Master Testing Agency
Practice papers, exam-standard · www.mastertestingagency.com

Matrices — CBSE Class 12 Mathematics Chapter Test

FREE CHAPTER TEST · CLASS XII · MATHEMATICS (041) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	19 (A 10 · B 3 · C 2 · D 2 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 19 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–13 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q14–15 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q16–17 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q18–19 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed. log x denotes the natural logarithm of x.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class XII Mathematics (041) Sample Question Paper 2026-27, released on 21 September 2026 at cbseacademic.nic.in, at half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

All questions are original and © Master Testing Agency. Free to download and use for personal practice; not for resale. Master Testing Agency is an independent test-prep publisher, not affiliated with, endorsed by or connected to the Central Board of Secondary Education (CBSE) or any other exam-conducting body.

Chapter: Matrices · **Topics:** Order, types and equality of matrices · Operations on matrices · Transpose; symmetric and skew-symmetric matrices · Properties and non-commutativity of multiplication · Invertible matrices

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The number of all possible matrices of order 2×2 with each entry 0 or 1 is 1

(A) 4 (B) 8

(C) 16 (D) 32

2. If A is a matrix of order 3×4 and B is of order 4×2, the order of AB is 1

(A) 3×2 (B) 4×4

(C) 2×3 (D) AB is not defined

3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then $A + A'$ is 1

(A) $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 5 \\ 5 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 5 \\ 5 & 4 \end{bmatrix}$ (D) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

4. If $A = [a_{ij}]$ is a skew-symmetric matrix, then each diagonal element a_{ii} equals 1

(A) 1 (B) -1

(C) $a_{ji} + 1$ (D) 0

5. If $\begin{bmatrix} x + y & 2 \\ 5 & x - y \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 2 \end{bmatrix}$, then (x, y) is 1

(A) (4, 2) (B) (2, 4)

(C) (3, 3) (D) (5, 1)

6. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^{2027} equals 1

(A) I (B) O

(C) $-A$ (D) A

7. If A is a square matrix such that $A^2 = A$, then $(I + A)^2 - 3A$ equals 1

(A) A (B) O

(C) I (D) 2A

8. The matrix $\begin{bmatrix} 2 & -1 \\ 3 & k \end{bmatrix}$ is not invertible when k equals 1

(A) $\frac{3}{2}$ (B) $-\frac{3}{2}$

(C) $\frac{2}{3}$ (D) $-\frac{2}{3}$

9. **Assertion (A):** For $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$, AB = O although A ≠ O and B ≠ O. 1

Reason (R): Matrix multiplication is commutative.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

10. **Assertion (A):** Every square matrix can be expressed as the sum of a symmetric and a skew-symmetric matrix. 1

Reason (R): For any square matrix A, $A + A'$ is symmetric and $A - A'$ is skew-symmetric.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

SECTION B

This section comprises 3 very short answer (VSA) type questions of 2 marks each.

11. If $A = \begin{bmatrix} 2 & 3 \\ -1 & 0 \end{bmatrix}$, show that $A^2 - 2A + 3I = O$. Hence find A^{-1}. 2

12. (a) Find x and y if $2\begin{bmatrix} x & 3 \\ 4 & y+1 \end{bmatrix} + \begin{bmatrix} 1 & -2 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 9 & 4 \\ 13 & 11 \end{bmatrix}$. 2

OR

(b) If $A = \begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}$, find A^2, and the value of a for which $A^2 = \begin{bmatrix} 1 & 6 \\ 0 & 1 \end{bmatrix}$.

13. Construct the 2 × 3 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = |2i - 3j|$. 2

SECTION C

This section comprises 2 short answer (SA) type questions of 3 marks each.

14. (a) Find the matrix X such that 2A + 3X = 5B, where $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -1 \\ 6 & 7 \end{bmatrix}$. 3

OR

(b) If $A = \begin{bmatrix} 4 & -1 \\ 2 & 1 \end{bmatrix}$, show that $A^2 - 5A + 6I = O$, and hence find A^{-1}.

15. If $A = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & -3 \end{bmatrix}$, verify that $(AB)' = B'A'$. 3

SECTION D

This section comprises 2 long answer (LA) type questions of 5 marks each.

16. (a) If $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$, show that $A^3 - 3A^2 + 3A - 2I = O$. Hence find A^{-1}. 5

OR

(b) A shop sells pens at ₹ 10, notebooks at ₹ 40 and files at ₹ 25 each. On Monday it sells 20 pens, 10 notebooks and 5 files; on Tuesday 15, 12 and 8; on Wednesday 10, 20 and 6. Using matrix multiplication, find the sales on each day and the total sales.

17. Express $A = \begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrix. 5

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

18. Three friends Asha, Bhanu and Chitra buy stationery. Asha buys 2 pens, 3 notebooks and 1 file; Bhanu buys 4 pens, 1 notebook and 2 files; Chitra buys 3 pens, 2 notebooks and 2 files. A pen costs ₹ 15, a notebook ₹ 40 and a file ₹ 30. Let Q be the 3 × 3 matrix of quantities (one row per friend) and P the 3 × 1 matrix of prices.

(i) Write the order of the matrix QP. [1]

(ii) Find the amount Asha pays. [1]

(iii) Find QP, and the total amount paid by the three friends. [2]

OR

(iii) If all prices rise by 10 %, write the new price matrix and find the new amount Chitra pays. [2]

19. A message is coded by writing it as pairs of numbers, each pair a column matrix X, and sending the column KX, where $K = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$. The receiver decodes with the matrix $L = \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$.

(i) Encode the pair $X = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$. [1]

(ii) Show that $KL = I$. [1]

(iii) Decode the received column $\begin{bmatrix} 9 \\ 6 \end{bmatrix}$. [2]

OR

(iii) Find K^2, and show that $K^2 - 3K + I = O$. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(C)	(A)	(B)	(D)	(A)	(D)	(C)	(B)	(C)	(A)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (C). Four entries, each with 2 choices: $2^4 = 16$.

Q2. Answer (A). $(3 \times 4)(4 \times 2)$ gives 3×2.

Q3. Answer (B). $A' = [[1, 3], [2, 4]]$; $A + A' = [[2, 5], [5, 8]]$ (a symmetric matrix).

Q4. Answer (D). $a_{ii} = -a_{ii}$ gives $a_{ii} = 0$.

Q5. Answer (A). $x + y = 6$ and $x - y = 2$ give $x = 4$, $y = 2$.

Q6. Answer (D). $A^2 = I$, so $A^{27} = (A^2)^{13}A = A$.

Q7. Answer (C). $(I + A)^2 = I + 2A + A^2 = I + 3A$, so $(I + A)^2 - 3A = I$.

Q8. Answer (B). It is singular when $2k - (-1)(3) = 2k + 3 = 0$, i.e. $k = -3/2$.

Q9. Answer (C). $AB = [[1 - 1, -1 + 1], [1 - 1, -1 + 1]] = O$, so A is true. R is false: in general $AB \neq BA$. Answer (C).

Q10. Answer (A). $A = \frac{1}{2}(A + A') + \frac{1}{2}(A - A')$, and R gives the nature of each part. Answer (A).

Q11. (2 marks) Answer: $A^{-1} = (1/3)[[0, -3], [1, 2]]$.
$A^2 = [[4 - 3, 6 + 0], [-2 + 0, -3 + 0]] = [[1, 6], [-2, -3]]$; $A^2 - 2A + 3I = [[1 - 4 + 3, 6 - 6], [-2 + 2, -3 - 0 + 3]] = O$. [1]
Multiplying by A^{-1}: $A - 2I + 3A^{-1} = O$, so $A^{-1} = (2I - A)/3 = (1/3)[[0, -3], [1, 2]]$. [1]

Q12. (2 marks) Answer: (a) $x = 4$, $y = 3$; (b) $A^2 = [[1, 2a], [0, 1]]$, $a = 3$.
(a) Comparing entries: $2x + 1 = 9$ and $2(y + 1) + 3 = 11$. [1] So $x = 4$ and $y = 3$ (the other entries, $6 - 2 = 4$ and $8 + 5 = 13$, agree). [1]
OR (b) $A^2 = [[1, a], [0, 1]][[1, a], [0, 1]] = [[1, 2a], [0, 1]]$. [1] So $2a = 6$, $a = 3$. [1]

Q13. (2 marks) Answer: $[[1, 4, 7], [1, 2, 5]]$.
$a_{11} = |2 - 3| = 1$, $a_{12} = |2 - 6| = 4$, $a_{13} = |2 - 9| = 7$; $a_{21} = |4 - 3| = 1$, $a_{22} = |4 - 6| = 2$, $a_{23} = |4 - 9| = 5$. [1]
$A = [[1, 4, 7], [1, 2, 5]]$. [1]

Q14. (3 marks) Answer: (a) $[[6, -3], [8, 9]]$; (b) $A^{-1} = (1/6)[[1, 1], [-2, 4]]$.
(a) $3X = 5B - 2A$. [1] $5B - 2A = [[20 - 2, -5 - 4], [30 - 6, 35 - 8]] = [[18, -9], [24, 27]]$. [1] $X = [[6, -3], [8, 9]]$. [1]
OR (b) $A^2 = [[16 - 2, -4 - 1], [8 + 2, -2 + 1]] = [[14, -5], [10, -1]]$. [1] $A^2 - 5A + 6I = [[14 - 20 + 6, -5 + 5], [10 - 10, -1 - 5 + 6]] = O$. [1] Multiplying by A^{-1}: $A - 5I + 6A^{-1} = O$, so $A^{-1} = (5I - A)/6 = (1/6)[[1, 1], [-2, 4]]$. [1]

Q15. (3 marks) Answer: verified.
$AB = [[-1, 2, -3], [2, -4, 6], [-3, 6, -9]]$, so $(AB)' = [[-1, 2, -3], [2, -4, 6], [-3, 6, -9]]$ (AB is symmetric). [1½]
$B'A' = [[-1], [2], [-3]]\ [[1, -2, 3]] = [[-1, 2, -3], [2, -4, 6], [-3, 6, -9]]$. [1]
So $(AB)' = B'A'$. [½]

Q16. (5 marks) Answer: (a) $A^{-1} = (1/2)[[1, -1, 1], [1, 1, -1], [-1, 1, 1]]$; (b) ₹ 725, ₹ 830, ₹ 1050; ₹ 2605.
(a) $A^2 = [[1, 2, 1], [1, 1, 2], [2, 1, 1]]$. [1] $A^3 = A^2A = [[2, 3, 3], [3, 2, 3], [3, 3, 2]]$. [1] $A^3 - 3A^2 + 3A - 2I$: e.g. the (1, 1) entry is $2 - 3 + 3 - 2 = 0$ and the (1, 2) entry $3 - 6 + 3 - 0 = 0$; all entries are 0. [1] Multiplying by A^{-1}: $A^2 - 3A + 3I - 2A^{-1} = O$. [1] $A^{-1} = (A^2 - 3A + 3I)/2 = (1/2)[[1, -1, 1], [1, 1, -1], [-1, 1, 1]]$. [1]
OR (b) Sales matrix S (rows Monday, Tuesday, Wednesday; columns pens, notebooks, files) = [[20, 10, 5], [15, 12, 8], [10, 20, 6]]; price column P = [[10], [40], [25]]. [1] SP gives each day's sales: Monday 200 + 400 + 125 = 725; Tuesday 150 + 480 + 200 = 830; Wednesday 100 + 800 + 150 = 1050. [3] Total = ₹ 2605. [1]

Q17. (5 marks) Answer: P = [[1, −3/2, 1/2], [−3/2, 8, 9/2], [1/2, 9/2, 5]], Q = [[0, 9/2, 9/2], [−9/2, 0, −3/2], [−9/2, 3/2, 0]]. $A' = [[1, -6, -4], [3, 8, 6], [5, 3, 5]]$. [1]
$P = ½(A + A') = ½[[2, -3, 1], [-3, 16, 9], [1, 9, 10]] = [[1, -3/2, 1/2], [-3/2, 8, 9/2], [1/2, 9/2, 5]]$, which is symmetric ($P' = P$). [1½]
$Q = ½(A - A') = ½[[0, 9, 9], [-9, 0, -3], [-9, 3, 0]] = [[0, 9/2, 9/2], [-9/2, 0, -3/2], [-9/2, 3/2, 0]]$, which is skew-symmetric ($Q' = -Q$). [1½]
$P + Q = A$. [1]

Q18. (4 marks) Answer: (i) 3×1; (ii) ₹ 180; (iii) [[180], [160], [185]], ₹ 525; or ₹ 203.50.
(i) $(3 \times 3)(3 \times 1) = 3 \times 1$. [1]
(ii) $2 \times 15 + 3 \times 40 + 1 \times 30 = 30 + 120 + 30 =$ ₹ 180. [1]
(iii)(a) QP = [[180], [60 + 40 + 60], [45 + 80 + 60]] = [[180], [160], [185]]. [1] Total ₹ 525. [1]
OR (iii)(b) New $P = 1.1P = [[16.5], [44], [33]]$. [1] Chitra pays $3 \times 16.5 + 2 \times 44 + 2 \times 33 = 49.5 + 88 + 66 =$ ₹ 203.50. [1]

Q19. (4 marks) Answer: (i) [[11], [8]]; (ii) I; (iii) [[3], [3]]; or $K^2 = [[5, 3], [3, 2]]$.
(i) $KX = [[6 + 5], [3 + 5]] = [[11], [8]]$. [1]
(ii) $KL = [[2 - 1, -2 + 2], [1 - 1, -1 + 2]] = I$, so $L = K^{-1}$. [1]
(iii)(a) $X = L[[9], [6]]$ [1] $= [[9 - 6], [-9 + 12]] = [[3], [3]]$. [1]
OR (iii)(b) $K^2 = [[5, 3], [3, 2]]$. [1] $K^2 - 3K + I = [[5 - 6 + 1, 3 - 3], [3 - 3, 2 - 3 + 1]] = O$. [1]

All questions are original and © Master Testing Agency. Free to download and use for personal practice; not for resale. Every answer in this paper was checked independently by computer in exact fractions: products, powers, transposes, inverses and every stated identity were computed.