

CHAPTER 3

Coordinate Geometry

CBSE · Mathematics · Class 9

WHAT THIS CHAPTER DOES

Boards prep that builds confidence, not anxiety.

TODAY'S MISSION

Today's Mission

WHY THIS MATTERS

From Number Line to Cartesian Plane

TOPIC

A

Part A — The Cartesian Plane

TOPIC

Descartes' Big Idea

POINT 1

POINT 2

POINT 3

POINT 4

WORKED EXAMPLE

Build the x-axis from a number line

- 1 Draw a horizontal straight line with arrows at both ends
- 2 Mark a point on it and call it the origin O
- 3 Mark equal divisions to the right and label them 1, 2, 3, 4 (positive x)
- 4 Mark equal divisions to the left and label them -1, -2, -3, -4 (negative x)
- 5 This horizontal labelled line is the x-axis



THEOREM · LOAD-BEARING RESULT

The Two Axes



The Cartesian plane is formed by two perpendicular number lines: the horizontal x-axis (XOX') and the vertical y-axis (YOY'). Their intersection point is called the origin, denoted $O = (0, 0)$.

STATEMENT

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WHY THIS MATTERS

- Two perpendicular references are enough to pin down any point on a flat surface — exactly like latitude and longitude on Earth.

WATCH OUT FOR

NOTE Always draw arrows on BOTH ends of EACH axis to mark positive direction. The CBSE markers deduct half mark when arrows or axis labels are missing.

TOPIC

The Four Quadrants

POINT 1

POINT 2

POINT 3

POINT 4

TOPIC

Sign Chart — One Glance

TRY IT · SOLVE BEFORE YOU PEEK

30-Second Check

Work it out before you flip the answer.

SOLUTION

TOPIC

B

Part B — Ordered Pairs and Plotting

THEOREM · LOAD-BEARING RESULT

Ordered Pair



Every point in the plane is associated with a unique ordered pair (x, y) where x is the abscissa (horizontal distance from y -axis, with sign) and y is the ordinate (vertical distance from x -axis, with sign).

STATEMENT

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WHY THIS MATTERS

- The word 'ordered' means the position matters
- $(3, 5)$ and $(5, 3)$ name two DIFFERENT points
- This 1-to-1 link between points and pairs is what makes algebra and geometry talk to each other.

WATCH OUT FOR

NOTE Always write x first, then y .
Memory hook: ' x comes before y in the alphabet just as left comes before up'.

TOPIC

How to Plot a Point (x, y) — 4-Step Drill

WORKED EXAMPLE

Plot P(3, -2)

- 1 From origin O move 3 units to the right along the x-axis (since $x = 3$ is positive)
- 2 From that stop move 2 units downward parallel to the y-axis (since $y = -2$ is negative)
- 3 Mark the point and label it P
- 4 P lies in Quadrant IV: x is positive, y is negative
- 5 Cross-check: abscissa = 3, ordinate = -2 — matches the given pair

TOPIC

Reading Coordinates from a Plotted Point

POINT 1

POINT 2

POINT 3

WORKED EXAMPLE

Read coordinates of a point Q in Quadrant II

1 Drop a perpendicular from Q onto the x-axis; it meets the axis at -4

2 So abscissa = -4

3 Drop a perpendicular from Q onto the y-axis; it meets the axis at 3

4 So ordinate = 3

5 Therefore $Q = (-4, 3)$ — confirmed in Quadrant II since $(-, +)$

TOPPER TEMPLATE · MARK-BY-MARK

Model 2-Mark Answer — Plot Points and Name the Figure

1

2

3

4

5

TOPIC

Special Points You Must Recognise

PYQ PATTERNS

Top 5 PYQ Patterns — How Examiners Test Coordinate Geometry

MARKS DISTRIBUTION

Where the Marks Hide — Sub-topic Weightage

TOPIC

Pre-Exam Self-Check

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** (3, 5) and (5, 3) name the same point.

✓ **CORRECT** An ordered pair is ORDERED — the first number is always the x-coordinate (abscissa) and the second is the y-coordinate (ordinate). (3, 5) and (5, 3) are two different points.

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** A point on the x-axis has x-coordinate 0.

✓ **CORRECT** A point on the x-axis has y-coordinate = 0 (its height above x-axis is zero). A point on the y-axis has x-coordinate = 0.

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** The point $(-4, -2)$ lies in the second quadrant.

✓ **CORRECT** Both coordinates negative means third quadrant (III). Sign pattern: I $(+, +)$, II $(-, +)$, III $(-, -)$, IV $(+, -)$.

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** The origin lies in the first quadrant.

✓ **CORRECT** The origin $(0, 0)$ lies on BOTH axes simultaneously — it does not belong to any quadrant.

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** Abscissa means y-coordinate.

✓ **CORRECT** Abscissa = x-coordinate (horizontal); Ordinate = y-coordinate (vertical). Memory hook: 'A' before 'O' just as x-axis is named before y-axis.

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** To plot (4, -3), move 4 units up and 3 units right.

✓ **CORRECT** Move 4 units along the x-axis (right because +ve) THEN 3 units along the y-axis (down because -ve). Always x-first, y-second.

TOPIC

Trap

TRAP → TRUTH

× **MISTAKE** The quadrant boundaries (the axes themselves) belong to one quadrant.

✓ **CORRECT** Points lying ON an axis are NOT in any quadrant — they are on the axis. Only points where BOTH coordinates are non-zero sit inside a quadrant.

PYQ PATTERNS

Top PYQ patterns to drill

#1	Identify the quadrant from given coordinates (1 marks)	90%
#2	Plot four points and name the figure formed (2 marks)	80%
#3	Read coordinates of a given plotted point (1 marks)	60%
#4	Write coordinates of a point on an axis (1 marks)	50%
#5	Mirror image / reflection of a point (2 marks)	30%

RECAP · MEMORISE THESE

Summary — Coordinate Geometry in One Slide

1 Cartesian plane = two perpendicular number lines meeting at origin $O(0, 0)$

2 Horizontal axis = x-axis; vertical axis = y-axis

3 Ordered pair (x, y) : abscissa first, ordinate second — order matters

4 Four quadrants — signs: I(+,+), II(-,+), III(-,-), IV(+,-) anticlockwise

5 Point on x-axis has $y = 0$; point on y-axis has $x = 0$

6 Origin and axes do not belong to any quadrant

WHAT'S NEXT

Coming Up Next



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