UDAAN

2026

Triangles

MATHS LECTURE-5

BY-RITIK SIR

Topics *to be covered*

A Questions (Part - 01)


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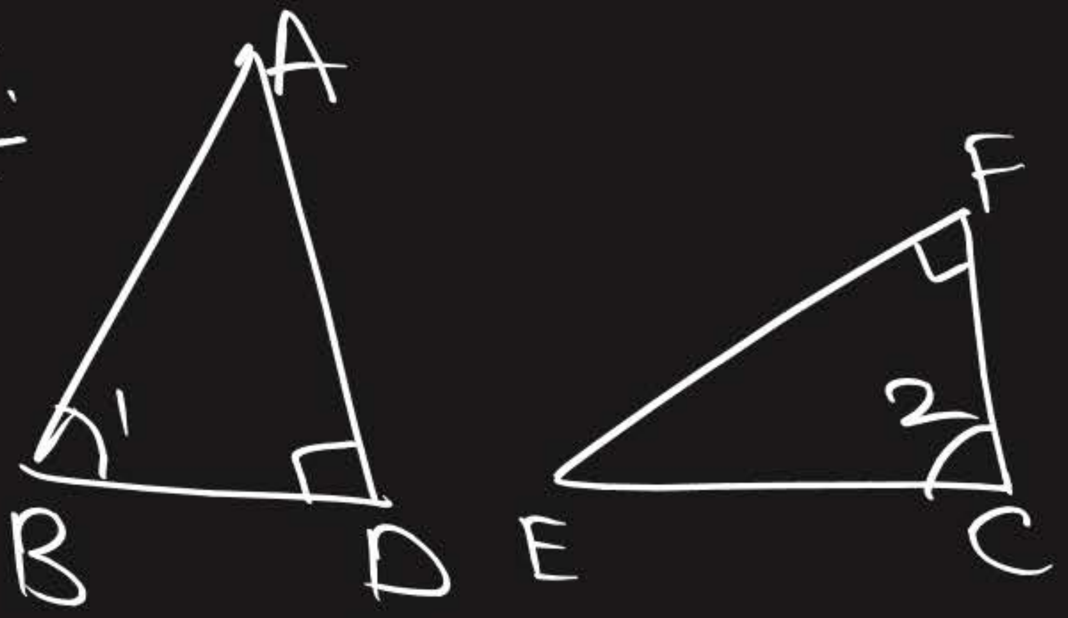
#Q. In fig. $\boxed{\text{E is a point}}$ on $\boxed{\text{side CB}}$ produced of an isosceles triangle ABC with AB = AC. If $AD \perp BC$ and $EF \perp AC$, prove that $\Delta ABD \sim \Delta ECF$.

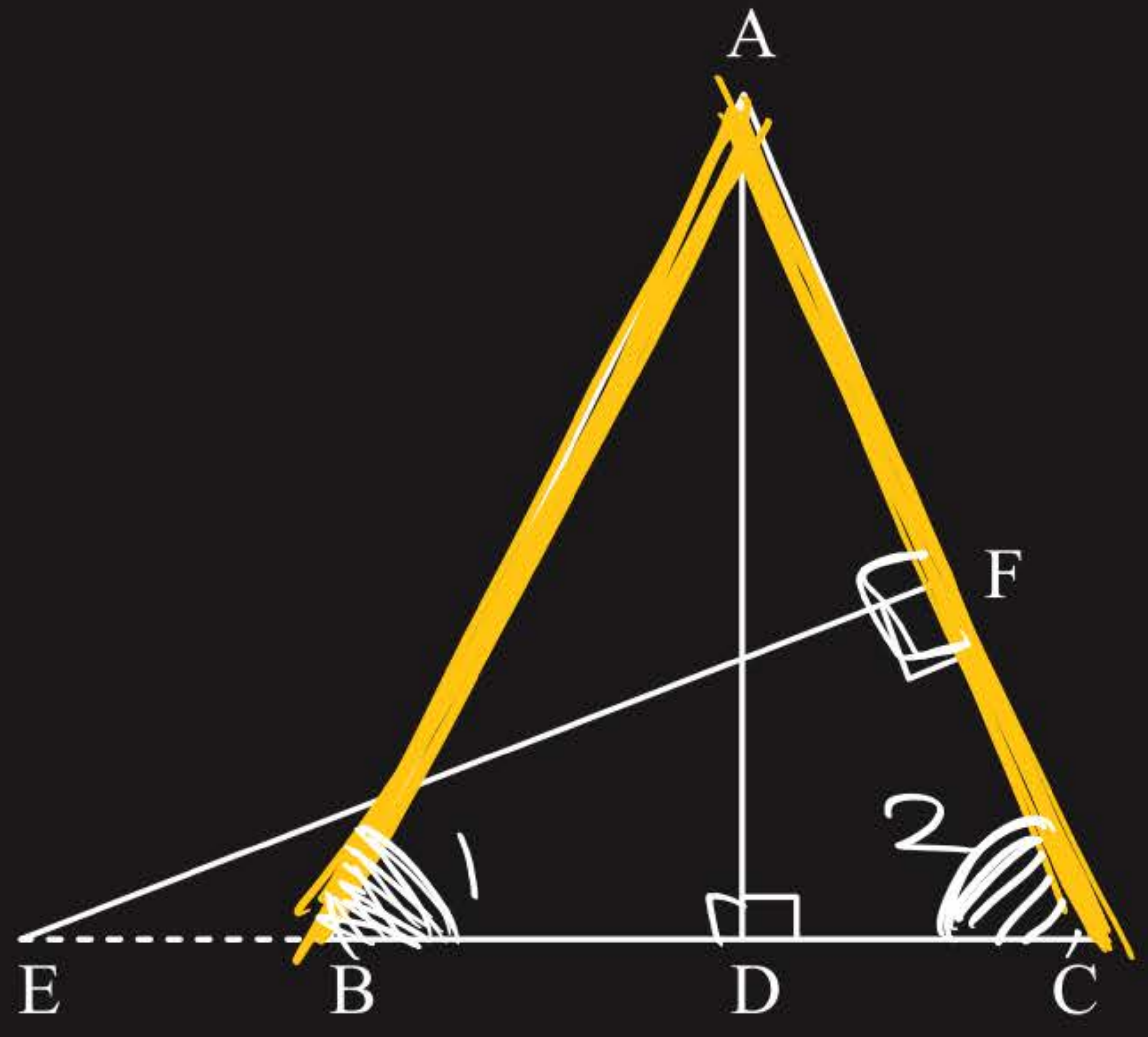
G: $AB = AC$, $AD \perp BC$, $EF \perp AC$

To p: $\Delta ABD \sim \Delta ECF$

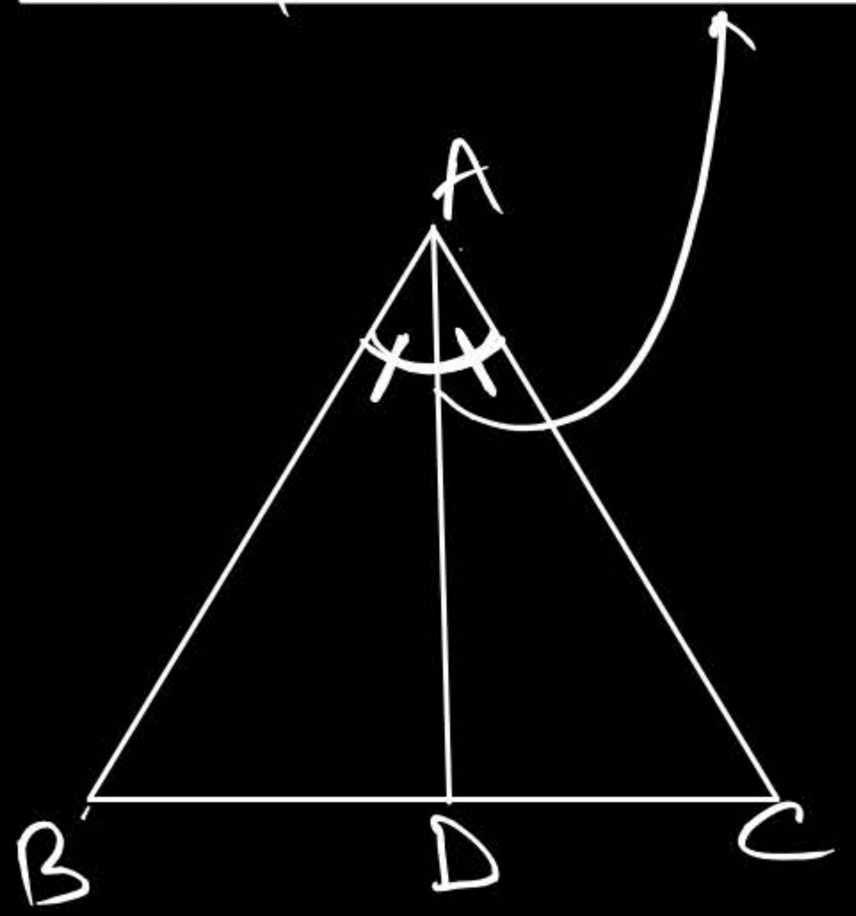
Proof:



AA //



Angle bisector

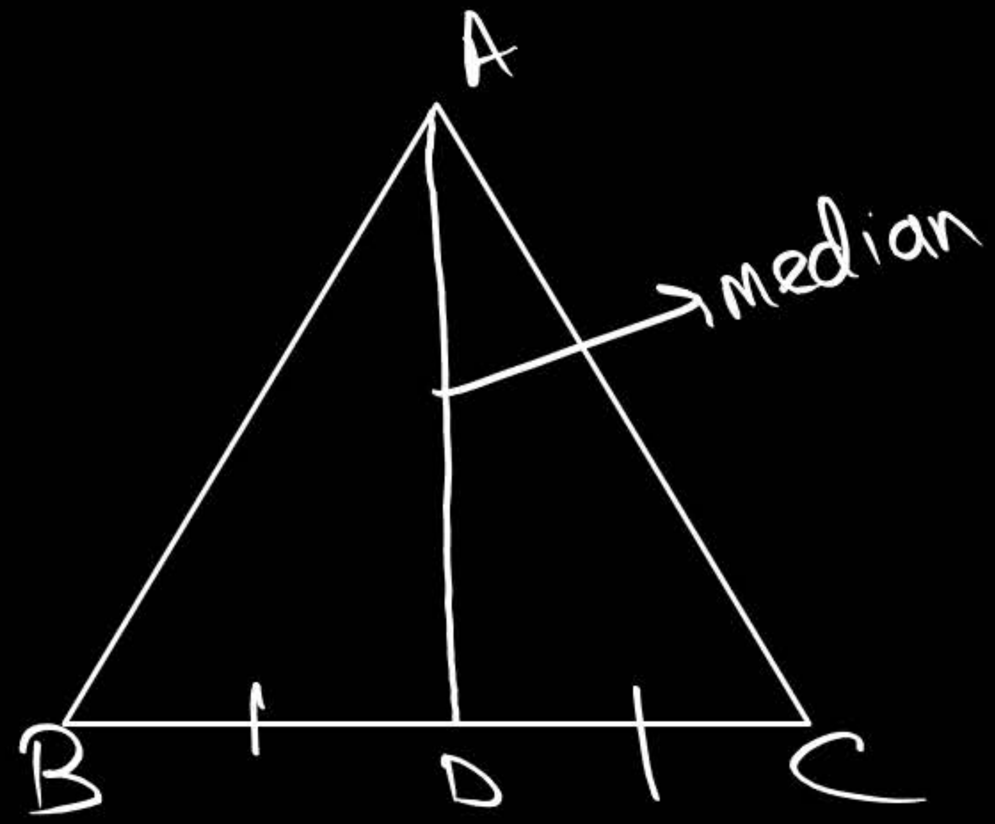


① $\angle BAD = \angle CAD$

② $\angle BAD = \angle CAD = \frac{1}{2}\angle BAC$

③ $\angle BAC = 2\angle BAD = 2\angle CAD$

Median



① $BD = DC$

② $BD = CD = \frac{1}{2}BC$

③ $BC = 2BD = 2DC$

#Q. If CD and GH (D and H lie on AB and FE) are respectively bisectors of $\angle ACB$ and $\angle EGF$ and $\Delta ABC \sim \Delta FEG$, prove that:

(i) $\Delta DCA \sim \Delta HGF$

(ii) $\frac{CD}{GH} = \frac{AC}{FG}$

G: $\angle 1 = \angle 2$, $\angle 3 = \angle 4$, $\Delta ABC \sim \Delta FEG$.

TOP:

Proof: $\Delta ABC \sim \Delta FEG$

$$\boxed{\begin{gathered}\angle A = \angle F \\ \angle B = \angle E \\ \angle C = \angle G \\ \frac{AB}{FE} = \frac{BC}{EG} = \frac{AC}{FG}\end{gathered}}$$

(i) In ΔDCA and ΔHGF

$\angle A = \angle F$

$\angle C = \angle G$

$\frac{1}{2}\angle C = \frac{1}{2}\angle G$

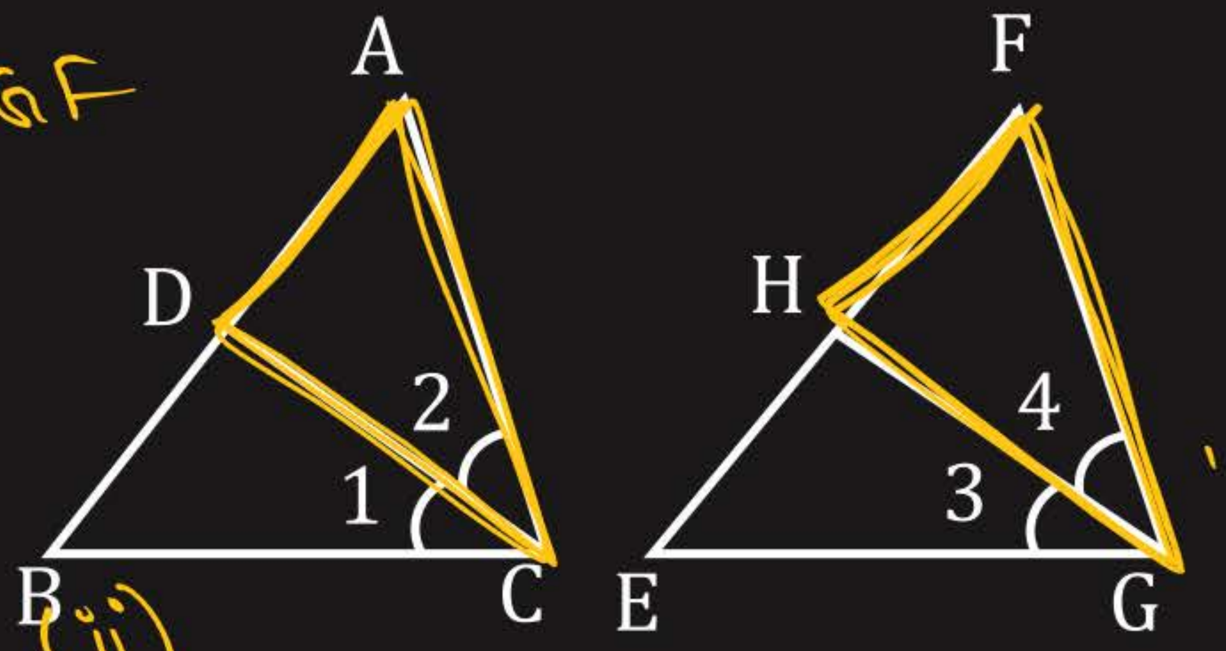
$\angle 2 = \angle 4$

By AA,

$\boxed{\Delta DCA \sim \Delta HGF}$

(ii) By C.P.S.T,

$$\boxed{\frac{DC}{HG} = \frac{CA}{GF}}$$



#Q. In figure, CD and GH are respectively the medians of ΔABC and ΔEFG and $\Delta ABC \sim \Delta FEG$, prove that:

(i) $\Delta ADC \sim \Delta FHG$ (ii) $\frac{CD}{GH} = \frac{AB}{FE}$

G: CD and GH are medians, $\Delta ABC \sim \Delta FEG$.

TOP: (i), (ii)

Proof: $\because \Delta ABC \sim \Delta FEG$

$$\frac{AB}{FE} = \frac{BC}{EG} = \frac{AC}{FG}$$

$\angle A = \angle F$

$\angle B = \angle E$ X

$\angle C = \angle G$ X

(i) In ΔADC and ΔHGF

$$\frac{AB}{FE} = \frac{AC}{FG}$$

$$\frac{\cancel{2}AD}{\cancel{2}FH} = \frac{AC}{FG}$$

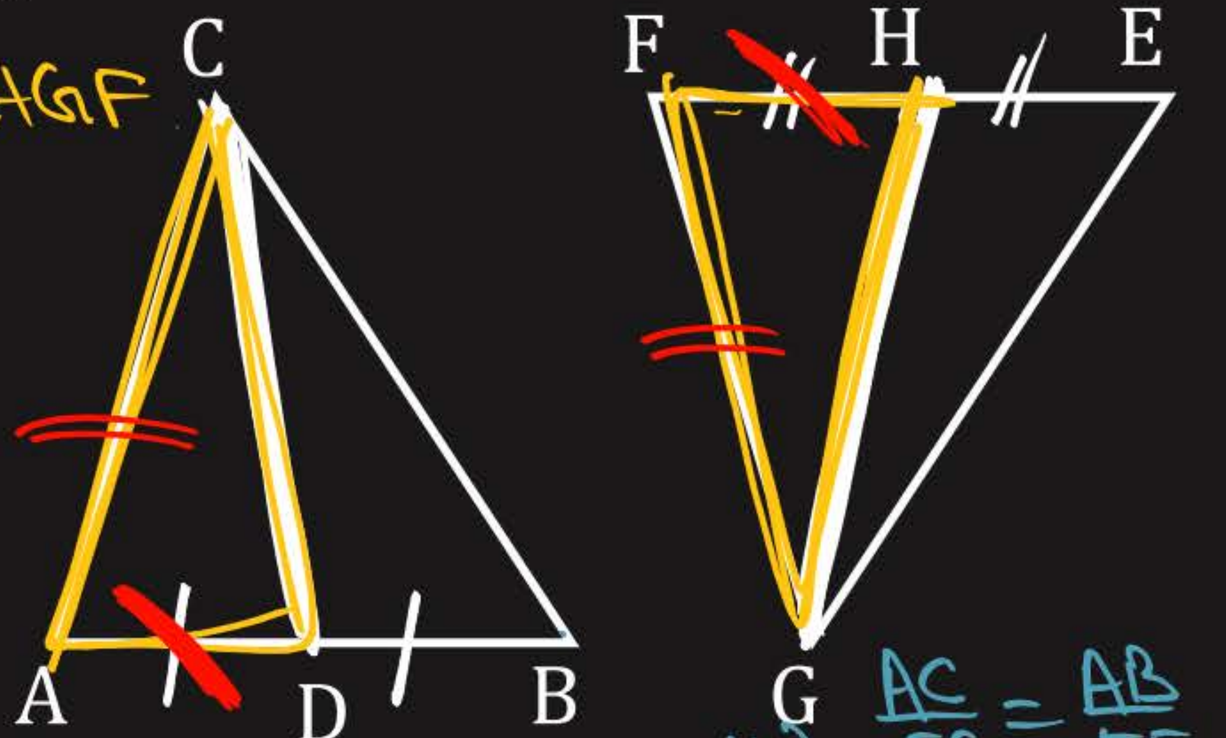
$\angle A = \angle F$

By SAS,

$\boxed{\Delta ADC \sim \Delta FHG}$

By CPST,

$$\boxed{\frac{AD}{FH} = \frac{DC}{HG} = \frac{AC}{FG}}$$



(ii) $\frac{AC}{FG} = \frac{AB}{FE}$

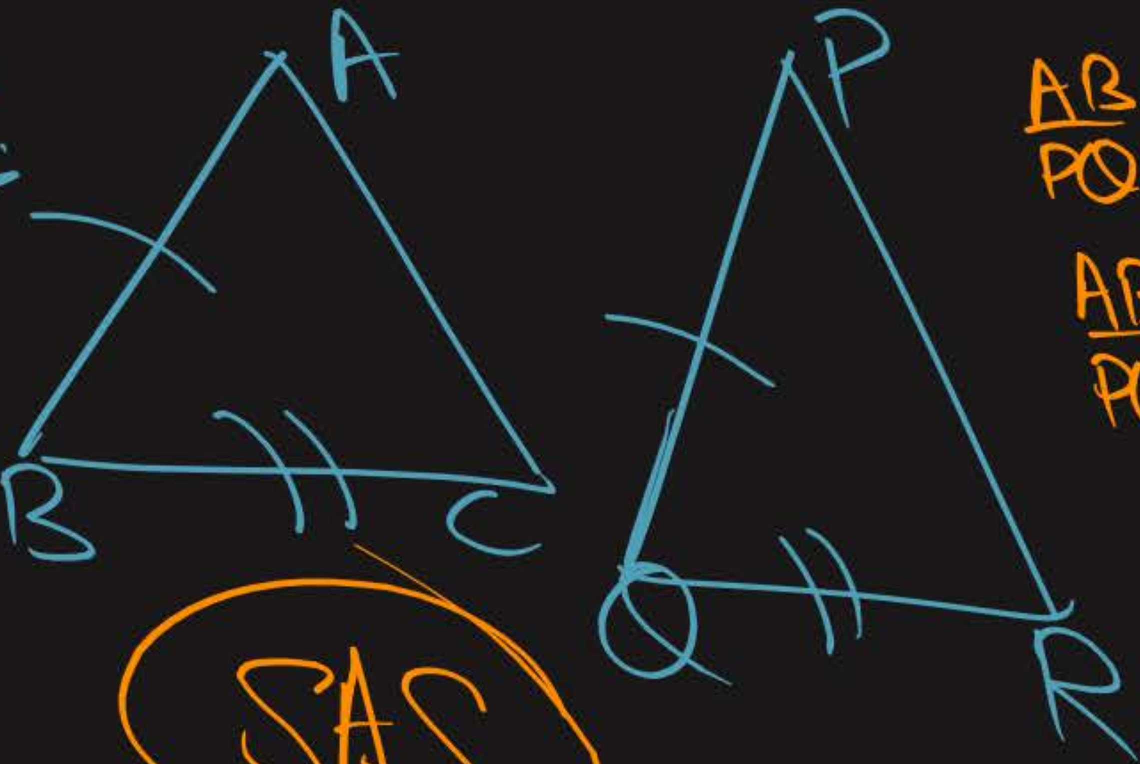
$$\Rightarrow \frac{CD}{GH} = \frac{AB}{FE}$$

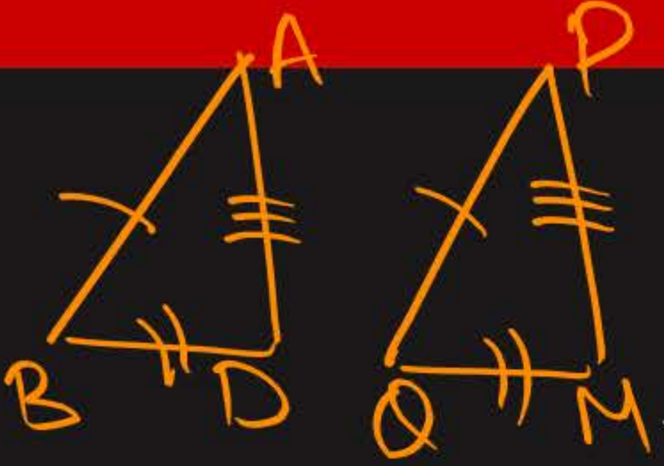
#Q. Sides AB, BC and the median AD of ΔABC are respectively proportional to sides PQ, QR and the median PM of another ΔPQR. Prove that $\Delta ABC \sim \Delta PQR$.

G: $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$

To p: $\Delta ABC \sim \Delta PQR$

Proof:





$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$

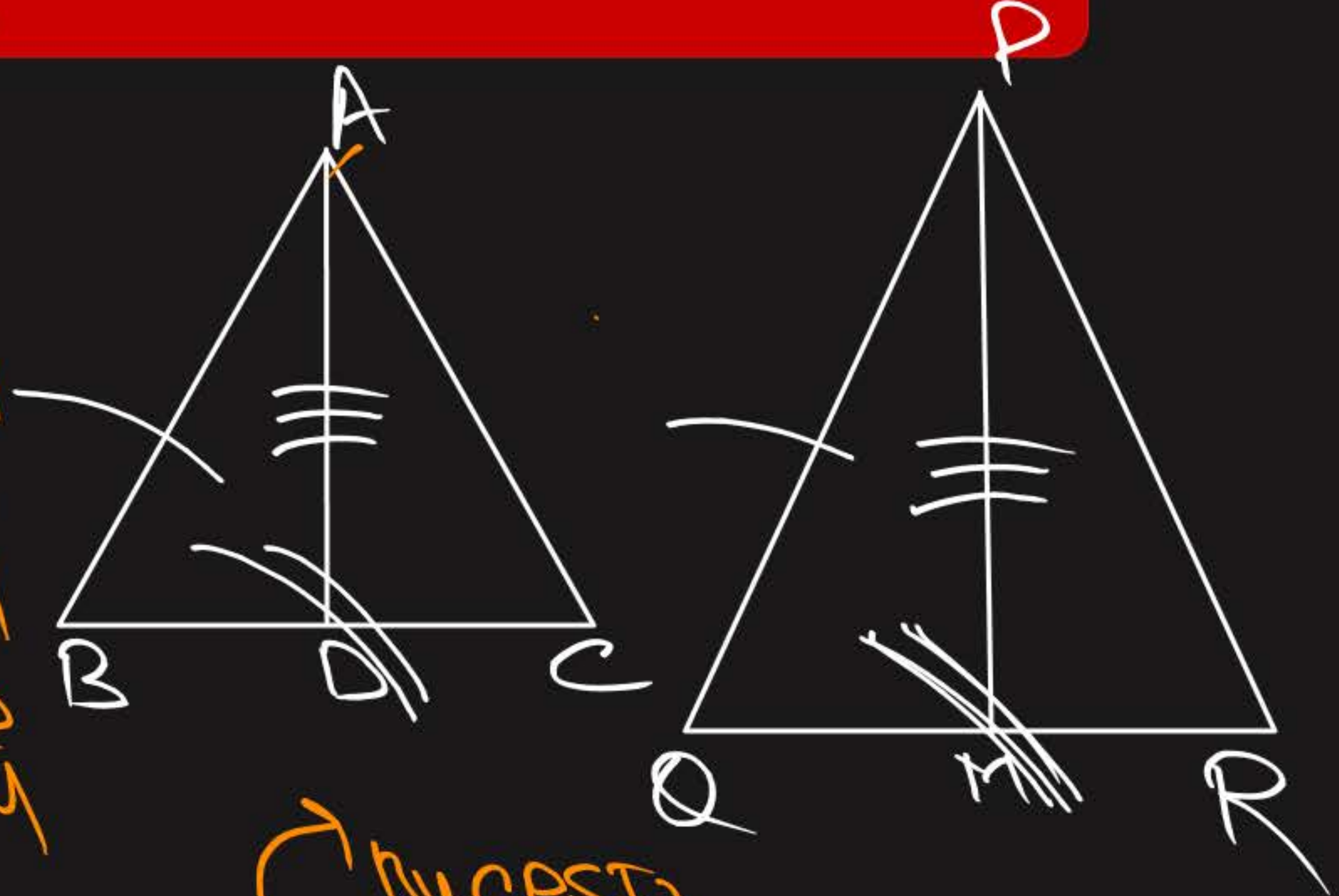
$\frac{AB}{PQ} = \frac{\cancel{2}BD}{\cancel{2}QM} = \frac{AD}{PM}$

SSS

$\Delta ABD \sim \Delta PQM$

(By CPST)

$\angle B = \angle Q$



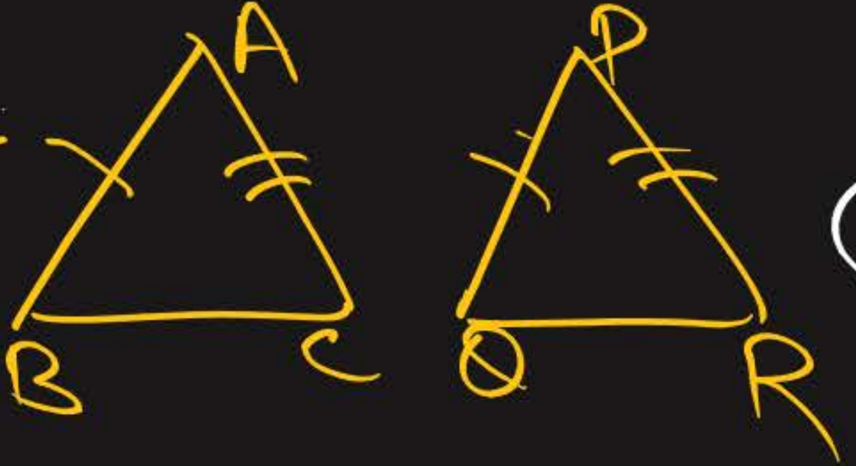
NCERT

#Q. Sides AB and AC and median AD to ΔABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\Delta ABC \sim \Delta PQR$.

G: $\frac{AB}{PQ} = \frac{AC}{PR} = \frac{AD}{PM}$

TOP: $\Delta ABC \sim \Delta PQR$

Proof:



Const: $DE = AD$, $MO = MP$.

In ΔADB and ΔEDC

$BD = DC$

$\angle 5 = \angle 6$

$AD = DE$

By SAS,

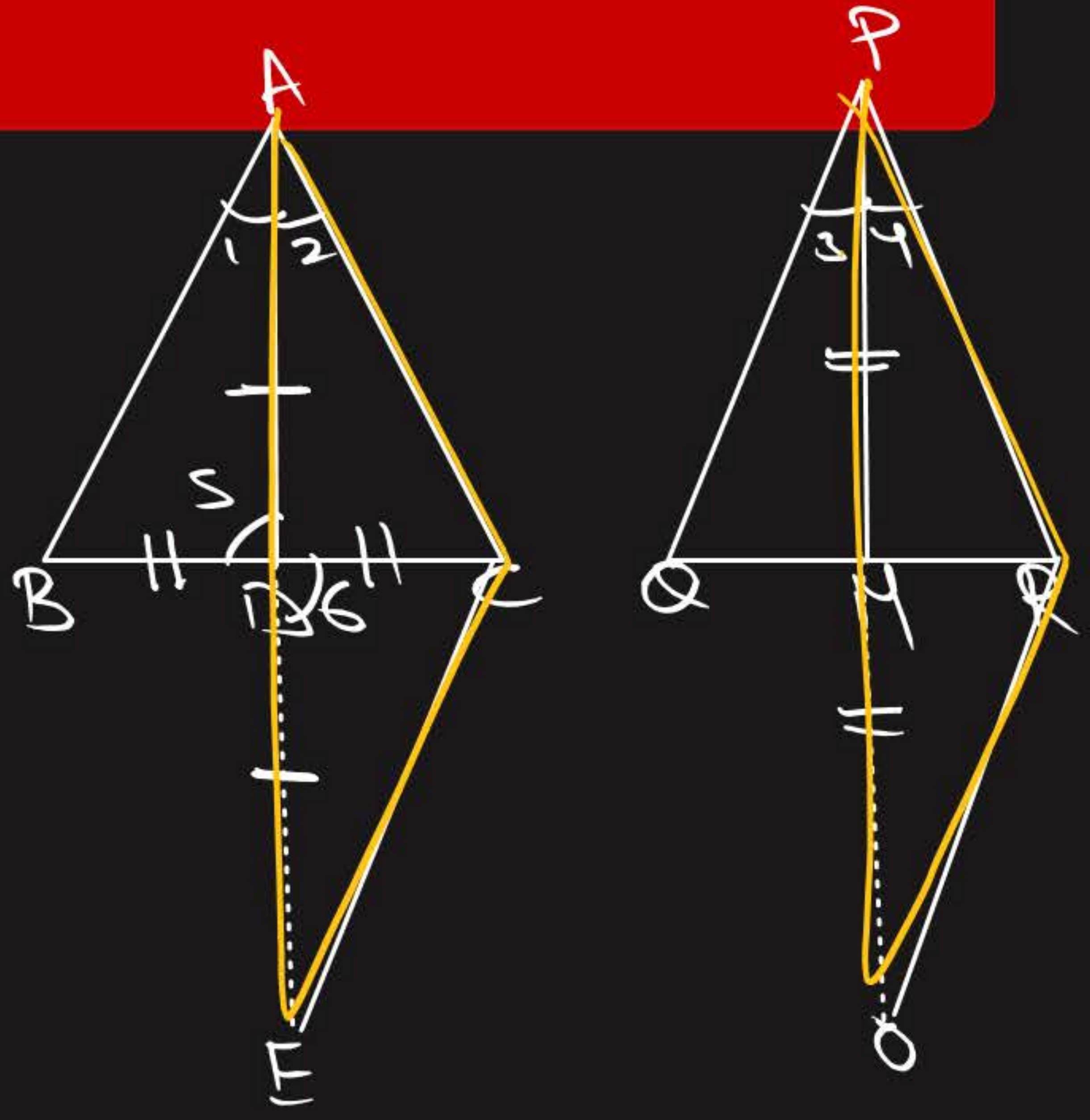
$\boxed{\Delta ADB \cong \Delta EDC}$

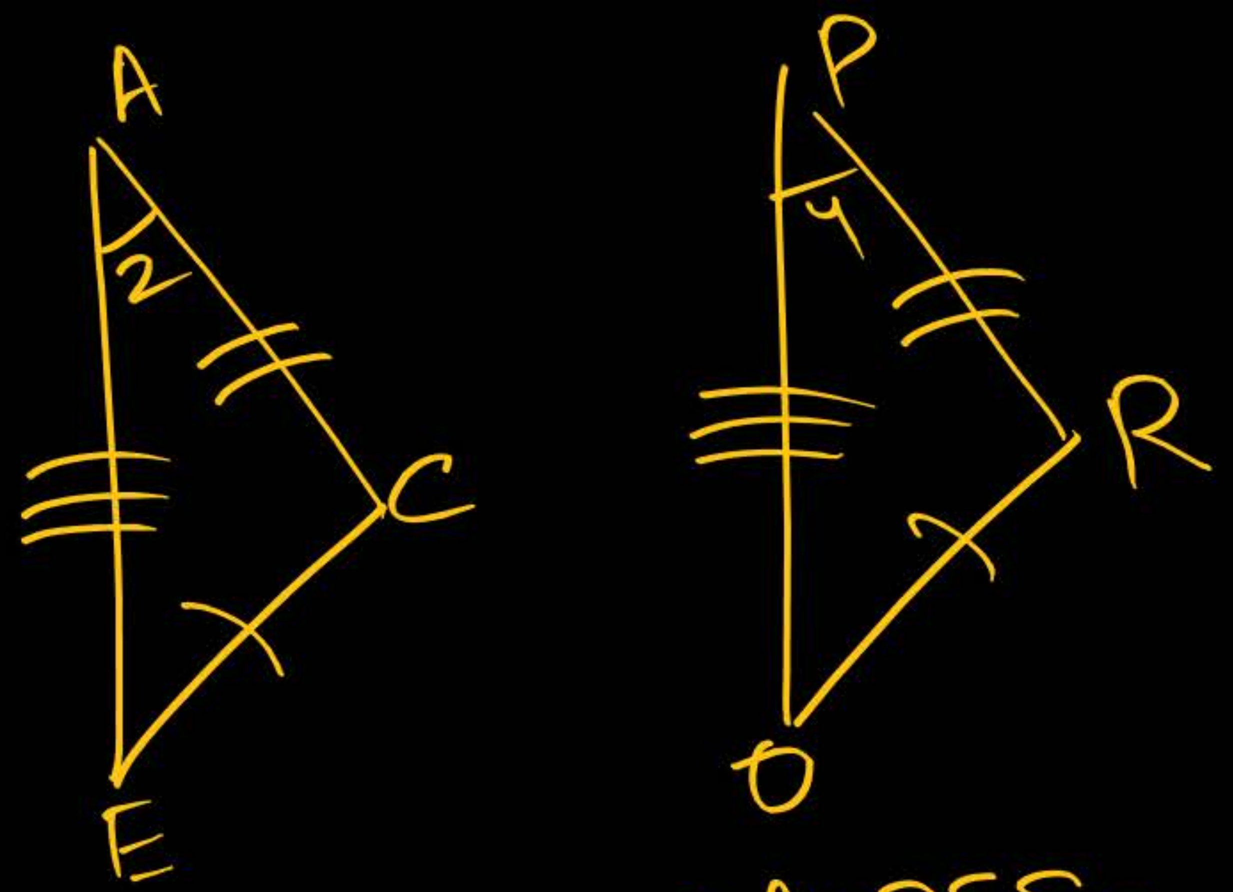
By CPCT, $AB = CE$

Similarly,

$\Delta PMQ \cong \Delta OMR$

By CPCT, $PQ = OR$





$$\frac{AB}{PO} = \frac{AC}{PR} = \frac{AD}{PM}$$

$$\frac{CE}{OR} = \frac{AC}{PR} = \frac{\cancel{\frac{1}{2}} AE}{\cancel{\frac{1}{2}} OP}$$

By SSS,

$\Delta ACE \sim \Delta PRO$

By CPST,

$\boxed{\angle 2 = \angle 4}$ — (1)

Similarly, $\boxed{\angle 1 = \angle 3}$ — (2)

(1) + (2)

$\angle 2 + \angle 1 = \angle 4 + \angle 3$

$\angle A = \angle P$

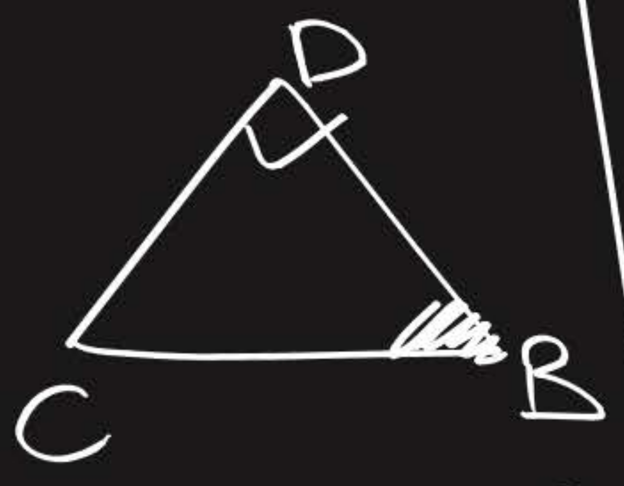
#Gpk

#Q. ΔABC is right angled at C. If p is the length of the perpendicular from C to AB and a, b, c are the length of the sides opposite to $\angle A$, $\angle B$ and $\angle C$ respectively, then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

G:

TOP:

Proof:



AA

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

By CPST

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

$$\frac{c}{a} = \frac{a}{BD} = \frac{b}{p}$$

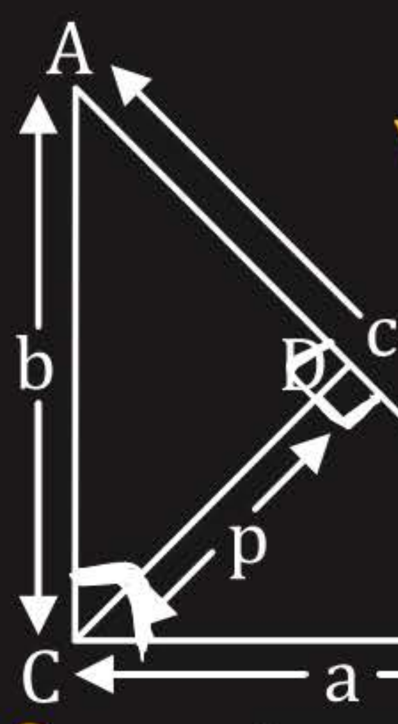
$$\frac{c}{a} = \frac{b}{p}$$

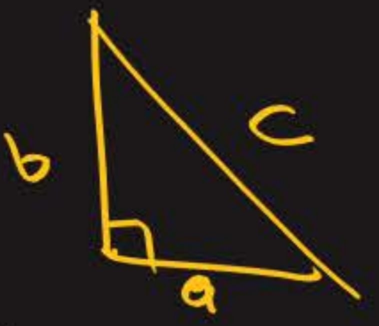
$$p = \frac{ab}{c}$$

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

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

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





$$\boxed{\frac{1}{p^2} = \frac{1}{b^2} + \frac{1}{a^2}}$$ H.P.

#Q. In the given figure, DEFG is a square and $\angle BAC = 90°$. Show that $FG^2 = BG \times FC$.

G: DEFG is a square, $\angle BAC = 90°$

To p: $FG^2 = BG \times FC$.

#Gp

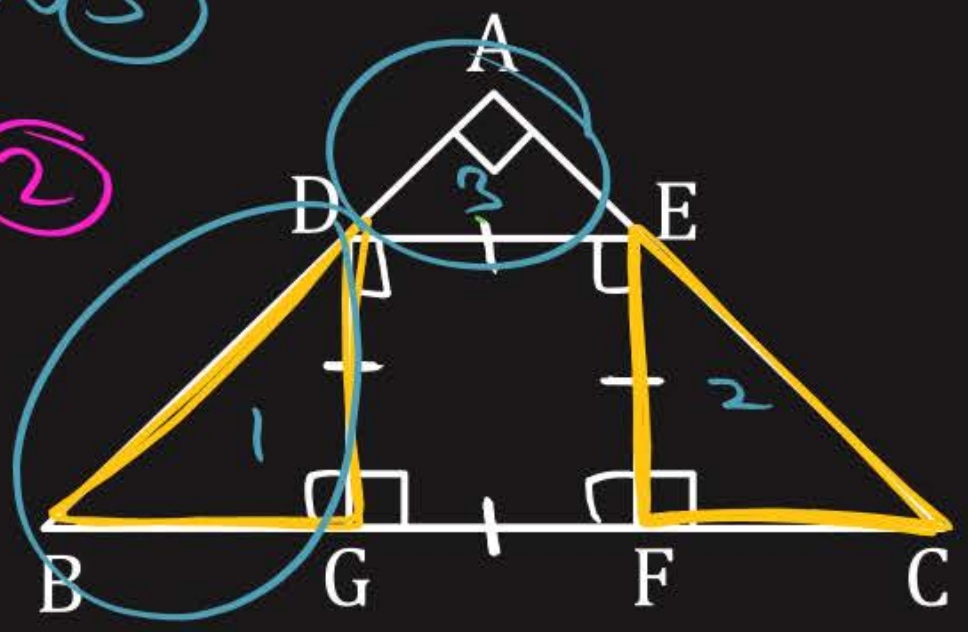
①~③

②~③

①~②

CPST

PROOF:



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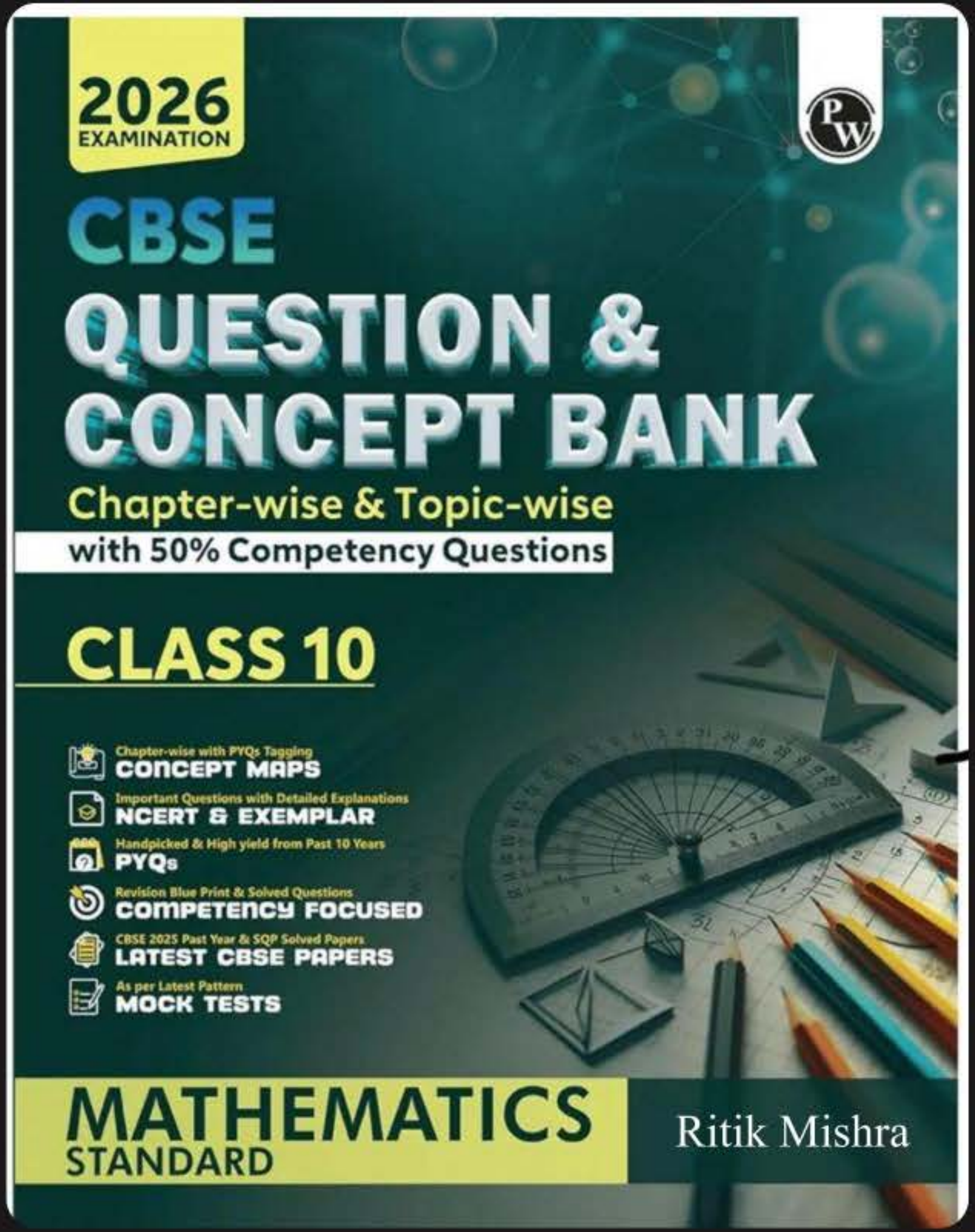


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