Factorisation of Algebraic Expressions Ex 5.2 Q22

Answer :

The given expression to be factorized is

$a^3+3a^2b+3ab^2+b^3-8$

Recall the well known formula

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

The given expression can be written as

$a^3+3a^2b+3ab^2+b^3-8=(a+b)^3-(2)^3$

Recall the formula for difference 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

$$\begin{aligned}a^3+3a^2b+3ab^2+b^3-8&=\{(a+b)-2\}\{(a+b)^2+(a+b).2+(2)^2\}\\&=(a+b-2)[\{(a)^2+2.a.b+(b)^2\}+(2a+2b)+4\}\\&=(a+b-2)(a^2+2ab+b^2+2a+2b+4)\end{aligned}$$

We cannot further factorize the expression.

So, the required factorization of $a^3+3a^2b+3ab^2+b^3-8$ is $\boxed{(a+b-2)(a^2+2ab+b^2+2a+2b+4)}$.

Factorisation of Algebraic Expressions Ex 5.2 Q23

Answer :

The given expression to be factorized is

$8a^3-b^3-4ax+2bx$

The given expression can be written as

$8a^3-b^3-4ax+2bx=\{(2a)^3-(b)^3\}-4ax+2bx$

Recall the formula for difference of two cubes

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

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

$$\begin{aligned}8a^3-b^3-4ax+2bx&=(2a-b)\{(2a)^2+2a.b+(b)^2\}-2x(2a-b)\\&=(2a-b)(4a^2+2ab+b^2)-2x(2a-b)\end{aligned}$$

Take common $(2a-b)$. Then we have,

$$\begin{aligned}8a^3-b^3-4ax+2bx&=(2a-b)\{(4a^2+2ab+b^2)-2x\}\\&=(2a-b)(4a^2+2ab+b^2-2x)\end{aligned}$$

We cannot further factorize the expression.

So, the required factorization of $8a^3-b^3-4ax+2bx$ is $\boxed{(2a-b)(4a^2+2ab+b^2-2x)}$.

Factorisation of Algebraic Expressions Ex 5.2 Q24

Answer :

(i) The given expression is

$$\frac{173\times173\times173+127\times127\times127}{173\times173-173\times127+127\times127}$$

Assume $a=173$ and $b=127$. Then the given expression can be rewritten as

$$\frac{a^3+b^3}{a^2-ab+b^2}$$

Recall the formula for sum of two cubes

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

Using the above formula, the expression becomes

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

Note that both a and b are positive. So, neither a^3+b^3 nor any factor of it can be zero.

Therefore we can cancel the term (a^2-ab+b^2) from both numerator and denominator. Then the expression becomes

$$\begin{aligned}\frac{(a+b)(a^2-ab+b^2)}{a^2-ab+b^2}&=a+b\\&=173+127\\&=\boxed{300}\end{aligned}$$

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