COORDINATE GEOMETRY
- DISTANCE FORMULA CHEAT SHEET -



1 CHAPTER SNAPSHOT

This chapter covers:

- ✓ Cartesian plane & Axes
- ✓ Points & Quadrants
- ✓ Distance Formula
- ✓ Midpoint Formula (mention)
- ✓ Verification of shapes

Coordinate geometry connects algebra and geometry to determine positions on a plane.

2 KEY CONCEPTS

- ★ x-axis, y-axis
- ★ Origin (0,0)
- ★ (x, y) coordinates
- ★ Quadrants

Example points: P(2,3) in QI, Q(-1,4) in QII, R(-2,-1) in QIII

Examples:

- ★ Distances can't be negative
- ★ Origin is a key point

3 FORMULA BOX (UPDATED)

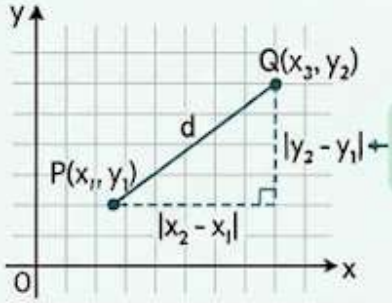
x-coordinates ↑ y-coordinates ↑

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

↓ Distance PQ

Collinear Condition:
AB + BC = AC (using distances) [cite: 4]

4 VISUAL MEMORY AID



Pythagoreon
$d^2 = ||x_2 - x_1||^2 + ||y_2 - y_1||^2$

5 BOARD EXAM FOCUS & HOTSPOTS

Common Question Types:

- ✓ Find distance between two points
- ✓ Check if points are collinear
- ✓ Verify geometric, rectangle, etc.)
- ✓ Find missing coordinate given distance

Example:
Find distance between P(1, 2) and Q(4, 6).

$d = \sqrt{(4-1)^2 + (6-2)^2}$

$= \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25}$

Example:
If distance between (x, 2) and (3, 4) is $\sqrt{2}$, find x. Show simple logic.

EXAM TIPS 6

Distance & Point Tips:

- Square both sides early to remove √.
- Points on x-axis: (x, 0); y-axis: (0, y).
- Equidistant point P from A & B: PA = PB (so $PA^2 = PB^2$).

Comprehensive Shape Conditions:

- **Equilateral Δ:** All 3 sides equal (AB = BC = CA).
- **Isosceles Δ:** Any 2 sides equal (e.g., AB = AC).
- **Scalene Δ:** All 3 sides unequal (AB ≠ BC ≠ CA).
- **Right Δ:** Satisfies $a^2 + b^2 = c^2$ (Hypote = Base² + Perp²).
- **Isosceles Right Δ:** Two sides equal AND $a^2 + b^2 = c^2$.
- **Parallelogram:** Opp. sides equal (AB = CD & BC = DA). Diagonals unequal (AC ≠ BD).
- **Rhombus:** All 4 sides equal (AB = BC = CD = DA). Diagonals unequal (AC ≠ BD).
- **Rectangle:** Opp. sides equal (AB = CD & BC = DA) AND Diagonals equal (AC = BD).
- **Square:** All 4 sides equal (AB = BC = CD = DA) AND Diagonals equal (AC = BD).

7 COMMON MISTAKES

- ⚠ Incorrectly using $(x-y)^2$ or similar
- ⚠ Forgetting to square terms before adding
- ⚠ Dropping the final square root sign
- ⚠ Mis-reading point coordinates
- ⚠ Swapping x and y pairs

8 30-SECOND RAPID REVISION

- ⚠ Incorrectly using $(x-y)^2$ or similar
- ⚠ Forgetting to square terms before adding
- ⚠ Dropping the final square root sign
- ⚠ Mis-reading point coordinates
- ⚠ Swapping x and y pairs

9

The distance formula is the fundamental tool for converting geometric distance into algebra, unlocking analysis for countless positions and shapes.

★ **Remember:** The formula is derived from the **Pythagorean theorem**. Visualize the vertical and horizontal changes on the Cartesian plane. [cite: 4]