

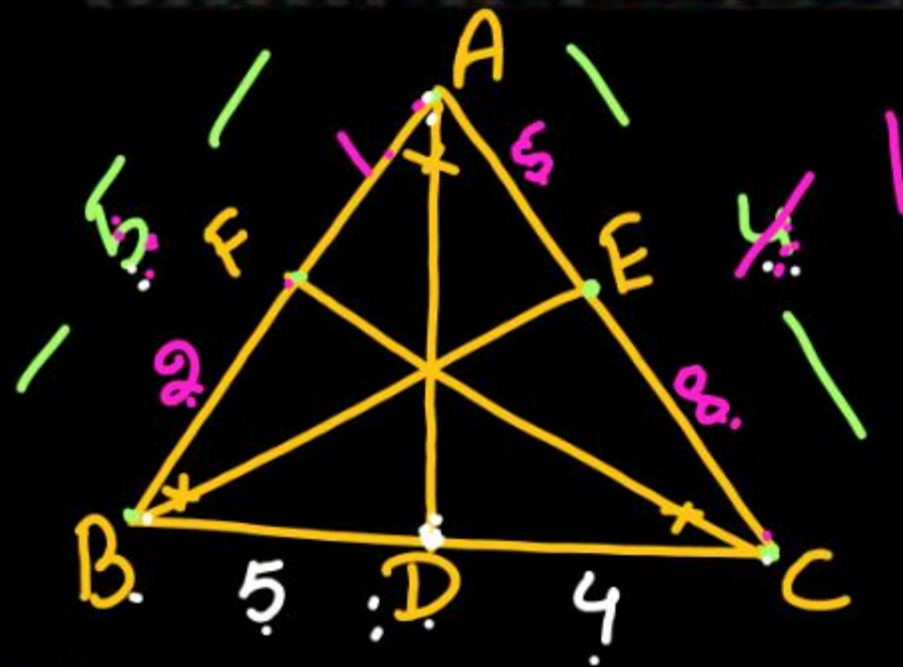
Foundation Batch

MATHS

Similarity and Congruency

LIVE 26-09-2024 07:00PM





In a $\triangle ABC$, AD , BE & CF are the interior bisector of $\angle A$, $\angle B$ & $\angle C$ respectively. If $AB = 5$ cm, $BC = 8$ cm & $AC = 4$ cm, then find, CE & BD .

$\triangle ABC$ में AD , BE और CF क्रमशः $\angle A$, $\angle B$ और $\angle C$ के कोण समद्विभाजक है। यदि $AB = 5$ सेमी, $BC = 8$ सेमी, और $AC = 4$ सेमी हो तो AF , CE एवं BD की लंबाई ज्ञात करें?

(a) 2 cm, 2.5 cm, 4.5 cm

(b) $\frac{5}{3}$ cm, $\frac{32}{13}$ cm, $\frac{40}{9}$ cm

(c) 3.5 cm, 2 cm, 4 cm,

(d) 2.5 cm, 3.5 cm, 4.5 cm

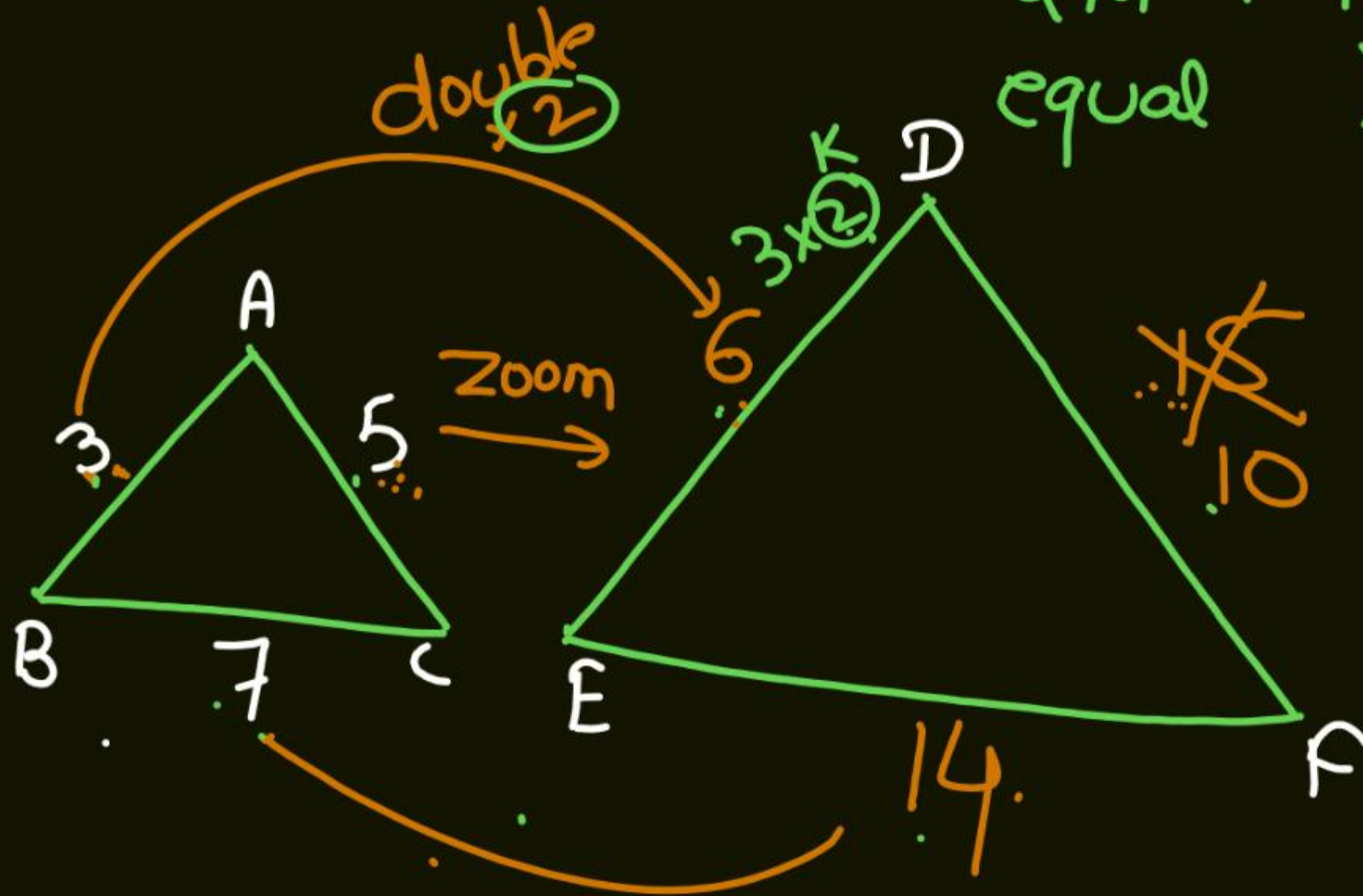
$3 \rightarrow 5$
 $1 \rightarrow \frac{5}{3}$
 $AF \rightarrow \frac{5}{3}$
 $1 \rightarrow \frac{5}{3}$
 $BD \rightarrow 5 \rightarrow \frac{8}{9} \times 5 = \frac{40}{9}$

$13 \rightarrow 4$
 $1 \rightarrow \frac{4}{13}$
 $CE \rightarrow 8 \rightarrow \frac{4}{13} \times 8 = \frac{32}{13}$

Similarity & Congruency
समरूपता सद्वर्गसमता

Similarity (समरूपता)

↓
सम + रूप
equal ↓ face





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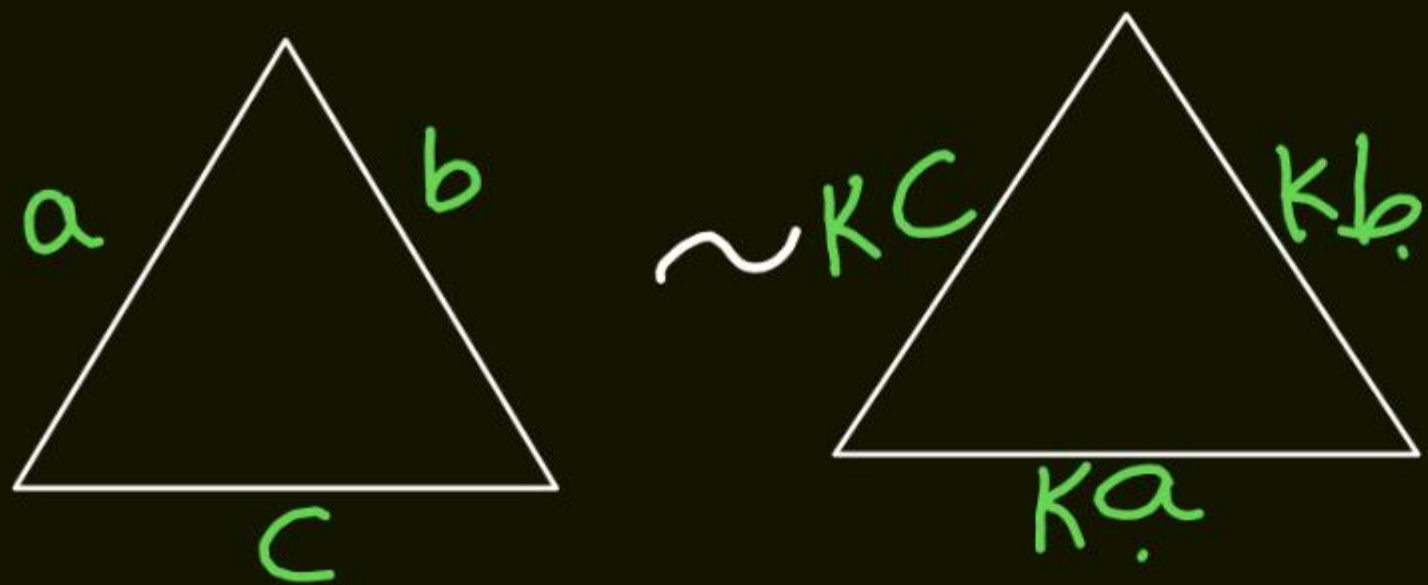
MATHS



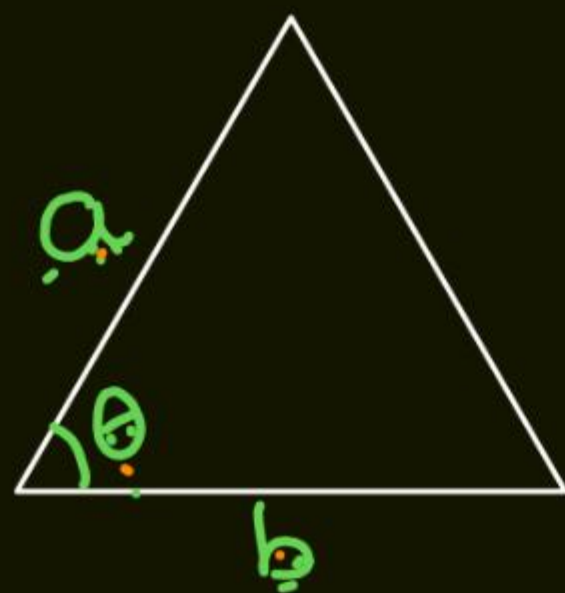
Similarity Based Question



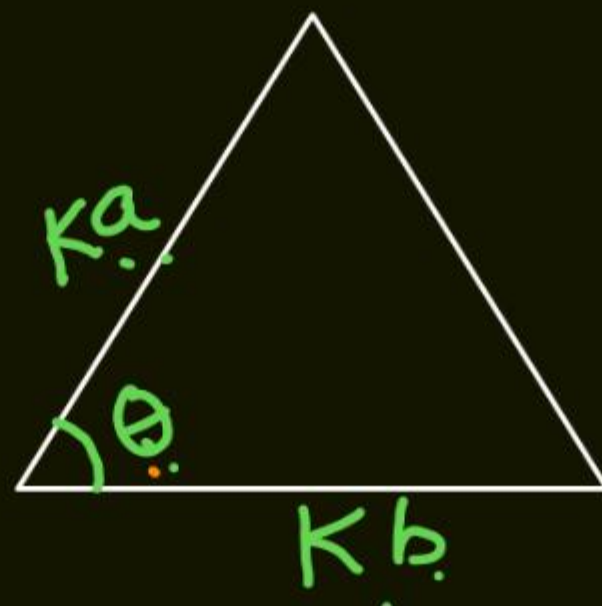
↳ A-A property



$\hookrightarrow$ S.S.S. property



$\sim$



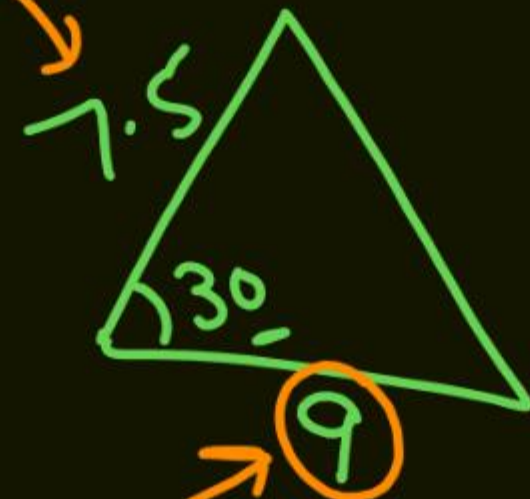
$\hookrightarrow$

SAS

property.

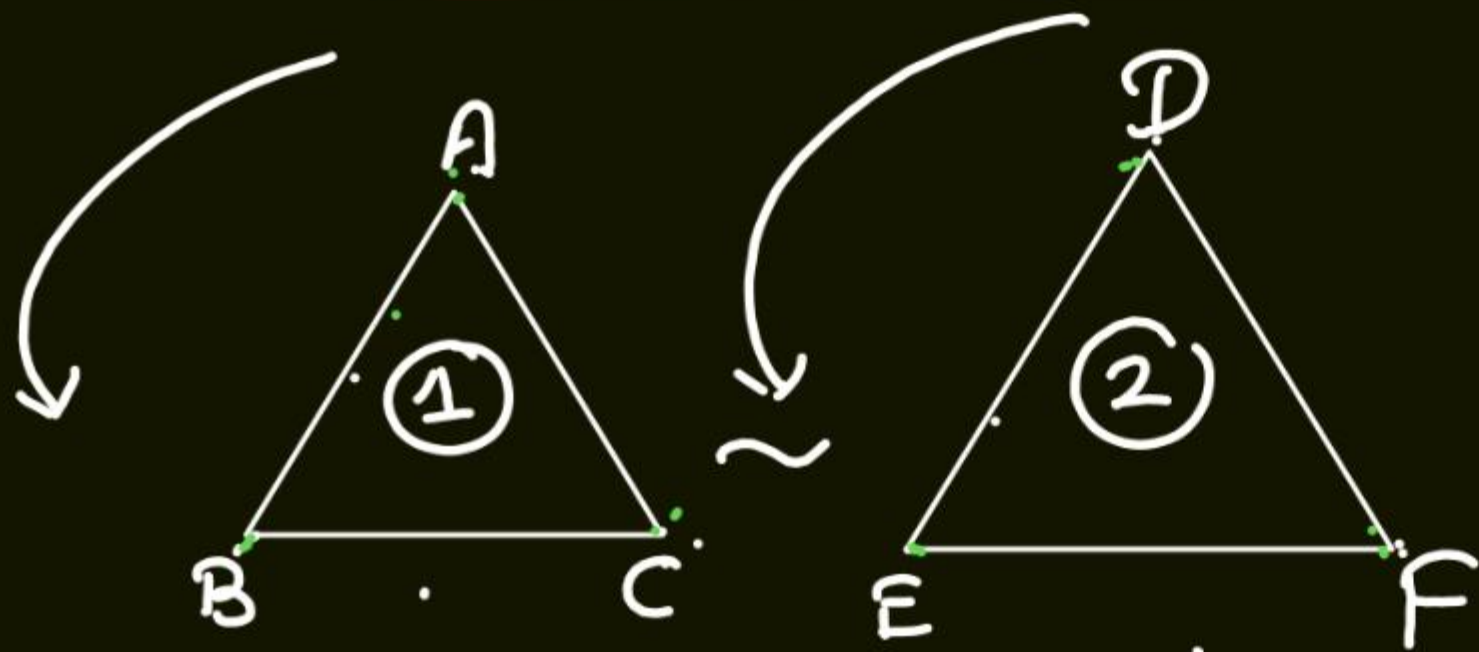


$\sim$



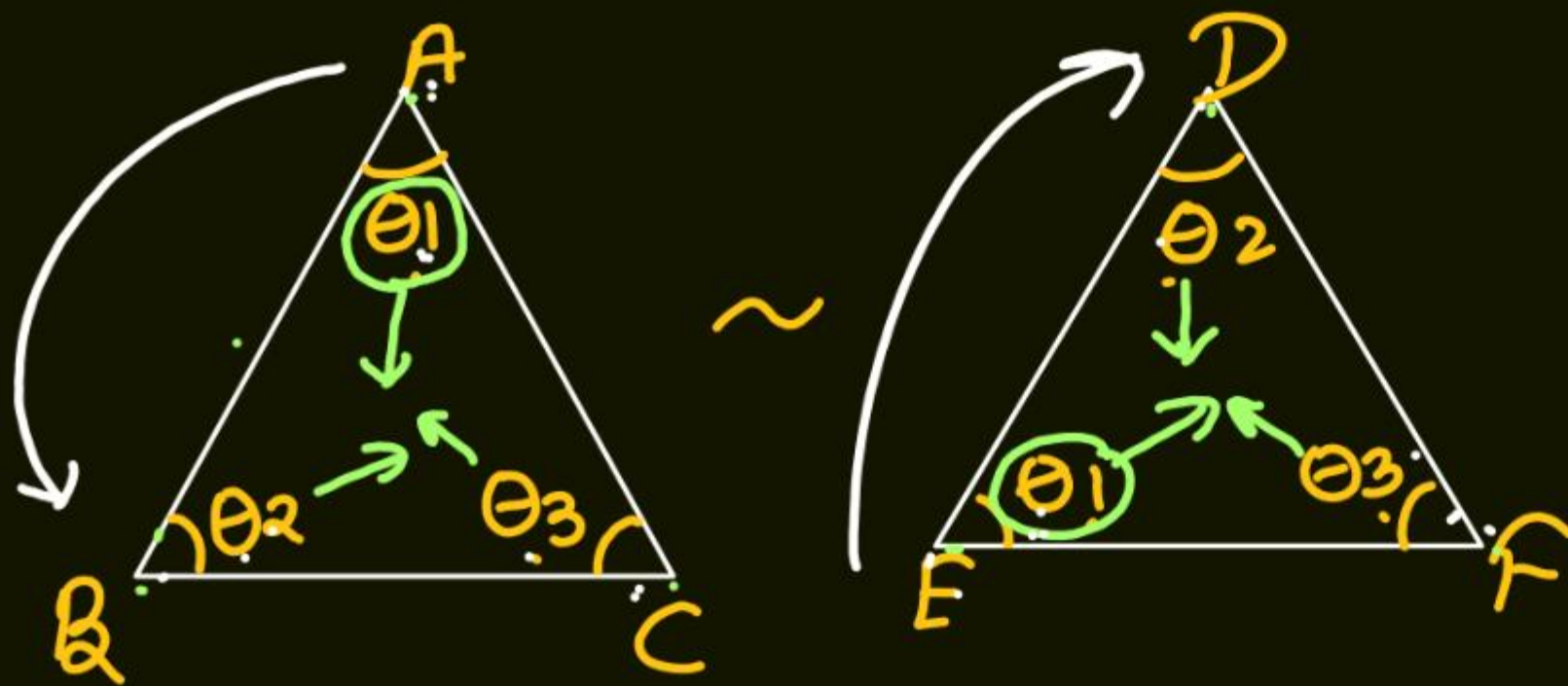
Yes/No.

$$\triangle ABC \sim \triangle DEF$$



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

Ratio of corresponding sides are equal
 համապատասխան կողմերի հարաբերակ հավասար է

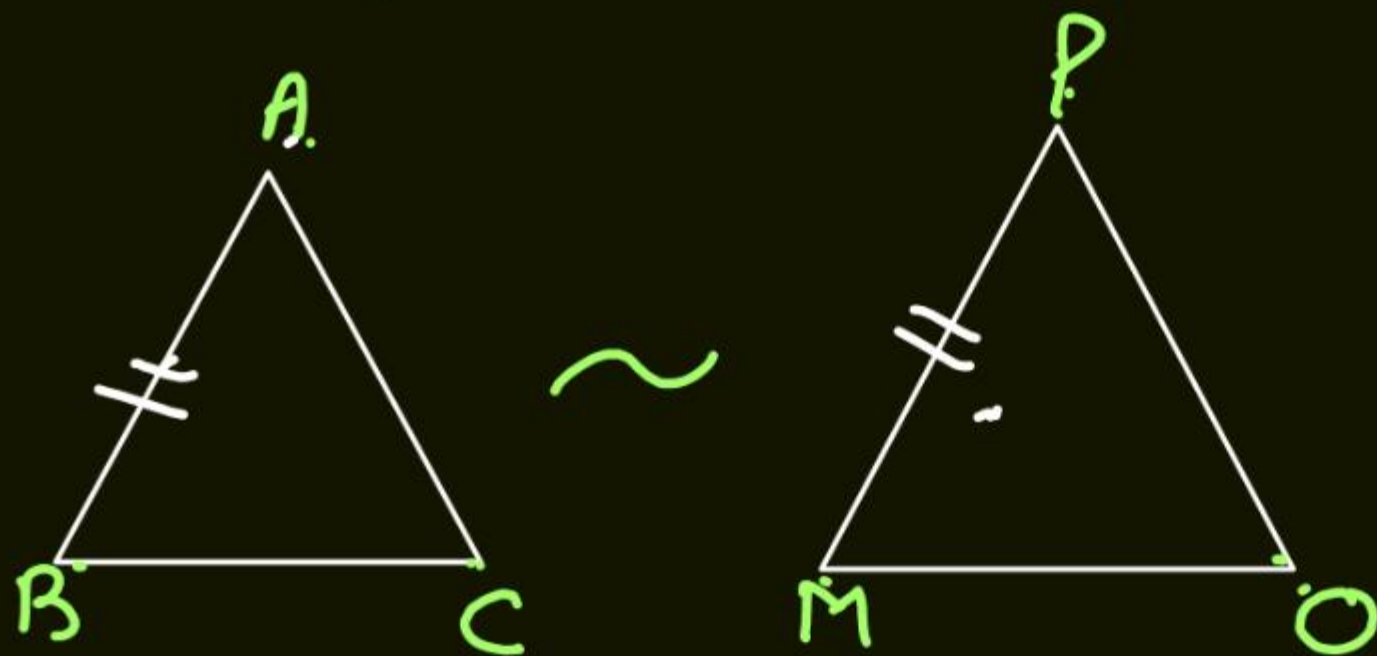


$$\frac{BC}{DF} = \frac{AC}{EF} = \frac{AB}{DE}$$

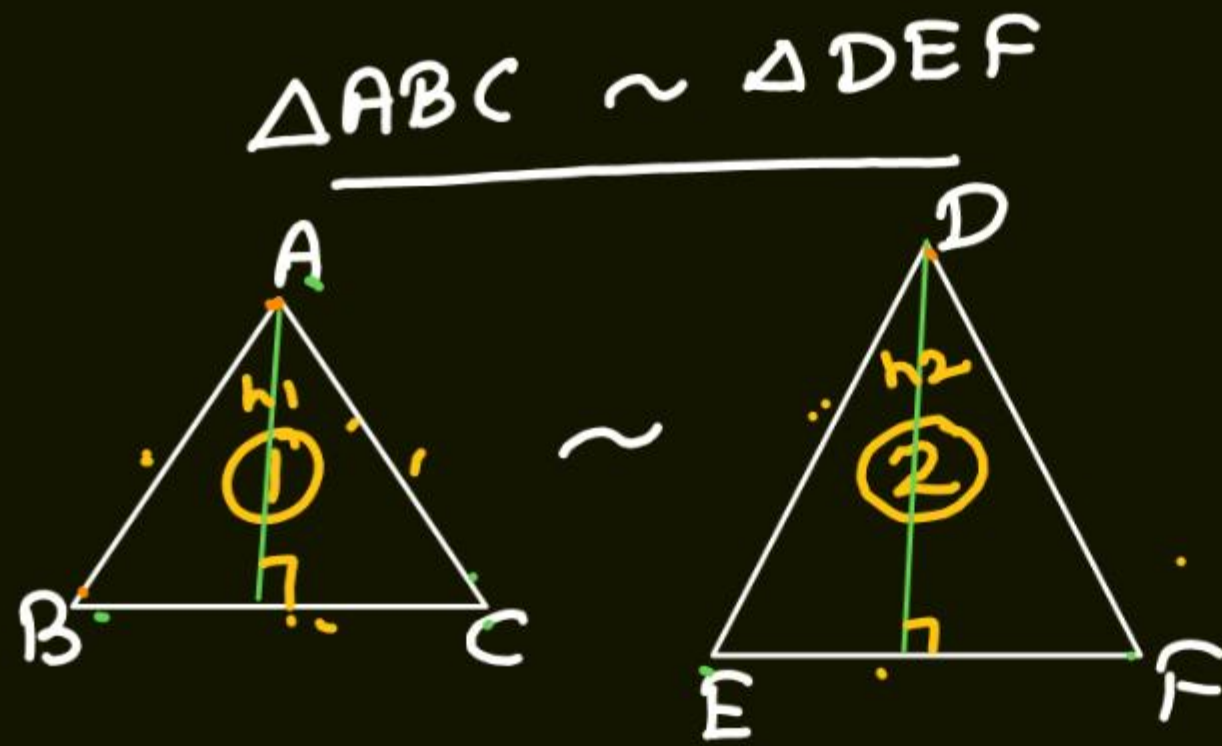
$$\triangle ABC \sim \triangle EDF$$



$$\triangle ABC \sim \triangle PMO$$



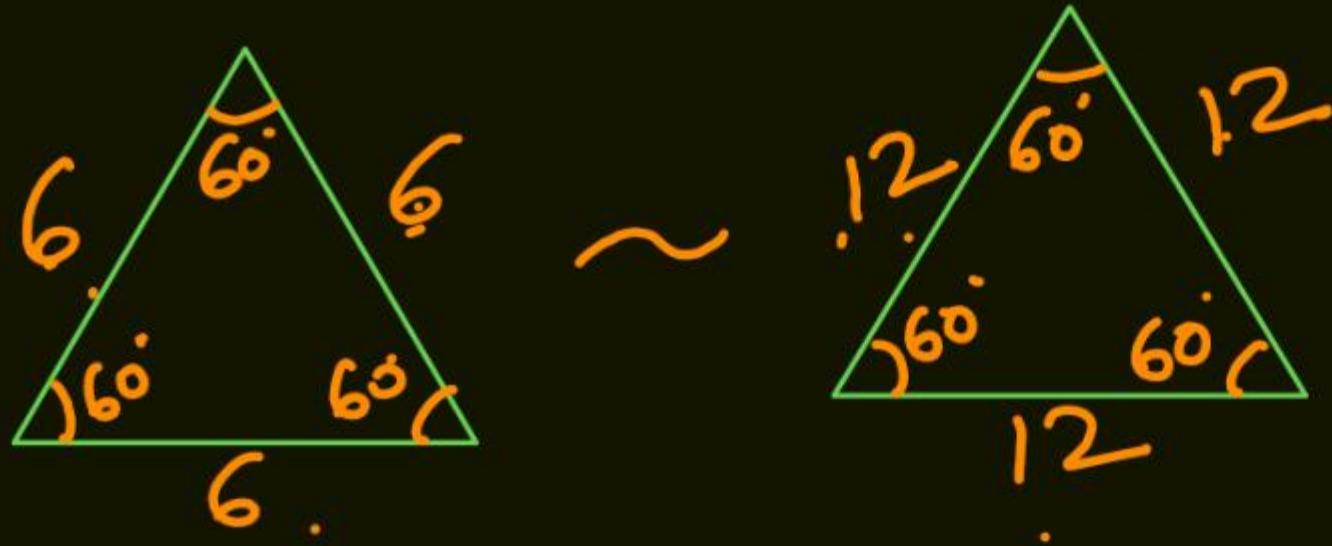
$$\frac{AB}{PM} = \frac{BC}{MO} = \frac{AC}{PO}$$



median

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{(\text{Perimeter})_1}{(\text{Perimeter})_2} = \frac{h_1}{h_2} = \frac{(\text{माध्यिका})_1}{(\text{माध्यिका})_2} = \frac{\sqrt{\text{Area}_1}}{\sqrt{\text{Area}_2}}$$

$$\frac{(\text{Area})_1}{(\text{Area})_2} = \left[\frac{AB}{DE} \right]^2 = \left(\frac{BC}{EF} \right)^2 = \left(\frac{AC}{DF} \right)^2$$



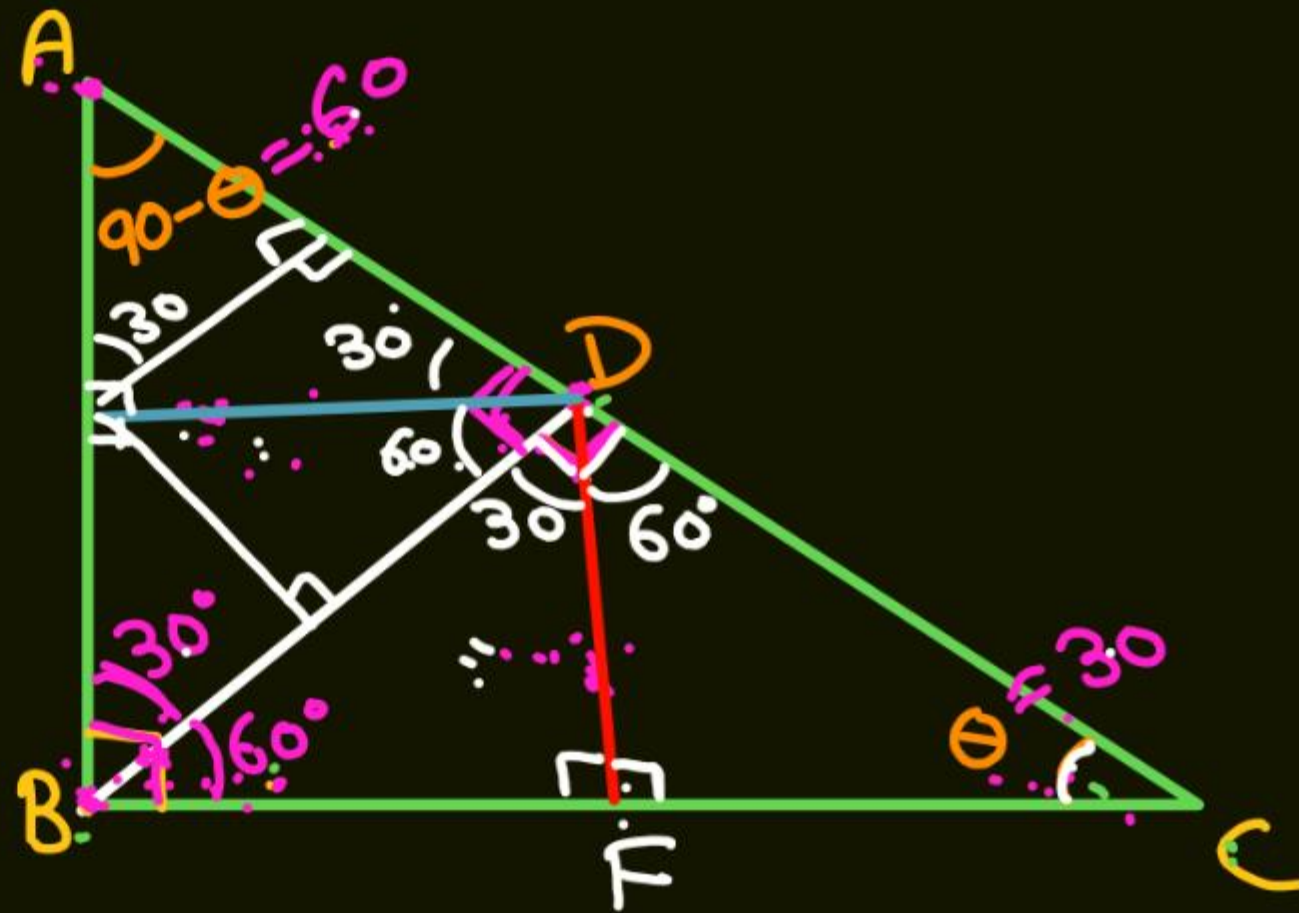
* Two equilateral triangle are always similar
दो समबाहु त्रिभुज हमेशा समरूप होंगे।

Right Angle Triangle (સમકોણ ત્રિજુગ)

$$\triangle ABC \sim \triangle BDC$$

$$\triangle ABC \sim \triangle ADB$$

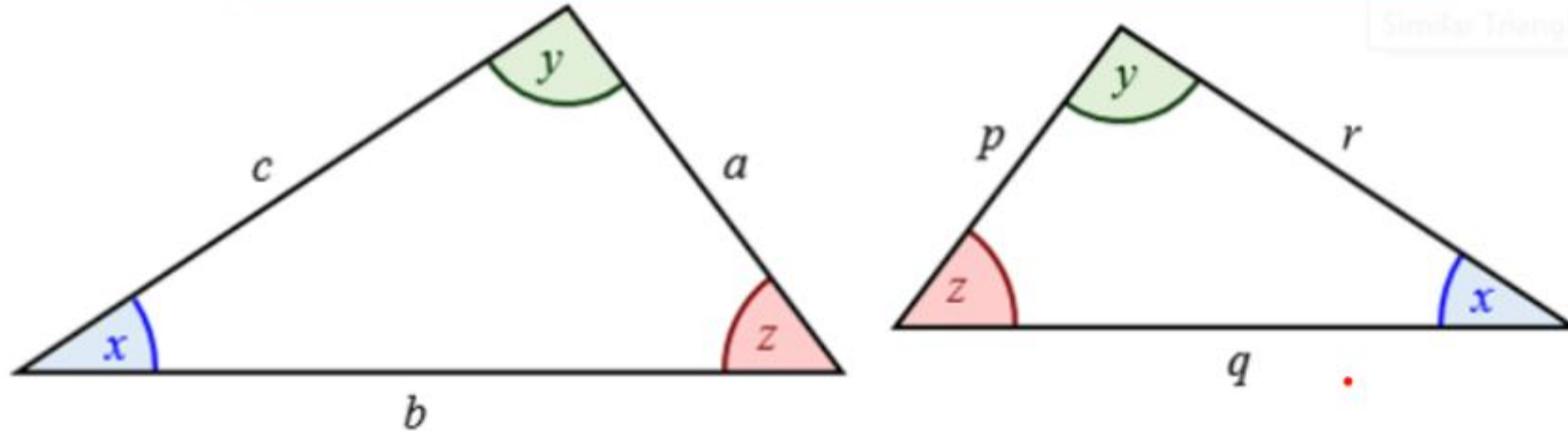
$$\triangle ADB \sim \triangle BDC$$



Similar Triangles

- Same shape, but not necessarily the same size.
- Corresponding angles are equal.
- Corresponding sides are in the same ratio.

$$\frac{a}{p} = \frac{b}{q} = \frac{c}{r}$$



To test for similar triangles:

- **AA** - If 2 corresponding angles are equal.
- **SSS** - If 3 corresponding sides are in the same ratio.
- **SAS** - Ratio of 2 pairs of corresponding sides are equal and their included angles are equal.



1. ABC is a triangle in which $\angle ABC = 90^\circ$, BD is perpendicular to AC. Which of the following is true?

ABC एक त्रिभुज है जिसमें $\angle ABC = 90^\circ$ है। BD, AC के लंब है। निम्न में से कौन-सा सत्य है?

(i) त्रिभुज BAD, त्रिभुज CBD के समरूप है/
Triangle BAD is similar to triangle CBD

(ii) त्रिभुज BAD, त्रिभुज CAB के समरूप है/
Triangle BAD is similar to triangle CAB

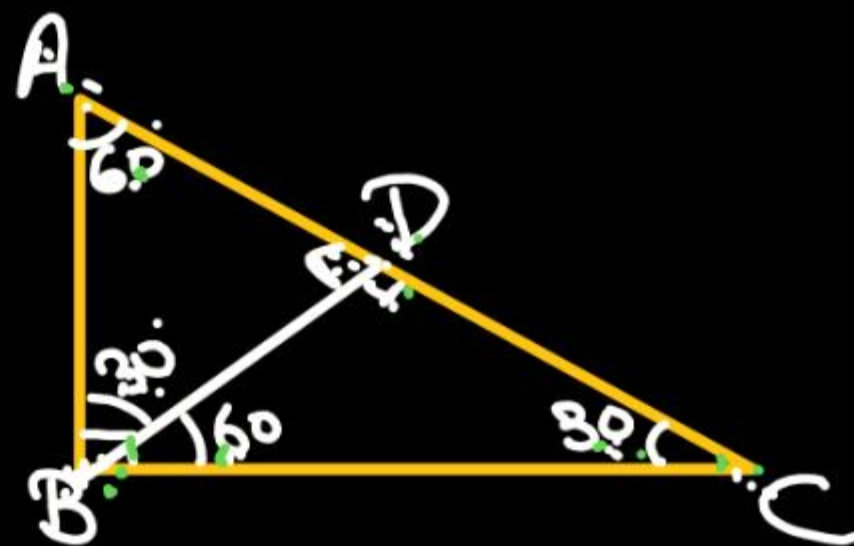
(iii) त्रिभुज CBD त्रिभुज CAB के समरूप है/
Triangle CBD is similar to triangle CAB

(a) केवल I / Only I

(b) केवल II और III / Only II and III

(c) केवल I और III / Only I and III

(d) सभी I, II और III / All I, II and III



$$\triangle BAD \sim \triangle CBD$$

$$\triangle BAD \sim \triangle CAB \checkmark$$

$$\triangle CBD \sim \triangle CAB \checkmark$$

(SSC CGL Mains, 09/03/2018)



2. If the ratio of the areas of two similar triangles is $196 : 625$, then what will be the ratio of the corresponding sides?

यदि दो समरूप त्रिभुजों के क्षेत्रफलों का अनुपात $196 : 625$ है, तो संगत भुजाओं का अनुपात क्या होगा?

SSC CGL 18/07/2023 (2nd shift)

- ✓ (a) $14:25$ (b) $13:20$
(c) $14:20$ (d) $13:25$

Area $196 : 625$

भुजा $\sqrt{196} : \sqrt{625}$

$14 : 25$



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3. $\triangle ABC$ is similar to $\triangle DEF$. The perimeters of $\triangle ABC$ and $\triangle DEF$ are 40 cm and 30 cm respectively. What is the ratio of $(BC + CA)$ to $(EF + FD)$ equal to:

$\triangle ABC, \triangle DEF$ के समरूप है। $\triangle ABC$ और $\triangle DEF$ के परिमाप क्रमशः 40 सेमी और 30 सेमी हैं। $(BC + CA)$ और $(EF + FD)$ का अनुपात क्या है?

- (a) 5:4
(c) 3:2

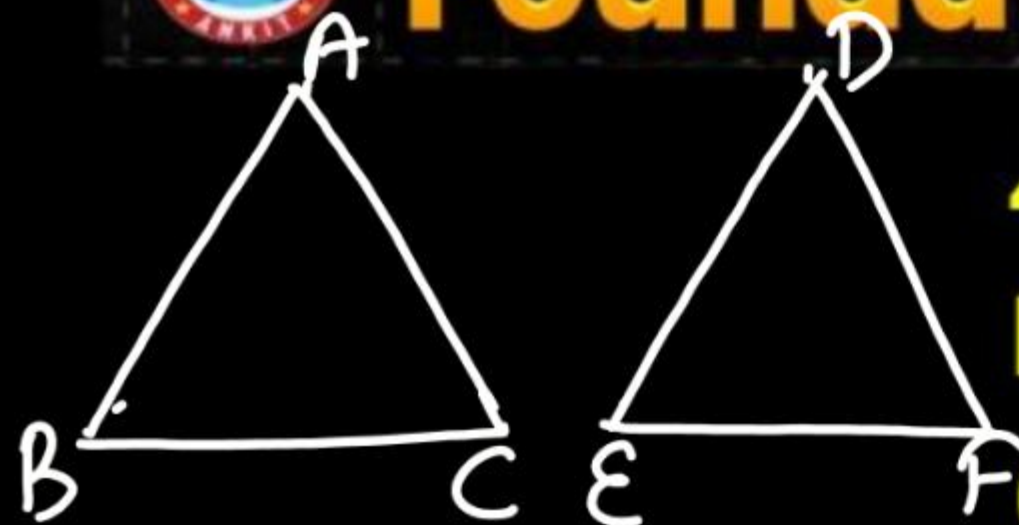
- (b) 4:3
(d) 2:1

(CDS)

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{(\text{परिमाप})_1}{(\text{परिमाप})_2}$$

$$(BC + CA) : (EF + FD)$$
$$(4 + 4) : (3 + 3)$$

$$\cancel{8} : \cancel{6}$$
$$\underline{\underline{4 : 3}}$$



4. ABC and DEF are similar triangles. If the ratio of side AB to side DE is $(\sqrt{2} + 1) : \sqrt{3}$, then the ratio of area of triangle ABC to that of DEF is :

ABC और DEF समरूप त्रिभुज हैं। यदि भुजा AB और भुजा DE का अनुपात $(\sqrt{2} + 1) : \sqrt{3}$ है, तो त्रिभुज ABC के क्षेत्रफल और DEF के क्षेत्रफल का अनुपात है:

$$\frac{AB}{DE} = \frac{\sqrt{2} + 1}{\sqrt{3}}$$

$$\frac{(Area)_{ABC}}{(Area)_{DEF}} = \left(\frac{AB}{DE} \right)^2 = \left(\frac{\sqrt{2} + 1}{\sqrt{3}} \right)^2$$

$$= \frac{2 + 1 + 2\sqrt{2}}{3} = \left(\frac{3 + 2\sqrt{2}}{3} \right)$$

- (a) $(3 + 2\sqrt{2}) : 3$ (b) $(9 - 6\sqrt{2}) : 2$
 (c) $1 : (9 - 6\sqrt{2})$ (d) $(3 + 2\sqrt{2}) : 2$



Q.5

5. The area of two similar triangles $(7 - 4\sqrt{3}) \text{ cm}^2$ and $(7 + 4\sqrt{3}) \text{ cm}^2$ respectively. The ratio of their corresponding sides is :

दो समान त्रिभुजाओं का क्षेत्रफल क्रमशः $(7 - 4\sqrt{3})$ सेमी² और $(7 + 4\sqrt{3})$ सेमी² है। उनकी संगत भुजाओं का अनुपात है:

- (a) $(7 - 4\sqrt{3})$ (b) $(7 - 3\sqrt{3})$
(c) $(5 - \sqrt{3})$ (d) $(5 + \sqrt{3})$