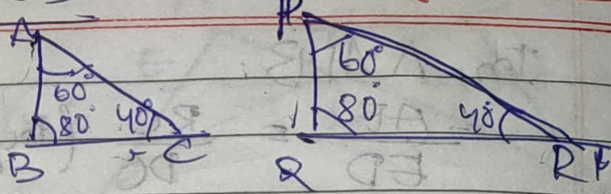
EXERCISE - 6.3

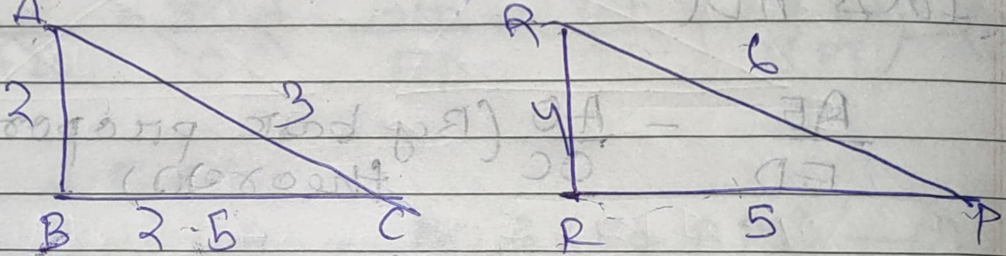
(1) (i)



$\angle A = \angle P = 60^\circ$
$\angle B = \angle Q = 80^\circ$
$\angle C = \angle R = 40^\circ$

$\therefore$ $\Delta ABC \sim \Delta PQR$ (By AAA criterion).

(ii)

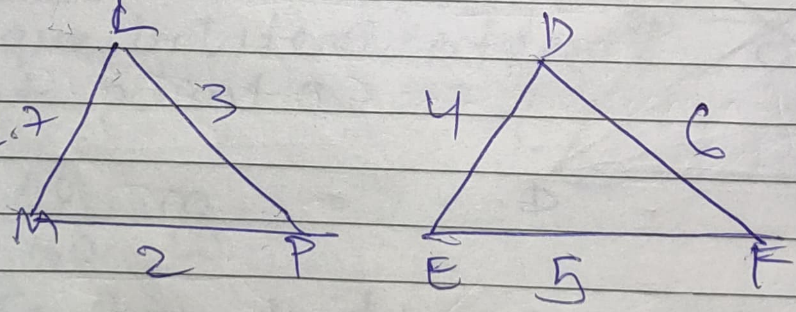


$$\frac{AB}{QR} = \frac{BC}{RP} = \frac{AC}{QP}$$

$$\frac{2}{4} = \frac{2.5}{5} = \frac{3}{6} = \left(\frac{1}{2}\right)$$

$\therefore$ By SSS similarity criterion
$\Delta ABC \sim \Delta QRP$.

(iii)



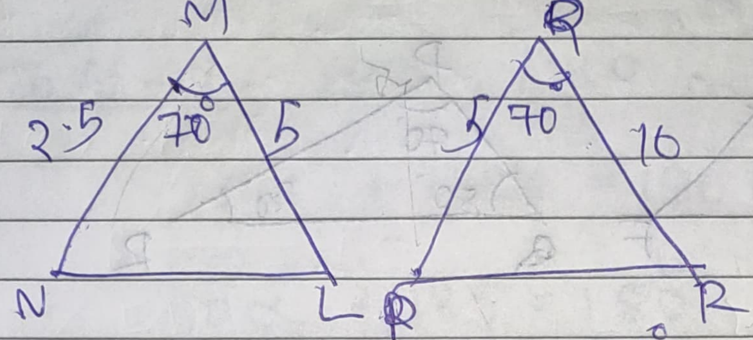
$$\frac{LM}{DE} = \frac{MP}{EF} = \frac{LP}{DE}$$

$$\frac{2.7}{4} \neq \frac{2}{5} \neq \frac{3}{6}$$

So, it doesn't satisfy any criterion of similarity

Hence, $\Delta LMP \sim \Delta DEF$

(iv)



Here, $\angle NML = \angle PQR = 70^\circ$

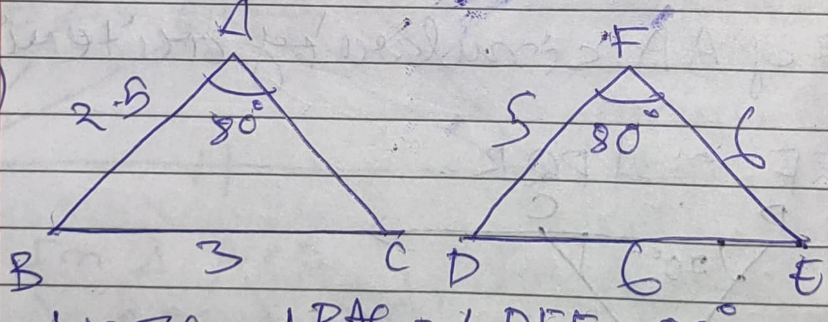
$$\frac{MN}{QP} = \frac{ML}{QR}$$

$$\frac{2.5}{5} = \frac{5}{2} = \left(\frac{1}{2}\right)$$

∴ By SAS similarity criterion

$\Delta MNL \sim \Delta QPR$

(v)



Here $\angle BAC = \angle DFE = 80^\circ$

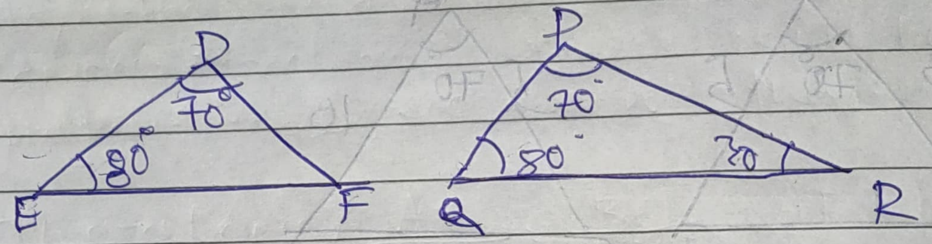
$$\frac{AB}{FD} = \frac{BC}{EF}$$

$$\frac{2.5}{5} \neq \frac{3}{ED}$$

So, it doesn't satisfy any criterion of similarity

Hence, $\triangle ABC \nsim \triangle FDE$

(vi)



$\angle PQR + \angle QRP + \angle QPR = 180°$ (Angle sum property of $\triangle$)

$80° + 30° + \angle QPR = 180$

$\angle QPR = 180° - 110°$

$\therefore \angle QPR = 70°$

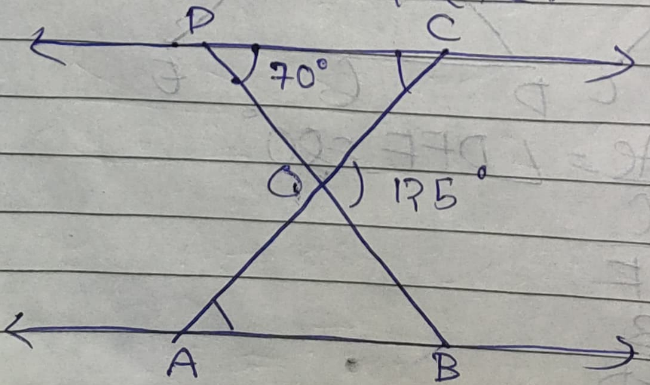
Here, $\angle EDF = \angle QPR = 70°$

$\angle DEF = \angle PQR = 80°$

$\therefore$ By AA similarity criterion

$\triangle DEF \sim \triangle PQR$.

(2)



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Given -
$\triangle ODC \sim \triangle OBA$
$\angle BOC = 125^\circ$
$\angle CDO = 70^\circ$

To find - $\angle DOC$, $\angle DCO$ and $\angle OAB$

$\angle DOC + \angle COB = 180^\circ$ (straight line)

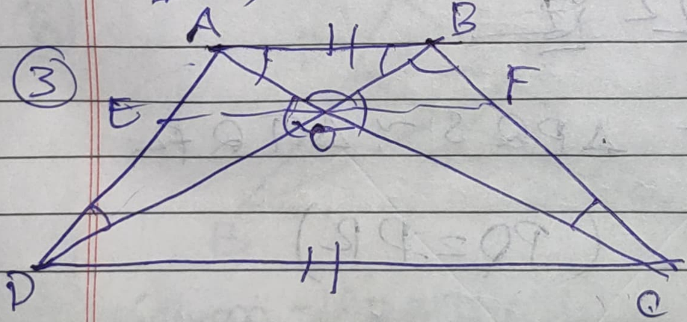
$\angle DOC + 125^\circ = 180^\circ$
$\angle DOC = 180^\circ - 125^\circ$
$\boxed{\therefore \angle DOC = 55^\circ}$

In $\triangle DOC$
$\angle DCO + \angle DOC + 70^\circ = 180^\circ$ (Angle sum property)

$\angle DCO = 180^\circ - 125^\circ$
$\boxed{\therefore \angle DCO = 55^\circ}$
$\angle OAB = \angle DCO$ (A.I.A)

$\boxed{\therefore OAB = 55^\circ}$

(3)



Given - $AB \parallel DC$
AB and BD
Draw line EF such that $EF \parallel AB \parallel DC$

In $\triangle ACD$
$\cancel{\frac{AE}{AD} = \frac{AO}{OC}}$

In $\triangle ABD$
$\cancel{\frac{AE}{AD} = \frac{BO}{DO}}$

In $\triangle AOB$ & $\triangle DOC$
$\angle AOB = \angle DOC$ (V.O.A)
$\angle BAO = \angle OCD$ (A.I.A)
$\angle ABO = \angle ODC$ (A.I.A)

∴, By AAA similarity criterion

We get that,

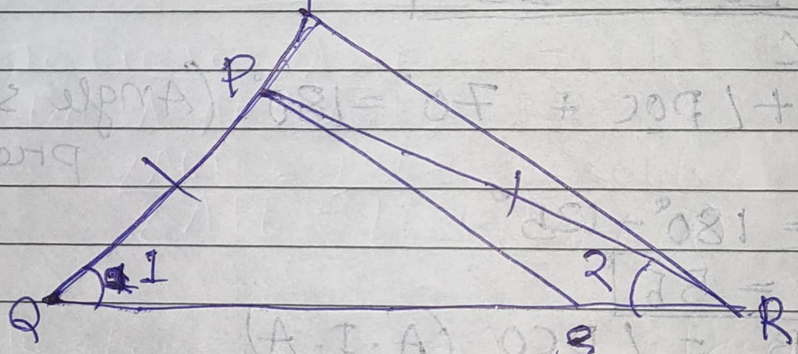
$\Delta AOB \sim \Delta COD$

As, the triangles are similar their corresponding sides will be proportional to each other

Therefore, $\frac{AO}{OC} = \frac{BO}{OD} = \frac{AB}{DC}$.

Hence proved that $\frac{OA}{OC} = \frac{OB}{OD}$

(4)



~~Given that~~ - $\frac{QR}{QS} = \frac{QT}{PR}$

$\angle 1 = \angle 2$

To show that - $\Delta PQS \sim \Delta TQR$

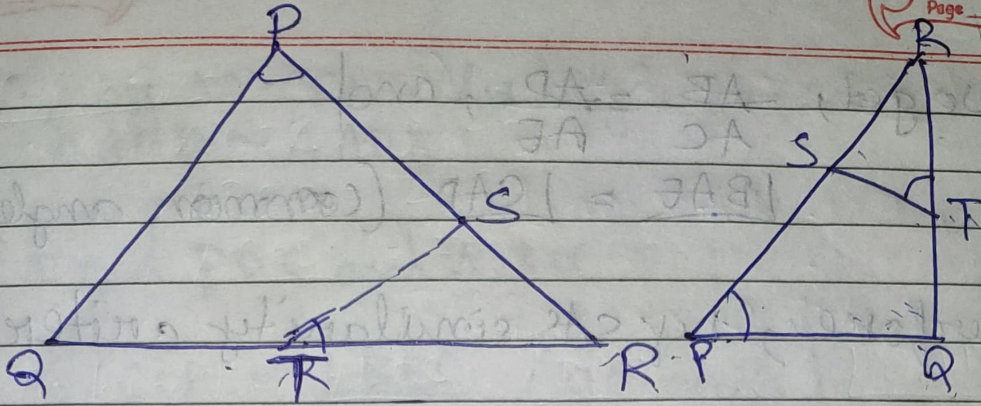
$\frac{QR}{QS} = \frac{QT}{PR}$ $(PQ = PR)$

$\angle PQS = \angle PQR$ (Common angle)

∴, By AA similarity criterion

$\Delta PQS \sim \Delta TQR$

(5)



<u>Given that:-</u>

$\angle P = \angle RTS$

<u>To prove that:-</u> $\Delta RPQ \sim \Delta RTS$

In Δ RPQ and Δ RTS

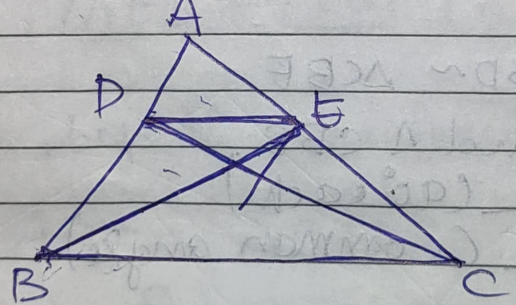
$\angle RPQ = \angle RTS$ (Given)

$\angle R = \angle R$ (common)

So, by using AA similarity criterion

$\Delta RPQ \sim \Delta RTS$.

(6)



<u>Given</u> - $\Delta ABE \cong \Delta ACD$.

<u>To show that</u> - $\Delta ADE \sim \Delta ABC$.

$\Delta ABE \cong \Delta AC$

$AB = AC$
$AD = AE$ } (CPCT)

$BE = CD$, by SSS congruency criterion.

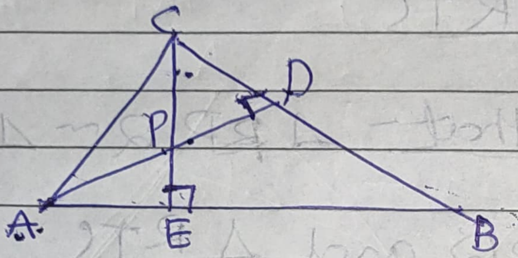
We get, $\frac{AB}{AC} = \frac{AD}{AE}$, and

$\angle BAE = \angle CAD$ (common angle)

Therfore, by SAS similarity criterion

$\triangle ADE \sim \triangle ABC$.

(7)



(i) To prove $\triangle AEP \sim \triangle CDP$

In $\triangle AEP$ and $\triangle CDP$

$\angle AEP = \angle CDP$ ($90°$ each)

$\angle APE = \angle DPC$ (V.O.A)

Thereforee, by AA similarity criterion

$\triangle AEP \sim \triangle CDP$

(ii) To ~~prove~~ show - $\triangle ABD \sim \triangle CBE$

In $\triangle ABD$ and $\triangle CBE$

$\angle ADB = \angle CEB$ ($90°$ each)

$\angle DBA = \angle CBE$ (Common angle)

Therefore, by AA similarity criterion

$\triangle ABD \sim \triangle CBE$.

(iii) To show - $\triangle AEP \sim \triangle ADB$

In $\triangle AEP$ and $\triangle ADB$

$\angle AEP = \angle ADB$ ($90°$ each)

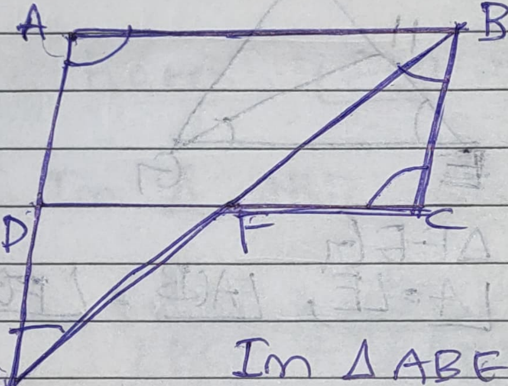
$\angle PAE = \angle DAB$ (common angle)

∴, by AA similarity criterion
$\Delta AED \sim \Delta ADB$

(iv) In ΔPDC and ΔBEC.

$\angle CDP = \angle BEC$ (90° each)
$\angle DCP = \angle BCE$ (common angle)
∴, by AA similarity criterion
$\Delta PDC \sim \Delta BEC$

(8)

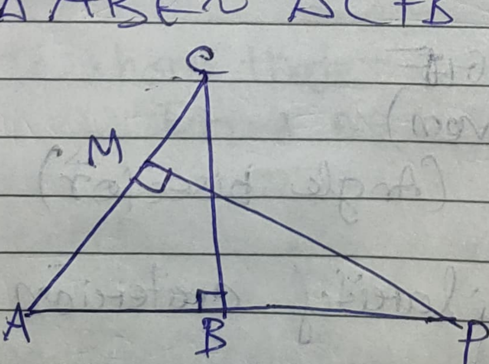


In ΔABE and ΔCFB

$\angle BAE = \angle BCF$ (opp. angles of a ||gm)
$\angle AEB = \angle CBF$ (A.I.A)

So, by AA similarity criterion
$\Delta ABE \sim \Delta CFB$.

(9)



Given -
$\angle PMA = \angle CBA$ (90° each)

(i) In ΔABC and ΔAMP
$\angle ABC = \angle AMP$ (90° each)

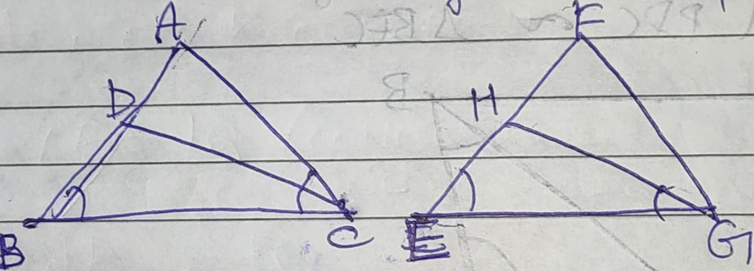
$\angle CAB = \angle PAM$ (common angle)

$\therefore$ By AA similarity criterion

$\Delta ABC \sim \Delta AMP$

(ii) $\frac{CA}{PA} = \frac{BC}{MP}$ (corresponding parts of similar triangles are proportional)

(10)



Given, $\Delta ABC \sim \Delta FEG$
Hence, $\angle B = \angle E$, $\angle A = \angle E$, $\angle ACB = \angle FGE$

$\angle A = \angle F$ (Given)
$\angle ACD = \angle FGH$ (Angle bisector)

$\therefore \Delta DCA \sim \Delta HGF$ (by AA similarity criterion)

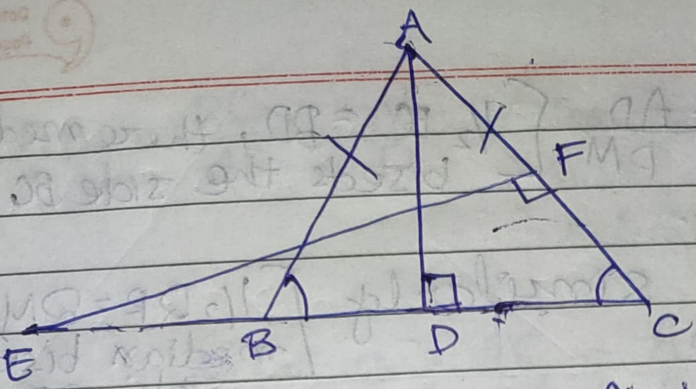
(i) $\frac{CD}{GH} = \frac{AD}{FG}$ (corresponding sides of similar triangles are equal)

(ii) In ΔDCB and ΔHGE
$\angle B = \angle E$ (Given)
$\angle DCB = \angle HGE$ (Angle bisector)

So, by AA similarity criterion

(11) $\Delta DCB \sim \Delta HGE$.

(11)



Given - $AB = AC$, $AD \perp BC$
$EF \perp AC$

~~To prove that~~ - $\triangle ABD \sim \triangle ECF$

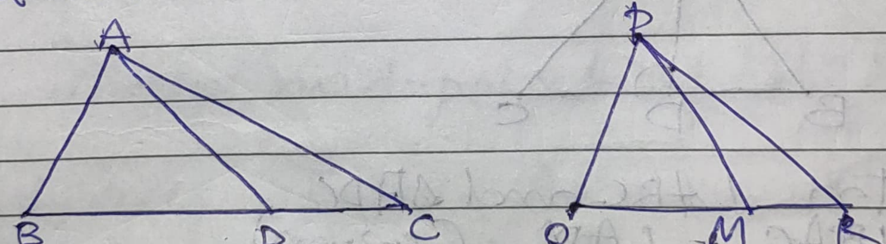
Here, $\angle ADB = \angle ADC$ ($90°$ each)

In $\triangle ABD$ and $\triangle ECF$

$\angle ADB = \angle EFC$ ($90°$ each)
$\angle ECF = \angle ABD$ (As ABC is isosceles)

So, by AA similarity criterion
$\triangle ABD \sim \triangle ECF$

(12)



To show that - $\triangle ABC \sim \triangle PQR$
In $\triangle ABD$ and $\triangle PQM$

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

we can write, $\frac{AB}{PQ} = \frac{1/2\, BC}{1/2\, QR} = \frac{AD}{PM}$

$\frac{AB}{PQ} = \frac{BD}{QM} = \frac{AD}{PM}$ [$\frac{1}{2}BC = BD$, there median bisects the side BC.]

So, by SSS similarly [$\frac{1}{2}QR = QM$, Here median bisects the side QR.]

$\therefore$, $\Delta ABD \sim \Delta PQM$.

As, we know that

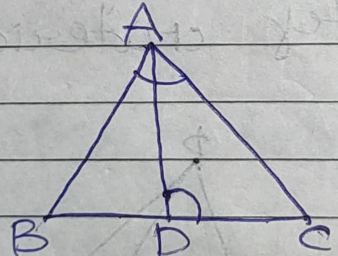
$\angle B = \angle Q$ (corresponding angles are equal in similar Δ)

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

So, by SAS similarity criterion

$\Delta ABC \sim \Delta PQR$

(13)



In ΔABC and ΔADC,

$\angle BAC = \angle ADC$ (Given)

$\angle ACB = \angle ACD$ (common)

By AA similarity criterion.

$\Delta ABC \sim \Delta DAC$

$\angle BAC = \angle ADC$, $\angle B = \angle A$, $\angle C = \angle C$

(corresponding angles are equal in similar Δ)

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Page

$$\frac{AB}{DA} = \frac{BC}{AC} = \frac{AC}{DC}$$ (Corresponding sides are proportional in ~~similarity~~ similar triangle)

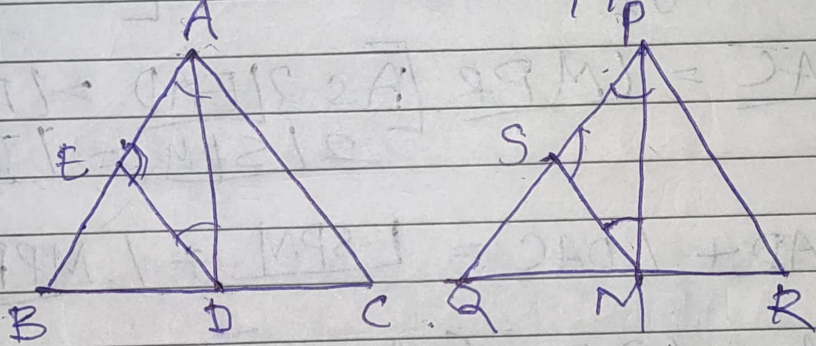
Considering, $\frac{BC}{AC} = \frac{AC}{DC}$

$$\frac{CA}{CD} = \frac{CB}{CA}; \quad \frac{CA}{CD} \times \frac{CB}{CA}$$

$$(CA)^2 = CB \cdot CD$$

Hence, proved

(14)



Construct: $DE \parallel AC$ and $AS \parallel PR$

E is the mid-point of AB (Converse of mid-point theorem.)

and also, $ED = \frac{1}{2} AC$

~~Given~~, $MS = \frac{1}{2} PR$

similarly,

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

$$\frac{2AE}{2PS} = \frac{2ED}{2MS} = \frac{AD}{PM}$$ [As E is the mid-point]

$$\frac{AE}{PS} = \frac{ED}{MS} = \frac{AD}{PM}$$

By SSS similarity criterion

$\Delta AED \sim \Delta PSM$

$\angle EAD = \angle SPM$, $\angle ADE = \angle PMS$,
$\angle DEA = \angle MSP$

As, $\angle DEA = \angle MSP$

$\angle EDA = \angle DAC$ [A.I.A] — (i)

Similarly, $\angle SMP = \angle MPA$ [A.I.A] — (ii)

$\angle DAC = \angle MPR$ [As $2\angle EAD = \angle DAC$ & $2\angle SPM = \angle MPR$]

$\angle EAD + \angle DAC = \angle SPM + \angle MPR$

$\angle BAC = \angle QPR$ ($\angle A = \angle P$)

In ΔABC and ΔPQR

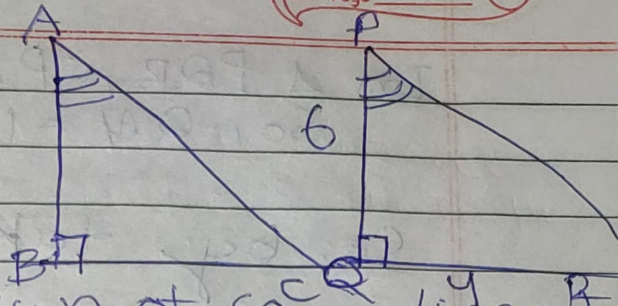
$\frac{AB}{PQ} = \frac{AC}{PR}$ [Given]

$\angle A = \angle P$. So, by SAS similarity criterion

$\Delta ABC \sim \Delta PQR$.

(15) Length of pole $= 6m$
Shadow of pole $= 4m$
Shadow of Tower $= 28m$

Height of tower = ?



In $\triangle ABC$ and $\triangle DEF$

$\angle B = \angle Q$ (90° each)

$\angle A = \angle P$ (Angle by sun at same time)

So, by AA similarity criterion

$\triangle ABC \sim \triangle PQR$

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

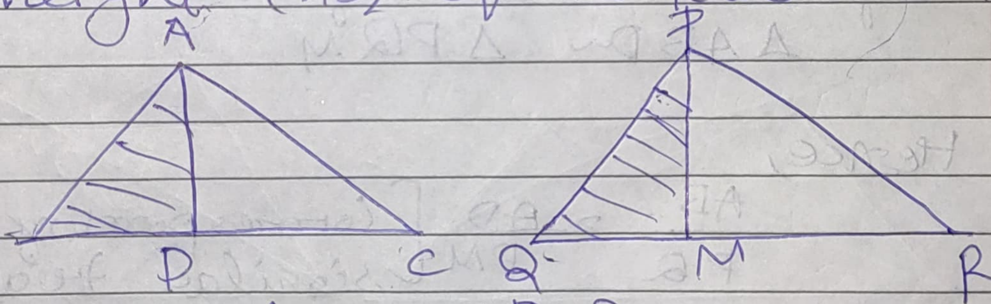
$\frac{AB}{6} = \frac{28}{4}$

$6 \times 28 = 4(AB)$

$(AB) = \frac{168}{4} = 42$

$\therefore$ The height (AB) of the tower is 42m.

(16)



Given - $\triangle ABC \sim \triangle PQR$

$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{BC}{QR}$ —— (i)

$\angle A = \angle P$, $\angle B = \angle Q$, $\angle C = \angle R$ —— (ii)

Given that is $\triangle ABC$, AD is the median.

So, $BD = 1/2\ BC$ —— (iii)

In Δ PQR, PM is the median
So, $QM = 1/2\, QR$ ——— (iv)

So, by taking $\frac{AB}{PQ} = \frac{BC}{QR}$

$\frac{AB}{PQ} = \frac{1/2\, BC}{1/2\, QR}$ (multiplying 1/2 on both numerator and denominator)

$\frac{AB}{PQ} = \frac{BD}{QM}$ [from (iii) & (iv)]

In Δ ABD and Δ PQM
$\frac{AB}{PQ} = \frac{BD}{QM}$ [from above]

$\angle B = \angle Q$ [from (ii)]

By SAS similarity rule
$\Delta ABD \sim \Delta PQM$

Hence,
$\frac{AB}{PQ} = \frac{AD}{PM}$ [corresponding sides of similar triangles are proportional]