Class 9 Mathematics Practice Worksheet: Polynomials

Section A: Objective Type Questions (1 Mark Each)

1. The degree of the polynomial $3x^5 - 7x^3 + 2x - 8$ is:
   a) 1
   b) 3
   c) 5
   d) 0
2. Which of the following is a correct identity for $(a - b)^2$?
   a) $a^2 + 2ab + b^2$
   b) $a^2 - 2ab + b^2$
   c) $a^2 - b^2$
   d) $a^2 + b^2$
3. The zero of the polynomial $p(x) = 4x - 12$ is:
   a) 1
   b) 2
   c) 3
   d) 4
4. Which of the following is a trinomial?
   a) $4x - 5$
   b) $x^2 + 2x + 1$
   c) $x^3 - 2$
   d) $3x^2$

Section B: Short Answer Questions (2 Marks Each)

5. Write the degree of each of the following polynomials:
   a) $4x^3 - 3x + 5$
   b) $7y^2 + y - 9$
6. Factorize using identities:
   a) $x^2 - 16$
   b) $9x^2 - 6x + 1$
7. Give one example each of:
   a) A binomial of degree 4.
   b) A trinomial of degree 3.
8. Find the zero of the polynomial $p(x) = 5x - 20$.

Section C: Short Answer Questions (3 Marks Each)

9. Use the Remainder Theorem to find the remainder when $p(x) = x^3 - 3x^2 + 4x - 5$ is divided by $x - 1$.
10. Factorize the following polynomial:
    a) $x^2 + 5x + 6$
11. Prove the identity $(x + y)^2 = x^2 + 2xy + y^2$ using algebraic methods.
12. Expand the following using suitable algebraic identities:
    a) $(3x + 4)^2$
    b) $(a - 6b)^2$

Section D: Long Answer Questions (4 Marks Each)

13. Prove that $(x - y)(x + y) = x^2 - y^2$ and use it to factorize $16x^2 - 25$.
14. Use the Factor Theorem to determine whether $x + 4$ is a factor of $p(x) = x^3 + 6x^2 + 11x + 6$.
15. Factorize the polynomial $2x^2 + 5x - 3$.
16. Expand the expression $(x + 2y + 3z)^2$ using the identity for squares of trinomials.

Section E: Higher Order Thinking Skills (HOTS)

17. Prove that $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$, and use it to expand $(2x + 3)^3$.
18. Factorize the expression $27x^3 + 64y^3 + 36x^2y + 48xy^2$ using the identity for perfect cubes.
19. Simplify and evaluate $(106)^2 - (94)^2$ using algebraic identities.
20. If the volume of a cube is given by $(x + 3)^3$, expand and simplify using identities.
