



Rationalisation Ex 3.2 Q7

Answer :

We know that $x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)\left(x^2 - 1 + \frac{1}{x^2}\right)$. We have to find the value of $x^3 + \frac{1}{x^3}$.

As $x = 2 + \sqrt{3}$ therefore,

$$\frac{1}{x} = \frac{1}{2 + \sqrt{3}}$$

We know that rationalization factor for $2 + \sqrt{3}$ is $2 - \sqrt{3}$. We will multiply numerator and denominator of the given expression $\frac{1}{2 + \sqrt{3}}$ by $2 - \sqrt{3}$, to get

$$\begin{aligned}\frac{1}{x} &= \frac{1}{2 + \sqrt{3}} \times \frac{2 - \sqrt{3}}{2 - \sqrt{3}} \\ &= \frac{2 - \sqrt{3}}{(2)^2 - (\sqrt{3})^2} \\ &= \frac{2 - \sqrt{3}}{4 - 3} \\ &= 2 - \sqrt{3}\end{aligned}$$

Putting the value of x and $\frac{1}{x}$, we get

$$\begin{aligned}x^3 + \frac{1}{x^3} &= (2 + \sqrt{3} + 2 - \sqrt{3})\left((2 + \sqrt{3})^2 - 1 + (2 - \sqrt{3})^2\right) \\ &= 4\left(2^2 + (\sqrt{3})^2 + 2 \times 2 \times \sqrt{3} - 1 + 2^2 + (\sqrt{3})^2 - 2 \times 2 \times \sqrt{3}\right) \\ &= 4(4 + 3 + 4\sqrt{3} - 1 + 4 + 3 - 4\sqrt{3}) \\ &= 52\end{aligned}$$

Hence the value of the given expression **52**

Rationalisation Ex 3.2 Q8

Answer :

We know that $x^2 + \frac{1}{x^2} = \left(x + \frac{1}{x}\right)^2 - 2$. We have to find the value of $x^2 + \frac{1}{x^2}$. As $x = 3 + \sqrt{8}$ therefore,

$$\frac{1}{x} = \frac{1}{3 + \sqrt{8}}$$

We know that rationalization factor for $3 + \sqrt{8}$ is $3 - \sqrt{8}$. We will multiply numerator and denominator of the given expression $\frac{1}{3 + \sqrt{8}}$ by $3 - \sqrt{8}$, to get

$$\begin{aligned}\frac{1}{x} &= \frac{1}{3 + \sqrt{8}} \times \frac{3 - \sqrt{8}}{3 - \sqrt{8}} \\ &= \frac{3 - \sqrt{8}}{(3)^2 - (\sqrt{8})^2} \\ &= \frac{3 - \sqrt{8}}{9 - 8} \\ &= 3 - \sqrt{8}\end{aligned}$$

Putting the value of x and $\frac{1}{x}$, we get

$$\begin{aligned}x^2 + \frac{1}{x^2} &= (3 + \sqrt{8} + 3 - \sqrt{8})^2 - 2 \\&= (6)^2 - 2 \\&= 36 - 2 \\&= 34\end{aligned}$$

Hence the given expression is simplified to 34 .

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