[Aim: 100/100 in Maths]

अभय CLASS 10

TRIANGLES

BPT

Similarity

L - 2

Proof of BPT :- If a line is drawn parallel to one side of a Δ to intersect the other two sides in distinct points, other two sides are divided in same ratio.

...ne base

[I]

...oin Δs
...ame base
...d b/w
...l lines
...DE

...(ABED) = ar(ΔCED) ... (A)

Given :- ΔABC, $DE \parallel BC$.

To prove :- $\frac{AD}{DB} = \frac{AE}{EC}$

Construction :- Join BE, CD

Proof :-

[I] $$\frac{ar.(\Delta ADE) = \cancel{\frac{1}{2}} \times AD \times \cancel{EF}}{ar(\Delta BED) = \cancel{\frac{1}{2}} \times BD \times \cancel{EF}}$$ divide

$$\Rightarrow \frac{ar(\Delta ADE)}{ar(\Delta BED)} = \frac{AD}{BD} \quad \text{— (I)}$$

[II] $$\frac{ar(\Delta ADE) = \cancel{\frac{1}{2}} \times AE \times \cancel{DG}}{ar(\Delta CDE) = \cancel{\frac{1}{2}} \times CE \times \cancel{DG}}$$ div

$$\frac{ar(\Delta ADE)}{ar(\Delta CED)} = \frac{AE}{CE} \quad \text{— (II)}$$

from eq (A)

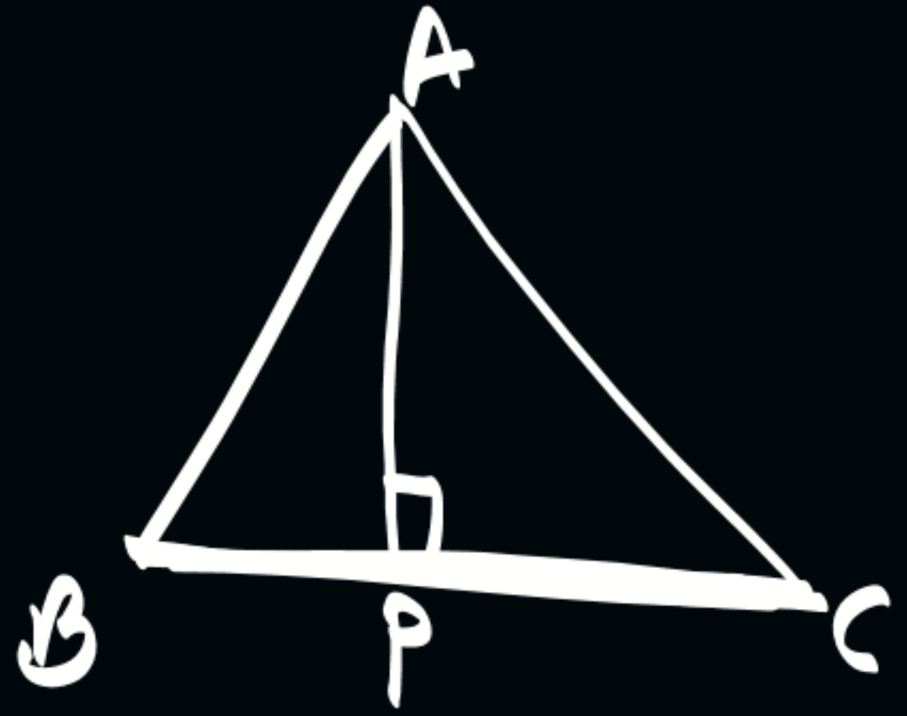
$$\frac{ar(\Delta ADE)}{ar(\Delta BED)} = \frac{AE}{CE} \quad \text{— (III)}$$

Now from (I) & (III)

$$\boxed{\frac{AD}{BD} = \frac{AE}{CE}}$$

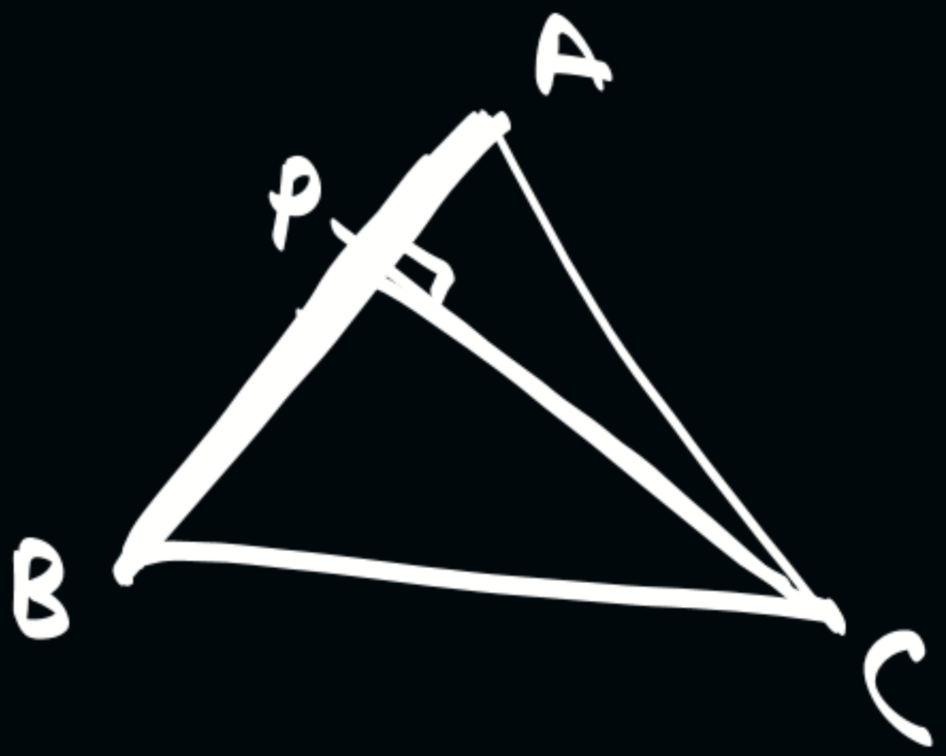
H.P

ar. of Δ :

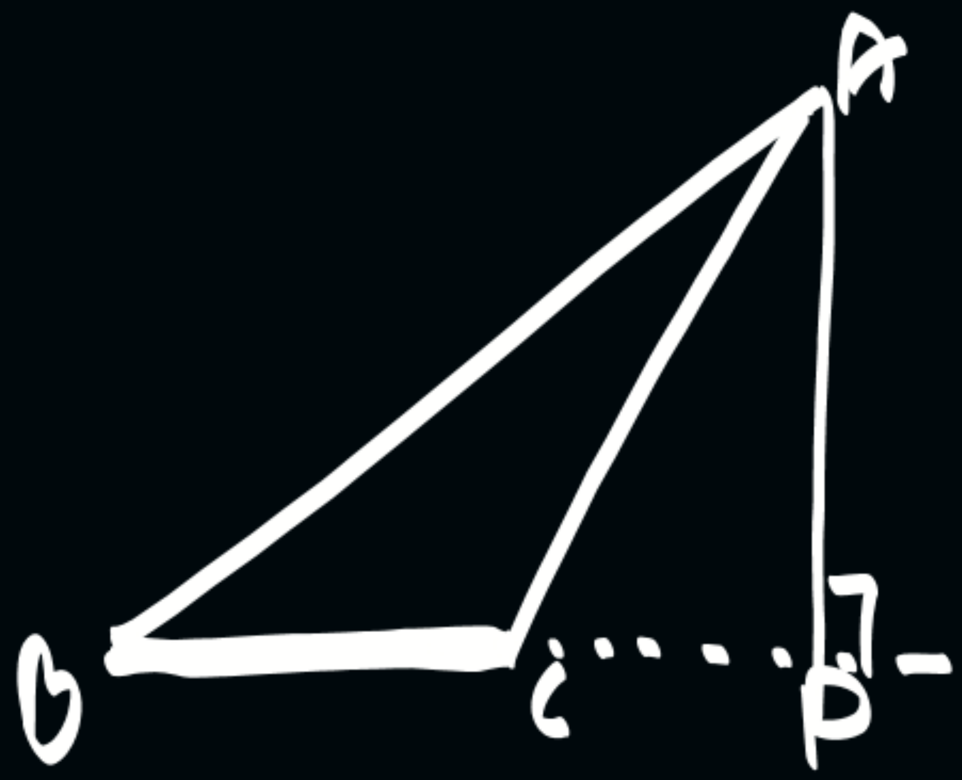


$$A = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2}(BC)(AP)$$

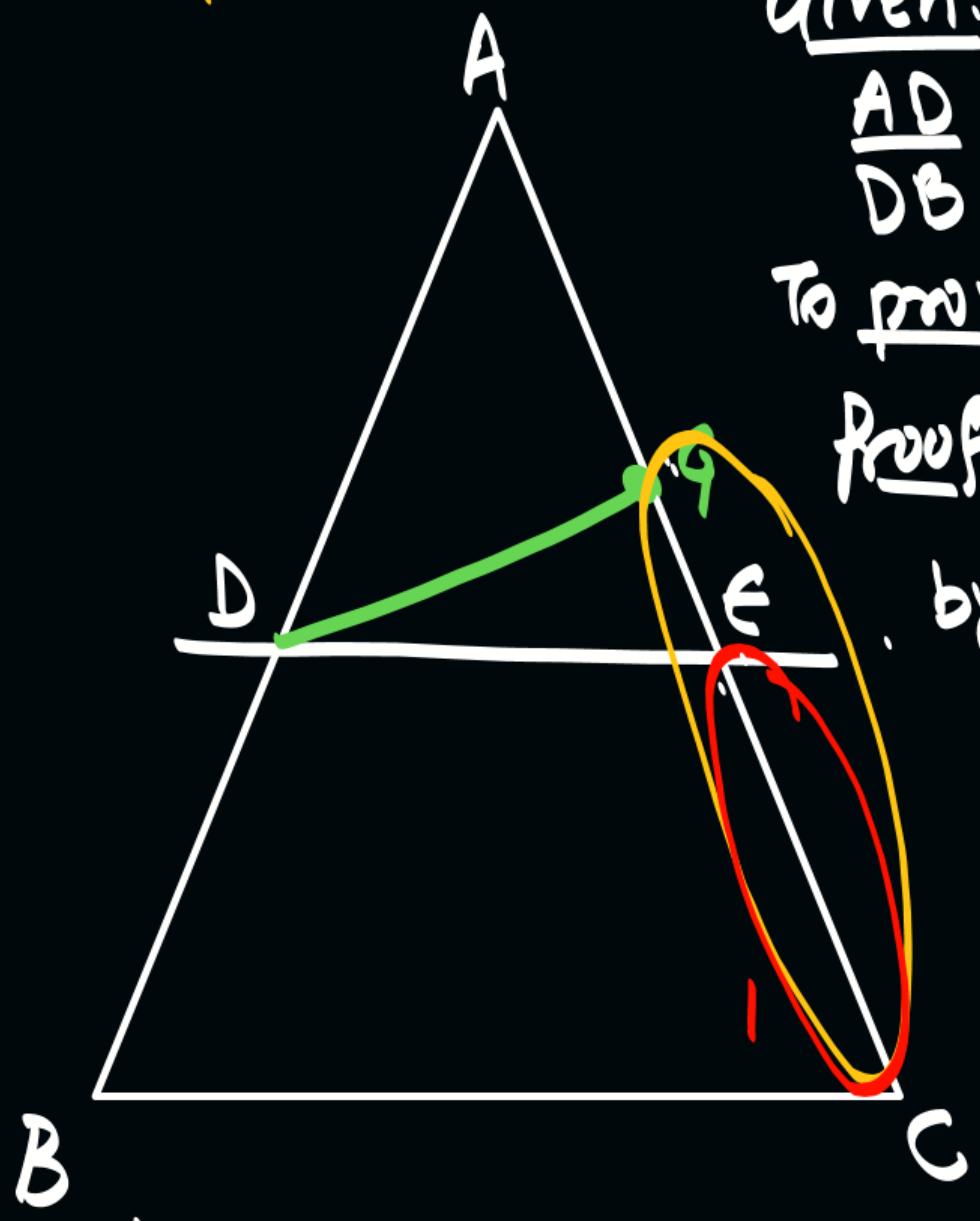


$$\frac{1}{2} \times AB \times CP$$



$$A = \frac{1}{2} \times BC \times AP$$

<u>converse of BPT</u> :- If a line divides two sides of Δ in the same ratio, the line is $\parallel$ to third line.



<u>Given</u> :- In ΔABC,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \text{— I}$$

To <u>prove</u> :- $DE \parallel BC$.

<u>Proof</u> :- Draw $DG \parallel BC$

$\therefore$ by BPT

$$\frac{AD}{DB} = \frac{AG}{GC} \quad \text{— II}$$

from I & II

$$\frac{AE}{EC} = \frac{AG}{GC}$$

add 1 both sides

$$\frac{AE}{EC} + 1 = \frac{AG}{GC} + 1$$

$$\frac{AE + EC}{EC} = \frac{AG + GC}{GC}$$

$$\frac{\cancel{AC}}{EC} = \frac{\cancel{AC}}{GC}$$

$$\boxed{GC = EC}$$

this contradiction is due to our wrong ass.

E & G are same point.

$\therefore$ <u>$DE \parallel BC$</u>.

Similarity of Δs :-

Class 9th

Congruency of Δ :

$\Delta ABC \cong \Delta PQR$

$\angle A = \angle P$	$AB = PQ$
$\angle B = \angle Q$	$BC = QR$
$\angle C = \angle R$	$AC = PR$

Prove that Δs are congruent

SSS

SAS

AAS

RHS

Class 10th : Similarity of Δ :-

$\Delta ABC \sim \Delta PQR$

$\angle A = \angle P$
$\angle B = \angle Q$
$\angle C = \angle R$

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$$

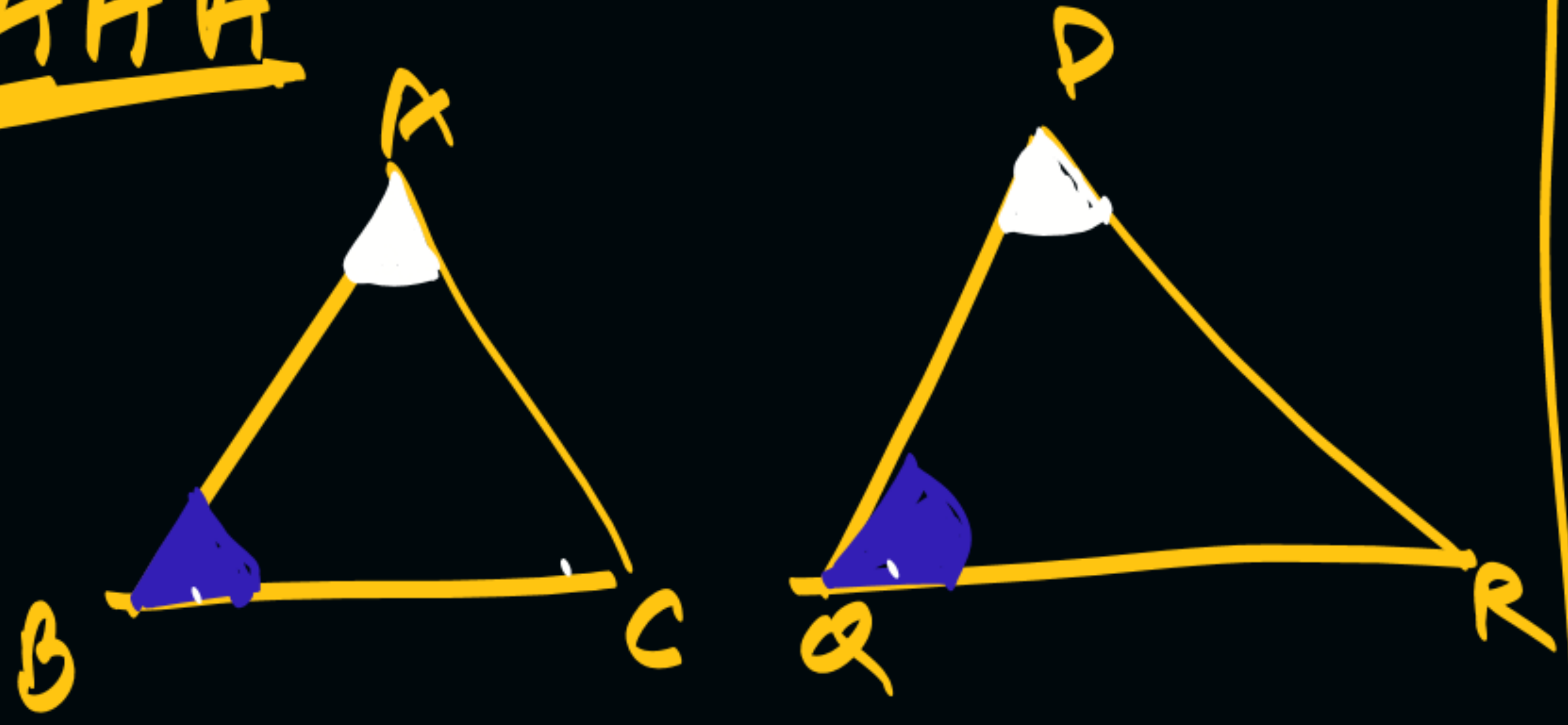
Sides proportional

To prove Δs are similar

→ AAA
→ AA**
→ SAS
→ SSS

Similarity criterias.

[I] AAA

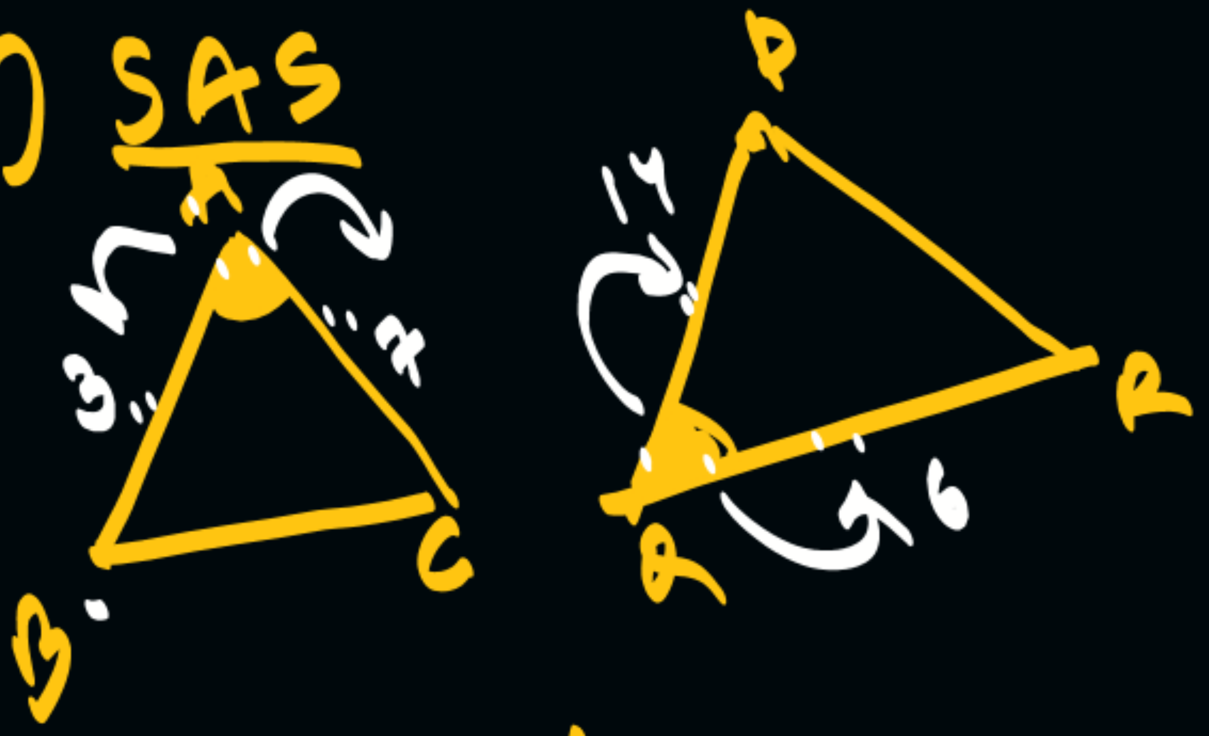


$$\left.\begin{array}{l}\angle A = \angle P \\ \angle B = \angle Q \\ \angle C = \angle R\end{array}\right\} \triangle ABC \sim \triangle PQR \quad (AAA)$$

[II] AA

$$\left.\begin{array}{l}\angle A = \angle P \\ \angle B = \angle Q\end{array}\right\} \text{by AA} \Rightarrow \triangle ABC \sim \triangle PQR$$

[III] SAS



$\angle A = \angle Q$

$$\frac{AB}{QR} = \frac{3}{6} = \frac{1}{2}$$

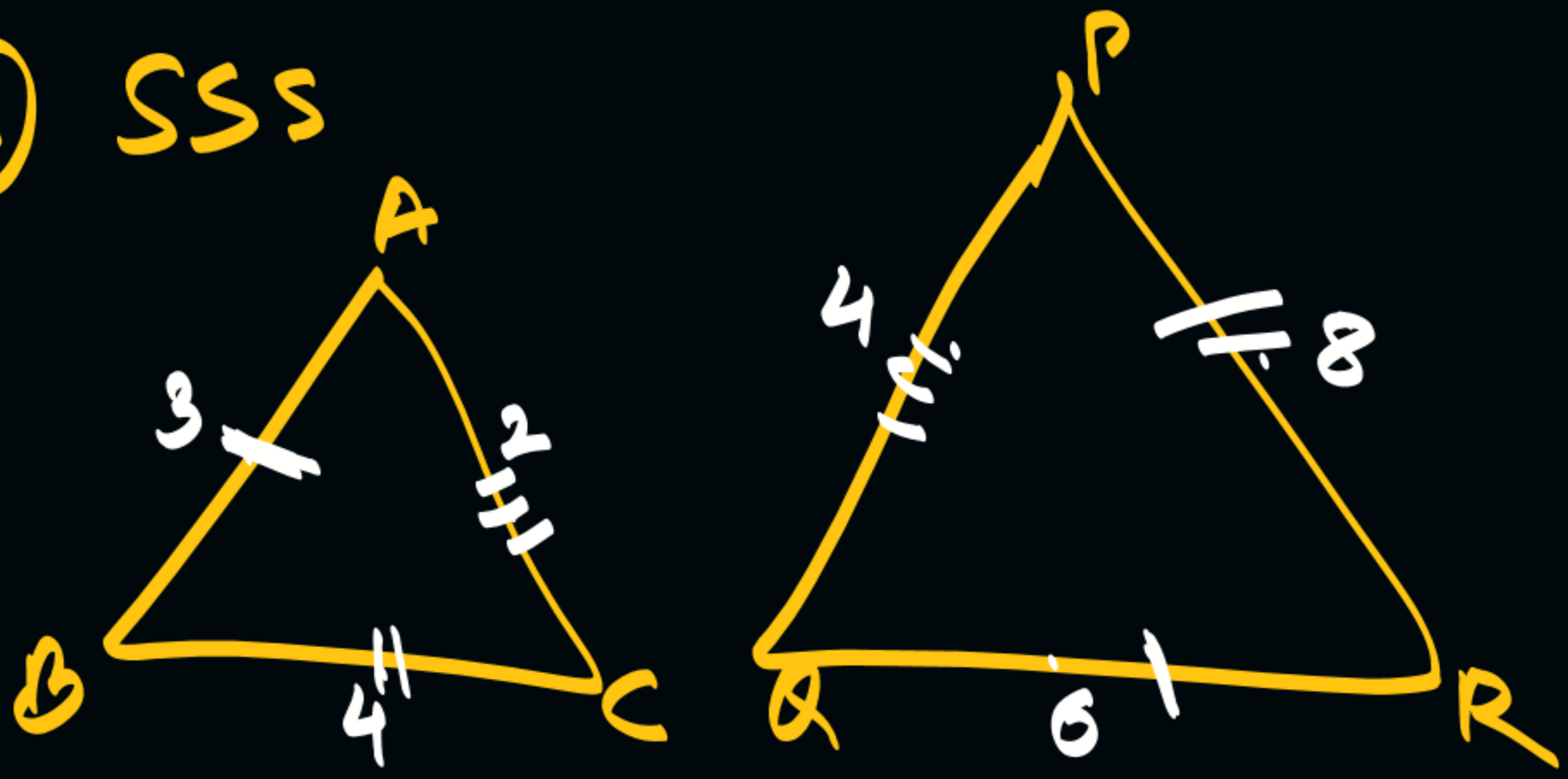
$$\frac{AC}{QP} = \frac{7}{14} = \frac{1}{2}$$

$$\frac{AB}{QR} = \frac{AC}{QP}$$

SAS

$$\boxed{\triangle ABC \sim \triangle QRP}$$

(V) SSS



$$\frac{AB}{QR} = \frac{3}{6} = \frac{1}{2}$$

$$\frac{BC}{PR} = \frac{4}{8} = \frac{1}{2}$$

$$\frac{AC}{PQ} = \frac{2}{4} = \frac{1}{2}$$

$$\frac{AB}{QR} = \frac{BC}{PR} = \frac{AC}{PQ}$$

by SSS $\boxed{\triangle ABC \sim \triangle QRP}$

नोट :- पहले सारे Results लिख लो।

LP : If triangle ABC is similar to triangle DEF such that 2AB = DE and BC = 8 cm . Then find the length of EF .

$2AB = DE$, $BC = 8$, EF ?

$\boxed{\Delta ABC \sim \Delta DEF}$

$\angle A = \angle D$

$\angle B = \angle E$

$\angle C = \angle F$

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

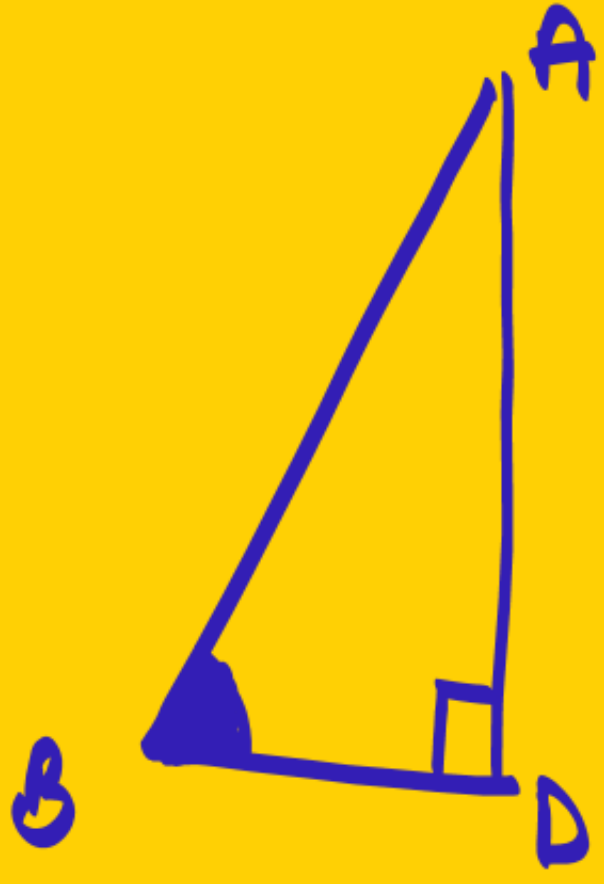
$\frac{AB}{DE} = \frac{BC}{EF}$

$\frac{\cancel{AB}}{2\cancel{AB}} = \frac{8}{EF} \Rightarrow EF = 8 \times 2 = 16\,cm$

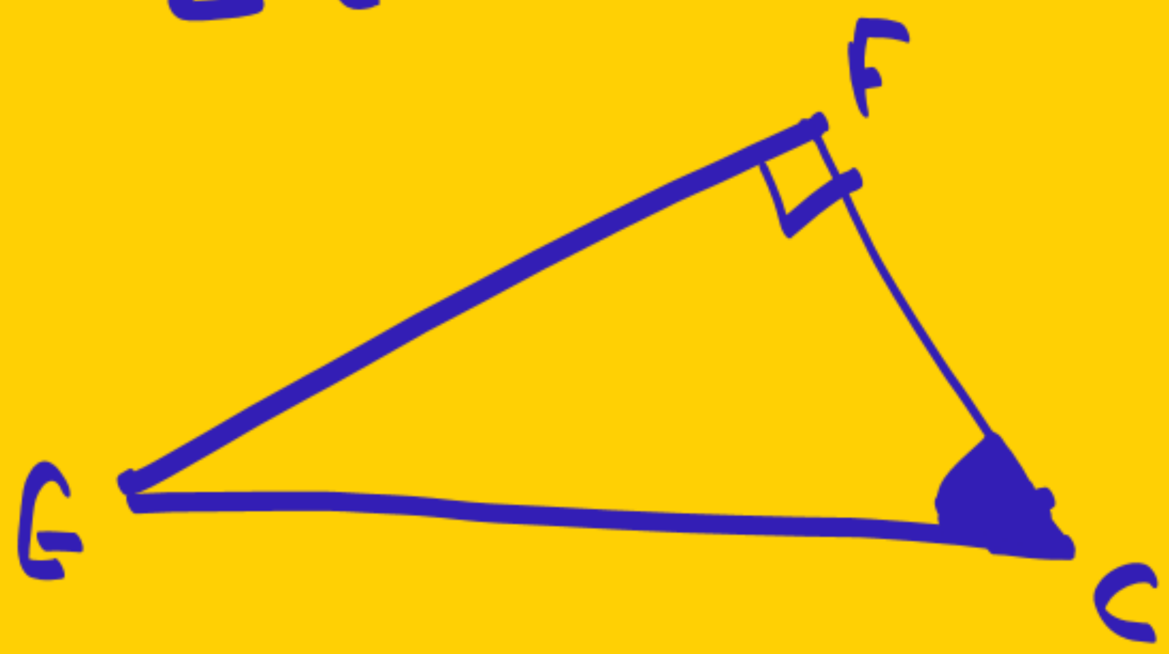
$\angle B = \angle C$ (angle opp to eq side are eq)

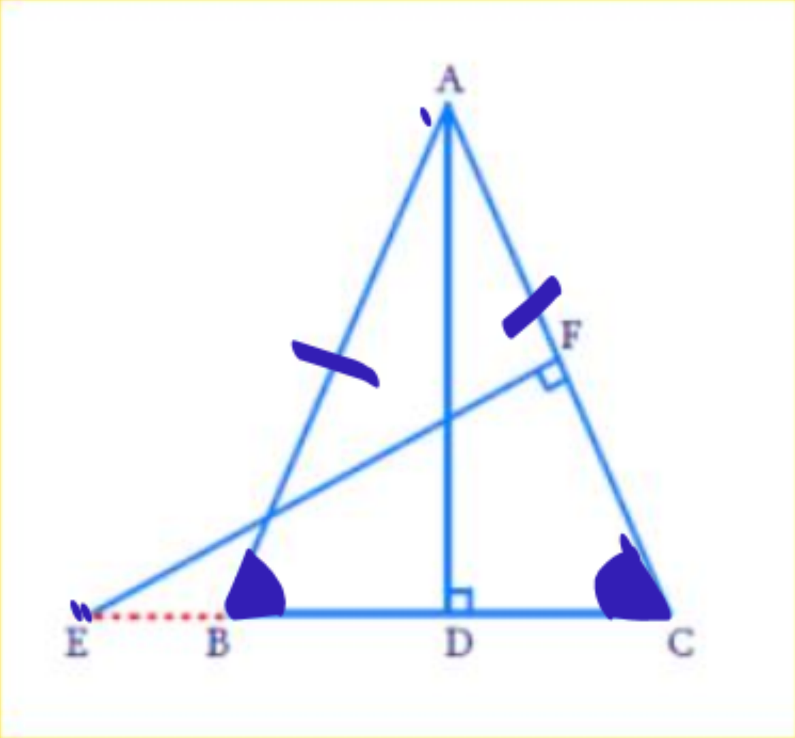
LP : In the following figure, E is a point on side CB produced of an isosceles triangle ABC with AB = AC. If AD $\perp$ BC and EF $\perp$ AC, prove that Δ ABD ~ Δ ECF.

ΔABD



ΔECF



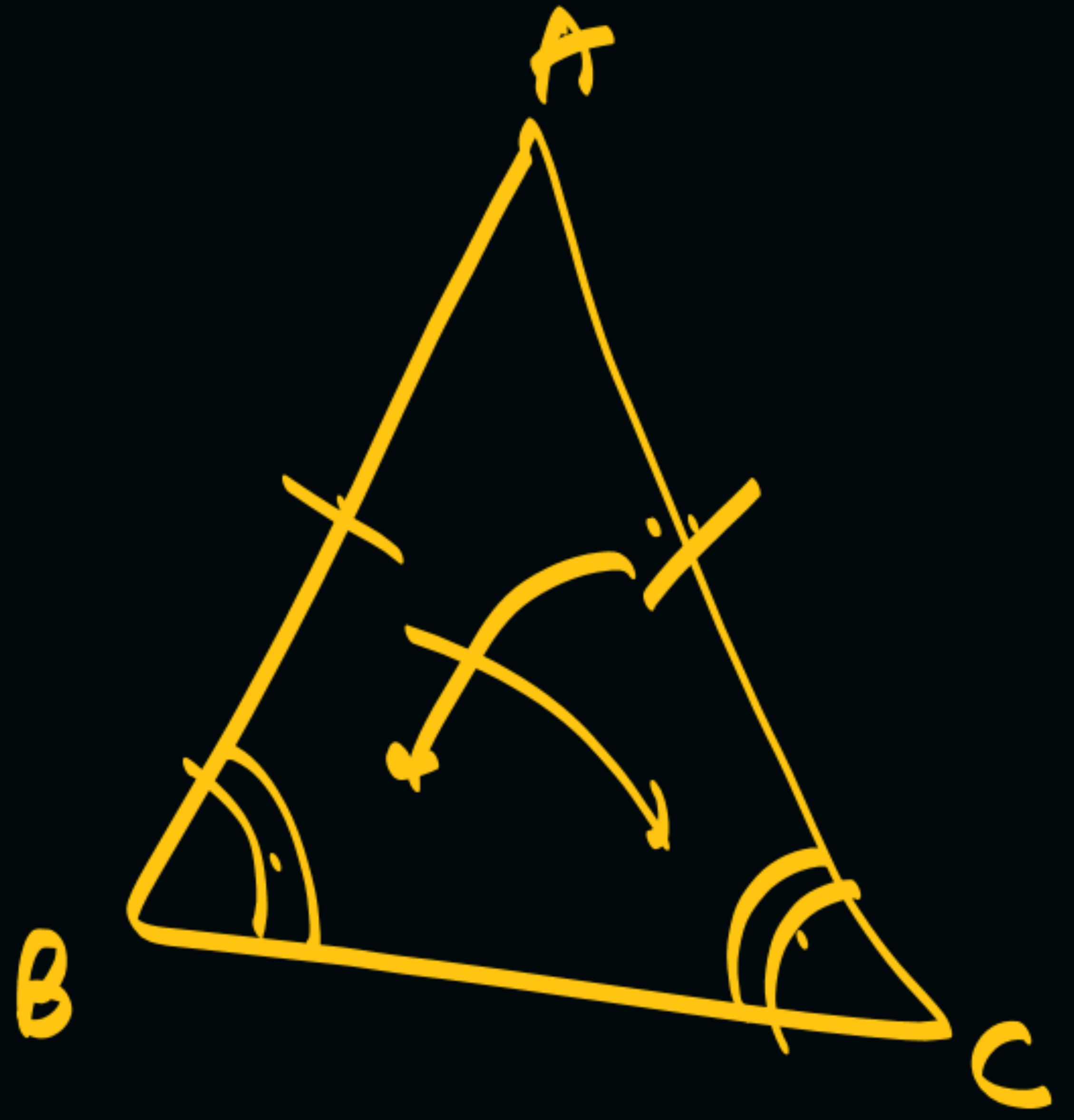


$\angle B = \angle C$ — (from ②)

$\angle D = \angle F$ (both 90)

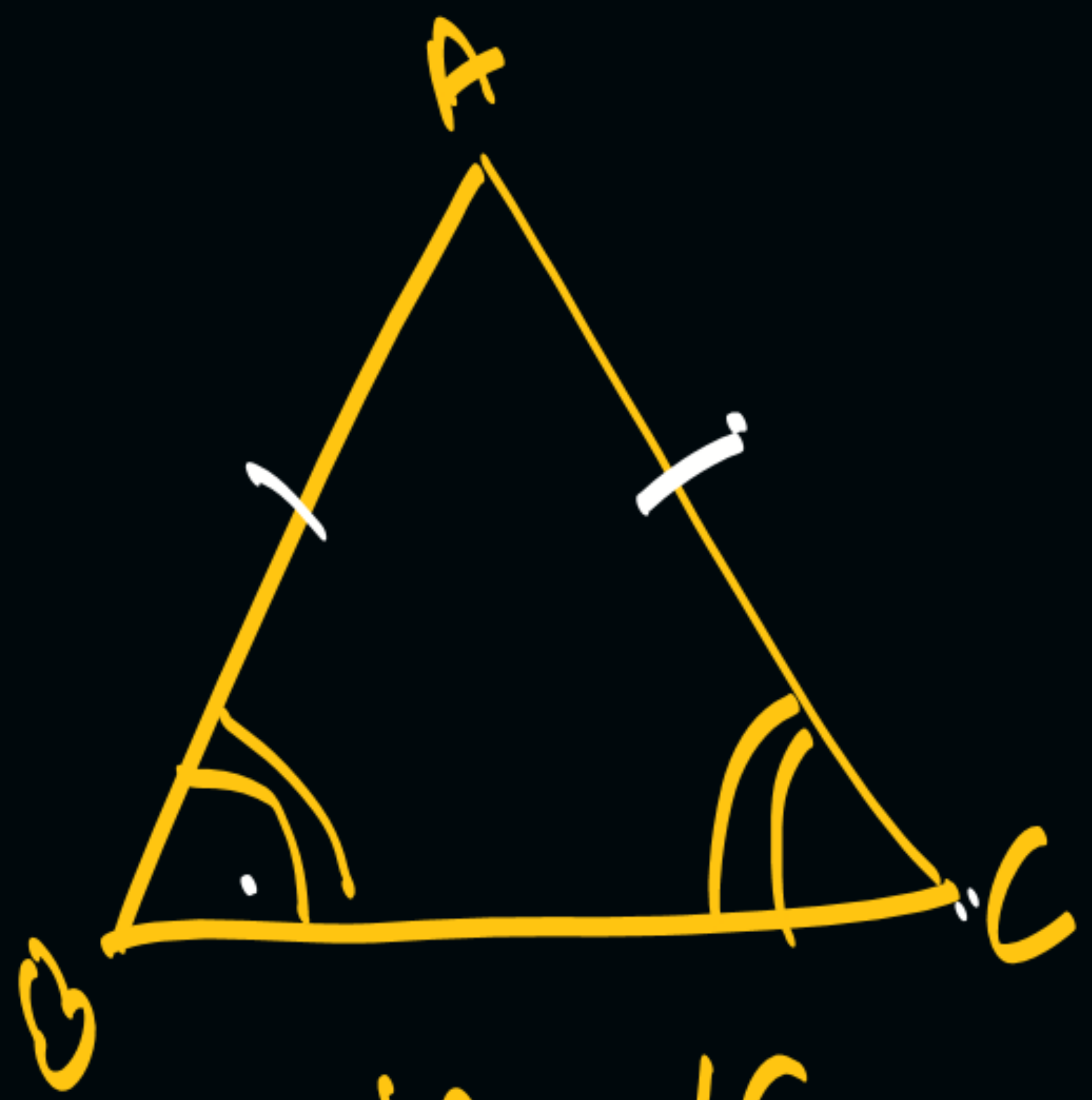
$\therefore$ $\boxed{\Delta ABD \sim \Delta ECF}$ (AA)

Isosceles △



if $AB = AC$

then $\angle B = \angle C$ angles opp to eq. sides are also eq



if $\angle B = \angle C$

$\boxed{AC = AB}$ sides opp to eq angles are also equal.

अभय

LP : In given figure, $\triangle FEC \cong \triangle GBD$ and $\angle 1 = \angle 2$, then prove that $\triangle ADE \sim \triangle ABC$.

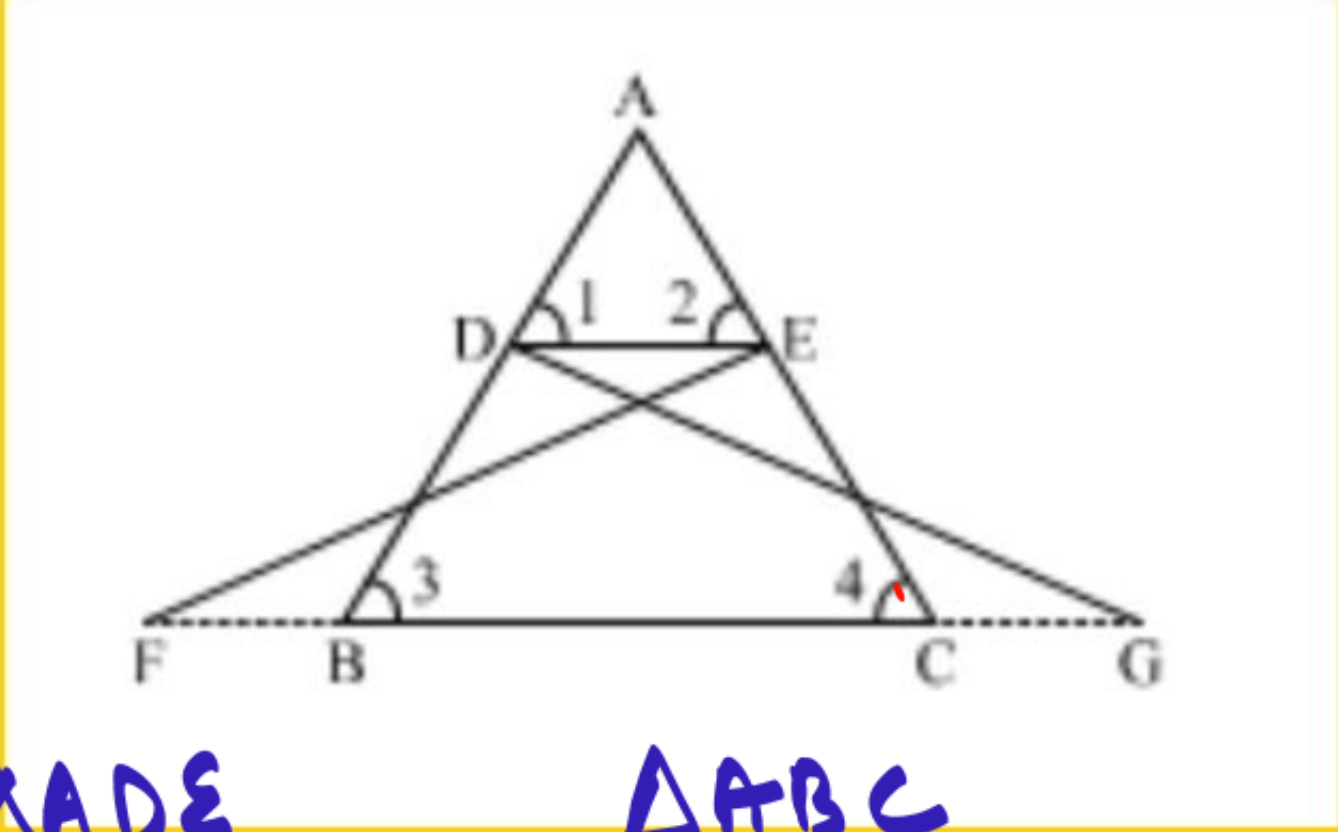
$\Delta FEC \cong \Delta GBD$

$\angle F = \angle G$	$FE = GB$
$\angle E = \angle B$	$EC = BD$
$\angle C = \angle D$	$FC = GD$

$\boxed{AD = AE}$ — (I)

$\angle D = \angle E$

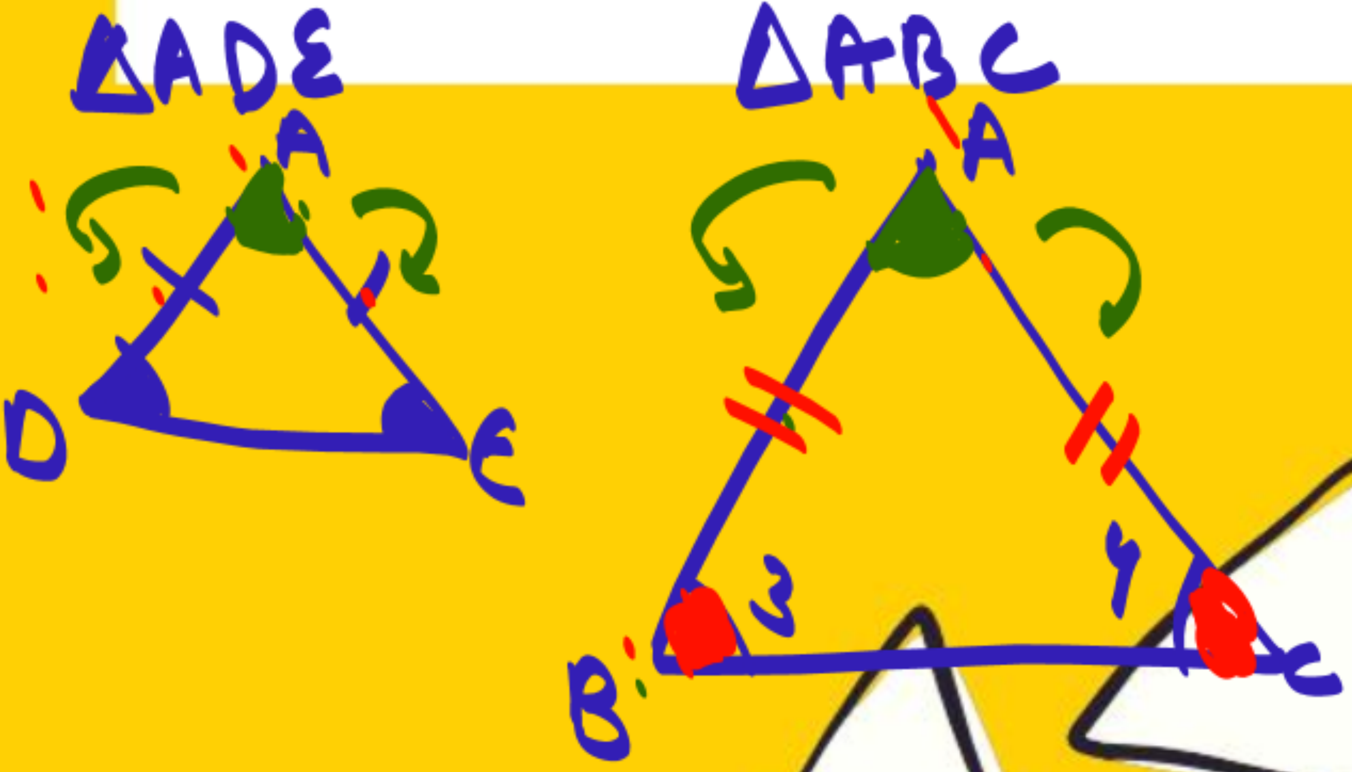
$\angle C = \angle B$



⇒ $\boxed{\angle A = \angle A \text{ (common)}}$

$\frac{(I)}{(II)}$ $\frac{AD}{AB} = \frac{AE}{AC}$

by SAS $\Delta ADE \sim \Delta ABC$



$AB = AC$ — (II)

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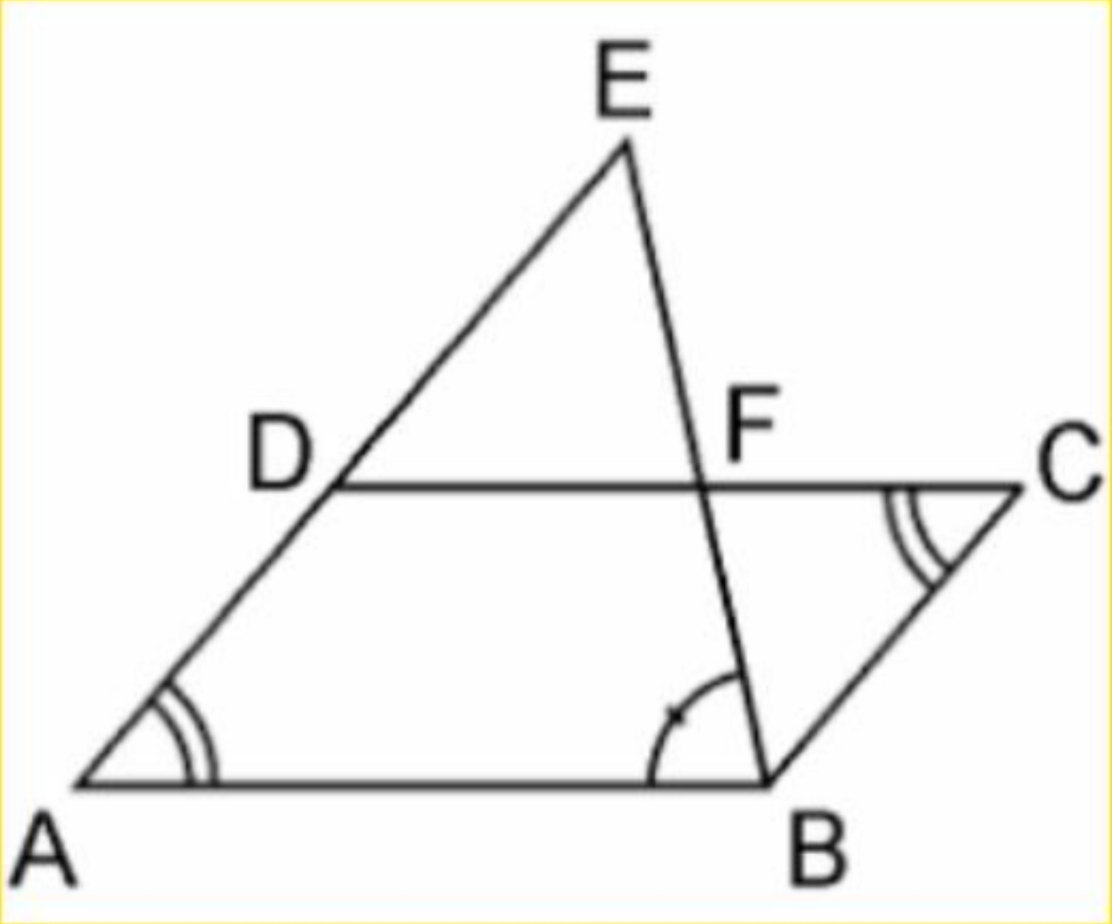
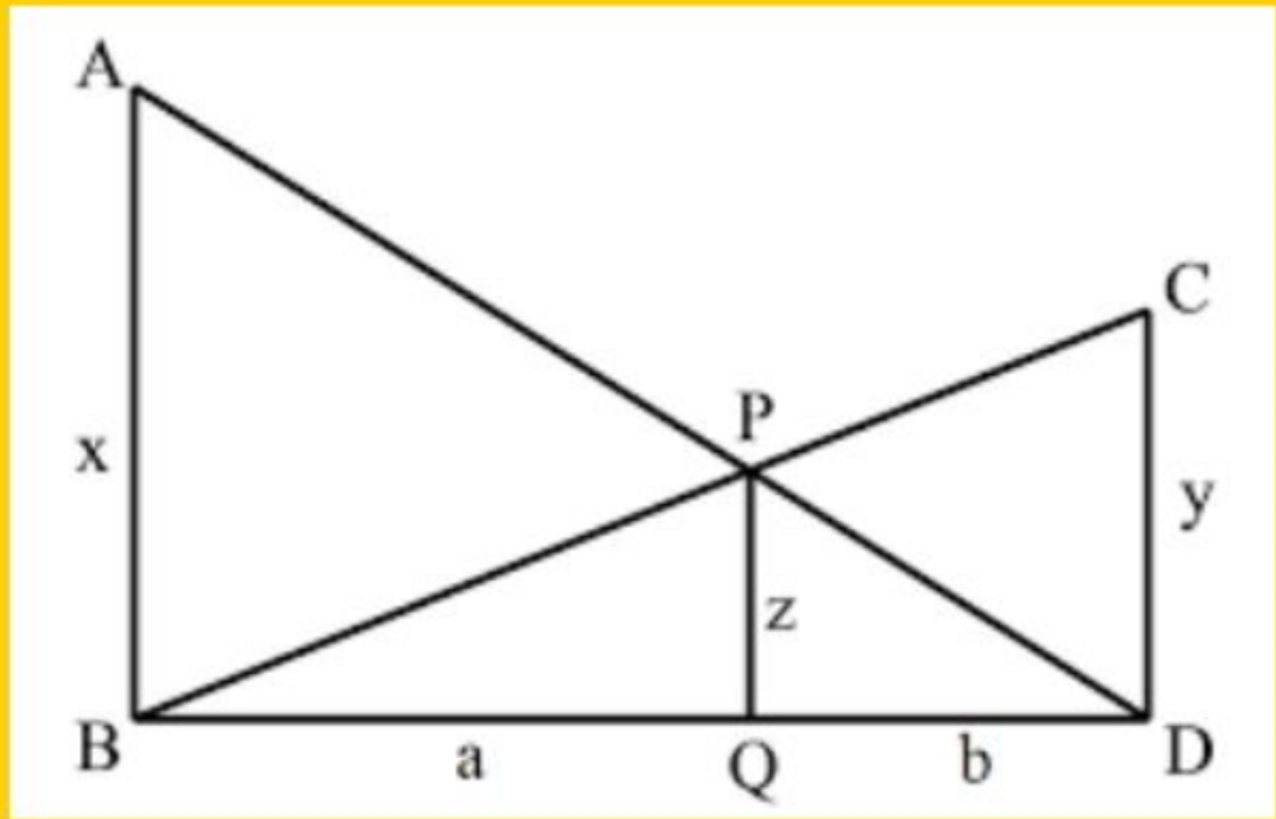
LP : In the figure given below, E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE$ $\triangle CFB$.



LP : In the figure AB II PQ II CD , AB = x units , CD = y units and PQ = z units .
Prove that $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$



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THANK YOU

COODIES 🥰