

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

Exercise 9.1

Page No: 140

1. Identify the terms, their coefficients for each of the following expressions.

(i) $5xyz^2 - 3zy$

(ii) $1 + x + x^2$

(iii) $4x^2y^2 - 4x^2y^2z^2 + z^2$

(iv) $3 - pq + qr - p$

(v) $(x/2) + (y/2) - xy$

(vi) $0.3a - 0.6ab + 0.5b$

Solution :

Sl. No.	Expression	Term	Coefficient
i)	$5xyz^2 - 3zy$	Term: $5xyz^2$ Term: $-3zy$	5 -3
ii)	$1 + x + x^2$	Term: 1 Term: x Term x^2	1 1 1
iii)	$4x^2y^2 - 4x^2y^2z^2 + z^2$	Term: $4x^2y^2$ Term: $-4x^2y^2z^2$ Term : z^2	4 -4 1
iv)	$3 - pq + qr - p$	3 - pq qr - p	3 -1 1 -1
v)	$(x/2) + (y/2) - xy$	$x/2$ $Y/2$ $-xy$	$\frac{1}{2}$ $\frac{1}{2}$ -1
vi)	$0.3a - 0.6ab + 0.5b$	0.3a -0.6ab 0.5b	0.3 -0.6 0.5

2. Classify the following polynomials as monomials, binomials, trinomials. Which polynomials do not fit in any of these three categories? $x + y$, 1000 , $x + x^2 + x^3 + x^4$, $7 + y + 5x$, $2y - 3y^2$, $2y - 3y^2 + 4y^3$, $5x - 4y + 3xy$, $4z - 15z^2$, $ab + bc + cd + da$, pqr , $p^2q + pq^2$, $2p + 2q$

Solution:

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

Let us first define the classifications of these 3 polynomials:

Monomials, Contain only one term.

Binomials, Contain only two terms.

Trinomials, Contain only three terms.

$x + y$	two terms	Binomial
1000	one term	Monomial
$x + x^2 + x^3 + x^4$	four terms	Polynomial, and it does not fit in listed three categories
$2y - 3y^2$	two terms	Binomial
$2y - 3y^2 + 4y^3$	three terms	Trinomial
$5x - 4y + 3xy$	three terms	Trinomial
$4z - 15z^2$	two terms	Binomial
$ab + bc + cd + da$	four terms	Polynomial, and it does not fit in listed three categories
pqr	one term	Monomial
$p^2q + pq^2$	two terms	Binomial
$2p + 2q$	two terms	Binomial

3. Add the following.

(i) $ab - bc, bc - ca, ca - ab$

(ii) $a - b + ab, b - c + bc, c - a + ac$

(iii) $2p^2q^2 - 3pq + 4, 5 + 7pq - 3p^2q^2$

(iv) $l^2 + m^2, m^2 + n^2, n^2 + l^2, 2lm + 2mn + 2nl$

Solution:

$$\begin{aligned} \text{i) } (ab - bc) + (bc - ca) + (ca - ab) &= ab - bc + bc - ca + ca - ab \\ &= ab - ab - bc + bc - ca + ca \\ &= 0 \end{aligned}$$

$$\begin{aligned} \text{ii) } (a - b + ab) + (b - c + bc) + (c - a + ac) &= a - b + ab + b - c + bc + c - a + ac \\ &= a - a + b - b + c - c + ab + bc + ca \\ &= 0 + 0 + 0 + ab + bc + ca \\ &= ab + bc + ca \end{aligned}$$

$$\begin{aligned} \text{iii) } 2p^2q^2 - 3pq + 4, 5 + 7pq - 3p^2q^2 &= (2p^2q^2 - 3pq + 4) + (5 + 7pq - 3p^2q^2) \\ &= 2p^2q^2 - 3p^2q^2 - 3pq + 7pq + 4 + 5 \\ &= -p^2q^2 + 4pq + 9 \end{aligned}$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$\begin{aligned}
 \text{iv) } & (l^2 + m^2) + (m^2 + n^2) + (n^2 + l^2) + \\
 & (2lm + 2mn + 2nl) \\
 & = l^2 + l^2 + m^2 + m^2 + n^2 + n^2 + 2lm + 2mn + 2nl \\
 & = 2l^2 + 2m^2 + 2n^2 + 2lm + 2mn + 2nl
 \end{aligned}$$

4. (a) Subtract $4a - 7ab + 3b + 12$ from $12a - 9ab + 5b - 3$

(b) Subtract $3xy + 5yz - 7zx$ from $5xy - 2yz - 2zx + 10xyz$

(c) Subtract $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from $18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q$

Solution:

$$(a) (12a - 9ab + 5b - 3) - (4a - 7ab + 3b + 12)$$

$$= 12a - 9ab + 5b - 3 - 4a + 7ab - 3b - 12$$

$$= 12a - 4a - 9ab + 7ab + 5b - 3b - 3 - 12$$

$$= 8a - 2ab + 2b - 15$$

$$b) (5xy - 2yz - 2zx + 10xyz) - (3xy + 5yz - 7zx)$$

$$= 5xy - 2yz - 2zx + 10xyz - 3xy - 5yz + 7zx$$

$$= 5xy - 3xy - 2yz - 5yz - 2zx + 7zx + 10xyz$$

$$= 2xy - 7yz + 5zx + 10xyz$$

$$c) (18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q) - (4p^2q - 3pq + 5pq^2 - 8p + 7q - 10)$$

$$= 18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q - 4p^2q + 3pq - 5pq^2 + 8p - 7q + 10$$

$$= 18 + 10 - 3p + 8p - 11q - 7q + 5pq + 3pq - 2pq^2 - 5pq^2 + 5p^2q - 4p^2q$$

$$= 28 + 5p - 18q + 8pq - 7pq^2 + p^2q$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

Exercise 9.2

Page No: 143

1. Find the product of the following pairs of monomials.

(i) $4, 7p$

(ii) $-4p, 7p$

(iii) $-4p, 7pq$

(iv) $4p^3, -3p$

(v) $4p, 0$

Solution:

(i) $4 \times 7p = 4 \times 7 \times p = 28p$

(ii) $-4p \times 7p = (-4 \times 7) \times (p \times p) = -28p^2$

(iii) $-4p \times 7pq = (-4 \times 7) (p \times pq) = -28p^2q$

(iv) $4p^3 \times -3p = (4 \times -3) (p^3 \times p) = -12p^4$

(v) $4p \times 0 = 0$

2. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths respectively.

(p, q) ; $(10m, 5n)$; $(20x^2, 5y^2)$; $(4x, 3x^2)$; $(3mn, 4np)$

Solution:

Area of rectangle = Length $\times$ breadth. So, it is multiplication of two monomials. The results can be written in square units.

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

(i) $p \times q = pq$

(ii) $10m \times 5n = 50mn$

(iii) $20x^2 \times 5y^2 = 100x^2y^2$

(iv) $4x \times 3x^2 = 12x^3$

(v) $3mn \times 4np = 12mn^2p$

3. Complete the following table of products:

First monomial → Second monomial ↓	$2x$	$-5y$	$3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$	$4x^2$	...	...	...	...	...
$-5y$	...	...	$-15x^2y$	...	...	...
$3x^2$	...	...	...	...	...	...
$-4xy$	...	...	...	...	...	...
$7x^2y$	...	...	...	...	...	...
$-9x^2y^2$	...	...	...	...	...	...

Solution:

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

First monomial	2x	-5y	3x ²	-4xy	7x ² y	-9x ² y ²
Second monomial						
2x	4x ²	-10xy	6x ³	-8x ² y	14x ³ y	-18x ³ y ²
-5y	-10xy	25y ²	-15x ² y	20xy ²	-35x ² y ²	45x ² y ³
3x ²	6x ³	-15x ² y	9x ⁴	-12x ³ y	21x ⁴ y	-27x ⁴ y ²
-4xy	-8x ² y	20xy ²	-12x ³ y	16x ² y ²	-28x ³ y ²	36x ³ y ³
7x ² y	14x ³ y	-35x ² y ²	21x ⁴ y	-28x ³ y ²	49x ⁴ y ²	-63x ⁴ y ³
-9x ² y ²	-18x ³ y ²	45x ² y ³	-27x ⁴ y ²	36x ³ y ³	-63x ⁴ y ³	81x ⁴ y ⁴

4. Obtain the volume of rectangular boxes with the following length, breadth and height respectively.

- (i) $5a, 3a^2, 7a^4$
- (ii) $2p, 4q, 8r$
- (iii) $xy, 2x^2y, 2xy^2$
- (iv) $a, 2b, 3c$

Solution:

Volume of rectangle = length x breadth x height. To evaluate volume of rectangular boxes, multiply all the monomials.

- (i) $5a \times 3a^2 \times 7a^4 = (5 \times 3 \times 7) (a \times a^2 \times a^4) = 105a^7$
- (ii) $2p \times 4q \times 8r = (2 \times 4 \times 8) (p \times q \times r) = 64pqr$
- (iii) $y \times 2x^2y \times 2xy^2 = (1 \times 2 \times 2) (x \times x^2 \times x \times y \times y \times y^2) = 4x^4y^4$
- (iv) $a \times 2b \times 3c = (1 \times 2 \times 3) (a \times b \times c) = 6abc$

5. Obtain the product of

- (i) xy, yz, zx
- (ii) $a, -a^2, a^3$
- (iii) $2, 4y, 8y^2, 16y^3$
- (iv) $a, 2b, 3c, 6abc$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

(v) $m, -mn, mnp$

Solution:

(i) $xy \times yz \times zx = x^2 y^2 z^2$

(ii) $a \times -a^2 \times a^3 = -a^6$

(iii) $2 \times 4y \times 8y^2 \times 16y^3 = 1024 y^6$

(iv) $a \times 2b \times 3c \times 6abc = 36a^2 b^2 c^2$

(v) $m \times -mn \times mnp = -m^3 n^2 p$

Exercise 9.3

Page No: 146

1. Carry out the multiplication of the expressions in each of the following pairs.

(i) $4p, q + r$

(ii) $ab, a - b$

(iii) $a + b, 7a^2b^2$

(iv) $a^2 - 9, 4a$

(v) $pq + qr + rp, 0$

Solution:

(i) $4p(q + r) = 4pq + 4pr$

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

(iii) $(a + b)(7a^2b^2) = 7a^3b^2 + 7a^2b^3$

(iv) $(a^2 - 9)(4a) = 4a^3 - 36a$

(v) $(pq + qr + rp) \times 0 = 0$ (Anything multiplied by zero is zero)

2. Complete the table.

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

	First expression	Second expression	Product
(i)	a	$b + c + d$	...
(ii)	$x + y - 5$	$5xy$	...
(iii)	p	$6p^2 - 7p + 5$	...
(iv)	$4p^2q^2$	$p^2 - q^2$	...
(v)	$a + b + c$	abc	...

Solution:

	First expression	Second expression	Product
(i)	a	$b + c + d$	$a(b+c+d)$ $= a \times b + a \times c + a \times d$ $= ab + ac + ad$
(ii)	$x + y - 5$	$5xy$	$5xy(x + y - 5)$ $= 5xy \times x + 5xy \times y - 5xy \times 5$ $= 5x^2y + 5xy^2 - 25xy$
(iii)	p	$6p^2 - 7p + 5$	$p(6p^2 - 7p + 5)$ $= p \times 6p^2 - p \times 7p + p \times 5$ $= 6p^3 - 7p^2 + 5p$
(iv)	$4p^2q^2$	$p^2 - q^2$	$4p^2q^2 \times (p^2 - q^2)$ $= 4p^4q^2 - 4p^2q^4$
(v)	$a + b + c$	abc	$abc(a + b + c)$ $= abc \times a + abc \times b + abc \times c$ $= a^2bc + ab^2c + abc^2$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

3. Find the product.

- i) $a^2 \times (2a^{22}) \times (4a^{26})$ ii)
 $(\frac{2}{3}xy) \times (-\frac{9}{10}x^2y^2)$ (iii) (-
 $\frac{10}{3}pq^3) \times (\frac{6}{5}p^3q)$
 (iv) $(x) \times (x^2) \times (x^3) \times (x^4)$

Solution:

$$i) a^2 \times (2a^{22}) \times (4a^{26}) = (2 \times 4) (a^2 \times a^{22} \times a^{26}) = 8 \times a^{(2+22+26)} = 8a^{50}$$

$$ii) (\frac{2xy}{3}) \times (-\frac{9x^2y^2}{10}) \\ = (\frac{2}{3} \times -\frac{9}{10}) (x \times x^2 \times y \times y^2) \\ = (-\frac{3}{5}x^3y^3)$$

$$iii) (-\frac{10pq^3}{3}) \times (\frac{6p^3q}{5}) \\ = (-\frac{10}{3} \times \frac{6}{5}) (p \times p^3 \times q^3 \times q) \\ = (-4p^4q^4)$$

$$iv) (x) \times (x^2) \times (x^3) \times (x^4) \\ = x^{(1+2+3+4)} \\ = x^{10}$$

4. (a) Simplify $3x(4x - 5) + 3$ and find its values for (i) $x = 3$ (ii) $x = \frac{1}{2}$

(b) Simplify $a(a^2 + a + 1) + 5$ and find its value for (i) $a = 0$, (ii) $a = 1$ (iii) $a = -1$.

Solution:

$$a) 3x(4x - 5) + 3 \\ = 3x(4x) - 3x(5) + 3 \\ = 12x^2 - 15x + 3$$

$$(i) \text{ Putting } x=3 \text{ in the equation we gets} \\ 12x^2 - 15x + 3 = 12(3^2) - 15(3) + 3 \\ = 108 - 45 + 3 = 66$$

(ii) Putting $x=\frac{1}{2}$ in the equation we get

$$12x^2 - 15x + 3 = 12(\frac{1}{2})^2 - 15(\frac{1}{2}) + 3 \\ = 12(\frac{1}{4}) - \frac{15}{2} + 3$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$= 3 - 15/2 + 3$$

$$\begin{aligned} &= 6 - 15/2 \\ &= (12 - 15) / 2 \\ &= -3/2 \end{aligned}$$

$$\begin{aligned} \text{b) } &a(a^2 + a + 1) + 5 \\ &= a^3 + a^2 + a + 5 \\ &= a^3 + a^2 + a + 5 \end{aligned}$$

(i) putting $a = 0$ in the equation we get
 $0^3 + 0^2 + 0 + 5 = 5$

(ii) putting $a = 1$ in the equation we get
 $1^3 + 1^2 + 1 + 5 = 1 + 1 + 1 + 5 = 8$

(iii) Putting $a = -1$ in the equation we get (-1)³ + (-1)² + (-1) + 5 = -1 + 1 - 1 + 5 = 4

5. (a) Add: $p(p - q)$, $q(q - r)$ and $r(r - p)$ (b) Add: $2x(z - x - y)$ and $2y(z - y - x)$ (c) Subtract: $3l(l - 4m + 5n)$ from $4l(10n - 3m + 2l)$ (d) Subtract: $3a(a + b + c) - 2b(a - b + c)$ from $4c(-a + b + c)$

Solution:

$$\text{a) } p(p - q) + q(q - r) + r(r - p)$$

$$\begin{aligned} &= (p^2 - pq) + (q^2 - qr) + (r^2 - pr) \\ &= p^2 + q^2 + r^2 - pq - qr - pr \end{aligned}$$

$$\text{b) } 2x(z - x - y) + 2y(z - y - x)$$

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

$$\begin{aligned} \text{c) } &4l(10n - 3m + 2l) - 3l(l - 4m + 5n) \\ &= (40ln - 12lm + 8l^2) - (3l^2 - 12lm + 15ln) \\ &= 40ln - 12lm + 8l^2 - 3l^2 + 12lm - 15ln \\ &= 25ln + 5l^2 \end{aligned}$$

$$\begin{aligned} \text{d) } &4c(-a + b + c) - (3a(a + b + c) - 2b(a - b + c)) \\ &= (-4ac + 4bc + 4c^2) - (3a^2 + 3ab + 3ac - 2ab - 2b^2 + 2bc) \\ &= -4ac + 4bc + 4c^2 - (3a^2 + 3ab + 3ac - 2ab + 2b^2 - 2bc) \end{aligned}$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$= -4ac + 4bc + 4c^2 - 3a^2 - 3ab - 3ac + 2ab - 2b^2 + 2bc$$

$$= -7ac + 6bc + 4c^2 - 3a^2 - ab - 2b^2$$

Exercise 9.4

Page No: 148

1. Multiply the binomials.

- i) $(2x + 5)$ and $(4x - 3)$
 (ii) $(y - 8)$ and $(3y - 4)$
 (iii) $(2.5l - 0.5m)$ and $(2.5l + 0.5m)$
 (iv) $(a + 3b)$ and $(x + 5)$
 (v) $(2pq + 3q^2)$ and $(3pq - 2q^2)$
 (vi) $(\frac{3}{4}a^2 + 3b^2)$ and $4(a^2 - \frac{2}{3}b^2)$

Solution :

- i) $(2x + 5)(4x - 3)$
 $= 2x * 4x - 2x * 3 + 5 * 4x - 5 * 3$
 $= 8x^2 - 6x + 20x - 15$
 $= 8x^2 + 14x - 15$
- ii) $(y - 8)(3y - 4)$
 $= y * 3y - 4y - 8 * 3y + 32$
 $= 3y^2 - 4y - 24y + 32$
 $= 3y^2 - 28y + 32$
- iii) $(2.5l - 0.5m)(2.5l + 0.5m)$
 $= 2.5l * 2.5l + 2.5l * 0.5m - 0.5m * 2.5l - 0.5m * 0.5m$
 $= 6.25l^2 + 1.25lm - 1.25lm - 0.25m^2$
 $= 6.25l^2 - 0.25m^2$
- iv) $(a + 3b)(x + 5) = ax + 5a + 3bx + 15b$
- v) $(2pq + 3q^2)(3pq - 2q^2)$
 $= 2pq * 3pq - 2pq * 2q^2 + 3q^2 * 3pq - 3q^2 * 2q^2$
 $= 6p^2q^2 - 4pq^3 + 9pq^3 - 6q^4$
 $= 6p^2q^2 + 5pq^3 - 6q^4$

- (vi) $(\frac{3}{4}a^2 + 3b^2)$ and $4(a^2 - \frac{2}{3}b^2)$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$\begin{aligned}
 &= (3/4 a^2 + 3b^2) * 4(a^2 - 2/3 b^2) \\
 &= (3/4 a^2 + 3b^2) * (4a^2 - 8/3 b^2) \\
 &= 3/4 a^2 * (4a^2 - 8/3 b^2) + 3b^2 * (4a^2 - 8/3 b^2) \\
 &= 3/4 a^2 * 4a^2 - 3/4 a^2 * 8/3 b^2 + 3b^2 * 4a^2 - 3b^2 * 8/3 b^2 \\
 &= 3a^4 - 2a^2b^2 + 12 a^2 b^2 - 8b^4 \\
 &= 3a^4 + 10a^2 b^2 - 8b^4
 \end{aligned}$$

2. Find the product.

(i) $(5 - 2x)(3 + x)$

(ii) $(x + 7y)(7x - y)$

(iii) $(a^2 + b)(a + b^2)$

(iv) $(p^2 - q^2)(2p + q)$

Solution:

i) $(5 - 2x)(3 + x)$

$$= 5(3 + x) - 2x(3 + x)$$

$$= 15 + 5x - 6x - 2x^2$$

$$= 15 - x - 2x^2$$

(ii) $(x + 7y)(7x - y)$

$$= x(7x - y) + 7y(7x - y)$$

$$= 7x^2 - xy + 49xy - 7y^2$$

$$= 7x^2 - 7y^2 + 48xy$$

iii) $(a^2 + b)(a + b^2) = a^2(a + b^2) + b(a + b^2)$

$$= a^3 + a^2b^2 + ab + b^3$$

$$= a^3 + b^3 + a^2b^2 + ab$$

iv) $(p^2 - q^2)(2p + q)$

$$= p^2(2p + q) - q^2(2p + q)$$

$$= 2p^3 + p^2q - 2pq^2 - q^3$$

$$= 2p^3 - q^3 + p^2q - 2pq^2$$

3. Simplify.

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$(i) (x^2 - 5)(x + 5) + 25$$

$$(ii) (a^2 + 5)(b^3 + 3) + 5$$

$$(iii) (t + s^2)(t^2 - s)$$

$$(iv) (a + b)(c - d) + (a - b)(c + d) + 2(ac + bd)$$

$$(v) (x + y)(2x + y) + (x + 2y)(x - y)$$

$$(vi) (x + y)(x^2 - xy + y^2)$$

$$(vii) (1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y$$

$$(viii) (a + b + c)(a + b - c)$$

Solution :

$$i) \quad (x^2 - 5)(x + 5) + 25 = x^3 + 5x^2 - 5x - 25 + 25 \\ = x^3 + 5x^2 - 5x$$

$$ii) \quad (a^2 + 5)(b^3 + 3) + 5 = a^2b^3 + 3a^2 + 5b^3 + 15 + 5 \\ = a^2b^3 + 5b^3 + 3a^2 + 20$$

$$iii) \quad (t + s^2)(t^2 - s) = t(t^2 - s) + s^2(t^2 - s) \\ = t^3 - st + s^2t^2 - s^3 \\ = t^3 - s^3 - st + s^2t^2$$

$$iv) \quad (a + b)(c - d) + (a - b)(c + d) + 2(ac + bd) \\ = (a + b)(c - d) + (a - b)(c + d) + 2(ac + bd) \\ = (ac - ad + bc - bd) + (ac + ad - bc - bd) + (2ac + 2bd) \\ = ac - ad + bc - bd + ac + ad - bc - bd + 2ac + 2bd \\ = 4ac$$

$$v) \quad (x + y)(2x + y) + (x + 2y)(x - y) \\ = 2x^2 + xy + 2xy + y^2 + x^2 - xy + 2xy - 2y^2 \\ = 3x^2 + 4xy - y^2$$

$$vi) \quad (x + y)(x^2 - xy + y^2) = x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3 \\ = x^3 + y^3$$

$$vii) \quad (1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y \\ = 2.25x^2 + 6xy + 4.5x - 6xy - 16y^2 - 12y - 4.5x + 12y \\ = 2.25x^2 - 16y^2$$

$$viii) \quad (a + b + c)(a + b - c) \\ = a^2 + ab - ac + ab + b^2 - bc + ac + bc - c^2 \\ = a^2 + b^2 - c^2 + 2ab$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

Exercise 9.5

Page No: 151

1. Use a suitable identity to get each of the following products.

(i) $(x + 3)(x + 3)$

(ii) $(2y + 5)(2y + 5)$

(iii) $(2a - 7)(2a - 7)$

(iv) $(3a - \frac{1}{2})(3a - \frac{1}{2})$

(v) $(1.1m - 0.4)(1.1m + 0.4)$

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

(vii) $(6x - 7)(6x + 7)$

(viii) $(-a + c)(-a + c)$

(ix) $(\frac{1}{2}x + \frac{3}{4}y)(\frac{1}{2}x + \frac{3}{4}y)$

(x) $(7a - 9b)(7a - 9b)$

Solution:

i) $(x + 3)(x + 3) = (x + 3)^2$

$= x^2 + 6x + 9$

Using $(a+b)^2 = a^2 + b^2 + 2ab$

ii)

$(2y + 5)(2y + 5) = (2y + 5)^2$

$= 4y^2 + 20y + 25$

Using $(a+b)^2 = a^2 + b^2 + 2ab$

iii) $(2a - 7)(2a - 7) = (2a - 7)^2$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$= 4a^2 - 28a + 49$$

$$\text{Using } (a-b)^2 = a^2 + b^2 - 2ab$$

$$\begin{aligned} \text{iv) } (3a - 1/2)(3a - 1/2) &= (3a - 1/2)^2 \\ &= (3a-1/2)(3a-1/2) = 9a^2 - 3a + (1/4) \end{aligned}$$

$$\text{Using } (a-b)^2 = a^2 + b^2 - 2ab$$

$$\begin{aligned} \text{v) } (1.1m - 0.4)(1.1m + 0.4) \\ = 1.21m^2 - 0.16 \end{aligned}$$

$$\text{Using } (a-b)(a+b) = a^2 - b^2$$

$$\begin{aligned} \text{vi) } (a^2 + b^2)(-a^2 + b^2) \\ = (b^2 + a^2)(b^2 - a^2) \\ = -a^4 + b^4 \end{aligned}$$

$$\text{Using } (a-b)(a+b) = a^2 - b^2$$

$$\begin{aligned} \text{vii) } (6x - 7)(6x + 7) \\ = 36x^2 - 49 \end{aligned}$$

$$\text{Using } (a-b)(a+b) = a^2 - b^2$$

$$\begin{aligned} \text{viii) } (-a + c)(-a + c) &= (-a + c)^2 \\ &= c^2 + a^2 - 2ac \end{aligned}$$

$$\text{Using } (a-b)^2 = a^2 + b^2 - 2ab$$

$$\begin{aligned} \text{ix) } \left(\frac{1}{2}x + \frac{3}{4}y\right)\left(\frac{1}{2}x + \frac{3}{4}y\right) &= \left(\frac{1}{2}x + \frac{3}{4}y\right)^2 \\ &= (x^2/4) + (9y^2/16) + (3xy/4) \end{aligned}$$

$$\text{Using } (a+b)^2 = a^2 + b^2 + 2ab$$

$$\begin{aligned} \text{x) } (7a - 9b)(7a - 9b) &= (7a - 9b)^2 \\ &= 49a^2 - 126ab + 81b^2 \end{aligned}$$

$$\text{Using } (a-b)^2 = a^2 + b^2 - 2ab$$

2. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products. (i) $(x + 3)(x + 7)$
(ii) $(4x + 5)(4x + 1)$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$(iii) (4x - 5)(4x - 1) \quad (iv) (4x + 5)(4x - 1)$$

$$(v) (2x + 5y)(2x + 3y)$$

$$(vi) (2a^2 + 9)(2a^2 + 5)$$

$$(vii) (xyz - 4)(xyz - 2)$$

Solution:

$$i) (x + 3)(x + 7)$$

$$= x^2 + (3+7)x + 21$$

$$= x^2 + 10x + 21$$

$$ii) (4x + 5)(4x + 1) = 16x^2 + (5 + 1)4x + 5$$

$$= 16x^2 + 24x + 5$$

$$iii) (4x - 5)(4x - 1) = 16x^2 + (-5-1)4x + 5$$

$$= 16x^2 - 20x + 5$$

$$iv) (4x + 5)(4x - 1) = 16x^2 + (5-1)4x - 5$$

$$= 16x^2 + 16x - 5$$

$$v) (2x + 5y)(2x + 3y) = 4x^2 + (5y + 3y)2x + 15y^2$$

$$= 4x^2 + 16xy + 15y^2$$

$$vi) (2a^2 + 9)(2a^2 + 5) = 4a^4 + (9+5)2a^2 + 45$$

$$= 4a^4 + 28a^2 + 45$$

$$vii) (xyz - 4)(xyz - 2) = x^2y^2z^2 + (-4 - 2)xyz + 8$$

$$= x^2y^2z^2 - 6xyz + 8$$

3. Find the following squares by using the identities.

$$i) (b - 7)^2$$

$$ii) (xy + 3z)^2$$

$$iii) (6x^2 - 5y)^2$$

$$iv) [(2m/3) + (3n/2)]^2$$

$$v) (0.4p - 0.5q)^2$$

$$vi) (2xy + 5y)^2$$

Solution:

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

Using identities:

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

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$(i) \quad (b - 7)^2 = b^2 - 14b + 49$$

$$(ii) \quad (xy + 3z)^2 = x^2y^2 + 6xyz + 9z^2$$

$$(iii) \quad (6x^2 - 5y)^2 = 36x^4 - 60x^2y + 25y^2$$

$$(iv) \quad [(2m/3) + (3n/2)]^2 = (4m^2/9) + (9n^2/4) + 2mn$$

$$(v) \quad (0.4p - 0.5q)^2 = 0.16p^2 - 0.4pq + 0.25q^2$$

$$(vi) \quad (2xy + 5y)^2 = 4x^2y^2 + 20xy^2 + 25y^2$$

4. Simplify.

$$i) \quad (a^2 - b^2)^2$$

$$ii) \quad (2x + 5)^2 - (2x - 5)^2$$

$$iii) \quad (7m - 8n)^2 + (7m + 8n)^2$$

$$iv) \quad (4m + 5n)^2 + (5m + 4n)^2$$

$$v) \quad (2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$$

$$vi) \quad (ab + bc)^2 - 2ab^2c$$

$$vii) \quad (m^2 - n^2m)^2 + 2m^3n^2$$

Solution:

$$i) \quad (a^2 - b^2)^2 = a^4 + b^4 - 2a^2b^2$$

$$\begin{aligned} ii) \quad (2x + 5)^2 - (2x - 5)^2 &= 4x^2 + 20x + 25 - (4x^2 - 20x + 25) \\ &= 4x^2 + 20x + 25 - 4x^2 + 20x - 25 \\ &= 40x \end{aligned}$$

$$\begin{aligned} iii) \quad (7m - 8n)^2 + (7m + 8n)^2 &= 49m^2 - 112mn + 64n^2 + 49m^2 + 112mn + 64n^2 \\ &= 98m^2 + 128n^2 \end{aligned}$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$\begin{aligned}\text{iv) } (4m + 5n)^2 + (5m + 4n)^2 \\ = 16m^2 + 40mn + 25n^2 + 25m^2 + 40mn + 16n^2 \\ = 41m^2 + 80mn + 41n^2\end{aligned}$$

$$\begin{aligned}\text{v) } (2.5p - 1.5q)^2 - (1.5p - 2.5q)^2 \\ = 6.25p^2 - 7.5pq + 2.25q^2 - 2.25p^2 + 7.5pq - 6.25q^2 \\ = 4p^2 - 4q^2\end{aligned}$$

$$\begin{aligned}\text{vi) } (ab + bc)^2 - 2ab^2c &= a^2b^2 + 2ab^2c + b^2c^2 - 2ab^2c \\ &= a^2b^2 + b^2c^2\end{aligned}$$

$$\begin{aligned}\text{vii) } (m^2 - n^2m)^2 + 2m^3n^2 &= m^4 - 2m^3n^2 + m^2n^4 + 2m^3n^2 \\ &= m^4 + m^2n^4\end{aligned}$$

5. Show that.

$$\text{i) } (3x + 7)^2 - 84x = (3x - 7)^2$$

(ii) $9p -$

$$25q)^2 + 180pq = (9p + 5q)^2$$

$$\text{(iii) } \left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn = \frac{16}{9}m^2 + \frac{9}{16}n^2$$

$$\text{(iv) } (4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$$

$$\text{(v) } (a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0 \text{ Solution:}$$

$$\begin{aligned}\text{i) } \text{LHS} &= (3x + 7)^2 - 84x \\ &= 9x^2 + 42x + 49 - 84x \\ &= 9x^2 - 42x + 49 \\ &= \text{RHS} \\ \text{LHS} &= \text{RHS}\end{aligned}$$

$$\begin{aligned}\text{ii) } \text{LHS} &= (9p - 5q)^2 + 180pq \\ &= 81p^2 - 90pq + 25q^2 + 180pq \\ &= 81p^2 + 90pq + 25q^2 \\ \text{RHS} &= (9p + 5q)^2 \\ &= 81p^2 + 90pq + 25q^2 \\ \text{LHS} &= \text{RHS}\end{aligned}$$

$$\begin{aligned}\text{(iii) } \text{LHS} &= \left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn \\ &= \frac{16}{9}m^2 + \frac{9}{16}n^2 - 2mn + 2mn \\ &= \frac{16}{9}m^2 + \frac{9}{16}n^2 \\ &= \text{RHS} \\ \text{LHS} &= \text{RHS}\end{aligned}$$

$$\text{iv) } \text{LHS} = (4pq + 3q)^2 - (4pq - 3q)^2$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$= 16p^2q^2 + 24pq^2 + 9q^2 - 16p^2q^2 + 24pq^2 - 9q^2$$

$$= 48pq^2$$

$$\text{RHS} = 48pq^2$$

$$\text{LHS} = \text{RHS}$$

$$\begin{aligned} \text{v) LHS} &= (a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) \\ &= a^2 - b^2 + b^2 - c^2 + c^2 - a^2 \\ &= 0 \\ &= \text{RHS} \end{aligned}$$

6. Using identities, evaluate.

(i) 71^2

(ii) 99^2

(iii) 102^2

(iv) 998^2

(v) 5.2^2

(vi) 297×303

(vii) 78×82

(viii) 8.9^2

(ix) 10.5×9.5

Solution:

$$\begin{aligned} \text{i) } 71^2 &= (70+1)^2 \\ &= 70^2 + 140 + 1^2 \\ &= 4900 + 140 + 1 \\ &= 5041 \end{aligned}$$

$$\begin{aligned} \text{ii) } 99^2 &= (100-1)^2 \\ &= 100^2 - 200 + 1^2 \\ &= 10000 - 200 + 1 \\ &= 9801 \end{aligned}$$

$$\begin{aligned} \text{iii) } 102^2 &= (100+2)^2 \\ &= 100^2 + 400 + 2^2 \\ &= 10000 + 400 + 4 \\ &= 10404 \end{aligned}$$

$$\begin{aligned} \text{iv) } 998^2 &= (1000-2)^2 \\ &= 1000^2 - 4000 + 2^2 \\ &= 1000000 - 4000 + 4 \\ &= 996004 \end{aligned}$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$\begin{aligned}\text{v)} \quad 5.2^2 &= (5 + 0.2)^2 \\ &= 5^2 + 2 + 0.2^2 \\ &= 25 + 2 + 0.4 \\ &= 27.4\end{aligned}$$

$$\begin{aligned}\text{vi)} \quad 297 \times 303 &= (300 \\ &\quad - 3)(300 + 3) \\ &= 300^2 - 3^2 \\ &= 90000 - 9 \\ &= 89991\end{aligned}$$

$$\begin{aligned}\text{vii)} \quad 78 \times 82 &= \\ (80 - 2)(80 + 2) \\ &= 80^2 - 2^2 \\ &= 6400 - 4 \\ &= 6396\end{aligned}$$

$$\begin{aligned}\text{viii)} \quad 8.9^2 &= (9 - 0.1)^2 \\ &= 9^2 - 1.8 + 0.1^2 \\ &= 81 - 1.8 + 0.01 \\ &= 79.21\end{aligned}$$

$$\begin{aligned}\text{ix)} \quad 10.5 \times 9.5 &= (10 \\ &\quad + 0.5)(10 - 0.5) \\ &= 10^2 - 0.5^2 \\ &= 100 - 0.25 \\ &= 99.75\end{aligned}$$

7. Using $a^2 - b^2 = (a + b)(a - b)$, find

(i) $51^2 - 49^2$

(ii) $(1.02)^2 - (0.98)^2$

(iii) $153^2 - 147^2$

(iv) $12.1^2 - 7.9^2$

Solution:

$$\begin{aligned}\text{i)} \quad 51^2 - 49^2 &= (51 + \\ &\quad 49)(51 - 49) \\ &= 100 \times 2 \\ &= 200\end{aligned}$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$\begin{aligned}\text{ii)} \quad (1.02)^2 - (0.98)^2 &= \\ (1.02 + 0.98)(1.02 - 0.98) &= \\ = 2 \times 0.04 &= \\ = 0.08 &= \end{aligned}$$

$$\begin{aligned}\text{iii)} \quad 153^2 - 147^2 &= \\ (153 + 147)(153 - 147) &= \\ = 300 \times 6 &= \\ = 1800 &= \end{aligned}$$

$$\begin{aligned}\text{iv)} \quad 12.1^2 - 7.9^2 &= \\ (12.1 + 7.9)(12.1 - 7.9) &= \\ = 20 \times 4.2 &= 84 \end{aligned}$$

8. Using $(x + a)(x + b) = x^2 + (a + b)x + ab$, find

(i) 103×104

(ii) 5.1×5.2

(iii) 103×98

(iv) 9.7×9.8

Solution:

$$\begin{aligned}\text{i)} \quad 103 \times 104 &= \\ (100 + 3)(100 + 4) &= \\ = 100^2 + (3 + 4)100 + 12 &= \\ = 10000 + 700 + 12 &= \\ = 10712 &= \end{aligned}$$

$$\begin{aligned}\text{ii)} \quad 5.1 \times 5.2 &= (5 + \\ 0.1)(5 + 0.2) &= \\ = 5^2 + (0.1 + 0.2)5 + 0.1 \times 0.2 &= \\ = 25 + 1.5 + 0.02 &= \\ = 26.52 &= \end{aligned}$$

$$\begin{aligned}\text{iii)} \quad 103 \times 98 &= \\ (100 + 3)(100 - 2) &= \\ = 100^2 + (3 - 2)100 - 6 &= \\ = 10000 + 100 - 6 &= \\ = 10094 &= \end{aligned}$$

$$\begin{aligned}\text{iv)} \quad 9.7 \times 9.8 &= \\ = (9 + 0.7)(9 + 0.8) &= \end{aligned}$$

NCERT Solution For Class 8 Maths Chapter 9 Algebraic Expressions and Identities

$$= 9^2 + (0.7 + 0.8)9 + 0.56$$

$$= 81 + 13.5 + 0.56$$

$$= 95.06$$

edugrooss.com