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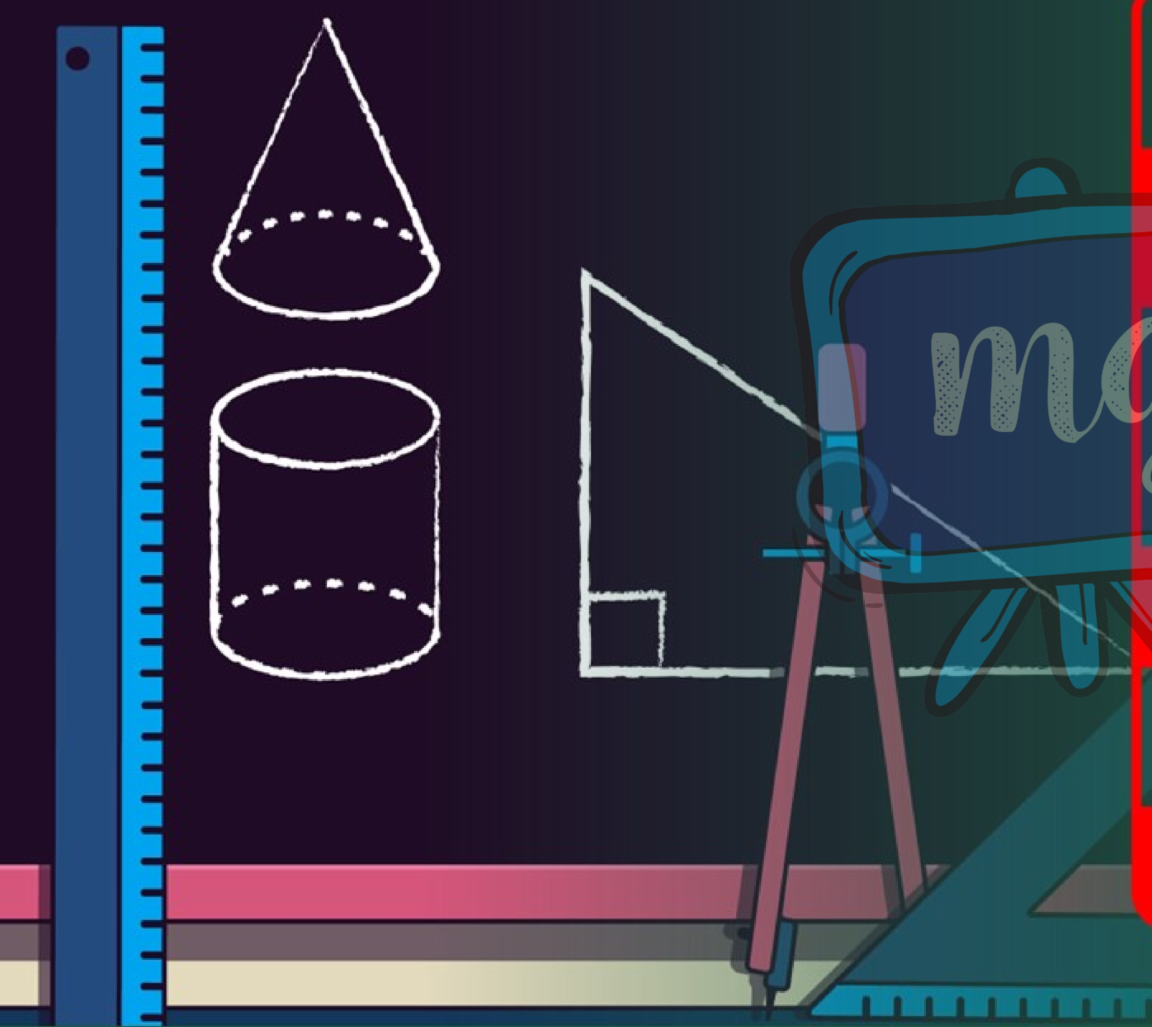


CLASS – 10

MATHEMATICS

CH – 6 Triangles

CBSE Board

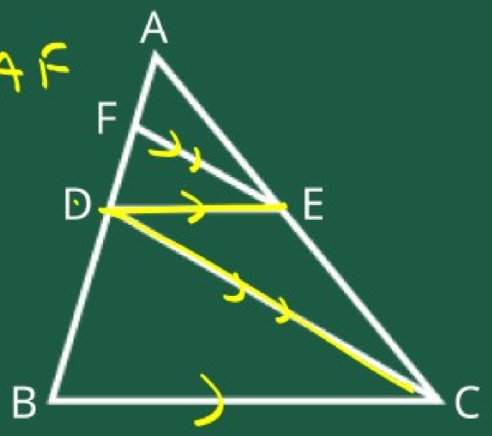
Most Important Questions

Shubham Tiwari

1. In Fig., DE||BC and CD||EF. Prove that $AD^2 = AB \times AF$.

Soln. $AD \times AD = AB \times AF$

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



In $\triangle ADE$ and $\triangle ABC$

$\angle ADE = \angle ABC$

$\angle A = \angle A$

then By AA similarity Rule $\triangle ADE \sim \triangle ABC$

$$\left[\frac{AD}{AB} = \frac{AE}{AC}\right. \quad —(1)$$

In ΔAFE and ΔADC

$\angle AFE = \angle ADC$

$\angle A = \angle A$

$\Delta AFE \sim \Delta ADC$ {AA Similarity Rule}

$$\left[\frac{AF}{AD} = \frac{AE}{AC}\right. \quad —(2)$$

By ① and ②

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

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

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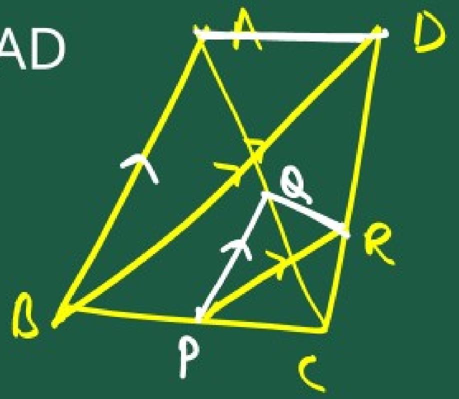
2. Two triangles ABC and DBC lie on the same side of the base BC. From a point P on BC, PQ||AB and PR||BD are drawn. They meet AC in Q and DC in R respectively. Prove that QR||AD



Soln:

in $\triangle ABC$, $PQ \parallel AB$

$\frac{CP}{PB} = \frac{CQ}{QA}$ — (1) {BPT}

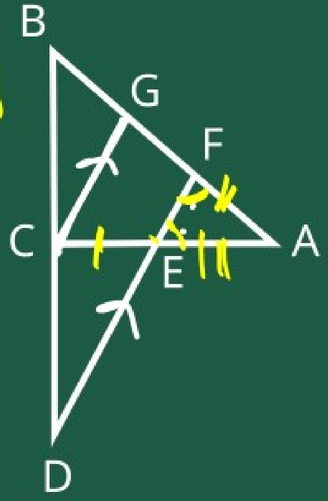
in $\triangle DBC$, $PR \parallel BD$

$\frac{CP}{PB} = \frac{CR}{RD}$ — (2) {BPT}

from (1) and (2)

$\frac{CQ}{QA} = \frac{CR}{RD}$ {By Converse of BPT
$QR \parallel AD$}

3. In Fig., line segment DF intersects the side AC of AABC at the point E such that E is the mid-point of CA and ∠AEF = ∠AFE. Prove that $\dfrac{BD}{CD} = \dfrac{BF}{CE}$



in △BDF BG ∥ DF {By constr}

$\dfrac{BC}{CD} = \dfrac{BG}{GF}$ —(1)

$\dfrac{BC}{CD} + 1 = \dfrac{BG}{GF} + 1$

$$\frac{BC+CD}{CD} = \frac{BG+GF}{GF}$$

$$\frac{BD}{CD} = \frac{BF}{GF} \longrightarrow (2)$$

In ΔAGC

E is the mid point of AC

$EF \parallel CG$.

Here F is mid point of AG.

$GF = AF$

$AF = AE$ { opp side equal to opp angle }

$AE = CE$

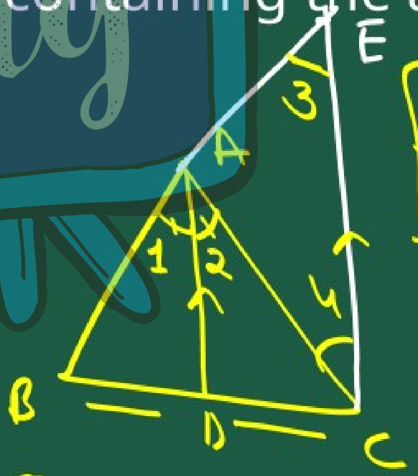
Hence $GF = CE$

By ⓒ

$$\boxed{\frac{BD}{CD} = \frac{BF}{CE}}$$

4. The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the sides containing the angle.

Soln.



$$\boxed{\frac{BD}{DC} = \frac{AB}{AC}}$$

in ΔBEC

By BPT

$$\frac{BA}{AE} = \frac{BD}{DC} \quad (1)$$

$\angle 1 = \angle 3$ {corr}

$\angle 2 = \angle 4$ = {AIA}

$\angle 1 = \angle 2$ {Angle Bisector}

then $\angle 3 = \angle 4$

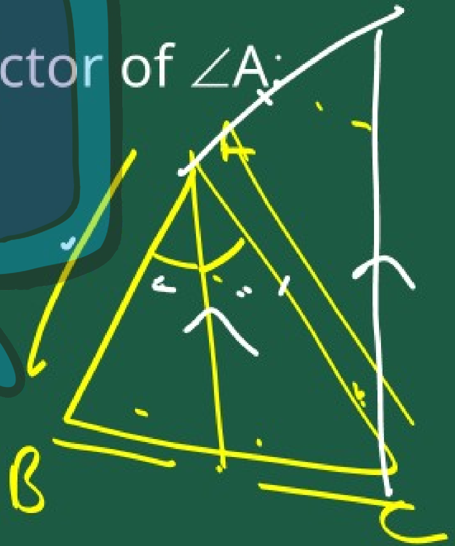
$\therefore AC = AE$ {opp side equal to opp angle}

we can write

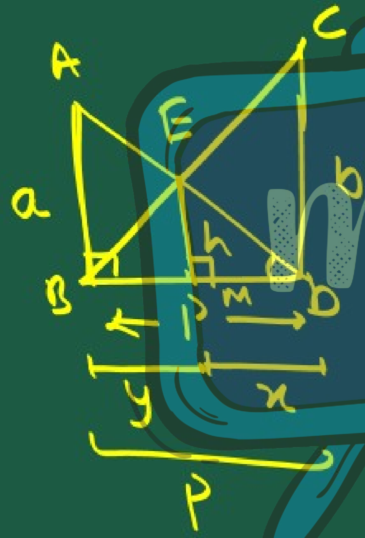
$$\boxed{\frac{BA}{AC} = \frac{BD}{DC}}$$

5. In a triangle ABC, if D is a point on BC such that D divides BC in the ratio AB : AC, then AD is the bisector of $\angle A$.

Sol.



6. Two poles of height a metres and b metres are p metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given ab by $\dfrac{ab}{a+b}$ metres.



in $\triangle ABD$ and $\triangle EMD$

$\angle ABD = \angle EMD = 90^\circ$

$\angle D = \angle D$ {common}

$\triangle DEM \sim \triangle DAB$

$$\frac{DM}{DB} = \frac{EM}{AB}$$

$$\frac{x}{p} = \frac{h}{a} \quad \text{—(1)}$$

in $\triangle BCD$ and $\triangle BEM$

$\angle B = \angle B$ — {common}

$\angle BDC = \angle BME = 90^\circ$

AA similarity Rule

$\triangle BCD \sim \triangle BEM$

$$\frac{BM}{BD} = \frac{EM}{CD}$$

$$\frac{y}{p} = \frac{h}{5} \quad 2$$

by adding ① & ②

$$\frac{x}{p} + \frac{y}{p} = \frac{h}{a} + \frac{h}{b}$$

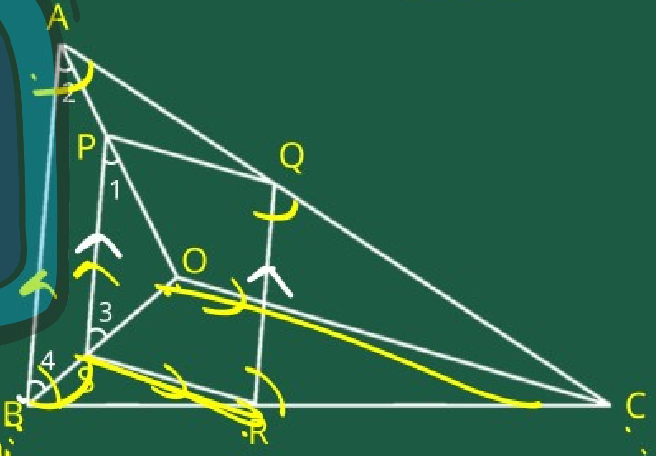
$$\frac{x+y}{p} = h\left[\frac{1}{a} + \frac{1}{b}\right]$$

$$\frac{p}{p} = h\left[\frac{a+b}{ab}\right]$$

$$1 = h\left[\frac{a+b}{ab}\right]$$

$$\boxed{h = \frac{ab}{a+b}}$$

7. In Fig. if PQRS is a parallelogram and AB||PS, then prove that OC||SR.



Soln. in ΔOAB

& ΔOPS

$AB \parallel PS$

$\left.\begin{array}{l}\angle 1 = \angle 2 \\ \angle 3 = \angle 4\end{array}\right\}$ corresponding

By AA Similarity Rule $\Delta OPS \sim \Delta OAB$.

$$\frac{OP}{OA} = \frac{OS}{OB} = \frac{PS}{AB} \rightarrow (A)$$

in ΔCAB

$CR \parallel AB$ { PQRS is ||gm }

$\angle CQR = \angle CAB$
$\angle CRQ = \angle CBA$ } Corresponding Angles

By AA Similarity Rule

$\Delta CAB \sim \Delta CQR$.

$$\frac{CQ}{CA} = \frac{CR}{CB} = \frac{QR}{AB} \rightarrow (2)$$

by (1) and (2) and PS = QR

$$\frac{CQ}{CA} = \boxed{\frac{CR}{CB}} = \boxed{\frac{OS}{OB}} = \frac{OP}{OA}$$

$$\frac{OS}{OB} = \frac{CR}{CB} \quad \therefore \frac{OB}{OS} - 1 = \frac{CB}{CR} - 1$$

$$\frac{OB - OS}{OS} = \frac{CB - CR}{CR}$$

$$\frac{SB}{OS} = \frac{RB}{CR}$$

Hence by Converse of BPT

$$\boxed{OC \parallel SR} \quad H.P.$$