



Factorisation of Algebraic Expressions Ex 5.1 Q19

Answer :

The given expression to be factorized is

$$x^4 + x^2y^2 + y^4$$

Add and subtract the term x^2y^2 in the given expression.

$$\begin{aligned} x^4 + x^2y^2 + y^4 &= x^4 + x^2y^2 + y^4 + x^2y^2 - x^2y^2 \\ &= (x^4 + x^2y^2 + y^4 + x^2y^2) - x^2y^2 \\ &= (x^4 + 2x^2y^2 + y^4) - x^2y^2 \\ &= \{(x^2)^2 + 2.x^2.y^2 + (y^2)^2\} - x^2y^2 \\ &= (x^2 + y^2)^2 - x^2y^2 \\ &= (x^2 + y^2)^2 - (xy)^2 \end{aligned}$$

Substituting $a = (x^2 + y^2)$ in the above expression, we get

$$\begin{aligned} x^4 + x^2y^2 + y^4 &= (a)^2 - (xy)^2 \\ &= (a + xy)(a - xy) \end{aligned}$$

Put $a = (x^2 + y^2)$ in the above expression,

$$\begin{aligned} x^4 + x^2y^2 + y^4 &= \{(x^2 + y^2) + xy\} \{(x^2 + y^2) - xy\} \\ &= (x^2 + y^2 + xy)(x^2 + y^2 - xy) \end{aligned}$$

We cannot further factorize the expression.

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

Factorisation of Algebraic Expressions Ex 5.1 Q20

Answer :

The given expression to be factorized is

$$x^2 - y^2 - 4xz + 4z^2$$

Rearrange the terms as

$$\begin{aligned} x^2 - y^2 - 4xz + 4z^2 &= (x^2 - 4xz + 4z^2) - y^2 \\ &= \{(x)^2 - 2.x.2z + (2z)^2\} - (y)^2 \\ &= (x - 2z)^2 - (y)^2 \end{aligned}$$

Substituting $a = (x - 2z)$ in the above expression,

$$\begin{aligned} x^2 - y^2 - 4xz + 4z^2 &= (a)^2 - (y)^2 \\ &= (a + y)(a - y) \end{aligned}$$

Put $a = (x - 2z)$.

$$\begin{aligned} x^2 - y^2 - 4xz + 4z^2 &= \{(x - 2z) + y\} \{(x - 2z) - y\} \\ &= (x - 2z + y)(x - 2z - y) \end{aligned}$$

We cannot further factorize the expression.

So, the required factorization of $x^2 - y^2 - 4xz + 4z^2$ is $(x - 2z + y)(x - 2z - y)$.

Factorisation of Algebraic Expressions Ex 5.1 Q21

Answer :

The given expression to be factorized is

$$x^2 + 6\sqrt{2}x + 10$$

This can be written in the form

$$\begin{aligned} x^2 + 6\sqrt{2}x + 10 &= x^2 + (5\sqrt{2} + \sqrt{2})x + 10 \\ &= x^2 + 5\sqrt{2}x + \sqrt{2}x + 10 \end{aligned}$$

Take common x from the first two terms and $\sqrt{2}$ from the last two terms.

$$x^2 + 6\sqrt{2}x + 10 = x(x + 5\sqrt{2}) + \sqrt{2}(x + 5\sqrt{2})$$

Finally, take common $(x + 5\sqrt{2})$ from the above expression. Then we have

$$x^2 + 6\sqrt{2}x + 10 = (x + 5\sqrt{2})(x + \sqrt{2})$$

We cannot further factorize the expression.

So, the required factorization is $x^2 + 6\sqrt{2}x + 10 = \boxed{(x + 5\sqrt{2})(x + \sqrt{2})}$.

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