



Algebraic Identities Ex 4.1 Q1

Answer :

In the given problem, we have to evaluate expressions by using identities.

(i) Given $\left[2x - \frac{1}{x}\right]^2$

We shall use the identity $(a - b)^2 = a^2 - 2ab + b^2$

Here $a = 2x$

$$b = \frac{1}{x}$$

By applying identity we get

$$\begin{aligned}\left[2x - \frac{1}{x}\right]^2 &= (2x)^2 + \left(\frac{1}{x}\right)^2 - 2 \times 2x \times \frac{1}{x} \\ &= (2x \times 2x) + \left(\frac{1}{x} \times \frac{1}{x}\right) - 2 \times 2x \times \frac{1}{x} \\ &= (2x \times 2x) + \left(\frac{1}{x} \times \frac{1}{x}\right) - 2 \times 2 \times \cancel{x} \times \frac{1}{\cancel{x}} \\ &= 4x^2 + \frac{1}{x^2} - 4\end{aligned}$$

Hence the value of $\left[2x - \frac{1}{x}\right]^2$ is $\boxed{4x^2 + \frac{1}{x^2} - 4}$

(ii) We have been given $(2x + y)(2x - y)$

We shall use the identity $(a + b)(a - b) = a^2 - b^2$

Here, $a = 2x$, $b = y$

By applying identity we get

$$\begin{aligned}(2x + y)(2x - y) &= (2x)^2 - (y)^2 \\ &= (2x \times 2x) - (y \times y) \\ &= 4x^2 - y^2\end{aligned}$$

Hence the value of $(2x + y)(2x - y)$ is $\boxed{4x^2 - y^2}$

(iii) The given expression is $(a^2b - b^2a)^2$

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

Here $x = a^2b$

$y = b^2a$

By applying identity we get

$$\begin{aligned}(a^2b - b^2a)^2 &= (a^2b)^2 + (b^2a)^2 - 2 \times a^2b \times b^2a \\ &= (a^2b \times a^2b) + (b^2a \times b^2a) - 2 \times a^2b \times b^2a \\ &= a^4b^2 - 2a^3b^3 + b^4a^2\end{aligned}$$

Hence the value of $(a^2b - b^2a)^2$ is $\boxed{a^4b^2 - 2a^3b^3 + b^4a^2}$

(iv) The given expression is $(a + 0.1)(a - 0.1)$

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

Here $x = a$

$y = 0.1$

By applying identity we get

$$\begin{aligned}(a + 0.1)(a - 0.1) &= (a)^2 - (0.1)^2 \\ &= (a \times a) - (0.1 \times 0.1) \\ &= a^2 - 0.01\end{aligned}$$

Hence the value of $(a + 0.1)(a - 0.1)$ is $\boxed{a^2 - 0.01}$

(v) The given expression is $(1.5x^2 - 0.3y^2)(1.5x^2 + 0.3y^2)$

We shall use the identity $(a + b)(a - b) = a^2 - b^2$

Here $a = 1.5x^2$

$b = 0.3y^2$

By applying identity we get

$$\begin{aligned}(1.5x^2 - 0.3y^2)(1.5x^2 + 0.3y^2) &= (1.5x^2)^2 - (0.3y^2)^2 \\ &= (1.5x^2 \times 1.5x^2) - (0.3y^2 \times 0.3y^2) \\ &= 2.25x^4 - 0.09y^4\end{aligned}$$

Hence the value of $(1.5x^2 - 0.3y^2)(1.5x^2 + 0.3y^2)$ is $\boxed{2.25x^4 - 0.09y^4}$

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