

Ex. 7A

1. Factorise:

(i) $12x + 15$

Solution:

$$\begin{aligned} 12x + 15 \\ = 3(4x + 5) \end{aligned}$$

(ii) $14m - 21$

Solution:

$$\begin{aligned} 14m - 21 \\ = 7(2m - 3) \end{aligned}$$

(iii) $9n - 12n^2$

Solution:

$$\begin{aligned} 9n - 12n^2 \\ = 3n(3 - 4n) \end{aligned}$$

2. Factorise:

(i) $16a^2 - 24ab$

Solution:

$$\begin{aligned} 16a^2 - 24ab \\ = 8a(2a - 3b) \end{aligned}$$

(ii) $15ab^2 - 20a^2b$

Solution:

$$\begin{aligned} 15ab^2 - 20a^2b \\ = 5ab(3b - 4a) \end{aligned}$$

(iii) $12x^2y^3 - 21x^3y^2$

Solution:

$$\begin{aligned} 12x^2y^3 - 21x^3y^2 \\ = 3x^2y^2(4y - 7x) \end{aligned}$$

3. Factorise:

(i) $24x^3 - 36x^2y$

Solution:

$$\begin{aligned} &24x^3 - 36x^2y \\ &= 12x^2(2x - 3y) \end{aligned}$$

(ii) $10x^3 - 15x^2$

Solution:

$$\begin{aligned} &10x^3 - 15x^2 \\ &= 5x^2(2x - 3) \end{aligned}$$

(iii) $36x^3y - 60x^2y^3z$

Solution:

$$\begin{aligned} &36x^3y - 60x^2y^3z \\ &= 12x^2y(3x - 5y^2z) \end{aligned}$$

4. Factorise:

(i) $9x^3 - 6x^2 + 12x$

Solution:

$$\begin{aligned} &9x^3 - 6x^2 + 12x \\ &= 3x(3x^2 - 2x + 4) \end{aligned}$$

(ii) $8x^2 - 72xy + 12x$

Solution:

$$\begin{aligned} &8x^2 - 72xy + 12x \\ &= 4x(2x - 18y + 3) \end{aligned}$$

(iii) $18a^3b^3 - 27a^2b^3 + 36a^3b^2$

Solution:

$$\begin{aligned} &18a^3b^3 - 27a^2b^3 + 36a^3b^2 \\ &= 9a^2b^2(2ab - 3b + 4a) \end{aligned}$$

5. Factorise:

(i) $14x^3 + 21x^4y - 28x^2y^2$

Solution:

$$\begin{aligned} &14x^3 + 21x^4y - 28x^2y^2 \\ &= 7x^2(2x + 3x^2y - 4y^2) \end{aligned}$$

(ii) $-5 - 10t + 20t^2$
Solution:
 $-5 - 10t + 20t^2$
 $= -5(1 + 2t - 4t^2)$

6. Factorise:

(i) $x(x + 3) + 5(x + 3)$
Solution:
 $x(x + 3) + 5(x + 3)$
 $= (x + 3)(x + 5)$

(ii) $5x(x - 4) - 7(x - 4)$
Solution:
 $5x(x - 4) - 7(x - 4)$
 $= (x - 4)(5x - 7)$

(iii) $2m(l - n) + 3(l - n)$
Solution:
 $2m(l - n) + 3(l - n)$
 $= (l - n)(2m + 3)$

7. $6a(a - 2b) + 5b(a - 2b)$
Solution:
 $6a(a - 2b) + 5b(a - 2b)$
 $= (a - 2b)(6a + 5b)$

8. $x^3(2a - b) + x^2(2a - b)$
Solution:
 $x^3(2a - b) + x^2(2a - b)$
 $= (2a - b)(x^3 + x^2)$
 $= x^2(2a - b)(x + 1)$

9. $9a(3a - 5b) - 12a^2(3a - 5b)$
Solution:
 $9a(3a - 5b) - 12a^2(3a - 5b)$
 $= (3a - 5b)(9a - 12a^2)$
 $= 3a(3a - 5b)(3 - 4a)$

$$10.(x + 5)^2 - 4(x + 5)$$

Solution:

$$\begin{aligned}(x + 5)^2 - 4(x + 5) \\ &= (x + 5)(x + 5 - 4) \\ &= (x + 5)(x + 1)\end{aligned}$$

$$11.3(a - 2b)^2 - 5(a - 2b)$$

Solution:

$$\begin{aligned}3(a - 2b)^2 - 5(a - 2b) \\ &= (a - 2b)[3(a - 2b) - 5] \\ &= (a - 2b)(3a - 6b - 5)\end{aligned}$$

$$12.2a + 6b - 3(a + 3b)^2$$

Solution:

$$\begin{aligned}2a + 6b - 3(a + 3b)^2 \\ &= 2(a + 3b) - 3(a + 3b)^2 \\ &= (a + 3b)[2 - 3(a + 3b)] \\ &= (a + 3b)(2 - 3a - 9b)\end{aligned}$$

$$13.16(2p - 3q)^2 - 4(2p - 3q)$$

Solution:

$$\begin{aligned}16(2p - 3q)^2 - 4(2p - 3q) \\ &= 4(2p - 3q)[4(2p - 3q) - 1] \\ &= 4(2p - 3q)(8p - 12q - 1)\end{aligned}$$

$$14.x(a - 3) + y(3 - a)$$

Solution:

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

$$15.12(2x - 3y)^2 - 16(3y - 2x)$$

Solution:

$$\begin{aligned}12(2x - 3y)^2 - 16(3y - 2x) \\ &= 12(2x - 3y)^2 + 16(2x - 3y) \\ &= 4(2x - 3y)[3(2x - 3y) + 4] \\ &= 4(2x - 3y)(6x - 9y + 4)\end{aligned}$$

$$16. (x + y)(2x + 5) - (x + y)(x + 3)$$

Solution:

$$\begin{aligned} & (x + y)[2x + 5 - (x + 3)] \\ &= (x + y)(2x + 5 - x - 3) \\ &= (x + y)(x + 2) \end{aligned}$$

$$17. ar + br + at + bt$$

Solution:

$$\begin{aligned} & ar + br + at + bt \\ &= r(a + b) + t(a + b) \\ &= (a + b)(r + t) \end{aligned}$$

$$18. x^2 - ax - bx + ab$$

Solution:

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

$$19. ab^2 - bc^2 - ab + c^2$$

Solution:

$$\begin{aligned} & ab^2 - bc^2 - ab + c^2 \\ &= b(ab - c^2) - 1(ab - c^2) \\ &= (ab - c^2)(b - 1) \end{aligned}$$

$$20. x^2 - xz + xy - yz$$

Solution:

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

$$21. 6ab - b^2 + 12ac - 2bc$$

Solution:

$$\begin{aligned} & 6ab - b^2 + 12ac - 2bc \\ &= b(6a - b) + 2c(6a - b) \\ &= (6a - b)(b + 2c) \end{aligned}$$

$$22. (x - 2y)^2 + 4x - 8y$$

Solution:

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

$$23. y^2 - xy(1 - x) - x^3$$

Solution:

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

$$24. (ax + by)^2 + (bx - ay)^2$$

Solution:

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

$$25. ab^2 + (a - 1)b - 1$$

Solution:

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

$$26. x^3 - 3x^2 + x - 3$$

Solution:

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

$$27. ab(x^2 + y^2) - xy(a^2 + b^2)$$

Solution:

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

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

Solution:

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

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