EngineeringRise

Points in space, distance and section formula

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

Result	Formula	Units or note
Distance between P and Q	PQ = sqrt((x2 - x1)^2 + (y2 - y1)^2 + (z2 - z1)^2) Valid when: rectangular axes, same length unit for all coordinates	length units of the coordinates
Distance from the origin	OP = sqrt(x^2 + y^2 + z^2) Valid when: rectangular axes	length
Distance from an axis	x-axis: sqrt(y^2 + z^2); y-axis: sqrt(x^2 + z^2); z-axis: sqrt(x^2 + y^2) Valid when: rectangular axes; drop the coordinate along that axis	length
Internal division m : n	R = (m Q + n P)/(m + n) Valid when: P, Q points; R on segment PQ between them, ratio PR : RQ = m : n	n/a (coordinates)
External division m : n	R = (m Q - n P)/(m - n), m not equal to n Valid when: m not equal to n; R on line PQ outside the segment	n/a (coordinates)
Midpoint	(P + Q)/2 Valid when: any two points P, Q	n/a (coordinates)
Centroid of a triangle	(A + B + C)/3; divides each median 2 : 1 from the vertex Valid when: A, B, C non-collinear vertices	n/a (coordinates)
Parallelogram ABCD	D = A + C - B (diagonals bisect each other) Valid when: ABCD parallelogram taken in order, A and C opposite	n/a (coordinates)
Plane cut ratio (xy-plane)	AR : RB = -z1 : z2; negative means external Valid when: A and B off the plane; negative ratio means external division	dimensionless

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/mathematics/three-dimensional-geometry/points-in-space-distance-and-section-

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