EXERCISE 7

Solve the following (1 to 12) equations:

1. (i) x² – 11x + 30 = 0
(ii) 4x² - 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,
$(x - 5) = 0$ 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,
$4x^2 = 25$
$x^2 = 25/4$
$x = \pm \sqrt{(25/4)}$
 $= \pm 5/2$
∴ Value of $x = +5/2, -5/2$

2. (i) 2x² – 5x = 0
(ii) x² – 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) $x^2 - 2x = 48$

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,
$(x - 8) = 0$ 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:
(i) 6 + x = x²
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,
$(x - 3) = 0$ or $(x + 2) = 0$
x = 3 or x = -2
∴ Value of x = 3, -2

(ii) 2x² + 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) 3x² = 2x + 8
(ii) 4x² + 15 = 16x
Solution:
(i) 3x² = 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) 4x² + 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 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,
$2x^2 + 5x – 25 = 0$
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 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,
$x^2 – 3x + 3x – 9 = 40$
$x^2 – 9 – 40 = 0$
$x^2 – 49 = 0$
$x^2 = 49$
$x = \sqrt{49}$
  = ± 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) $4x^2 + 4x + 1 = 0$
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,
$(2x + 1) = 0$ or $(2x + 1) = 0$
2x = -1 or 2x = -1
x = -1/2 or x = -1/2
∴ Value of x = -1/2, -1/2

(ii) $(x – 4)^2 + 5^2 = 13^2$
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) $21x^2 = 4 (2x + 1)$
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,
$(3x - 2) = 0$ 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) $2/3x^2 – 1/3x – 1 = 0$
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,
$(2x - 3) = 0$ 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
$6x^2 + 29x – 5 = 0$
By factorizing, we get
$6x^2 + 30x – x – 5 = 0$
$6x (x + 5) -1 (x + 5) = 0$
$(x + 5) (6x - 1) = 0$
So,
$(x + 5) = 0$ 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
$x^2 + 27 = 12x$
$x^2 – 12x + 27 = 0$
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 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)
$3x^2 – 7x – 3x + 7 = 2x^2 + 2x – 5x – 5$
$3x^2 – 10x + 7 – 2x^2 +3x + 5 = 0$
$x^2 – 7x + 12 = 0$
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 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 given equation,
By taking x(x + 2) as LCM
(x+x+2)/x(x + 2) = ¾
By cross multiplying,
4(2x + 2) = 3x(x + 2)

$8x + 8 = 3x^2 + 6x$
$3x^2 + 6x – 8x – 8 = 0$
$3x^2 – 2x – 8 = 0$
By factorizing, we get
$3x^2 – 6x + 4x – 8 = 0$
$3x(x - 2) + 4 (x - 2) = 0$
$(x - 2) (3x + 4) = 0$
So,
$(x - 2) = 0$ 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
$[8(2-x) – 3(x+3)] / (x+3) (2-x) = 2$
$[16 – 8x – 3x – 9] / [2x – x^2 + 6 – 3x] = 2$
$[-11x + 7] = 2(-x^2 – x + 6)$
$7 – 11x = -2x^2 – 2x + 12$
$2x^2 + 2x – 11 x – 12 + 7 = 0$
$2x^2 – 9x – 5 = 0$
By factorizing, we get
$2x^2 – 10x + x – 5 = 0$
$2x (x - 5) + 1 (x - 5) = 0$
$(x - 5) (2x + 1) = 0$
So,
$(x - 5) = 0$ 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
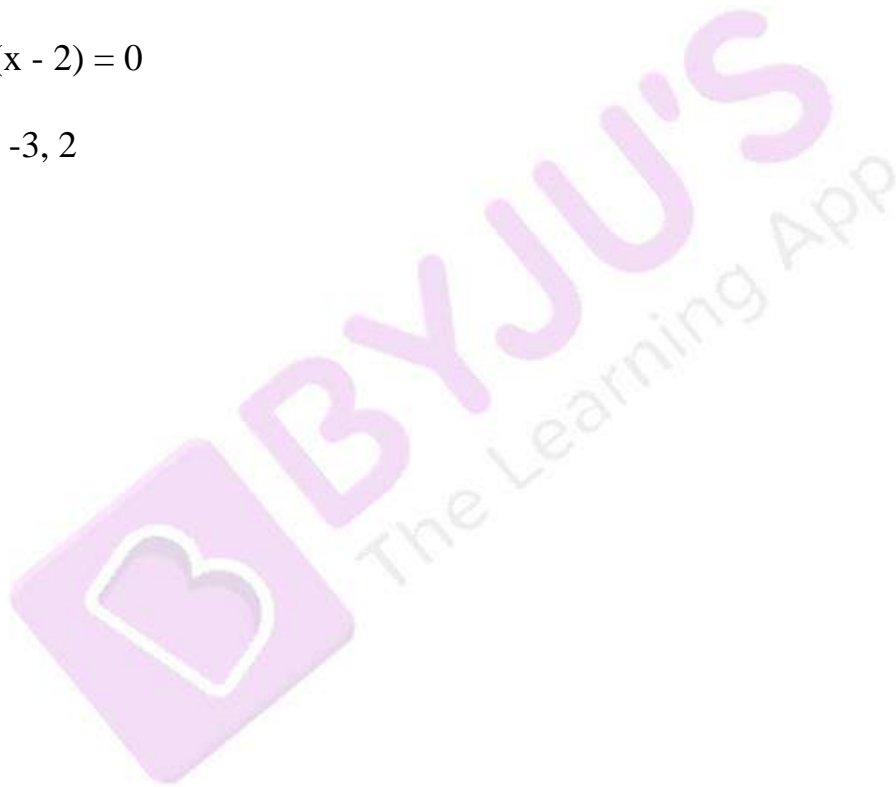x^2 + 3x – 2x – 6 = 0
x (x + 3) – 2 (x + 3) = 0
(x + 3) (x - 2) = 0
So,
(x + 3) = 0 or (x - 2) = 0
x = -3 or x = 2
∴ Value of x = -3, 2

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 then x = - 3
2x – 1 = 0 then 2x = 1 where x = ½

Therefore, x = - 3, ½.

(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 then x = 2
3x + 2 = 0 then 3x = - 2 where x = - 2/3

Therefore, x = 2, - 2/3.

2. (i) $4x^2 – 2x + ¼ = 0$
(ii) $2x^2 + 7x + 6 = 0$.
Solution:

(i) $4x^2 - 2x + ¼ = 0$
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
$x = ¼, ¼$

(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
$x + 2 = 0$ then $x = - 2$
$2x + 3 = 0$ then $2x = - 3$ where $x = - 3/2$
$x = - 2, - 3/2$

3. (i) (x – 1)/ (x – 2) + (x – 3)/ (x – 4) = 3 1/3
(ii) 6/x – 2/(x – 1) = 1/(x – 2).
Solution:

(i) $(x - 1)/ (x - 2) + (x - 3)/ (x - 4) = 3 1/3$
By taking LCM
$[(x - 1) (x - 4) + (x - 2) (x - 3)]/ (x - 2) (x - 4) = 10/3$
By further calculation
$(x^2 - 5x + 4 + x^2 - 5x + 6)/ (x^2 - 6x + 8) = 10/3$
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
$x – 5 = 0$ then $x = 5$
$2x – 5 = 0$ then $2x = 5$ 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
$3x – 4 = 0$ then $3x = 4$ where $x = 4/3$
$x – 3 = 0$ then $x = 3$
Therefore, $x = 3, 4/3$.