is terminating
- The decimal expansion of $1/3$ is 0.333..., which is non-terminating repeating

Euclid's Division Algorithm

- Any positive integer a can be divided by another positive integer b to find the quotient and remainder
- The remainder is always smaller than the divisor
- This algorithm has many applications in number theory

Fundamental Theorem of Arithmetic

- Every composite number can be expressed as a product of primes in a unique way

- This theorem has many applications in number theory, including the study of irrational numbers
- It can be used to determine the nature of the decimal expansion of a rational number

Summary:

This topic introduces the concept of real numbers, including irrational numbers, and explores the properties of positive integers using Euclid's Division Algorithm and the Fundamental Theorem of Arithmetic.