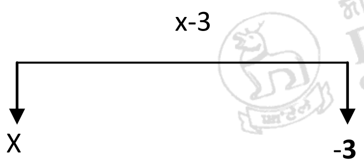
CHAPTER-12
ALGEBRAIC EXPRESSION

<u>SOLUTIONS:</u>

EXERCISE 12.1

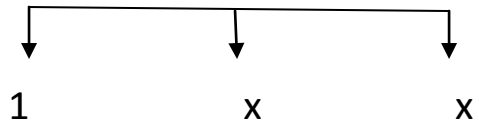
1. Get the algebraic expression in the following cases using constants, variables and arithmetic operations.
   (i). soln: y – z.
   (ii). ½ of (x + y) = ½ (x + y)
   (iii). z x z = z^2.
   (iv). ¼ (p x q) = ¼ pq.
   (v). (*x* X *x*) + (y X y) = $x^2 + y^2$.
   (vi). 5 + 3m
   (vii). 10 – (x X y) = 10 – xy.
   (viii). (a x b) – (a + b) = ab – (a + b).

2. (i). Identify the terms and the factors in the following expressions. Show that the term and the factors by tree diagram.
   (a). x – 3.
   Soln :



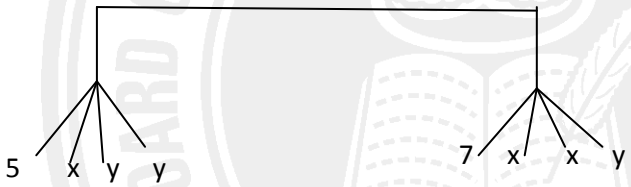
(b). $1 + x + x^2$.

Soln :

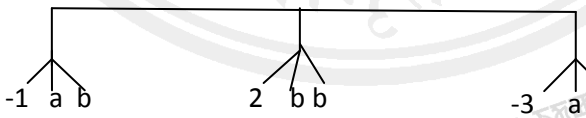


(c) $y-y^3$

(d) $5xy^2 + 7x^2y$



(e) $-ab + 2b^2 - 3a^2$



(II). Identify terms and factors in the following expression given below.

Soln :

EXPRESSION	TERMS	FACTORS
(a)-4x+5	-4x & 5	-4, x and 5
(b) -4x+5y	-4x & 5y	-4, x, 5 and y.
(c)5y+3y^2	5y & 3y^2	5, y, 3, y and y
(d)xy+2x^2y^2	Xy & 2x^2y^2	2, x, x, x, y, y and y
(e)pq+q	Pq & q	P, q and q
(f)1.2ab-2.4b+3.6a	1.2ab ,-2.4b & 3.6a	1.2, -2.4, 3.6, a, a, b, b.
(g)3/4x + 1/4	3/4x and 1/4	3/4 , ¼, x.
(h)0.1p^2 +0.2q^2	0.1p^2 and 0.2q^2	0.1, 0.2, p, p, q, q.

3. Identify the numerical co-efficient of terms (other than constant) in the following expression.

Ans :

EXPRESSION	TERMS	CO-EFFECIENT
(I) 5-3t^2	-3t^2	-3
(i) 1+t+t^2+t^3	t, t^2, t^3	1, 1, 1
(ii) X+2xy+3y	X, 2xy, 3y	1, 2, 3
(iii) 100m + 1000n	100m and 1000n	100 and 1000
(iv) –p^2q + 7pq	–p^2q and 7pq	-1 and 7
(v) 1.2a + 0.8b	1.2a and 0.8b	1.2 and 0.8
(vi) 3.14r^2	3.14r^2	3.14
(vii) 2(l+ b)	2(l+ b)	2
(viii) 0.1y + 0.01y^2	0.1y and 0.01y^2	0.1 and 0.01

4. (a) Identify terms which contain x and give the co-efficient of x.

Ans:

	EXPRESSION	TERMS CONTAIN X	CO EFFICIENT OF x
(i)	$y^2x + y$	y^2x	y^2
(ii)	$13y^2 - 8yx$	$-8yx$	$-8y$
(iii)	$x+ y+ Zx$	X	1
(iv)	$5+Z+Zx$	Zx	Z
(v)	$1+x+xy$	x and xy	1 and 1
(vi)	$12xy^2+25$	$12xy^2$	12
(vii)	$7x + xy^2$	$7x$ and xy^2	7 and 1

(b).

EXPRESSION	TERMS CONTANING y^2	CO-EFFICIENT OF y^2
$8-xy^2$	$-xy^2$	y^2
$5y^2+7x$	$5y^2$	5
$2x^2-15xy^2+7y^2$	$-15xy^2$ and $7y^2$	-15 and 7

5. Classify into monomial, binomial and trinomials.

Soln :

(i) 4y-7z	**Binomial**
(ii) y^2	Monomial
(iii) x+y-xy	Trinomial
(iv) 100	Not a polynomial
(v) ab-a-b	Trinomial
(vi) 5-3t	Binomial
(vii) $4p^2q - 4pq^2$	Binomial
(viii) 7mn	Monomial
(ix) z^2-3z+8	Trinomial
(x) a^2+b^2	Binomial
(xi) z^2+z	Binomial
(xii) 1+x+ x^2	Trinomial

6. Soln :

(i) 1,100	**Like**
(ii) -7x , 5/2 x	Like
(iii) -29x, -29y	Unlike
(iv) 14xy, 42yx	Like
(v) $4m^2p$, $4mp^2$	Unlike
(vi) 12xz, $12x^2z^2$	Unlike

7. Identify like terms in the following.

Soln : (a) $-xy^2$ and $2xy^2$

$-4yx^2$ and $2x^2y$

$8x^2$, $-11x^2$, $-6x^2$

3x, -100x

7y, y, 2xy

(b).10pq, -7qp, 78qp

7p, 2405p

8q, -100q

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

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

$13\ p^2q$, qp^2

23, 41.

EXERCISE 12.2

1. Simplify combining like terms:

(i) Soln: $21b-32+7b-20b$

$= 21b+7b-20b-32$

$= 28b - 20b - 32$

$= 8b - 32.$

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

$= -z^2+13z^2-5z-15z+7z^2$

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

(iii) $p- (p-q)-q-(q-p)$

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

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

$=2p-p+q-2q$

$= p-q$

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

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

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

$=3a-2a-\cancel{2b}+\cancel{2b}-2ab+3ab$

$= a+ab$

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

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

$= 8x^2y - 4x^2 - 7y^2 +8xy^2$

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

$= 3y^2+5y-4-8y+y^2+4$

$= 3y^2+y^2+5y-8y-4+4$

$= 4y^2-3y$

2. ADD:

Soln (i) 3mn-5mn, 8mn-4mn

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

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

= 11mn-9mn

=2mn.

(ii). t-8tz,3tz-z, z-t

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

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

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

= -5tz

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

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

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

=-9mn+21mn+7-11

= 12mn-4

(iv). (a+b-3)+(b-a+3)+(a-b+3)

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

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

=a-2a+2b-b+6-3

=-a+b+3

(v). (14x+10y-12xy-13)+(18-7x-10y+8xy)+4xy

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

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

=7x-~~12xy~~+~~12xy~~+5

=7x+5

(vi). (5m-7n) + (3n-4m+2) +(2m-3mn-5)

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

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

=7m -4m-4n-3

=3m -4n -3

(vii) $4x^2y – 3xy^2 – 5xy^2 +5x^2y$

$= 4x^2y+5x^2y – 3xy^2 -5xy^2$

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

(viii) $3p^2q^2 – 4pq +5 -10\ p^2q^2+15 +9pq+7p^2q^2$

$= 3p^2q^2 -10\ p^2q^2+7p^2q^2 -4pq+9pq +5+15$

$=10\ p^2q^2-10\ p^2q^2+5pq +20.$

= 5pq +20.

(ix) ab-4a+4b-ab+4a -4b

= ab-ab-4a+4a+4b-4b

=0-0+0= 0.

(x) $x^2-y^2-1+ y^2-1-x^2+1-x^2-y^2$

$= x^2- x^2- x^2- y^2+ y^2- y^2-1-1+1$

$= x^2-2\ x^2 - 2\ y^2+ y^2-2+1$

$= -x^2-y^2-1.$

3. Subtract:

Soln:-

i. $-5y^2$ from y^2

$=y^2-(-5y^2)$

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

ii. 6xy from -12xy

=-12xy-6xy

=-18xy

iii. (a-b) from (a+b)

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

iv. a(b-5) from b(5-a)

=b(5-a)-a(b-5)

=5b-ab-ab+5a

=5b-2ab+5a

v. $-m^2+5mn$ from $4m^2-3mn+8$

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

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

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

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

vi. $-x^2+10x-5$ from $5x-10$

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

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

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

$=x^2-5x-5$

vii. $5a^2-7ab+5b^2$ from $3ab-2a^2-2b^2$

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

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

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

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

viii. $4pq-5q^2-3p^2$ from $5p^2+3q^2-pq$

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

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

$=8p^2+3pq+8q^2$

4.Soln:-

a) $(2x^2+3xy)-(x^2+xy+y^2)$

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

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

$=x^2+2xy-y^2$

The number to be added is $(x^2+2xy-y^2)$.

b) $(2a+8b+10)-(-3a+7b+16)$

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

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

$=5a+b-6$

The number to be subtracted is$(5a+b-6)$.

5. $(3x^2-4y^2+5xy+20)-(-x^2-y^2+6xy+20)$

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

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

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

The number to be taken away from $3x^2-4y^2+5xy+20$ to get $-x^2-y^2+6xy+20$ is $4x^2-3y^2-xy$

6. a) Soln:-

$\{(3x-y+11)+(-y-11)\}-(3x-y-11)$

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

$=(3x-2y)-(3x-y-11)$

$=3x-2y-3x+y+11$

$=-y+11$

b) $\{(4+3x)+(5-4x+2x^2)\}-\{(3x^2-5x)+(-x^2+2x+5)\}$

$=(4+3x+5-4x+2x^2)-(3x^2-5x-x^2+2x+5)$

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

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

$=2x+4$

EXERCISE 12.3

1. If m=2, find the value of:

Soln:-

i. M-2=2-2=0
ii. 3m-5=3×2-5=6-5=1
iii. 9-5m=9-5×2=9-10=-1
iv. $3m^2$-2m-7
$=3\times2^2-2\times2-7=3\times4-4-7=12-4-7=12-11=1$
v. 5m/2-4
=5×2/2-4=10/2-4=5-4=1

2. If p=-2, find the value of

Soln:-

i. 4p+7=4×(-2)+7=-8+7=-1
ii. $-3p^2+4p+7=-3(-2)^2+4\times(-2)+7=-3\times4-8+7=-12-8+7=-20+7=-13$
iii. $-2p^3-3p^2+4p+7$
$=-2\times(-2)^3-3\times(-2)^2+4\times(-2)+7$
=-2×(-8)-3×4-8+7
=16-12-8+7
=23-20
=3

Notes: the product of odds negative sign is negative and the product of even negative sign is positive.

3. Find the values of the following expressions when, x=-1

Soln:-

i. $2x-7=2\times(-1)-7=-2-7=-9$

ii. $-x+2=-(-1)+2=1+2=3[(-)\times(-)=+]$

iii. x^2+2x+1

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

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

iv. $2x^2-x-2=2\times(-1)^2-(-1)-2=2+1-2=3-2=1$

4. If a=2, b=-2, find the value of

Soln:-

i. $a^2+b^2=2^2+(-2)^2=2\times2+(-2)\times(-2)=4+4=8$

ii. $a^2+ab+b^2=2^2+2\times(-2)+(-2)^2=4-4+4=4$

iii. $a^2-b^2=2^2-(-2)^2=4-4=0$

5. When a= 0 , b = -1, find the value of the given expressions:

Soln:

(i) $2a+2b$

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

$= 0 - 2$

$= -2$.

(ii) $2a^2 + 2b^2 + ab.(-1)$

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

$= 0 + 1 + 1. = 2.$

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

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

$= 0 + 0 + 0$

$= 0.$

(iv) $a^2 + ab + 2 = 0+0 \times (-1) + 2.$

$= 0+0+2 = 2.$

6. Simplify the expression and find the value if x is equal to 2.

Soln:

(i) $X+7+4(x-5)$

$=2+7+4 (x-5)$

$= 2+7+4 (2 – 5)$

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

$= 9-12$

$= -3.$

(ii) $3(x+2)+5x – 7$

$=3(2+2)+5x\ 2 – 7$

$=3 \times 4 +10 – 7$

$=12+10-7$

$=22-7 = 15$

(iii) $6x + 5 (x-2)$

$= 6 \times 2 + 5(2 – 2)$

$= 12 + 5 \times 0$

$=12$

(iv) $4(2x-1) + 3x + 11$

$= 4(2 \times 2 -1) + 3 \times 2 +11$

$=4(4 – 1) + 6 + 11$

$= 12 + 6 + 11$

$= 29$

7. Simplify the expressions and find their values iff x = 3, a=-1 , b = -2

Soln:

(i) 3x-5-x +9

= 3x 3 x -5-3+9

=9 -5-3+9

= 18 – 8

= 10.

(ii) 2-8x+4x +4

= 2 – 8 x 3+ 4 x 3 +4

=2-24+12+4

=18-24

= -6

(iii) 3a +5-8a+1

3 x (-1) +5 – 8 x (-1)+1

= -3+5+8+1

= -3 + 14 = 11

(iv) 10-3b-4-5b

= 10- 3 (-2)-4-5b

= 10+6-4+10

= 26-4

=22

(v) 2a – 2b – 4-5+a

= -2 +4-45-1

=-12+4 = -8

8.

(i) If z = 10, find the value of z^3- 3(z-10)

Soln :

Now, z^3- 3(z-10)

= 10^3- 3(10-10)

= 10 x 10 x 10 – 3 x 0

= 1000 – 0

=1000

(ii) If p = -10, find the value of p^2-2p-100

Now,

P^2 – 2p – 100

= $(-10)^2$ – 2(-10) – 100

= (-10) x (-10) + 20 -100

= 100+20-100 = 20

9.Now, $2x^2$+ x – a = 5

Putting x = 0 , we get

⇨ 2 x 0 + 0 – a =5

⇨ 0 – a = 5

⇨ -a = 5

Therefore a = -5.

10.

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

Putting a =5 and b = -3, we get

$2\{ 5^2 + 5 \times (-3)\} + 3 - 5 \times (-3)$

$= 2(25 - 15) + 3 + 15$

$= 2 \times 10 + 18$

$= 20 + 18$

$= 38.$

EXERCISE 12.4

1.

(a) Soln :

If the digit are 5, 10 and 100

Then, n = 5, we get

$5n+1 = 5 \times 5 + 1 = 25+1 = 26$

n= 10, then

$5n+1 = 5 \times 10+1 = 50+1 = 51$

N = 100, then

$5n+1 = 5 \times 100 + 1 = 500+1 = 501$

(b). If n= 5, 10 0r 100, then

$3n + 1 = 3 \times 5 + 1 = 15 + 1 = 16$

$3n + 1 = 3 \times 10 + 1 = 30 + 1 = 31.$

$3n + 1 = 3 \times 100 + 1 = 300 + 1 = 301.$

c). If term are 5, 10 0r 100, then

$(5n + 2) = 5 \times 5 + 2 = 25 + 2 = 27$

$(5n + 2) = 5 \times 10 + 2 = 50 + 2 = 52.$

$(5n + 2) = 35x\ 100 + 2 = 500 + 2 = 502.$

2.

(i) Here, the expression 2n-1,

when n = 5, 10, 100 then $2n-1 = 2 \times 5 - 1$

$= 10 - 1 = 9$

When n = 10 then,

$2n-1 = 2 \times 10 - 1 = 50 - 1 = 49$

$2n-1 = 2 \times 100 - 1 = 200 - 1 = 199$

(ii) When n = 5, 10 and 100 then,

$3n+2 = 3 \times 5+2 = 15 +2= 17$

$3n+2 = 3 \times 10 +2 = 30 +2 = 32$

$3n+2 = 3 \times 100 +2 = 300 +2 = 302$

(iii)

When n = 5, 10 and 100 then,

$4n+2 = 4 \times 5+1 = 20 +1= 21$

$4n+2 = 4 \times 10 +1 = 40 +1 = 41$

$4n+2 = 4 \times 100 +1 = 400 +1 = 401$

(iv) When n = 5, 10 and 100 then,

$7n+20 = 7 \times 5+20= 35 +20= 55$

$7n+20 = 7 \times 10 +20 = 70 +20 = 90$

$7n+20 = 7 \times 100 +20 = 700 +20 = 720.$

(v)

When n = 5, 10 and 100 then,

$n^2+1 = 5^2+1 = 25 +1= 26$

$n^2+1 =10^2 +1 = 100 +1 = 101$

$n^2+1 =100^2 +1 = 1000 +1 = 10001$