NCERT Solutions Class 9 Maths
Chapter 1: Number Systems
EXERCISE 1.5

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Quick Summary: In NCERT Solutions Class 9 Maths Chapter 1 Exercise 1.5, students learn to apply laws of exponents to simplify expressions involving rational and irrational numbers with fractional powers. This exercise covers fundamental exponent rules and decimal expansions of real numbers, which are essential building blocks for algebra and higher mathematics in CBSE exams.

Key Takeaways:

- Master the fundamental laws of exponents: a^m × a^n = a^m+n and (a^m)^n = a^mn
- Learn to simplify expressions with fractional exponents like a^1/n = √[n]a
- Understand how to convert between radical form and exponential form for easier calculations
- Practice identifying rational vs irrational numbers through their decimal expansions

Complete Solutions

Question 1

QUESTION

Find the values of the following:

(i) 64^1/2
(ii) 32^1/5
(iii) 125^1/3

SOLUTION

This question tests our understanding of exponents and how to simplify expressions with fractional powers. We need to express the base numbers as powers of some other number to simplify the given expressions.

(i)

Step 1: Express the base as a power

We need to express 64 as a power of some number. We know that .

Step 2: Substitute the power into the expression

Substituting into the expression, we get:

Step 3: Simplify using exponent rules

Using the rule , we have:

Final Answer:

(ii)

Step 1: Express the base as a power

We need to express 32 as a power of some number. We know that .

Step 2: Substitute the power into the expression

Substituting into the expression, we get:

Step 3: Simplify using exponent rules

Using the rule , we have:

Final Answer:

(iii)

Step 1: Express the base as a power

We need to express 125 as a power of some number. We know that .

Step 2: Substitute the power into the expression

Substituting into the expression, we get:

Step 3: Simplify using exponent rules

Using the rule , we have:

Final Answer:

ANSWER

(i) 8

(ii) 2

(iii) 5

Question 2

QUESTION

Find the values of the following:

(i) 9^3/2
(ii) 32^2/5
(iii) 16^3/4
(iv) 125^-1/3

SOLUTION

This question tests our understanding of exponents and how to simplify expressions with fractional powers.

(i)

Step 1: Express the base as a power of a prime number.

, so we can rewrite the expression as:

Step 2: Apply the power of a power rule:

Step 3: Simplify the exponent.

So, we have:

Step 4: Calculate the final value.

Therefore,

(ii)

Step 1: Express the base as a power of a prime number.

, so we can rewrite the expression as:

Step 2: Apply the power of a power rule:

Step 3: Simplify the exponent.

So, we have:

Step 4: Calculate the final value.

Therefore,

(iii)

Step 1: Express the base as a power of a prime number.

, so we can rewrite the expression as:

Step 2: Apply the power of a power rule:

Step 3: Simplify the exponent.

So, we have:

Step 4: Calculate the final value.

Therefore,

(iv)

Step 1: Express the base as a power of a prime number.

, so we can rewrite the expression as:

Step 2: Apply the power of a power rule:

Step 3: Simplify the exponent.

So, we have:

Step 4: Use the rule

Therefore,

ANSWER

(i) 27

(ii) 4

(iii) 8

(iv) (1)/(5) [(125)^-1/3 = (5^3)^-1/3 = 5^-1]

Question 3

QUESTION

Simplify the following:

(i) 2^2/3 · 2^1/5
(ii) \left((1)/(3^3)\right)^7
(iii) 11^1/211^1/4
(iv) 7^1/2 · 8^1/2

SOLUTION

This question tests our understanding of the laws of exponents. We need to simplify expressions involving powers with the same base or the same exponent.

(i)

Step 1: Identify the applicable law of exponents

When multiplying powers with the same base, we add the exponents:

Step 2: Apply the law

In this case, the base is 2, and the exponents are and . So we have:

Step 3: Add the exponents

To add the fractions, we need a common denominator, which is 15:

Step 4: Write the final answer

Therefore,

(ii)

Step 1: Rewrite the expression

We can rewrite as . So the expression becomes .

Step 2: Apply the power of a power rule

When raising a power to another power, we multiply the exponents:

Step 3: Multiply the exponents

Step 4: Write the final answer

Therefore,

(iii)

Step 1: Identify the applicable law of exponents

When dividing powers with the same base, we subtract the exponents:

Step 2: Apply the law

In this case, the base is 11, and the exponents are and . So we have:

Step 3: Subtract the exponents

To subtract the fractions, we need a common denominator, which is 4:

Step 4: Write the final answer

Therefore,

(iv)

Step 1: Identify the applicable law of exponents

When multiplying powers with the same exponent, we multiply the bases:

Step 2: Apply the law

In this case, the exponent is , and the bases are 7 and 8. So we have:

Step 3: Multiply the bases

Step 4: Write the final answer

Therefore,

ANSWER

(i) 2^13/15

(ii) 3^-21

(iii) 11^1/4

(iv) 56^1/2

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🔢 Key Formulas

Important Formulas for Exercise 1.5

Formula / Concept	Description
Rational Numbers	A number is called rational if it can be written in the form (p)/(q), where p and q are integers and q ≠ 0. Their decimal expansion is either terminating or non-terminating recurring.
Irrational Numbers	A number is called irrational if it cannot be written in the form (p)/(q), where p and q are integers and q ≠ 0. Their decimal expansion is non-terminating and non-repeating.
Real Numbers	The collection of all rational and irrational numbers together make up the collection of real numbers.
Operations on Real Numbers	
r+s or r-s	The sum or difference of a rational number (r) and an irrational number (s) is irrational.
r × s or r ÷ s (where r ≠ 0)	The product or quotient of a non-zero rational number (r) with an irrational number (s) is irrational.
Operations on two irrationals	If we add, subtract, multiply, or divide two irrational numbers, the result may be rational or irrational.
Identities for Square Roots	
√ab = √a √b	The square root of a product is the product of the square roots.
√(a)/(b) = √a√b	The square root of a quotient is the quotient of the square roots.
(√a + √b)(√a - √b) = a - b	This is based on the difference of squares identity: (x+y)(x-y) = x^2 - y^2.
(a + √b)(a - √b) = a^2 - b	Another form of the difference of squares identity.
(√a + √b)^2 = a + 2√ab + b	This is based on the square of a binomial identity: (x+y)^2 = x^2 + 2xy + y^2.
(√a - √b)^2 = a - 2√ab + b	This is based on the square of a binomial identity: (x-y)^2 = x^2 - 2xy + y^2.

Formula / Concept	Description
(√a + √b)(√c + √d) = √ac + √ad + √bc + √bd	Distributive property of multiplication over addition.
Laws of Exponents for Real Numbers	
a^m · a^n = a^m+n	Product of Powers: When multiplying two powers with the same base, add the exponents.
(a^m)/(a^n) = a^m-n	Quotient of Powers: When dividing two powers with the same base, subtract the exponents.
(a^m)^n = a^mn	Power of a Power: To raise a power to another power, multiply the exponents.
a^m b^m = (ab)^m	Power of a Product: To raise a product to a power, raise each factor to that power and multiply.
a^0 = 1 (where a ≠ 0)	Zero Exponent: Any non-zero base raised to the power of zero is 1.
a^-n = (1)/(a^n) (where a ≠ 0)	Negative Exponent: A non-zero base raised to a negative exponent is the reciprocal of the base raised to the positive exponent.
a^(m)/(n) = (a^(1)/(n))^m = (√[n]a)^m	Rational Exponent: The denominator 'n' of the exponent becomes the index of the root, and the numerator 'm' remains as the exponent.

Top FAQs

Q1. How many questions are in NCERT Solutions Class 9 Maths Chapter 1 Number Systems Exercise 1.5 for CBSE board exam 2025-26?

Exercise 1.5 of NCERT Solutions for Class 9 Maths Chapter 1 Number Systems contains exactly 3 questions. These questions focus on the laws of exponents and properties of rational and irrational numbers, carrying significant weightage for CBSE board exam 2025-26.

Q2. Where can I download free PDF of NCERT Solutions for Class 9 Maths Chapter 1 Number Systems Exercise 1.5 with step by step solutions?

You can download the free PDF of NCERT Solutions for Class 9 Maths Chapter 1 Number Systems Exercise 1.5 from the official NCERT website or various educational platforms. These PDFs include detailed step by step solutions for all 3 questions, making it easier for students preparing for CBSE board exam 2025-26.

Q3. How many marks does Number Systems Chapter 1 carry in CBSE Class 9 Maths board exam 2025-26 syllabus?

Number Systems (Chapter 1) carries 10 marks in CBSE Class 9 Maths board exam 2025-26 as part of Unit I. This chapter includes important concepts like rational and irrational numbers, decimal expansions, and laws of exponents covered in Exercise 1.5.

Q4. Which is the most difficult question in Exercise 1.5 of NCERT Solutions Class 9 Maths Chapter 1 Number Systems?

Question 3 in Exercise 1.5 of NCERT Solutions Class 9 Maths Chapter 1 Number Systems is often considered the most challenging as it involves simplifying complex expressions using laws of exponents. However, with step by step solutions and practice, students can master this question for CBSE board exam 2025-26.

Q5. What is Rational and Irrational Numbers concept in NCERT Solutions Class 9 Maths Chapter 1 Number Systems Exercise 1.5?

Rational numbers are numbers that can be expressed as p/q where q≠0, while irrational numbers cannot be expressed in this form. Exercise 1.5 of NCERT Solutions Class 9 Maths Chapter 1 focuses on applying laws of exponents to both rational and irrational numbers, which is crucial for CBSE board exam 2025-26.

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