## Class 9 Mathematics Practice Worksheet: Polynomials

### Section A: Objective Type Questions (1 Mark Each)

1. The degree of the polynomial $6x^4 - 2x^3 + 7$ is:
   a) 1
   b) 3
   c) 4
   d) 0
2. Which of the following is a binomial?
   a) $4x^2 + 3x$
   b) $x^2 + 5x + 1$
   c) $x^3 - 1$
   d) $6x^2 - 7x + 4$
3. The zero of the polynomial $p(x) = 7x - 21$ is:
   a) 1
   b) 2
   c) 3
   d) -3
4. Which of the following is a correct expansion of $(a + b)^2$?
   a) $a^2 + b^2$
   b) $a^2 + 2ab + b^2$
   c) $a^2 - 2ab + b^2$
   d) $a^2 - b^2$

**Section B: Short Answer Questions (2 Marks Each)**

5. Write the degree of each of the following polynomials:
   a) $5x^3 - 2x + 7$
   b) $9y^2 + y - 4$
6. Factorize the following using algebraic identities:
   a) $x^2 - 25$
   b) $4x^2 + 12x + 9$
7. Give one example each of:
   a) A monomial of degree 4.
   b) A trinomial of degree 2.
8. Find the zero of the polynomial $p(x) = x + 9$.

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**Section C: Short Answer Questions (3 Marks Each)**

9. Use the Remainder Theorem to find the remainder when $p(x) = x^3 - 2x^2 + 4x - 8$ is divided by $x - 2$.
10. Factorize the following polynomials:
    a) $2x^2 + 7x + 3$
11. Prove the identity $(x - y)^2 = x^2 - 2xy + y^2$ using algebraic methods.
12. Expand the following using algebraic identities:
    a) $(2x + 3)^2$
    b) $(a - 5b)^2$

**Section D: Long Answer Questions (4 Marks Each)**

13. Use the Factor Theorem to determine whether $x - 3$ is a factor of $p(x) = 2x^3 - 5x^2 + 4x - 3$.
14. Prove that $(a + b)(a - b) = a^2 - b^2$ and use this identity to factorize $9x^2 - 16$.
15. Find the zeroes of the polynomial $p(x) = x^2 - 6x + 9$ and verify the relationship between the zeroes and the coefficients.
16. Expand the following using the identity $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$: $(2a + b + 3c)^2$.

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**Section E: Higher Order Thinking Skills (HOTS)**

17. Prove that $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$ and use it to expand $(3x + 2)^3$.
18. Factorize the expression $8a^3 + 27b^3 + 36a^2b + 54ab^2$ using the identity for perfect cubes.
19. Using suitable algebraic identities, simplify and evaluate $(104)^2 - (96)^2$.
20. If the volume of a cube is given by $(x + 2)^3$, expand and simplify the expression using identities.