



#### 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

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

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

$$\begin{aligned} & \frac{1}{27}x^3 - y^3 + 125z^3 + 5xyz \\ &= \left\{\left(\frac{1}{3}x\right) + (-y) + (5z)\right\} \left\{\left(\frac{1}{3}x\right)^2 + (-y)^2 + (5z)^2 - \left(\frac{1}{3}x\right)(-y) - (-y)(5z) - (5z)\left(\frac{1}{3}x\right)\right\} \\ &= \left(\frac{1}{3}x - y + 5z\right)\left(\frac{1}{9}x^2 + y^2 + 25z^2 + \frac{1}{3}xy + 5yz - \frac{5}{3}zx\right) \end{aligned}$$

We cannot further factorize the expression.

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

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

#### 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

$$\begin{aligned} & 8x^3 + 27y^3 - 216z^3 + 108xyz \\ &= \{(2x) + (3y) + (-6z)\} \{(2x)^2 + (3y)^2 + (-6z)^2 - (2x)(3y) - (3y)(-6z) - (-6z)(2x)\} \\ &= (2x + 3y - 6z)(4x^2 + 9y^2 + 36z^2 - 6xy + 18yz + 12zx) \end{aligned}$$

We cannot further factorize the expression.

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

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

#### 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

$$\begin{aligned} & 125 + 8x^3 - 27y^3 + 90xy \\ &= \{5 + (2x) + (-3y)\} \{(5)^2 + (2x)^2 + (-3y)^2 - (5)(2x) - (2x)(-3y) - (-3y)(5)\} \\ &= (5 + 2x - 3y)(25 + 4x^2 + 9y^2 - 10x + 6xy + 15y) \end{aligned}$$

We cannot further factorize the expression.

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

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

