ICSE Class 10 Maths Selina Solutions Chapter 5: ICSE Class 10 Maths Selina Solutions for Chapter 5, "Quadratic Equations," make it easy to understand and solve quadratic equations.

It covers different methods to find the solutions, like factoring, completing the square, and using the quadratic formula. The solutions are explained step-by-step, helping students see how to apply these methods and solve problems correctly. By using these solutions students can get better at solving quadratic equations and be well-prepared for their exams.

ICSE Class 10 Maths Selina Solutions Chapter 5 Quadratic Equations Overview

ICSE Class 10 Maths Selina Solutions for Chapter 5, "Quadratic Equations," are prepared by the subject experts from Physics Wallah.

These solutions are designed to help students grasp the concepts effectively and apply the methods correctly.

By following these expert-prepared solutions, students can enhance their problem-solving skills and gain confidence in tackling quadratic equations, ensuring they are well-prepared for their exams.

ICSE Class 10 Maths Selina Solutions Chapter 5 Quadratic Equations PDF

ICSE Class 10 Maths Selina Solutions for Chapter 5, "Quadratic Equations," are available in a PDF format.

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ICSE Class 10 Maths Selina Solutions Chapter 5 Quadratic Equations

Below we have provided ICSE Class 10 Maths Selina Solutions Chapter 5 Quadratic Equations for the ease of the students –

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1. Find which of the following equations are quadratic:

(i) $(3x – 1)^2 = 5(x + 8)$

(ii) $5x^2 – 8x = -3(7 – 2x)$

(iii) $(x -4) (3x + 1) = (3x – 1) (x + 2)$

(iv) $x^2 + 5x – 5 = (x – 3)^2$

(v) $7x^3 – 2x^2 + 10 = (2x – 5)^2$

(vi) $(x – 1)^2 + (x + 2)^2 + 3(x + 1) = 0$

Solution:

(i) $(3x – 1)^2 = 5(x + 8)$

$\Rightarrow (9x^2 – 6x + 1) = 5x + 40$

$\Rightarrow 9x^2 – 11x – 39 = 0$; which is of the general form $ax^2 + bx + c = 0$.

Thus, the given equation is a quadratic equation.

(ii) $5x^2 – 8x = -3(7 – 2x)$

$\Rightarrow 5x^2 – 8x = 6x – 21$

$\Rightarrow 5x^2 – 14x + 21 = 0$; which is of the general form $ax^2 + bx + c = 0$.

Thus, the given equation is a quadratic equation.

(iii) $(x – 4) (3x + 1) = (3x – 1) (x +2)$

$\Rightarrow 3x^2 + x – 12x – 4 = 3x^2 + 6x – x – 2$

$\Rightarrow 16x + 2 = 0$; which is not of the general form $ax^2 + bx + c = 0$. And it's a linear equation.

Thus, the given equation is not a quadratic equation.

(iv) $x^2 + 5x – 5 = (x – 3)^2$

$\Rightarrow x^2 + 5x – 5 = x^2 – 6x + 9$

$\Rightarrow 11x – 14 = 0$; which is not of the general form $ax^2 + bx + c = 0$. And it's a linear equation.

Thus, the given equation is not a quadratic equation.

(v) $7x^3 – 2x^2 + 10 = (2x – 5)^2$

$\Rightarrow 7x^3 – 2x^2 + 10 = 4x^2 – 20x + 25$

$\Rightarrow 7x^3 – 6x^2 + 20x – 15 = 0$; which is not of the general form $ax^2 + bx + c = 0$. And it's a cubic equation.

Thus, the given equation is not a quadratic equation.

(vi) $(x – 1)^2 + (x + 2)^2 + 3(x +1) = 0$

$\Rightarrow x^2 – 2x + 1 + x^2 + 4x + 4 + 3x + 3 = 0$

$\Rightarrow 2x^2 + 5x + 8 = 0$; which is of the general form $ax^2 + bx + c = 0$.

Thus, the given equation is a quadratic equation.

2. (i) Is x = 5 a solution of the quadratic equation $x^2 – 2x – 15 = 0$?

Solution:

Given quadratic equation, $x^2 – 2x – 15 = 0$

We know that, for x = 5 to be a solution of the given quadratic equation it should satisfy the equation.

Now, on substituting x = 5 in the given equation, we have

L.H.S = $(5)^2 – 2(5) – 15$

= 25 – 10 – 15

= 0

= R.H.S

Therefore, x = 5 is a solution of the given quadratic equation $x^2 – 2x – 15 = 0$

(ii) Is x = -3 a solution of the quadratic equation $2x^2 – 7x + 9 = 0$?

Solution:

Given quadratic equation, $2x^2 – 7x + 9 = 0$

We know that, for x = -3 to be solution of the given quadratic equation it should satisfy the equation.

Now, on substituting x = 5 in the given equation, we have

L.H.S = $2(-3)^2 – 7(-3) + 9$

= 18 + 21 + 9

= 48

≠ R.H.S

Therefore, x = -3 is not a solution of the given quadratic equation $2x^2 – 7x + 9 = 0$.

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1. Without solving, comment upon the nature of roots of each of the following equations:

(i) $7x^2 – 9x +2 = 0$ (ii) $6x^2 – 13x +4 = 0$

(iii) $25x^2 – 10x + 1= 0$ (iv) $x^2 + 2\sqrt{3}x – 9 = 0$

(v) $x^2 – ax – b^2 = 0$ (vi) $2x^2 + 8x + 9 = 0$

Solution:

(i) Given quadratic equation, $7x^2 – 9x + 2 = 0$

Here, a = 7, b = -9 and c = 2

So, the Discriminant (D) = $b^2 – 4ac$

D = $(-9)^2 – 4(7)(2)$

= 81 – 56

= 25

As D > 0, the roots of the equation is real and unequal.

(ii) Given quadratic equation, $6x^2 – 13x + 4 = 0$

Here, a = 6, b = -13 and c = 4

So, the Discriminant (D) = $b^2 – 4ac$

D = $(-13)^2 – 4(6)(4)$

= 169 – 96

= 73

As D > 0, the roots of the equation is real and unequal.

(iii) Given quadratic equation, $25x^2 – 10x + 1 = 0$

Here, a = 25, b = -10 and c = 1

So, the Discriminant (D) = $b^2 – 4ac$

$D = (-10)^2 – 4(25)(1)$

$= 100 – 100$

$= 0$

As D = 0, the roots of the equation is real and equal.

(iv) Given quadratic equation, $x^2 + 2\sqrt{3}x – 9 = 0$

Here, a = 1, b = $2\sqrt{3}$ and c = -9

So, the Discriminant (D) = $b^2 – 4ac$

$D = (2\sqrt{3})^2 – 4(1)(-9)$

$= 12 + 36$

$= 48$

As D > 0, the roots of the equation is real and unequal.

(v) Given quadratic equation, $x^2 – ax – b^2 = 0$

Here, a = 1, b = -a and c = $-b^2$

So, the Discriminant (D) = $b^2 – 4ac$

$D = (a)^2 – 4(1)(-b^2)$

$= a^2 + 4b^2$

$a^2 + 4b^2$ is always positive value.

Thus D > 0, and the roots of the equation is real and unequal

(vi) Given quadratic equation, $2x^2 + 8x + 9 = 0$

Here, a = 2, b = 8 and c = 9

So, the Discriminant (D) = $b^2 – 4ac$

D = $(8)^2 – 4(2)(9)$

= 64 – 72

= -8

As D < 0, the equation has no roots.

2. Find the value of ‘p’, if the following quadratic equations has equal roots:

(i) $4x^2 – (p – 2)x + 1 = 0$

(ii) $x^2 + (p – 3)x + p = 0$

Solution:

(i) $4x^2 – (p – 2)x + 1 = 0$

Here, a = 4, b = -(p – 2), c = 1

Given that the roots are equal,

So, Discriminant = 0 ⇒ $b^2 – 4ac = 0$

D = $(-(p – 2))^2 – 4(4)(1) = 0$

⇒ $p^2 + 4 – 4p – 16 = 0$

⇒ $p^2 – 4p – 12 = 0$

⇒ $p^2 – 6p + 2p – 12 = 0$

⇒ p(p – 6) + 2(p – 6) = 0

⇒ (p + 2)(p – 6) = 0

⇒ p + 2 = 0 or p – 6 = 0

Hence, p = -2 or p = 6

(ii) $x^2 + (p – 3)x + p = 0$

Here, a = 1, b = (p – 3), c = p

Given that the roots are equal,

So, Discriminant = 0 ⇒ $b^2 – 4ac = 0$

$D = (p – 3)^2 – 4(1)(p) = 0$

⇒ $p^2 + 9 – 6p – 4p = 0$

⇒ $p^2 – 10p + 9 = 0$

⇒ $p^2 - 9p – p + 9 = 0$

⇒ $p(p – 9) – 1(p – 9) = 0$

⇒ $(p - 9)(p – 1) = 0$

⇒ $p – 9 = 0$ or $p – 1 = 0$

Hence, p = 9 or p = 1

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Solve equations, number 1 to 20, given below, using factorization method:

1. $x^2 – 10x – 24 = 0$

Solution:

Given equation, $x^2 – 10x – 24 = 0$

$x^2 – 12x + 2x – 24 = 0$

$x(x – 12) + 2(x – 12) = 0$

$(x + 2)(x – 12) = 0$

So, $x + 2 = 0$ or $x – 12 = 0$

Hence,

$x = -2$ or $x = 12$

2. $x^2 – 16 = 0$

Solution:

Given equation, $x^2 – 16 = 0$

$x^2 + 4x – 4x + 16 = 0$

$x(x + 4) -4(x + 4) = 0$

$(x – 4) (x + 4) = 0$

So, $(x – 4) = 0$ or $(x + 4) = 0$

Hence,

$x = 4$ or $x = -4$

3. $2x^2 – ½ x = 0$

Solution:

Given equation, $2x^2 – ½ x = 0$

$4x^2 – x = 0$

$x(4x – 1) = 0$

So, either $x = 0$ or $4x – 1 = 0$

Hence,

$x = 0$ or $x = ¼$

4. $x(x – 5) = 24$

Solution:

Given equation, $x(x – 5) = 24$

$x^2 – 5x = 24$

$x^2 – 5x – 24 = 0$

$x^2 – 8x + 3x – 24 = 0$

$x(x – 8) + 3(x – 8) = 0$

$(x + 3)(x – 8) = 0$

So, $x + 3 = 0$ or $x – 8 = 0$

Hence,

$x = -3$ or $x = 8$

5. $9/2\ x = 5 + x^2$

Solution:

Given equation, $9/2\ x = 5 + x^2$

On multiplying by 2 both sides, we have

$9x = 2(5 + x^2)$

$9x = 10 + 2x^2$

$2x^2 – 9x + 10 = 0$

$2x^2 – 4x – 5x + 10 = 0$

$2x(x – 2) – 5(x – 2) = 0$

$(2x – 5)(x -2) = 0$

So, $2x – 5 = 0$ or $x – 2 = 0$

Hence,

$x = 5/2$ or $x = 2$

6. $6/x = 1 + x$

Solution:

Given equation, $6/x = 1 + x$

On multiplying by x both sides, we have

$6 = x(1 + x)$

$6 = x + x^2$

$x^2 + x – 6 = 0$

$x^2 + 3x – 2x – 6 = 0$

$x(x + 3) – 2(x + 3) = 0$

$(x – 2) (x + 3) = 0$

So, $x – 2 = 0$ or $x + 3 = 0$

Hence,

$x = 2$ or $x = -3$

7. $x = (3x + 1)/ 4x$

Solution:

Given equation, $x = (3x + 1)/ 4x$

On multiplying by 4x both sides, we have

$4x(x) = 3x + 1$

$4x^2 = 3x + 1$

$4x^2 – 3x – 1 = 0$

$4x^2 – 4x + x – 1 = 0$

$4x(x – 1) + 1(x – 1) = 0$

$(4x + 1) (x – 1) = 0$

So, $4x + 1 = 0$ or $x – 1 = 0$

Hence,

$x = -1/4$ or $x = 1$

8. $x + 1/x = 2.5$

Solution:

Given equation, $x + 1/x = 2.5$

$x + 1/x = 5/2$

Taking LCM on L.H.S, we have

$(x^2 + 1)/ x = 5/2$

$2(x^2 + 1) = 5x$

$2x^2 + 2 = 5x$

$2x^2 – 5x + 2 = 0$

$2x^2 – 4x – x + 2 = 0$

$2x(x – 2) -1(x – 2) = 0$

$(2x – 1)(x – 2) = 0$

So, $2x – 1 = 0$ or $x – 2 = 0$

Hence,

$x = ½$ or $x = 2$

9. $(2x – 3)^2 = 49$

Solution:

Given equation, $(2x – 3)^2 = 49$

Expanding the L.H.S, we have

$4x^2 – 12x + 9 = 49$

$4x^2 – 12x – 40 = 0$

Dividing by 4 on both side

$x^2 – 3x – 10 = 0$

$x^2 – 5x + 2x – 10 = 0$

$x(x – 5) + 2(x – 5) = 0$

$(x + 2) (x – 5) = 0$

So, $x + 2 = 0$ or $x – 5 = 0$

Hence,

$x = -2$ or 5

10. $2(x^2 – 6) = 3(x – 4)$

Solution:

Given equation, $2(x^2 – 6) = 3(x – 4)$

$2x^2 – 12 = 3x – 12$

$2x^2 = 3x$

$x(2x – 3) = 0$

So, $x = 0$ or $(2x – 3) = 0$

Hence,

$x = 0$ or $x = 3/2$

11. $(x + 1) (2x + 8) = (x + 7) (x + 3)$

Solution:

Given equation, $(x + 1) (2x + 8) = (x + 7) (x + 3)$

$2x^2 + 2x + 8x + 8 = x^2 + 7x + 3x + 21$

$2x^2 + 10x + 8 = x^2 + 10x + 21$

$x^2 = 21 – 8$

$x^2 – 13 = 0$

$(x – \sqrt{13}) (x + \sqrt{13}) = 0$

So, $x – \sqrt{13} = 0$ or $x + \sqrt{13} = 0$

Hence,

$x = – \sqrt{13}$ or $x = \sqrt{13}$

12. $x^2 – (a + b)x + ab = 0$

Solution:

Given equation, $x^2 – (a + b)x + ab = 0$

$x^2 – ax – bx + ab = 0$

$x(x – a) – b(x – a) = 0$

$(x – b) (x – a) = 0$

So, $x – b = 0$ or $x – a = 0$

Hence,

$x = b$ or $x = a$

13. $(x + 3)^2 – 4(x + 3) – 5 = 0$

Solution:

Given equation, $(x + 3)^2 – 4(x + 3) – 5 = 0$

$(x^2 + 9 + 6x) – 4x – 12 – 5 = 0$

$x^2 + 2x – 8 = 0$

$x^2 + 4x – 2x – 8 = 0$

$x(x + 4) – 2(x – 4) = 0$

$(x – 2)(x + 4) = 0$

So, $x – 2 = 0$ or $x + 4 = 0$

Hence,

$x = 2$ or $x = -4$

14. $4(2x – 3)^2 – (2x – 3) – 14 = 0$

Solution:

Given equation, $4(2x – 3)^2 – (2x – 3) – 14 = 0$

Let substitute $2x – 3 = y$

Then the equation becomes,

$4y^2 – y – 14 = 0$

$4y^2 – 8y + 7y – 14 = 0$

$4y(y – 2) + 7(y – 2) = 0$

$(4y + 7)(y – 2) = 0$

So, $4y + 7 = 0$ or $y – 2 = 0$

Hence,

y = -7/4 or y = 2

But we have taken y = 2x – 3

Thus,

2x – 3 = -7/4 or 2x – 3 = 2

2x = 5/ 4 or 2x = 5

x = 5/8 or x = 5/2

15. 3x – 2/ 2x- 3 = 3x – 8/ x + 4

Solution:

Given equation, 3x – 2/ 2x- 3 = 3x – 8/ x + 4

On cross-multiplying we have,

(3x – 2)(x + 4) = (3x – 8)(2x – 3)

$3x^2 – 2x + 12x – 8 = 6x^2 – 16x – 9x + 24$

$3x^2 + 10x – 8 = 6x^2 – 25x + 24$

$3x^2 – 35x + 32 = 0$

$3x^2 – 3x – 32x + 32 = 0$

3x(x – 1) – 32(x – 1) = 0

(3x – 32)(x – 1) = 0

So, 3x – 32 = 0 or x – 1 = 0

Hence,

x = 32/3 or x = 1

16. $2x^2 – 9x + 10 = 0$, when:

(i) x ∈ N (ii) x ∈ Q

Solution:

Given equation, $2x^2 – 9x + 10 = 0$

$2x^2 – 4x – 5x + 10 = 0$

$2x(x – 2) – 5(x – 2) = 0$

$(2x – 5)(x – 2) = 0$

So, $2x – 5 = 0$ or $x – 2 = 0$

Hence,

$x = 5/2$ or $x = 2$

(i) When $x \in N$

$x = 2$ is the solution.

(ii) When $x \in Q$

$x = 2, 5/2$ are the solutions

$$\frac{x-3}{x+3}+\frac{x+3}{x-3}=2\frac{1}{2}$$

17.

Solution:

$$\frac{x-3}{x+3}+\frac{x+3}{x-3}=2\frac{1}{2}$$
$$\Rightarrow \frac{(x-3)^2+(x+3)^2}{(x+3)(x-3)}=\frac{5}{2}$$
$$\Rightarrow \frac{x^2-6x+9+x^2+6x+9}{x^2-9}=\frac{5}{2}$$

$2(2x^2 + 18) = 5(x^2 – 9)$

$4x^2 + 36 = 5x^2 – 45$

$x^2 – 81 = 0$

$(x – 9)(x + 9) = 0$

So, $x – 9 = 0$ or $x + 9 = 0$

Hence,

x = 9 or x = -9

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1. Solve, each of the following equations, using the formula:

(i) $x^2 – 6x = 27$

Solution:

Given equation, $x^2 – 6x = 27$

$x^2 – 6x – 27 = 0$

Here, a = 1 , b = -6 and c = -27

By quadratic formula, we have

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

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-27)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{36 - -108}}{2}$$

$$x = \frac{6 \pm \sqrt{144}}{2}$$

$$x = \frac{6 \pm 12}{2}$$

$$x = \frac{18}{2} \quad x = -\frac{6}{2}$$

$$x = 9$$

$$x = -3$$

Therefore, x = 9 or -3

(ii) $x^2 – 10x + 21 = 0$

Solution:

Given equation, $x^2 – 10x + 21 = 0$

Here, a = 1, b = -10 and c = 21

By quadratic formula, we have

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(21)}}{2(1)}$$

$$x = \frac{10 \pm \sqrt{100 - 84}}{2}$$

$$x = \frac{10 \pm \sqrt{16}}{2}$$

$$x = \frac{10 \pm 4}{2}$$

$$x = \frac{14}{2} \quad x = \frac{6}{2}$$

$$x = 7 \quad x = 3$$

Therefore, x = 7 or x = 3

(iii) $x^2 + 6x – 10 = 0$

Solution:

Given equation, $x^2 + 6x – 10 = 0$

Here, a = 1, b = 6 and c = -10

By quadratic formula, we have

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

$$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(-10)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{36 - -40}}{2}$$

$$x = \frac{-6 \pm \sqrt{76}}{2}$$

$$x = \frac{-6 \pm 2\sqrt{19}}{2}$$

$$x = \frac{-6}{2} \pm \frac{2\sqrt{19}}{2}$$

$$x = -3 \pm \sqrt{19}$$

Therefore, x = -3 + √19 or x = -3 – √19

(iv) $x^2 + 2x – 6 = 0$

Solution:

Given equation, $x^2 + 2x – 6 = 0$

Here, a = 1, b = 2 and c = -6

By quadratic formula, we have

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(-6)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 - -24}}{2}$$

$$x = \frac{-2 \pm \sqrt{28}}{2}$$

$$x = \frac{-2 \pm 2\sqrt{7}}{2}$$

$$x = \frac{-2}{2} \pm \frac{2\sqrt{7}}{2}$$

$$x = -1 \pm \sqrt{7}$$

Therefore, x = -1 + √7 or x = -1 – √7

(v) $3x^2 + 2x – 1 = 0$

Solution:

Given equation, $3x^2 + 2x – 1 = 0$

Here, a = 3, b = 2 and c = -1

By quadratic formula, we have

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4(3)(-1)}}{2(3)}$$

$$x = \frac{-2 \pm \sqrt{4 - -12}}{6}$$

$$x = \frac{-2 \pm \sqrt{16}}{6}$$

$$x = \frac{-2 \pm 4}{6}$$

$$x = \frac{2}{6} \quad x = -\frac{6}{6}$$

$$x = \frac{1}{3} \quad x = -1$$

Therefore, x = 1/3 or x = -1

(vi) $2x^2 + 7x + 5 = 0$

Solution:

Given equation, $2x^2 + 7x + 5 = 0$

Here, a = 2, b = 7 and c = 5

By quadratic formula, we have

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

$$x = \frac{-7 \pm \sqrt{7^2 - 4(2)(5)}}{2(2)}$$

$$x = \frac{-7 \pm \sqrt{49 - 40}}{4}$$

$$x = \frac{-7 \pm \sqrt{9}}{4}$$

$$x = \frac{-7 \pm 3}{4}$$

$$x = -\frac{4}{4} \quad x = -\frac{10}{4}$$

$$x = -1 \quad x = -\frac{5}{2}$$

Therefore, x = -1 or x = -5/2

(vii) 2/3 x = -1/6 x^2 – 1/3

Solution:

Given equation, 2/3 x = -1/6 x^2 – 1/3

1/6 x^2 + 2/3 x + 1/3 = 0

Multiplying by 6 on both sides

x^2 + 4x + 2 = 0

Here, a = 1, b = 4 and c = 2

By quadratic formula, we have

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

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

$$x = \frac{-4 \pm \sqrt{16 - 8}}{2}$$

$$x = \frac{-4 \pm \sqrt{8}}{2}$$

$$x = \frac{-4 \pm 2\sqrt{2}}{2}$$

$$x = \frac{-4}{2} \pm \frac{2\sqrt{2}}{2}$$

$$x = -2 \pm \sqrt{2}$$

Therefore, x = -2 + √2 or x = -2 – √2

(viii) 1/15 x^2 + 5/3 = 2/3 x

Solution:

Given equation, 1/15 x^2 + 5/3 = 2/3 x

1/15 x^2 – 2/3 x + 5/3 = 0

Multiplying by 15 on both sides

x^2 – 10x + 25 = 0

Here, a = 1, b = -10 and c = 25

By quadratic formula, we have

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(25)}}{2(1)}$$

$$x = \frac{10 \pm \sqrt{100 - 100}}{2}$$

$$x = \frac{10 \pm \sqrt{0}}{2}$$

$$x = \frac{10}{2}$$

$$x = 5$$

Therefore, x = 5 (equal roots)

(ix) $x^2 - 6 = 2\sqrt{2}\,x$

Solution:

Given equation, $x^2 - 6 = 2\sqrt{2}\,x$

$x^2 - 2\sqrt{2}\,x - 6 = 0$

Here, a = 1, b = $-2\sqrt{2}$ and c = -6

By quadratic formula, we have

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

$$= \frac{-(-2\sqrt{2}) \pm \sqrt{(-2\sqrt{2})^2 - 4(1)(-6)}}{2(1)}$$

$$= \frac{2\sqrt{2} \pm \sqrt{32}}{2} = \frac{2\sqrt{2} \pm 4\sqrt{2}}{2} = \frac{2\sqrt{2} + 4\sqrt{2}}{2} \text{ and } \frac{2\sqrt{2} - 4\sqrt{2}}{2}$$

$$= \frac{6\sqrt{2}}{2} \text{ and } \frac{-2\sqrt{2}}{2} = 3\sqrt{2} \text{ and } -\sqrt{2}$$

Therefore, x = $3\sqrt{2}$ or x = $-\sqrt{2}$

(x) 4/x – 3 = 5/ (2x + 3)

Solution:

Given equation, 4/x – 3 = 5/ (2x + 3)

(4 – 3x)/ x = 5/ (2x + 3)

On cross multiplying, we have

(4 – 3x)(2x + 3) = 5x

$8x – 6x^2 + 12 – 9x = 5x$

$6x^2 + 6x – 12 = 0$

Dividing by 6, we get

$x^2 + x – 2 = 0$

Here, a = 1, b = 1 and c = -2

By quadratic formula, we have

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

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

$$x = \frac{-1 \pm \sqrt{1 - -8}}{2}$$

$$x = \frac{-1 \pm \sqrt{9}}{2}$$

$$x = \frac{-1 \pm 3}{2}$$

$$x = \frac{2}{2} \quad x = -\frac{4}{2}$$

$$x = 1$$

$$x = -2$$

Therefore, x = 1 or x = -2

(xi) 2x + 3/ x + 3 = x + 4/ x + 2

Solution:

Given equation, 2x + 3/ x + 3 = x + 4/ x + 2

On cross-multiplying, we have

(2x + 3) (x + 2) = (x + 4) (x + 3)

$2x^2 + 4x + 3x + 6 = x^2 + 3x + 4x + 12$

$2x^2 + 7x + 6 = x^2 + 7x + 12$

$x^2 + 0x – 6 = 0$

Here, a = 1, b = 0 and c = -6

By quadratic formula, we have

Therefore, x = √6 or x = -√6

(xii) $\sqrt{6}x^2 – 4x – 2\sqrt{6} = 0$

Solution:

Given equation, $\sqrt{6}x^2 – 4x – 2\sqrt{6} = 0$

Here, a = √6, b = -4 and c = -2√6

By quadratic formula, we have

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

$$= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(\sqrt{6})(-2\sqrt{6})}}{2(\sqrt{6})}$$

$$= \frac{4 \pm \sqrt{64}}{2\sqrt{6}} = \frac{4 \pm 8}{2\sqrt{6}} = \frac{4+8}{2\sqrt{6}} \text{ and } \frac{4-8}{2\sqrt{6}}$$

$$= \frac{6}{\sqrt{6}} \text{ and } \frac{-2}{\sqrt{6}} = \sqrt{6} \text{ and } \frac{-\sqrt{6}}{3}$$

Therefore, x = √6 or -√6/3

(xiii) 2x/ x – 4 + (2x – 5)/(x – 3) = $8\frac{1}{3}$

Solution:

Given equation, 2x/ x – 4 + (2x – 5)/(x – 3) = $8\frac{1}{3}$

$$\Rightarrow \frac{2x(x-3)+(x-4)(2x-5)}{(x-4)(x-3)} = \frac{25}{3}$$

$$\Rightarrow \frac{2x^2-6x+2x^2-5x-8x+20}{x^2-3x-4x+12} = \frac{25}{3}$$

$$\Rightarrow \frac{4x^2-19x+20}{x^2-7x+12} = \frac{25}{3}$$

$25x^2 – 175x + 300 = 12x^2 – 57x + 60$

$13x^2 – 118x + 240 = 0$

Here, a = 13, b = -118 and c = 240

By quadratic formula, we have

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

$$x = \frac{-(-118) \pm \sqrt{(-118)^2-4(13)(240)}}{2(13)}$$

$$x = \frac{118 \pm \sqrt{13924-12480}}{26}$$

$$x = \frac{118 \pm \sqrt{1444}}{26}$$

$$x = \frac{118 \pm 38}{26}$$

$$x = \frac{156}{26} \quad x = \frac{80}{26}$$

$$x = 6 \quad x = \frac{40}{13}$$

Therefore, x = 6 or x = 40/13

(xiv) $\frac{x-1}{x-2}+\frac{x-3}{x-4}=3\frac{1}{3}$

Solution:

From the given equation,

$10x^2 – 60x + 80 = 6x^2 – 30x + 30$

$4x^2 – 30x + 50 = 0$

$2x^2 – 15x + 25 = 0$

Here, a = 2, b = -15 and c = 25

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

$$x=\frac{-(-15)\pm\sqrt{(-15)^2-4(2)(25)}}{2(2)}$$

$$x=\frac{15\pm\sqrt{225-200}}{4}$$

$$x=\frac{15\pm\sqrt{25}}{4}$$

$$x=\frac{15\pm5}{4}$$

$$x=\frac{20}{4}\quad x=\frac{10}{4}$$

$$x=5\quad x=\frac{5}{2}$$

Therefore, x = 5 or x = 5/2

2. Solve each of the following equations for x and give, in each case, your answer correct to one decimal place:

(i) $x^2 – 8x +5 = 0$

(ii) $5x^2 + 10x – 3 = 0$

Solution:

(i) $x^2 – 8x + 5 = 0$

Here, a = 1, b = -8 and c = 5

By quadratic formula, we have

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

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(5)}}{2(1)}$$

$$x = \frac{8 \pm \sqrt{64 - 20}}{2}$$

$$x = \frac{8 \pm \sqrt{44}}{2}$$

$$x = \frac{8 \pm 2\sqrt{11}}{2}$$

$$x = \frac{8}{2} \pm \frac{2\sqrt{11}}{2}$$

$$x = 4 \pm \sqrt{11}$$

x = 4 ± 3.3

Thus, x = 7.7 or x = 0.7

(ii) $5x^2 + 10x – 3 = 0$

Here, a = 5, b = 10 and c = -3

By quadratic formula, we have

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

$$x = \frac{-10 \pm \sqrt{10^2 - 4(5)(-3)}}{2(5)}$$

$$x = \frac{-10 \pm \sqrt{100 - -60}}{10}$$

$$x = \frac{-10 \pm \sqrt{160}}{10}$$

$$x = \frac{-10 \pm 4\sqrt{10}}{10}$$

$$x = \frac{-10}{10} \pm \frac{4\sqrt{10}}{10}$$

$$x = -1 \pm \frac{2\sqrt{10}}{5}$$

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

$$x = \frac{-10 \pm \sqrt{10^2 - 4(5)(-3)}}{2(5)}$$

$$x = \frac{-10 \pm \sqrt{100 - -60}}{10}$$

$$x = \frac{-10 \pm \sqrt{160}}{10}$$

$$x = \frac{-10 \pm 4\sqrt{10}}{10}$$

$$x = \frac{-10}{10} \pm \frac{4\sqrt{10}}{10}$$

$$x = -1 \pm \frac{2\sqrt{10}}{5}$$

Thus, x = 0.3 or x = -2.3

3. Solve each of the following equations for x and give, in each case, your answer correct to 2 decimal places:

(i) $2x^2 – 10x + 5 = 0$

Solution:

Given equation, $2x^2 – 10x + 5 = 0$

Here, a = 2, b = -10 and c = 5

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(2)(5)}}{2(2)}$$

$$x = \frac{10 \pm \sqrt{100 - 40}}{4}$$

$$x = \frac{10 \pm \sqrt{60}}{4}$$

$$x = \frac{10 \pm 2\sqrt{15}}{4}$$

$$x = \frac{10}{4} \pm \frac{2\sqrt{15}}{4}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{15}}{2}$$

$$x = 4.43649$$

$$x = 0.563508$$

Therefore, x = 4.44 or x = 0.56

(ii) 4x + 6/x + 13 = 0

Solution:

Given equation, 4x + 6/x + 13 = 0

Multiplying by x both sides, we get

$4x^2 + 13x + 6 = 0$

Here, a = 4, b = 13 and c = 6

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

$$x = \frac{-13 \pm \sqrt{13^2 - 4(4)(6)}}{2(4)}$$

$$x = \frac{-13 \pm \sqrt{169 - 96}}{8}$$

$$x = \frac{-13 \pm \sqrt{73}}{8}$$

$$x = \frac{-13 \pm \sqrt{73}}{8}$$

$$x = \frac{-13}{8} \pm \frac{\sqrt{73}}{8}$$

$$x = -\frac{13}{8} \pm \frac{\sqrt{73}}{8}$$

$$x = -0.557$$

$$x = -2.693$$

Therefore, x = -0.56 or x = -2.70

(iii) $4x^2 – 5x – 3 = 0$

Solution:

Given equation, $4x^2 – 5x – 3 = 0$

Here, a = 4, b = -5 and c = -3

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

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(4)(-3)}}{2(4)}$$

$$x = \frac{5 \pm \sqrt{25 - -48}}{8}$$

$$x = \frac{5 \pm \sqrt{73}}{8}$$

$$x = \frac{5 \pm \sqrt{73}}{8}$$

$$x = \frac{5}{8} \pm \frac{\sqrt{73}}{8}$$

$$x = 1.693$$

$$x = -0.443$$

Therefore, x = 1.70 or x = -0.44

(iv) $x^2 – 3x – 9 = 0$

Solution:

Given equation, $x^2 – 3x – 9 = 0$

Here, a = 1, b = -3 and c = -9

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

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-9)}}{2(1)}$$

$$x = \frac{3 \pm \sqrt{9 - -36}}{2}$$

$$x = \frac{3 \pm \sqrt{45}}{2}$$

$$x = \frac{3 \pm 3\sqrt{5}}{2}$$

$$x = \frac{3}{2} \pm \frac{3\sqrt{5}}{2}$$

$$x = 4.8541$$

$$x = -1.8541$$

Therefore, x = 4.85 or x = -1.85

(v) $x^2 – 5x – 10 = 0$

Solution:

Given equation, $x^2 – 5x – 10 = 0$

Here, a = 1, b = -5 and c = -10

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

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-10)}}{2(1)}$$

$$x = \frac{5 \pm \sqrt{25 - -40}}{2}$$

$$x = \frac{5 \pm \sqrt{65}}{2}$$

$$x = \frac{5 \pm \sqrt{65}}{2}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{65}}{2}$$

$$x = 6.53113$$

$$x = -1.53113$$

Therefore, x = 6.53 or x = -1.53

4. Solve each of the following equations for x and give, in each case, your answer correct to 3 decimal places:

(i) $3x^2 – 12x – 1 = 0$

(ii) $x^2 – 16 x +6 = 0$

(iii) $2x^2 + 11x + 4 = 0$

Solution:

(i) Given equation, $3x^2 – 12x – 1 = 0$

Here, a = 3, b = -12 and c = -1

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

$$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(3)(-1)}}{2(3)}$$

$$x = \frac{12 \pm \sqrt{144 - -12}}{6}$$

$$x = \frac{12 \pm \sqrt{156}}{6}$$

$$x = \frac{12 \pm 2\sqrt{39}}{6}$$

$$x = \frac{12}{6} \pm \frac{2\sqrt{39}}{6}$$

$$x = 2 \pm \frac{\sqrt{39}}{3}$$

$$x = 4.08167$$

$$x = -0.081666$$

Therefore, x = 4.082 or x = -0.082

(ii) Given equation, $x^2 – 16 x + 6 = 0$

Here, a = 1, b = -16 and c = 6

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

$$x = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(1)(6)}}{2(1)}$$

$$x = \frac{16 \pm \sqrt{256 - 24}}{2}$$

$$x = \frac{16 \pm \sqrt{232}}{2}$$

$$x = \frac{16 \pm 2\sqrt{58}}{2}$$

$$x = \frac{16}{2} \pm \frac{2\sqrt{58}}{2}$$

$$x = 8 \pm \sqrt{58}$$

$$x = 15.6158$$

$$x = 0.384227$$

Therefore, x = 15.616 or x = 0.384

(iii) Given equation, $2x^2 + 11x + 4 = 0$

Here, a = 2, b = 11 and c = 4

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

$$x = \frac{-11 \pm \sqrt{11^2 - 4(2)(4)}}{2(2)}$$

$$x = \frac{-11 \pm \sqrt{121 - 32}}{4}$$

$$x = \frac{-11 \pm \sqrt{89}}{4}$$

$$x = \frac{-11 \pm \sqrt{89}}{4}$$

$$x = \frac{-11}{4} \pm \frac{\sqrt{89}}{4}$$

$$x = -\frac{11}{4} \pm \frac{\sqrt{89}}{4}$$

$$x = -0.391505$$

$$x = -5.1085$$

Therefore, x = -0.392 or x = -5.110

5. Solve:

(i) $x^4 – 2x^2 – 3 = 0$

Solution:

Given equation, $x^4 – 2x^2 – 3 = 0$

$x^4 – 3x^2 + x^2 – 3 = 0$

$x^2(x^2 – 3) + 1(x^2 – 3) = 0$

$(x^2 + 1) (x^2 – 3) = 0$

So, $x^2 + 1 = 0$ (which is not possible) or $x^2 – 3 = 0$

Hence,

$x^2 – 3 = 0$

$x = \pm \sqrt{3}$

(ii) $x^4 – 10x^2 + 9 = 0$

Solution:

Given equation, $x^4 – 10x^2 + 9 = 0$

$x^4 – x^2 – 9x^2 + 9 = 0$

$x^2(x^2 – 1) – 9(x^2 – 1) = 0$

$(x^2 – 9)(x^2 – 1) = 0$

So, we have

$x^2 – 9 = 0$ or $x^2 – 1 = 0$

Hence,

$x = \pm 3$ or $x = \pm 1$

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1. Solve each of the following equations:

$$\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0;\ x \neq 3,\ x \neq -\frac{3}{2}$$

Solution:

Given equation,

$$\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0$$
$$\Rightarrow \frac{2x(2x+3) + 1(x-3) + 3x + 9}{(x-3)(2x+3)} = 0$$

$4x^2 + 6x + x – 3 + 3x + 9 = 0$

$4x^2 + 10x + 6 = 0$

$4x^2 + 4x + 6x + 6 = 0$

$4x(x + 1) + 6(x + 1) = 0$

$(4x + 6)(x + 1) = 0$

So, $4x + 6 = 0$ or $x + 1 = 0$

$x = -1$ or $x = -6/4 = -3/2$ (rejected as this value is excluded in the domain)

Therefore,

$x = -1$ is the only solution

2. $(2x + 3)^2 = 81$

Solution:

Given, $(2x + 3)^2 = 81$

Taking square root on both sides we have,

$2x + 3 = \pm 9$

$2x = \pm 9 – 3$

$x = (\pm 9 – 3)/ 2$

So,

$x = (9 – 3)/ 2$ or $(-9 – 3)/ 2$

Therefore,

$x = 3$ or $x = -6$

3. $a^2x^2 – b^2 = 0$

Solution:

Given equation, $a^2x^2 – b^2 = 0$

$(ax)^2 – b^2 = 0$

$(ax + b)(ax – b) = 0$

So,

$ax + b = 0$ or $ax – b = 0$

Therefore,

$x = -b/a$ or b/a

4. $x^2 – 11/4\ x + 15/8 = 0$

Solution:

Given equation, $x^2 – 11/4\ x + 15/8 = 0$

Taking L.C.M we have,

$(8x^2 – 22x + 15)/ 8 = 0$

$8x^2 – 22x + 15 = 0$

$8x^2 – 12x – 10x + 15 = 0$

$4x(2x – 3) – 5(2x – 3) = 0$

$(4x – 5)(2x – 3) = 0$

So, $4x – 5 = 0$ or $2x – 3 = 0$

Therefore,

$x = 5/4$ or $x = 3/2$

5. $x + 4/x = -4; x \neq 0$

Solution:

Given equation, $x + 4/x = -4$

$(x^2 + 4)/ x = -4$

$x^2 + 4 = -4x$

$x^2 + 4x + 4 = 0$

$x^2 + 2x + 2x + 4 = 0$

$x(x + 2) + 2(x + 2) = 0$

$(x + 2)(x + 2) = 0$

$(x + 2)^2 = 0$

Taking square – root we have,

$x + 2 = 0$

Therefore, x = -2

6. $2x^4 – 5x^2 + 3 = 0$

Solution:

Given equation, $2x^4 – 5x^2 + 3 = 0$

Let's take $x^2 = y$

Then, the equation becomes

$2y^2 – 5y + 3 = 0$

$2y^2 – 2y – 3y + 3 = 0$

$2y(y – 1) – 3(y – 1) = 0$

$(2y – 3) (y – 1) = 0$

So, $2y – 3 = 0$ or $y – 1 = 0$

$y = 3/2$ or $y = 1$

And, we have taken $y = x^2$

Thus,

$x^2 = 3/2$ or $x^2 = 1$

$x = \pm \sqrt{(3/2)}$ or $x = \pm 1$

7. $x^4 – 2x^2 – 3 = 0$

Solution:

Given equation, $x^4 – 2x^2 – 3 = 0$

Let's take $x^2 = y$

Then, the equation becomes

$y^2 – 2y – 3 = 0$

$y^2 – 3y + y – 3 = 0$

$y(y – 3) + 1(y – 3) = 0$

(y + 1)(y – 3) = 0

So, y + 1 = 0 or y – 3 = 0

y = -1 or y = 3

And, we have taken $y = x^2$

Thus,

$x^2 = -1$ (impossible, no real solution)

$x^2 = 3$

$x = \pm \sqrt{3}$

8. $9\left(x^2+\frac{1}{x^2}\right)-9\left(x+\frac{1}{x}\right)-52=0$

Solution:

Let us take $(x + 1/x) = y$ …. (1)

Now, squaring it on both sides

$(x + 1/x)^2 = y^2$

$x^2 + 1/x^2 + 2 = y^2$

So,

$x^2 + 1/x^2 = y^2 - 2$ ….. (2)

Using (1) and (2) in the given equation, we have

$9(y^2 - 2) - 9(y) - 52 = 0$

$9y^2 - 18 - 9y - 52 = 0$

$9y^2 - 9y - 70 = 0$

$9y^2 - 30y + 21y - 70 = 0$

$3y(3y - 10) + 7(3y - 10) = 0$

$(3y + 7)(3y - 10) = 0$

So, 3y + 7 = 0 or 3y – 10 = 0

y = -7/3 or y = 10/3

Now,

x + 1/x = -7/3 or x + 1/x = 10/3

$(x^2 + 1)/x = -7/3$ or $(x^2 + 1)/x = 10/3$

$3x^2 – 10x + 3 = 0$ or $3x^2 + 7x + 3 = 0$

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

$$x=\frac{-7 \pm \sqrt{13}}{6}$$

$3x^2 – 9x – x + 3 = 0$ or

3x(x – 3) – 1(x – 3) = 0

(3x – 1)(x – 3) = 0

So, x = 1/3 or 3

9. $$2\left(x^2 + \frac{1}{x^2}\right) - \left(x + \frac{1}{x}\right) = 11$$

Solution:

Let us take (x + 1/x) = y …. (1)

Now, squaring it on both sides

$(x + 1/x)^2 = y^2$

$x^2 + 1/x^2 + 2 = y^2$

So,

$x^2 + 1/x^2 = y^2 – 2$ ….. (2)

Using (1) and (2) in the given equation, we have

$2(y^2 – 2) – (y) = 11$

$2y^2 – 4 – y = 11$

$2y^2 – y – 15 = 0$

$2y^2 – 6y + 5y – 15 = 0$

$2y(y – 3) + 5(y – 3) = 0$

$(2y + 5) (y – 3) = 0$

So,

$2y + 5 = 0$ or $y – 3 = 0$

$y = -5/2$ or $y = 3$

Now,

$x + 1/x = -5/2$ or $x + 1/x = 3$

$(x^2 + 1)/x = -5/2$ or $(x^2 + 1)/x = 3$

$2(x^2 + 1) = -5x$ or $x^2 + 1 = 3x$

$2x^2 + 5x + 2 = 0$ or $x^2 – 3x + 1 = 0$

$$x=\frac{-3\pm\sqrt{(-3)^2-4(1)(1)}}{2(1)}$$

$$x=\frac{-3\pm\sqrt{5}}{2}$$

$2x^2 + 4x + x + 2 = 0$ or

$2x(x + 2) + 1(x + 2) = 0$

$(2x + 1)(x + 2) = 0$

Hence, $x = -1/2$ or -2

10. $\left(x^2+\frac{1}{x^2}\right)-3\left(x-\frac{1}{x}\right)-2=0$

Solution:

Let us take $(x – 1/x) = y$ …. (1)

Now, squaring it on both sides

$(x – 1/x)^2 = y^2$

$x^2 + 1/x^2 – 2 = y^2$

So,

$x^2 + 1/x^2 = y^2 + 2$ ….. (2)

Using (1) and (2) in the given equation, we have

$(y^2 + 2) – 3(y) – 2 = 0$

$y^2 -3y = 0$

$y(y – 3) = 0$

So, $y = 0$ or $y – 3 = 0$

Now,

$(x – 1/x) = 0$ or $(x – 1/x) = 3$

$x^2 – 1 = 0$ or $x^2 – 1 = 3x$

$x^2 = 1$ or $x^2 – 3x – 1 = 0$

$$x=\frac{-(-3)\pm\sqrt{(-3)^2-4(1)(-1)}}{2(1)}$$

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

$x = \pm 1$ or

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1. Solve:

(i) (x + 5) (x – 5) = 24

Solution:

Given equation, $(x + 5) (x – 5) = 24$

$x^2 – 25 = 24$

$x^2 = 49$

Thus,

$x = \pm 7$

(ii) $3x^2 – 2\sqrt{6}x + 2 = 0$

Solution:

Given equation, $3x^2 – 2\sqrt{6}x + 2 = 0$

$3x^2 – \sqrt{6}x – \sqrt{6}x + 2 = 0$

$\sqrt{3}x(\sqrt{3}x – \sqrt{2}) – \sqrt{2}(\sqrt{3}x – \sqrt{2}) = 0$

$(\sqrt{3}x – \sqrt{2})(\sqrt{3}x – \sqrt{2}) = 0$

So, $\sqrt{3}x – \sqrt{2} = 0$ or $\sqrt{3}x – \sqrt{2} = 0$

Therefore,

$x = \sqrt{(2/3)}, \sqrt{(2/3)}$ (equal roots)

(iii) $3\sqrt{2}x^2 – 5x – \sqrt{2} = 0$

Solution:

Given equation, $3\sqrt{2}x^2 – 5x – \sqrt{2} = 0$

$3\sqrt{2}x^2 – 6x + x – \sqrt{2} = 0$

$3\sqrt{2}x(x – \sqrt{2}) + 1(x – \sqrt{2}) = 0$

$(3\sqrt{2}x + 1)(x – \sqrt{2}) = 0$

So, $3\sqrt{2}x + 1 = 0$ or $x – \sqrt{2} = 0$

Therefore,

$x = -1/ 3\sqrt{2}$ or $x = \sqrt{2}$

(iv) $2x – 3 = \sqrt{(2x^2 – 2x + 21)}$

Solution:

Given equation, $2x – 3 = \sqrt{(2x^2 – 2x + 21)}$

On squaring on both sides, we have

$(2x – 3)^2 = 2x^2 – 2x + 21$

$4x^2 + 9 – 12x = 2x^2 – 2x + 21$

$2x^2 – 10x – 12 = 0$

Dividing by 2, we get

$x^2 – 5x – 6 = 0$

$x^2 – 6x + x – 6 = 0$

$x(x – 6) + 1(x – 6) = 0$

$(x + 1) (x – 6) = 0$

So, $x + 1 = 0$ or $x – 6 = 0$

Thus, we get

$x = -1$ or $x = 6$

But, putting $x = -1$ the L.H.S become negative. And we know that the square root function always gives a positive value.

Therefore,

$x = 6$ is the only solution.

2. One root of the quadratic equation $8x^2 + mx + 15 = 0$ is ¾. Find the value of m. Also, find the other root of the equation.

Solution:

Given equation, $8x^2 + mx + 15 = 0$

One of the roots is ¾, and hence it satisfies the given equation

So,

$8(3/4)^2 + m(3/4) + 15 = 0$

$8(9/16) + m(3/4) + 15 = 0$

$18/4 + 3m/4 + 15 = 0$

Taking L.C.M, we have

$(18 + 3m + 60)/4 = 0$

$18 + 3m + 60 = 0$

$3m = – 78$

$m = -26$

Now, putting the value of m in the given equation, we get

$8x^2 + (-26)x + 15 = 0$

$8x^2 – 26x + 15 = 0$

$8x^2 – 20x – 6x + 15 = 0$

$4x(2x – 5) – 3(2x – 5) = 0$

$(4x – 3) (2x – 5) = 0$

So, $4x – 3 = 0$ or $2x – 5 = 0$

Therefore.

$x = ¾$ or $x = 5/2$

3. Show that one root of the quadratic equation $x^2 + (3 – 2a)x – 6a = 0$ is -3. Hence, find its other root.

Solution:

Given quadratic equation, $x^2 + (3 – 2a)x – 6a = 0$

Now, putting $x = -3$ we have

$(-3)^2 + (3 – 2a)(-3) – 6a = 0$

$9 – 9 + 6a – 6a = 0$

$0 = 0$

Since, $x = -3$ satisfies the given equation -3 is one of the root of the quadratic equation.

$x^2 + (3 – 2a)x – 6a = 0$

$x^2 + 3x – 2ax – 6a = 0$

$x(x + 3) – 2a(x + 3) = 0$

$(x – 2a) (x + 3) = 0$

So, $x – 2a = 0$ or $x + 3 = 0$

$x = 2a$ or $x = -3$

Hence, the other root is 2a.

4. If $p – 15 = 0$ and $2x^2 + px + 25 = 0$: find the values of x.

Solution:

Given equations, $p – 15 = 0$ and $2x^2 + px + 25 = 0$

Thus, $p = 15$

Now, using p in the quadratic equation, we get

$2x^2 + (15)x + 25 = 0$

$2x^2 + 10x + 5x + 25 = 0$

$2x(x + 5) + 5(x + 5) = 0$

$(2x + 5) (x + 5) = 0$

So, $2x + 5 = 0$ or $x + 5 = 0$

Hence,

$x = -5/2$ or $x = -5$

5. Find the solution of the quadratic equation $2x^2 – mx – 25n = 0$; if $m + 5 = 0$ and $n – 1 = 0$.

Solution:

Given,

$m + 5 = 0$ and $n – 1 = 0$

so,

$m = -5$ and $n = 1$

Now, putting these values in the given quadratic equation $2x^2 – mx – 25n = 0$, we get

$2x^2 – (-5)x – 25(1) = 0$

$2x^2 + 5x – 25 = 0$

$2x^2 + 10x – 5x – 25 = 0$

$2x(x + 5) -5(x + 5) = 0$

$(2x – 5) (x + 5) = 0$

So, $2x – 5 = 0$ or $x + 5 = 0$

Hence,

$x = 5/2$ or $x = -5$

6. If m and n are roots of the equation: $1/x – 1/(x-2) = 3$: where $x \neq 0$ and $x \neq 2$; find m x n.

Solution:

Given equation, $1/x – 1/(x-2) = 3$

$(x – 2 – x)/ (x(x – 2)) = 3$

$-2 = 3(x^2 – 2x)$

$3x^2 – 6x + 2 = 0$

Solving by using quadratic formula, we get

$$\Rightarrow x = \frac{6 \pm \sqrt{6^2 - 4(3)(2)}}{2 \times 3}$$

$$\Rightarrow x = \frac{6 \pm \sqrt{12}}{2 \times 3}$$

$$\Rightarrow x = \frac{\sqrt{3} \pm 1}{\sqrt{3}}$$

And, since m and n are roots of the equation, we have

$m = (\sqrt{3} + 1)/ \sqrt{3}$ $n = (\sqrt{3} – 1)/ \sqrt{3}$

So,

$m \times n = (\sqrt{3} + 1)/ \sqrt{3} \times (\sqrt{3} – 1)/ \sqrt{3} = [(\sqrt{3})^2 – 1]/ (\sqrt{3})^2$

Thus,

$m \times n = 2/3$

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