

**CBSE Class -VII Mathematics**  
**NCERT Solutions**  
**Algebraic Expressions (Ex. 12.2)**

**Question 1.** Simplify combining like terms:

1.  $21b - 32 + 7b - 20b$

2.  $-z^2 + 13z^2 - 5z + 7z^3 - 15z$

3.  $p - (p - q) - q - (q - p)$

4.  $3a - 2b - ab - (a - b + ab) + 3ab + b - a$

5.  $5x^2y - 5x^2 + 3yx^2 - 3y^2 + x^2 - y^2 + 8xy^2 - 3y^2$

6.  $(3y^2 + 5y - 4) - (8y - y^2 - 4)$

**Answer:** (i)  $21b - 32 + 7b - 20b = 21b + 7b - 20b - 32$

$$= 28b - 20b - 32 = 8b - 32$$

(ii)  $-z^2 + 13z^2 - 5z + 7z^3 - 15z$

$$= 7z^3 + (-z^2 + 13z^2) - (5z + 15z)$$

$$= 7z^3 + 12z^2 - 20z$$

(iii)  $p - (p - q) - q - (q - p) = p - p + q - q - q + p$

$$= p - p + p + q - q - q = p - q$$

(iv)  $3a - 2b - ab - (a - b + ab) + 3ab + b - a$

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

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

$$= (3a - a - a) - (2b - b - b) - (ab + ab - 3ab)$$

$$= a - 0 - (-ab)$$

$$= a + ab$$

$$\begin{aligned} \text{(v)} \quad & 5x^2y - 5x^2 + 3yx^2 - 3y^2 + x^2 - y^2 + 8xy^2 - 3y^2 \\ &= 5x^2y + 3yx^2 + 8xy^2 - 5x^2 + x^2 - 3y^2 - y^2 - 3y^2 \\ &= (5x^2y + 3x^2y) + 8xy^2 - (5x^2 - x^2) - (3y^2 + y^2 + 3y^2) \\ &= 8x^2y + 8xy^2 - 4x^2 - 7y^2 \end{aligned}$$

$$\begin{aligned} \text{(vi)} \quad & (3y^2 + 5y - 4) - (8y - y^2 - 4) = 3y^2 + 5y - 4 - 8y + y^2 + 4 \\ &= (3y^2 + y^2) + (5y - 8y) - (4 - 4) \\ &= 4y^2 - 3y - 0 = 4y^2 - 3y \end{aligned}$$

**Question 2.** Add:

1.  $3mn, -5mn, 8mn - 4mn$
2.  $t - 8tz, 3tz - z, z - t$
3.  $-7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3$
4.  $a + b - 3, b - a + 3, a - b + 3$
5.  $14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy$
6.  $5m - 7n, 3n - 4m + 2, 2m - 3mn - 5$
7.  $4x^2y, -3xy^2, -5xy^2, 5x^2y$
8.  $3p^2q^2 - 4pq + 5, -10p^2q^2, 15 + 9pq + 7p^2q^2$
9.  $ab - 4a, 4b - ab, 4a - 4b$
10.  $x^2 - y^2 - 1, y^2 - 1 - x^2, 1 - x^2 - y^2$

**Answer:** (i)  $3mn, -5mn, 8mn, -4mn$

$$= 3mn + (-5mn) + 8mn + (-4mn)$$

$$= (3 - 5 + 8 - 4)mn = 2mn$$

(ii)  $t - 8tz, 3tz - z, z - t = t - 8tz + 3tz - z + z - t$

$$= t - t - 8tz + 3tz - z + z$$

$$= (1 - 1)t + (-8 + 3)tz + (-1 + 1)z$$

$$= 0 - 5tz + 0 = -5tz$$

$$(iii) -7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3$$

$$= -7mn + 5 + 12mn + 2 + 9mn - 8 + (-2mn) - 3$$

$$= -7mn + 12mn + 9mn - 2mn + 5 + 2 - 8 - 3$$

$$= (-7 + 12 + 9 - 2)mn + 7 - 11$$

$$= 12mn - 4$$

$$(iv) a + b - 3, b - a + 3, a - b + 3$$

$$= a + b - 3 + b - a + 3 + a - b + 3$$

$$= (a - a + a) + (b + b - b) - 3 + 3 + 3$$

$$= a + b + 3$$

(v)

$$14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy = 14x + 10y - 12xy - 13 + 18 - 7x$$

$$= 14x - 7x + 10y - 10y - 12xy + 8xy + 4xy - 13 + 18$$

$$= 7x + 0y + 0xy + 5 = 7x + 5$$

(vi)

$$5m - 7n, 3n - 4m + 2, 2m - 3mn - 5 = 5m - 7n + 3n - 4m + 2 + 2m - 3mn - 5$$

$$= 5m - 4m + 2m - 7n + 3n - 3mn + 2 - 5$$

$$= (5 - 4 + 2)m + (-7 + 3)n - 3mn - 3$$

$$= 3m - 4n - 3mn - 3$$

$$(vii) 4x^2y, -3xy^2, -5xy^2, 5x^2y = 4x^2y + (-3xy^2) + (-5xy^2) + 5x^2y$$

$$= 4x^2y + 5x^2y - 3xy^2 - 5xy^2$$

$$= 9x^2y - 8xy^2$$

$$\begin{aligned} \text{(viii)} \quad & 3p^2q^2 - 4pq + 5, -10p^2q^2, 15 + 9pq + 7p^2q^2 = \\ & 3p^2q^2 - 4pq + 5 + (-10p^2q^2) + 15 + 9pq + 7p^2q^2 \\ & = 3p^2q^2 - 10p^2q^2 + 7p^2q^2 - 4pq + 9pq + 5 + 15 \\ & = (3 - 10 + 7)p^2q^2 + (-4 + 9)pq + 20 \\ & = 0p^2q^2 + 5pq + 20 = 5pq + 20 \end{aligned}$$

$$\begin{aligned} \text{(ix)} \quad & ab - 4a, 4b - ab, 4a - ab = ab - 4a + 4b - ab + 4a - ab \\ & = -4a + 4a + 4b - 4b + ab - ab \\ & = 0 + 0 + 0 = 0 \end{aligned}$$

$$\begin{aligned} \text{(x)} \quad & x^2 - y^2 - 1, y^2 - 1 - x^2, 1 - x^2 - y^2 = x^2 - y^2 - 1 + y^2 - 1 - x^2 + 1 - x^2 - y^2 \\ & = x^2 - x^2 - x^2 - y^2 + y^2 - y^2 - 1 - 1 + 1 \\ & = (1 - 1 - 1)x^2 + (-1 + 1 - 1)y^2 - 1 - 1 + 1 \\ & = -x^2 - y^2 - 1 \end{aligned}$$

**Question 3.** Subtract:

1.  $-5y^2$  from  $y^2$
2.  $6xy$  from  $-12xy$
3.  $(a - b)$  from  $(a + b)$
4.  $a(b - 5)$  from  $b(5 - a)$
5.  $-m^2 + 5mn$  from  $4m^2 - 3mn + 8$
6.  $-x^2 + 10x - 5$  from  $5x - 10$
7.  $5a^2 - 7ab + 5b^2$  from  $3ab - 2a^2 - 2b^2$
8.  $4pq - 5q^2 - 3p^2$  from  $5p^2 + 3q^2 - pq$

**Answer:** (i)  $y^2 - (-5y^2) = y^2 + 5y^2 = 6y^2$

(ii)  $-12xy - (6xy) = -12xy - 6xy = -18xy$

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

$$(iv) b(5 - a) - a(b - 5) = 5b - ab - ab + 5a = 5b - 2ab + 5a = 5a + 5b - 2ab$$

$$(v) 4m^2 - 3mn + 8 - (-m^2 + 5mn) = 4m^2 - 3mn + 8 + m^2 - 5mn$$

$$= 4m^2 + m^2 - 3mn - 5mn + 8$$

$$= 5m^2 - 8mn + 8$$

$$(vi) 5x - 10 - (-x^2 + 10x - 5) = 5x - 10 + x^2 - 10x + 5$$

$$= x^2 + 5x - 10x - 10 + 5 = x^2 - 5x - 5$$

$$(vii) 3ab - 2a^2 - 2b^2 - (5a^2 - 7ab + 5b^2) = 3ab - 2a^2 - 2b^2 - 5a^2 + 7ab - 5b^2$$

$$= 3ab + 7ab - 2a^2 - 5a^2 - 2b^2 - 5b^2$$

$$= 10ab - 7a^2 - 7b^2$$

$$= -7a^2 - 7b^2 + 10ab$$

$$(viii) 5p^2 + 3q^2 - pq - (4pq - 5q^2 - 3p^2) = 5p^2 + 3q^2 - pq - 4pq + 5q^2 + 3p^2$$

$$= 5p^2 + 3p^2 + 3q^2 + 5q^2 - pq - 4pq$$

$$= 8p^2 + 8q^2 - 5pq$$

**Question 4.**(a) What should be added to  $x^2 + xy + y^2$  to obtain  $2x^2 + 3xy$ ?

(b) What should be subtracted from  $2a + 8b + 10$  to get  $-3a + 7b + 16$  ?

**Answer:** (a) Let  $p$  should be added.

Then according to question,

$$x^2 + xy + y^2 + p = 2x^2 + 3xy \Rightarrow p = 2x^2 + 3xy - (x^2 + xy + y^2)$$

$$\Rightarrow p = 2x^2 + 3xy - x^2 - xy - y^2 \Rightarrow p = 2x^2 - x^2 - y^2 + 3xy - xy$$

$$\Rightarrow p = x^2 - y^2 + 2xy$$

Hence,  $x^2 - y^2 + 2xy$  should be added.

(b) Let  $q$  should be subtracted.

Then according to question,

$$2a + 8b + 10 - q = -3a + 7b + 16 \Rightarrow -q = -3a + 7b + 16 - (2a + 8b + 10)$$

$$\Rightarrow -q = -3a + 7b + 16 - 2a - 8b - 10 \Rightarrow -q = -3a - 2a + 7b - 8b + 16 - 10$$

$$\Rightarrow -q = -5a - b + 6 \Rightarrow q = -(-5a - b + 6)$$

$$\Rightarrow q = 5a + b - 6$$

**Question 5.** What should be taken away from  $3x^2 - 4y^2 + 5xy + 20$  to obtain  $-x^2 - y^2 + 6xy + 20$  ?

**Answer:** Let  $q$  should be subtracted.

Then according to question,

$$3x^2 - 4y^2 + 5xy + 20 - q = -x^2 - y^2 + 6xy + 20$$

$$\Rightarrow q = 3x^2 - 4y^2 + 5xy + 20 - (-x^2 - y^2 + 6xy + 20)$$

$$\Rightarrow q = 3x^2 - 4y^2 + 5xy + 20 + x^2 + y^2 - 6xy - 20$$

$$\Rightarrow q = 3x^2 + x^2 - 4y^2 + y^2 + 5xy - 6xy + 20 - 20$$

$$\Rightarrow q = 4x^2 - 3y^2 - xy + 0$$

Hence,  $4x^2 - 3y^2 - xy$  should be subtracted.

**Question 6.** (a) From the sum of  $3x - y + 11$  and  $-y - 11$ , subtract  $3x - y - 11$

(b) subtract the sum of  $3x^2 - 5x$  and  $-x^2 + 2x + 5$  from the sum of  $4 + 3x$  and  $5 - 4x + 2x^2$

**Answer:** (a) According to question,

$$(3x - y + 11) + (-y - 11) - (3x - y - 11) = 3x - y + 11 - y - 11 - 3x + y + 11$$

$$\begin{aligned} &= 3x - 3x - y - y + y + 11 - 11 + 11 \\ &= (3 - 3)x - (1 + 1 - 1)y + 11 + 11 - 11 \\ &= 0x - y + 11 = -y + 11 \end{aligned}$$

(b) According to question,

$$\begin{aligned} &[(4 + 3x) + (5 - 4x + 2x^2)] - [(3x^2 - 5x) + (-x^2 + 2x + 5)] \\ &= [4 + 3x + 5 - 4x + 2x^2] - [3x^2 - 5x - x^2 + 2x + 5] \\ &= [2x^2 + 3x - 4x + 5 + 4] - [3x^2 - x^2 + 2x - 5x + 5] \\ &= [2x^2 - x + 9] - [2x^2 - 3x + 5] \\ &= 2x^2 - x + 9 - 2x^2 + 3x - 5 \\ &= 2x^2 - 2x^2 - x + 3x + 9 - 5 \\ &= 2x + 4 \end{aligned}$$