

SSC FOUNDATION



सम्यान बैच

समय से तैयारी, समय से सफलता

MATHEMATICS

ज्यामिति

GEOMETRY - TRIANGLE

★ सबसे सटीक, सबसे बेहतर ★



सटीक
CONCEPT



BEST
STRATEGY



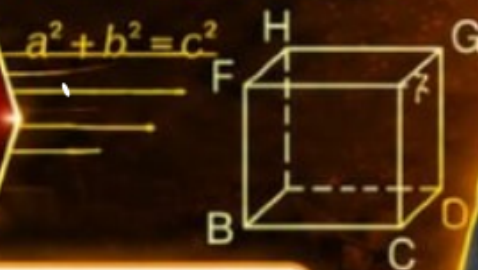
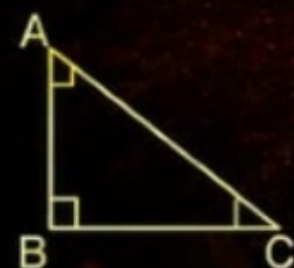
सटीक
PRACTICE



बेहतरीन
RESULT

LIVE STREAM : 11:00 AM

BY - SHASHI SIR





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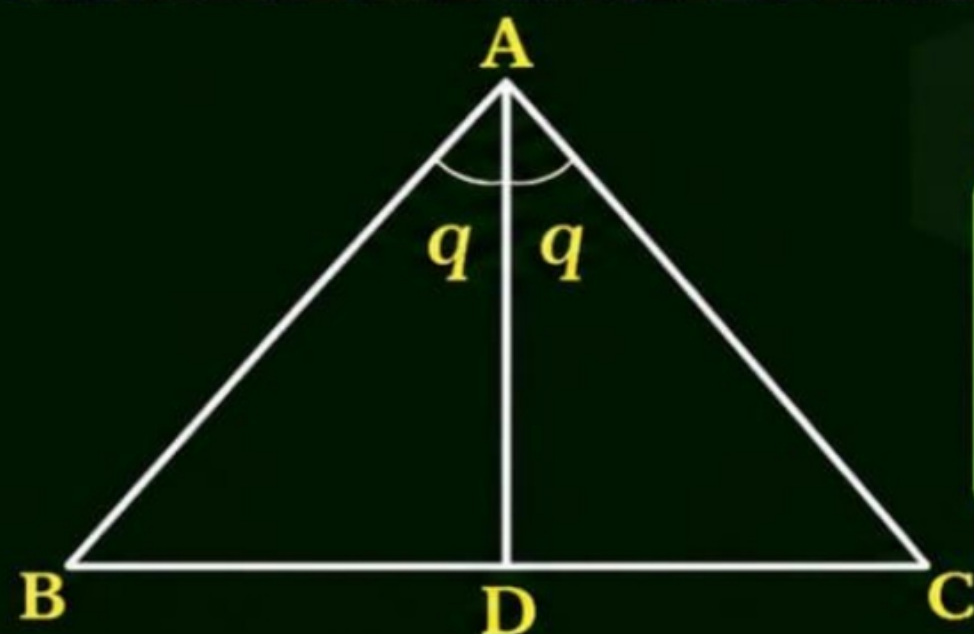
Triangle (त्रिभुज)

ANGLE BISECTOR THEOREM

OR

INTERNAL BISECTOR THEOREM

If **AD** is the angle bisector of angle $\angle A$ of $\triangle ABC$, then



THEOREM

$$\frac{AB}{AC} = \frac{BD}{DC}$$

KEY POINTS

- ✓ AD bisects $\angle A \Rightarrow \angle BAD = \angle CAD$
- ✓ It divides the opposite side BC in the ratio of the other two sides.



PROOF (TRIGONOMETRIC METHOD)

- In $\triangle ABD$ and $\triangle ACD$

$$\angle BAD = \angle CAD = \theta$$

- By Sine Rule in $\triangle ABD$ and $\triangle ACD$

$$\frac{BD}{AB} = \frac{\sin \theta}{\sin \alpha} \quad \text{and} \quad \frac{DC}{AC} = \frac{\sin \theta}{\sin(180 - \alpha)}$$

- Since $\sin(180 - \alpha) = \sin \alpha$

$$\frac{BD}{AB} = \frac{\sin \theta}{\sin \alpha} \quad \text{and} \quad \frac{DC}{AC} = \frac{\sin \theta}{\sin \alpha}$$

- Hence, $\frac{BD}{AB} = \frac{DC}{AC}$

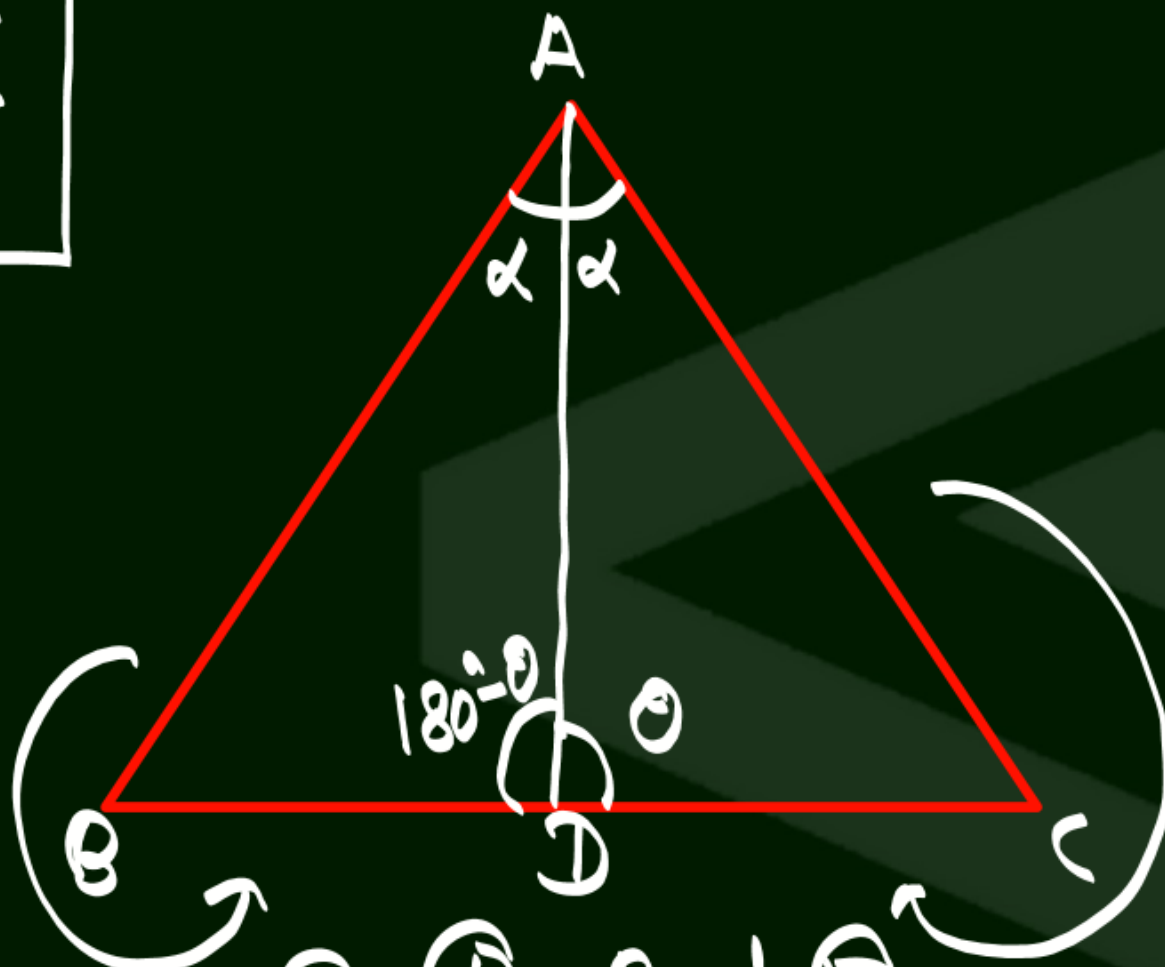
- Taking reciprocal, we get

$$\frac{AB}{BD} = \frac{AC}{DC}$$

$$\therefore \frac{AB}{AC} = \frac{BD}{DC}$$

Hence Proved.

$$\frac{BD}{DC} = \frac{AB}{AC}$$



Q ① and ②

$$\frac{BD}{AB} = \frac{DC}{AC} \Rightarrow$$

$$\frac{AB}{AC} = \frac{BD}{DC}$$

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

In $\triangle ABD$

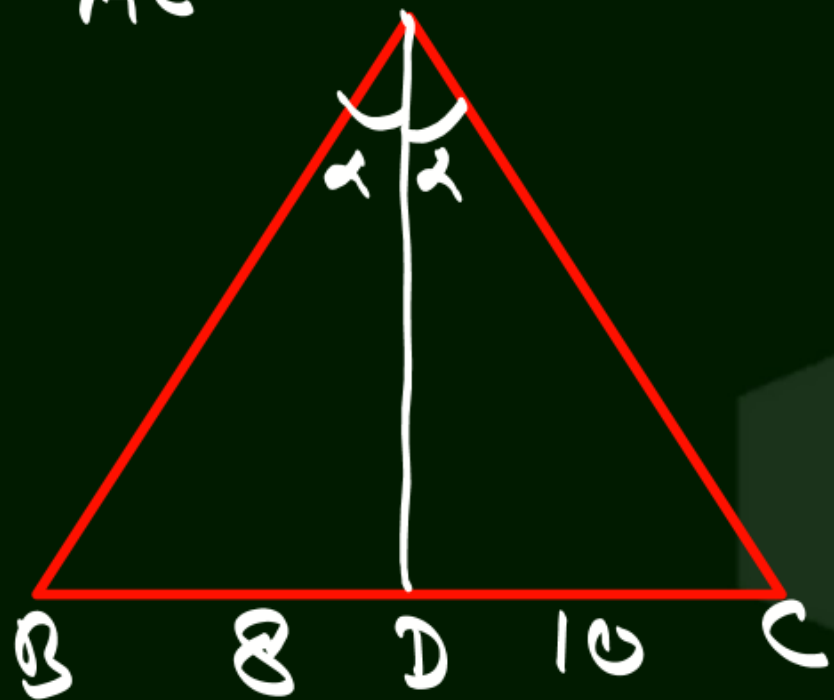
$$\frac{\sin \alpha}{\sin(180^\circ - \theta)} = \frac{BD}{AB} = \frac{\sin \alpha}{\sin \theta} \quad \text{--- ①}$$

In $\triangle ADC$

$$\frac{\sin \alpha}{\sin \theta} = \frac{DC}{AC} \quad \text{--- ②}$$

$$\frac{BD}{DC} = \frac{AB}{AC} = \frac{12}{15} = \frac{4}{5}$$

BD



$$9 = 18$$

$$8 = 4 : 5 = 10$$

In $\triangle ABC$, the internal bisector of $\angle A$ intersect side BC at D, If $AB = 12\text{cm}$ $AC = 15\text{cm}$ and $BC = 18\text{cm}$, then the length of BD is:

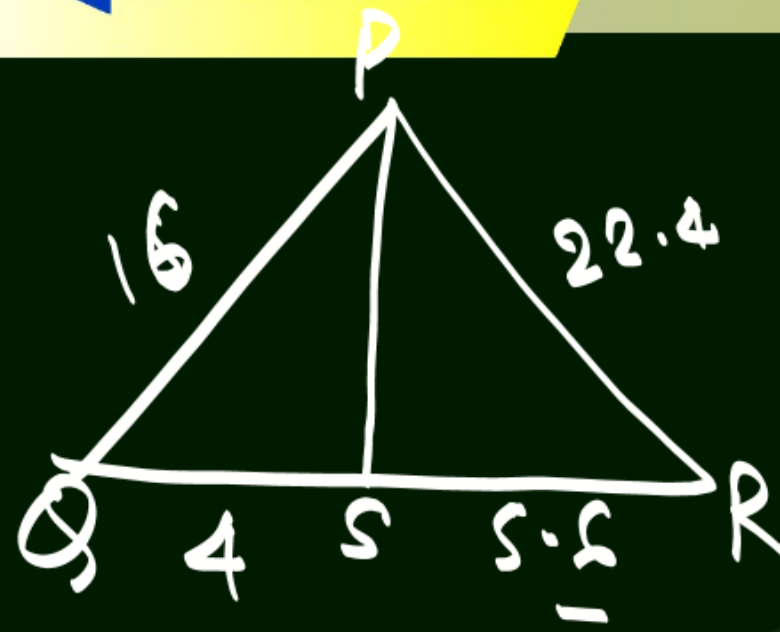
$\triangle ABC$ में $\angle A$ का अंतः समद्विभाजक भुजा BC को D पर प्रतिच्छेदित करता है। यदि $AB = 12\text{cm}$, $AC = 15\text{cm}$ और $BC = 18\text{cm}$ है, तो BD की लंबाई ज्ञात कीजिए।

(a) 7.5cm

(b) 8cm

(c) 9.6cm

(d) 9cm



$$16 : 22.4 = 4 : 5.6$$

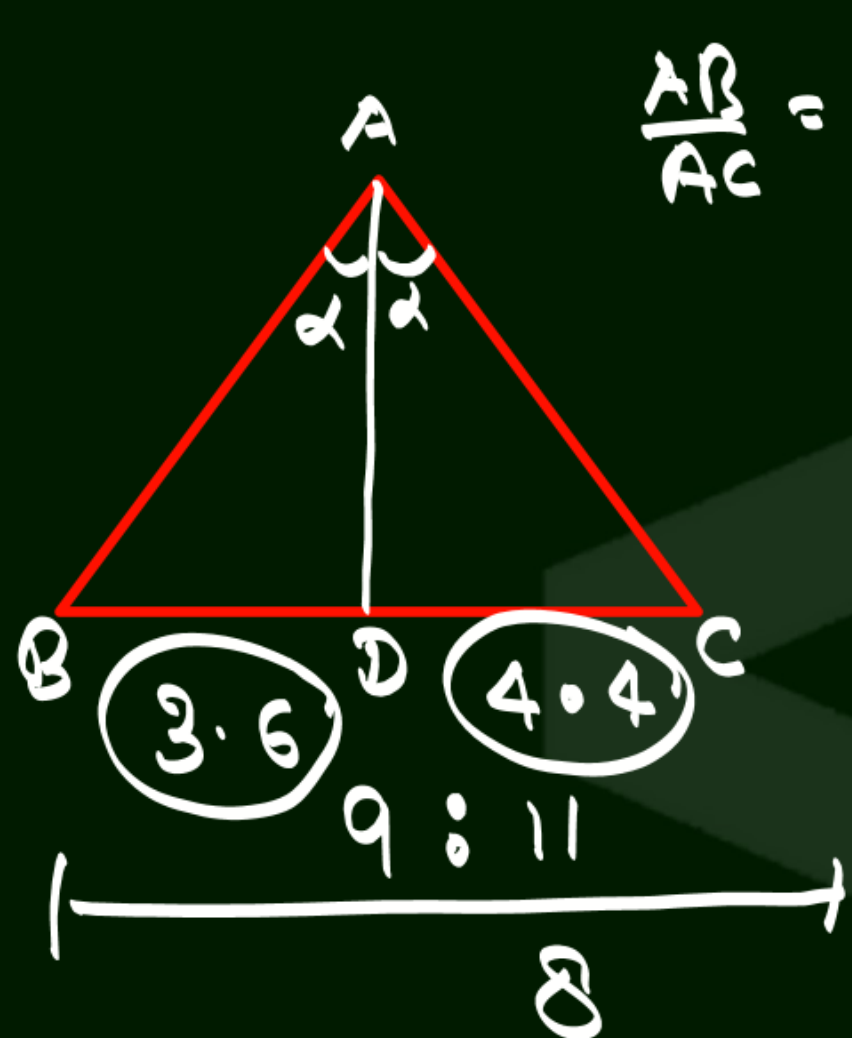
$$16 \div 4 = 4$$

$$22.4 \div 4 = 5.6$$

In $\triangle PQR$, PS is the internal bisector of $\angle P$ meeting QR at S, PQ = 16cm, PR = 22.4 cm and QR = 9.6cm length of SR (in cm) is:

$\triangle PQR$ में, $\angle P$ का अंतः समद्विभाजक भुजा QR को S पर प्रतिच्छेदित करता है। यदि PQ = 16cm, PR = 22.4cm और QR = 9.6cm है। SR की लंबाई (cm में) ज्ञात कीजिए।

- (a) 47
- (b) 4.4
- (c) 6
- ☒ (d) 5.6



$$\frac{AB}{AC} = \frac{BD}{DC} = \frac{9}{11}$$

In triangle ABC, AD is the internal bisector $\angle A$ meeting BC at D. If BD = 3.6 cm and BC = 8 cm, then the ratio of AB to AC will be

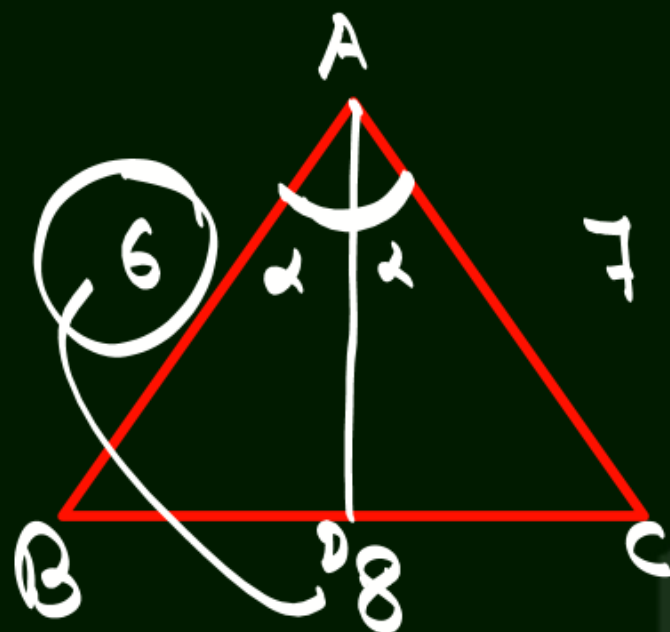
त्रिभुज ABC में, $\angle A$ का अंतः समद्विभाजक भुजा BC को D पर प्रतिच्छेदित करता है। यदि BD = 3.6 सेमी और BC 8 सेमी है, तो AB और AC का अनुपात होगा?

(a) 11:9

(b) 7:12

(c) 13:7

(d) 9:11



$$BD : DC$$

$$6 : 7$$

$$BD = 8 \times \frac{6}{13}$$

$$= \frac{48}{13}$$

लंबाई क्या है?

~~(a) $\frac{24}{5}$~~

☒ (c) $\frac{48}{13}$

~~(b) $\frac{21}{5}$~~

(d) $\frac{56}{13}$

In triangle ABC with sides 6 cm, 7 cm and 8 cm, the angle bisector of the largest angle divides the opposite side into two segment. What is the length of the shorter segment?

6 सेमी, 7 सेमी और 8 सेमी भुजाओं वाले $\triangle ABC$ में, सबसे बड़े कोण का कोण समद्विभाजक विपरीत भुजा को दो खंडों में विभाजित करता है। छोटे खंड की

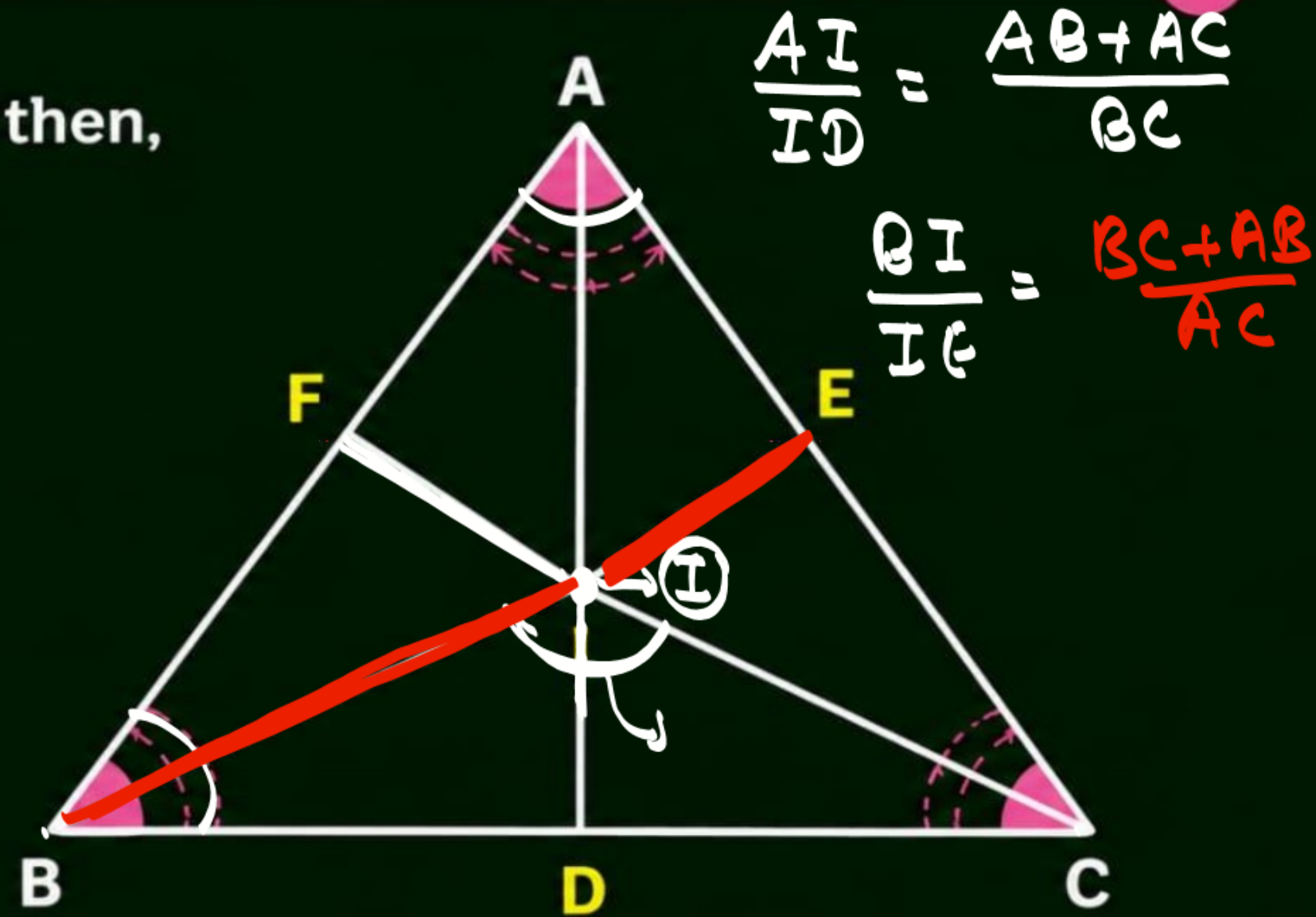
Concept :-

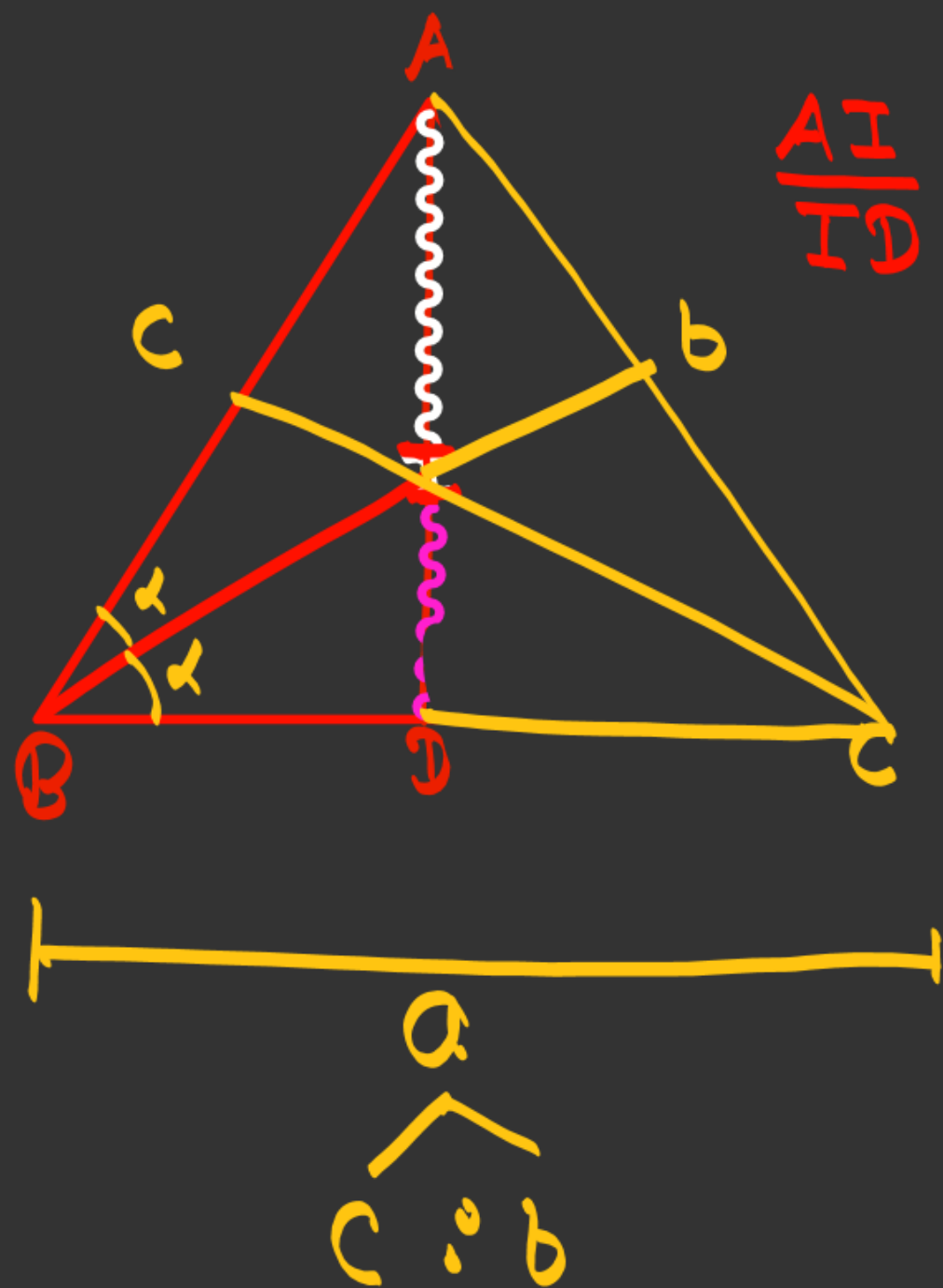
If **AD**, **BE** and **CF** are angle bisector then,

$$\checkmark \bullet \frac{AI}{ID} = \frac{AB + AC}{BC}$$

$$\checkmark \bullet \frac{BI}{IE} = \frac{AB + BC}{AC}$$

$$\checkmark \bullet \frac{CI}{IF} = \frac{AC + BC}{AB}$$





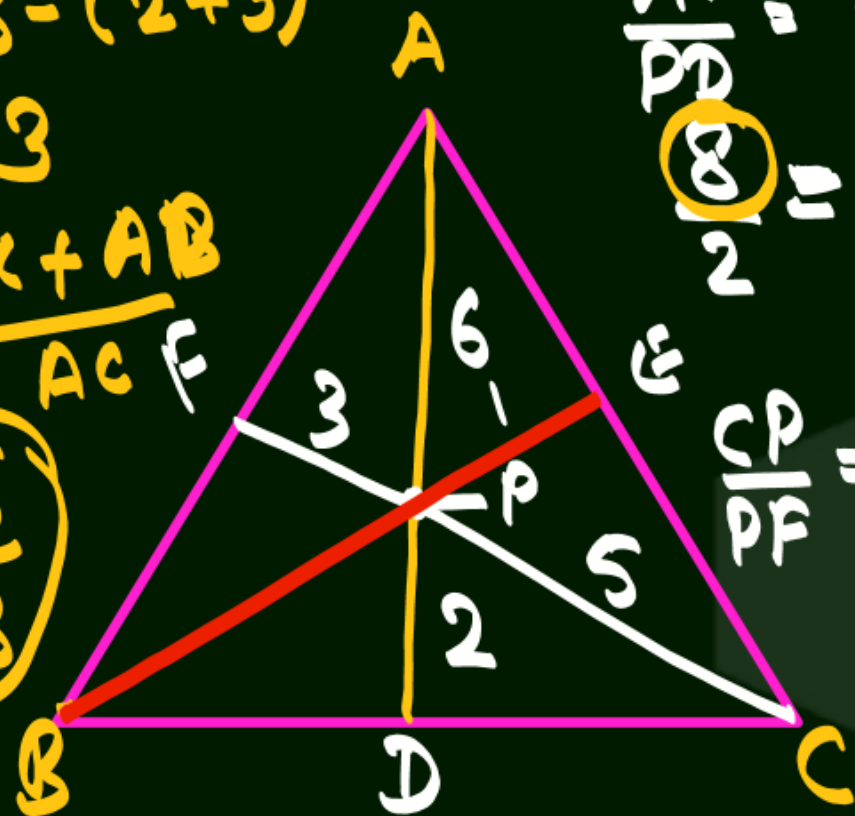
$$\frac{AI}{ID} = \frac{AB}{BD} = \frac{AB \times (AB+AC)}{BC \times AB}$$

$$= \frac{AB+AC}{BC}$$

$$BD = \frac{a \times c}{b+c} = \frac{BC \times AB}{AB+AC}$$

$$AC = 8 - (2 + 3) = 3$$

$$\frac{BP}{PE} = \frac{BC + AB}{AC} = \frac{5}{3}$$



$$\frac{AP}{PD} = \frac{AB + AC}{BC} = \frac{6}{2}$$

$$\frac{8}{2} = \frac{AB + AC + BC}{BC}$$

$$\frac{CP}{PF} = \frac{AC + BC}{AB} = \frac{5}{3}$$

$$\frac{AC + BC + AB}{AB} = \frac{8}{3}$$

In the given figure 'P' is meeting point of all the angle bisector of triangle ABC.

If AP = 6, CP = 5, PD = 2, PE = 1, PF = 3 cm find BP = ?

दी गई आकृति में 'P' त्रिभुज ABC के सभी कोणों के समद्विभाजक का मिलन बिंदु है। यदि AP = 6, CP = 5, PD = 2, PE = 1, PF = 3 सेमी तो BP = ?

(a) $\frac{5}{3}$

(b) $\frac{4}{3}$

(c) $\frac{7}{3}$

(d) $\frac{8}{3}$

$$\frac{AO}{OE} = \frac{AB+AC}{BC} = \frac{5}{4} \quad \text{All} = \frac{9 \times 5}{4 \times 5} = \frac{45}{20}$$

$$\frac{CO}{OD} = \frac{AC+BC}{AB} = \frac{3}{2} \quad \text{All} = \frac{5 \times 9}{2 \times 9} = \frac{45}{18}$$

$$\text{All} - (AB+BC) \\ 45 - 38 = 7 \quad B$$

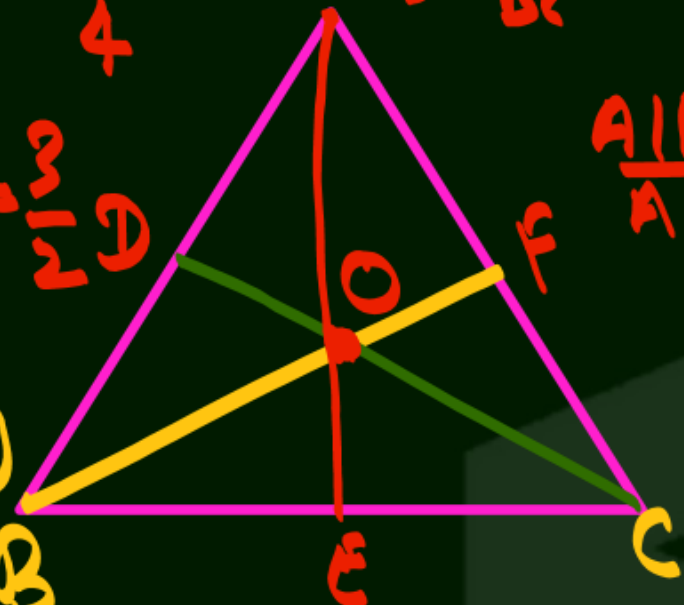
$$BC : AB : AC \\ 20 : 18 : 7$$

$$\frac{BO}{OF} = \frac{BC+AB}{AC} \\ = \frac{20+18}{7} \quad (a) \frac{19}{14}$$

$$(c) \frac{38}{7}$$

$$(b) \frac{38}{17}$$

$$(d) \frac{19}{7}$$



In the given figure 'O' is meeting point of all the angle bisector of triangle ABC. If $\frac{AO}{OE} = \frac{5}{4}$, $\frac{CO}{OD} = \frac{3}{2}$ then find the value of $\frac{BO}{OF}$.

त्रिभुज ABC. के कोण समद्विभाजक बिंदु 'O' पर प्रतिच्छेद करते हैं। यदि $\frac{AO}{OE} = \frac{5}{4}$, $\frac{CO}{OD} = \frac{3}{2}$

तो $\frac{BO}{OF}$ का मान बताओ?

H.W

In the given figure 'O' is meeting point of all the angle bisector of triangle ABC. If $\frac{AO}{OE} =$

$\frac{7}{4}$, $\frac{CO}{OD} = \frac{3}{2}$ then find the value of $\frac{BO}{OF}$

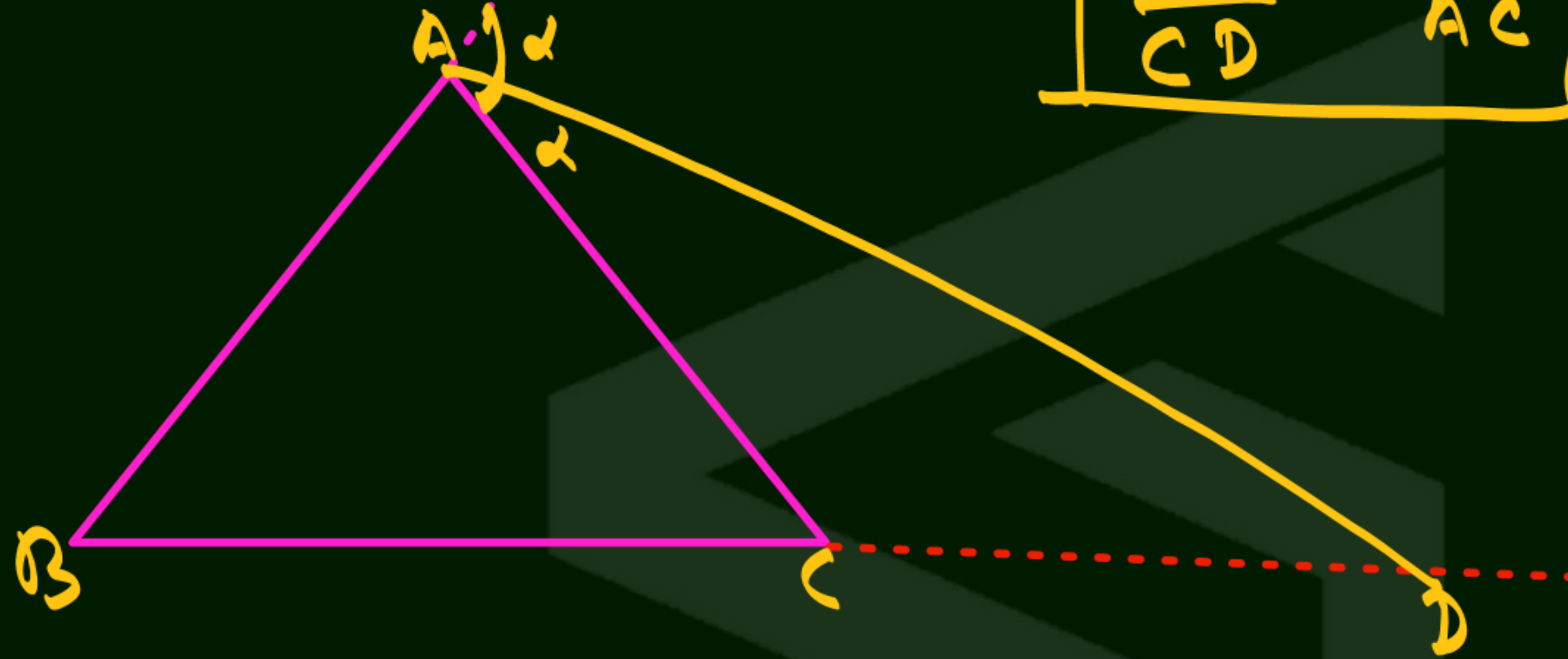
त्रिभुज ABC के कोण समद्विभाजक बिंदु 'O' पर प्रतिच्छेद करते हैं। $\frac{AO}{OE} = \frac{7}{4}$, $\frac{CO}{OD} = \frac{3}{2}$ तो $\frac{BO}{OF}$ का मान बताओ?

(a) $\frac{42}{13}$

(b) $\frac{61}{23}$

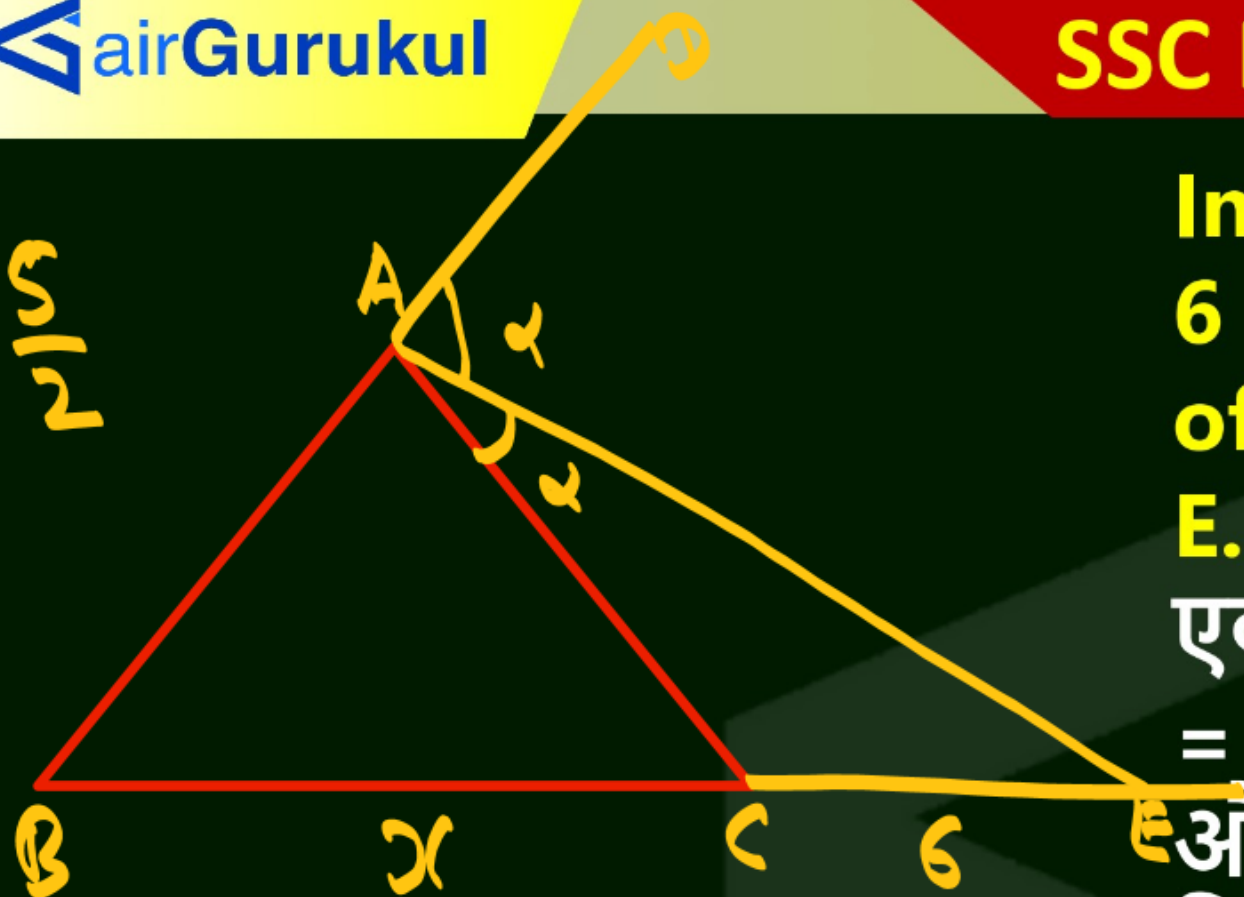
(c) $\frac{65}{23}$

(d) $\frac{68}{36}$



$$\frac{BD}{CD} = \frac{AB}{AC}$$

$$\frac{AB}{AC} = \frac{5}{2}$$



In a triangle ABC, $AB : AC = 5 : 2$, if $CE = 6$ cm, BA is produced to D and bisectors of the angle CAD meets BC produced at E. what is the length of BC?

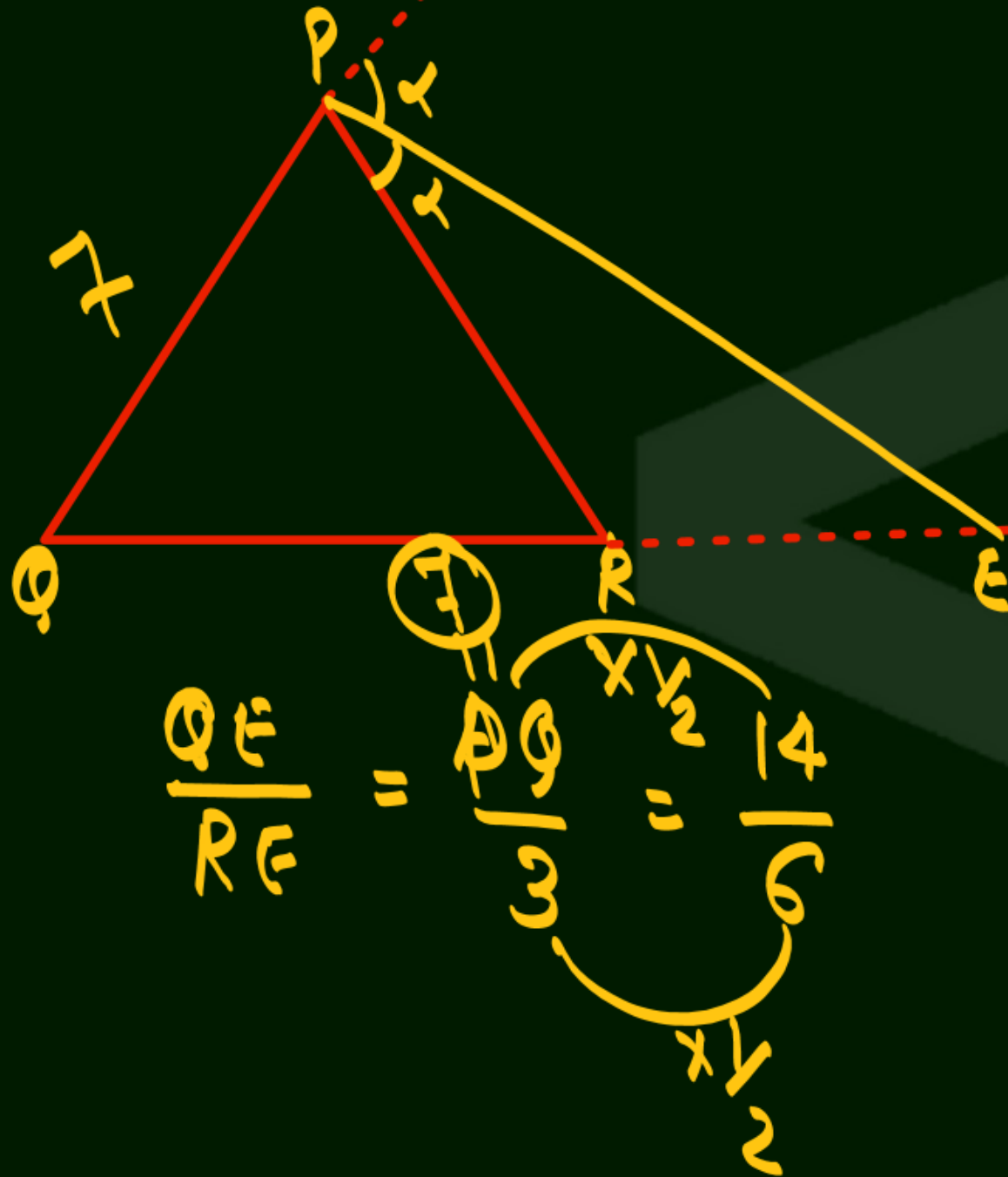
एक त्रिभुज ABC में, $AB : AC = 5 : 2$, यदि $CE = 6$ सेमी है, तो BA को D तक बढ़ाया जाता है और कोण CAD का समद्विभाजक BC को E पर मिलता है। BC की लंबाई क्या है?

$$\frac{BE}{CE} = \frac{AB}{AC}$$

$$\frac{x+6}{6} = \frac{5}{2} \Rightarrow x+6=15$$

$$x=9$$

- (a) 9
(b) 10
(c) 6
(d) 3



In a triangle PQR, QP is produced to S, if PR = 3cm , QE = 14cm , RE = 6 and QR is produced to E and bisector of angle RPS to meet QR at E. What is the length of PQ.

एक त्रिभुज PQR में, QP को S तक बढ़ाया जाता है, यदि PR = 3 सेमी, QE = 14 सेमी, RE = 6 और QR को E तक बढ़ाया जाता है और कोण RPS का समद्विभाजक QR को E पर मिलता है। PQ की लंबाई क्या है?

- (a) 8 cm
- (b) 7 cm
- (c) 9 cm
- (d) 10 cm

Triangle condition



Similarity
(समरूपता)

$$\begin{aligned} \angle A &= \angle D \\ \angle B &= \angle E \\ \angle C &= \angle F \end{aligned}$$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

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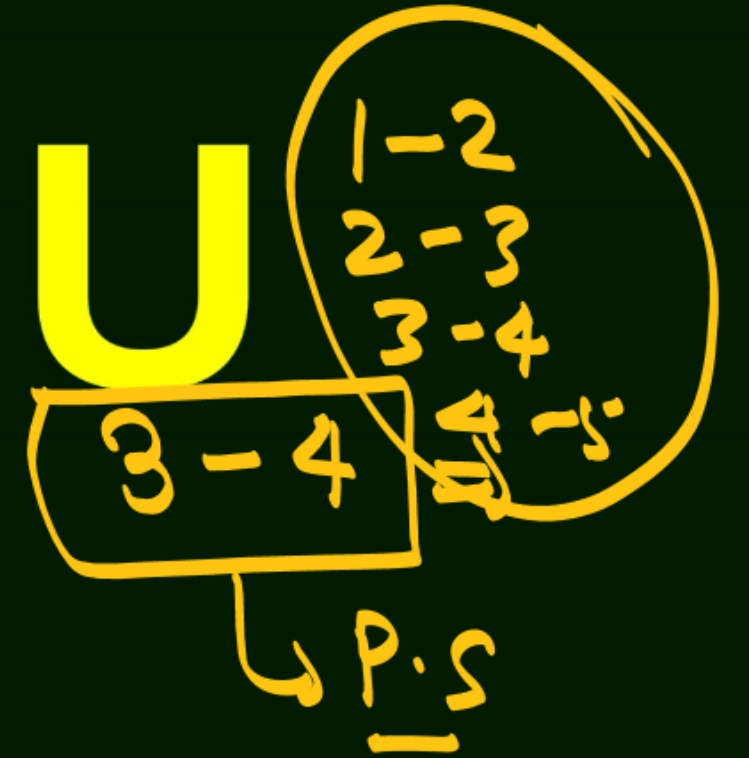
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