ALGEBRA

SYNOPSIS - 1

ALGEBRAIC EXPRESSIONS

FUNDAMENTAL CONCEPTS

There are two types of symbols in algebra:

(i) Constants: A symbol having a fixed numerical value is called a constant.

Thus, each of the symbols $3, -2, \frac{5}{9}$, 0.6 is a constant.

In fact, every number is a constant.

(ii) Variables: Consider the following example.

Example: We know that the perimeter of a square is given by the formula,

$p = 4 \times s$

Here 4 is a constant.

When s = 3, then $p = 4 \times s$

When $s = 5$, then $p = 4 \times 5 = 20$

Thus, the values of p and s are not fixed, they vary.

A symbol which takes on various numerical values is called a variable or a literal.

In the above example, s and p are literals or variables.

OPERATIONS ON NUMBERS AND LITERALS

We shall denote the lieterals by a, b, c, x, y, z, m, n etc.

1. Addition:

(i) The sum of x and 8 is $x + 8$ (ii) The sum of x and y is $x + y$

(iii) For any literals, a, b, c we have

I. $a + b = b + a$ II. $a + 0 = 0 + a$ III. $(a + b) + c = a(b + c)$

2. Subtraction:

(i) 6 less than x is $x - 6$ (ii) y less than x is $x - y$.

3. Multiplication:

(i) 7 times x is $7 \times x$, written as $7x$ (ii) The product of x and y is xy

(iii) For any literals, a, b, c we have

I. $ab = ba$ II. $a \times 0 = 0 \times a = 0$

III. $(ab)c = a(bc)$ IV. $a(b + c) = ab + ac$

4. Division:

(i) 5 divided by x is written as $\frac{5}{x}$ (ii) x divided by 6 is written as $\frac{x}{6}$

(iii) x divided by y is written as $\frac{x}{y}$

Algebraic Expression:

A combination of constants and variables, connected by the symbols +, -, $\times$ and $\div$ is called an algebraic expression.

Example: $5x+6y+2xy$ is an algebraic expression.

Terms: The several parts of an expression separated by the sign + or - are called the terms of the expression.
Examples:

(i) The expression $2x-5y+3xyz$ has three terms, namely $+2x, -5y$ and $+3xyz$

(ii) The expression $a^2b-2ab^3+5b^2a-8$ has four terms, namely $+a^2b-2ab^3$, $+5b^2a$ and -8

(iii) The expression abc has only one term.

Various Types of Algebraic Expressions

i. Monomials: An algebraic expression which contains only one term is called a monomial.

Examples: Each one of the expressions $5x, 9xy, 8a^2bc, -2z^3, 6, \frac{5}{x}$ is a monomial.

ii. Binomials: An algebraic expression which contains two terms is called a binomial.

Examples: Each one of the expressions $5+2x, 1-3xyz, x^2+a^2, a+\frac{1}{a}$ is a.

iii. Trinomials: An algebraic expression which contains three terms is called a trinomial.

Examples: Each one of the expressions $2x+3y-4z, 5-a-bc, a^2+b^2-2ab$ is a trinomial.

iv. Multinomials: An algebraic expression containing two or more terms is called a multinomial.

Factors of a Term:

When numbers and literals are multiplied to form a product, then each quantity multiplied is called a factor of the product.
A constant factor is called a numerical factor while a variable factor is called a literal factor.

Examples: (i) In $7ab$, the numerical factor is 7 and the literal factors are a, b and ab.

(ii) In $-9x^2y$, the numerical factor is -9 and the literal factors are x, x^2, y, xy and x^2y.

Constant Term:

A term of the expression having no literal factor is called the constant term.

Examples: (i) In the expression $3x-4y+2$, the constant term is 2.

(ii) In the expression $a^2+b^2-3ab-5$ the constant term is -5

Coefficients:

Any of the factors of a term is called the coefficient of the product of other factors. In particular, the constant part is called the numerical cvoefficient of the term and the remaining part is called the literal coefficient of the term.

Examples:

In the term $-2xyz^2$:

Numerrical coefficient $=-2$;

Literal coefficient $=xyz^2$;

Coefficient of $x=-2yz^2$;

Coefficient of $y=-2xz^2$.

Coefficient of $z^2=-2xy$ etc.

Like Terms:

Two terms having csame literal factors are known as like terms. Otherwise, they are known as unlike terms.

Examples: (i) $3xy, -5xy$ are like terms.

(ii) $2a^2b, 3ab^2$ are unlike terms.

(iii) $6ab^2, 9b^2a$ are like terms [Since $ab^2=b^2a$].

Polynomials:

An algebraic expression in which the powers of the variables involved are non-negative integers, is called a polynomial.

The highest power of the gvariable in a polynomial is called its degree.

Examples:

(i) $3x+7$ is a polynomial in x of degree 1.

(ii) $2y^2-5y+1$ is a polynomial in y of degree 2.

(iii) z^3+4z^2+3z-6 is a polynomial in z of degree 3.

(iv) $x+\frac{1}{x}$ is not a polynomial, since $\frac{1}{x}=x^{-1}$, i.e., power of x is negative integer.

Note that $x+\frac{1}{x}$ is a binomial expression but it is not a polynomial.

Polynomials in Two or More Variables:

An algebraic expression involving two or more variables with non-negative integral power is called a polynomial in these variables.

The degree of any term of a polynomial is the sum of the powers of all the variables in that term.

The degree of the highest degree term in a polynomial is called the degree of the polynomial.

Examples:

i. $x+y+xy$ is a polynomial in x and y whose terms are of degree 1, 1 and 2 respectively. So, it is a polynomial of degree 2.

ii. $a^2b+ab^2+3ab+5$ is a polynomial in a and b whose terms are of degree 3, 3, 2 and 0 respectively. So, it is a polynomial of degree 3.

iii. $y+z$ is a polynomial in y and z whose terms are of degree 1 and 1 respectively. So, it is a polynomial of degree 1.

Zero Value: The values which are satisfying the given polynomial.

Example: $f\left(x\right)=x+3$. -3 is zero value of $f\left(x\right)$.

WORK SHEET - 1

Single Answer Type

1. The value of the expression $\frac{n^2}{2}+\frac{n}{2}$ when n = 12 is

1) 76 2) 74 3) 78 4) 72

2. If $\frac{7x}{3}-\frac{7}{6}$ is a polynomial, then the zero of the polynomial is

1) $\frac{1}{2}$ 2) $-\frac{1}{2}$ 3) 0 4) – 2

3. If the zero of the polynomial in 'x' is $-\frac{5}{4}$, then the polynomial is

1) 4x – 5 2) 5x – 4 3) 5x + 4 4) 4x + 5

4. If A = – 8x² – 6x + 10, then its value when 'x' = $\frac{1}{2}$ is

1) 6 2) 4 3) 5 4) 7

5. The third degree polynomial among the following is

1) $2x^{3-1} + 3x^{2-1} + 5$ 2) $3x^{4-1} + 2x^{3-1} + 6x^{2-1} + 8$

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

6. Among the following the expression which is not a monomial is

1) $\frac{4a^3b^2c^5}{23}$ 2) $-147x^3y^2$ 3) $\frac{2}{7}x^{-2}y^5z$ 4) $x^3y^5z^{12}$

7. If $x = \frac{a}{2}$, then the value of $4x^2 + 8x + 18$ is

1) $a^2 + 2a + 8$ 2) $a^2 + 3a + 18$ 3) $a^2 + 4a + 18$ 4) $a^2 + 5a + 18$

8. The value of the expression $\frac{-26}{3} - \frac{13x}{27}$ when $x = \frac{9}{13}$ is

1) – 8 2) – 10 3) – 9 4) – 11

9. Degree of the polynomial $p + q\,x^m + rx^{m+2} + 5x^{m+3} + x^{m+4}$ is

1) m 2) m + 2 3) m + 3 4) m+ 4

10. If $\frac{n(n+1)(2n+1)}{6}$ represents sum of the squares of first 'n' natural numbers, then its value when n = 10 is

1) 365 2) 375 3) 395 4) 385

11. Degree of the polynomial $\frac{1}{2}x^5 + 3x^4 + 2x^3 + 3x^2 + 6$ is

1) 4 2) 3 3) 5 4) 2

12. Degree of the monomial $\frac{3}{5}x^2y^6z^7$ is

1) 15 2) 9 3) 8 4) 13

13. In a polynomial 3x + 5 where x = a + 2, then its value when a = 8 is

1) 25 2) 45 3) 35 4) 40

Multi Answer Type

14. Which of the following is/are true?

1) The coefficient of 'x' in 9xy is –9y 2) The coefficient of 'a' in –7abc is –7bc
3) The coefficient of 'xyz' in –xyz is –1 4) The coefficient of 'b' in –abc is –ac

15. In $6x^2y + 5xy^2 - 8xy^2 - 7yx^2$, like terms are

1) $6x^2y, - 7x^2y$ 2) $5xy^2, - 8xy^2$ 3) $6x^2y, - 5xy^2$ 4) $- 7yx^2, 8xy^2$

16. Which of the following is/are false?

a) 3 more than a number 'x' is x + 3
b) One third of the sum of x and y is (x + y)/3
c) The quotient of x by y added to the product of x and y is (x + y)+ x/y
d) 5 less than the quotient of x by y is (x/y) + 5

17. a) The degree of $x^2 + xy^2 + y^3$ is 3 b) The degree of $m^2n^3 + mn^2 + 4$ is 5
c) The degree of $p^2q^2 + pq^2 + 1$ is 4
which of the above is/are true?

1) a 2) b 3) c 4) all of these

18. Which of the following statement is/are false?

a) $x^3 - \frac{1}{x^3} + 3x^2 - \frac{3}{x^2} + 8$ is a polynomial. b) $p^3 + p^2q - \frac{4p}{q} + 8$ is a polynomial.

c) $a^3 + b^3 + c^3 - abc$ is a polynomial.

1) a 2) b 3) c 4) both 1 & 2

19. The degree of the polynomial $2x^{3^2 \times 2^3} + 3x^{4^2 \times 3^2} + 5x^{4^2 \times 3^2} + 5x^{4^2 \times 2^3}$ is

1) 12^2 2) 146 3) 144 4) 148

20. If $A = \frac{1}{2}(m+n)p$ where m = 12.25, n= 108.35, p = 3.5, then the value of A is less than

1) 211.05 2) 211.50 3) 211.00 4) 211.105

21. If a = 1 and b = $\frac{1}{2}$, then the value of $(25a^4b) \times -(-2a^2b^2) \times (-2.1a^3b^3)$ is

1) 131/32 2) – 105/32 3) 128/17 4) –105/64

22. If a = 7, b = 5, then the value of $(a + b)(a + b) - (a - b)(a - b) + (a^2 - b^2)$

1) 41×2^3 2) 41×2 3) 41×2^2 4) 41×2^4

Reasoning Answer Type

23. *Statement I :* The value of $(a + b)^2 + (a - b)^2 + (a^2 - b^2)$ when a = 3, b = 2 is 30

Statement II : $(a + b)^2 = a^2 + b^2 + 2ab$, $(a - b)^2 = a^2 + b^2 - 2ab$, $a^2 - b^2 = (a + b)(a - b)$

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

24. *Statement I :* If 10 oranges are taken out from a basket containing 'x' oranges and added to another basket containing y + 20 oranges, then the total number of oranges in the two baskets is x + y + 30.

Statement II : The sum of 'p' and 10 is subtracted from sum of 5 more than 4 times 'q' and 'r', then the resultant is (4q + r) – (p + 5)

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

25. *Statement I :* If $A = 4x^{2m}y^{4n}z^{3p}$ where 2m = 4n = 3p = 24, then the degree of polynomial A is 74.

Statement II : In case of polynomials in more than one variable the sum of the power of the variable in each term is taken and the highest sum is the degree of the polynomial.

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

26. *Statement I :* $2m^2n, -4nm^2, \frac{-8}{3}m^2n$ are like terms.

Statement II : Monomials having different literal factors are like terms.

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

27. *Statement I :* The value of $(5a^6) \times (-10ab^2) \times (-2.1a^2b^3)$ when a = 1, b = 1/2 is 105/32.

Statement II : The value of an expression depends on the given values of the variable.

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

28. *Statement I :* If x = 2, y = – 2 and z = 3, then $x^2 + y^2 + z^2 - 2xy - 2yz - 2zx = 25$

Statement II : If p = 3, q = – 5 and r = 4, the $p^2 + q^2 + r^2 - pq - qr - pr = 73$

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

Comprehension Type

Writeup-1:

If $A = 18x^3y^2z^4$, $B = 12x^2y^3z^3$, $C = x^4y^3$

29. a) A × C in simplified form is $18x^7y^7z^7$

b) A × C in simplified form is $18x^6y^7z^3$

Which of the following is/are true?

1) a 2) b 3) both (1) & (2) 4) none

30. B × C in product form is

1) $12x^6y^6z^3$ 2) $-12x^6y^6z^3$ 3) $12x^5y^5z^3$ 4) $12x^6y^5z^3$

31. A × B × C in product form is

1) $216x^9y^8z^7$ 2) $216x^8y^9z^7$ 3) $216x^7y^8z^7$ 4) $216x^9y^8z^6$

Writeup-2:

$A = 6a^{p+2} + 5a^{2p+3} + 7a^{3p+4}$ and $B = 4b^{q+3} + 5b^{3q+2} + 8b^{4q+3}$ where p = 2, q = 3

32. The degree of polynomial A is

1) 10 2) 7 3) 6 4) 11

33. The degree of polynomial B is
1) 10 2) 15 3) 11 4) 12

34. Which polynomial has higher degree?
1) A 2) B 3) both 1 & 2 4) none

Writeup-3:

(i) An algebraic expression of the form $a + bx + cx^2 + dx^3 + \ldots$ where a, b, c, d etc are constants is a polynomial in one variable. Here the highest power of x is the degree of the polynomial.

(ii) An algebraic expression in two or more variables is a polynomial if every variable is a polynomial if every variable in it has only positive integral powers. Here the sum of the variables in each term is taken and the highestsum is the degree of the polynomial.

35. Which of the following is a polynomial in one variable ?
1) $x^3 - \frac{1}{x^3}$ 2) $x^{-3} + 2$ 3) $\frac{y^3}{x}$ 4) $\frac{4}{7}t - t$

36. The degree of the Polynomial $\frac{3}{5}x^2 - \frac{5}{4}x + \frac{2}{3}$ is ___________.
1) 3/5 2) 2 3) 3 4) Not a Polynomial

37 The degree of the polynomial $2p^2q + pq^2 + 3p^3 - p^2q^2$ is ____________.
1) 2 2) 3 3) 4 4) Not a Polynomial

Writeup-4:

If $A = \frac{V}{W\left(R^2 - r^2\right)}$ where V = 115.5, W = 22/7, R = 2.6, r = 2.3, then

38. The value of $R^2 - r^2$ is
1) 1.48 2) 1.44 3) 1.46 4) 1.47

39. The value of V/W is
1) $\frac{143}{4}$ 2) $\frac{149}{4}$ 3) $\frac{141}{4}$ 4) $\frac{147}{4}$

40. The value of A is
1) 2.5 2) 25 3) 0.25 4) None

Writeup-5:

The value of the expression $ax^2 + bx + c$ at $x = k$ is $(ak^2 + bk + c)$

41. The value of the expression $2x^2 + (7/2)xy + 5y^2$ at x=1, y = 2 is
1) 92 2) 29 3) –29 4) 19

42. The value of the expression $a^2 - bc + c^2 - b^2$ at a = 0, b = 1 c = 2 is ___
1) 1 2) 2 3) 3 4) 4

43. The value of the expression $x^3 + \frac{xy}{3} + \frac{7}{2}y^2$ at x = 2, y = 3 is ___
1) 75 2) 72/5 3) 75/2 4) 57/2

Matrix Matching Type

44. **Column-I** | **Column-II**

Column-I	Column-II
a) a.25 = 25.a	1) associative law in multiplication
b) $3 \times (5 + x) = 3 \times 5 + 3 \times x$	2) associative law in addition
c) $4 + (5 + x) = (4 + 5) + x$	3) distributive law
d) $5 \times (7 \times x) = (5 \times 7) \times x$	4) commutative law in multiplication

45.

Column-I	Column-II
a) 7 times x increased by 5 gives Quotient of 11 by 2	1) $2x - 9 = 23$
b) 7 less than the quotient of x by 11 equals 2	2) $\frac{x}{11} - 7 = 2$
c) Twice x decreased by 9 gives 23	3) $2 + x - 9 = 23$
d) 2 times x exceeds 9 by 23	4) $7x + 5 = \frac{11}{2}$
	5) $\frac{x}{7} - 11 = 2$

46.

Column-I Polynomials	Column-II Degree
a) $5x$	1) 5
b) $15x^2 - x + 2$	2) 4
c) $-x^4 + 2x + 1$	3) 2
d) $x^2 - x^5$	4) 1

47.

Column-I	Column-II
a) If $l = 5$ and $m = 3$, then $2l + 3m$ = _____	1) 1
b) If $x = 3$, then $x^2 - 4x + 4$ =______	2) 13^2
c) If $x = 5$, $y = 12$, then $x^2 + y^2$ = ___	3) 19
d) If $x = 4$, $y = 3$ & $z = -2$, then $xy + yz + zx$ =____	4) -2
	5) 169

Integer Answer Type

48. 6 less than the quotient of x by 3 equals 2. Their x = __________.

49. The degree of the polynomial $p^3q^2 + 2p^2q + pq^2 + 5p^4 + 8q^3$ is __________.

50. If $a = +1$, $b = -2$ and $c = -3$, then the value of $\frac{a^3 + b^3 + c^3 - 3abc}{ab + bc + ca - (a^2 + b^2 + c^2)}$ is______

SYNOPSIS - 2

Addition of polynomials:

1. $5x, -3x, 4x, \frac{7}{6}x$ are like terms.
2. $-\frac{3}{2}y$, $6x$, $-7x^2$, $8x^3$ are unlike terms.
3. Like terms can be added and their sum can be simplified.
   E.g. $7x - 9x + 6x = x(7 - 9 + 6) = 4x$.
4. If no two terms are alike in a polynomial, then it is said to be in the simplified standard form.
   Eg : $2x^3 - 8x^2 - 6x + 9$
5. If an expression is
   a) in ascending order, then its terms are arranged in increasing order of powers in the expression.
   b) in descending order, then its terms are arranged in decreasing order of powers in the expression.
6. The sum or difference of two rational polynomials is also a polynomial with rational coefficients.

WORK SHEET - 2

Single Answer Type

1. The sum of $\frac{3}{4}x^3, \frac{5}{6}x^3, -\frac{2}{3}x^3$ and $\frac{7}{2}x^3$ is

   1) $\frac{12}{53}x^3$ 2) $-\frac{53}{12}x^3$ 3) $\frac{53}{12}x^3$ 4) $-\frac{12}{53}x^3$

2. The simplified form of $3x^3 - 2x^2 - 8x - 6x^2 + 7x^3 + 9x + 8x^3 - 9x^2 + 6x$ is

   1) $-18x^3 - 17x^2 + 7x$ 2) $18x^3 - 17x^2 - 7x$
   3) $18x^3 + 17x^2 - 7x$ 4) $18x^3 - 17x^2 + 7x$

3. The ascending order of the polynomials $-3x^3 + 7x^2 - 9x^4 + 6x - 8$ is

   1) $-8 + 6x + 7x^2 - 3x^3 + 9x^4$ 2) $-8 - 6x - 7x^2 - 3x^3 - 9x^4$
   3) $-8 + 6x + 7x^2 - 3x^3 - 9x^4$ 4) $8 + 6x + 7x^2 + 3x^3 + 9x^4$

4. If $A = -7x - 3x - 5x$ and $B = 9x + 3x + 2x$, then $A + B$ is

   1) $2x$ 2) $-2x$ 3) $-x$ 4) $-3x$

5. If $\frac{1}{2}x - \frac{1}{3}x = A$ and $\frac{1}{3}x - \frac{1}{4}x = B$, then $A - B$ is

   1) $\frac{1}{12}x$ 2) $-\frac{1}{12}x$ 3) $-2x$ 4) 0

6. The equivalent expression of $2x^3 - 3x^2 - 8x - 3$ is
1) $3x^3 - 5x^3 + 7x^2 - 5x^2 - 8x + 10x - 4 + 1$
2) $3x^3 - x^3 - 5x^2 + 2x^2 - 9x + x - 7 + 4$
3) $4x^3 - 6x^2 - 3x^3 + 3x^2 + x^2 - 9x + 3x + 6 - 3$
4) $4x^3 - 2x^3 + 3x^2 - 5x^2 - 8x + 6x + 4 - 1$

7. The descending order of $4x^2 - 9x^3 + 3x^2 - 9x^4 + 3x^3 - 9x^2 + 6x - 3x + 5 - 3$ is
1) $-9x^4 + 6x^3 - 2x^2 + 3x + 2$ 2) $-9x^4 - 6x^3 + 2x^2 - 3x + 2$
3) $-9x^4 - 6x^3 - 2x^2 + 3x + 2$ 4) $-9x^4 + 6x^3 - 2x^2 + 3x - 2$

8. If $-\frac{7}{5}x^3 + \frac{3}{4}x^3 + \frac{7}{2}x^3 + \frac{9}{3}x^3$ is added to $\frac{9x^3}{60}$, then the result is
1) $-6x^3$ 2) $6x^3$ 3) $60x^3$ 4) $16x^3$

9. If $2x - 3x + 5x = P$, $Q = -8x + 3x + 9x$ and $R = -8x - 6x - 7x$, then $(P + Q) - R$ is
1) $27x$ 2) $28x$ 3) $29x$ 4) $26x$

10. If $A = -3x^3 - 2x^3 + 4x^2 - 2x^2$, $B = -3x^2 + 5x^2 - 8x + 3x$ and $C = 2x - 9x - 7 + 8$, then $A + B + C$ in simplified form is
1) $-5x^3 + 4x^2 - 12x + 1$ 2) $5x^3 - 3x^2 - 12x + 1$
3) $-5x^3 - 4x^2 - 12x - 1$ 4) $5x^3 + 3x^2 + 12x + 1$

11. If $4x^3y^2 + 3x^2y^3 - 8x^2y^5$ is added $-9x^2y^3 + 6x^2y^5 - 9x^3y^4$, then the result is
1) $4x^3y^2 + 5x^2y^3 - 2x^2y^5 - 9x^3y^4$ 2) $4x^3y^2 - 6x^2y^3 - 2x^2y^5 - 9x^3y^4$
3) $4x^3y^2 - 6x^2y^3 + 2x^2y^5 - 9x^3y^4$ 4) $-4x^2y^2 - 6x^2y^3 - 2y^2y^5 - 9x^3y^4$

12. If $0.5x^3 + 1.85x^3 + 2.96x^3 - 4.71x^3$ is added to $(1.25x^4 - 2.5x^5 + 3.6x^4 - 4.71x^4)$, then the result is
1) $0.6x^3 + 2.36x^4$ 2) $-0.6x^3 - 2.36x^4$
3) $0.6x^3 - 2.36x^4$ 4) $-0.6x^3 + 2.36x^4$

Multi Answer Type

13. The sum of $5x^2 - \frac{1}{3}x + \frac{5}{2}$; $-\frac{1}{2}x^2 + \frac{1}{2}x - \frac{1}{3}$ and $-2x^2 + \frac{1}{5}x - \frac{1}{6}$
1) $\frac{5}{4}x^2 + \frac{11}{30}x + 2$ 2) $\frac{5}{4}x^2 - \frac{11}{30}x + 2$
3) $\frac{5}{2}x^2 + \frac{11}{30}x + 2$ 4) $\frac{5}{2}x^2 + \frac{11}{30}x - 2$

14. If the lengths of the three sides of a triangle in centimetres are $\frac{7}{2}x^3 - \frac{1}{2}x^2 + \frac{5}{3}$, $\frac{3}{2}x^3 + \frac{7}{4}x^2 - x + \frac{1}{3}$ and $\frac{3}{2}x^2 - \frac{5}{2}x - 2$, then its perimeter is
1) $5x^3 - \frac{11}{4}x^2 + \frac{7}{2}x$ 2) $5x^3 - \frac{11}{4}x + \frac{7}{2}x^2$
3) $5x^3 + \frac{11}{4}x^2 - \frac{7}{2}x$ 4) $5x^3 + \frac{7}{2}x^2 - \frac{11}{4}x$

Reasoning Answer Type

15. *Statement I :* If $A = 5x^2 - \frac{1}{3}x + \frac{5}{2}$, $B = -\frac{1}{2}x^2 + \frac{1}{2}x - \frac{1}{3}$, $C = -2x^2 + \frac{1}{5}x - \frac{1}{6}$, then

$$A + B + C = \frac{5}{2}x^2 - \frac{11}{30}x - 2$$

Statement II : Two or more algebraic expression can be added by arranging their terms and combining like terms.

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

16. *Statement I :* The sum of $8p^2 - 9q^2$ and $-6p^2 + 5q^2$ is $2p^2 - 4q^2$

Statement II : The sum can be found by adding the dissimidar terms in both the expressions.

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

Comprehension Type

Writeup-1:

$A = 7x^2 - 4x + 5$, $B = -3x^2 + 2x - 1$, $C = 5x^2 - x + 9$

17. The value of A + B is

1) $4x^2 - 2x + 4$ 2) $4x^2 + 2x - 4$ 3) $4x^2 - 2x - 4$ 4) $4x^2 + 2x + 4$

18. The value of B + C is

1) $2x^2 - x - 8$ 2) $2x^2 + x + 8$ 3) $2x^2 - x + 8$ 4) $2x^2 + x - 8$

19. The value of 2A + B + C is

1) $16x^2 + 7x + 18$ 2) $16x^2 - 7x - 18$ 3) $16x^2 + 7x - 18$ 4) $16x^2 - 7x + 18$

Writeup-2:

The sum can be found by adding the simmilar terms in the expressions.

20. If $a = 2a - 5b + 4c$, $B = 5a - 2b + 2c$, then A + B = ____

1) $7(a - b + c)$ 2) $7(a - b) + 6c$ 3) $a - b + 6c$ 4) $7(a - b) + c$

21. If $A = x - y + 1$, $B = -2x + 7y + 3$, then $(2/5)A + B/5$ =______

1) $5y + 1$ 2) $y + 5$ 3) $y - 5$ 4) $y + 1$

22. If $A = -3x - y + 5$, $B = x + 2y + 3$, then $3A - 5B$ =_____

1) $14x - 13y$ 2) $13x - 14y$ 3) $-13x + 14y$ 4) $-14x - 13y$

Matrix Matching Type

Add the two expressions

23.

Column-I	Column-II
a) $3a - 4b,\ 7a - 2b$	1) $3ab - 3bc - ac$
b) $3a + 5b - 4c,\ 2a - 5b - bc$	2) $10a - 6b$
c) $2ab - 5bc + 4ca,\ ab + 2bc - 5ac$	3) $-2a + 8b - 6$
d) $2a + 3b - 1,\ -4a + 5b - 5$	4) $5a - 10c$
	5) $5(a - 2c)$

Integer Answer Type

24. If $B = 2x^3 + 6x^2 - 7x + 8$ and $A + B = B$, then A is

1) -1 2) 1 3) B 4) 0

SYNOPSIS - 3

Subtraction of polynomials :

1. Subtraction is the inverse process of addition.
2. To every positive rational number there exists a negative rational number such that their sum is zero i.e., $A + (-A) = 0$.
   Here, the letter $(-A)$ is called the additive inverse of A.
   Eg : $A = -2x^2 - 8x + 7$
   \ Its additive inverse is $2x^2 + 8x - 7$.
3. If $A + B = 0$, then B is called the additive inverse of A.
   Eg: $A = -2x^4 + 3x^2 + 5x$
   $B = 2x^4 - 3x^2 - 5x$ Þ $A + B = -2x^4 + 3x^2 + 5x + 2x^4 - 3x^2 - 5x = 0$.
   \ B is the additive inverse of A.
4. Sum of a polynomial and its additive inverse is zero.
   Eg : $A = 4x^3 - 4x^2 + 3x + 7$
   Þ Additive inverse is $B = -4x^3 + 4x^2 - 3x - 7$
   \ $A + B = 4x^3 - 4x^2 + 3x + 7 - 4x^3 + 4x^2 - 3x - 7 = 0$.

WORK SHEET - 3

Single Answer Type

1. If $B = -9x^2 + 3x - 7$, then the additive inverse of B is

1) $9x^2 - 3x - 7$ 2) $9x^2 - 3x + 7$ 3) $-9x^2 - 3x - 7$ 4) $-9x^2 + 3x + 7$

2. If $A = \frac{-3x^2}{4} + \frac{2}{3}x + 7$ and $B = \frac{1}{4}x^2 - \frac{1}{3}x + 8$, then A – B is

1) $x^2 - x + 1$ 2) $-x^2 - x - 1$ 3) $-x^2 + x - 1$ 4) $x^2 + x + 1$

3. If P = $2x^3 - 3x^2 - 5x + 6$ and Q = $\frac{1}{3}x^3 - \frac{3}{4}x^2 - \frac{5}{2}x + \frac{7}{3}$, then Q – P is

1) $\frac{5x^3}{3} + \frac{9x^2}{4} + \frac{5x}{2} - \frac{11}{3}$ 2) $\frac{-5x^3}{3} - \frac{9x^2}{4} + \frac{5x}{2} - \frac{11}{3}$

3) $\frac{-5x^3}{3} - \frac{9x^2}{4} - \frac{5x}{2} - \frac{11}{3}$ 4) $\frac{5x^3}{3} + \frac{9x^2}{4} + \frac{5x}{2} - \frac{11}{3}$

4. If $A = -\frac{3}{2}x^3 - \frac{9}{7}x^2 + \frac{6x}{7} + 2$ and A + B = 0, then polynomial B is

1) $\frac{-3x^3}{2} - \frac{9}{2}x^2 + \frac{6x}{7} + 2$ 2) $\frac{3x^3}{2} + \frac{9}{2}x^2 + \frac{6x}{7} + 2$

3) $\frac{-3x^3}{2} - \frac{9}{2}x^2 - 6x - 2$ 4) $\frac{3x^3}{2} + \frac{9}{7}x^2 - \frac{6x}{7} - 2$

5. If A = $2x^3 - 9x^2 - 6x + 7$ and A + B = $5x^3 - 6x^2 - 8x + 9$, then the polynomial (A + 2) – A is 1) $3x^3 - 3x^2 - 2x + 2$ 2) $3x^3 + 3x^2 - 2x + 2$
3) $3x^3 + 3x^2 + 2x + 2$ 4) $-3x^3 - 3x^2 - 2x + 2$

6. If A = $4x^3 - 9x^2 - 9x - 8$ and A – B = $-2x^3 - 8x^2 - 6x - 2$, then the polynomial B = A – (A – 2) is
1) $6x^3 - x^2 - 3x - 6$ 2) $6x^3 + x^2 + 3x + 6$
3) $6x^3 + x^2 + 3x - 6$ 4) $-6x^3 - x^2 - 3x - 6$

7. Given A = $2x^3 - 3x^2 + 6x + 7$ and B = $4x^3 - 9x^2 - 3x + 7$, If C, D are additive inverses of A and B, then D – C is
1) $-2x^3 + 6x^2 + 9x$ 2) $-2x^3 + 5x^2 + 9x$
3) $-2x^3 - 6x^2 + 9x$ 4) $-2x^3 - 6x^2 - 9x$

8. If A – B = $2x^3 - 3x^2 + 8x - 7$ and B = $5x^3 - 9x^2 + 6x - 8$, where A = (A – 2) + B, then the polynomial A is
1) $7x^3 - 12x^2 + 14x + 18$ 2) $7x^3 - 12x^2 + 14x - 15$
3) $7x^3 - 12x^2 - 14x + 15$ 4) $-7x^3 + 12x^2 - 14x - 15$

9. Given $C = \frac{-5}{6}x^2 - \frac{7}{6}x + \frac{3}{2}$ and C + A = 0. If $B = \frac{x^2}{6} - \frac{1}{6}x + \frac{1}{2}$ is added to A, then the result is
1) $x^2 - x + 1$ 2) $-x^2 - x - 1$ 3) $x^2 + x - 1$ 4) $x^2 - x + 1$

10. If A = $7x^3 - 2x^2 - 9x + 6$, B = $2x^3 - 8x^2 + 3x - 5$, C = $2x^3 - 4x^2 - 8x + 7$, and D = $-3x^3 - 5x^2 + 6x + 7$, then (A – 3) – (B – 4) is
1) $5x^2 - 2x - 11$ 2) $5x^2 + 2x + 11$ 3) $5x^2 - 2x + 11$ 4) $-5x^2 - 2x - 11$

Multi Answer Type

11. On multiplication of $\left(3x - \frac{4}{5}y^2x\right)$ by $\frac{1}{2}xy$, the result is

1) $\frac{3}{2}x^2y + \frac{5}{2}x^2y^3$ 2) $x^2y(\frac{3}{2} - \frac{2}{5}y^2)$ 3) $\frac{3}{2}x^2y - \frac{2}{5}x^2y^3$ 4) $\frac{5}{2}x^2y + \frac{3}{2}yx^2$

12. The product of $100x \times (0.01\,x^4 - 0.01\,x^2)$ is
1) $0.01\,x^4 - x^3$ 2) $0.5\,x^5 - x^3$ 3) $x^5 - x^3$ 4) $x^3 - x^5$
13. Which of the following must be subtracted from a^2+b^2+2ab to get $-4ab+2b^2$
1) $2b^2 - 4ab$ 2) $a^2 - b^2 + 6ab$ 3) $a^2 - b(b + 6a)$ 4) $a^2 + b(-b + 6a)$

Reasoning Answer Type

14. *Statement I :* If a = 1 and b = 0.5, then the value of $2.3a^5b^2 \times 1.2a^2b^2$ is 0.1725
Statement II : In a given expression, the process of replacing each variable by a given value of it is called substitution.
1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.
15. *Statement I : The perimeter ofa triangle is $14a^2+20a+13$. Two of its sides are $3a^2+5a+1$* and $a^2 + 10a - 6$, then its 3rd side is $10a^2 + 5a + 18$
Statement II : The perimeter of a triangle is sum of its three sides.
1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

Comprehension Type

Writeup-1

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

16. The simplified form of (B – A) is
1) $\frac{17x^3}{15} - \frac{37x^2}{10} - \frac{9x}{10} - \frac{7}{12}$ 2) $\frac{17x^3}{15} + \frac{37x^2}{10} + \frac{9x}{10} - \frac{7}{12}$
3) $\frac{17x^3}{15} - \frac{37x^2}{10} + \frac{9x}{10} + \frac{7}{12}$ 4) $\frac{17x^3}{15} + \frac{37x^2}{10} + \frac{9x}{10} + \frac{7}{12}$
17. If $C = B - A + \frac{17x^3}{15} + \frac{37x^2}{10} + \frac{9x}{10} - \frac{7}{12}$, then the C =
1) $\frac{34x^3}{15} - \frac{7}{6}$ 2) $\frac{34x^3}{15} - \frac{7}{12}$ 3) $\frac{34x^3}{15} - \frac{6}{12}$ 4) none
18. The simplified form of (A + C) is
1) $\frac{22x^3}{15} - \frac{1}{3} - \frac{6}{5}x^2 + \frac{3}{2}x$ 2) $\frac{22x^3}{15} + \frac{1}{3} + \frac{6}{5}x^2 + \frac{3}{2}x$
3) $-\frac{22x^3}{15} + \frac{1}{3} + \frac{6}{5}x^2 - \frac{3}{2}x$ 4) $\frac{22x^3}{15} + \frac{1}{4} + \frac{6}{5}x^2 + \frac{3}{2}x$

Writeup-2

If A = $(x^2y - 1)$, B = $-6x^2 + 15x^2y^3$, C = $6x^2 - 15y^2$, D = $-2x^4y + x^2y^3$

19. $A \times C$ =____________

1) $6x^4y + 15x^2y^3 - 6x^2 + 15y^2$
2) $6x^4y - 15x^2y^3 - 6x^2 + 15y^2$
3) $-6x^4y - 15x^2y^3 - 6x^2 - 15y^2$
4) $6x^4y + 15x^2y^3 + 6x^2 + 15y^2$

20. $(A \times C) - B$ =____

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

21. $D - (A \times C) + B$ = ___

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

Matrix Matching Type

22.

Column-I	Column-II
a) $(x - y) - (2x + y)$	1) $-(-2y - x)$
b) $(3x + 2y) + (-4x - 4y)$	2) $-(-2y + x)$
c) $(8y - 7x) - (6y - 8x)$	3) $-x - 2y$
d) $2(x + y)$	4) $4y + 2x$
	5) $2y + x$

Integer Answer Type

23. If $x = 2a^2 - 5a + 3$, $y = -3a^2 + a + 8$ and $z = 5a^2 - 6a - 5$, then the value of $x - (y - z)$ at $a = -1$ is___

SYNOPSIS - 4

MULTIPLICATION

The multiplication of algebraic expression is based on the following simple rules:

(i) The product of two factors with like signs is positive, and the product of two factors with unlike signs is negative.

(ii) If a is any variable and m, n are positive integers, then $a^m \times a^n = a^{m+n}$

Thus, $x^2.x^3 = x^{2+3} = x^5, x^6.x = x^{6+1} = x^7$.

Multiplication of Binomials

Rule: The coefficient of the product of two monomials is equal to the product of their coefficients, and the variable part in the product is equal to the product of the variables in the given monomials.

Example: $3x^2, 2xy$ and $4xy^2$

Sol. $3x^2 \times 2xy \times 4xy^2 = (3 \times 2 \times 4) \times (x^2 \times xy \times xy^2)$

$= 24x^2x^2$

Multiplication of a Polynomial and Monomial

Rule: Multiply each term of the given polynomial by the given monomial and simplify as shown below.

Example: Multiply $4a+3b-5$ by $2a$.

Sol. We have

$$2a\times(4a+3b-5)=2a\times 4a+2a\times 3b-2a\times 5$$

$$=8a^2+6ab-10a$$

Multiplication of Two Polynomials

Rule: Multiply each term of one polynomial by each term of another polynomial and then add the like terms.

Example: Find the product of $2a+3b$ and $3a+4b$.

Sol. Multiplying each term of one polynomial with each term of another polynomial and adding the like terms, we get

$$\begin{array}{rrrrr} 2a & + & 3b & & \\ \underline{3a} & \underline{+} & \underline{4b} & & \\ 6a^2 & + & 9ab & & \\ & + & 8ab & + & 12b^2 \\ \hline 6a^2 & + & 17ab & + & 12b^2 \end{array}$$

[Multiplying first expression by $3a$]

[Multiplying second expression by $4b$]

[Adding like terms]

Alternatrive Method:

$(2a+3b)\times(3a+4b)$

$$=2a\times(3a+4b)+3b\times(3a+4b)$$

$$=2a\times 3a+2a\times 4b+3b\times 3a+3b\times 4b$$

$$=6a^2+8ab+9ba+12b^3$$

$$=6a^2+17ab+12b^2$$

WORK SHEET - 4

SINGLE ANSWER TYPE

1. The value of (3p – 1)3p + 5 is =_______
   1) $9p^2-12p+5$ 2) $9p^2+12p-5$ 3) $4p^2+12p-5$ 4) $9p^2-12p-5$
2. The value of (t/2+6)(t/3–2) is =_______
   1) $\frac{t^3}{4}+\frac{3t^2}{2}-12$ 2) $\frac{t^4}{4}+\frac{3t}{2}-18$ 3) $\frac{t^3}{4}-\frac{3t^2}{2}+18$ 4) $\frac{t^3}{4}+\frac{3t^2}{2}-18$
3. The value of $(497)^2$ is ____(using the indentity)
   1) 247006 2) 247009 3) 257006 4) 2578009
4. The expansior of $\left(\frac{1}{2}x^2y+\frac{1}{3xy^2}\right)^2$ is _________
   1) $\frac{1}{4}x^4y-\frac{x}{3y}+\frac{1}{9x^2y^4}$ 2) $\frac{1}{4}x^4y^2+\frac{x}{3y}+\frac{1}{9x^2y^4}$
   3) $\frac{1}{4}x^4y^2-\frac{x}{3y}-\frac{1}{9x^2y^4}$ 4) $x^4y^2+\frac{1}{xy}-\frac{1}{9x^2y^4}$
5. The expanssion of $(3.2d-5f)^2$ is ______________
   1) $10.24d^2+32df+25f^2$ 2) $10.24d^2-25f^2+32df$
   3) $10.24d^2-32df+25f^2$ 4) $10.24d^2-32df-25f^2$
6. Without actual multiplication, the value of (1001×1007) is =_______
   1) 10008007 2) 1080007 3) 10080007 4) 1008007
7. Without actual multiplication, the value of (79.01×79.01)+2×79.01×20.99+(20.99×20.99) is =______
   1) 10009 2) 1000.05 3) 10000 4) 10007
8. If (4x – 3 – 2x + 7)(– 3x – 4 + 5x + 1) is simplified, then the answer is _
   1) $4x^2 + 2x - 12$ 2) $14x^2 - 22x + 12$ 3) $4x^2 + 2x + 12$ 4) $-14x^2 - 2x - 12$
9. If (x + 7)(x + 3) + (x – 2)(x + 5) is simplified , then the answer is _______
   1) $2x^2 + 13x + 11$ 2) $2x^2 - 13x + 11$ 3) $2x^2 - 13x - 11$ 4) $-2x^2 - 13x - 11$
10. $(12x^3+1)^2+(6x^3-3)^2$=____________________
    1) $180x^6-12x^3+10$ 2) $180x^6+12x^3+10$ 3) $180x^6-12x^3-10$ 4) $180x^6+12x^3-10$
11. If A= $100^2+100(5+3)+5\times3$ and B= $100^2-100(8+3)+8\times3$, then A+B=_____
    1) 19735 2) 19736 3) 19739 4) 19732
12. For the product ($\left(\frac{3}{5}p+\frac{1}{3}\right)\left(\frac{3}{5}p-\frac{1}{3}\right)$ is the value obtained by using the identity is _____
    1) $\frac{9p^2}{25}+\frac{1}{9}$ 2) $\frac{1}{9}-\frac{9p^2}{25}$ 3) $\frac{9p^2}{25}-\frac{1}{9}$ 4) $\frac{3p^2}{5}-\frac{1}{3}$

13. Using the identity the value obtained from the product 25.4×24.6 is
1) 62.84 2) 624.84 3) 642.84 4)264.84

14. Using the identity $(a+b)(a-b) = a^2 - b^2$, the value obtained from the product $(2/5+x)(2/5-x)(4/25+x^2)$ is ____
1) $\frac{16}{625} - x^4$ 2) $\frac{16}{625} + x^4$ 3) $x^4 - \frac{16}{625}$ 4) $x^4 + \frac{16}{625}$

15. If $(x - 3y)(x + 3y)(x^2 + 9y^2)$ is simplified, then the answer is _____
1) $x^4 + 81y^4$ 2) $-81y^4 + x^4$ 3) $x^4 - 81y^4$ 4) $-x^4 - 81y^4$

16. $[2(x + y)]^2 - 28y(x + y) + (7y)^2$ =_______
1) $(2x + 5y)^2$ 2) $(2x - 5y)^2$ 3) $(5x + 2y)^2$ 4) $(2x - 5y)^2$

17. If $\left(3\frac{7}{12}\right)^2 - \left(2\frac{5}{12}\right)^2$ =A and B = $(3.2)^2 - (1.8)^2$,then $A^2 + B^2 + 2AB$ =____
1) 14^2 2) 16^2 3) 12^2 4) 18^2

18. If 2a = 3b =12, then $(36a^2 + 4ab + 16b^2) - (36a^2 - 48ab + 16b^2)$=____
1) 2307 2) 2308 3) 2316 4) 2304

19. The value of (2y + 3)(3y + 4)(2y – 3)3y – 4)if y = 2 is _____
1) 120 2) 280 3) 240 4) 140

20. $\frac{(994 \times 1006)}{(1000-6)} + \frac{(106 \times 94)}{(100-6)} + \frac{(10006 \times 9994)}{(10000-6)}$ =_____
1) 10018 2) 10008 3) 10108 4) 11118

21. If $A = 5(25x^2 - 9y^2)$, $B= 15x^2 - 9y^2$, then A×B = ______
1) $16(a^2 + b^2)$ 2) $64(a^2 + b^2)$ 3) $64(a^2 - b^2)$ 4) $16(a^2 - b^2)$

22. If $X = 3(9a^2 - 4b^2)$ and $Y = 3(4a^2 - 9b^2)$, then $B + C + 25x^2 - 25y^2$ is=_____
1) $16(a^2 + b^2)$ 2) $64(a^2 + b^2)$ 3) $64(a^2 - b^2)$ 4) $16(a^2 - b^2)$

MULTI ANSWER TYPE

23. The expansion of $[(2/3)x^2+5y^2]\ [(2/3)x^2+5y^2]$ is ____
1) $\frac{4}{9}x^4 + \frac{20}{3}x^2y^2 + 25y^4$ 2) $\frac{4}{9}x^4 - \frac{20}{3}x^2y^2 + 25y^4$
3) $\left(\frac{2}{3}x^2\right)^2 - 2\left(\frac{2}{3}x^2\right)\left(5y^2\right) + \left(5y^2\right)^2$ 4) $\left(\frac{2}{3}x^2\right)^2 + 2\left(\frac{2}{3}x^2\right)\left(5y^2\right) + \left(5y^2\right)^2$

24. Without actual multiplication, the value of (0.768×0.768)–2×0.768×0.568+(0.568×0.568) is __________
1) 0.04 2) 0.4×10 3) 0.004×10 4) 0.0004×10

25. If $(2a+3b)^2+(3a-2b)^2$ is simplified,then the answer is _____
1) $13a^2-13b^2$ 2) $13(a^2-b^2)$ 3) $13a^2+13b^2$ 4) $13(a^2+b^2)$

26. Without actual multiplication,t he value of 687×687–313×313 is ____
1) 374000 2) 574000 3) 374×1000 4) 574×1000

27. $(x + y)^2 - (a + b)^2$=____
1) (x + y + a – b)(x + y – a + b) 2) (x + y + a + b)(x + y – a – b)
3) – (a + b – x – y)(x + a + y + b) 4) (x + y – a – b)(x + y – a + b)

28. If $A = 18x^2-127$, $B = 163-32y^2$, then $\left[\left(\frac{A-1}{2}\right)^2 - \left(\frac{B-1}{2}\right)^2\right]$ =____

1) $(9x^2 - 16y^2 + 17)(9x^2 + 16y^2 - 145)$
2) $(9x^2 + 16y^2 + 17)(9x^2 + 16y^2 + 145)$
3) $(-9x^2 + 16y^2 - 17)(-9x^2 - 16y^2 - 145)$
4) $(9x^2 - 16y^2 + 17)(9x^2 + 16y^2 + 145)$

29. If $(2x+3)(2x-3)^2+(2x-3)(2x+3)^2$ is simplified, then the answer is __
1) $16x^2-36x^3$ 2) $16x^3-36x$ 3) $16x^2-36x^2$ 4) $(4x^2-9)(4x)$

REASONING ANSWER TYPE

30. *Statement I :* $64x^2+48xy+9y^2= (8x+3y)^2$
Statement II : $(a+b)^2 =a^2+2ab+b^2$
1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

31. *Statement I :* $(11x - 7y)^2 + 308xy = (11x + 7y)^2$
Statement II : $(a - b)^2 - 4ab = (a + b)^2$
1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

32. *Statement I :* $100(x+y)^2-81(a+b)^2=[10(x+y)+9(a+b)][10(x+y)-9(a+b)]$
Statement II : $a^2-b^2 = (a+b)(a-b)$
1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

33. *Statement I :* The value of $\frac{8.63 \times 8.63 - 1.37 \times 1.37}{0.726} = 100$
Statement II : $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4) = x^8 - y^8$
1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

COMPREHENSION TYPE

Writeup:1

If $(x+a)(x+b)= x^2+(a+b)x+ab$, $(a+b)^2= a^2+b^2+2ab$, $(a-b)^2= a^2+b^2-2ab$ then

34. Using the identity $(a+b)^2$, the value of $(141)^2$ is _______
    1) 19883 2) 29081 3) 19881 4) 39181
35. $(2x+3)(x+5)$ =____
    1) $2x^2+(3+5)x+15$ 2) $2x^2+13x+15$ 3) $2x^2+8x+15$ 4) $2x^2-8x+15$
36. $(3x+y)^2 -4(3x)(y)$=_____
    1) $9x^2+2(3x)(y)+y^2$ 2) $9x^2+6(3x)(y)+y^2$ 3) $(3x-y)^2$ 4) $(3x-2y)^2$

Writeup:2

If $A = 3x^3+6x^2$, $B=6x^2-3x^3$, then

37. A^2=_______
    1) $9x^6+36x^4+36x^5$ 2) $9x^6+36x^2+36x^5$ 3) $9x^3+36x^4+36x^3$ 4) $9x^6+36x^3+36x^5$
38. The value of A^2+B is ____
    1) $9x^6+36x^5+36x^4+3x^3-6x^2$ 2) $9x^6+36x^5+36x^5+3x^1-6x^2$
    3) $9x^6+36x^5+36x^4-3x^3+6x^2$ 4) $3x^2[3x^4+12x^3+12x^2+3x+2]$
39. The value of A^2-B^2 is =______________
    1) $72x^4$ 2) $72x^3$ 3) $72x^5$ 4) $72x^6$

Writeup:3

If i) $a^2-b^2 = (a+b)(a-b)$ ii) $a^4-b^4=(a^2+b^2)(a^2-b^2)$, then

40. The value of the product (0.47x2+0.25y2)(0.47x2–0.25y2) is ___
    1) $0.2209x^4-0.0625y^4$ 2) $0.0625y^4-0.2209x^4$
    3) $0.0089x^4-0.6235y^4$ 4) $0.625x^4-0.009y^4$
41. $(2a+3/5)(2a-3/5)(4a^2+9/25)$=______
    1) $16a^2-81/125$ 2) $16a^2-81/25$ 3) $16a^2-27/125$ 4) $16a^2-81/625$
42. $\dfrac{5718\times5718-4135\times4135}{5718+4135}$ =____
    1) 1683 2) 1583 3) 1783 4) 1563

MATRIX MATCHING TYPE

43.

Column-I	Column-II
a) $(x+1)(x+2)$=___	1) $(x+y)^2$
b) $(ax+b)(ax+c)$=___	2) $(x-y)^2$
c) $(x-y)^2+4xy$=____	3) x^2+3x+2
d) $(x+y)^2-4xy$=____	4) $a^2x^2+ax(b+c)+bc$
	5) $(ax)^2+x(ab+ac)+bc$

44.

Column-I	Column-II
a) The value of $(4x^2 + 9/x^2 -12)$ if x = 2	1) 4
b) The vlaue of $(25x^2 +16y^2 - 40xy)$ if x = 6, y = 7 is ____	2) 25/100
c) The missing term in the perfect square $81x^2 + 90x$ +____is	3) 25/4
d) The missing term in the perfect square $0.09x^2 + 0.15x$ +__is	4) 5
	5) 25/10

INTEGER ANSWER TYPE

45. Using the formula for squaring a binomial, the value of $(99)^2$=_______
46. The value of $16x^2 - 9$ when x = 3 is ______

SYNOPSIS - 5

DIVISION

The division of algebraic expression is based on the following simple rules:

(i) The quotient of two terms with like signs is positive, and the quotient of two terms with unlike signs is negative.

(ii) If a is any variable and m, n are positive integers, then $a^m \div a^n = a^{m-n}$

Dividing a Monomial By a Monomial

Method:

Step1: Arrange them in fractional form, keeping the dividend as numerator and the divisor as denominator.

Step2: Divide numerical coefficients.

Step3: Divide literal coefficients

Step4: Multiply the results

Thus, we have :

Quotient of two monomials = (Quotient of their numerical coefficients) $\times$ (Quotient of their variables)

Example1: Divide : (i) $28a^2b^3 by -7a^3b^2$ (ii) $-14x^2y^3z by -21xy^4z^3$

Sol. We have

(i) $28a^2b^3 \div \left(-7a^3b^2\right) = \frac{28a^2b^3}{-7a^3b^2} = \left(\frac{28}{-7}\right) \times \left(\frac{a^2b^3}{a^3b^2}\right) = -4 \times \frac{b^{3-2}}{a^{3-2}} = \frac{-4b}{a}$

(ii) $-14x^2y^3z \div \left(-21xy^4z^3\right) = \frac{-14x^2y^3z}{-21xy^4z^3} = \left(\frac{-14}{-21}\right) \times \left(\frac{x^2y^3z}{xy^4z^3}\right)$

$$= \frac{2}{3} \times \frac{x^{2-1}}{y^{4-3}z^{3-1}} = \frac{2x}{3yz^2}$$

Dividing a Polynomial By a Monomial

Rule: Divide each term of the polynomial by the given monomial and combine the results.

Example2: Divide

(i) $6x^5 + 18x^4 - 3x^2$ by $3x^2$ (ii) $12m^2n - 18mn^2 + 24mn^3$ by $6m^2n^2$

(iii) $9x^2y - 6xy + 12xy^2$ by $-\frac{3}{2}xy$

Sol. We have

(i) $\left(6x^5+18x^4-3x^2\right)\div 3x^2=\dfrac{6x^5}{3x^2}+\dfrac{18x^4}{3x^2}-\dfrac{3x^2}{3x^2}=2x^3+6x^2-1$

(ii) $\left(12m^2n-18mn^2+24mn^3\right)\div 6m^2n^2=\dfrac{12m^2n}{6m^2n^2}-\dfrac{18mn^2}{6m^2n^2}+\dfrac{24mn^3}{6m^2n^2}$

$$=\frac{2}{n}-\frac{3}{m}+\frac{4n}{m}=\frac{2m-3n+4n^2}{mn}$$

(iii) $\left(9x^2y-6xy+12xy^2\right)\div\left(-\dfrac{3}{2}xy\right)=\dfrac{9x^2y}{\left(-\frac{3}{2}xy\right)}-\dfrac{6xy}{\left(-\frac{3}{2}xy\right)}+\dfrac{12xy^2}{\left(-\frac{3}{2}xy\right)}$

$$=\left[9\times\left(-\frac{2}{3}\right)\right]x-\left[6\times\left(-\frac{2}{3}\right)\right]+\left[12\times\left(-\frac{2}{3}\right)\right]y$$

$$=-6x+4-8y$$

Division of Polynomials:

Example3: Divide : $3x^2-7x+2$ by $x-2$

Sol.

$$\begin{array}{l}
x-2\overline{)3x^3-7x+2}(3x-1 \\
\quad\;\; 3x^2-6x \\
\quad\;\; -\quad + \\
\hline
\qquad\qquad -x+2 \\
\qquad\qquad -x+2 \\
\qquad\qquad +\quad - \\
\hline
\qquad\qquad\quad 0 \\
\hline
\end{array}$$

Step1: Arrange the polynomials in descending powers of x.

Step2: Divide the first term of divident by first term of divisor, giving the quotient $3x$.

Step3: Multiply $3x$ with each term of the divisor and subtract the result from the dividentd.

Step4: Bring down one or more terms as needed.

Step5: Now, use the remainder $-x+2$ as new dividend and repeat steps 2 to 4.

Step6: Stop when the remainder is 0 or when there is no term in the remainder into which the first term of the divisor divides evenly.

Verification: The division algorithm for numbers

Dividend = DIvisor $\times$ Quotient + Remainder

also holds good in algebra.
As such, it may be used to verify your answer.
Thus, in the above example, we have

Divisor $\times$ Quotient + Remainder $=(x-2)(3x-1)+0$

$=3x^2-x-6x+2=3x^2-7x+2$

= Dividend

Hence, the quotient obtained on division is correct.

Example 4: Divide $x^3-2x-21$ by $x-3$. Verify your answer.

Sol. Here, dividend $=x^3+0.x^2-2x-21$ and divisor = $x-3$

$$
\begin{array}{r|l}
x-3 & x^3+0x^2-2x-21\ (x^2+3x+7 \\
 & x^3-3x^2 \\
 & -\quad + \\
\hline
 & \quad 3x^2-2x-21 \\
 & \quad 3x^2-9x \\
 & \quad -\quad + \\
\hline
 & \qquad 7x-21 \\
 & \qquad 7x-21 \\
 & \qquad -\quad + \\
\hline
 & \qquad\qquad 0 \\
\hline
\end{array}
$$

$\therefore$ Quotient $=x^2+3x+7$.

WORK SHEET - 5

SINGLE ANSWER TYPE

1. If $(84a^5x^3) \div (-12a^4x)$, then the answer is
   1) $-7ax^2$ 2) $7a^2x$ 3) $-7a^2x$ 4) $7ax^2$
2. If $(5a^3b - 7ab^3) \div ab$, then the answer is
   1) $5a^2-7b^2$ 2) $5a^2+7b^2$ 3) $-5a^2-7b^2$ 4) $5a^2-7b^2$
3. If you divide $x^4+x^3+7x^2-6x+8$ by x^2+2x+8 the remainder is
   1) -8 2) 32 3) 2 4) 0

4. If divisor = $\frac{1}{2}x+\frac{1}{3}y$, quotient = $\frac{1}{2}x^2-\frac{1}{3}xy+\frac{1}{4}y^2$ & remainder = 0, then the dividend is

1) $\frac{1}{4}x^3+\frac{1}{72}xy^2+\frac{1}{12}y^3$ 2) $\frac{1}{4}x^3-\frac{1}{72}xy+\frac{1}{12}y^3$

3) $\frac{1}{4}x^3-\frac{1}{72}xy^2+\frac{1}{12}y^3$ 4) $\frac{1}{4}x^3+\frac{1}{72}xy+\frac{1}{12}y^3$

5. If $4x^4y^4 - 8x^3y^4 + 6xy^3$ is divided by $-2xy$, then the answer is

1) $2x^3y^3 + 4x^2y^3 - 3y^2$ 2) $-2x^3y^3 + 4x^2y^3 - 3y^2$

3) $2x^3y + 4x^2y^3 + 3y^2$ 4) $-2x^3y^3 - 4x^2y^3 - 3y^2$

6. If $\frac{16x^4+8x^3+4x^2+6x}{Ax} = 8x^3+4x^2+2x+3$, then $\frac{8x^3+4x^2+10x}{Ax}$ is

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

7. If $(a^4 - b^4) \div (a - b)$, then the quotient is

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

3) $a^3 - a^2b - ab^2 + b^3$ 4) $a^3 + a^2b + ab^2 + b^3$

8. If A = $\frac{32x^8y^4+16x^4y^3+4x^2y^4}{4xy}$; B = $\frac{16x^5y^4}{4x^2y^2}$, then $\frac{A\times B}{4x^3y^3}$ is

1) $8x^7y^2 + 4x^3y + xy^2$ 2) $8x^7y^2 - 4x^3y - xy^2$

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

9. If $A = 7x^2 + 5x + 6$, $B = -6x^2 - x - 2$, $C = 2x + 4$, $D = -x - 2$, then (A + B) (C + D), then the quotient is

1) x + 2 2) x + 1 3) x + 3 4) x – 2

10. If $X = 12x^4 + 16x^3 + 8x^2 - 12x$ and $Y = -8x^4 - 12x^3 - 4x^2 + 8x$, then $\frac{(X+Y)-(X-Y)}{8x}$ is

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

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

11. If $A = 4x^2 - 2x - 8$; $B = 2x + 4$, then $\frac{A\times B}{4}$ is

1) $2x^3 + 3x^2 - 6x - 8$ 2) $-2x^3 - 3x^2 - 6x - 8$

3) $2x^3 - 3x^2 - 6x + 8$ 4) $2x^3 + 3x^2 + 6x + 8$

MULTI ANSWER TYPE

12. If A = $\frac{28x^5y^4}{4x^2y^2}$, B = $\frac{18x^4y^3}{3xy}$, C = $\frac{24x^8y^6}{8x^5y^4}$, then (A + B – C) – (A – B + C) is

1) A 2) 2C 3) B 4) A + B + C

13. If $\frac{a^2-b^2}{a-b}\times\frac{a^3-b^3}{a^2+ab+b^2}$ is simplified, then the product is

1) (a + b)(a – b) 2) $a^2 - 2ab + b^2$ 3) $a^2 - b^2$ 4) $a^2 + b^2$

14. $2m^2 + 4m^3 + 2m^4 - m^6$ is divisible by $\sqrt{2}\,m^2$, then the quotient is ______

1) $\dfrac{-m^4 + 2m^2 + 4m + 2}{\sqrt{2}}$ 2) $\dfrac{2\left(1+2m+m^2\right)-m^4}{\sqrt{2}}$

3) $\dfrac{-1}{\sqrt{2}}m^4 + \sqrt{2}m^2 + 2\sqrt{2}m + \sqrt{2}$ 4) $\sqrt{2}\left(1+2m+m^2\right) - \dfrac{m^4}{\sqrt{2}}$

REASONING ANSWER TYPE

15. *Statement I :* If $\frac{3}{4}ab^2c^3 - \frac{2}{5}a^2b^2c^2 + \frac{1}{3}ab^2c$ is divided by $\frac{1}{2}abc$, then the answer is $\frac{3}{2}bc^2 - \frac{4}{5}abc - \frac{2}{3}b$.

Statement II : In the division of polynomial by monomial, the quotient is obtaine by dividing each term of the polynomial by the onomial.

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

16. *Statement I :* $\left(10x^3 - x2 + 4x + 35\right) \div 2x^2 - 3x + 5 = 5x + 7$

Statement II : The quotient when $x^3 - 4x^2 + x + 6$ divided by $x^2 - x - 2$ is $x + 3$

1. Both Statements are true, Statement II is the correct explanation of Statement I.
2. Both Statements are true, Statement II is not correct explanation of Statement I.
3. Statement I is true, Statement II is false.
4. Statement I is false, Statement II is true.

COMPREHENSION TYPE

$$A = \frac{18x^4y^2 + 15x^2y^2 - 27x^2y}{-3xy};\ B = \frac{144x^3y^8}{9xy^2}$$

17. If A is simplified, then the answer is

1) $6x^3y + 5xy + 9x$ 2) $-6x^3y + 5xy + 9x$ 3) $-6x^3y - 5xy - 9x$ 4) $-6x^3y - 5xy + 9x$

18. If B is simplified, then the answer is

1) $16x^2y^6$ 2) $16xy^6$ 3) $16x^6y^2$ 4) $-16x^6y^2$

19. $A \times B =$

1) $-96x^5y^7 - 80x^3y^7 + 144x^3y^6$ 2) $96x^5y^7 + 80x^3y^7 + 144x^3y^6$

3) $96x^5y^7 - 80x^3y^7 + 144x^3y^6$ 4) $96x^5y^7 + 80x^3y^7 - 144x^3y^6$

MATRIX MATCHING TYPE

20. Column-I | Column-II

a) If $-3a^2 + \frac{9}{2}ab - 6ac$ is divided by $-\frac{3}{2}a$ then the answer is

b) If $\frac{1}{2}x^5y^2 - 3x^3y^4$ is divided by $-\frac{3}{2}x^3y^2$

c) If $-2a^5x^3 + \frac{7}{4}a^4x^4$ is divided by $\frac{7}{8}a^3x$

d) If $\frac{px^4y^5 + qx^3y^4 + rx^2y^3}{3x^2y^2} = 8x^2y^2 + 6xy^2 + 10y$, then $(px^3y^2 + qxy^2 + ry^3)/(2y^2) =$

1) $\frac{-16a^2x^2}{7} + 2ax^3$

2) $2a - 3b + 4c$

3) $\frac{-1}{3}x^2 + 2y^2$

4) $12x^3 + 9x + 15y$

5) $12x^3 - 9x - 15y$

21. Column-I | Column-II

a) $\left(\sqrt{3}m^4 + 2\sqrt{3}m^3 + 3m^2 - 6m\right) \div 3m =$____

b) $\left(5m^6 - 6m^3 + 7m^2\right) \div \left(2m^2\right) =$____

c) $\left(3 + 5m + m^2 + 6m^3 + 10m^4 + 2m^5\right) \div \left(1 + 2m^3\right) =$____

d) $\left(6m^5 + 4m^4 + 4m^3 + 3m^2 + 2m + 2\right) \div \left(1 + 2m^3\right)$

1) $\frac{5}{2}m^4 - 3m + \frac{7}{2}$

2) $3 + 5m + m^2$

3) $\frac{m^3}{\sqrt{3}} + \frac{2}{\sqrt{3}}m^2 + m^{-2}$

4) $3m^2 + 2m + 2$

5) $3 + m(5 + m)$

INTEGER ANSWER TYPE

22. If $\frac{px^3}{8x} = 3x^2$ and $\frac{qx^3}{4x} = 12x^2$ & $\frac{qx^4y^3}{px^2y^2} = kx^2y$, then k = ________

KEY & HINTS

WORK SHEET – 1 (KEY)				
1) 3	2) 1	3) 3	4) 3	5) 2
6) 3	7) 3	8) 2	9) 3	10) 4
11) 3	12) 1	13) 3	14) 2,3,4	15) 1,2
16) 3,4	17) 1,2,3	18) 4	19) 3	20) 2,4
21) 2	22) 3	23) 4	24) 4	25) 4
26) 4	27) 1	28) 2	29) 4	30) 1
31) 1	32) 1	33) 2	34) 2	35) 4
36) 2	37) 3	38) 4	39) 4	40) 2
41) 2	42) 1	43) 3	44) A-4 B-3 C-2 D-1	45) A-4 B-2 C-1 D-1
46) A-4 B-3 C-2 D-1	47) A-3 B-1 C-2,5 D-4	48) 24	49) 5	50) 1

1. Substitute n = 12 in $\frac{n^2}{2}+\frac{n}{2}$

$\Rightarrow \frac{n^2}{2}+\frac{n}{2} = \frac{12^2}{2}+\frac{12}{2}=\frac{144}{2}+\frac{12}{2}=72+6=78$

$\therefore$ Value of the expression is 78.

2. $\frac{7}{3}x-\frac{7}{6}=0$

Transpose $-\frac{7}{6}$ to RHS

$\Rightarrow \frac{7x}{3} = \frac{7}{6}$

Transpose $\frac{7}{3}$ to RHS

$\Rightarrow x = \frac{7}{6} \times \frac{3}{7} = \frac{1}{2}$

$\therefore$ Zero of the given polynomial is $\frac{1}{2}$

3. $x = -\frac{5}{4}$ $\Rightarrow 4x = -5$

$\therefore$ $4x + 5$ is the required polynomial

4. $A = -8x^2 - 6x + 10$

Put $x = \frac{1}{2}$ $\Rightarrow A = -8 \times \left(\frac{1}{2}\right)^2 - 6 \times \frac{1}{2} + 10$

$= -8 \times \frac{1}{4} - 6 \times \frac{1}{2} + 10 = -2 - 3 + 10 = 5$

5. $3x^{4-1} + 2x^{3-1} + 6x^{2-1} + 8 = 3x^3 + 2x^2 + 6x + 8$ is a 3rd degree polynomial

6. $\frac{2}{7} x^{-2} y^5 z$

7. Put $x = \frac{a}{2}$ in $4x^2 + 8x + 18$

$\Rightarrow 4x^2 + 8x + 18 = 4 \times \left(\frac{a}{2}\right)^2 + 8 \times \frac{a}{2} + 18 = 4 \times \frac{a^2}{4} + 8 \times \frac{a}{2} + 18 = a^2 + 4a + 18$

8. Put $x = \frac{9}{13}$ in $\frac{-26}{3} - \frac{13x}{27}$

$\Rightarrow \frac{-26}{3} - \frac{13x}{27} = \frac{-26}{3} - \frac{13}{27} \times \frac{9}{13} = -\frac{26}{3} - \frac{1}{3} = \frac{-27}{3} = -9$

9. Degree of the polynomial is $m + 4$

10. Put $n = 10$ in $\frac{n(n+1)(2n+1)}{6}$

$\Rightarrow \frac{n(n+1)(2n+1)}{6} = \frac{10(10+1)(2 \times 10 + 1)}{6} = \frac{10 \times 11 \times 21}{6} = 385$

11. The polynomial is $\frac{1}{2}x^5+3x^4+2x^3+3x^2+6$

$\therefore$ The degree of the polynomial is 5.

12. Degree of the monomial $\frac{3}{5}x^2y^6z^7$ is 2 + 6 + 7 = 15

13. x = a + 2 and a = 8 $\Rightarrow$ x = 10

$\therefore$ The value of 3x + 5 = 3 × 10 + 5 = 35

14. Key: (2,3,4) ; Sol:- The coefficient of x in 9xy is '9y'

The coefficient of 'a' in (–7abc) is (–7bc) ; The coefficient of 'xyz' on (–xyz) is –1

The coefficient of b in –abc is (–ac)

15. Key: (1,2) ; Sol:- In $6x^2y+5xy^2-8xy^2-7yx^2, 6x^2y, -7x^2y$ are like terms

Also $5xy^2, -8xy^2$ are like terms

16. Key: (3, 4) ; Sol:- 1. 3 more than x = x + 3 (True)

2. One third of sum of x and y = one third of (x + y) = $\frac{1}{3}(x+y)$ (True)

3. The quotient of x by y = $\frac{x}{y}$; product of x and y = xy

now the quotient of x by y added to the product of x and y = $\frac{x}{y}+xy$

but it is given that $x+y+\frac{x}{y}$ $\therefore(3)$ is false

4.The quotient of x by y = $\frac{x}{y}$;Now 5 lessthan $\frac{x}{y}=\frac{x}{y}-5$; but it is given that $\frac{x}{y}+5$

$\therefore(4)$ is false.

17. Key: (1,2,3); Sol:- The degre of $x^2+xy^2+y^3$ is 3 (True)

The degree of $m^2n^3+mn^2+4$ is 5 (True) ; The degree of $p^2q^2+pq^2+1$ is 4 (True)

18. Key: 4 ; Sol:- Clearly (a) and (b) are not polynomials only (c) is a polynomials

$\therefore$ (a) and (b) are false

19. Key: 3 ; Sol:- $2x^{3^2\times 2^3}+3x^{4^2\times 3^2}+5x^{4^2\times 3^2}+5x^{4^2\times 3^3}=2x^{54}+3x^{144}+5x^{144}+5x^{128}$

$\therefore$ degree = 144.

20. Key: 2, 4 ; Sol:- A = (m+n)p/2 = (120.6)(3.5)/2 = 211.05

Clearly, A < 211.50.& Also, A < 211.105

21. Key: 2 ; Sol:- $\left(25a^4b\right)\times-\left(-2a^2b^2\right)\times\left(-2.1a^3b^3\right)$ = $-105\times a^{4+2+3}b^{1+2+3}$= $-105\times a^9b^6$

putting a = 1 and b = $\frac{1}{2}$ we get ,$-105a^9b^6$= $-105(1)^9(1/2)^6$= $-105/64$

22. Key: 3; Sol:- (a + b) (a + b) – (a – b) (a – b) + (a^2 – b^2) = (7 + 5)(7 + 5) – (7 – 5)(7 – 5)+(7^2 – 5^2)

=12 × 12 – 2 × 2 + 49 – 25 = 144 – 4 + 24 = 164.

23. Key: 4 ; Sol:- Clearly statement 2 is true (by conceptual formulae)

Statement - 1: $(a+b)^2+(a-b)^2+\left(a^2-b^2\right)$

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

$=3(3)^2+(2)^2\ (\because a=3,\ b=2)$

$=37+4=31$ --------------> statement - 1 is false.

24. Key: 4 ; Sol:- Statement I: (x – 10) + (y + 20) + 10 = x + y + 20

$\therefore$ Statement I is False.

Statement II: [(4 × q) + 5 + r] – (p + 10) = 4q + 5 + r – p – 10 = 4q + r – p – 5

$\therefore$ Statement 2 is True.

25. Key: 4 ; Sol:- Clearly statement - 2 is true

St-1 : $A=4x^{2m}y^{4n}z^{3p}$; Since 2m = 4n = 3p = 24 $\Rightarrow$ m = 12, n = 6, p = 8

$\therefore$ Degree of A = 2m + 4n + 3p = 2(12) + 4(6) + 3(8) = 24 + 24 + 24 = 72

$\therefore$ statement - 1 is false.

26. Key: 4 ; Sol:- Conceptual.

27. Key: 1 ; Sol:-Clearly, St-2 is true.

$5a^6$ × (–10)ab^2×(–2.1)a^2b^3 = $105a^9b^5$ = $105\times(1)^9(1/2)^5$ = 105/32------>St-1 is true.

And St-2 is correct explanation of St-1

28. Key: 2; Sol:- $x^2+y^2+z^2-2xy-2yz-2zx$ = $(2)^2+(-2)^2+(3)^2-2(2)(-2)-2(-2)(3)-2(3)(2)$= 25 st-1 is ture; $p^2+q^2+r^2-pq-qr-pr=(3)^2+(-5)^2+(4)^2-(3)(-5)-(3)-(-5)(4)-(4)(3)$=73

st-2 is true. But st-2 is not correct explanation of st-1

29. Key: 4 ; Sol:- Given A = $18x^3y^2z^4$, B = $12x^2y^3z^3$ and $C=x^4y^3$;

$\therefore A\times C=\left(18x^3y^2z^4\right)\times\left(x^4y^3\right)=18x^7y^5z^4$ -------> So, Both (a) & (b) is false

30. Key: 1 ; Sol:- B×C = $\left(12x^2y^3z^3\right)\times\left(x^4y^3\right)=12x^6y^6z^3$

31. Key: 1 ; Sol:- $A\times B\times C=\left(18x^3y^2z^4\right)\times\left(12x^6y^6z^3\right)=216x^9y^8z^7$

32. Key: 1 ; Sol:- Given $A = 6a^{p+2} + 5a^{2p+3} + 7a^{3p+4}$; Since p = 2, q = 3

$\therefore A = 6.a^{2+2} + 5.a^{2(2)+3} + 7.a^{3(2)+4} \Rightarrow A = 6a^4 + 5a^7 + 7a^{10}$; $\therefore$ degree of A = 10

33. Key: 2 ; Sol:- Since $B = 4b^{q+3} + 5b^{3q+2} + 8b^{4q+3}$; Given q = 3

$\therefore B = 4.b^{3+3} + 5.b^{3(3)+2} + 8.b^{4(3)+3} \Rightarrow 4.b^6 + 5.b^{11} + 8.b^{15}$; $\therefore$ degree of B = 15

34. Key: 2 ; Sol:- Clearly, degree of A < degree of B. i.e., 10 < 15
35. Key: 4 ; Sol:- Conceptual.
36. Key: 2 ; Sol:- Conceptual.
37. Key: 3 ; Sol:- Conceptual.
38. Key: 4 ; Sol:- $R^2 - r^2 = (R + r)(R - r) = (2.6 + 2.3)(2.6 - 2.3) = 4.9 \times 0.3 = 1.47$.
39. Key: 4 ; Sol:- (V/W) = 115.5/(22/7) = 115.5×(7/22) = (73.5/2) = (147/4)
40. Key: 2 ; Sol:- $A = \dfrac{115.5}{\frac{22}{7}\left[(2.6)^2 - (2.3)^2\right]} = \dfrac{115.5 \times 7}{22 \times (6.76 - 5.29)}$

$$= \frac{808.5}{22 \times 1.47} = \frac{808.5}{32.34} = 25$$

41. Key: 2; Sol:- $2x^2+(7/2)xy+5y^2=2(1)^2+(7/2)(1)(2)+5(2)^2= 29$
42. Key: 1; Sol:- $a^2-bc+c^2-b^2=(0)^2-(1)(2)+(2)^2-(1)^2=1$
43. Key: 3; Sol:- $x^3-xy/3+7/2\ y^2= (2)^3-2(3)/3+7/2(3)^2= 75/2$
44. Key: $a \to 4$; $b \to 3$; $c \to 2$; $d \to 1$; Sol:- Conceptual
45. (a)$\to$ 4, (b)$\to$ 2, (c)$\to$ 1, (d)$\to$ 1 ; Sol:- Conceptual.
46. Key: $a \to 4$; $b \to 3$; $c \to 2$; $d \to 1$;

Sol:- a) degree of 5x is 1 b) degree of $15x^2 - x + 2$ is 2

c) degre of $-x^4 + 2x + 11$ is 4 d) degree of $x^2 - x^5$ is 5.

47. key: a–3, b –1, c–2,5, d–4

Sol:- a) $2l+3m= 2(5)+3(3)=10+9=19$;

b) $x^2-4x+4=(x-2)^2=(3-2)^2=1$

c) $x^2+y^2= 5^2+12^2=25+144=169$;

d) $xy+yz+zx= 4(3)+(3)(-2)+(-2)(4) = 12-6-8=-2$

48. Key: (24) ; Sol:- $\frac{x}{3} - 6 = 2 \Rightarrow \frac{x}{3} = 8 \Rightarrow x = 24$.
49. Key: 5 ; Sol:- Conceptual.
50. Key: 1;

Sol:- $\dfrac{(+1)^3 + (-2)^3 + (-3)^3 - 3(1)(-2)(-3)}{(1)(-2) + (-2)(-3) + (-3)(1) - (1 + 4 + 9)} = \dfrac{1 - 8 - 27 - 18}{-2 + 6 - 3 - 14} = \dfrac{1 - 53}{6 - 19} = \dfrac{-52}{-13} = 4$

WORK SHEET – 2 (KEY)

1) 3	2) 2	3) 1	4) 3	5) 1
6) 1	7) 3	8) 2	9) 3	10) 1
11) 2	12) 3	13) 3	14) 3	15) 4
16) 3	17) 1	18) 2	19) 4	20) 2
21) 4	22) 4	23) A-2 B-4,5 C-1 D-3	24) 4	

1. $\frac{3}{4}x^3+\frac{5}{6}x^3-\frac{2}{3}x^3+\frac{7}{2}x^3 = \frac{9x^3+10x^3-8x^3+42x^3}{12} = \frac{x^3}{12}(9+10-8+42)=\frac{53x^3}{12}$
2. $3x^3 + 7x^3 + 8x^3 - 2x^2 - 6x^2 - 9x^2 - 8x + 9x + 6x$
   $= x^3(3 + 7 + 8) + x^2(-2 - 6 - 9) + x(-8 + 9 + 6)$
   $= 18x^3 - 17x^2 + 7x$
3. Ascending order of $-3x^3 + 7x^2 - 9x^4 + 6x - 8$ is $-8 + 6x + 7x^2 - 3x^3 - 9x^4$
4. $A = x(-7 - 3 - 5) \Rightarrow A = -15x$
   $B = x(9 + 3 + 2) \Rightarrow B = 14x$
   $\therefore A + B = -15x + 14x = -x$
5. $A=\frac{1}{2}x-\frac{1}{3}x=x\left(\frac{1}{2}-\frac{1}{3}\right)=x\left(\frac{3-2}{6}\right)=\frac{1}{6}x$

   $B=\frac{1}{3}x-\frac{1}{4}x=x\left(\frac{1}{3}-\frac{1}{4}\right)=x\left(\frac{4-3}{12}\right)=\frac{1}{12}x$

   $\therefore A-B=\frac{1}{6}x-\frac{1}{12}x=x\left(\frac{1}{6}-\frac{1}{12}\right)=x\left(\frac{2-1}{12}\right)=\frac{1}{12}x$
6. $3x^3 - x^3 - 5x^2 + 2x^2 - 9x + x - 7 + 4$
   $= 2x^3 - 3x^2 - 8x - 3$
7. The descending order of the given expression is $-9x^4 - 6x^3 - 2x^2 + 3x + 2$
8. $\frac{-7}{5}x^3+\frac{3}{4}x^3+\frac{7}{2}x^3+\frac{9x^3}{3}+\frac{9x^3}{60}$

   $=\frac{-84x^3+45x^3+210x^3+180x^3+9x^3}{60}=\frac{360}{60}x^3=6x^3$

9. $P = 2x - 3x + 5x = 4x$, $Q = -8x + 3x + 9x = 4x$
$R = -8x - 6x - 7x = -21x$
$\therefore (P + Q) - R = (4x + 4x) - (-21x)$
$= 8x + 21x = x(8 + 21) = 29x$

10. $A = -5x^3 + 2x^2$
$B = 2x^2 - 5x$
$C = -7x + 1$
$\therefore A + B + C = -5x^3 + 2x^2 + 2x^2 - 5x - 7x + 1$
$= -5x^3 + x^2(2 + 2) + x(-5 - 7) + 1$
$= -5x^3 + 4x^2 - 12x + 1$

11. $4x^3y^2 + 3x^2y^3 - 9x^2y^3 - 8x^2y^5 + 6x^2y^5 - 9x^3y^4$
$= 4x^3y^2 - 6x^2y^3 - 2x^2y^5 - 9x^3y^4$

12. $x^3(0.5 + 1.85 + 2.96 - 4.71) + x^4(1.25 - 2.5 + 3.6 - 4.71)$
$0.6x^3 - 2.36x^4$

13. Key: 3; Sol:- Required sum

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

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

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

$$= \frac{5}{2}x^2 + \frac{11}{30}x + 2$$

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

$$= \left(\frac{10}{2}\right)x^3 + \left(\frac{-2 + 7 + 6}{4}\right)x^2 + \left(\frac{-7}{2}\right)x + \left(\frac{+6 - 6}{3}\right) = 5x^3 + \frac{11}{4}x^2 - \frac{7}{2}x$$

15. Key: 4; Sol:- Clearly, St-2 is true.

$$A + B + C = \left(5x^2 - \frac{1}{3}x + \frac{5}{2}\right) + \left(-\frac{1}{2}x^2 + \frac{1}{2}x - \frac{1}{3}\right) + \left(-2x^2 + \frac{1}{2}x - \frac{1}{6}\right) = \left(\frac{5}{2}x^2 + \frac{11}{30}x + 2\right)$$

So, St-1 is false.

16. Key: 3;; Sol:- clearly st-2 is false ; st-1 $8p^2 - 9q^2 - 6p^2 + 5q^2 = 2p^2 - 4q^2$ st-1 is true

17. Key: 1 ; Sol:- $A + B = (7x^2 - 4x + 5) + (-3x^2 + 2x - 1) = 4x^2 - 2x + 4$

18. Key: 2; Sol: $B + C = (-3x^2 + 2x - 1) + (5x^2 - x + 9) = 2x^2 + x + 8$

19. Key: 4; Sol:- $2A + B + C = 2(7x^2 - 4x + 5) + 2x^2 + x + 8 = 16x^2 - 7x + 18$.

20. key: 2; Sol:- $A + B = 2a - 5b + 4c + 5a - 2b + 2c = 7a - 7b + 6c$

21. key: 4; Sol:- $2/5A + B/5 =$

$$\frac{2A+B}{5}=\frac{2(x-y+1)+(-2x+7y+3)}{5}=\frac{5(y+1)}{5}=Y+1$$

22. key: 4; Sol:- $3A-5B=3(-3x-y+5)-5(x+2y+3)=-9x-3y+15-5x-10y-15=-14x-13y$
23. Key: a–2; b–(4,5), c–1, d–3
    ; Sol:-a) $3a-4b+7a-2b=10a-6b$; b) $3a+5b-4c+2a-5b-6c=5(a-2c)$
    c) $2ab-5bc+4ca+ab+2bc-5ac=3ab-3bc-ac$ d) $2a+3b-1-4a+5b-5=-2a+8b-6$
24. Key: 4; Sol:- $A+B=B \Rightarrow A=0$

WORK SHEET – 3 (KEY)

1) 2	2) 3	3) 2	4) 4	5) 2
6) 1	7) 1	8) 2	9) 3	10) 2
11) 2,3	12) 3	13) 2,4	14) 1	15) 1
16) 1	17) 1	18) 4	19) 2	20) 2
21) 3	22) A-2,3 B-2,3 C-1,5 D-4	23) 12		

1. $B=-9x^2+3x-7$,
   $\therefore$ Additive inverse of B is $9x^2-3x+7$.

2. $A-B=-\frac{3}{4}x^2-\frac{1}{4}x^2+\frac{2}{3}x+\frac{1}{3}x+7-8=-\frac{4x^2}{4}+\frac{3}{3}x+7-8=-x^2+x-1$

3. $Q-P=\frac{1}{3}x^3-2x^3-\frac{3}{4}x^2+3x^2-\frac{5}{2}x+5x+\frac{7}{3}-6=\frac{-5x^3}{3}-\frac{9x^2}{4}+\frac{5x}{2}-\frac{11}{3}$

4. B is the additive inverse of A. ($\because$ $A+B=0$)

   $\Rightarrow A=-\frac{3}{2}x^3-\frac{9}{7}x^2+\frac{6x}{7}+2$

   $\therefore B=\frac{3}{2}x^3+\frac{9}{7}x^2-\frac{6x}{7}-2$

5.
$$\begin{array}{rrrrr} A+B= & +5x^3 & -6x^2 & -8x & +9 \\ A= & +2x^3 & -9x^2 & -6x & +7 \\ & - & + & + & - \\ \hline \end{array}$$

$\therefore$ $(A+B)-A=3x^3+3x^2-2x+2$

6. $B = A - (A - B)$

$$\begin{array}{rl} A = & 4x^3 - 9x^2 - 9x - 8 \\ A - B = & -2x^3 - 8x^2 - 6x - 2 \\ & + \quad + \quad + \quad + \\ \hline \therefore\ B = A - (A - B) = & 6x^3 - x^2 - 3x - 6 \\ \hline \end{array}$$

7. D is the additive inverse of B and C is the additive inverse of A

$$\begin{array}{rl} D = & -4x^3 + 9x^2 + 3x - 7 \\ C = & -2x^3 + 3x^2 - 6x - 7 \\ & + \quad - \quad + \quad + \\ \hline \therefore\ D - C = & -2x^3 + 6x^2 + 9x \\ \hline \end{array}$$

8. $A = (A - B) + B$

$$\begin{array}{rl} \Rightarrow\ A - B = & 2x^3 - 3x^2 + 8x - 7 \\ B = & 5x^3 - 9x^2 + 6x - 8 \\ \hline \therefore\ A = (A - B) + B = & 7x^3 - 12x^2 + 14x - 15 \\ \hline \end{array}$$

9. A is the additive inverse of C. $(\because\ C + A = 0)$

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

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

10. $A - C = 7x^3 - 2x^2 - 9x + 6 - (2x^3 - 4x^2 - 8x + 7) = 5x^3 + 2x^2 - x - 1$

$B - D = 2x^3 - 8x^2 + 3x - 5 - (-3x^3 - 5x^2 + 6x + 7) = 5x^3 - 3x^2 - 3x - 12.$

$$\begin{array}{rl} A - C = & 5x^3 + 2x^2 - x - 1 \\ B - D = & 5x^3 - 3x^2 - 3x - 12 \\ & - \quad + \quad + \quad + \\ \hline \therefore\ (A - C) - (B - D) = & 5x^2 + 2x + 11 \\ \hline \end{array}$$

11. Key: (2,3); Sol:- $\left(3x - \frac{4}{5}y^2x\right) \times \frac{1}{2}xy = \frac{3}{2}x^2y - \frac{2}{5}x^2y^3 = x^2y(\frac{3}{2} - \frac{2}{5}y^2)$

12. Key: 3 ; Sol:- $100x \times 0.01\, x^4 - 100x \times 0.01x^2 = (100 \times 0.01)x^5 - (100 \times 0.01)x^3$

$$= \left(100 \times \frac{1}{100}\right)x^5 - \left(100 \times \frac{1}{100}\right)x^3 = x^5 - x^3$$

13. Key: (2,4) ; Sol: $a^2 + b^2 + 2ab - x = -4ab + 2b^2 \Rightarrow a^2 + b^2 + 2ab + 4ab - 2b^2 = x$

$\Rightarrow x = a^2 - b^2 + 6ab$

14. key: 1 ; Sol:- Clearly St- 2 is true. Now, $2.3a^5b^2 \times 1.2a^2b^2 = (2.3)\times(1.2)a^7b^4$
$= (2.3)\times(1.2)\times(1)^7(0.5)^4 = 0.1725$
So, St-1 is true & St- 2 is correct explanation of St- 1 .
15. Key: 1; Sol:- Clearly st-2 is true; $(3a^2+5a+1)+(a^2+10a-6)=4a^2+15a-5$
Now $(14a^2+20a+13)-(4a^2+15a-5) = 10a^2+5a+18$ so, st-1 is true and st-2 is correct explanation of st-2
16. Key: 1 ;
Sol:- B – A =
$$\left(\frac{x^3}{3}-\frac{5x^2}{2}+\frac{3}{5}x+\frac{1}{4}\right)-\left(\frac{6}{5}x^2-\frac{4}{5}x^3+\frac{5}{6}+\frac{3}{2}x\right)=\frac{17x^3}{15}-\frac{37x^2}{10}-\frac{9x}{10}-\frac{7}{12}.$$
17. Key: 1 ; Sol:- $C=\frac{17x^3}{15}-\frac{37x^2}{10}-\frac{9x}{10}-\frac{7}{12}+\frac{17x^3}{15}+\frac{37x^2}{10}+\frac{9x}{10}-\frac{7}{12}=\frac{34x^3}{15}-\frac{7}{6}$
18. Key: 4 ; Sol:- $A+C=\left(\frac{6}{5}x^2-\frac{4}{5}x^3+\frac{5}{6}+\frac{3}{2}x\right)+\frac{34x^3}{15}-\frac{7}{6}=\frac{22x^3}{15}+\frac{1}{4}+\frac{6}{5}x^2+\frac{3}{2}x$
19. Key: 2; Sol:- $A \times C = (x^2y-1)\times(6x^2-5y^2) = 6x^4y-15x^2y^3-6x^2+15y^2$
20. Key 2; Sol:- $(A \times C) - B = 6x^4y - 15x^2y^3 - 6x^2 + 15y^2 + 6x^2 + 15x^2y^3 = 3y(2x^4 + 5y)$
21. Key: 3; Sol:- $D-(A \times C) + B = D - [(A \times C) - B] = -2x^4y - 6x^4y - 15y^2$
$= -8x^4 - 14y^2 = -2y(4x^4 + 7y)$
22. Key: a® (2,3) ; b® (2,3) ; c® (1,5); d® 4;
Sol:- a) $(x-y)-(2x+y) = x-y-2x-y = -x-2y$
b) $(3x+2y)(-4x-4y) = 3x+2y-4x-4y = -x-2y$
c) $(8y-7x)-(6y-8x) = (8y-6y)-7x+8x = 2y+x$
d) $2(x+2y) = 2x+4y$
23. Key: 12 ; Sol:- $y-z=(-3a^2+a+8)-(5a^2-6a-5)=-8a^2+7a+13$
$x-(y-z) = (2a^2-5a+3)-(-8a^2+7a+13)= 10a^2-12a-10$
if $a=-1$, then $x-(y-z) = 10(-1)^2 - 12(-1) - 10 = 12.$

WORK SHEET – 4 (KEY)				
1) 4	2) 2	3) 2	4) 2	5) 3
6) 4	7) 3	8) 1	9) 1	10) 1
11) 3	12) 3	13) 2	14) 1	15) 3
16) 2	17) 1	18) 4	19) 4	20) 4
21) 2	22) 3	23) 1,4	24) 1,3	25) 3
26) 1,3	27) 2,3	28) 1,3	29) 2	30) 1
31) 3	32) 1	33) 2	34) 3	35) 2
36) 3	37) 1	38) 3	39) 3	40) 1
41) 4	42) 2	43) 3,(4,5),1,2	44) 3,1,4,2	45) 9801
46) 135				

1. Key: 4 ; Sol: Put 3p = x, then it becomes $(x - 1)(x + 5) = [x + (-1)][x + 5]$ $= x^2 + [(-1) + 5]x + (-1) \times 5 = x^2 + 4x - 5 = (3p)^2 + 4(3p) - 5 = 9p^2 + 12p - 5 [\because x = 3p]$

2. Key: 2 ; Sol: Put $\frac{t}{2} = z$, then $(z + 6)(z - 3) = (z + 6)[z + (-3)]$

$= z^2 + [6 + (-3)]z + 6 \times (-3) = z^2 + 3z - 18 \Rightarrow \left(\frac{t}{2}\right)^2 + 3\left(\frac{t}{2}\right) - 18 = \frac{t^2}{4} + \frac{3t}{2} - 18$

3. Key: 2 ; Sol: $(497)^2 = (500 - 3)^2 = (500)^2 + (3)^2 - 2 \times 500 \times 3$
$= 250000 + 9 - 3000 = 247009$

4. Key : 2 ;
Sol:

$$\left(\frac{1}{2}x^2y + \frac{1}{3xy^2}\right)^2 = \left(\frac{1}{2}x^2y\right)^2 + 2\left(\frac{1}{2}x^2y\right)\left(\frac{1}{3xy^2}\right) + \left(\frac{1}{3xy^2}\right)^2 =$$

$$\frac{1}{4}x^4y^2 + \frac{x}{3y} + \frac{1}{9x^2y^4}$$

5. Key : 3 ;
Sol: $(3.2d - 5f)^2 = (3.2d)^2 + (5f)^2 - 2(3.2d)(5f) = 10.24d^2 + 25f^2 - (6.4d)(5f)$
$= 10.24d^2 + 25f^2 - 32df$

6. Key : 4 ; Sol: $(1000 + 1)(1000 + 7)$
Let $x = 1000$, $a = 1$, $b = 7$, then it becomes $(x + a)(x + b)$
i.e. $x^2 + (a + b)x + ab$
$= (1000)^2 + (1 + 7)(1000) + 1 \times 7 = 1000000 + 8 \times 1000 + 7$
$= 1000000 + 8007 = 1008007$

7. Key : 3 ; Sol: Let $a = 79.01$, $b = 20.99$, then it becomes $a^2 + 2ab + b^2$
i.e., $(a + b)^2 = (79.01 + 20.99)^2 = (100)^2 = 10,000$

8. Key : 1 ; Sol: $(4x - 3 - 2x + 7)(2x - 4 + 5x + 1)$
$= (2x + 4)(2x - 3) = (2x)^2 + (4 - 3)(2x) + 4(-3) = 4x^2 + 2x - 12$

9. Key : 1 ; Sol: $(x + 7)(x + 3) = x^2 + (7 + 3)x + 21 = x^2 + 10x + 21$
$(x - 2)(x + 5) = x^2 + (-2 + 5)x + (-2)(5) = x^2 + 3x - 10$
$\therefore (x + 7)(x + 3) + (x - 2)(x + 5) = x^2 + 10x + 21 + x^2 + 3x - 10 = 2x^2 + 13x + 11$

10. Key : 1 ;
Sol: $(12x^3 + 1)^2 + (bx^3 - 3)^2 = (12x^3)^2 + 2(12x^3)(1) + (1)^2 + (6x^3)^2 - 2(6x^3)(3) + (3)^2$
$= 144x^6 + 24x^3 + 1 + 36x^6 - 36x^3 + 9 = 180x^6 - 12x^3 + 10.$

11. Key : 3 ;
Sol: A $= 100^2 + 100(5 + 3) + (5 \times 3) = (100 + 5)(100 + 3) = (105)(103) = 10815$
B $= 100^2 + 100(8 + 3) + (8 \times 3) = (100 - 8)(100 - 3) = (92)(97) = 8924$
$\therefore$ A + B = 10815 + 8924 = 19739.

12. Key: 3 ; Sol:- $\left(\frac{3p}{5} + \frac{1}{3}\right)\left(\frac{3p}{5} - \frac{1}{3}\right) = \frac{9p^2}{25} - \frac{1}{9}$ $\quad [\because (a + b)(a - b) = a^2 - b^2]$

13. Key: 2 ; Sol:- $25.4 \times 24.6 = (25 + 0.4)(25 - 0.4) = (25)^2 - (0.4)^2$
$= 625 - 0.16 = 624.84$
$[\because (a + b)(a - b) = a^2 - b^2]$

14. Key: 1 ;
Sol:- $\left(\frac{2}{5} + x\right)\left(\frac{2}{5} - x\right)\left(\frac{4}{25} + x^2\right) = \left(\left(\frac{2}{5}\right)^2 - x^2\right)\left(\frac{4}{25} + x^2\right) = \left(\left(\frac{4}{25}\right)^2 - \left(x^2\right)^2\right)$

15. Key: 3 ; Sol:- $(x - 3y)(x + 3y)(x^2 + 9y^2) = (x^2 - 9y^2)(x^2 + 9y^2) = x^4 - 81y^4$

16. Key: 2 ; Sol:- $[2(x + y)]^2 - 28y(x + y) + (7y)^2 = [2(x + y) - 7y]^2 = (2x - 5y)^2$

17. Key: 1 ; Sol:- A $= \left(3\frac{7}{12}\right)^2 - \left(2\frac{5}{12}\right)^2 = \left(\frac{43}{12} + \frac{29}{12}\right)\left(\frac{43}{12} - \frac{29}{12}\right) = \frac{72}{12} \times \frac{14}{12} = 7$
$B = (3.2)^2 - (1.8)^2 = (3.2 + 1.8)(3.2 - 1.8) = 5 \times (1.4) = 7$

So, $A^2 + 2AB + B^2 = (A + B)^2 = (7 + 7)^2 = 196$.

18. Key: 4 ; Sol:- Since 2a = 3b = 12, then a = 6, b = 4.
so, $(36a^2 + 48ab + 16b^2) - (36a^2 - 48ab + 16b^2) = (6a + 4b)^2 - (6a - 4b)^2 = 96ab$, then substitute the values of a & b.

19. Key: 4 ; Sol:- $(2y+3)(3y+4)(2y-3)(3y\_4)=(4y^2-9)(9y^2-16)=[16-9)(36-16)=7\times20=140$.

20. Key: 4 ; Sol:- $\frac{994\times1006}{1000-6}+\frac{94\times106}{100-6}+\frac{9994\times10006}{10000-6}$

$$= \frac{994' \ 1006}{994}+\frac{994' \ 1006}{94}+\frac{994' \ 1006}{9994} = 1006+106+10006 = 11118$$

21. key: 2 ; Sol:- $A\times B=5(25x^2-9y^2)(12x^2-27y^2)=15(5x+3y)(5x-3y)(2x+3y)(2x-3y)$

22. key: 3 ; Sol:- Given $X = 3(9a^2 - 4b^2)$ & $Y = 3(4a^2 - 9b^2)$
\ $X+Y+25a^2- 25b^2 = (27a^2- 12b^2)+(12a^2- 27b^2)+(25a^2- 25b^2) = 64(a^2-b^2)$

23. Key: 1,4 ; Sol: $\left(\frac{2}{3}x^2+5y^2\right)^2$ where $a = \frac{2}{3}x^2$, $b = 5y^2$

$= \left(\frac{2}{3}x^2\right)^2+\left(5y^2\right)^2+2\left(\frac{2}{3}x^2\right)\left(5y^2\right) = \frac{4}{9}x^4+25y^4+\frac{20}{3}x^2y^2$ [$\therefore (a + b)^2 = a^2 + 2ab + b^2$]

24. Key : 1,3 ; Sol: Let a = 0.768 and b = 0.568, then it becomes
$a^2 - 2ab + b^2 = (a - b)^2 = (0.768 - 0.568)^2 = (0.2)^2 = 0.04$

25. Key : 3 ; Sol: $(2a+3b)^2+(3a-2b)^2= 4a^2+12ab+9b^2+9a^2-12ab+4b^2=13a^2+13b^2$

26. key: 1,3 ; Sol:- $687 \times 687 - 313 \times 313$
$= (687)^2 - (313)^2 = (687 + 313)(687 - 313)$
$= 1000 \times 374$.

27. Key: (2,3) ; Sol:- $(x + y)^2- (a + b)]^2 = (x + y + a + b)(x + y - a - b)$

28. Key: (1,3) ; Sol:- Given $A = 18x^2 - 127$ & $B = 163 - 32y^2$

$$\left(\frac{A-1}{2}\right)=\frac{18x^2-127-1}{2}=\frac{18x^2-128}{2}=9x^2-64$$

$$\left(\frac{B-1}{2}\right)=\frac{163-32y^2-1}{2}=\frac{162-32y^2}{2}=81-16y^2$$

$$\backslash \quad \left(\left(\frac{A-1}{2}\right)^2-\left(\frac{B-1}{2}\right)^2\right)=\left(\left(9x^2-64\right)^2-\left(81-16y^2\right)^2\right)$$

$$=\left(9x^2-64+81-16y^2\right)-\left(9x^2-64-81+16y^2\right)$$

$=\left(9x^2-16y^2+17\right)\left(9x^2+16y^2-145\right)$

29. Key: 2 ;

Sol:- $(2x+3)(2x-3)^2+(2x+3)^2(2x-3)=(2x+3)(2x-3)[2x+3+2x-3]$

$=\left(4x^2-9\right).4x=16x^3-36x$

30. Key: 1 ; Sol: Clearly St-2 is true.
Now $64x^2 + 48xy + 9y^2 = (8x)^2 + 2(8x)(3y) + (3y)^2 = (8x + 3y)^2$ -------->St-1 is true.

31. Key : 3
Sol: St-2: $(a - b)^2 - 4ab = a^2 - 2ab + b^2 - 4ab = a^2 - 6ab + b^2$
but $(a + b)^2 = a^2 + 2ab + b^2$.
Clearly $(a - b)^2 - 4ab + (a + b)^2$ St-2: is false.
St-1: $(11x - 7y)^2 + 308xy = (11x)^2 + (7y)^2 - 2(11x)(7y) + 308xy$
$= (11x)^2 + (7y)^2 - 154xy + 308xy$
$= (11x + 7y)^2$ ----------->St-1 is true.

32. Key: 1 ; Sol:- Clearly St-2 is true.
now, $100(x+y)^2 - 81(a+b)^2 = [10(x+y)]^2 - [9(a+b)]^2 = [10(x+y)+9(a+b)][10(x+y) - 9(a+b)]$
So, St-1 is true. & St-2 is correct explanation of St-1.

33. Key: 2 ; Sol:- <u>St-2</u>:- $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4) = (x^2 - y^2)(x^2 + y^2)(x^4 + y^4)$
$= (x^4 - y^4)(x^4 + y^4) = (x^8 - y^8)$------------> St-2 is true.

<u>St-1</u>:-

$$\frac{8.63\times 8.63-1.37\times 1.37}{0.726}=\frac{(8.63)^2-(1.37)^2}{0.726}=\frac{(8.63+1.37)(8.63-1.37)}{0.726}$$

$=\dfrac{10\times 7.26}{0.726}=100$ ----------> St -1 is true ,but not correct explanation.

And St- 2 is correct explanation of St-1.

34. key: 3 ; Sol: $(141)^2 = (140 + 1)^2 = (140)^2 + (1)^2 + 2(140)(1)$
$= 19600 + 1 + 280$
$= 19601 + 280 = 19881$

35. Key : 2 ; Sol: $(2x + 3)(x + 5) = 2x(x + 5) + 3(x + 5)$
$= 2x^2 + 10 + 3x + 15 = 2x^2 + 13x + 15.$

36. Key : 3 ; Sol: $(3x + y)^2 - 4(3x)(y) = 9x^2 + 2(3x)(y) + (y)^2 - 4(3x)(y)$
$= (3x)^2 - 2(3x)y + (y)^2 = (3x - y)^2.$

37. key: 1 ; Sol: $A^2= (3x^3+6x^2)^2=(3x^3)^2+2(3x^3)(6x^2)+(6x^2)^2 = 9x^6+36x^5+36x^4$

38. Key: 3 ; Sol: $A^2+B = (9x^6+36x^5+36x^4)+6x^2-3x^3= 9x^6+36x^5+36x^4-3x^3+6x^2$

39. Key: 3 ; Sol: $A^2-B^2=(3x^3+6x^2)^2-(6x^2-3x^3)^2=4(3x^3)(6x^2)=72x^5$

40. Key: 1 ; Sol:- $(0.47x^2 + 0.25y^2)(0.47x^2 - 0.25y^2) = (0.47x^2)^2 - (0.25y^2)^2$
$= 0.2209x^4 - 0.0625y^4$

41. Key: 4 ;

Sol:- $\left(2a+\frac{3}{5}\right)\left(2a-\frac{3}{5}\right)\left(4a^2+\frac{9}{25}\right)=\left(4a^2-\frac{9}{25}\right)\left(4a^2+\frac{9}{25}\right)=16a^4-\frac{81}{625}$

42. Key: 2 ;

Sol:- $\frac{5718\times 5718-4135\times 4135}{5718+4135}=\frac{(5718+4135)(5718-4135)}{5718+4135}=1583$

43. Key : $a \to 3$, $b \to (4,5)$, $c \to 1$, $d \to 2$

Sol: (a) $(x+1)(x+2) = x^2+(1+2)x+2 = x^2+3x+2$.

(b) $(ax+b)(ax+c) = (ax)^2+(b+c)(ax)+bc = a^2x^2+a(b+c)x+bc$
$= a^2x^2+(ab+ac)x+bc$.

(c) $(x-y)^2+(4xy) = x^2-2xy+y^2+4xy = x^2+2xy+y^2 = (x+y)^2$

(d) $(x+y)^2-4xy = x^2+2xy+y^2-4xy = x^2-2xy+y^2 = (x-y)^2$

44. Key: $a \to 3, b \to 1, c \to 4, d \to 2$

Sol:- a) $4x^2+\frac{9}{x^2}-12=(2x)^2-2(2x)\left(\frac{3}{x}\right)+\left(\frac{3}{x}\right)^2=\left(2x-\frac{3}{x}\right)^2=\left(4-\frac{3}{2}\right)^2=\frac{25}{4}$

b) $25x^2+16y^2-40xy = (5x)^2-2(5x)(4y)+(4y)^2 = (5x-4y)^2 = (30-28)^2 = 4$

c) Let the missing term be 'k'. $81x^2+90x+k = (9x)^2+2(9x)(5)+k$;

since $81x^2+90x+k$ is a perfect square. So, k must be 5^2 ; k=25.

d) Let the missing term be 'k'. $0.09x^2+0.15x+k = [(0.3)x]^2+2(0.3x)(0.25)+k$;

since $0.09x^2+0.15x+k$ is a perfect square. So, k must be $(0.25)^2$; 0.25=25/100

45. Key: (9801) ; Sol: $99^2=(100-1)^2 = 10000-200+1 = 9801$.

46. Key: 135 ; Sol:- $16x^2-9 = (4x)^2-3^2 = (4x+3)(4x-3) = 15 \times 9 = 135$

WORK SHEET – 5 (KEY)

1) 1	2) 1	3) 4	4) 2	5) 2
6) 4	7) 4	8) 1	9) 1	10) 3
11) 1	12) 2,3	13) 1,3	14) 1,2,3,4	15) 4
16) 3	17) 4	18) 1	19) 1	20) 2,3,1,4
21) 3,1,2,4	22) 2			

1. Key: (1); Sol:- $(84a^5x^3) \div (-12a^4x) = \dfrac{84a^5x^3}{-12a^4x} = -7ax^2$

2. Key: (1); Sol:-$(5a^3b - 7ab^3) \div ab = \dfrac{5a^3b - 7ab^3}{ab} = \dfrac{ab(5a^2 - 7b^2)}{ab} = 5a^2 - 7b^2$

3. Key: (4); Sol:- $x^2+2x+8\ )\ x^4 + x^3 + 7x^2 - 6x + 8\ (\ x^2 - x + 1$

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

$-x^3 - x^2 - 6x$

$-x^3 - 2x^2 - 8x$

$x^2 + 2x + 8$

$x^2 + 2x + 8$

(0) So, required remander = 0

4. Key: (2); Sol:- Since, Dividend = Divisor × quotient+remaind

$= \left(\frac{1}{2}x + \frac{1}{3}y\right)\left(\frac{1}{2}x^2 - \frac{1}{3}xy + \frac{1}{4}y^2\right) + 0$

$= \frac{1}{4}x^3 - \frac{1}{6}x^2y + \frac{1}{8}xy^2 + \frac{1}{6}x^2y - \frac{1}{9}xy^2 + \frac{1}{12}y^3$

$= \frac{1}{4}x^3 + \frac{1}{72}xy^2 + \frac{1}{12}y^3$.

5. Key: (2); Sol:- $\dfrac{2xy\left(2x^3y^3 - 4x^2y^3 + 3y^2\right)}{-2xy} = -2x^3y^3 + 4x^2y^3 - 3y^2$

6. Key: (4); Sol:- $\dfrac{16x^4 + 8x^3 + 4x^2 + 6x}{Ax} = \left(8x^3 + 4x^2 + 2x + 3\right)$

$\Rightarrow \dfrac{2x\left(8x^3 + 4x^2 + 2x + 3\right)}{Ax} = \left(8x^3 + 4x^2 + 2x + 3\right)$

$\Rightarrow$ Ax = 2x $\Rightarrow$ A = 2 $\Rightarrow \dfrac{8x^3 + 4x^2 + 10x}{2x} = 4x^2 + 2x + 5$

7. Key: (4); Sol:-

$a - b)\ a^4 - b^4\ (a^3 + a^2b + ab^2 + b^3$

$\underset{-}{a^4} \underset{+}{-} a^3b$

$a^3b - b^4$

$\underset{-}{a^3b} - \underset{+}{a^2b^2}$

$a^2b^2 - b^4$

$\underset{-}{a^2b^2} \underset{+}{-} ab^3$

$ab^3 - b^4$

$\underset{-}{ab^3} \underset{+}{-} b^4$

0

8. Key: 1 ; Sol:- $A = 8x^7y^3 + 4x^3y^2 + xy^3$; $B = 4x^3y^2$

$A \times B = 4x^3y^2(8x^7y^3 + 4x^3y^2 + xy^3)$

$$\frac{A\times B}{4x^3y^3} = \frac{32x^{10}y^5 + 16x^6y^4 + 4x^4y^5}{4x^3y^3} = 8x^7y^2 + 4x^3y + xy^2$$

9. Key: 1 ; Sol:- $A + B = x^2 + 4x + 4$; $C + D = x + 2$

$$\begin{array}{r|l} x+2) & x^2 + 4x + 4 \; (x + 2 \\ & \underline{\,x^2 + 2x\,} \\ & \quad 2x + 4 \\ & \quad \underline{2x + 4} \\ & \quad\quad 0 \end{array}$$

$$\therefore \frac{A+B}{C+D} = x+2$$

10. Key: 3 ; Sol:- $X + Y = 4x^4 + 4x^3 + 4x^2 - 4x$

$X - Y = 20x^4 + 28x^3 + 12x^2 - 20x$

$\therefore (X + Y) - (X - Y) = -16x^4 - 24x^3 - 8x^2 + 16x$

$$\frac{(X+Y)-(X-Y)}{8x} = -2x^3 - 3x^2 - x + 2$$

11. Key: 1 ; Sol:- $A \times B = (2x + 4)(4x^2 - 2x - 8) = 8x^3 - 4x^2 - 16x + 16x^2 - 8x - 32$

$$(A \times B)/4 = \frac{8x^3 + 12x^2 - 24x - 32}{4} = 2x^3 + 3x^2 - 6x - 8$$

12. Key: (2,3); Sol:- $A = 7x^3y^2$; $B = 6x^3y^2$; $C = 3x^3y^2$

$(A + B - C) - (A - B + C) = (A + B - C - A + B - C) = 2B - 2C$

$= 2 \times 6x^3y^2 - 2 \times 3x^3y^2 = 12x^3y^2 - 6x^3y^2 = 6x^3y^2 = B = 2C.$

13. Key: (1,3); Sol:- $\frac{a^2-b^2}{a-b} \times \frac{a^3-b^3}{a^2+ab+b^2} = \frac{(a+b)(a-b)}{a-b} \times \frac{(a-b)(a^2+ab+b^2)}{(a^2+ab+b^2)}$

$= a^2 - b^2.$

14. Key: (1,2,3,4) ; Sol:- $2m^2+4m^3+2m^4-m^6 \div \sqrt{2}\,m^2$

$$= \frac{2m^2}{\sqrt{2}m^2} + \frac{4m^3}{\sqrt{2}m^2} + \frac{2m^4}{\sqrt{2}m^2}\frac{m^6}{\sqrt{2}m^2}$$

$$= \sqrt{2} + 2\sqrt{2}m + \sqrt{2}m^2 - \frac{1}{\sqrt{2}}m^4$$

15. Key: (4); Sol:- Clearly, St-2 is true.

$$\frac{(3/4)ab^2c^3 - (2/5)a^2b^2c^2 + (1/3)ab^2c}{(1/2)abc} = \frac{(3/4)ab^2c^3}{(1/2)abc} - \frac{(2/5)a^2b^2c^2}{(1/2)abc} + \frac{(1/3)ab^2c}{(1/2)abc}$$

$= (3/2)bc^2 - (4/5)abc + (2/3)b$ ---------> St-1 is false.

16. Key: 3 ; Sol:-

$$
\begin{array}{l}
2x^2-3x+5\ )\ 10x^3-x^2+4x+35\ (\ 5x+7 \\
\qquad\qquad\qquad 10x^3-15x^2+25x \\
\qquad\qquad\qquad\qquad 14x^2-21x+35 \\
\qquad\qquad\qquad\qquad 14x^2-21x+35 \\
\qquad\qquad\qquad\qquad\qquad (0)
\end{array}
$$

-----------> st -1 is true

$$
\begin{array}{l}
x^2-x-2)\ x^3-4x^2+x+6\ (\ x-3 \\
\qquad\quad x^3-x^2-2x \\
\qquad\qquad -3x^2+3x+6 \\
\qquad\qquad -3x^2+3x+6 \\
\qquad\qquad\qquad (0)
\end{array}
$$

--------------> st - 2 is false

17. Key: (4); Sol:- $A = \dfrac{18x^4y^2 + 15x^2y^2 - 27x^2y}{-3xy} = -6x^3y - 5xy + 9x.$

18. Key: (1); Sol:- $B = \dfrac{144x^3y^8}{9xy^2} = 16x^2y^6$

19. Key: (1); Sol:- $A \times B = (-6x^3y - 5xy + 9x) \times (16x^2y^6)$

$= -96x^5y^7 - 80x^3y^7 + 144x^3y^6$

20. Key: a® 2,b® 3, c® 1, d® 4

Sol:- (a) $\dfrac{-3a^2 + (9/2)ab - 6ac}{-(3/2)a} = 2a - 3b + 4c$

(b) $\dfrac{(1/2)x^5y^2 - 3x^3y^4}{-(3/2)x^3y^2} = -(1/3)x^2 + 2y^2$

(c) $\dfrac{-2a^5x^3 + (7/4)a^4x^4}{(7/8)xa^3} = -(16/7)a^2x^2 + 2x^3a$

(d) $\dfrac{px^4y^5}{3x^2y^2} = 8x^2y^3 \leftrightarrow px^4y^5 = 24x^4y^5 \leftrightarrow p = 24$

$\dfrac{qx^3y^4}{3x^2y^2} = 6xy^2 \leftrightarrow qx^3y^4 = 18x^3y^4 \leftrightarrow q = 18$

$\dfrac{rx^2y^3}{3x^2y^2} = 10y \leftrightarrow rx^2y^3 = 30x^2y^3 \leftrightarrow r = 30$

$$\therefore \frac{24x^3y^2+18xy^2+30y^3}{2y^2} = 12x^3 + 9x + 15y$$

21. Key: a® 3, b® 1,c® 2,d® 4 ;

Sol:- a) $\frac{\sqrt{3}m^4+2\sqrt{3}m^3+3m^2-6m}{3m} = \frac{\sqrt{3}m^4}{3}+\frac{2\sqrt{3}m^3}{3m}+\frac{3m^2}{3m}-\frac{6m}{3m}$

$$=\frac{1}{\sqrt{3}}m^3+\frac{2}{\sqrt{3}}m^2+m-2$$

b) $\frac{5m^6-6m^3+7m^2}{2m^2}=\frac{5m^6}{2m^2}-\frac{6m^3}{2m^2}+\frac{7m^2}{2m^2}=\frac{5}{2}m^4-3m+\frac{7}{2}$

c) $\frac{2m^5+10m^4+6m^3+m^2+5m+3}{2m^3+1}=\frac{2m^3\left(m^2+5m+3\right)+\left(m^2+5m+3\right)}{2m^3+1}$

$$=\frac{\left(m^2+5m+3\right)\left(2m^3+1)\right)}{2m^3+1}=m^2+5m+3$$

d) $2m^3 + 1$) $6m^5 + 4m^4 + 4m^3 + 3m^2 + 2m + 2$ ($3m^2 + 2m + 2$

$6m^5 + 3m^2$

$4m^4 + 4m^3 + 2m + 2$

$4m^4 + 2m$

$4m^3 + 2$

$4m^3 + 2$

(0)

22. Key: (2); Sol:- $\frac{px^3}{8x}=3x^2 \Rightarrow px^3 = 24x^3 \Rightarrow p = 24$

$\frac{qx^3}{4x}=12x^2 \Rightarrow qx^3 = 48x^3 \Rightarrow q = 48 \therefore \frac{qx^4y^3}{px^2y^2}=\frac{48x^4y^3}{24x^2y^2}=2x^2y \Rightarrow kx^2y = 2x^2y$

$\Rightarrow k = 2$

$\therefore$