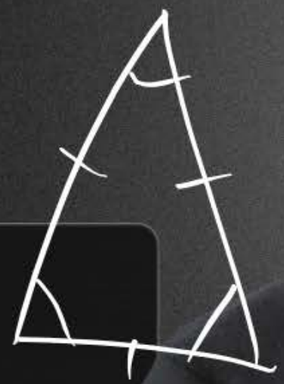
UDAAN

2026

Triangles

MATHS LECTURE-2

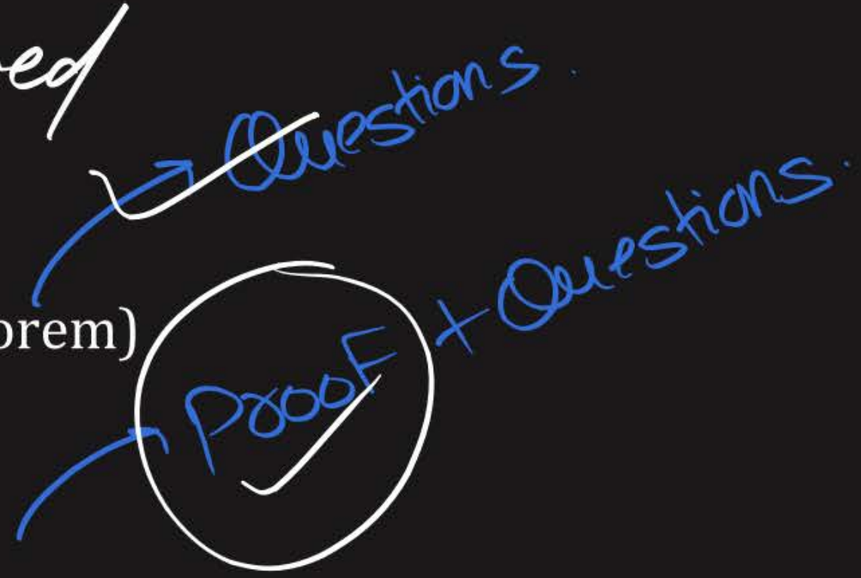
BY-RITIK SIR



Topics to be covered

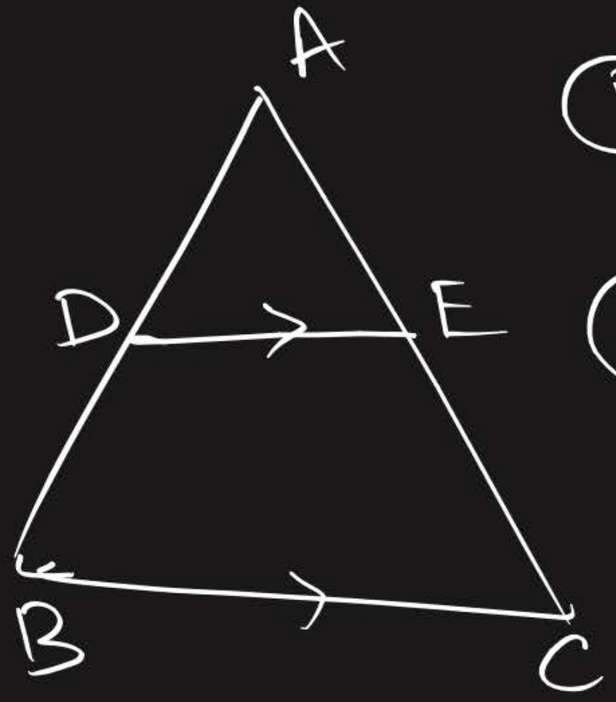
A Basic Proportionality Theorem (Thales Theorem)

B Converse of Basic Proportionality Theorem



Proof of Converse of BPT
Questions on BPT

B.P.T & Corollary.



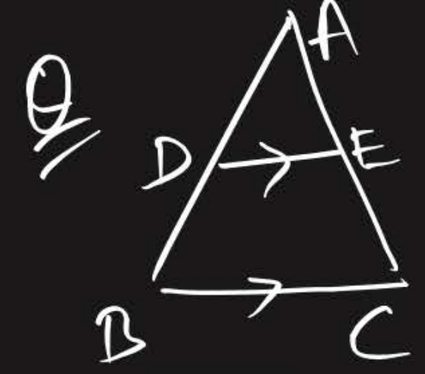
Last class Bow

(1) $\frac{AD}{DB} = \frac{AE}{EC}$

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

(3) $\frac{DB}{AB} = \frac{EC}{A}$

Q



$DE \parallel BC$

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

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

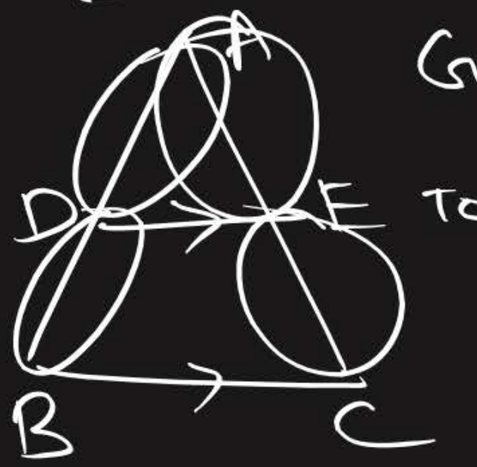
$\frac{DB}{AD} + \frac{1}{1} = \frac{EC}{AE} + \frac{1}{1}$

$\frac{DB+AD}{AD} = \frac{EC+AE}{AE}$

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

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

Proof



G: DE || BC

To P: $\frac{DB}{AB} = \frac{EC}{AC}$

Proof: $\frac{AD}{DB} = \frac{AE}{EC}$ (B.P.T)

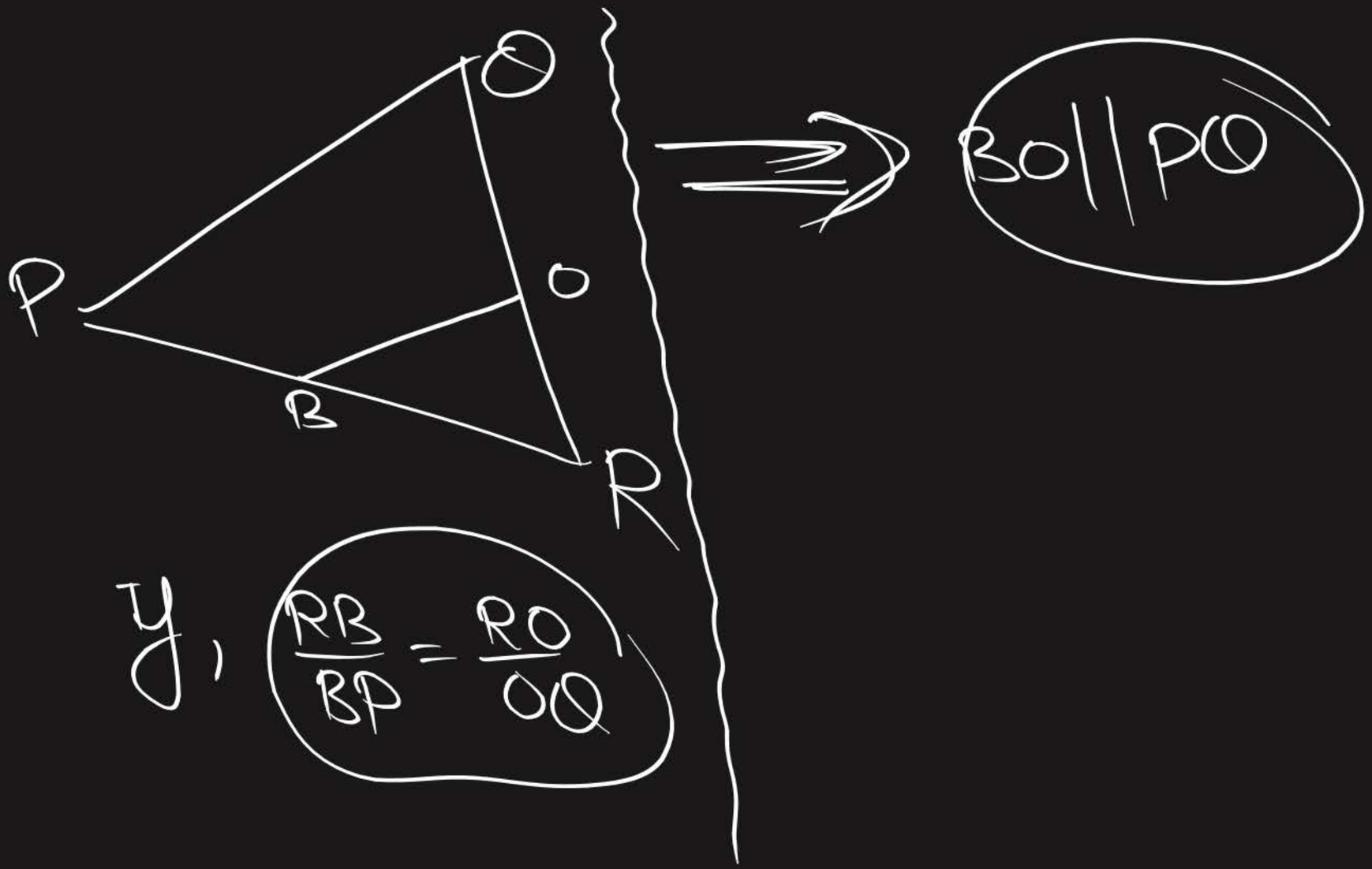
$\frac{AD}{DB} + 1 = \frac{AE}{EC} + 1$

$\frac{AD+DB}{DB} = \frac{AE+EC}{EC}$

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

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

Converse of B.P.T

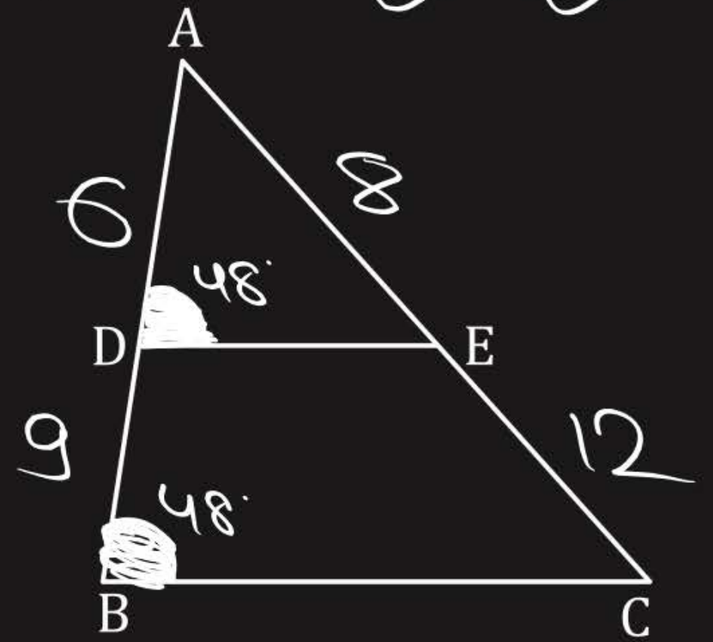


$\Rightarrow$ BoI || PQ

If, $\frac{RB}{BP} = \frac{RO}{OQ}$

#Q. In figure, If AD = 6 cm, DB = 9 cm, AE = 8 cm and EC = 12 cm and $\angle ADE = 48°$. Find $\angle ABC$.

CBSE SQP, 2018, 19



Proof:

$\frac{6}{9} = \frac{2}{3}$ $\quad \frac{8}{12} = \frac{2}{3}$

$\frac{2}{3} = \frac{2}{3}$

$\Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$

$\Rightarrow$ DE || BC (By C'ol B.P.T)

$\therefore \angle ADE = \angle ABC$ (corres. $\angle$'s)

$\Rightarrow \angle ABC = 48°$ //

#Q. If D and E are points on side AB and AC respectively of a ΔABC such that DE || BC and BD = CE. Prove that ΔABC is isosceles.

CBSE 2007, 09

G: $DE \| BC$, $BD = CE$

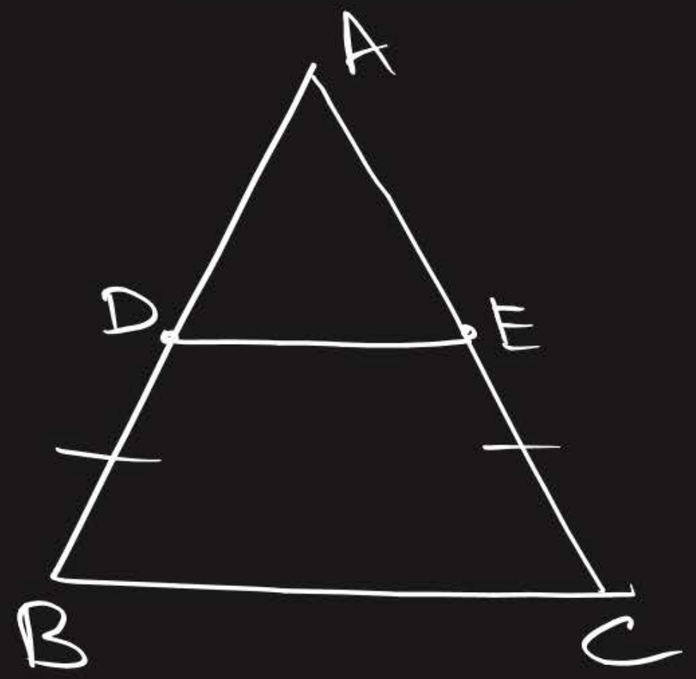
To P: ΔABC is isosceles

Proof: $\because DE \| BC$

$\Rightarrow \frac{DB}{AB} = \frac{EC}{AC}$ (BY B.P.T)

$AC = AB$ ($\because BD = CE$)

$\therefore \Delta ABC$ is isosceles.



#Q. $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$. Prove that ΔPQR is an isosceles.

NCERT

$\because \angle PST = \angle PRQ = x$.

also, $\angle PST = \angle PQR = x$

$\Rightarrow \boxed{\angle PQR = \angle PRQ = x}$

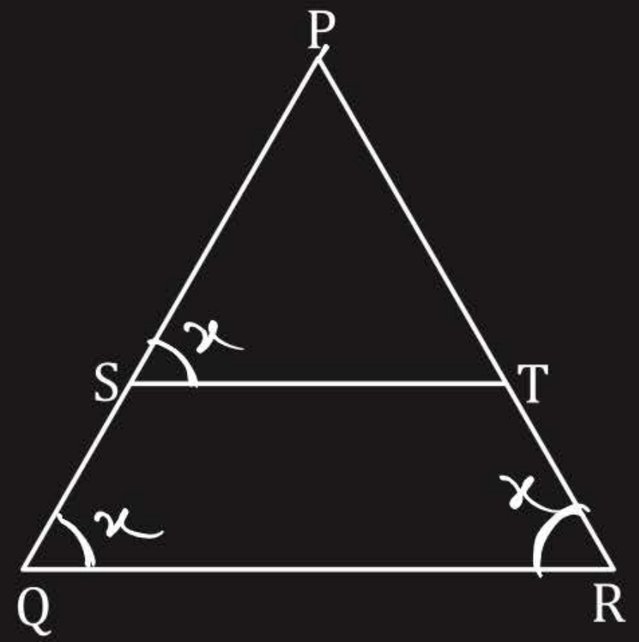
$\Rightarrow PR = PQ$

(sides opp to equal angles)

$\therefore \Delta PQR$ is isosceles.

ST || QR

(By C.B.P.T)



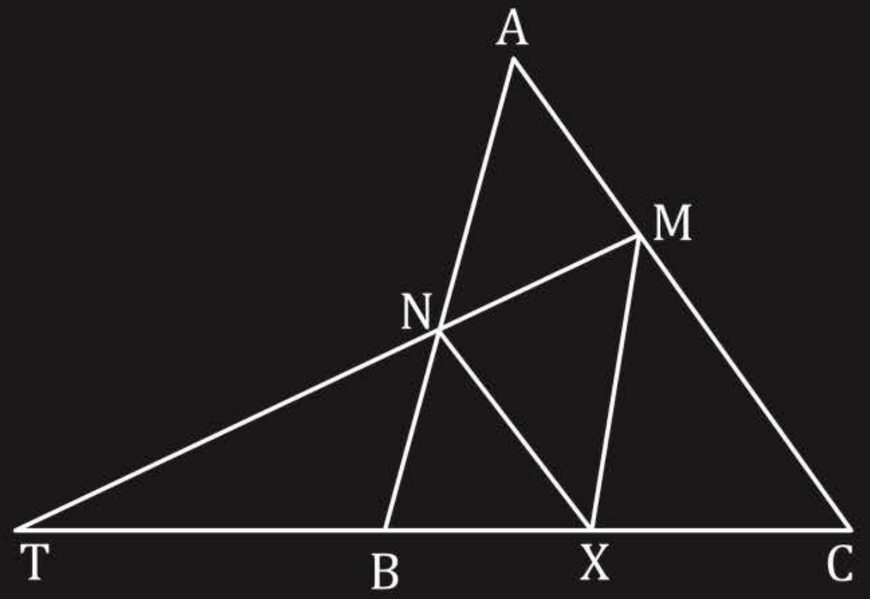
#Q. Let X be any point on the side BC of a triangle ABC. If XM, XN are drawn parallel to BA and CA meeting CA, BA in M, N respectively; MN meets BC produced in T, prove that $TX^2 = TB \times TC$.

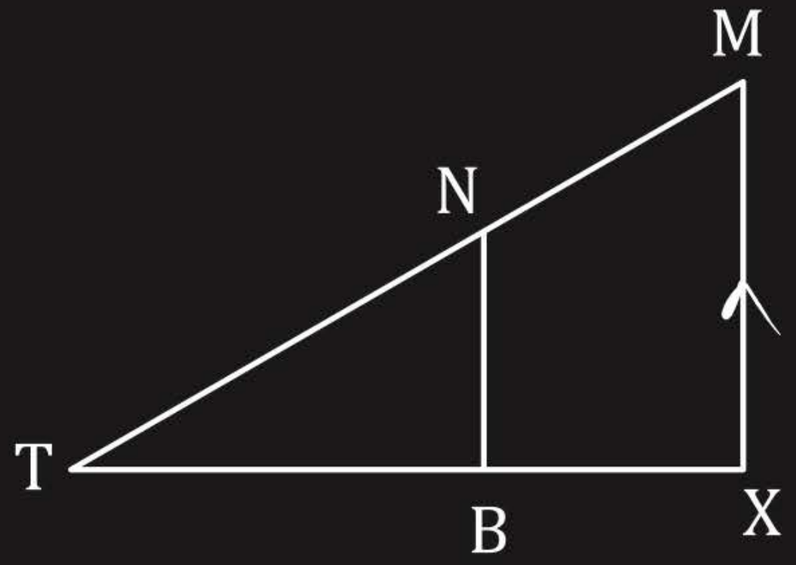
$XM \parallel BA$

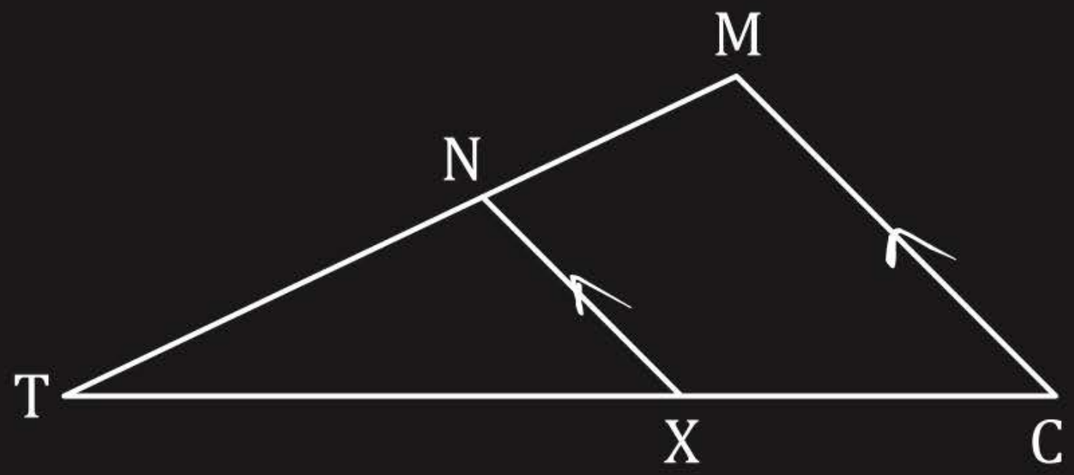
$XM \parallel BN$

$XN \parallel CA$

$XN \parallel CM$







$$\frac{TB}{TX} = \frac{TN}{TM}$$

$$\frac{TX}{TC} = \frac{TN}{TM}$$

$$\frac{TB}{TX} = \frac{TX}{TC}$$

$$\boxed{TB \cdot TC = TX^2}$$

#Q. Prove that the line joining the mid-points of any two sides of a triangle is parallel - to the third side. (Recall that you have done it in Class IX).

G: $AD = DB$, $AE = EC$

To p: $DE \parallel BC$.

Proof: $AD = DB \times 1$

$$\frac{AD}{DB} = 1 \quad (1)$$

$AE = EC \times 1$

$$\frac{AE}{EC} = 1 \quad (2)$$

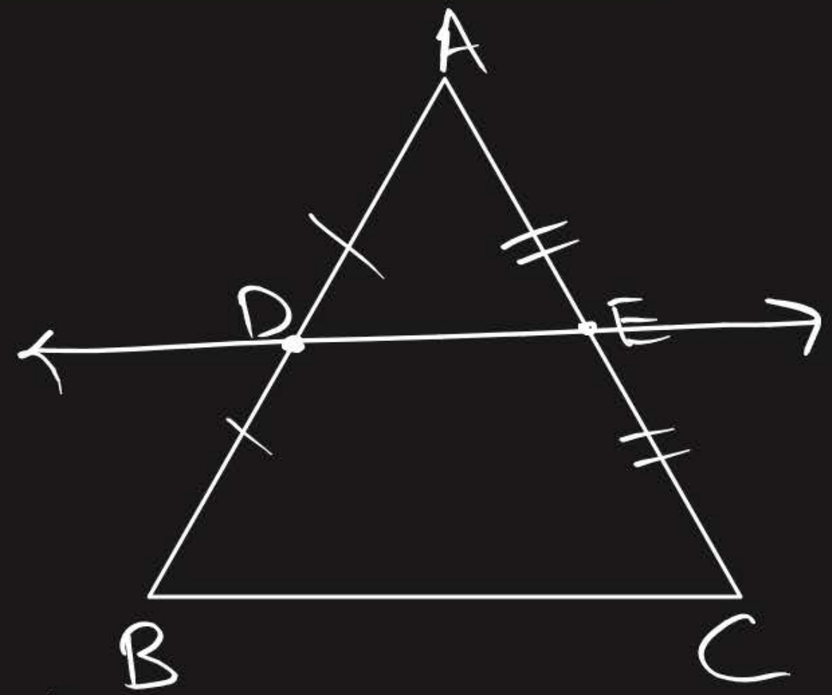
$$\frac{AD}{DB} = \frac{AE}{EC}$$

From (1) and (2)

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

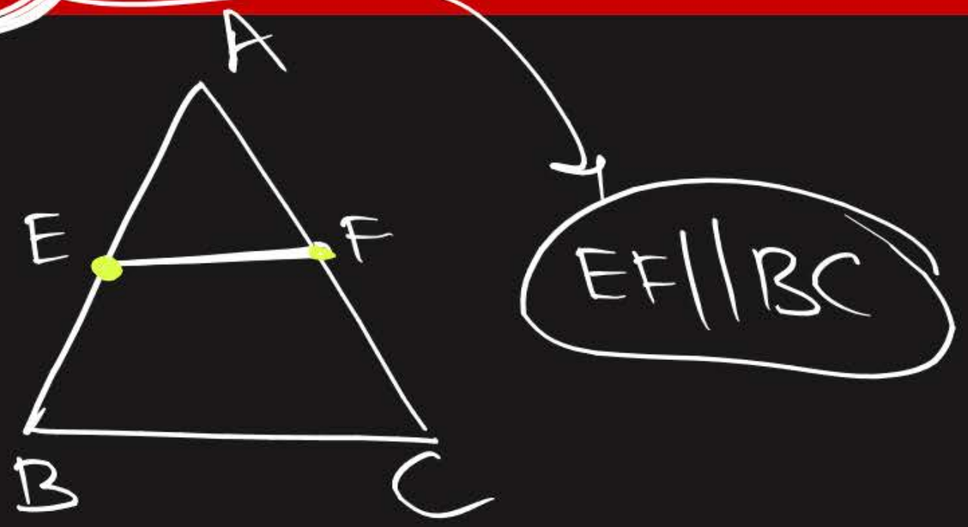
$\Rightarrow$ $DE \parallel BC$

(By C' of B.P.T)



#Q. E and F are points on the sides AB and AC respectively of a ΔABC such that $\frac{AE}{EB} = \frac{AF}{FC} = \frac{1}{2}$. Which of the following relation is true?

CBSE 2025



EF || BC

Similarity

A $EF = 2BC$

B $BC = 2EF$

C $EF = 3BC$

D $BC = 3EF$

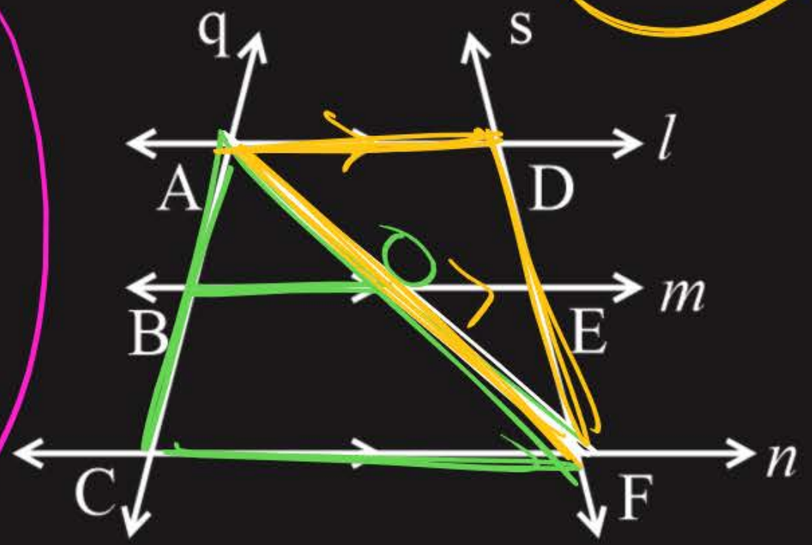
#Q. State basic proportionality theorem. Use it to prove the following:

If three parallel lines l, m, n are intersected by transversals q and s as shown in the adjoining figure, then $\frac{AB}{BC} = \frac{DE}{EF}$.

CBSE 2025

$\frac{AB}{BC} = \frac{AO}{OF}$

$\frac{AO}{OF} = \frac{DE}{EF}$



#Q. ABCD is a trapezium in which AB || DC and its diagonal intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

G: AB || DC

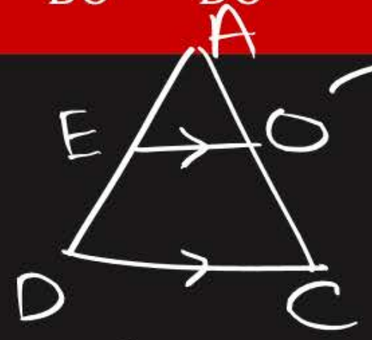
Top: $\frac{AO}{BO} = \frac{CO}{DO}$.

Const: EO || DC.

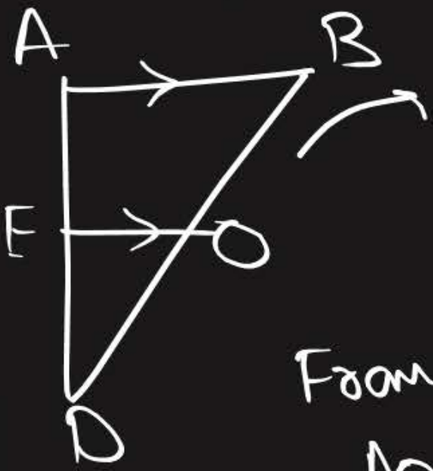
Proof: ∵ EO || DC.

also, AB || DC

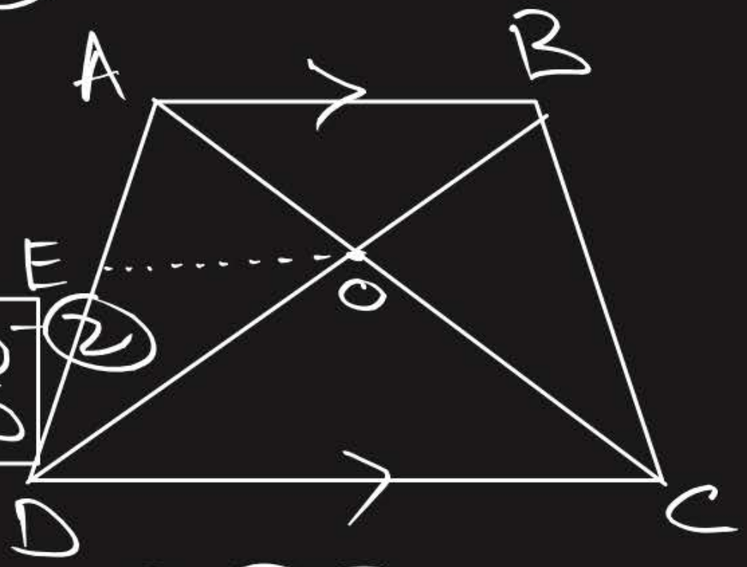
⇒ EO || AB || DC



$\frac{AE}{ED} = \frac{AO}{OC}$ ①



$\frac{AF}{FD} = \frac{BO}{OD}$ ②



From ① and ②

$\frac{AO}{OC} = \frac{BO}{OD}$

$\frac{AO}{BO} = \frac{OC}{OD}$ H.P

#Q. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. ABCD is a trapezium.

G: $\frac{AO}{BO} = \frac{CO}{DO}$

Tob: ABCD is trapezium.

Const: EO || DC.

Proof: ∵ EO || DC.

$\frac{AE}{ED} = \frac{AO}{OC}$ ①

$\frac{AO}{OC} = \frac{OB}{OD}$ ①

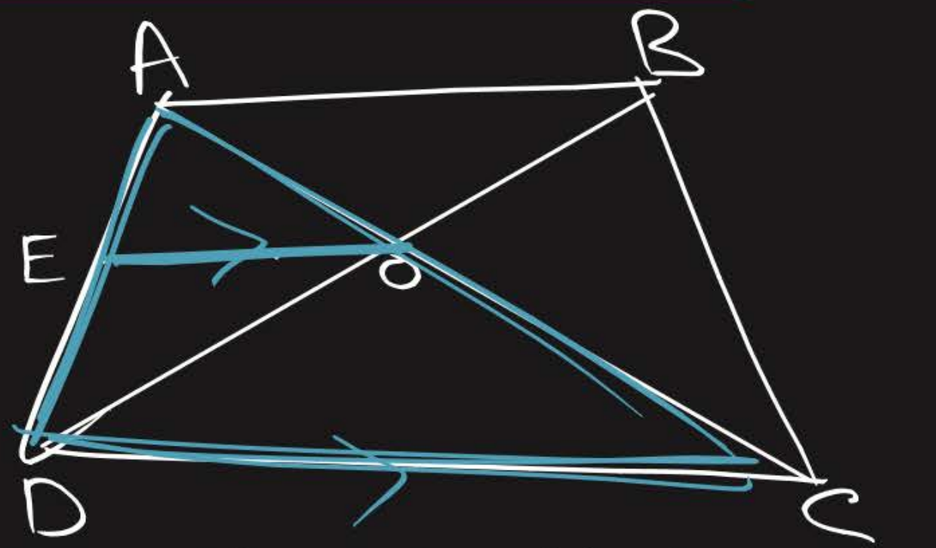
From ① and ②

$\frac{AE}{ED} = \frac{OB}{OD}$

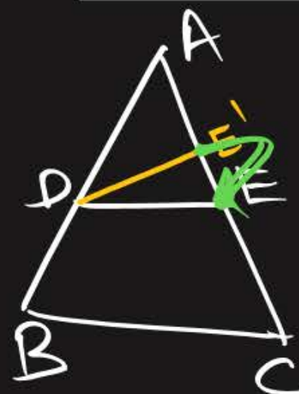
⇒ EO || AB (By 'c' of B.P.T)

⇒ AB || DC

H.P



Proof of 'c' of B.P.T → CBSE 2023



G: $\frac{AD}{DB} = \frac{AE}{EC}$ — (1)

Top: DE || BC.

Const: DE' || BC.

Proof: ∵ DE' || BC

$\Rightarrow \frac{AD}{DB} = \frac{AE'}{E'C}$ — (2)

From (1) and (2)

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

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

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

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

$E'C = EC$

'E' and 'E' coincides.

∵ DE' || BC

∴ DE || BC

H.P

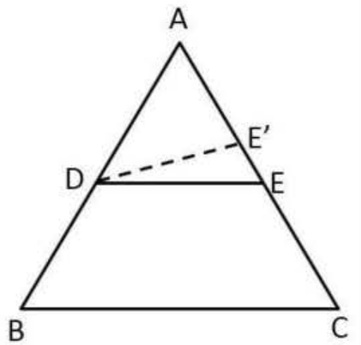
Theorem 2

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~~ Parallel 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.*

Th-1 Statement

(Prove karo)
Isha Converse

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

And given that,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \ldots(2)$$

From (1) and (2)

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

Adding 1 on both sides

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

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

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

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

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

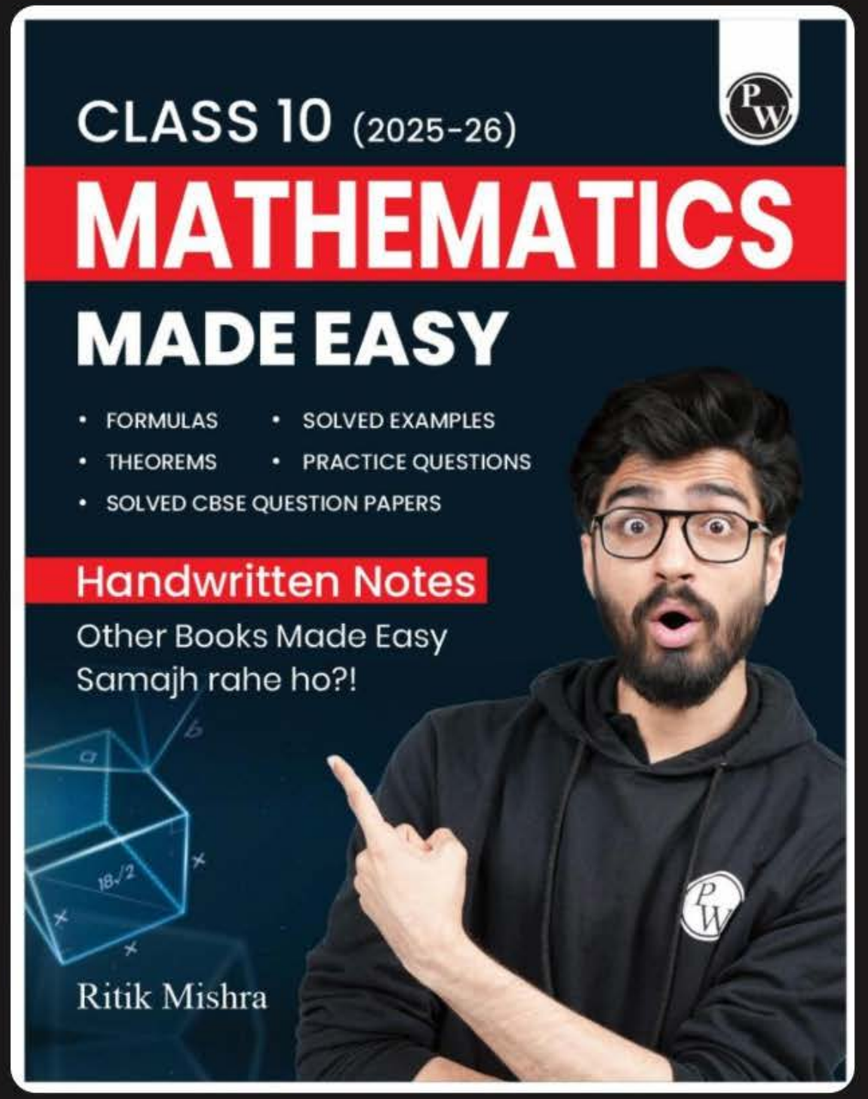
EC = E'C

Thus, E and E' coincide

Since DE' ∥ BC

∴ DE ∥ BC.

Hence, proved



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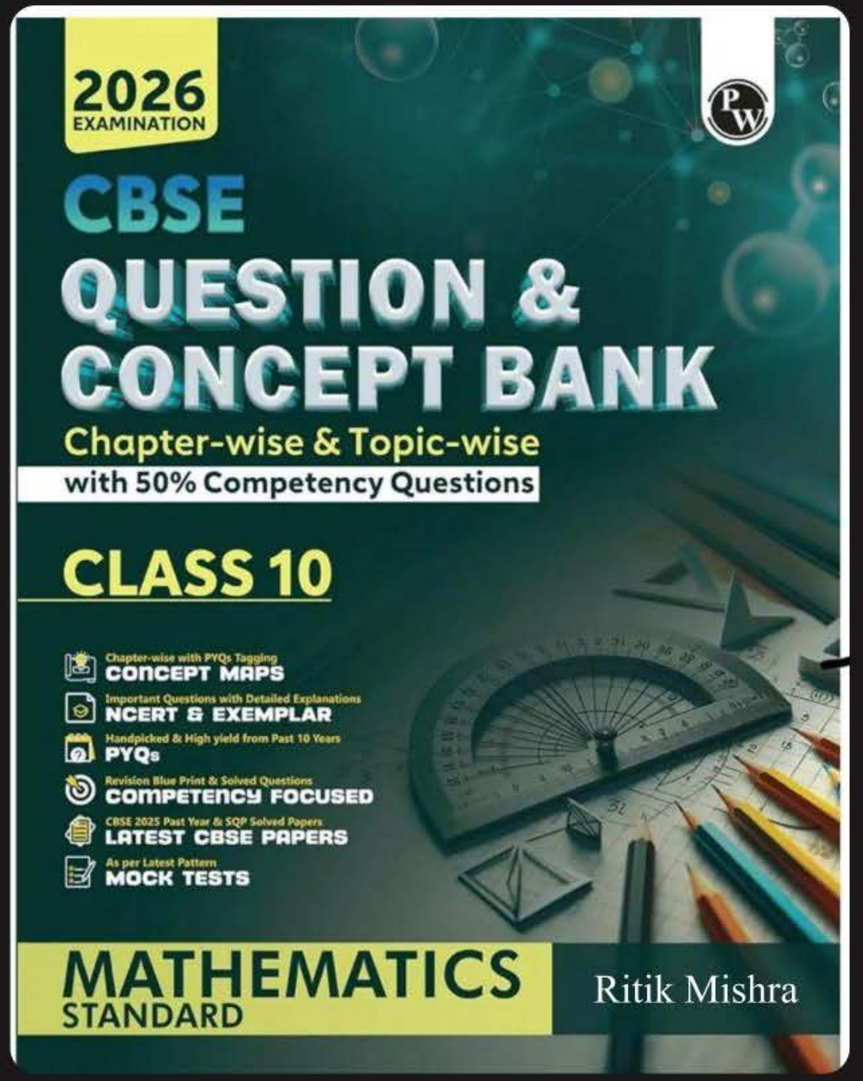


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RITIK SIR

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Thank You Babuaas❤️🫂