



Algebraic Identities Ex 4.3 Q9

Answer :

In the given problem, we have to find the value of $x^3 + \frac{1}{x^3}$

Given $x^2 + \frac{1}{x^2} = 98$

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

Here putting $x^2 + \frac{1}{x^2} = 98$,

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

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

$$\left(x + \frac{1}{x}\right)^2 = 98 + 2$$

$$\left(x + \frac{1}{x}\right)^2 = 100$$

$$\left(x + \frac{1}{x}\right) = \sqrt{100}$$

$$\left(x + \frac{1}{x}\right) = \pm 10$$

In order to find $x^3 + \frac{1}{x^3}$ we are using identity $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$

$$x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right) \left(x^2 + \frac{1}{x^2} - x \times \frac{1}{x}\right) \text{ Here } \left(x + \frac{1}{x}\right) = 10 \text{ and } x^2 + \frac{1}{x^2} = 98$$

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

$$= 10(98 - 1)$$

$$= 10 \times 97$$

$$= 970$$

Hence the value of $x^3 + \frac{1}{x^3}$ is 970.

Algebraic Identities Ex 4.3 Q10

Answer :

In the given problem, we have to find the value of $8x^3 + 27y^3$

Given $2x + 3y = 13, xy = 6$,

In order to find $8x^3 + 27y^3$ we are using identity $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

$$(2x + 3y)^3 = (13)^3$$

$$8x^3 + 27y^3 + 3(2x)(3y)(2x + 3y) = 2197$$

$$8x^3 + 27y^3 + 18xy(2x + 3y) = 2197$$

Here putting, $2x + 3y = 13, xy = 6$

$$8x^3 + 27y^3 + 18 \times 6 \times 13 = 2197$$

$$8x^3 + 27y^3 + 1404 = 2197$$

$$8x^3 + 27y^3 = 2197 - 1404$$

$$8x^3 + 27y^3 = 793$$

Hence the value of $8x^3 + 27y^3$ is $\boxed{793}$.

Algebraic Identities Ex 4.3 Q11

Answer :

In the given problem, we have to find the value of $27x^3 - 8y^3$

Given $3x - 2y = 11, xy = 12$.

In order to find $27x^3 - 8y^3$ we are using identity $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$$(3x - 2y)^3 = (11)^3$$

$$27x^3 - 8y^3 - 3(3x)(2y)(3x - 2y) = 11 \times 11 \times 11$$

$$27x^3 - 8y^3 - 3(3x)(2y)(3x - 2y) = 1331$$

Here putting, $3x - 2y = 11, xy = 12$,

$$27x^3 - 8y^3 - 18 \times 12 \times 11 = 1331$$

$$27x^3 - 8y^3 - 2376 = 1331$$

$$27x^3 - 8y^3 = 1331 + 2376$$

$$27x^3 - 8y^3 = 3707$$

Hence the value of $27x^3 - 8y^3$ is $\boxed{3707}$.

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