NCERT Solutions for Class 10 Maths Chapter 4: NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations provide answers to all the problems in the Class 10 Maths NCERT textbook, aiding students in their CBSE exam preparations. Expertly solved by subject specialists, these solutions offer detailed, step-by-step guidance for each question. It's crucial to approach the exercises in this chapter diligently to achieve good scores in exams, as Maths requires both comprehension and practice. This resource offers tips and tricks for solving problems easily. A quadratic equation in the variable x follows the form ax^2 + bx + c = 0, where a, b, and c are real numbers, and a ≠ 0, known as the standard form of a quadratic equation.

NCERT Solutions for Class 10 Maths Chapter 4 PDF

You can access the PDF link for NCERT Solutions for Class 10 Maths Chapter 4 by clicking below. These solutions cover all the topics comprehensively, aiding students in their exam preparations. With step-by-step explanations and detailed solutions, students can enhance their understanding and proficiency in solving quadratic equations.

NCERT Solutions for Class 10 Maths Chapter 4 PDF

NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations

NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations provide comprehensive solutions to the problems presented in the NCERT textbook. These solutions created by subject experts, provide step-by-step explanations to help students understand the concepts thoroughly. With detailed solutions and clear explanations students can practice solving quadratic equations with confidence. By utilizing these NCERT solutions, students can strengthen their grasp of quadratic equations and improve their problem-solving skills.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.1

1. Check whether the following are quadratic equation?

(i) $(x+1)^2 = 2(x-3)$

(ii) $x^2-2x = (-2)(3-x)$

(iii) $(x - 2)(x + 1) = (x - 1)(x + 3)$

(iv) $(x - 3)(2x + 1) = x(x + 5)$

(v) $(2x - 1)(x - 3) = (x + 5)(x - 1)$

(vi) $x^2+3x+1 = (x-2)^2$

(vii) $(x+2)^3 = 2x(x^2-1)$

(viii) $x^3-4x^2-x+1 = (x-2)^3$

Answer:
An equation of the form $ax^2+bx+c = 0$, $a \neq 0$ and a, b, c are real numbers is called quadratic equation.

(i) $(x+1)^2 = 2(x-3)$
$x^2+2x+1 = 2x-6$
$x^2+2x+1 -2x+6 = 0$
$x^2+7 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 1 \neq 0$, $b = 0$, $c = 7$
Hence the given equation is quadratic equation.

(ii) $x^2-2x = (-2)(3-x)$
$x^2-2x = -6+2x$
$x^2-2x -2x+6 = 0$
$x^2-4x+6 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 1 \neq 0$, $b = -4$, $c = 6$
Hence the given equation is quadratic equation.

(iii) $(x-2)(x+1) = (x-1)(x+3)$
$x^2-2x+x-2 = x^2-x+3x-3$
$x^2-2x+x-2 -x^2+x-3x+3= 0$
$-3x+1 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 0$, $b = -3$, $c = 1$
Hence the given equation is not quadratic equation.

(iv) $(x-3)(2x+1) = x(x+5)$
$x^2-6x+x-3 = x^2+5x$
$x^2-6x+x-3 -x^2-5x = 0$
$-10x-3 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 0$, $b = -10$, $c = -3$
Hence the given equation is not quadratic equation.

(v) $(2x-1)(x-3) = (x+5)(x-1)$
$2x^2-6x-x+3 = x^2+5x-x-5$
$2x^2-6x-x+3 -x^2-5x+x+5 = 0$
$x^2-11x+8 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 1 \neq 0$, $b = -11$, $c = 8$
Hence the given equation is quadratic equation.

(vi) $x^2+3x+1 = (x-2)^2$
$x^2+3x+1 = x^2-4x+4$
$x^2+3x+1 -x^2+4x-4= 0$
$7x-3 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 0$, $b = 7$, $c = -3$

Hence the given equation is not quadratic equation.

(vii) $(x+2)^3 = 2x(x^2-1)$
$x^3+6x^2+12x+8 = 2x^3-2x$
$x^3+6x^2+12x+8 -2x^3+2x = 0$
$x^3 – 6x^2-14x-8 = 0$
It is not in the form of $ax^2+bx+c = 0$s
Hence the given equation is not a quadratic equation.

(viii) $x^3-4x^2-x+1 = (x-2)^3$
$x^3-4x^2-x+1 = x^3-6x^2+12x-8$
$x^3-4x^2-x+1 -x^3+6x^2-12x+8= 0$
$2x^2-13x+9 = 0$
Comparing above equation with $ax^2+bx+c = 0$, we have $a = 2 \neq 0$, $b = -13$, $c = 9$
Hence the given equation is quadratic equation.

2. (i) The area of rectangular plot is 528 m^2. The length of the plot (in meters) is one more than twice its breadth. We need to find the length and breadth of the plot .

Answer:

Let the breadth of the plot is x meters
Then, the length is (2x + 1) meters.
Area = length × breadth
$528 = x \times (2x + 1)$
$528 = 2x^2 + x$
$2x^2 + x – 528 = 0$

(ii) The product of two consecutive positive integers is 306. We need to find the integers.

Answer:

Let x and x+1 be two consecutive integers.
Then, $x(x + 1) = 306$
$x^2 + x – 306 = 0$

(iii) Rohan’s mother is 26 years older than him. The products of their ages (in years) 3 years from now will be 360. We would like to find Rohan’s present age.

Answer:

Let x be the Rohan’s present age. Then, his mother’s present age is x+26
After 3 years theirs ages will be x+3 and x+26+3 = x+29 respectively.
Hence,

(x+3)(x+29) = 360
x^2+3x+29x+87 = 360
x^2+32x- 273 = 0

(iv) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. We need to find the speed of the train.

Answer:

Let speed of train be x km/h

Time taken by train to cover 480 km = 480xhours

If, speed had been 8km/h less then time taken would be (480x−8) hours

According to given condition, if speed had been 8km/h less then time taken is 3 hours less.

Therefore, 480x – 8 = 480x + 3

⇒480 (1x – 8 − 1x) = 3

⇒480 (x – x + 8) (x) (x − 8) = 3

⇒480 × 8 = 3 (x) (x − 8)

$$\Rightarrow x^2 - 8x = 1280$$
$$\Rightarrow x^2 - 8x - 1280 = 0$$
$$\Rightarrow x(x-40) + 32(x-40) = 0$$
$$\Rightarrow (x-40)(x+32) = 0$$
$$\Rightarrow x - 40 = 0 \ or \ x + 32 = 0$$
$$\Rightarrow x = 40 \ or \ x = -32$$
$$\therefore x = 40$$

This is a Quadratic Equation.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.2

1. Find the roots of the following Quadratic Equations by factorization.

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

Answer:
x^2-3x-10 = 0
x^2-5x+2x-10 = 0
x(x-5)+2(x-5) = 0
(x-5)(x+2) = 0
⇒ x-5 = 0 or, x+2 = 0
x = 5 or x =-2
Hence the required roots are 5, -2.

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

Answer:
$2x^2$+x-6 = 0
$2x^2$+4x-3x-6 = 0
2x(x+2)-3(x+2) = 0
(2x-3)(x+2) = 0
⇒ 2x-3 = 0 or, x+2 = 0
x = 3/2 or x = -2
Hence the required roots are 3/2 , -2.

(iii) √2x2+7x+5√2 = 0

Answer:
√$2x^2$+7x+5√2 = 0
√$2x^2$+2x+5x+ 5√2 = 0
√2x(x+√2)+5(x+√2) = 0
(x+√2)(√2x +5) = 0
⇒ x+√2 = 0 or, √2x +5 = 0
x = -√2 or x = –5/√2

Hence the required roots are -√2, –5/√2.

(iv) $2x^2$-x+1/8=0

Answer:
$2x^2$-x+1/8=0
$16x^2$-8x+1 = 0
$(4x)^2$-2.4x.1+12 = 0
(4x-1)2= 0
⇒ 4x-1 = 0 or 4x-1 = 0
x = 1/4 or x = 1/4
Hence the required roots are 1/4 , 1/4

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

Answer:

$100x^2-20x+1 = 0$
$(10x)^2-2\times10x.1+12= 0$
$(10x-1)^2 = 0$
$10x-1 = 0$ or $10x-1 = 0$
$x = 1/10$ or $x = 1/10$
Hence the required roots are 1/10 or 1/10

2. (i) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each others, and product of the marbles they now have is 124. We would like to find how many marbles they had to start with?

Answer:

Let the number of marbles John had be x.
Then the number of marbles Jivanti had be 45-x
They lost 5 marbles to each others.
Hence now the number of marbles of John is x-5 and that of Jivanti is 45-x-5 = 40-x.
Then by given condition we have
$(x-5)(40-x) = 124$
$40x-200-x^2+5x = 124$
$x^2-45x+324 = 0$
$x^2-36x-9x+324 = 0$
$x(x-36)-9(x-36) = 0$
$(x-36)(x-9) = 0$
$x-36 = 0$
$x = 36$
or $x-9 = 0$
$x = 9$
Therefore, they had 36 and 9 marvels respectively.

(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.

Answer:

Let the number of toys produced on that day is x.
Therefore, the cost of production of each toy on that day is (55-x)
So, the total cost of production on that day is = x(55-x)

Then using the given condition, we have,
$x(55-x) = 750$
$55x-x^2 = 750$
$x^2-55x+750 = 0$
$x^2-25x-30x+750 = 0$
$x(x-25)-30(x-25) = 0$
$(x-25)(x-30) = 0$
$x-25 = 0$
$x = 25$
or $x-30 = 0$
$x = 30$
Therefore, the number of toys produced on that day is 25 or 30.

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

Answer:

Let one number is x. Then another number is 27-x.
Then by the given condition,
$x(27-x) = 182$
$27x- x^2-182 = 0$
$x^2-27x+182 = 0$
$x^2-14x-13x+182 = 0$
$x(x-14)-13(x-14) = 0$
$(x-14)(x-13) = 0$
$x-14 = 0$
$x = 14$
or, $x-13 = 0$
$x = 13$
Hence the required two numbers are 13 and 14.

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

Answer:

Let the two consecutive positive integers be x and x+1
Then by the given condition,
$x^2+(x+1)^2 = 365$
$x^2+ x^2+2x+1 = 365$
$2x^2+2x-364 = 0$
$x2+x-182 = 0$
$x^2+14x-13x-182 = 0$
$x(x+14)-13(x+14) = 0$
$(x+14)(x-13) = 0$
$x = -14$ or 13

Since the numbers are positive so x = -14 not possible.
So, the numbers are 13 and 13+1 = 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.

Answer:

Let base of the right triangle is x cm. Then the altitude is x-7 cm.
Then by the property of right triangle and using the given property we have
$x^2+(x-7)^2 = (13)^2$
$x^2+ x^2-14x+49 = 169$
$2x^2-14x-120 = 0$
$x^2-7x-60 = 0$
$x^2-12x+5x-60 = 0$
$x(x-12)+5(x-12) = 0$
$(x-12)(x+5) = 0$
$x-12 = 0$
$x =12$
or, $x+5 = 0$
$x = -5$
Since length can't be negative, so x = -5 is not possible.
Hence the base is 12 cm and the altitude is (12-7)cm = 5 cm

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

Answer:

Let the number of articles produced on that day is x. then the price on that day is 2x+3
Then using the given condition we have,
$x(2x+3) = 90$
$2x^2+3x-90 = 0$
$2x^2+15x-12x-90 = 0$
$x(2x+15)-6(2x+15)=0$
$(2x+15)(x-6) = 0$
$2x+15 = 0$
$x = – 15/2$
or, $x-6 = 0$
$x = 6$
Since Articles can't be negative then x = – 15/2 is not possible.

Therefore, the number of articles produced on that day = 6
Cost of each article = 2×6+3 = 15

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.3

1. Find the roots of the following quadratic equations if they exist by the method of completing square.

(i) $2x^2 – 7x + 3 = 0$
(ii) $2x^2 + x – 4 = 0$
(iii) $4x^2+4\sqrt{3}x+3 = 0$
(iv) $2x^2 + x + 4 = 0$

Answer:

(i)$2x^2 – 7x + 3 = 0$

First we divide equation by 2,

$$x^2 - \frac{7}{2}x + \frac{3}{2} = 0$$

$$x^2 - \frac{7}{2}x = -\frac{3}{2}$$

$$\text{Here, } b = -\frac{7}{2}$$

$$\left(\frac{b}{2}\right)^2 = \left(-\frac{7}{2}\times\frac{1}{2}\right)^2 = \left(\frac{-7}{4}\right)^2 = \frac{49}{16}$$

Adding $\frac{49}{16}$ on both sides of equation,

$$x^2 - \frac{7}{2}x + \frac{49}{16} = -\frac{3}{2} + \frac{49}{16}$$

$$\left(x - \frac{7}{4}\right)^2 = \frac{-24+49}{16}$$

$$\left(x - \frac{7}{4}\right)^2 = \frac{25}{16}$$

$$\sqrt{\left(x-\frac{7}{4}\right)^2} = \sqrt{\frac{25}{16}}$$

$$x - \frac{7}{4} = \pm\frac{5}{4}$$

$$\therefore \quad x = +\frac{5}{4}+\frac{7}{4} \qquad \text{OR} \quad x = -\frac{5}{4}+\frac{7}{4}$$

$$= \frac{12}{4} \qquad\qquad x = \frac{-5+7}{4} = \frac{2}{4}$$

$$\therefore \quad x = 3 \qquad\qquad x = \frac{1}{2}$$

$$\therefore \quad x = 3 \text{ OR } x = \frac{1}{2}.$$

(ii) $2x^2 + x - 4 = 0$

Dividing equation by 2,

$$x^2 + \frac{x}{2} - 2 = 0$$

$$x^2 + \frac{x}{2} = 2$$

Here, $b = \frac{1}{2}$

$$\left(\frac{b}{2}\right)^2 = \left(\frac{1}{2\times 2}\right)^2 = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$$

Adding $\frac{1}{16}$ on both sides,

$$x^2 + \frac{x}{2} + \frac{1}{16} = \frac{2}{1} + \frac{1}{16}$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{32+1}{16}$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{33}{16}$$

$$\sqrt{\left(x + \frac{1}{4}\right)^2} = \sqrt{\frac{33}{16}}$$

$$x + \frac{1}{4} = \pm\frac{\sqrt{33}}{4}$$

$$x = -\frac{1}{4} \pm \frac{\sqrt{33}}{4} \quad \therefore \quad x = \frac{-1 \pm \sqrt{33}}{4}$$

(iii) $4x^2+4\sqrt{3}x+3 = 0$

Dividing equation by 4,

$$x^2+\sqrt{3}x+\frac{3}{4}=0$$

$$x^2+\sqrt{3}x=-\frac{3}{4}$$

Here, $b=\sqrt{3}$

$$\left(\frac{b}{2}\right)^2=\left(\frac{\sqrt{3}}{2}\right)^2=\frac{3}{4}$$

Adding $\frac{3}{4}$ on both sides,

$$x^2+\sqrt{3}x+\frac{3}{4}=-\frac{3}{4}+\frac{3}{4}$$

$$\left(x+\frac{\sqrt{3}}{2}\right)^2=0$$

$$\left(x+\frac{\sqrt{3}}{2}\right)\left(x+\frac{\sqrt{3}}{2}\right)=0$$

If $x+\frac{\sqrt{3}}{2}=0$, OR $x+\frac{\sqrt{3}}{2}=0$, then

$$x=-\frac{\sqrt{3}}{2} \qquad x=-\frac{\sqrt{3}}{2}$$

$$\therefore\ x=-\frac{\sqrt{3}}{2},-\frac{\sqrt{3}}{2}.$$

(iv) $2x^2+x+4=0$

Dividing equation by 2,

$$x^2+\frac{1}{2}x+2=0$$

$$x^2+\frac{1}{2}x=-2$$

Here, $b=\frac{1}{2}$

$$\left(\frac{b}{2}\right)^2=\left(\frac{1}{2}\times\frac{1}{2}\right)^2=\left(\frac{1}{4}\right)^2=\frac{1}{16}$$

Adding $\frac{1}{16}$ on both sides,

$$x^2+\frac{1}{2}x+\frac{1}{16}=-\frac{2}{1}+\frac{1}{16}$$

$$\left(x+\frac{1}{4}\right)^2=\frac{-32+1}{16}$$

$$\left(x+\frac{1}{4}\right)^2=\frac{-31}{16}$$

$$\sqrt{\left(x+\frac{1}{4}\right)^2}=\sqrt{\frac{-31}{16}}$$

Here 'x' has no fixed value because $\sqrt{-31}$ is not a square root.

2. Find the roots of the following Quadratic Equations by applying quadratic formula.

(i) $2x^2 – 7x + 3 = 0$
(ii) $2x^2 + x – 4 = 0$
(iii) $4x^2+4\sqrt{3}x+3 = 0$
(iv) $2x^2 + x + 4 = 0$

Answer:

(i) $2x^2 – 7x + 3 = 0$

Comparing quadratic equation $2x^2 – 7x + 3 = 0$ with general form $ax^2 + bx + c = 0$, we get $a = 2$, $b = -7$ and $c = 3$

Putting these values in quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(3)}}{2 \times 2}$$

$$= \frac{7 \pm \sqrt{49 - 24}}{4}$$

$$= \frac{7 \pm \sqrt{25}}{4} \quad = \frac{7 \pm 5}{4}$$

$$= \frac{7+5}{4}, \quad \text{OR} \quad \frac{7-5}{4}$$

$$= \frac{12}{4} \quad \text{OR} \quad \frac{2}{4}$$

$$\therefore \ x = 3 \ \text{OR} \ \frac{1}{2}.$$

(ii) $2x^2 + x - 4 = 0$

Comparing quadratic equation $2x^2 + x - 4 = 0$ with the general form $ax^2 + bx + c = 0$, we get $a = 2$, $b = 1$ and $c = -4$

Putting these values in quadratic formula ,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm \sqrt{(1)^2 - 4(2)(-4)}}{2 \times 2}$$

$$= \frac{-1 \pm \sqrt{1 + 32}}{4}$$

$$= \frac{-1 \pm \sqrt{33}}{4}$$

$$\therefore \ x = \frac{-1 + \sqrt{33}}{4} \ \text{OR} \ \frac{-1 - \sqrt{33}}{4}$$

(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$

Comparing quadratic equation $4x^2+4\sqrt{3}x+3 = 0$ with the general form $ax^2 + bx + c = 0$, we get b = $4\sqrt{3}$, and c = 3

Putting these values in quadratic formula ,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-4\sqrt{3} \pm \sqrt{\left(4\sqrt{3}\right)^2 - 4(4)(3)}}{2\times 4}$$

$$= \frac{-4\sqrt{3} \pm \sqrt{16\times 3 - 48}}{8}$$

$$= \frac{-4\sqrt{3} \pm \sqrt{48 - 48}}{8}$$

$$= \frac{-4\sqrt{3} \pm 0}{8}$$

$$= \frac{-4\sqrt{3}}{8}$$

$$\therefore x = -\frac{1}{2}\sqrt{3}$$

$$\therefore x = \frac{-\sqrt{3}}{2}, \frac{-\sqrt{3}}{2}$$

(iv) $2x^2+ x + 4 = 0$

Comparing quadratic equation $2x^2+ x + 4 = 0$ with the general form $ax^2 + bx + c = 0$, we get a = 2, b = 1 and c = 4

Putting these values in quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm \sqrt{(1)^2 - 4(2)(4)}}{2 \times 2}$$

$$= \frac{-1 \pm \sqrt{1 - 32}}{4}$$

$$= \frac{-1 \pm \sqrt{-31}}{4}$$

$$\therefore x = \frac{-1 + \sqrt{-31}}{4} \text{ OR } \frac{-1 - \sqrt{-31}}{4}$$

3. Find the roots of the following equations:

(i) $x - \frac{1}{x} = 3, x \neq 0$

(ii) $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, x = -4, 7$

Answer:

(i) Given equation: $x - \frac{1}{x} = 3, x \neq 0$

So, simplifying it,

$$\Rightarrow \frac{x^2 - 1}{x} = 3$$

$$\Rightarrow x^2 - 3x - 1 = 0$$

Comparing equation with general form $ax^2 + bx + c = 0$,

We get a = 1, b = −3 and c = −1

Using quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow x = \frac{3 \pm \sqrt{9 + 4}}{2}$$

$$\Rightarrow x = \frac{3 \pm \sqrt{13}}{2}$$

Therefore, the roots are

$$\Rightarrow x = \frac{3 + \sqrt{13}}{2} \; or \; \frac{3 - \sqrt{13}}{2}$$

(ii) $\boldsymbol{\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, \; x \; = -4, 7}$

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}$$

$$\Rightarrow \frac{x - 7 - x - 4}{(x+4)(x-7)} = \frac{11}{30}$$

$$\Rightarrow \frac{-11}{(x+4)(x-7)} = \frac{11}{30}$$

$\Rightarrow (x+4)(x-7) = -30$

$\Rightarrow x^2 - 3x - 28 = 30$

$\Rightarrow x^2 - 3x + 2 = 0$

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

$\Rightarrow x(x -2) -1 (x - 2) = 0$

$\Rightarrow (x -1)(x - 2) = 0$

$\Rightarrow x = 2, 1$