Class 10 Mathematics – Chapter: Real Numbers

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1. Introduction

Real Numbers include all rational and irrational numbers. This chapter builds on number systems studied previously.

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2. Euclid’s Division Lemma

If a and b are positive integers, then there exist unique integers q and r such that:
a=bq+ra = bq + ra=bq+r
where 0□r<b0 \leq r < b0□r<b.

This lemma is fundamental for finding the Highest Common Factor (HCF) of two numbers.

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3. Fundamental Theorem of Arithmetic

Every composite number can be expressed as a product of prime numbers in a unique way, except for the order of the factors. This is called the prime factorization.

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4. Revisiting Irrational Numbers

Numbers that cannot be expressed as pq\frac{p}{q}qp, where p and q are integers and q□0q \neq 0q□=0, are called irrational numbers. Examples: 2\sqrt{2}2, 3\sqrt{3}3, π\piπ, etc.

Proofs of irrationality for numbers like 2\sqrt{2}2, 3\sqrt{3}3, and 5\sqrt{5}5 are important.

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5. Rational Numbers and Their Decimal Expansions

- Terminating decimals: Decimal expansion ends after a finite number of digits.
- Non-terminating recurring decimals: Digits repeat in a fixed pattern infinitely.

For a rational number pq\frac{p}{q}qp in lowest form:

- If the prime factorization of qqq contains only 2 and/or 5, the decimal expansion terminates.
- Otherwise, it is non-terminating recurring.

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6. Important Exam Tips

- Always express rational numbers in the lowest terms.
- Use Euclid’s Lemma confidently for HCF questions.
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Practice proving irrationality using contradiction method.

- Know the difference between terminating and non-terminating decimals clearly.