EXERCISE 7.1 **PAGE NO: 7.7**

1. Identify the monomials, binomials, trinomials and quadrinomials from the following expressions:
(i) a²
(ii) a² − b²
(iii) x³ + y³ + z³
(iv) x³ + y³ + z³ + 3xyz
(v) 7 + 5
(vi) a b c + 1
(vii) 3x − 2 + 5
(viii) 2x − 3y + 4
(ix) x y + y z + z x
(x) ax³ + bx² + cx + d

Solution:
(i) Given a²
a² is a monomial expression because it contains only one term

(ii) Given a² − b²
a² − b² is a binomial expression because it contains two terms

(iii) Given x³ + y³ + z³
x³ + y³ + z³ is a trinomial because it contains three terms

(iv) Given x³ + y³ + z³ + 3xyz
x³ + y³ + z³ + 3xyz is a quadrinomial expression because it contains four terms

(v) Given 7 + 5
7 + 5 is a monomial expression because it contains only one term

(vi) Given a b c + 1
a b c + 1 is a binomial expression because it contains two terms

(vii) Given 3x − 2 + 5
3x − 2 + 5 is a binomial expression because it contains two terms

(viii) Given 2x – 3y + 4

2x – 3y + 4 is a trinomial because it contains three terms

(ix) Given x y + y z + z x

x y + y z + z x is a trinomial because it contains three terms

(x) Given $ax^3 + bx^2 + cx + d$

$ax^3 + bx^2 + cx + d$ is a quadrinomial expression because it contains four terms

2. Write all the terms of each of the following algebraic expressions:
(i) 3x
(ii) 2x – 3
(iii) 2x² – 7
(iv) 2x² + y² – 3xy + 4

Solution:
(i) Given 3x
3x is the only term of the given algebraic expression.

(ii) Given 2x – 3
2x and -3 are the terms of the given algebraic expression.

(iii) Given $2x^2 – 7$
$2x^2$ and −7 are the terms of the given algebraic expression.

(iv) Given $2x^2 + y^2 – 3xy + 4$
$2x^2$, y^2, −3xy and 4 are the terms of the given algebraic expression.

3. Identify the terms and also mention the numerical coefficients of those terms:
(i) 4xy, -5x²y, -3yx, 2xy²
(ii) 7a²bc,-3ca²b,-(5/2) abc², 3/2abc²,(-4/3)cba²

Solution:
(i) Like terms 4xy, -3yx and Numerical coefficients 4, -3
(ii) Like terms (-7a²bc, −3ca²b) and (−4/3cba²) and their Numerical coefficients 7, -3, (-4/3)

Like terms are (−5/2abc^2) and (3/2 abc^2) and numerical coefficients are (−5/2) and (3/2)

4. Identify the like terms in the following algebraic expressions:
(i) a^2 + b^2 -2a^2 + c^2 + 4a
(ii) 3x + 4xy − 2yz + 52zy
(iii) abc + ab^{2}c + 2acb^2 + 3c^{2}ab + b^{2}ac − 2a^{2}bc + 3cab^2

Solution:
(i) Given a^2 + b^2 -2a^2 + c^2 + 4a
The like terms in the given algebraic expressions are a^2 and −2a^2.

(ii)   Given 3x + 4xy − 2yz + 52zy
The like terms in the given algebraic expressions are -2yz and 52zy.

(iii)   Given abc + ab^{2}c + 2acb^2 + 3c^{2}ab + b^{2}ac − 2a^{2}bc + 3cab^2
The like terms in the given algebraic expressions are ab^{2}c, 2acb^2, b^{2}ac and 3cab^2.

5. Write the coefficient of x in the following:
(i) −12x
(ii) −7xy
(iii) xyz
(iv) −7ax

Solution:
(i) Given -12x
The numerical coefficient of x is -12.

(ii) Given -7xy
The numerical coefficient of x is -7y.

(iii) Given xyz
The numerical coefficient of x is yz.

(iv) Given -7ax
The numerical coefficient of x is -7a.

6. Write the coefficient of x^2 in the following:

(i) $-3x^2$
(ii) $5x^2yz$
(iii) $5/7x^2z$
(iv) $(-3/2)ax^2 + yx$

Solution:
(i) Given $-3x^2$
The numerical coefficient of x^2 is -3.

(ii) Given $5x^2yz$
The numerical coefficient of x^2 is 5yz.

(iii) Given $5/7x^2z$
The numerical coefficient of x^2 is 5/7z.

(iv) Given $(-3/2)ax^2 + yx$
The numerical coefficient of x^2 is $-(3/2)a$.

7. Write the coefficient of:
(i) y in $-3y$
(ii) a in 2ab
(iii) z in $-7xyz$
(iv) p in $-3pqr$
(v) y^2 in $9xy^2z$
(vi) x^3 in $x^3 + 1$
(vii) x^2 in $-x^2$

Solution:
(i) Given $-3y$
The coefficient of y is -3.

(ii) Given 2ab
The coefficient of a is 2b.

(iii) Given -7xyz
The coefficient of z is -7xy.

(iv) Given -3pqr

The coefficient of p is -3qr.

(v) Given $9xy^2z$

The coefficient of y^2 is 9xz.

(vi) Given $x^3 +1$

The coefficient of x^3 is 1.

(vii) Given $-x^2$

The coefficient of x^2 is -1.

8. Write the numerical coefficient of each in the following:
(i) xy
(ii) -6yz
(iii) 7abc
(iv) $-2x^3y^2z$

Solution:
(i) Given xy

The numerical coefficient in the term xy is 1.

(ii) Given -6yz

The numerical coefficient in the term - 6yz is - 6.

(iii) Given 7abc

The numerical coefficient in the term 7abc is 7.

(iv) Given $-2x^3y^2z$

The numerical coefficient in the term $-2x^3y^2z$ is -2.

9. Write the numerical coefficient of each term in the following algebraic expressions:
(i) $4x^2y - (3/2)xy + 5/2\ xy^2$
(ii) $(-5/3)x^2y + (7/4)xyz + 3$

Solution:
(i) Given $4x^2y - (3/2)\ xy + 5/2\ xy^2$

Numerical coefficient of following algebraic expressions are given below

Term	Coefficient
$4x^2y$	4
$-(3/2)xy$	-(3/2)
$5/2\,xy^2$	(5/2)

(ii) Given $(-5/3)x^2y + (7/4)xyz + 3$
Numerical coefficient of following algebraic expressions are given below

Term	Coefficient
$(-5/3)x^2y$	(-5/3)
$(7/4)xyz$	(7/4)
3	3

10. Write the constant term of each of the following algebraic expressions:
(i) $x^2y - xy^2 + 7xy - 3$
(ii) $a^3 - 3a^2 + 7a + 5$

Solution:
(i) Given $x^2y - xy^2 + 7xy - 3$
The constant term in the given algebraic expressions is -3.

(ii) Given $a^3 - 3a^2 + 7a + 5$
The constant term in the given algebraic expressions is 5.

11. Evaluate each of the following expressions for x = -2, y = -1, z = 3:
(i) $(x/y) + (y/z) + (z/x)$
(ii) $x^2 + y^2 + z^2 - xy - yz - zx$

Solution:
(i) Given x = -2, y = -1, z = 3
Consider $(x/y) + (y/z) + (z/x)$
On substituting the given values we get,
= (-2/-1) + (-1/3) + (3/-2)
The LCM of 3 and 2 is 6
= (12 – 2 – 9)/6
= (1/6)

(ii) Given x = -2, y = -1, z = 3
Consider x² + y² + z² – xy – yz – zx
On substituting the given values we get,
= (-2)² + (-1)² + 3² – (-2) (-1) – (-1) (3) – (3) (-2)
= 4 + 1 + 9 – 2 + 3 + 6
= 23 – 2
= 21

12. Evaluate each of the following algebraic expressions for x = 1, y = -1, z = 2, a = -2, b = 1, c = -2:
(i) ax + by + cz
(ii) ax² + by² – cz
(iii) axy + byz + cxy

Solution:
(i) Given x = 1, y = -1, z = 2, a = -2, b = 1, c = -2
Consider ax + by + cz
On substituting the given values
= (-2) (1) + (1) (-1) + (-2) (2)
= –2 – 1 – 4
= –7

(ii)　Given x = 1, y = -1, z = 2, a = -2, b = 1, c = -2 Consider ax² + by² – cz
On substituting the given values
= (-2) × 1² + 1 × (-1)² – (-2) × 2
= -2 + 1 – (-4)
= - 1 + 4
= 9

(iii)　Given x = 1, y = -1, z = 2, a = -2, b = 1, c = -2 Consider axy + byz + cxy
= (-2) × 1 × -1 + 1 × -1 × 2 + (-2) × 1 × (-1)
= 2 + (-2) + 2
= 4 – 2
= 2

1. Add the following:
(i) 3x and 7x
(ii) -5xy and 9xy

Solution:
(i) Given 3x and 7x
3x + 7x = (3 + 7) x
= 10x

(ii) Given -5xy and 9xy
-5xy + 9xy = (-5 + 9) xy
= 4xy

2. Simplify each of the following:
(i) $7x^3y + 9yx^3$
(ii) $12a^2b + 3ba^2$

Solution:
(i) Given $7x^3y + 9yx^3$
$7x^3y + 9yx^3 = (7 + 9) x^3y$
$= 16x^3y$

(ii) Given
$12a^2b + 3ba^2 = (12 + 3) a^2b$
$= 15a^2b$

3. Add the following:
(i) 7abc, -5abc, 9abc, -8abc
(ii) $2x^2y, - 4x^2y, 6x^2y, -5x^2y$

Solution:
(i) Given 7abc, -5abc, 9abc, -8abc
Consider 7abc + (-5abc) + (9abc) + (-8abc)
= 7abc – 5abc + 9abc – 8abc

= (7 – 5 + 9 – 8) abc [by taking abc common]
= (16 – 13) abc
= 3abc

(ii) Given $2x^2y$, $- 4x^2y$, $6x^2y$, $-5x^2y$
$2x^2y + (-4x^2y) + (6x^2y) + (-5x^2y)$
= $2x^2y - 4x^2y + 6x^2y - 5x^2y$
= $(2- 4 + 6 - 5) x^2y$ [by taking $x^2 y$ common]
= $(8 - 9) x^2y$
= $-x^2y$

4. Add the following expressions:
(i) $x^3 -2x^2y + 3xy^2- y^3$, $2x^3- 5xy^2 + 3x^2y - 4y^3$
(ii) $a^4 - 2a^3b + 3ab^3 + 4a^2b^2 + 3b^4$, $- 2a^4 - 5ab^3 + 7a^3b - 6a^2b^2 + b^4$

Solution:
(i) Given $x^3 -2x^2y + 3xy^2- y^3$, $2x^3- 5xy^2 + 3x^2y - 4y^3$
Collecting positive and negative like terms together, we get
= $x^3 +2x^3 - 2x^2y + 3x^2y + 3xy^2 - 5xy^2 - y^3- 4y^3$
= $3x^3 + x^2y - 2xy^2 - 5y^3$

(ii) Given $a^4 - 2a^3b + 3ab^3 + 4a^2b^2 + 3b^4$, $- 2a^4 - 5ab^3 + 7a^3b - 6a^2b^2 + b^4$
= $a^4 - 2a^3b + 3ab^3 + 4a^2b^2 + 3b^4 - 2a^4 - 5ab^3 + 7a^3b - 6a^2b^2 + b^4$
Collecting positive and negative like terms together, we get
= $a^4 - 2a^4- 2a^3b + 7a^3b + 3ab^3 - 5ab^3 + 4a^2b^2 - 6a^2b^2 + 3b^4 + b^4$
= $- a^4 + 5a^3b - 2ab^3 - 2a^2b^2 + 4b^4$

5. Add the following expressions:
(i) 8a – 6ab + 5b, –6a – ab – 8b and –4a + 2ab + 3b
(ii) $5x^3 + 7 + 6x - 5x^2$, $2x^2 – 8 - 9x$, $4x - 2x^2 + 3 x 3$, $3 x 3 - 9x - x^2$ and $x - x^2 - x^3 – 4$

Solution:
(i) Given 8a – 6ab + 5b, –6a – ab – 8b and –4a + 2ab + 3b
= (8a – 6ab + 5b) + (–6a – ab – 8b) + (–4a + 2ab + 3b)
Collecting positive and negative like terms together, we get
= 8a – 6a – 4a – 6ab – ab + 2ab + 5b – 8b + 3b
= 8a – 10a – 7ab + 2ab + 8b – 8b

= −2a − 5ab

(ii) Given $5x^3 + 7 + 6x - 5x^2$, $2x^2 – 8 - 9x$, $4x - 2x^2 + 3 x^3$, $3 x^3 - 9x - x^2$ and $x - x^2 - x^3 – 4$ =
$(5 x^3 + 7+ 6x - 5x^2) + (2 x^2 – 8 - 9x) + (4x - 2x^2 + 3 x^3) + (3 x^3 - 9x-x^2) + (x - x^2 - x^3 - 4)$
Collecting positive and negative like terms together, we get
$5x^3 + 3x^3 + 3x^3 - x^3 - 5x^2 + 2x^2 - 2x^2- x^2 - x^2 + 6x - 9x + 4x - 9x + x + 7 – 8 - 4$
$= 10x^3 - 7x^2 - 7x – 5$

6. Add the following:
(i) x – 3y – 2z
5x + 7y – 8z
3x – 2y + 5z
(ii) 4ab – 5bc + 7ca
−3ab + 2bc – 3ca
5ab – 3bc + 4ca

Solution:
(i) Given x – 3y – 2z, 5x + 7y – 8z and 3x – 2y + 5z
= (x – 3y – 2z) + (5x + 7y – 8z) + (3x – 2y + 5z)
Collecting positive and negative like terms together, we get
= x + 5x + 3x – 3y + 7y – 2y – 2z – 8z + 5z
= 9x – 5y + 7y – 10z + 5z
= 9x + 2y – 5z

(ii) Given 4ab – 5bc + 7ca, −3ab + 2bc – 3ca and 5ab – 3bc + 4ca
= (4ab – 5bc + 7ca) + (−3ab + 2bc – 3ca) + (5ab – 3bc + 4ca)
Collecting positive and negative like terms together, we get
= 4ab – 3ab + 5ab – 5bc + 2bc – 3bc + 7ca – 3ca + 4ca
= 9ab – 3ab – 8bc + 2bc + 11ca – 3ca
= 6ab – 6bc + 8ca

7. Add $2x^2 - 3x + 1$ to the sum of $3x^2 - 2x$ and $3x + 7$.

Solution:
Given $2x^2 - 3x + 1$, $3x^2 - 2x$ and $3x + 7$
sum of $3x^2 - 2x$ and $3x + 7$
$= (3x^2 - 2x) + (3x +7)$

$=3x^2 - 2x + 3x + 7$
$= (3x^2 + x + 7)$
Now, required expression $= 2x^2 - 3x + 1 + (3x^2 + x + 7)$
$= 2x^2 + 3x^2 - 3x + x + 1 + 7$
$= 5x^2 - 2x + 8$

8. Add $x^2 + 2xy + y^2$ to the sum of $x^2 - 3y^2$ and $2x^2 - y^2 + 9$.

Solution:
Given $x^2 + 2xy + y^2$, $x^2 - 3y^2$ and $2x^2 - y^2 + 9$.
First we have to find the sum of $x^2 - 3y^2$ and $2x^2 - y^2 + 9$
$= (x^2 - 3y^2) + (2x^2 - y^2 + 9)$
$= x^2 + 2x^2 - 3y^2 - y^2 + 9$
$= 3x^2 - 4y^2 + 9$
Now, required expression $= (x^2 + 2xy + y^2) + (3x^2 - 4y^2 + 9)$
$= x^2 + 3x^2 + 2xy + y^2 - 4y^2 + 9$
$= 4x^2 + 2xy - 3y^2 + 9$

9. Add $a^3 + b^3 - 3$ to the sum of $2a^3 - 3b^3 - 3ab + 7$ and $-a^3 + b^3 + 3ab - 9$.

Solution:
Given $a^3 + b^3 - 3$, $2a^3 - 3b^3 - 3ab + 7$ and $-a^3 + b^3 + 3ab - 9$.
First, we need to find the sum of $2a^3 - 3b^3 - 3ab + 7$ and $-a^3 + b^3 + 3ab - 9$.
$= (2a^3 - 3b^3 - 3ab + 7) + (-a^3 + b^3 + 3ab - 9)$
Collecting positive and negative like terms together, we get
$= 2a^3 - a^3 - 3b^3 + b^3 - 3ab + 3ab + 7 - 9$
$= a^3 - 2b^3 - 2$
Now, the required expression $= (a^3 + b^3 - 3) + (a^3 - 2b^3 - 2)$.
$= a^3 + a^3 + b^3 - 2b^3 - 3 - 2$
$= 2a^3 - b^3 - 5$

10. Subtract:
(i) $7a^2b$ from $3a^2b$
(ii) $4xy$ from $-3xy$

Solution:
(i) Given $7a^2b$ from $3a^2b$

= 3a^{2}b -7a^{2}b

= (3 -7) a^{2}b

= - 4a^{2}b

(ii) Given 4xy from -3xy

= −3xy − 4xy

= −7xy

11. Subtract:
(i) - 4x from 3y
(ii) - 2x from − 5y

Solution:
(i) Given - 4x from 3y

= (3y) − (−4x)

= 3y + 4x

(ii) Given - 2x from − 5y

= (-5y) − (−2x)

= −5y + 2x

12. Subtract:
(i) 6x^3 −7x^2 + 5x − 3 from 4 − 5x + 6x^2 − 8x^3
(ii) − x^2 −3z from 5x^2 − y + z + 7
(iii) x^3 + 2x^{2}y + 6xy^2 − y^3 from y^3−3xy^2−4x^{2}y

Solution:
(i) Given 6x^3 −7x^2 + 5x − 3 and 4 − 5x + 6x^2 − 8x^3

= (4 - 5x + 6x^2 - 8x^3) - (6x^3 - 7x^2 + 5x - 3)

= 4 - 5x + 6x^2 - 8x^3 - 6x^3 + 7x^2 - 5x + 3

= - 8x^3- 6x^3 + 7x^2 + 6x^2- 5x - 5x + 3 + 4

= - 14x^3 + 13x^2 - 10x +7

(ii) Given − x^2 −3z and 5x^2 − y + z + 7

= (5x^2 - y + z + 7) - (- x^2 - 3z)

= 5x^2 - y + z + 7 + x^2 + 3z

= 5x^2+ x^2 - y + z + 3z + 7

= 6x² - y + 4z + 7

(iii) Given x³ + 2x²y + 6xy² – y³ and y³–3xy²–4x²y
= (y³ - 3xy² - 4x²y) - (x³ + 2x²y + 6xy² - y³)
= y³ - 3xy² - 4x²y - x³ - 2x²y - 6xy² + y³
= y³ + y³- 3xy²- 6xy²- 4x²y - 2x²y - x³
= 2y³- 9xy² - 6x²y - x³

13. From
(i) p³ – 4 + 3p², take away 5p² – 3p³ + p – 6
(ii) 7 + x – x², take away 9 + x + 3x² + 7x³
(iii) 1– 5y², take away y³ + 7y² + y + 1
(iv) x³ – 5x² + 3x + 1, take away 6x² – 4x³ + 5 + 3x

Solution:
(i) Given p³ – 4 + 3p², take away 5p² – 3p³ + p – 6
= (p³ - 4 + 3p²) - (5p² - 3p³ + p - 6)
= p³ - 4 + 3p² - 5p² + 3p³ - p + 6
= p³ + 3p³ + 3p² - 5p²- p - 4+ 6
= 4p³ - 2p² - p + 2

(ii) Given 7 + x – x², take away 9 + x + 3x² + 7x³
= (7 + x - x²) - (9 + x + 3x² + 7x³)
= 7 + x - x² - 9 - x - 3x² - 7x³
= - 7x³- x² - 3x² + 7 - 9
= - 7x³ - 4x² - 2

(iii) Given 1– 5y², take away y³ + 7y² + y + 1
= (1 - 5y²) - (y³+ 7y² + y + 1)
= 1 - 5y² - y³ - 7y² - y - 1
= - y³- 5y² - 7y² - y
= - y³- 12y² - y

(iv) Given x³ – 5x² + 3x + 1, take away 6x² – 4x³ + 5 + 3x
= (x³ - 5x² + 3x + 1) - (6x² - 4x³ + 5 +3x)
= x³ - 5x² + 3x + 1 - 6x² + 4x³ - 5 - 3x
= x³+ 4x³ - 5x² - 6x² + 1 - 5

= 5x^3 - 11x^2 − 4

14. From the sum of 3x^2 − 5x + 2 and − 5x^2 − 8x + 9 subtract 4x^2 − 7x + 9.

Solution:
First we have to add 3x^2 − 5x + 2 and − 5x^2 − 8x + 9 then from the result we have to subtract 4x^2 − 7x + 9.
= {(3x^2 - 5x + 2) + (- 5x^2 - 8x + 9)} - (4x^2 - 7x + 9)
= {3x^2 - 5x + 2 - 5x^2 - 8x + 9} - (4x^2 - 7x + 9)
= {3x^2 - 5x^2 - 5x - 8x + 2 + 9} - (4x^2 - 7x + 9)
= {- 2x^2 - 13x +11} - (4x^2 - 7x + 9)
= - 2x^2 - 13x + 11 - 4x^2 + 7x − 9
= - 2x^2 - 4x^2 - 13x + 7x + 11 - 9
= - 6x^2 - 6x + 2

15. Subtract the sum of 13x − 4y + 7z and − 6z + 6x + 3y from the sum of 6x − 4y − 4z and 2x + 4y − 7.

Solution:
First we have to find the sum of 13x − 4y + 7z and − 6z + 6x + 3y
Therefore, sum of (13x − 4y + 7z) and (−6z + 6x + 3y)
= (13x − 4y + 7z) + (−6z + 6x + 3y)
= (13x − 4y + 7z − 6z + 6x + 3y)
= (13x + 6x − 4y + 3y + 7z − 6z)
= (19x − y + z)
Now we have to find the sum of (6x − 4y − 4z) and (2x + 4y − 7)
= (6x − 4y − 4z) + (2x + 4y − 7)
= (6x − 4y − 4z + 2x + 4y − 7)
= (6x + 2x − 4z − 7)
= (8x − 4z − 7)
Now, required expression = (8x − 4z − 7) − (19x − y + z)
= 8x − 4z − 7 − 19x + y − z
= 8x − 19x + y − 4z − z − 7
= −11x + y − 5z − 7

16. From the sum of x^2 + 3y^2 − 6xy, 2x^2 − y^2 + 8xy, y^2 + 8 and x^2 − 3xy subtract −3x^2 + 4y^2 − xy + x − y + 3.

Solution:
First we have to find the sum of $(x^2 + 3y^2 - 6xy)$, $(2x^2 - y^2 + 8xy)$, $(y^2 + 8)$ and $(x^2 - 3xy)$
$= \{(x^2 + 3y^2 - 6xy) + (2x^2 - y^2 + 8xy) + (y^2 + 8) + (x^2 - 3xy)\}$
$= \{x^2 + 3y^2 - 6xy + 2x^2 - y^2 + 8xy + y^2 + 8 + x^2 - 3xy\}$
$= \{x^2 + 2x^2 + x^2 + 3y^2 - y^2 + y^2 - 6xy + 8xy - 3xy + 8\}$
$= 4x^2 + 3y^2 - xy + 8$
Now, from the result subtract the $-3x^2 + 4y^2 - xy + x - y + 3$.
Therefore, required expression $= (4x^2 + 3y^2 - xy + 8) - (- 3x^2 + 4y^2 - xy + x - y + 3)$
$= 4x^2 + 3y^2 - xy + 8 + 3x^2 - 4y^2 + xy - x + y - 3$
$= 4x^2 + 3x^2 + 3y^2 - 4y^2 - x + y - 3 + 8$
$= 7x^2 - y^2 - x + y + 5$

17. What should be added to xy – 3yz + 4zx to get 4xy – 3zx + 4yz + 7?

Solution:
By subtracting xy – 3yz + 4zx from 4xy – 3zx + 4yz + 7, we get the required expression.
Therefore, required expression $= (4xy – 3zx + 4yz + 7) – (xy – 3yz + 4zx)$
$= 4xy – 3zx + 4yz + 7 – xy + 3yz – 4zx$
$= 4xy – xy – 3zx – 4zx + 4yz + 3yz + 7$
$= 3xy – 7zx + 7yz + 7$

18. What should be subtracted from x² – xy + y² – x + y + 3 to obtain –x² + 3y² – 4xy + 1?

Solution:
Let 'E' be the required expression. Then, we have
$x^2 - xy + y^2 - x + y + 3 - E = - x^2 + 3y^2 - 4xy + 1$
Therefore, $E = (x^2 - xy + y^2 - x + y + 3) - (- x^2 + 3y^2 - 4xy + 1)$
$= x^2 - xy + y^2 - x + y + 3 + x^2 - 3y^2 + 4xy - 1$
Collecting positive and negative like terms together, we get
$= x^2 + x^2 - xy + 4xy + y^2 - 3y^2 - x + y + 3 - 1$
$= 2x^2 + 3xy - 2y^2 - x + y + 2$

19. How much is x – 2y + 3z greater than 3x + 5y – 7?

Solution:
By subtracting x – 2y + 3z from 3x + 5y – 7 we can get the required expression,
Required expression $= (x – 2y + 3z) – (3x + 5y – 7)$

= x − 2y + 3z − 3x − 5y + 7
Collecting positive and negative like terms together, we get
= x − 3x − 2y + 5y + 3z + 7
= −2x − 7y + 3z + 7

20. How much is $x^2 − 2xy + 3y^2$ less than $2x^2 − 3y^2 + xy$?

Solution:
By subtracting the $x^2 − 2xy + 3y^2$ from $2x^2 − 3y^2 + xy$ we can get the required expression,
Required expression = $(2x^2 - 3y^2 + xy) - (x^2 - 2xy + 3y^2)$
= $2x^2 - 3y^2 + xy - x^2 + 2xy - 3y^2$
Collecting positive and negative like terms together, we get
= $2x^2 - x^2 - 3y^2 - 3y^2 + xy + 2xy$
= $x^2 - 6y^2 + 3xy$

21. How much does $a^2 − 3ab + 2b^2$ exceed $2a^2 − 7ab + 9b^2$?

Solution:
By subtracting $2a^2 − 7ab + 9b^2$ from $a^2 − 3ab + 2b^2$ we get the required expression
Required expression = $(a^2 - 3ab + 2b^2) - (2a^2 - 7ab + 9b^2)$
= $a^2 - 3ab + 2b^2 - 2a^2 + 7ab - 9b^2$
Collecting positive and negative like terms together, we get
= $a^2 - 2a^2 - 3ab + 7ab + 2b^2 - 9b^2$
= $- a^2 + 4ab - 7b^2$

22. What must be added to $12x^3 − 4x^2 + 3x − 7$ to make the sum $x^3 + 2x^2 − 3x + 2$?

Solution:
Let 'E' be the required expression. Thus, we have
$12x^3 - 4x^2 + 3x - 7 + E = x^3 + 2x^2 - 3x + 2$
Therefore, E = $(x^3 + 2x^2 - 3x + 2) - (12x^3 - 4x^2 + 3x - 7)$
= $x^3 + 2x^2 - 3x + 2 - 12x^3 + 4x^2 - 3x + 7$
Collecting positive and negative like terms together, we get
= $x^3 - 12x^3 + 2x^2 + 4x^2 - 3x - 3x + 2 + 7$
= $- 11x^3 + 6x^2 - 6x + 9$

23. If P = $7x^2 + 5xy − 9y^2$, Q = $4y^2 − 3x^2 − 6xy$ and R = $−4x^2 + xy + 5y^2$, show that P + Q + R

= 0.

Solution:
Given P = $7x^2 + 5xy - 9y^2$, Q = $4y^2 - 3x^2 - 6xy$ and R = $-4x^2 + xy + 5y^2$
Now we have to prove P + Q + R = 0,
Consider P + Q + R = $(7x^2 + 5xy - 9y^2) + (4y^2 - 3x^2 - 6xy) + (- 4x^2 + xy + 5y^2)$
= $7x^2 + 5xy - 9y^2 + 4y^2 - 3x^2 - 6xy - 4x^2 + xy + 5y^2$
Collecting positive and negative like terms together, we get
= $7x^2 - 3x^2 - 4x^2 + 5xy - 6xy + xy - 9y^2 + 4y^2 + 5y^2$
= $7x^2 - 7x^2 + 6xy - 6xy - 9y^2 + 9y^2$
= 0

24. If P = $a^2 - b^2 + 2ab$, Q = $a^2 + 4b^2 - 6ab$, R = $b^2 + b$, S = $a^2 - 4ab$ and T = $-2a^2 + b^2 - ab + a$. Find P + Q + R + S - T.

Solution:
Given P = $a^2 - b^2 + 2ab$, Q = $a^2 + 4b^2 - 6ab$, R = $b^2 + b$, S = $a^2 - 4ab$ and T = $-2a^2 + b^2 - ab + a$.
Now we have to find P + Q + R + S - T
Substituting all values we get
Consider P + Q + R + S - T = {$(a^2 - b^2 + 2ab) + (a^2 + 4b^2 - 6ab) + (b^2 + b) + (a^2 - 4ab)$} - ($-2a^2 + b^2 - ab + a$)
= {$a^2 - b^2 + 2ab + a^2 + 4b^2 - 6ab + b^2 + b + a^2 - 4ab$} - ($- 2a^2 + b^2 - ab + a$)
= {$3a^2 + 4b^2 - 8ab + b$ } - ($-2a^2 + b^2 - ab + a$)
= $3a^2 + 4b^2 - 8ab + b + 2a^2 - b^2 + ab - a$
Collecting positive and negative like terms together, we get
$3a^2 + 2a^2 + 4b^2 - b^2 - 8ab + ab - a + b$
= $5a^2 + 3b^2 - 7ab - a + b$

EXERCISE 7.3 PAGE NO: 7.16

1. Place the last two terms of the following expressions in parentheses preceded by a minus sign:
(i) x + y – 3z + y
(ii) 3x – 2y – 5z – 4
(iii) 3a – 2b + 4c – 5
(iv) 7a + 3b + 2c + 4
(v) $2a^2$ - b^2 - 3ab + 6
(vi) a^2 + b^2 - c^2 + ab - 3ac

Solution:
(i) Given x + y – 3z + y
x + y – 3z + y = x + y – (3z – y)

(ii) Given 3x – 2y – 5z – 4
3x – 2y – 5z – 4 = 3x – 2y – (5z + 4)

(iii) Given 3a – 2b + 4c – 5
3a – 2b + 4c – 5 = 3a – 2b – (–4c + 5)

(iv) Given 7a + 3b + 2c + 4
7a + 3b + 2c + 4 = 7a + 3b – (–2c – 4)

(v) Given $2a^2$ - b^2 - 3ab + 6
$2a^2$ - b^2 - 3ab + 6 = $2a^2$ - b^2 - (3ab - 6)

(vi) Given a^2 + b^2 - c^2 + ab - 3ac
a^2 + b^2 - c^2 + ab - 3ac = a^2 + b^2 - c^2 - (- ab + 3ac)

2. Write each of the following statements by using appropriate grouping symbols:
(i) The sum of a – b and 3a – 2b + 5 is subtracted from 4a + 2b – 7.
(ii) Three times the sum of 2x + y – [5 – (x – 3y)] and 7x – 4y + 3 is subtracted from 3x – 4y + 7
(iii) The subtraction of x^2 - y^2 + 4xy from $2x^2$ + y^2 - 3xy is added to $9x^2$ - $3y^2$ - xy.

Solution:
(i) Given the sum of a – b and 3a – 2b + 5 = [(a – b) + (3a – 2b + 5)].
This is subtracted from 4a + 2b – 7.
Thus, the required expression is (4a + 2b – 7) – [(a – b) + (3a – 2b + 5)]

(ii) Given three times the sum of 2x + y – {5 – (x – 3y)} and 7x – 4y + 3 = 3[(2x + y – {5 – (x – 3y)}) + (7x – 4y + 3)]
This is subtracted from 3x – 4y + 7.
Thus, the required expression is (3x – 4y + 7) – 3[(2x + y – {5 – (x – 3y)}) + (7x – 4y + 3)]

(iii) Given the product of subtraction of x^2- y^2 + 4xy from $2x^2$ + y^2 - 3xy is given by {($2x^2$ + y^2 - 3xy) – (x^2-y^2 + 4xy)}
When the above equation is added to $9x^2$ - $3y^2$ - xy, we get
{($2x^2$ + y^2 - 3xy) – (x^2 - y^2 + 4xy)} + ($9x^2$ - $3y^2$- xy))
This is the required expression.

EXERCISE 7.4 **PAGE NO: 7.20**

Simplify each of the following algebraic expressions by removing grouping symbols.
1. 2x + (5x – 3y)

Solution:
Given 2x + (5x – 3y)
Since the '+' sign precedes the parentheses, we have to retain the sign of each term in the parentheses when we remove them.
= 2x + 5x – 3y
On simplifying, we get
= 7x – 3y

2. 3x – (y – 2x)

Solution:
Given 3x – (y – 2x)
Since the '–' sign precedes the parentheses, we have to change the sign of each term in the parentheses when we remove them. Therefore, we have
= 3x – y + 2x
On simplifying, we get
= 5x – y

3. 5a – (3b – 2a + 4c)

Solution:
Given 5a – (3b – 2a + 4c)
Since the '-'sign precedes the parentheses, we have to change the sign of each term in the parentheses when we remove them.
= 5a – 3b + 2a – 4c
On simplifying, we get
= 7a – 3b – 4c

4. -2(x^2 - y^2 + xy) - 3(x^2 +y^2 - xy)

Solution:

Given - 2(x^2 - y^2 + xy) - 3(x^2 +y^2 - xy)
Since the '–' sign precedes the parentheses, we have to change the sign of each term in the parentheses when we remove them. Therefore, we have
= -2x^2 + 2y^2 - 2xy - 3x^2 - 3y^2 + 3xy
On rearranging,
= -2x^2 - 3x^2 + 2y^2 - 3y^2 - 2xy + 3xy
On simplifying, we get
= -5x^2 - y^2 + xy

5. 3x + 2y – {x – (2y – 3)}

Solution:
Given 3x + 2y – {x – (2y – 3)}
First, we have to remove the parentheses. Then, we have to remove the braces.
Then we get,
= 3x + 2y – {x – 2y + 3}
= 3x + 2y – x + 2y – 3
On simplifying, we get
= 2x + 4y – 3

6. 5a – {3a – (2 – a) + 4}

Solution:
Given 5a – {3a – (2 – a) + 4}
First, we have to remove the parentheses. Then, we have to remove the braces.
Then we get,
= 5a – {3a – 2 + a + 4}
= 5a – 3a + 2 – a – 4
On simplifying, we get
= 5a – 4a – 2
= a – 2

7. a – [b – {a – (b – 1) + 3a}]

Solution:
Given a – [b – {a – (b – 1) + 3a}]
First we have to remove the parentheses, then the curly brackets, and then the square

brackets.
Then we get,
= a – [b – {a – (b – 1) + 3a}]
= a – [b – {a – b + 1 + 3a}]
= a – [b – {4a – b + 1}]
= a – [b – 4a + b – 1]
= a – [2b – 4a – 1]
On simplifying, we get
= a – 2b + 4a + 1
= 5a – 2b + 1

8. a – [2b – {3a – (2b – 3c)}]

Solution:
Given a – [2b – {3a – (2b – 3c)}]
First we have to remove the parentheses, then the braces, and then the square
brackets.
Then we get,
= a – [2b – {3a – (2b – 3c)}]
= a – [2b – {3a – 2b + 3c}]
= a – [2b – 3a + 2b – 3c]
= a – [4b – 3a – 3c]
On simplifying we get,
= a – 4b + 3a + 3c
= 4a – 4b + 3c

9. -x + [5y – {2x – (3y – 5x)}]

Solution:
Given -x + [5y – {2x – (3y – 5x)}]
First we have to remove the parentheses, then remove braces, and then the square
brackets.
Then we get,
= – x + [5y – {2x – (3y – 5x)}]
= – x + [5y – {2x – 3y + 5x)]
= – x + [5y – {7x – 3y}]
= – x + [5y – 7x + 3y]

= – x + [8y – 7x]
On simplifying we get
= – x + 8y – 7x
= – 8x + 8y

10. 2a – [4b – {4a – 3(2a – b)}]

Solution:
Given 2a – [4b – {4a – 3(2a – b)}]
First we have to remove the parentheses, then remove braces, and then the square brackets.
Then we get,
= 2a – [4b – {4a – 3(2a – b)}]
= 2a – [4b – {4a – 6a + 3b}]
= 2a – [4b – {- 2a + 3b}]
= 2a – [4b + 2a – 3b]
= 2a – [b + 2a]
On simplifying, we get
= 2a – b – 2a
= – b

11. -a – [a + {a + b – 2a – (a – 2b)} - b]

Solution:
Given -a – [a + {a + b – 2a – (a – 2b)} - b]
First we have to remove the parentheses, then remove braces, and then the square brackets.
Then we get,
= – a – [a + {a + b – 2a – (a – 2b)} – b]
= – a – [a + {a + b – 2a – a + 2b} – b]
= – a – [a + {- 2a + 3b} – b]
= – a – [a – 2a + 3b – b]
= – a – [- a + 2b]
On simplifying, we get
= – a + a – 2b
= – 2b

12. 2x – 3y – [3x – 2y -{x – z – (x – 2y)}]

Solution:
Given 2x – 3y – [3x – 2y -{x – z – (x – 2y)}]
First we have to remove the parentheses, then remove braces, and then the square brackets.
Then we get,
= 2x – 3y – [3x – 2y – {x – z – (x – 2y)}])
= 2x – 3y – [3x – 2y – {x – z – x + 2y}]
= 2x – 3y – [3x – 2y – {- z + 2y}]
= 2x – 3y – [3x – 2y + z – 2y]
= 2x – 3y – [3x – 4y + z]
On simplifying, we get
= 2x – 3y – 3x + 4y – z
= - x + y – z

13. 5 + [x – {2y – (6x + y – 4) + 2x} – {x – (y – 2)}]

Solution:
Given 5 + [x – {2y – (6x + y – 4) + 2x} – {x – (y – 2)}]
First we have to remove the parentheses, then remove braces, and then the square brackets.
Then we get,
= 5 + [x – {2y – (6x + y – 4) + 2x} – {x – (y – 2)}]
= 5 + [x – {2y – 6x – y + 4 + 2x} – {x – y + 2}]
= 5 + [x – {y – 4x + 4} – {x – y + 2}]
= 5 + [x – y + 4x – 4 – x + y – 2]
= 5 + [4x – 6]
= 5 + 4x – 6
= 4x – 1

14. x^2 - [3x + [2x - (x^2 - 1)] + 2]

Solution:
Given x^2 - [3x + [2x - (x^2 - 1)] + 2]
First we have to remove the parentheses, then remove braces, and then the square brackets.

Then we get,
= x^2 - [3x + [2x - (x^2 - 1)] + 2]
= x^2 - [3x + [2x - x^2 + 1] + 2]
= x^2 - [3x + 2x - x^2 + 1 + 2]
= x^2 - [5x - x^2 + 3]
On simplifying we get
= x^2 - 5x + x^2 - 3
= $2x^2$ - 5x – 3

15. 20 - [5xy + 3[x^2 - (xy - y) - (x - y)]]

Solution:
Given 20 - [5xy + 3[x^2 - (xy - y) - (x - y)]]
First we have to remove the parentheses, then remove braces, and then the square
brackets.
Then we get,
= 20 - [5xy + 3[x^2 - (xy - y) - (x - y)]]
= 20 - [5xy + 3[x^2 – xy + y – x + y]]
= 20 - [5xy + 3[x^2 – xy + 2y - x]]
= 20 - [5xy + $3x^2$ - 3xy + 6y - 3x]
= 20 - [2xy + $3x^2$ + 6y - 3x]
On simplifying we get
= 20 - 2xy - $3x^2$ - 6y + 3x
= - $3x^2$ - 2xy - 6y + 3x + 20

16. 85 – [12x – 7(8x – 3) – 2{10x – 5(2 – 4x)}]

Solution:
Given 85 – [12x – 7(8x – 3) – 2{10x – 5(2 – 4x)}]
First we have to remove the parentheses, then remove braces, and then the square
brackets.
Then we get,
= 85 – [12x – 7(8x – 3) – 2{10x – 5(2 – 4x)}]
= 85 – [12x – 56x + 21 – 2{10x – 10 + 20x}]
= 85 – [12x – 56x + 21 – 2{30x – 10}]
= 85 – [12x – 56x + 21 – 60x + 20]
= 85 – [12x – 116x + 41]

= 85 – [- 104x + 41]
On simplifying, we get
= 85 + 104x – 41
= 44 + 104x

17. xy [yz – zx – {yx – (3y – xz) – (xy – zy)}]

Solution:
Given xy [yz – zx – {yx – (3y – xz) – (xy – zy)}]
First we have to remove the parentheses, then remove braces, and then the square
brackets.
Then we get,
= xy – [yz – zx – {yx – (3y – xz) – (xy – zy)}]
= xy – [yz – zx – {yx – 3y + xz – xy + zy}]
= xy – [yz – zx – {- 3y + xz + zy}]
= xy – [yz – zx + 3y – xz – zy]
= xy – [- zx + 3y – xz]
On simplifying, we get
= xy – [- 2zx + 3y]
= xy + 2xz – 3y