Access answers to Maths RD Sharma Solutions For Class 7 Chapter 7 – Algebraic Expressions

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) $5x^3 + 7 + 6x – 5x^2$, $2x^2 – 8 – 9x$, $4x – 2x^2 + 3 \text{ x } 3$, $3 \text{ x } 3 – 9x – x^2$ 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 $5x^3 + 7 + 6x – 5x^2$, $2x^2 – 8 – 9x$, $4x – 2x^2 + 3 \text{ x } 3$, $3 \text{ x } 3 – 9x – x^2$ and $x – x^2 – x^3 – 4$

$= (5 \text{ x } 3 + 7 + 6x – 5x^2) + (2 \text{ x } 2 – 8 – 9x) + (4x – 2x^2 + 3 \text{ x } 3) + (3 \text{ x } 3 – 9x - x^2) + (x – x^2 – x^3 – 4)$

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 $3a^2b$

$= 3a^2b - 7a^2b$

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

$= -4a^2b$

(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

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