MATHEMATICS

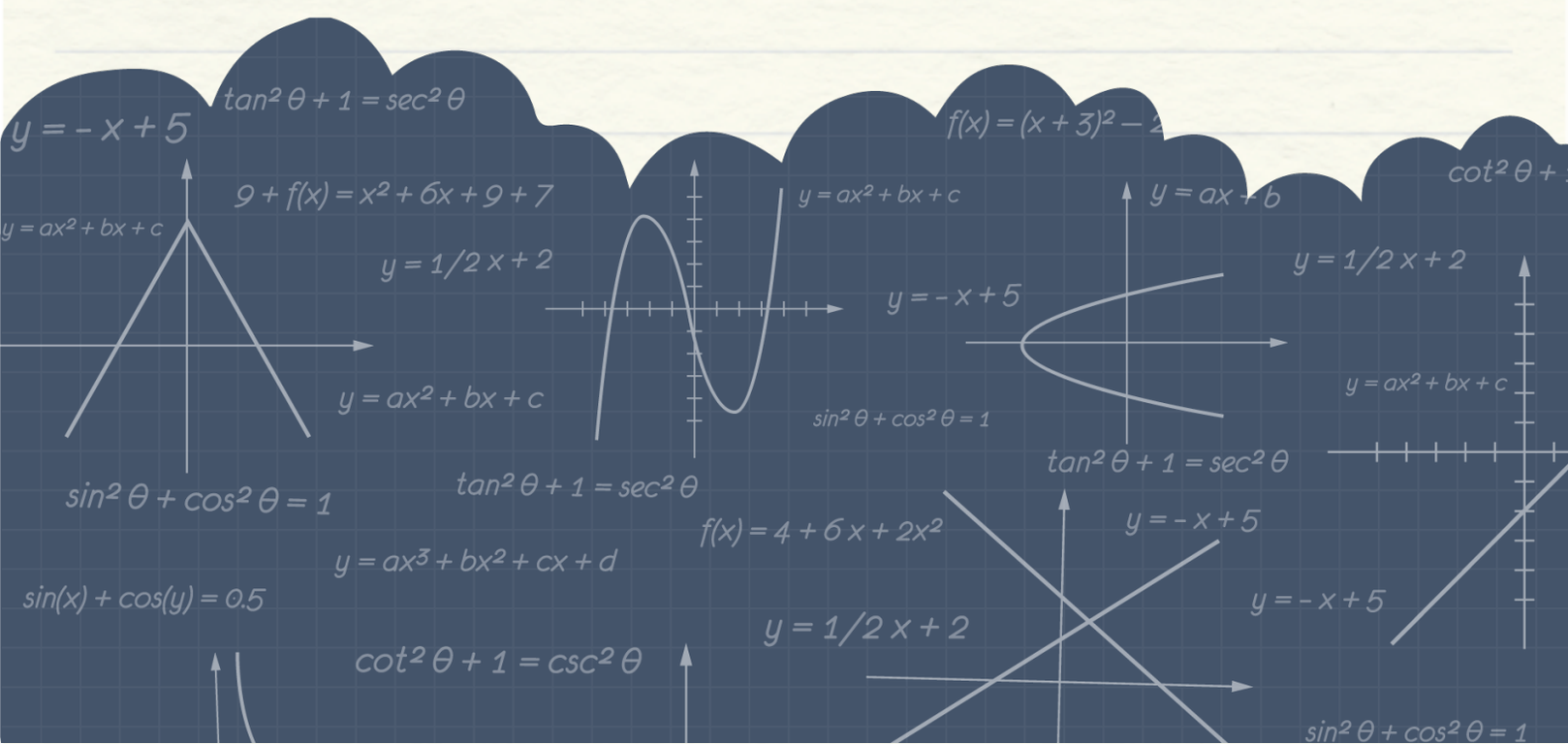
BYJU'S

POST CLASS NOTES

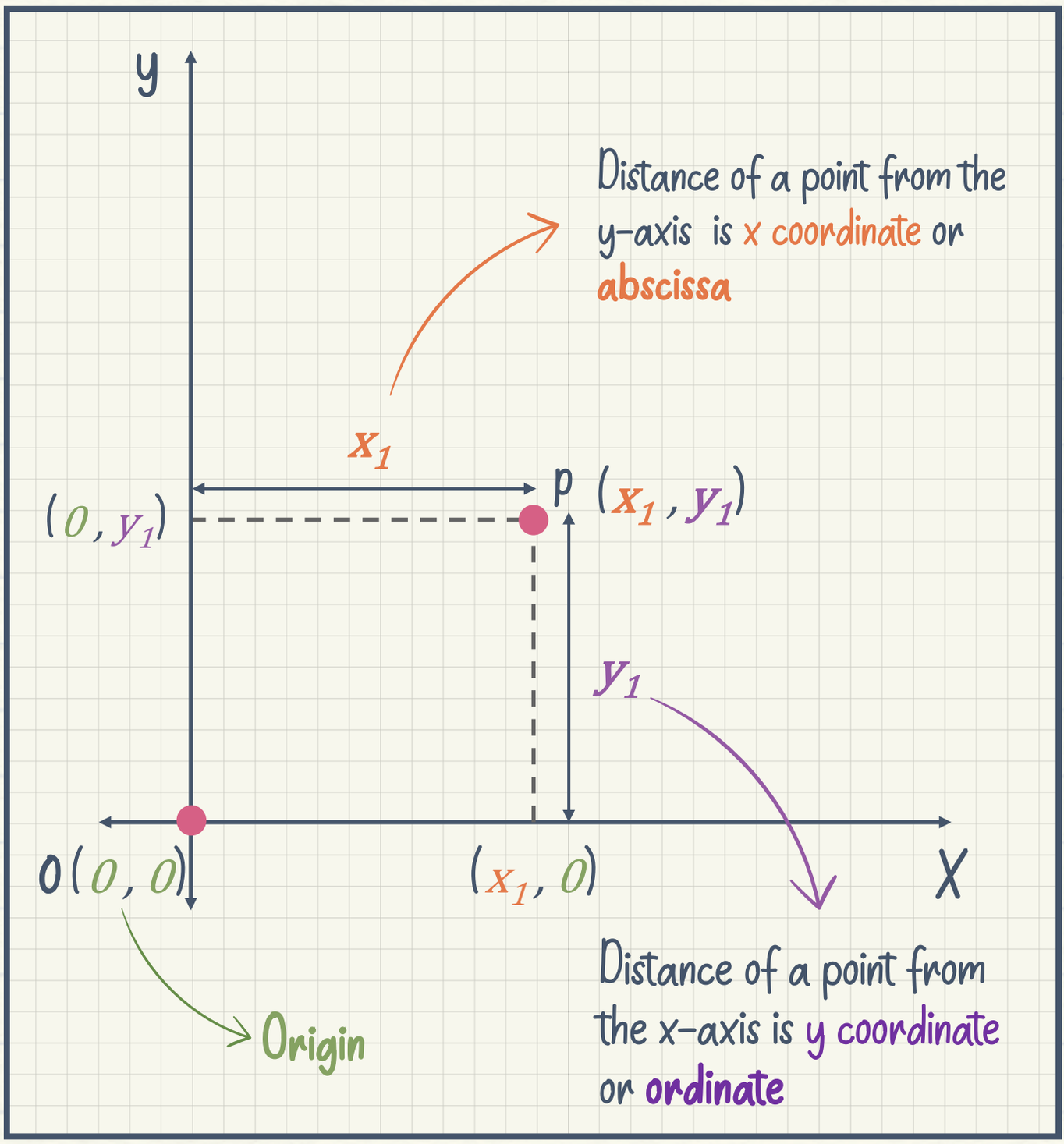
Coordinate Geometry

Topics

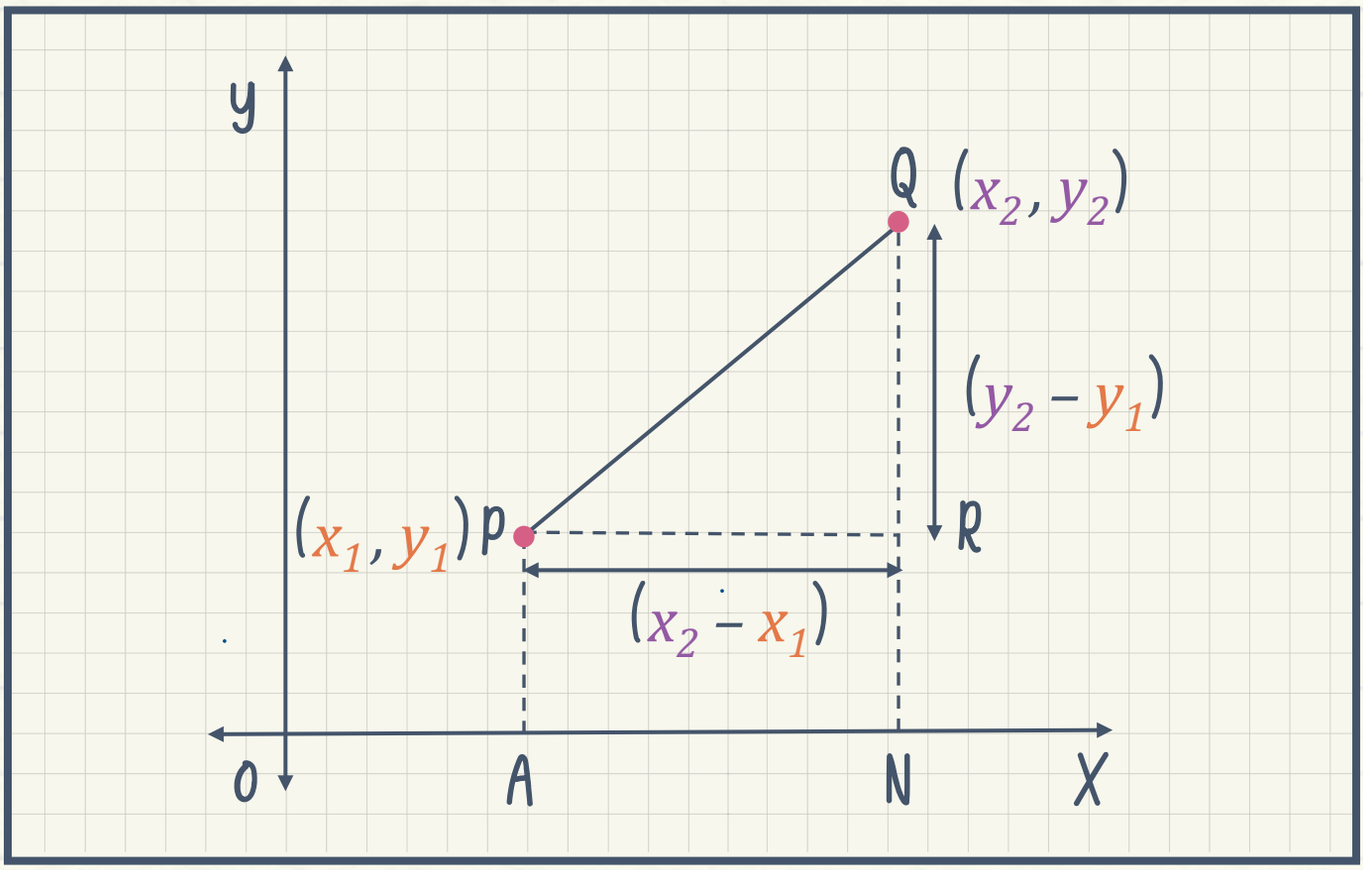
1. Fundamentals
2. Distance Formula
3. Section Formula
   - 3.1 Mid-Point Formula
4. Area of Triangle



Fundamentals



Distance Formula



Steps to Derive

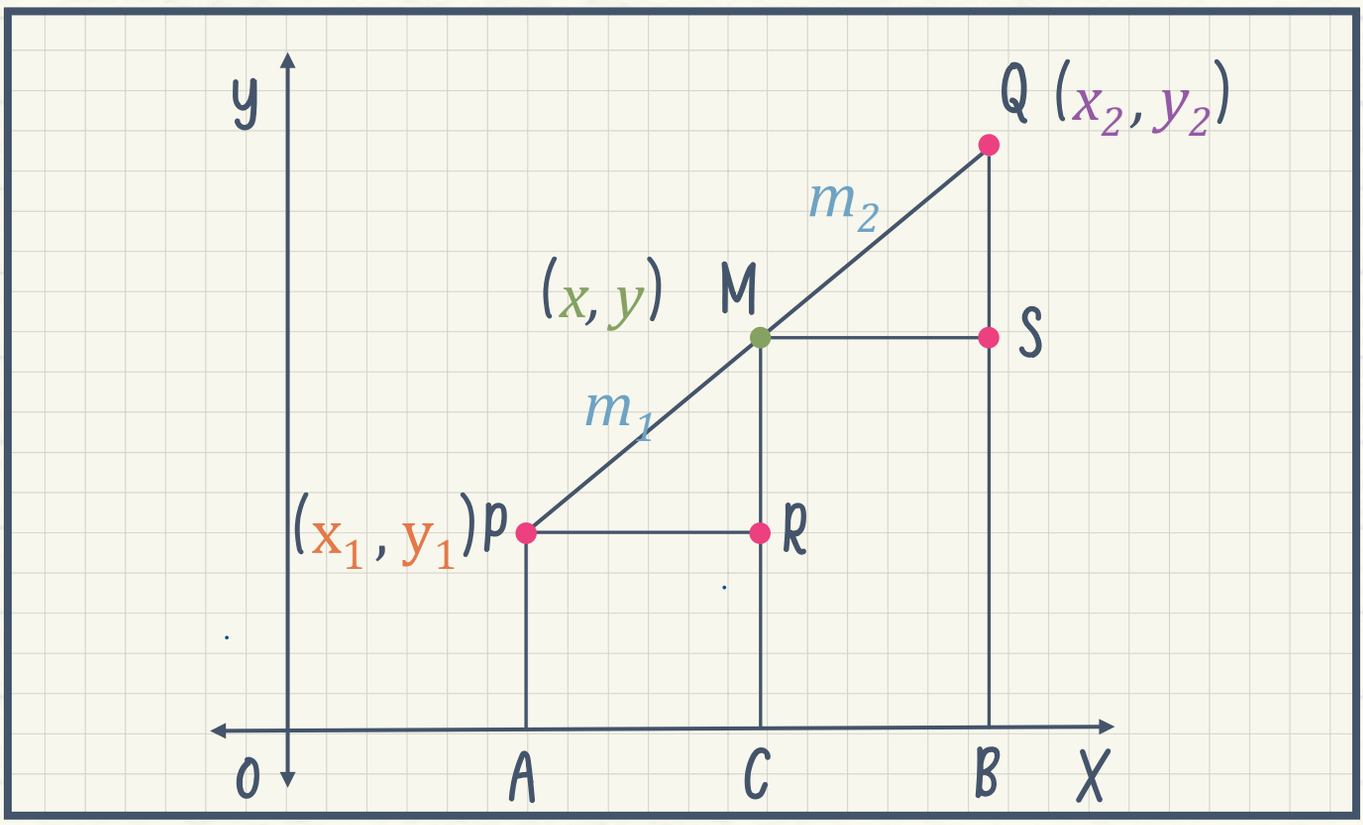
Using Pythagoras theorem:

$$PQ = \sqrt{(PR)^2 + (QR)^2}$$

Now, PR = $(x_2 - x_1)$ and QR = $(y_2 - y_1)$

$$\text{Distance, PQ} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Section Formula



Steps to Derive

$\triangle PRM \sim \triangle MSQ$ (Similar triangles)

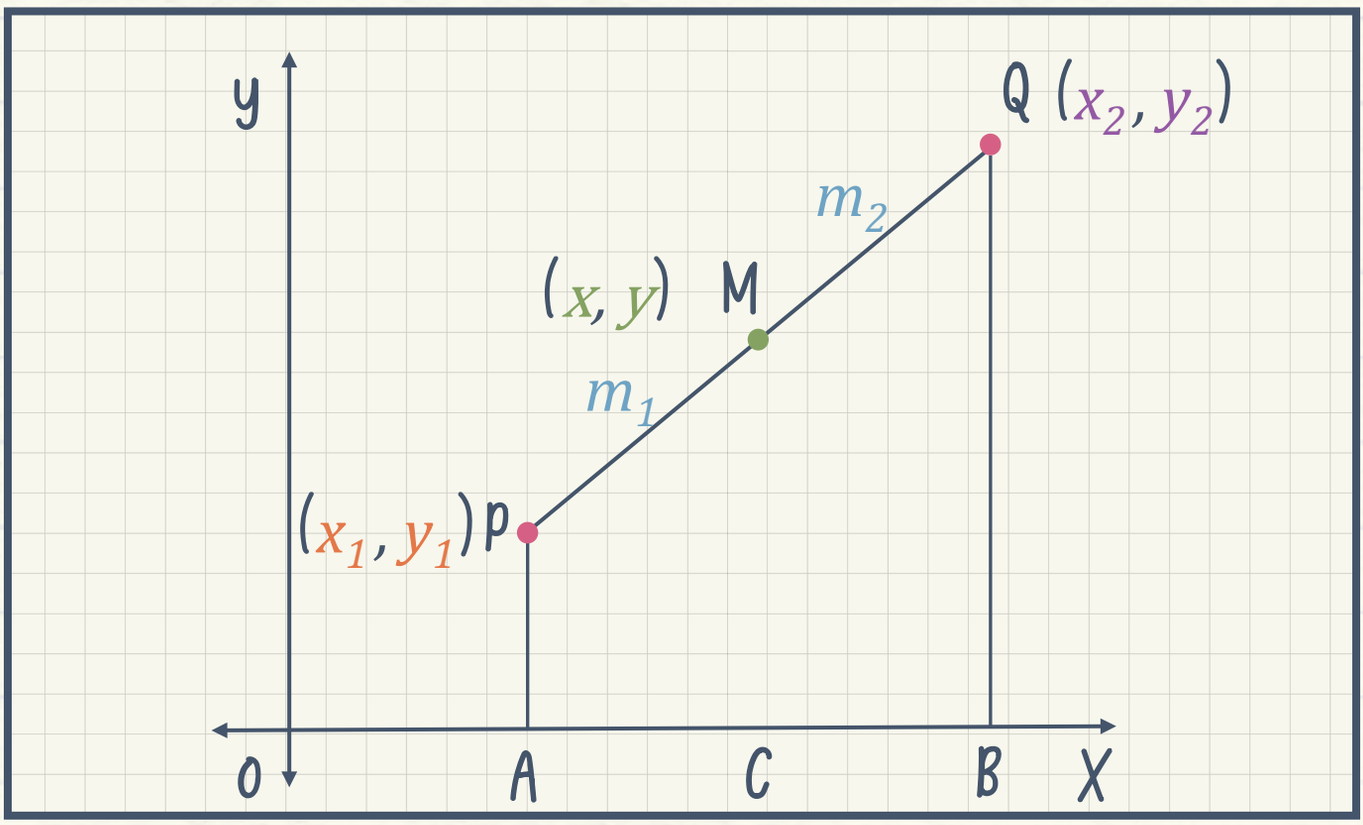
$$\frac{PM}{MQ} = \frac{PR}{MS} = \frac{RM}{SQ}$$

$$\frac{m_1}{m_2} = \frac{x - x_1}{x_2 - x} = \frac{y - y_1}{y_2 - y}$$

On solving for x and y separately:

$$\mathbf{M(x, y) = \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)}$$

Mid-Point Formula



Steps to Derive

Section Formula

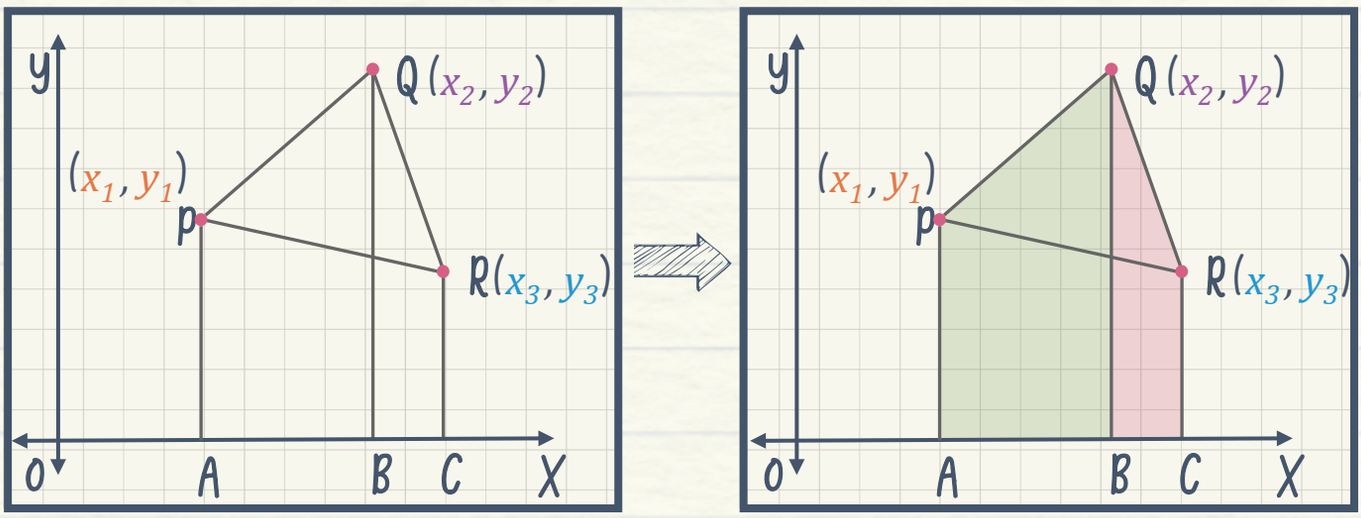
$$M(x, y) = \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$$

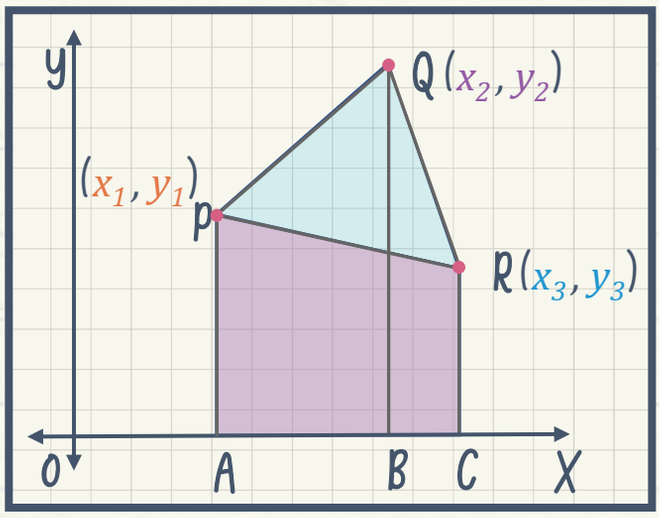
M is the mid point, so $m_1 : m_2 = 1 : 1$

$\therefore$ $m_1 = 1$ and $m_2 = 1$

$$\mathbf{M(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)}$$

Area of Triangle





Steps to Derive

Area of $\triangle PQR$ = area of trapezium APQB + area of trapezium BQRC − area of trapezium APRC

Area of $\triangle PQR = \frac{1}{2}[(AP + BQ)x(AB)]$

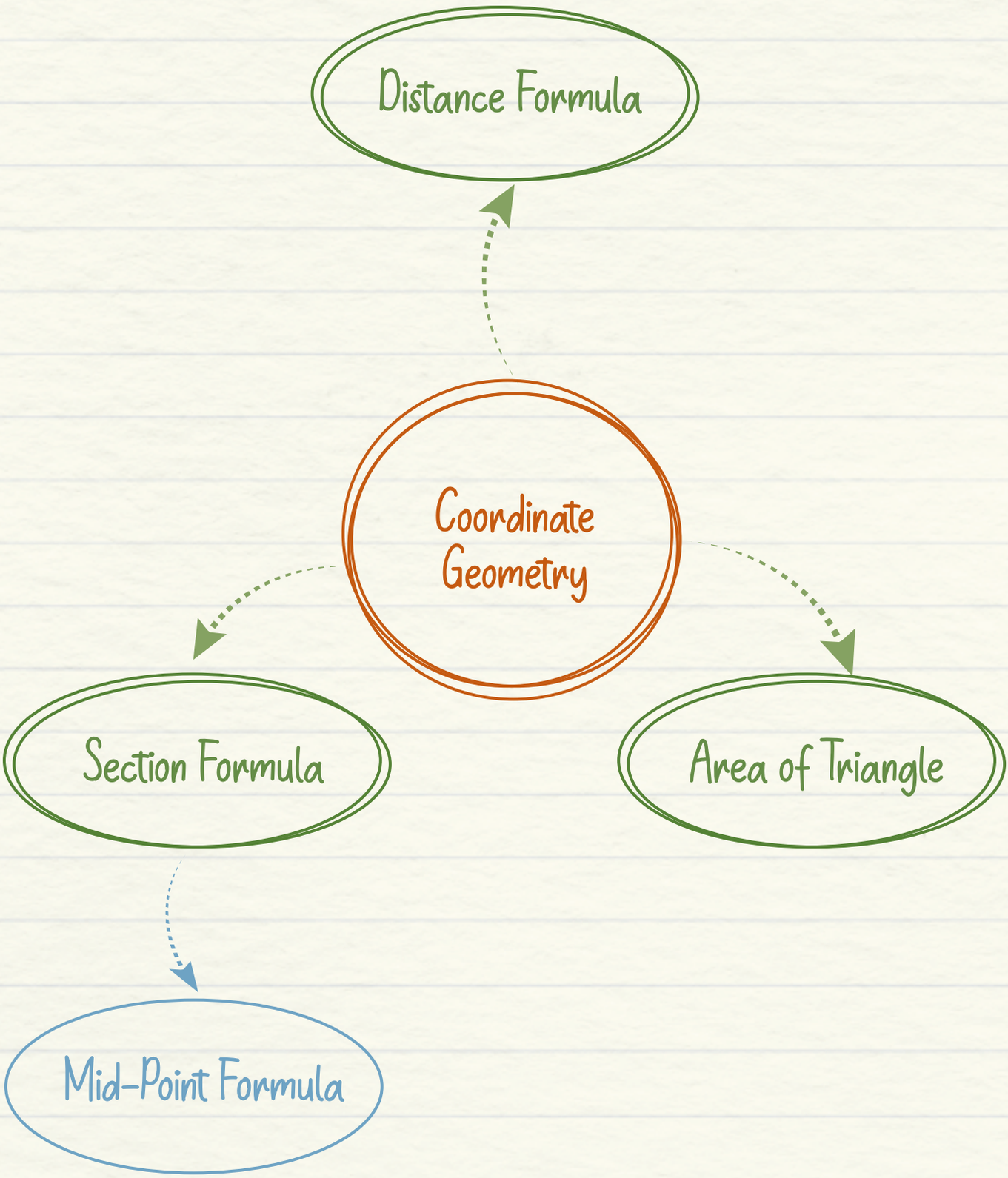
$+ \frac{1}{2}[(BQ + CR)x(BC)]$

$- \frac{1}{2}[(AP + CR)x(AC)]$

After writing distances using coordinates and solving

Area of $\triangle PQR = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

Mind Map


Distance Formula
Coordinate Geometry
Section Formula
Area of Triangle
Mid-Point Formula