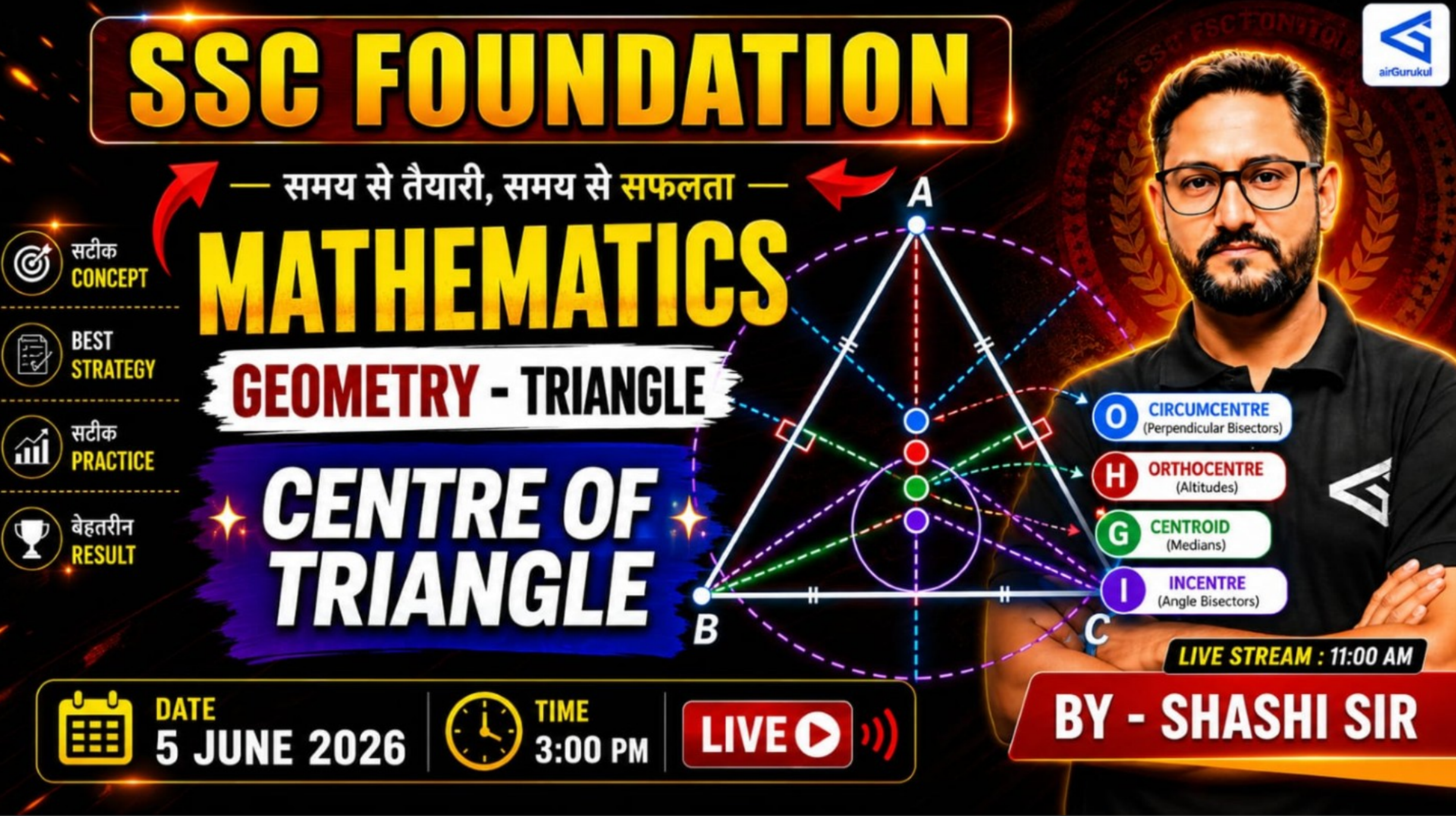
SSC FOUNDATION
— समय से तैयारी, समय से सफलता —
सटीक CONCEPT
BEST STRATEGY
सटीक PRACTICE
बेहतरीन RESULT
MATHEMATICS
GEOMETRY - TRIANGLE
CENTRE OF TRIANGLE
A
B
C
O CIRCUMCENTRE (Perpendicular Bisectors)
H ORTHOCENTRE (Altitudes)
G CENTROID (Medians)
I INCENTRE (Angle Bisectors)
airGurukul
LIVE STREAM : 11:00 AM
BY - SHASHI SIR
DATE 5 JUNE 2026
TIME 3:00 PM
LIVE

# WELCOME TO

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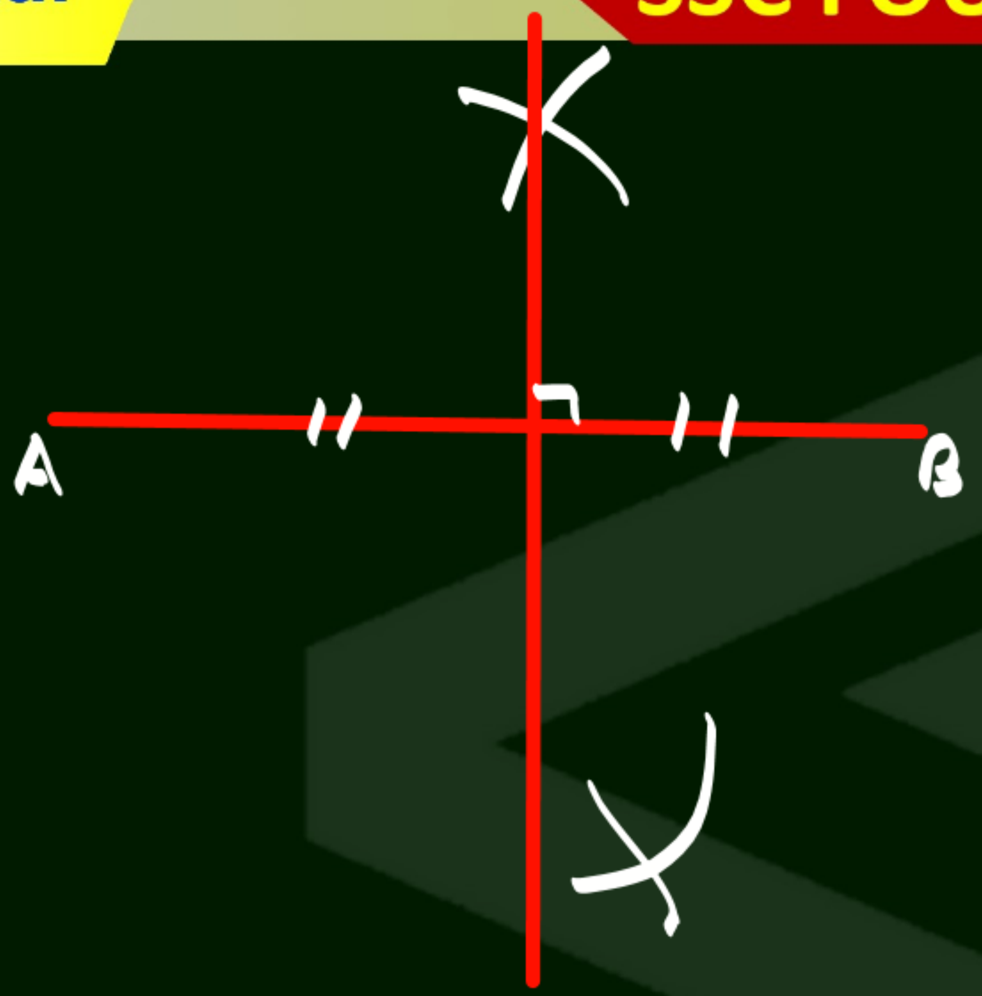
# Triangle (त्रिभुज)

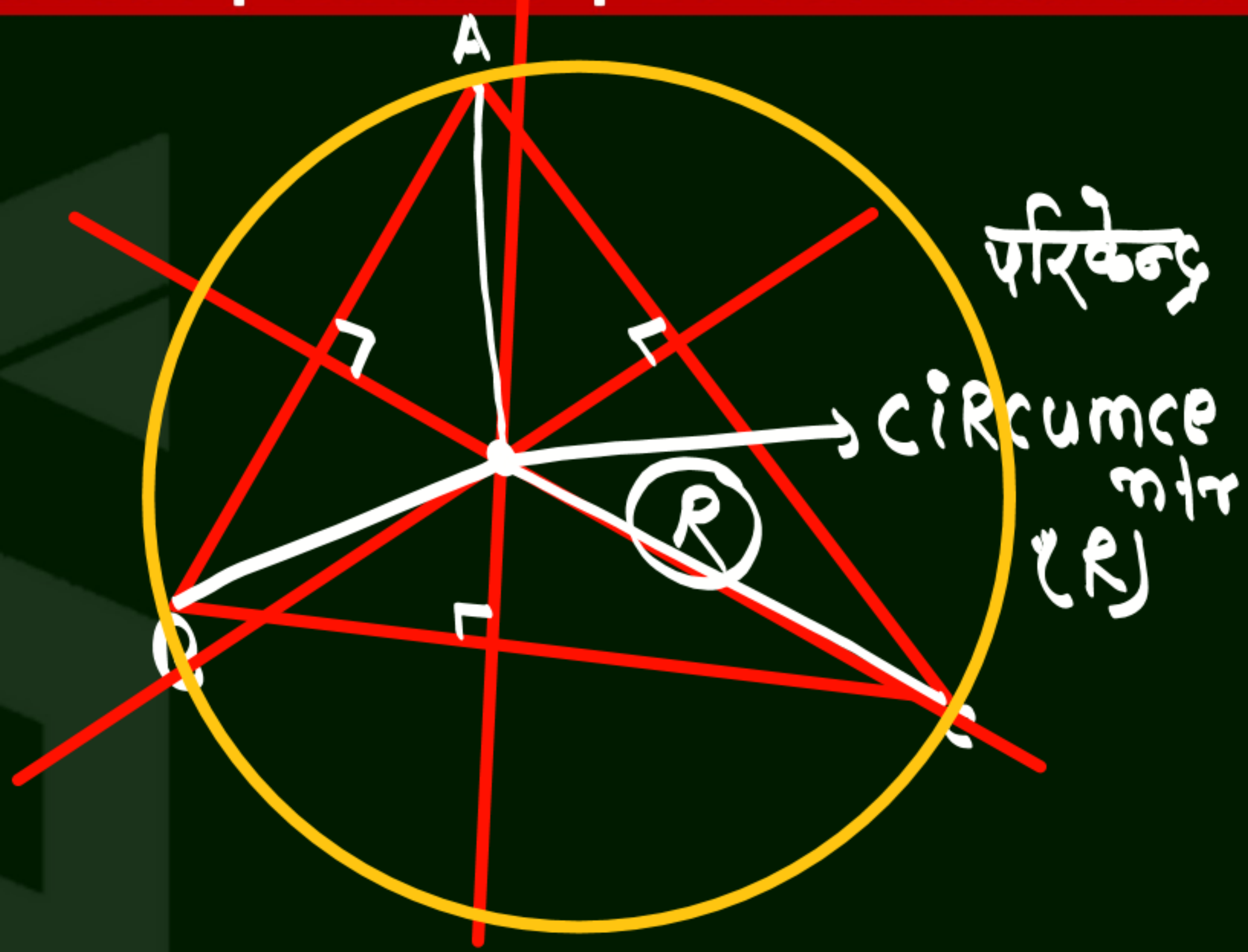
## Side Prependicular Bisector भुजा लम्ब समद्विभाजक

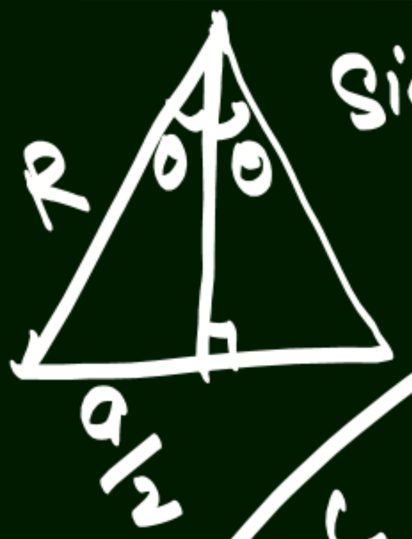
Line perpendicular to the given side and also divide it in two parts is called per-pendicular bisector. / यदि कोई रेखा दी रेखा क दो समान भागों में विभाजित करती हैं तथा उस पर लंब भहैं तो वह रेखा लंब समद्विभाजक कहलाती हैं।

## Circumcentre/परिकेंद्र

Intersecting point of side perpendicular bisector of three side of triangles is called circumcentre.
एक त्रिभुज के तीनों भुजा लम्ब समद्विभाजक जिस बिन्दु पर प्रतिच्छेद करते हैं। उसे परिकेंद्र कहते हैं।


A
B


A
R
परिकेन्द्र
circumcentre
(R)

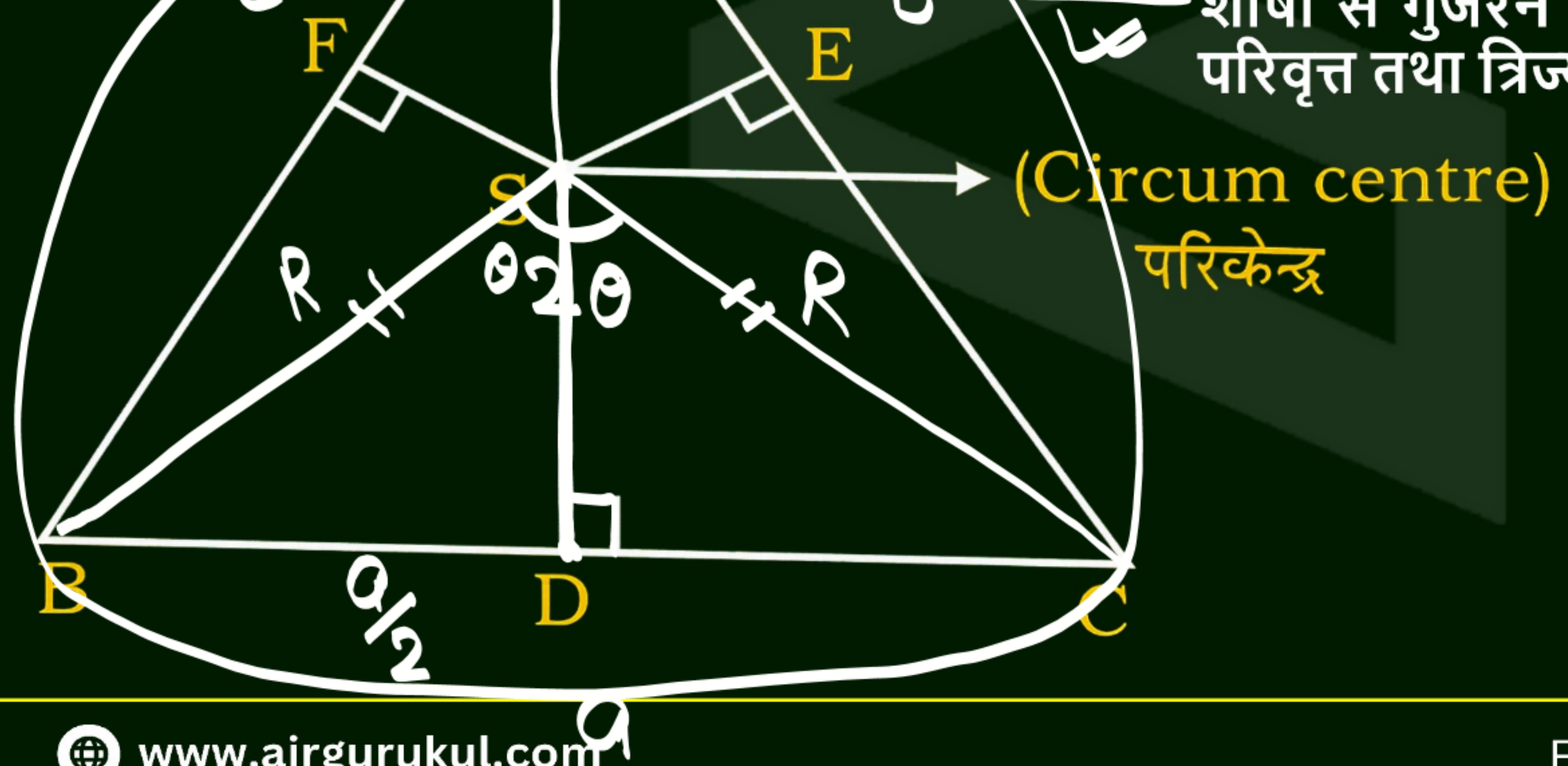



$\sin\theta = \frac{a}{2R}$

$A = \frac{1}{2} \times c \times b \times \sin\theta$

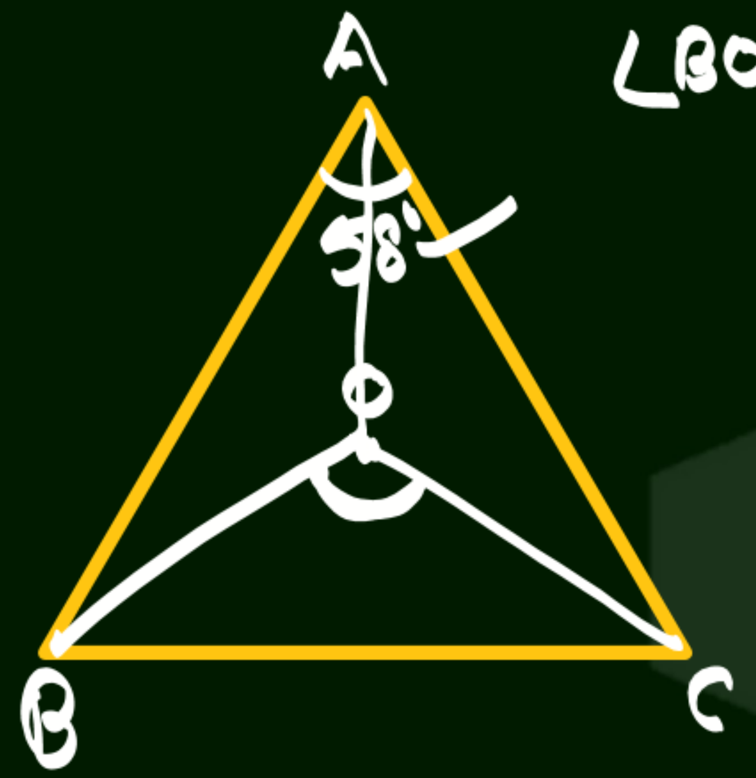
$A = \frac{1}{2} \times c \times b \times \frac{a}{2R}$

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




Another definition is, it is a center of a circle passing through the vertices of a triangle. This circle is called circumcircle and radius is called circumradius (R).

एक अन्य परिभाषा यह है कि यह एक त्रिभुज के शीषों से गुजरने वाले वृत्त का केंद्र है। इस वृत्त को परिवृत्त तथा त्रिज्या को परित्रिज्या (R) कहते हैं।

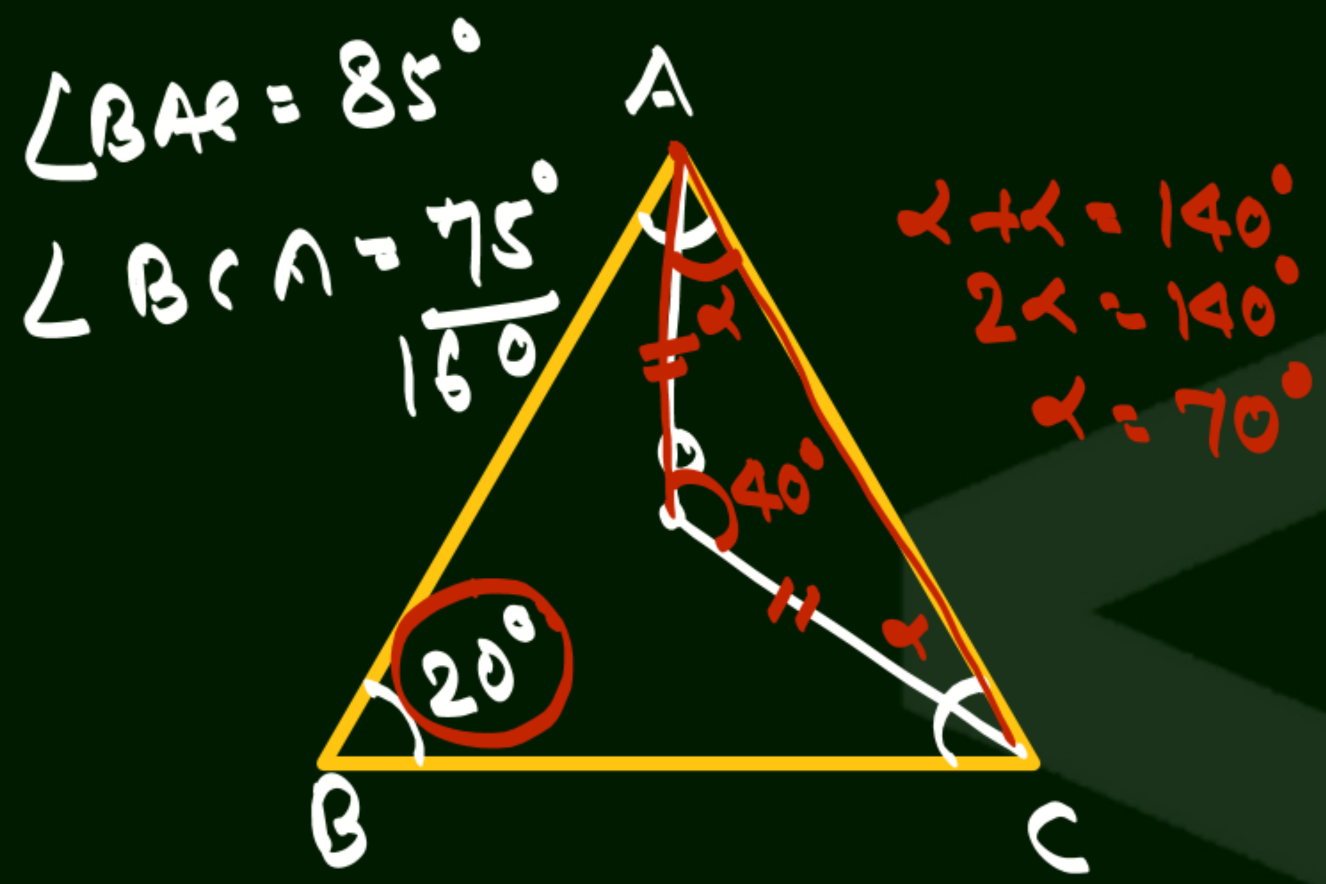



$\angle BOC = 2 \times \angle BAC$
$= 2 \times 58^\circ$
$= 116^\circ$

If O is circumcentre of AABC and $\angle BAC = 58^\circ$ then find the value of $\angle BOC$?

यदि एक त्रिभुज ABC का परिकेन्द्र O है तथा $\angle BAC = 58^\circ$ तब $\angle BOC$ का मान क्या है?

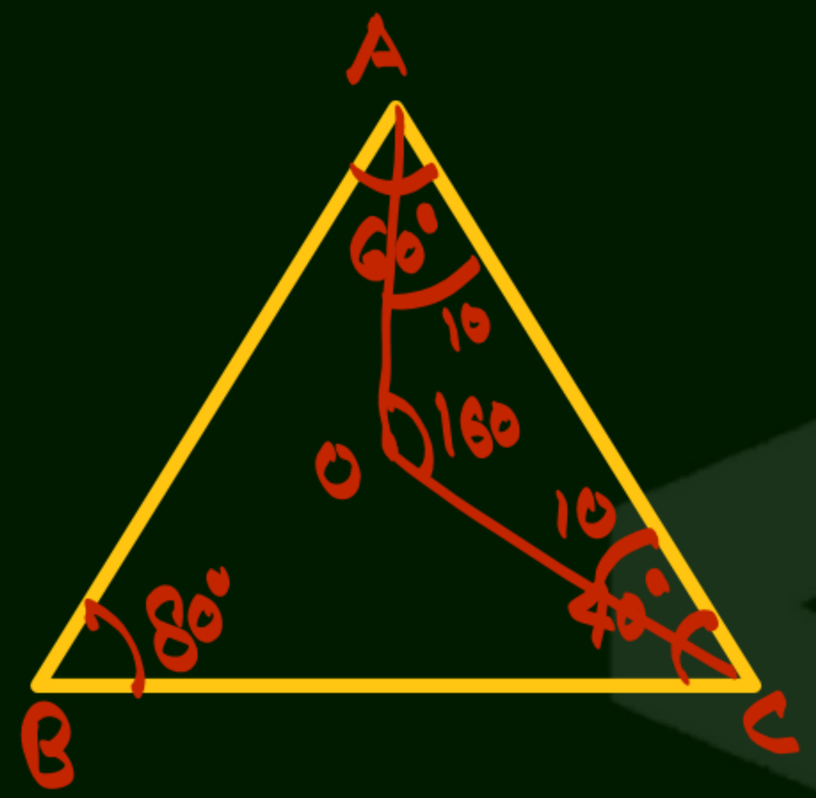
(a) 29°
(b) 58°
(c) 118°
(d) 116°




O is the circumcentre of AABC. If the value of ∠BAC and ∠BCA is 85° and 75° respectively, the find the ∠OAC ?

O, ΔABC का परिकेन्द्र है। यदि ∠BAC और ∠BCA का मान क्रमशः 85° और 75° हैं, ∠OAC ज्ञात कीजिए ?

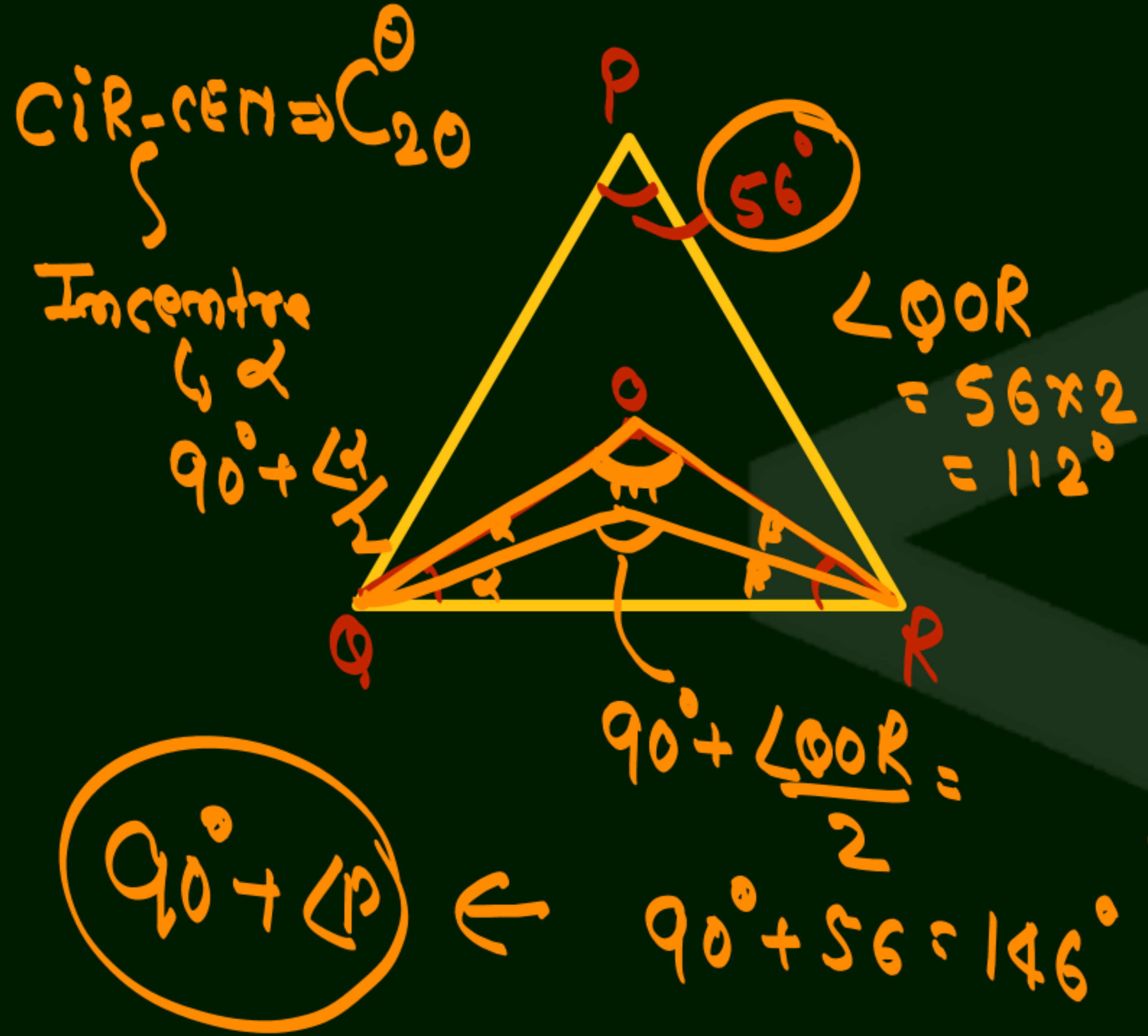
(a) 55°
(b) 70°
(c) 20°
(d) 50°




O is the circumcentre of ΔABC . If the value of ∠BAC and ∠BCA is 60° and 40° respectively, the find the ∠OAC ?

O, ΔABC का परिकेन्द्र है। यदि का मान ∠BAC और ∠BCA क्रमशः 60° और 40° हैं, ∠OAC ज्ञात कीजिए ?

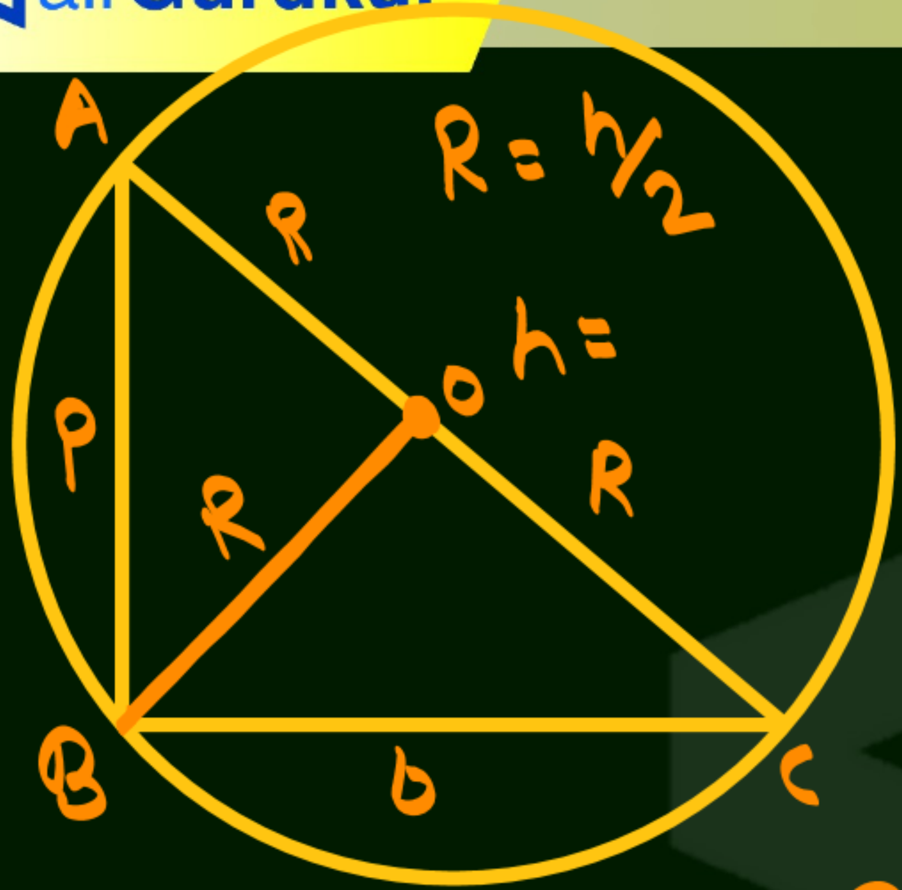
(a) 55°
(b) 70°
(c) 20°
(d) 10°




O is the circumcentre of a triangle PQR whose P = 56° If the bisector of OQR and ORQ intersect at M then what is the measure of QMR ?

किसी त्रिभुज PQR का परिकेन्द्र O है जिसका P = 56° है और OQR और ORQ का कोण समद्विभाजक M पर मिलते है तब QMR का मान क्या है?

(a) 118°
(b) 129°
(c) 146°
(d) 151°




यदि एक समकोण त्रिभुज ABC का जो B पर समकोण है, परिकेन्द्र है, तो बिंदु की स्थिति है।

(a) Inside ∆ABC

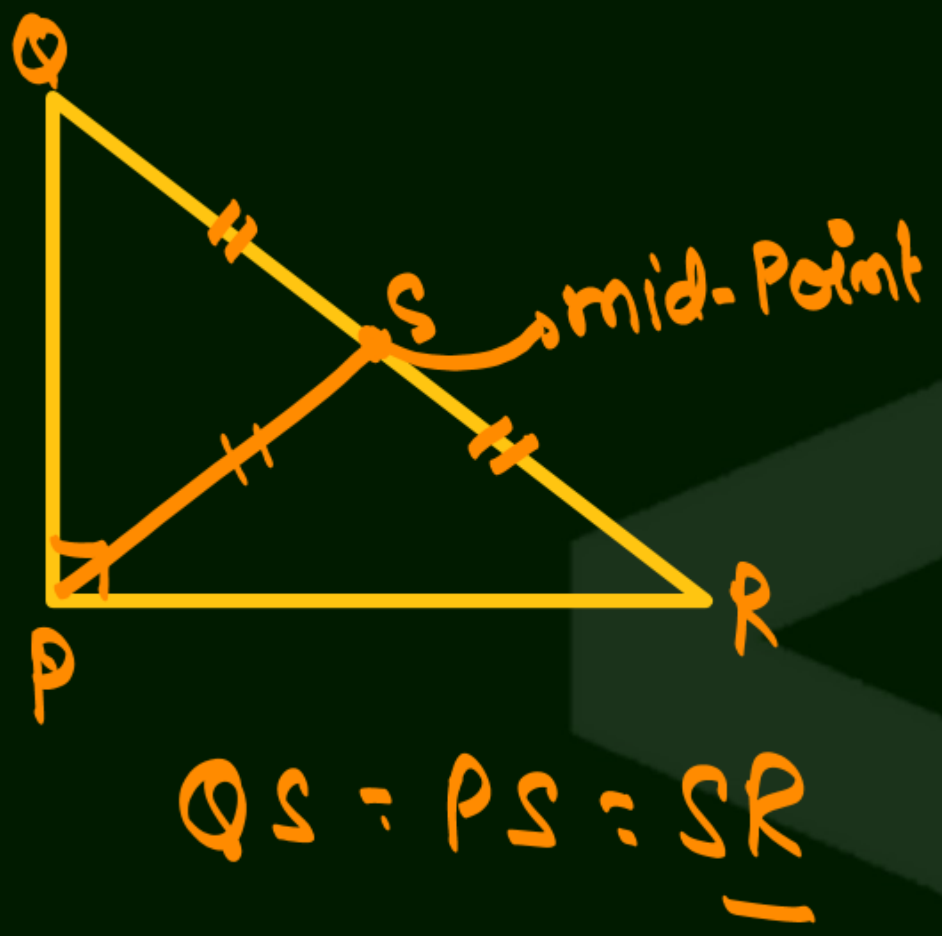
(b) Outside ∆ABC

(c) On BC

(d) Mid point of CA ✓

AO = OC = OB

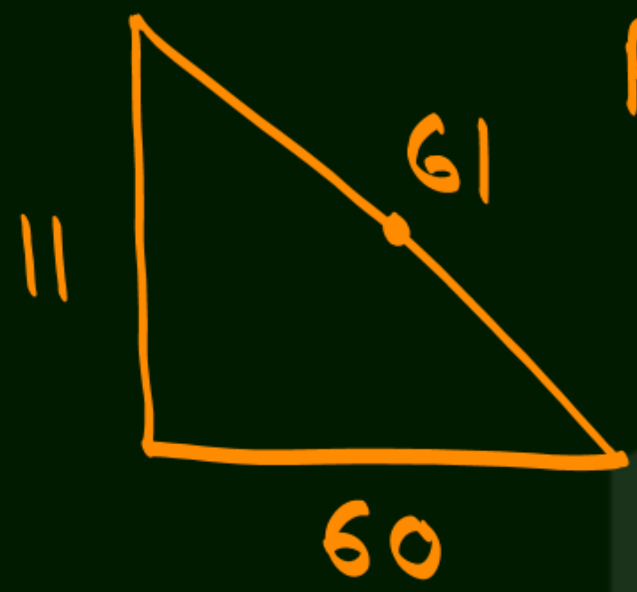
$$R = \frac{abc}{4\Delta} = \frac{P \times b \times h}{4 \times \frac{1}{2} \times P \times b} = \frac{h}{2}$$




In a right angle triangle PQR, S is mid point of QR, then

यदि एक समकोणीय त्रिभुज PQR के कर्ण QR का मध्य बिन्दु S है, तब

(a) PS = QS = RS
(b) PS < QS; QS = RS
(c) PS > QS; QS = RS
(d) PQ < PS < PR




$R = \frac{61}{2} = 30.5$

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

The side of triangle are 11 cm, 60 cm and 61 cm. What is the radius of the circle circumscribing the triangle ?

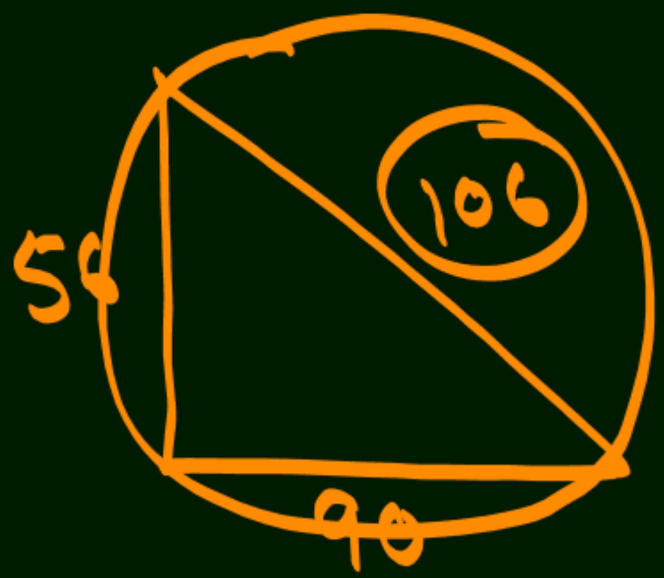
एक त्रिभुज की भुजायें क्रमशः 11 सेमी, 60 सेमी और 61 सेमी है तो उस त्रिभुज के परिवृत्त की त्रिज्या क्या है?

(a) 30.5 cm
(b) 31.5 cm
(c) 30 cm
(d) 31 cm

Triplet
11, 60, 61

एक त्रिभुज की भुजाऐं 56 सेमी, 90 सेमी और 106 सेमी है तो इसके परिवृत्त की परिधि क्या है?

(a) 109π
(b) 106π
(c) 112π
(d) 108π




$R = \frac{106}{2} = 53$

$2\pi R = 2R\pi = 106\pi$

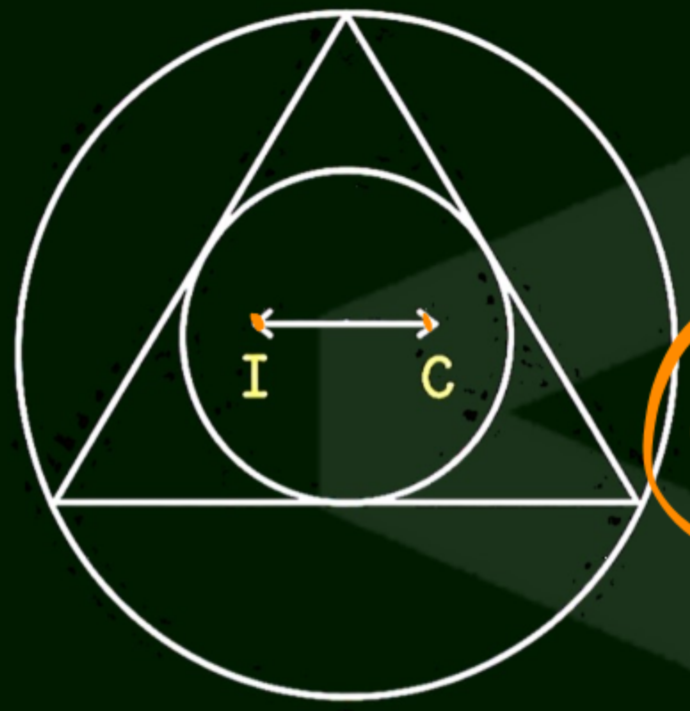
Triplet

56, 90, 106

28, 45, 53

4 + 5 → 9

## Distance b/w Incenter & circumcenter.
## अंतःकेन्द्र तथा परिकेन्द्र के बीच की दूरी

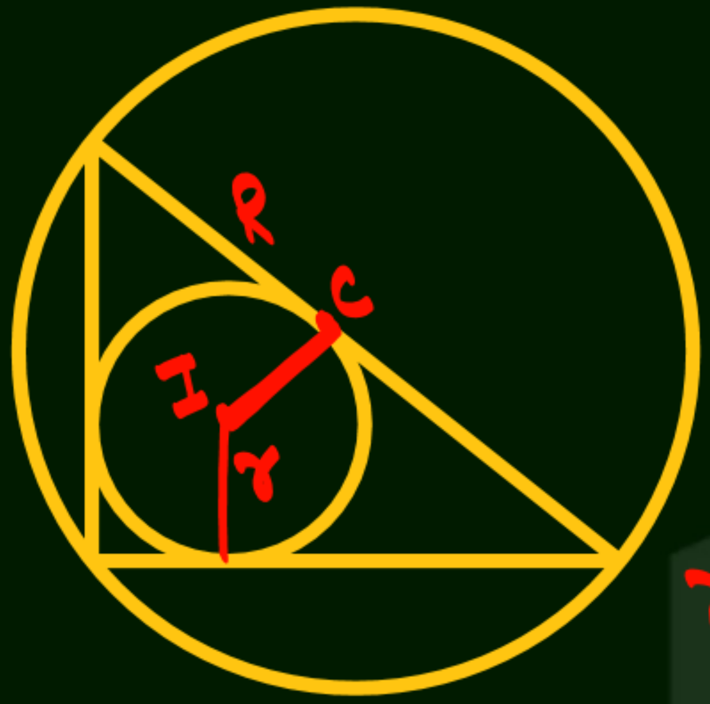



$d = \sqrt{R^2 - 2R \times r}$

(1) Incentre

(c) Circumcentre

distance = $d = \sqrt{R^2 - 2Rr}$




Find the distance between incentre and circumcentre of a triangle whose side are 6, 8 and 10 cm?

उस त्रिभुज के अंतः केन्द्र और परिकेन्द्र के बीच की दूरी ज्ञात करें जिसकी भुजायें 6 सेमी, 8 सेमी और 10 सेमी है?

(a) $\sqrt{5}$

(b) $\sqrt{6}$

(c) $2\sqrt{2}$

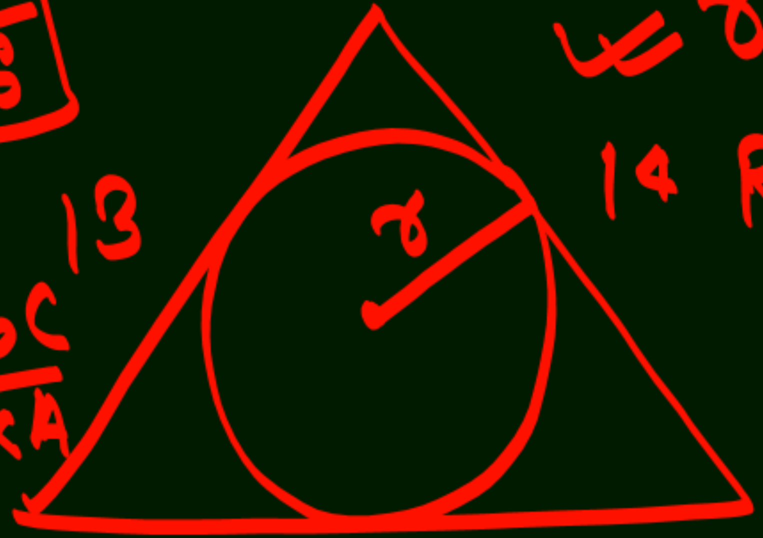
(d) $\sqrt{7}$

$d = \sqrt{R^2 - 2Rr}$

$R = \frac{10}{2} = 5$

$r = \frac{P+b-h}{2} = \frac{6+8-10}{2} = \frac{4}{2} = 2$

$d = \sqrt{R^2 - 2R \times r} = \sqrt{25 - 2 \times 5 \times 2} = \sqrt{25 - 20} = \sqrt{5}$



उस त्रिभुज के अन्तः केन्द्र और परिकेन्द्र के बीच की दूरी ज्ञात करे जिसकी भुजायें 13 सेमी, 14 सेमी, और 15 सेमी है?

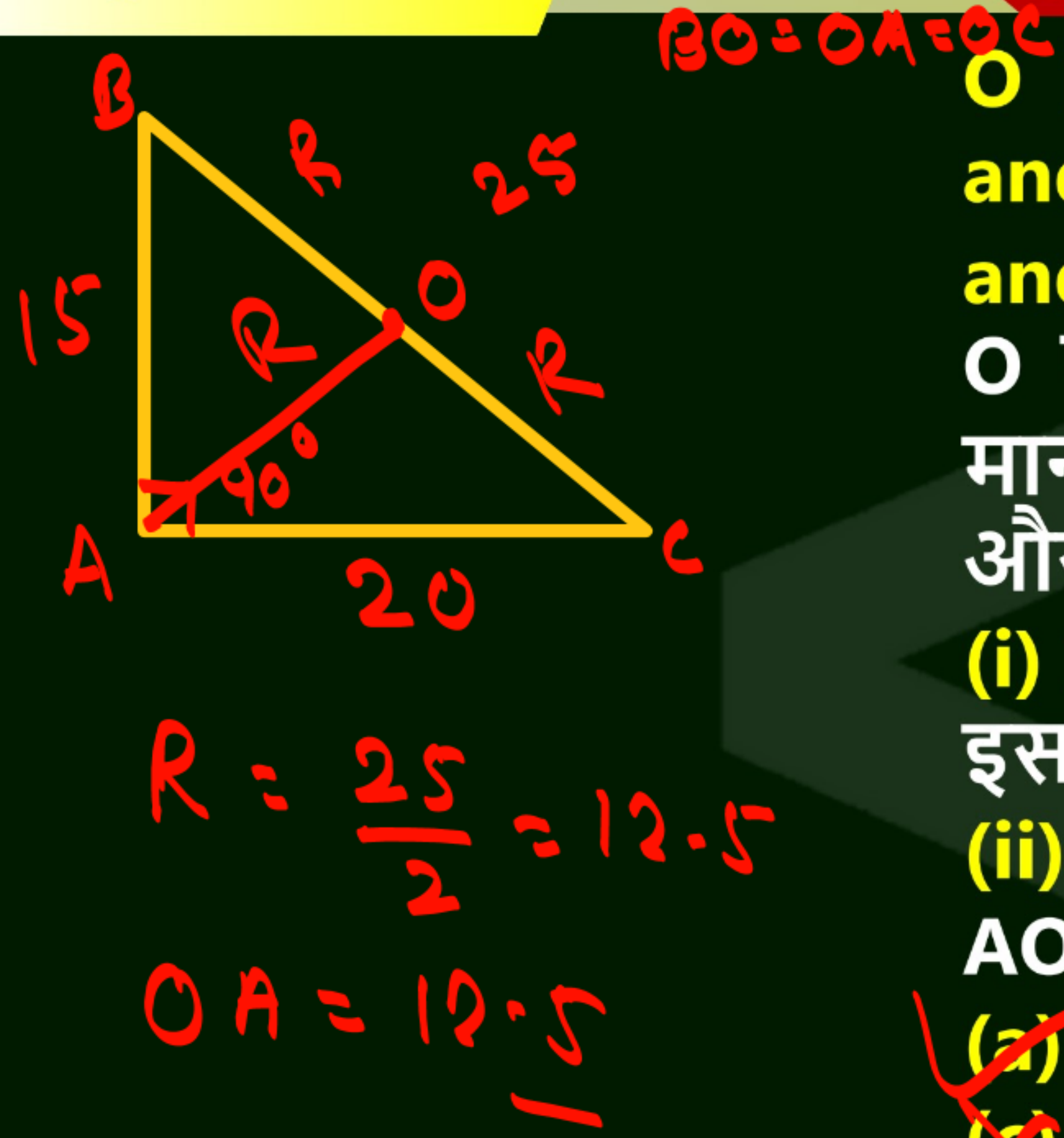
Find the distance between the incenter and the circumcenter of a triangle with sides 13 cm, 14 cm, and 15 cm.

(a) $\frac{\sqrt{70}}{6}$

(b) $\frac{\sqrt{91}}{12}$

(c) $\frac{\sqrt{65}}{8}$

(d) $\sqrt{\frac{65}{8}}$




O is the circumcentre of a right angle $\Delta ABC$ and the value of $\angle A$ is 90°. If the value of AB and AC is 15 cm and 20 cm respectively, then:-

O एक समकोण $\triangle ABC$ का परिकेन्द्र है तथा $\angle A$ का मान 90° है। यदि AB तथा AC का मान क्रमशः 15 सेमी और 20 सेमी हो तो,

(i) Find the radius of the circumcircle

इसके परिवृत्त की त्रिज्या बताएं?

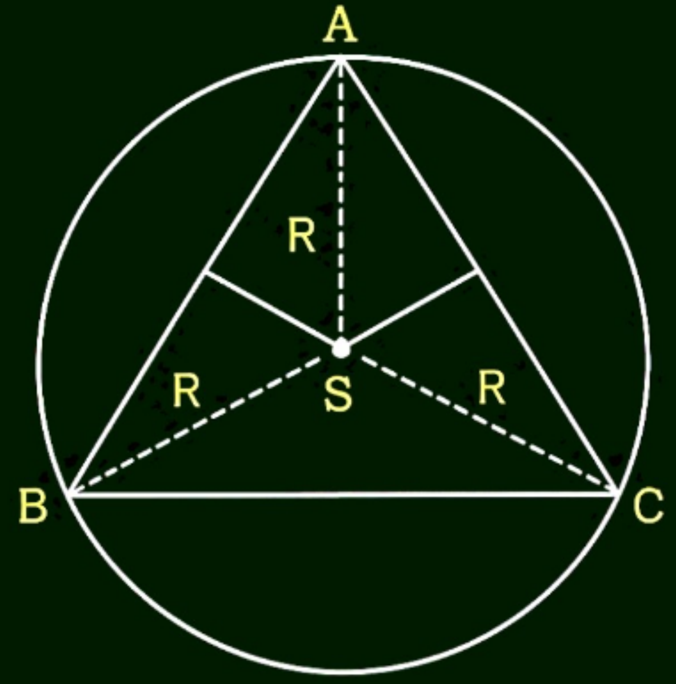
(ii) Find the length of AO

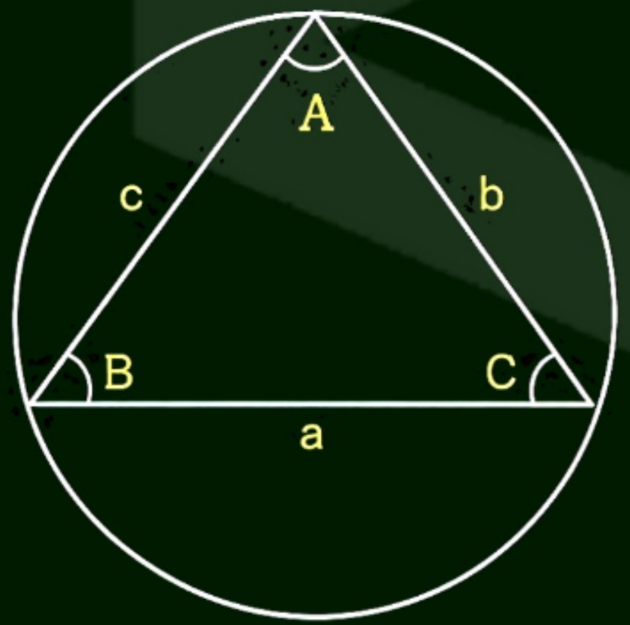
AO की लंबाई ज्ञात कीजिए।

(a) 12.5, 12.5
(b) 7.5, 10
(c) 7.5, 12
(d) 12.5, 10

$$R = \frac{abc}{4\Delta} \quad \left[\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R\right]$$

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




## Important point of circum center
## परिकेंद्र के महत्वपूर्ण बिंदु

**Circumcenter is the only point which is equidistant from three vertices of the triangle.**

**परिकेंद्र एकमात्र ऐसा बिंदु होता है जो तीनों शीर्षों से समान दूरी पर होता हैं।**

**Radius of circum circle / परिवृत्त की त्रिज्या**

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

In $\Delta PQR$, $\angle Q = 60°$, $PR = 14\sqrt{6}$cm. find the circumradius of triangle PQR.

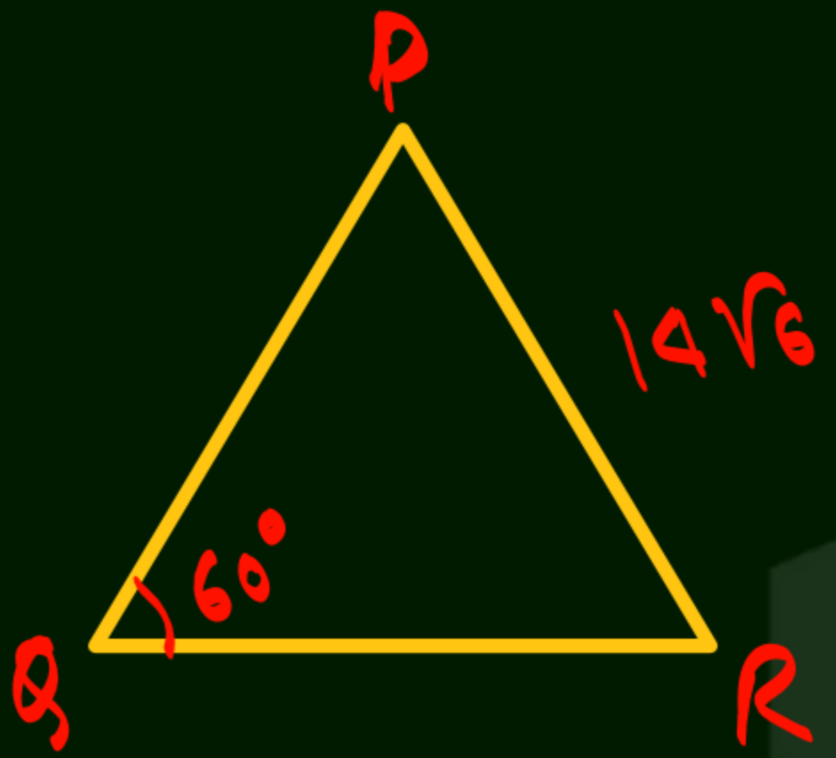
$\Delta PQR$ में, $\angle Q = 60°$, $PR = 14\sqrt{6}$ सेमी है, त्रिभुज PQR के बाहय वृत्त की त्रिज्या क्या हैं?

(a) $7\sqrt{7}$ cm

(b) $7\sqrt{3}$ cm

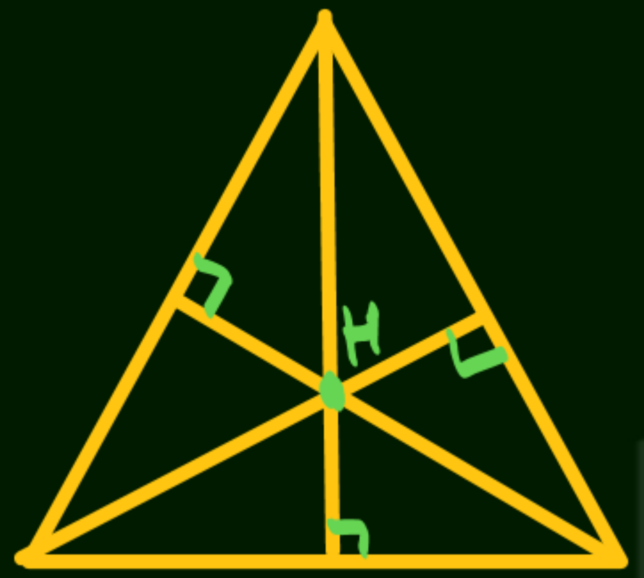
(c) $7\sqrt{6}$ cm

(d) $14\sqrt{2}$ cm




$R = \frac{PR}{2\sin Q} = \frac{14\sqrt{6}}{2 \times \sin 60°}$

$R = \frac{14\sqrt{6}}{2 \times \sqrt{3}/2} = 14\sqrt{2}$ cm



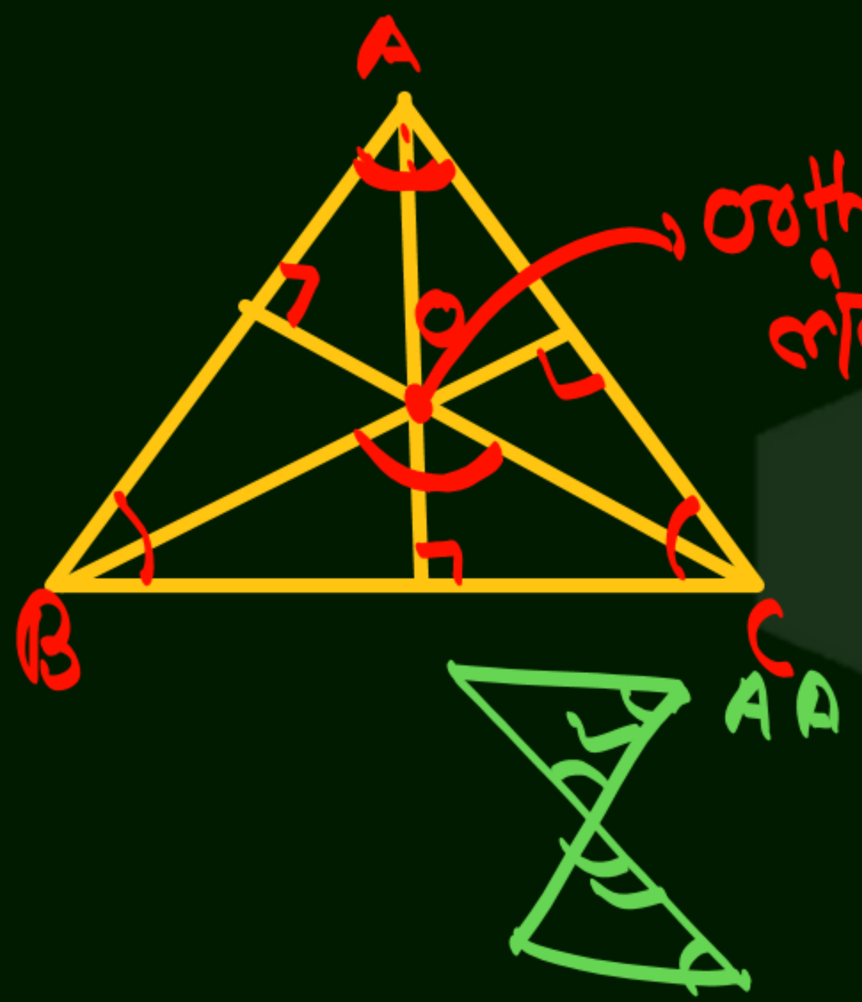
**Orthocentre/लंबकेंद्र,**

**Altitude of Triangle/त्रिभुज के शीर्ष लंब**

**If a line forms right angle on the opposite side of a triangle from any vertex will be altitude of the triangle.**

**किसी भी शीर्ष से सामने वाली भुजा पर 90° का कोण वाली रेखा त्रिभुज का शीर्ष लंब होगी।**

# ORTHOCENTRE

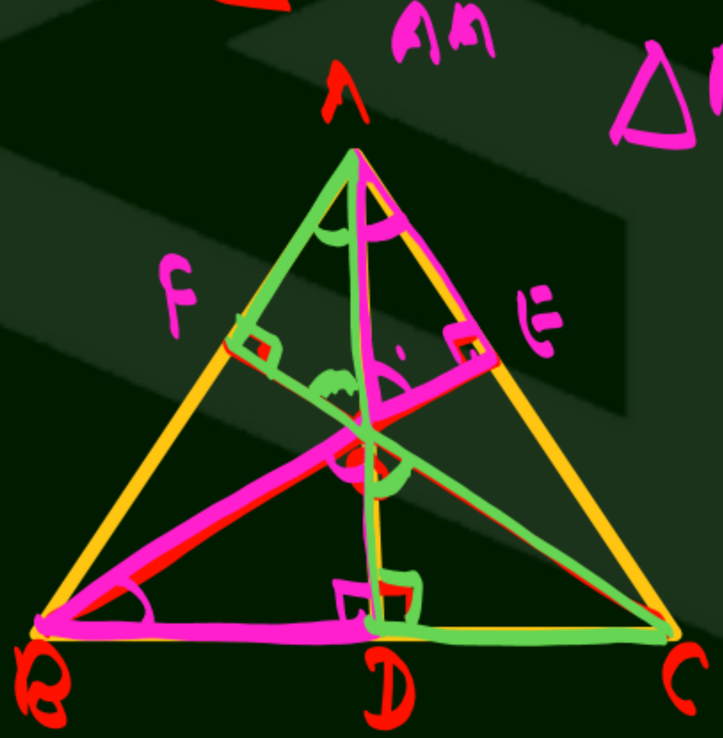



$\angle BAC + \angle BOC = 180^\circ$

$\angle ABC + \angle COA = 180^\circ$

$\angle BCA + \angle AOB = 180^\circ$

AOxOD = BOxOE
= COxOF



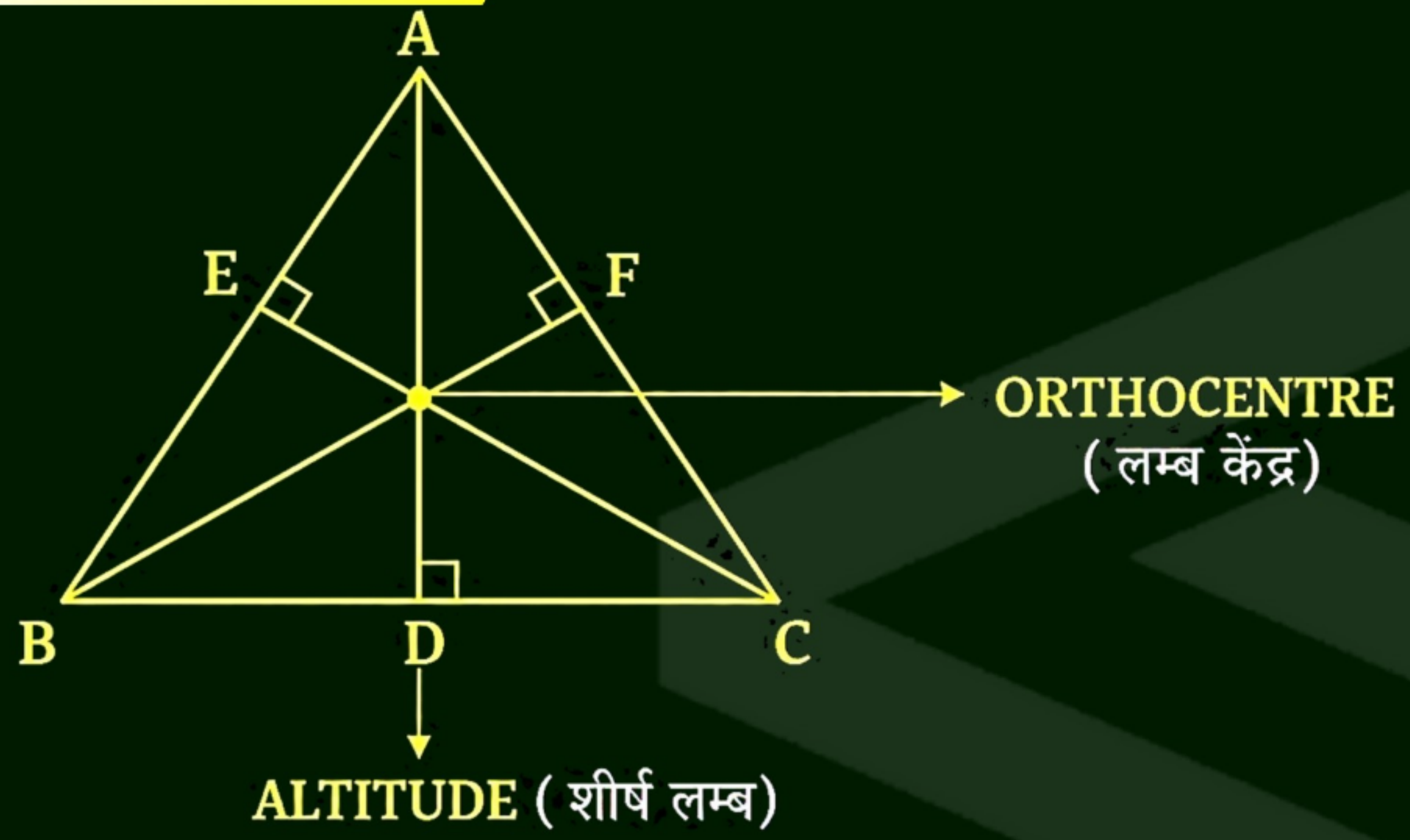

$\triangle AOE \sim \triangle BOD$

$\frac{AO}{BO} = \frac{OE}{OD}$

$AO \times OD = BO \times OE$

$\triangle COD \sim \triangle AOF$

$\frac{CO}{AO} = \frac{OD}{OF}$ $\therefore OD \times AO = CO \times OF$




**Rule – 1 :-**

- $\angle BHC + \angle BAC = 180°$
- $\angle BHA + \angle BCA = 180°$
- $\angle CHA + \angle ABC = 180°$

**Rules – 2 – :** यदि किसी त्रिभुज ABC में AD, BE तथा CF शीर्ष लेता है तो:

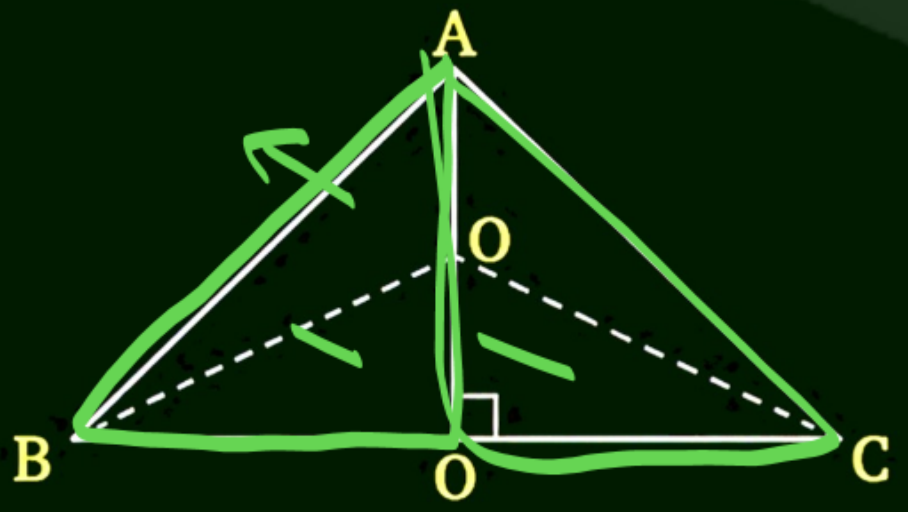
$$AH \times HD = BH \times HE = CH \times HF$$

**Rules – 3 – :**

△ABC में AD भुजा BC पर लंब है। तथा AD पर एक D बिंदु हैं। O को B,C से मिलाया जाता है तो,

H.W

$$AB^2 + CO^2 = AC^2 + BO^2$$




**लंब-केन्द्र की स्थिति -:**

समकोण त्रिभुज में लंबकेन्द्र उसके समकोणिय शीष पर ही होता है। परंतु परिकेन्द्र उसके कर्ण के मध्य बिंदु पर होता है।

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