
UDAAN
2026
Xin chao!
Triangles
MATHS
LECTURE-1
BY-RITIK SIR

Topics *to be covered*

2 → B.P.T.
→ Similarity.

A Basic Proportionality Theorem (Thales Theorem)

B Converse of Basic Proportionality Theorem

Kese gaye Mid terms?

A) Bhut Badhiya! 9%

B) Okay, okay! 9%

C) Hue hi nahi. 67%

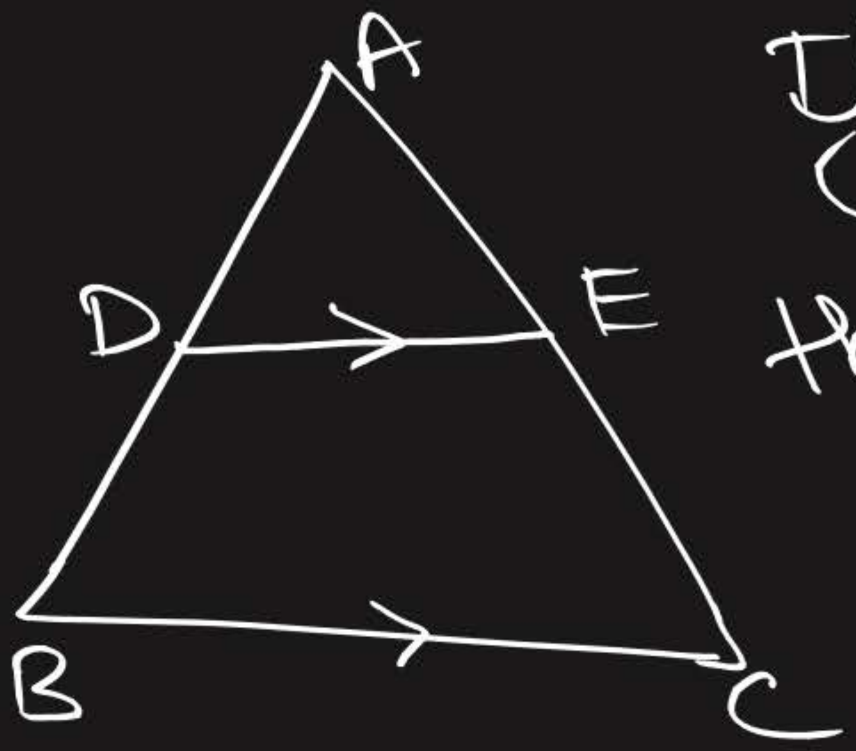
D) Chal rahe hain? 15%

6.5 → Months

Maths → Notes

+

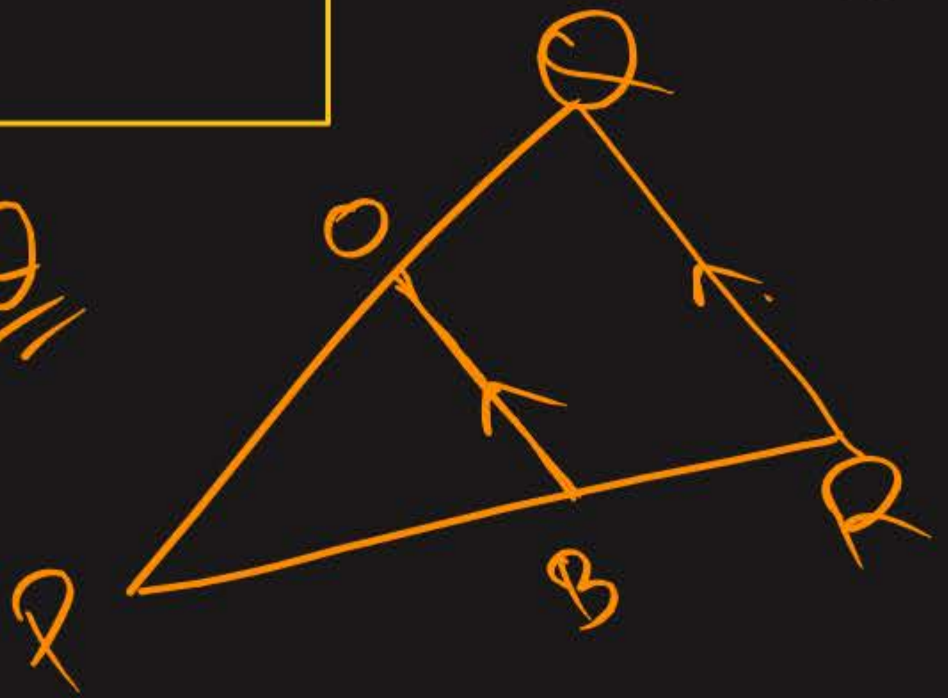
B.P.T → Basic proportionality theorem.
(Thale's theorem).



If $DE \parallel BC$

then, $\boxed{\dfrac{AD}{DB} = \dfrac{AE}{EC}}$

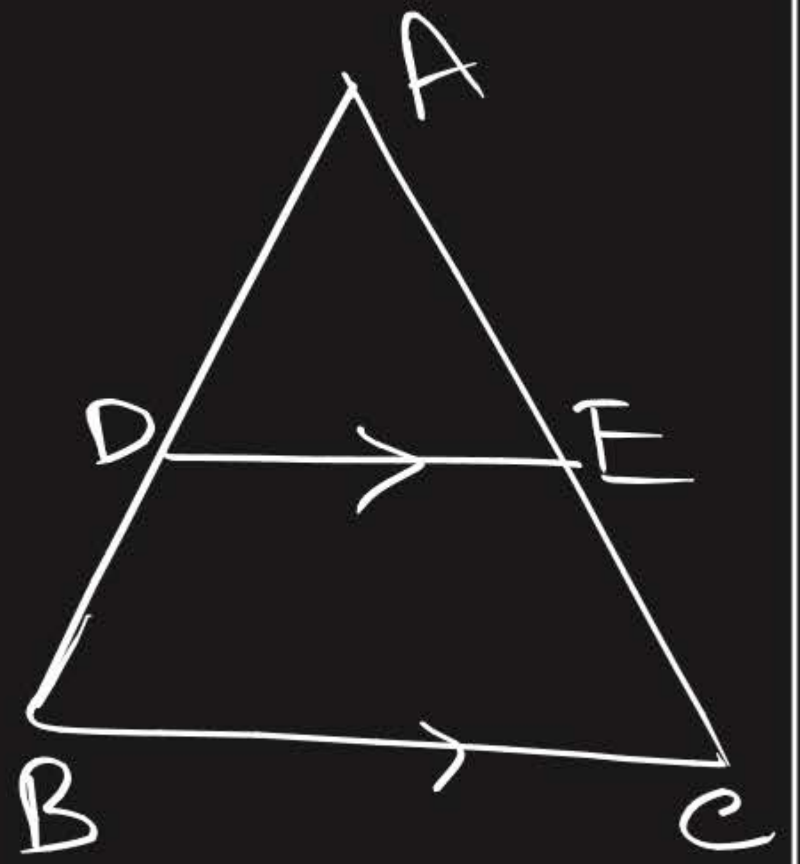
Q.



B.P.T,

$$\frac{PB}{BR} = \frac{PO}{OQ}$$

B.P.T ki Corallary.

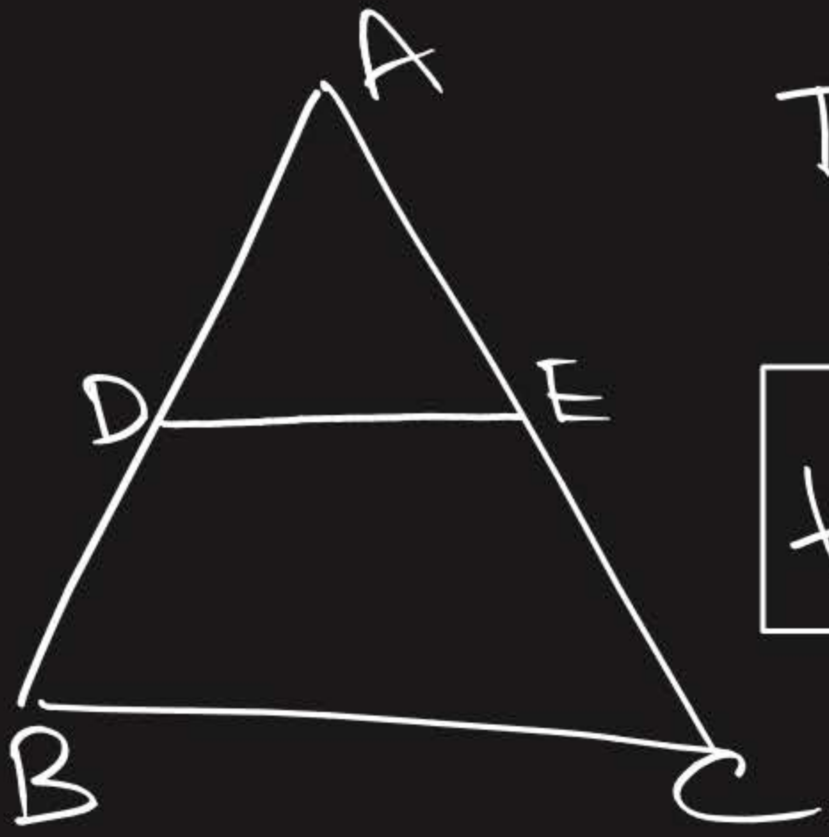


1. $\frac{AD}{DB} = \frac{AE}{EC}$

2. $\frac{AD}{AB} = \frac{AE}{AC}$

3. $\frac{DB}{AB} = \frac{EC}{AC}$.

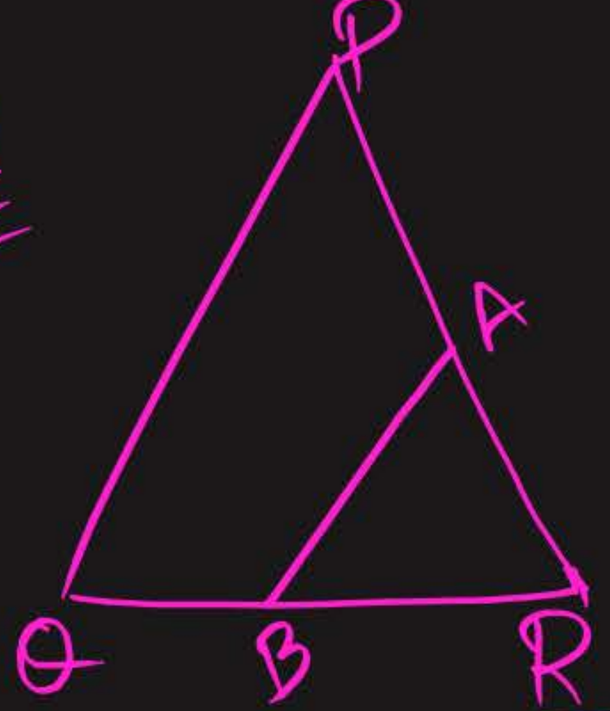
Converse of B.P.T



If, $\frac{AD}{DB}=\frac{AE}{EC}$

$\boxed{\text{then, } DE \parallel BC}$

Q



G: $\frac{RB}{BQ}=\frac{AP}{AR}$

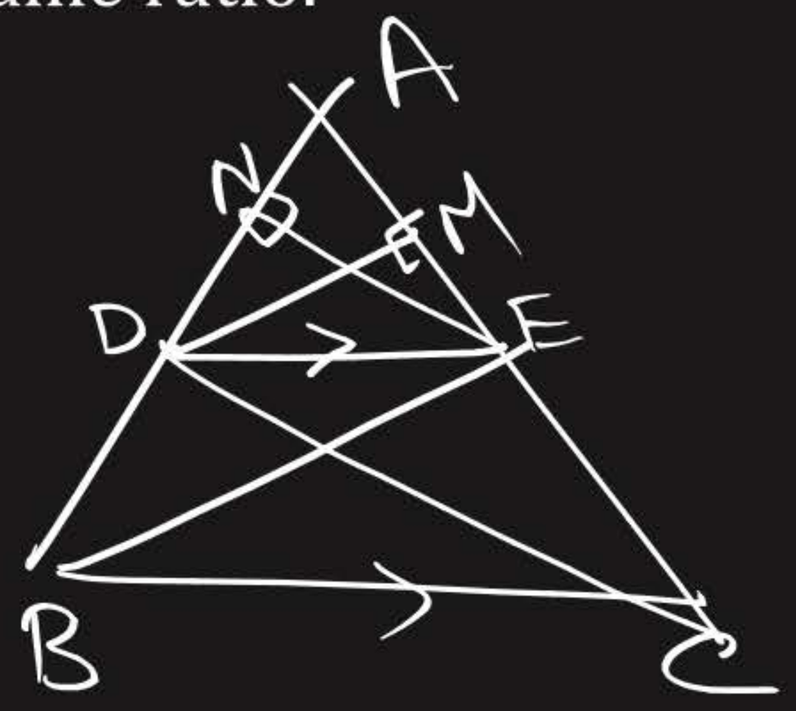
then, $AB \parallel PQ$

Theorem 1

Basic Proportionality Theorem (BPT) or Thales Theorem

If a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio.

CBSE 2002 C, 05, 06 C, 07, 08, 09, 10, 19, 2023



Given: Δ ABC where DE ∥ BC

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

Construction: Join BE and CD

Draw DM ⊥ AC and EN ⊥ AB.

Proof:

$$\text{ar (ADE)} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$= \frac{1}{2} \times AD \times EN \quad ...(1)$$

$$\text{ar (BDE)} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$= \frac{1}{2} \times DB \times EN \quad ...(2)$$

Divide (1) and (2)

$$\frac{\text{ar (ADE)}}{\text{ar (BDE)}} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN}$$

$$\frac{\text{ar (ADE)}}{\text{ar (BDE)}} = \frac{AD}{DB} \quad ...(A)$$

$$\text{ar (ADE)} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$= \frac{1}{2} \times AE \times DM \quad ...(3)$$

$$\text{ar (DEC)} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$= \frac{1}{2} \times EC \times DM \quad ...(4)$$

Divide (3) and (4)

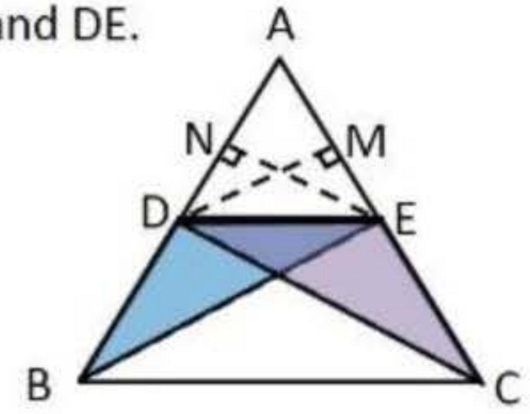
$$\frac{\text{ar (ADE)}}{\text{ar (DEC)}} = \frac{\frac{1}{2} \times AE \times DM}{\frac{1}{2} \times EC \times DM}$$

$$\frac{\text{ar (ADE)}}{\text{ar (DEC)}} = \frac{AE}{EC} \quad ...(B)$$

Now,

ΔBDE and ΔDEC are on the same base DE

and between the same parallel lines BC and DE.



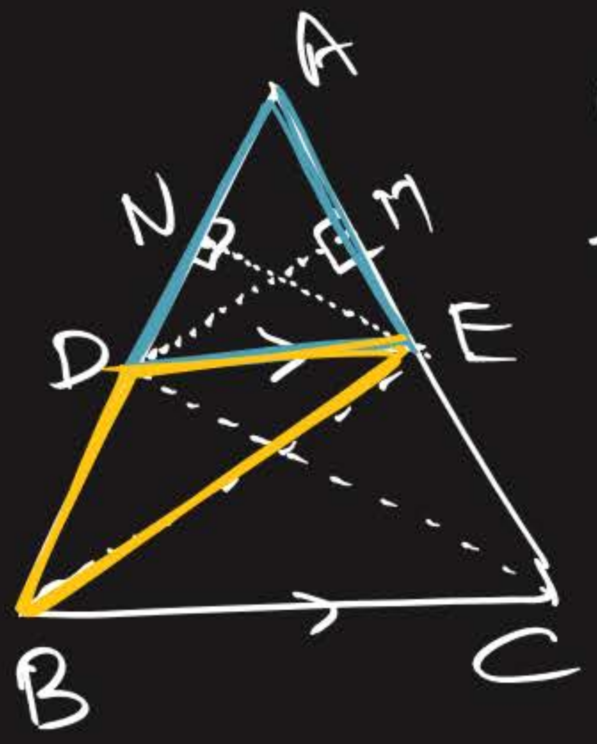
$\therefore$ ar (BDE) = ar (DEC)

Hence,

$$\frac{\text{ar (ADE)}}{\text{ar (BDE)}} = \frac{\text{ar (ADE)}}{\text{ar (DEC)}}$$

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \textit{(From (A) and (B))}$$

Hence Proved.



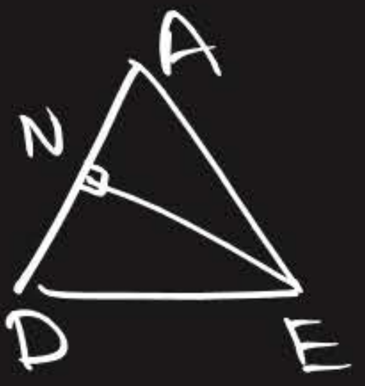
G: $DE \parallel BC$

Top: $\frac{AD}{DB} = \frac{AE}{EC}$

Const: $DM \perp AE$, $EN \perp AD$

Join DC and BE.

Proof:



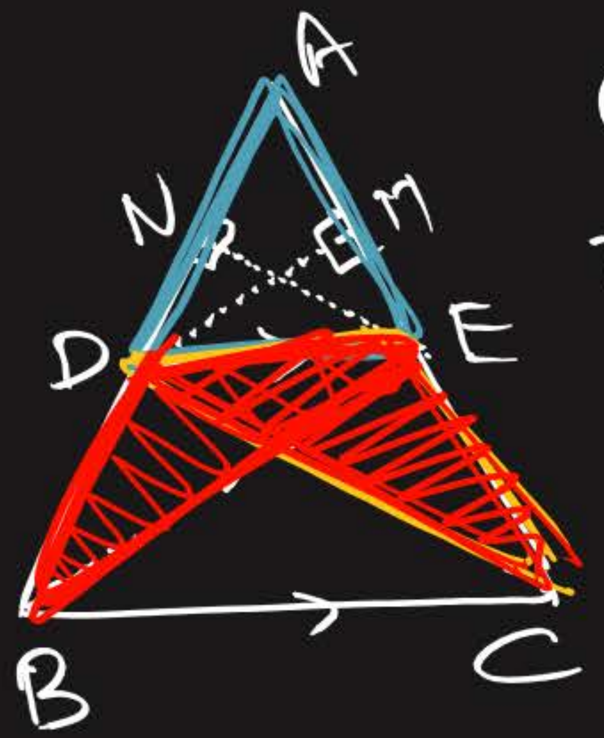
$A \cdot \Delta ADE = \frac{1}{2} \times b \times h$

$$\boxed{A \cdot \Delta ADE = \frac{1}{2} \times AD \times EN} \quad (1)$$

$$\boxed{A \cdot \Delta BDE = \frac{1}{2} \times BD \times EN} \quad (2)$$

$(1) \div (2)$

$$\boxed{\frac{A \cdot \Delta ADE}{A \cdot \Delta BDE} = \frac{AD}{BD}} \quad (3)$$



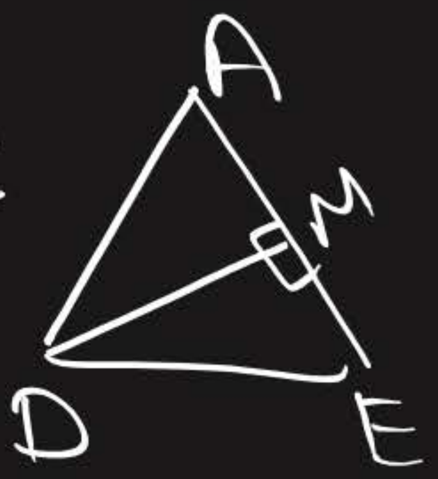
G: $DE \parallel BC$

Top: $\frac{AD}{DB} = \frac{AE}{EC}$.

Const: $DM \perp AE$, $EN \perp AD$

Join DC and BE.

Proof:



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

$$\boxed{A \cdot \Delta ADE = \frac{1}{2} \times AE \times DM} \quad (4)$$

$$\boxed{A \cdot \Delta DEC = \frac{1}{2} \times EC \times DM} \quad (5)$$

(4) ÷ (5)

$$\boxed{\frac{A \cdot \Delta ADE}{A \cdot \Delta DEC} = \frac{AE}{EC}} \quad (6)$$

$$\boxed{\frac{A \cdot \Delta ADE}{A \cdot \Delta BDE} = \frac{AD}{BD}} \quad (3)$$

$A \cdot \Delta DEC = A \cdot \Delta BDE$

(Δ's having same base and are b/w same parallel lines.)

$$\Rightarrow \frac{A \cdot \Delta ADE}{A \cdot \Delta DEC} = \frac{A \cdot \Delta ADE}{A \cdot \Delta BDE}$$

$$\frac{AE}{EC} = \frac{AD}{BD} \quad \underline{H.P}$$

Theorem 2

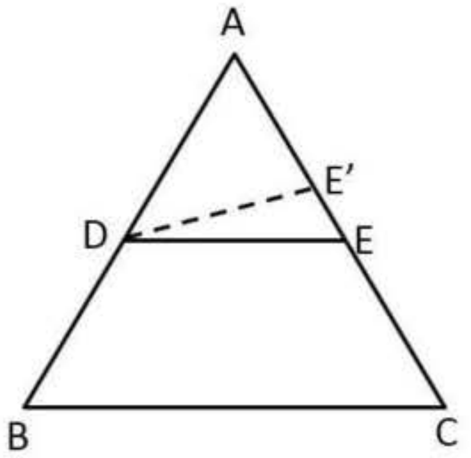
Next class

Converse of Basic Proportionality Theorem

If a line divides any two sides of a tringle in the same ratio then the line must be product to the third side.

Given: Δ ABC and a line DE intersecting AB at D and AC at E,

such that $\frac{AD}{DB} = \frac{AE}{EC}$



To Prove: DE ∥ BC

Construction: Draw DE' parallel to BC.

Proof:

Since DE' ∥ BC ,

*By **Theorem 6.1** :If a line is drawn parallel to one side of a triangle to intersecting other two sides not distinct points, the other two sided are divided in the same ratio.*

$$\therefore \frac{AD}{DB} = \frac{AE'}{E'C} \qquad ...(1)$$

And given that,

$$\frac{AD}{DB} = \frac{AE}{EC} \qquad ...(2)$$

From (1) and (2)

$$\frac{AE'}{E'C} = \frac{AE}{EC}$$

Adding 1 on both sides

$$\frac{AE'}{E'C} + 1 = \frac{AE}{EC} + 1$$

$$\frac{AE' + E'C}{E'C} = \frac{AE + EC}{EC}$$

$$\frac{AE' + E'C}{E'C} = \frac{AE + EC}{EC}$$

$$\frac{AC}{E'C} = \frac{AC}{EC}$$

$$\frac{1}{E'C} = \frac{1}{EC}$$

EC = E’C

Thus, E and E’ coincide

Since DE’ ∥ BC

∴ DE ∥ BC.

Hence, proved

#Q. In fig. $\boxed{DE \parallel BC}$. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, find the value of x.

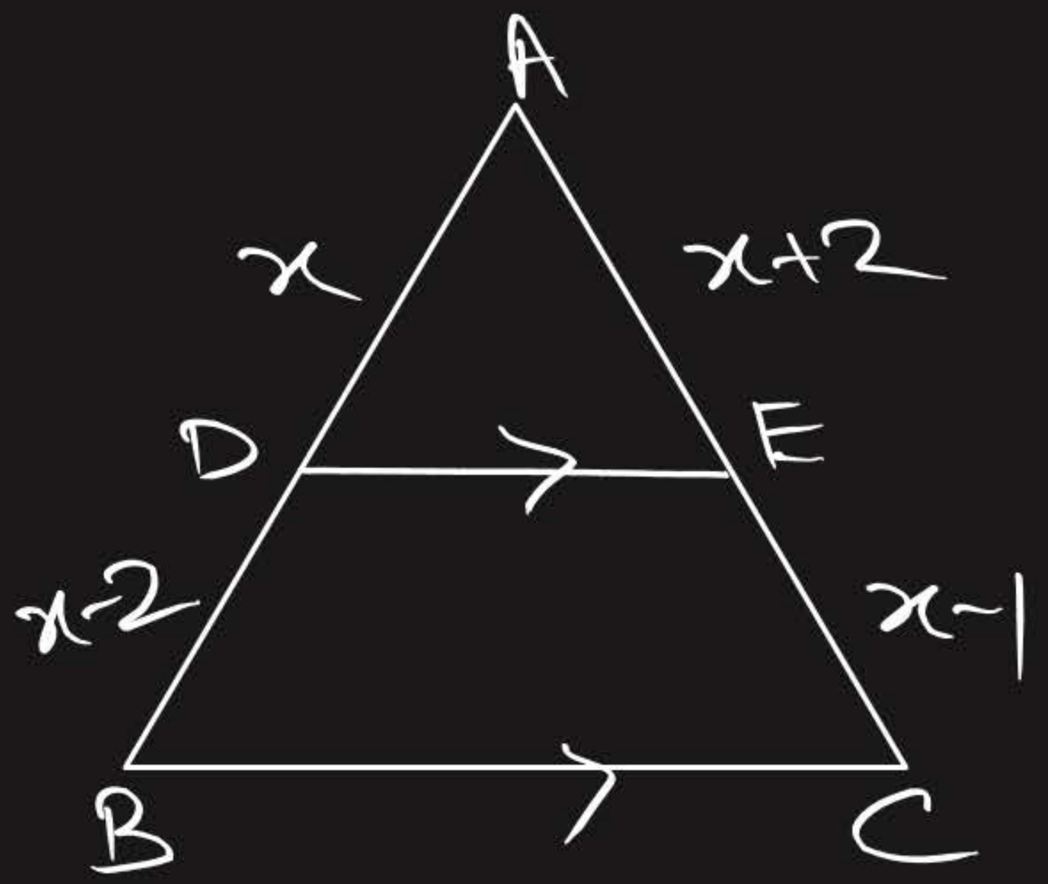
$$\frac{x}{x-2} = \frac{x+2}{x-1}$$

$$x(x-1) = (x+2)(x-2)$$

$$\cancel{x^2} - x = \cancel{x^2} - 4$$

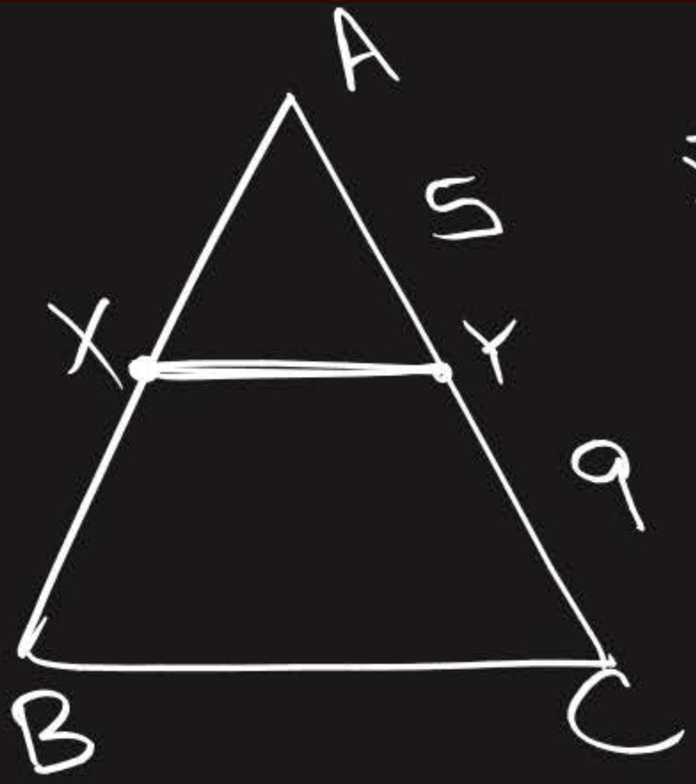
$$-x = -4$$

$$x = 4$$



#Q. In ΔABC, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}$, $AY = 5$ and $YC = 9$, then state whether XY and BC parallel or not.

CBSE Term-1, 2015, 16



$$\frac{AX}{XB} = \frac{3}{4}$$

$$\frac{AY}{YC} = \frac{5}{9}$$

$$\because \frac{AX}{XB} \neq \frac{AY}{YC}$$

$\therefore$ XY is not parallel to BC.

#Q. In fig. PQ || BC and PR || CD. Prove that

#GPh

(i) $\frac{AR}{AD} = \frac{AQ}{AB}$

(ii) $\frac{QB}{AQ} = \frac{DR}{AR}$

From (1) and (2)

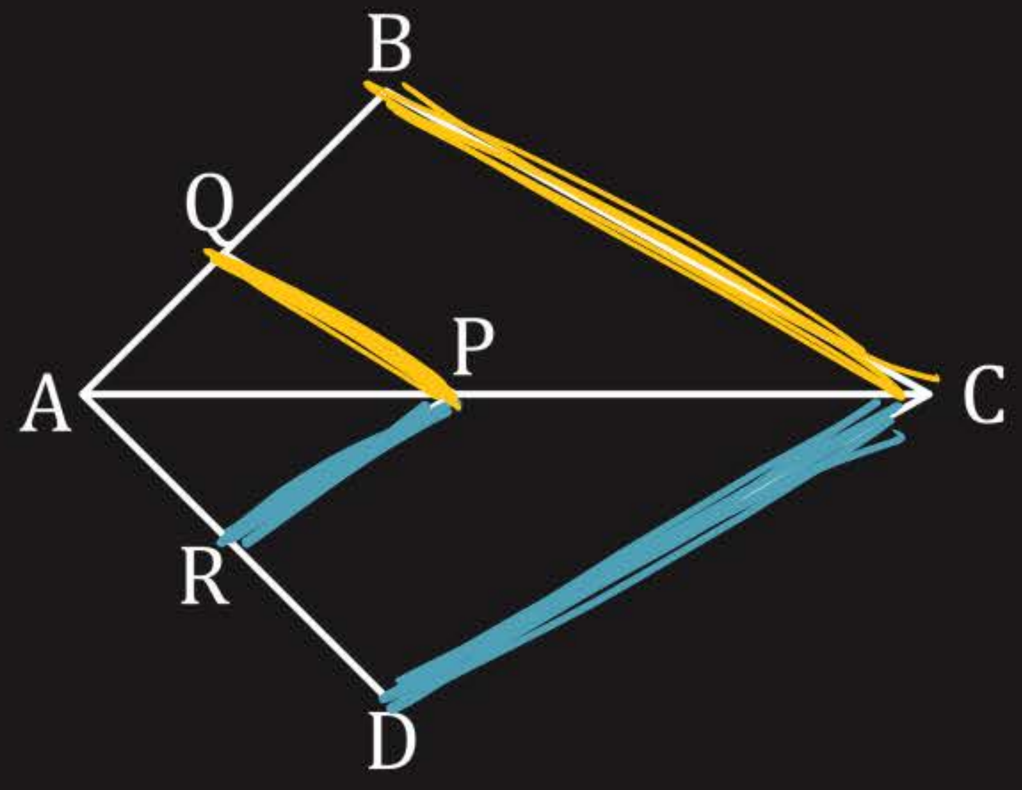
$$\boxed{\frac{AR}{AD} = \frac{AQ}{AB}}$$

(i) $\because PQ \parallel BC$

$\therefore \boxed{\frac{AP}{AC} = \frac{AQ}{AB}}$ (By B.P.T) (1)

$\because PR \parallel CD$

$\therefore \boxed{\frac{AR}{AD} = \frac{AP}{AC}}$ (2)



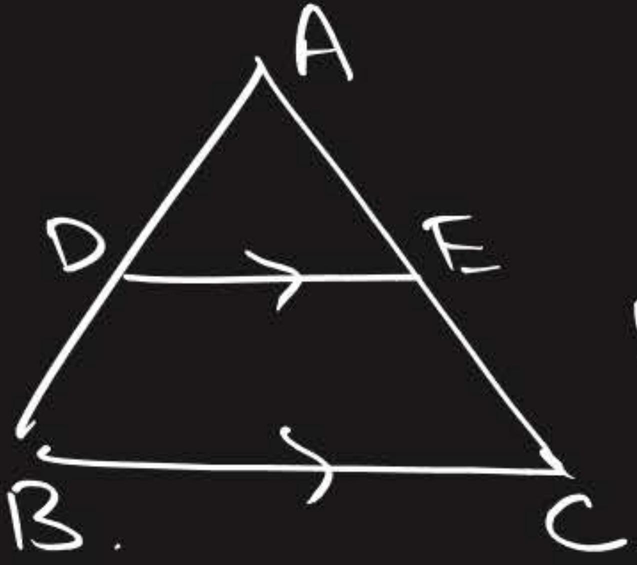
#Q. In fig. DE || BC and CD || EF. Prove that $AD^2 = AB \times AF$.

CBSE 2007

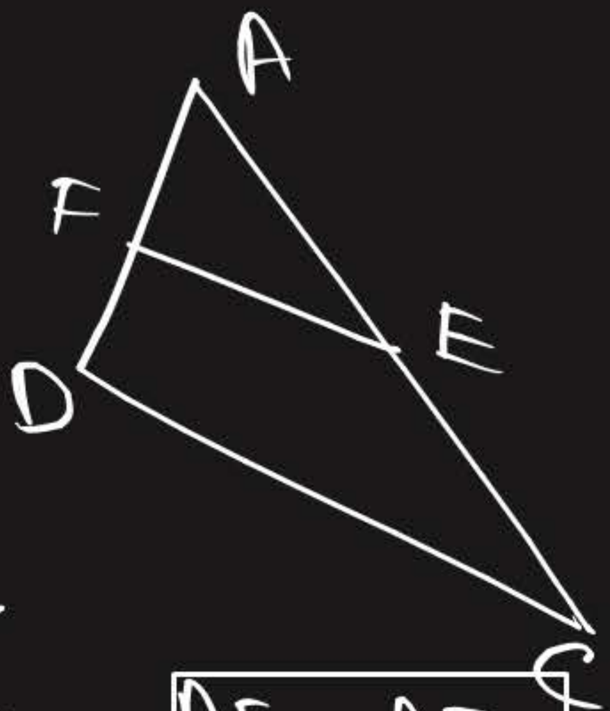
G:

To p:

Proof:



$$\boxed{\frac{AD}{AB} = \frac{AE}{AC}} \quad (1)$$

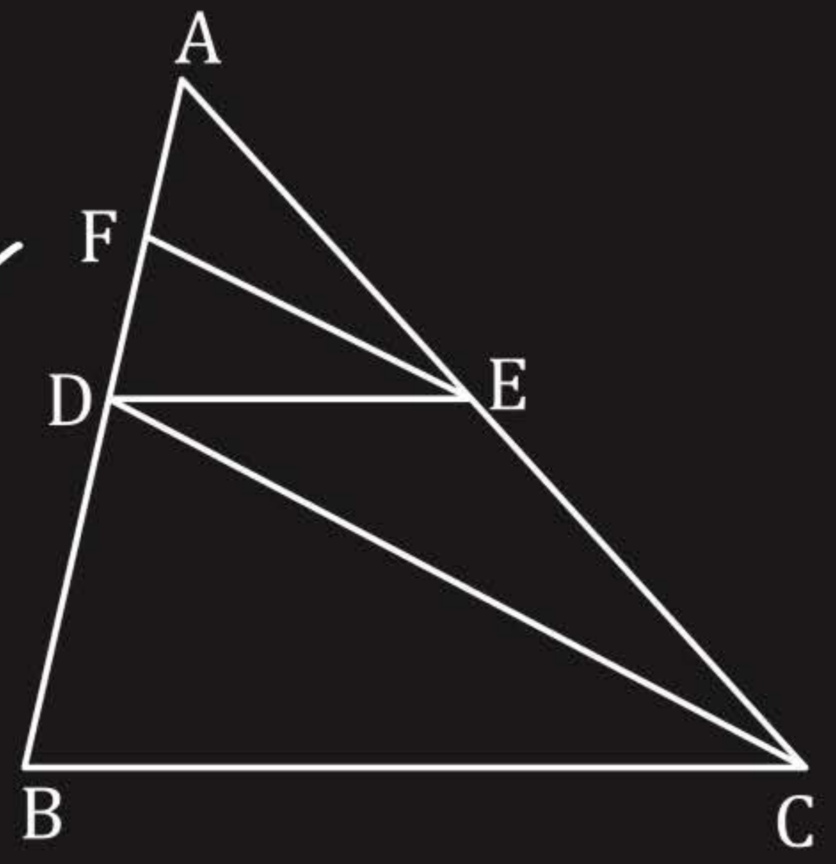


$$\boxed{\frac{AF}{AD} = \frac{AE}{AC}} \quad (2)$$

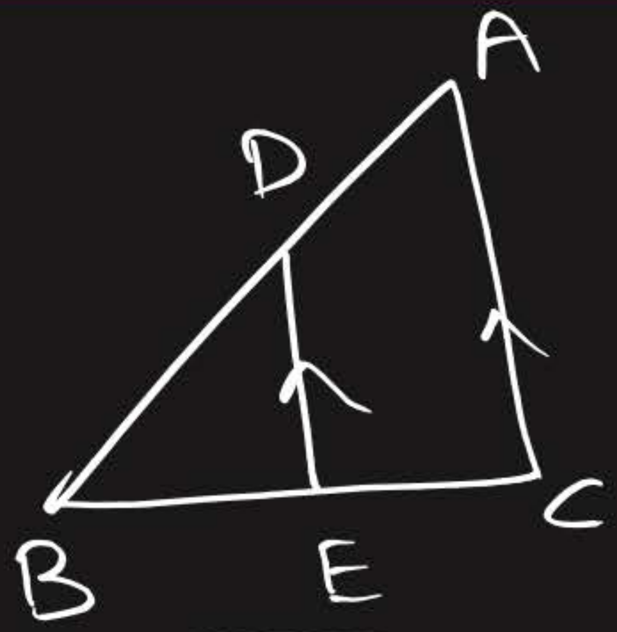
From (1) and (2)

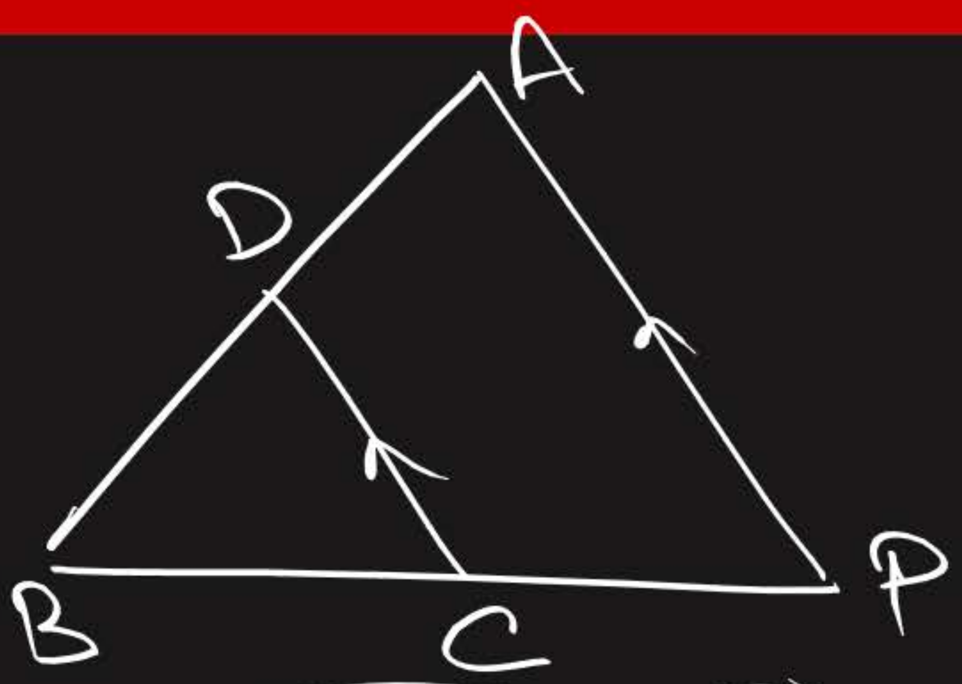
$$\frac{AD}{AB} = \frac{AF}{AD}$$

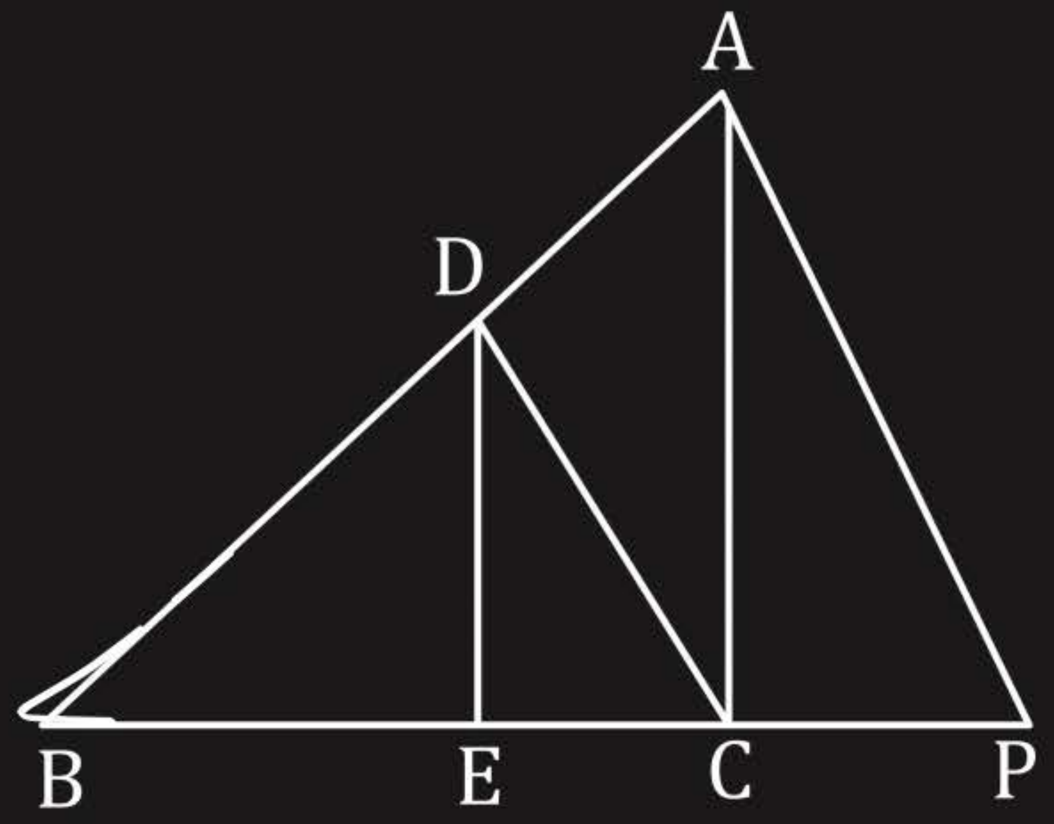
$$\boxed{AD^2 = AB \cdot AF}$$



#Q. DE || AC and DC || AP, prove that $\frac{BE}{EC} = \frac{BC}{CP}$







$$\frac{BE}{EC} = \frac{BD}{DA} \quad (1)$$

$$\frac{BC}{CP} = \frac{BD}{DA} \quad (2)$$

$$\frac{BE}{EC} = \frac{BC}{CP}$$

#Q. DE || AQ and DF || AR, prove that EF || QR.

NCERT, CBSE 2008

G: $DE \parallel AQ$, $DF \parallel AR$

TOP: $EF \parallel QR$

Proof: $\because DE \parallel AQ$

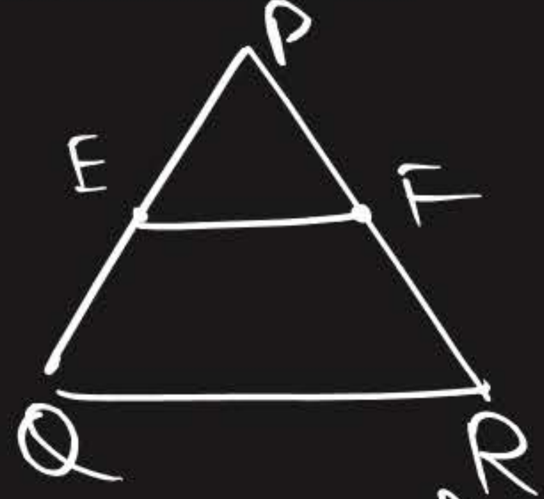
By B.P.T, $\boxed{\frac{PE}{EQ} = \frac{PD}{DA}}$ —(1)

$\because DF \parallel AR$

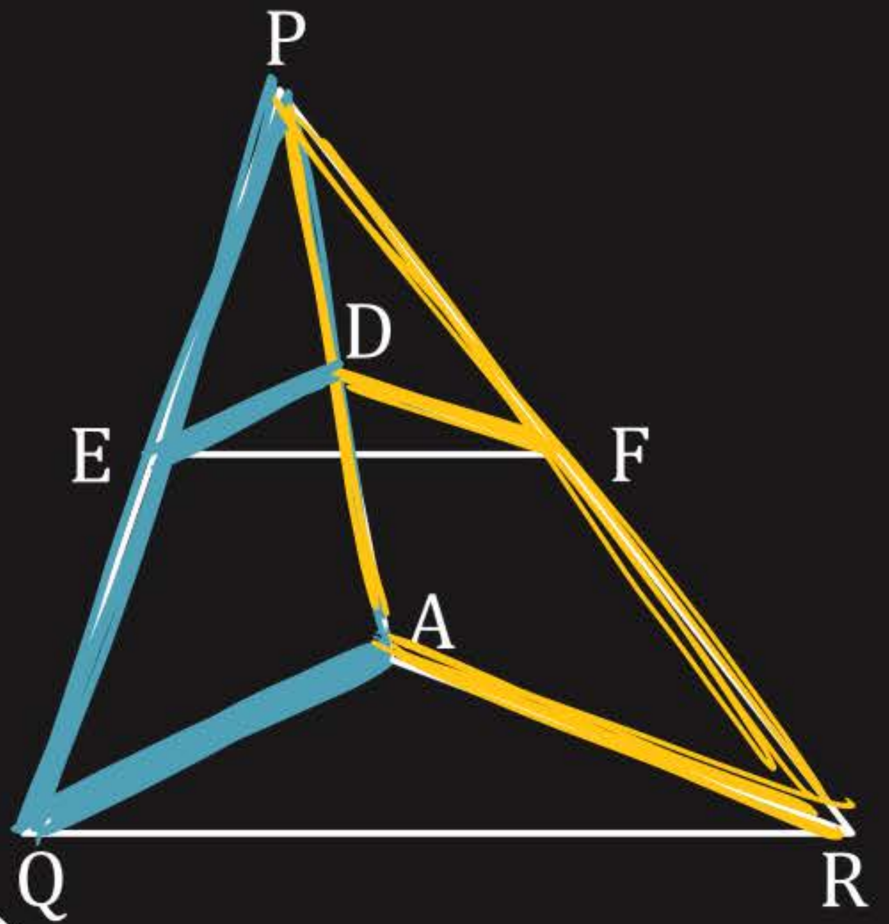
By B.P.T, $\boxed{\frac{PF}{FR} = \frac{PD}{DA}}$ —(2)

From (1) and (2)

$$\frac{PE}{EQ} = \frac{PF}{FR}$$



By Converse of B.P.T, $EF \parallel QR$



#Q. In fig. A, B and C are points on OP, OQ and OR respectively such that AB || PQ and AC || PR. Show that BC || QR.

AB || PQ

$$\frac{OA}{AP} = \frac{OB}{BQ} \quad (1)$$

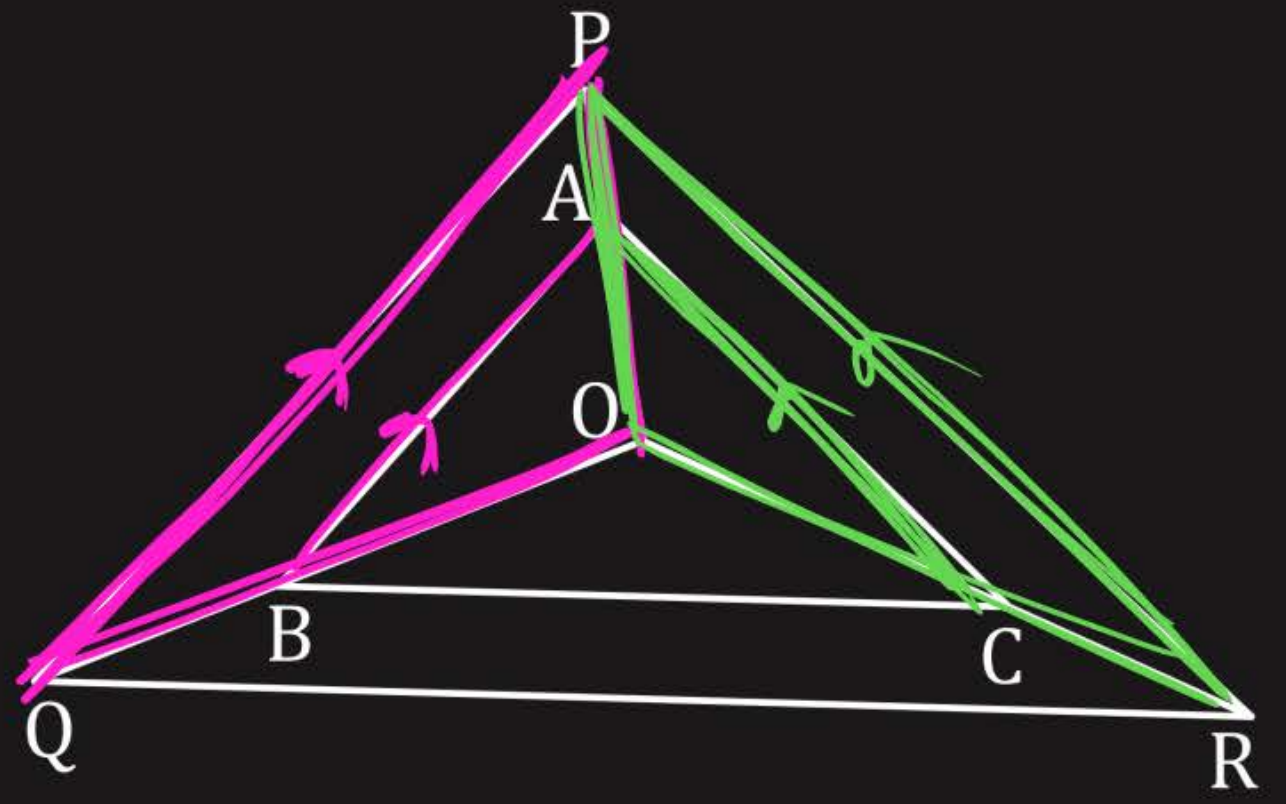
AC || PR

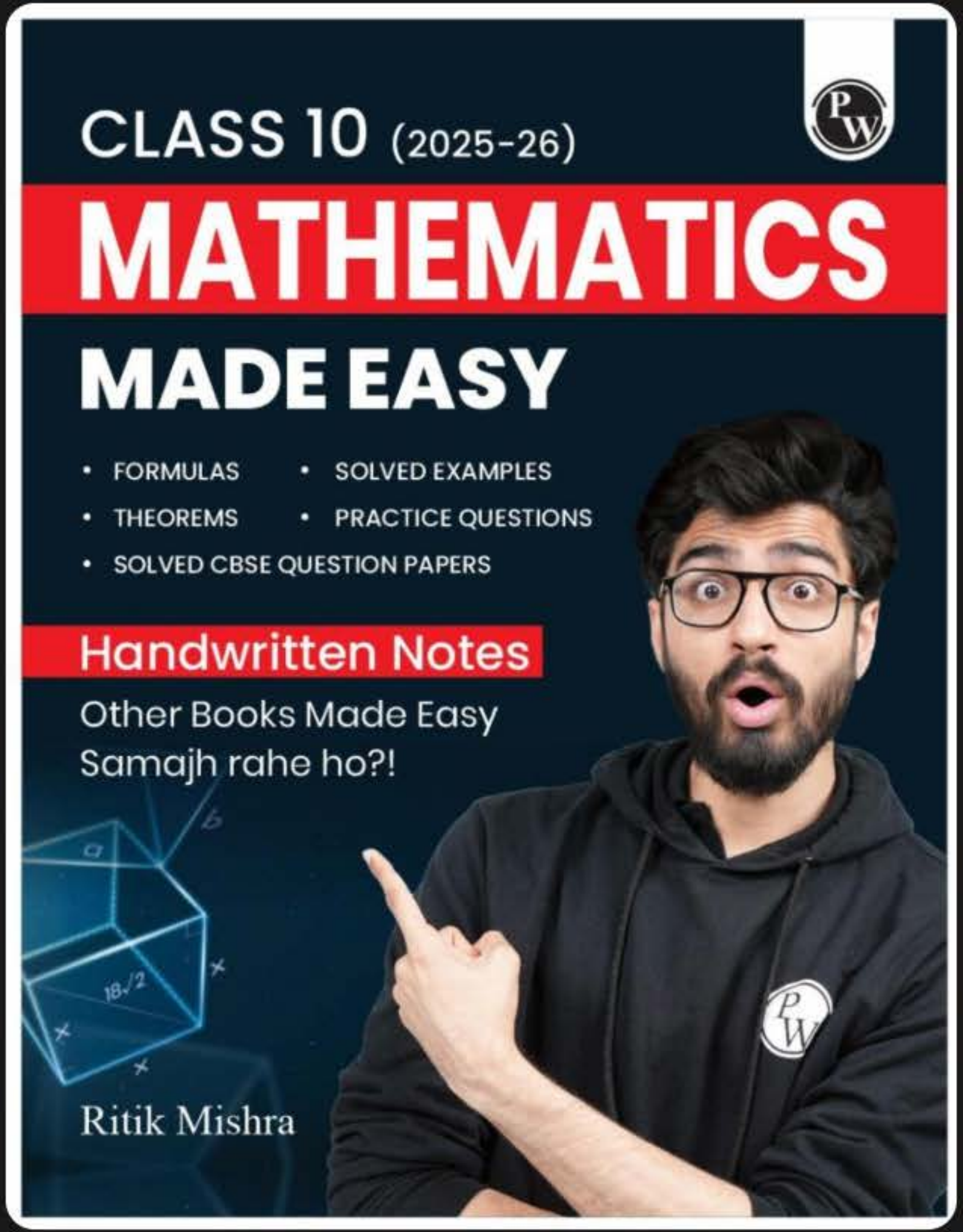
$$\frac{OA}{AP} = \frac{OC}{CR} \quad (2)$$

$$\frac{OB}{BQ} = \frac{OC}{CR}$$

By "C" of B.P.T,

BC || QR

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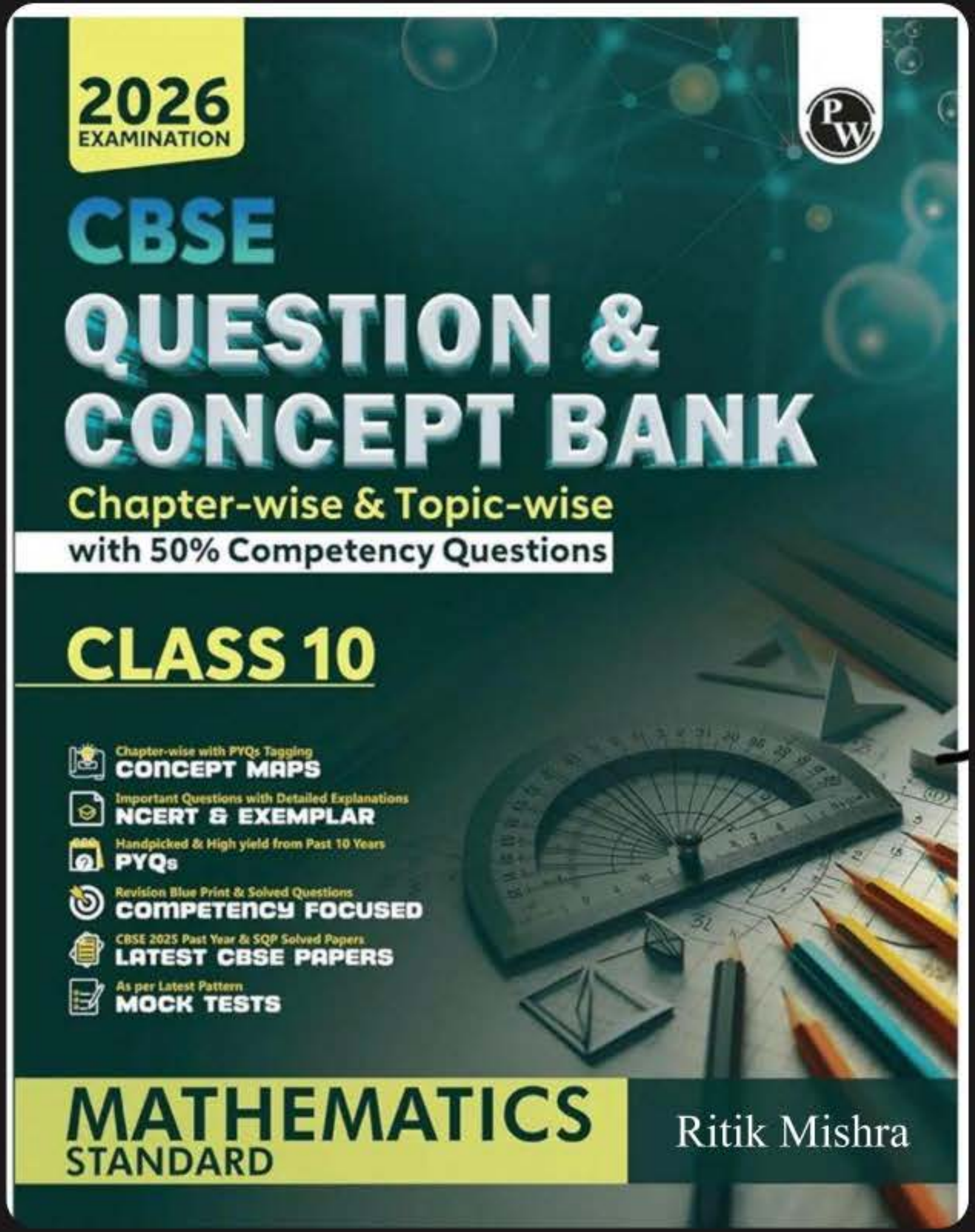
1 → C:of B.P.T → Next class

2 → corallary




WORK HARD
DREAM BIG
NEVER GIVE UP


RITIK SIR
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Thank You Babuaas❤️🫂