

Distance $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ · **Section** $P = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2} \right)$ · **Midpoint** $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

The whole chapter in one line

Two formulas — **distance** and **section** — plus the midpoint, which is just the section formula for the ratio 1 : 1. Everything CBSE asks in this unit is one of those three applied carefully.

Scope note. Class 10 covers **internal division only** (the point lies between A and B). External division and the coordinate **area-of-a-triangle** formula are **not** in the current rationalised syllabus — do not spend revision time on them.

The three formulas and what each one gives you

Formula	What it gives you	Use it when the question...
Distance $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	The length of the segment joining two points	asks how far apart, or to compare side lengths to name a shape
Section ratio $m_1 : m_2 = PA : PB$	The point dividing AB internally in a given ratio	gives a ratio and wants the point, or a point on an axis
k : 1 form $P = \left(\frac{kx_2 + x_1}{k+1}, \frac{ky_2 + y_1}{k+1} \right)$	One unknown instead of two — solve for k, ratio is k : 1	gives the point and wants the ratio
Midpoint the ratio 1 : 1 case	The exact halfway point — a plain average	says midpoint, centre of a diameter, or diagonals bisect

What the question is really asking for

Board phrasing	Set up	Typical marks
"Find the distance between..."	Distance formula, once	1 or 2
"Show that the points form a square / rhombus"	All 4 sides + both diagonals	5
"Find the point dividing AB in 2 : 3"	Section formula, substitute	2 or 3
"In what ratio does the x-axis divide AB?"	k : 1 form, then set y = 0	3
"Find the fourth vertex of the parallelogram"	Midpoints of the two diagonals are equal	3 or 5

Get the signs right before you touch a formula

Sign slips cost more marks here than anything else, and they start at the plotting stage. The **abscissa** is x, the **ordinate** is y, and a point is always written (**x, y**) — in that order.

Quadrant I	Quadrant II	Quadrant III	Quadrant IV	On the axes
(+, +)	(-, +)	(-, -)	(+, -)	x-axis: y = 0 · y-axis: x = 0

Key takeaways

- ▶ Coordinate Geometry is its own **6-mark unit** — small, but the most predictable marks on the paper.
- ▶ Distance answers **how far**; section answers **which point**. Naming that first picks your formula.
- ▶ The section formula **crosses over**: m_1 multiplies the far point x_2 , m_2 the near point x_1 .
- ▶ On the **x-axis y = 0**; on the **y-axis x = 0**. That one line unlocks every axis-ratio question.
- ▶ Almost every lost mark here is a **sign or substitution slip**, not a concept gap.

$A(x_1, y_1), B(x_2, y_2) \rightarrow AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ — compare squares, take the root once at the end

5 MARKS · DISTANCE FORMULA

Show that **A(1, 7), B(4, 2), C(-1, -1) and D(-4, 4) are the vertices of a square.**

Step 1 — the four sides. $AB^2 = (4-1)^2 + (2-7)^2 = 9 + 25 = 34$ · $BC^2 = (-1-4)^2 + (-1-2)^2 = 25 + 9 = 34$ · $CD^2 = (-4+1)^2 + (4+1)^2 = 9 + 25 = 34$ · $DA^2 = (1+4)^2 + (7-4)^2 = 25 + 9 = 34$. So $AB = BC = CD = DA = \sqrt{34}$. (all four sides equal)

Step 2 — the two diagonals. $AC^2 = (-1-1)^2 + (-1-7)^2 = 4 + 64 = 68$ · $BD^2 = (-4-4)^2 + (4-2)^2 = 64 + 4 = 68$. So $AC = BD = \sqrt{68} = 2\sqrt{17}$. (diagonals equal)

Step 3 — conclude. All four sides equal **and** both diagonals equal $\Rightarrow$ ABCD is a **square**. Hence proved.

Check: $68 = 2 \times 34$, so $AC^2 = AB^2 + BC^2$ — the angle at B really is 90° . Equal sides alone would only prove a rhombus; the diagonal step is what earns the last mark.

3 MARKS · SECTION FORMULA

In what ratio does the x-axis divide the segment joining **A(2, -3) and B(5, 6)**? Find the point.

Step 1. A point on the **x-axis** has **y = 0**. Let the ratio be **k : 1**.

Step 2. $y = (k(6) + 1(-3))/(k + 1) = 0 \Rightarrow 6k - 3 = 0 \Rightarrow k = 1/2$. So the ratio is $(1/2) : 1 = 1 : 2$.

Step 3. Substitute $m_1 : m_2 = 1 : 2 \rightarrow x = (1(5) + 2(2))/3 = 9/3 = 3$, $y = (1(6) + 2(-3))/3 = 0/3 = 0$. The point is **(3, 0)**.

Check: y came out 0 on its own, which confirms the ratio. And 1 : 2 puts the point nearer A — A is only 3 units below the axis while B is 6 above, so that is exactly where it should sit.

WHERE THE MARKS ACTUALLY GO

- ▶ **Squaring a negative wrongly.** $(-5)^2 = 25$, not -25 — the single most common slip in this unit.
- ▶ **Stopping at “all sides equal”.** That is a rhombus. A square needs the **diagonals** checked too.
- ▶ **Reversing the ratio.** $m_1 : m_2$ is PA : PB and m_1 pairs with the **far** point.
- ▶ **Rooting too early.** Work in squares, compare, and take $\sqrt{}$ once — fewer surds, fewer errors.

NOW TRY THIS ONE

Three vertices of a parallelogram ABCD are A(1, 2), B(4, 3) and C(6, 6). Find D. *Hint: the diagonals of a parallelogram bisect each other, so the midpoint of AC equals the midpoint of BD.* **Answer:** midpoint of AC = (3.5, 4), so $(4 + x)/2 = 3.5$ and $(3 + y)/2 = 4 \Rightarrow$ **D(3, 5)**. Check: A→B is (3, 1) and D→C is (3, 1) — equal and parallel, as a parallelogram needs.

30-SECOND MIDPOINT DRILL

- ▶ Midpoint of (2, 3) and (6, 7) $\rightarrow$ **(4, 5)** — just average each coordinate.
- ▶ A diameter runs from (-3, 1) to (5, 7). The **centre** is its midpoint $\rightarrow$ **(1, 4)**.
- ▶ P(4, y) is the midpoint of (1, 3) and (7, 9) $\rightarrow (3 + 9)/2 = y = 6$; x checks as $(1 + 7)/2 = 4$.

Turn these two formulas into six guaranteed marks

- ▶ **Chapter 1 free** on examfront — start practising today, no payment.
- ▶ **Mistake identification** tells you whether you lost the mark to a sign, a ratio or the formula.
- ▶ **Anytime tests** on Coordinate Geometry, as many as you want.
- ▶ **Weekly tests** to keep the distance and section formulas sharp all year.
- ▶ **Full mock tests** before the boards, timed like the real paper.

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