Algebraic Expressions

Exercise - 8.1

1

(i) $3x+6$

(ii) $13-5x$

(iii) x^2+y^2

(iv) $3pq+7$

(v) x^2-3x

(vi) $mn-(m+n)$

(2)

A taxi charges = 9 / km

fixed charges = 50

Taxi hired for x km is

$9x+50$.

(3)

i. $5a-3b+c$

ii. x^2-5x+6

iii. $x^2y+xy-xy^2$

4

i) $3, -7x$

ii) $2, -5a, \frac{3}{2}b$

iii) $3x^5, 4y^3, -7xy^2, 3$

5)

i) $-4x + 5y$

Term $-4x$, $5y$

factor $-4, x$ $5, y$

ii) $xy + 2x^2y^2$

Term : xy , $2x^2y^2$

factor : x, y $2, x, x, y, y$

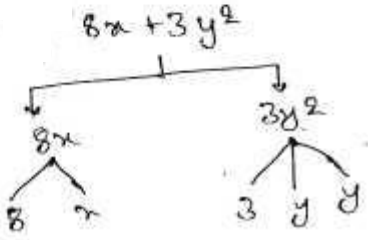
iii) $1.2ab - 2.4b + 3.6a$

Term : $1.2ab$ $-2.4b$ $3.6a$

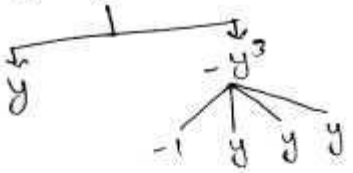
factor : $1.2, a, b$ $-2.4, b$ $3.6, a$

6)

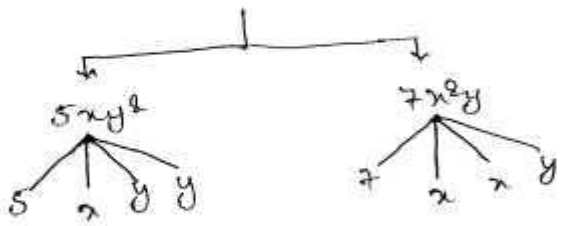
i) $8x + 3y^2$



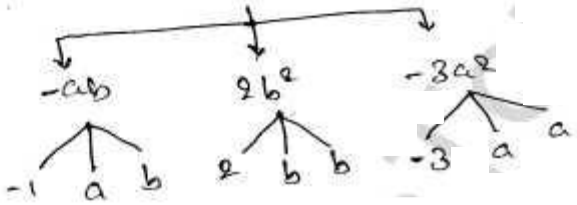
ii, $y - y^3$



iii, $5xy^2 + 7x^2y$



iv, $-ab + 2b^2 - 3a^2$



(7)

i, -7

ii, -2

iii, 6

iv, $2/3$

8,

i, $-4b$

ii, $5y2$

iii, -1

iv, $-3xy$

9.

i. $-y^2z^3$

ii. $7z^3$

iii. $-7yz^2$

iv. $-xyz$

10.

i. Non-constant term $= -7x$

numerical coefficients $= -7$

ii. $1 + 2x - 3x^2$

Non-constant term $= 2x, -3x^2$

Numerical coefficients $= 2, -3$

iii. $1.2a + 0.8b$

non-constant term $= 1.2a, 0.8b$

numerical coefficients $= 1.2, 0.8$.

11.

i. $13y^2 - 8xy$

$-8xy$

coefficient of $x = -8y$

ii. $7x - xy^2$

$7x, -xy^2$

coefficient of $x = 7, -y^2$

iii) $5 - 7xy2 + 4x^2y$

$-7xy2$, $4x^2y$

coefficient of $x = -7y2, 4xy$

12.

i) $8 - xy^2$

$-xy^2$

coefficient of $y^2 = -x$

ii) $5y^2 + 7x - 3xy^2$

$5y^2$, $-3xy^2$

coefficient of $y^2 - 5, -3x$

iii) $2x^2y - 15xy^2 + 7y^2$

$-15x\,y^2$, $7y^2$

coefficient of $y^2 = -15x, 7$

13.

i) $4y - 72$ binomial

ii) $-5xy^2$ monomial

iii) $xty - xy$ trinomial

iv) $ab^2 - 5b - 3a$ trinomial

v) $4p^2q - 5pq^2$ binomial

vi. 2017 monomial

vii. $1+x+x^2$ trinomial

viii. $5x^2-7+3x+4$ trinomial

14.

i. $-7x, \frac{5}{2}x$ like term

ii. $-29x, -29y$ unlike term

iii. $2xy, 2xyz$ unlike term

iv. $4m^2p, 4mp^2$ unlike term

v. $12x2, 12x^2z^2$ unlike term

vi. $-5pq, 7qp$ like term

15.

i. $x^2y, -2x^2y$

ii. $3a^2b, -6a^2b, 2abc, 4abc$

iii. $10pq, -7pq, 789qp.$

$7p, 2405p.$

$8q, -100q.$

$-p^2q^2, 12q^2p^2.$

$-23, 41$

$-5p^2, 701p^2.$

$13p^2q, 9p^2.$

16

i, 8

ii, 1

iii, 0

iv, 2

17,

i, 3

ii, 4

iii, 5

18,

i, true

ii, false

iii, false

iv, false

v, true

vi, false

vii, false

① Exercise 8.2

i, $7x, -3x$

$7x - 3x = 4x$

ii, $6x, -11x$

$6x - 11x = -5x$

iii, $5x^2, -9x^2$

$5x^2 - 9x^2 = -4x^2$

iv, $3ab^2, -5ab^2$

$3ab^2 - 5ab^2 = -4ab^2$

v, $\frac{1}{2}pq, -\frac{1}{3}pq$

$= \frac{1}{2}pq - \frac{1}{3}pq$

$= \frac{3pq - 2pq}{3 \times 2}$

$= \frac{pq}{6}$

vi, $5x^3y, -\frac{2}{3}x^3y$

$= 5x^3y - \frac{2}{3}x^3y$

$= \frac{15x^3y - 2x^3y}{3}$

$= \frac{13x^3y}{3}$

2,

i, $3x, -5x, 7x$

$3x - 5x + 7x = 5x$

ii, $7xy, 2xy, -8xy$

$7xy + 2xy - 8xy$

$= xy$

iii, $-2abc, 3abc, abc$

$-2abc + 3abc + abc = 2abc$

iv, $3mn, -5mn, 8mn, -4mn$

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

v, $2x^3, 3x^3, -4x^3, -5x^3$

$2x^3 + 3x^3 - 4x^3 - 5x^3$

$5x^3 - 9x^3 = -4x^3$

3,

i, $8b - 32$

ii, $8m^2 - 11m + 10$

iii, $7z^3 + 12z^2 - 20z$

iv, $8x^2y + 8xy^2 - 4x^2 - 7y^2$

v, $P - q$

vi, $a + ab$

vii, $4y^2 - 3y$

4,

i, $5xy, -7xy, 3x^2$

$5xy - 7xy + 3x^2$

$3x^2 - 2xy$

ii, $4x^2y, -3xy^2, -5xy^2, 5x^2y$

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

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

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

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

$11mn + 4$

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

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

$a + b + 3$

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

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

$7x + 5$

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

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

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

vii, $7a^2-5a+2,\ 3a^2-7,\ 2a+9,\ 1+2a-5a^2$

$7a^2-5a+2+3a^2-7+2a+9+1+2a-5a^2$

$5a^2-a+5$

5,

i, $2x^2+3y^2-5xy+5x^2-y^2+6xy-3x^2$

$x^2(2+5)+y^2(3-1)+xy(-5+6)$

$4x^2+2y^2+xy$

ii, $3xy^2-5x^2y+7xy-8y^2x-4xy+6x^2y$

$xy^2(3-8)+x^2y(-5+6)+xy(7-4)$

$-5xy^2+6x^2y+3xy$

iii $5x^4-7x^2+8x-1+3x^3-9x^2+7-3x^4+11x-2+8x^2$

$x^4(5-3)+x^2(-7-9+8)+x(8+11)+3x^3-1+7-2$

$2x^4-8x^2+19x+3x^3+4$

$2x^4+3x^3-8x^2+19x+4.$

6.

i. $y^2 - (-5y^2)$

$y^2 + 5y^2 = 6y^2$

ii. $-2xy - (-7xy)$

$-2xy + 7xy$

$5xy$

iii. $b(5-a) - a(b-5)$

$5b - ab - ab + 5a$

$5a + 5b - 2ab$

iv. $4m^2 - 3mn + 8 - (-m^2 + 5mn)$

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

$5m^2 - 8mn + 8$

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

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

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

vi. $5p^2 + 3q^2 - pq - (4pq - 5q^2 - 3p^2)$

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

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

vii, $7x^2 - 8xy + 3y^2 - 5 - (7xy + 5x^2 - 7y^2 + 3)$

$7x^2 - 8xy + 3y^2 - 5 - 7xy - 5x^2 + 7y^2 + 3$

$x^2(7-5) + xy(-8-7) + y^2(3+7) - 8$

$2x^2 - 15xy + 10y^2 - 8$

viii, $(x^4 - 3x^3 - 2x^2 + 3) - (2x^4 - 7x^2 + 5x + 3)$

$x^4 - 3x^3 - 2x^2 + 3 - 2x^4 + 7x^2 - 5x - 3$

$x^4(1-2) - 3x^3 + x^2(-2+7) - 5x$

$-x^4 - 3x^3 + 5x^2 - 5x$

⑦ Sum of $(10p - 8)$ and $5p + 2q$ is

$= 10p - 8 + 5p + 2q$

$= 15p + 2q - 8$

$p - 2q + 8$ subtract from $15p + 2q - 8$

$(15p + 2q - 8) - (p - 2q + 8)$

$15p + 2q - 8 - p + 2q - 8$

$p(15-1) + q(2+2) + 8(-1-1)$

$14p + 4q - 2r$

(8) Sum of $4+3x$ and $5-4x+2x^2$

$$2x^2 - 4x + 5 + 4 + 3x$$

$$2x^2 - x + 9$$

Sum of $3x^2 - 5x$ and $-x^2 + 2x + 5$

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

$$2x^2 - 3x + 5$$

$2x^2 - x + 9$ is subtracted from $2x^2 - 3x + 5$

$$2x^2 - 3x + 5 - (2x^2 - x + 9)$$

$$2x^2 - 3x + 5 - 2x^2 + x - 9$$

$$-2x - 4$$

(9)

Sum is $x^2 + y^2 + 5xy$

Subtract $x^2 - y^2 + 2xy$ from $x^2 + y^2 + 5xy$

$$\begin{array}{r} x^2 + y^2 + 5xy \\ x^2 - y^2 + 2xy \\ - \quad + \quad - \\ \hline 2y^2 + 3xy \end{array}$$

(10)

$$-7mn + 2m^2 + 3n^2$$
$$2mn + m^2 + n^2$$
$$- \quad - \quad -$$

$$-9mn + m^2 + 2n^2$$

(11) The required

$$y^4 - 12y^2 + y + 14 - (17y^3 + 34y^2 - 51y + 68)$$

$$y^4 - 17y^3 + y^2(-12 - 34) + y(1 + 51) + 14 - 68$$

$$y^4 - 17y^3 - 46y^2 + 52y - 54$$

(12) The required

$$93p^2 - 55p + 4 - (13p^3 - 5p^2 + 17p - 90)$$

$$93p^2 - 55p + 4 - 13p^3 + 5p^2 - 17p + 90$$

$$-13p^3 + 98p^2 - 72p + 94$$

(13) The required expressions

$$3x^2 - 4y^2 + 5xy + 20$$
$$-x^2 - y^2 + 6xy + 20$$
$$+ \quad + \quad - \quad -$$

$$4x^2 - 2y^2 - xy$$

(14) Sum of $2y^2 + 3yz$, $-y^2 - yz - z^2$, $yz + 2z^2$ is

$$2y^2 + 3yz - y^2 - yz - z^2 + yz + 2z^2$$

$$y^2(2-1) + yz(3-1+1) + z^2(-1+2)$$

$$y^2 + 3yz + z^2$$

Excercise - 8.3

①

i) $3m - 5$

Given $m = 2$

$3(2) - 5 = 6 - 5 = 1$

ii) $9 - 5m$

$m = 2$

$9 - 5(2) = 9 - 10$

$= -1$

iii) $3m^2 - 2m - 7$

$m = 2$

$3(2)^2 - 2(2) - 7$

$3 \times 4 - 2 \times 2 - 7$

$12 - 4 - 7$

1

iv) $\frac{5}{2}m - 4$

$m = 2$

$\frac{5}{2} \times 2 - 4$

$5 - 4$

1

(2)

i. $4p + 7$

$p = -2$

$4(-2) + 7 = -8 + 7 = -1$

ii. $-3p^2 + 4p + 7$

$-3(-2)^2 + 4(-2) + 7$

$-3 \times 4 - 8 + 7$

$-12 - 8 + 7$

-13

iii. $-2p^3 - 3p^2 + 4p + 7$

$-2 \times (-2)^3 - 3(-2)^2 + 4(-2) + 7$

$-2 \times -8 - 3 \times 4 + 4 \times -2 + 7$

$16 - 12 - 8 + 7$

3

③

i. a^2+b^2

$a=2, \quad b=2$

$(2)^2 + (2)^2$

$4+4 = 8$

ii. a^2+ab+b^2

$a=2 \quad b=2$

$(2)^2 + 2\times2 + (2)^2$

$4+4+4$

$= 12$

iii. a^2-b^2

$(2)^2 - (2)^2$

$4-4$

0

④

i. $2a^2 + b^2 + 1$

$a = 0 \quad b = -1$

$2 \times (0)^2 + (-1)^2 + 1$

$0 + 1 + 1$

2

ii. $a^2 + ab + 2$

$(0)^2 + 0 \times -1 + 2$

2

iii. $2a^2b + 2ab^2 + ab$

$2(0)^2(-1) + 2(0)(-1)^2 + 0(-1)$

0

⑤ Given $p = -10$

The value of $p^2 - 2p - 100$

$(-10)^2 - 2(-10) - 100$

$100 + 20 - 100$

20

⑥ Given $z = 10$

The value of $z^3 - 3z + 30$

$(10)^3 - 3(10) + 30$

$1000 - 30 + 30$

1000

⑦

(i) Given $x = 2$

The value of $x + 7 + 4(x - 5)$ is

$x + 7 + 4x - 20$

$5x - 13$

$5 \times 2 - 13$

$10 - 13 = -3$

ii, Given $x = 2$

The value of $3(x + 2) + 5x - 7$

$3x + 6 + 5x - 7$

$8x - 1$

$8(+2) - 1$

$16 - 1$

15

(iii) Given $x = 2$

The value of $6x + 5(x-2)$

$6x + 5x - 10$

$11x - 10$

$11 \times 2 - 10$

$22 - 10$

12

(iv) Given $x = 2$

The value of $4(2x-1) + 3x + 11$

$8x - 4 + 3x + 11$

$11x + 7$

$11 \times 2 + 7$

$22 + 7$

29

(8)

(i) Given $a = -1$, $b = 2$

$2a - 2b - 4 - 5 + a$

$2(-1) - 2(-2) - 4 - 5 + (-1)$

$-2 + 4 - 4 - 5 - 1$

-8

(ii) Given $a=-1$, $b=-2$

The value of $2(a^2+ab)+3-ab$

$$2a^2+2ab+3-ab$$

$$2a^2+ab+3$$

$$2(-1)^2+(-1)(-2)+3$$

$$2+2+3$$

$$7$$

Exercise 8.4

①

(i) $2n+1$

Number of shapes	No of line segments
1	3
2	5
3	7

n shape of letter are formed then algebraic equation is $2n+1$

ii,

Number of shapes	No of line segments
1	5
2	8
3	11

algebraic equation is $3n+2$

②

ii,

Number of shapes	No of line segments
1	4
2	7
3	10
⋮	⋮

Algebraic expression is $3n+1$

ii.

Number of shapes	No of line segments
1	6
2	11
3	16

Algebraic expression is $5n+1$

iii.

Number of shapes	No of line segments
1	7
2	12
3	17
⋮	⋮

Algebraic expression is $5n+2$

(3)

i. $2n+1$

$n=5 \quad 2(5)+1 = 11$

$n=10 \quad 2(10)+1 = 21$

$n=100 \quad 2(100)+1 = 201$

ii, $3n+1$

$n = 5 \quad 3(5)+1 = 16$

$n = 10 \quad 3(10)+1 = 31$

$n = 100 \quad 3(100)+1 = 301$

iii, $3n+2$

$n = 5 \quad 3(5)+2 = 17$

$n = 10 \quad 3(10)+2 = 32$

$n = 100 \quad 3(100)+2 = 302$

iv, $5n+1$

$n = 5 \quad 5(5)+1 = 26$

$n = 10 \quad 5(10)+1 = 51$

$n = 100 \quad 5(100)+1 = 501$

v, $5n+2$

$n = 5 \quad 5(5)+2 = 27$

$n = 10 \quad 5(10)+2 = 52$

$n = 100 \quad 5(100)+2 = 502$

vi, $4n+3$

$n = 5 \quad 4(5)+3 = 23$

$n = 10 \quad 4(10)+3 = 43$

$n = 100 \quad 4(100)+3 = 403$