NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2: Chapter 4 of Class 10 Maths, **Quadratic Equations**, explores solving quadratic equations using different methods. Exercise 4.2 focuses on solving quadratic equations by the **factorization method**, which involves expressing the equation in its factored form and finding its roots. This method is simple and effective, building upon students' algebraic skills from earlier chapters.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2 emphasizes understanding the relationship between the coefficients and the factors, offering practice problems that reinforce these concepts. Mastery of Exercise 4.2 is essential for developing problem-solving skills and preparing students for more advanced methods of solving quadratic equations, such as the quadratic formula and completing the square.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2 Overview

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2, delves into solving quadratic equations using various methods. Exercise 4.2 focuses on the factorization method, a fundamental technique for finding the roots of quadratic equations by breaking them into linear factors.

This exercise is crucial as it strengthens algebraic manipulation skills and enhances problem-solving abilities. Understanding the factorization method lays the foundation for grasping advanced techniques like the quadratic formula and completing the square. Mastering these concepts is vital for solving real-life problems modeled by quadratic equations and for excelling in competitive exams and higher-level mathematics.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2 Quadratic Equations

Below is the NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2 Quadratic Equations -

1. 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) $2x^2 – x + 1/8 = 0$
(v) $100x^2 – 20x + 1 = 0$

Solutions:

(i) Given, $x^2 – 3x – 10 =0$

Taking LHS,

$=>x^2 – 5x + 2x – 10$

$=>x(x – 5) + 2(x – 5)$

$=>(x – 5)(x + 2)$

The roots of this equation, $x^2 – 3x – 10 = 0$ are the values of x for which $(x – 5)(x + 2) = 0$

Therefore, $x – 5 = 0$ or $x + 2 = 0$

$=> x = 5$ or $x = -2$

(ii) Given, $2x^2 + x – 6 = 0$

Taking LHS,

$=> 2x^2 + 4x – 3x – 6$

$=> 2x(x + 2) – 3(x + 2)$

$=> (x + 2)(2x – 3)$

The roots of this equation, $2x^2 + x – 6=0$ are the values of x for which $(x + 2)(2x – 3) = 0$

Therefore, $x + 2 = 0$ or $2x – 3 = 0$

$=> x = -2$ or $x = 3/2$

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

Taking LHS,

$=> \sqrt{2}\, x^2 + 5x + 2x + 5\sqrt{2}$

$=> x\,(\sqrt{2}x + 5) + \sqrt{2}(\sqrt{2}x + 5)= (\sqrt{2}x + 5)(x + \sqrt{2})$

The roots of this equation, $\sqrt{2}\, x^2 + 7x + 5\sqrt{2}=0$ are the values of x for which $(\sqrt{2}x + 5)(x + \sqrt{2}) = 0$

Therefore, $\sqrt{2}x + 5 = 0$ or $x + \sqrt{2} = 0$

$=> x = -5/\sqrt{2}$ or $x = -\sqrt{2}$

(iv) $2x^2 – x +1/8 = 0$

Taking LHS,

$=1/8\ (16x^2 – 8x + 1)$

$= 1/8\ (16x^2 – 4x - 4x + 1)$

$= 1/8\ (4x(4x – 1) - 1(4x – 1))$

$= 1/8\ (4x – 1)^2$

The roots of this equation, $2x^2 – x + 1/8 = 0$, are the values of x for which $(4x – 1)^2 = 0$

Therefore, $(4x – 1) = 0$ or $(4x – 1) = 0$

$\Rightarrow x = 1/4$ or $x = 1/4$

(v) Given, $100x^2 – 20x + 1=0$

Taking LHS,

$= 100x^2 – 10x – 10x + 1$

$= 10x(10x – 1) - 1(10x – 1)$

$= (10x – 1)^2$

The roots of this equation, $100x^2 – 20x + 1=0$, are the values of x for which $(10x – 1)^2 = 0$

$\therefore$ $(10x – 1) = 0$ or $(10x – 1) = 0$

$\Rightarrow x = 1/10$ or $x = 1/10$

2. Solve the problems given in Example 1.

Represent the following situations mathematically:

(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. We would like to find out how many marbles they had to start with.

(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. We would like to find out the number of toys produced on that day.

Solutions:

(i) Let us say, the number of marbles John has = x.

Therefore, number of marbles Jivanti has = $45 - x$

After losing 5 marbles each,

Number of marbles John has = $x - 5$

Number of marbles Jivanti has = $45 - x - 5 = 40 - x$

Given that the product of their marbles is 124.

$\therefore (x - 5)(40 - x) = 124$

$\Rightarrow x^2 - 45x + 324 = 0$

$\Rightarrow x^2 - 36x - 9x + 324 = 0$

$\Rightarrow x(x - 36) - 9(x - 36) = 0$

$\Rightarrow (x - 36)(x - 9) = 0$

Thus, we can say,

$x - 36 = 0$ or $x - 9 = 0$

$\Rightarrow x = 36$ or $x = 9$

Therefore,

If, John's marbles = 36,

Then, Jivanti's marbles = $45 - 36 = 9$

And if John's marbles = 9,

Then, Jivanti's marbles = $45 - 9 = 36$

(ii) Let us say, number of toys produced in a day be x.

Therefore, cost of production of each toy = Rs$(55 - x)$

Given, total cost of production of the toys = Rs 750

$\therefore x(55 - x) = 750$

$\Rightarrow x^2 - 55x + 750 = 0$

$\Rightarrow x^2 - 25x - 30x + 750 = 0$

⇒ $x(x – 25) -30(x – 25) = 0$

⇒ $(x – 25)(x – 30) = 0$

Thus, either $x -25 = 0$ or $x – 30 = 0$

⇒ $x = 25$ or $x = 30$

Hence, the number of toys produced in a day, will be either 25 or 30.

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

Solution:

Let us say, first number be x and the second number is 27 – x.

Therefore, the product of two numbers

$x(27 – x) = 182$

⇒ $x^2 – 27x – 182 = 0$

⇒ $x^2 – 13x – 14x + 182 = 0$

⇒ $x(x – 13) -14(x – 13) = 0$

⇒ $(x – 13)(x -14) = 0$

Thus, either, $x = -13 = 0$ or $x – 14 = 0$

⇒ $x = 13$ or $x = 14$

Therefore, if first number = 13, then second number = 27 – 13 = 14

And if first number = 14, then second number = 27 – 14 = 13

Hence, the numbers are 13 and 14.

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

Solution:

Let us say, the two consecutive positive integers be x and $x + 1$.

Therefore, as per the given questions,

$x^2 + (x + 1)^2 = 365$

$\Rightarrow x^2 + x^2 + 1 + 2x = 365$

$\Rightarrow 2x^2 + 2x – 364 = 0$

$\Rightarrow x^2 + x – 182 = 0$

$\Rightarrow x^2 + 14x – 13x – 182 = 0$

$\Rightarrow x(x + 14) -13(x + 14) = 0$

$\Rightarrow (x + 14)(x – 13) = 0$

Thus, either, $x + 14 = 0$ or $x – 13 = 0$,

$\Rightarrow x = – 14$ or $x = 13$

since, the integers are positive, so x can be 13, only.

$\therefore x + 1 = 13 + 1 = 14$

Therefore, two consecutive positive integers will be 13 and 14.

5. 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:

Let us say, the base of the right triangle is x cm.

Given, the altitude of right triangle = (x – 7) cm

From Pythagoras theorem, we know,

$\text{Base}^2 + \text{Altitude}^2 = \text{Hypotenuse}^2$

$\therefore x^2 + (x – 7)^2 = 13^2$

$\Rightarrow x^2 + x^2 + 49 – 14x = 169$

$\Rightarrow 2x^2 – 14x – 120 = 0$

$\Rightarrow x^2 – 7x – 60 = 0$

$\Rightarrow x^2 – 12x + 5x – 60 = 0$

$\Rightarrow x(x – 12) + 5(x – 12) = 0$

$\Rightarrow (x – 12)(x + 5) = 0$

Thus, either x – 12 = 0 or x + 5 = 0,

⇒ x = 12 or x = – 5

Since sides cannot be negative, x can only be 12.

Therefore, the base of the given triangle is 12 cm and the altitude of this triangle will be (12 – 7) cm = 5 cm.

6. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was Rs. 90, find the number of articles produced and the cost of each article.

Solution:

Let us say, the number of articles produced is *x*.

Therefore, cost of production of each article = Rs. (2*x* + 3)

Given, total cost of production is Rs. 90

∴ $x(2x + 3) = 90$

⇒ $2x^2 + 3x – 90 = 0$

⇒ $2x^2 + 15x - 12x – 90 = 0$

⇒ $x(2x + 15) - 6(2x + 15) = 0$

⇒ $(2x + 15)(x – 6) = 0$

Thus, either $2x + 15 = 0$ or $x – 6 = 0$

⇒ $x = -15/2$ or $x = 6$

As the number of articles produced can only be a positive integer, x can only be 6.

Hence, number of articles produced = 6

Cost of each article = 2 × 6 + 3 = Rs. 15.

Benefits of Using NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2

Step-by-Step Guidance: Solutions simplify the factorization process, making it easier for students to understand and apply.

Error Reduction: Verified answers help minimize mistakes while solving quadratic equations.

Concept Reinforcement: Strengthens the understanding of breaking equations into linear factors and solving them effectively.

Exam-Oriented: Prepares students for CBSE exams by aligning with the syllabus and pattern.

Time Efficiency: Provides clear methods to solve equations quickly, aiding time management during exams.

Skill Development: Builds foundational skills for tackling more complex algebraic and mathematical problems in higher studies.