EngineeringRise

Coordinates, distance, section formula and locus

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Distance between two points	d = sqrt((x2 - x1)^2 + (y2 - y1)^2) Valid when: Cartesian coordinates with the same unit on both axes	length
Internal division AP : PB = m : n	((m x2 + n x1)/(m + n), (m y2 + n y1)/(m + n)) Valid when: P divides AP : PB = m : n internally, P between A and B	length
External division AP : PB = m : n	((m x2 - n x1)/(m - n), (m y2 - n y1)/(m - n)) Valid when: P divides AP : PB = m : n externally, m not equal to n	length
Midpoint	((x1 + x2)/2, (y1 + y2)/2) Valid when: midpoint of the segment (internal ratio 1 : 1)	length
Slope through two points	m = (y2 - y1)/(x2 - x1) = tan(theta) Valid when: x1 not equal to x2 (non-vertical line)	dimensionless
Parallel and perpendicular lines	m1 = m2 and m1 m2 = -1 Valid when: both lines non-vertical with slopes m1, m2	dimensionless
Area of triangle	(1/2)|x1(y2 - y3) + x2(y3 - y1) + x3(y1 - y2)| Valid when: vertices in order; zero area means collinear points	length squared
Ratio in which the x-axis cuts AB	-y1/y2 Valid when: A and B on opposite sides of the x-axis, y2 not 0	dimensionless
Locus PA^2 + PB^2 = k	circle, centre at midpoint of AB, radius^2 = k/2 - AB^2/4 Valid when: A, B fixed points; needs k >= AB^2/2 for a real circle	length squared

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/mathematics/coordinate-geometry/coordinates-distance-section-formula-and-loc

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