Exercise 6.2

1.

(i) In $\triangle ABC$ and $\triangle PQR$

$\angle A = \angle P$ [Each $60°$]

$\angle B = \angle Q$ [Each $80°$]

$\angle C = \angle R$ [Each $40°$]

$\therefore \triangle ABC \sim \triangle PQR$ [AAA criterion]

(ii) In $\triangle ABC$ and $\triangle PQR$

$\frac{BC}{PR} = \frac{2.5}{5} = \frac{1}{2}$

$\frac{AB}{QR} = \frac{2}{4} = \frac{1}{2}$

$\frac{AC}{PQ} = \frac{3}{6} = \frac{1}{2}$

Hence, $\triangle ABC \sim \triangle QRP$

[SSS criterion]

(iii) In $\triangle LMP$ and $\triangle EFD$

$\frac{LM}{EF} = \frac{2.7}{5}$

$\frac{LP}{DF} = \frac{3}{6} = \frac{1}{2}$

$\frac{MP}{DE} = \frac{2}{4} = \frac{1}{2}$

$\therefore$ $\triangle LMP$ is not similar to $\triangle EFD$

The ratio three ratios are not same

(iv) In $\Delta MNL$ and $\Delta PQR$

$$\frac{MN}{PQ} = \frac{2.5}{5} = \frac{1}{2}$$

$$\frac{ML}{QR} = \frac{5}{10} = \frac{1}{2}$$

$$\angle M = \angle Q = 70^\circ$$

$$\Delta NML \sim \Delta PQR$$

(v) In $\Delta ABC$ and $\Delta DEF$

$$\frac{AB}{DF} = \frac{2.5}{5} = \frac{1}{2}$$

$$\frac{BC}{EF} = \frac{3}{6} = \frac{1}{2}$$

$$\angle A = \angle F = 80^\circ$$

$\Delta ABC$ is not similar to $\Delta DEF$

$\because$ Angles between two sides are not same.

(vi) In $\Delta DEF$ and $\Delta PQR$

$$\angle E = \angle Q = 80^\circ$$

$$\angle F = \angle R = 30^\circ$$

$$[\because F = 180^\circ - (80^\circ + 70^\circ) = 30^\circ]$$

$\therefore \Delta DEF \sim \Delta PQR$ [AA]

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2.
Ans- From the given figure.

$\angle DOC + 125° = 180°$

$\Rightarrow \angle DOC = 180° - 125° = 55°$

Now, in $\Delta DOC$

$\angle DCO + \angle ODC + \angle DOC = 180°$

[Angle sum property of a triangle]

$\Rightarrow \angle DCO + 70° + 55° = 180°$

$\Rightarrow \angle DCO = 180° - 125° = 55°$

Now, $\Delta ODC \sim \Delta OBA$ [Given]

$\therefore \angle OAB = \angle OCD = 55°$

Hence $\angle DOC = 55°$, $\angle DCO = 55°$ and $\angle OAB = 55°$.

3.
Given: Diagonals of AC and BC intersect at O

AB ∥ DC

To prove $\frac{OA}{OC} = \frac{OB}{OD}$

Proof : In $\Delta AOB$ and $\Delta COD$

$\angle 1 = \angle 2$

$\angle 3 = \angle 4$ [Alternate angles]

$\Delta AOB \sim \Delta COD$ [AA]

$\frac{OA}{OC} = \frac{OB}{OD}$ [Corresponding sides of similar triangles]

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$\angle 1 = \angle 2$

$\therefore PQ = PR$ [Sides opposite to equal angles are equal]

In $\Delta PQS$ and $\Delta TQR$

$\therefore \frac{QR}{QS} = \frac{QT}{PR}$

$\frac{QR}{QS} = \frac{QT}{PR}$ [

$\angle PQS = \angle TQR = \angle 1$

$\therefore \Delta PQS \sim \Delta TQR$ [By SAS similarity]

Hence proved

5. In $\Delta RPQ$ and $\Delta RTS$

$\angle R = \angle RTS$ [Given]

$\angle R = \angle R$ [common]

$\Delta RPQ \sim \Delta RTS$ [AA]

6. $\Delta ABE \cong \Delta ACD$ [Given]

$AB = AC$ [by CPCT]

and $AE = AD$ [by CPCT]

$\therefore \frac{AB}{AC} = \frac{AD}{AE} = 1$

and $\angle DAE = \angle BAC$ [common]

$\therefore \Delta ADE \sim \Delta ABC$ [by SAS criterion]

Hence proved.

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7 AD and CE are altitudes of the $\Delta ABC$

(i) To prove: $\Delta AEP \sim \Delta CDP$
Proof: In $\Delta AEP$ and $\Delta CDP$
$\angle AEP = \angle CDP$ [Each 90°]
$\angle APE = \angle CPD$ [vertically opposite angles]
$\Delta AEP \sim \Delta CDP$ [AA]

(ii) In $\Delta ABD$ and $\Delta CBE$
$\angle ADB = \angle CEB$ [Each 90°]
$\angle ABD = \angle CBE$ [common]
$\Delta ABD \sim \Delta CBE$ [AA]

(iii) In $\Delta AEP$ and $\Delta ADB$,
$\angle AEP = \angle ADB$ [Each 90°]
$\therefore \Delta AEP \sim \Delta ADB$ [AA]

(iv) In $\Delta PDC$ and $\Delta BEC$
$\angle PDC = \angle BEC$ [Each 90°]
$\angle PCD = \angle BCE$ [common]
$\Delta PDC \sim \Delta BEC$ [AA]

8 In parallelogram ABCD
$\angle A = \angle C$ [opposite angles]

In $\Delta$ ABE and $\Delta$ CFB

$\angle EAB$ and $\Delta CFB$
$\angle EAB = \angle BCF$ [Proved above]
and $\angle ABE = \angle BFC$ [Alternate angles as $DC \parallel AB$]
$\therefore \Delta ABE \sim \Delta CFB$ [AA similarity]
Hence proved

a)
i) $\Delta ABC \sim \Delta AMP$

(i) In $\Delta ABC$ and $\Delta AMP$.
$\angle B = \angle AMP$ [Each $90°$]
$\angle A = \angle A$ [common]
$\Rightarrow \Delta ABC \sim \Delta AMP$ [AA]

(ii) $\Delta ABC \sim \Delta AMP$ [Proved above]
$\Rightarrow \dfrac{CA}{PA} = \dfrac{CB}{PM}$
[Ratio of the corresponding side of similar triangle]

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11(i)

$\Delta ABC \sim \Delta EFG$
$\angle A = \angle E$
$\angle B = \angle F$
$\angle C = \angle G$
$\dfrac{AB}{EF} = \dfrac{BC}{FG} = \dfrac{AC}{EG}$

(ii) In $\Delta ACD$ and $\Delta EGH$.
$\angle A = \angle E$
$\angle 1 = \angle 2$ [$\because \frac{1}{2}\angle C = \frac{1}{2}\angle G$]
$\therefore \Delta ACD \sim \Delta EGH$ [AA]
$\Rightarrow \dfrac{CD}{GH} = \dfrac{AC}{EG}$ [Corresponding sides of similar triangles]

(iii) $\dfrac{CD}{GH} = \dfrac{AC}{EG}$

(ii) $\frac{CD}{GH} = \frac{AC}{FG}$ [corresponding sides of similar triangle]

But $\frac{AC}{FG} = \frac{BC}{EG}$

$\therefore$ $\frac{CD}{GH} = \frac{BC}{EG}$

In $\triangle DCB$ and $\triangle HGE$,

$\angle 3 = \angle 4$

$\frac{CD}{GH} = \frac{BC}{EG}$ [Proved above]

$\therefore$ $\triangle DCB \sim \triangle HGE$ [SAS]

(iii) In $\triangle DCA$ and $\triangle HGR$

$\angle 1 = \angle 2$ [bisectors]

$\frac{CD}{GH} = \frac{AC}{FG}$

$\Rightarrow \triangle DCA \sim \triangle HGR$ [SAS]

4)

Given $\triangle ABC$ is an isosceles triangle

So $AB = AC$ [Given]

$\therefore$ $\angle ABC = \angle ACB$ (i)

[Angles opposite to equal sides are equal]

In $\Delta ABD$ and $ECF$ [Proved above]

$\angle ADB = \angle EFC$ [Each of 90°]

$\Delta ABD \sim \Delta ECF$ [by AA Similar]

Hence proved

10)

~~In $\Delta ABC$ and $\Delta PQR$,~~

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

~~$\angle B = \angle Q$~~

~~$\Delta ABC \sim \Delta PQR$~~

13)

In $\Delta ABC$ and $\Delta DAC$

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

$\angle BAC = \angle ADC$ [Given]

$\therefore \Delta ABC \sim \Delta DAC$ [by AA similar]

Thus their corresponding sides are proportional.

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

$\Rightarrow CA^2 = CB + CD$ Hence Proved

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$\Delta ABC$ D → mid-point of BC

[Given DE || AC]

$DE = \frac{1}{2} AC$

Similarly $SM = \frac{1}{2} PR$

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

$\Rightarrow \frac{2AE}{2PS} = \frac{2DE}{2SM} = \frac{AD}{PM}$

$\Rightarrow \frac{AE}{PS} = \frac{DE}{SM} = \frac{AD}{PM}$

$\angle 1 = \angle 3$

Similarly $\angle 2 = \angle 4$

$\Rightarrow \angle A = \angle P$

Now in $\Delta ABC$ and $PQR$

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

$\angle A = \angle P$ [Proved above]

$\therefore \Delta ABC \sim \Delta PQR$