Algebraic Identities Ex 4.3 Q6

Answer :

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

Given $x-\frac{1}{x}=7$

We shall use the identity $(a-b)^3=a^3-b^3-3ab(a-b)$

Here putting $x-\frac{1}{x}=7$,

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

$$(7)^3=x^3-\frac{1}{x^3}-3\left(\cancel{x}\times\frac{1}{\cancel{x}}\right)\left(x-\frac{1}{x}\right)$$

$$343=x^3-\frac{1}{x^3}-3\left(x-\frac{1}{x}\right)$$

$$343=x^3-\frac{1}{x^3}-3\times 7$$

$$343=x^3-\frac{1}{x^3}-21$$

$$343+21=x^3-\frac{1}{x^3}$$

$$364=x^3-\frac{1}{x^3}$$

Hence the value of $x^3-\frac{1}{x^3}$ is $\boxed{364}$

Algebraic Identities Ex 4.3 Q7

Answer :

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

Given $x-\frac{1}{x}=5$

We shall use the identity $(a-b)^3=a^3-b^3-3ab(a-b)$

Here putting $x-\frac{1}{x}=5$,

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

$$(5)^3=x^3-\frac{1}{x^3}-3\left(\cancel{x}\times\frac{1}{\cancel{x}}\right)\left(x-\frac{1}{x}\right)$$

$$125=x^3-\frac{1}{x^3}-3\left(x-\frac{1}{x}\right)$$

$$125=x^3-\frac{1}{x^3}-3\times5$$

$$125=x^3-\frac{1}{x^3}-15$$

$$125+15=x^3-\frac{1}{x^3}$$

$$140=x^3-\frac{1}{x^3}$$

Hence the value of $x^3-\frac{1}{x^3}$ is $\boxed{140}$.

Algebraic Identities Ex 4.3 Q8

Answer :

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

Given $x^2+\frac{1}{x^2}=51$

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

Here putting $x^2+\frac{1}{x^2}=51$,

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

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

$$\left(x-\frac{1}{x}\right)^2=51-2$$

$$\left(x-\frac{1}{x}\right)^2=49$$

$$\left(x-\frac{1}{x}\right)=\sqrt{49}$$

$$\left(x-\frac{1}{x}\right)=\pm7$$

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

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

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

Here $\left(x-\frac{1}{x}\right)=7$ and $x^2+\frac{1}{x^2}=51$

$=7(51+1)$

$=7\times52$

$=364$

Hence the value of $x^3-\frac{1}{x^3}$ is $\boxed{364}$.

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