

NCERT Solutions Class 10 Maths

Chapter 4: Quadratic Equations

Exercise 4.2

Document Information:

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Quick Summary: In NCERT Solutions Class 10 Maths Chapter 4 Exercise 4.2, students learn to solve quadratic equations using the factorization method and apply these techniques to real-world problems. This exercise covers finding roots by factoring, converting word problems into quadratic equations, and using the zero product rule, which are essential concepts for CBSE Class 10 board exams and form the foundation for advanced algebra topics.

Key Takeaways:

- Master the zero product rule: if $ab = 0$, then $a = 0$ or $b = 0$, used to find roots after factorization
- Learn to convert word problems involving consecutive numbers, geometric shapes, and practical situations into quadratic equations
- Understand when factorization method applies and how to check if solutions are valid in the given context
- Practice step-by-step problem-solving approach: assign variables, form equations, factorize, and verify solutions

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Question 1

QUESTION

Find the roots of the following quadratic equations by factorisation:

(i) $x^2 - 3x - 10 = 0$

(ii) $2x^2 + x - 6 = 0$

(iii) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

(iv) $2x^2 - x + \frac{1}{8} = 0$

(v) $100x^2 - 20x + 1 = 0$

SOLUTION

Method reminder: For each quadratic equation, we factorise the left-hand side and then use the zero product rule: if , then or .

(I)

1. We look for two numbers whose product is and whose sum is . These numbers are and because and .

2. Split the middle term using and :

.

3. Group the terms in pairs and factor each group:

.

4. Take common:

.

5. So the equation becomes:

.

6. Set each factor equal to zero:

;

Roots: .

(II)

1. Here, the product of the first and last coefficients is . We need two numbers whose product is and sum is (the coefficient of). These numbers are and .

2. Split the middle term as :

.

3. Group the terms in pairs:

.

4. Factor out :

.

5. Equation becomes:

.

6. Set each factor to zero:

.

.

Roots: .

(III)

1. Here, the product of the first and last coefficients is .

2. We need two numbers whose product is and sum is . The numbers are and .

3. We split as , because their coefficients (and) correspond to the chosen numbers and involve :

.

4. Group and factorise:

First pair: .

Second pair: .

So, .

5. Factor out from the second bracket:

, but for finding roots it is simpler to keep it as:

.

6. Set each factor equal to zero:

.

.

Roots: .

(IV)

1. To remove the fraction, multiply the whole equation by 8:

.

2. Recognise this as a perfect square: , , and . So:

.

3. Hence, we can write:

.

4. Take square root on both sides (or directly set the factor equal to zero):

.

5. Since the same factor appears twice, this is a **repeated (double) root**.

Root: .

(v)

1. Again, observe the pattern of a perfect square. Note that , , and .

2. So, we can write:

.

3. Therefore, the equation becomes:

.

4. Set the factor equal to zero:

.

5. Here also, the factor is repeated, so there is a **double root**.

Root: .

Summary: By careful splitting of the middle term and recognising perfect-square patterns, we obtain all roots by factorisation.

ANSWER

(i) -2, 5

(ii) -2, $\frac{3}{2}$

(iii) $-\frac{5}{\sqrt{2}}$, $-\sqrt{2}$

(iv) $\frac{1}{4}$, $\frac{1}{4}$

(v) $\frac{1}{10}$, $\frac{1}{10}$

Question 2

QUESTION

Solve the problems given in Example 1.

Example 1: Represent the following situations mathematically and solve them:

(i) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. How many marbles did each of them have originally?

(ii) A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was ₹750. How many toys were produced on that day?

SOLUTION

Key Idea: Convert each situation into an equation by assigning a variable, translating the conditions into algebra, forming a quadratic equation, and then solving by factorisation.

(I) MARBLES WITH JOHN AND JIVANTI

1. Let John originally have x marbles. Since the total is 45, Jivanti originally has $45 - x$ marbles.

2. Both lose 5 marbles each, so their new counts become:

John: $x - 5$, Jivanti: $45 - x - 5$.

3. We are told the product of the marbles they now have is 124:

4. Expand the expression:

So the equation becomes:

5. Move 124 to the left side:

6. Multiply by -1 to simplify:

7. Factorise. We need two numbers whose product is 324 and whose sum is 45. These are 9 and 36.

Thus:

8. Solving:

Hence, the original number of marbles was **9 and 36**.

(II) NUMBER OF TOYS PRODUCED

1. Let the number of toys produced on that day be x .

2. Cost of production per toy is given as:

3. Total production cost is ₹750. Total cost = (number of toys) \times (cost per toy), so:

4. Expand the expression:

5. Rearrange to form a quadratic equation:

6. Multiply by to simplify:

7. Factorise the quadratic. We need two numbers whose product is 750 and whose sum is 55. These numbers are 25 and 30.

So:

8. Solving:

Both values satisfy the conditions. So the industry produced **25 or 30 toys** on that day (depending on the production-cost model).

Conclusion: Real-life word problems involving sum, product, or cost constraints often lead naturally to quadratic equations, which can be solved efficiently by factorisation.

ANSWER

(i) 9, 36

(ii) 25, 30

Question 3

QUESTION

Find two numbers whose sum is 27 and product is 182.

SOLUTION

Step 1: Assign variables. Let the two numbers be x and y , because their sum is given as 27.

Step 2: Use the product condition. Their product is 182, so we form the equation:

Step 3: Expand and simplify.

Rearrange to get the standard quadratic form:

Multiply by :

Step 4: Factorise the quadratic. We look for two numbers whose product is 182 and whose sum is 27. The pair is 13 and 14 since:

So the factorisation is:

Step 5: Solve for x and y .

Conclusion: The required numbers are **13 and 14**.

ANSWER

Numbers are 13 and 14.

Question 4

QUESTION

Find two consecutive positive integers, the sum of whose squares is 365.

SOLUTION

Step 1: Represent the consecutive integers. Let the smaller positive integer be x . Then the next consecutive integer is $x + 1$.

Step 2: Use the condition on the sum of squares. The sum of the squares of these two integers is given as 365. So we write:

Step 3: Expand and simplify.

First expand :

Substitute back into the equation:

Combine like terms:

Now move 365 to the left side:

Step 4: Simplify the quadratic equation. Divide the whole equation by 2 to make it simpler:

Step 5: Factorise the quadratic. We look for two numbers whose product is -182 and whose sum is 13 . These numbers are 14 and -13 because:

So we can factorise as:

Step 6: Solve for x .

From $x + 13 = 0$, we get $x = -13$.

From $x - 14 = 0$, we get $x = 14$.

Step 7: Choose the positive solution. The question asks for *positive* integers, so we discard -13 and take:

The next consecutive integer is 15 .

Conclusion: The two consecutive positive integers are **13 and 14**.

ANSWER

Positive integers are 13 and 14.

Question 5

QUESTION

The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

SOLUTION

Step 1: Introduce a variable. Let the base of the right triangle be x cm.

We are told that the altitude (height) is 7 cm less than the base, so:

Altitude = $x - 7$ cm.

The hypotenuse is given as 13 cm.

Step 2: Use the Pythagoras theorem. In a right triangle,

Substitute the given expressions:

Step 3: Expand and simplify.

First expand :

Substitute into the equation:

Combine like terms on the left:

Move 169 to the left side:

Step 4: Simplify the quadratic equation. Divide the entire equation by 2:

Step 5: Factorise the quadratic. We look for two numbers whose product is -169 and sum is 13 . These numbers are 13 and -13 because:

So we can write:

Step 6: Solve for x .

From $x - 13 = 0$, we get $x = 13$.

From $x + 13 = 0$, we get $x = -13$.

But a side length cannot be negative, so $x = -13$ is rejected.

Therefore, the base is: 12 cm.

Step 7: Find the altitude.

Altitude = $12 - 7 = 5$ cm.

Conclusion: The other two sides of the right triangle are **5 cm** (altitude) and **12 cm** (base).

ANSWER

5 cm and 12 cm

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Question 6

QUESTION

A cottage industry produces a certain number of pottery articles in a day. The cost of production of each article is 3 rupees more than twice the number of articles produced that day. If the total cost of production is ₹90, find the number of articles produced and the cost of each article.

SOLUTION

Step 1: Introduce the variable. Let the number of pottery articles produced in a day be x .

Step 2: Express the cost per article. According to the question, the cost of production of each article (in rupees) is 3 more than twice the number of articles produced. So,

Step 3: Form the equation using total cost. Total cost = (number of articles) \times (cost per article). The total cost is given as ₹90, so:

Step 4: Expand and rearrange.

Multiply out the brackets:

Bring 90 to the left side to get a standard quadratic equation:

Step 5: Factorise the quadratic. We want two numbers whose product is -180 and whose sum is 6 . These numbers are 18 and -10 because:

So we split the middle term as :

Group the terms:

Factor each group:

Take common:

Step 6: Solve for x . Using the zero product rule:

Step 7: Choose the meaningful solution. The number of articles produced cannot be negative or fractional, so we reject $x = -6$ and accept $x = 6$.

Step 8: Find the cost per article.

Cost per article = ₹15.

Conclusion: The cottage industry produces **6 articles** in that day, and the **cost of each article** is **₹15**.

ANSWER

Number of articles = 6, Cost of each article = ₹15

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Key Formulas

Important Formulas for Exercise 4.2

Formula / Concept	Description
Standard Form of a Quadratic Equation	A quadratic equation in the variable x is an equation of the form $ax^2 + bx + c = 0$, where a , b , and c are real numbers, and $a \neq 0$.
Solution by Factorization	To find the roots of a quadratic equation by factorization, we first express the quadratic polynomial as a product of two linear factors. Then, we set each linear factor to zero to find the values of the variable. This often involves splitting the middle term.
Quadratic Formula	The roots of a quadratic equation $ax^2 + bx + c = 0$ can be found using the formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. This formula is also known as the Sridharacharya formula.
Discriminant	The expression $D = b^2 - 4ac$ is called the discriminant of the quadratic equation. The value of the discriminant determines the nature of the roots.
Nature of Roots	<ul style="list-style-type: none">• If $D > 0$, the equation has two distinct real roots.• If $D = 0$, the equation has two equal real roots.• If $D < 0$, the equation has no real roots.

Top FAQs

Q1. How many questions are in NCERT Solutions Class 10 Maths Chapter 4 Quadratic Equations Exercise 4.2?

Exercise 4.2 of NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations contains exactly 6 questions. These questions focus on solving quadratic equations using the quadratic formula and finding the nature of roots using discriminant. All step by step solutions are available for free PDF download for CBSE board exam 2025-26 preparation.

Q2. Where can I download free PDF of NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations Exercise 4.2 for CBSE 2025-26?

Free PDF download of NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations Exercise 4.2 is available on official NCERT website and various educational platforms. The step by step solutions PDF includes detailed explanations of all 6 questions covering quadratic formula and discriminant concepts. These updated solutions are specifically aligned with CBSE board exam 2025-26 syllabus.

Q3. How many marks does Quadratic Equations Chapter 4 carry in CBSE Class 10 Maths board exam 2025-26?

Quadratic Equations (Chapter 4) carries approximately 5 marks in CBSE Class 10 Maths board exam 2025-26 under Unit II - Algebra. This weightage is shared with other algebra topics, making NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2 crucial for scoring well. Students should practice all questions from Exercise 4.2 focusing on quadratic formula and nature of roots.

Q4. Which is the most difficult question in Exercise 4.2 of NCERT Solutions Class 10 Maths Chapter 4 Quadratic Equations?

Question 6 in Exercise 4.2 of NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations is considered the most challenging as it involves finding relationships between roots and coefficients. Students often struggle with discriminant-based word problems requiring step by step solutions. Regular practice with these NCERT solutions helps master the quadratic formula application for CBSE board exam 2025-26.

Q5. What is Quadratic Formula in NCERT Solutions Class 10 Maths Chapter 4 Quadratic Equations Exercise 4.2?

The Quadratic Formula in NCERT Class 10 Maths Chapter 4 is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, used to solve any quadratic equation $ax^2 + bx + c = 0$. Exercise 4.2 specifically focuses on applying this formula to find roots of quadratic equations. The discriminant $(b^2 - 4ac)$ determines the nature of roots, which is extensively covered in step by step solutions for CBSE board exam 2025-26.

More Exercises

Visit all exercises from Chapter 4:

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