Algebraic Identities Ex 4.1 Q4

Answer :

In the given problem, we have to find $x^2 + \dfrac{1}{x^2}$

Given $x + \dfrac{1}{x} = 11$

On squaring both sides we get,

$$\left(x + \dfrac{1}{x}\right)^2 = (11)^2$$

$$x^2 + \dfrac{1}{x^2} + 2 \times \cancel{x} \times \dfrac{1}{\cancel{x}} = (11)^2$$

$$x^2 + \dfrac{1}{x^2} + 2 = 121$$

$$x^2 + \dfrac{1}{x^2} = 121 - 2$$

$$x^2 + \dfrac{1}{x^2} = 119$$

Hence the value of $x^2 + \dfrac{1}{x^2}$ is $\boxed{119}$.

Algebraic Identities Ex 4.1 Q5

Answer :

In the given problem, we have to find $x^2 + \dfrac{1}{x^2}$

Given $\left(x - \dfrac{1}{x}\right) = -1$

On squaring both sides we get,

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

We shall use the identity $(x - y)^2 = x^2 - 2xy + y^2$

$$x^2 + \dfrac{1}{x^2} - 2 \times \cancel{x} \times \dfrac{1}{\cancel{x}} = -1 \times -1$$

$$x^2 + \dfrac{1}{x^2} - 2 = 1$$

$$x^2 + \dfrac{1}{x^2} = 1 + 2$$

$$x^2 + \dfrac{1}{x^2} = 3$$

Hence the value of $x^2 + \dfrac{1}{x^2}$ is $\boxed{3}$.

Algebraic Identities Ex 4.1 Q6

Answer :

In the given problem, we have to find $x^2 + \dfrac{1}{x^2}$ and $x^4 + \dfrac{1}{x^4}$

We have $x + \dfrac{1}{x} = \sqrt{5}$

On squaring both sides we get,

$$\left(x + \dfrac{1}{x}\right)^2 = \left(\sqrt{5}\right)^2$$

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

$$x^2 + \dfrac{1}{x^2} + 2 \times \cancel{x} \times \dfrac{1}{\cancel{x}} = \sqrt{5} \times \sqrt{5}$$

$$x^2 + \dfrac{1}{x^2} + 2 = 5$$

$$x^2 + \dfrac{1}{x^2} = 5 - 2$$

$$\left(x^2 + \dfrac{1}{x^2}\right) = 3$$

Again squaring on both sides we get,

$$\left(x^2 + \dfrac{1}{x^2}\right)^2 = 3^2$$

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

$$x^4 + \dfrac{1}{x^4} + 2 \times \cancel{x^2} \times \dfrac{1}{\cancel{x^2}} = 9$$

$$x^4 + \dfrac{1}{x^4} + 2 = 9$$

$$x^4 + \dfrac{1}{x^4} = 9 - 2$$

$$x^4 + \dfrac{1}{x^4} = 7$$

Hence the value of $x^2 + \dfrac{1}{x^2}$ is $\boxed{3}$ and $x^4 + \dfrac{1}{x^4}$ is $\boxed{7}$.

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