

Foundation Batch



MATHS

Geometry

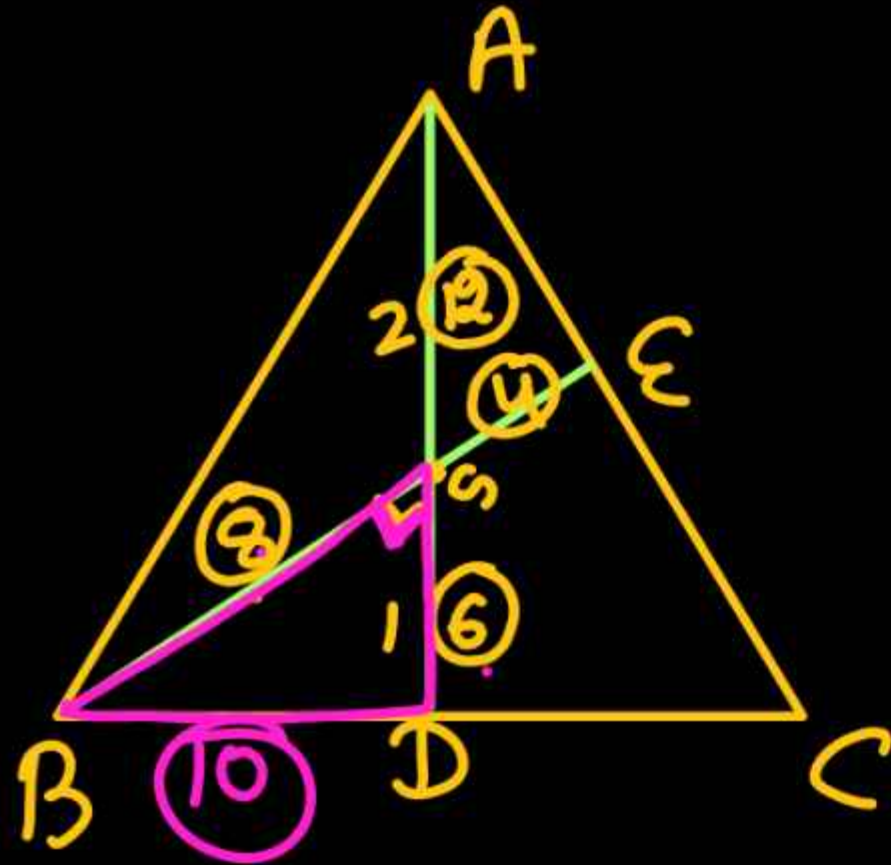
(Centres Of Triangle)

Part -3

LIVE

04-10-2024 07:00PM



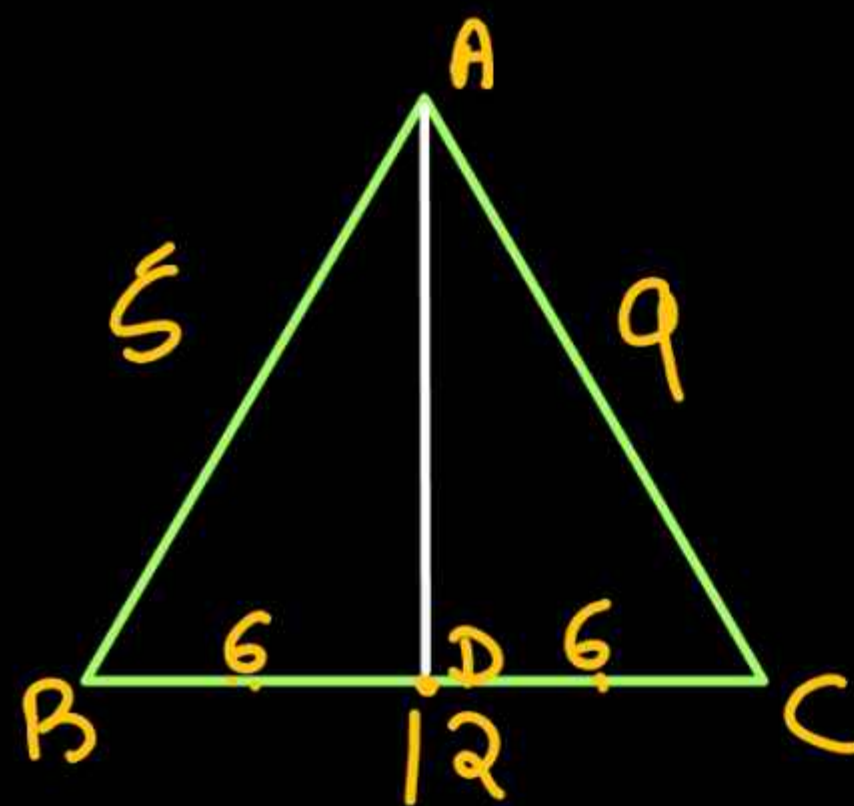


In $\triangle ABC$, two medians AD and BE intersect at right angles at G . If $AD = 18$ cm and $BE = 12$ cm, then the length of BD is equal to?

$\triangle ABC$ में, दो माधिकाएँ AD और BE , G पर समकोण पर प्रतिच्छेद करती हैं। यदि $AD = 18$ cm और $BE = 12$ cm है। तो BD की लंबाई किसके बराबर है?

- (a) 20 cm (b) 8 cm
(c) 10 cm (d) 15 cm

(SSC CHSL Pre. 01/07/2024)



$\triangle$ In ABC , AB , BC and AC are equal to 5 cm, 12 cm and 9cm respectively. If the median AD intersects the opposite side BC at D , find the measure of the median AD .

$\triangle ABC$ में, AB , BC और AC क्रमशः 5 सेमी, 12 सेमी और 9 सेमी के बराबर हैं। यदि माध्यिका AD विपरीत भुजा BC को D पर प्रतिच्छेदित करती है, तो माध्यिका AD , की माप ज्ञात कीजिए।

$$5^2 + 9^2 = (6^2 + AD^2) \times 2$$

$$25 + 81$$

$$106 = (36 + AD^2) \times 2$$

$$53$$

$$AD^2 = 17$$

$$AD = \sqrt{17}$$

$$(a) \sqrt{8.5} \text{ सेमी}$$

$$(c) 5 \text{ सेमी}$$

$$(b) \sqrt{17} \text{ सेमी}$$

$$(d) \sqrt{34} \text{ सेमी}$$



Incenter/ex-center/circumcenter/orthocenter

Center (કેન્દ્ર)

① Centroid (કેન્દ્રક)

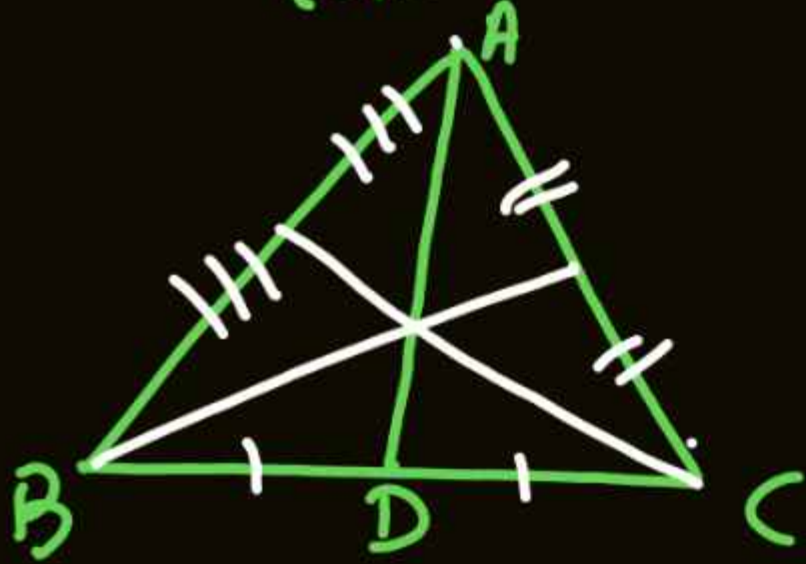
② Orthocenter (ભરથકેન્દ્ર)

③ Circumcenter (પરિકેન્દ્ર)

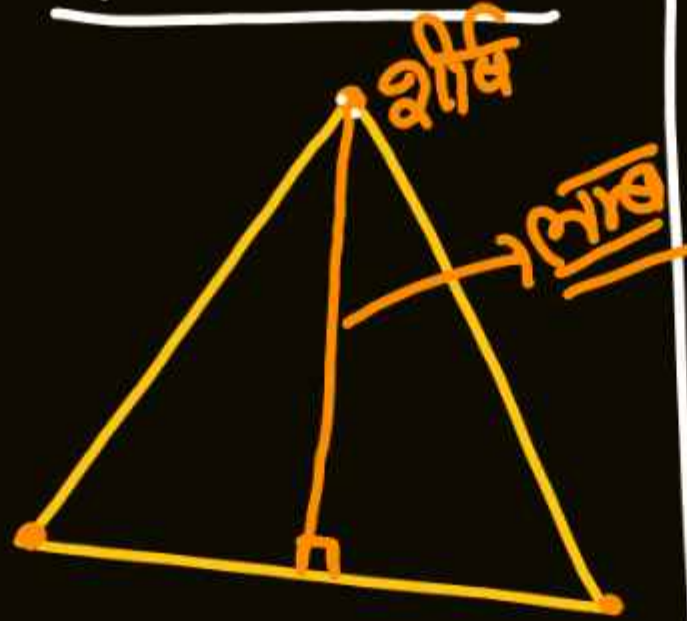
④ Incenter (અંતઃકેન્દ્ર)

⑤ Excenter → (બાહ્યકેન્દ્ર)

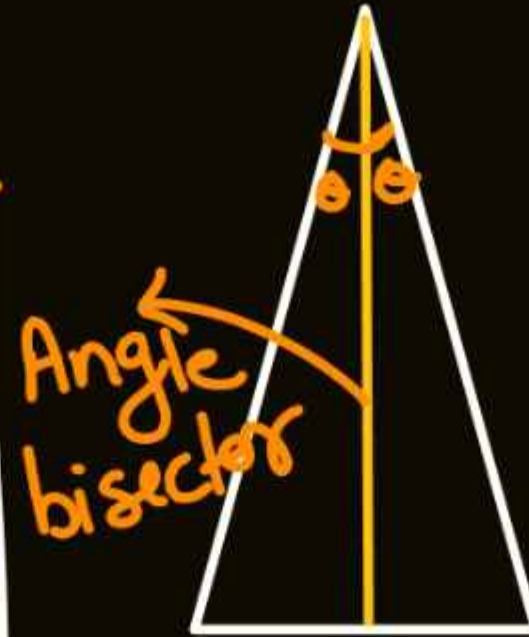
median
(મધિયકા)



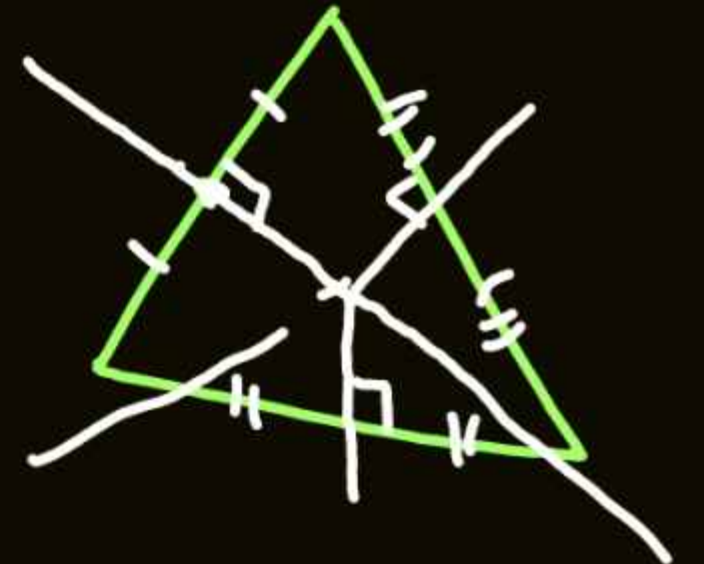
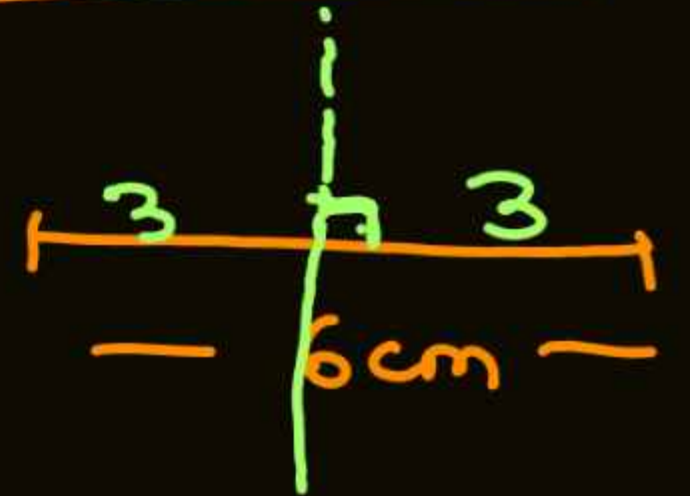
(લમ્બ)
(Altitude)



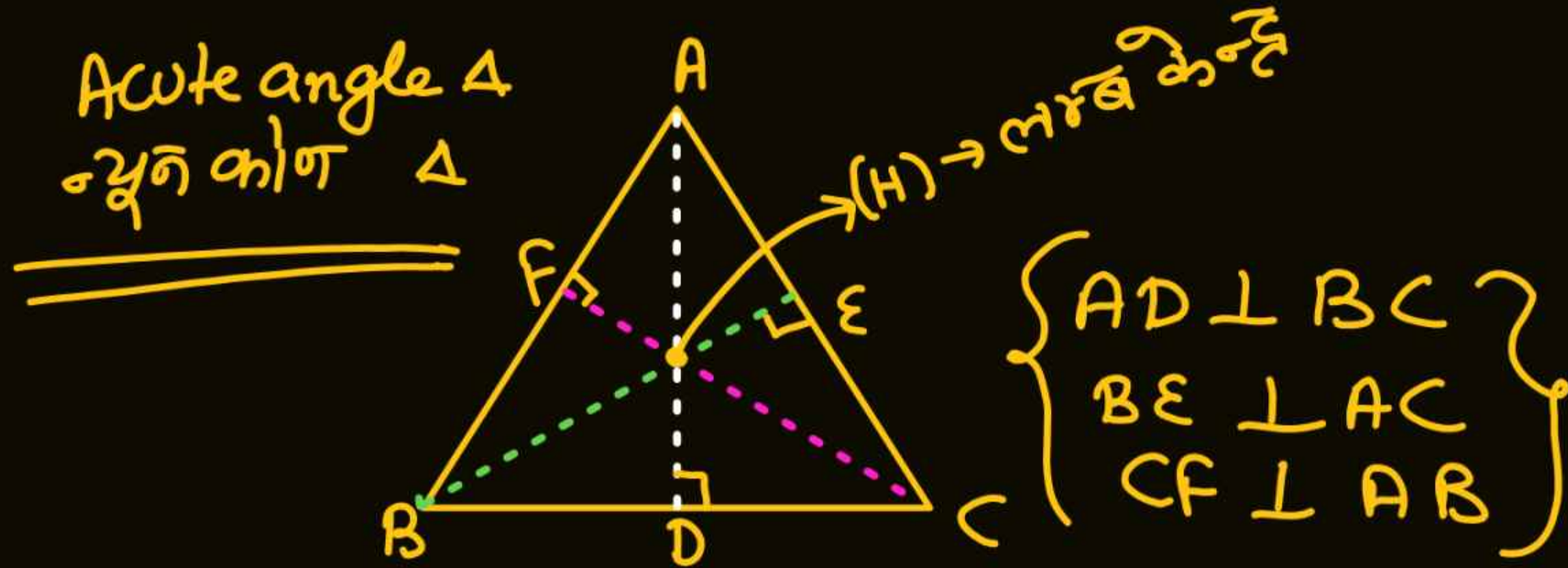
Angle bisector
કોણ વિભાજક



Perpendicular
Bisector
લમ્બ વિભાજક

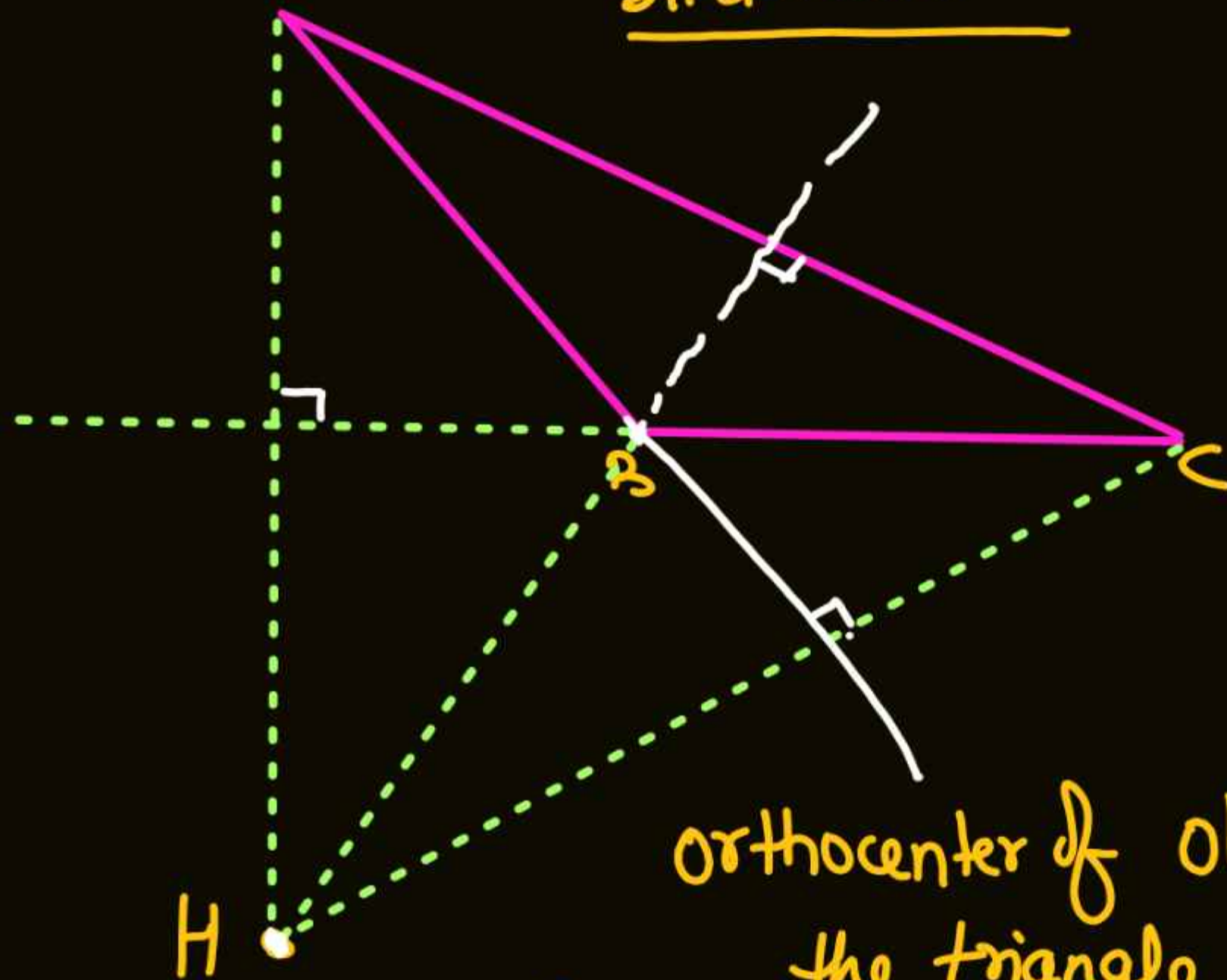


Orthocenter (लम्ब केन्द्र)



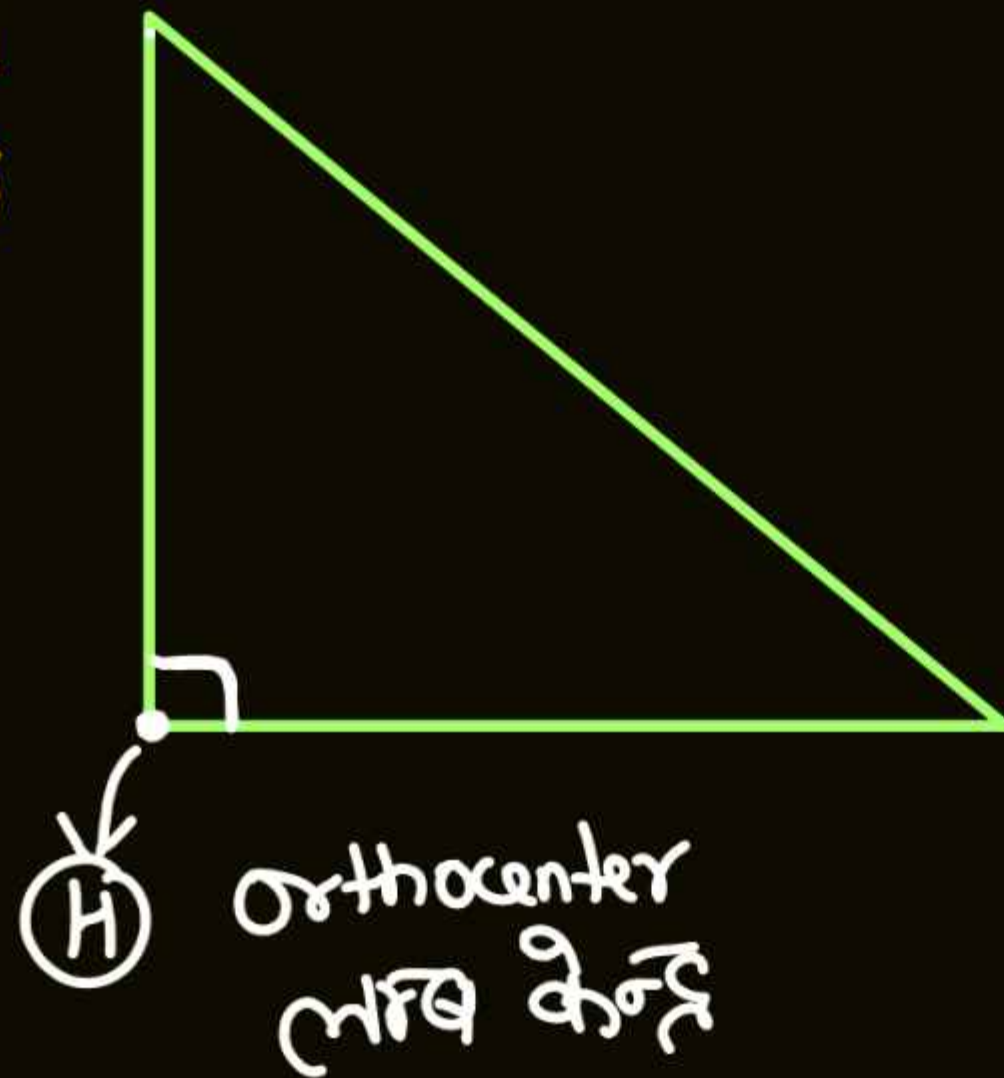
* Where all three Altitudes meet $\rightarrow$ Orthocenter
जहाँ तीनों लम्ब मिलते हैं $\rightarrow$ लम्ब केन्द्र .

Obtuse angle Δ
ଅକ୍ଷେପ କୋଣ Δ

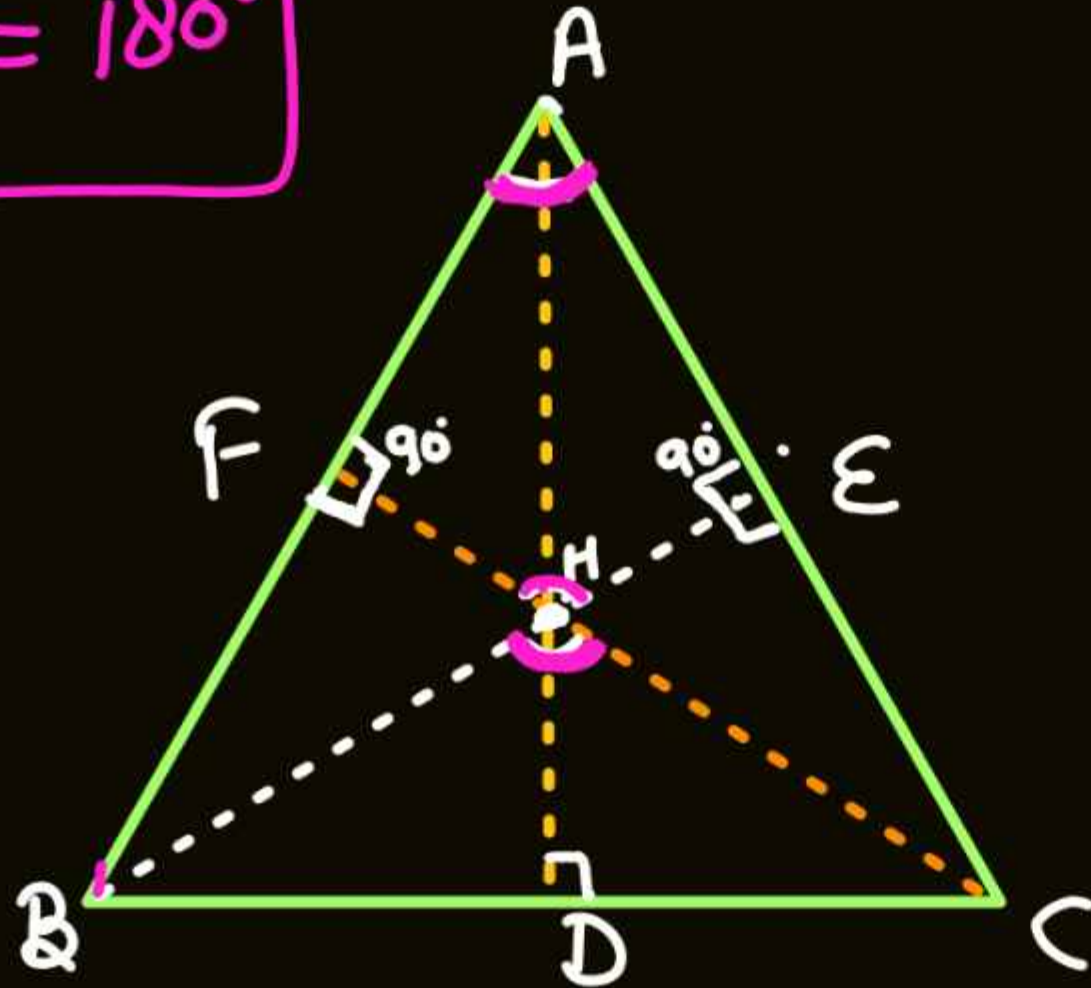


Orthocenter of obtuse angle Δ lies outside
the triangle.

Right angle Δ
ସମକୋଣ ତ୍ରିଭୁଜ



$$\angle BHC + \angle A = 180^\circ$$



$$\angle BHC = \angle FHE$$

opposite angles

$$\square FAEH$$

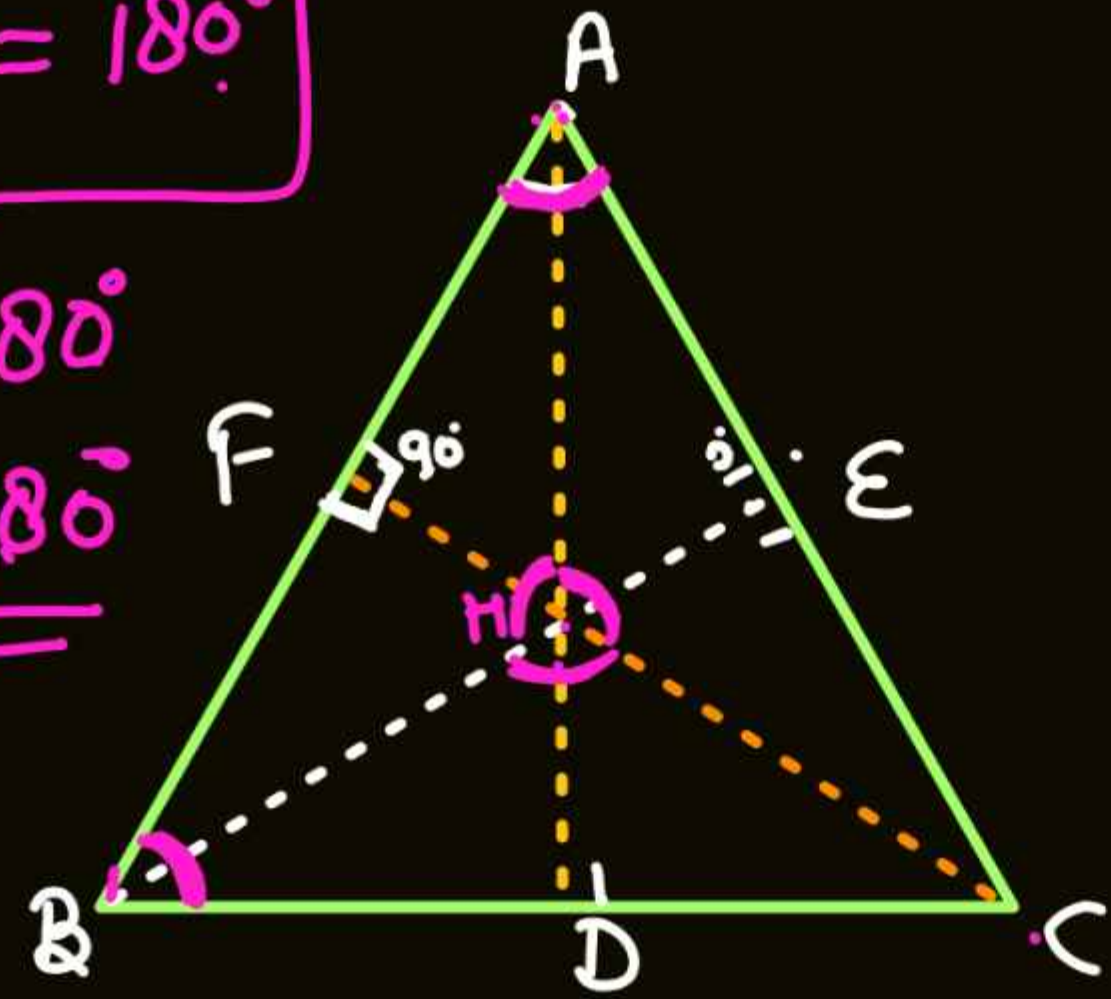
$$90 + A + 90 + \angle EHF = 360$$

$$A + \angle EHF = 180^\circ$$

$$\angle BHC + \angle A = 180^\circ$$

$$\angle CHA + \angle B = 180^\circ$$

$$\angle AHB + \angle C = 180^\circ$$



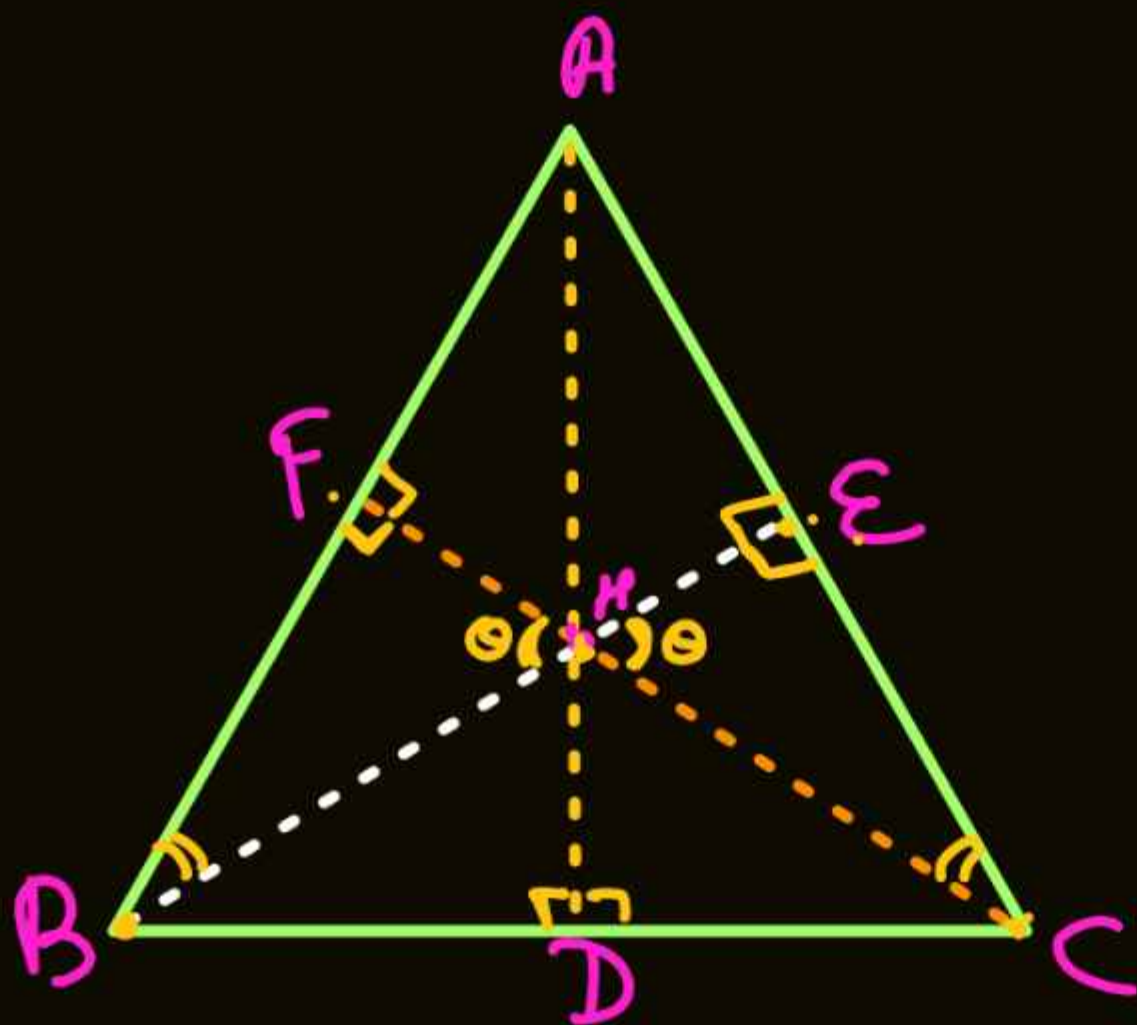
$$\angle BHC = \angle FHE$$

opposite angles

$$\square FAEH$$

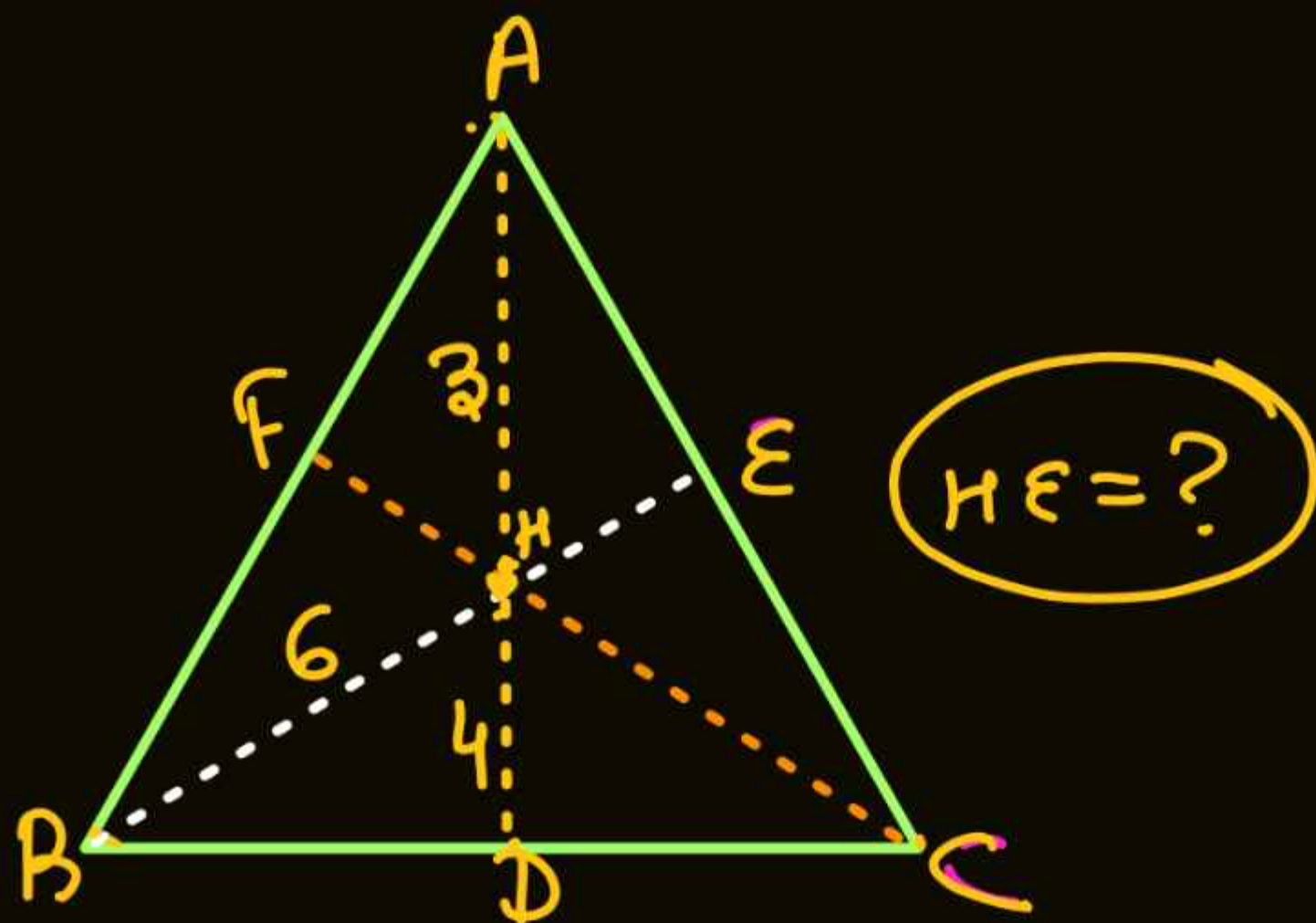
$$90 + A + 90 + \angle EHF = 360$$

$$A + \angle EHF = 180^\circ$$



$$\triangle FHB \sim \triangle EHC$$

$$\frac{HB}{HC} = \frac{FH}{EH} \Rightarrow \boxed{HB \times EH = FH \times HC = AH \times HD}$$

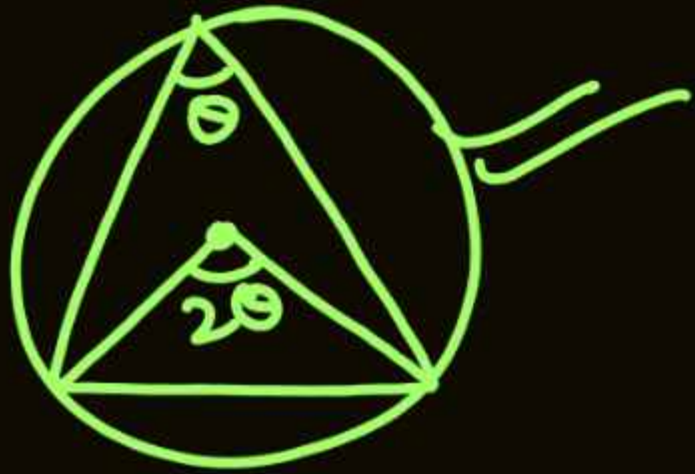


$$AH \times HD = BH \times HE = CH \times HF$$

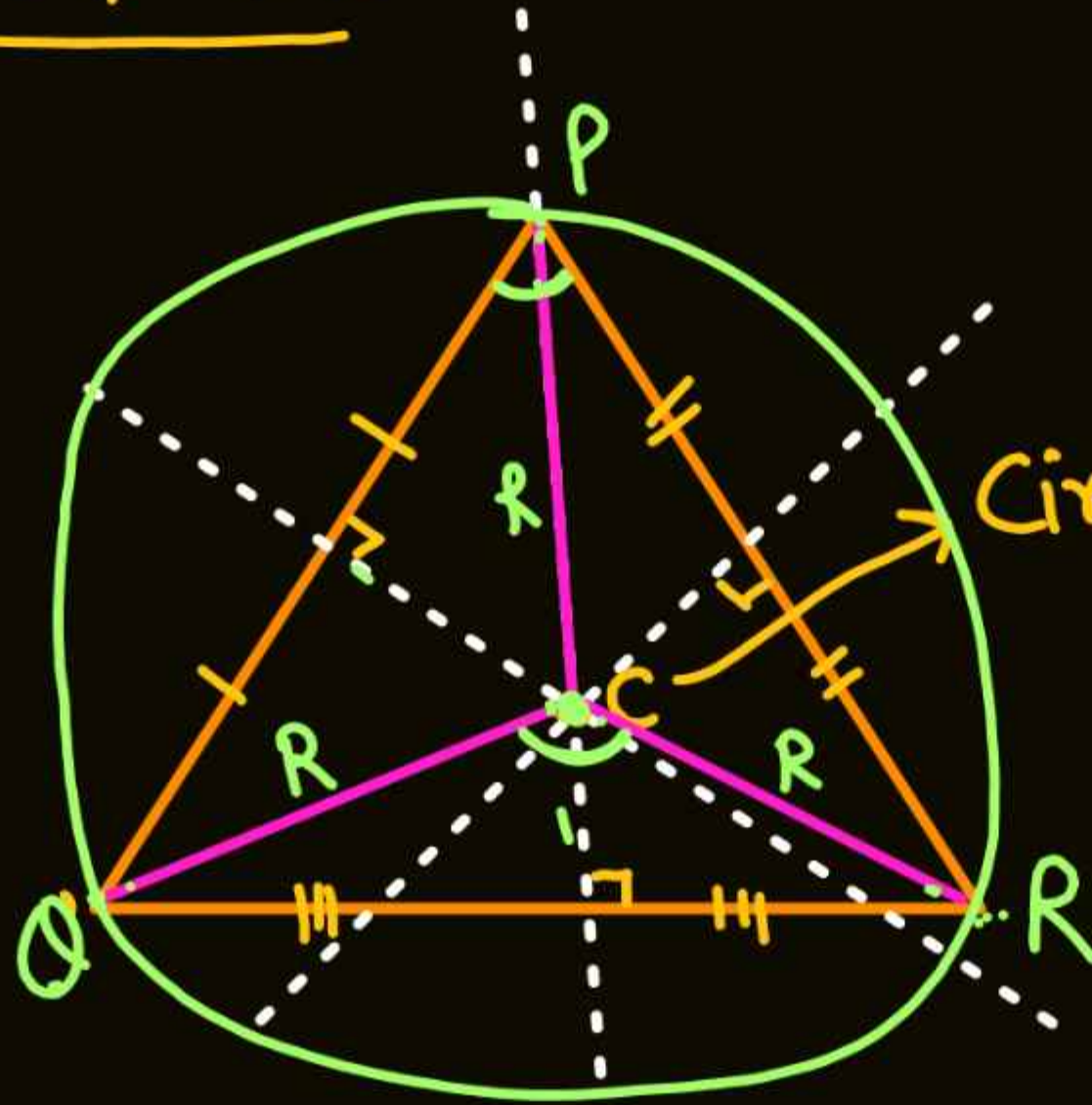
$$3 \times 4 = 6 \times HE$$

$$HE = \frac{12}{6} \text{ (2)}$$

Circumcenter (परिकेंद्र)

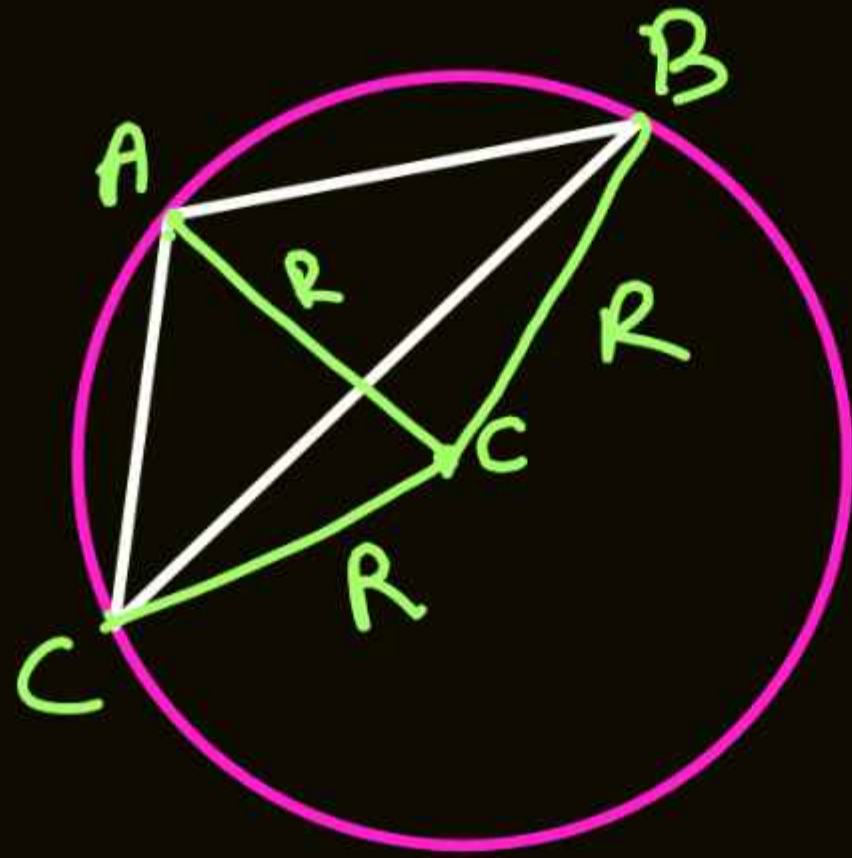


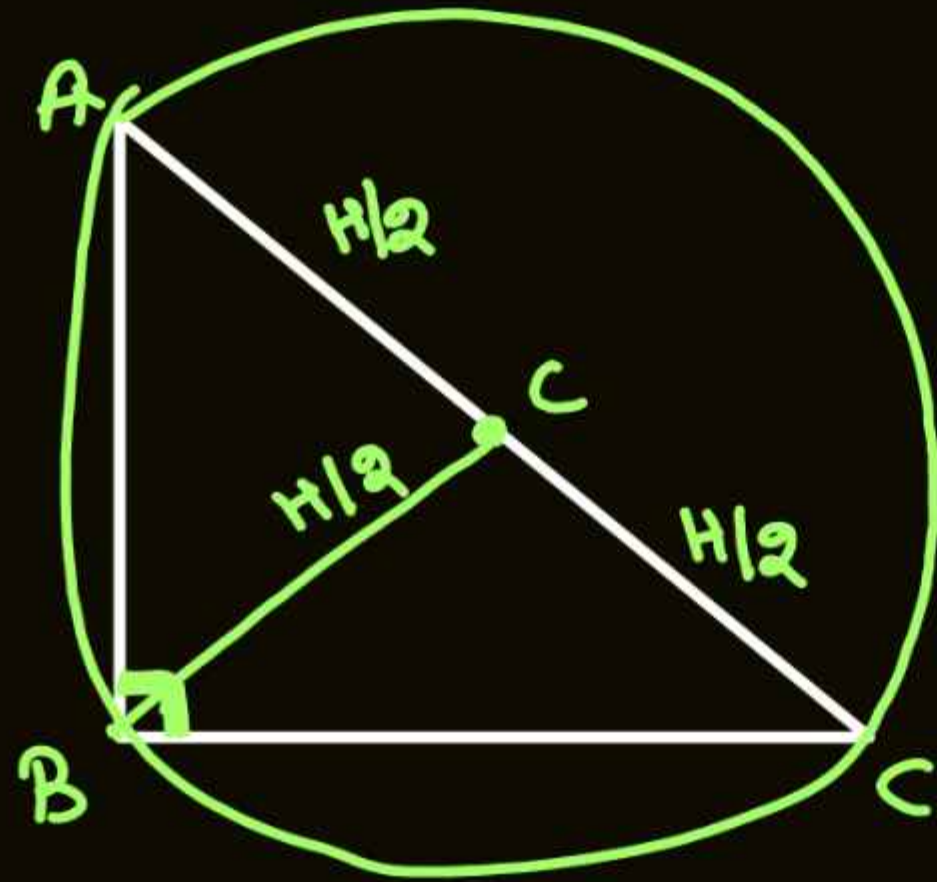
$$\left\{ \begin{array}{l} \angle OCR = 2\angle P \\ \angle RCP = 2\angle Q \\ \angle OCP = 2\angle R \end{array} \right\}$$



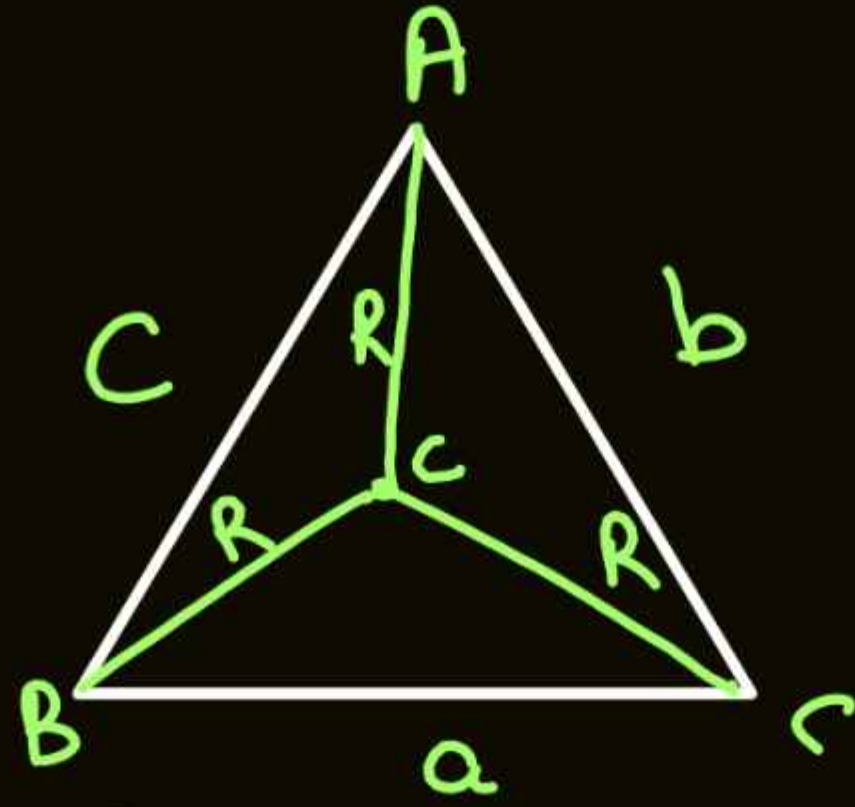
Circumcenter
(परिकेंद्र)

$R = \text{Circumradius}$
(परि त्रिज्या)





$$\text{समकोण त्रिभुज का परिकेन्द्र} = \frac{\text{कर्ण}}{2}$$



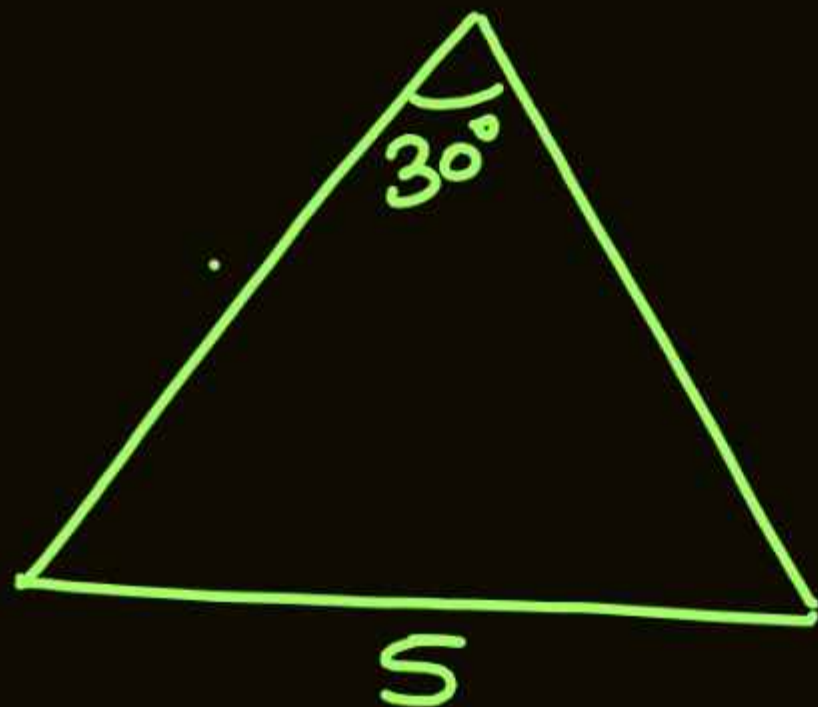
$$R = \frac{abc}{4\Delta}$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

$$R = \frac{abc}{4\Delta}$$

$\Delta \rightarrow$ area of triangle.



$$\frac{a}{\sin A} = 2R$$

$$\frac{S}{\sin 30} = 2R$$

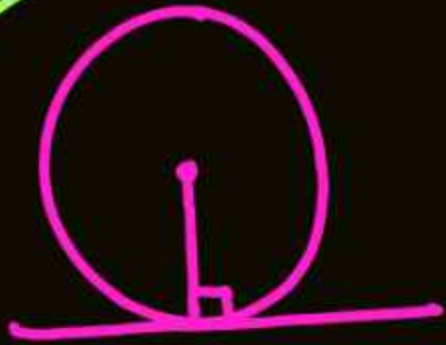
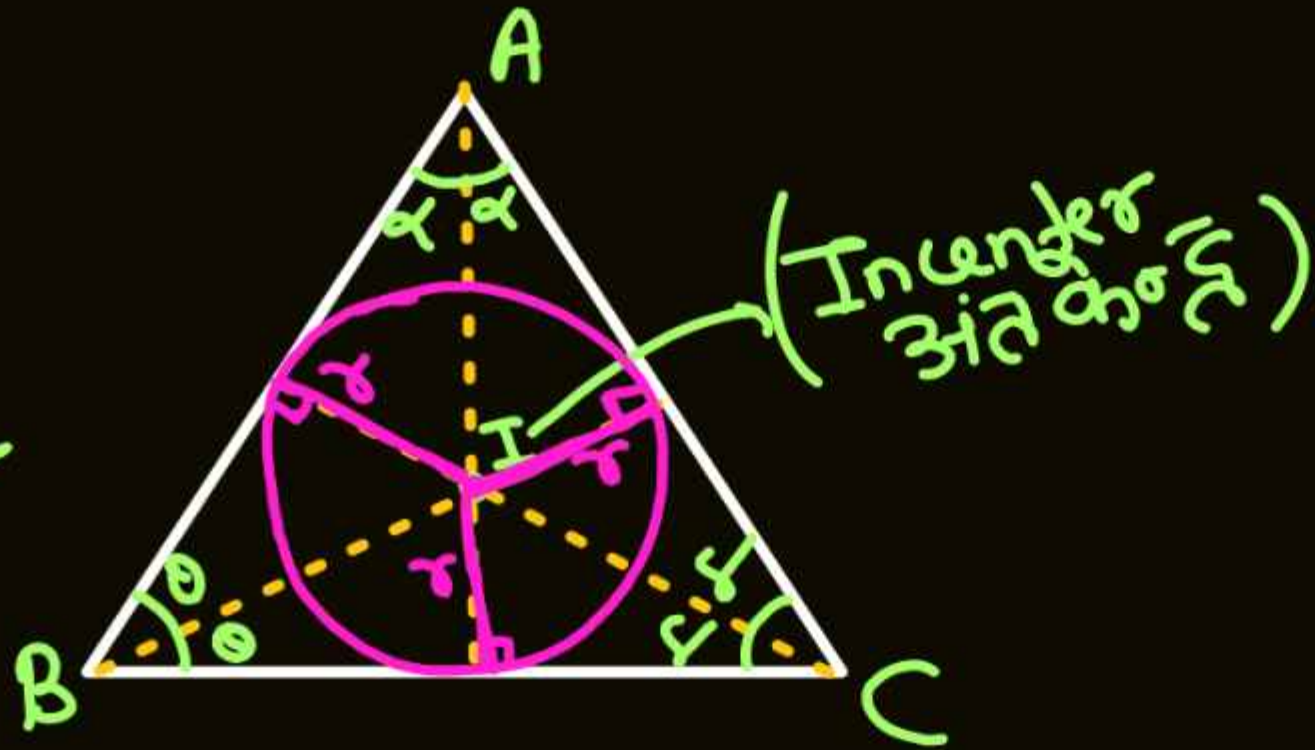
$$\frac{S}{\frac{1}{2}} = 10 = 2R$$

$$\underline{\underline{R = ?}}$$

$$\underline{\underline{R = S}}$$

Incenter (અંતઃકેન્દ્ર)

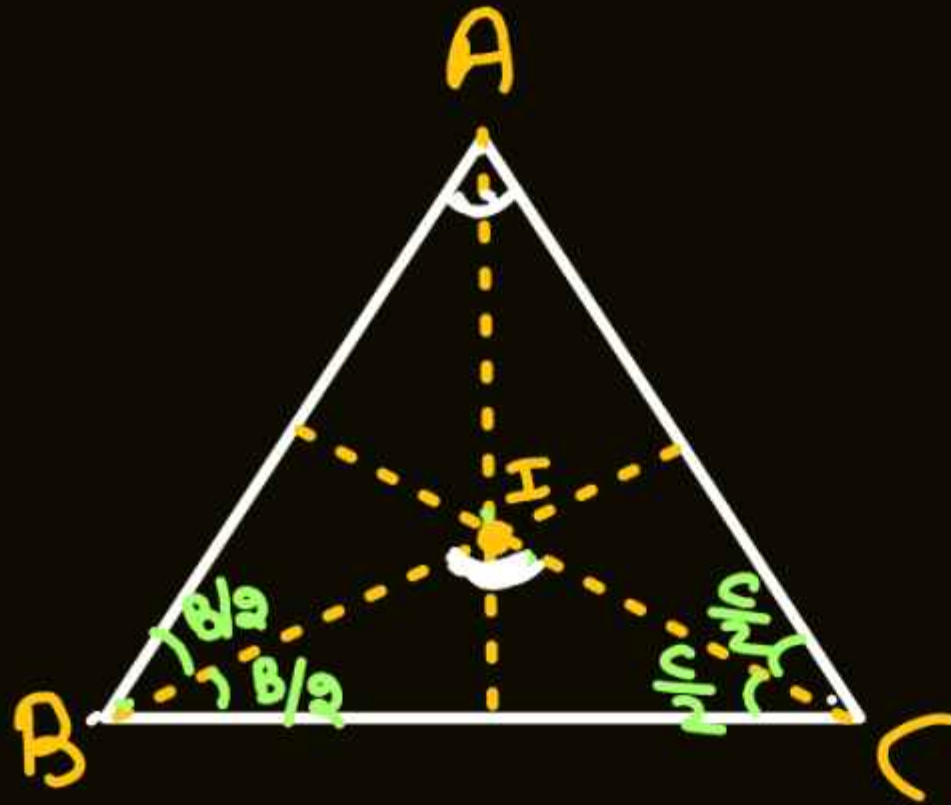
$\alpha \rightarrow$ alpha
 $\theta \rightarrow$ Theta
 $\gamma \rightarrow$ Gamma



Where all these angle bisectors meet
↳ Incenter

$\gamma =$ inradius (અંતઃ ત્રિજ્યા)

Incenter (અંતઃકેન્દ્ર)



$$\triangle BIC \Rightarrow \frac{B}{2} + \frac{C}{2} + \angle BIC = 180^\circ$$

$$\angle BIC = 180 - \left(\frac{B+C}{2} \right)$$

=

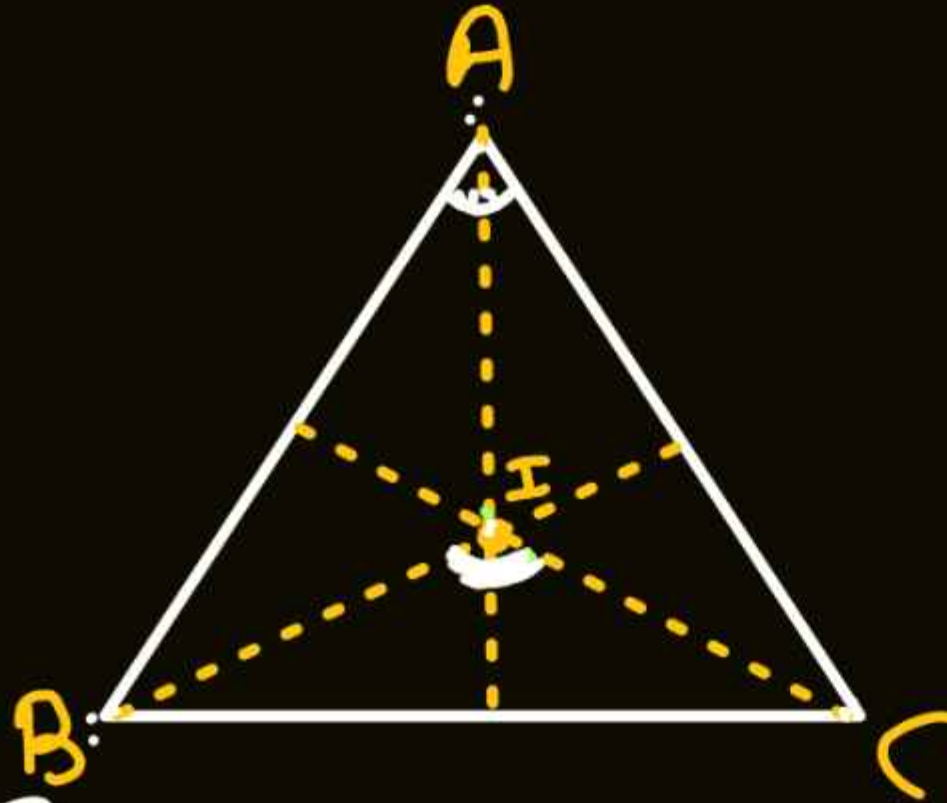
$$\angle BIC = 180 - \frac{1}{2}(180 - A)$$
$$180 - 90 + \frac{A}{2}$$

$$\boxed{\angle BIC = 90^\circ + \frac{A}{2}}$$

$$\therefore A + B + C = 180$$

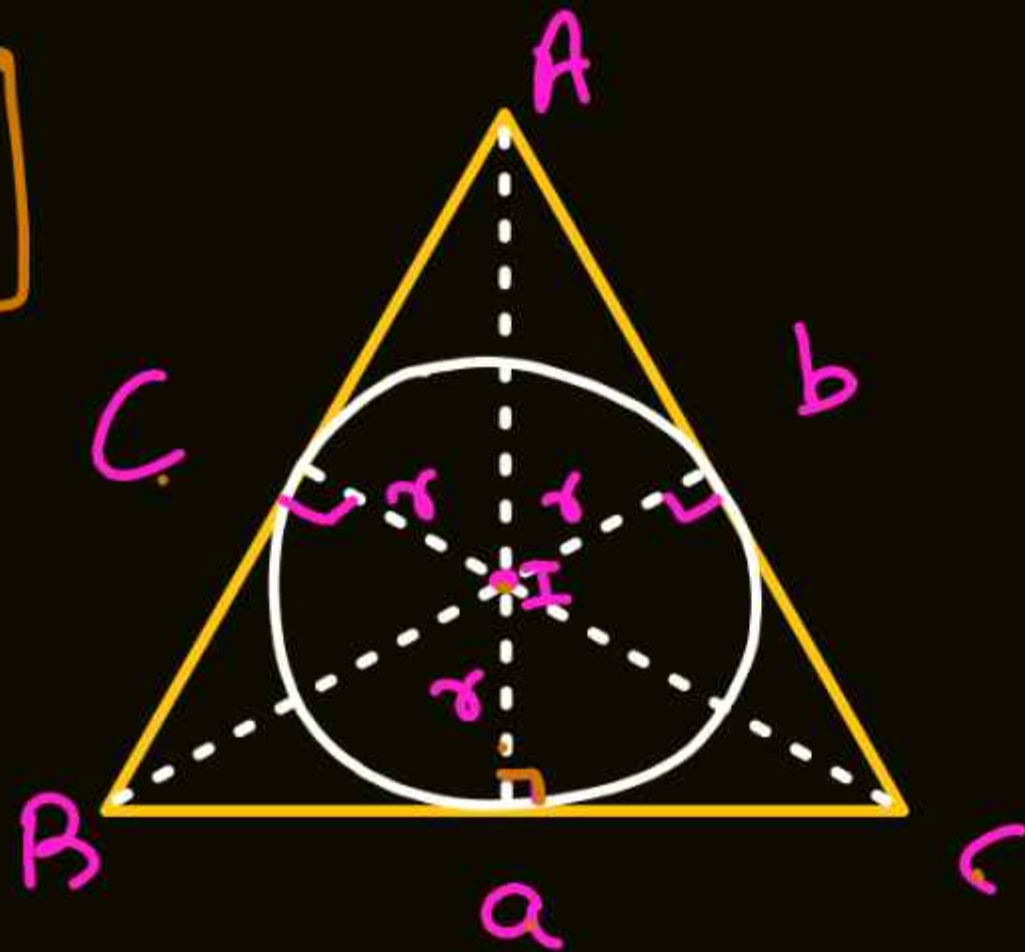
$$B + C = 180 - A$$

Incenter (अंतर्विन्दु)



$$\left\{ \begin{array}{l} \angle BIC = 90 + \frac{A}{2} \\ \angle CIA = 90 + \frac{B}{2} \\ \angle AIB = 90 + \frac{C}{2} \end{array} \right\}$$

$$\Delta = r \times s$$



$s = \text{अर्धपरिमाप}$
 $s = \frac{a+b+c}{2}$

$$\text{ar } \Delta ABC = \text{ar } \Delta BIC + \text{ar } \Delta CIA + \text{ar } \Delta AIB$$

$$\therefore \frac{1}{2} \times a \times r + \frac{1}{2} \times b \times r + \frac{1}{2} \times c \times r$$

$$\Delta = \frac{1}{2} r (a+b+c) \Rightarrow r \times \left(\frac{a+b+c}{2} \right) = r \times s$$