Nishant Jindal

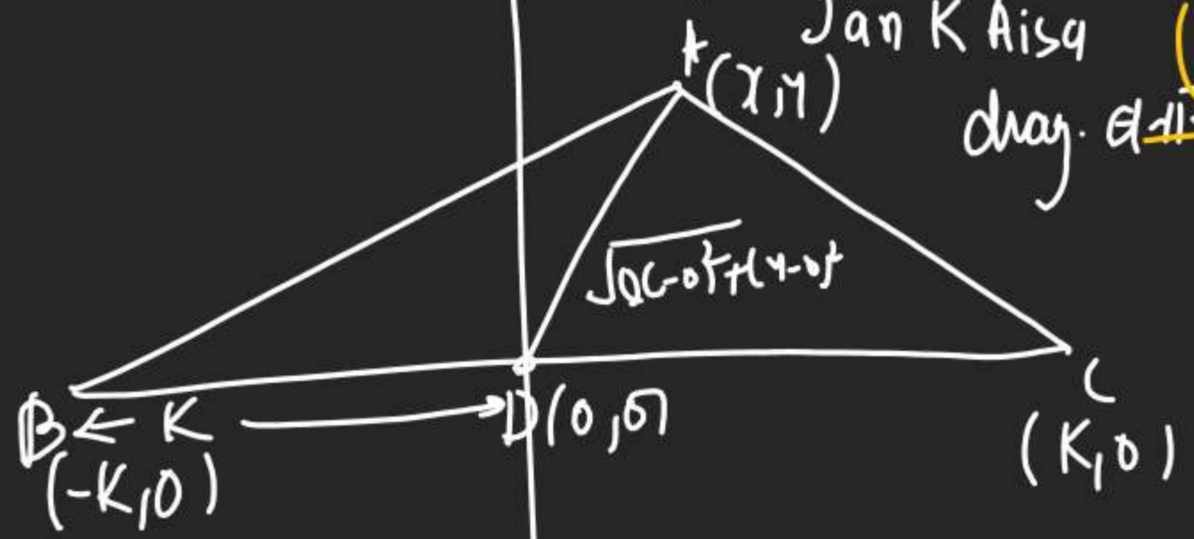
Q Prove Apollonius Theorem.

$AB^2+AC^2 = 2(AD^2+BD^2)$

D = Mid pt of BC?

Jan K Aisa

drag. a(1,3)



LHS $= AB^2+AC^2$

$= (x+K)^2+(y-0)^2+(x-K)^2+(y-0)^2$

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

RHS $= 2(AD^2+BD^2)$

$= 2(x^2+y^2+K^2) = LHS \Rightarrow H.P.$

A)

$P = (3,-\sqrt{3})$

$O = (0,0)$

$A = (3,\sqrt{3})$

$\sqrt{0+(2\sqrt{3})^2} = 12$

$\sqrt{9+3} = 12$

$\sqrt{9+3} = 12$

(B) $h = 0,\ K = 2\sqrt{3}$.

$P\ (0, 2\sqrt{3})$

$O\ (0,0)$

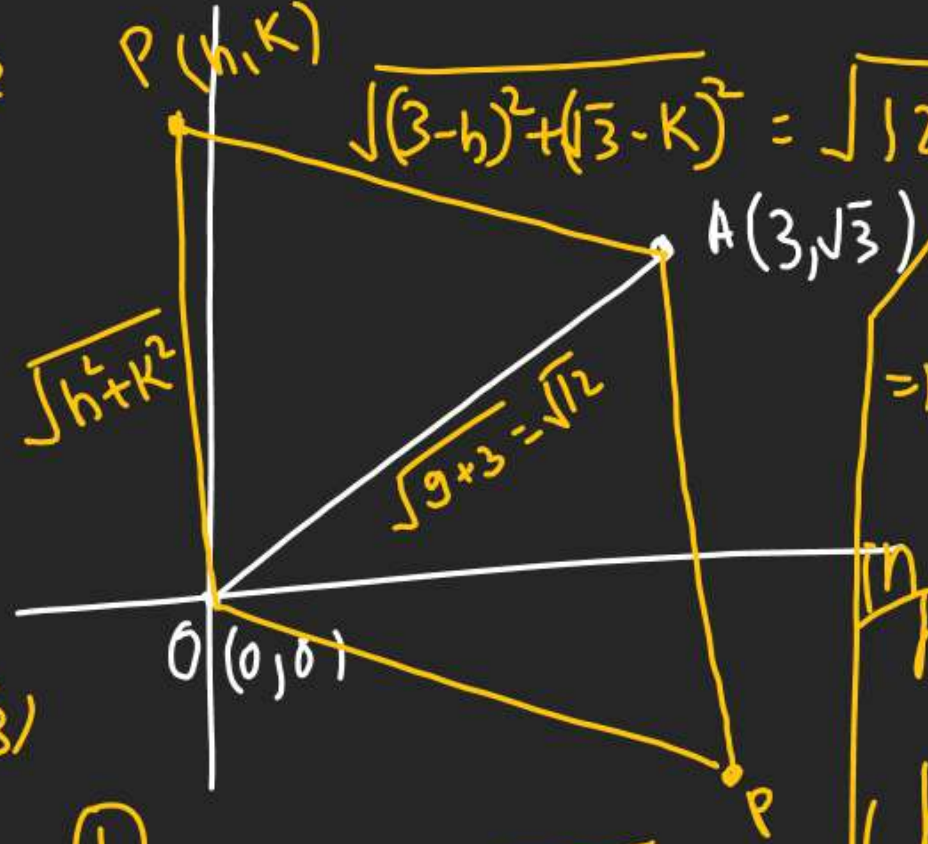
$A\ (3,\sqrt{3})$

$= 12$

12

$P = (3,-\sqrt{3})\ \&\ (0, 2\sqrt{3})$

Q 2 pts O(0,0) & A$(3,\sqrt{3})$ with another pt. P form an eqt Δ. find P.



$\sqrt{(3-h)^2+(\sqrt{3}-K)^2} = \sqrt{12+h^2+K^2-6h-2\sqrt{3}K}$

$\sqrt{h^2+K^2}$

$\sqrt{9+3} = \sqrt{12}$

① $\sqrt{12+h^2+K^2-6h-2\sqrt{3}K} = \sqrt{12}$

$h^2+K^2-6h-2\sqrt{3}K = 0$

② $h^2+K^2 = 12$

(3) $\sqrt{12+h^2+K^2-6h-2\sqrt{3}K} = \sqrt{h^2+K^2}$

$6h+2\sqrt{3}K = 12 \rightarrow 3h+\sqrt{3}K = 6$

$3h+\sqrt{3}K = 6$

$\Rightarrow \sqrt{3}h+K = 2\sqrt{3}$

$K = 2\sqrt{3}-\sqrt{3}h$.

$h^2+(2\sqrt{3}-\sqrt{3}h)^2 = 12$

$h^2+\cancel{12}+3h^2-12h = \cancel{12}$

$4h^2-12h = 0 \Rightarrow h = 3$

$\therefore K = 2\sqrt{3}-3\sqrt{3} = -\sqrt{3}$.

$P = (3,-\sqrt{3})$

If $h = 0,\ K = \pm 2\sqrt{3}$

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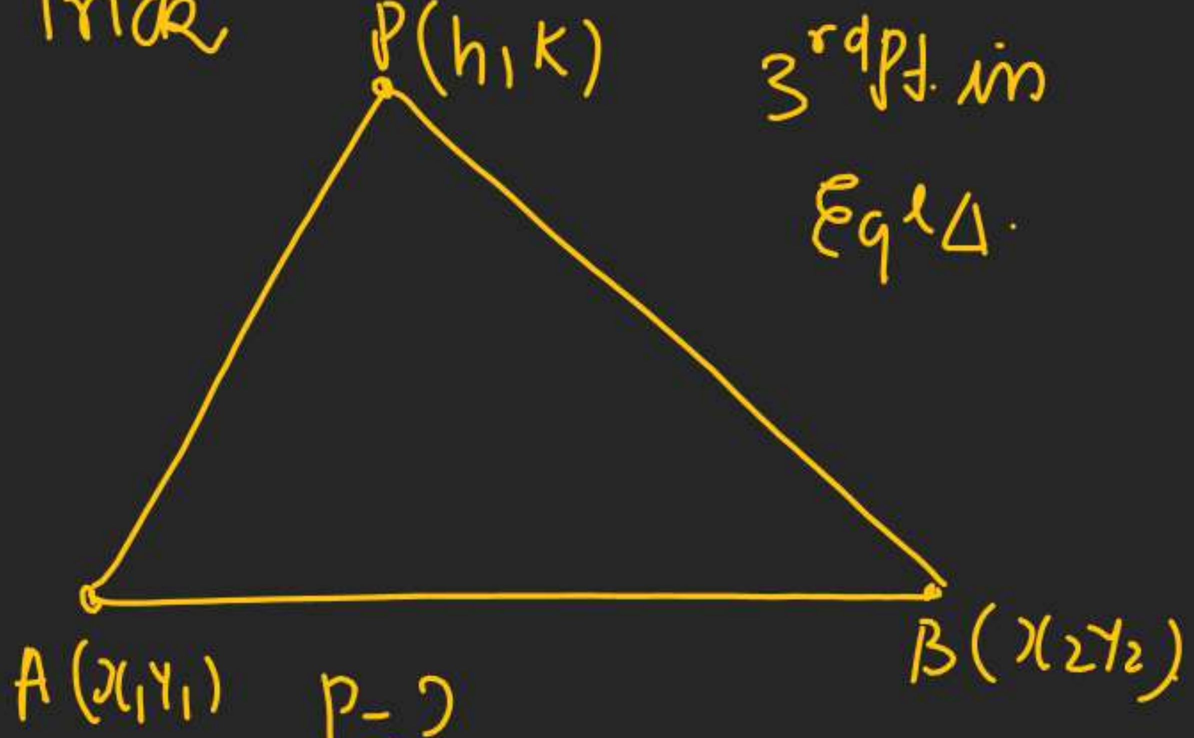
Trick

3rd pt. in Eq^l Δ.



P = ?

$$h = \frac{(x_1 + x_2) \pm \sqrt{3}(y_1 - y_2)}{2}$$

$$k = \frac{(y_1 + y_2) \mp \sqrt{3}(x_1 - x_2)}{2}$$

Q $O \equiv (0, 0)$, $A = (3, \sqrt{3})$

$(x_1\ y_1)$ $\quad$ $(x_2\ y_2)$

$P = (h, k)$

$$h = \frac{(0+3) \pm \sqrt{3}(0 - \sqrt{3})}{2} = \frac{3 + \sqrt{3}(-\sqrt{3})}{2} = 0, \quad \frac{3 - \sqrt{3}(-\sqrt{3})}{2} = 3$$

$$k = \frac{(0 + \sqrt{3}) \mp \sqrt{3}(0 - 3)}{2} = \frac{\sqrt{3} + \sqrt{3}(+3)}{2} = 2\sqrt{3}, \quad \frac{\sqrt{3} + \sqrt{3}(-3)}{2} = -\sqrt{3}.$$

$(h, k) = (0, 2\sqrt{3})$ $\quad$ $(3, -\sqrt{3})$

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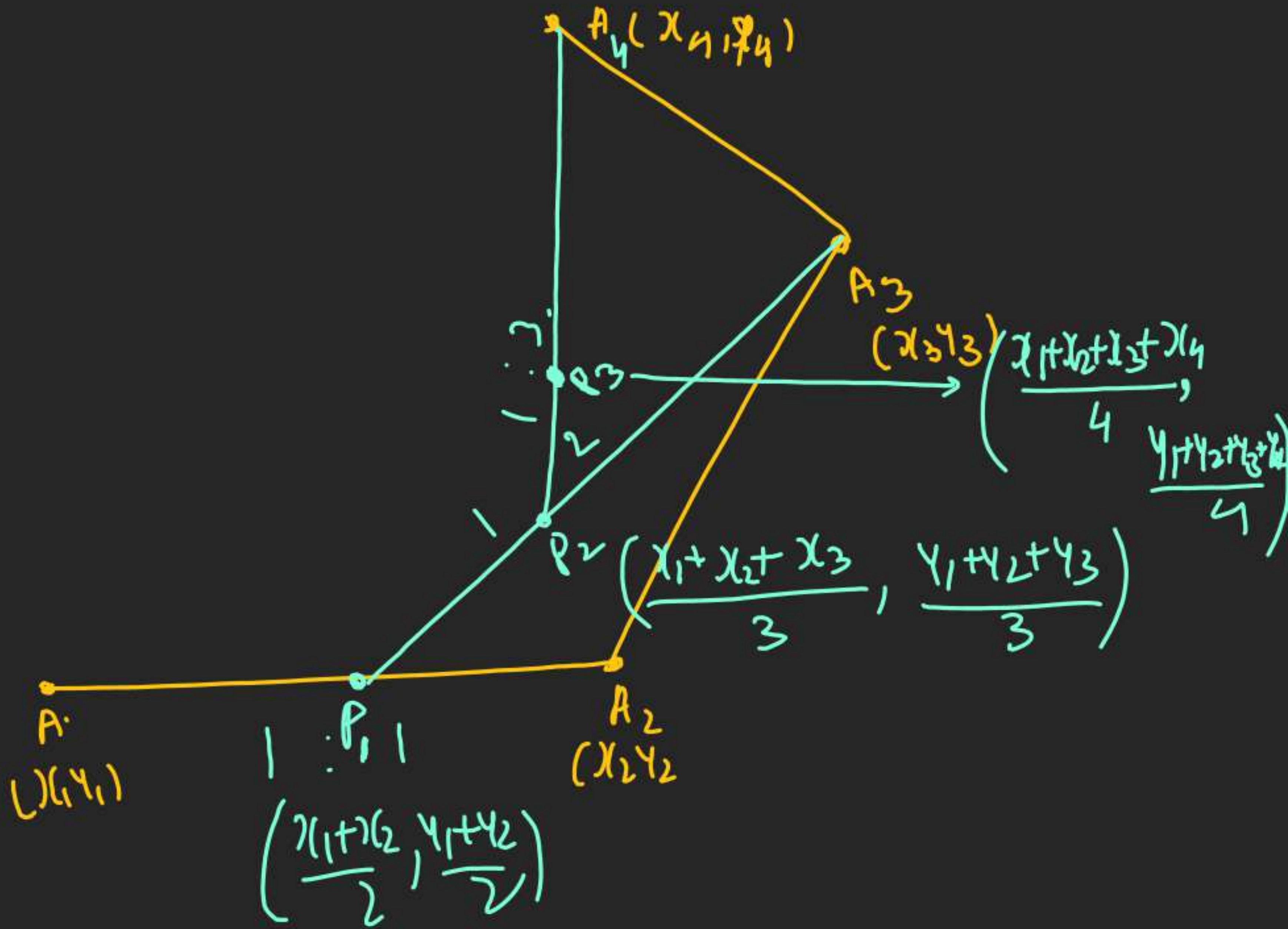
Q. let $A_1, A_2, A_3 \dots A_n$ are n pts in a plane whose coord. are $(x_1, y_1)(x_2, y_2)(x_3, y_3) \dots (x_n, y_n)$

A_1A_2 is Bisected at P_1, P_1A_3 is divided in Ratio 1:2 at P_2, P_2A_4 is divided in Ratio 1:3 at P_3, P_3A_5 is divided in Ratio 1:4 at P_4 & so on untill all n pts are exhausted. Find coord. of final Pt.



Final Pt P_{n-1} $\left(\frac{x_1+x_2+x_3 \dots x_n}{n}, \frac{y_1+y_2+y_3+\dots+y_n}{n}\right)$

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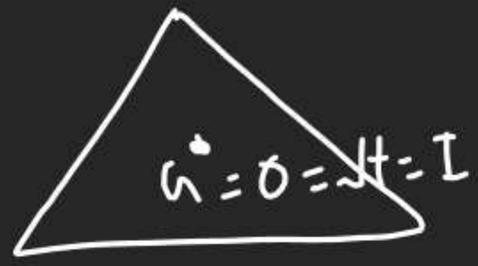
Relation betⁿ H, G, O

Relation betⁿ Orthocentre, Centroid, Circumcentre.

depends on Δ.

① If Δ is equilateral Δ then H, G, I, O will coincide.



(2) Δ other than eqˡ Δ then H, G, O will be in a line always.

(3) Ratio of HG : GO = 2 : 1 always

$G = \left(\frac{a(\cos\theta_1+\cos\theta_2+\cos\theta_3)}{3}, \frac{a(\sin\theta_1+\sin\theta_2+\sin\theta_3)}{3} \right)$

$\frac{a}{3}(\cos\theta_1+\cos\theta_2+\cos\theta_3)=0$

$\cos\theta_1+\cos\theta_2+\cos\theta_3=0$

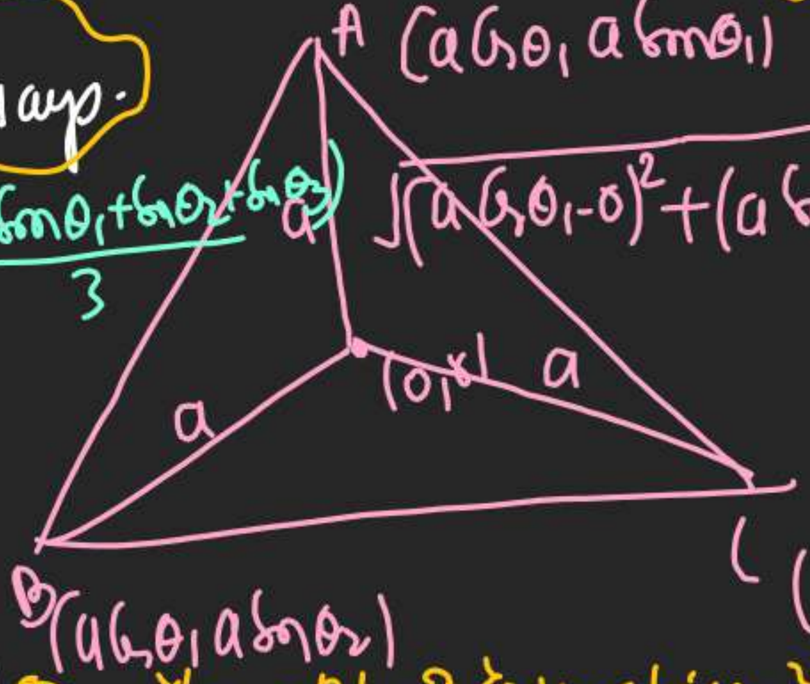
$\frac{a}{3}(\sin\theta_1+\sin\theta_2+\sin\theta_3)=0$

$\Rightarrow \sin\theta_1+\sin\theta_2+\sin\theta_3=0$

Q Δ ABC have vertices $A(a\cos\theta_1, a\sin\theta_1)$ $B(a\cos\theta_2, a\sin\theta_2)$, $C(a\cos\theta_3, a\sin\theta_3)$ is an equilateral Δ then P.T. $\cos\theta_1+\cos\theta_2+\cos\theta_3$ $=\sin\theta_1+\sin\theta_2+\sin\theta_3=0$ H.P

Common Sense

① तीनों vertices को (0,0) से दूरी Socho.



$\sqrt{(a\cos\theta_1-0)^2+(a\sin\theta_1-0)^2}$

$=\sqrt{a^2\cos^2\theta_1+a^2\sin^2\theta_1}$

$=\sqrt{a^2(\cos^2\theta_1+\sin^2\theta_1)}$

$=a$

② कौनसा Pt. तीनों vertices से eqˡ dist. पर होता है?

Circumcentre $=(0,0)$ है

(3) Circumcentre = Centroid = (0,0)