

NCERT Class 9 Mathematics (Ganit Manjari)

Chapter: Exploring Algebraic Identities

This comprehensive question bank is designed for Class 9 students to test and strengthen their foundational understanding of algebraic identities. It contains 20 easy Multiple Choice Questions (MCQs) and 20 easy Subjective Questions, followed by a concise answer key.

Part A: Multiple Choice Questions (20 MCQs - Easy) Alpha Level

1. What is the expanded form of $(x + 3)^2$?
A) $x^2 + 9$
B) $x^2 + 6x + 9$
C) $x^2 + 3x + 9$
D) $x^2 + 6x + 6$
2. Expand the expression $(y - 5)^2$.
A) $y^2 - 25$
B) $y^2 - 5y + 25$
C) $y^2 - 10y + 25$
D) $y^2 + 10y + 25$
3. What is the value of $(x - 4)(x + 4)$?
A) $x^2 - 16$
B) $x^2 + 16$
C) $x^2 - 8$
D) $x^2 - 8x - 16$
4. Evaluate the product $(x + 2)(x + 5)$ using identities.
A) $x^2 + 7x + 10$
B) $x^2 + 10x + 7$
C) $x^2 + 7x + 7$
D) $x^2 + 3x + 10$
5. What is the expansion of $(2x + 1)^2$?
A) $4x^2 + 1$

- B) $4x^2 + 2x + 1$
C) $4x^2 + 4x + 1$
D) $2x^2 + 4x + 1$
6. Expand $(3a - 2b)^2$.
A) $9a^2 - 4b^2$
B) $9a^2 - 12ab + 4b^2$
C) $9a^2 - 6ab + 4b^2$
D) $3a^2 - 12ab + 2b^2$
7. Find the value of $(99)^2$ using algebraic identities.
A) 9801
B) 9901
C) 9811
D) 9081
8. Evaluate 102×98 using a suitable identity.
A) 9996
B) 10004
C) 9964
D) 9916
9. What is the identity for $(a + b + c)^2$?
A) $a^2 + b^2 + c^2 + ab + bc + ca$
B) $a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
C) $a^2 + b^2 + c^2 - 2ab - 2bc - 2ca$
D) $a^3 + b^3 + c^3$
10. If $x + y = 5$ and $xy = 6$, find the value of $x^2 + y^2$.
A) 13
B) 19
C) 25
D) 37
11. Expand $(x + 2)^3$.
A) $x^3 + 8$
B) $x^3 + 6x^2 + 12x + 8$
C) $x^3 + 2x^2 + 4x + 8$
D) $x^3 + 6x + 8$
12. Expand $(x - 1)^3$.
A) $x^3 - 1$
B) $x^3 - 3x^2 + 3x - 1$
C) $x^3 - 3x^2 - 3x - 1$

- D) $x^3 + 3x^2 - 3x + 1$
13. What is the value of $(2a - 3)(2a + 3)$?
- A) $4a^2 - 9$
B) $4a^2 + 9$
C) $2a^2 - 3$
D) $4a^2 - 12a + 9$
14. Find the product of $(x - 3)(x + 7)$.
- A) $x^2 + 4x - 21$
B) $x^2 - 4x - 21$
C) $x^2 + 10x - 21$
D) $x^2 - 10x + 21$
15. Complete the identity: $a^3 + b^3 = (a + b)(\dots\dots\dots)$
- A) $a^2 + ab + b^2$
B) $a^2 - ab + b^2$
C) $a^2 - 2ab + b^2$
D) $a^2 + 2ab + b^2$
16. Complete the identity: $a^3 - b^3 = (a - b)(\dots\dots\dots)$
- A) $a^2 - ab + b^2$
B) $a^2 + 2ab + b^2$
C) $a^2 + ab + b^2$
D) $a^2 - 2ab + b^2$
17. Evaluate $(105)^2$ using identities.
- A) 11025
B) 10025
C) 11055
D) 11250
18. If $a + b + c = 0$, then what is the value of $a^3 + b^3 + c^3$?
- A) 0
B) $ab + bc + ca$
C) $3abc$
D) $2abc$
19. What is the coefficient of x in the expansion of $(x + 5)^2$?
- A) 5
B) 10
C) 25
D) 1
20. Expand $(p - q)(p + q)(p^2 + q^2)$.

- A) $p^4 + q^4$
- B) $p^4 - q^4$
- C) $(p - q)^4$
- D) $p^2 - q^2$

Part B: Subjective Questions (20 Questions – Easy) Alpha Level

1. Using a suitable identity, expand $(2x + 5y)^2$.
2. Evaluate $(49)^2$ by writing it as $(50 - 1)^2$.
3. Find the product of $(3x - 4)(3x + 4)$ using algebraic identities.
4. Expand $(x - 7)(x - 3)$ using the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$.
5. Factorize: $x^2 - 9y^2$.
6. Factorize the quadratic expression: $x^2 + 6x + 9$.
7. Using identity, calculate the value of 103×107 .
8. Expand the trinomial expression: $(x + 2y + 4z)^2$.
9. If $x^2 + y^2 = 29$ and $xy = 10$, find the value of $(x + y)^2$.
10. Expand $(2x + 3)^3$ using the cubic identity.
11. Expand $(3a - 2)^3$ using the cubic identity.
12. Evaluate $(101)^3$ using algebraic identities.
13. Without actual calculation, find the value of $(28)^3 + (-15)^3 + (-13)^3$.
14. Factorize: $8x^3 + y^3 + 27z^3 - 18xyz$.
15. If $x + y = 8$ and $x - y = 2$, find the value of $x^2 - y^2$.
16. Expand $(5x - 2y)^2$.
17. Find the value of 105×95 using an algebraic identity.
18. Factorize the trinomial: $4x^2 - 12x + 9$.
19. Simplify the expression: $(x + y)^2 - (x - y)^2$.
20. If $x + (1/x) = 4$, find the value of $x^2 + (1/x^2)$.

Answer Key (MCQs)

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

Part A: Multiple Choice Questions (20 MCQs - Moderate) Beta Level

21. If $x + (1/x) = 5$, then find the value of $x^2 + (1/x^2)$.
- A) 23
 - B) 25
 - C) 27
 - D) 21
22. If $x - (1/x) = 4$, then the value of $x^4 + (1/x^4)$ is:
- A) 194
 - B) 322
 - C) 326
 - D) 18
23. Find the value of $(x + y)^3 - (x - y)^3$.
- A) $2y^3 + 6x^2y$
 - B) $2x^3 + 6xy^2$
 - C) $2y^3 - 6x^2y$
 - D) 0
24. If $a + b + c = 9$ and $ab + bc + ca = 26$, then the value of $a^2 + b^2 + c^2$ is:
- A) 29
 - B) 55
 - C) 43
 - D) 81
25. Evaluate the product 103×97 using a suitable identity.
- A) 9991
 - B) 10009
 - C) 9919
 - D) 9999
26. The factorization of $x^2 - 1 - 2a - a^2$ yields:
- A) $(x - a - 1)(x + a + 1)$
 - B) $(x - a - 1)(x + a - 1)$
 - C) $(x + a + 1)(x - a + 1)$
 - D) $(x - a + 1)(x + a - 1)$
27. If $x^2 - 3x + 1 = 0$, then the value of $x^3 + (1/x^3)$ is:

- A) 9
B) 18
C) 27
D) 36
28. If $a + b + c = 0$, what is the value of $(a^2/bc) + (b^2/ca) + (c^2/ab)$?
A) 0
B) 1
C) 3
D) -3
29. What are the factors of $25x^2 - 10x + 1 - 36y^2$?
A) $(5x - 6y - 1)(5x + 6y - 1)$
B) $(5x - 6y + 1)(5x + 6y - 1)$
C) $(5x - 1 - 6y)(5x - 1 + 6y)$
D) $(5x + 1 - 6y)(5x + 1 + 6y)$
30. If $x + y + z = 1$, $xy + bc + ca = -1$, and $xyz = -1$, find the value of $x^3 + y^3 + z^3$.
A) 1
B) 2
C) -1
D) 4
31. Expand $(2x - y + 3z)^2$.
A) $4x^2 + y^2 + 9z^2 - 4xy - 6yz + 12zx$
B) $4x^2 + y^2 + 9z^2 - 4xy + 6yz - 12zx$
C) $4x^2 - y^2 + 9z^2 - 4xy - 6yz + 12zx$
D) $4x^2 + y^2 + 9z^2 + 4xy - 6yz + 12zx$
32. The value of $(0.98)^3 + 3(0.98)^2(0.02) + 3(0.98)(0.02)^2 + (0.02)^3$ is:
A) 1
B) 2
C) 0.96
D) 0.5
33. Find the value of k if $x + 3$ is a factor of $x^3 + 3x^2 - kx + 12$.
A) 4
B) -4
C) 3
D) -3
34. Factorize: $64a^3 - 27b^3$.
A) $(4a - 3b)(16a^2 + 12ab + 9b^2)$
B) $(4a - 3b)(16a^2 - 12ab + 9b^2)$

- C) $(4a + 3b)(16a^2 - 12ab + 9b^2)$
 D) $(4a - 3b)(16a^2 + 9b^2)$
35. If $x + y = 12$ and $xy = 27$, find the value of $x^3 + y^3$.
 A) 756
 B) 810
 C) 702
 D) 648
36. If $a^2 + b^2 + c^2 - ab - bc - ca = 0$, then:
 A) $a = b = c$
 B) $a + b + c = 0$
 C) $a = -b = c$
 D) $a^2 + b^2 = c^2$
37. What is the product of $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$?
 A) $x^8 + y^8$
 B) $x^8 - y^8$
 C) $x^{16} - y^{16}$
 D) $x^4 - y^4$
38. If $(x/y) + (y/x) = -1$ (where $x, y \neq 0$), the value of $x^3 - y^3$ is:
 A) 1
 B) -1
 C) 0
 D) $1/2$
39. Find the value of $(a - b)^3 + (b - c)^3 + (c - a)^3$.
 A) $3(a - b)(b - c)(c - a)$
 B) 0
 C) $(a + b + c)^3$
 D) $3abc$
40. If $3x + 2y = 12$ and $xy = 6$, find the value of $9x^2 + 4y^2$.
 A) 72
 B) 144
 C) 0
 D) 108

Part B: Subjective Questions (20 Questions – Moderate) Beta Level

21. If $x + (1/x) = 6$, evaluate the value of $x^4 + (1/x^4)$.
 22. If $x^2 + (1/x^2) = 27$, find the value of the positive expression $x - (1/x)$.
 23. Evaluate $(998)^3$ using an appropriate algebraic identity.

24. If $a + b + c = 15$ and $a^2 + b^2 + c^2 = 83$, compute the value of $ab + bc + ca$.
25. Factorize completely: $x^6 - y^6$.
26. If $x + y + z = 8$ and $xy + bc + ca = 15$, find the value of $x^3 + y^3 + z^3 - 3xyz$.
27. Factorize the algebraic expression: $a^2 - b^2 - 4ac + 4c^2$.
28. Simplify the product: $(2x - 3y + 4z)(4x^2 + 9y^2 + 16z^2 + 6xy + 12yz - 8zx)$.
29. If $2x + 3y = 11$ and $xy = 3$, find the value of $8x^3 + 27y^3$.
30. Factorize the quadratic polynomial by splitting the middle term or using identities:
 $9x^2 - 30x + 25 - 16y^2$.
31. Without expanding the individual cubes, compute the exact value of $(-12)^3 + (7)^3 + (5)^3$.
32. If $x + y = 10$ and $x^2 + y^2 = 58$, find the value of the cube sum $x^3 + y^3$.
33. Prove or evaluate the expansion of $(x - 2y - 3z)^2$ using identity formulas.
34. Factorize the polynomial expression: $x^3 - 23x^2 + 142x - 120$.
35. If $a + b = 7$ and $ab = 12$, evaluate the value of $a^4 + b^4$.
36. Factorize: $27x^3 + y^3 + z^3 - 9xyz$.
37. Evaluate 105×106 without direct multiplication using an identity.
38. Simplify the expression: $(a + b + c)^2 + (a - b + c)^2 + (a + b - c)^2$.
39. If $x - (1/x) = 3$, determine the value of $x^3 - (1/x^3)$.
40. If $a + b + c = 0$, prove or show that $(a + b)^2/ab + (b + c)^2/bc + (c + a)^2/ca = 3$.

Answer Key (MCQs)

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

Part A: Multiple Choice Questions (20 MCQs – Difficult) Delta Level

41. If $x^4 + (1/x^4) = 47$, then find the value of $x^3 + (1/x^3)$ for $x > 1$.
- A) 18
 - B) 36
 - C) 52
 - D) 76
42. If $a + b + c = 0$, find the value of $(a + b)^4 + (b + c)^4 + (c + a)^4 - 2(a^2b^2 + b^2c^2 + c^2a^2)$.
- A) 0
 - B) $a^4 + b^4 + c^4$
 - C) $2(ab + bc + ca)^2$
 - D) $4a^2b^2c^2$
43. If $x = 2 + \sqrt{3}$, then evaluate the value of $x^4 - 4x^3 + x^2 + x - 1$.
- A) $\sqrt{3}$
 - B) 1
 - C) 2
 - D) 0
44. Factorizing the expression $a^3(b - c)^3 + b^3(c - a)^3 + c^3(a - b)^3$ results in:
- A) $3abc(a - b)(b - c)(c - a)$
 - B) $-3abc(a - b)(b - c)(c - a)$
 - C) $3(a - b)(b - c)(c - a)$

- D) 0
45. If $a + b + c = 6$ and $a^2 + b^2 + c^2 = 14$ and $a^3 + b^3 + c^3 = 36$, find the value of abc .
- A) 6
B) 8
C) 12
D) 4
46. If $x^2 - x - 1 = 0$, then the value of $x^5 + (1/x^5)$ is:
- A) 11
B) 7
C) 5
D) 13
47. The factors of the polynomial $x^4 + 4x^2 + 16$ are:
- A) $(x^2 + 2x + 4)(x^2 - 2x + 4)$
B) $(x^2 + 4x + 4)(x^2 - 4x + 4)$
C) $(x^2 + 2x - 4)(x^2 - 2x - 4)$
D) $(x^2 + 4)(x^2 + 4)$
48. If $a + b + c = 0$, evaluate $[(2a - b)^2 + (2b - c)^2 + (2c - a)^2] / (a^2 + b^2 + c^2)$.
- A) 3
B) 6
C) 9
D) 5
49. If $x + y + z = 0$, simplify the expression: $(x^3 + y^3 + z^3)^2 / (9x^2y^2z^2)$.
- A) 1
B) 3
C) 9
D) $1/3$
50. If $a = 999$, $b = 997$, and $c = 995$, find the value of $a^2 + b^2 + c^2 - ab - bc - ca$.
- A) 4
B) 12
C) 8
D) 6
51. If $(x + y)/z + (y + z)/x + (z + x)/y = -3$ for non-zero x, y, z where $x + y + z \neq 0$, then:
- A) $x^3 + y^3 + z^3 = 3xyz$
B) $x + y + z = xyz$
C) $x = y = z$
D) $x^2 + y^2 + z^2 = 0$
52. Find the value of $(x - a)^3 + (x - b)^3 + (x - c)^3 - 3(x - a)(x - b)(x - c)$ if $a + b + c = 3x$.

- A) $3x^3$
 B) 0
 C) $a^3 + b^3 + c^3$
 D) $-3abc$
53. If $x = 1 / (2 - \sqrt{3})$, find the value of $x^3 - 2x^2 - 7x + 5$.
 A) 3
 B) 2
 C) 0
 D) 4
54. Factorize completely: $(x^2 - 4x)(x^2 - 4x - 1) - 20$.
 A) $(x - 5)(x + 1)(x^2 - 4x + 4)$
 B) $(x - 5)(x + 1)(x - 2)^2$
 C) $(x^2 - 4x - 5)(x^2 - 4x + 4)$
 D) Both B and C are correct
55. If $a + b + c = 0$, find the value of $[(b+c)^2/3bc + (c+a)^2/3ca + (a+b)^2/3ab]$.
 A) 0
 B) 1
 C) 3
 D) $1/3$
56. If $x + y = 1$ and $x^2 + y^2 = 2$, find the value of $x^5 + y^5$.
 A) $19/4$
 B) $7/2$
 C) $5/2$
 D) $11/4$
57. Find the value of the expression $8x^3 + 27y^3 + 64z^3 - 72xyz$ when $2x + 3y + 4z = 0$.
 A) 1
 B) 72
 C) 0
 D) -1
58. If $x^2 - 4x + 1 = 0$, find the value of $x^6 + (1/x^6)$.
 A) 2702
 B) 2744
 C) 2698
 D) 2548
59. The expression $(a - b)^3 + (b - c)^3 + (c - a)^3$ is divisible by:
 A) 3
 B) $(a - b)$

- C) $(b - c)$
 D) All of the above
60. If $a^2 + b^2 + c^2 = ab + bc + ca$, then the value of $(a + b + c)^{10} / (a^{10} + b^{10} + c^{10})$ is:
 A) 3^9
 B) 3^{10}
 C) 1
 D) 3

Part B: Subjective Questions (20 Questions - Difficult) Delta Level

41. If $x = (\sqrt{5} + \sqrt{3}) / (\sqrt{5} - \sqrt{3})$ and $y = (\sqrt{5} - \sqrt{3}) / (\sqrt{5} + \sqrt{3})$, evaluate the value of $x^2 + xy + y^2$.
42. Factorize the highly complex polynomial: $x^8 + x^4 + 1$.
43. If $x + y + z = 0$, prove that $x^4 + y^4 + z^4 = 2(x^2y^2 + y^2z^2 + z^2x^2) = 1/2 (x^2 + y^2 + z^2)^2$.
44. If a, b, c are all non-zero and $a + b + c = 0$, find the numerical value of $(a^2 + b^2 + c^2) / ((a-b)^2 + (b-c)^2 + (c-a)^2)$.
45. If $x^3 + y^3 + z^3 = 3xyz$ and $x + y + z \neq 0$, prove rigorously that $x = y = z$.
46. Find the value of $x^3 - 8y^3 - 36xy - 216$ given that $x = 2y + 6$.
47. If $x = \sqrt[3]{2 + \sqrt{3}} + \sqrt[3]{2 - \sqrt{3}}$, determine the value of $x^3 - 3x$.
48. Factorize completely: $a(b^2 - c^2) + b(c^2 - a^2) + c(a^2 - b^2)$.
49. If $a + b + c = 0$, evaluate the rational expression: $a^4 / (a^2b^2 - b^2c^2 - c^2a^2) + b^4 / (b^2c^2 - c^2a^2 - a^2b^2) + c^4 / (c^2a^2 - a^2b^2 - b^2c^2)$.
50. If $x + (1/x) = \sqrt{3}$, find the value of $x^{18} + x^{12} + x^6 + 1$.
51. Factorize: $(x - y)^5 + (y - z)^5 + (z - x)^5$.
52. If $a + b + c = 6$ and $ab + bc + ca = 11$, evaluate the value of $a^2b + ab^2 + b^2c + bc^2 + c^2a + ca^2$.
53. If $x + y + z = 3$, $x^2 + y^2 + z^2 = 9$, and $x^3 + y^3 + z^3 = 24$, find the value of $4xyz$.
54. Factorize the cyclic polynomial expression: $(a + b + c)^3 - a^3 - b^3 - c^3$.
55. If $x = \sqrt{5 + 2\sqrt{6}}$, find the value of $x^3 + (1/x^3)$.
56. Show that $x^2 + y^2 + z^2 - xy - bc - ca$ is always non-negative for all real values of x, y , and z .
57. If $a = 2026$, $b = 2025$, and $c = 2024$, calculate the value of $a^3 + b^3 + c^3 - 3abc$ without long direct multiplication.
58. If $x^4 + (1/x^4) = 119$, determine the value of the cubic difference $x^3 - (1/x^3)$ for $x > 1$.
59. Factorize: $x^4 + y^4 + (x + y)^4$.
60. If $a + b + c = 0$, prove that $a^5 + b^5 + c^5 = -5abc(ab + bc + ca)$.

Answer Key (MCQs)

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

Part A: Multiple Choice Questions (20 MCQs - Olympiad Level)

Quantum Level

61. If $x + y + z = 3$ and $x^2 + y^2 + z^2 = 5$ and $x^3 + y^3 + z^3 = 7$, find the value of $x^4 + y^4 + z^4$ without using formal matrix theory.
- A) 9
 - B) 8
 - C) 10
 - D) 12
62. If $a + b + c = 0$, what is the value of the expression $[(a^3 + b^3 + c^3)^4] / [(a^2b^2 + b^2c^2 + c^2a^2)^6]$?
- A) $64/729$
 - B) $16/27$

C) $4/9$

D) $729/64$

63. Let x, y, z be distinct real numbers such that $x + 1/y = y + 1/z = z + 1/x$. Find the absolute value of the product xyz .

A) 0

B) 1

C) 2

D) 3

64. If $x^2 - 3x + 1 = 0$, evaluate the value of the algebraic fraction $(x^6 + x^4 + x^2 + 1) / x^3$.

A) 36

B) 18

C) 33

D) 40

65. Determine the number of pairs of positive integers (m, n) that satisfy the equation $m^2 - n^2 = 96$.

A) 4

B) 6

C) 8

D) 2

66. If $a = \sqrt{7 + 4\sqrt{3}}$, find the value of $a^3 + 1/a^3$.

A) 52

B) 48

C) 50

D) 56

67. If $x + y = 1$ and $x^3 + y^3 = 19/4$, find the value of $x^4 + y^4$.

A) $7/2$

B) $25/8$

C) $31/8$

D) $17/4$

68. Simplify the product of cyclic factors: $(a + b)(b + c)(c + a) + abc$ when $a + b + c = 0$.

A) abc

B) 0

C) $-abc$

D) $2abc$

69. If $a + b + c = 0$, find the value of $[(a - b)^3 + (b - c)^3 + (c - a)^3] / [(a^2 - b^2)(b - c) + (b^2 - c^2)(c - a) + (c^2 - a^2)(a - b)]$.

A) $3/2$

- B) 3
C) -3
D) 1
70. Find the exact value of the product $(1 - 1/2^2)(1 - 1/3^2)(1 - 1/4^2)\dots(1 - 1/2026^2)$ using difference of squares.
A) $2027/4052$
B) $1013/2026$
C) $2027/2026$
D) $1/2$
71. If $x = \sqrt[3]{(\sqrt{5} + 2)} - \sqrt[3]{(\sqrt{5} - 2)}$, then the value of $x^3 + 3x$ is:
A) 4
B) 2
C) $\sqrt{5}$
D) 0
72. If $x + y + z = 0$, find the value of the expression $(x^5 + y^5 + z^5) / (xyz(x^2 + y^2 + z^2))$.
A) $5/2$
B) $-5/2$
C) 5
D) $1/2$
73. If $a^2 - b^2 = 24$ and $ab = 5$ (where $a, b > 0$), find the value of $a^4 + b^4$.
A) 626
B) 576
C) 601
D) 676
74. If the expression $x^4 + kx^2 + 16$ is a perfect square of a quadratic polynomial, what are the possible real values of k ?
A) 8 or -8
B) 4 or -4
C) 16 or -16
D) 0
75. If $a + b + c = 6$ and $ab + bc + ca = 11$, find the value of $a^2b + ab^2 + b^2c + bc^2 + c^2a + ca^2$.
A) 36
B) 44
C) 30
D) 66
76. What is the value of $2026^3 - 2025^3 - 3 \times 2026 \times 2025$?
A) 0

- B) 1
C) -1
D) 4051
77. If $x + 1/x = -1$, evaluate the value of $x^{300} + 1/x^{300}$.
A) 2
B) -1
C) 1
D) 0
78. If a, b, c are real numbers satisfying $a^2 + 4b^2 + 9c^2 = 2ab + 6bc + 3ca$, then which statement is definitely true?
A) $a = b = c$
B) $a = 2b = 3c$
C) $3a = 2b = c$
D) $a + 2b + 3c = 0$
79. Find the value of $(x - y)^3 + (y - z)^3 + (z - x)^3$ if x, y, z are the sides of a triangle such that $(x-y)^2 + (y-z)^2 + (z-x)^2 = 0$.
A) $3xyz$
B) 0
C) $x^3 + y^3 + z^3$
D) 1
80. If $x^2 + x = 1$, find the value of the simplified expression $x^5 + 8/x$.
A) 5
B) 6
C) 7
D) 8

Part B: Subjective Questions (20 Questions - Olympiad Level)

Quantum Level

61. If $x = (\sqrt{3} + 1)/2$, evaluate the expression $4x^3 + 2x^2 - 8x + 7$ by reducing it through its minimal quadratic identity.
62. If $a + b + c = 0$, prove that $2(a^5 + b^5 + c^5) = 5abc(a^2 + b^2 + c^2)$ using basic polynomial expansions.
63. Factorize completely within the bounds of standard identities: $(x + y + z)^3 - (x + y - z)^3 - (y + z - x)^3 - (z + x - y)^3$.
64. If $x + 1/y = 4$ and $y + 1/z = 1$ and $z + 1/x = 7/3$, evaluate the explicit product value of xyz .

65. Find all integer values of x for which the expression $x^4 + 4$ is a prime number.
66. If $a + b + c = 3$, $a^2 + b^2 + c^2 = 9$, and $a^3 + b^3 + c^3 = 3$, determine the value of $a^4 + b^4 + c^4$.
67. If $x + y + z = 1$, $xy + bc + ca = 2$, and $xyz = 3$, calculate the value of $(x + y)^2(y + z)^2(z + x)^2$.
68. Factorize the symmetric Class 9 expression completely: $x^4 + y^4 + (x + y)^4$.
69. If $x^2 - 5x + 1 = 0$, find the value of $x^4 + 1/x^4$ without utilizing decimals or square root approximations.
70. If $a + b + c = 0$, simplify the rational algebraic identity expression: $a^2 / (2a^2 + bc) + b^2 / (2b^2 + ca) + c^2 / (2c^2 + ab)$.
71. Prove that the expression $n^4 + 2n^3 + 2n^2 + 2n + 1$ is never a perfect square for any positive integer $n > 1$.
72. If a, b, c are non-zero real numbers such that $a^3 + b^3 + c^3 = 3abc$, but $a + b + c \neq 0$, prove that $(a + 2b + 3c)^3 / (a^3 + 8b^3 + 27c^3) = 1$.
73. Find the value of $x^3 - 1/x^3$ given that $x - 1/x = \sqrt{5}$.
74. Factorize the cyclic expression: $a^2(b - c)^3 + b^2(c - a)^3 + c^2(a - b)^3$ using properties of cyclic variables.
75. If $x = \sqrt{2} + 1$, find the value of $x^4 - 2x^3 - 2x^2 - 2x + 3$.
76. If $a + b + c = 0$, show that $(a^6 + b^6 + c^6) / 3 = a^2b^2c^2 + (a^3 + b^3 + c^3)^2 / 18$.
77. Evaluate the numeric value of the expression $125x^3 - 8y^3 - 30xy - 1$ when $5x - 2y = 1$.
78. If $x = \sqrt[3]{5} + 2$, show that $x^3 - 6x^2 + 12x - 13 = 0$.
79. If $a + b + z = 0$, evaluate the algebraic form: $[(a^2 - b^2 - z^2) / 2ab] \times [(b^2 - a^2 - z^2) / 2bz] \times [(z^2 - a^2 - b^2) / 2za]$.
80. Factorize completely using substitution or restructuring methods: $(x^2 + 3x + 2)(x^2 + 7x + 12) - 3$.

Answer Key (MCQs)

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