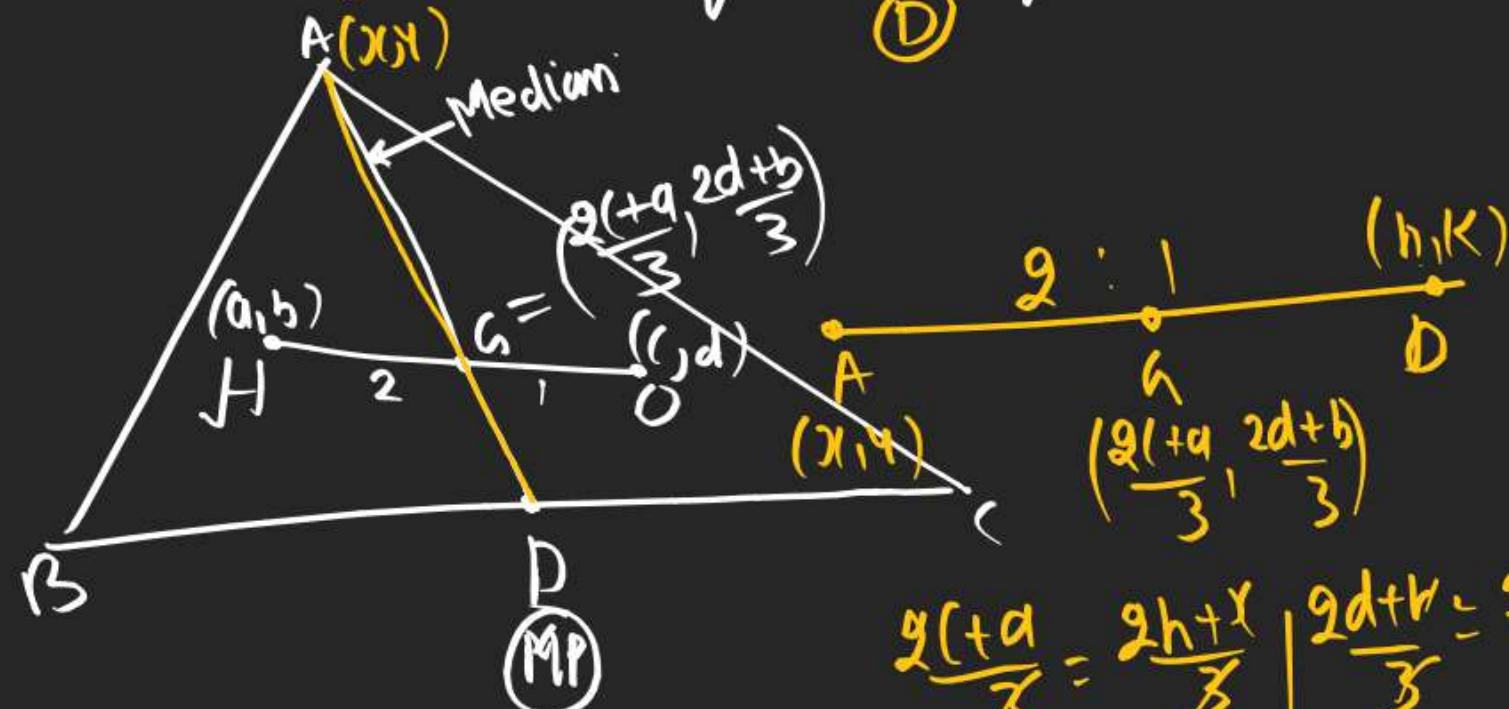


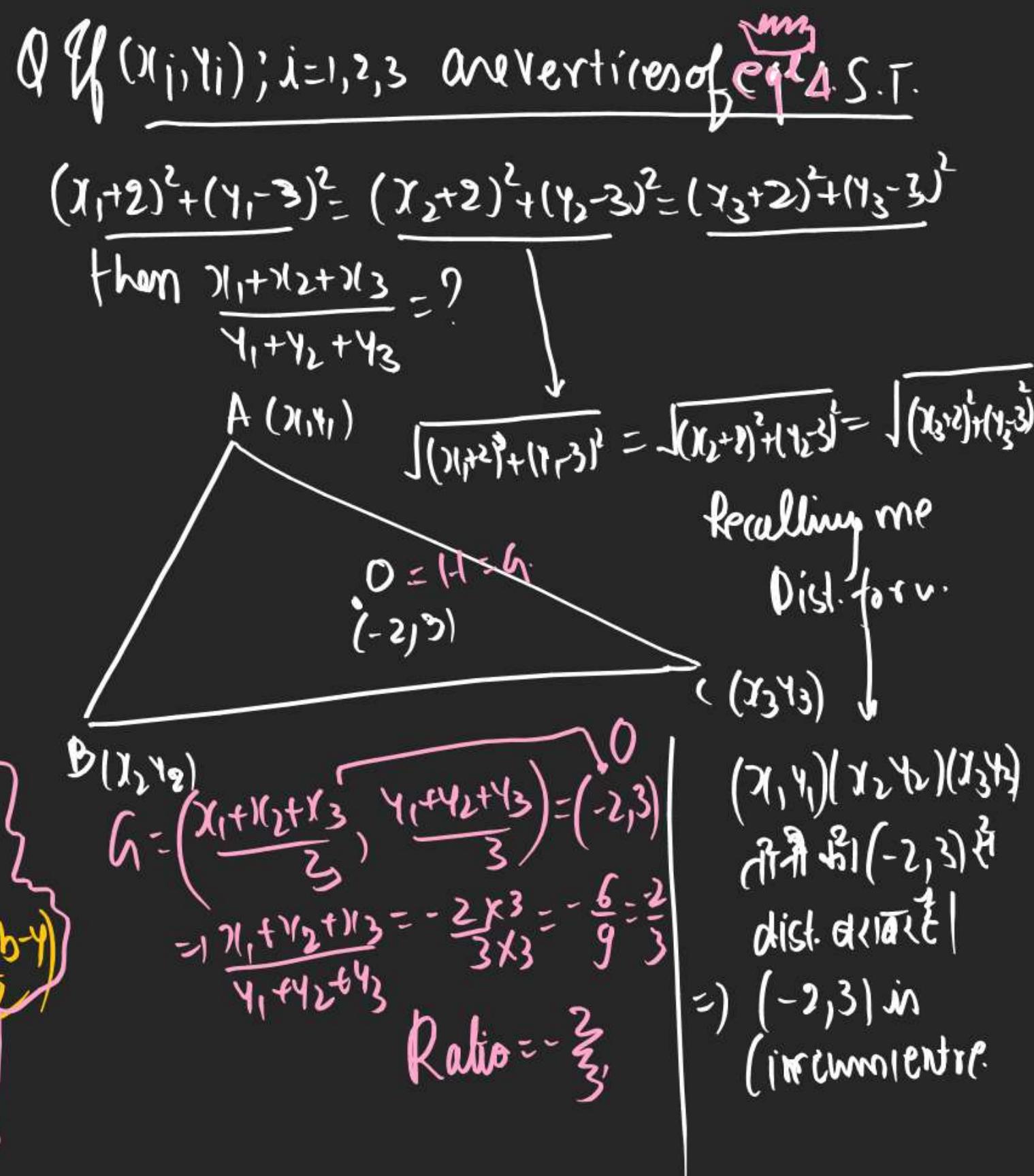
Q3 Orthocentre & Circumcentre of $\triangle ABC$
are (a, b) , (c, d) . If coord. of vertex A
are (x, y) . Find coord. of Mid P. of BC?



$$\frac{g+a}{3} = \frac{2h+x}{3} \quad | \quad \frac{2d+b-y}{3} = \frac{2k+y}{3}$$

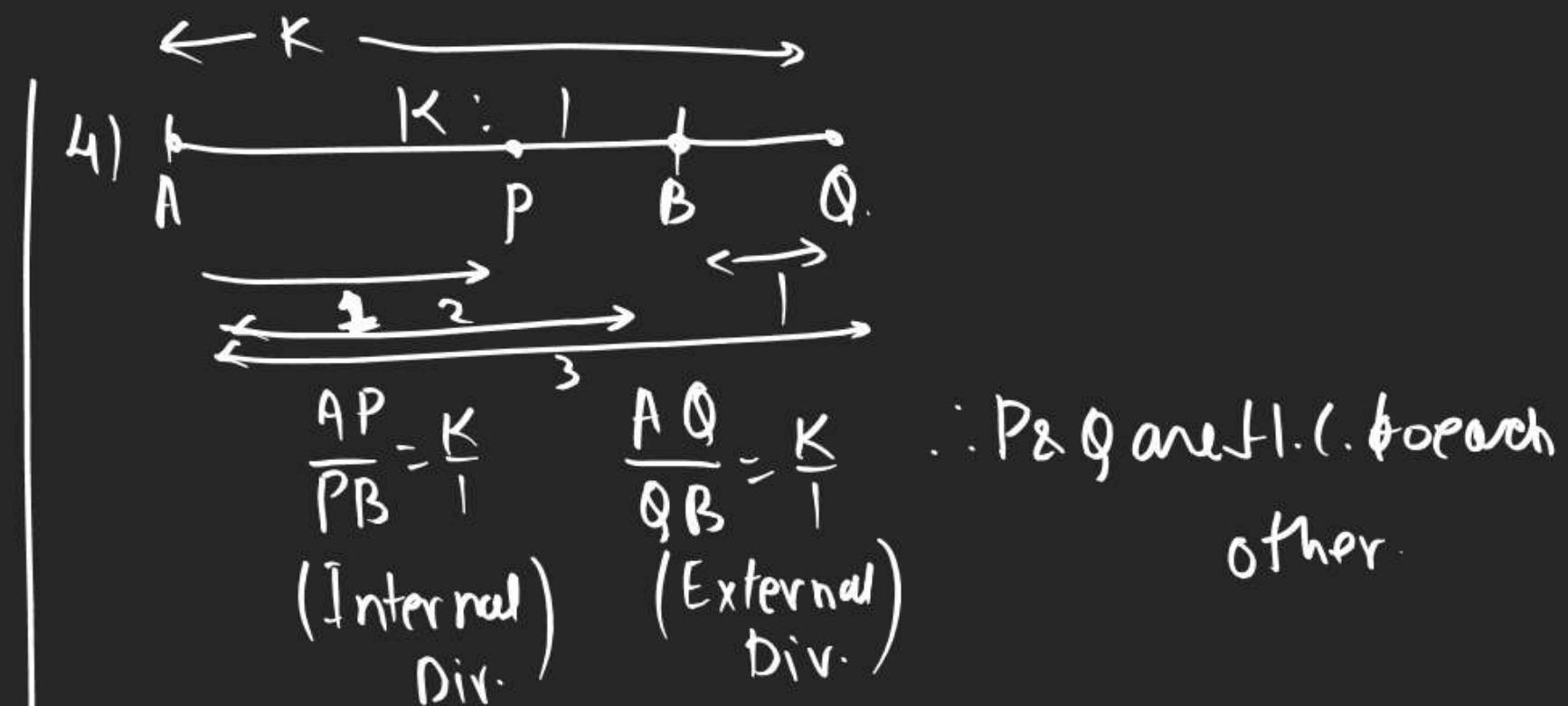
$$h = \frac{2(a-x)}{2} \quad & k = \frac{2(d+b-y)}{2}$$

$$\therefore D = \left(\frac{2(a-x)}{2}, \frac{2(d+b-y)}{2} \right)$$



Harmonic Conjugate

- (1) Here we are talking about 2 pts
One which is dividing internally.
& other dividing externally.
- (2) Both pts are dividing in same ratio
- (3) So if 2 pts P & Q divides line joining A & B in same Ratio Internally & Externally then P & Q will be called Harmonic Conjugate to each other.



Proof $\frac{AP}{PB} = \frac{AQ}{QB} \Rightarrow \frac{AP}{AB-AP} = \frac{AQ}{AQ-AB}$

Reciprocal $\frac{AB-AP}{AP} = \frac{AB-AQ}{AQ} = 1 \Rightarrow \frac{AB}{AP} - 1 = 1 - \frac{AB}{AQ}$

$$AB\left(\frac{1}{AP} + \frac{1}{AQ}\right) = 2 \Rightarrow \frac{1}{AP} + \frac{1}{AQ} = \frac{2}{AB} \rightarrow H.P$$

$$\frac{1}{Ch} + \frac{1}{Bd} = \frac{2}{Med}$$

2 ImpExp. of H.C.

\odot Internals & External (om. tangents)
 \equiv of 2 circles

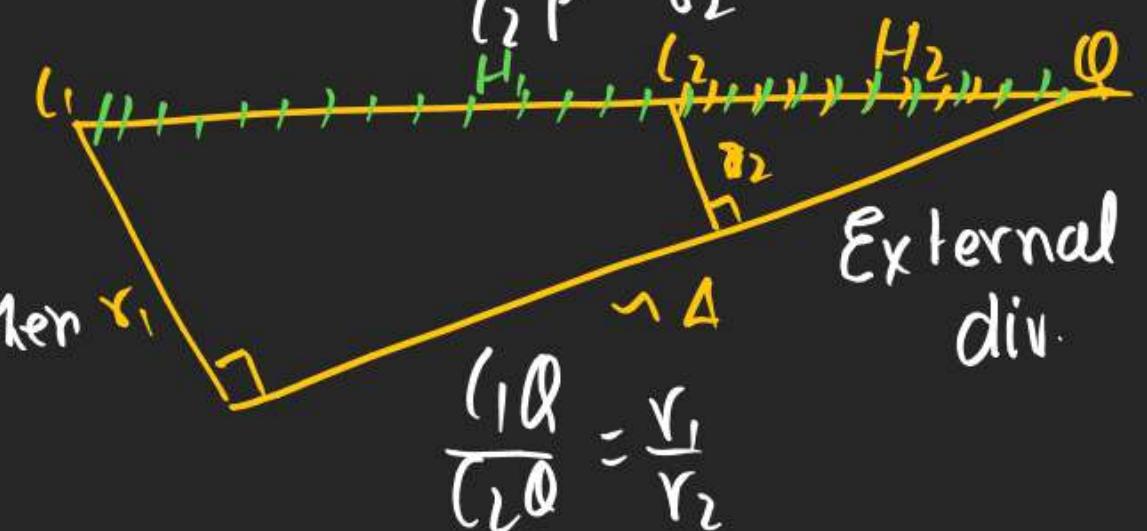
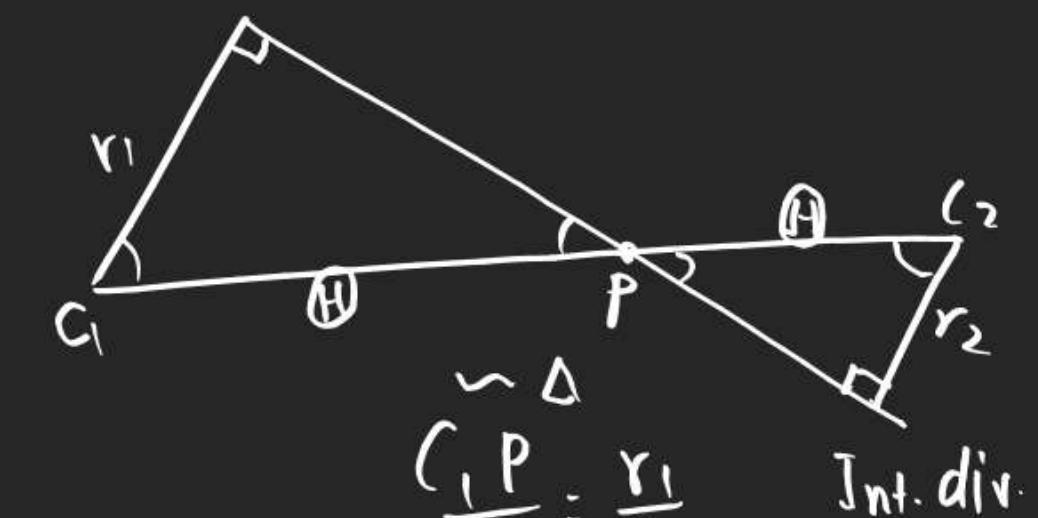
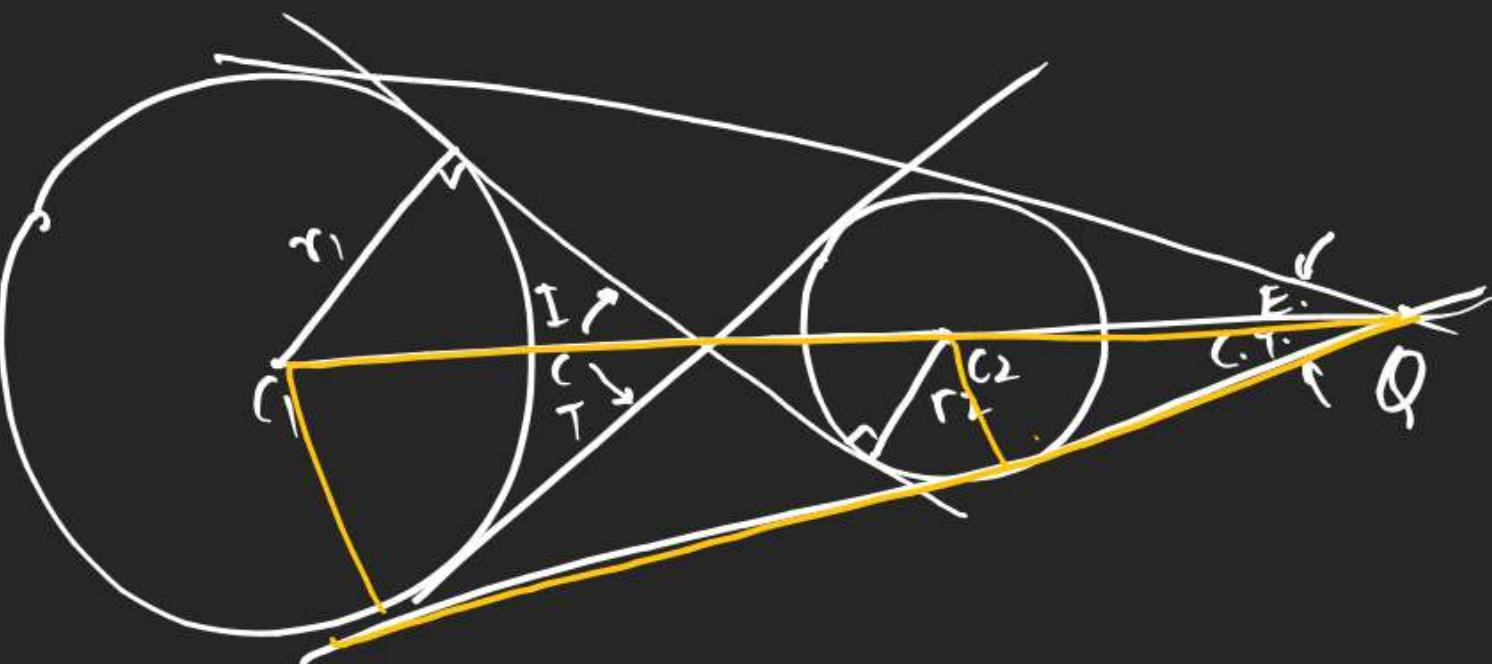
② Internal & External Angle Bisector

External & Int. Com. tangent dividing the
line joining centre of 2 circles externally
& internally in Ratio of their Radii.

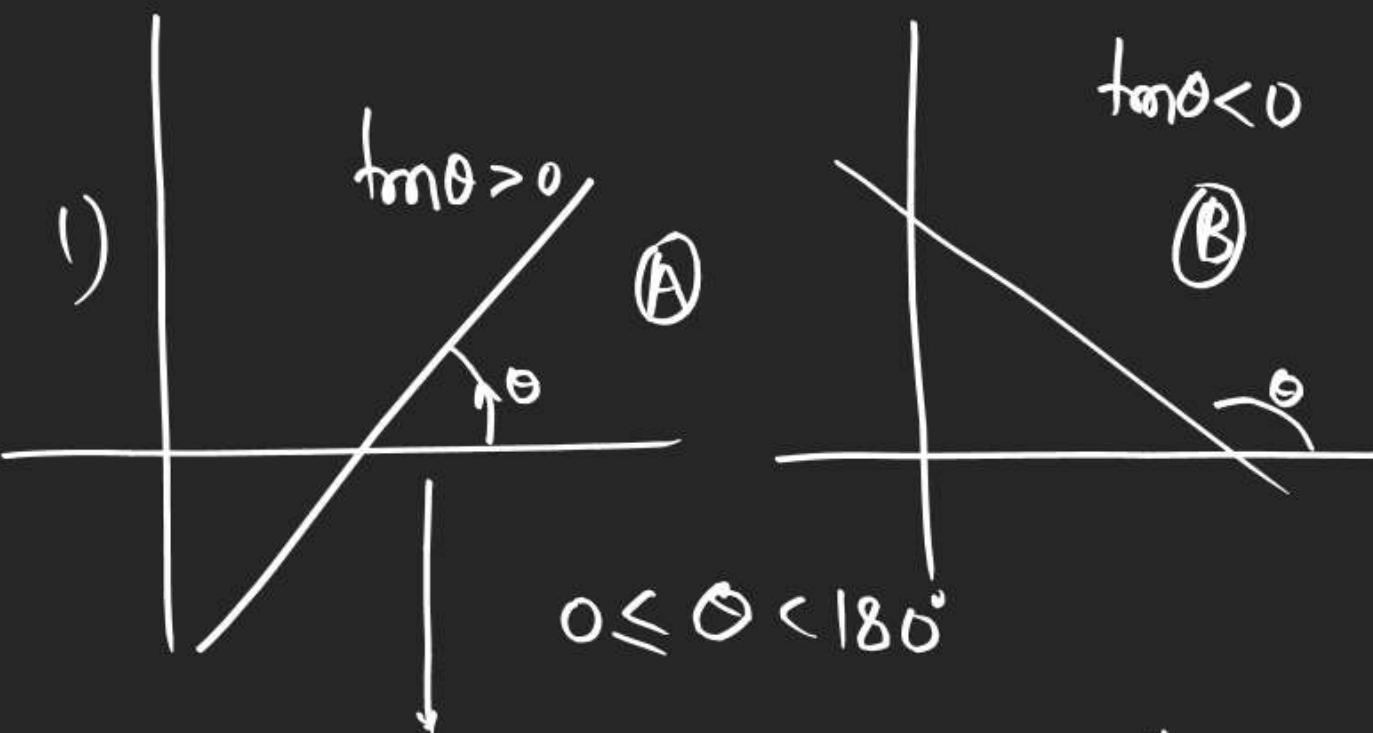
W Ratio for

P & Q in Y₁

$\therefore P, Q$ are H.L topachotter

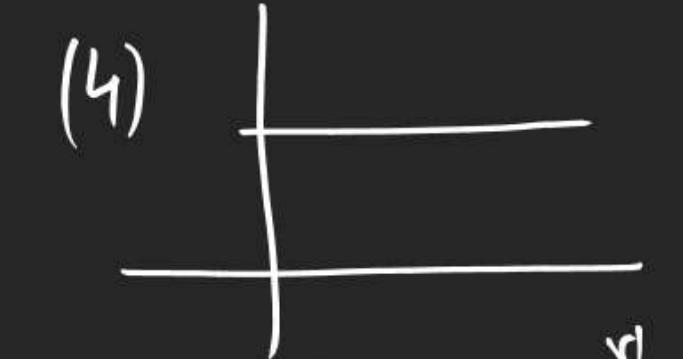


Slope of Line



(2) $m\theta$ is Slope of Line & θ is Inclination

<p>(3) $m\theta > 0$ on (A) as θ is acute Angle $\theta \in (0, 90^\circ)$ $\therefore m\theta > 0$</p>	<p>& $m\theta < 0$ on (B) θ is obtuse Angle $\theta \in (90, 180^\circ)$ 90° & 180° are 90° & 180° are</p>
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If line is \parallel to
x Axis
 $\theta = 0$

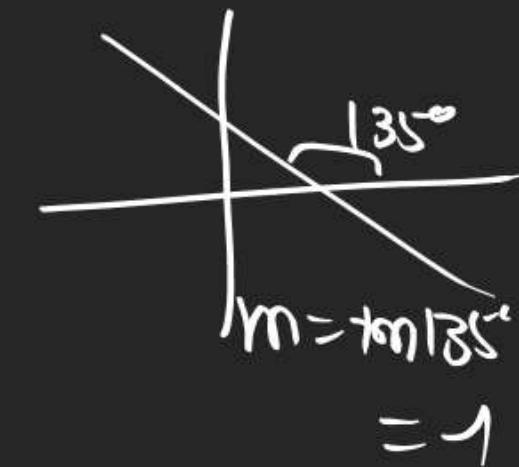
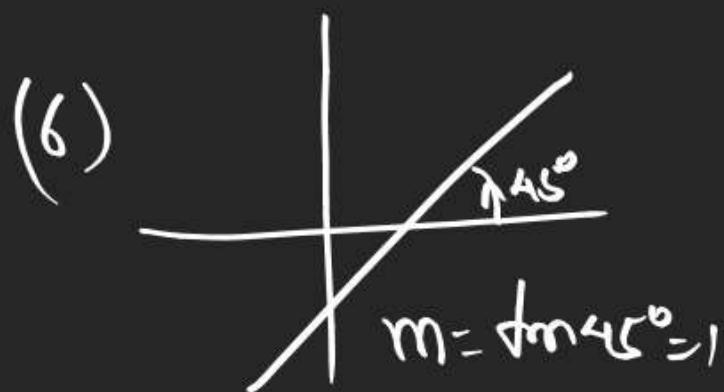
Slope: $m = m\theta = 0$

(5) If line is \perp to x Axis



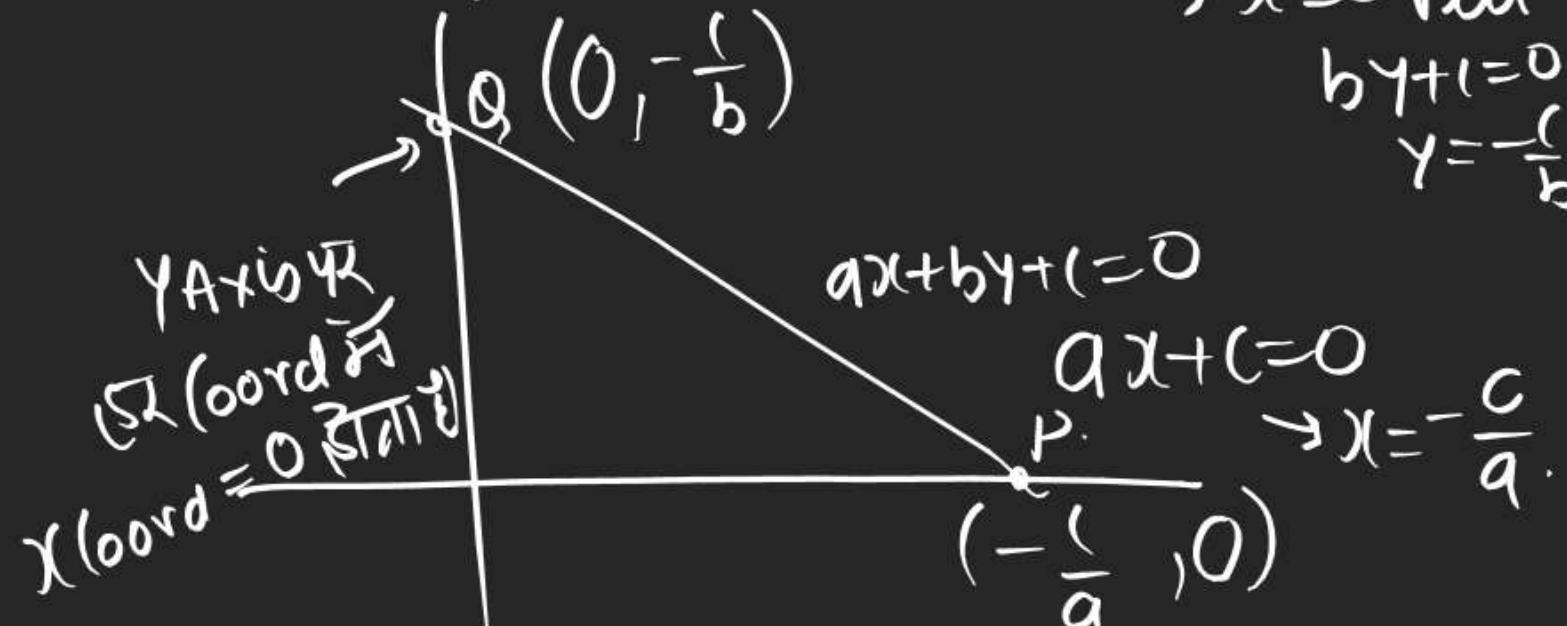
Slope: $m = m\theta \rightarrow \infty$
Undefined.

\therefore for line \perp to x Axis
slope is null and undefined



(8) (x_1, y_1) (x_2, y_2)

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

(9) If Eqn of line is $ax+by+c=0$ 

$$\overrightarrow{PQ} \quad \left(-\frac{c}{a}, 0 \right) \quad \left(0, -\frac{c}{b} \right)$$

$$m_{PQ} = \frac{-\frac{c}{b} - 0}{0 + \left(-\frac{c}{a} \right)} = -\frac{\cancel{c}}{\cancel{b}} \times \frac{a}{\cancel{c}} = -\frac{a}{b}$$

(10) So Slope of line $ax+by+c=0$ is $-\frac{a}{b}$.

$$m = -\frac{\text{(off of x)}}{\text{(off of y)}}$$

Line.

Q. $3x-2y+5=0$ finds Slope of line

$$x\text{ off} = 3$$

$$y\text{ off} = -2$$

$$m = -\frac{3}{-2}$$

$$m = \frac{3}{2}$$

RK 0 If 2 lines are || then their slope is same
 $m_1 = m_2$ (2) If 2 lines are \perp then $m_1 \times m_2 = -1$ (Psbl)

Q If line $3x - ay - 1 = 0$ is \perp to

$(a+2)x - y + 3 = 0$ find a ?

$$m_1 = m_2 \text{ Hoga.} \quad \left| \begin{array}{l} 3x - ay - 1 = 0 \rightarrow m_1 = -\frac{3}{a} = \frac{3}{a} \\ (a+2)x - y + 3 = 0 \quad m_2 = +\frac{(a+2)}{-1} \end{array} \right.$$

$$\frac{3}{a} = a+2$$

$$\Rightarrow a^2 + 2a - 3 = 0$$

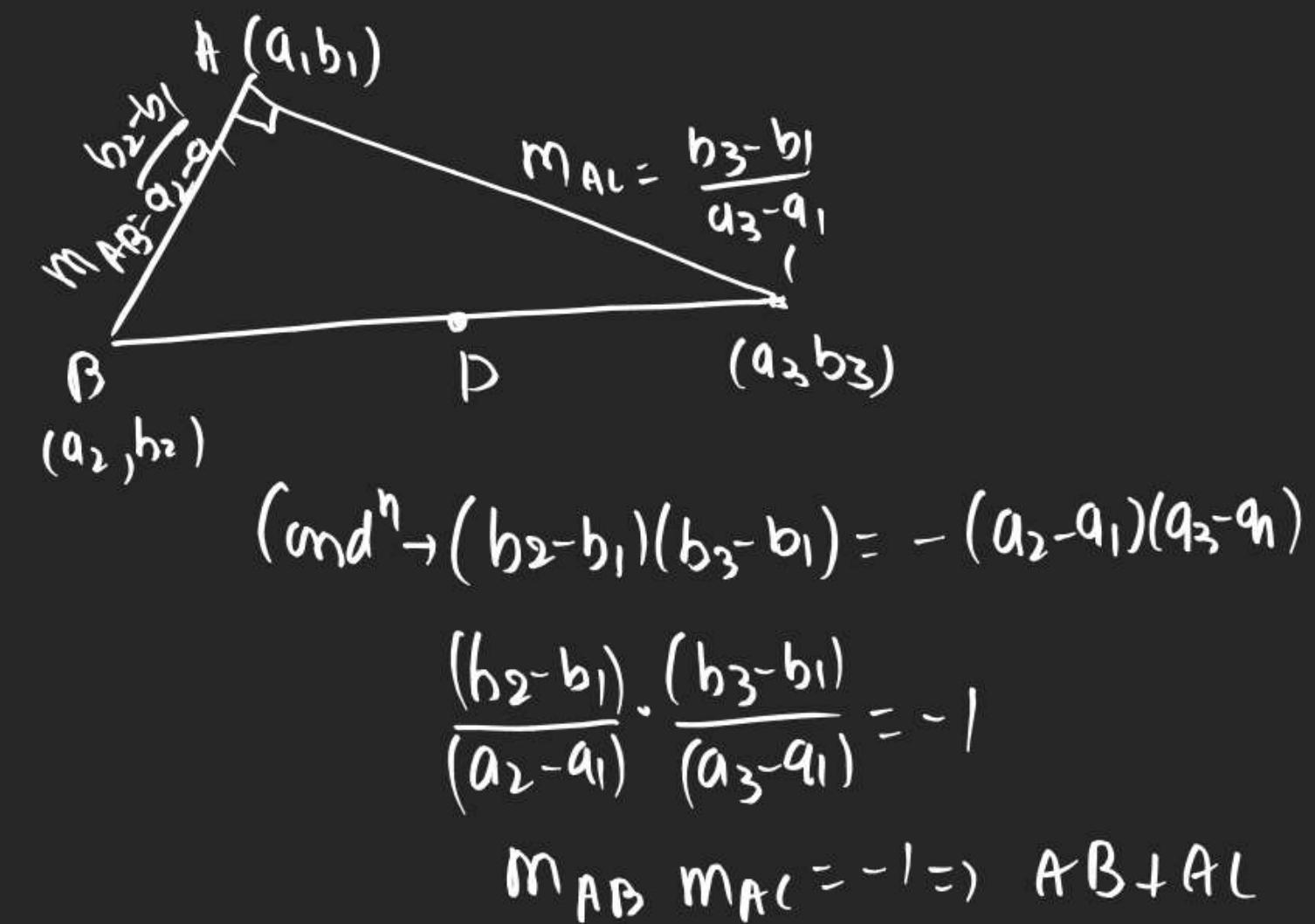
$$\Rightarrow (a+3)(a-1) = 0$$

$$\Rightarrow a = \underline{\underline{1, -3}}$$

$$Q \text{ If } (b_2 - b_1)(b_3 - b_1) + (a_2 - a_1)(a_3 - a_1) = 0$$

then Show that (circumcentre of \triangle having

$$\text{vertices } (a_1, b_1), (a_2, b_2), (a_3, b_3) \text{ is } \left(\frac{a_1+a_2+a_3}{3}, \frac{b_1+b_2+b_3}{3} \right)$$



$$(b_2 - b_1)(b_3 - b_1) = -(a_2 - a_1)(a_3 - a_1)$$

$$\frac{(b_2 - b_1)}{(a_2 - a_1)} \cdot \frac{(b_3 - b_1)}{(a_3 - a_1)} = -1$$

$$m_{AB} m_{AC} = -1 \Rightarrow AB \perp AC$$

\therefore ABC is Rt. angle \angle at A

Rt angle \angle or Rt. angle \angle are orthogonal

Midpt. of Hyp in Circumcentre

$$\therefore (\text{circumcentre } D = \left(\frac{a_1+a_2+a_3}{3}, \frac{b_1+b_2+b_3}{3} \right))$$

Locus

A) Set of Pt. In which follow Q's (mdⁿ)

B) Steps.

A) first assumption In base locus is to be known.

1 pt (h, K)

(B) Now follow Q's (md^m)

((C) after solving (h \rightarrow x, K \rightarrow y))

$$\left. \begin{array}{l} h \rightarrow x \\ K \rightarrow y \\ 61 \rightarrow 66 \\ 67 \rightarrow 69 \end{array} \right\} \text{done}$$