Mathematics — Ganita Manjari

Chapter 4 Test 8

Exploring Algebraic Identities

Class IX | 2026–27

Time Allowed: 45 Minutes | Maximum Marks: 25

General Instructions

1. All 13 questions are compulsory. Choose one option in A; show working in B–D.
2. Use suitable identities and show the main steps. Calculators are not allowed.
3. In rational expressions, state all restrictions from the original denominator.

SECTION A

(5 questions × 1 mark = 5 marks)

1. Which sign pattern occurs in the four-term expansion of $(a - b)^3$, in descending powers of a?

(A) +, +, −, −
(B) +, −, +, −
(C) +, −, −, −
(D) −, +, −, +

2. Which expression evaluates 71×69 by a difference of squares?

(A) $70^2 + 1$
(B) $71^2 - 69^2$
(C) $70^2 - 1$
(D) $69^2 - 1$

3. For $x^2 + 12x + k = (x + 6)^2$, the value of k is:

(A) 12
(B) 6
(C) 24
(D) 36

4. A quadratic with leading coefficient 1 has factors $(x - 2)$ and $(x - \frac{1}{2})$. Its constant term is:

(A) 1
(B) −1
(C) 2
(D) $\frac{1}{2}$

5. If $x = y = z$, then $x^3 + y^3 + z^3 - 3xyz$ equals:

(A) x^3
(B) 0
(C) $3x^3$
(D) $6x^3$

SECTION B

(4 questions × 2 marks = 8 marks)

6. Factor the following:

$$64y^3 + \frac{z^3}{125}.$$

7. Use $127 = 130 - 3$ and a cube identity to calculate:

$$127^3.$$

8. Solve the following using an identity:

$$(x + 3)^2 - (x - 3)^2 = 72.$$

9. A student factors $x^2 + 11x + 30$ as $(x + 2)(x + 15)$. Explain the error and give the correct factors.

SECTION C

(3 questions × 3 marks = 9 marks)

10. Prove the following:

$$(a + b)^3 + (a - b)^3 = 2a(a^2 + 3b^2).$$

11. Simplify the following. State every excluded value:

$$\frac{(x^2 + 6x - 7)(x^2 - 7x + 12)}{(x^2 - 6x + 8)(x^2 - 9)}.$$

12. Prove the following identity:

$$(p + q + r)^2 - 3(pq + qr + rp) = \frac{(p - q)^2 + (q - r)^2 + (r - p)^2}{2}.$$

When is its value zero for real p, q and r?

SECTION D

(1 application question × 3 marks = 3 marks)

13. A cube has edge 12 cm. Each edge is reduced by t cm, where $0 < t < 12$. Find an expression for the decrease in volume, then evaluate it for $t = 2$.