

EXERCISE 7

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

$$x^2 - 5x - 6x + 30 = 0$$

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

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

So,

$$(x - 5) = 0 \text{ or } (x - 6) = 0$$

$$x = 5 \text{ or } x = 6$$

∴ Value of $x = 5, 6$

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

Let us simplify the given equation,

$$4x^2 = 25$$

$$x^2 = 25/4$$

$$x = \pm \sqrt{(25/4)}$$

$$= \pm 5/2$$

∴ 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,

$$x = 0 \text{ or } 2x - 5 = 0$$

$$x = 0 \text{ or } 2x = 5$$

$$x = 0 \text{ or } x = 5/2$$

∴ Value of $x = 0, 5/2$

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

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,

$$(x - 8) = 0 \text{ or } (x + 6) = 0$$

$$x = 8 \text{ or } x = -6$$

∴ Value of $x = 8, -6$

3. (i) $6 + x = x^2$

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

Solution:

(i) $6 + x = x^2$

Let us simplify the given equation,

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

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

By factorizing, we get

$$x^2 - 3x + 2x - 6 = 0$$

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

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

So,

$$(x - 3) = 0 \text{ or } (x + 2) = 0$$

$$x = 3 \text{ or } x = -2$$

∴ 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,

$$(x - 1) = 0 \text{ or } (2x - 1) = 0$$

$$x = 1 \text{ or } 2x = 1$$

$$x = 1 \text{ or } x = \frac{1}{2}$$

∴ Value of $x = 1, \frac{1}{2}$



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,

$$(x - 2) = 0 \text{ or } (3x + 4) = 0$$

$$x = 2 \text{ or } 3x = -4$$

$$x = 2 \text{ or } x = -4/3$$

∴ Value of $x = 2$ or $-4/3$

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

Let us simplify the given equation,

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

By factorizing, we get

$$4x^2 - 6x - 10x + 15 = 0$$

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

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

So,

$$(2x - 3) = 0 \text{ or } (2x - 5) = 0$$

$$2x = 3 \text{ or } 2x = 5$$

$$x = 3/2 \text{ or } x = 5/2$$

∴ 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,

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

By factorizing, we get

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

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

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

So,

$$(x + 5) = 0 \text{ or } (2x - 5) = 0$$

$$x = -5 \text{ or } 2x = 5$$

$$x = -5 \text{ or } x = 5/2$$

$$\therefore \text{ Value of } x = -5, 5/2$$

$$\text{(ii) } (x + 3)(x - 3) = 40$$

Let us simplify the given equation,

$$x^2 - 3x + 3x - 9 = 40$$

$$x^2 - 9 - 40 = 0$$

$$x^2 - 49 = 0$$

$$x^2 = 49$$

$$x = \sqrt{49}$$

$$= \pm 7$$

$$\therefore \text{ Value of } x = 7, -7$$

$$\text{6. (i) } (2x + 3)(x - 4) = 6$$

$$\text{(ii) } (3x + 1)(2x + 3) = 3$$

Solution:

$$\text{(i) } (2x + 3)(x - 4) = 6$$

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,

$$(2x - 9) = 0 \text{ or } (x + 2) = 0$$

$$2x = 9 \text{ or } x = -2$$

$$x = 9/2 \text{ or } x = -2$$

$$\therefore \text{ Value of } x = 9/2, -2$$

$$\text{(ii) } (3x + 1)(2x + 3) = 3$$

Let us simplify the given equation,

$$6x^2 + 9x + 2x + 3 - 3 = 0$$

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

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

So,

$$x = 0 \text{ or } 6x + 11 = 0$$

$$x = 0 \text{ or } 6x = -11$$

$$x = 0 \text{ or } x = -11/6$$

$$\therefore \text{ Value of } x = 0, -11/6$$

7. (i) $4x^2 + 4x + 1 = 0$

(ii) $(x - 4)^2 + 5^2 = 132$

Solution:

(i) $4x^2 + 4x + 1 = 0$

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,

$$(2x + 1) = 0 \text{ or } (2x + 1) = 0$$

$$2x = -1 \text{ or } 2x = -1$$

$$x = -1/2 \text{ or } x = -1/2$$

$$\therefore \text{ Value of } x = -1/2, -1/2$$

(ii) $(x - 4)^2 + 5^2 = 132$

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,

$$(x - 16) = 0 \text{ or } (x + 8) = 0$$

$$x = 16 \text{ or } x = -8$$

$$\therefore \text{ Value of } x = 16, -8$$

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

(ii) $2/3x^2 - 1/3x - 1 = 0$

Solution:

(i) $21x^2 = 4(2x + 1)$

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,

$$(3x - 2) = 0 \text{ or } (7x + 2) = 0$$

$$3x = 2 \text{ or } 7x = -2$$

$$x = 2/3 \text{ or } x = -2/7$$

$$\therefore \text{ Value of } x = 2/3 \text{ or } -2/7$$

$$\text{(ii) } 2/3x^2 - 1/3x - 1 = 0$$

Let us simplify the given equation,

By taking 3 as LCM and cross multiplying

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

By factorizing, we get

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

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

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

So,

$$(2x - 3) = 0 \text{ or } (x + 1) = 0$$

$$2x = 3 \text{ or } x = -1$$

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

$$\therefore \text{ Value of } x = 3/2, -1$$

$$\mathbf{9. (i) 6x + 29 = 5/x}$$

$$\text{(ii) } x + 1/x = 2 \frac{1}{2}$$

Solution:

$$\text{(i) } 6x + 29 = 5/x$$

Let us simplify the given equation,

By cross multiplying, we get

$$6x^2 + 29x - 5 = 0$$

By factorizing, we get

$$6x^2 + 30x - x - 5 = 0$$

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

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

So,

$$(x + 5) = 0 \text{ or } (6x - 1) = 0$$

$$x = -5 \text{ or } 6x = 1$$



$$x = -5 \text{ or } x = 1/6$$

∴ Value of $x = -5, 1/6$

(ii) $x + 1/x = 2 \frac{1}{2}$

$$x + 1/x = 5/2$$

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,

$$(2x - 1) = 0 \text{ or } (x - 2) = 0$$

$$2x = 1 \text{ or } x = 2$$

$$x = 1/2 \text{ or } x = 2$$

∴ Value of $x = 1/2, 2$



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,

$$(x - 2) = 0 \text{ or } (3x + 4) = 0$$

$$x = 2 \text{ or } 3x = -4$$

$$x = 2 \text{ or } x = -4/3$$

∴ 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

$$x^2 + 27 = 12x$$

$$x^2 - 12x + 27 = 0$$

By factorizing, we get

$$x^2 - 3x - 9x + 27 = 0$$

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

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

So,

$$(x - 3) = 0 \text{ or } (x - 9) = 0$$

$$x = 3 \text{ or } x = 9$$

\therefore Value of $x = 3, 9$

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

(ii) $1/(x + 2) + 1/x = 3/4$

Solution:

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

Let us simplify the given equation,

By cross multiplying,

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

$$3x^2 - 7x - 3x + 7 = 2x^2 + 2x - 5x - 5$$

$$3x^2 - 10x + 7 - 2x^2 + 3x + 5 = 0$$

$$x^2 - 7x + 12 = 0$$

By factorizing, we get

$$x^2 - 4x - 3x + 12 = 0$$

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

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

So,

$$(x - 4) = 0 \text{ or } (x - 3) = 0$$

$$x = 4 \text{ or } x = 3$$

\therefore Value of $x = 4, 3$

(ii) $1/(x + 2) + 1/x = 3/4$

Let us simplify the given equation,

By taking $x(x + 2)$ as LCM

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

By cross multiplying,

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

$$8x + 8 = 3x^2 + 6x$$

$$3x^2 + 6x - 8x - 8 = 0$$

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

By factorizing, we get

$$3x^2 - 6x + 4x - 8 = 0$$

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

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

So,

$$(x - 2) = 0 \text{ or } (3x + 4) = 0$$

$$x = 2 \text{ or } 3x = -4$$

$$x = 2 \text{ or } x = -4/3$$

∴ Value of $x = 2, -4/3$

12. (i) $8/(x + 3) - 3/(2 - x) = 2$

(ii) $x/(x + 1) + (x + 1)/x = 2 \frac{1}{6}$

Solution:

(i) $8/(x + 3) - 3/(2 - x) = 2$

Let us simplify the given equation,

By taking $(x+3)(2-x)$ as LCM

$$[8(2-x) - 3(x+3)] / (x+3)(2-x) = 2$$

$$[16 - 8x - 3x - 9] / [2x - x^2 + 6 - 3x] = 2$$

$$[-11x + 7] = 2(-x^2 - x + 6)$$

$$7 - 11x = -2x^2 - 2x + 12$$

$$2x^2 + 2x - 11x - 12 + 7 = 0$$

$$2x^2 - 9x - 5 = 0$$

By factorizing, we get

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

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

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

So,

$$(x - 5) = 0 \text{ or } (2x + 1) = 0$$

$$x = 5 \text{ or } 2x = -1$$

$$x = 5 \text{ or } x = -1/2$$

∴ Value of $x = 5, -1/2$

(ii) $x/(x + 1) + (x + 1)/x = 2 \frac{1}{6}$

$$x/(x + 1) + (x + 1)/x = 13/6$$

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,

$$(x+3) = 0 \text{ or } (x-2) = 0$$

$$x = -3 \text{ or } x = 2$$

∴ Value of x = -3, 2



CHAPTER TEST

Solve the following (1 to 3) equations:

1. (i) $x(2x + 5) = 3$

(ii) $3x^2 - 4x - 4 = 0$.

Solution:

(i) $x(2x + 5) = 3$

We can write it as

$$2x^2 + 5x - 3 = 0$$

By further calculation

$$2x^2 + 6x - x - 3 = 0$$

By taking out the common terms

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

So we get

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

Here

$$x + 3 = 0 \text{ then } x = -3$$

$$2x - 1 = 0 \text{ then } 2x = 1 \text{ where } x = \frac{1}{2}$$

Therefore, $x = -3, \frac{1}{2}$.

(ii) $3x^2 - 4x - 4 = 0$

We can write it as

$$3x^2 - 6x + 2x - 4 = 0$$

By taking out the common terms

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

So we get

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

Here

$$x - 2 = 0 \text{ then } x = 2$$

$$3x + 2 = 0 \text{ then } 3x = -2 \text{ where } x = -\frac{2}{3}$$

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

2. (i) $4x^2 - 2x + \frac{1}{4} = 0$

(ii) $2x^2 + 7x + 6 = 0$.

Solution:

(i) $4x^2 - 2x + \frac{1}{4} = 0$

Multiply the equation by 4

$$16x^2 - 8x + 1 = 0$$

We can write it as

$$16x^2 - 4x - 4x + 1 = 0$$

Taking out the common terms

$$4x(4x - 1) - 1(4x - 1) = 0$$

So we get

$$(4x - 1)(4x - 1) = 0$$

$$(4x - 1)^2 = 0$$

Here

$$4x - 1 = 0$$

$$4x = 1$$

By division

$$x = \frac{1}{4}, \frac{1}{4}$$

(ii) $2x^2 + 7x + 6 = 0$

We can write it as

$$2x^2 + 4x + 3x + 6 = 0$$

By further calculation

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

So we get

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

Here

$$x + 2 = 0 \text{ then } x = -2$$

$$2x + 3 = 0 \text{ then } 2x = -3 \text{ where } x = -\frac{3}{2}$$

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

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

(ii) $\frac{6}{x} - \frac{2}{(x - 1)} = \frac{1}{(x - 2)}$.

Solution:

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

By taking LCM

$$[\frac{(x - 1)(x - 4) + (x - 2)(x - 3)}{(x - 2)(x - 4)}] = \frac{10}{3}$$

By further calculation

$$\frac{(x^2 - 5x + 4 + x^2 - 5x + 6)}{(x^2 - 6x + 8)} = \frac{10}{3}$$

So we get

$$(2x^2 - 10x + 10)/(x^2 - 6x + 8) = 10/3$$

By cross multiplication

$$10x^2 - 60x + 80 = 6x^2 - 30x + 30$$

By further simplification

$$10x^2 - 60x + 80 - 6x^2 + 30x - 30 = 0$$

So we get

$$4x^2 - 30x + 50 = 0$$

Dividing by 2

$$2x^2 - 15x + 25 = 0$$

It can be written as

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

Taking out the common terms

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

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

Here

$$x - 5 = 0 \text{ then } x = 5$$

$$2x - 5 = 0 \text{ then } 2x = 5 \text{ where } x = 5/2$$

Therefore, $x = 5, 5/2$.



$$(ii) 6/x - 2/(x - 1) = 1/(x - 2)$$

Taking LCM

$$(6x - 6 - 2x)/x(x - 1) = 1/(x - 2)$$

By further calculation

$$(4x - 6)/(x^2 - x) = 1/(x - 2)$$

By cross multiplication

$$4x^2 - 8x - 6x + 12 = x^2 - x$$

So we get

$$4x^2 - 14x + 12 - x^2 + x = 0$$

$$3x^2 - 13x + 12 = 0$$

$$3x^2 - 4x - 9x + 12 = 0$$

Taking out the common terms

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

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

Here

$$3x - 4 = 0 \text{ then } 3x = 4 \text{ where } x = 4/3$$

$$x - 3 = 0 \text{ then } x = 3$$

Therefore, $x = 3, 4/3$.