Coordinate Geometry Cheat Sheet

All the key formulas for working with points, lines, and shapes on the coordinate plane.

Distance and Midpoint

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

Midpoint: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2)$

Slope and Line Equations

Slope: $m = (y_2 - y_1) / (x_2 - x_1)$

Point-slope: $y - y_1 = m(x - x_1)$

Slope-intercept: $y = mx + b$

Standard form: $Ax + By = C$

Parallel and Perpendicular

Parallel lines: same slope ($m_1 = m_2$)

Perpendicular: $m_1 \times m_2 = -1$

Equation of a Circle

Standard form: $(x - h)^2 + (y - k)^2 = r^2$

Center = (h, k), Radius = r

General form: $x^2 + y^2 + Dx + Ey + F = 0$

Area of a Triangle (Coordinates)

Formula: $A = (1/2)\lvert x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\rvert$

Uses the three vertices (x_1, y_1), (x_2, y_2), (x_3, y_3). The absolute value ensures a positive area.

Section Formula

Internal division (m:n): $((mx_2 + nx_1)/(m+n), (my_2 + ny_1)/(m+n))$

To find if a point lies on a line or circle, substitute its coordinates into the equation and check if it holds true.