REAL NUMBERS
Premium Revision Notes

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1. Introduction

- Real numbers include both rational and irrational numbers.
- Euclid’s Division Algorithm helps in finding HCF of numbers.
- Fundamental Theorem of Arithmetic explains prime factorisation.
- Decimal expansion of rational numbers can be terminating or non-terminating recurring.

2. Fundamental Theorem of Arithmetic

Statement:

Every composite number can be written as a product of prime numbers and this factorisation is unique except for order.

Example:

$32760 = 2^3 \times 3^2 \times 5 \times 7 \times 13$

3. Important Points

- Prime factorisation of a natural number is unique.
- HCF = Product of smallest powers of common prime factors.
- LCM = Product of greatest powers of all prime factors.

4. Formula Box

$HCF(a,b) \times LCM(a,b) = a \times b$

5. Examples

Example 1: 4■ never ends with zero because it has only factor 2 and no factor 5.

Example 2:

$6 = 2 \times 3$

$20 = 2^2 \times 5$

HCF = 2

LCM = 60

6. Irrational Numbers

- A number which cannot be written in the form p/q is irrational.
- $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$ are irrational numbers.
- Sum of rational and irrational number is irrational.

7. Proof Idea of $\sqrt{2}$ Irrational

Assume $\sqrt{2}$ is rational.

Let $\sqrt{2} = a/b$ where a and b are coprime.

On squaring:

$2b^2 = a^2$

Hence a is divisible by 2 and b is also divisible by 2.

This contradicts that a and b are coprime.

Therefore $\sqrt{2}$ is irrational.

8. Quick Revision

■ Every composite number has unique prime factorisation.

■ Use prime factors to find HCF and LCM.

■ $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$ are irrational.

■ HCF × LCM = Product of numbers.

■ Designed as colourful handwritten-style class revision notes for fast study.