Algebraic Expressions and Identities Ex 6.6 Q7

Answer :

Let us consider the following equation:

$x + \frac{1}{x} = 20$

Squaring both sides, we get:

$\left(x + \frac{1}{x}\right)^2 = (20)^2 = 400$

$\Rightarrow \left(x + \frac{1}{x}\right)^2 = 400$

$\Rightarrow x^2 + 2 \times x \times \frac{1}{x} + \left(\frac{1}{x}\right)^2 = 400$ $\left[(a+b)^2 = a^2 + b^2 + 2ab\right]$

$\Rightarrow x^2 + 2 + \frac{1}{x^2} = 400$

$\Rightarrow x^2 + \frac{1}{x^2} = 398$ (Subtracting 2 from both sides)

Thus, the answer is 398.

Algebraic Expressions and Identities Ex 6.6 Q8

Answer :

Let us consider the following equation:

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

Squaring both sides, we get:

$\left(x - \frac{1}{x}\right)^2 = (3)^2 = 9$

$\Rightarrow \left(x - \frac{1}{x}\right)^2 = 9$

$\Rightarrow x^2 - 2 \times x \times \frac{1}{x} + \left(\frac{1}{x}\right)^2 = 9$

$\Rightarrow x^2 - 2 + \frac{1}{x^2} = 9$

$\Rightarrow x^2 + \frac{1}{x^2} = 11$ (Adding 2 to both sides)

Squaring both sides again, we get:

$\left(x^2 + \frac{1}{x^2}\right)^2 = (11)^2 = 121$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 = 121$

$$\Rightarrow \left(x^2\right)^2 + 2\left(x^2\right)\left(\frac{1}{x^2}\right) + \left(\frac{1}{x^2}\right)^2 = 121$$

$$\Rightarrow x^4 + 2 + \frac{1}{x^4} = 121$$

$$\Rightarrow x^4 + \frac{1}{x^4} = 119$$

Algebraic Expressions and Identities Ex 6.6 Q9

Answer :

Let us consider the following expression:

$x + \frac{1}{x}$

Squaring the above expression, we get:

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

$$\left[\left(a + b\right)^2 = a^2 + b^2 + 2ab\right]$$

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

$$\Rightarrow \left(x + \frac{1}{x}\right)^2 = 20 \qquad\qquad (\because x^2 + \tfrac{1}{x^2} = 18)$$

$$\Rightarrow x + \frac{1}{x} = \pm\sqrt{20} \qquad\qquad \text{(Taking square root of both sides)}$$

Now, let us consider the following expression:

$x - \frac{1}{x}$

Squaring the above expression, we get:

$x - \frac{1}{x}$

Squaring the above expression, we get:

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

$$\left[\left(a - b\right)^2 = a^2 + b^2 - 2ab\right]$$

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

$$\Rightarrow \left(x - \frac{1}{x}\right)^2 = 16 \qquad\qquad (\because x^2 + \tfrac{1}{x^2} = 18)$$

$$\Rightarrow x - \frac{1}{x} = \pm 4 \qquad\qquad \text{(Taking square root of both sides)}$$

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