(ii) In ΔDCB and ΔHGE

$\angle 1 = \angle 3$ (from equⁿ (IV))

$\angle B = \angle E$ [from equⁿ (I)]

$\therefore \Delta DCB \sim \Delta HGE$ [AA-similarity]

Proved

(iii) In ΔDCA and ΔHGF,

$\angle A = \angle F$ [from equⁿ (I)]

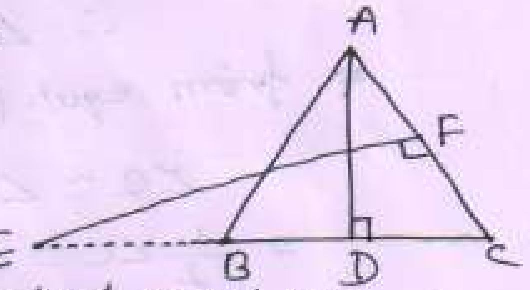
$\angle 2 = \angle 4$ [from equⁿ (IV)]

$\therefore \Delta DCA \sim \Delta HGF$ [AA-similarity]

Proved

<14> Given that:- An Isosceles ΔABC in which $AB = AC$, $AD \perp BC$, $EF \perp AC$ and, E is a point on side CB produced.

To prove:- $\Delta ABD \sim \Delta ECF$



Proof:- $\because$ In ΔABC,

$AB = AC$

$\therefore \angle B = \angle C$ — (1) [opp. ∠s of equal sides are equal]

~~Again~~

In ΔABD and ΔECF

$\angle B = \angle C$

$\angle ADB = \angle EFC$ (90°)

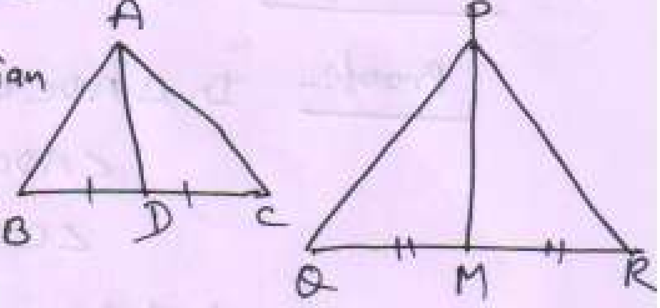
$\therefore \Delta ABD \sim \Delta ECF$ [AA-similarity]

Proved

⟨12⟩ Given that:- In ΔABC and ΔPQR,

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM} \quad \text{—} (1)$$

To prove:- $\Delta ABC \sim \Delta PQR$



Proof:- $\because$ AD is the median of ΔABC.

$\therefore BD = CD = \frac{1}{2} BC$

$\Rightarrow 2BD = 2CD = BC \quad \text{—} (1)$

Again,

PM is the median of ΔPQR.

$\therefore QM = MR = \frac{1}{2} QR$

$\Rightarrow 2QM = 2MR = QR \quad \text{—} (11)$

from eqn (1),

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

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

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

$\because$ In ΔABD and ΔPQM,

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

$\therefore \Delta ABD \sim \Delta PQM$ [SSS - similarity]

$\therefore \angle B = \angle Q$

In ΔABC and ΔPQR,

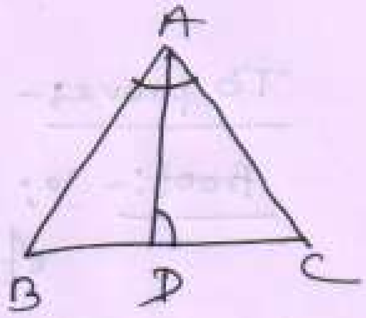
$$\frac{AB}{PQ} = \frac{BC}{QR} \text{ and } \angle B = \angle Q$$

$\therefore \Delta ABC \sim \Delta PQR$ [SAS - similarity]

Proved

(12.) Given that:- In ΔABC,

$\angle ADC = \angle BAC$



To Prove:- $CA^2 = CB \cdot CD$

Proof:- In ΔADC and ΔABC,

$\angle ADC = \angle BAC$

$\angle C = \angle C$ [Common]

$\therefore \Delta ADC \sim \Delta ABC$ [AA-similarity]

$\therefore \angle CAD = \angle B$

$\therefore \dfrac{CA}{CB} = \dfrac{CD}{CA}$

$\Rightarrow CA^2 = CB \cdot CD$

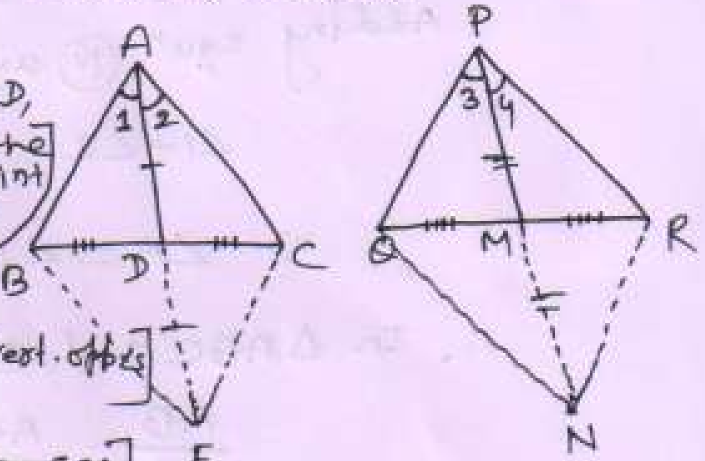
Proved

⟨14.⟩ **Given that :-** In ΔABC and ΔPQR

$$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{AD}{PM} \quad - (1)$$

To prove :- $\Delta ABC \sim \Delta PQR$

Const :- Produce AD to E such that $AD = DE$ and Produce PM to N such that $PM = MN$. join EC and NR, BE, QN.



Proof :- In ΔABD and ΔECD,

$BD = CD$ [$\because$ D is the mid point of BC]

$AD = DE$

$\angle BDA = \angle CDE$ [vert. opp. $\angle s$]

$\therefore \Delta ABD \cong \Delta ECD$ [by SAS]

$AB = EC \quad - (11)$ [CPCT]

Again,

In ΔPQM and ΔNRM,

$QM = MR$ [M is the midpoint of QR]

$PM = MN$

$\angle PMQ = \angle NMR$ [vert. opp. $\angle s$]

$\therefore \Delta PQM \cong \Delta NRM$ [by SAS]

$PQ = NR \quad — (111)$

Now,

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

$$\Rightarrow \frac{EC}{NR} = \frac{AC}{PR} = \frac{AD}{PM} \quad \text{[from equ}^n \text{ (11) and (111)]}$$

$$\Rightarrow \frac{EC}{NR} = \frac{AC}{PR} = \frac{\frac{1}{2}AE}{\frac{1}{2}PN}$$

$$\Rightarrow \frac{EC}{NR} = \frac{AC}{PR} = \frac{AE}{PN}$$

$\Delta ACE \sim \Delta PNR$ [by S-S-S]

$\angle 2 = \angle 4$ — (iv)

Similarly,

$\Delta ABE \sim \Delta PQN$

$\angle 1 = \angle 3$ — (v)

Adding equ^n (iv) and (v), we get,

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

$\Rightarrow \angle A = \angle D$ — (vi)

In ΔABC and ΔPQR,

$\frac{AB}{PQ} = \frac{AC}{PR}$ and $\angle A = \angle D$

$\therefore \Delta ABC \sim \Delta PQR$ [by SAS]

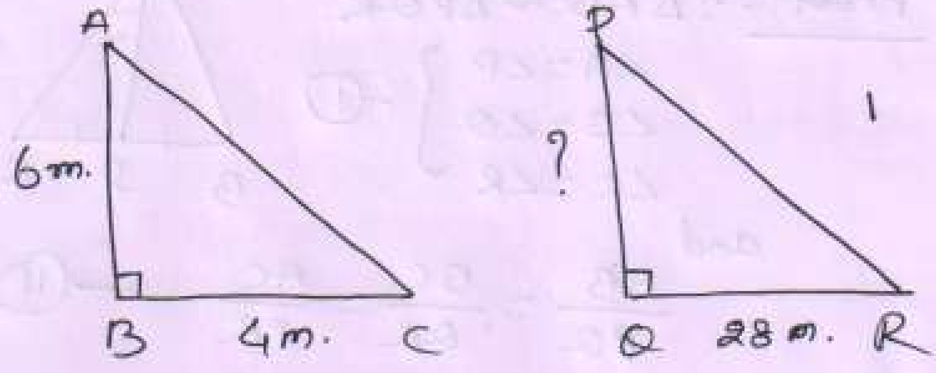
Proved

(15.) <u>Given that:-</u> height of vertical pole $= AB = 6m.$

shadow of Pole $= BC = 4m.$

shadow of Tower $= QR = 28 m.$

height of Tower $= PQ = ?$



<u>Pole</u> Tower

In ΔABC and ΔPQR,

$\angle B = \angle Q \ (90^\circ)$

$\angle ACB = \angle PRQ$ [angular elevation of the sun at the same time]

$\therefore \Delta ABC \sim \Delta PQR$ [by AA-similarity]

$\therefore \angle A = \angle P$

$\therefore \dfrac{AB}{PQ} = \dfrac{BC}{QR}$

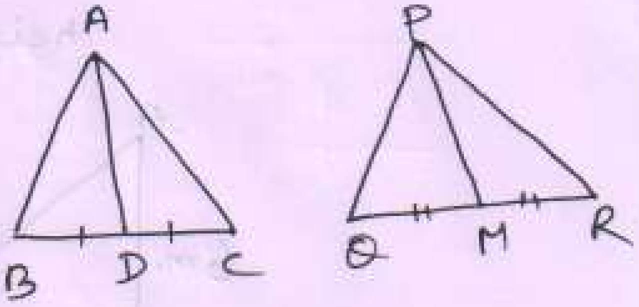
$\Rightarrow \dfrac{6}{PQ} = \dfrac{\cancel{4}}{\cancel{28}\,7}$

$\Rightarrow PQ = 42 m.$

$\therefore$ height of tower $= 42 m.$ Ans

(16) Given that :- AD and PM are medians of ΔABC and ΔPQR. and $\Delta ABC \sim \Delta PQR$

To Prove :- $\frac{AB}{PQ} = \frac{AD}{PM}$



Proof :- $\because \Delta ABC \sim \Delta PQR$.

$$\left.\begin{array}{l}\angle A = \angle P \\ \angle B = \angle Q \\ \angle C = \angle R\end{array}\right\} \text{—(I)}$$

and

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} \quad \text{—(II)}$$

but,

$$\frac{BC}{QR} = \frac{\cancel{2}BD}{\cancel{2}QM} = \frac{BD}{QM}$$ [$\because$ D and M are the mid point of BC and QR respectively]

from equ^n (II),

$$\frac{AB}{PQ} = \frac{BD}{QM} \cdot \cancel{\text{and}} .$$

In ΔABD and ΔPQM,

$$\frac{AB}{PQ} = \frac{BD}{QM} \text{ and } \angle B = \angle Q$$

$\therefore \Delta ABD \sim \Delta PQM$ [by S.A.S-similarity]

$$\therefore \frac{AB}{PQ} = \frac{AD}{PM}$$

Proved