Algebraic Expressions and Identities Ex 6.6 Q14

Answer :

Let us consider the following equation:

$$x+\frac{1}{x}=9$$

Squaring both sides, we get:

$$\left(x+\frac{1}{x}\right)^2=(9)^2=81$$

$$\Rightarrow \left(x+\frac{1}{x}\right)^2=81$$

$$\Rightarrow x^2+2\times x\times \frac{1}{x}+\left(\frac{1}{x}\right)^2=81$$

$$\Rightarrow x^2+2+\frac{1}{x^2}=81$$

$$\Rightarrow x^2+\frac{1}{x^2}=79$$ (Subtracting 2 from both sides)

Now, squaring both sides again, we get:

$$\left(x^2+\frac{1}{x^2}\right)^2=(79)^2=6241$$

$$\Rightarrow \left(x^2+\frac{1}{x^2}\right)^2=6241$$

$$\Rightarrow \left(x^2\right)^2+2\left(x^2\right)\left(\frac{1}{x^2}\right)+\left(\frac{1}{x^2}\right)^2=6241$$

$$\Rightarrow x^4+2+\frac{1}{x^4}=6241$$

$$\Rightarrow x^4+\frac{1}{x^4}=6239$$

Algebraic Expressions and Identities Ex 6.6 Q15

Answer :

Let us consider the following equation:

$x+\frac{1}{x}=12$

Squaring both sides, we get:

$\left(x+\frac{1}{x}\right)^2=(12)^2=144$

$\Rightarrow \left(x+\frac{1}{x}\right)^2=144$

$\Rightarrow x^2+2\times x\times \frac{1}{x}+\left(\frac{1}{x}\right)^2=144 \qquad \left[\left(a+b\right)^2=a^2+b^2+2ab\right]$

$\Rightarrow x^2+2+\frac{1}{x^2}=144$

$\Rightarrow x^2+\frac{1}{x^2}=142$ (Subtracting 2 from both sides)

Now

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

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

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

$\Rightarrow \left(x-\frac{1}{x}\right)^2=142-2 \qquad \left(\because\ x^2+\frac{1}{x^2}=142\right)$

$\Rightarrow \left(x-\frac{1}{x}\right)^2=140$

$\Rightarrow x-\frac{1}{x}=\pm\sqrt{140}$ (Taking square root)

Algebraic Expressions and Identities Ex 6.6 Q16

Answer :

We will use the identity $(a+b)(a-b)=a^2-b^2$ to obtain the value of *xy*.

Squaring $(2x+3y)$ and $(2x-3y)$ both and then subtracting them, we get :

$(2x+3y)^2-(2x-3y)^2=\{(2x+3y)+(2x-3y)\}\{(2x+3y)-(2x-3y)\}=4x\times 6y$

$=24xy$

$\Rightarrow (2x+3y)^2-(2x-3y)^2=24xy$

$\Rightarrow 24xy=(2x+3y)^2-(2x-3y)^2$

$\Rightarrow 24xy=(14)^2-(2)^2$

$\Rightarrow 24xy=(14+2)(14-2) \qquad \left(\because\ (a+b)(a-b)=a^2-b^2\right)$

$\Rightarrow 24xy=16\times 12$

$\Rightarrow xy=\frac{16\times 12}{24} \qquad \left(\text{Dividing both sides by } 24\right)$

$\Rightarrow xy=8$

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