NCERT Solutions Class 10 Maths
Chapter 1: Real Numbers
EXERCISE 1.2

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Quick Summary: In NCERT Solutions Class 10 Maths Chapter 1 Exercise 1.2, students learn to prove the irrationality of numbers using the Fundamental Theorem of Arithmetic and contradiction method. This exercise covers essential proof techniques for irrational numbers like √2, √5, and expressions involving surds, which are crucial topics for CBSE Class 10 board exams and competitive tests.

Key Takeaways:

- Master the contradiction method to prove irrationality of √p where p is prime
- Apply Fundamental Theorem of Arithmetic stating every composite number has unique prime factorization
- Learn to prove irrationality of expressions like 3 + 2√5 and (1)/(√2)
- Understand the key principle: if p^2 is divisible by prime q, then p is also divisible by q

Complete Solutions

Question 1

QUESTION

Prove that √5 is irrational.

SOLUTION

Let be rational. Then it can be written as , where and are integers having no common factor other than 1 (i.e.,) and .

Squaring both sides, we get

which gives

This means that is divisible by 5. Hence must also be divisible by 5 (because if a prime divides the square of a number, it divides the number itself). So we can write for some integer .

Substituting in , we get

Thus, is also divisible by 5, and hence is divisible by 5.

Therefore, both and are divisible by 5, which means they have a common factor 5. This contradicts our assumption that and have no common factor other than 1.

Hence, our initial assumption that is rational is false. Therefore, is irrational.

Question 2

QUESTION

Prove that $3 + 2\sqrt{5}$ is irrational.

SOLUTION

Assume that is rational. Then there exists a rational number such that

Rewriting, we get

Since and 3 are rational numbers, their difference is also rational. Thus, the right-hand side is rational. Dividing both sides by 2, we obtain

The right-hand side is a quotient of rational numbers, so it is rational. Hence would be rational.

But from the previous result, is irrational. This is a contradiction.

Therefore, our assumption that is rational is false. Hence is irrational.

Question 3

QUESTION

Prove that the following are irrationals:

(i) $\frac{1}{\sqrt{2}}$

(ii) $7\sqrt{5}$

(iii) $6 + \sqrt{2}$.

SOLUTION

(i) Irrationality of

Assume that is rational. Then there exists a rational number such that

Taking reciprocals on both sides (which is allowed because), we get

The right-hand side is the reciprocal of a rational number and hence is rational. Thus would be rational, which contradicts the known fact that is irrational. Therefore, must be irrational.

(ii) Irrationality of

Assume that is rational. Then there exists a rational number such that

Dividing both sides by 7 (a non-zero rational number), we get

The right-hand side is a quotient of two rational numbers, so it is rational. Hence would be rational, which contradicts the fact that is irrational. Therefore, is irrational.

(iii) Irrationality of

Assume that is rational. Then there exists a rational number such that

Rearranging, we get

Since and 6 are rational, their difference is rational. Thus, would be rational, which contradicts the fact that is irrational.

Hence the assumption is false, and is irrational.

Therefore, each of , and is irrational.

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📌 Key Formulas

Important Formulas for Exercise 1.2

Formula / Concept	Description
Fundamental Theorem of Arithmetic	Every composite number can be expressed (factorised) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur. For any integer n > 1, it can be written as n = p_1^a_1 × p_2^a_2 × ·s × p_k^a_k, where p_1, p_2, ..., p_k are prime numbers and a_1, a_2, ..., a_k are positive integers.
Highest Common Factor (HCF)	The HCF of two or more numbers is the product of the smallest power of each common prime factor in the numbers.
Lowest Common Multiple (LCM)	The LCM of two or more numbers is the product of the greatest power of each prime factor involved in the numbers.
Relationship between HCF and LCM	For any two positive integers 'a' and 'b', the product of their HCF and LCM is equal to the product of the two numbers. HCF(a, b) × LCM(a, b) = a × b
Euclid's Division Lemma	For a given pair of positive integers 'a' and 'b', there exist unique integers 'q' and 'r' satisfying the relation a = bq + r, where 0 \le r < b. Here, 'a' is the dividend, 'b' is the divisor, 'q' is the quotient, and 'r' is the remainder.
Composite Numbers	A composite number is a positive integer that has at least one divisor other than 1 and itself. Every composite number can be expressed as a product of prime numbers.

Top FAQs

Q1. How many questions are there in NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers Exercise 1.2?

Exercise 1.2 of NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers contains exactly 3 questions. These questions focus on the Fundamental Theorem of Arithmetic and require students to express numbers as products of prime factors using step by step solutions for better understanding.

Q2. Where can I download free PDF of NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers Exercise 1.2 for CBSE board exam 2025-26?

You can download the free PDF of NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers Exercise 1.2 from the official NCERT website or various educational portals offering CBSE board exam 2025-26 study materials. These PDFs include detailed step by step solutions for all three questions covering the Fundamental Theorem of Arithmetic with proper explanations.

Q3. How many marks does Chapter 1 Real Numbers carry in CBSE Class 10 Maths board exam 2025-26?

Chapter 1 Real Numbers carries 5 marks weight in the CBSE Class 10 Maths board exam 2025-26 under Unit I - Number Systems. Exercise 1.2 specifically covers the Fundamental Theorem of Arithmetic, which is crucial for scoring full marks in this chapter during the examination.

Q4. Which is the most difficult question in NCERT Solutions Class 10 Maths Chapter 1 Real Numbers Exercise 1.2 for CBSE board preparation?

Question 3 is generally considered the most challenging in Exercise 1.2 of NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers as it requires proving statements using the Fundamental Theorem of Arithmetic. Students preparing for CBSE board exam 2025-26 should practice this question with step by step solutions to master the application of prime factorization concepts.

Q5. What is Euclid's Division Algorithm in NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers and how is it used in Exercise 1.2?

Euclid's Division Algorithm states that for any two positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where $0 \leq r < b$. While Exercise 1.2 of NCERT Solutions for Class 10 Maths Chapter 1 primarily focuses on the Fundamental Theorem of Arithmetic, understanding Euclid's Division Algorithm from Exercise 1.1 helps in finding HCF and solving problems with step by step solutions.

More Exercises

Visit all exercises from Chapter 1:

EXERCISE 1.1 →

EXERCISE 1.2 ✓ →

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