# Exercise 17.2

**1.Construct the following Δ's ABC. Draw the bisectors of their angles and verify their concurrency.**

(i) **$m\overline{AB} = 4.5cm$, $m\overline{BC} = 3.1cm$, $m\overline{CA} = 5.2cm$.**

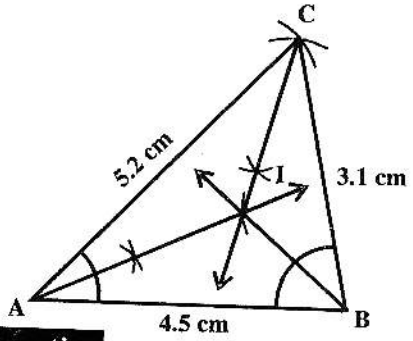
**Given**

The sides $m\overline{AB} = 4.5cm$, $m\overline{BC} = 3.1cm$, and $m\overline{CA} = 5.2cm$.

**Required**

(i) To construct ΔABC.

(ii) To draw its angle bisectors and verify their concurrency.




**Construction**

(i) Take $m\overline{AB} = 4.5cm$.

(ii) With A as centre and radius 5.2cm draw an arc.

(iii) With B as centre and radius 3.1cm draw another arc which intersect the first arc at C.

(iv) Join AC and BC to complete the ΔABC.

(v) Draw bisectors of $\angle A, \angle B$ and $\angle C$ meeting each other in the point I.

Hence angle bisectors of the ΔABC are concurrent at I which lies within the triangle.

**(ii)** **$m\overline{AB} = 4.2cm, m\overline{BC} = 6cm,$ $mCA = 5.2cm$**

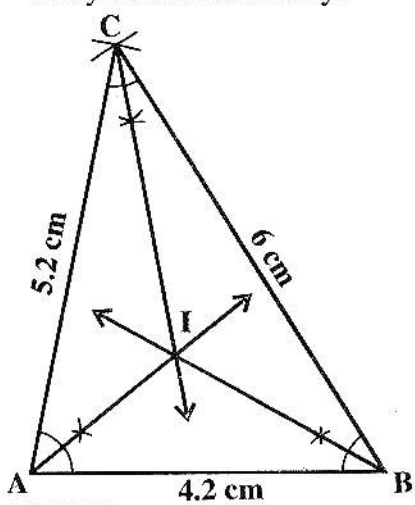
**Given**

The sides $m\overline{AB} = 4.2cm$, $m\overline{BC} = 6cm$, $m\overline{CA} = 5.2cm$ of a ΔABC.

**Required**

(i) To construct ΔABC.

(ii) To draw its angle bisectors and verify their concurrency.




**Construction**

(i) Take $m\overline{AB} = 4.2cm$.

(ii) With A as centre and radius 5.2cm draw an arc.

(iii) With B as centre and radius 6cm draw another arc which intersect the first arc at C.

(iv) Join BC and AC to complete the ΔABC.

(v) Draw bisectors of $\angle A, \angle B$ and $\angle C$ meeting each other in the point I . Hence angle bisectors of the ΔABC are concurrent at I which lies within the triangle.

**(iii)** **$m\overline{AB} = 3.6cm$, $m\overline{BC} = 4.2cm$, $m\angle B = 75^\circ$.**

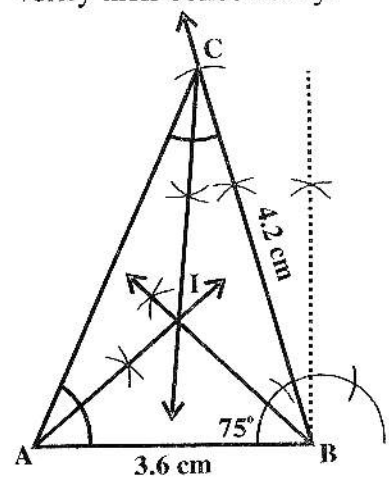
**Given**

The sides $m\overline{AB} = 3.6cm$, $m\overline{BC} = 4.2cm$ and $m\angle B = 75^\circ$ of ΔABC

**Required**

(i) To construct ΔABC.

(ii) To draw its angle bisectors and verify their concurrency.




**Construction**

(i) Take $m\overline{AB} = 3.6cm$.

(ii) At B draw angle of $75^\circ$

(iii) With B as centre and radius 4.2cm draw arc which intersect terminal arm of $75^\circ$ in C.

(iv) Join AC to complete the ΔABC.

(v) Draw bisectors of $\angle A, \angle B$ and $\angle C$ meeting each other in the point I.

Hence angle bisectors of the ΔABC are concurrent at I which lies within the triangle.

**Q.2. Construct Δs PQR. Draw their altitudes and show that they are concurrent.**

**(i) $m\overline{PQ} = 6cm, m\overline{QR} = 4.5cm, m\overline{PR} = 5.5cm.$**

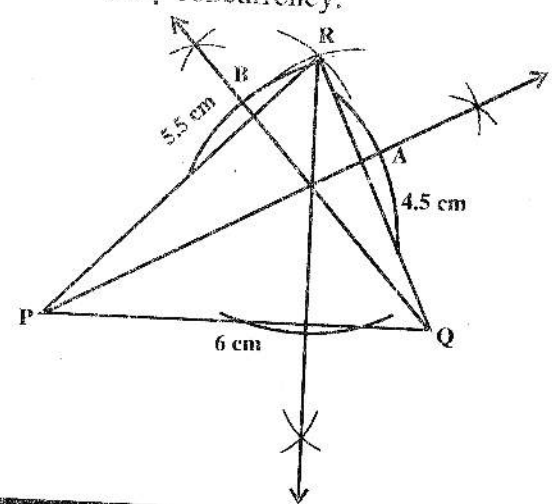
**Given**

The sides $m\overline{PQ} = 6cm$, $m\overline{QR} = 4.5cm$ and $m\overline{PR} = 5.5cm$ of a $\Delta PQR$.

**Required**

(i) To construct Δ PQR.

(ii) To draw its altitudes and verify their concurrency.




**Construction**

(i) Take $m\overline{PQ} = 6cm$

(ii) With P as centre draw an arc of radius 5.5 cm.

(iii) With Q as centre draw an arc of radius 4.5cm, cutting the first in R.

(iv) Join R with P and Q.

(v) Draw the altitudes on, $\overline{PR}, \overline{QR}$ and $\overline{PQ}$ which cut each other in I.

(vi) All altitudes are concurrent.

**(ii) $m\overline{PQ} = 4.5cm$, $m\overline{QR} = 3.9cm$, $m\angle R = 45°$.**

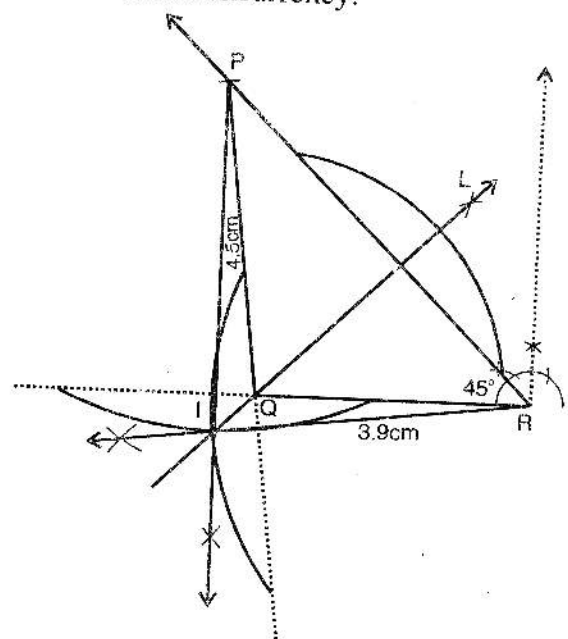
**Given**

The sides $m\overline{PQ} = 4.5cm$, $m\overline{QR} = 3.9cm$ and $m\angle R = 45°$ of $\Delta PQR$

**Required**

(i) To construct Δ PQR.

(ii) To draw its altitudes and verify their concurrency.




**Construction**

(i) Draw $\overline{QR} = 3.9cm$.

(ii) Make $\angle R = 45°$

(iii) Cut $\overline{QP} = 4.5cm$ join PQ, $\Delta PQR$ is formed.

(iv) Draw altitudes on $\overline{PR}$, $\overline{QR}$ and $\overline{PQ}$ they cut each other in I.

The altitudes are concurrent.

**(iii)** $\mathbf{m\overline{RP} = 3.6cm, m\angle Q = 30^\circ,}$

$\mathbf{m\angle P = 105^\circ.}$

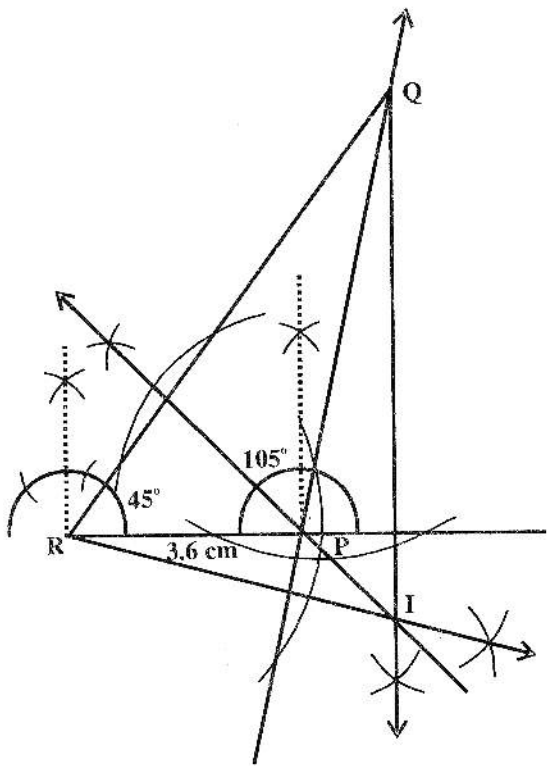
**Given**

$m\overline{RP} = 3.6cm, m\angle Q = 30^\circ, m\angle P = 105^\circ.$

**Required**

(i) To construct Δ PQR.

(ii) To draw its altitudes and verify their concurrency.




**Construction**

$m\angle P + m\angle Q + m\angle R = 180^\circ$

$105^\circ + 30^\circ + m\angle R = 180^\circ$

$135^\circ + m\angle R = 180^\circ$

$m\angle R = 180^\circ - 135^\circ = 45^\circ$

(i) Take $m\overline{RP} = 3.6cm$.

(ii) At P draw an angle of $105^\circ$.

(iii) At R draw an angle of $45^\circ$.

(iv) Terminal arms of both angles meet in point Q. It form Δ PQR.

(v) Draw the altitudes, of $\overline{PQ}$ and $\overline{QR}$ and $\overline{RP}$ cutting each other in I.

The altitudes are concurrent.

**Q.3. Construct the following triangles ABC. Draw the perpendicular bisectors of their sides and verify their concurrency. Do they meet inside the triangle.**

**(i)** $\mathbf{m\overline{AB} = 5.3cm,\ m\angle A = 45^\circ,}$

$\mathbf{m\angle B = 30^\circ}$

**Given**

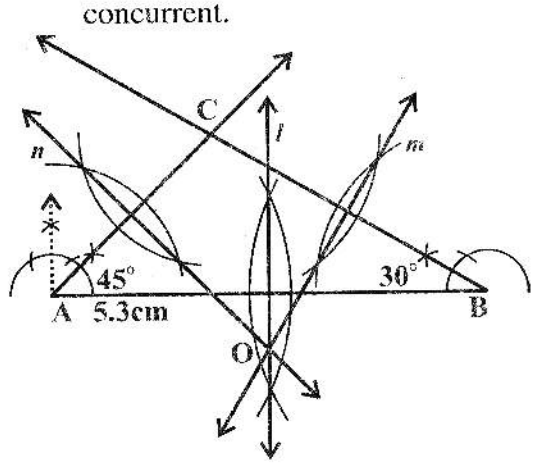
Side $m\overline{AB} = 5.3cm$ and $m\angle A = 45^\circ$,

$m\angle B = 30^\circ$ of a ΔABC.

**Required**

(i) To construct the ΔABC.

(ii) To draw perpendicular bisectors of its sides and to verify that they are concurrent.




**Construction**

(i) Take $m\overline{AB} = 5.3cm$

(ii) At the end point A of $\overline{AB}$ make $m\angle A = 45^\circ$.

(iii) At the end point B of $\overline{AB}$ make $m\angle B = 30^\circ$.

(iv) The terminal sides of these two angles meet at C.

Then ABC is required Δ.

(v) Draw perpendicular bisectors of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ meeting each other in the point O.

Hence the three perpendicular bisectors of sides of ΔABC are concurrent at O.

**(ii) $m\overline{BC} = 2.9cm$, $m\angle A = 30^\circ$, $m\angle B = 60^\circ$**

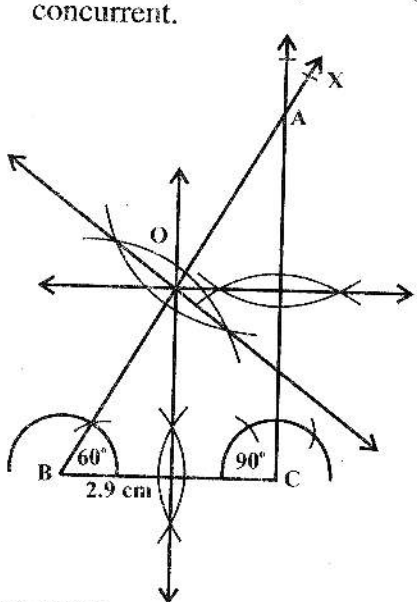
**Given**

The side $m\overline{BC} = 2.9cm$, $m\angle A = 30^\circ$ and $m\angle B = 60^\circ$ of ΔABC.

**Required**

(i) To construct the ΔABC.

(ii) To draw perpendicular bisectors of its sides and to verify that they are concurrent.




**Construction**

$m\angle A + m\angle B + m\angle C = 180^\circ$

$30^\circ + 60^\circ + m\angle C = 180^\circ$

$90^\circ + m\angle C = 180^\circ$

$m\angle C = 90^\circ$.

(i) Take $m\overline{BC} = 2.9cm$

(ii) At the end point B of $\overline{BC}$ make $m\angle B = 60^\circ$.

(iii) At the end point C of $\overline{BC}$ make $m\angle C = 90^\circ$.

(iv) The terminal sides of these two angles meet in A.

Then ABC is required Δ.

(v) Draw perpendicular bisectors of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ meeting each other in the point O.

Hence the three perpendicular bisectors of sides of ΔABC are concurrent at O.

**(iii) $m\overline{AB} = 2.4cm, m\overline{AC} = 3.2cm$, $m\angle A = 120^\circ$**

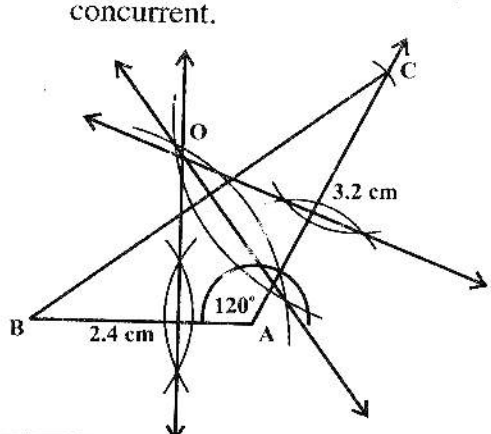
**Given**

The sides $m\overline{AB} = 2.4cm$, $m\overline{AC} = 3.2cm$ $m\angle A = 120^\circ$ of a ΔABC

**Required**

(i) To construct the ΔABC.

(ii) To draw perpendicular bisectors of its sides and to verify that they are concurrent.




**Construction**

(i) Take $m\overline{AB} = 2.4cm$

(ii) At the end point A of $\overline{AB}$ make $m\angle A = 120^\circ$.

(iii) With centre A, draw an arc of radius 3.2cm which cut terminal arm of $\angle A$ at C.

(iv) Join B to C

Then ABC is required $\Delta$.

(v) Draw perpendicular bisectors of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ meeting each other at the point O.

Hence the three perpendicular bisectors of sides of $\Delta ABC$ are concurrent at O.

**Q.4. Construct following $\Delta$'s XYZ. Draw their three medians and show that they are concurrent.**

(i) **$m\overline{YZ} = 4.1cm$, $m\angle Y = 60^\circ$ and $m\angle X = 75^\circ$**

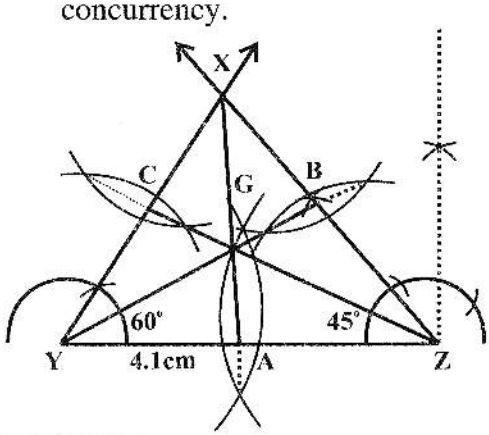
**Given**

The side $m\overline{YZ} = 4.1cm$, $m\angle Y = 60^\circ$ and $m\angle X = 75^\circ$

**Required**

(i) Construct the $\Delta XYZ$.

(ii) Draw its medians and verify their concurrency.




**Construction**

$m\angle X + m\angle Y + m\angle Z = 180^\circ$

$75^\circ + 60^\circ + m\angle Z = 180^\circ$

$135^\circ + m\angle Z = 180^\circ$

$m\angle Z = 180^\circ - 135^\circ$

$m\angle Z = 45^\circ$.

(i) Take $m\overline{YZ} = 4.1cm$.

(ii) At the end point y of $\overline{YZ}$ make $m\angle Y = 60^\circ$.

(iii) At the end point Zof $\overline{ZY}$ make $m\angle Z = 45^\circ$

(iv) The terminal sides of these angles meet at X. Then XYZ is required $\Delta$.

(v) Draw perpendicular bisectors of the sides $\overline{YZ}$, $\overline{ZX}$ and $\overline{XY}$ of $\Delta XYZ$ and make their midpoints A, B and C respectively.

(vi) Join Y to midpoint B to get median $\overline{YB}$.

(vii) Join Z to midpoint C to get median $\overline{ZC}$.

(viii) Join X to mid point A to get median $\overline{AX}$.The medians of $\Delta XYZ$ pass through the same point G.

All medians intersect at point G.

Hence medians are concurrent at G.

**(ii) $m\overline{XY} = 4.5cm, m\overline{YZ} = 3.4cm$, $m\overline{ZX} = 5.6cm$**

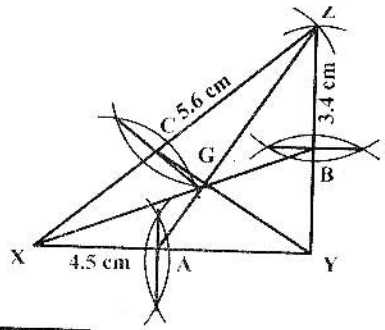
**Given**

The sides $m\overline{XY} = 4.5cm$, $m\overline{YZ} = 3.4cm$ and $m\overline{ZX} = 5.6cm$ of a $\Delta XYZ$.

**Required**

(i) Construct the $\Delta XYZ$.

(ii) Draw its medians and verify their concurrency.




**Construction**

(i) Take $m\overline{XY} = 4.5cm$.

(ii) With Y as centre and radius 3.4 cm draw an arc.

(iii) With X as centre and radius 5.6cm draw another arc cutting first in Z join Z to Y and X to Z.

(iv) Draw perpendicular bisectors of the sides $\overline{XY}$, $\overline{YZ}$ and $\overline{XZ}$ of $\Delta XYZ$ and make their midpoints A,B and C respectively.

(v) Join X to mid point B to get median $\overline{XB}$.

(vi) Join Y to midpoint C to get medians $\overline{YC}$.

(vii) Join Z to midpoint A to get median $\overline{ZA}$.

All medians intersect at point G.

Hence medians are concurrent at G.

**(iii) $m\overline{ZX} = 4.3cm, m\angle X = 75^\circ$ and $m\angle Y = 45^\circ$.**

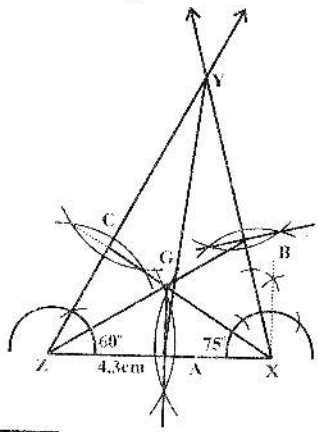
**Given**

The side $m\overline{ZX} = 4.3cm$, $m\angle X = 75^\circ$ and $m\angle = 45^\circ$ of $\Delta XYZ$.

**Required**

(i) Construct the $\Delta XYZ$.

(ii) Draw its medians and verify their concurrency.




**Construction**

$m\angle X + m\angle Y + m\angle Z = 180^\circ$

$75^\circ + 45^\circ + m\angle Z = 180^\circ$

$m\angle Z + 120^\circ = 180^\circ$

$m\angle Z = 180^\circ - 120^\circ$

$m\angle Z = 60^\circ$

(i) Take $m\overline{ZX} = 4.3cm$.

(ii) At the end point Z of $\overline{ZX}$ make $m\angle Z = 60^\circ$.

(iii) At the end point X of $\overline{XY}$ make $m\angle X = 75^\circ$

(iv) The terminal sides of these angles meet at Y. Then XYZ is required $\Delta$.

(v) Draw perpendicular bisectors of the sides $\overline{ZX}$, $\overline{XY}$ and $\overline{YZ}$ of $\Delta XYZ$ and make their midpoints A,B and C respectively.

(vi) Join Y to midpoint A to get median $\overline{YA}$.

(vii) Join Z to the midpoint B to get median $\overline{ZB}$.

(viii) Join X to the midpoint B to get median $\overline{XC}$.

All medians intersect at point G.
Hence medians are concurrent at G.