Factorisation of Algebraic Expressions Ex 5.4 Q4

Answer :

The given expression to be factorized is

$$\frac{1}{27}x^3 - y^3 + 125z^3 + 5xyz$$

This can be written in the form

$$\frac{1}{27}x^3 - y^3 + 125z^3 + 5xyz = (\frac{1}{3}x)^3 + (-y)^3 + (5z)^3 - 3.(\frac{1}{3}x).(-y).(5z)$$

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

$$\frac{1}{27}x^3 - y^3 + 125z^3 + 5xyz$$

$$= \{(\frac{1}{3}x) + (-y) + (5z)\}\{(\frac{1}{3}x)^2 + (-y)^2 + (5z)^2 - (\frac{1}{3}x).(-y) - (-y).(5z) - (5z).(\frac{1}{3}x)\}$$

$$= (\frac{1}{3}x - y + 5z)(\frac{1}{9}x^2 + y^2 + 25z^2 + \frac{1}{3}xy + 5yz - \frac{5}{3}zx)$$

We cannot further factorize the expression.

So, the required factorization is of $\frac{1}{27}x^3 - y^3 + 125z^3 + 5xyz$ is

$$\boxed{(\frac{1}{3}x - y + 5z)(\frac{1}{9}x^2 + y^2 + 25z^2 + \frac{1}{3}xy + 5yz - \frac{5}{3}zx)}.$$

Factorisation of Algebraic Expressions Ex 5.4 Q5

Answer :

The given expression to be factorized is

$$8x^3 + 27y^3 - 216z^3 + 108xyz$$

This can be written in the form

$$8x^3 + 27y^3 - 216z^3 + 108xyz = (2x)^3 + (3y)^3 + (-6z)^3 - 3.(2x).(3y).(-6z)$$

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

$$8x^3 + 27y^3 - 216z^3 + 108xyz$$

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

$$= (2x + 3y - 6z)(4x^2 + 9y^2 + 36z^2 - 6xy + 18yz + 12zx)$$

We cannot further factorize the expression.

So, the required factorization is of $8x^3 + 27y^3 - 216z^3 + 108xyz$ is

$$\boxed{(2x + 3y - 6z)(4x^2 + 9y^2 + 36z^2 - 6xy + 18yz + 12zx)}.$$

Factorisation of Algebraic Expressions Ex 5.4 Q6

Answer :

The given expression to be factorized is $125 + 8x^3 - 27y^3 + 90xy$

This can be written in the form $125 + 8x^3 - 27y^3 + 90xy = (5)^3 + (2x)^3 + (-3y)^3 - 3.(5).(2x).(-3y)$

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

$$125 + 8x^3 - 27y^3 + 90xy$$

$$= \{5 + (2x) + (-3y)\}\{(5^2) + (2x)^2 + (-3y)^2 - (5).(2x) - (2x).(-3y) - (-3y).(5)\}$$

$$= (5 + 2x - 3y)(25 + 4x^2 + 9y^2 - 10x + 6xy + 15y)$$

We cannot further factorize the expression.

So, the required factorization is of $125 + 8x^3 - 27y^3 + 90xy$ is

$$\boxed{(5 + 2x - 3y)(25 + 4x^2 + 9y^2 - 10x + 6xy + 15y)}.$$

********** END **********