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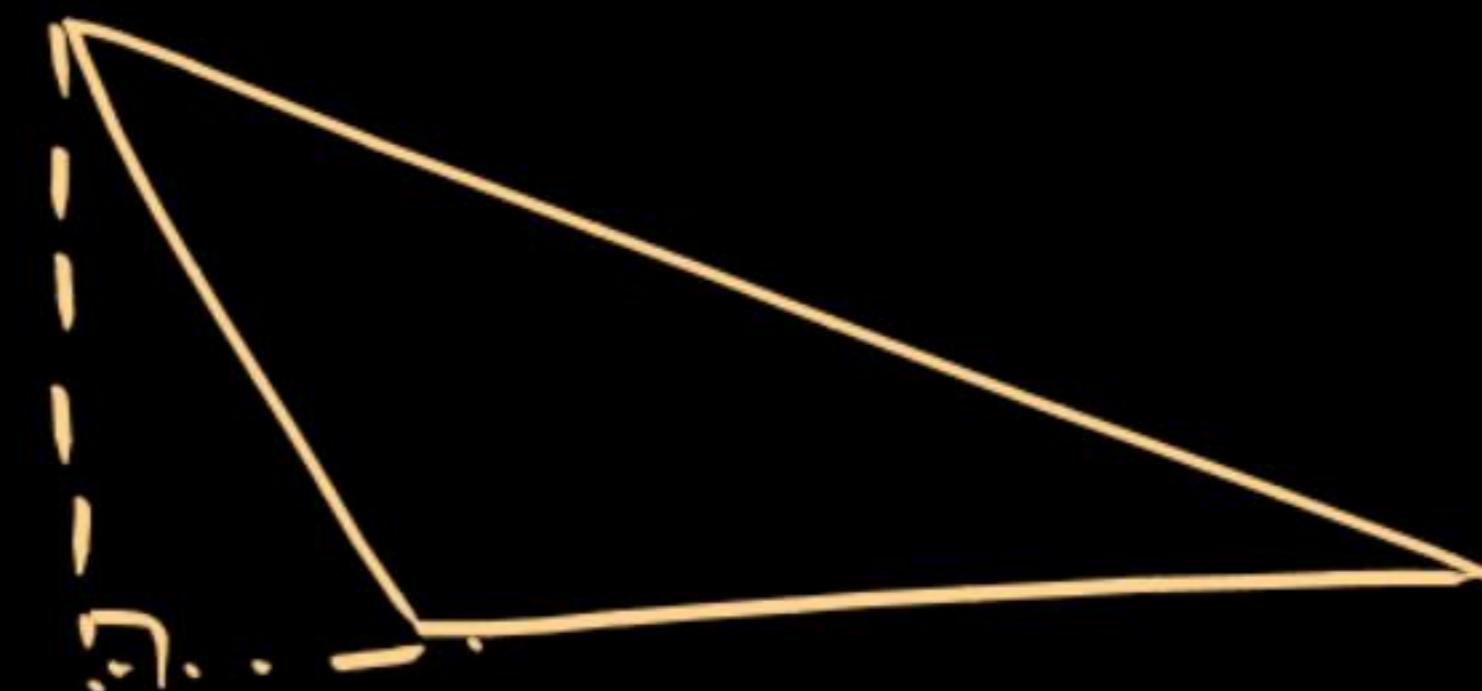
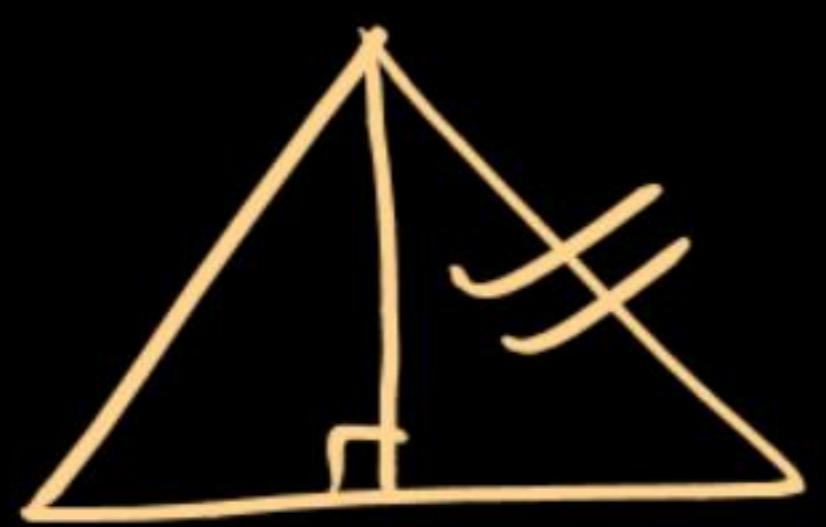
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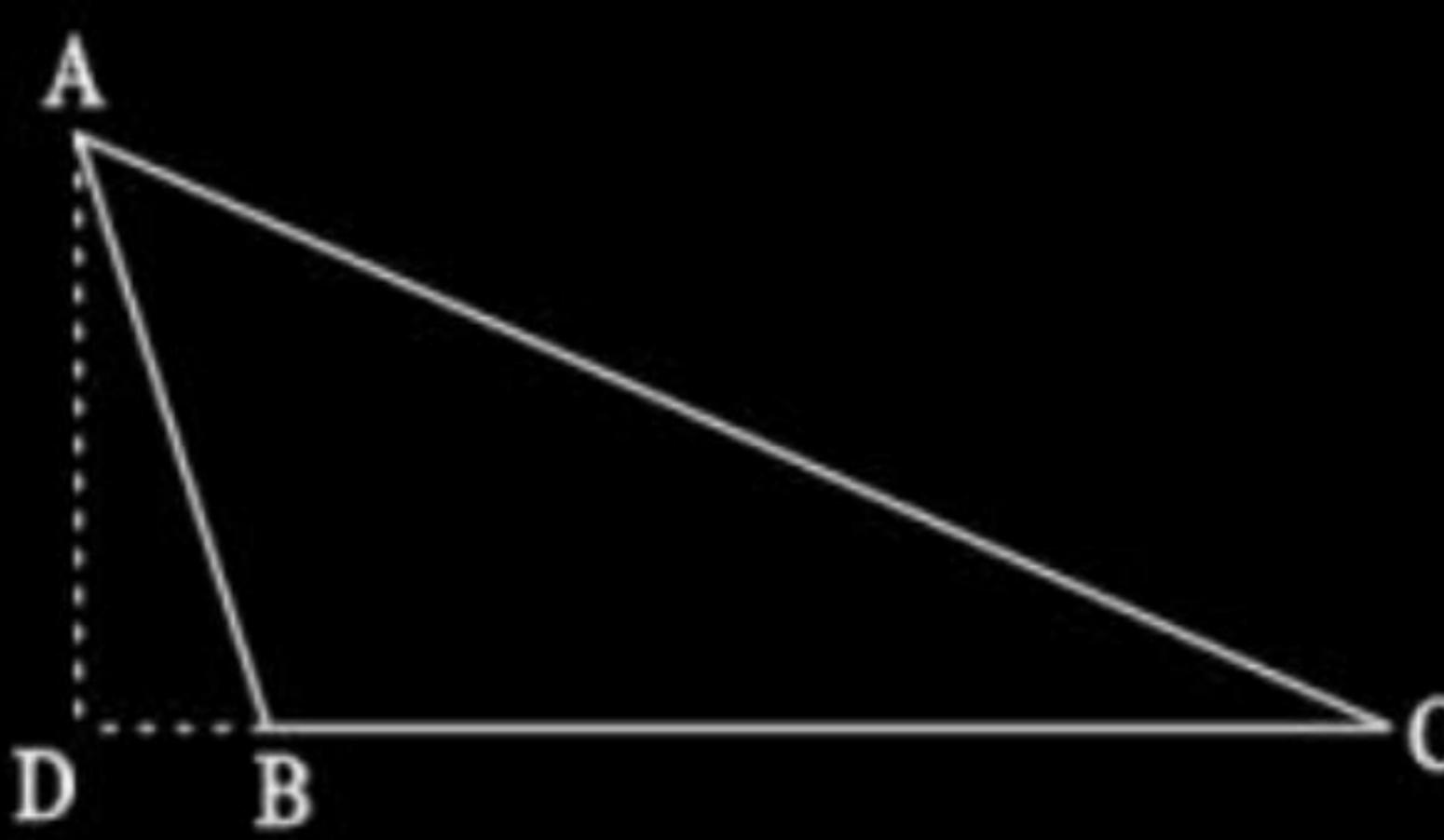
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# Geometry Triangle



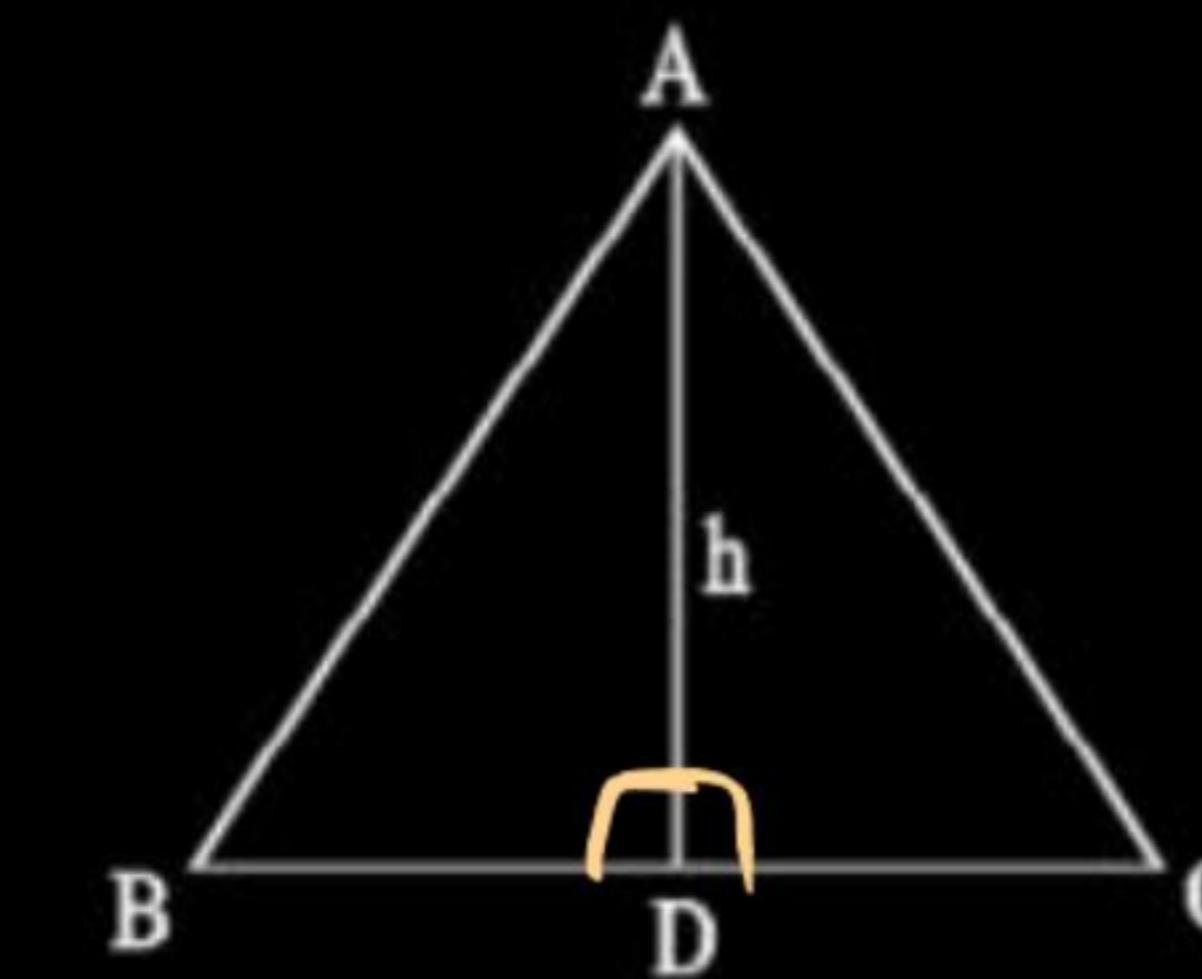
\*

Height of triangle can be outside the triangle.

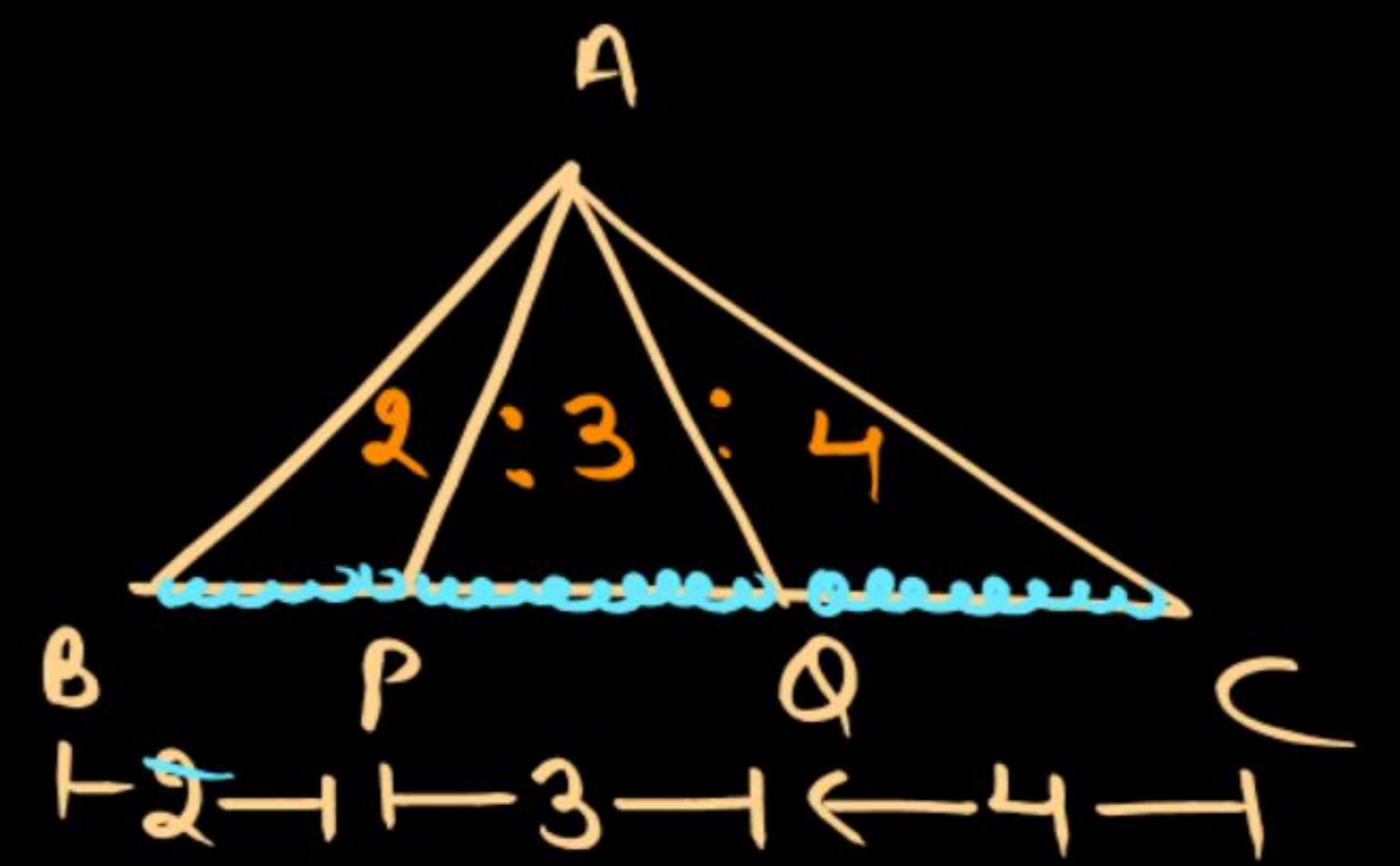


**AD → Height**

**BC → Base**

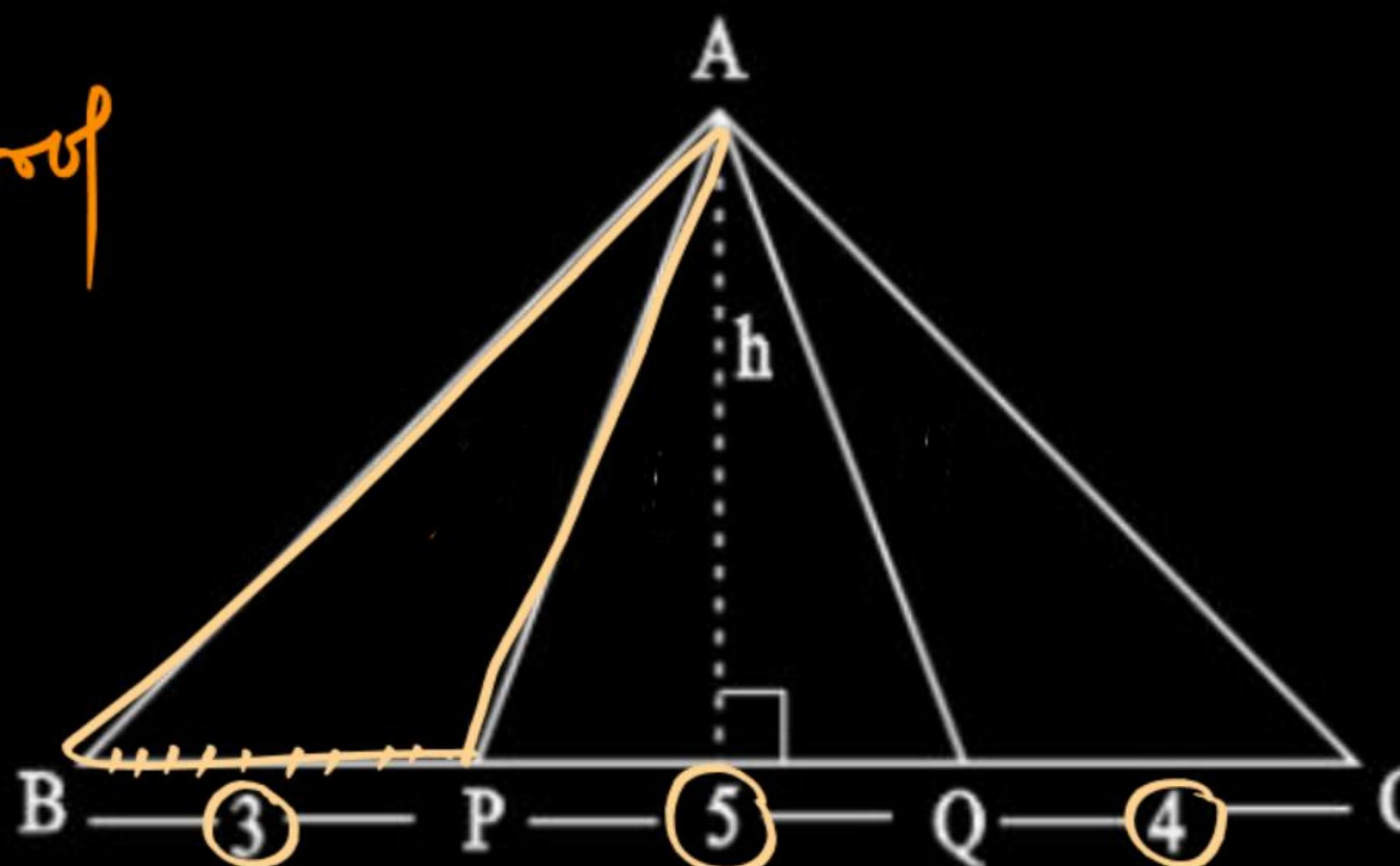


$l^-$



\*

Proof

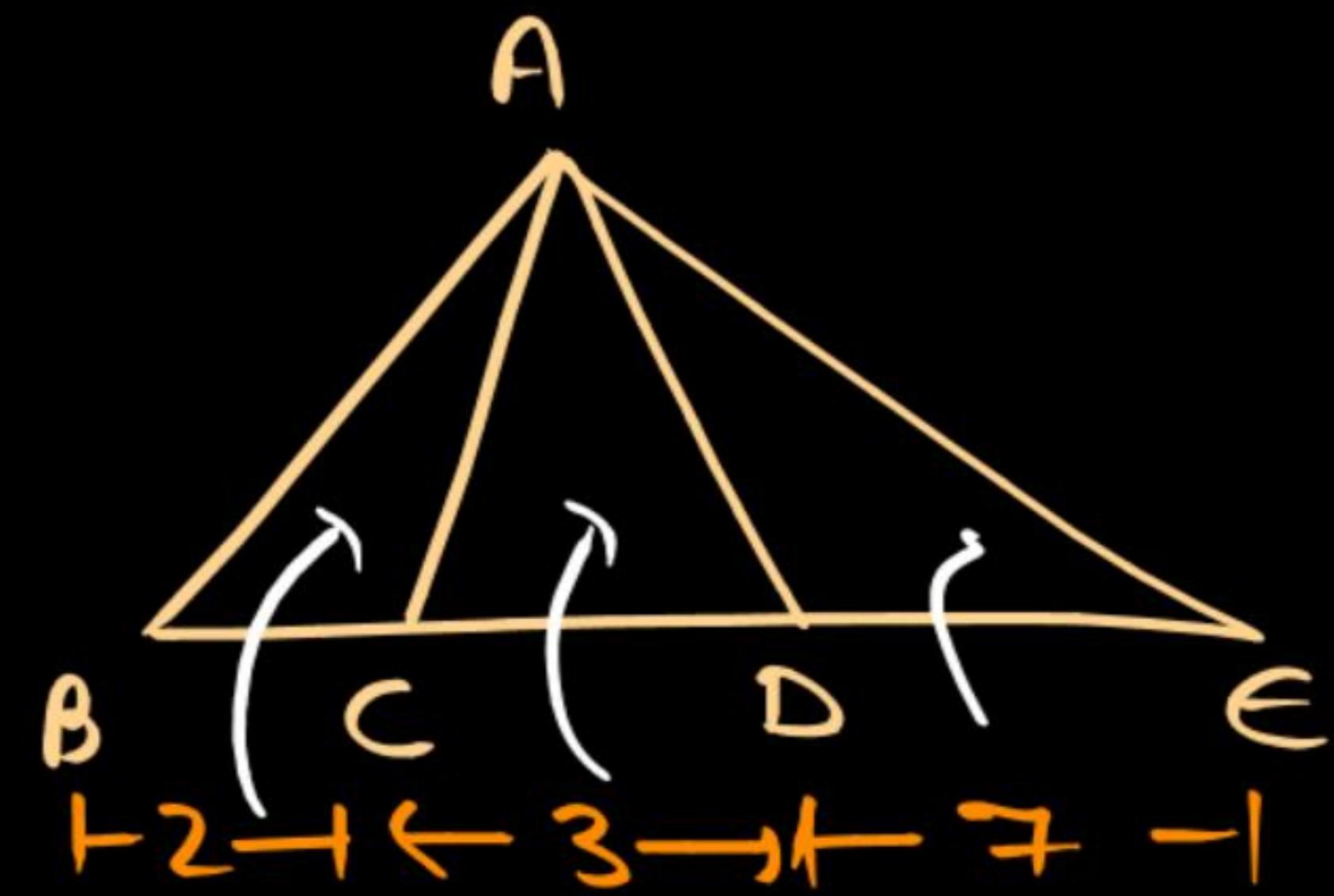


$$\text{Ar}(\Delta BAP) : \text{Ar}(\Delta PAQ) : \text{Ar}(\Delta AQC)$$

$$\cancel{\frac{1}{2}} \times 3 \times h : \cancel{\frac{1}{2}} \times 5h : \cancel{\frac{1}{2}} \times 4 \times h$$

**3 : 5 : 4**

प



$\text{Area } \triangle ABC : \text{Area } \triangle ACD : \text{Area } \triangle ACE$

2

3

: 7



- \* Median always divides the area of triangle in two equal parts.
- \* Median formed on side 'a'

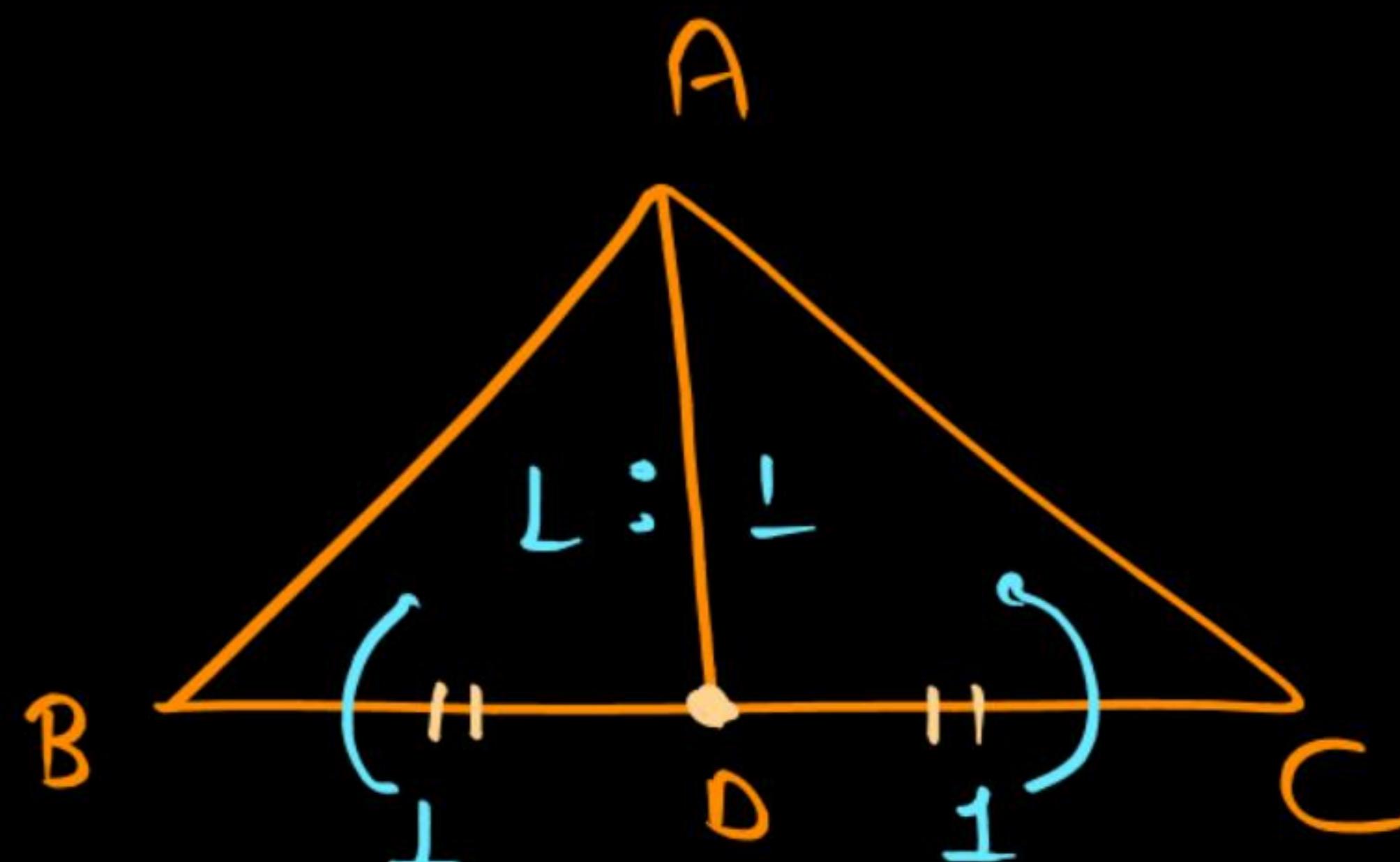
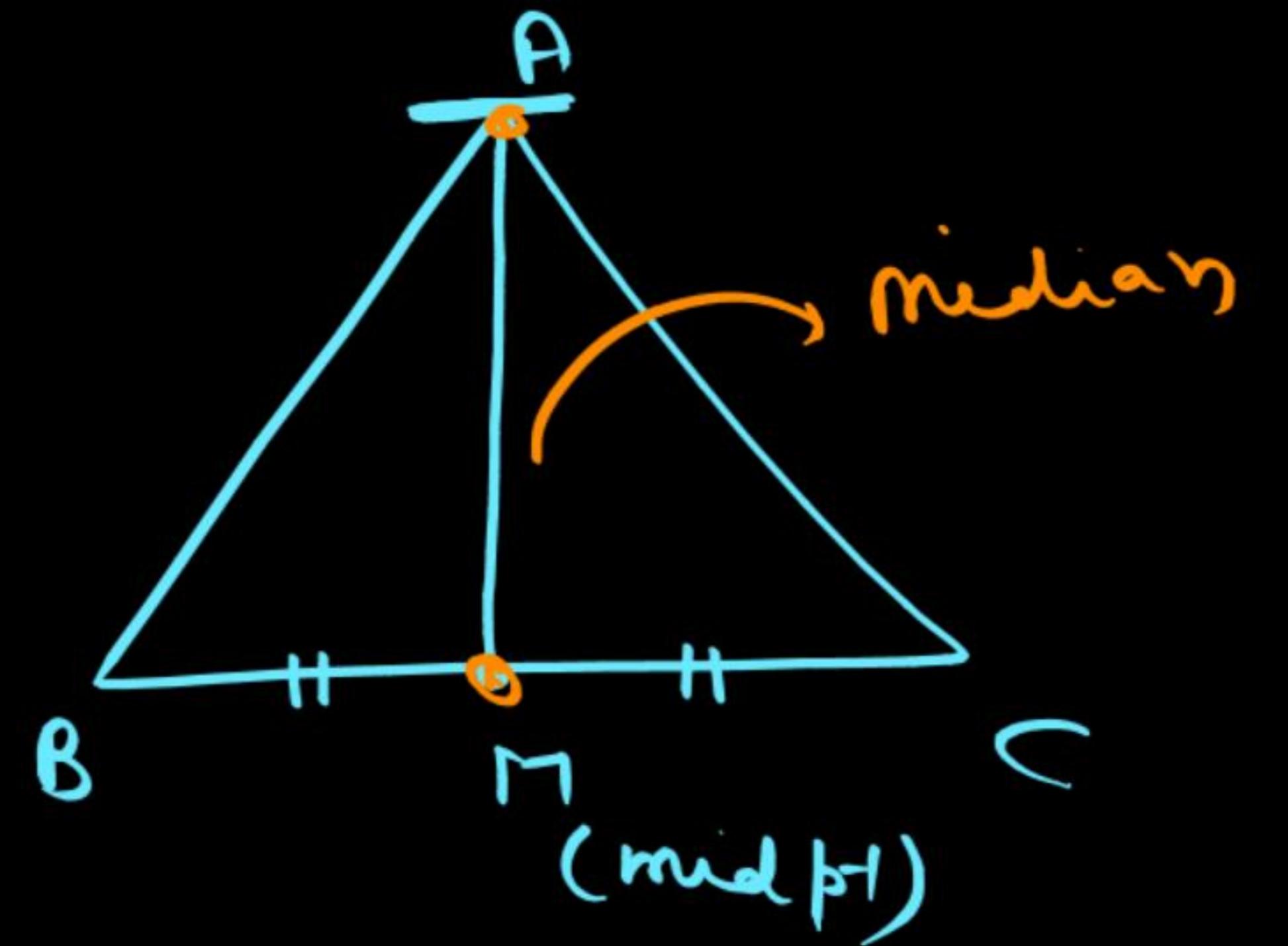
$$M_a = \sqrt{\frac{2b^2 + 2c^2 - a^2}{4}}$$

- \* Median formed on side 'b' and 'c'

$$M_b = \sqrt{\frac{2a^2 + 2c^2 - b^2}{4}}$$

$$M_c = \sqrt{\frac{2a^2 + 2b^2 - c^2}{4}}$$

Median (मध्यका)



$AD \rightarrow$  Median

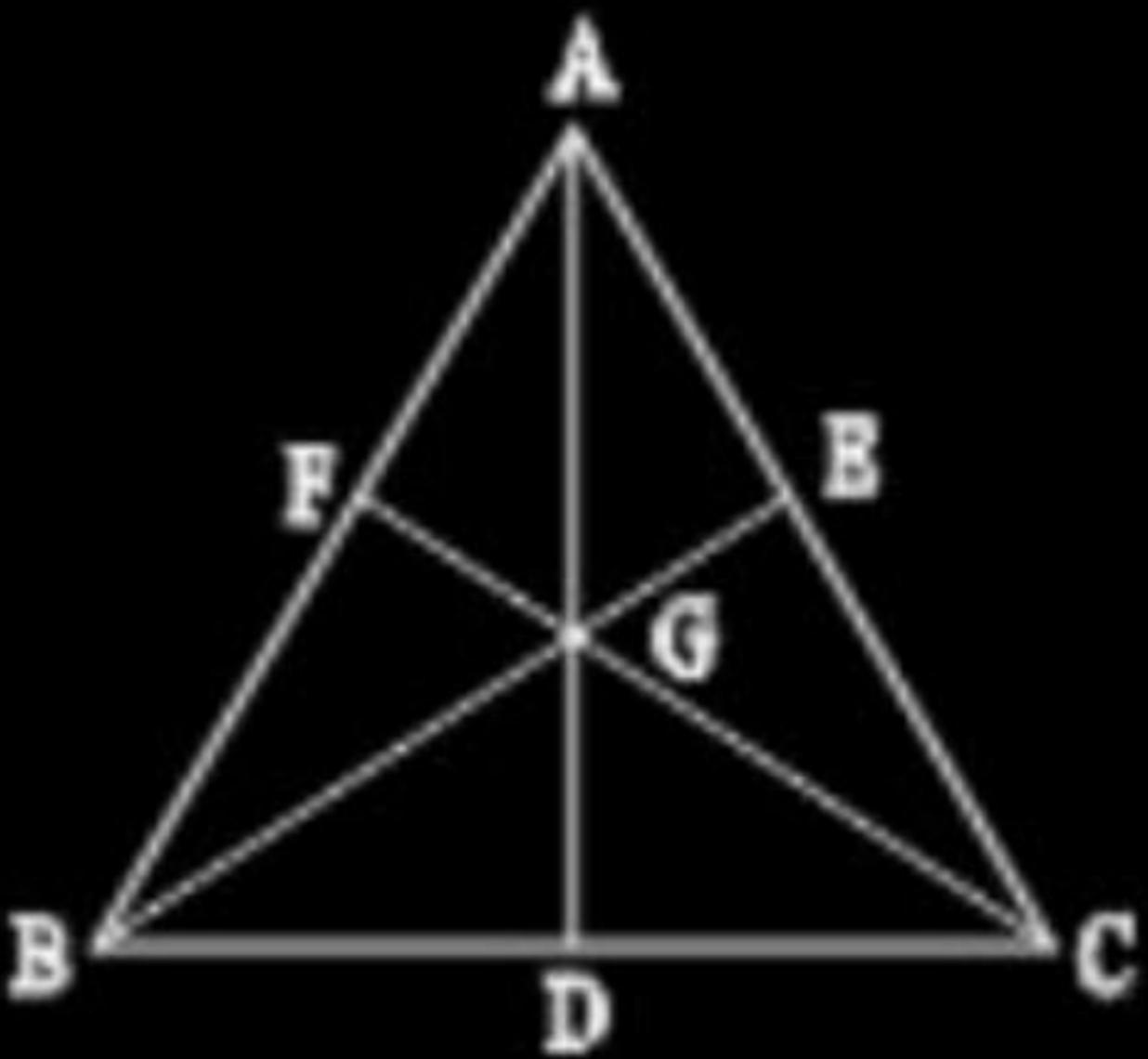
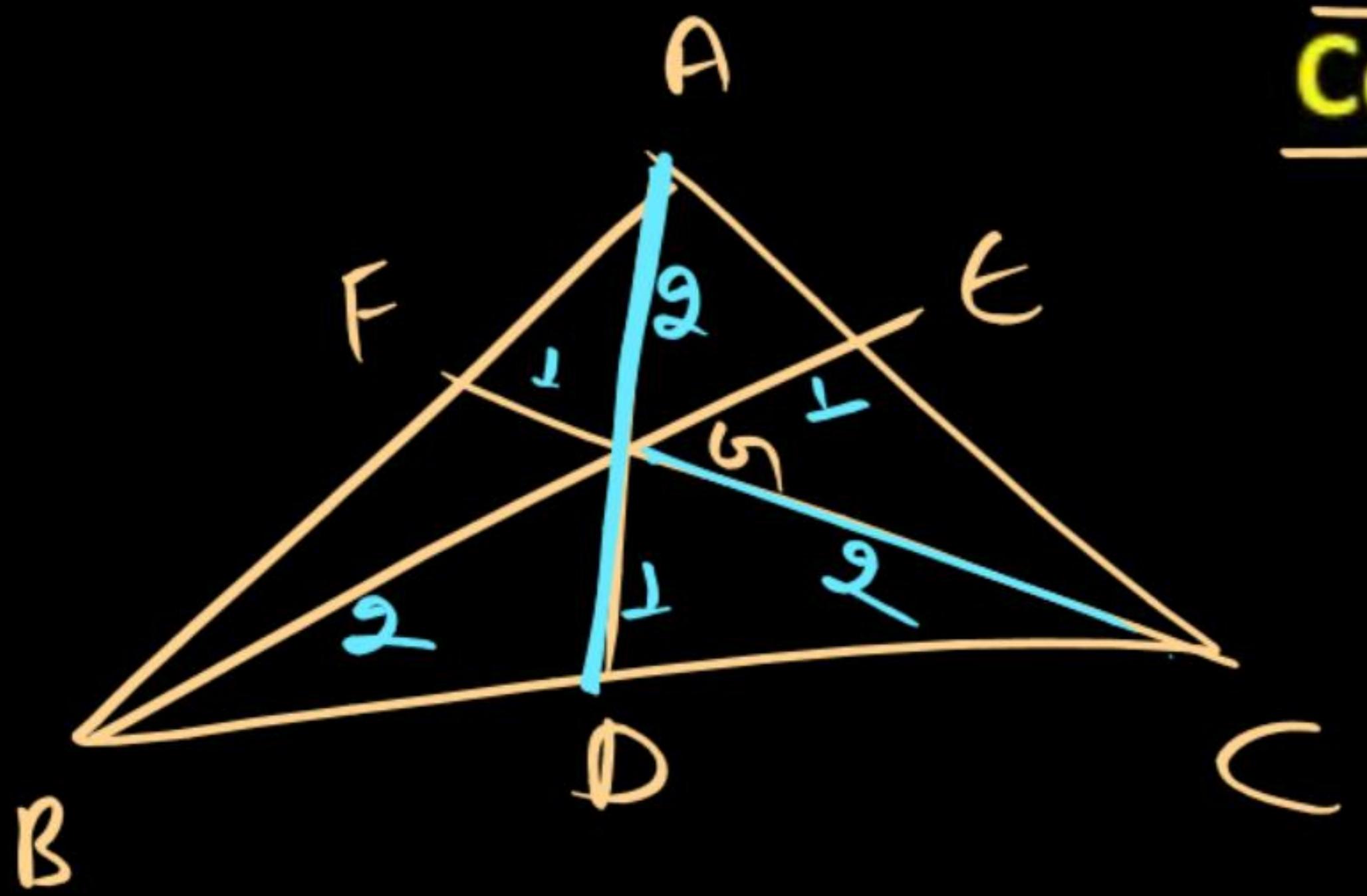
\* **Centroid: It is the point of intersection of all the three medians.**

**Centroid  $\approx$  Centre of Gravity  $\approx$  'G'**

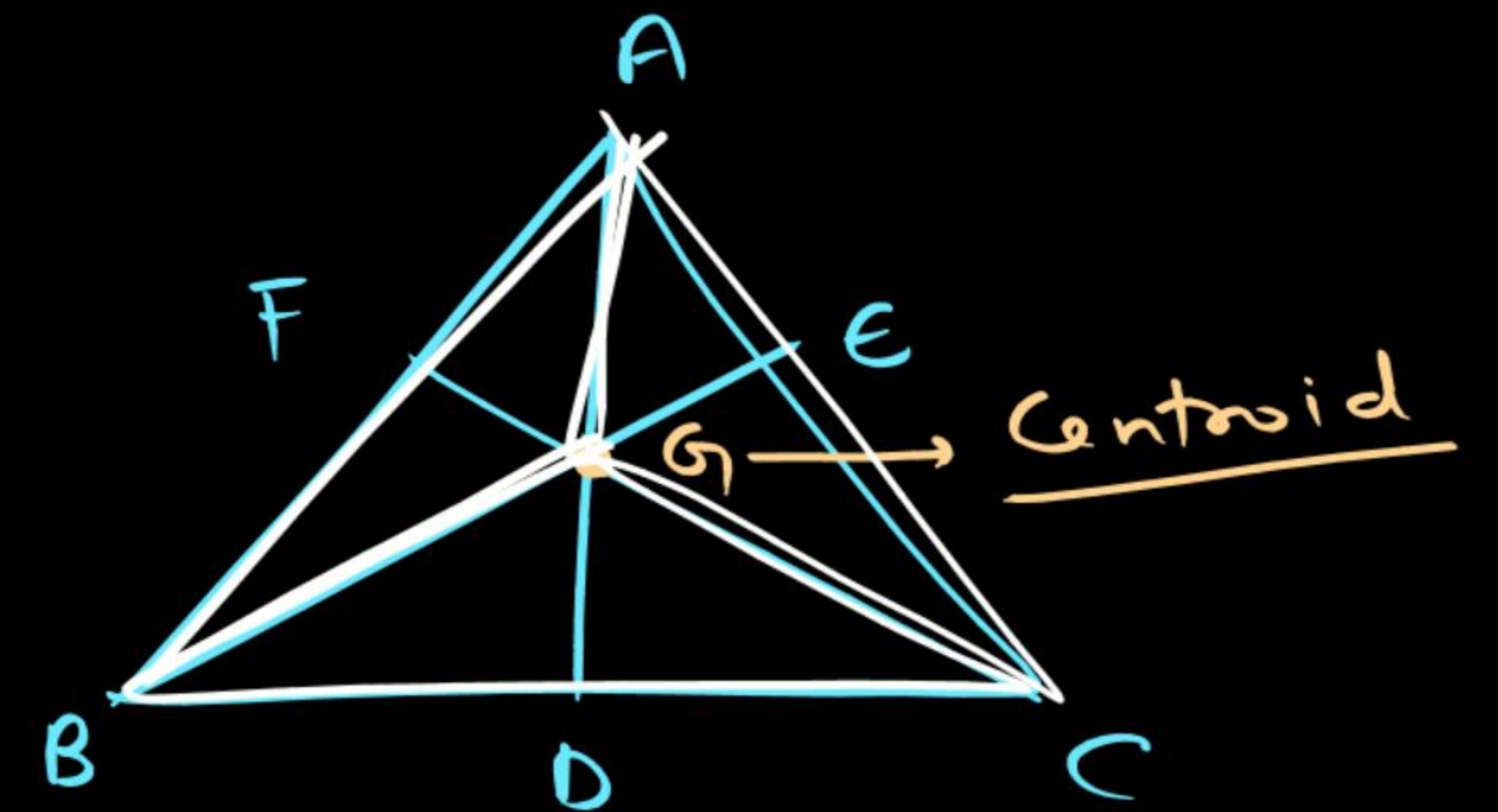
$$AG : GD = 2 : 1$$

$$BG : GE = 2 : 1$$

$$CG : GF = 2 : 1$$

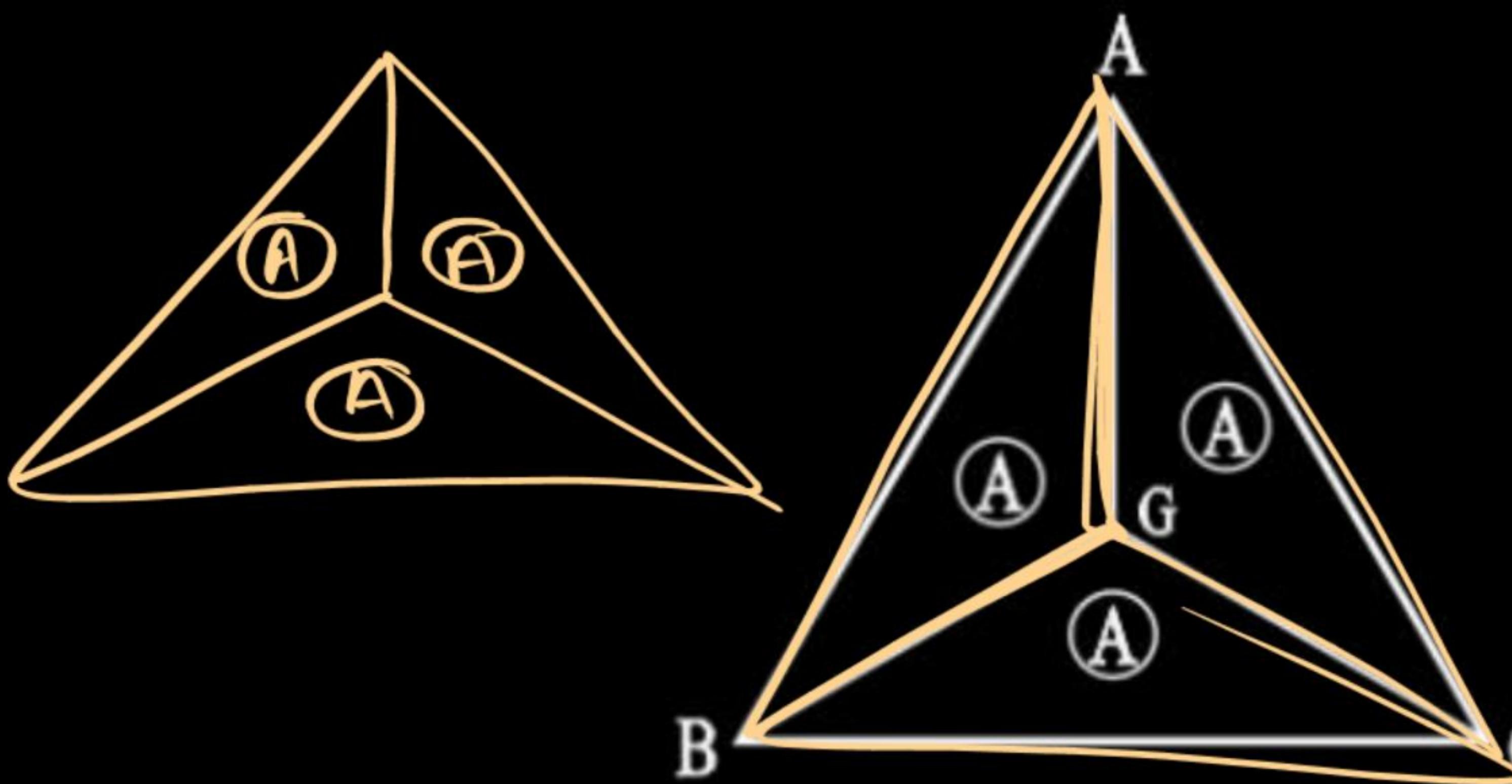


**Centroid divides the median in 2 : 1**

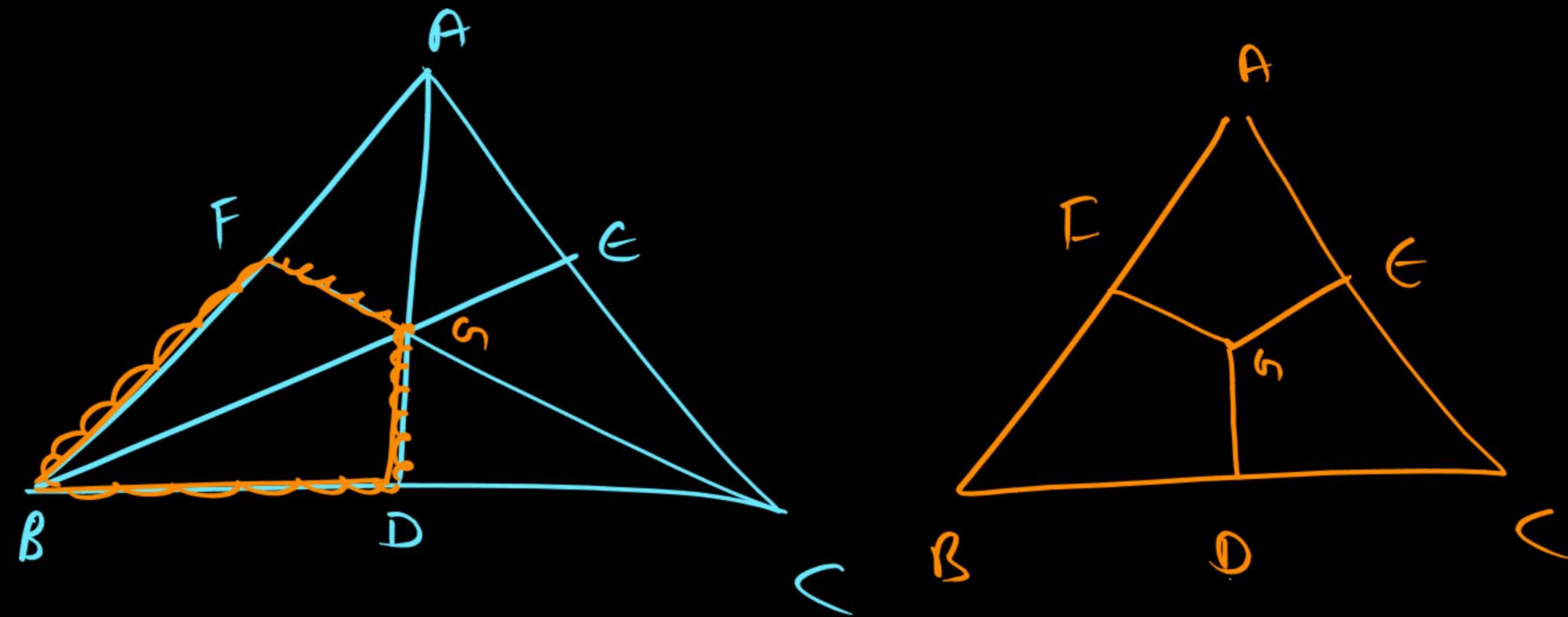




\* Centroid divides the area in three equal part



$$ar(\Delta AGB) = ar(\Delta BGC) = ar(\Delta AGC)$$



At BF-4D

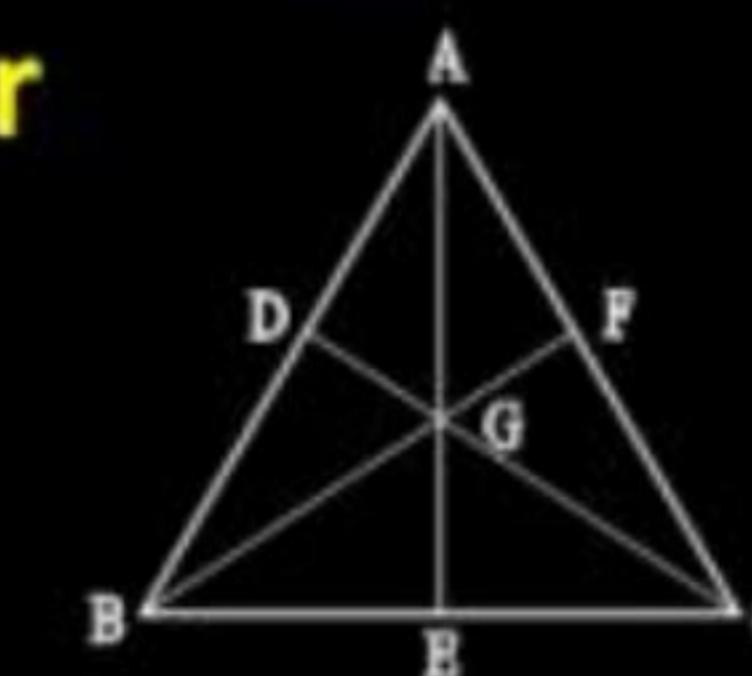
or

$$\text{Area}_{\triangle ABC} = \frac{1}{2} AB \cdot \text{height}$$

A U AFGH



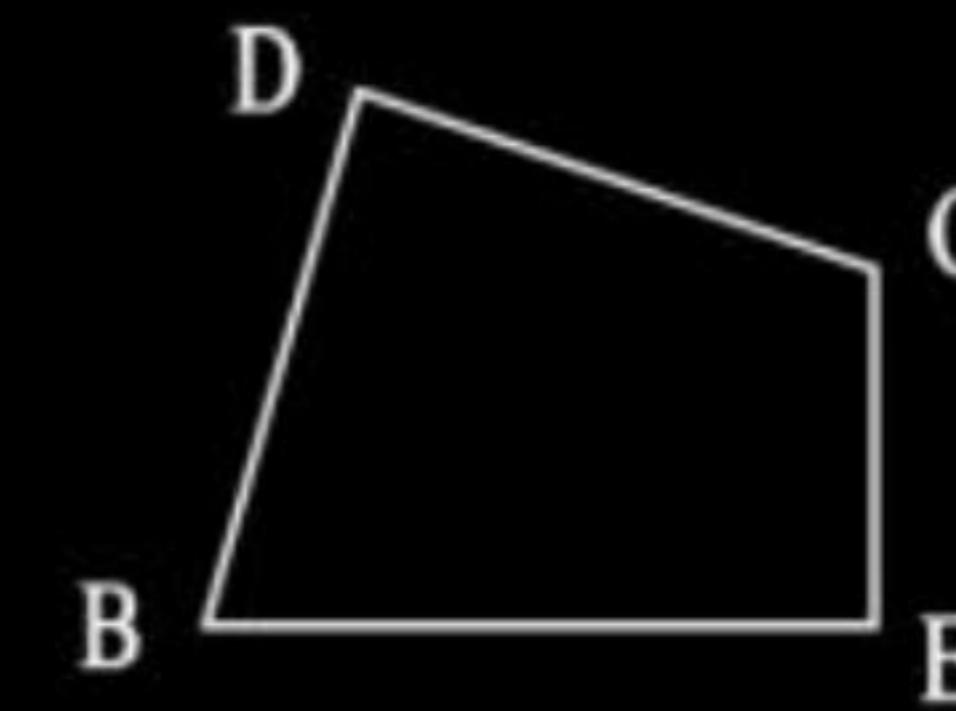
- \* Centroid divides the triangle in 3 quadrilateral area of quadrilateral so formed in three equal parts



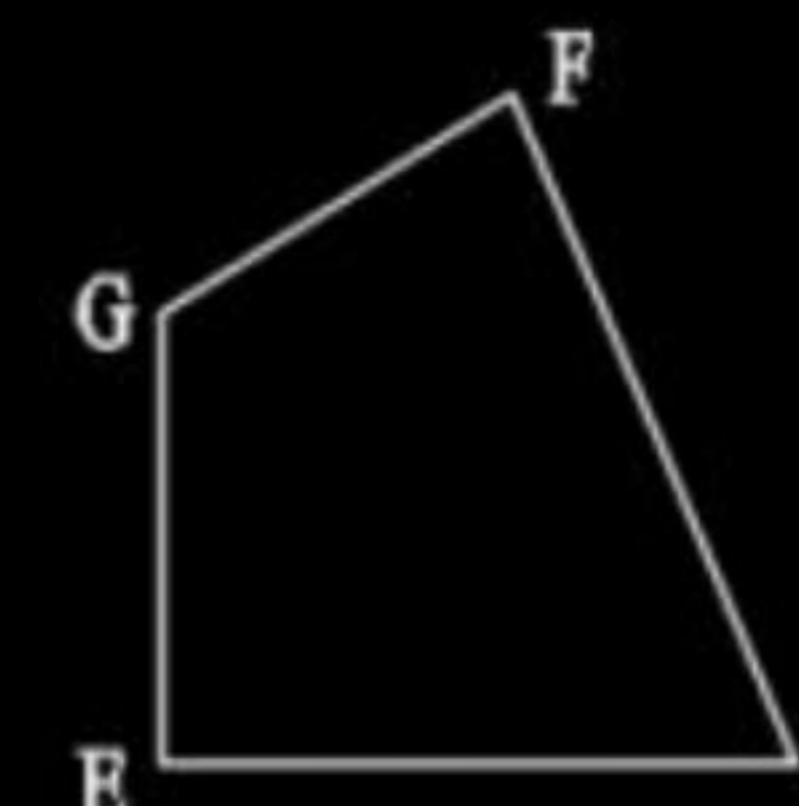
**Area of quadrilateral ADGF**



**Area of quadrilateral BEGD**

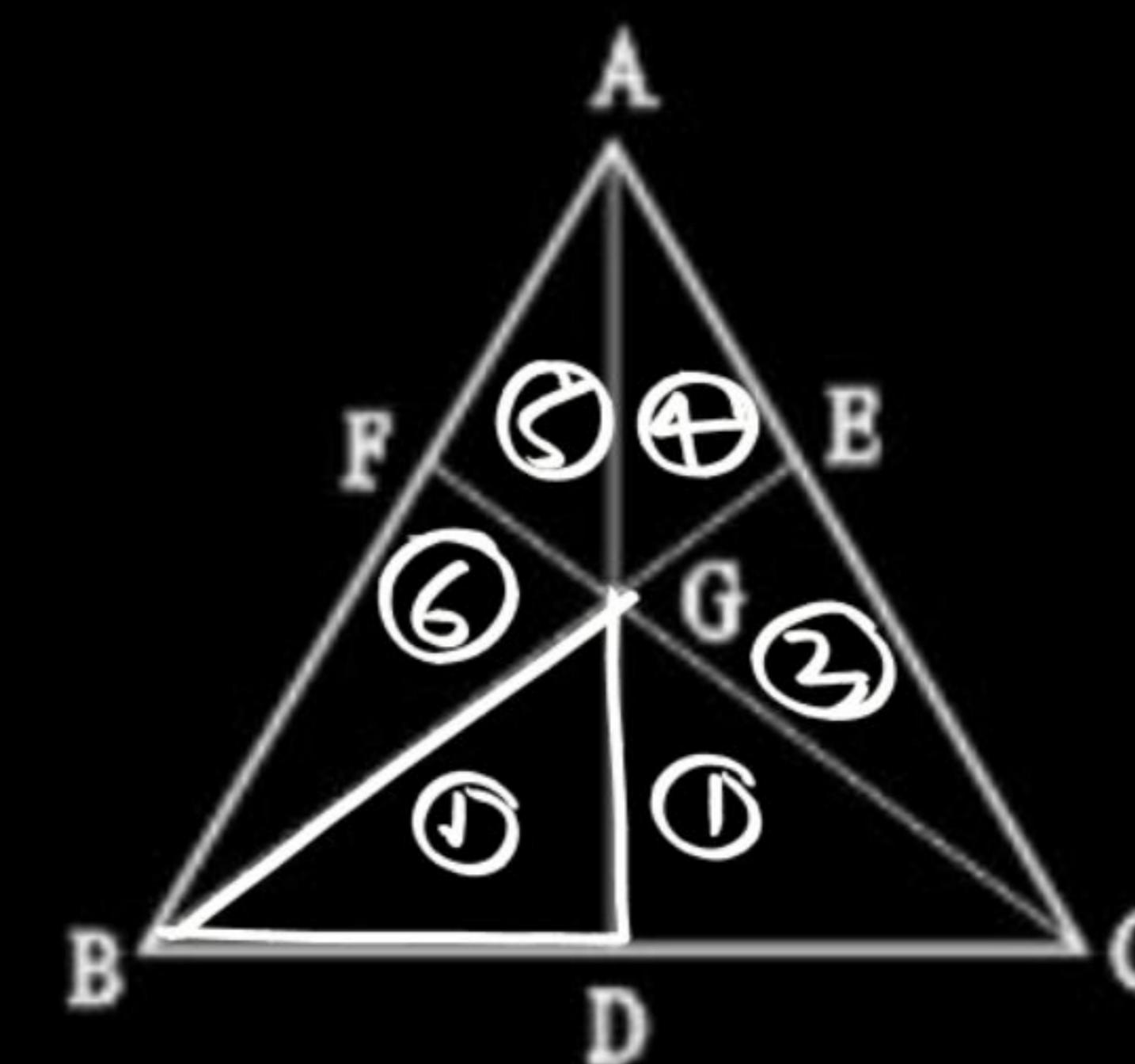


**Area of quadrilateral CFGE**

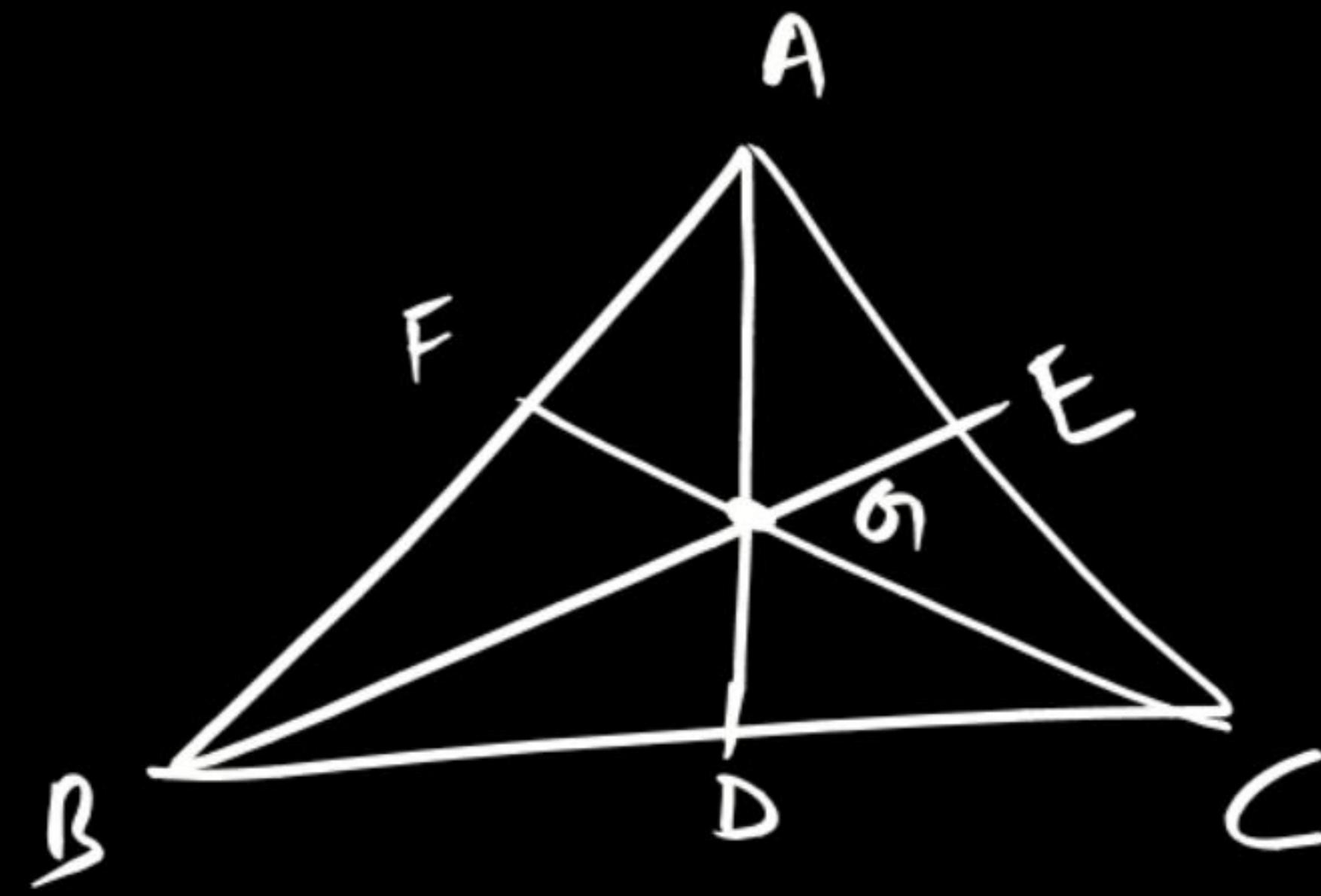


**1 : 1 : 1**

- \* Centroid divides the triangle in 6 small triangles whose area is equal.



$$ar(\triangle BGD) = \frac{1}{6} ar(\triangle ABC)$$

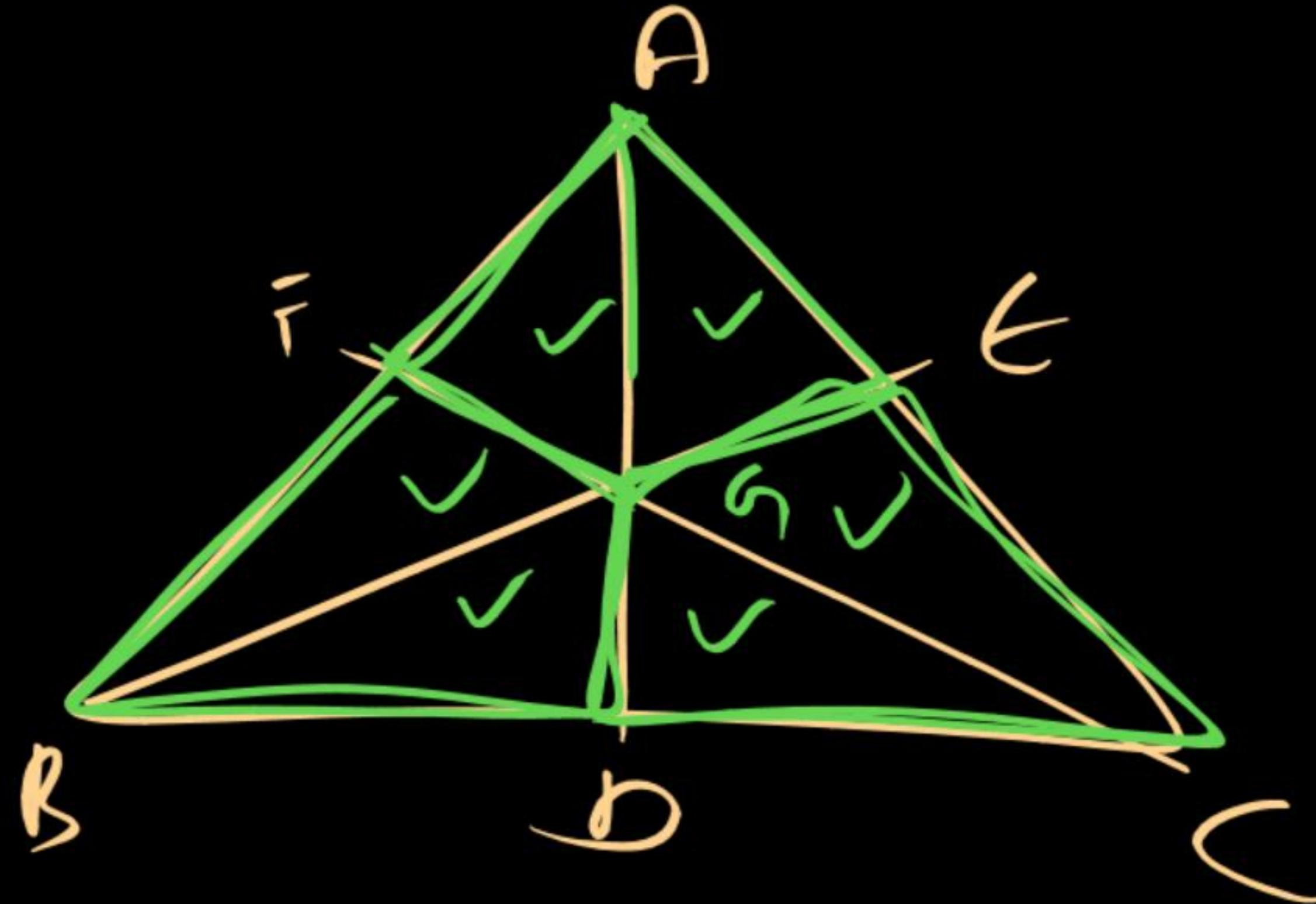


$A \triangle BGC$

or

$$\Delta AGB = \frac{1}{3} A \triangle ABC$$

or  
 $\Delta AGC$



$A \triangle DBFGD$

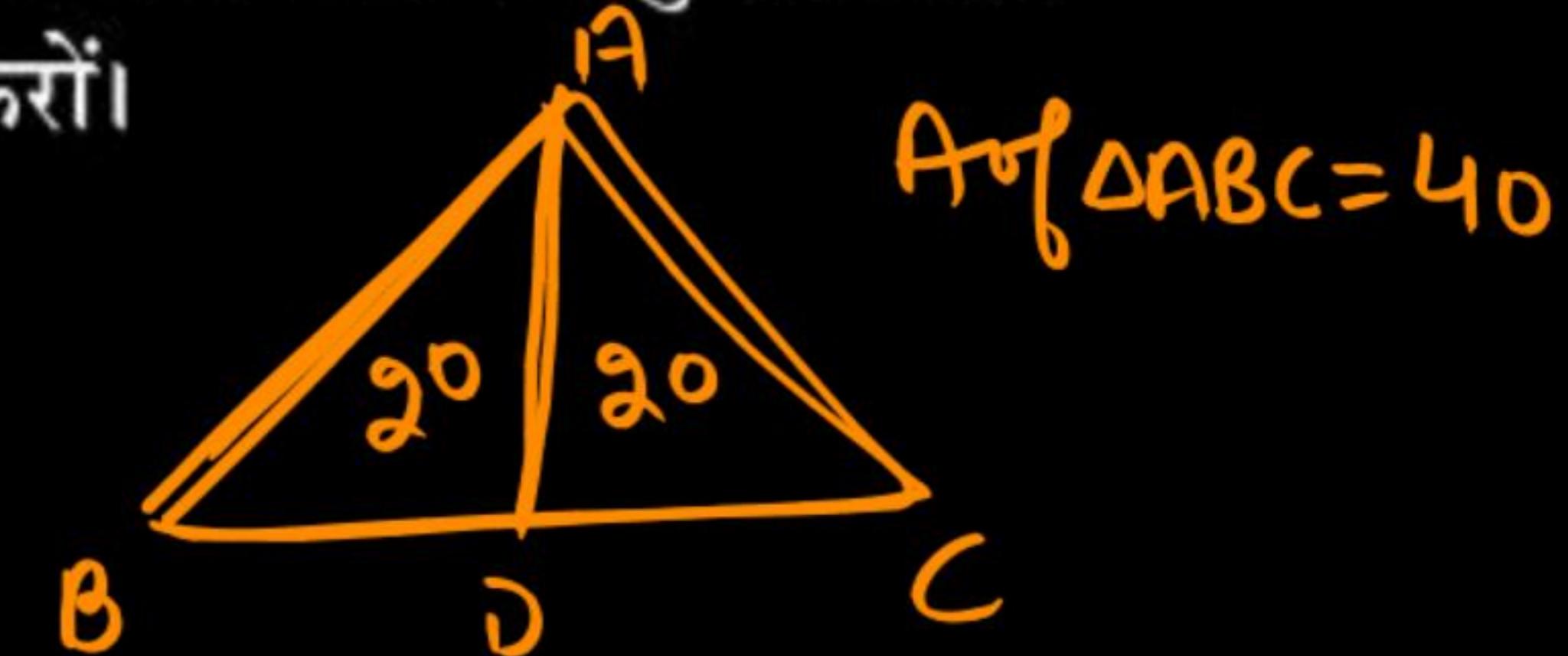
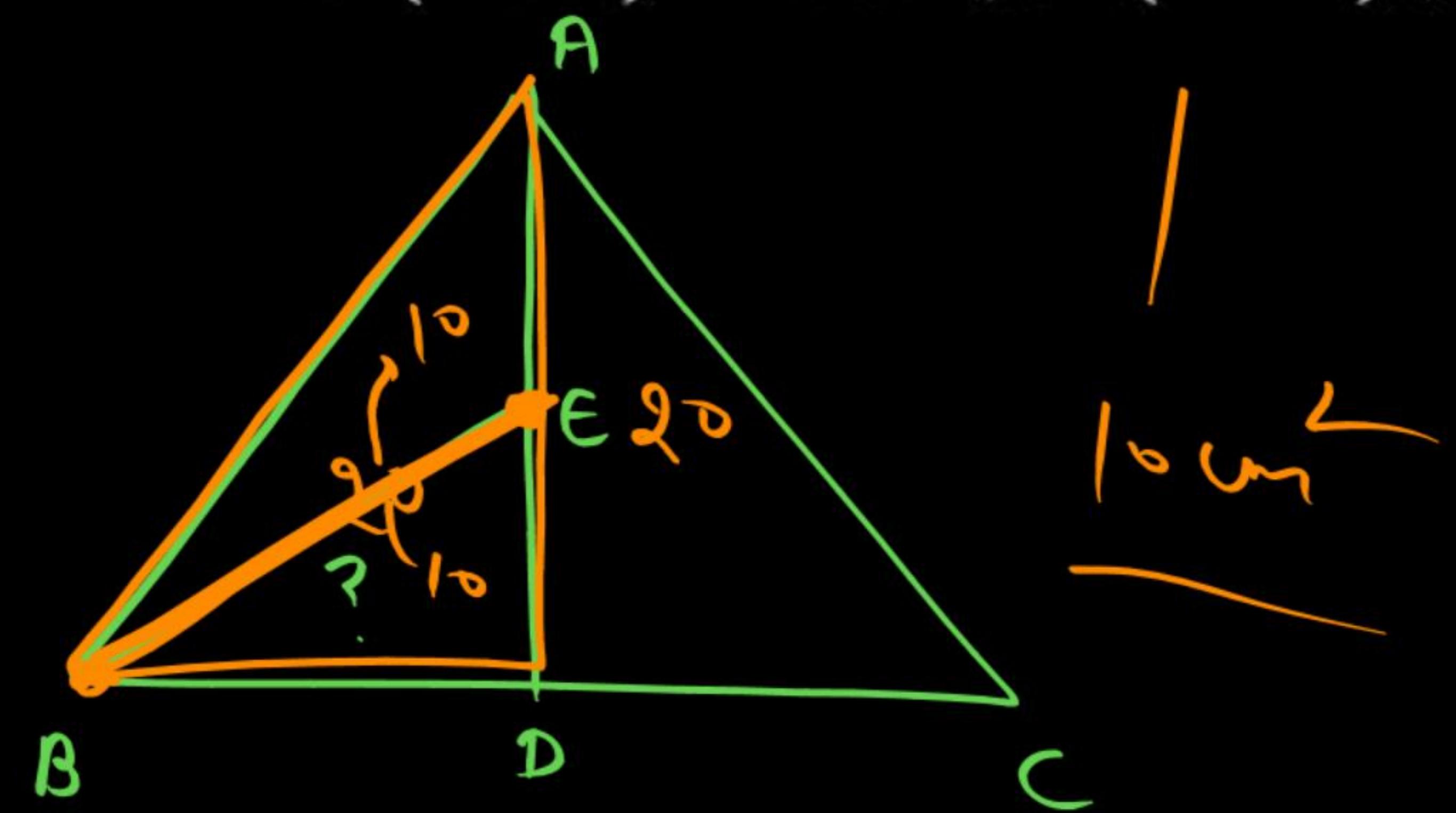
or

$$\Delta DGE = \frac{1}{3} A \triangle ABC$$

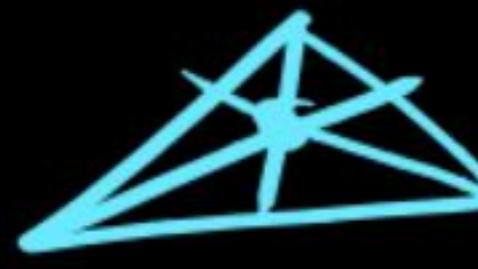
or  
 $\Delta AFGE$

25. In a  $\Delta ABC$ , AD is median and E is the midpoint of AD. If  $\text{Ar}(\Delta ABC) = 40 \text{ cm}^2$ , Find  $\text{ar}(\Delta BED)$ .

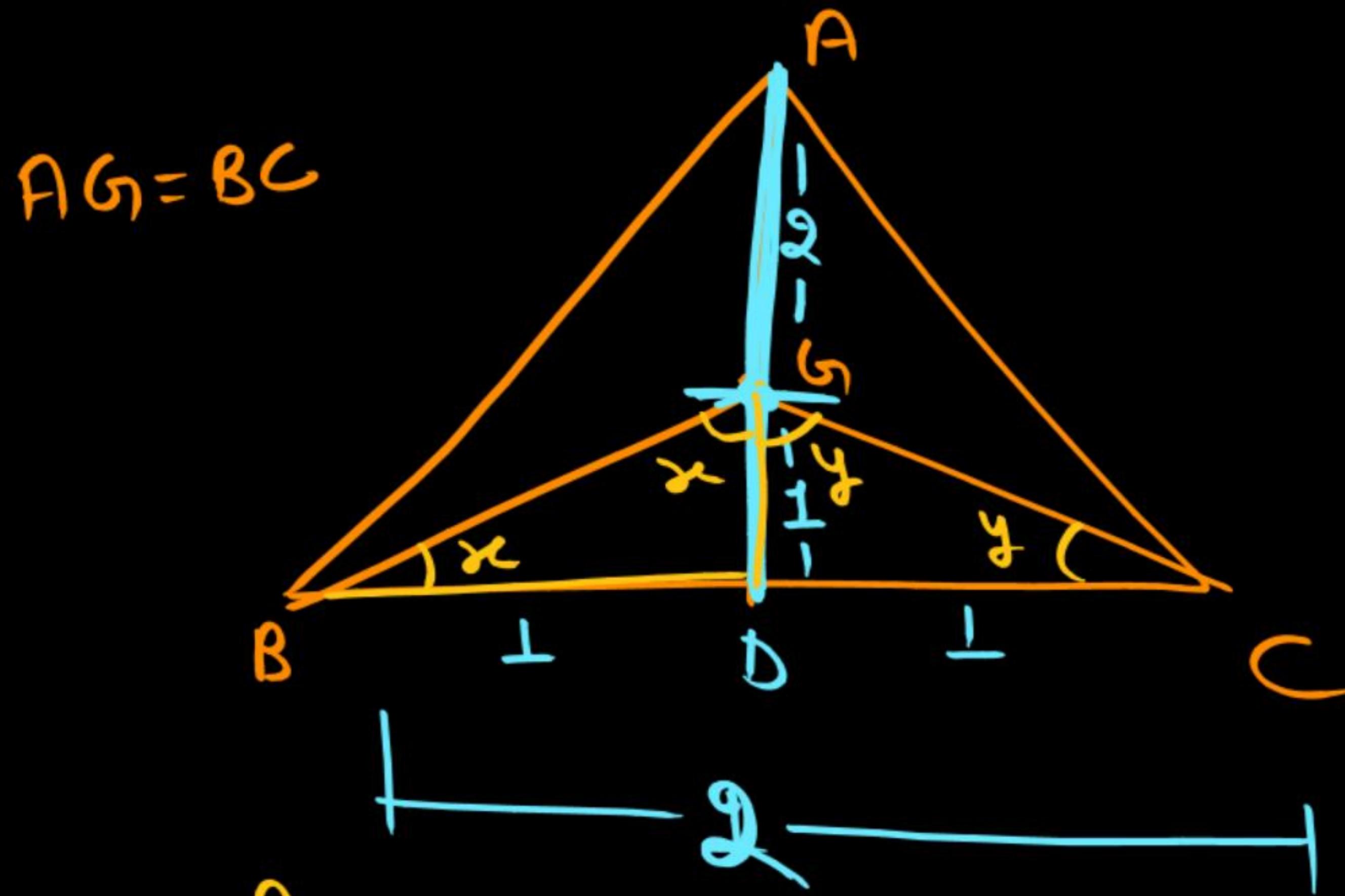
एक  $\Delta ABC$  में, AD माध्यिका है और E, AD का मध्य बिन्दु है। यदि  $Ar(\Delta ABC) = 40 \text{ cm}^2$ , ar( $\Delta BED$ ) ज्ञात करों।



26. In a  $\Delta ABC$ , G is the centroid in which  $AG = BC$ , then find  $\angle BGC$ .



एक  $\Delta ABC$  में, G केन्द्रक है जिसमें  $AG = BC$ ,  $\angle BGC$  ज्ञात करों।



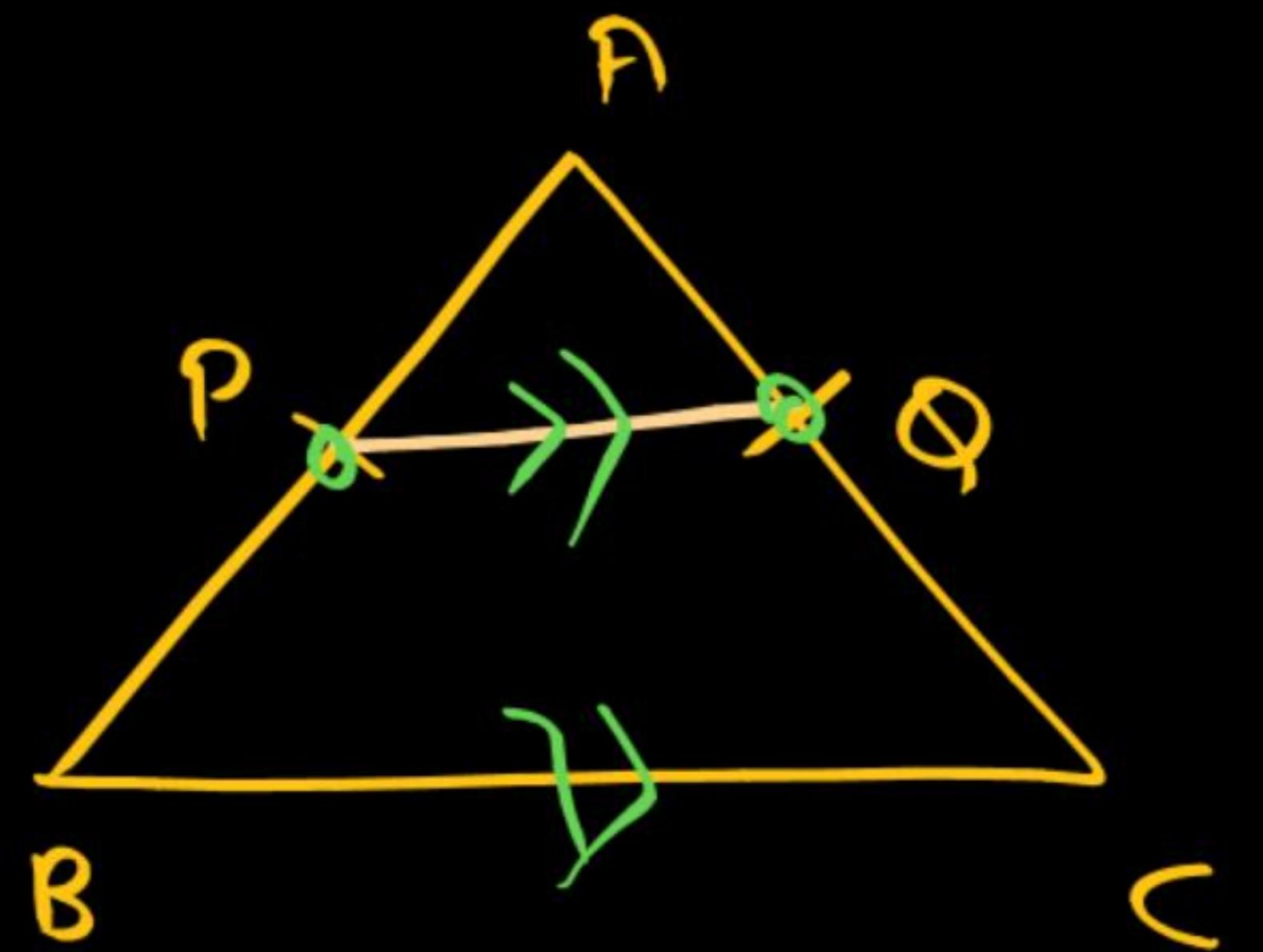
माना  $\angle BGC$

$$x + n + y + z = 180$$

$$2(n+y) = 180$$

$$n+y=90 = \angle BGC$$

## Mid point Theorem

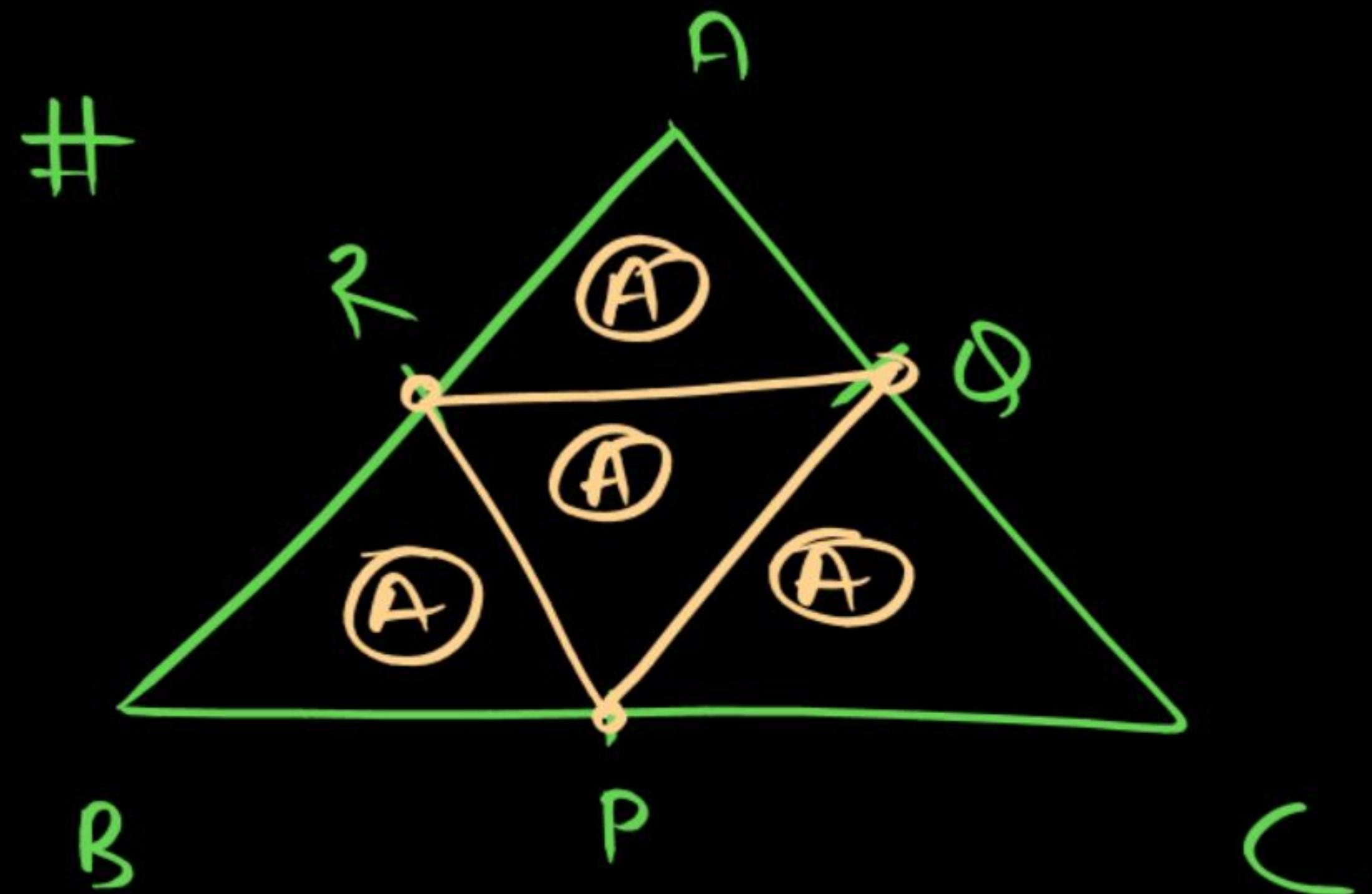


P & Q are mid points

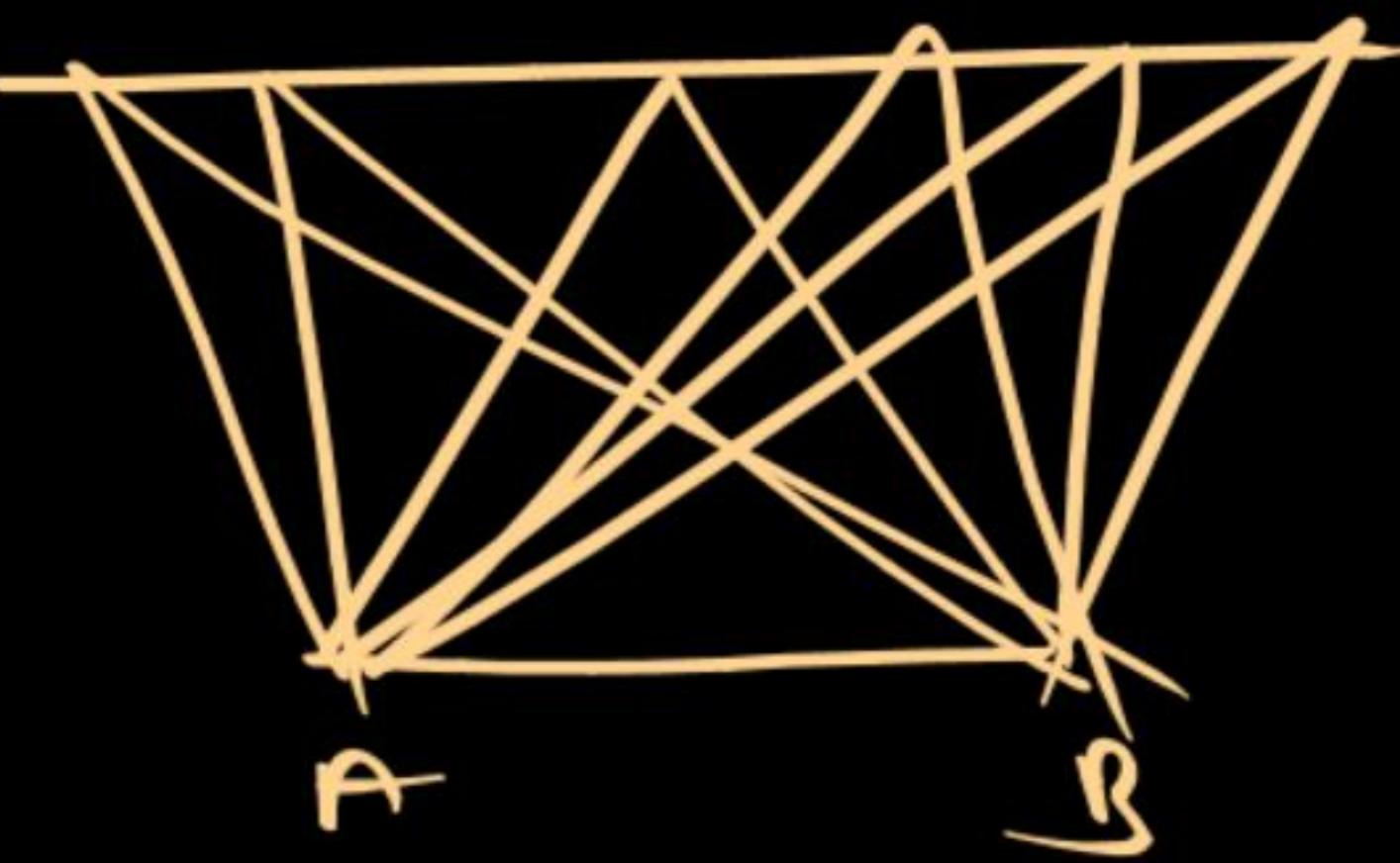
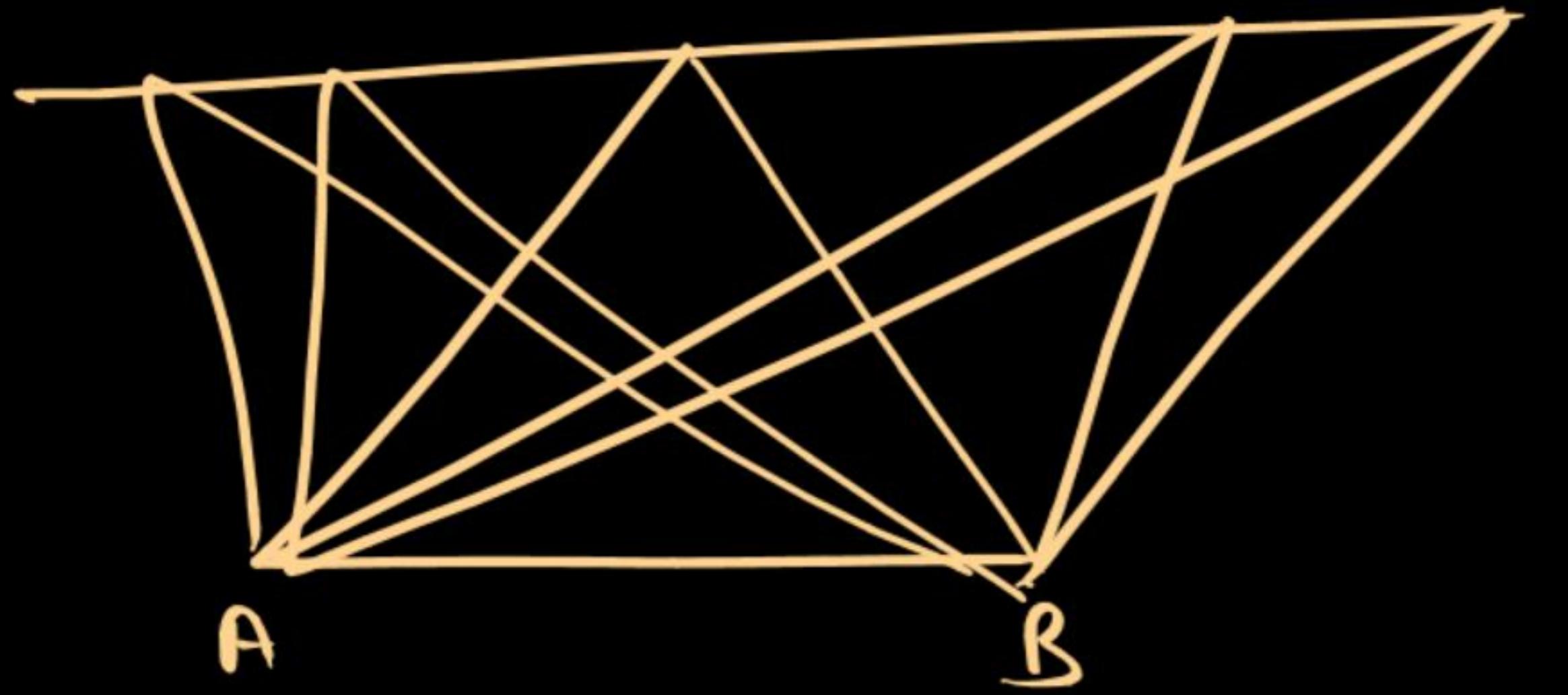
If P & Q are mid points of AB & AC

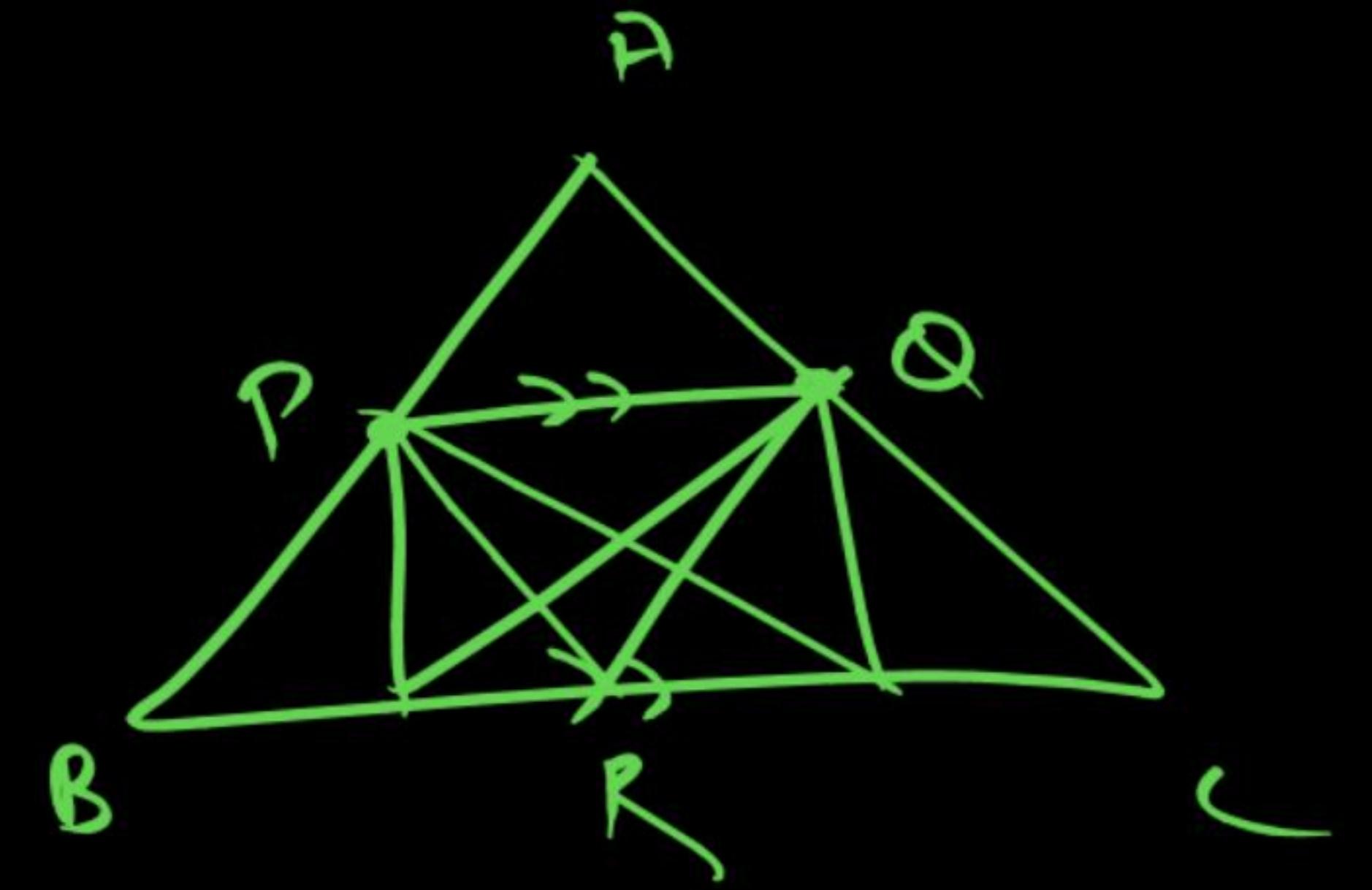
$$PQ \parallel BC$$

$$PQ = \frac{1}{2} BC$$



P, Q, R are mid points of side  
BC, AC & AB

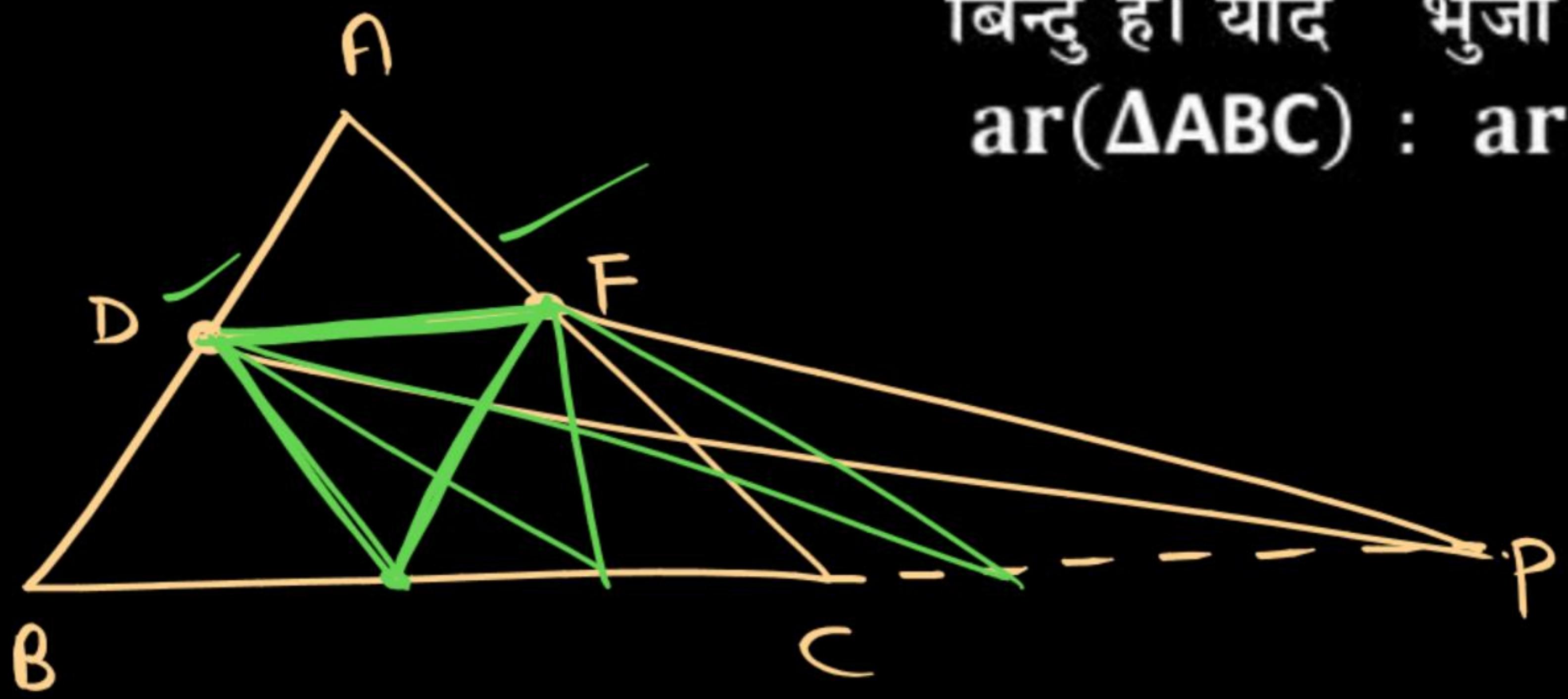




$PQ \parallel BC$

27. In a  $\Delta ABC$ , D and F are the midpoints of AB and AC. If side BC is extended upto a point P, then find  $\text{ar}(\Delta ABC) : \text{ar}(\Delta DPF)$ .

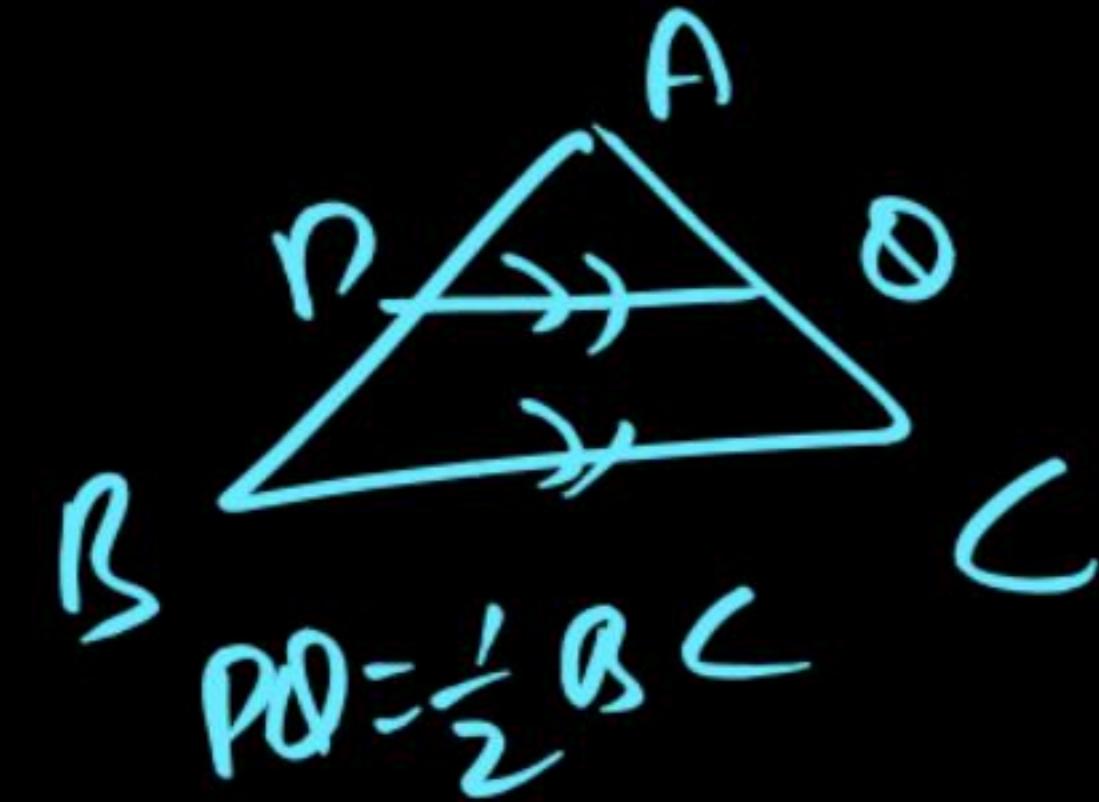
एक  $\Delta ABC$  में,  $D$  तथा  $F$  भुजा AB और AC के मध्य बिन्दु हैं। यदि भुजा  $BC, P$  बिन्दु तक बढ़ाई जाय, तो  $\text{ar}(\Delta ABC) : \text{ar}(\Delta DPF)$  ज्ञात करों



$PF \parallel BC$

$\text{राशि } \Delta ABC : \text{राशि } \Delta DPF$

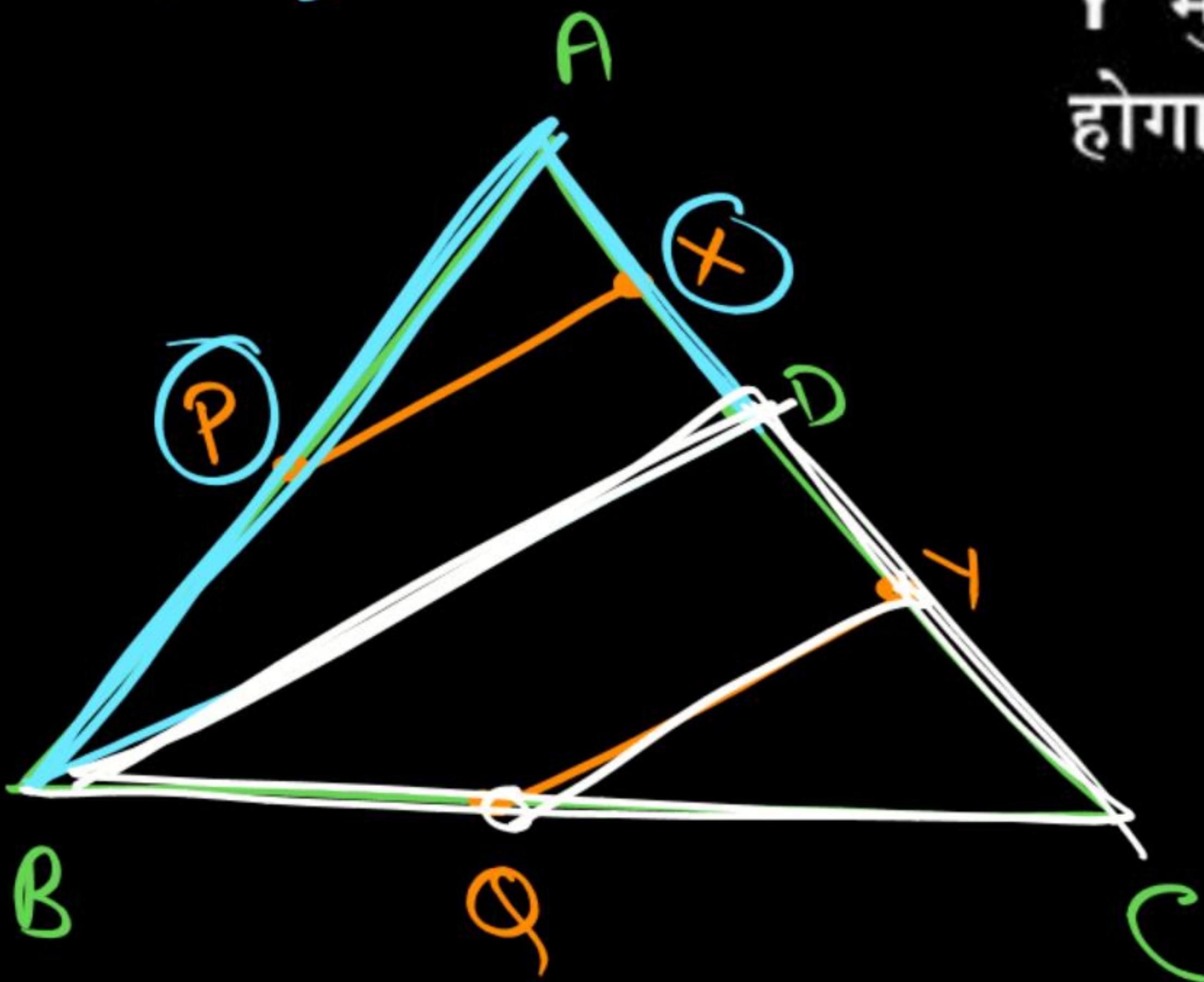
$4 : 1$



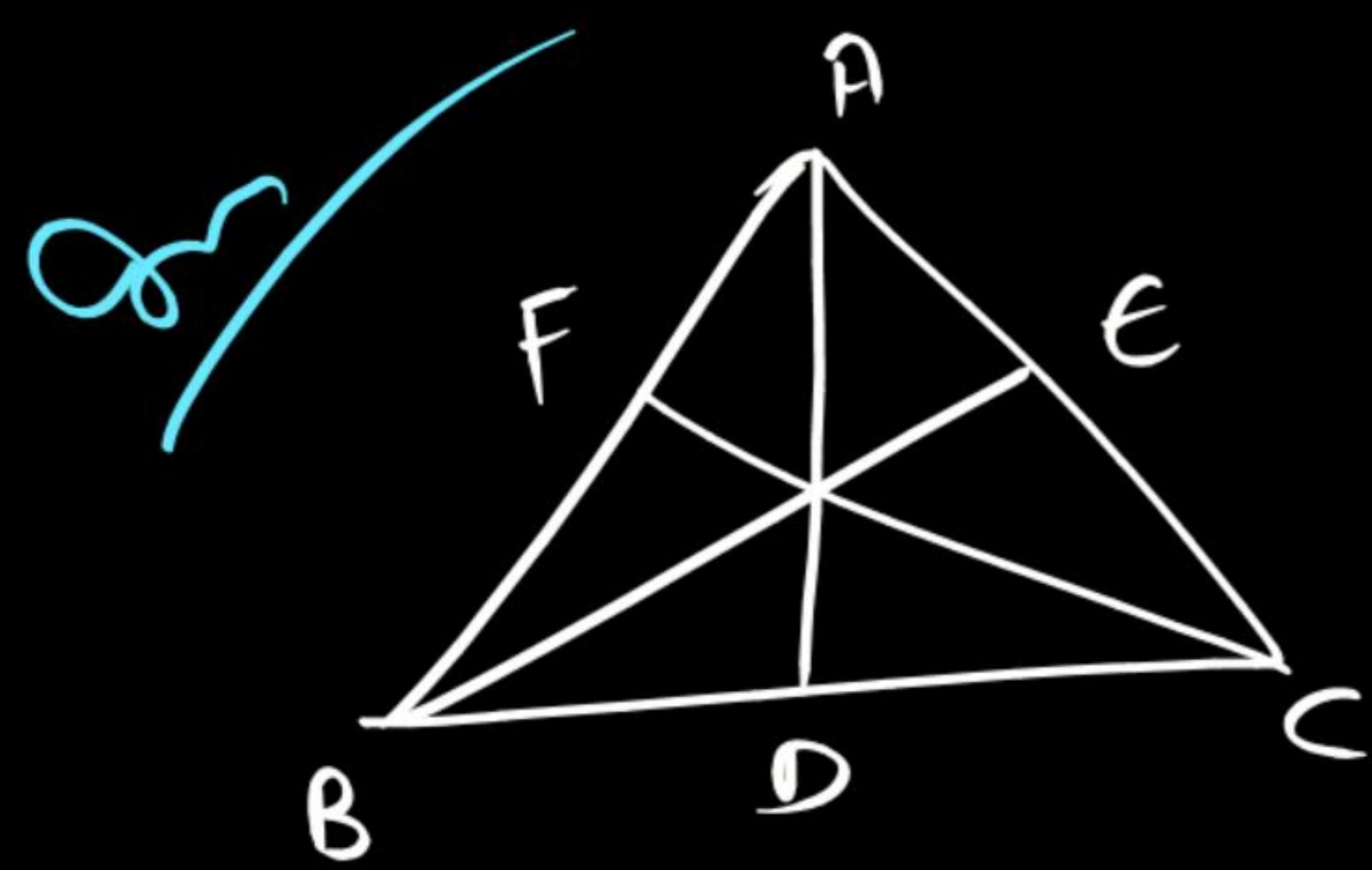
28.

In  $\Delta ABC$ , D is a point on side AC and P, Q, X, Y, are the midpoints of AB, BC, AD, DC then  $PX : QY$ .

एक  $\Delta ABC$  में, D भुजा AC पर एक बिन्दु है और P, Q, X, Y भुजाओं AB, BC, AD, DC के मध्य बिन्दु हैं तो  $PX : QY$  होगा:



$$\begin{aligned} PX &: QY \\ \frac{1}{2}BD &: \frac{1}{2}BD \\ 1 &: 1 \end{aligned}$$

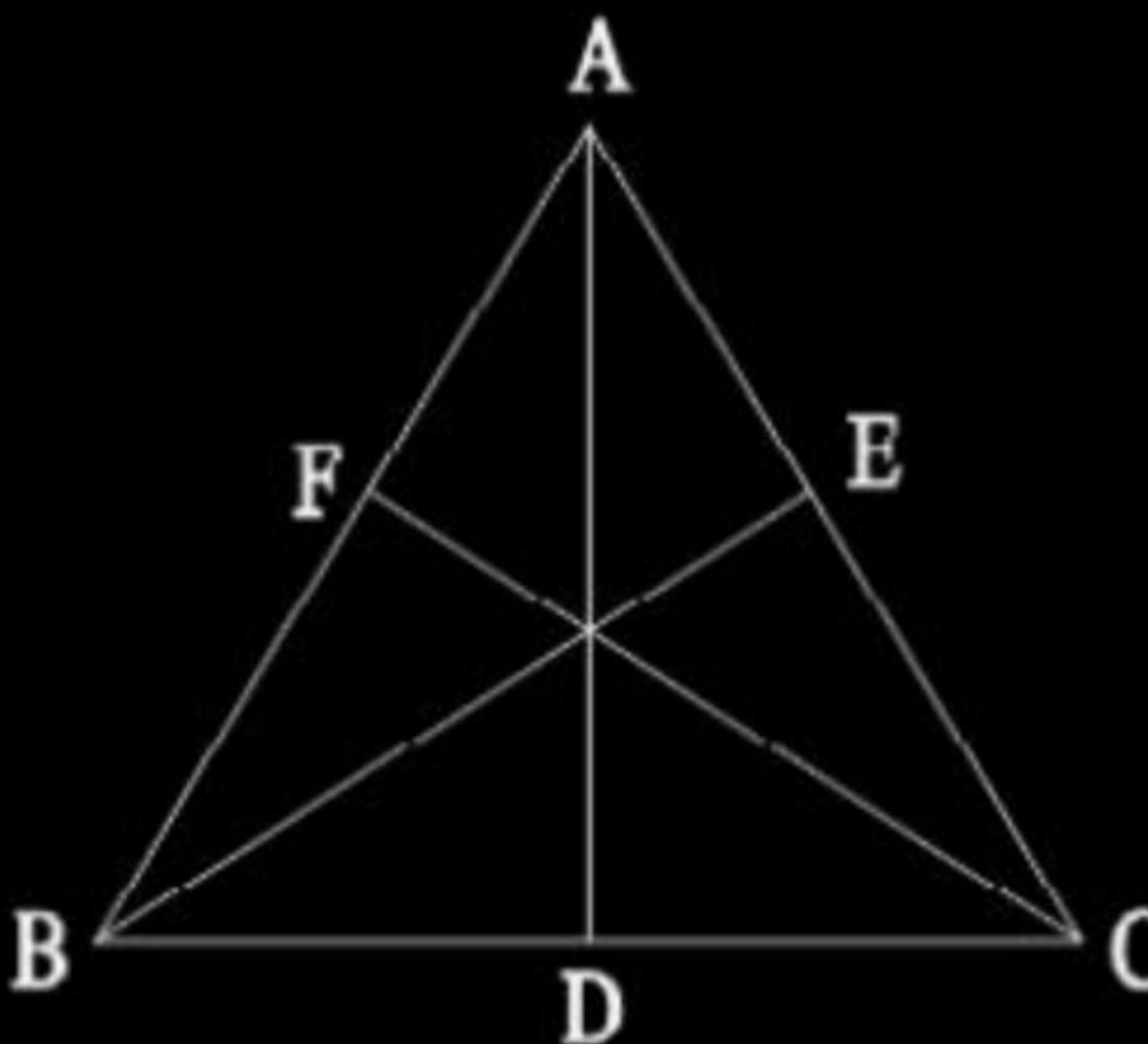


**Relation between sides and medians:**

**Which portion is correct?**

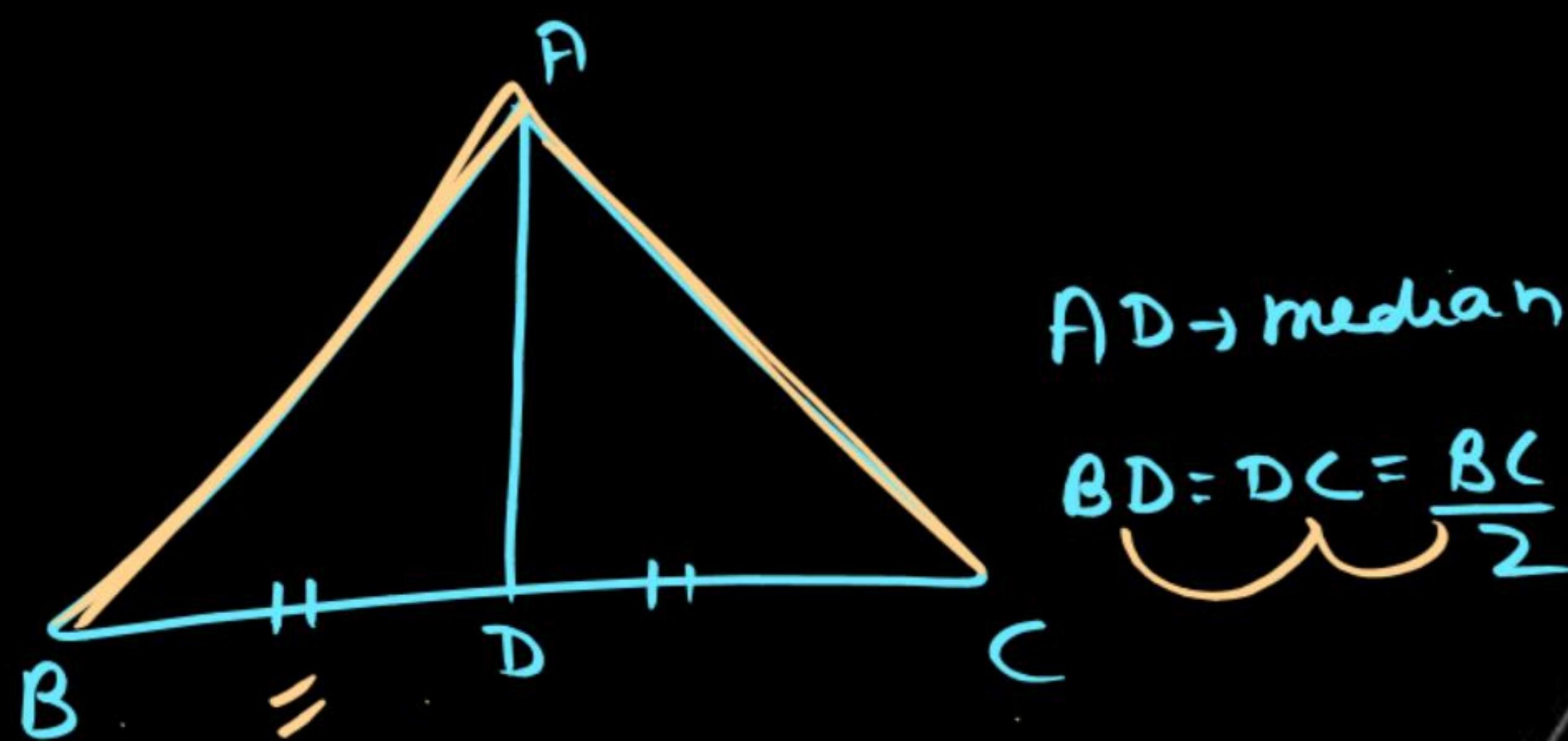
- (i)  $(AD + BE + CF) = (AB + BC + CA)$
- (ii)  $3(AD + BE + CF) > 4(AB + BC + CA)$
- (iii)  $4(AD + BE + CF) > 3(AB + BC + CA)$
- (iv)  $4(AD + BE + CF) < 3(AB + BC + CA)$

$$3(AB + BC + CA) < 4(AD + BE + CF)$$



**Appollonius Theorem:**  
**Relation between (Sides and Medians)**

$$BD = DC = \frac{BC}{2}$$

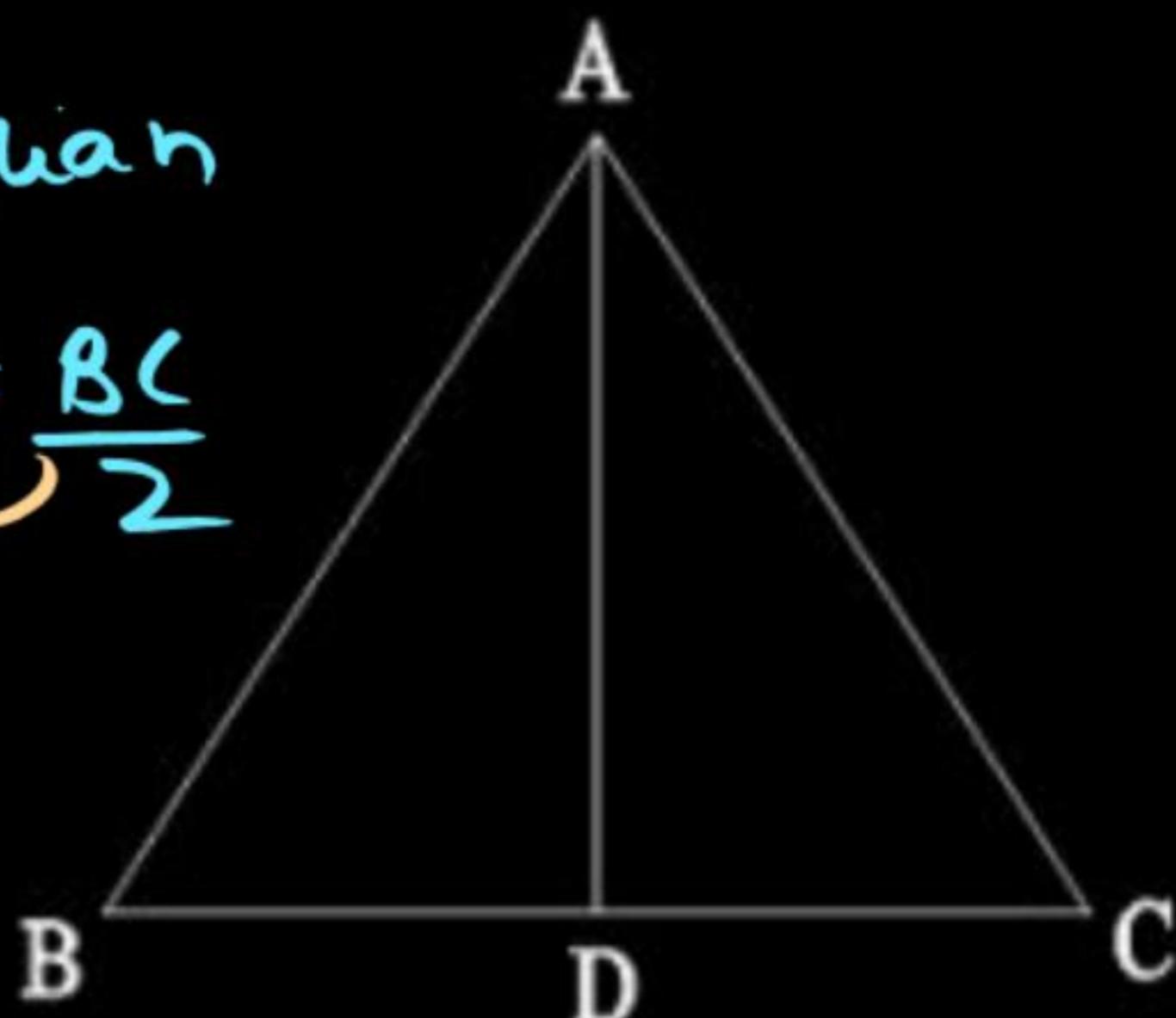


$$AB^2 + AC^2 = 2[AD^2 + BD^2]$$

or  
 $2[AD^2 + CD^2]$

or

$$2\left[AD^2 + \left(\frac{BC}{2}\right)^2\right]$$



According to appollonious theorem,

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

or

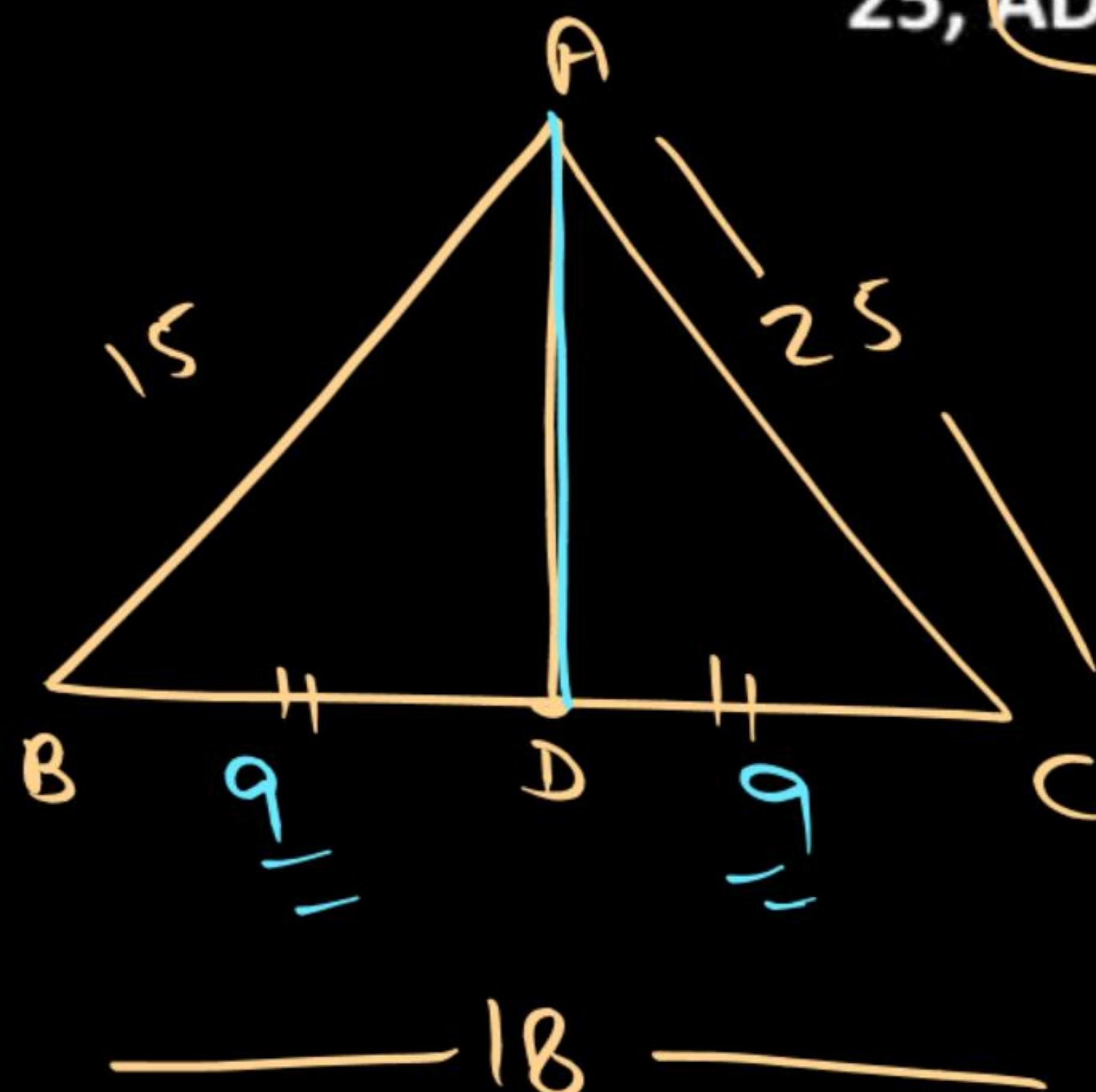
$$2(AD^2 + DC^2)$$

or

$$2\left(AD^2 + \left(\frac{BC}{2}\right)^2\right)$$

29. In  $\Delta ABC$ , D is midpoint of BC. If  $AB = 15$ ,  $BC = 18$ ,  $CA = 25$ ,  
 $AD = ?$

$\Delta ABC$  में, D, BC का मध्यबिंदु है। यदि  $AB = 15$ ,  $BC = 18$ ,  $CA = 25$ ,  $AD = ?$



$$AB^2 + AC^2 = 2[AD^2 + BD^2]$$

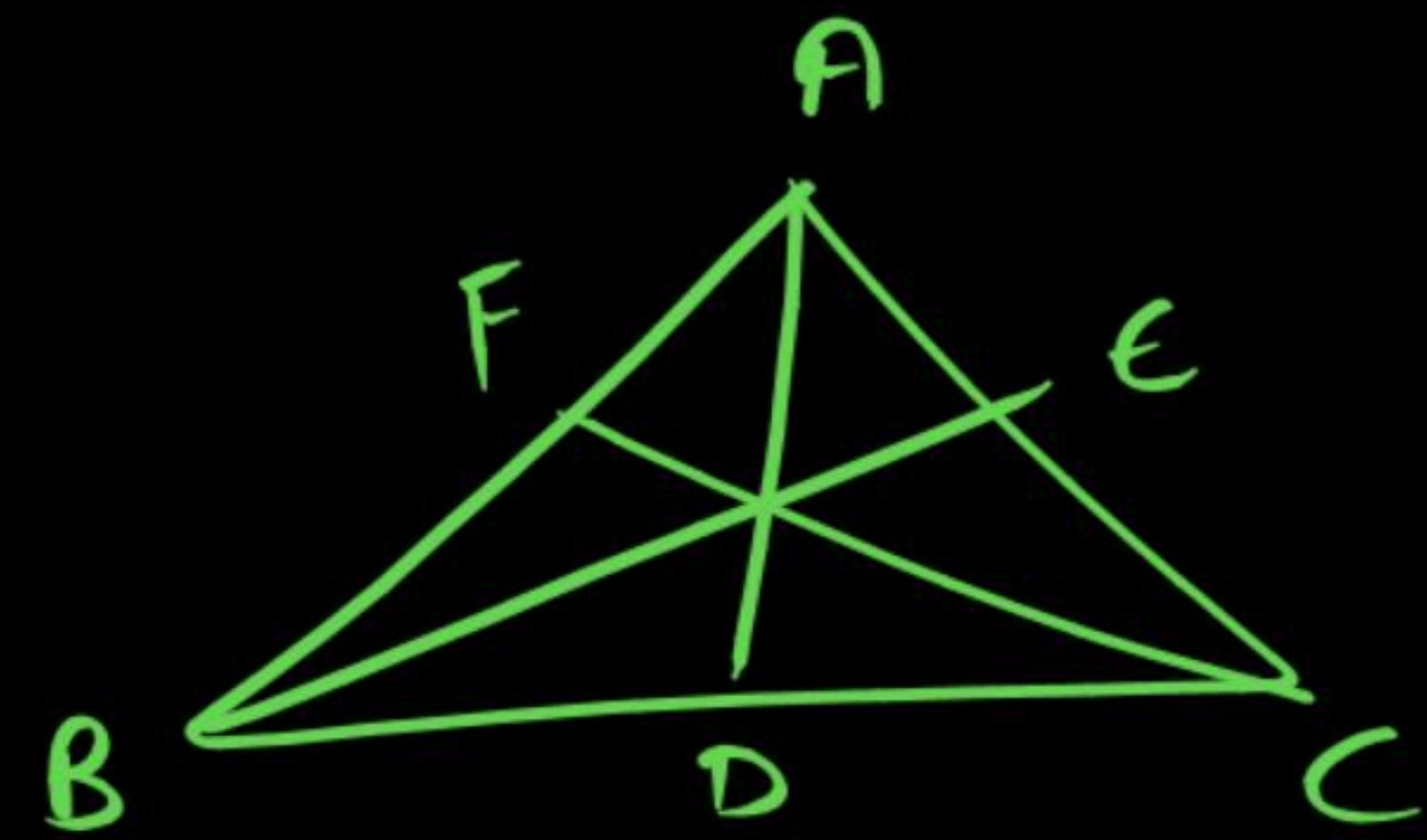
$$\underline{125} + \underline{625} = 2[AD^2 + 81]$$

~~$$\frac{425}{850} = 2[AD^2 + 81]$$~~

$$AD^2 = 425 - 81$$

$$AD = \sqrt{344}$$

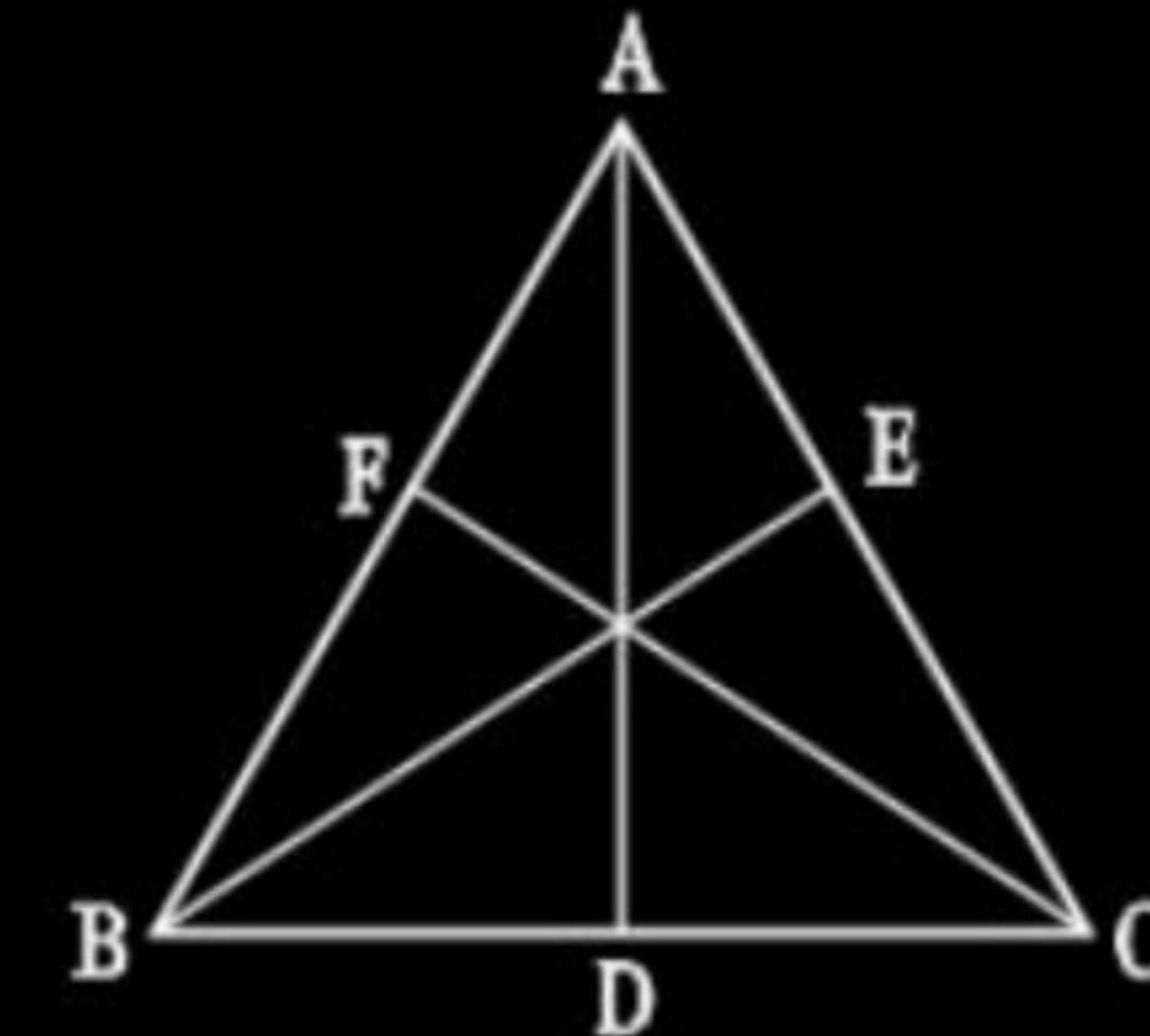
## Relation between sides and medians:



$$\textcircled{1} \quad (AB + BC + CA) > (AD + BE + CF)$$

$$\textcircled{II} \quad 3(AB + BC + CA) < 4(AD + BE + CF)$$

$$\textcircled{III} \quad \underline{3(AB^2 + BC^2 + CA^2)} = \underline{4(AD^2 + BE^2 + CF^2)}$$



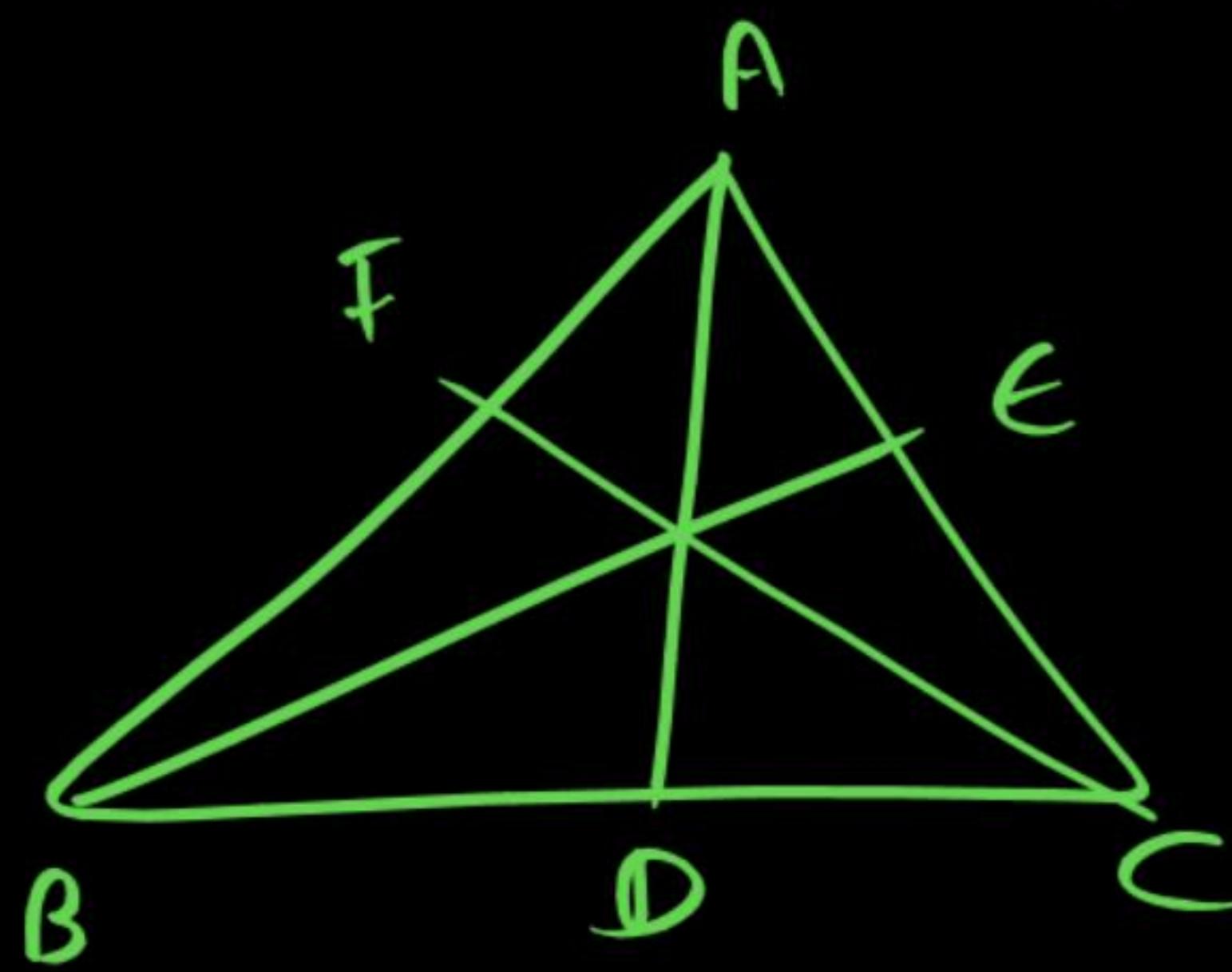
$$3(AB + BC + CA) > 4(AD + BE + CF)$$

$$3(AB^2 + BC^2 + CA^2) = 4(AD^2 + BE^2 + CF^2)$$

30.

The sum of the squares of the sides of the triangle is  $96^\circ$ .  
 Find the sum of the squares of medians.

त्रिभुज की भुजाओं के वर्गों का योग  $96^\circ$  होता है। माध्यकाओं के वर्गों का योग ज्ञात कीजिए।



$$\overline{AB^2 + BC^2 + CA^2 = 96}$$

$$\overline{AD^2 + BE^2 + CF^2 = ?}$$

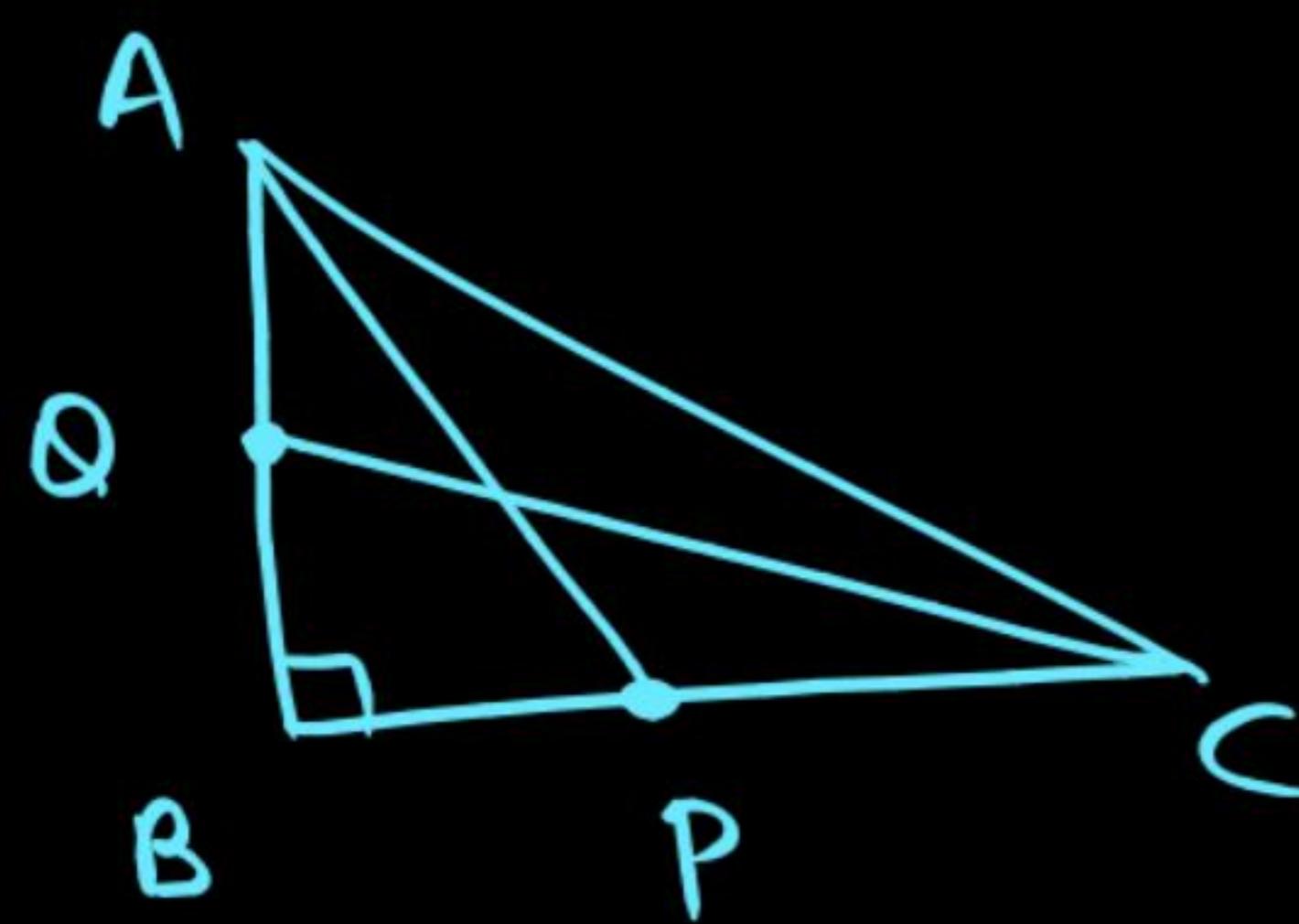
$$3(AB^2 + BC^2 + CA^2) = 4(AD^2 + BE^2 + CF^2)$$

$$3 \times 96 = 4(AD^2 + BE^2 + CF^2)$$

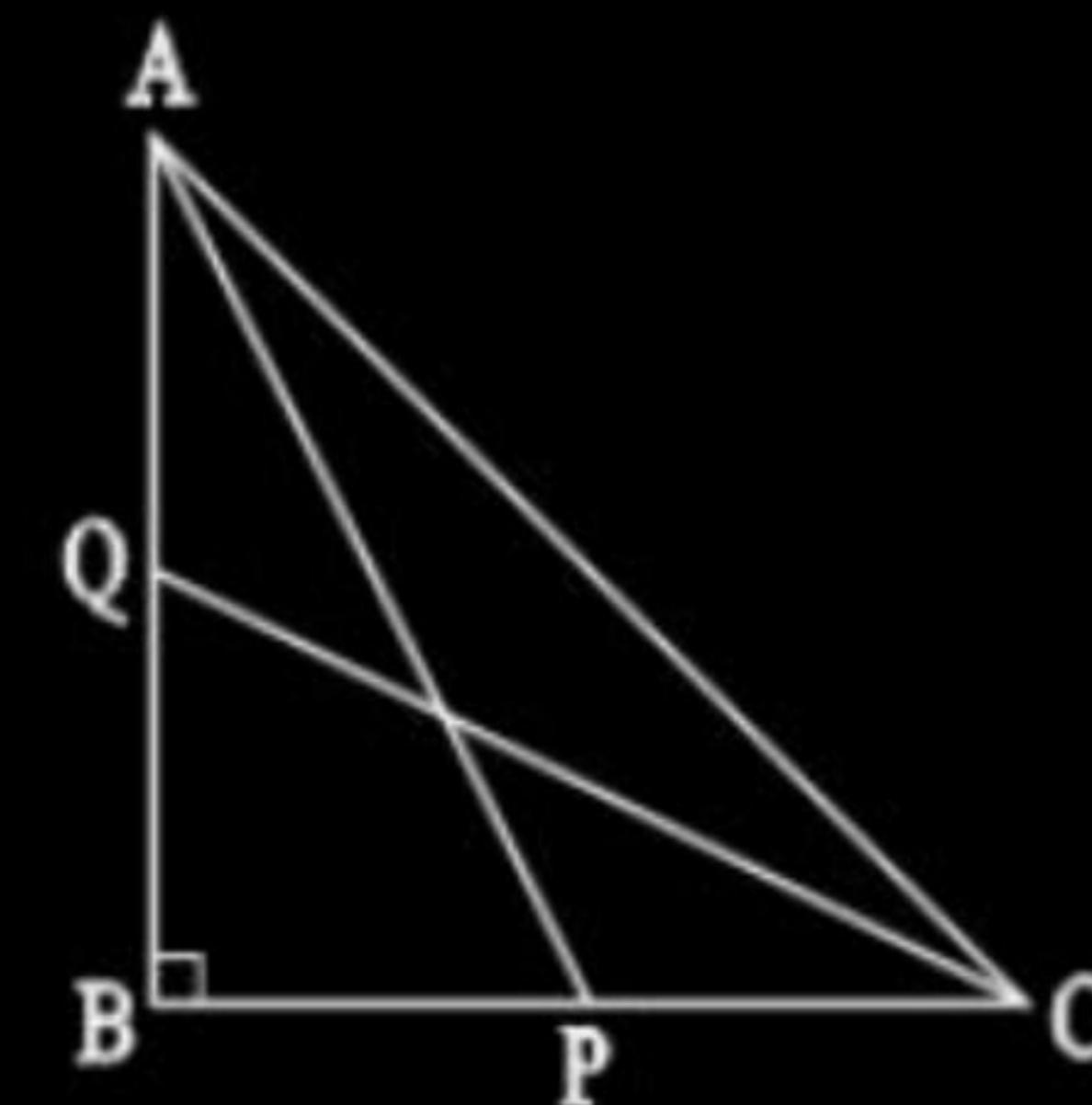
720

**Relation between medians and hypotenuse in a right angled triangle:**

एक समकोण त्रिभुज में माध्यिका और कर्ण के बीच संबंध:



$$4[AP^2 + QC^2] = 5AC^2$$



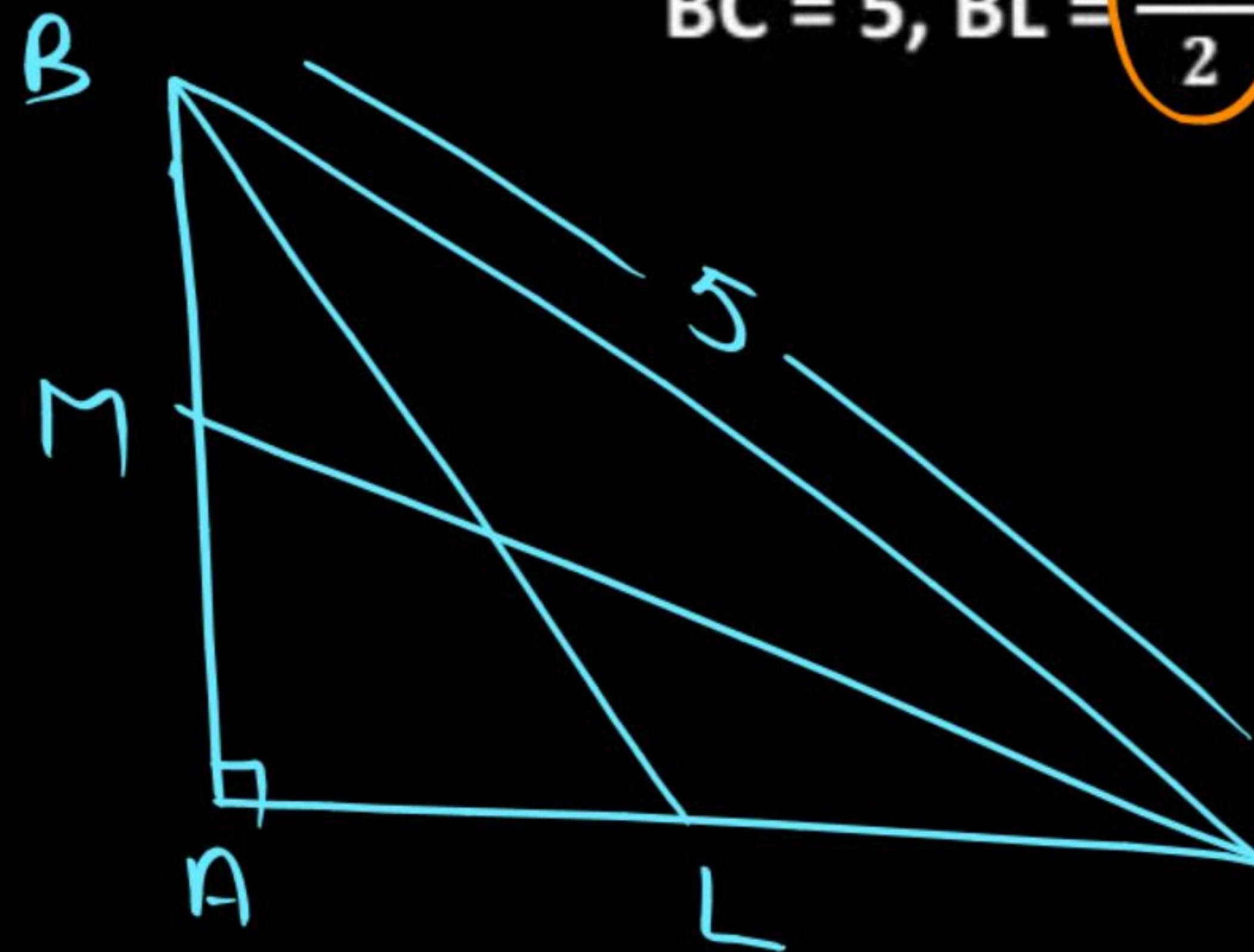
$$5AC^2 = 4AP^2 + 4CQ^2$$

31. In  $\Delta ABC$ ,  $\angle A = 90^\circ$  in which  $BL$  and  $CM$  are medians.

If  $BC = 5$ ,  $BL = \frac{3\sqrt{5}}{2}$ . Find  $CM$  ?

$\Delta ABC$  में,  $\angle A = 90^\circ$  जिसमें  $BL$  और  $CM$  माध्यिका हैं। यदि

$BC = 5$ ,  $BL = \frac{3\sqrt{5}}{2}$  तो  $CM$  ज्ञात कीजिए?



$$4[BL^2 + CM^2] = 5BC^2$$

$$4\left[\frac{45}{4} + CM^2\right] = 125$$

$$\cancel{4} \times \frac{45}{4} + 4CM^2 = 125$$

$$4CM^2 = 80$$

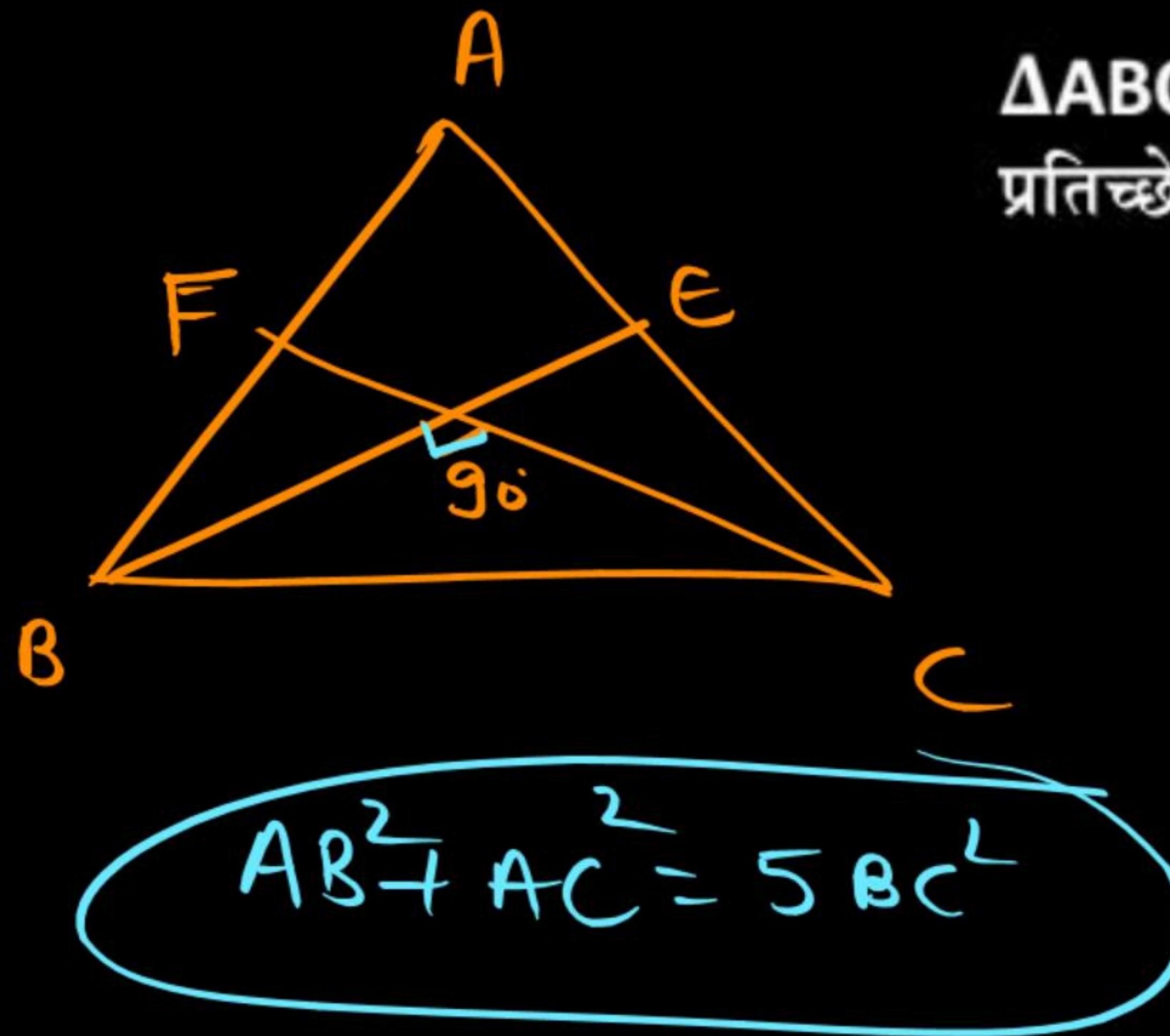
$$CM = \sqrt{20} \\ = 2\sqrt{5} \text{ cm}$$

\* In a  $\Delta ABC$ , BE and CF are the median and they intersects each other at  $90^\circ$ .

$$AB^2 + AC^2 = 5BC^2$$

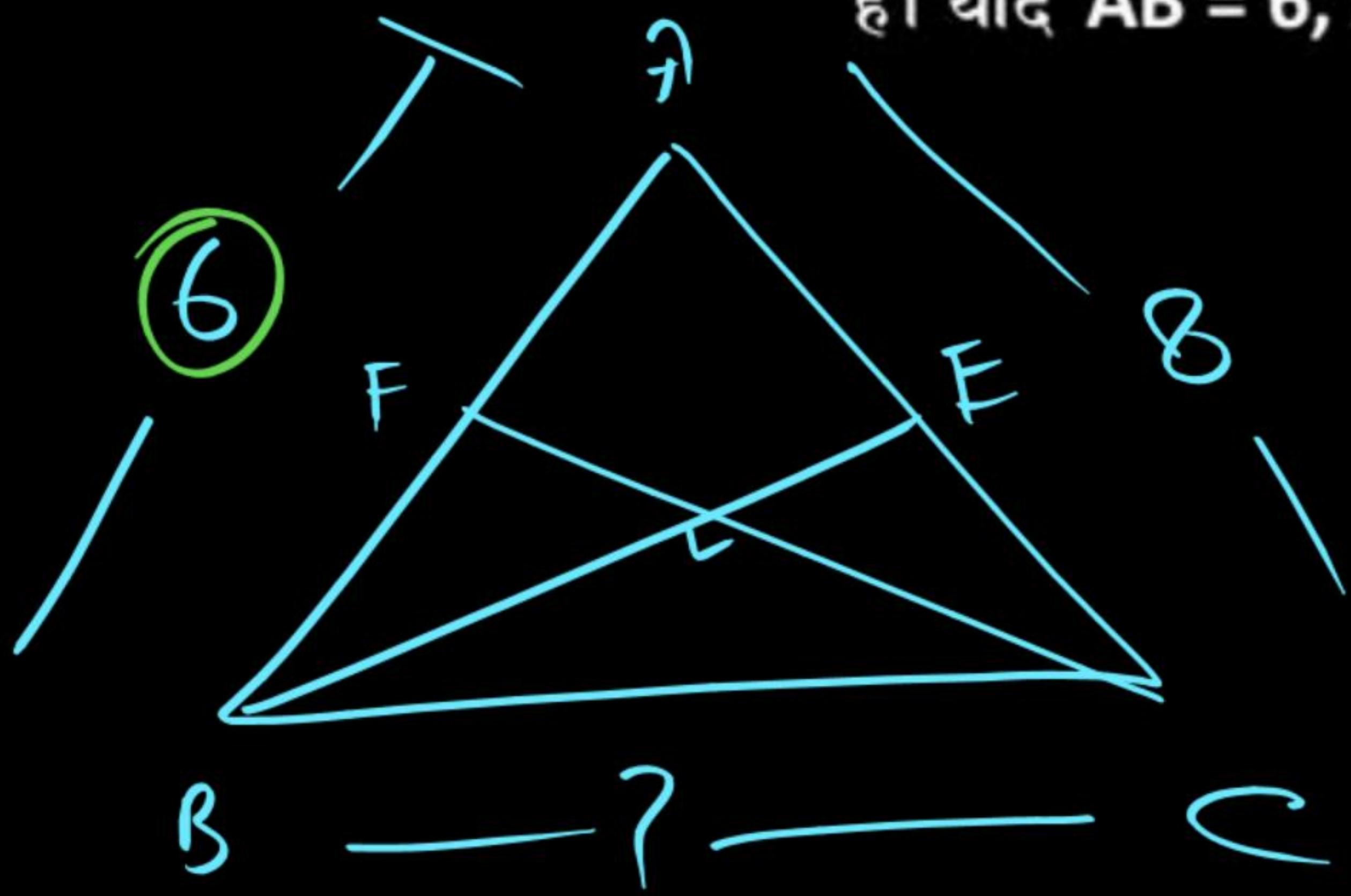
$\Delta ABC$  में, BE और CF माध्यिकाएँ हैं और ये एक दूसरे को  $90^\circ$  पर प्रतिच्छेद करती हैं।

$$AB^2 + AC^2 = 5BC^2$$



32. In a  $\Delta ABC$ , BE and CF are the medians and they intersects at  $90^\circ$ . If  $AB = 6$ ,  $AC = 8$ , find  $BC$ ?

$\Delta ABC$  में, BE और CF माध्यिकाएँ हैं और वे  $90^\circ$  पर प्रतिच्छेद करती हैं। यदि  $AB = 6$ ,  $AC = 8$ , तो  $BC$  ज्ञात कीजिए।



$$AB^2 + AC^2 = 5 BC^2$$

$$36 + 64 = 5 BC^2$$

$$\frac{100}{20} = 5 BC^2$$

$$BC = \sqrt{20}$$

$$= 2\sqrt{5} \text{ cm}$$

# If medians  $a, b, c$  are given find Area of  $\triangle$

$$A = \left(\frac{4}{3}\right) \sqrt{s(s-a)(s-b)(s-c)}$$

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



33.

If Medians are 9, 12, 15. Find area(ABC).

यदि माध्यकाएँ 9, 12, 15 हैं। ABC का क्षेत्रफल ज्ञात कीजिए।

$$S = \frac{9+12+15}{2}$$

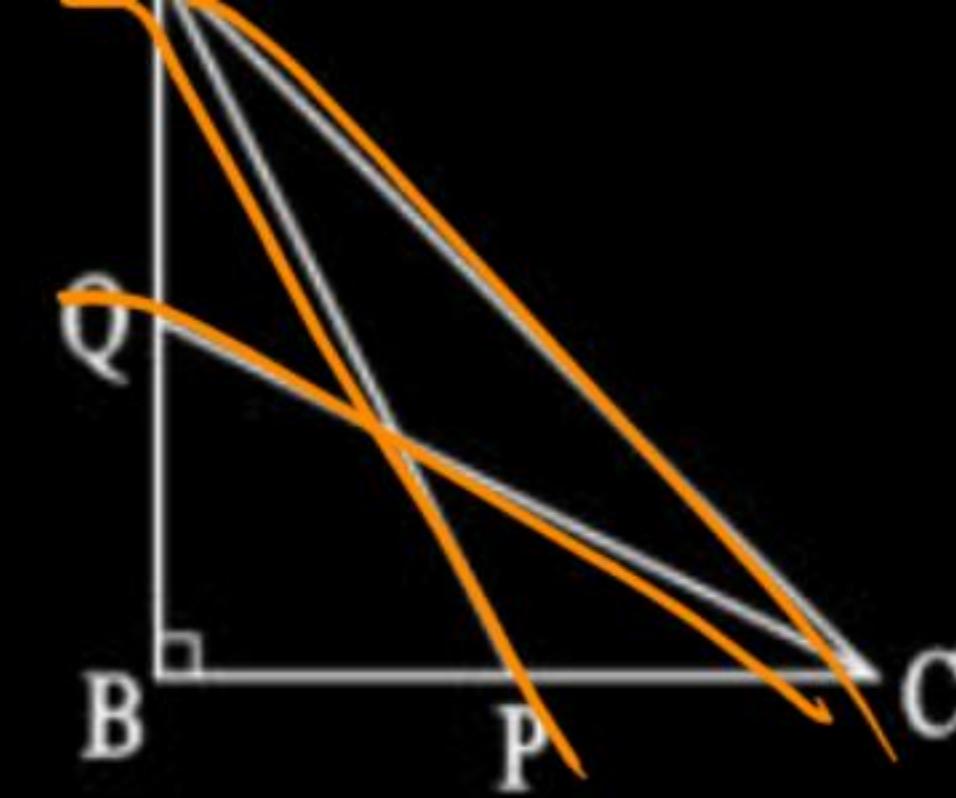
$$= \frac{36}{2} = 18$$

$$A = \frac{4}{3} \sqrt{18 \times 9 \times 6 \times 3}$$

$$\frac{4}{3} \sqrt{9 \times 2 \times 9 \times 2 \times 3 \times 3}$$

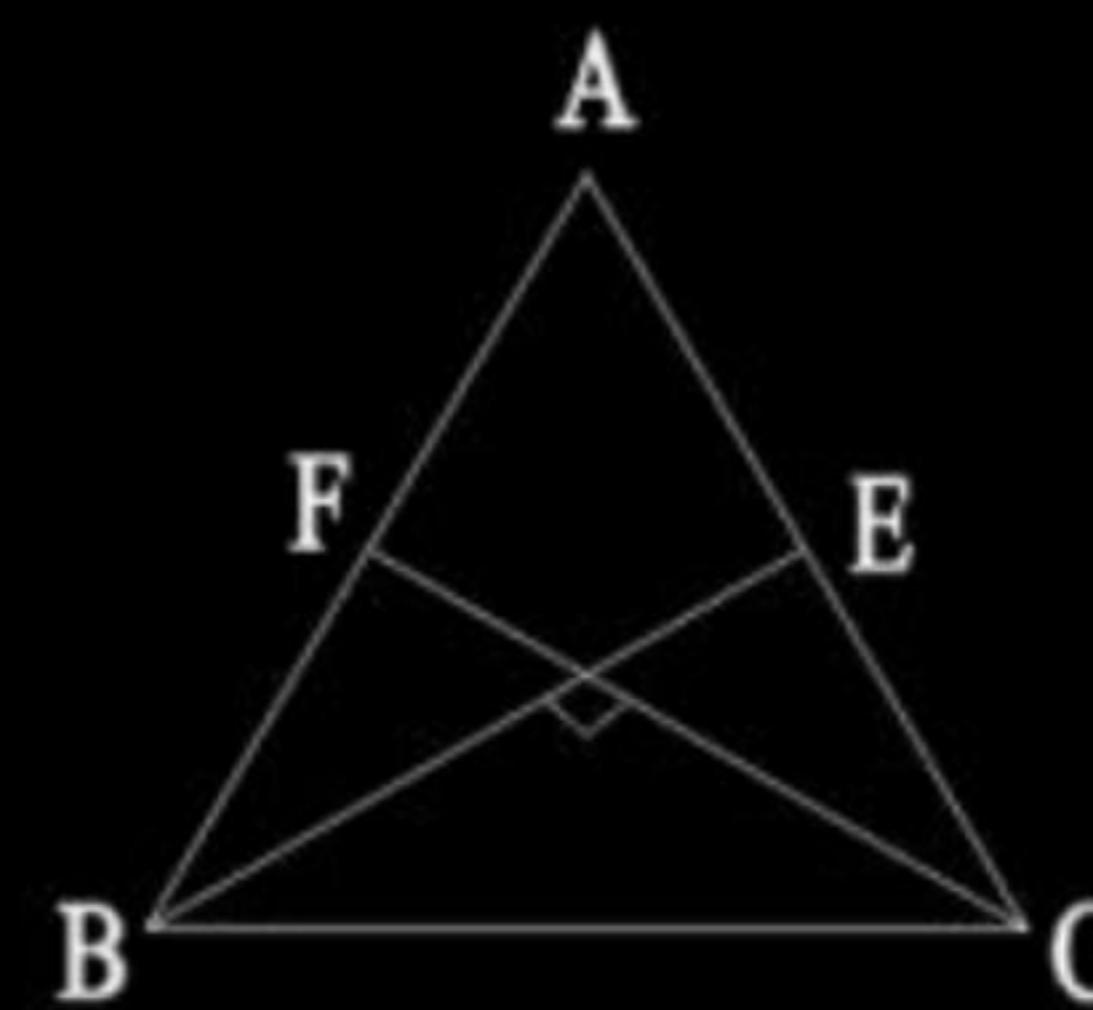
$$\frac{4}{3} \times 9 \times 2 \times 3$$

$$72 \text{ cm}^2$$



$$5AC^2 = 4(AP^2 + CQ^2)$$

**Relation between median and hypotenuse**

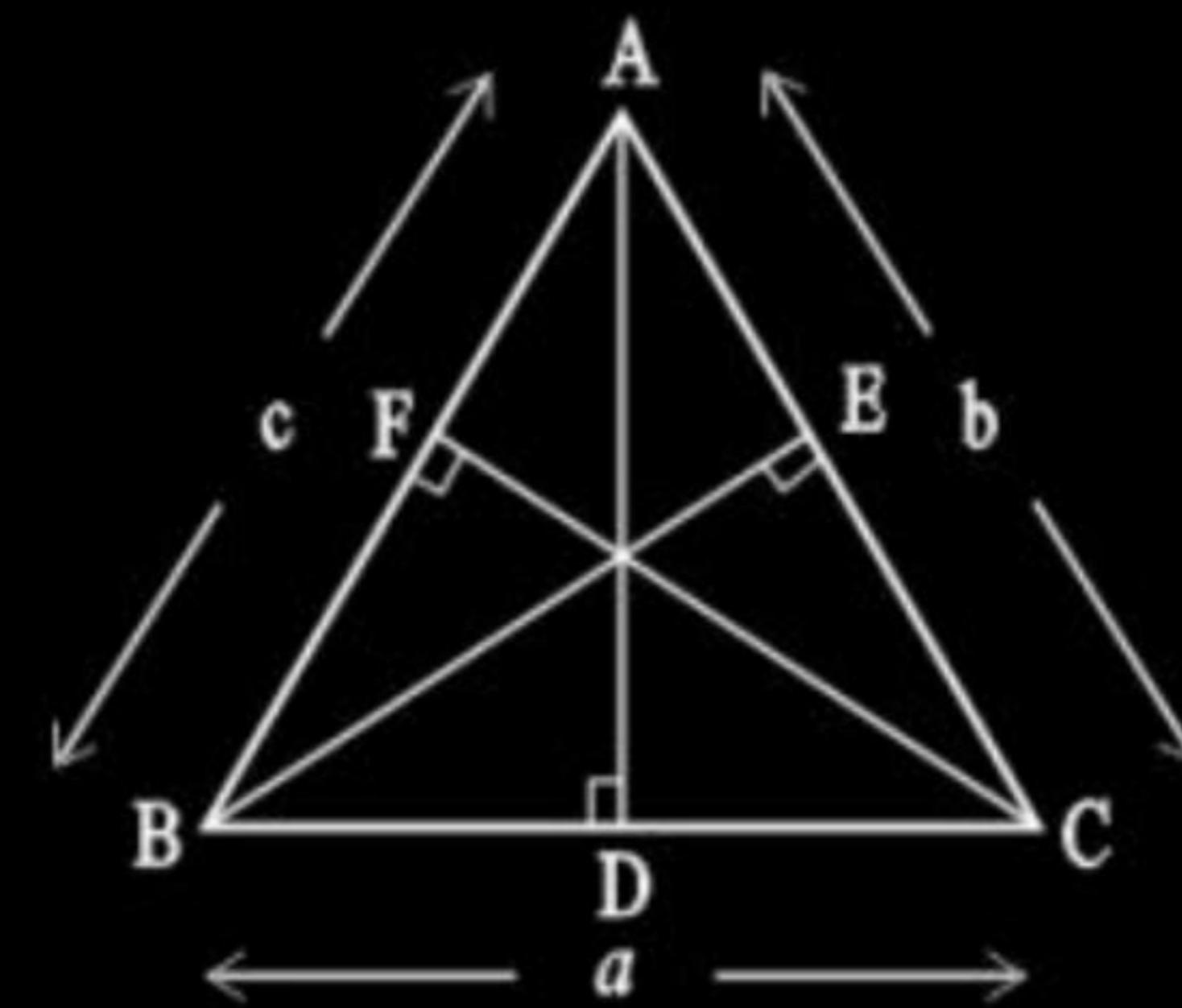
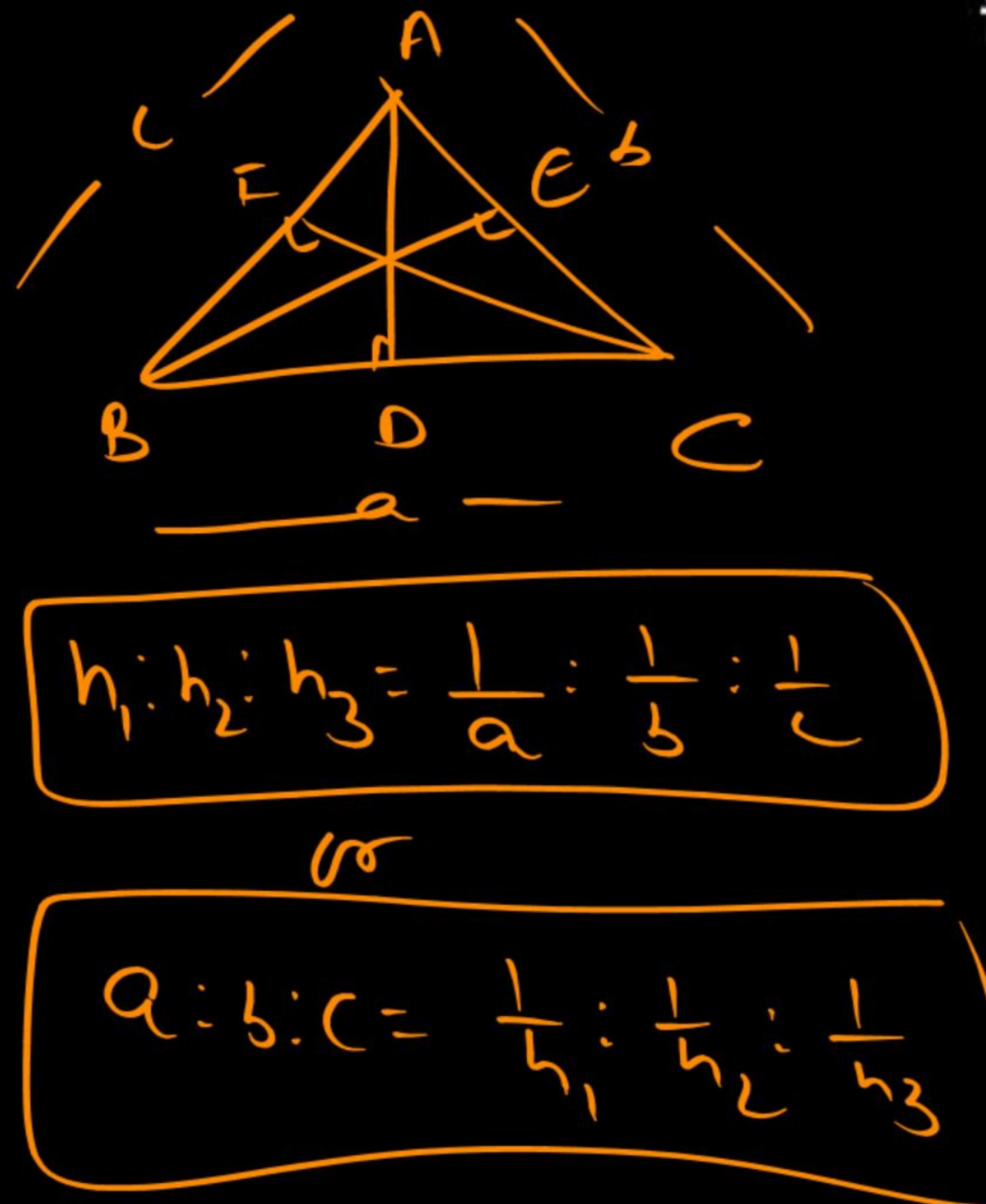


$$AB^2 + AC^2 = 5BC^2$$

**(When medians intersect each other at  $90^\circ$ )**

## Altitude:

**Relation between altitudes and sides of a triangle:**  
 त्रिभुज की ऊँचाई और भुजाओं के बीच संबंध:



$$AD = h_1$$

$$BE = h_2$$

$$CF = h_3$$

$$h_1 : h_2 : h_3 = \frac{1}{a} : \frac{1}{b} : \frac{1}{c}$$



34. The sides of a triangle are 8 cm, 10 cm, 12 cm, Find the ratio of their side and altitudes.

एक त्रिभुज की भुजाएँ 8 सेमी, 10 सेमी, 12 सेमी हैं, उनकी भुजाओं और ऊँचाई का अनुपात ज्ञात कीजिए।

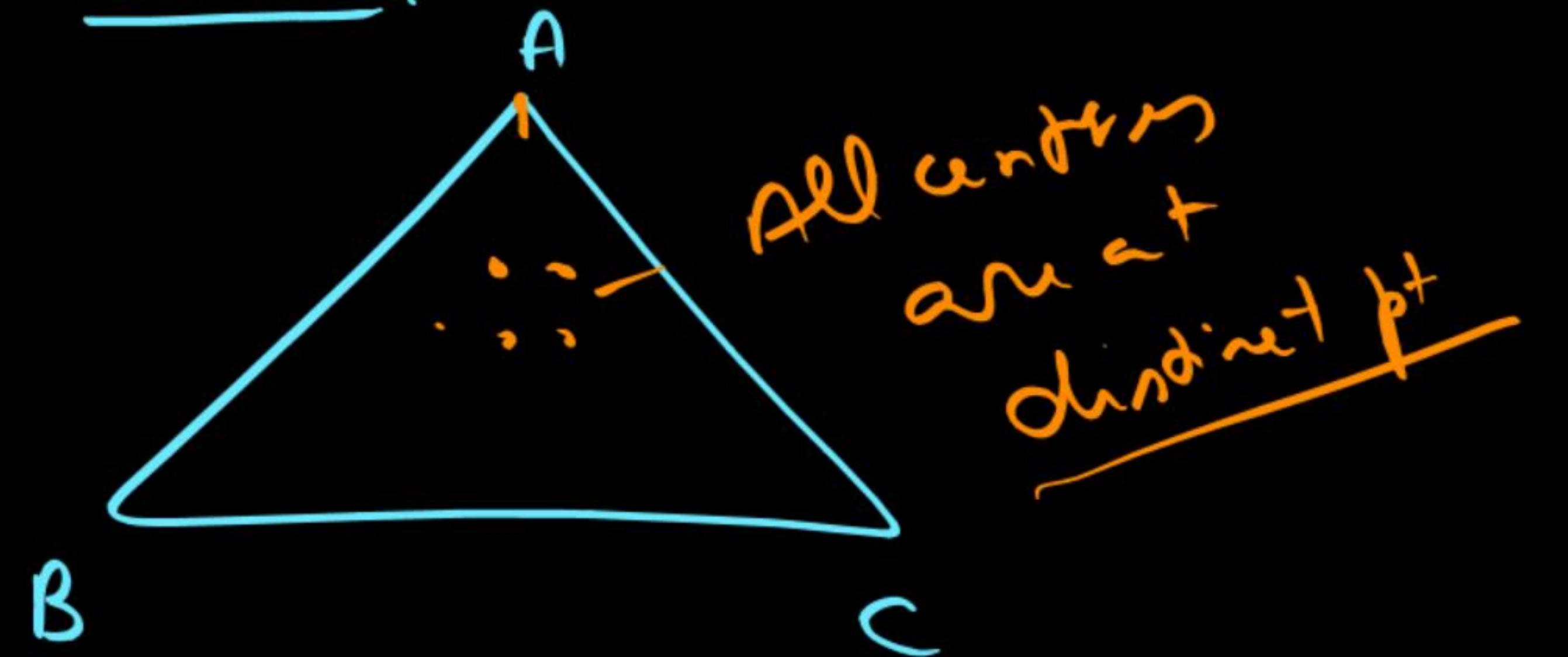
$$h_1 : h_2 : h_3 = \frac{1}{a} : \frac{1}{b} : \frac{1}{c}$$

$$= \frac{1 \times 120}{8} : \frac{1 \times 120}{10} : \frac{1 \times 120}{12}$$

$$= 15 : 12 : 10$$

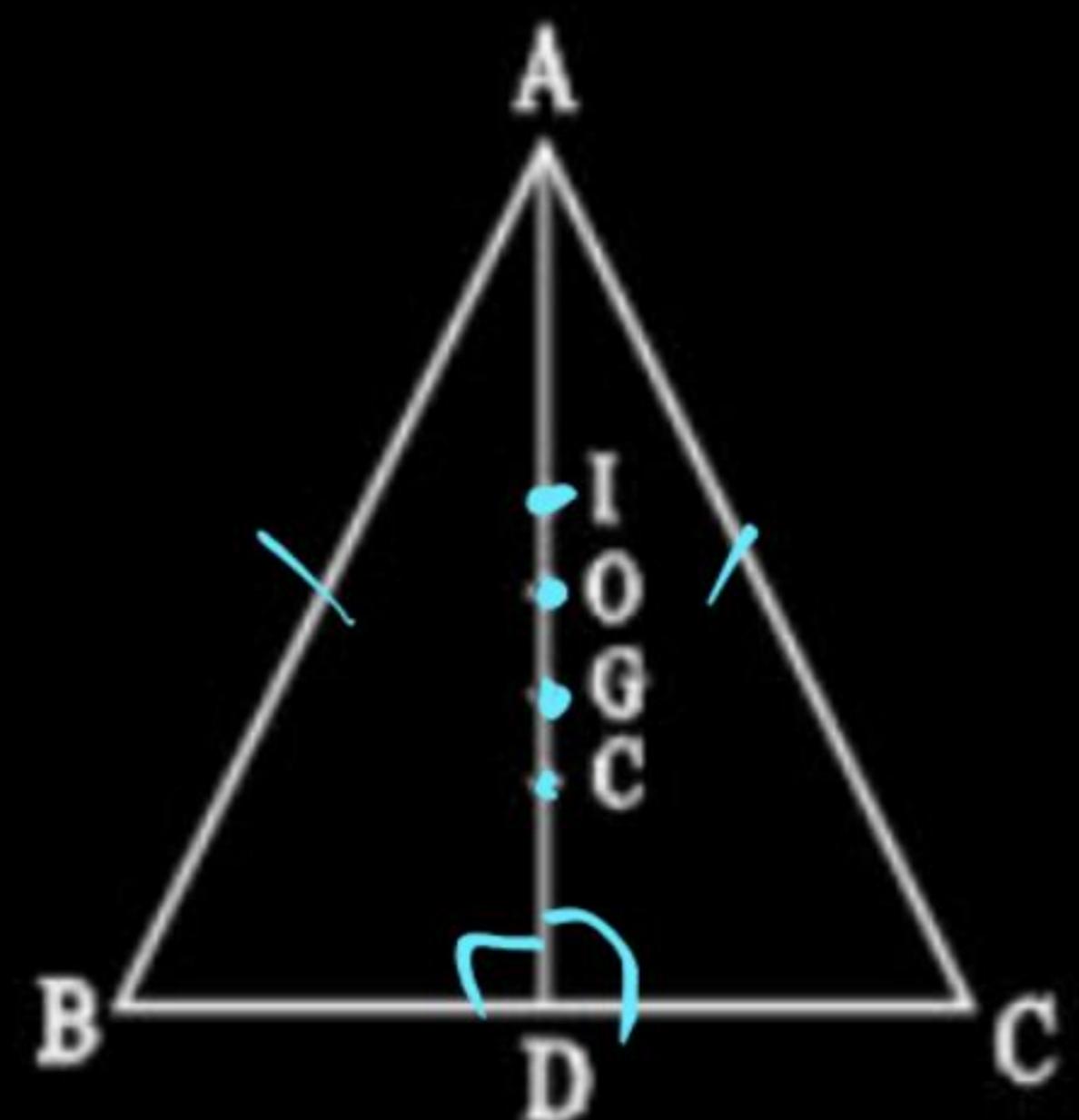
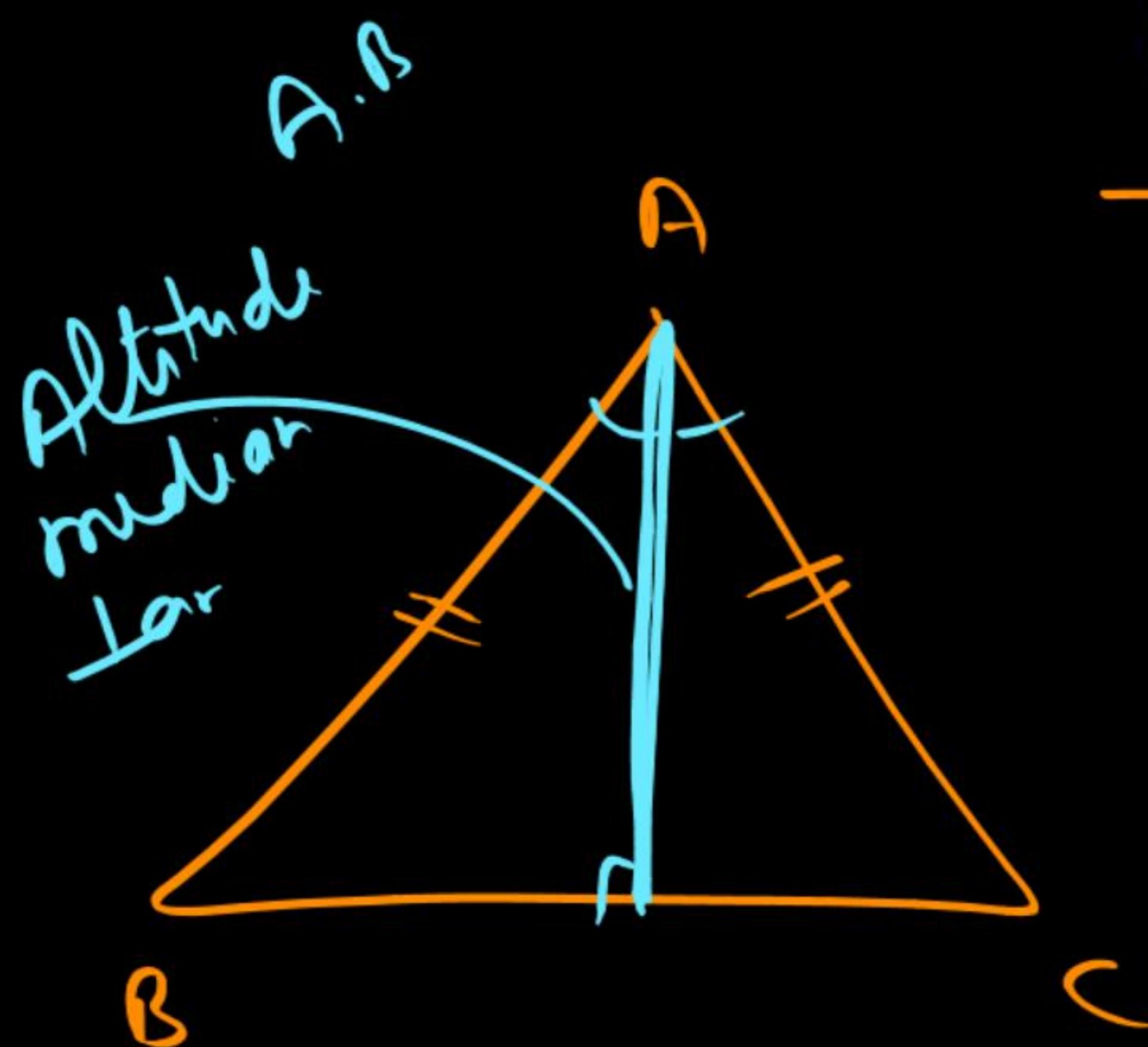
## Conclusion

Scales :-



\* Isosceles triangle: In isosceles triangle, all centres lie at the same line, (Collinear line)

समद्विबाहु त्रिभुजः समद्विबाहु त्रिभुज में, सभी केंद्र एक ही रेखा पर स्थित होते हैं, ( सरेख रेखा )



O → Orthocentre

G → Centroid

C → Circumcentre

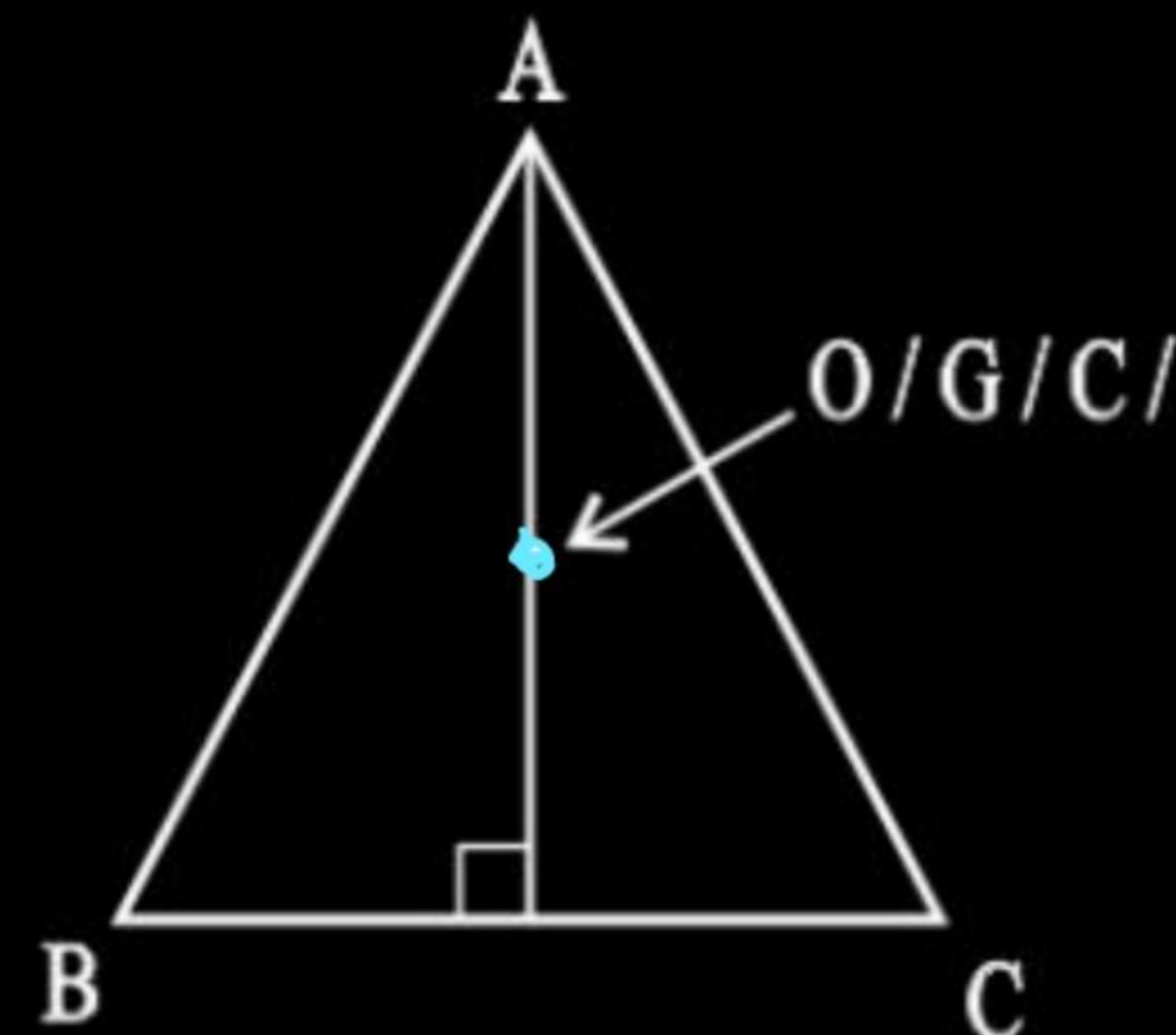
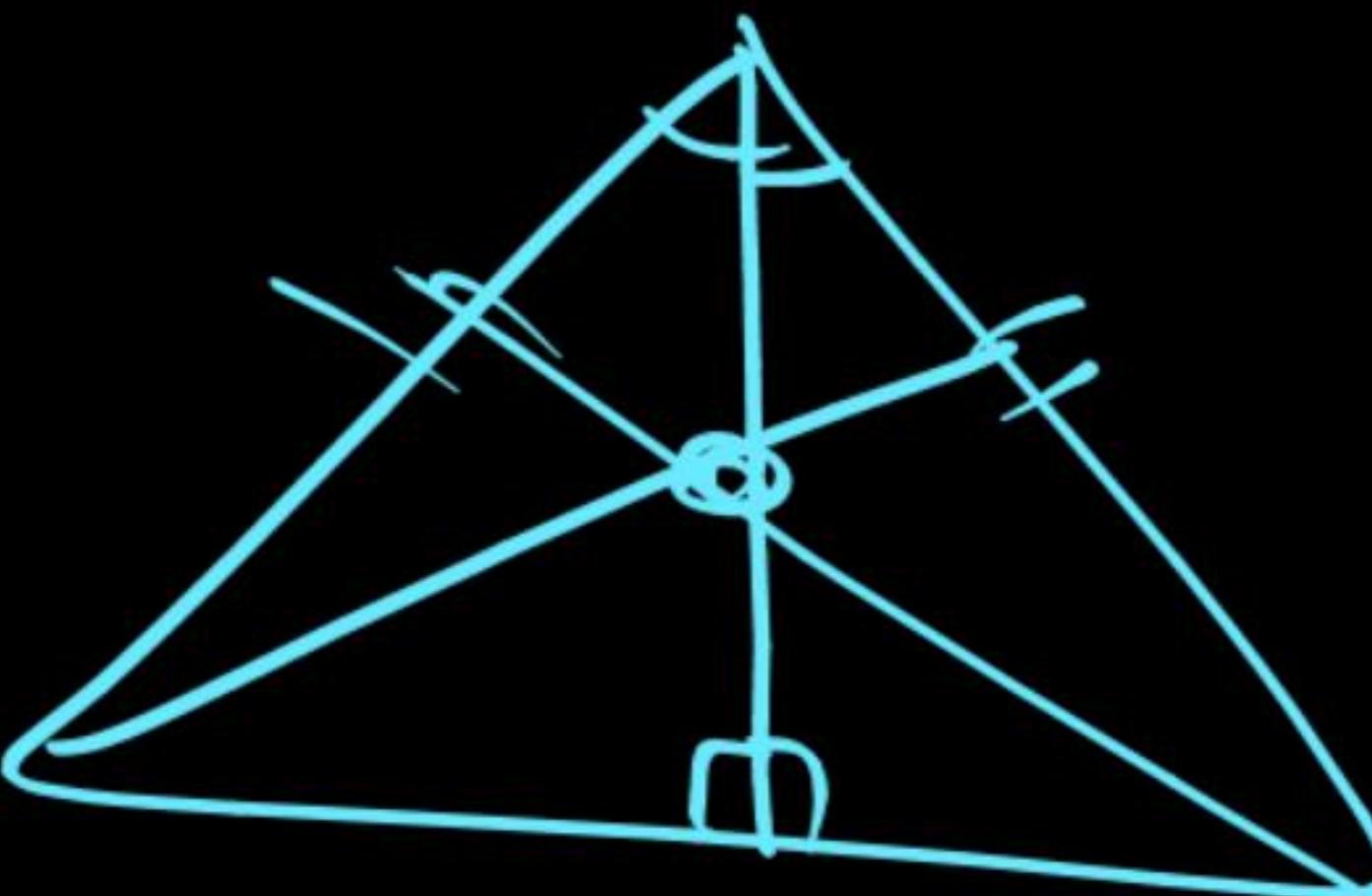
I → Incentre



( $\angle 1 = \angle 2$ )

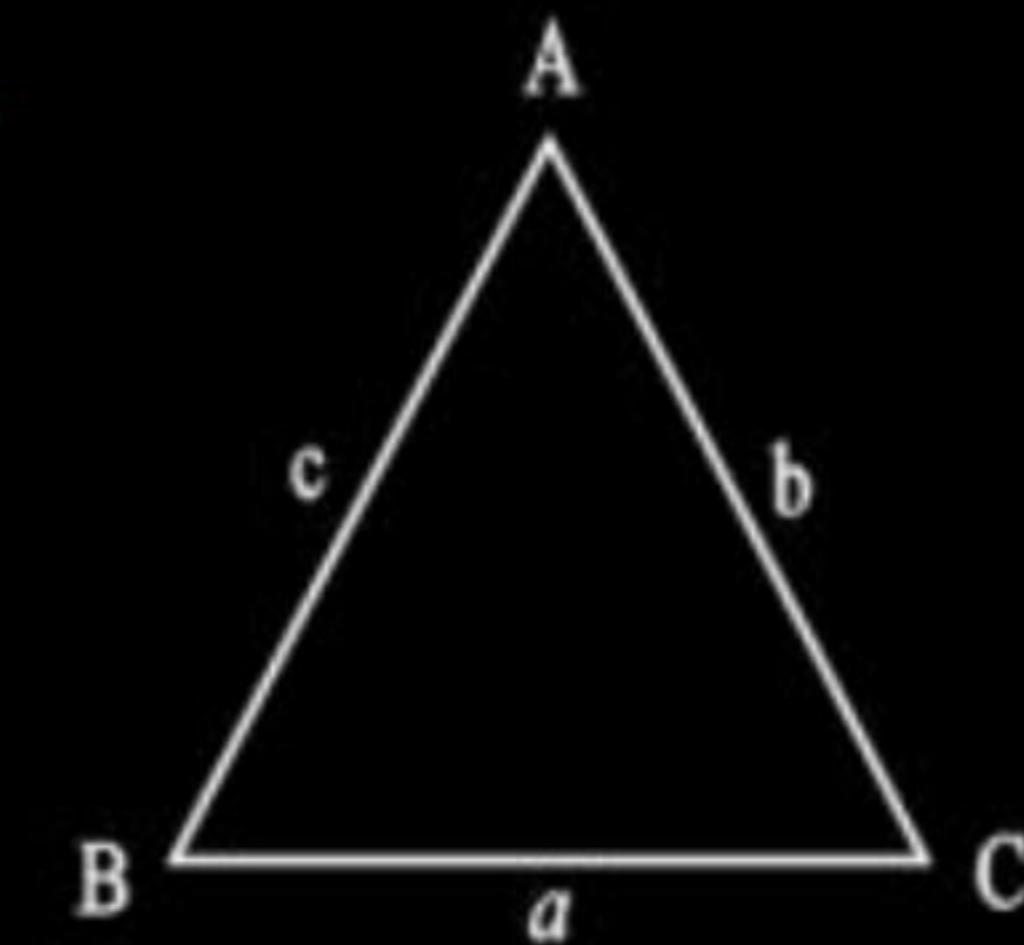
- \* **Equilateral triangle:** In an equilateral triangle, all centres lie at the same line, and at same point.

समबाहु त्रिभुजः एक समबाहु त्रिभुज में, सभी केंद्र एक ही रेखा पर और एक ही बिंदु पर स्थित होते हैं।



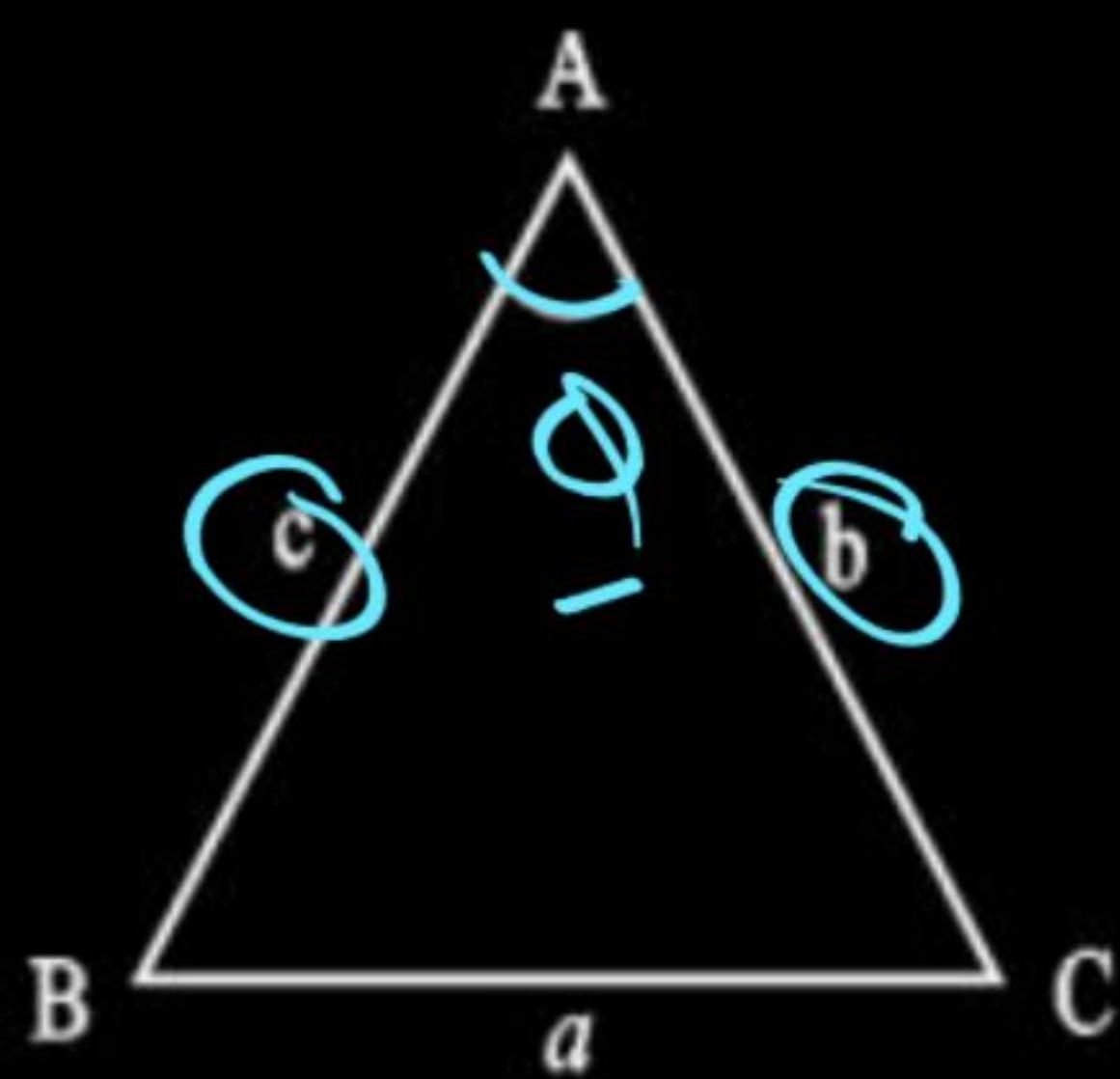
\*

### Area of scalene triangle:



$$\text{Area} = \sqrt{s(s - a)(s - b)(s - c)}$$

Where,  $s = \frac{a + b + c}{2}$



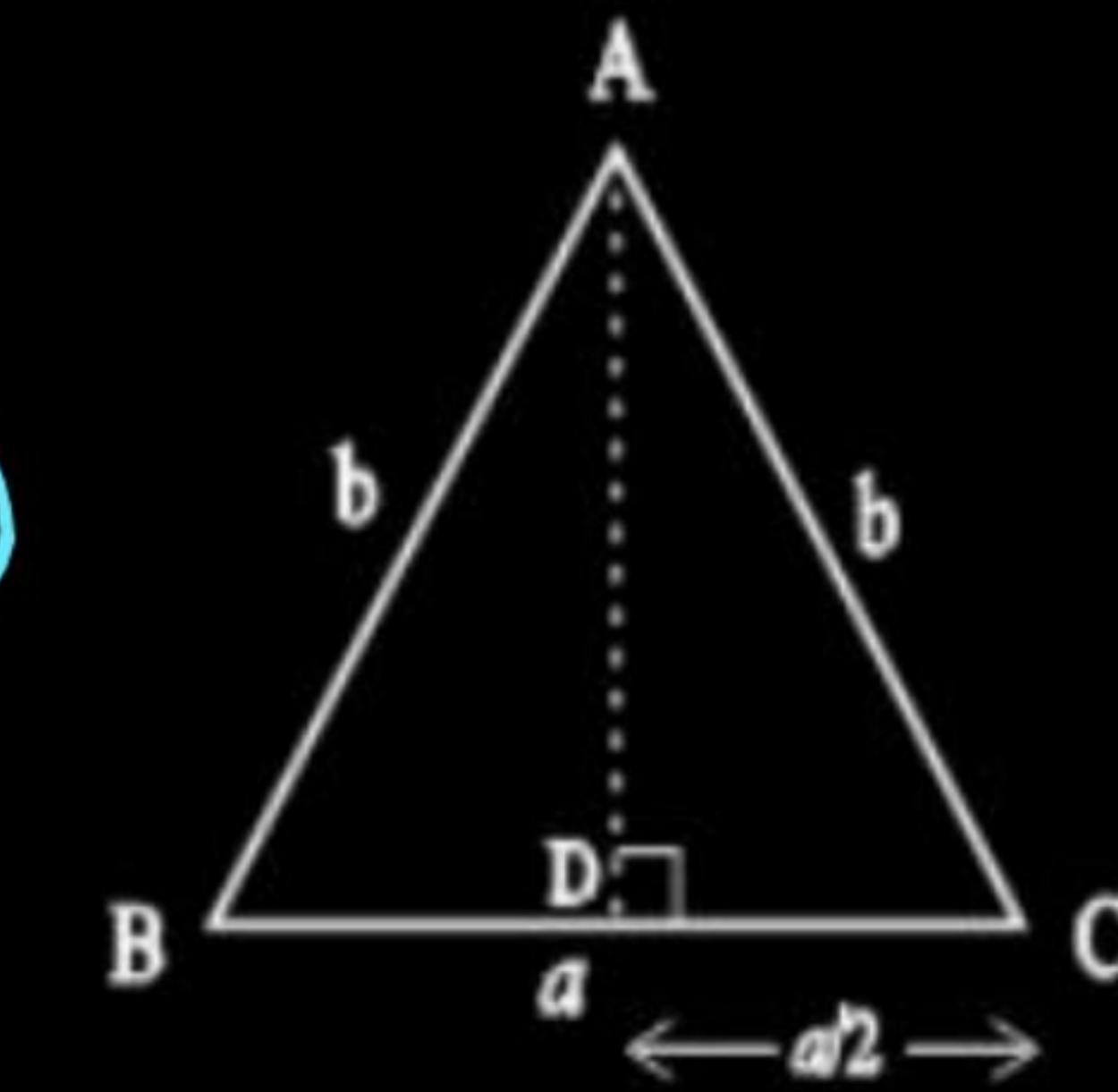
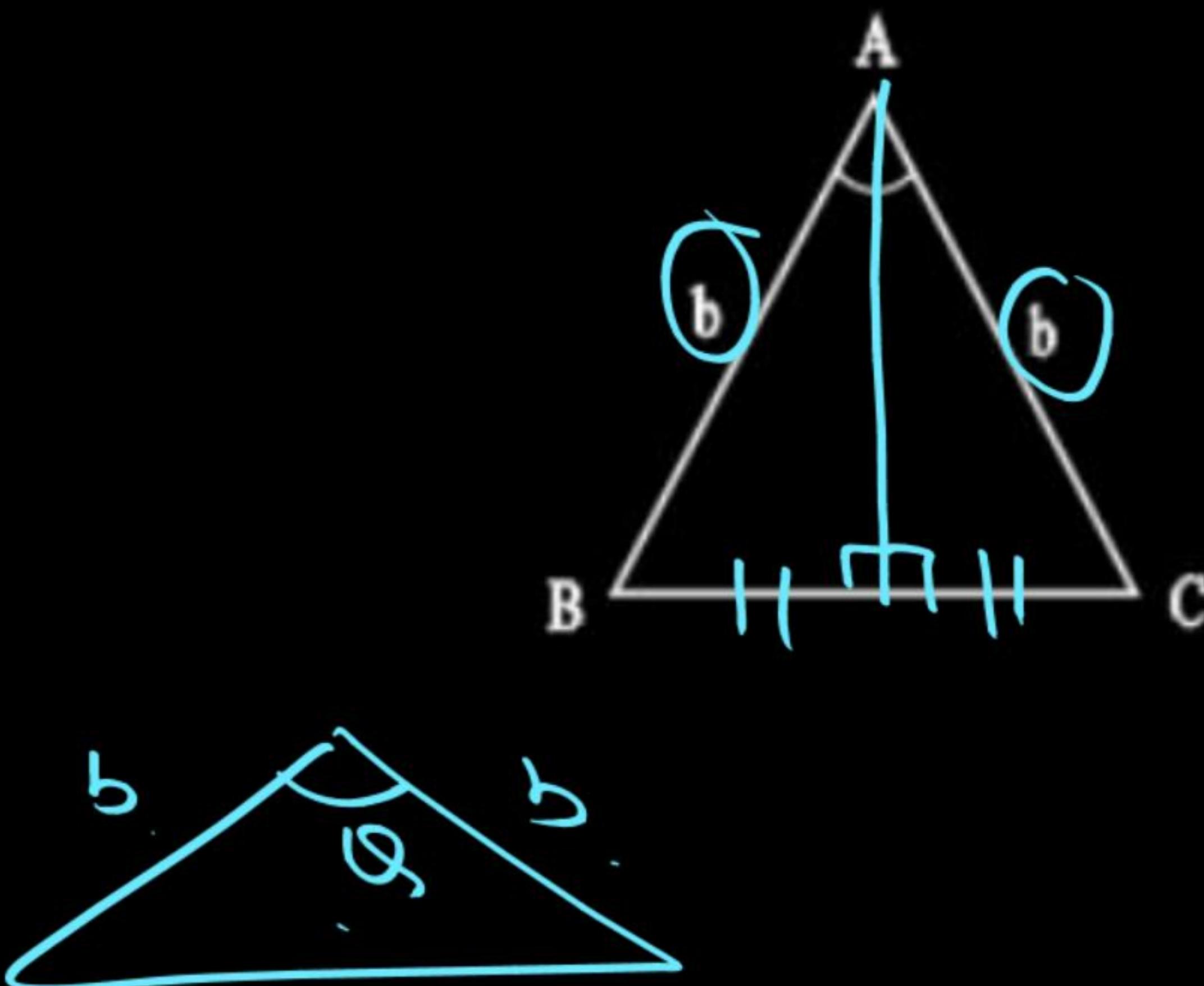
$$\text{Area} = \frac{1}{2} bc \sin\theta$$

\* Area of an isosceles triangle:

$$\text{Area} = \frac{1}{2} \times BC \times AD$$

$$\text{Area} = \frac{1}{2} \times a \times \frac{\sqrt{4b^2 - a^2}}{2}$$

$$\text{Area} = \frac{1}{2} \times b^2 \sin\theta$$



$$b^2 = \left(\frac{a}{2}\right)^2 + AD^2 \Rightarrow b^2 - \frac{a^2}{4} = AD^2$$

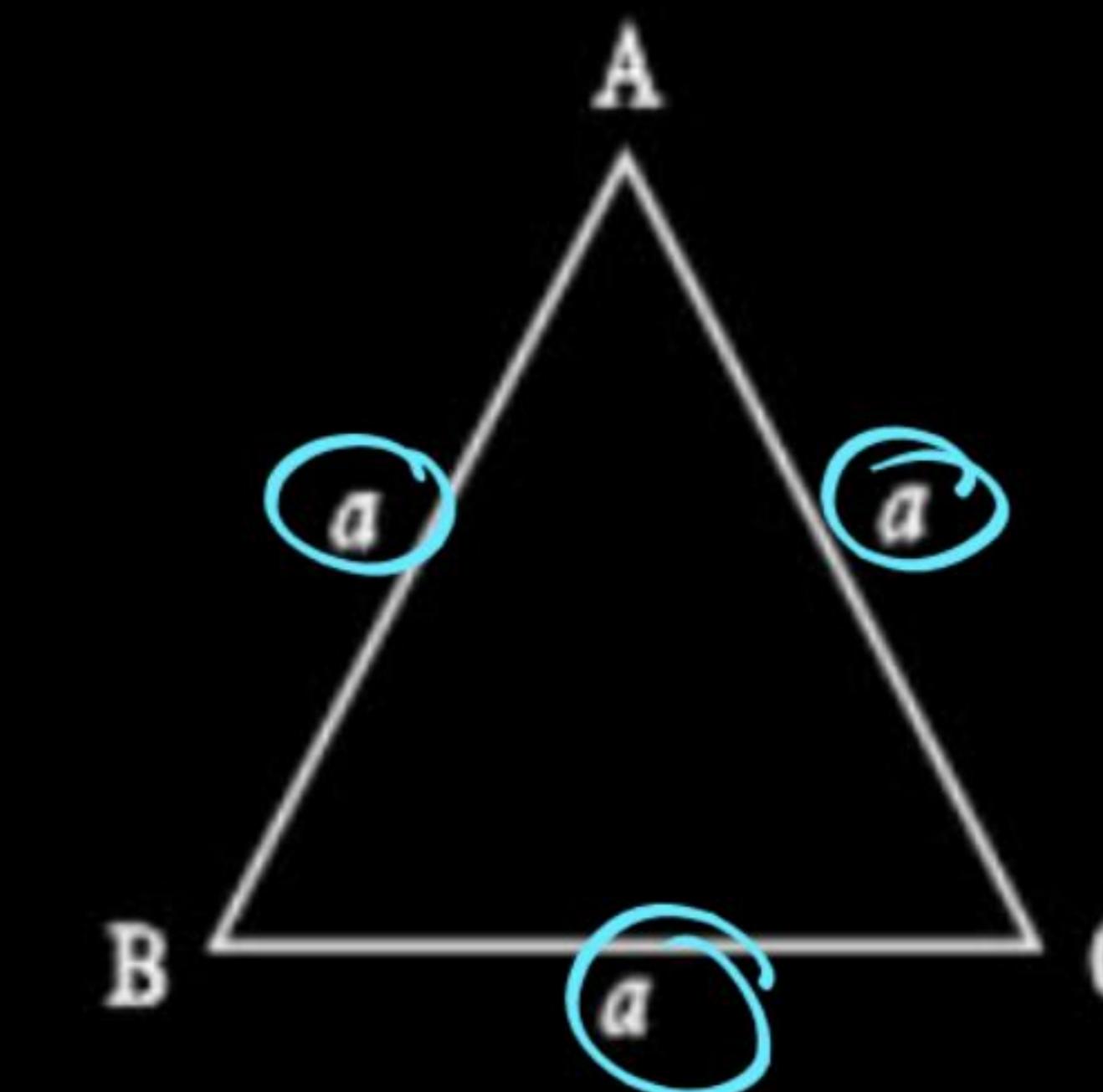
$$\frac{4b^2 - a^2}{4} = AD^2 \Rightarrow AD = \frac{\sqrt{4b^2 - a^2}}{2}$$



### Area of an equilateral triangle:

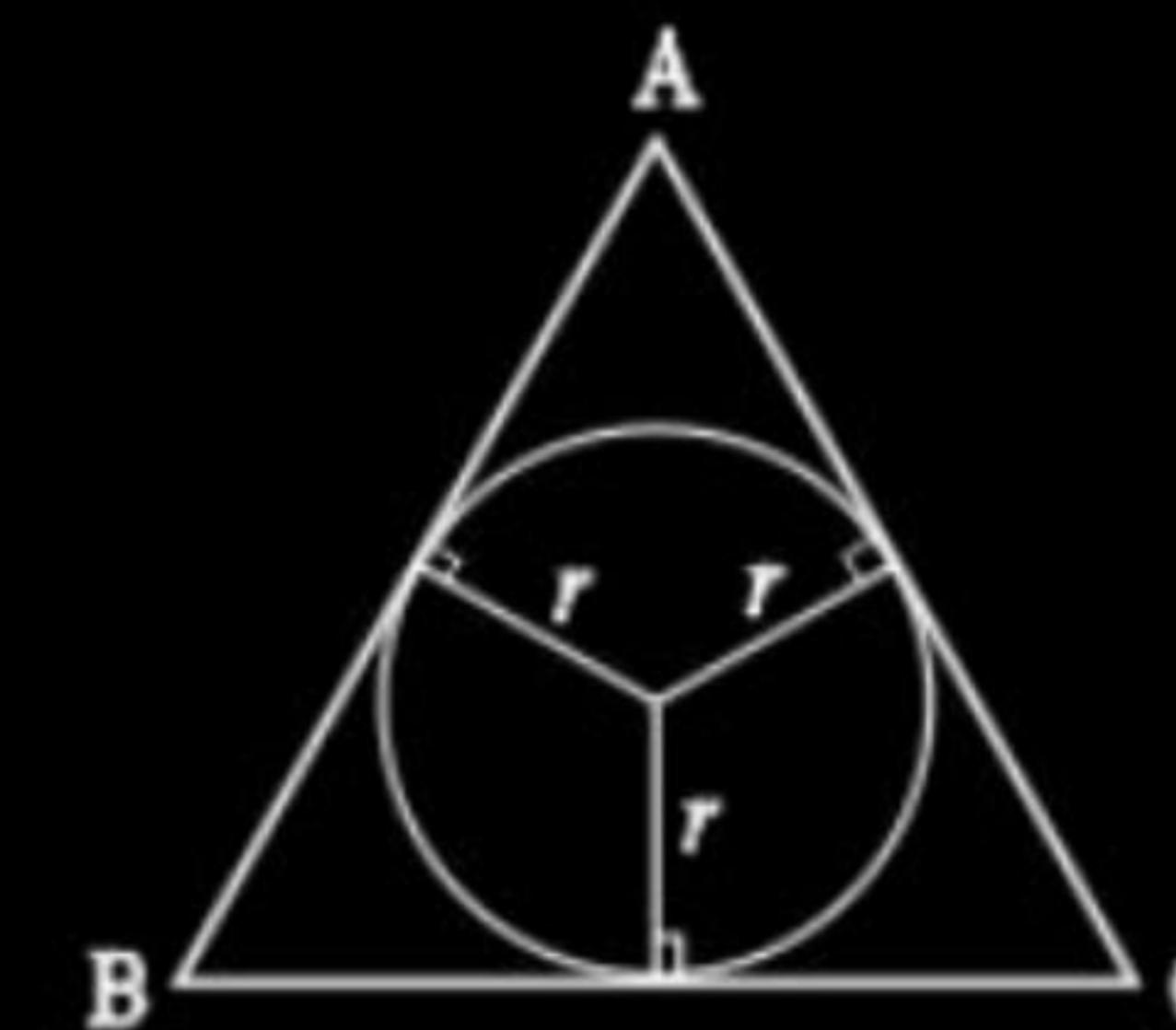
$$A = \frac{\sqrt{3}}{4} \times (\text{side})^2$$

$$\text{Height} = \frac{\sqrt{3}}{2} \times \text{side}$$

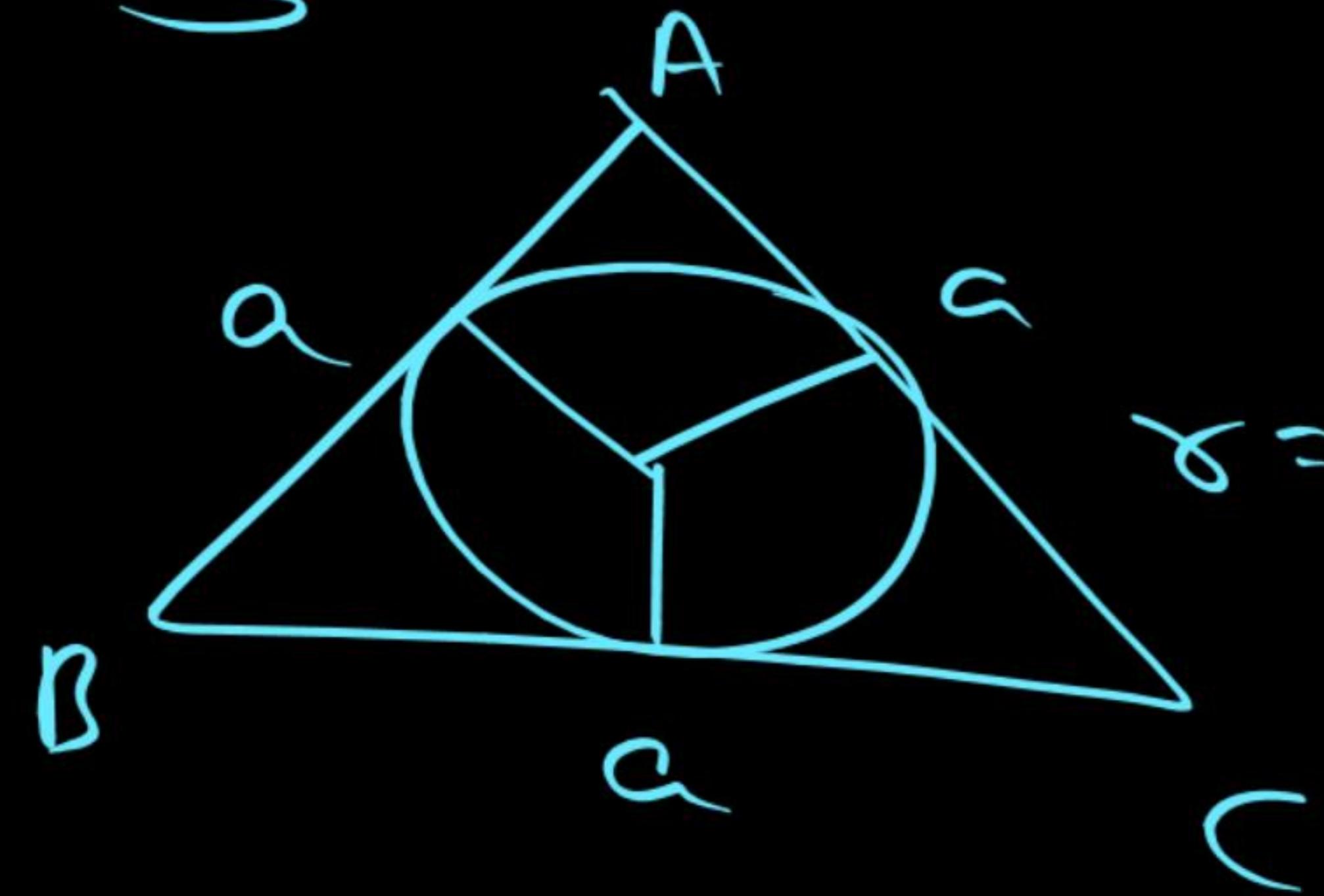


### Radius of incircle of an equilateral triangle

$$r_1 = \frac{a}{2\sqrt{3}}$$

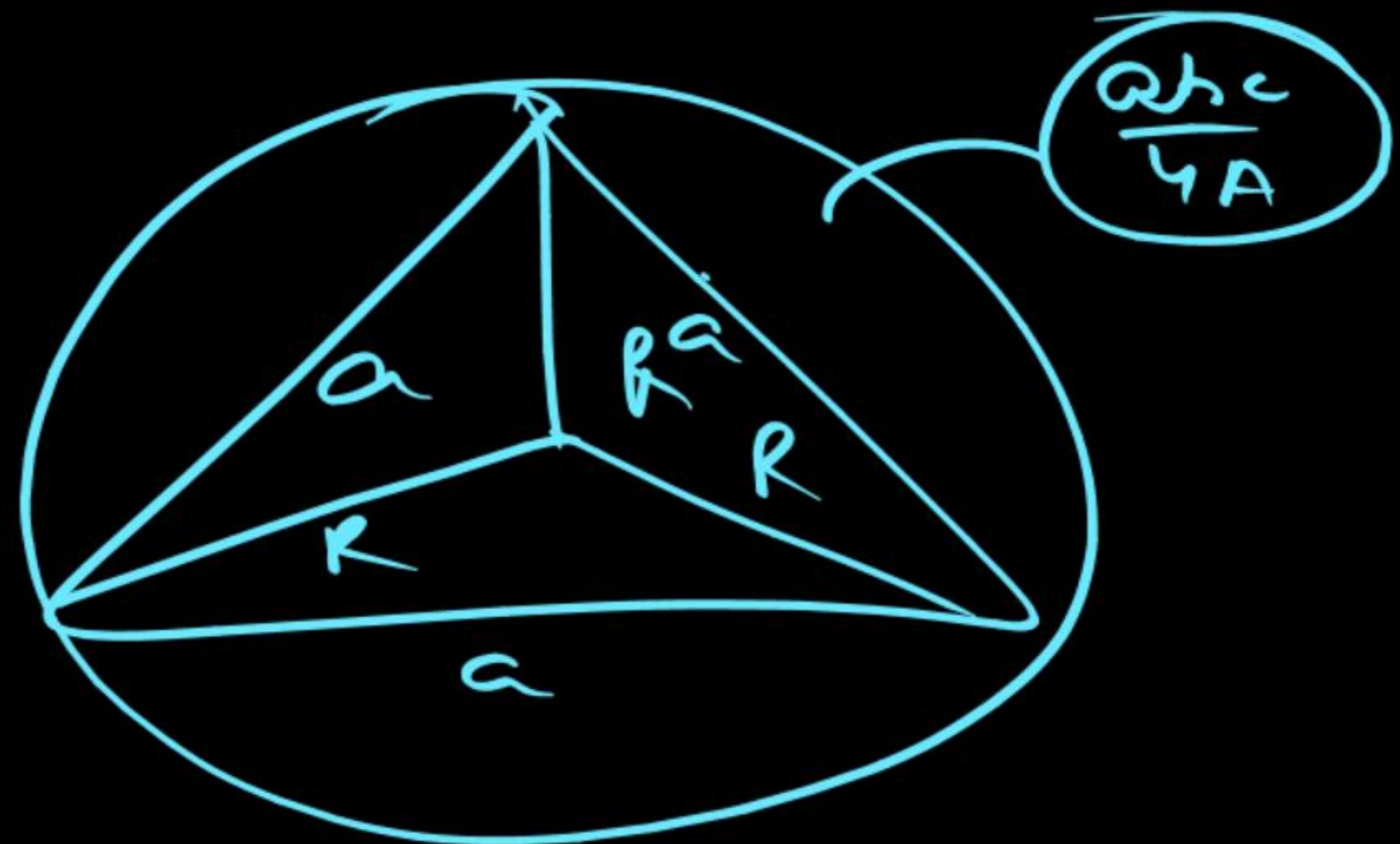


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$$\gamma = \frac{A_{\text{of } \Delta}}{SP}$$

$$\gamma = \frac{a}{2\sqrt{3}} \text{ or } \frac{\text{side}}{2\sqrt{3}}$$



$$R = \frac{a}{\sqrt{3}} = \frac{\text{side}}{\sqrt{3}}$$

## Radius of circumcircle of an equilateral triangle:

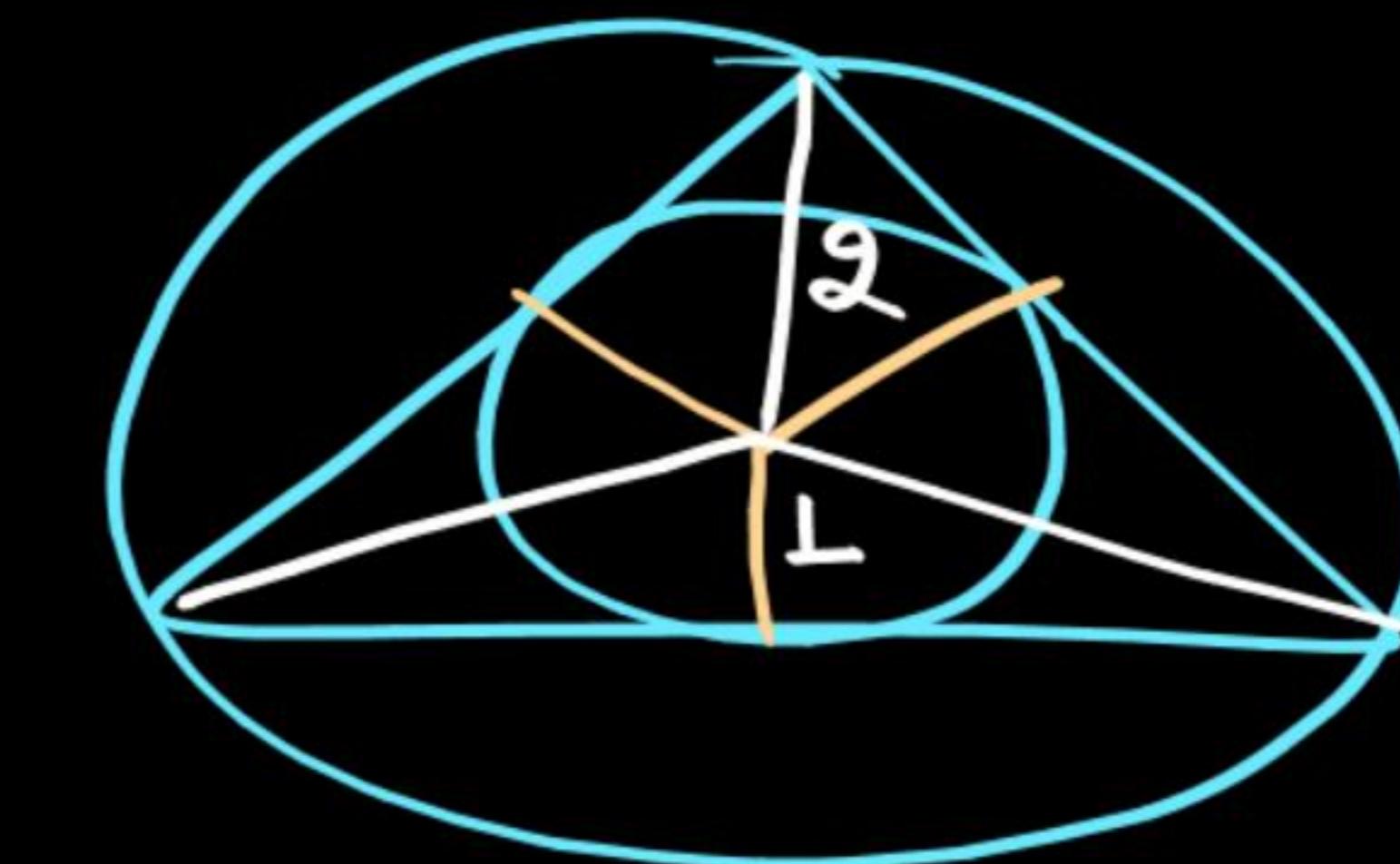


$$R_C = \frac{a}{\sqrt{3}}$$

35. Find the ratio of radii of incircle and circumcircle of an equilateral triangle.

एक समबाहु त्रिभुज के अन्तःवृत्त और परिवृत्त की त्रिज्याओं का अनुपात ज्ञात कीजिए।

$$\begin{aligned}r_I : R_C \\ \frac{a}{2\sqrt{3}} : \frac{a}{\sqrt{3}} \\ \frac{1}{2} : 1 \\ 1 : 2\end{aligned}$$



36. The radius of incircle of an equilateral triangle is  $2\sqrt{3}$ .

Then find :

एक समबाहु त्रिभुज के अंतःवृत्त की त्रिज्या  $2\sqrt{3}$  है। तो ज्ञात कीजिए -

$4\sqrt{3}$

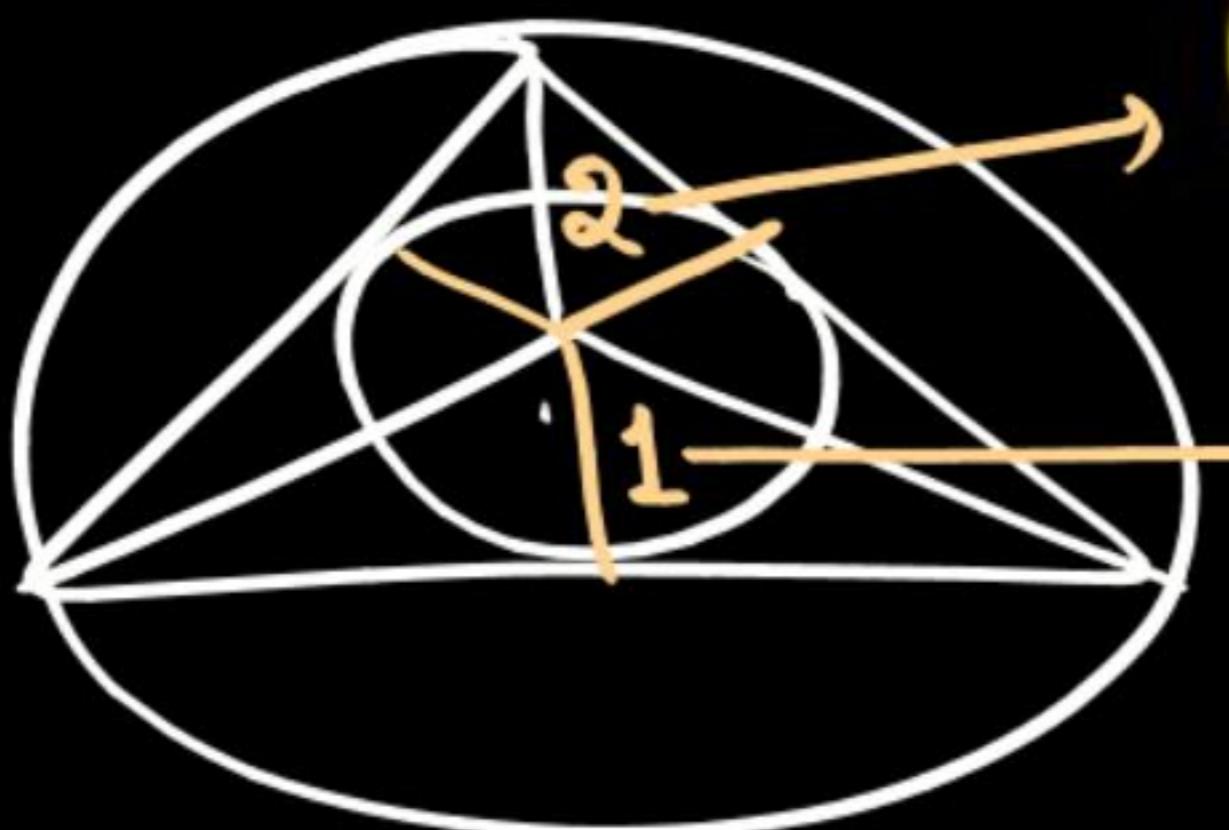
(i) Radius of circumcircle = ?

(ii) Height of triangle = ?

(iii) Side of triangle = ?

(iv) Area of triangle = ?

$6\sqrt{3}$



$$A = \frac{\sqrt{3}}{4} \times \text{side}^2$$

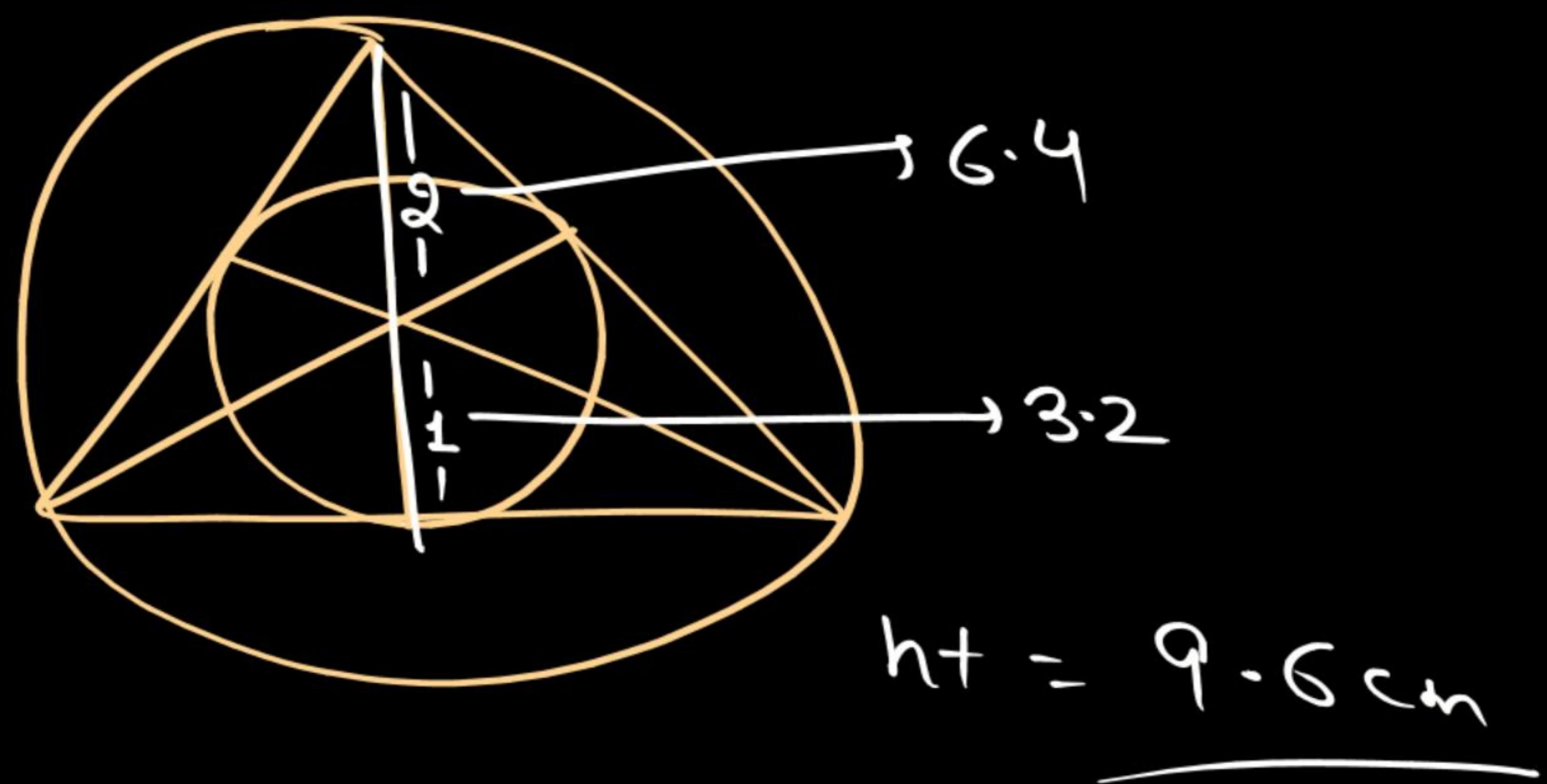
$$\frac{\sqrt{3}}{4} \times 12^2 = 36\sqrt{3} \text{ cm}^2$$

$$ht = \frac{\sqrt{3} \times \text{side}}{2} = 6\sqrt{3}$$

$$\text{Side} = 12$$

37. In an equilateral triangle, circumcentre is 3.2 cm from the base of that triangle, then find the length of each altitude.

एक समबाहु त्रिभुज में, परिकेन्द्र उस त्रिभुज के आधार से 3.2 सेमी. की दूरी पर है, तो प्रत्यक्ष ऊँचाई की लम्बाई ज्ञात कीजिए।

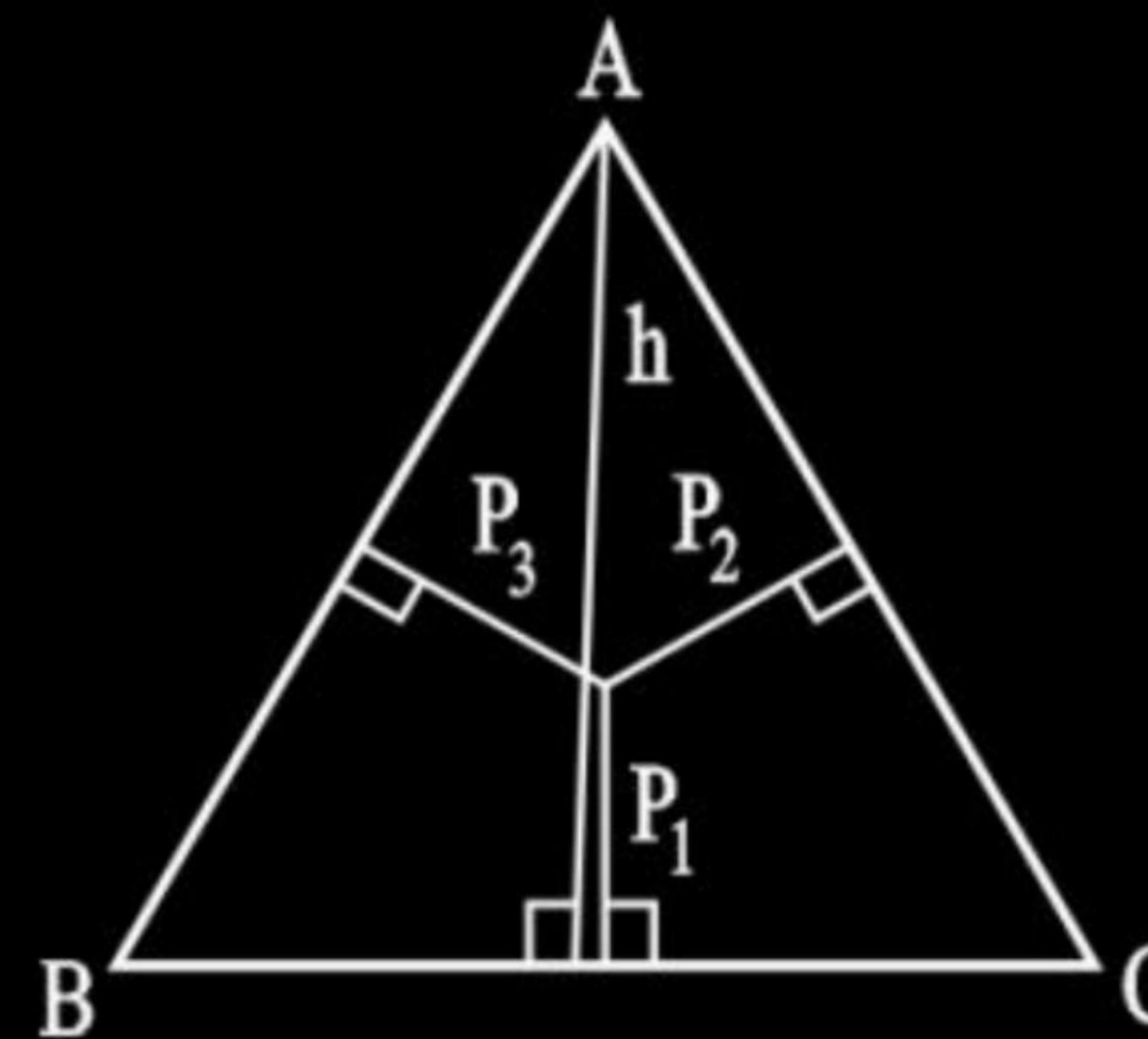


\* Relation between height of equilateral triangle and perpendiculars:

समबाहु त्रिभुज की ऊंचाई और लंब के बीच संबंध:



$$ht = h_1 + h_2 + h_3$$



$$h = P_1 + P_2 + P_3$$



38. In an equilateral  $\Delta ABC$ ,  $AD$ ,  $BE$  and  $CF$  are the altitudes then which one is true.

एक समबाहु  $\Delta ABC$  में,  $AD$ ,  $BE$  और  $CF$  ऊँचाई हैं, तो कौन-सा सत्य है।

- (a)  $2AB^2 = 3AD^2$     (b)  $3AC^2 = 4BE^2$
- (c)  $7AB^2 = 9AD^2$     (d)  $4AC^2 = 5BE^2$



39. In an equilateral triangle ABC, a point D lies on BC and  $BD = \frac{1}{3} BC$ . Find  $AD^2 : AB^2$ .

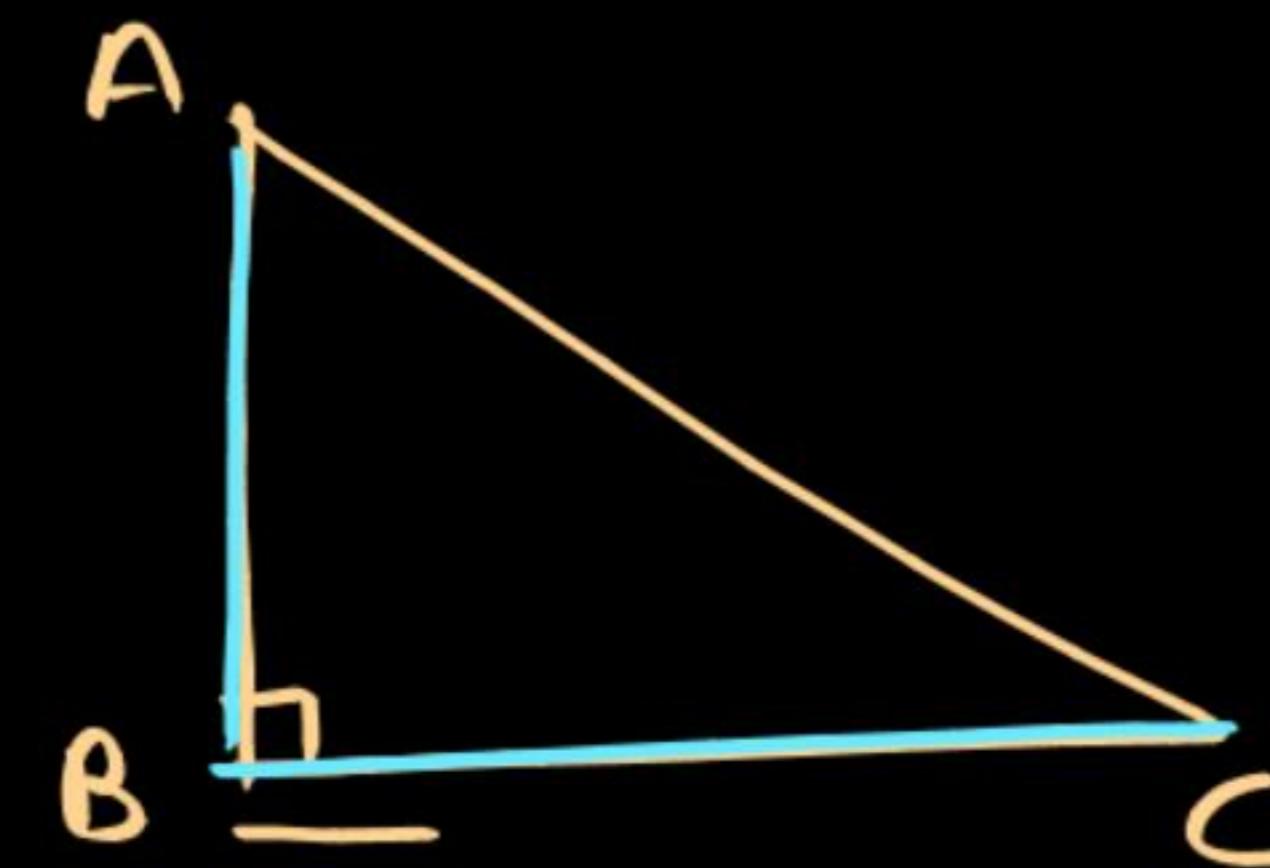
एक समबाहु त्रिभुज ABC में, एक बिंदु D भुजा, BC पर है और  $BD = \frac{1}{3} BC$  पर स्थित है। तो  $AD^2 : AB^2$  ज्ञात कीजिए।



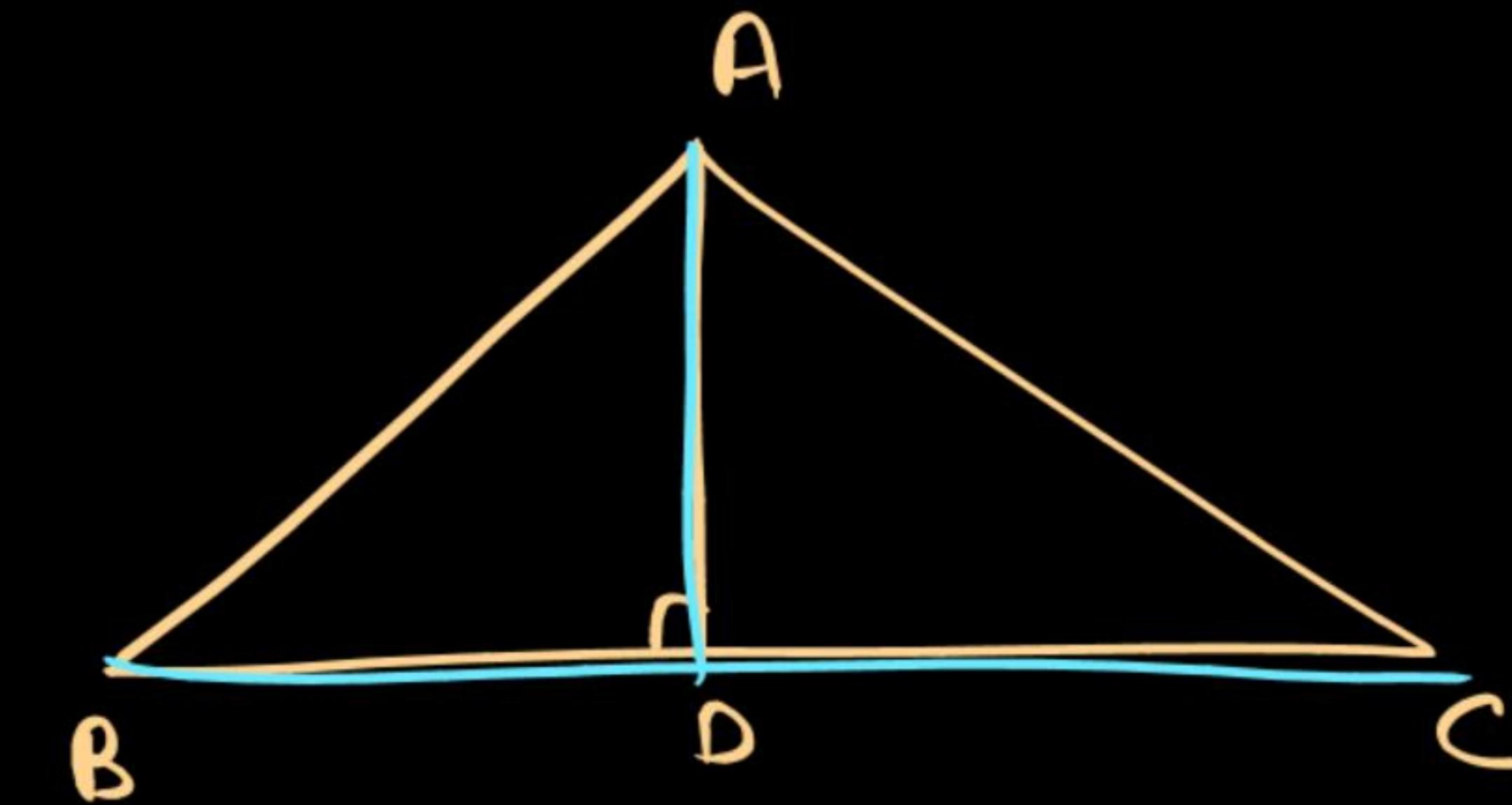
40. In an equilateral  $\Delta ABC$ ,  $BD : DC = 3 : 5$ . Find  $AD : DC$ .

समबाहु  $\Delta ABC$  में  $BD : DC = 3 : 5$  है। तो  $AD : DC$  ज्ञात कीजिए।

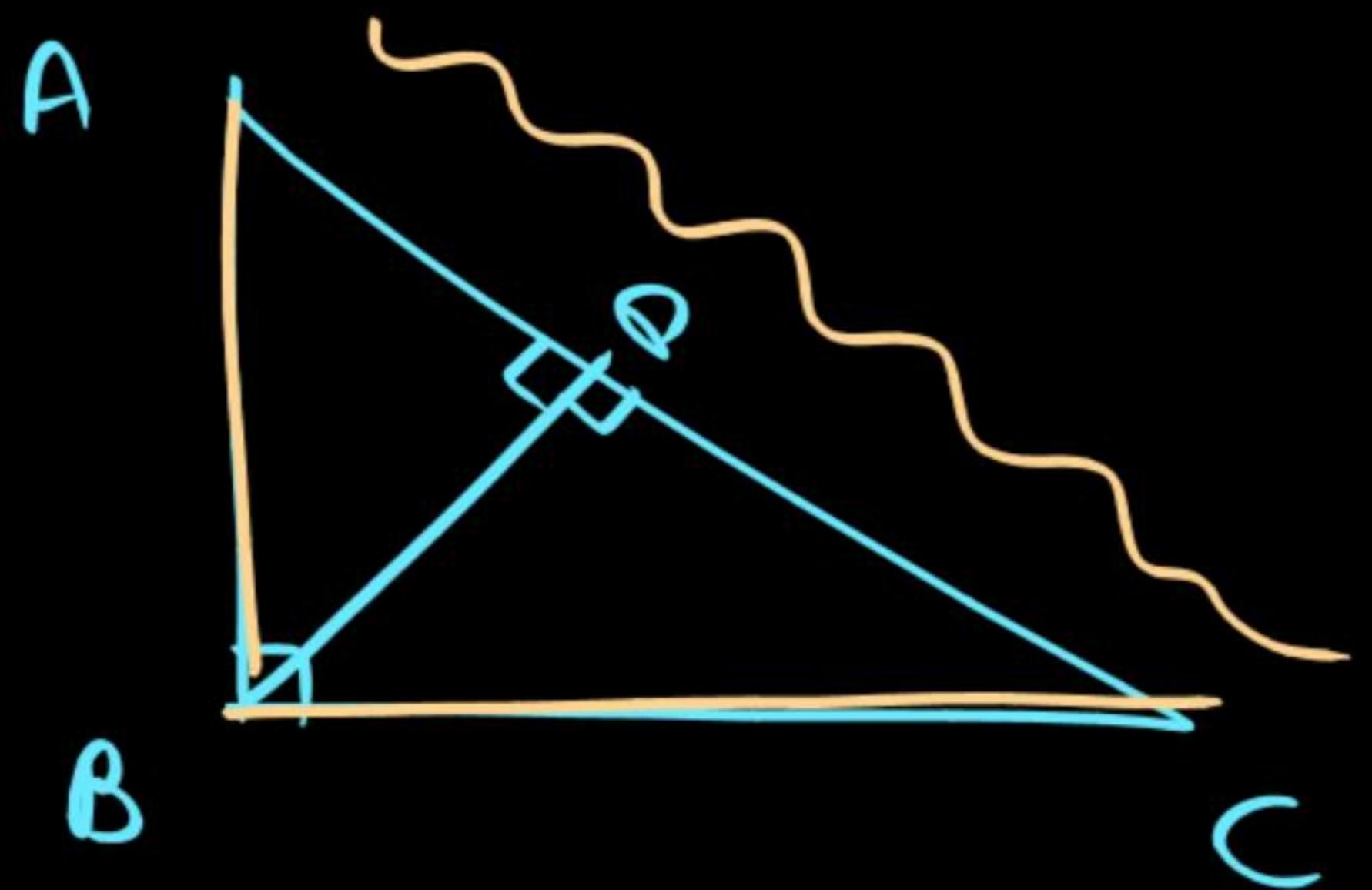
$$A = \frac{1}{2} \text{Base} \times \text{ht}$$



$$\text{Area} = \frac{1}{2} \times BC \times AB$$



$$\text{Area} = \frac{1}{2} \times BC \times AD$$



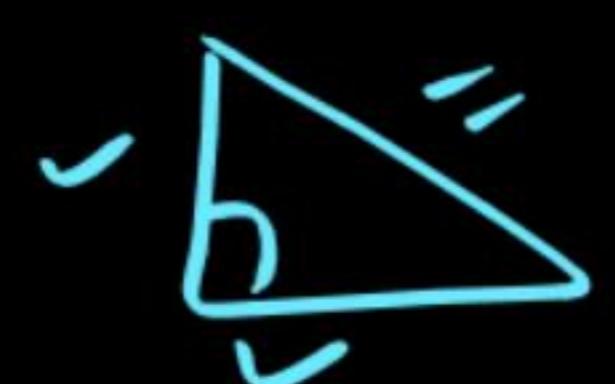
$$\frac{1}{2} BC \times AB = \frac{1}{2} AC \times BD$$

$\boxed{BC \times AB = AC \times BD}$

$$A = \frac{1}{2} \times BC \times AB - \textcircled{I}$$

$$A = \frac{1}{2} AC \times BD - \textcircled{II}$$

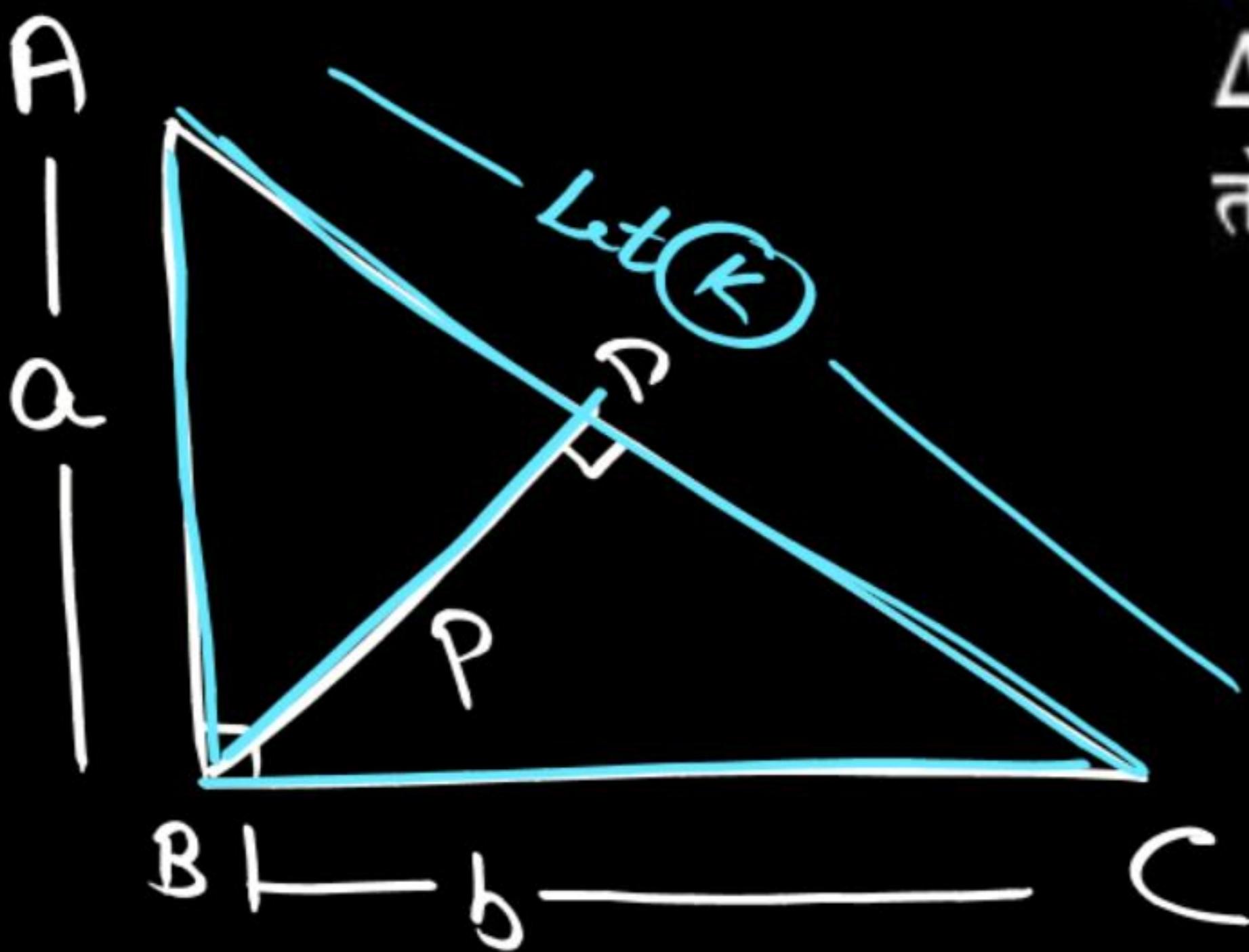
## Right Angled Triangle:



41.

In a  $\Delta ABC$ ,  $\angle B = 90^\circ$ ,  $AB = a$ ,  $BC = b$ ,  $BD = p$ ,  $BD \perp AC$ ,  
Find the relation between  $a$ ,  $b$  and  $p$ .

$\Delta ABC$  में,  $\angle B = 90^\circ$ ,  $AB = a$ ,  $BC = b$ ,  $BD = p$  और  $BD \perp AC$   
तो  $a$ ,  $b$  और  $p$  के बीच संबंध ज्ञात कीजिए।



$$\frac{1}{2} b \times a = \frac{1}{2} k \times p$$

$$ab = kp$$

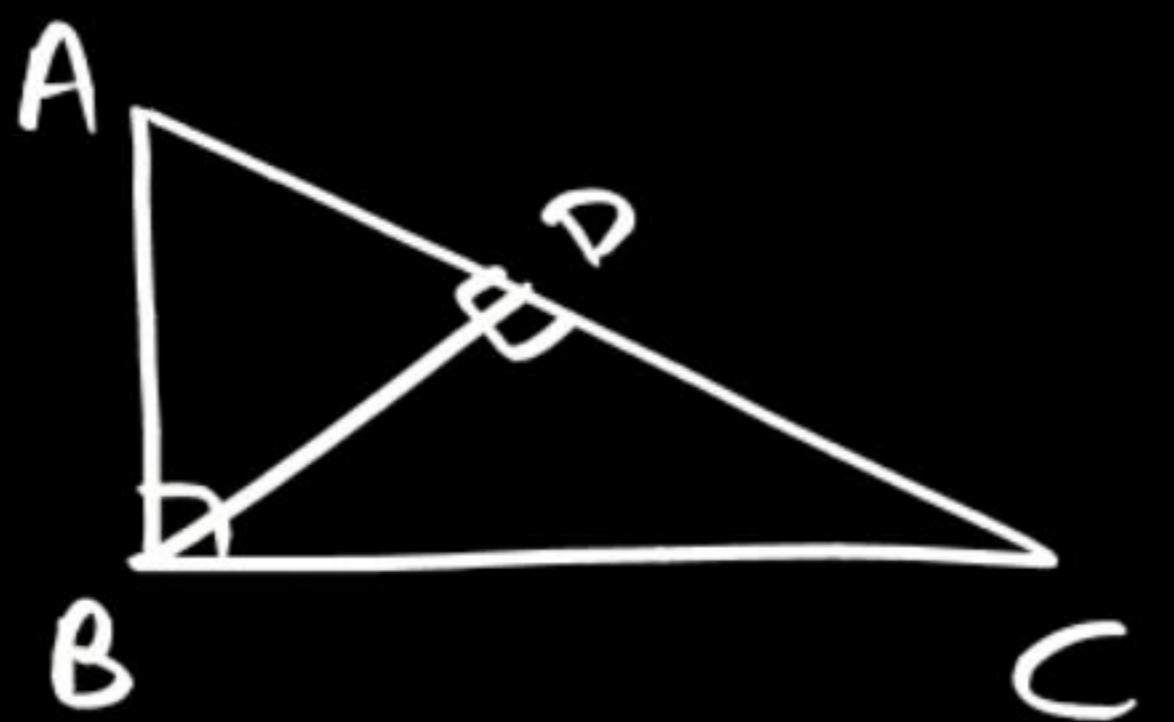
$$k = \frac{ab}{p}$$

$$a^2 + b^2 = k^2$$

$$a^2 + b^2 = \frac{a^2 b^2}{p^2}$$

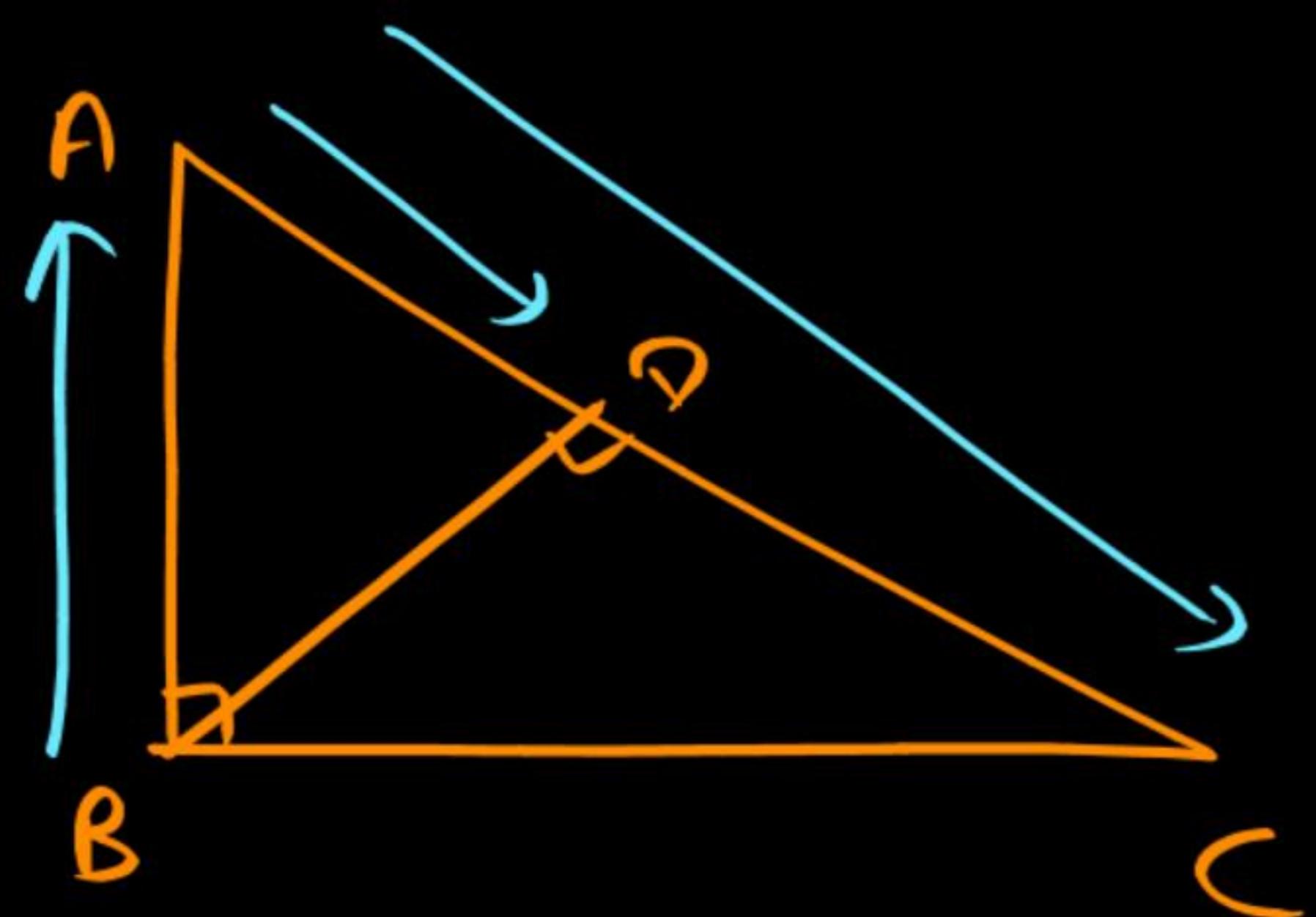
~~$$\frac{a^2}{a^2 b^2} + \frac{b^2}{a^2 b^2} = \frac{1}{p^2}$$~~

$$\frac{1}{b^2} + \frac{1}{a^2} = \frac{1}{p^2}$$

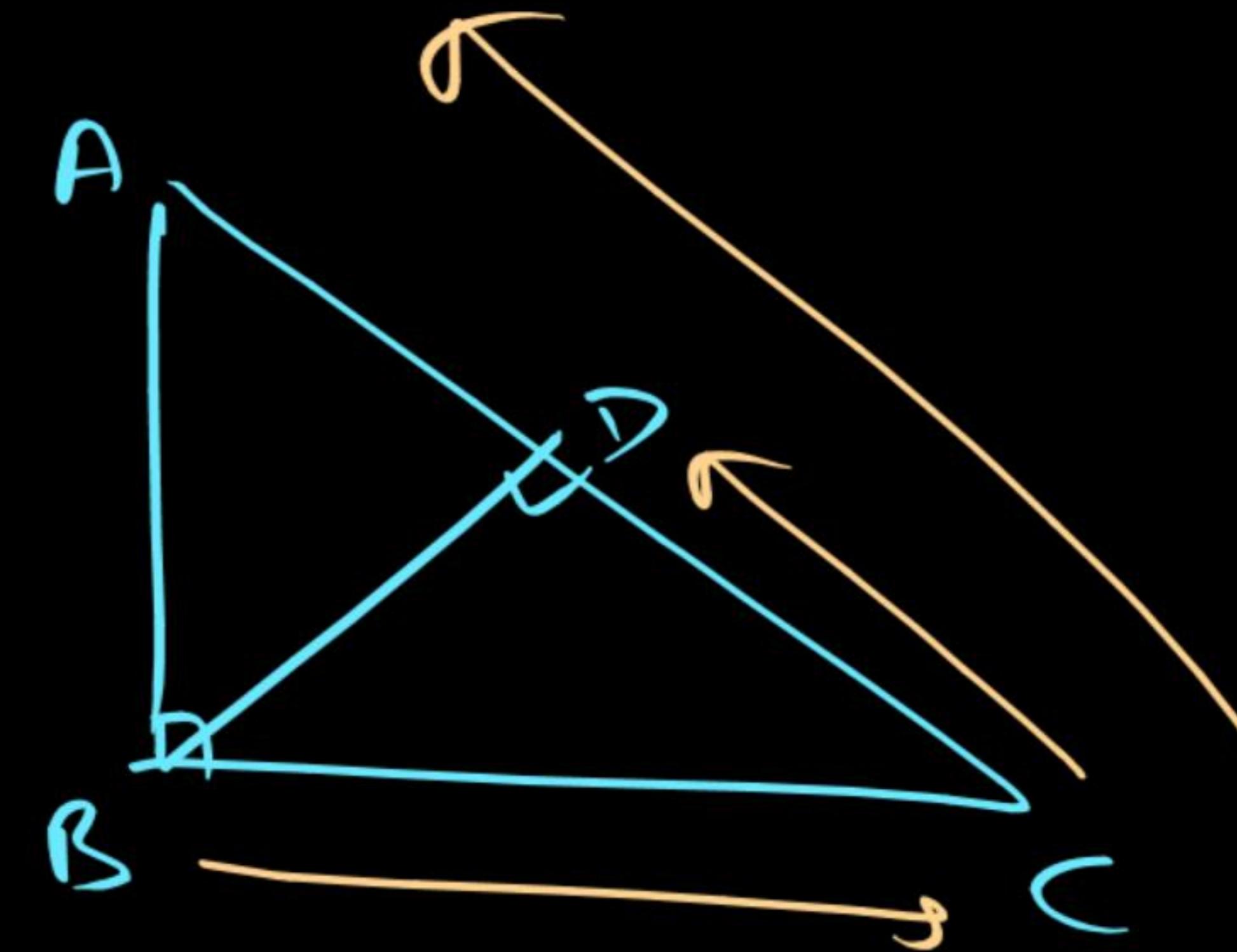


~~①~~  $AB \times BC = AC \times BD$

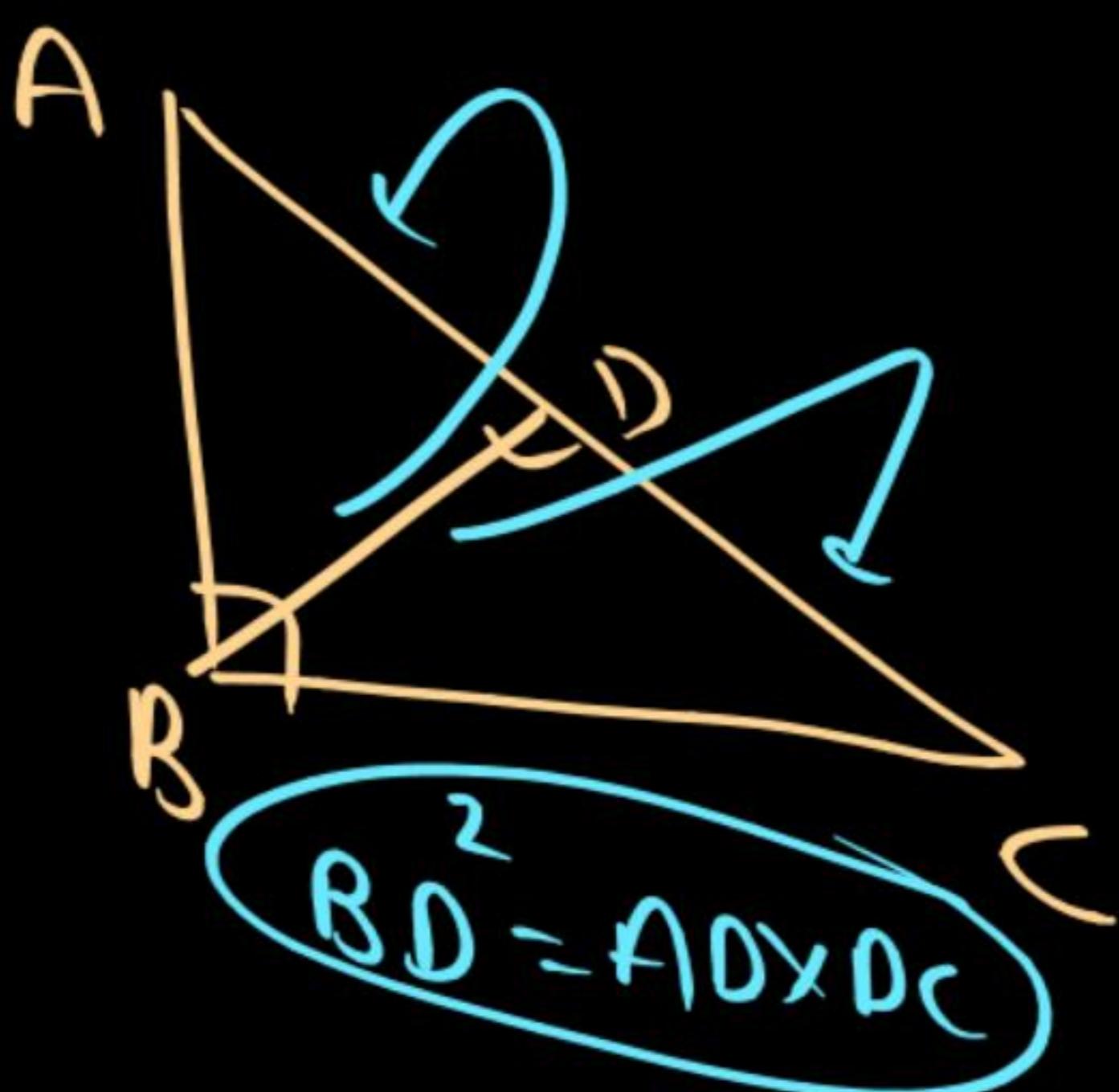
~~(H)~~  $\frac{1}{AB^2} + \frac{1}{BC^2} = \frac{1}{BD^2}$



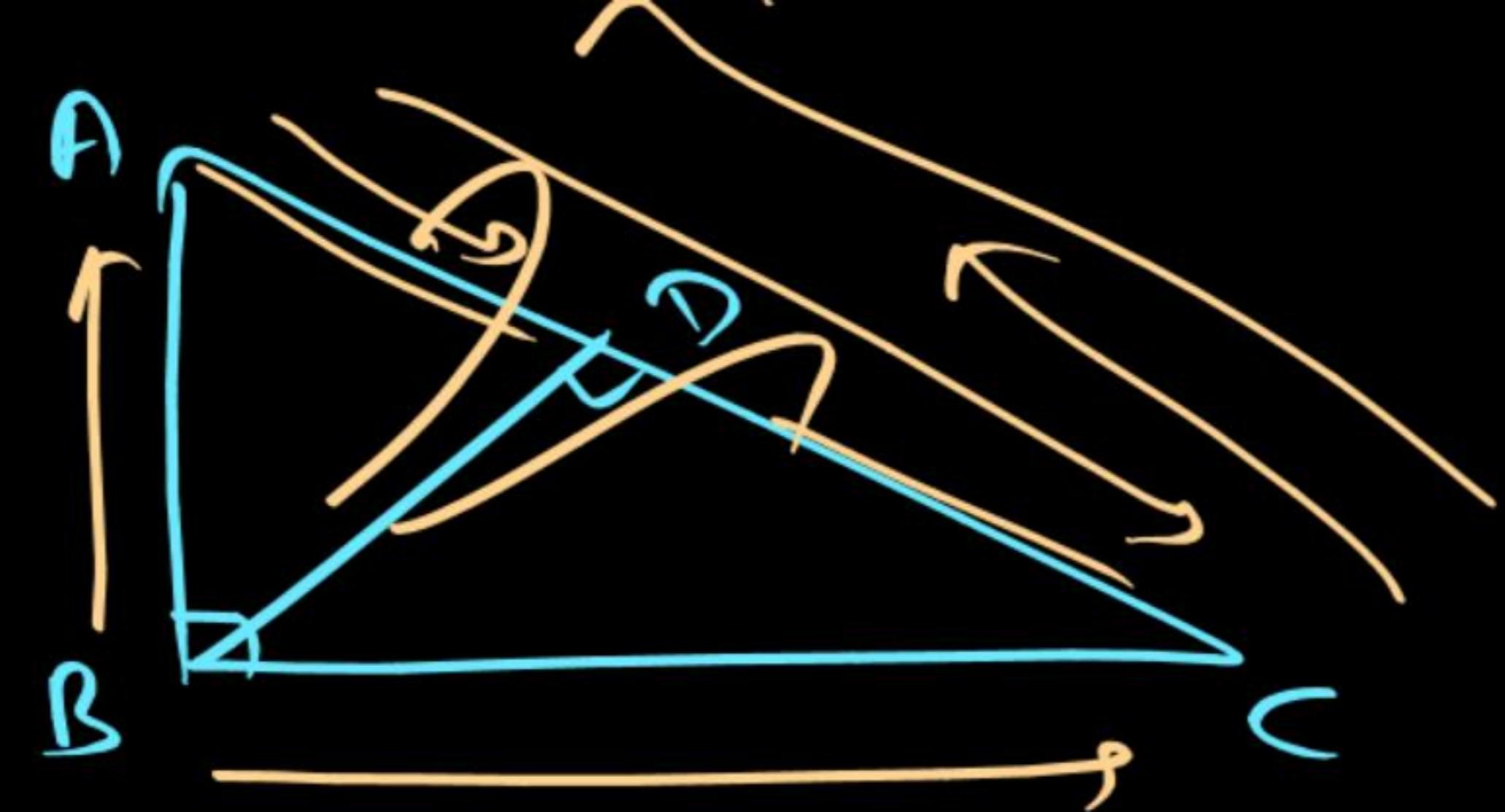
$$AB^2 = AD \times AC$$



$$BC^2 = CD \times CA$$



$$BD^2 = AD \times DC$$



$$\textcircled{I} \quad AB \times BC = AC \times BD$$

$$\textcircled{II} \quad \frac{1}{AB^2} + \frac{1}{BC^2} = \frac{1}{BD^2}$$

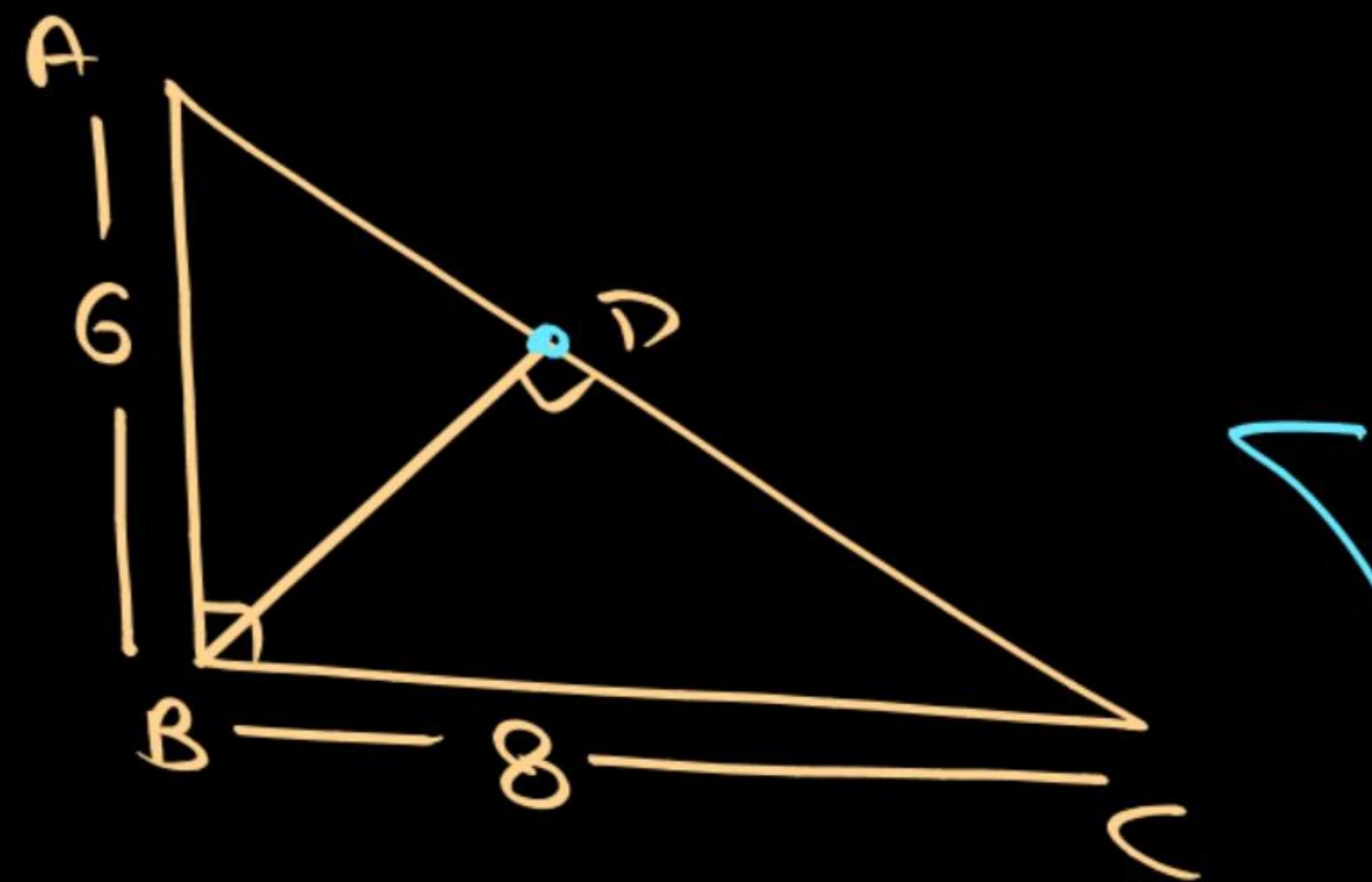
$$\textcircled{III} \quad AB^2 = AD \times AC$$

$$\textcircled{IV} \quad BC^2 = CD \times CA$$

$$\textcircled{V} \quad BD^2 = AD \times DC$$

42. In a right angled  $\Delta ABC$ ,  $\angle B = 90^\circ$ ,  $BD \perp AC$ ,  $AB = 6$ ,  $BC = 8$ . Find  $BD$ .

एक समकोण  $\Delta ABC$  में,  $\angle B = 90^\circ$ ,  $BD \perp AC$ ,  $AB = 6$ ,  $BC = 8$  तो  $BD$  ज्ञात कीजिए।



$$\frac{1}{AB^2} + \frac{1}{BC^2} = \frac{1}{BD^2}$$

$$\frac{1}{36} + \frac{1}{64} = \frac{1}{BD^2}$$

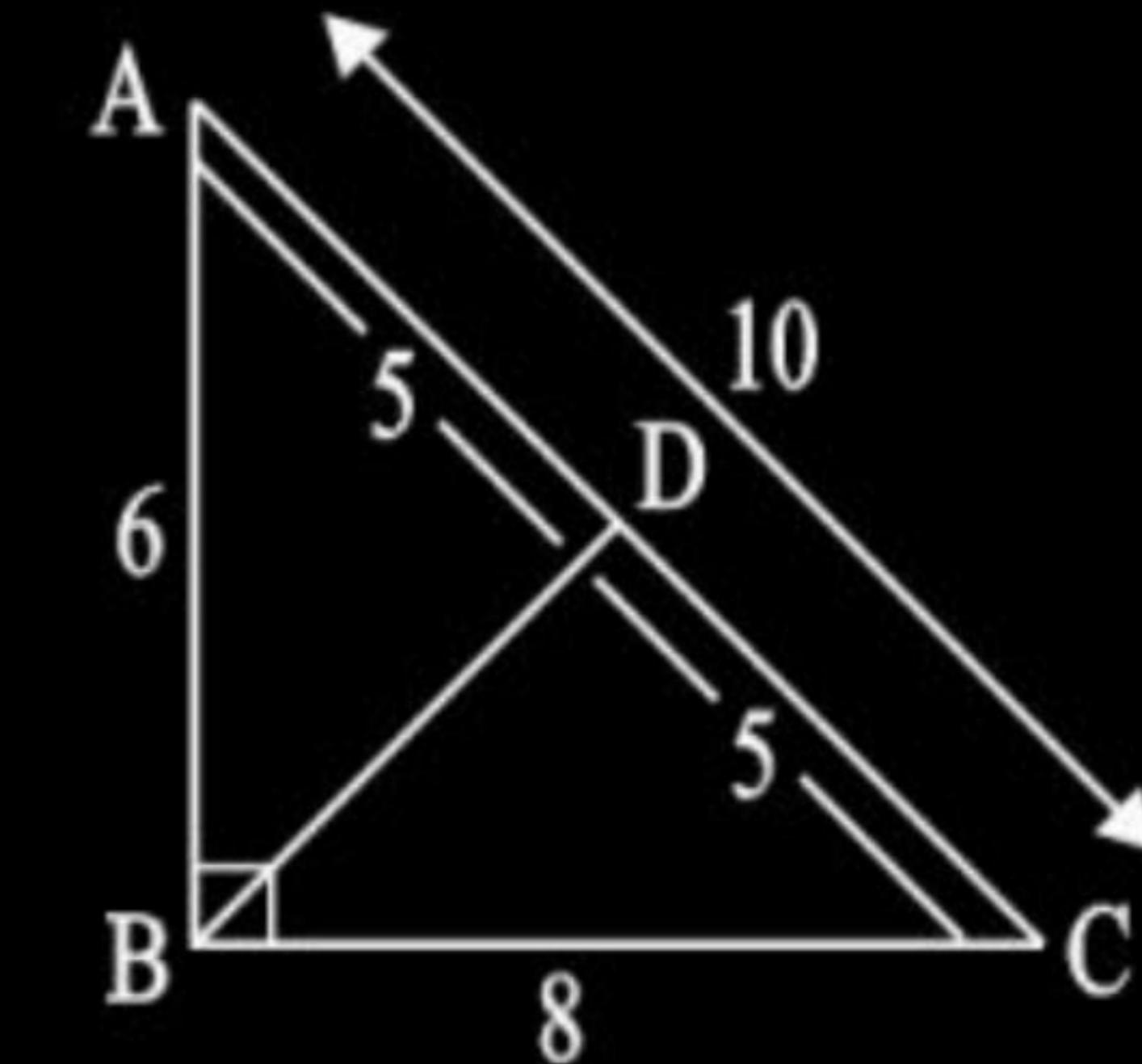
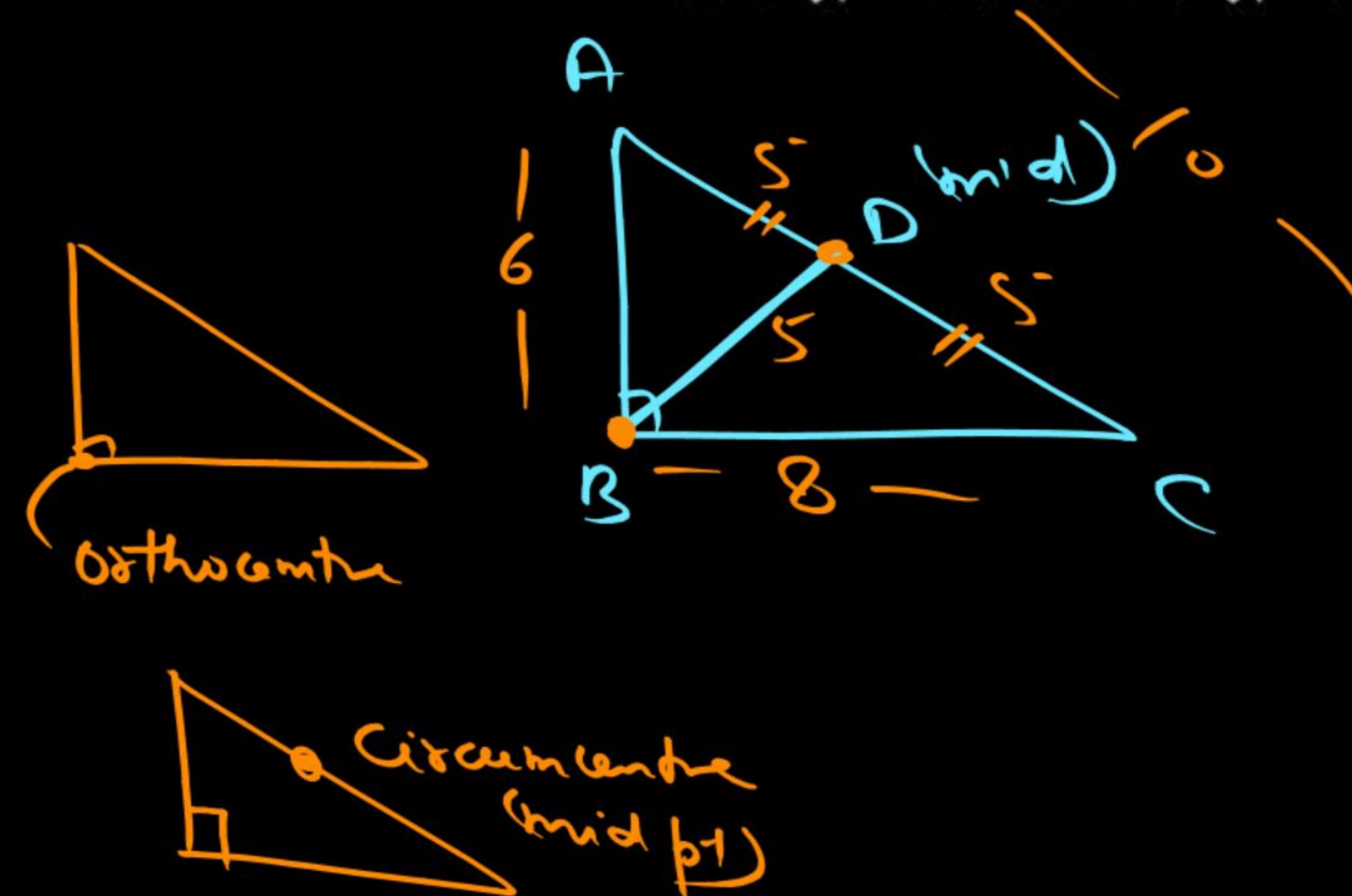
$$\frac{1}{BD^2} = \frac{100}{36 \times 64}$$

$$BD^2 = \frac{36 \times 64}{100}$$

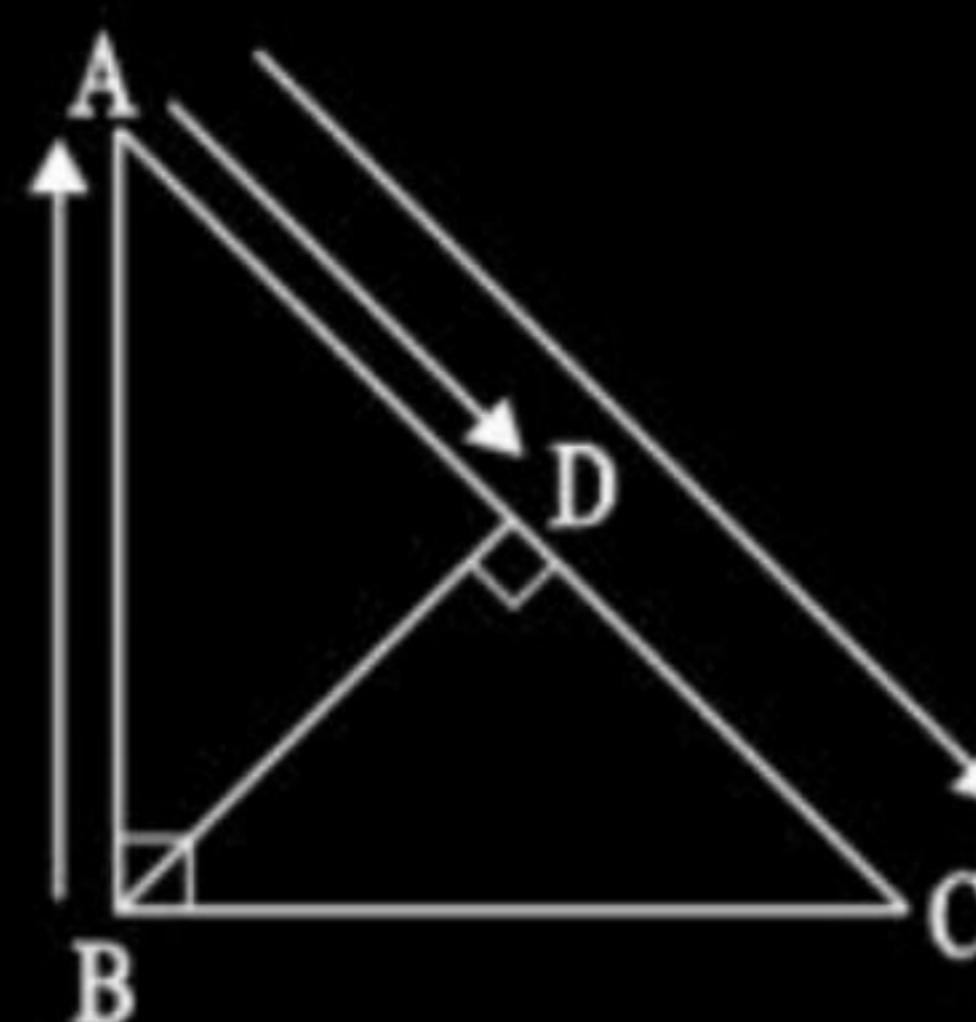
$$BD = \sqrt{\frac{6 \times 8}{10}} = \textcircled{4.8}$$

43. In a  $\Delta ABC$ ,  $\angle B = 90^\circ$  and D is the midpoint of AC. Find the distance between circumcentre and orthocentre.

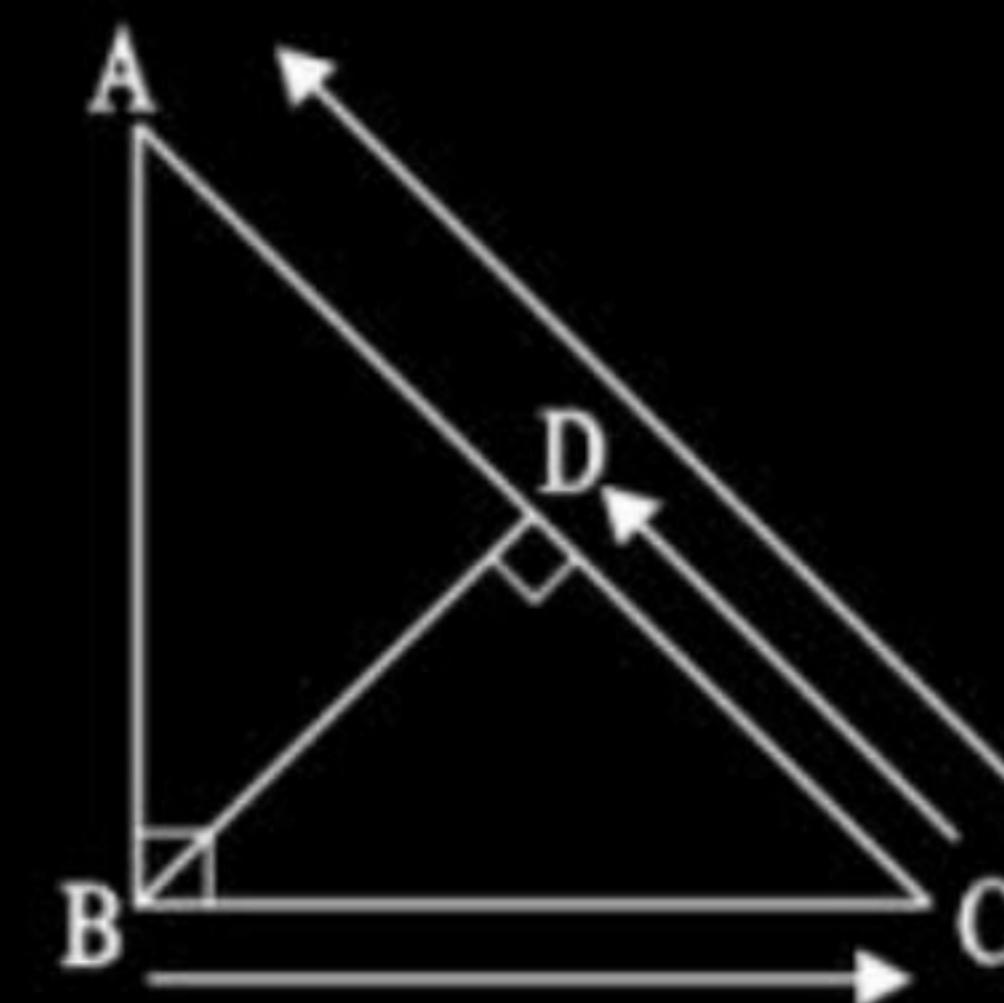
$\Delta ABC$  में,  $\angle B = 90^\circ$  और D, AC का मध्यबिंदु है। परिकेन्द्र और लम्बकेन्द्र के बीच की दूरी ज्ञात कीजिए।



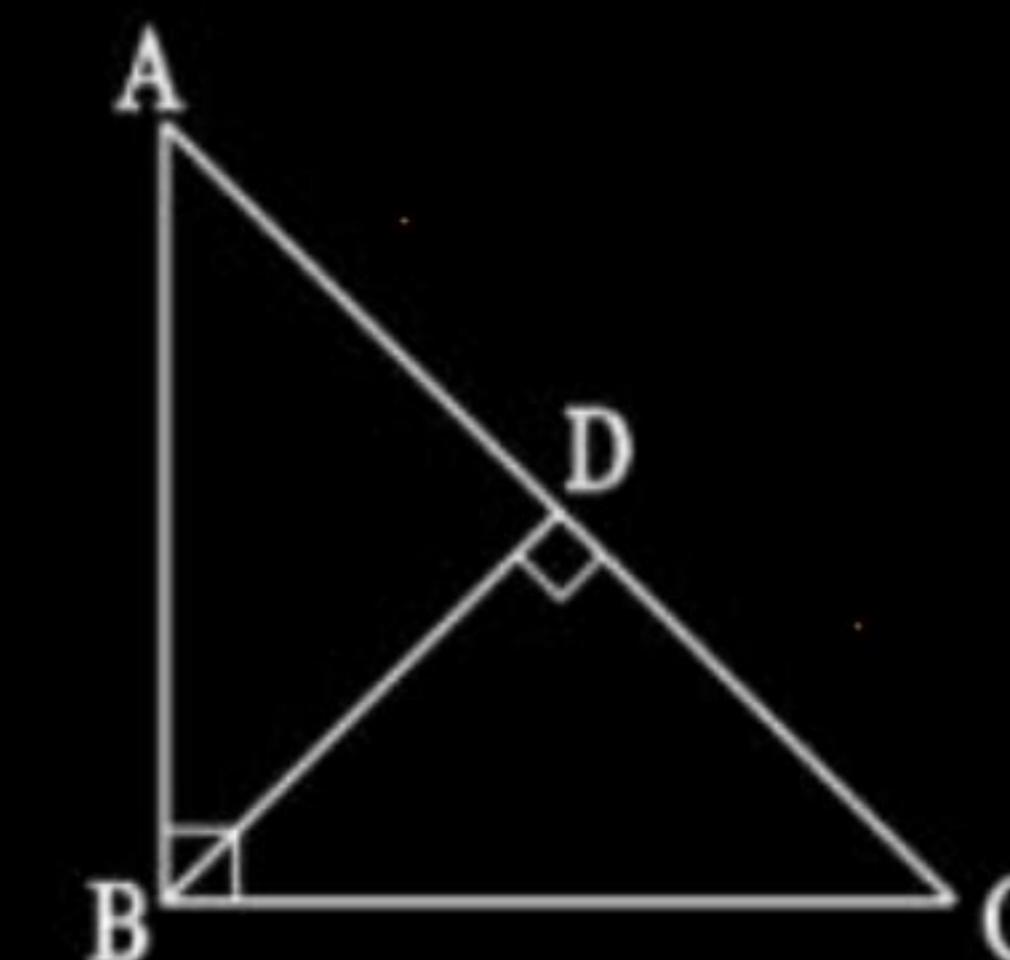
## Some properties in right angled triangle:



$$AB^2 = AD \times AC$$



$$BC^2 = CD \times CA$$



$$BD^2 = AD \times DC$$

\*

$$AB^2 + BC^2 = AC^2$$

\*

$$AB \times BC = BD \times AC$$

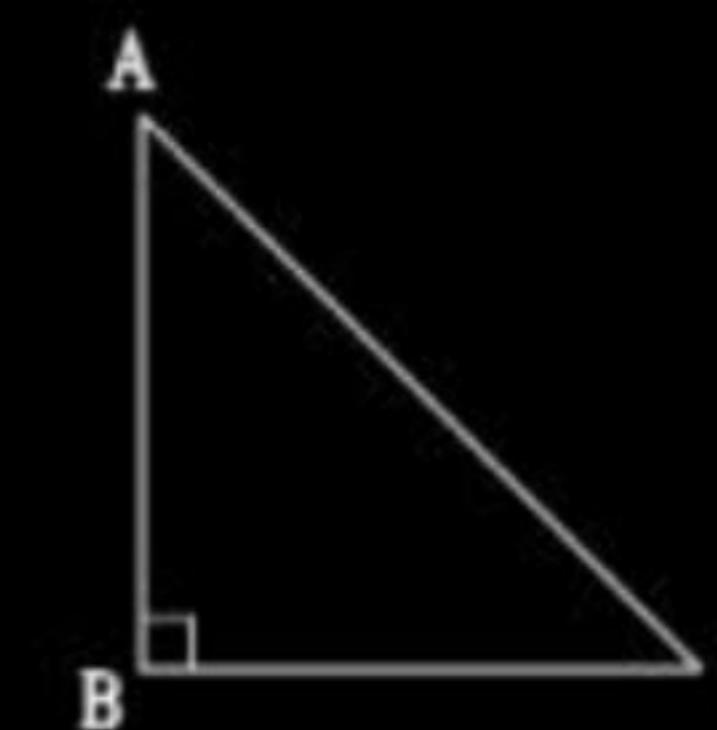
\*

$$\frac{1}{BD^2} = \frac{1}{AB^2} + \frac{1}{BC^2}$$

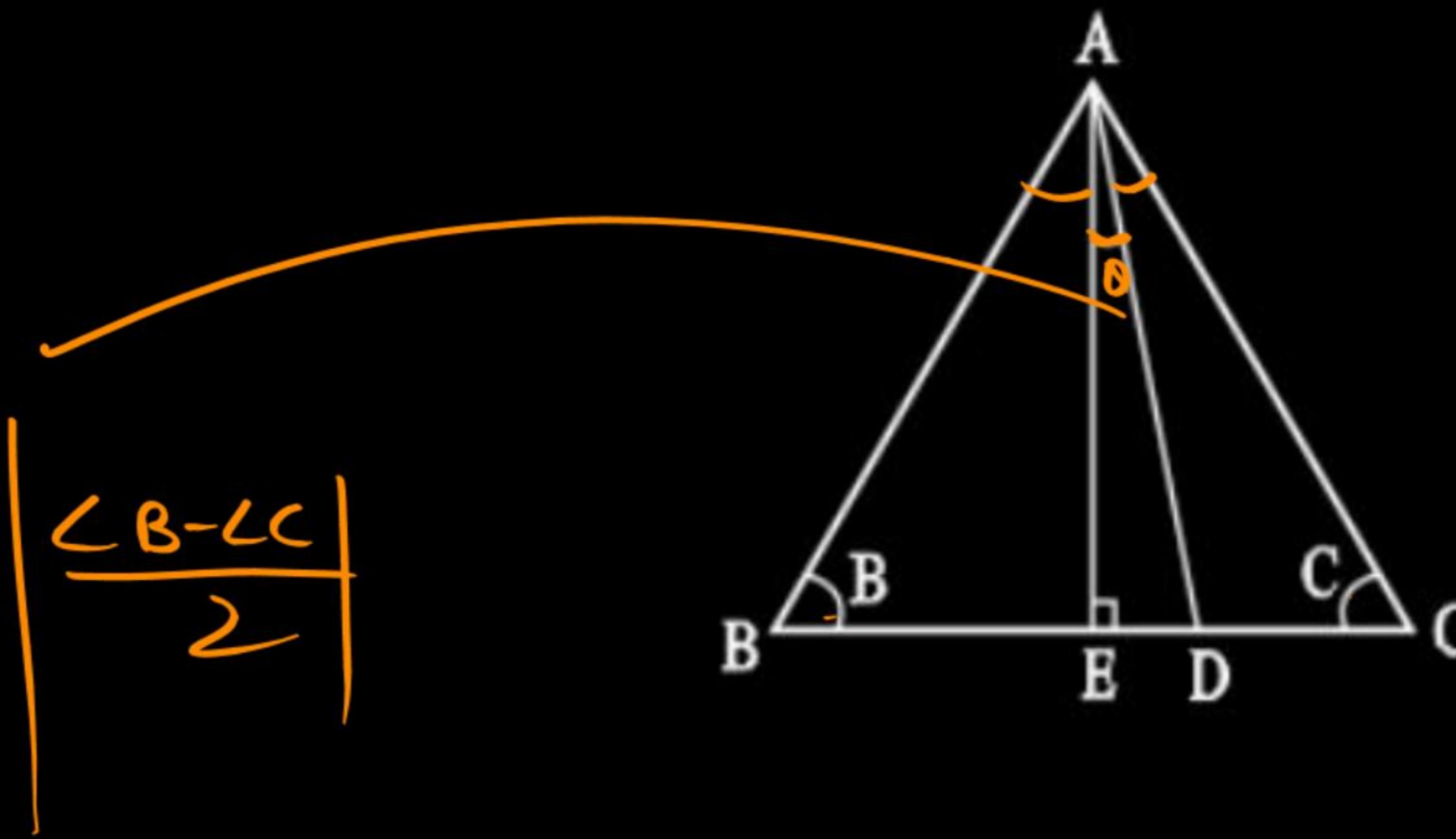


44. In an isosceles right angled  $\Delta ABC$ ,  $2p$  is Perimeter. Then find the area of that triangle.

एक समद्विबाहु समकोण  $\Delta ABC$  में,  $2p$  परिमाप है। तो उस त्रिभुज का क्षेत्रफल ज्ञात कीजिए।



\* **Theorem:** In  $\triangle ABC$ , AD is the angular bisector and AE is the altitude.



$$\angle EAD = \frac{|\angle B - \angle C|}{2}$$

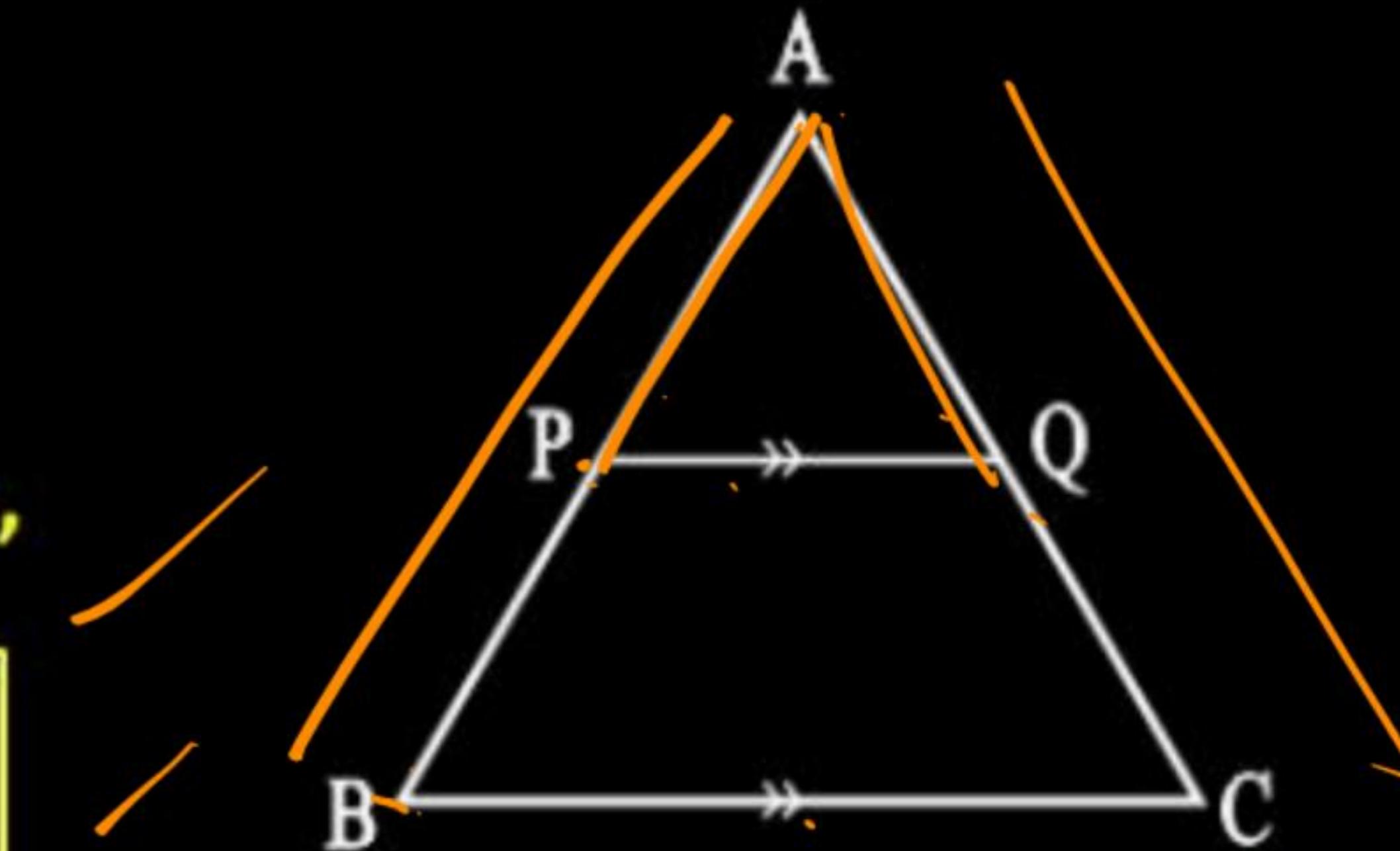
\*

## Thales /BPT-Basic Proportion In :

In  $\triangle ABC$ ,

If  $PQ \parallel BC$ , then,

$$\frac{AP}{AB} = \frac{AQ}{AC}$$



Or

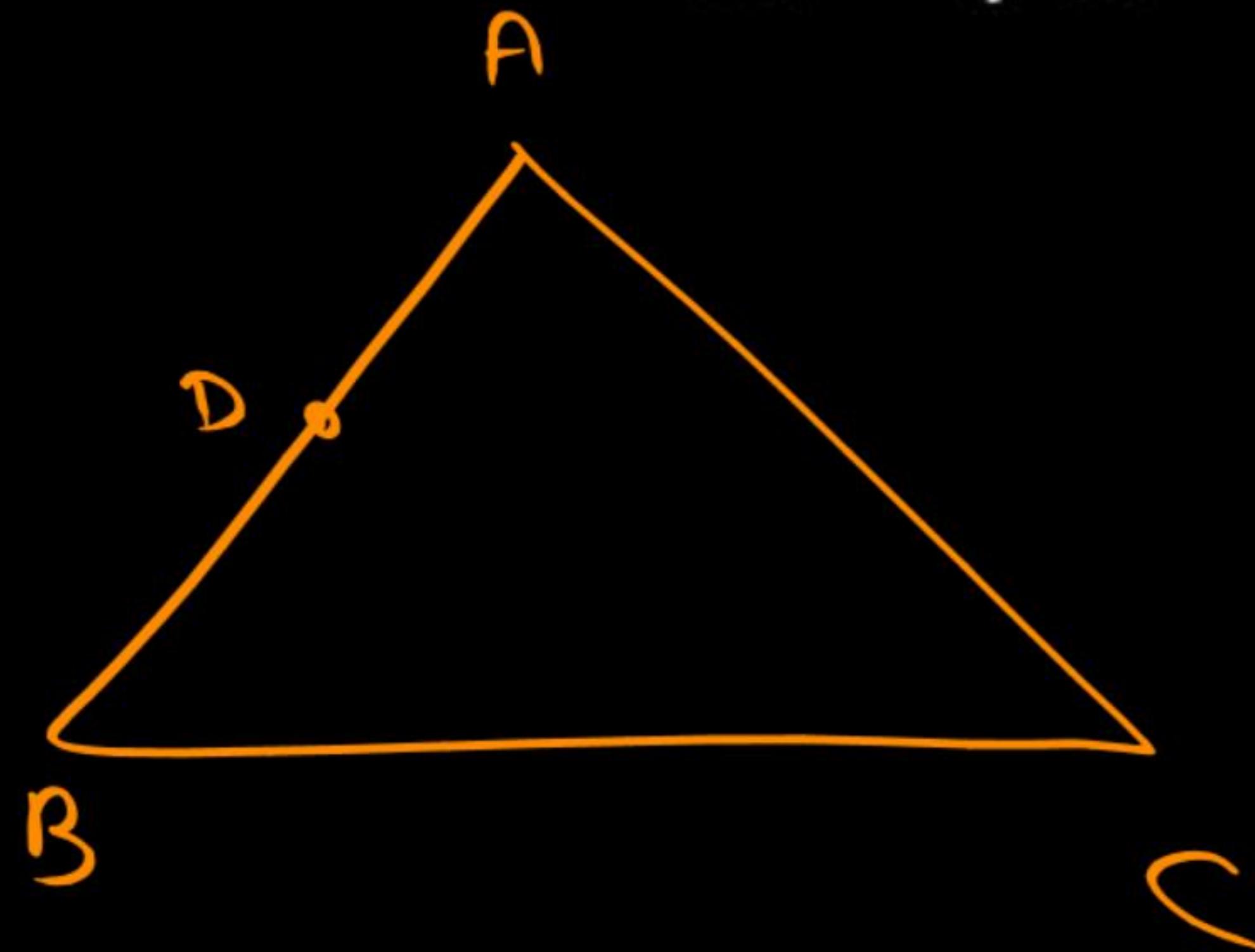
$$\frac{AP}{PB} = \frac{AQ}{QC}$$

Or

$$\frac{AB}{PB} = \frac{AC}{QC}$$

45. In a  $\Delta ABC$ , point D lies on AB and point E and F lies on BC such that  $DF \parallel AC$  and  $DE \parallel AF$ ,  $BE = 4$ ,  $CF = 3$ ,  $EF = ?$

$\Delta ABC$  में, बिंदु D, AB पर स्थित है और बिंदु E और F, BC पर इस प्रकार स्थित है कि  $DF \parallel AC$  और  $DE \parallel AF$ ,  $BE = 4$ ,  $CF = 3$ ,  $EF = ?$





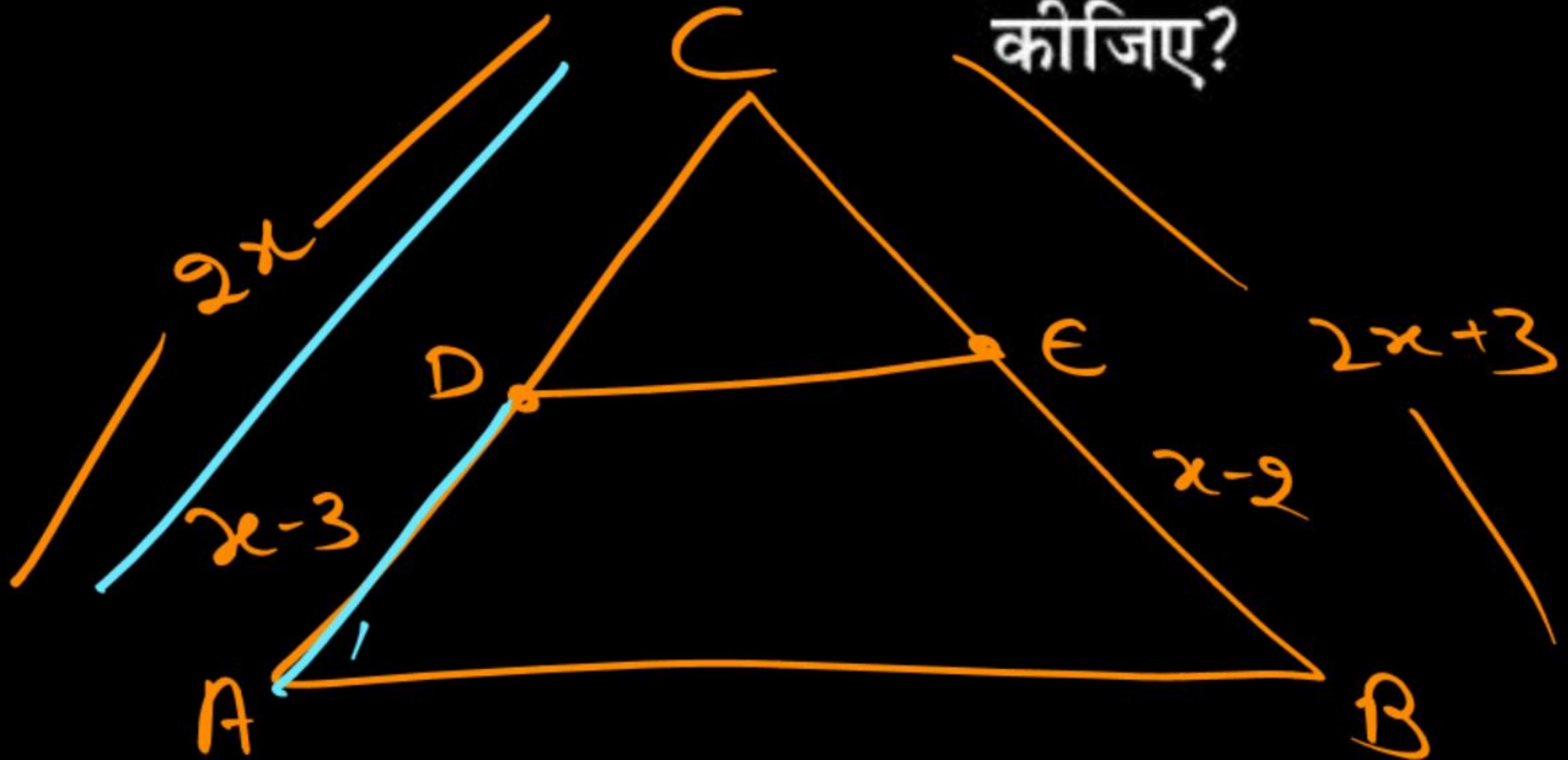
46. In  $\Delta ABC$ , point D lies on AB and point E and F lies on BC such that  $DF \parallel AC$  and  $DE \parallel AF$ ,  $BE = 4$ ,  $CF = 3$ ,  $EF = ?$

$\Delta ABC$  में, बिंदु D, AB पर स्थित है और बिंदु E और F, BC पर इस प्रकार स्थित है कि  $DF \parallel AC$  और  $DE \parallel AF$ ,  $BE = 4$ ,  $CF = 3$ , EF ज्ञात कीजिए ?

51.2

47. In  $\Delta ABC$ ,  $DE \parallel AF$ . D and E are on the sides AC and BC respectively.  $AD = x - 3$ ,  $AC = 2x$ ,  $BE = x - 2$ ,  $BC = 2x + 3$ . Find x.

$\Delta ABC$  में, D और E क्रमशः AC और BC भुजाओं पर हैं।  
 $AD = x - 3$ ,  $AC = 2x$ ,  $BE = x - 2$ ,  $BC = 2x + 3$ . x ज्ञात कीजिए?



$$\frac{2x}{x-3} = \frac{2x+3}{x-2}$$

~~$$2x^2 - 4x = 2x^2 + 3x - 6x - 9$$~~

$$-4x + 3x = -9$$

$$-x = -9$$

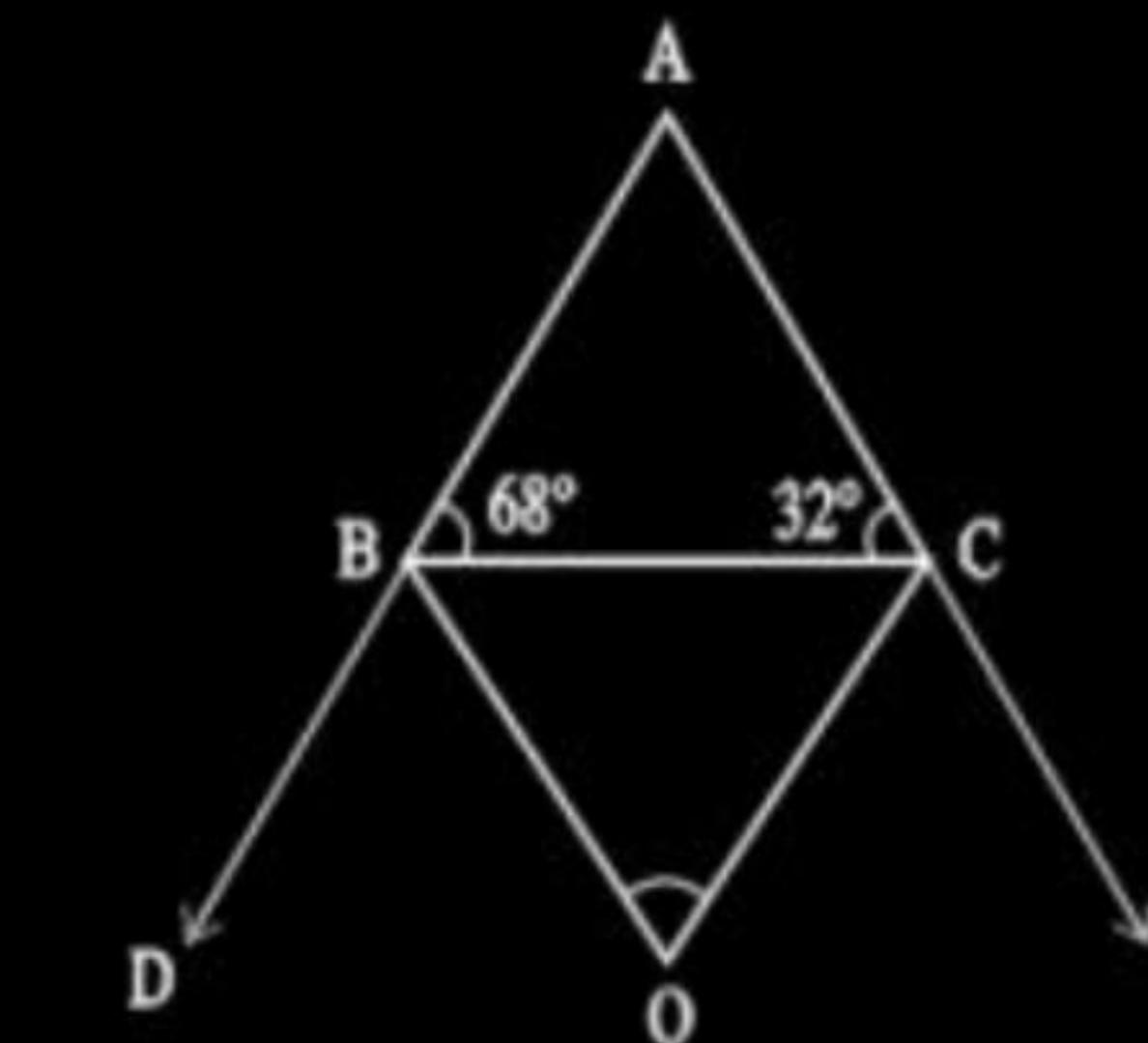
$x = 9$



48. In the given figure, a circle is inscribed in  $\Delta ABC$ . If  $AB = 6$  cm,  $BC = 4$  cm and  $AC = 9$  cm. Find the area of circle.

दी गई आकृति,  $\Delta ABC$  में एक वृत्त खदा हुआ है। यदि  $AB = 6$  सेमी,  
 $BC = 4$  सेमी और  $AC = 9$  सेमी। वृत्त का क्षेत्रफल ज्ञात कीजिए।

49. In  $\triangle ABC$ , then find  $\angle BOC$ .  
BO and CO are angular bisector





50. AE, BF and CD are angular bisectors of  $\angle A$ ,  $\angle B$  and  $\angle C$ . If  $AB = 6 \text{ cm}$ ,  $BC = 7 \text{ cm}$ ,  $AC = 8 \text{ cm}$ ,  $BE = ?$

AE, BF और CD,  $\angle A$ ,  $\angle B$  और  $\angle C$  के कोणीय समद्विभाजक हैं। यदि  $AB = 6 \text{ cm}$ ,  $BC = 7 \text{ cm}$ ,  $AC = 8 \text{ cm}$ ,  $BE = ?$