



Factorisation of Algebraic Expressions Ex 5.4 Q1

Answer :

The given expression to be factorized is

$$a^3 + 8b^3 + 64c^3 - 24abc$$

This can be written in the form

$$a^3 + 8b^3 + 64c^3 - 24abc = (a)^3 + (2b)^3 + (4c)^3 - 3.a.2b.4c$$

$$\text{Recall the formula } a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

Using the above formula, we have

$$\begin{aligned} a^3 + 8b^3 + 64c^3 - 24abc &= (a + 2b + 4c)\{(a)^2 + (2b)^2 + (4c)^2 - a.2b - 2b.4c - 4c.a\} \\ &= (a + 2b + 4c)(a^2 + 4b^2 + 16c^2 - 2ab - 8bc - 4ca) \end{aligned}$$

We cannot further factorize the expression.

So, the required factorization of $a^3 + 8b^3 + 64c^3 - 24abc$ is

$$(a + 2b + 4c)(a^2 + 4b^2 + 16c^2 - 2ab - 8bc - 4ca).$$

Factorisation of Algebraic Expressions Ex 5.4 Q2

Answer :

The given expression to be factorized is

$$x^3 - 8y^3 + 27z^3 + 18xyz$$

This can be written in the form

$$x^3 - 8y^3 + 27z^3 + 18xyz = (x)^3 + (-2y)^3 + (3z)^3 - 3.x.(-2y).3z$$

$$\text{Recall the formula } a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

Using the above formula, we have

$$\begin{aligned} x^3 - 8y^3 + 27z^3 + 18xyz &= \{x + (-2y) + 3z\} \{(x)^2 + (-2y)^2 + (3z)^2 - (x).(-2y) - (-2y).(3z) - (3z).(x)\} \\ &= (x - 2y + 3z)(x^2 + 4y^2 + 9z^2 + 2xy + 6yz - 3zx) \end{aligned}$$

We cannot further factorize the expression.

So, the required factorization is of $x^3 - 8y^3 + 27z^3 + 18xyz$ is

$$(x - 2y + 3z)(x^2 + 4y^2 + 9z^2 + 2xy + 6yz - 3zx).$$

Factorisation of Algebraic Expressions Ex 5.4 Q3

Answer :

The given expression to be factorized is

$$27x^3 - y^3 - z^3 - 9xyz$$

This can be written in the form

$$27x^3 - y^3 - z^3 - 9xyz = (3x)^3 + (-y)^3 + (-z)^3 - 3.(3x).(-y).(-z)$$

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

$$\begin{aligned} 27x^3 - y^3 - z^3 - 9xyz &= \{3x + (-y) + (-z)\} \{(3x)^2 + (-y)^2 + (-z)^2 - (3x).(-y) - (-y).(-z) - (-z).(3x)\} \\ &= (3x - y - z)(9x^2 + y^2 + z^2 + 3xy - yz + 3zx) \end{aligned}$$

We cannot further factorize the expression.

So, the required factorization is of $27x^3 - y^3 - z^3 - 9xyz$ is

$$(3x - y - z)(9x^2 + y^2 + z^2 + 3xy - yz + 3zx).$$

