Mathematics — Ganita Manjari

Chapter 4 Test 3

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. One allowed substitution makes the two sides of a proposed identity unequal. What follows?

(A) It is not an identity

(B) It is always an identity

(C) It holds for all positive numbers

(D) Nothing can be concluded

2. The term containing u^2v in $(2u - 3v)^3$ is:

(A) $-18u^2v$ (B) $36u^2v$

(C) $-36u^2v$ (D) $54u^2v$

3. For real a and b, $(a + b)^2 = a^2 + b^2$ holds exactly when:

(A) $a = b$ (B) $ab = 0$

(C) $a + b = 0$ (D) $ab = 1$

4. To factor $x^2 - x - 42$, which pair should split the middle coefficient −1?

(A) 7 and −6 (B) −6 and −7

(C) −3 and 14 (D) 6 and −7

5. Although $\frac{x^2-4}{x-2}$ simplifies to $x + 2$, the original expression excludes:

(A) $x = 2$ (B) $x = -2$

(C) Both 2 and −2 (D) No value

SECTION B

(4 questions × 2 marks = 8 marks)

6. Use an identity to find the following:

$$79^2.$$

7. Factor the following:

$$9a^2 + b^2 + 4c^2 - 6ab + 12ac - 4bc.$$

8. Find the following using an identity:

$$(s - 2t)(s^2 + 2st + 4t^2).$$

9. Verify the following for $a = -\frac{2}{3}$ and $b = \frac{3}{4}$:

$$(a + b)^2 = a^2 + 2ab + b^2.$$

SECTION C

(3 questions × 3 marks = 9 marks)

10. Prove the following identity:

$$(a + b)^2 - (a - b)^2 = 4ab.$$

Hence find ab when $a + b = 13$ and $a - b = 5$.

11. Factor the following by splitting the middle term:

$$10x^2 - 11x - 6.$$

12. Simplify the following, retaining the restriction:

$$\frac{n^3 - 3n^2m + 3nm^2 - m^3}{5m^2 - 10mn + 5n^2}.$$

SECTION D

(1 application question × 3 marks = 3 marks)

13. One square of side x, eight x-by-1 rectangles and fifteen unit squares form a larger rectangle. Find possible side lengths and its perimeter, for $x > 0$.