EXERCISE 7.1 PAGE NO: 7.7

1. Identify the monomials, binomials, trinomials and quadrinomials from the following expressions:

(i) a^2
(ii) $a^2 - b^2$
(iii) $x^3 + y^3 + z^3$
(iv) $x^3 + y^3 + z^3 + 3xyz$
(v) 7 + 5
(vi) a b c + 1
(vii) 3x – 2 + 5
(viii) 2x – 3y + 4
(ix) x y + y z + z x
(x) $ax^3 + bx^2 + cx + d$

Solution:

(i) Given a^2
a^2 is a monomial expression because it contains only one term

(ii) Given $a^2 - b^2$
$a^2 - b^2$ is a binomial expression because it contains two terms

(iii) Given $x^3 + y^3 + z^3$
$x^3 + y^3 + z^3$ is a trinomial because it contains three terms

(iv) Given $x^3 + y^3 + z^3 + 3xyz$
$x^3 + y^3 + z^3 + 3xyz$ 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) $2x^2 - 7$
(iv) $2x^2 + y^2 - 3xy + 4$

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, $-5x^2y$, -3yx, $2xy^2$
(ii) $7a^2bc$,$-3ca^2b$,$-(5/2)\ abc^2$, $3/2abc^2$,$(-4/3)cba^2$

Solution:
(i) Like terms - 4xy, -3yx and Numerical coefficients - 4, -3

(ii) Like terms ($-7a^2bc$, $-3ca^2b$) and ($-4/3cba^2$) 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) $abc + ab^2c + 2acb^2 + 3c^2ab + b^2ac - 2a^2bc + 3cab^2$

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 5/2zy.

(iii) Given $abc + ab^2c + 2acb^2 + 3c^2ab + b^2ac - 2a^2bc + 3cab^2$
The like terms in the given algebraic expressions are ab^2c, $2acb^2$, b^2ac 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 57z.

(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 $x^2 + y^2 + z^2 – xy – yz – zx$
On substituting the given values we get,
$= (-2)^2 + (-1)^2 + 3^2 – (-2)(-1) – (-1)(3) – (3)(-2)$
$= 4 + 1 + 9 – 2 + 3 + 6$
$= 23 – 2$
$= 21$

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) $ax^2 + by^2 – cz$
(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 $ax^2 + by^2 – cz$
On substituting the given values
$= (-2) \times 1^2 + 1 \times (-1)^2 – (-2) \times 2$
$= 4 + 1 – (-4)$
$= 5 + 4$
$= 9$

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

EXERCISE 7.2

PAGE NO: 7.13

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 $5x^3 + 7 + 6x - 5x^2$, $2x^2 – 8 - 9x$, $4x - 2x^2 + 3 \times 3$, $3 \times 3 - 9x - x^2$ and $x - x^2 - x^3 – 4$
$= (5 \times 3 + 7 + 6x - 5x^2) + (2 \times 2 – 8 - 9x) + (4x - 2x^2 + 3 \times 3) + (3 \times 3 - 9x - x^2) + (x - x^2 - x^3 - 4)$
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 $3a^2b$

$= 3a^2b - 7a^2b$
$= (3 - 7)\ a^2b$
$= -\ 4a^2b$

(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) $x^3 + 2x^2y + 6xy^2 - y^3$ from $y^3 - 3xy^2 - 4x^2y$

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

$= 6x^2 - y + 4z + 7$

(iii) Given $x^3 + 2x^2y + 6xy^2 - y^3$ and $y^3 - 3xy^2 - 4x^2y$
$= (y^3 - 3xy^2 - 4x^2y) - (x^3 + 2x^2y + 6xy^2 - y^3)$
$= y^3 - 3xy^2 - 4x^2y - x^3 - 2x^2y - 6xy^2 + y^3$
$= y^3 + y^3 - 3xy^2 - 6xy^2 - 4x^2y - 2x^2y - x^3$
$= 2y^3 - 9xy^2 - 6x^2y - x^3$

13. From
(i) $p^3 - 4 + 3p^2$, take away $5p^2 - 3p^3 + p - 6$
(ii) $7 + x - x^2$, take away $9 + x + 3x^2 + 7x^3$
(iii) $1 - 5y^2$, take away $y^3 + 7y^2 + y + 1$
(iv) $x^3 - 5x^2 + 3x + 1$, take away $6x^2 - 4x^3 + 5 + 3x$

Solution:
(i) Given $p^3 - 4 + 3p^2$, take away $5p^2 - 3p^3 + p - 6$
$= (p^3 - 4 + 3p^2) - (5p^2 - 3p^3 + p - 6)$
$= p^3 - 4 + 3p^2 - 5p^2 + 3p^3 - p + 6$
$= p^3 + 3p^3 + 3p^2 - 5p^2 - p - 4 + 6$
$= 4p^3 - 2p^2 - p + 2$

(ii) Given $7 + x - x^2$, take away $9 + x + 3x^2 + 7x^3$
$= (7 + x - x^2) - (9 + x + 3x^2 + 7x^3)$
$= 7 + x - x^2 - 9 - x - 3x^2 - 7x^3$
$= -7x^3 - x^2 - 3x^2 + 7 - 9$
$= -7x^3 - 4x^2 - 2$

(iii) Given $1 - 5y^2$, take away $y^3 + 7y^2 + y + 1$
$= (1 - 5y^2) - (y^3 + 7y^2 + y + 1)$
$= 1 - 5y^2 - y^3 - 7y^2 - y - 1$
$= -y^3 - 5y^2 - 7y^2 - y$
$= -y^3 - 12y^2 - y$

(iv) Given $x^3 - 5x^2 + 3x + 1$, take away $6x^2 - 4x^3 + 5 + 3x$
$= (x^3 - 5x^2 + 3x + 1) - (6x^2 - 4x^3 + 5 + 3x)$
$= x^3 - 5x^2 + 3x + 1 - 6x^2 + 4x^3 - 5 - 3x$
$= x^3 + 4x^3 - 5x^2 - 6x^2 + 1 - 5$

$= 5x^3 - 11x^2 - 4$

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 $x^2 - xy + y^2 - x + y + 3$ to obtain $-x^2 + 3y^2 - 4xy + 1$?

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. 5a – (3b – 2a + 4c)

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