Algebraic Expressions and Identities Ex 6.6 Q1

Answer :

We will use the identities $(a+b)^2 = a^2 + 2ab + b^2$ and $(a-b)^2 = a^2 - 2ab + b^2$ to convert the squares of binomials as trinomials.

$\left(\text{i}\right)\ (x+2)^2$

$= x^2 + 2 \times x \times 2 + b^2$

$= x^2 + 4x + b^2$

$\left(\text{ii}\right)\ (8a+3b)^2$

$= (8a)^2 + 2(8a)(3b) + (6b)^2$

$= 64a^2 + 48ab + 36b^2$

$\left(\text{iii}\right)\ (2m+1)^2$

$= (2m)^2 + 2(2m)(1) + 1^2$

$= 4m^2 + 4m + 1$

$\left(\text{iv}\right)\ \left(9a + \frac{1}{6}\right)^2$

$= (9a)^2 + 2(9a)\left(\frac{1}{6}\right) + \left(\frac{1}{6}\right)^2$

$= 81a^2 + 3a + \frac{1}{36}$

$$\left(\text{v}\right)\ \left(x+\frac{x^2}{2}\right)^2$$

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

$$=x^2+x^3+\frac{x^4}{4}$$

$$\left(\text{vi}\right)\ \left(\frac{x}{4}-\frac{y}{3}\right)^2$$

$$=\left(\frac{x}{4}\right)^2-2\left(\frac{x}{4}\right)\left(\frac{y}{3}\right)+\left(\frac{y}{3}\right)^2$$

$$=\frac{x^2}{16}-\frac{1}{6}xy+\frac{y^2}{9}$$

$$\left(\text{vii}\right)\ \left(3x-\frac{1}{3x}\right)^2$$

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

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

$$\left(\text{viii}\right)\ \left(\frac{x}{y}-\frac{y}{x}\right)^2$$

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

$$=\frac{x^2}{y^2}-2+\frac{y^2}{x^2}$$

$$\left(\text{ix}\right)\ \left(\frac{3a}{2}-\frac{5b}{4}\right)^2$$
$$=\left(\frac{3a}{2}\right)^2-2\left(\frac{3a}{2}\right)\left(\frac{5b}{4}\right)+\left(\frac{5b}{4}\right)^2$$
$$=\frac{9a^2}{4}-\frac{15ab}{4}+\frac{25b^2}{16}$$

$$\left(\text{x}\right)\ \left(a^2b-bc^2\right)^2$$
$$=\left(a^2b\right)^2-2\left(a^2b\right)\left(bc^2\right)+\left(bc^2\right)^2$$
$$=a^4b^2-2a^2b^2c^2+b^2c^4$$

$$\left(\text{xi}\right)\ \left(\frac{2a}{3b}+\frac{2b}{3a}\right)^2$$
$$=\left(\frac{2a}{3b}\right)^2+2\left(\frac{2a}{3b}\right)\left(\frac{2b}{3a}\right)+\left(\frac{2b}{3a}\right)^2$$
$$=\frac{4a^2}{9b^2}+\frac{8}{9}+\frac{4b^2}{9a^2}$$

$$\left(\text{xii}\right)\ \left(x^2-ay\right)^2$$
$$=\left(x^2\right)^2-2x^2(ay)+(ay)^2$$
$$=x^4-2x^2ay+a^2y^2$$

Answer :

(i) We will use the identity $(a+b)^2 = a^2 + 2ab + b^2$ in the given expression to find the product.

$(2x+y)(2x+y)$

$= (2x+y)^2$

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

$= 4x^2 + 4xy + y^2$

(ii) We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$(a+2b)(a-2b)$

$= a^2 - (2b)^2$

$= a^2 - 4b^2$

(iii) We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$(a^2+bc)(a^2-bc)$

$= (a^2)^2 - (bc)^2$

$= a^4 - b^2c^2$

(iv)We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$\left(\frac{4x}{5} - \frac{3y}{4}\right)\left(\frac{4x}{5} + \frac{3y}{4}\right)$

$= \left(\frac{4x}{5}\right)^2 - \left(\frac{3y}{4}\right)^2$

$= \frac{16x^2}{25} - \frac{9y^2}{16}$

(v) We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$\left(2x + \frac{3}{y}\right)\left(2x - \frac{3}{y}\right)$

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

$= 4x^2 - \frac{9}{y^2}$

(vi) We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$\left(2a^3 + b^3\right)\left(2a^3 - b^3\right)$

$= \left(2a^3\right)^2 - \left(b^3\right)^2$

$= 4a^6 - b^6$

(vii) We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$\left(x^4 + \frac{2}{x^2}\right)\left(x^4 - \frac{2}{x^2}\right)$

$= \left(x^4\right)^2 - \left(\frac{2}{x^2}\right)^2$

$= x^8 - \frac{4}{x^4}$

(viii) We will use the identity $(a+b)(a-b) = a^2 - b^2$ in the given expression to find the product.

$\left(x^3 + \frac{1}{x^3}\right)\left(x^3 - \frac{1}{x^3}\right)$

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

$= x^6 - \frac{1}{x^6}$

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