Algebraic Identities Ex 4.3 Q9

Answer :

In the given problem, we have to find the value of $x^3+\frac{1}{x^3}$

Given $x^2+\frac{1}{x^2}=98$

We shall use the identity $\left(x+y\right)^2=x^2+y^2+2xy$

Here putting $x^2+\frac{1}{x^2}=98$,

$$\left(x+\frac{1}{x}\right)^2=x^2+\frac{1}{x^2}+2\times x\times\frac{1}{x}$$

$$\left(x+\frac{1}{x}\right)^2=x^2+\frac{1}{x^2}+2\times \cancel{x}\times\frac{1}{\cancel{x}}$$

$$\left(x+\frac{1}{x}\right)^2=98+2$$

$$\left(x+\frac{1}{x}\right)^2=100$$

$$\left(x+\frac{1}{x}\right)=\sqrt{100}$$

$$\left(x+\frac{1}{x}\right)=\pm 10$$

In order to find $x^3+\frac{1}{x^3}$ we are using identity $a^3+b^3=\left(a+b\right)\left(a^2+b^2-ab\right)$

$x^3+\frac{1}{x^3}=\left(x+\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}-x\times\frac{1}{x}\right)$ Here $\left(x+\frac{1}{x}\right)=10$ and $x^2+\frac{1}{x^2}=98$

$$x^3+\frac{1}{x^3}=\left(x+\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}-\cancel{x}\times\frac{1}{\cancel{x}}\right)$$

$$=10\left(98-1\right)$$

$$=10\times 97$$

$$=970$$

Hence the value of $x^3+\frac{1}{x^3}$ is $\boxed{970}$.

Algebraic Identities Ex 4.3 Q10

Answer :

In the given problem, we have to find the value of $8x^3+27y^3$

Given $2x+3y=13, xy=6$.

In order to find $8x^3+27y^3$ we are using identity $(a+b)^3=a^3+b^3+3ab(a+b)$

$(2x+3y)^3=(13)^3$

$8x^3+27y^3+3(2x)(3y)(2x+3y)=2197$

$8x^3+27y^3+18xy(2x+3y)=2197$

Here putting, $2x+3y=13, xy=6$

$8x^3+27y^3+18\times6\times13=2197$

$8x^3+27y^3+1404=2197$

$8x^3+27y^3=2197-1404$

$8x^3+27y^3=793$

Hence the value of $8x^3+27y^3$ is $\boxed{793}$.

Algebraic Identities Ex 4.3 Q11

Answer :

In the given problem, we have to find the value of $27x^3-8y^3$

Given $3x-2y=11, xy=12$.

In order to find $27x^3-8y^3$ we are using identity $(a-b)^3=a^3-b^3-3ab(a-b)$

$(3x-2y)^3=(11)^3$

$27x^3-8y^3-3(3x)(2y)(3x-2y)=11\times11\times11$

$27x^3-8y^3-3(3x)(2y)(3x-2y)=1331$

Here putting, $3x-2y=11, xy=12$.

$27x^3-8y^3-18\times12\times11=1331$

$27x^3-8y^3-2376=1331$

$27x^3-8y^3=1331+2376$

$27x^3-8y^3=3707$

Hence the value of $27x^3-8y^3$ is $\boxed{3707}$.

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