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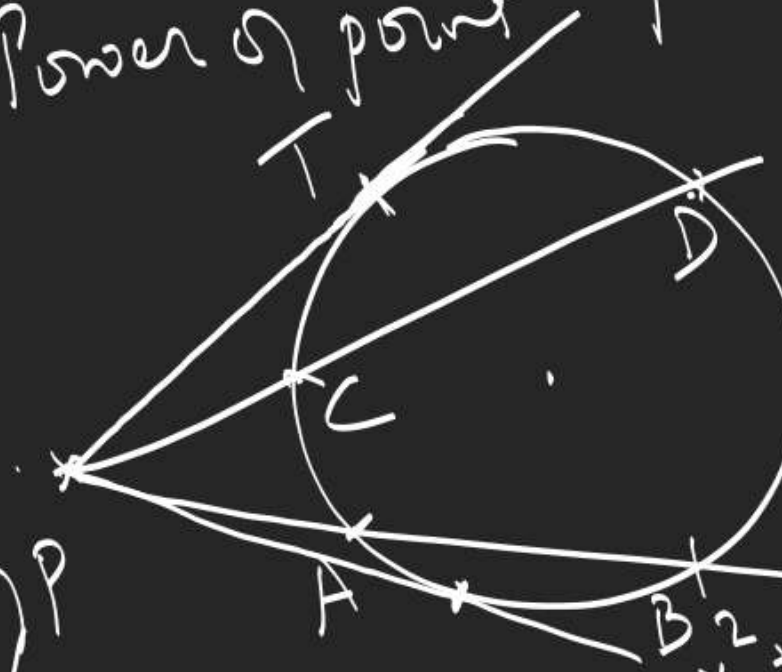
Power of point

Power of point 'P' w.r.t. circle 'S' $= S_1$

$= \alpha^2+\beta^2+2g\alpha+2f\beta+C$.

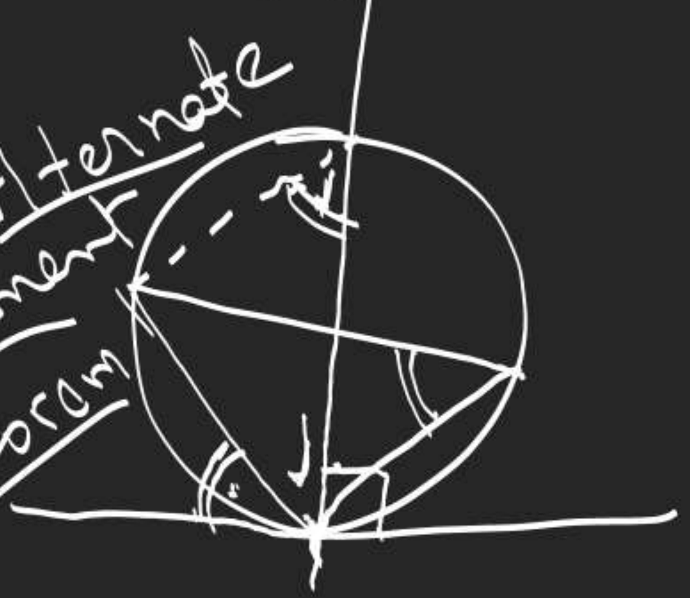


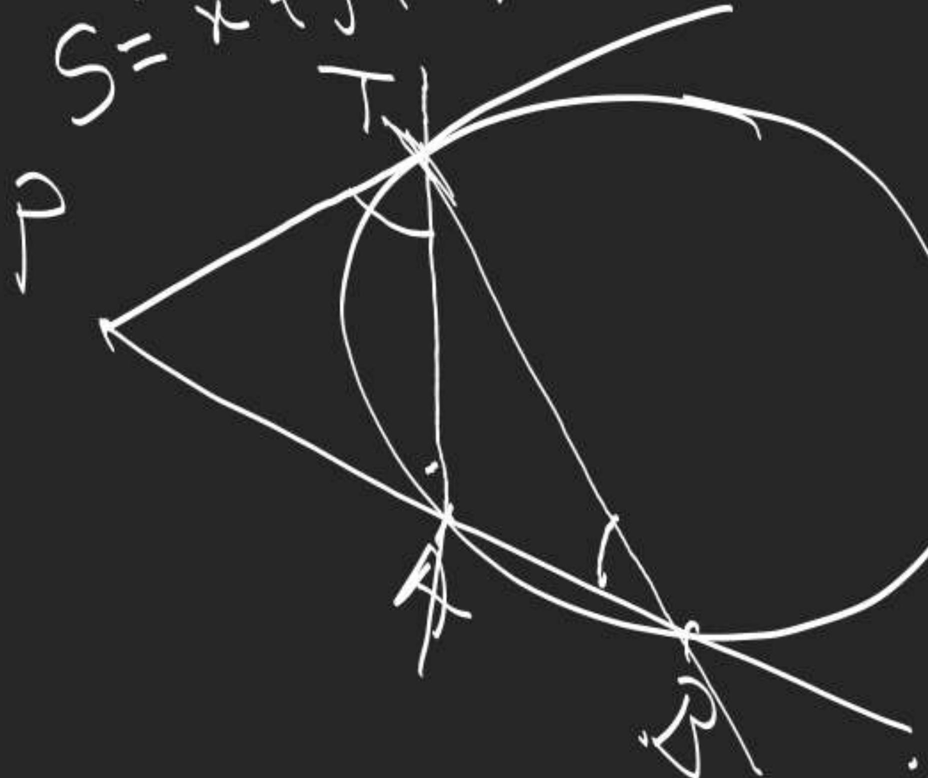
(α,β) P

$S = x^2+y^2+2gx+2fy+C=0$

$$S_1 = PT^2 = (PA)(PB) = (PC)(PD)$$

Alternate Segment Theorem





$\Delta PTA \sim \Delta PBT$

$$\frac{PT}{PB} = \frac{PA}{PT}.$$

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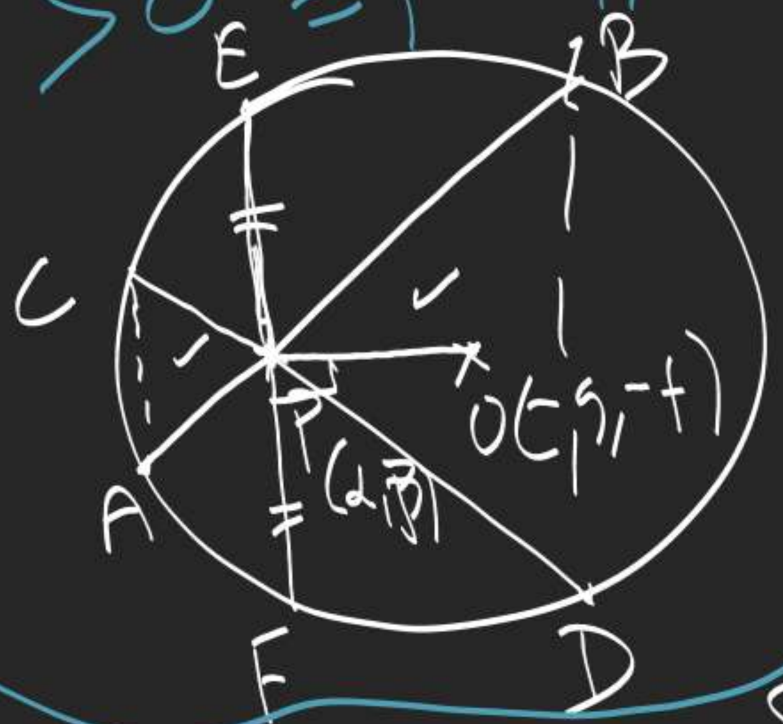
Power $< 0 \Rightarrow$ 'P' lies inside

$> 0 \Rightarrow$ — " — outside



$$(PA)(PB) = (PC)(PD) = (PE)^2$$

$$= r^2 - (OP)^2$$

$$= g^2 + f^2 - c - \left((\alpha+g)^2 + (\beta+f)^2\right)$$

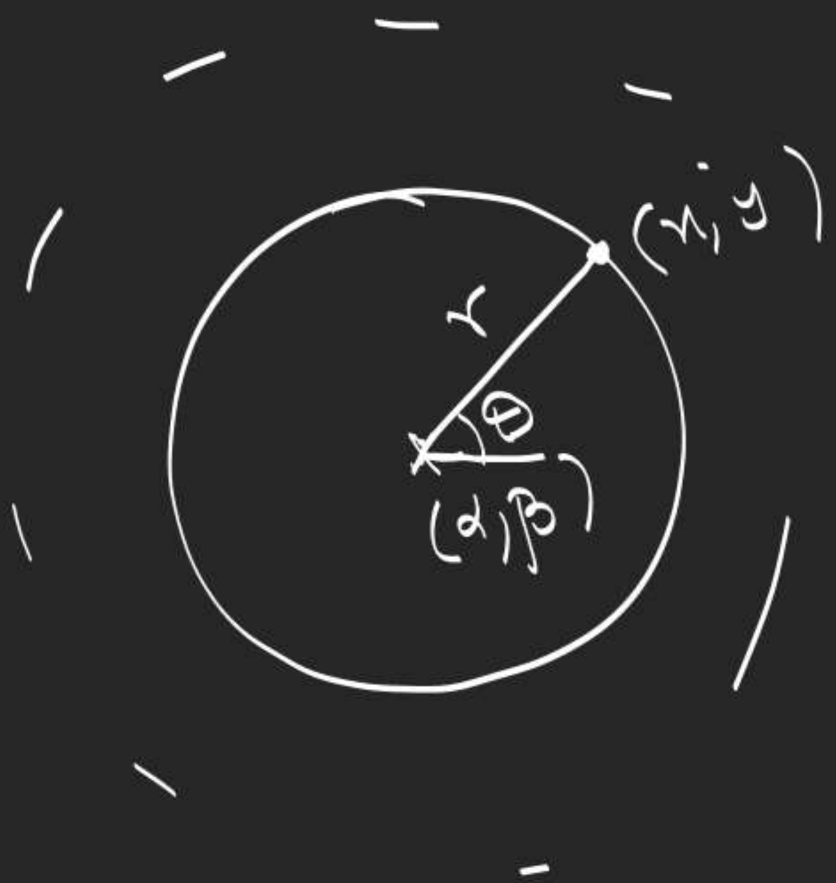
$$= -\left(\alpha^2 + \beta^2 + 2g\alpha + 2f\beta + c\right)$$

$$(PA)(PB) = -S_1$$

$$\frac{PA}{PD} = \frac{PC}{PB}$$

$$= -S_1$$

Parametric form



$$\boxed{\begin{aligned} x &= \alpha + r\cos\theta \\ y &= \beta + r\sin\theta \end{aligned}} \longrightarrow \text{Circle.}$$

$\theta \to$ parameter

r vary $\longrightarrow$ Line.

r, θ vary $\longrightarrow$ x-y, Plane

r, θ fixed $\longrightarrow$ Point.

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

$$(x-1)^2+(y-2)^2=10$$

$$\boxed{(x,y)=\left(1+\sqrt{10}\cos\theta,\ 2+\sqrt{10}\sin\theta\right)}$$

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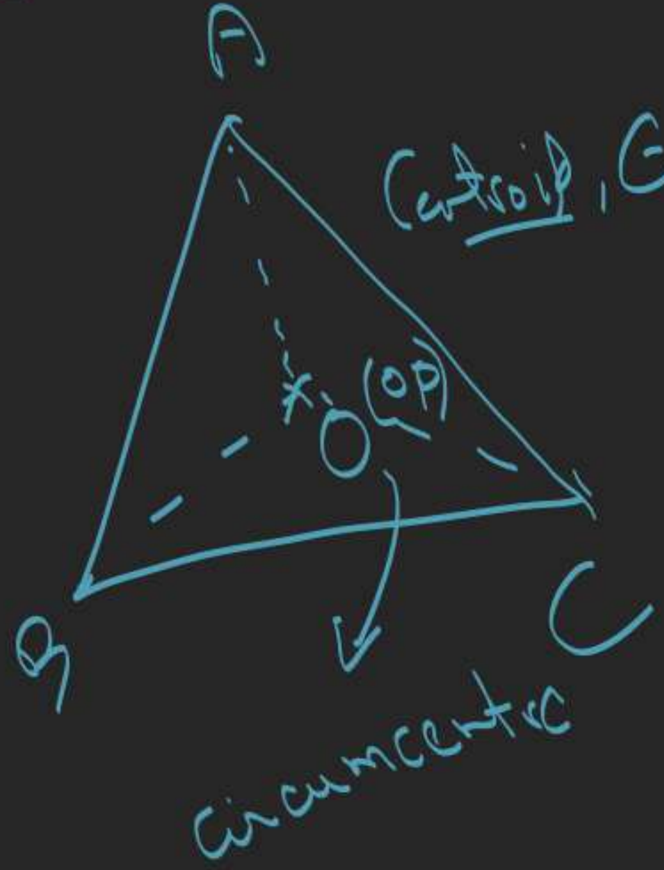
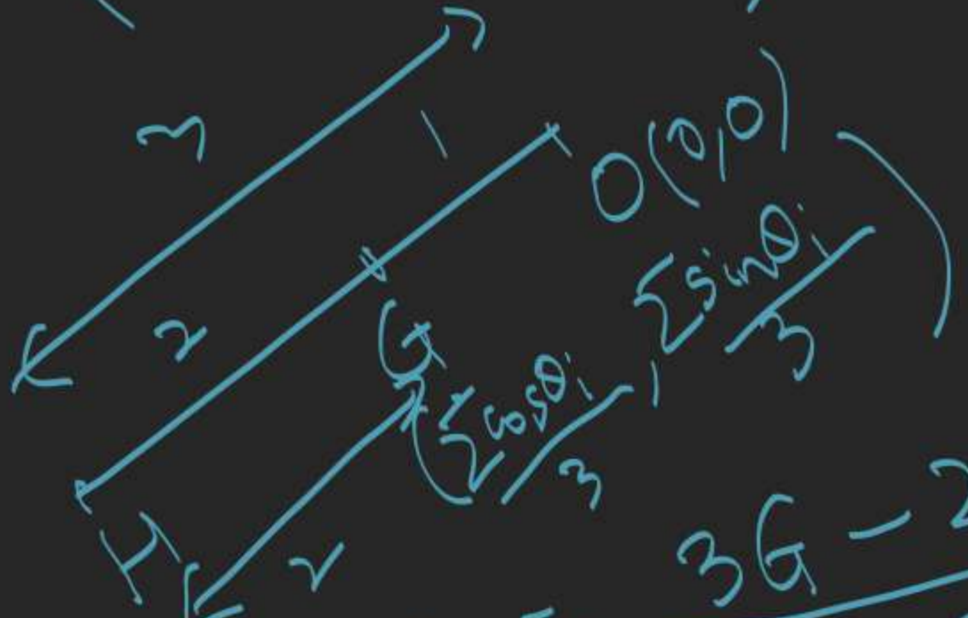
1. If $A(\cos\theta_1, \sin\theta_1)$, $B(\cos\theta_2, \sin\theta_2)$, $C(\cos\theta_3, \sin\theta_3)$ are the vertices of ΔABC. Find the orthocentre of ΔABC.

$$H = \left(\cos\theta_1 + \cos\theta_2 + \cos\theta_3,\ \sin\theta_1 + \sin\theta_2 + \sin\theta_3\right).$$



Centroid, $G = \left(\frac{\sum \cos\theta_1}{3}, \frac{\sum \sin\theta_1}{3}\right)$



$$\left(\frac{\sum\cos\theta_i}{3}, \frac{\sum\sin\theta_i}{3}\right)$$

$$H = \frac{3G - 2O}{3-2}$$

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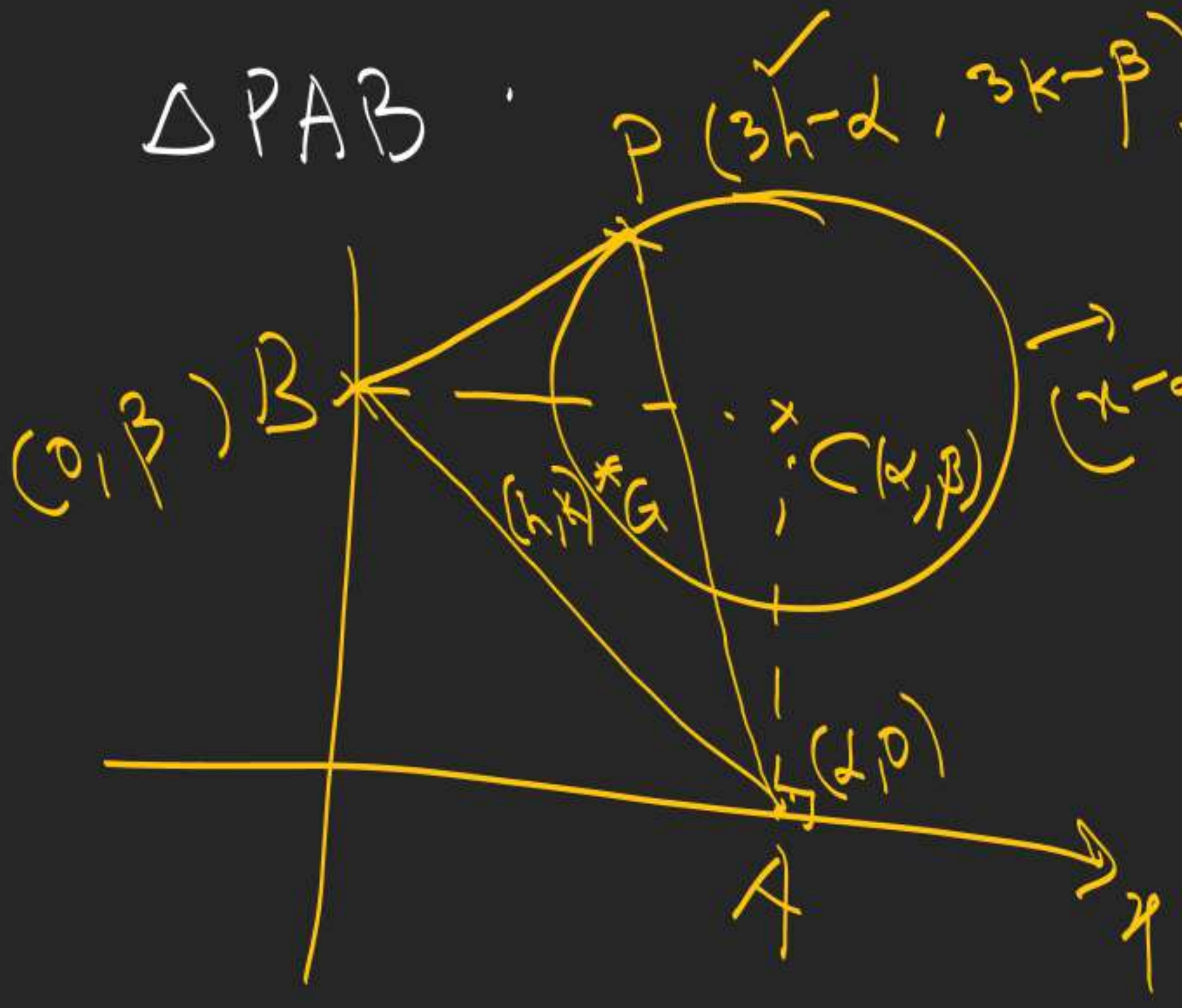
Q. 'P' is a variable point on the circle with centre at C. CA & CB are ⊥ar from C on x-axis and y-axis respectively. Find the locus of centroid of ΔPAB.

$\boxed{\text{Straight Lines}}$



$$(x-\alpha)^2+(y-\beta)^2=r^2$$

$$\Rightarrow (3h-2\alpha)^2+(3k-2\beta)^2=r^2$$

Single Choice

1, 2, 3, 4, 5, 6, 9, 12, 14, 17, 18,
19, 20, 21, 22, 23, 24, 25, 26
27, 29, 31

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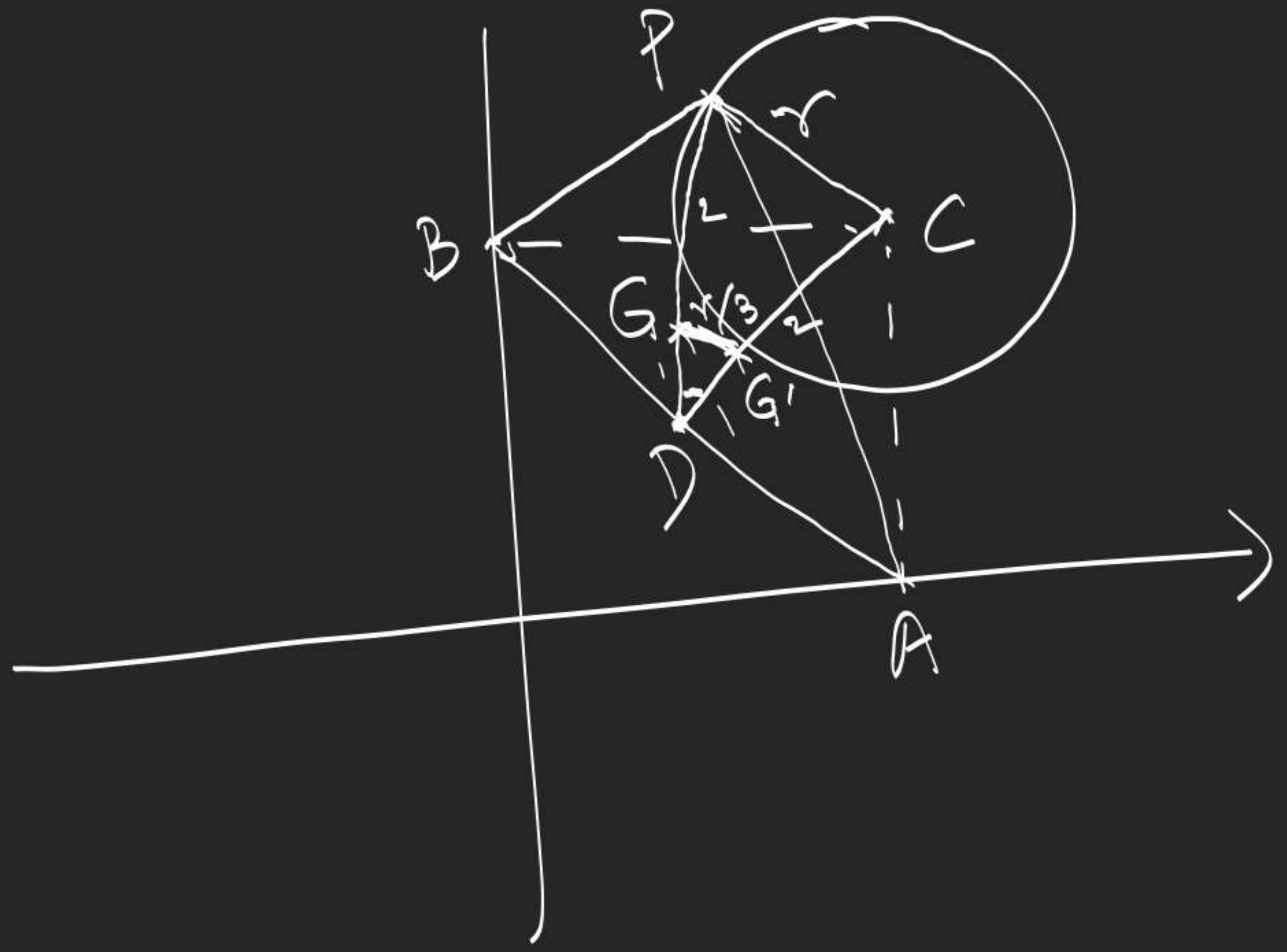

$$9m^2+121+66m = 16(9+m^2)$$

$$7m^2-66m+23=0$$

$$\frac{|6+3m+5|}{\sqrt{9+m^2}} = 4$$

$$m = \frac{66 \pm \sqrt{(66)^2-(28)(23)}}{14}$$

3. Find 'm' for which the line $3x-my+5=0$ is tangent to circle $x^2+y^2-4x+6y-3=0$.

$(2,-3)$, $r=4$

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4. If $4l^2-5m^2+6l+1=0$, then show that the line $lx+my+1=0$ touches a fixed circle. Find the centre and radius of the circle.

$$\boxed{(3,0)}$$

$$\sqrt{5}$$

$$(3l+1)^2 = 9l^2+6l+1 = 5(m^2+l^2)$$

$$\frac{|3l+1|}{\sqrt{l^2+m^2}} = \sqrt{5}$$

$p = r$