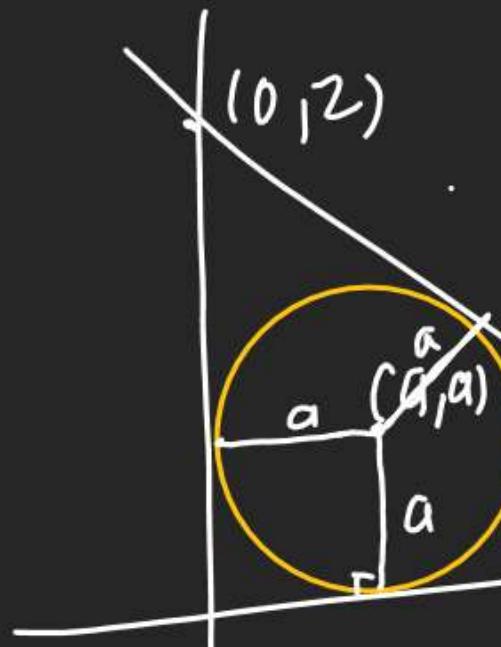


Q Find Eqn of Circle
15

touching Both axes &
Lie exactly under Line

$$4x+3y=6.$$



① Center (a, a) - $\left(\frac{1}{2}, \frac{1}{2}\right)$
Radius $= \frac{1}{2}$

② $(x - \frac{1}{2})^2 + (y - \frac{1}{2})^2 = \left(\frac{1}{2}\right)^2$

dist of (a, a) from

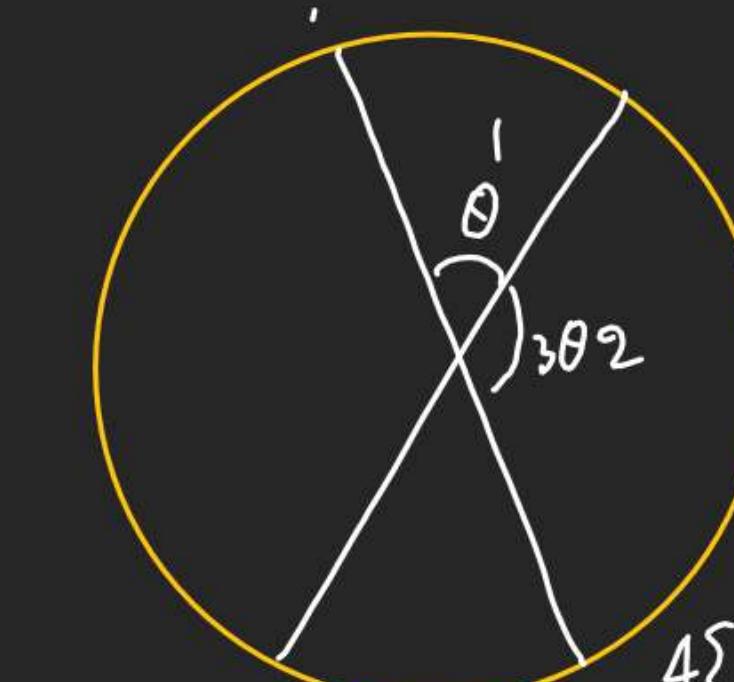
$$(4x+3y-6=0) = a \\ \Rightarrow \left| \frac{4a+3a-6}{\sqrt{4^2+3^2}} \right| = a$$

$$\Rightarrow |7a-6| = 5a$$

$$7a-6 = 5a \quad 7a-6 = -5a$$

$$2a = 6 \\ a = \frac{1}{2} \text{ ✓}$$

Q If Pair of Lines $ax^2 + 2(a+b)xy + by^2 = 0$ lie along
dia. of circle & divide the circle into 4 sectors
a = a such that area of one of the sectors is thrice
b = b the area of another sector from $3a^2 + 3b^2 = ?$



$$4\theta = 180^\circ \Rightarrow \theta = 45^\circ$$

Pair of lines &

Angle

$$\tan \theta = \frac{2\sqrt{h^2-ab}}{a+b} = 1$$

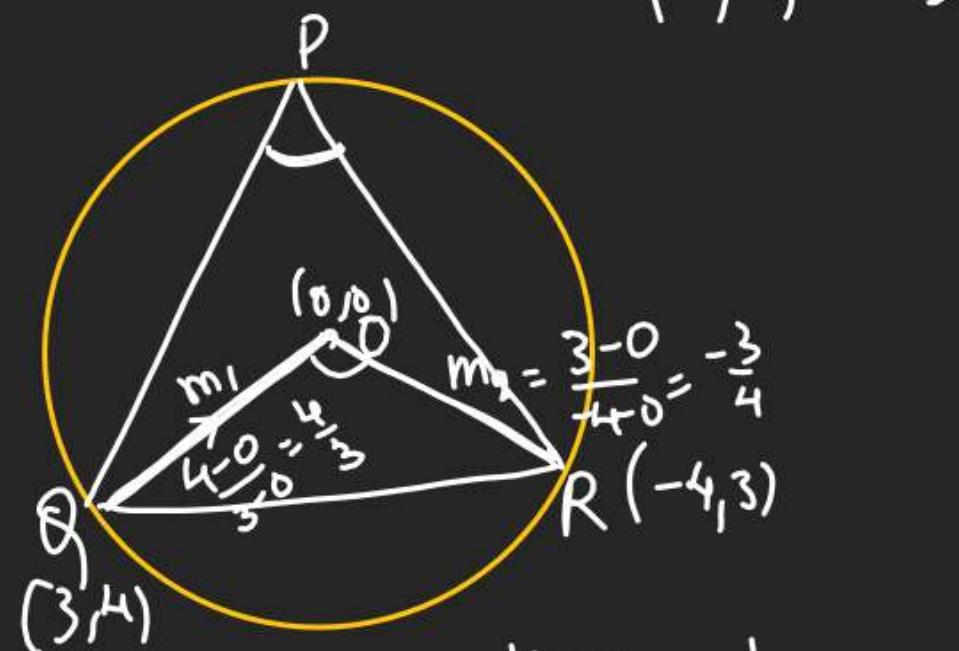
$$2\sqrt{(a+b)^2-ab} = (a+b)$$

$$4\{a^2+b^2+ab\} = (a+b)^2$$

$$3a^2 + 3b^2 + 2ab = 0$$

$$\therefore 3a^2 + 3b^2 = -2ab$$

Q A_Δ PQR inside circle $x^2 + y^2 = 25$
 Such that Q & R are $(3, 4)$ & $(-4, 3)$
 find $\angle QPR$.

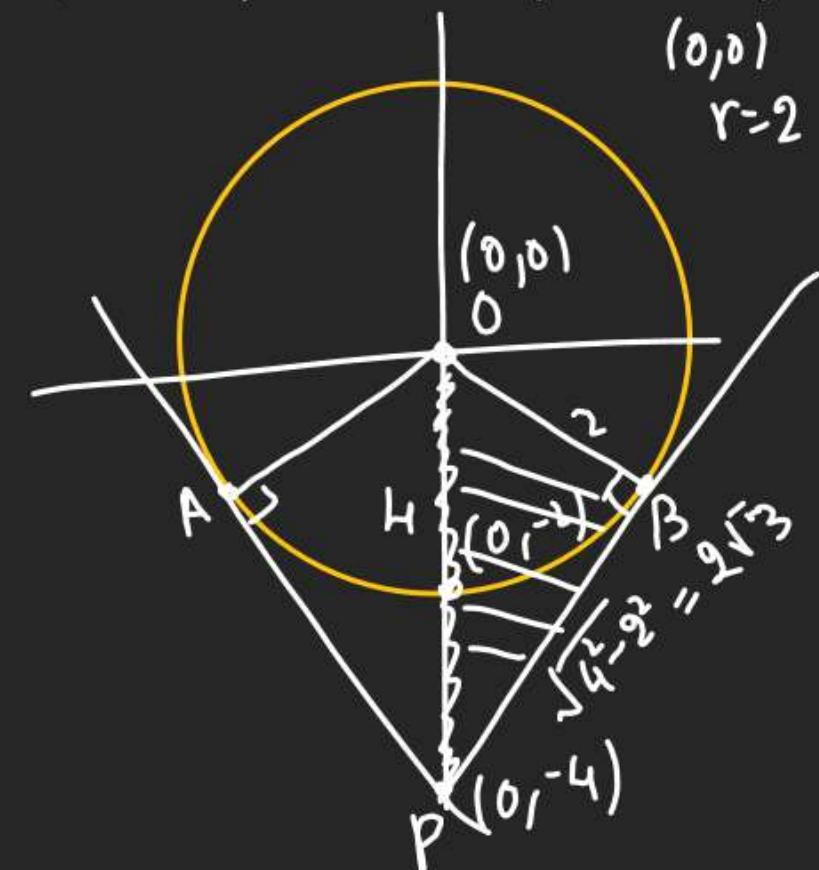


$$m_1 m_2 = -1$$

$$\angle QOR = 90^\circ$$

$$\therefore \angle QPR = 45^\circ$$

Q If 2 tangents are drawn
 on circle $x^2 + y^2 = 4$ from
 Pt. P(0, -4) meets circle at
 A & B then Area $\triangle ABP$ = ?



$$\text{Area Quad} = 2 \times \frac{1}{2} \times 2\sqrt{3} \times 2 \\ = 4\sqrt{3}$$

Q Find circumcircle eqn
 for $\triangle ABC$ by Lines

$$x + 2y + 2 = 0 \quad x + y + 2 = 0$$

$$x + 2y + 2 = 0 \quad y + 2 = 0$$

$$x + 2 = 0 \quad y + 2 = 0$$

$$(x+2)^2 + (y+2)^2 = r^2$$

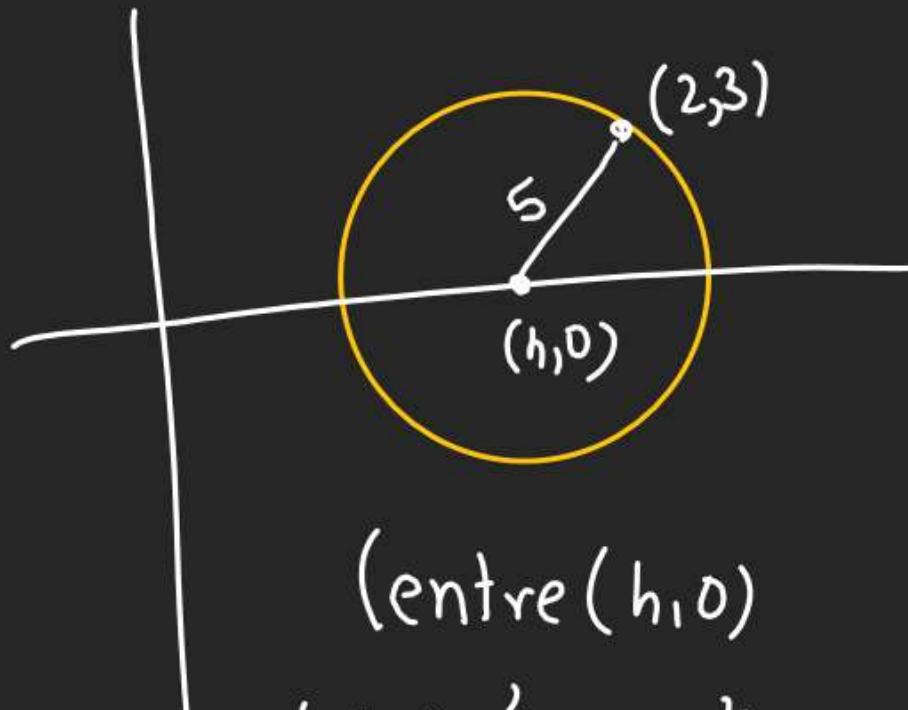
$$(-2, 0), (0, -2)$$

$$(x+1)^2 + (y+1)^2 = r^2$$

$$(x+1)^2 + (y+1)^2 = 2$$

Q) Find EOC having centre

at x-axis & rad=5 P.T.(2,3)



(centre $(h, 0)$)

$$(x-h)^2 + (y-0)^2 = 25$$

P.T.
(2,3)

$$(2-h)^2 + (3)^2 = 25$$

$$(2-h)^2 = 16$$

$$2-h=4 \quad | \quad 2-h=-4$$

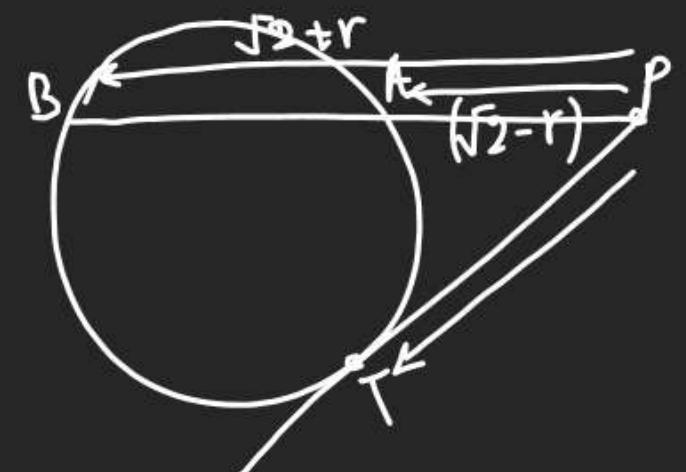
$$h=6$$

$$h=-2$$

$$(x+2)^2 + y^2 = 25 \quad | \quad (x-6)^2 + y^2 = 25$$

Q) Eqn of chord AB to Circle
 $x^2 + y^2 = r^2$ P.T. P(1,1)

such that $\frac{PB}{PA} = \frac{\sqrt{2+r}}{\sqrt{2-r}}$ ($0 < r < \sqrt{2}$)



$$\textcircled{1} PA \times PB = PT^2$$

$$(\sqrt{2+r})(\sqrt{2-r}) = PT^2$$

$$\Rightarrow PT^2 = 2 - r^2$$

$$\textcircled{2} AB = PB - PA = (\sqrt{2+r}) - (\sqrt{2-r})$$

$$\textcircled{3} \quad A(10,0) \quad B(1,1) \quad = 2r = \text{Dia.}$$

$$\therefore AB \Rightarrow (y-x)$$

Q) If Line $y = mx + c$ is common tangent to given circles (See diagram)

Radius of 4 is sum of Radii of 1 & 1

& Radius of 5 is sum of Radii of 2 & 3

Find $m+c = ?$

$$b_1 + b_2 + b_4 = 0$$

(0,0)

(2,2)

(1,0)

(4,6)

(-1,-2)

(1,2)

(-1,0)

(2,1)

(4,1)

(5,6)

(-2,1)

$$m = \frac{1-0}{4-1} = \frac{1}{3}$$

$c = ?$

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

$\Delta C_1 C_2 C_4$

Line will form

(Centroid $d = (1,0)$)

Line will pass

from (entroid)

$\Delta C_2 C_3 C_5 = (4,2)$

Q If circle P.T. Pt where

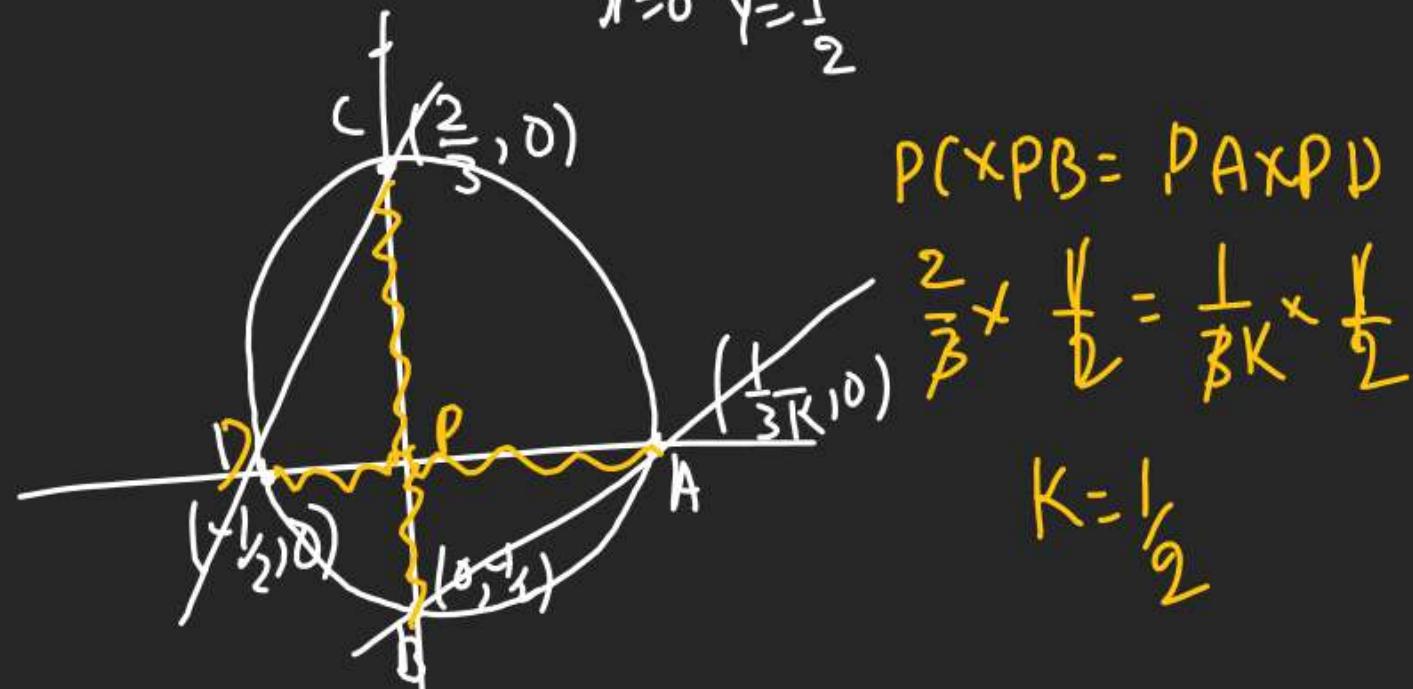
$$\text{Lines } 3Kx - 2y - 1 = 0$$

$$\text{& } 4x - 3y + 2 = 0 \text{ meet}$$

(0 axes then $K = ?$)

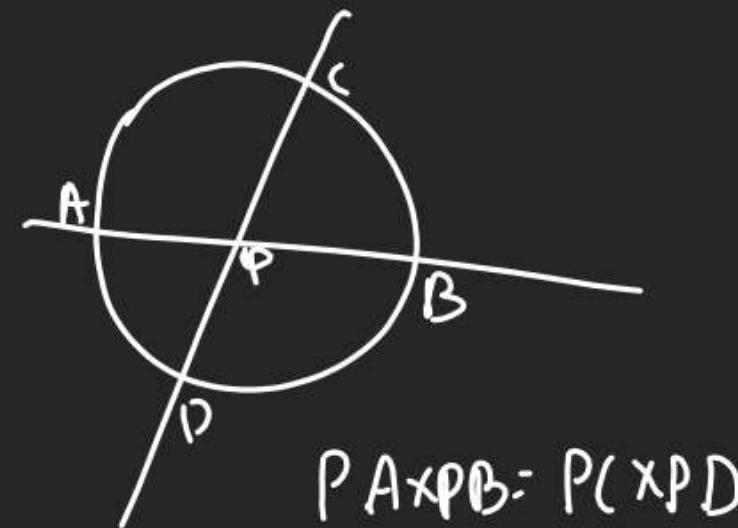
$$\text{L}_1: 3Kx - 2y - 1 \rightarrow y = 0, x = \frac{1}{3K}$$

$$x = 0, y = \frac{1}{2}$$



$$\text{L}_2: 4x - 3y = -2$$

$$\frac{x}{1/2} + \frac{y}{2/3} = 1$$

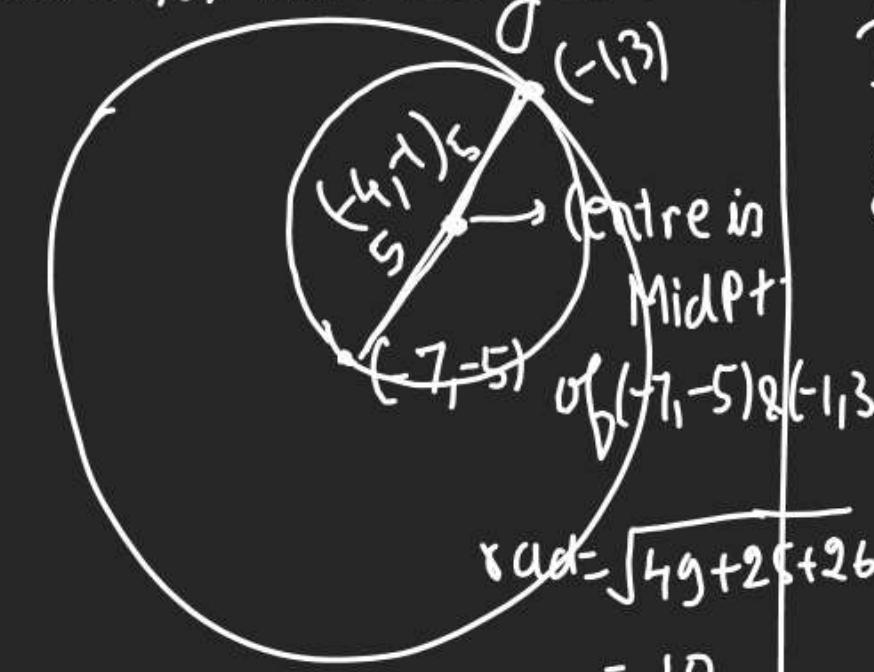


$$PA \times PB = PC \times PD$$

Q Find EOC which touches

$$\text{circle } x^2 + y^2 + 14x + 10y - 26 = 0$$

at $(-1, 3)$ internally & Rad=5



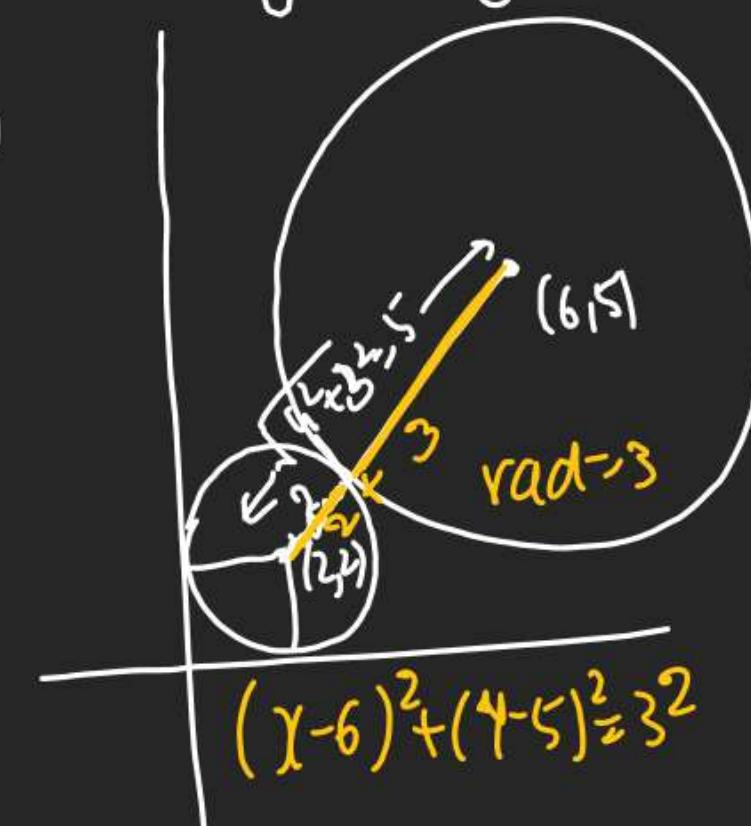
$$(x+4)^2 + (y+1)^2 = 5^2$$

Q A circle of radius 2 in 1st

quad touches both axes

find EOC touches 1st circle

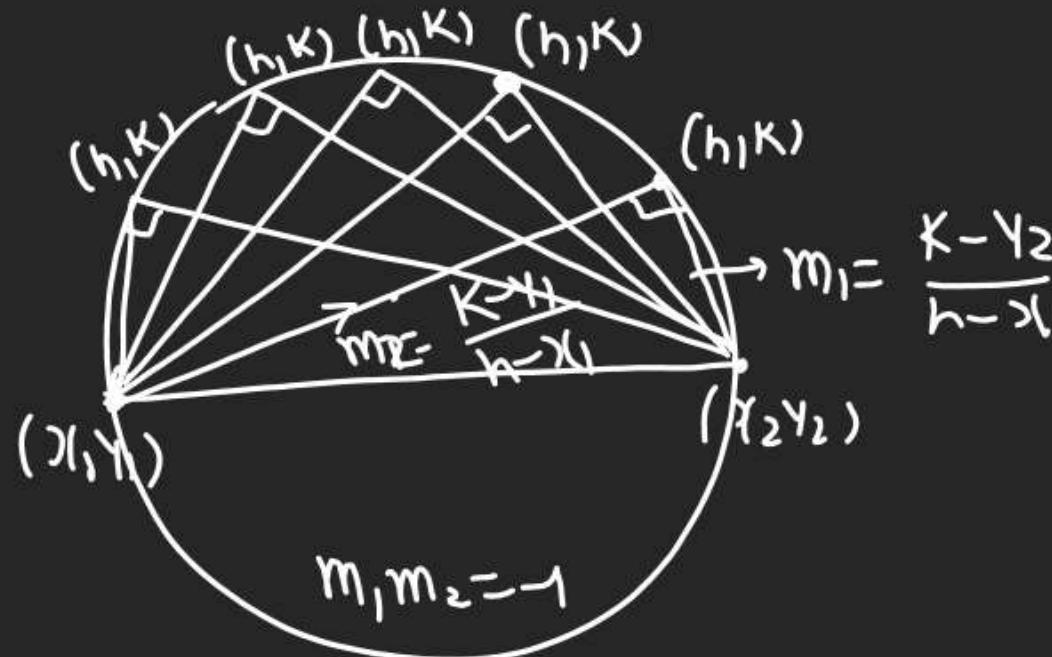
Externally having center $(6, 5)$



Diametric form of a circle

Here we will find End Pt of

$$\text{diameter} = (x_1, y_1) \ (x_2, y_2)$$



$$\frac{y_2 - y_1}{x_2 - x_1} \times \frac{k - y_1}{h - x_1} = -1$$

this is known as
$$(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$$
 diametric form of circle

$$(2) \quad \underbrace{(x - x_1)(x - x_2)}_{\text{Quadratic Eqn in } x} + \underbrace{(y - y_1)(y - y_2)}_{\text{Quadratic Eqn in } y} = 0$$

Off 2 Endpts of Dia. are (1, 2), (3, 4)
find EOC.

$$(x_1, y_1) = (1, 2)$$

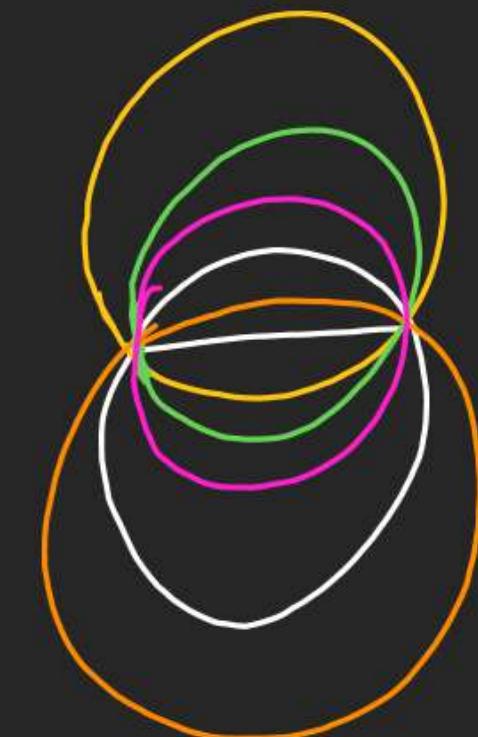
$$(x_2, y_2) = (3, 4)$$

(3) Language of Qs.

EOC P.I. Chord AB whose Circumference is Min.

$$\text{Area in Min. } (y - 1)(x - 3) + (y - 2)(x - 4) = 0$$

$$\text{Rad in Min. } x^2 + y^2 - 4x - 6y + 11 = 0$$



In Qs he will give Q of Abscissa & Ordinate of end pt of diameter (in chord instead of diameter).
befind it by Root of

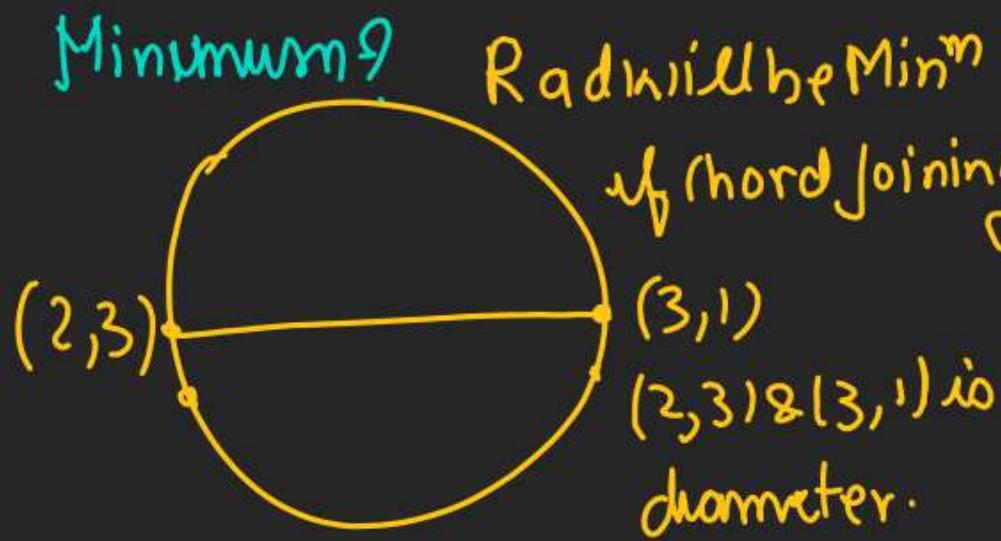
$$\text{Q Eqn } x^2 - 2ax + a^2 = 0$$

$$y^2 - 2by + b^2 = 0 \text{ find EOC}$$

Just add Q Eqn

$$x^2 + y^2 - 2ax - 2by + a^2 + b^2 = 0$$

Q Find Eq of circle passing thru:
28 $(2, 3)$ & $(3, 1)$ whose radius is

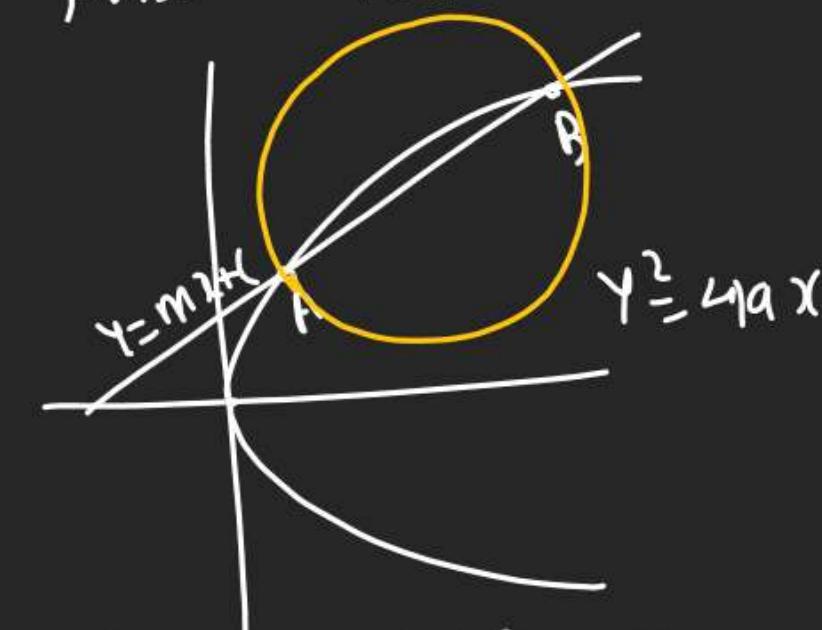


$$(x-2)(x-3) + (y-3)(y-1) = 0$$

$$x^2 + y^2 - 5x - 4y + 9 = 0$$

Q If Line $y = mx + c$ (wts
99 (where $y^2 = 4ax$ at A & B

Find Eq of circle taking AB as diameters.



Q $y = mx + c$ & $y^2 = 4ax$

Put y in curve

$$(mx+c)^2 = 4ax$$

$$\underbrace{m^2x^2 + x(2mc-4a)}_{x \text{ H Quad}} + c^2 = 0$$

$$m^2x^2 + my^2 + \cancel{x((2m(-4a)-4ay+c^2)} + 4ac = 0$$

Put $x = \frac{y-c}{m}$ in $y^2 = 4ax$
 $y^2 = 4a\left(\frac{y-c}{m}\right)$
 $\underbrace{my^2 - 4ay + 4ac = 0}_{y \text{ H Q}}$