



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

$$\begin{aligned}\left(x - \frac{1}{x}\right)^3 &= x^3 - \frac{1}{x^3} - 3\left(x \times \frac{1}{x}\right)\left(x - \frac{1}{x}\right) \\ (7)^3 &= x^3 - \frac{1}{x^3} - 3\left(\cancel{x} \times \frac{1}{\cancel{x}}\right)\left(x - \frac{1}{x}\right) \\ 343 &= x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right) \\ 343 &= x^3 - \frac{1}{x^3} - 3 \times 7 \\ 343 &= x^3 - \frac{1}{x^3} - 21 \\ 343 + 21 &= x^3 - \frac{1}{x^3} \\ 364 &= x^3 - \frac{1}{x^3}\end{aligned}$$

Hence the value of $x^3 - \frac{1}{x^3}$ is 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 $x - \frac{1}{x} = 5$,

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

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

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

$$125 = x^3 - \frac{1}{x^3} - 3 \times 5$$

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

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

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

Hence the value of $x^3 - \frac{1}{x^3}$ is 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 $(x+y)^2 = x^2 + y^2 + 2xy$

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

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

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

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

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

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

$$\left(x - \frac{1}{x}\right) = \pm 7$$

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

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

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

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

$$= 7(51 + 1)$$

$$= 7 \times 52$$

$$= 364$$

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

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