



Factorisation of Algebraic Expressions Ex 5.1 Q13

Answer :

The given expression to be factorized is

$$a^2 + b^2 + 2(ab + bc + ca)$$

This can be written as

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

Take common $2c$ from the last two terms.

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

Finally, take common $(a + b)$ from the two terms of the above expression.

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

We cannot further factorize the expression.

So, the required factorization of $a^2 + b^2 + 2(ab + bc + ca)$ is $(a + b)(a + b + 2c)$.

Factorisation of Algebraic Expressions Ex 5.1 Q14

Answer :

The given expression to be factorized is

$$4(x - y)^2 - 12(x - y)(x + y) + 9(x + y)^2$$

Substituting $a = (x - y)$ and $b = (x + y)$ in the above expression, we get

$$4(x - y)^2 - 12(x - y)(x + y) + 9(x + y)^2 = 4a^2 - 12ab + 9b^2$$

This can be arrange in the form

$$\begin{aligned} 4a^2 - 12ab + 9b^2 &= (2a)^2 - 2 \cdot 2a \cdot 3b + (3b)^2 \\ &= (2a - 3b)^2 \end{aligned}$$

Put $a = (x - y)$ and $b = (x + y)$.

$$\begin{aligned} 4(x - y)^2 - 12(x - y)(x + y) + 9(x + y)^2 &= \{2(x - y) - 3(x + y)\}^2 \\ &= (2x - 2y - 3x - 3y)^2 \\ &= (-x - 5y)^2 \end{aligned}$$

Take common -1 from the expression within the braces.

$$\begin{aligned} 4(x - y)^2 - 12(x - y)(x + y) + 9(x + y)^2 &= \{-1(x + 5y)\}^2 \\ &= (-1)^2 (x + 5y)^2 \\ &= 1 \cdot (x + 5y)^2 \\ &= (x + 5y)^2 \end{aligned}$$

We cannot further factorize the expression.

So, the required factorization of $4(x - y)^2 - 12(x - y)(x + y) + 9(x + y)^2$ is $(x + 5y)^2$.

Factorisation of Algebraic Expressions Ex 5.1 Q15

Answer :

The given expression to be factorized is

$$a^2 - b^2 + 2bc - c^2$$

This can be arrange in the form

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

Substituting $x = (b - c)$ in the above expression, we get.

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

Put $x = (b - c)$.

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

We cannot further factorize the expression.

So, the required factorization of $a^2 - b^2 + 2bc - c^2$ is $\boxed{(a + b - c)(a - b + c)}$.

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