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 $\boxed{(a+b)(a+b+2c)}$.

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

$$\begin{aligned} 4a^2-12ab+9b^2 &= (2a)^2-2.2a.3b+(3b)^2 \\ &= (2a-3b)^2 \end{aligned}$$

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.

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

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 $\boxed{(x+5y)^2}$.

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

$$a^2 - b^2 + 2bc - c^2 = a^2 - (b^2 - 2bc + c^2)$$
$$= a^2 - (b - c)^2$$

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

$$a^2 - b^2 + 2bc - c^2 = a^2 - x^2$$
$$= (a + x)(a - x)$$

Put $x = (b - c)$.

$$a^2 - b^2 + 2bc - c^2 = \{a + (b - c)\}\{a - (b - c)\}$$
$$= (a + b - c)(a - b + c)$$

We cannot further factorize the expression.

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

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