

Determinants — CBSE Pattern Test 2

Class 12 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

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General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
 (2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
 (3) For MCQ questions choose the single correct option; for VSA answers write a single line.
 (4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. A determinant of order 3 has
 - (A) 3 rows and 3 columns
 - (B) 2 rows and 3 columns
 - (C) 3 rows and 2 columns
 - (D) 1 row and 3 columns
2. The determinant of a 1×1 matrix $[a]$ is
 - (A) a
 - (B) 0
 - (C) 1
 - (D) $-a$
3. If each element of a row is multiplied by k , the determinant is
 - (A) multiplied by k
 - (B) divided by k
 - (C) unchanged
 - (D) squared
4. If each element of a row is added to another row, the determinant
 - (A) is unchanged
 - (B) changes sign
 - (C) doubles
 - (D) becomes zero
5. A square matrix A is singular if
 - (A) $|A| = 0$
 - (B) $|A| \neq 0$
 - (C) A is symmetric
 - (D) $A = I$
6. For the system $a_1x + b_1y = c_1$, $a_2x + b_2y = c_2$, x equals
 - (A) Δ_x/Δ
 - (B) Δ/Δ_x
 - (C) $\Delta_x \cdot \Delta$
 - (D) $\Delta_x + \Delta$
7. The system has a unique solution if
 - (A) $\Delta \neq 0$

- (B) $\Delta = 0$
 (C) $\Delta_x \neq 0$
 (D) all coefficients zero
8. The area of a triangle with vertices (x_1, y_1) , (x_2, y_2) , (x_3, y_3) is
 (A) $\frac{1}{2} |\det|$
 (B) $|\det|$
 (C) $2|\det|$
 (D) $\det$
9. Find the value of $[[2, 0], [0, 5]]$.
10. Write the relation between A and $\text{adj}(A)$.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. If a row is multiplied by k , what happens to the determinant?
 12. Write the formula for A^{-1} .
 13. State the condition for a unique solution by Cramer's rule.
 14. Write the formula for the area of a triangle using determinants.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Find the determinant $[[2, -1, 3], [0, 1, 4], [5, 2, -2]]$.
 16. Evaluate $[[a, b], [b, a]]$.
 17. Find $|A|$ and state whether $A = [[1, 2], [3, 4]]$ is invertible.
 18. Solve $2x + y = 4$, $x + y = 3$ by Cramer's rule.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Show that $[[1, a, a^2], [1, b, b^2], [1, c, c^2]] = (a - b)(b - c)(c - a)$.
 20. Find the inverse of $A = [[1, 2, 1], [2, 3, 1], [1, 1, 1]]$. Using determinants, show that the points $(1, 2)$, $(3, 4)$ and $(5, 6)$ are collinear.

Answer Key (Marking Scheme)

- Q1 — (A) 3×3 . Q2 — (A) a . Q3 — (A) multiplied by k . Q4 — (A) is unchanged.
 Q5 — (A) $|A| = 0$. Q6 — (A) Δ_x/Δ . Q7 — (A) $\Delta \neq 0$. Q8 — (A) $\frac{1}{2} |\det|$.
 Q9 — 10.
 Q10 — $A \cdot \text{adj}(A) = |A| I$.
 Q11 — Multiplied by k .
 Q12 — $A^{-1} = \text{adj}(A)/|A|$.
 Q13 — $\Delta \neq 0$.
 Q14 — $\frac{1}{2} |\det \text{ of coordinate matrix}|$.
 Q15 — -31 .
 Q16 — $a^2 - b^2$.
 Q17 — $|A| = -2$, invertible.
 Q18 — $x = 1$, $y = 2$.

Q19 — Proof as in notes.

Q20 — $A^{-1} = \begin{bmatrix} 2 & -1 & -1 \\ -1 & 0 & 1 \\ -1 & 1 & -1 \end{bmatrix}$; area = 0 $\Rightarrow$ collinear.