
FACTORISATION OF POLYNOMIALS - CHAPTER – 3

EXERCISE – 3A

Answer1. $9x^2 + 12xy$

$$\begin{aligned}9x^2 + 12xy &= 3x(3x) + 3x(4y) \\ &= 3x(3x + 4y)\end{aligned}$$

Answer2. $18x^2y - 24xyz$

$$\begin{aligned}18x^2y - 24xyz &= 6xy(3x) - 6xy(4z) \\ &= 6xy(3x - 4z)\end{aligned}$$

Answer3. $27a^3b^3 - 45a^4b^2$

$$\begin{aligned}27a^3b^3 - 45a^4b^2 &= 9a^3b^2(3b) - 9a^3b^2(5a) \\ &= 9a^3b^2(3b - 5a)\end{aligned}$$

Answer4. $2a(x + y) - 3b(x + y)$

$$2a(x + y) - 3b(x + y) = (x + y)(2a - 3b)$$

Answer5. $2x(p^2 + q^2) + 4y(p^2 + q^2)$

$$\begin{aligned}2x(p^2 + q^2) + 4y(p^2 + q^2) &= (p^2 + q^2)(2x + 4y) \\ &= 2(p^2 + q^2)(x + 2y)\end{aligned}$$

Answer6. $x(a - 5) + y(a - 5)$

$$x(a - 5) + y(a - 5) = (a - 5)(x + y)$$

Answer7. $4(a + b) - 6(a + b)^2$

$$\begin{aligned}4(a + b) - 6(a + b)^2 &= 2(a + b)(2 - 3(a + b)) \\ &= 2(a + b)(2 - 3a - 3b)\end{aligned}$$

Answer8. $8(3a - 2b)^2 - 10(3a - 2b)$

$$\begin{aligned}8(3a - 2b)^2 - 10(3a - 2b) &= 2(3a - 2b)(4(3a - 2b) - 5) \\ &= 2(3a - 2b)(12a - 8b - 5)\end{aligned}$$

Answer9. $x(x + y)^3 - 3x^2y(x + y)$

$$\begin{aligned}x(x + y)^3 - 3x^2y(x + y) &= x(x + y)((x + y)^2 - 3xy) \\ &= x(x + y)(x^2 + y^2 + 2xy - 3xy) \\ &= x(x + y)(x^2 + y^2 - xy)\end{aligned}$$

Answer10. $x^3 + 2x^2 + 5x + 10$

$$\begin{aligned}x^3 + 2x^2 + 5x + 10 &= x^3 + 5x + 2x^2 + 10 \\ &= x(x^2 + 5) + 2(x^2 + 5) \\ &= (x + 2)(x^2 + 5)\end{aligned}$$

Answer11. $x^2 + xy - 2xz - 2yz$

$$\begin{aligned}x^2 + xy - 2xz - 2yz &= x^2 - 2xz + xy - 2yz \\ &= x(x - 2z) + y(x - 2z) \\ &= (x + y)(x - 2z)\end{aligned}$$

Answer12. $(a^3b - a^2b + 5ab - 5b)$

$$\begin{aligned}(a^3b - a^2b + 5ab - 5b) &= (a^3b + 5ab - a^2b - 5b) \\ &= [ab(a^2 + 5) - b(a^2 + 5)] \\ &= (ab - b)(a^2 + 5) \\ &= b(a - 1)(a^2 + 5)\end{aligned}$$

Answer13. $8 - 4a - 2a^3 + a^4$

$$\begin{aligned}8 - 4a - 2a^3 + a^4 &= 8 - 2a^3 - 4a + a^4 \\ &= 2(4 - a^3) - a(4 + a^3) \\ &= (2 - a)(4 - a^3)\end{aligned}$$

Answer14. $x^3 - 2x^2y + 3xy^2 - 6y^3$

$$\begin{aligned}x^3 - 2x^2y + 3xy^2 - 6y^3 &= x^2(x - 2y) + 3y^2(x - 2y) \\ &= (x - 2y)(x^2 + 3y^2)\end{aligned}$$

Answer15. $px - 5q + pq - 5x$

$$\begin{aligned}px - 5q + pq - 5x &= px - 5x + pq - 5q \\ &= x(p - 5) + q(p - 5) \\ &= (x + q)(p - 5)\end{aligned}$$

Answer16. $x^2 + y - xy - x$

$$\begin{aligned}x^2 + y - xy - x &= x^2 - xy + y - x \\ &= x(x - y) + (-1)(x - y) \\ &= (x - 1)(x - y)\end{aligned}$$

Answer17. $(3a - 1)^2 - 6a + 2$

$$\begin{aligned}(3a - 1)^2 - 6a + 2 &= (3a)^2 + (1)^2 - 2 \cdot 3a \cdot 1 - 6a + 2 \\ &= 9a^2 + 1 - 6a - 6a + 2 \\ &= 9a^2 - 12a + 3 \\ &= 9a^2 - 9a - 3a + 3 \\ &= 9a(a - 1) - 3(a - 1) \\ &= (a - 1)(9a - 3) \\ &= 3(a - 1)(3a - 1)\end{aligned}$$

Answer18. $(2x - 3)^2 - 8x + 12$

$$\begin{aligned}(2x - 3)^2 - 8x + 12 &= (2x - 3)^2 - 4(2x - 3) \\ &= (2x - 3)[(2x - 3) - 4] \\ &= (2x - 3)(2x - 7)\end{aligned}$$

Answer19. $a^3 + a - 3a^2 - 3$

$$\begin{aligned}a^3 + a - 3a^2 - 3 &= a(a^2 + 1) - 3(a^2 + 1) \\ &= (a^2 + 1)(a - 3)\end{aligned}$$

Answer20. $3ax - 6ay - 8by + 4bx$

$$\begin{aligned}3ax - 6ay - 8by + 4bx &= 3a(x - 2y) + 4b(-2y + x) \\ &= (x - 2y)(3a + 4b)\end{aligned}$$

Answer21. $abx^2 + a^2x + b^2x + ab$

$$\begin{aligned}abx^2 + a^2x + b^2x + ab &= ax(bx + a) + b(bx + a) \\ &= (ax + b)(bx + a)\end{aligned}$$

Answer22. $x^3 - x^2 + ax + x - a - 1$

$$\begin{aligned}x^3 - x^2 + ax + x - a - 1 &= x^3 - x^2 + x(a + 1) - 1(a + 1) \\ &= x^3 - x^2 + [(x - 1)(a + 1)] \\ &= x^2(x - 1) + [(x - 1)(a + 1)] \\ &= (x - 1)[x^2 + (a + 1)] \\ &= (x - 1)(x^2 + a + 1)\end{aligned}$$

Answer23. $2x + 4y - 8xy - 1$

$$\begin{aligned}2x + 4y - 8xy - 1 &= 2x - 1 + 4y - 8xy \\ &= 1(2x - 1) - 4y[(-1) + 2x] \\ &= 1(2x - 1) - 4y(2x - 1) \\ &= (2x - 1)(1 - 4y)\end{aligned}$$

Answer24. $ab(x^2 + y^2) - xy(a^2 + b^2)$

$$\begin{aligned}ab(x^2 + y^2) - xy(a^2 + b^2) &= abx^2 + aby^2 - a^2xy - b^2xy \\ &= abx^2 - a^2xy + aby^2 - b^2xy \\ &= ax(bx - ay) - by[(-ay) + bx] \\ &= ax(bx - ay) - by(bx - ay) \\ &= (bx - ay)(ax - by)\end{aligned}$$

Answer25. $a^2 + ab(b + 1) + b^3$

$$\begin{aligned}.a^2 + ab(b + 1) + b^3 &= a^2 + ab^2 + ab + b^3 \\ &= a(a + b^2) + b(a + b^2) \\ &= (a + b)(a + b^2)\end{aligned}$$

Answer26. $a^3 + ab(1 - 2a) - 2b^2$

$$\begin{aligned}.a^3 + ab(1 - 2a) - 2b^2 &= a^3 + ab - 2a^2b - 2b^2 \\ &= a(a^2 + b) - 2b(a^2 + b) \\ &= (a - 2b)(a^2 + b)\end{aligned}$$

Answer27. $2a^2 + bc - 2ab - ac$

$$\begin{aligned}2a^2 + bc - 2ab - ac &= 2a^2 - 2ab + bc - ac \\ &= 2a(a - b) - c(a - b) \\ &= (a - b)(2a - c)\end{aligned}$$

Answer28. $(ax + by)^2 + (bx - ay)^2$

$$\begin{aligned}(ax + by)^2 + (bx - ay)^2 &= (ax)^2 + (by)^2 + 2.ax.by + (bx)^2 + (ay)^2 - 2.bx.ay \\ &= a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2 + (2abxy - 2abxy) \\ &= a^2x^2 + a^2y^2 + b^2x^2 + b^2y^2 \\ &= a^2(x^2 + y^2) + b^2(x^2 + y^2) \\ &= (x^2 + y^2)(a^2 + b^2)\end{aligned}$$

Answer29. $a(a + b - c) - bc$

$$\begin{aligned}a(a + b - c) - bc &= a^2 + ab - ac - bc \\ &= a(a + b) - c(a + b) \\ &= (a + b)(a - c)\end{aligned}$$

Answer30. $a(a - 2b - c) + 2bc$

$$\begin{aligned}a(a - 2b - c) + 2bc &= a^2 - 2ab - ac + 2bc \\ &= a^2 - ac - 2ab + 2bc \\ &= a(a - c) - 2b(a - c) \\ &= (a - c)(a - 2b)\end{aligned}$$

Answer31. $a^2x^2 + (ax^2 + 1)x + a$

$$\begin{aligned} a^2x^2 + (ax^2 + 1)x + a &= a^2x^2 + ax^3 + x + a \\ &= ax^2(a + x) + 1(a + x) \\ &= (a + x)(ax^2 + 1) \end{aligned}$$

Answer32. $ab(x^2 + 1) + x(a^2 + b^2)$

$$\begin{aligned} ab(x^2 + 1) + x(a^2 + b^2) &= abx^2 + ab + xa^2 + xb^2 \\ &= abx^2 + xa^2 + xb^2 + ab \\ &= ax(bx + a) + b(bx + a) \\ &= (ax + b)(bx + a) \end{aligned}$$

Answer33. $x^2 - (a + b)x + ab$

$$\begin{aligned} x^2 - (a + b)x + ab &= x^2 - ax - bx + ab \\ &= x(x - a) - b(x - a) \\ &= (x - a)(x - b) \end{aligned}$$

Answer34. $x^2 + \frac{1}{x^2} - 2 - 3x + \frac{3}{x}$

$$\begin{aligned} x^2 + \frac{1}{x^2} - 2 - 3x + \frac{3}{x} &= x^2 + \frac{1}{x^2} - 2 \cdot x \cdot \frac{1}{x} - 3 \left(x - \frac{1}{x}\right) \\ &= \left(x - \frac{1}{x}\right)^2 - 3 \left(x - \frac{1}{x}\right) \\ &= \left(x - \frac{1}{x}\right) \left(x - \frac{1}{x} - 3\right) \end{aligned}$$