Chapter-7(Quadratic equations)

EXERCISE 7

1.Solve the following (1 to 12) equations: 1. (i) $x^2 - 11x + 30 = 0$

(ii) $4x^2 - 25 = 0$

Solution:

(i) $x^2 - 11x + 30 = 0$

Let us simplify the given equation,

By factorizing, we get $x2 - 5x - 6x + 30 = 0$ $x(x - 5) - 6 (x - 5) = 0$

$(x - 5) (x - 6) = 0$

So,

$(x - 5) = 0$ or $(x - 6) = 0$

x = 5 or x = 6

∴ Value of x = 5, 6

(ii) $4x^2 - 25 = 0$

Let us simplify the given equation,

$4x^2 = 25$

$x2 = 25/4$

x = ± √(25/4)

= ±5/2

∴ Value of x = +5/2, -5/2

2. (i) $2x^2 - 5x = 0$

(ii) $x^2 - 2x = 48$

Solution:

(i) $2x^2 - 5x = 0$

Let us simplify the given equation,

x(2x - 5) = 0

so,

x = 0 or 2x − 5 = 0 x = 0 or 2x = 5

x = 0 or x = 5/2

∴ Value of x = 0, 5/2

(ii) x² – 2x = 48

Let us simplify the given equation,

By factorizing, we get $x^2 - 2x - 48 = 0$

$x^2 - 8x + 6x - 48 = 0$ $x(x - 8) + 6 (x - 8) = 0$

(x - 8) (x + 6) = 0

So,

(x - 8) = 0 or (x + 6) = 0

x = 8 or x = -6

∴ Value of x = 8, -6

3. (i) 6 + x = x²

(ii) 2x² + 3x + 1= 0 Solution:

$6 + x = x^2$

Let us simplify the givenequation,

$6 + x - x^2 = 0$

$x^2 - x - 6 = 0$

By factorizing, we get $x^2 - 3x + 2x - 6 = 0$ $x(x - 3) + 2 (x - 3) = 0$

(x - 3) (x + 2) = 0

So,

(x - 3) = 0 or (x + 2) = 0

x = 3 or x = -2

∴ Value of x = 3, -2

(ii) $2x^2 + 3x + 1 = 0$

Let us simplify the given equation, By factorizing, we get

$2x^2 - 2x - x + 1 = 0$

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

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

So,

$(x - 1) = 0$ or $(2x - 1) = 0$

$x = 1$ or $2x = 1$ $x = 1$ or $x = ½$

∴ Value of x = 1, ½

4. (i) $3x^2 = 2x + 8$

(ii) $4x^2 + 15 = 16x$

Solution:

(i) $3x^2 = 2x + 8$

Let us simplify the given equation,

$3x^2 - 2x - 8 = 0$

By factorizing, we get $3x^2 - 6x + 4x - 8 = 0$

$3x(x - 2) + 4(x - 2) = 0$

$(x - 2)(3x + 4) = 0$

So,

$(x - 2) = 0$ or $(3x + 4) = 0$

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

∴ Value of x = 2 or -4/3

(ii) $4x^2 + 15 = 16x$

Let us simplify the givenequation,

$4x^2 - 16x + 15 = 0$

By factorizing, we get $4x^2 - 6x - 10x + 15 = 0$

$2x(2x - 3) - 5(2x - 3) = 0$

(2x - 3) (2x - 5) = 0

So,

(2x - 3) = 0 or (2x - 5) = 0

2x = 3 or 2x = 5 x = 3/2 or x = 5/2

∴ Value of x = 3/2 or 5/2

5. (i) x (2x + 5) = 25

(ii) (x + 3) (x – 3) = 40

Solution:

(i) x (2x + 5) = 25

Let us simplify the given equation,

2x2+ 5x – 25 = 0

By factorizing, we get 2x2+ 10x – 5x – 25 =0

2x(x + 5) – 5 (x + 5) =0

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

So,

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

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

∴ Value of x = -5, 5/2

(ii) (x + 3) (x – 3) = 40

Let us simplify the given equation,

 x2– 3x + 3x – 9 = 40

x2– 9 – 40 = 0

x2– 49 = 0

x2= 49

x = √49

= ± 7

∴ Value of x = 7, -7

6. (i) (2x + 3) (x − 4) = 6

(ii) (3x + 1) (2x + 3) = 3

Solution:

(i) (2x + 3) (x − 4) = 6

Let us simplify the given equation,

$2x^2 − 8x + 3x − 12 − 6 = 0$

$2x^2 − 5x − 18 = 0$

By factorizing, we get $2x^2 − 9x + 4x − 18 = 0$

x (2x - 9) + 2 (2x - 9) = 0

(2x - 9) (x + 2) = 0

So,

(2x - 9) = 0 or (x + 2) = 0

2x = 9 or x = -2 x = 9/2 or x = -2

∴ Value of x = 9/2, -2

(ii) (3x + 1) (2x + 3) = 3

Let us simplify the given equation,

$6x^2 + 9x + 2x + 3 − 3 = 0$

$6x^2 + 11x = 0$ x(6x + 11) = 0

So,

x = 0 or 6x + 11 = 0 x = 0 or 6x = -11

x = 0 or x = -11/6

∴ Value of x = 0, -11/6

7. (i) 4x² + 4x + 1 = 0

(ii) (x − 4)² + 5² = 132

Solution:

(i) 4x² + 4x + 1 = 0

Let us simplify the given equation, By factorizing, we get

$4x^2+ 2x + 2x + 1 = 0$

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

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

So,

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

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

∴ Value of x = -1/2, -1/2

(ii) (x – 4)² + 5² = 132

Let us simplify the given equation, $x^2+ 16 – 2(x) (4) + 25 – 169 = 0$

$x^2– 8x -128 = 0$

By factorizing, we get $x^2– 16x + 8x – 128 = 0$ $x(x - 16) + 8 (x - 16) =0$

$(x - 16) (x + 8) = 0$

So,

$(x - 16) = 0$ or $(x + 8) = 0$

$x = 16$ or $x = -8$

∴ Value of x = 16, -8

8. (i) 21x2= 4 (2x + 1)

(ii) 2/3x2– 1/3x – 1 = 0

 Solution:

(i) 21x2= 4 (2x + 1)

Let us simplify the given equation, $21x^2= 8x + 4$

$21x^2– 8x – 4 = 0$

By factorizing, we get $21x^2– 14x + 6x – 4 = 0$

7x(3x - 2) + 2(3x - 2) = 0

(3x - 2) (7x + 2) = 0

So,

(3x - 2) = 0 or (7x + 2) = 0

3x = 2 or 7x = -2 x = 2/3 or x = -2/7

∴ Value of x = 2/3 or -2/7

(ii) 2/3x2– 1/3x – 1 = 0

Let us simplify the given equation,

By taking 3 as LCM and cross multiplying 2x2– x – 3 = 0

By factorizing, we get 2x2– 3x + 2x – 3 = 0 x(2x - 3) + 1 (2x - 3) = 0

(2x - 3) (x + 1) = 0

So,

(2x - 3) = 0 or (x + 1) = 0

2x = 3 or x = -1 x = 3/2 or x = -1

∴ Value of x = 3/2, -1

9. (i) 6x + 29 = 5/x

(ii)x + 1/x = 2 ½

Solution:

(i) 6x + 29 = 5/x

Let us simplify the given equation, By cross multiplying, we get

6x2+ 29x – 5 = 0

By factorizing, we get 6x2+ 30x – x – 5 = 0

6x (x + 5) -1 (x + 5) = 0

(x + 5) (6x - 1) = 0

So,

(x + 5) = 0 or (6x - 1) = 0

x = -5 or 6x = 1

x = -5 or x = 1/6

∴ Value of x = -5, 1/6

(ii) x + 1/x = 2 ½

= x + 1/x = 5/2

Let us simplify the given equation,

By taking LCM $x^2 + 1 = 5x/2$

By cross multiplying, $2x^2 + 2 - 5x = 0$

$2x^2 - 5x + 2 = 0$

By factorizing, we get $2x^2 - x - 4x + 2 = 0$ $x(2x - 1) - 2 (2x - 1) = 0$

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

So,

$(2x - 1) = 0$ or $(x - 2) = 0$

$2x = 1$ or $x = 2$ $x = ½$ or $x = 2$

∴ Value of x = ½, 2

10. (i) 3x – 8/x = 2

(ii) x/3 + 9/x = 4

Solution:

(i) 3x – 8/x = 2

Let us simplify the given equation,

By taking LCM and cross multiplying, $3x^2 - 8 = 2x$

$3x^2 - 2x - 8 = 0$

By factorizing, we get $3x^2 - 6x + 4x - 8 = 0$

$3x(x - 2) + 4 (x - 2) = 0$

$(x - 2) (3x + 4) = 0$

So,

$(x - 2) = 0$ or $(3x + 4) = 0$

x = 2 or 3x = -4 x = 2 or x = -4/3

∴ Value of x = 2, -4/3

(ii) x/3 + 9/x = 4

Let us simplify the given equation,

By taking 3x as LCM and cross multiplying x2+ 27 = 12x

x2– 12x + 27 = 0

By factorizing, we get x2– 3x – 9x + 27 = 0 x (x - 3) – 9 (x - 3) =0

(x - 3) (x - 9) = 0

So,

(x - 3) = 0 or (x - 9) = 0

x = 3 or x = 9

∴ Value of x = 3, 9

11. (i) (x - 1)/(x + 1) = (2x - 5)/(3x - 7)

(ii) 1/(x + 2) + 1/x = ¾

 Solution:

(i) (x - 1)/(x + 1) = (2x - 5)/(3x - 7)

Let us simplify the given equation, By cross multiplying,

(x - 1) (3x - 7) = (2x - 5) (x + 1)

3x2– 7x – 3x + 7 = 2x2+ 2x – 5x – 5

3x2– 10x + 7 – 2x2+3x + 5 = 0 x2– 7x + 12 = 0

By factorizing, we get x2– 4x – 3x + 12 = 0 x (x - 4) – 3 (x - 4) =0

(x - 4) (x - 3) = 0

So,

(x - 4) = 0 or (x - 3) = 0

x = 4 or x = 3

∴ Value of x = 4, 3

(ii) 1/(x + 2) + 1/x = ¾

Let us simplify the givenequation, By taking x(x + 2) as LCM (x+x+2)/x(x + 2) =¾

By cross multiplying, 4(2x + 2) = 3x(x +2)

8x + 8= 3x2+ 6x

3x2+ 6x – 8x – 8 = 0

3x2– 2x – 8 = 0

By factorizing, we get 3x2– 6x + 4x – 8 = 0

3x(x - 2) + 4 (x - 2) = 0

(x - 2) (3x + 4) = 0

So,

(x - 2) = 0 or (3x + 4) = 0

x = 2 or 3x = -4 x = 2 or x = -4/3

∴ Value of x = 2, -4/3

12. (i) 8/(x + 3) – 3/(2 - x) = 2

(ii) x/(x + 1) + (x + 1)/x = 2 1/6

 Solution:

(i) 8/(x + 3) – 3/(2 - x) = 2

Let us simplify the given equation,

By taking (x+3)(2-x) as LCM [8(2-x) – 3(x+3)] / (x+3) (2-x) = 2

[16 – 8x – 3x – 9] / [2x – x2+ 6 – 3x] = 2

[-11x + 7] = 2(-x2– x + 6) 7 – 11x = -2x2– 2x + 12

2x2+ 2x – 11 x – 12 + 7 = 0

2x2– 9x – 5 = 0

By factorizing, we get 2x2– 10x + x – 5 = 0

2x (x - 5) + 1 (x - 5) = 0

(x - 5) (2x + 1) = 0

So,

(x - 5) = 0 or (2x + 1) = 0

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

∴ Value of x = 5, -1/2

(ii) x/(x + 1) + (x + 1)/x = 2 1/6 x/(x + 1) + (x + 1)/x = 13/6

Let us simplify the given equation, By taking x(x+1) as LCM

$[x(x) + (x+1) (x+1)] / x(x + 1) = 13/6$ $6[x^2+ x^2+ x + x + 1] = 13x(x + 1)$

$6[2x^2+ 2x + 1] = 13x^2+ 13x$

$12x^2+ 12x + 6 - 13x^2- 13x = 0$

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

By factorizing, we get $x^2+ 3x - 2x - 6 = 0$

x (x + 3) - 2 (x + 3) = 0

(x + 3) (x - 2) = 0

So,

(x + 3) = 0 or (x - 2) = 0

x = -3 or x = 2

∴ Value of x = -3, 2