Grade VII

Lesson : 12 ALGEBRAIC EXPRESSION

Objective Type Questions

I. Multiple choice questions

1. What is the coefficient of y^2 in expression $6y^2$+27

a) 6 b) 2 c) Y^2 d) none of these

2. The value of expression 4x – 3 for x=1 is :

a) 2 b) 1 c) 0 d) none of these

3. Which of the following are like terms?

a) 1, 10 b) x_1 – x y c) x^2, z d) c^2, 8

4. Which of the following is the coefficient of 'x' in $3x^2 - 4x^2 + 7x - 8$?

a) 3 b) -4 c) 7 d) -8

5. What is the sum of (3 x -7y + 5z) and (-2x + 3y)

a) 5 x -4y b) x-4y+5z c) 5 x -4y + 5z d) x -10y + 5 x

6. What is the value of (24ab-10b-18a) - (30ab + 12b + 14a) ?

a) – (6ab+22b+32a) b) -54ab-12b c) 6ab+22b+32a d) 6ab-22

7. What should be added to -5 x +3y to get 3x-2y?

a) 5 x -4y b) 8 x – 5y c) -8 x – 4y d) 2x -10y

8. What is the value of (3X^2-5x+6) at x=1 ?

a) 3 b) 4 c) -8 d) 14

9) The like terms in 3 x (3 - 2y) and 2(xy + x^2) are :

a) 9 x and 2x^2 b) -6 x y and 2 x y c) 9 x and 2 x y d) -6xy and 2 x^2

10) The coefficient of xy in $3x^2zy + 7xyz - 2x^2x$ is :

a) 3z b) -2 c) 7yz d) 7z

11) The factors of the term $-xy^2$ are :

a) $x \times y \times y$ b) $-1 \times y \times y$ c) $-1 \times x \times y$ d) $-1 \times x \times y \times y$

12. An algebraic expression containing three terms is called a :

a) monomial b) binomial c) Trinomial d) All of these

13. Number of terms in the expression $3x^2y - 2y^2z - z^2x + 5$ is:

a) 2 b) 3 c) 4 d) 5

14.The terms of expression $4x^2 - 3xy$ are :

a) $4x^2$ and $-3xy$ b) $4x^2$ and $3xy$ c) $4x^2$ and $x\,y$ d) x^2 and $x\,y$

15. Factors of $-5x^2y^2z$ are :

a) $-5 \times x\,y \times z$ b) $-5 \times x^2 \times y \times z$ c) $-5 \times x \times x \times y \times y \times z$ d) $-5 \times x \times y \times x^2$

16. Coefficient of x in $-9xy^2z$ is :

a) 9yz b) -9yz c) $9y^2z$ d) $-9y^2z$

17. Which of the following is a pair of like terms?

a) $-7xy^2z$, $-7x^2yz$ b) $-10\,x\,yz^2$, $3\,x\,yz^2$ c) $3\,x\,yz$, $3x^2y^2z^2$ d) $4\,x\,yz^2$, $4x^2yz$

18. Identify the binomial out of the following :

a) $3\,x\,y^2 + 5y - x^2y$ b) $x^2\,y - 5y - x^2y$ c) $x\,y + yz + z\,x$ d) $3xy^2 + 5y - xy^2$

19. The sum of $x^4 - xy + 2y^2$ and $-x^2 + x\,y + 2y^2$ is :

a) Monomial b) Binomial c) Trinomial d) Tetranomial

20. The subtraction of 5 times of y from x is :

a) $5\,x - y$ b) $y - 5\,x$ c) $x - 5y$ d) $5y - x$

21. -b-0 is equal to :

a) $-1 \times b$ b) 1-b-0 c) $0-(-1) \times b$ d) b-0-1

22. The side length of the top of square table is x. The expression for perimeter is :

a) 4 + x b) 2 x c) 4 x d) 8 x

23) The number of scarfs of length half metre that can be made from y meters of cloth is :

a) 2y b) $\frac{y}{2}$ c) y + 2 d) y + $\frac{1}{2}$

24) 123x^2y – 138 x^2y is a like term of :

a) 10 x y b) -15 x y c) -15x^2y d) 10x^2 y

25. The value of 3x^2-5 x + 3 when x = 1 is :

a) 1 b) 0 c) -1 d) 11

26. The expression for the number of diagonals that we can make from one vertex of a n sided polygon is :

a) 2n+1 b) n-2 c) 5n+2 d) n-3

27. The length of a side of square is given as 2 x +3. Which expression represents the per meter of the square.

a) 2x+16 b) 6 x +9 c) 8 x +3 d) 8 x + 12

ANSWERS								
1) a	2)b	3) a	4) c	5) b	6) a	7) b	8) b	9)b
10) d	11) d	13) c	14) a	15) c	16) d	17) b	18) d	19) a
20) c	21) a	22) c	23) a	24) c	25) a	26) d	27) d	

II. Multiple choice questions

1. The degree of the polynomial $5x^3 - 2x^2 + 1$ is

a. 3 b. 2 c. 0 d. 4

2. The degree of the polynomial $x^2y - 2xy^4 + 5$ *is*

a. 5 b. 4 c. 3 d. 2

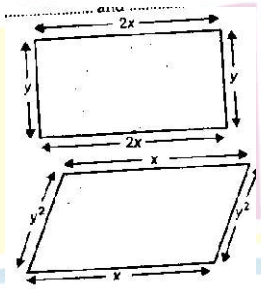
3. The algebraic language of 'Twice the cube of a number x subtracted from five times, the sum of y and 2" is

a. $5y + 2 - 2x^2$ **b.** $2x^2 - 5y + 2$ **c.** $5\,(y + 2) - 2x^2$ **d.** $5(y + 2) - (2x)^2$

1. a	**2. a**	**3. c**

I. Fill in the blanks

1. Sum or difference of two like terms is _____.
2. In the formula, area of circle $=\pi\ r^2$ the numerical constant of the expression $\pi\ r^2$ *is* _____.
3. $3a^2$b and -7 ab^2 are _____terms.
4. -5a^2 b and -5b^2a are _____ terms.
5. In the expression 2πr the algebraic variable is _____.
6. Number of terms in a monominial is _____.
7. Like terms in the expression n(n+1) + 6(n-1) are and _____.
8. The expression 13 + 90 is a _____.
9. The speed of car is 55km/hrs. The distance covered in y hours is _____.
10. x y + = is an expression which is neither monomial is _____.
11. If (x^2y+y^2+3)is subtracted from If ($3x^2y$+ 2 y^2+3) their coefficient of in the result is _____.
12. -a-b-c is same as –a- (_____).
13. The unlike terms to perimeters of following figures are _____and



14. On adding a monomial _____to -2 x + 4y^2 +z the resulting expression becomes a binomial.
15. 3x^2 + 23x + 6y^2+ _____ = 5x^2 + 7y^2
16. If Rohit has 3xy toffees, then Shantanu has 20yx toffees then Shantanu has _____ More toffees.

1. like term	2) π	3) unlike	4) unlike	5) r	6) 1	7) n1 + 6n	8) constant	9) 55 y km
10)binomial	11) $2x^2$	12) b+ c	13)2y, $2y^2$	14)$2x$	15) -23x	16) 15yx		

II. Fill in the blanks

1. The value of $\frac{5}{3}x^2 + 5 \; at \; x = \; -3 \; is$

2. In $x^4, 4 \; is \; called \; the$_____

3. In 3x, 3 is called _____and x is called _____

4. The sum of $2xy - 6xy^2 \; and \; 3xy + 5xy^2 \; is$_____.

<u>ANSWER</u>

1. Given expression $\frac{5}{3}x^2 + 5$

When x = -3, the value of of $\frac{5}{3}x^2 + 5$

= $\frac{5}{3}x(-3)^2 + 5 = \frac{5}{3}x9 + 5 = \frac{45}{3} + 5 = 15 + 5 = 20$

The value of $\frac{5}{3}x^2 + 5$ at $x = -3 \; is \; 20.$

2. in $x^4, 4 \; is \; called \; exponent$

3. in 3 x, 3 is called coefficient and x is called variable

4. Sum of $2xy - 6xy^2 \; and \; 3xy + 5xy^2$

$= 2xy - 6xy^2 + \; 3xy + 5xy^2 = 5xy - 6xy^2 + 5xy^2$

= 5 x y - xy^2

The sum of 2 x y-$xy^2 \; and \; 3xy + 5xy \; is \; 5xy - xy^2$

I. True or false

1. $1 + \frac{x}{2} + x^3$ *is a polynomial*

   True, $1 + \frac{x}{2} + x^3$ *is a polynomial*

   Because a trinomial is a polynomial

2. $(3a - b + 3) - (a + b)$*is a binomial*

   False, Given (3a - b + 3) – (a + b)

   = 3a –b +3-a-b

   = 3a – a – b - b + 3 = 2a - 2b +3

   Here above expression as the three terms. So, it is a trinomial

3. A trinomial can be polynomial

   True, An expression with two or more than two terms is called a polynomial

4. Sum of x and y is x + y

   True, sum of x and y

   Sum sign '+'

   So x + y

5. Sum of 2 and p is 2p

   False, Sum of 2 and p

   Sum sign '+'

   So, 2 + p.

6. A binomial has more than two terms.

   False, A binomial has only two terms.

7. A trinomial has exactly three terms.

   True, A trinomial has exactly three terms.

8. The value of $2x - 3y^2$ at x =1 and y = -1 is -1

True, given expression $2x - 3y^2$

When x=1 and y =-1, the value of $2x - 3y^2$

= 2 x (1) -3 x (-1)2

= 2 x 1-3(-1) x (-1) = 2 x 1-3 x1

= 2-3 = -1.

9. The sum of $4x^2\ with - 8x^2\ is\ 4x^2$

False, sum of $4x^2\ with - 8x^2$

= $4x^2$ + (-8 x^2) =$4x^2$ -8x^2 = -4x^2

10. The sum of $x^2\ and\ 7xy - 5x^2\ is\ 7xy - 4x^2$

True, The sum of $x^2\ and\ 7xy - 5x^2$

x^2+7xy-5x^2

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

=7xy - 4x^2

11. In like terms, variables and their powers are the same.

True

12. 4p is the numerical coefficient of $q^2\ in - 4pq^2$

False

13. If we subtract a monomial from a binomial. Then answer is at least a binomial.

False

14. When we subtract a monomial from a trinomial, then answer can be a polynomial.

True

15. When we add a monomial and a trinomial, then answer can be a monomial.

False

II. True or false

1. Subtracting a term from a given expression is the same as adding its additive inverse to the given expression.
2. The total number of planets of Sun can be denoted by the variable n
3. In like terms, the numerical coefficients should also be the same.
4. If we add a monomial and binomial, then answer can never be a monomial
5. If we subtract a monomial from binomial then answer is at least a binomial
6. When we subtract a monomial from a trinomial, then answer can be a polynomial
7. When we add monomial and a trinomial, then answer can be a monomial

1. True	2. False	3. False	4. False	5. False	6. True	7. False

I. Match the column

Column A	Column B
i. The coefficient of x in $24xy$ is	a. $-11x^2y^2$
ii. the factors of $5xy^2$ *is*	b. $24y$
iii. the sum of $9x^2y^2$ *and* $2x^2y^2$ *is*	c. $5 \times x \times y \times y$
iv. the sum of $-2x^2y^2$ *and* $-9x^2y^2$	d. $11x^2y^2$

(i) - (b)	**(ii) - (c)**	**(iii) - (d)**	**(iv) - (a)**

II. Match the column

Column A	Column B
i. $(3a-2b)+(4a-9b)$	a. $12cm^2$
ii. $[13a-2ab-2(a+b)]$	b. 2
iii. 6a + 3ab - 2a $(a-b)$	c. 11a - 2b - 2ab
iv. if a =1, b = 1, then $6a^2-2ab-2b^2$ *is*	d. 7a - 11b

(i) - (d)	(ii) - (c)	(iii) - (a)	(iv) - (b)

I. Very short answer

1. Find the sum of x^2-3x+5 *and* $3x^2+4x-7$

Sol x^2-3x+5 *and* $3x^2+4x-7$

$= 4x^2+x-2$

2. What is the degree of the expression $3-2x^2+x$.

Sol. Degree = 2.

3. What should be subtracted from $3a^2-3b+6$ *to get* $4a^2-b+2$?

Sol. a^2-2b+4

4. Write the degree of the following expression.

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

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

Degree = 5.

II. Very short answer

Q:1. Get the algebraic expressions in the following cases using variables, constants and arithmetic operations.

i. Number 5 added to three times the product of numbers m and n

ii. Sum of numbers a and b subtracted from their product

Sol. I). 5 + 3 x m x n = 5 + 3mn

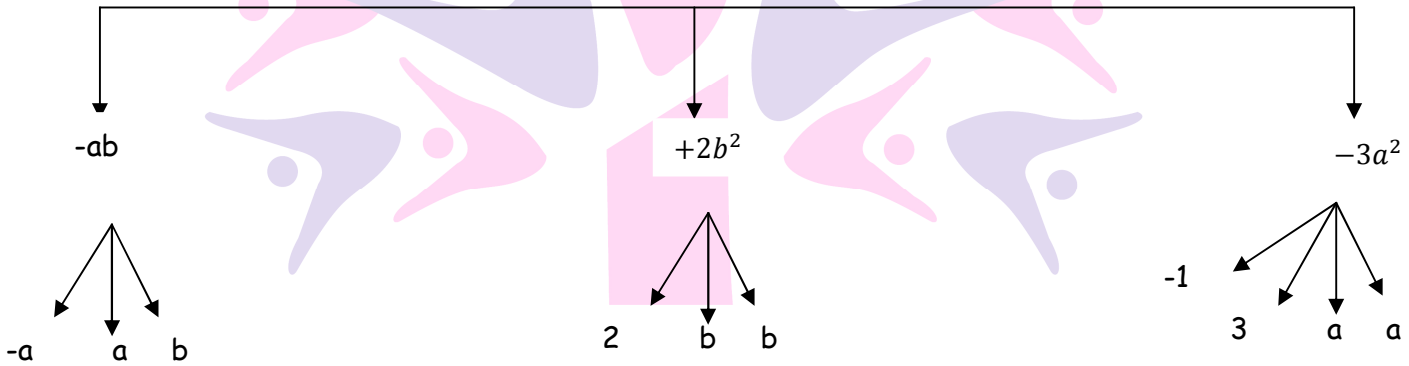
ii) sum of number a and b = a + b and product = ab

$\Longrightarrow \quad ab - (a + b)$

Q.2. identify the terms and their factors in the given expression. Sho the terms and factors by tree diagrams.

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

Sol. - ab +$2b^2 - 3a^2$



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

Sol. - ab + $2b^2 - 3a^2$

Q.3. Identify terms and factors in the expression given 1.2ab-2.4b+3.6a

Sol. 1. 2ab - 2.4b + 3.6a

Terms	Factors
1.2ab	1.2, and b
-2.4b	-2.4 and b
3.6a	3.6 and a

Q.4. Identify terms which contains $y^2$and give the coefficient of y^2

$2x^2y - 15xy^2 - 7y^2$

Term containingy^2	coefficient of y^2
$15xy^2$	-15x
$7y^2$	7

Q.5. State whether a given pair of terms is of like or unlike terms

i. $4m^2p, 4mp^2$ ii. 14xy, 42yx

Sol. i. $4m^2p, 4mp^2$

It is a pair of unlike terms

ii. 14 x y, 42y x x

It is a pair of like terms.

Q.6. Identify like terms in the following

- $xy^2, -4yx^2, 8x^2, 2xy^2, 7y, -11yx, 20x^2y, -6x^2, y, 2xy, 3x$

Sol. - xy^2 and $2xy^2$, -4 xy^2 and 20x^2y, 8x^2, - 11x^2 and -6 x^2:7y and y:-100x and 3x: 11yx and 2xy *are like terms*

Q.7. If m=2, find the value of $\frac{5m}{2} - 4$

Sol. $\frac{5m}{2} - 4$

$\because m = 2 \quad \Rightarrow \quad \frac{5(2)}{2} - 4 = 1$

Q . 8. If p = -2, find the value of - $3p^2 + 4p + 7$

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

$\because p = -2$

$\therefore \ -3(2)^2 + 4(-2) + 7 = -3x4 - 8 + 7 = -12 - 8 + 7$

Q. 9. If a -2, b=-2 find the value of $a^2 + ab + b^2$

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

$\because a = 2\,, b = \ -2$

$(2)^2 + (2)(-2) + (-2)^2 = 4 - 4 + 4$

= 4

Q.10. Translate the algebraic expression $\frac{7}{8-x}$ into words.

Ans. $\frac{7}{8-x}$

Quotient on dividing seven by the difference of eight and $x(x < 8)$.

I. Short answer questions

1. Find the value of the following if x=2 and y=-1:

a. 5 x - 2y

b. 3 x + 2y

Sol. (a). 5 x -2y = 5 x2-2 x(-1)

= 10 + 2 = 12

(b). 3 x + 2y = 3 x 2 + 2 x (-1)

= 6 + (-2) =4

2. Simplify: $2x^2 + x + 7 + 4(x - 5)$. $[given\ x = 3]$

Sol. $2x^2 + x + 7 + x + 4(x - 5)$. $= 2x^2 + x + 7 + 4x - 20$

$= 2x^2 + x + 4x + 7 - 20$

$= 2x^2 + 5x - 13$

If x = 3 given expression

= 2(3^2) + 5(3) – 13

= 18 + 15 – 13 = 20

3. Add.

a. mn + 5 – 2 and mn + 3

b. m + n and m-n

Sol. (a). mn + 5 – 2

mn + 3

Adding 2mn + 8 – 2 = 2mn+6

b. m + n

m – n

Adding 2m + 0 = 2m

4. If A = $3x^2 + 2x$ and $B = 3x + 1$

Find the value of A – B

Sol. A = $3x^2 + 2x$ and $B = 3x + 1$

A-B = $3x^2 + 2x$ - $3x + 1$

= $3x^2 - x - 1$

5. Find the value of the following expressions at a =1 and b=-2

a. $a^2 + b^2 + 3ab$

b. $a^3 + a^2b + ab^2 + b^3$

Sol. A. Value of $a^2 + b^2 + 3ab$ at $a = 1$ and $b = -2$

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

= 1 + 4 - 6

= 5 - 6

= -1

b. Value of $a^3 + a^2b + ab^2 + b^3$ at $a = 1$ and $b = -2$

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

= 1- 2 + 4 - 8

= 5-10

= - 5

II. Short answer questions

1. Find the degree of each term in the expression

$mn^2 + m^2n + 8mn + 9$

Sol. Expression $mn^2 + m^2n + 8mn + 9$

Term I : mn^2

Degree = 1 + 2 = 3

Term II : m^2n

Degree = 1 + 2 = 3

Term III : $8mn$

Degree = 0 + 1 + 1 = 2

Term IV : 9

Degree = 0

2. Take away $\left(\frac{8}{5}x^2 - \frac{2}{3}x^3 + \frac{3}{2}x - 1\right)$ *from* $\left(\frac{x^3}{5} - \frac{3}{2}x^2 + \frac{2}{3}x + \frac{1}{4}\right)$

Sol. We have

$\left(\frac{x^3}{5} - \frac{3}{2}x^2 + \frac{2}{3}x + \frac{1}{4}\right) - \left(\frac{8}{5}x^2 - \frac{2}{3}x^3 + \frac{3}{2}x - 1\right)$

$= \frac{x^3}{5} - \frac{3}{2}x^2 + \frac{2}{3}x + \frac{1}{4} - \left(\frac{8}{5}x^2 - \frac{2}{3}x^3 + \frac{3}{2}x - 1\right)$

$= \left(\frac{1}{5} + \frac{2}{3}\right)x^3 + \left(-\frac{3}{2} - \frac{8}{5}\right)x^2 + \left(\frac{2}{3} - \frac{3}{2}\right)x + \left(\frac{1}{4} + 1\right)$

$= \frac{13x^3}{15} - \frac{31x^3}{10} - \frac{5x}{6} + \frac{5}{4}$

3. Add:

$\left(3x^2 - \frac{1}{5}x + \frac{7}{3}\right) + \left(-\frac{1}{4}x^2 + \frac{1}{3}x - \frac{1}{6}\right) + \left(-2x^2 - \frac{1}{2}x + 5\right)$

Sol. $\left(3x^2 - \frac{1}{5}x + \frac{7}{3}\right) + \left(-\frac{1}{4}x^2 + \frac{1}{3}x - \frac{1}{6}\right) + \left(-2x^2 - \frac{1}{2}x + 5\right)$

$= 3x^2 - \frac{1}{4}x^2 - 2x^2 - \frac{1}{5}x + \frac{1}{3}x - \frac{1}{2}x + \frac{7}{3} - \frac{1}{6} + 5$

$= \left(3 - \frac{1}{4} - 2^2\right)x^2 + \left(-\frac{1}{5} + \frac{1}{3} - \frac{1}{2}\right)x + \left(\frac{7}{3} - \frac{1}{6} + 5\right)$

$= \left(\frac{12-1-8}{4}\right)x^2 + \left(\frac{-6+10-15}{30}\right)x + \left(\frac{14-1+30}{6}\right)$

$= \frac{3}{4}x^2 - \frac{11}{30}x + \frac{43}{6}$

4. Subtract the sum of $(8a - 6a^2 + 9)$ *and* $(-10a - 8 + 8a^2)$ *from* -3.

Sol. Sum of $(8a - 6a^2 + 9)$ *and* $(-10a - 8 + 8a^2)$

$= (8a - 6a^2 + 9)$ *and* $(-10a - 8 + 8a^2)$

$= 8a - 6x^2 + 9 - 10a - 8 + 8a^2$

$= (8a^2 - 6a^2) + (8a - 10a) + (9 - 8) = 2a^2 - 2a + 1$

Subtraction of $(2a^2 - 2a + 1)$ from - 3

= - 3 - $2a^2 - 2a + 1$

= $2a^2 - 2a + 1 - 3$

= $2a^2 - 2a - 4$

5. Find the value of the given expression if y=2.

$\left(\frac{1}{3}y^2 - \frac{4}{7}y^2 + 5\right) - \left(\frac{2}{7}y - \frac{2}{3}y^2 + 2\right)$

Sol. $\left(\frac{1}{3}y^2 - \frac{4}{7}y^2 + 5\right) - \left(\frac{2}{7}y - \frac{2}{3}y^2 + 2\right)$

= $\frac{1}{3}y^2 - \frac{4}{7}y + 5 - \frac{2}{7}y + \frac{2}{3}y^2 - 2$

= $\left(\frac{1}{3} + \frac{2}{3}\right)y^2 - \left(\frac{4}{7} + \frac{2}{7}\right)y + 5 - 2$

= $\frac{3}{3}y^2 - \frac{6}{7}y + 3$

= $y^2 - \frac{6}{7}y + 3$

= $(2)^2 - \frac{6}{7}(2) + 3$

= 4 - $\frac{12}{7} + 3$

= $\frac{28-12+21}{7}$ $[\because y = 2]$

= $\frac{37}{7}$

III. Short answer question

1. Simplify the following by combining the like terms and then write whether the expression is a monomial, a binomial or a trinomial.

i. $50x^3 - 21x + 107 + 41x^3 - x + 1 - 93 + 71x - 31x^3$

ii. Three times of p and two times of q are multiplied and then subtracted from r.

Sol. i. $50x^3 - 21x + 107 + 41x^3 - x + 1 - 93 + 71x - 31x^3$

$\Rightarrow x^3(50 + 41 - 31) + x(-21 - 1 + 71) + 107 + 1 - 93$

$\Rightarrow x^3(60) + x(49) + 15$ = $60x^3 + 49x + 15$

It is $\Rightarrow$ trinomial expression.

ii.. Three times of p = 3p

Two times of q = 2q

From above statement we get

$\Rightarrow\ r-(3px2q)$

it is binomial

2. Add

i. $\boldsymbol{x^2-y^2-1, y^2-1-x^2, 1-x^2-y^2}$

ii. $\boldsymbol{t-t^2-t^3-14; 15t^3+13+9t-8t^2; 12t^2-19-24t\ and\ 4t-9t^2+19t^3}$

Sol. $x^2-y^2-1, y^2-1-x^2, 1-x^2-y^2$

We have

$$\begin{array}{r} x^2-y^2-1 \\ -\ x^2+y^2-1 \\ +\ -x^2-y^2+1 \\ \hline -x^2-y^2-1 \\ \hline \end{array}$$

ii. $t-t^2-t^3-14; 15t^3+13+9t-8t^2; 12t^2-19-24t\ and\ 4t-9t^2+19t^3$

Rearranging terms

$$\begin{array}{r} t-\ t^2-\ t^3-14 \\ +9t-8t^2+15t^3+13 \\ -24t+12t^2+\ 0\ -19 \\ 4t-9t^2+19t^3+\ 0 \\ \hline \text{-10t -}\ \ 6t^2+33t^3-20 \\ \hline \end{array}$$

$=33t^3-6t^2-10t-20$ *is required answer.*

3. Subtract:

i. $\boldsymbol{5a^2-7ab+5b^2\ from\ 3ab-2a^2-2b^2}$

ii. $\boldsymbol{x^2y^2+3x^2y^2-7xy^3\ from\ x^4+y^4 3x^2y^2-xy^3}$

Sol. i. we have

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

$$\begin{array}{r} \text{3ab - } 2a^2-2b^2 \\ \text{-7ab + } 5a^2+5b^2 \\ \hline \text{10ab - } 7a^2-7b^2 \\ \hline \end{array}$$

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

ii.. We have

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

$$\begin{array}{l} x^4 + y^4 + 3x^2y^2 - xy^3 \\ \quad\quad +3x^3y^2 - 7xy^3 + x^3y^2 \\ \hline x^4 + y^4 + 0 + 6xy^3 - x^3y^2 \\ \hline \end{array}$$

$= x^4 + y^4 + 0 + 6xy^3 - x^3y^2$

4. What should be taken away from $3x^2 - 4y^2 + 5xy + 20$ *to obtain* $- x^2 - y^2 6xy + 20$?

Sol. Required expression.

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

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

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

$= 4x^2 + 3y^2 - xy + 0$

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

5. What should be added to 3pq + $5p^2q^2 + p^3$ *to get* $p^3 + 2p^2q^2 + 4pq$?

Sol. Required

$= p^3 + 2p^2q^2 + 4pq - (3\text{pq} + 5p^2q^2 + p^3)$

$= p^3 + 2p^2q^2 + 4pq - 3\text{pq} + 5p^2q^2 + p^3$

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

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

6. Simplify the expression and find its value when a=5 and b=3.

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

Sol. $2(a^2 + ab) + 3 - ab = 2a^2 + 2ab + 3 = ab$

$= 2a^2 + ab + 3$

Now $= 2a^2 + ab + 3 = 2a^2 + (a)(b) + 3$

$\because a = 5 \text{ and } b = -3$

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

= 2(25)-15+3 = 50-15+3

= 50-12=38

7. **What should be the value of a if the value of $2x^2 + x - a$ equals to 5, when $x = 0$?**

Sol. Since $2x^2 + x - a = 5, and\ x = 0$

$\therefore\ 2(x)^2 + x - a = 5$

$2(0) + 0 = a - 5$

0 + 0 – a = 5

-a = 5 $\Rightarrow$ $a = -5$

The required value of a = - 5

8. Subtract 24ab-10b-18a from 30ab+12b+14a

Sol. 30ab+12b+14a- $(24ab - 10b - 18a)$

= 30ab+12b+14a - $24ab + 10b + 18a$

= 30ab-24ab+12b+10b+14a+18a

= 6ab+22b+32a

Alternatively, we write the expressions one below the other with the like terms.

Appearing exactly below like terms as:

30ab+12b+14a

_24ab∓10b∓18a

6ab+22b+32a

9. If A=$3x^2 - 4x + 1, B = 5x^2 + 3x - 8\ and\ C = 4x^2 - 7x + 3\ then\ find\ B + C - A$

Sol. A = $3x^2 - 4x + 1$

B = $5x^2 + 3x - 8$

And C = $4x^2 - 7x + 3$

$B + C - A$

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

= $5x^2 + 3x - 8 + 4x^2 - 7x + 3 - 3x^2 - 4x + 1$

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

= $9x^2 - 3x^2 + (-4x + 4x) - 9 + 3$

= $6x^2 + 0 - 6$

= $6x^2 - 6$

10. Arjun bought a rectangular plot with length x and breath y and they sold a triangular part of it whose base is y and height is x. find the area of the remaining part of the plot.

Sol. Plot in rectangular shape to the length x and breadth y

Area of plot = length x breadth

= $x \times y$

Triangular part is sold with base is y and height is x

Area of Triangular plot = $\frac{1}{2}\ x\ base\ x\ height$

$= \frac{1}{2} x\, y\, x\, z = \frac{1}{2} yz$

Area of the remaining plot

= area of rectangular plot – area of triangular plot

$= xy - \frac{1}{2} yz = y\left(x - \frac{1}{2} z\right)$

11. Shiv works in a mall and gets paid Rs.50 per hour. Last week he worked for 7 hours and this week he will work for x hour. Write an algebraic expression for the money paid to him for both the weeks.

Sol. Shiv is paid Rs.50 for one hour

Money paid for last week he worked for 7 hours = 7 x 50 = Rs.350

This week he will work for x hour

Money paid to him for both weeks = 50x + 350 or 50(x+7).

I. Long answer question

1. If A=2a-3b, B=-3a+4b and C=-a+b, find A + B +C AND A + B – C.,

Sol. A = 2a-3b

B = - 3a + 4b

C = -a + b

A + B + C = (2a-3b) + (-3a+4b) + (-a + b)

= 2a- 3b -3a + 4b - a+b

= a (2-3-1) + b (-3 + 4 + 1)

= a (2-4) + b(1+1)

= -2a+2b

A + B – C =?

A + B + C = (2a-3b) + (-3a+4b) + (-a + b)

= 2a-3b-3a+4b+ a + b

= a(2-3+1) + b(-3+4-1)

= a(0) + b(-4+4)

= a (0) + b (0)

= 0.

2. Find the value of the following expressions, for

a = 3, b = 2

a. a+b b. 7a - 4b

c. $a^2 + 2ab + b^2$ d. $a^2 - b^2$

Sol. Substituting a=3 and b=2 in

a. a + b we get
   a + b = 3 + 2 =5
b. 7a - 4b we get
   7a - 4b = 7 x 3 – 4 x 2
   = 21 – 8 = 13
c. $a^2 + 2ab + b^2$
   $a^2 + 2ab + b^2$ = $3^2 + 2\ x\ 3\ x2 + 2^2$
   = 9 + 2 x 6 + 4
   = 9 + 12 + 4 = 25
d. a^3- b^3 we get
   a^3- $b^3 = 3^3 - 2^3 = 3\ x\ 3\ x\ 3 - 2\ x\ 2\ x\ 2$
   $= 27 - 8 = 9$

3. If A = 2 + 4x + 8x^2

B = -3 - 5x + $x^{2,}$

C = 1+3x-7$x^{2,}$ find A + B + C

Sol. A = 2 + 4x + 8x^2

B = - 3 - 5x + $x^{2,}$

C = 1 + 3x - 7$x^{2,}$

A + B + C=?

A + B + C = $(2+4x+8x^2) + (-3 - 5x + x^{2,}) + (1 + 3x - 7x^{2,})$

$= 2 + 4x + 8x^2 - 3 - 5x + x^{2,} + 1 + 3x - 7x^{2,}$

$= x^{2,}(8 + 1 - 7) + (4 - 5 + 3) + 2 - 3 + 1$

$= 2x^{2,} + 2x + 0$

$= 2x^{2,} + 2x$

$= 2x\ (x+1)$

4. Find the value of the following expression, when

n = -2

a. 5n-2 b. $5n^2 + 5n - 2$

c. $n^3 + 5n^2$+5n-2

Sol. A. Putting n=2 in 5n – 2 we get

5(-2)-2 = -10-2=-2

b. In $5n^2 + 5n - 2$ we have
For n = -2, 5n-2=-12
And $5n^2 = 5\ (-2)^2 = 5\ x\ 4 = 20$
Combining,
$5n^2 + 5n - 2 = 20 - 12 = 8$

c. Now for n=-2
$5n^2$+5n-2=8
and $n^3 = (-2)^3 = (-2)\ x\ (-2)\ x(-2) = -8$
Combining

$n^3 + 5n^2$+5n-2 =-8 + 8 = 0

II. Long answer question

1. From the sum of 4+3x and 5-4x+2x^2, *subtract the sum of* $3x^2 - 5x$ *and* $-x^2 + 2x + 5$

Sol. Sum of 4+3x and 5-4x+2x^2,

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

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

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

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

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

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

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

Now according to the question, we have

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

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

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

$= 4+2x$ or $2x+4$

2. If P=-(x-2), Q=-2(y+1) and R=-x+2y find a, when P+Q+R=ax.

Sol. P = - $(x - 2)$

Q = - 2 (y+1)

R = - x + 2y

We have

P+Q+R=ax

Putting the values in above equation

$-x+2+(-2y - 2) + (-x + 2y) = ax$

$-x+2 -2y -2-x + 2y= ax$

$(-x - x) + (2y - 2y) + 2 - 2 = ax$

$-2x + 0 + 0 = ax$

$-2x = ax$

$a = -2$

3. **Subtract the sum of 12ab-10$b^2 - 18a^2$ *and* $9ab + 12b^2 + 14a^2$ *from the sum of* $ab + 2b^2$ *and* $3b^2 - a^2$**

Sol. Sum of 12ab-10$b^2 - 18a^2$ *and* $9ab + 12b^2 + 14a^2$

= 12ab-10$b^2 - 18a^2 + 9ab + 12b^2 + 14a^2$

$= (12ab + 9ab) + (12b^2 - 10b^2) + (14a^2 - 18a^2)$

= 21ab+2$b^2 - 4a^2$

Sum of $ab + 2b^2$ *and* $3b^2 - a^2$

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

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

Now, subtracting 21ab+2$b^2 - 4a^2$ *from* $ab + 5b^2 - a^2$

$= (ab + 5b^2 - a^2) - (21\text{ab} + 2b^2 - 4a^2)$

$= ab + 5b^2 - a^2 - 21\text{ab} + 2b^2 - 4a^2$

$= -20ab + 3b^2 + 3a^2$

4. Match column I with column II in the following

Sl.No	Column I	Column II
1.	The difference of 3 and a number squared	a. 4 - 2x
2.	5 less than twice a number squared	b. $n^2 - 3$
3.	Five minus twice the square of a number	c. $2n^2 - 5$
4.	Four minus a number multiplied by 2	d. 5 - $2n^2$
5.	Seven times the sum of a number and 1	e. $3 - n^2$
6.	A number squared plus 6	f. $2(n + 6)$
7.	2 times the sum of a number and 6	g. $7(n + 1)$
8.	Three less than the square of a number	h. $n^2 + 6$

Sol. 1.(e), 2.(c), 3.(d), 4.(a), 5.(g), 6.(h), 7.(f), 8.(b)

5. A. subtract the sum of $5x^2 - 6x + 4$ *and* $-4x^2 - 2x + 3$ *from* 0

b. what should be subtracted from $3a^2 - 3b + 6$ *to get* $4a^2 - b + 2$?

Sol: a. sum of $5x^2 - 6x + 4$ *and* $-4x^2 - 2x + 3$

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

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

$= x^2 - 8x + 7$

Now subtract $x^2 - 8x + 7$ *from* 0, *we get*

0-$[x^2 - 8x + 7]$ = 0 - $x^2 - 8x + 7$

= 0 - $x^2 - 3x + 7$

b. we have let the expression which is to be subtracted from $(3x^2 - 3b + 6)$ be x

$(3a^2 - 3b + 6) - (4a^2 - b + 2)$

$= 3a^2 - 3b + 6 - 4a^2 + b - 2$

$= (3a^2 - 4a^2) + (-3b + b) + (6 - 2)$

$= -a^2 - 2b + 4$

Thus, he expression $(-a^2 - 2b + 4)$ can be subtracted from $3a^2 - 3b + 6$ to get $4a^2 - b + 2$

6. **SIMPLIFY**

a. $\frac{1}{3}[(a^2-5b)-2(2a^2-(3c-2b)]$

b. **5a-**$[a^2-\{2a(1-a+4a^2)-3a(a^2-5a-3)\}]-8a$

Sol. $\frac{1}{3}[(a^2-5b)-2(2a^2-(3c-2b)]$

= $a-\frac{1}{3}[(a^2-5b)-2(2a^2-3c+2b)]$

= $a-\frac{1}{3}[(a^2-5b)-4a^2+6c-4b)]$

= $a-\frac{1}{3}[-3a^2+9b+6c\ )]$

= $a-\frac{1}{3}[-3a^2+9b+6c\ ]$

=a-$[-a^2-3b+2c]$

=a+$a^2+3b-2c \quad \Rightarrow a^2+a+3b-2c$

b. 5a-$[a^2-\{2a(1-a+4a^2)-3a(a^2-5a-3)\}]-8a$

= 5a-$[a^2-\{2a-2a^2+8a^3-(3a^3-15a^2-9a)\}]-8a$

= 5a-$[a^2-\{2a-2a^2+8a^3-3a^3+15a^2+9a\}]$-8a

= 5a-$[a^2-\{11a-13a^2+5a^3\}]$-8a

= 5a-$[a^2-11a-13a^2-5a^3]-8a$

= 5a—$12a^2-11a-5a^3-8a$

=5a+$12a^2+11a+5a^3-8a=5x^3+12a^2+8a$

7. **Fine the value**

a. $\boldsymbol{4x+x-2x^2+x-1\ if\ x=\ -1}$

$\boldsymbol{b.(x^2-y^2)+(x+y)(x-y) if\ x=-1.7, y=-3.9}$

Sol a. $4x+x-2x^2+x-1\ if\ x=\ -1$

=$4x+x-2x^2+x-1$

= $6x$ - $2x^2-1$

Putting value of x =-1

= $6(-1)-2(-1)^2-1$

= -6-2-1

= -9

b. $(x^2-y^2)+(x+y)(x-y) if\ x=-1.7, y=-3.9$

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

We know $(a+b)(a-b)=a^2-b^2$

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

Putting the values of x = 1.7 and y=-3.9

We get

$$2[(-1.7)^2 - (-3.9)^2]$$

$$2[2.89 - 15.21]$$

$$2[-12.32]$$

= 24.64