



Factorisation of Algebraic Expressions Ex 5.4 Q15

Answer :

The given expression is

$$x^3 + y^3 - 12xy + 64$$

It is given that

$$x + y = -4$$

$$\Rightarrow x + y + 4 = 0$$

The given expression can be written in the form

$$\begin{aligned} x^3 + y^3 - 12xy + 64 &= x^3 + y^3 + 64 - 12xy \\ &= (x)^3 + (y)^3 + (4)^3 - 3.(x).(y).(4) \end{aligned}$$

Recall the formula

$$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

Using the above formula, we have

$$\begin{aligned} &x^3 + y^3 - 12xy + 64 \\ &= (x + y + 4)\{(x)^2 + (y)^2 + (4)^2 - (x).(y) - (y).(4) - (4).(x)\} \\ &= (x + y + 4)(x^2 + y^2 + 16 - xy - 4y - 4x) \\ &= 0.(x^2 + y^2 + 16 - xy - 4y - 4x) \\ &= \boxed{0} \end{aligned}$$

Factorisation of Algebraic Expressions Ex 5.4 Q16

Answer :

(i) The given expression is

$$x^2 + y^2 + z^2 - xy + xz + yz$$

We have to multiply the above expression by $(x + y - z)$.

The required product is

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

Recall the formula

$$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

Using the above formula, we have

$$\begin{aligned} &= x^3 + y^3 + (-z)^3 - 3.x.y.(-z) \\ &= \boxed{x^3 + y^3 - z^3 + 3xyz} \end{aligned}$$

(ii) The given expression is

$$x^2 + 4y^2 + z^2 + 2xy + xz - 2yz$$

We have to multiply the above expression by $(x - 2y - z)$.

The required product is

$$(x-2y-z)(x^2+4y^2+z^2+2xy+xz-2yz) \\ = \{x+(-2y)+(-z)\} \{(x)^2+(-2y)^2+(-z)^2-x(-2y)-(-2y)(-z)-(-z)x\}$$

Recall the formula

$$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$$

Using the above formula, we have

$$= x^3+(-2y)^3+(-z)^3-3.x.(-2y).(-z) \\ = \boxed{x^3-8y^3-z^3-6xyz}$$

(iii) The given expression is

$$x^2+4y^2+2xy-3x+6y+9$$

We have to multiply the above expression by $(x-2y+3)$.

The required product is

$$(x-2y+3)(x^2+4y^2+2xy-3x+6y+9) \\ = \{x+(-2y)+3\} \{(x)^2+(-2y)^2+(3)^2-x(-2y)-(-2y)(3)-(3)x\}$$

Recall the formula

$$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$$

Using the above formula, we have

$$= x^3+(-2y)^3+(3)^3-3.x.(-2y).(3) \\ = \boxed{x^3-8y^3+27+18xy}$$

(iii) The given expression is

$$9x^2+25y^2+15xy+12x-20y+16$$

We have to multiply the above expression by $(3x-5y+4)$.

The required product is

$$(3x-5y+4)(9x^2+25y^2+15xy+12x-20y+16) \\ = \{3x+(-5y)+4\} \{(3x)^2+(-5y)^2+(4)^2-3x(-5y)-(-5y)(4)-(4).3x\}$$

Recall the formula

$$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$$

Using the above formula, we have

$$= (3x)^3+(-5y)^3+(4)^3-3.3x.(-5y).(4) \\ = \boxed{27x^3-125y^3+64+180xy}$$

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