NCERT Solutions Class 12 Maths
Chapter 4: Determinants
Exercise 4.2

Document Information:
Class: 12 | **Subject:** Mathematics | **Chapter:** 4 | **Exercise:** 4.2
Total Questions: 5 | **Academic Year:** 2025-26
Source: www.ncertbooks.net | **Generated:** February 21, 2026

Quick Summary: In NCERT Solutions Class 12 Maths Chapter 4 Exercise 4.2, students learn the fundamental properties of determinants and their practical applications in coordinate geometry. This exercise covers area calculation of triangles using determinants, collinearity of points, and finding equations of lines, which are essential topics for CBSE Class 12 board exams and competitive entrance tests.

Key Takeaways:

- Area of triangle with vertices $(x_1, y_1), (x_2, y_2), (x_3, y_3) = (1)/(2)\left|\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}\right|$
- Three points are collinear if the determinant formed by their coordinates equals zero
- Equation of line passing through two points can be found using determinant form
- Properties of determinants help solve geometric problems involving areas, distances, and linear equations efficiently

Complete Solutions

Question 1

QUESTION

Find area of the triangle with vertices at the point given in each of the following:

(i) (1,0), (6,0), (4,3)

(ii) (2,7), (1,1), (10,8)

(iii) (-2,-3), (3,2), (-1,-8)

SOLUTION

This question tests the student's understanding of how to calculate the area of a triangle using determinants when the vertices are given.

(i) Vertices:

Step 1: Write the determinant formula for the area of a triangle.

The area of a triangle with vertices , , and is given by:

Step 2: Substitute the given vertices into the determinant.

Step 3: Evaluate the determinant.

Expanding along the first row:

Final Answer: The area of the triangle is square units.

(ii) Vertices:

Step 1: Substitute the given vertices into the determinant.

Step 2: Evaluate the determinant.

Expanding along the first row:

Final Answer: The area of the triangle is square units.

(iii) Vertices:

Step 1: Substitute the given vertices into the determinant.

Step 2: Evaluate the determinant.

Expanding along the first row:

Final Answer: The area of the triangle is square units.

ANSWER

(i) (15)/(2)

(ii) (47)/(2)

(iii) 15

Question 2

QUESTION

Show that points A(a, b+c),\; B(b, c+a),\; C(c, a+b) are collinear.

SOLUTION

We need to show that the points , , and are collinear. Points are collinear if they lie on the same straight line. One way to prove collinearity is to show that the area of the triangle formed by these points is zero.

Step 1: Write down the determinant formula for the area of a triangle.

The area of a triangle with vertices , , and is given by:

Step 2: Substitute the coordinates of points A, B, and C into the determinant.

In our case, , , and . So the area is:

Step 3: Apply determinant properties to simplify the determinant.

Apply the column operation :

Step 4: Factor out the common term from the second column.

We can factor out from the second column:

Step 5: Evaluate the determinant.

Since the second and third columns are identical, the determinant is zero.

Step 6: Calculate the area.

Final Answer:

Since the area of the triangle formed by the points , , and is 0, the points are collinear.

ANSWER

Question 3

QUESTION

Find values of k if area of triangle is 4 sq. units and vertices are

(i) (k,0), (4,0), (0,2)

(ii) (-2,0), (0,4), (0,k)

SOLUTION

This question tests our understanding of how to calculate the area of a triangle using determinants, and how to solve for an unknown variable when the area is given.

(i) Vertices: ; Area = 4 sq. units

Step 1: Write the formula for the area of a triangle using determinants

The area of a triangle with vertices , , and is given by:

Step 2: Substitute the given vertices into the formula

Step 3: Evaluate the determinant

Expanding along the first row:

Step 4: Solve for k

This gives us two cases:

Case 1:

Case 2:

Therefore,

(ii) Vertices: ; Area = 4 sq. units

Step 1: Write the formula for the area of a triangle using determinants

Step 2: Substitute the given vertices into the formula

Step 3: Evaluate the determinant

Expanding along the first column:

Step 4: Solve for k

This gives us two cases:

Case 1:

Case 2:

Therefore,

ANSWER

(i) $k = 0,\; 8$

(ii) $k = 0,\; 8$

Question 4

QUESTION

(i) Find equation of line joining (1,2) and (3,6) using determinants.

(ii) Find equation of line joining (3,1) and (9,3) using determinants.

SOLUTION

This question tests our understanding of how to find the equation of a line passing through two given points using determinants.

(i) Find the equation of the line joining and using determinants.

Step 1: Recall the determinant form for the equation of a line.

The equation of the line passing through points and is given by:

Step 2: Substitute the given points.

Here, and . Substituting these values into the determinant equation, we get:

Step 3: Expand the determinant.

Expanding the determinant along the first row, we have:

Step 4: Simplify the equation.

Final Answer: The equation of the line is .

(ii) Find the equation of the line joining and using determinants.

Step 1: Substitute the given points.

Here, and . Substituting these values into the determinant equation, we get:

Step 2: Expand the determinant.

Expanding the determinant along the first row, we have:

Step 3: Simplify the equation.

Final Answer: The equation of the line is .

ANSWER

(i) y = 2x

(ii) x - 3y = 0

Question 5

QUESTION

If area of triangle is 35 sq units with vertices (2,-6), (5,4) and (k,4). Then k is

(A) 12

(B) -2

(C) -12, -2

(D) 12, -2

SOLUTION

We are given the area of a triangle and its vertices, and we need to find the possible values of .

Step 1: Recall the formula for the area of a triangle given its vertices

The area of a triangle with vertices , , and is given by:

Step 2: Substitute the given values

We have the vertices , , and , and the area is 35 sq units. Substituting these values into the formula, we get:

Step 3: Simplify the equation

Step 4: Solve for k

We have two cases:

Case 1:

Case 2:

Step 5: State the final answer

Therefore, the possible values of are 12 and -2.

The correct answer is (D) 12, -2

ANSWER

(D)

Relevant Resources

Explore more NCERT solutions (click links to visit):

Resource	Visit Link
NCERT Class 12 Sociology Textbook	Download Book →
NCERT Class 10 Maths (Foundation)	View Solutions →

📐 Key Formulas

Important Formulas for Exercise 4.2

Formula / Concept	Description
Property 1: Reflection Property	The value of the determinant remains unchanged if its rows and columns are interchanged. If A is a square matrix, then $\|A\| = \|A'\|$, where A' is the transpose of A.
Property 2: All-Zero Property	If all the elements of a row or a column of a determinant are zero, then the value of the determinant is zero.
Property 3: Switching Property	If any two rows or columns of a determinant are interchanged, then the sign of the determinant changes.
Property 4: Repetition / Proportionality Property	If any two rows or columns of a determinant are identical or proportional, then the value of the determinant is zero.
Property 5: Scalar Multiple Property	If each element of a row or a column of a determinant is multiplied by a constant k, then its value gets multiplied by k.
Property 6: Sum Property	If some or all elements of a row or column of a determinant are expressed as the sum of two or more terms, then the determinant can be expressed as the sum of two or more determinants.
Property 7: Property of Invariance	If to each element of any row or column of a determinant, the equimultiples of corresponding elements of other row (or column) are added, then the value of the determinant remains the same.
Cramer's Rule for a System of Two Linear Equations	For a system of equations $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$, the solution is given by $x = (D_x)/(D)$ and $y = (D_y)/(D)$, where $D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} \neq 0$, $D_x = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}$, and $D_y = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}$.
Cramer's Rule for a System of Three Linear Equations	For a system of equations $a_1x + b_1y + c_1z = d_1$, $a_2x + b_2y + c_2z = d_2$, and $a_3x + b_3y + c_3z = d_3$, the solution is given by $x = (D_x)/(D)$, $y = (D_y)/(D)$, and $z = (D_z)/(D)$, where $D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} \neq 0$, $D_x = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}$, $D_y = \begin{vmatrix} a_1 & d_1 & c_1 \\$

Formula / Concept	Description
	a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \endvmatrix, and D_z = \beginvmatrix a_1 & b_1 & d_1 \\ a_2 & b_2 & d_2 \\ a_3 & b_3 & d_3 \endvmatrix.
Condition for Consistency	A system of equations is consistent if it has one or more solutions. For a system of linear equations AX = B: - If |A| ≠ 0, the system is consistent and has a unique solution. - If |A| = 0 and (\textadj A)B = 0, the system may be consistent with infinitely many solutions. - If |A| = 0 and (\textadj A)B ≠ 0, the system is inconsistent and has no solution.

Top FAQs

Q1. How many questions are in NCERT Solutions Class 12 Maths Chapter 4 Determinants Exercise 4.2?

NCERT Solutions for Class 12 Maths Chapter 4 Determinants Exercise 4.2 contains exactly 5 questions. These questions focus on Properties of Determinants and help students prepare for CBSE board exam 2025-26, where this unit carries significant weightage in Unit II - Algebra.

Q2. Where can I download free PDF of NCERT Solutions for Class 12 Maths Chapter 4 Determinants Exercise 4.2 with step by step solutions?

You can download free PDF of NCERT Solutions for Class 12 Maths Chapter 4 Determinants Exercise 4.2 from the official NCERT website or various educational platforms offering step by step solutions. These PDFs include detailed explanations of all 5 questions covering Properties of Determinants for CBSE board exam 2025-26 preparation.

Q3. How many marks does Chapter 4 Determinants carry in CBSE Class 12 Maths board exam 2025-26?

Chapter 4 Determinants carries 5 marks in CBSE Class 12 Maths board exam 2025-26 as part of Unit II - Algebra. NCERT Solutions for Class 12 Maths Chapter 4 Exercise 4.2 helps students master Properties of Determinants which is crucial for scoring full marks in this section.

Q4. Which is the most difficult question in NCERT Solutions Class 12 Maths Chapter 4 Determinants Exercise 4.2?

Question 5 in NCERT Solutions Class 12 Maths Chapter 4 Determinants Exercise 4.2 is generally considered the most challenging as it involves complex applications of Properties of Determinants. Students should practice step by step solutions for this question to prepare effectively for CBSE board exam 2025-26.

Q5. What is Properties of Determinants covered in NCERT Solutions for Class 12 Maths Chapter 4 Exercise 4.2?

Properties of Determinants in NCERT Class 12 Maths Chapter 4 Exercise 4.2 include row and column transformations, effects of interchanging rows/columns, and how multiplication factors affect determinant values. These 5 questions with step by step solutions help students understand fundamental concepts essential for CBSE board exam 2025-26.

📚 More Exercises

Visit all exercises from Chapter 4:

Exercise 4.1 →

Exercise 4.2 ✓ →

Exercise 4.3 →

Exercise 4.4 →

Exercise 4.5 →

Miscellaneous Exercise on Chapter 4 →

🌐 **Complete Chapter:** Class 12 Maths Ch 4: Determinants →