



Algebraic Expressions and Identities Ex 6.6 Q 10

Answer :

We have:

$$\begin{aligned}(x + y)^2 &= x^2 + 2xy + y^2 \\ \Rightarrow x^2 + y^2 &= (x + y)^2 - 2xy \\ \Rightarrow x^2 + y^2 &= 4^2 - 2 \times 2 & (\because x + y = 4 \text{ and } xy = 2) \\ \Rightarrow x^2 + y^2 &= 16 - 4 \\ \Rightarrow x^2 + y^2 &= 12\end{aligned}$$

Algebraic Expressions and Identities Ex 6.6 Q11

Answer :

We have:

$$\begin{aligned}(x - y)^2 &= x^2 - 2xy + y^2 \\ \Rightarrow x^2 + y^2 &= (x - y)^2 + 2xy \\ \Rightarrow x^2 + y^2 &= 7^2 + 2 \times 9 & (\because x - y = 7 \text{ and } xy = 9) \\ \Rightarrow x^2 + y^2 &= 7^2 + 2 \times 9 \\ \Rightarrow x^2 + y^2 &= 49 + 18 \\ \Rightarrow x^2 + y^2 &= 67\end{aligned}$$

Algebraic Expressions and Identities Ex 6.6 Q12

Answer :

We have:

$$\begin{aligned}(3x + 5y)^2 &= (3x)^2 + 2(3x)(5y) + (5y)^2 \\ \Rightarrow (3x + 5y)^2 &= 9x^2 + 30xy + 25y^2 \\ \Rightarrow 9x^2 + 25y^2 &= (3x + 5y)^2 - 30xy \\ \Rightarrow 9x^2 + 25y^2 &= 11^2 - 30 \times 2 & (\because 3x + 5y = 11 \text{ and } xy = 2) \\ \Rightarrow 9x^2 + 25y^2 &= 121 - 60 \\ \Rightarrow 9x^2 + 25y^2 &= 61\end{aligned}$$

Algebraic Expressions and Identities Ex 6.6 Q13

Answer :

(i) Let us consider the following expression:

$$16x^2 + 24x + 9$$

Now

$$\begin{aligned} 16x^2 + 24x + 9 &= (4x + 3)^2 && \text{(Using identity } (a + b)^2 = a^2 + 2ab + b^2) \\ \Rightarrow 16x^2 + 24x + 9 &= \left(4 \times \frac{7}{4} + 3\right)^2 && \left(\text{Substituting } x = \frac{7}{4}\right) \\ \Rightarrow 16x^2 + 24x + 9 &= (7 + 3)^2 \\ \Rightarrow 16x^2 + 24x + 9 &= 10^2 \\ \Rightarrow 16x^2 + 24x + 9 &= 100 \end{aligned}$$

(ii) Let us consider the following expression:

$$64x^2 + 81y^2 + 144xy$$

Now

$$\begin{aligned} 64x^2 + 81y^2 + 144xy &= (8x + 9y)^2 && \text{(Using identity } (a + b)^2 = a^2 + 2ab + b^2) \\ \Rightarrow 64x^2 + 81y^2 + 144xy &= \left[8(11) + 9\left(\frac{4}{3}\right)\right]^2 && \left(\text{Substituting } x = 11 \text{ and } y = \frac{4}{3}\right) \\ \Rightarrow 64x^2 + 81y^2 + 144xy &= [88 + 12]^2 \\ \Rightarrow 64x^2 + 81y^2 + 144xy &= 100^2 \\ \Rightarrow 64x^2 + 81y^2 + 144xy &= 10000 \end{aligned}$$

(iii) Let us consider the following expression:

$$81x^2 + 16y^2 - 72xy$$

Now

$$\begin{aligned} 81x^2 + 16y^2 - 72xy &= (9x - 4y)^2 && \text{(Using identity } (a + b)^2 = a^2 + 2ab + b^2) \\ \Rightarrow 81x^2 + 16y^2 - 72xy &= \left[9\left(\frac{2}{3}\right) - 4\left(\frac{3}{4}\right)\right]^2 && \left(\text{Substituting } x = \frac{2}{3} \text{ and } y = \frac{3}{4}\right) \\ \Rightarrow 81x^2 + 16y^2 - 72xy &= [6 - 3]^2 \\ \Rightarrow 81x^2 + 16y^2 - 72xy &= 3^2 \\ \Rightarrow 81x^2 + 16y^2 - 72xy &= 9 \end{aligned}$$

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