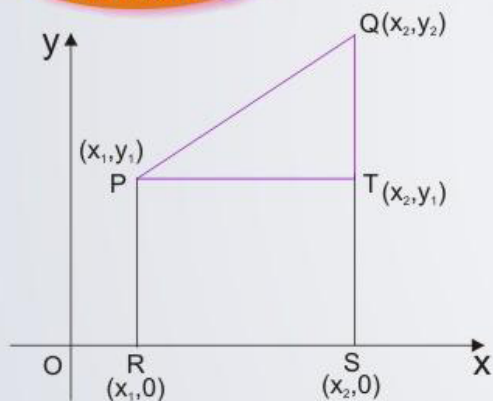


COORDINATE GEOMETRY

Distance formula



$$RS = (x_2 - x_1) = PT$$

$$SQ = y_2; ST = y_1; QT = (y_2 - y_1)$$

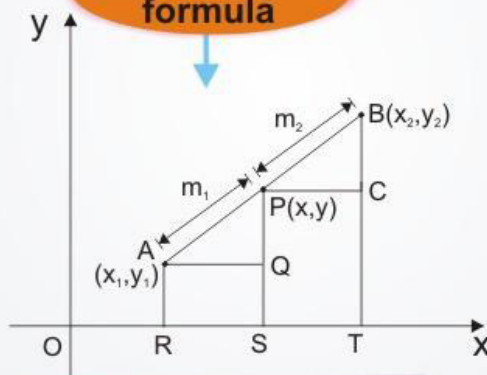
Applying Pythagoras in ΔPTQ

$$PQ^2 = PT^2 + QT^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

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

(Distance formula)

Section formula



Coordinates of $P(x, y) =$

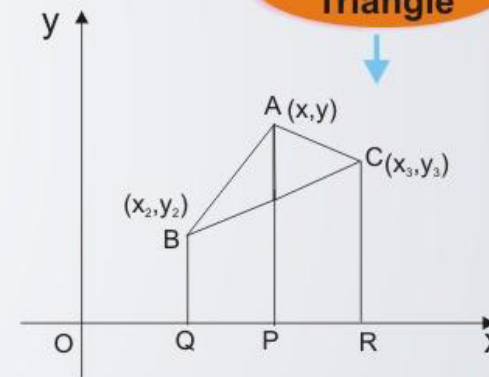
$(m_1 : m_2 \text{ Internally})$

$$\left\{ \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right\}$$

$(m_1 : m_2 \text{ externally})$

$$\left\{ \frac{m_1 x_2 - m_2 x_1}{m_1 - m_2}, \frac{m_1 y_2 - m_2 y_1}{m_1 - m_2} \right\}$$

Area of Triangle



$A(x_1, y_1) B(x_2, y_2) C(x_3, y_3)$

$$\text{Area} = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$$

If Area = 0,

then points are **collinear**

Applications

Verifying collinearity

$A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$

→ Find AB, BC, CA using distance formula

→ If $AB + BC = CA$

or $BC + CA = AB$

or $AB + CA = BC$

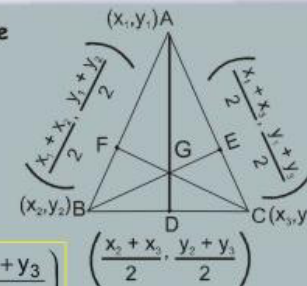
→ Then 3 points are collinear



- For an equilateral triangle - Prove that three sides are equal.
- For a right-angled triangle - Prove that the sum of the squares of two sides is equal to the square of the third side.
- For a square - Prove that the four sides are equal, two diagonals are equal.
- For a rhombus - Prove that four sides are equal.
- For a rectangle - Prove that the opposite sides are equal and two diagonals are equal.
- For a parallelogram - Prove that the opposite sides are equal

Centroid of Triangle

Coordinates of the centroid of the triangle whose vertices are $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3) are



$$\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right)$$

NCERT / X / Coordinate Geometry