Factorisation of Algebraic Expressions Ex 5.2 Q19

Answer:

The given expression to be factorized is

$$x^3 + 6x^2 + 12x + 16$$

This can be written as

$$x^3 + 6x^2 + 12x + 16 = x^3 + 4x^2 + 2x^2 + 8x + 4x + 16$$

Take common x^2 from first two terms, $2x$ from the next two terms and 4 from the last two terms. Then we have,

$$x^3 + 6x^2 + 12x + 16 = x^2(x+4) + 2x(x+4) + 4(x+4)$$

Finally, take common $(x+4)$. Then we get,

$$x^3 + 6x^2 + 12x + 16 = (x+4)(x^2 + 2x + 4)$$

We cannot further factorize the expression.

So, the required factorization of $x^3 + 6x^2 + 12x + 16$ is $\boxed{(x+4)(x^2 + 2x + 4)}$.

Factorisation of Algebraic Expressions Ex 5.2 Q20

Answer:

The given expression to be factorized is

$$a^3 + b^3 + a + b$$

This can be written as

$$a^3 + b^3 + a + b = \{(a)^3 + (b)^3\} + (a+b)$$

Recall the formula for sum of two cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

Using the above formula, we have

$$a^3 + b^3 + a + b = (a+b)(a^2 - ab + b^2) + (a+b)$$

Take common $(a+b)$. Then we have

$$a^3 + b^3 + a + b = (a+b)\{(a^2 - ab + b^2) + 1\}$$
$$= (a+b)(a^2 - ab + b^2 + 1)$$

We cannot further factorize the expression.

So, the required factorization of $a^3 + b^3 + a + b$ is $\boxed{(a+b)(a^2 - ab + b^2 + 1)}$.

Factorisation of Algebraic Expressions Ex 5.2 Q21

Answer :

The given expression to be factorized is

$$a^3 - \dfrac{1}{a^3} - 2a + \dfrac{2}{a}$$

This can be written as

$$a^3 - \dfrac{1}{a^3} - 2a + \dfrac{2}{a} = \left\{(a)^3 - \left(\dfrac{1}{a}\right)^3\right\} - 2a + \dfrac{2}{a}$$

Recall the formula for sum of two cubes

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Using the above formula and taking common -2 from the last two terms, we get

$$a^3 - \dfrac{1}{a^3} - 2a + \dfrac{2}{a} = \left[\left(a - \dfrac{1}{a}\right)\left\{(a)^2 + a.\dfrac{1}{a} + \left(\dfrac{1}{a}\right)^2\right\}\right] - 2\left(a - \dfrac{1}{a}\right)$$

$$= \left(a - \dfrac{1}{a}\right)\left(a^2 + 1 + \dfrac{1}{a^2}\right) - 2\left(a + \dfrac{1}{a}\right)$$

Take common $\left(a - \dfrac{1}{a}\right)$. Then we have,

$$a^3 - \dfrac{1}{a^3} - 2a + \dfrac{2}{a} = \left(a - \dfrac{1}{a}\right)\left\{\left(a^2 + 1 + \dfrac{1}{a^2}\right) - 2\right\}$$

$$= \left(a - \dfrac{1}{a}\right)\left(a^2 + 1 + \dfrac{1}{a^2} - 2\right)$$

$$= \left(a - \dfrac{1}{a}\right)\left(a^2 + \dfrac{1}{a^2} - 1\right)$$

We cannot further factorize the expression.

So, the required factorization of $a^3 - \dfrac{1}{a^3} - 2a + \dfrac{2}{a}$ is $\boxed{\left(a - \dfrac{1}{a}\right)\left(a^2 + \dfrac{1}{a^2} - 1\right)}$.

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