GRADE: 7

LESSON: Mathematics

DETAILED ANSWERS

SECTION A (4 × 10 = 40 marks)

1. Choose the correct option:

a) An algebraic expression consists of:

- **Correct Answer:** (i) Constants and variables

b) The degree of the polynomial $5x^3 - 2x^2 + 7$ is:

- **Correct Answer:** (iii) 3 (The highest power of x is 3)

c) The number of terms in the expression $4xy + 5y - 3$ is:

- **Correct Answer:** (iii) 3 d) The product of two monomials is always a:
- **Correct Answer:** (ii) Monomial (Multiplication of two single terms results in another single term)

2. Solve the following:

a) **Definition of an Algebraic Expression**

- An algebraic expression is a mathematical expression containing constants, variables, and operations like addition, subtraction, multiplication, and division.
- **Example:** $3x^2 + 2x - 5$

b) **Identifying Terms and Coefficients:**

- Expression: $7x^2y - 5xy + 3$
- Terms: $7x^2y$, $-5xy$, 3

- Coefficients: 7, -5, 3

c) **Degree of Polynomials:**

- $3x^4 - 2x^2 + 5$ → **Degree = 4**
- $7y^3 + 4y^2 - 9y + 6$ → **Degree = 3**

3. Solve the following equations:

a) **Addition of Expressions:**

- $(3x^2 - 4x + 7) + (5x^2 + 6x - 2)$
- **Solution:** $(3x^2 + 5x^2) + (-4x + 6x) + (7 - 2) = 8x^2 + 2x + 5$

b) **Subtraction of Expressions:**

- $(7x^2 - 4x + 9) - (2x^2 + 3x - 5)$
- **Solution:** $(7x^2 - 2x^2) + (-4x - 3x) + (9 + 5) = 5x^2 - 7x + 14$

c) **Value of Expression for x = 2:**

- $3(2)^2 - 5(2) + 7 = 3(4) - 10 + 7 = 12 - 10 + 7 = 9$

4. TRUE or FALSE:

a) **True** (A binomial has exactly two terms)

b) **False** (The sum of two monomials may be a binomial if the terms are different)

c) **True** (A constant has a degree of 0)

d) **False** (The subtraction of two algebraic expressions may result in polynomials of different types)

5. Solve the following problems:

a) **Expanding Expressions:**

- $2(x + 3) + 5(x - 2)$
- **Solution:** $2x + 6 + 5x - 10 = 7x - 4$

b) **Finding P + Q and P - Q:**

- $P = 3x^2 + 4x - 7, Q = x^2 - 2x + 5$
- $P + Q = (3x^2 + x^2) + (4x - 2x) + (-7 + 5) = 4x^2 + 2x - 2$
- $P - Q = (3x^2 - x^2) + (4x + 2x) + (-7 - 5) = 2x^2 + 6x - 12$

c) **Identifying Types of Expressions:**

- $3x^2 - 7$ → Binomial
- $x + 2y$ → Binomial
- $5xy - 4x + 7$→ Trinomial

SECTION B (4 × 10 = 40 marks)

6. Expression Formation:

a) **Writing Algebraic Expressions:**

- Sum of three times a number and $7 \longrightarrow 3x + 7$
- Difference between the square of a number and five times the number → $x^2 - 5x$

b) **Converting Word Statements:**

- Twice the sum of a number and four → $2(x + 4)$
- Product of three and sum of a number and two → $3(x + 2)$

7. Operations on Algebraic Expressions:

a) **Multiplication:**

- $(x + 3)(x - 2) = x^2 - 2x + 3x - 6 = x^2 + x - 6$
- $(2x + 5)(x + 4) = 2x^2 + 8x + 5x + 20 = 2x^2 + 13x + 20$

b) **Division:**

- $(6x^3 + 9x^2) \div 3x = 2x^2 + 3x$

c) **Finding Value:**

- $5(-1)^2 - 3(-1) + 2 = 5(1) + 3 + 2 = 10$

8. Real-Life Applications:

a) **Perimeter of Rectangle:**

- $P = 2(l + w)$
- $P = 2((3x + 4) + (x + 2)) = 2(4x + 6) = 8x + 12$

b) **Total Cost Calculation:**

- $2(3) + 5(2) = 6 + 10 = ₹16$

c) **Area of Triangle:**

- A = $\frac{1}{2} \times (4x + 3) \times 2x$
- $A = (4x + 3)x = 4x^2 + 3x$

9. HOTS:

a) **Finding Missing Expression:**

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

b) **Finding Unknown Coefficient:**

- $P(3) = 0 = 3^2 - 2(3) + k$
- $9 - 6 + k = 0$
- $k = -3$

c) **Finding Binomial Values:**

- $(x + a)(x + b) = x^2 + 7x + 10$
- $a + b = 7, ab = 10$
- $a = 2, b = 5$

END OF SOLUTIONS