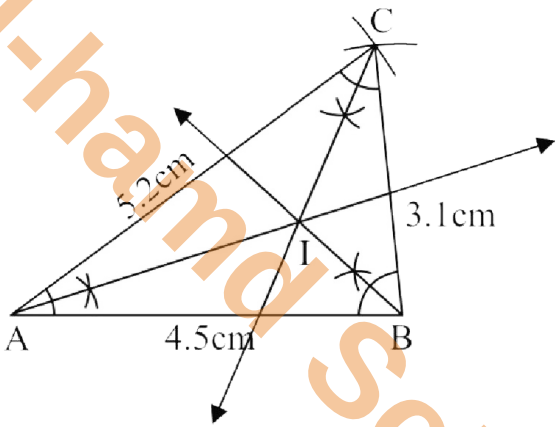
Exercise 17.2

Q.1 Construct the following Δ's ABC. Draw the Bisector of their angle and verify their Concurrency.

(i) $mAB = 4.5cm \quad m\overline{BC} = 3.1cm \quad m\overline{CA} = 5.2cm$



i. Draw a line segment $m\overline{AB} = 4.5cm$.

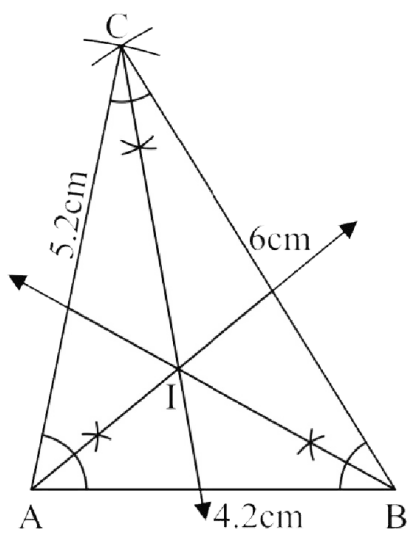
ii. Taking B as centre draw an arc of $m\overline{BC} = 3.1cm$.

iii. Taking A as centre draw a arc $m\overline{AC} = 5.2cm$ to cut C.

iv. Join C to B and C to A.

v. Draw the angle bisectors of $\angle A, \angle B$ and $\angle C$ meeting each other at the point I.
All the angle bisectors pass through point I. hence angle bisectors of ΔABC are concurrent.

(ii) $mAB = 4.2cm \quad m\overline{BC} = 6cm \quad m\overline{CA} = 5.2cm$



i. Draw a line segment $\overline{AB} = 4.2cm$.

ii. Taking A as centre draw an arc of radius $5.2cm$.

iii. Taking B as centre draw another arc of radius $6cm$ to intersect the first arc at C.

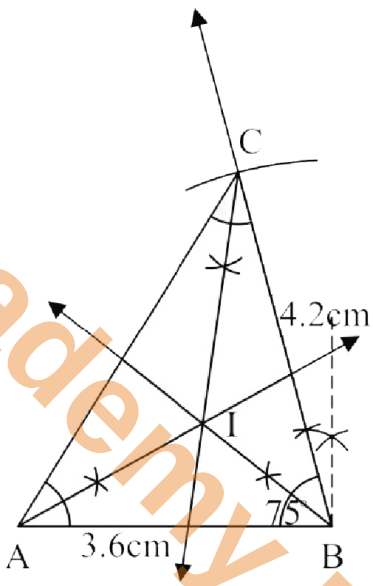
iv. Draw $\overline{AC}$ and $\overline{BC}$. Thus ΔABC is the required triangle.

v. Draw the bisectors of $\angle A$ and $\angle B$ meeting each other at point I.

vi. Now draw the bisector of third $\angle C$.

vii. We observe that the third angle bisector also passes through the point I.
Hence the angle bisectors of the ΔABC are concurrent at I.

(iii) $mAB = 3.6cm \quad m\overline{BC} = 4.2cm \quad m\angle B = 75^\circ$



i. Draw a line segment $m\overline{AB} = 3.6\,cm$.

ii. Taking B as center draw an angle of 75° .

iii. Taking B as centre draw an arc of radius $4.2cm$ to intersect the terminal sides of angle at C.

iv. Draw $\overline{AC}$ to complete ΔABC.

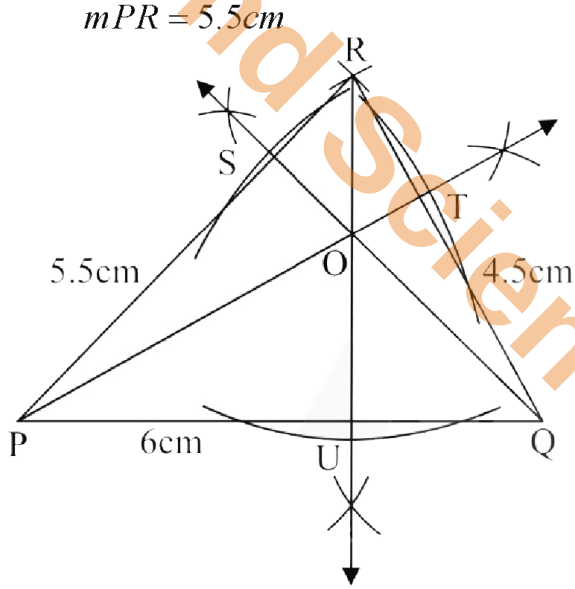
v. Draw the bisector of $\angle A$ and $\angle B$ meeting each other at point I.

vi. Now draw the bisector of the third angle $\angle C$.

vii. We observe that third angle bisector also passes through the point I.
Hence the angle bisectors of the ΔABC are concurrent at I which lies within the triangle.

Q.2 Construct the following triangles PQR. Draw their altitudes and show that they are concurrent.

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



i. Draw a line segment $m\overline{PQ} = 6cm$.

ii. Taking P as centre draw an arc of radius $5.5cm$.

iii. Taking Q as centre draw another arc of radius $4.5cm$ to intersect the first arc at R.

iv. Join P to R and Q to R to complete ΔPQR.

v. From vertex P drop $\overline{PT} \perp \overline{QR}$.

vi. Form vertex Q drop $\overline{QS} \perp \overline{PR}$.

vii. Now from third vertex R drop $\overline{RU} \perp \overline{PQ}$.

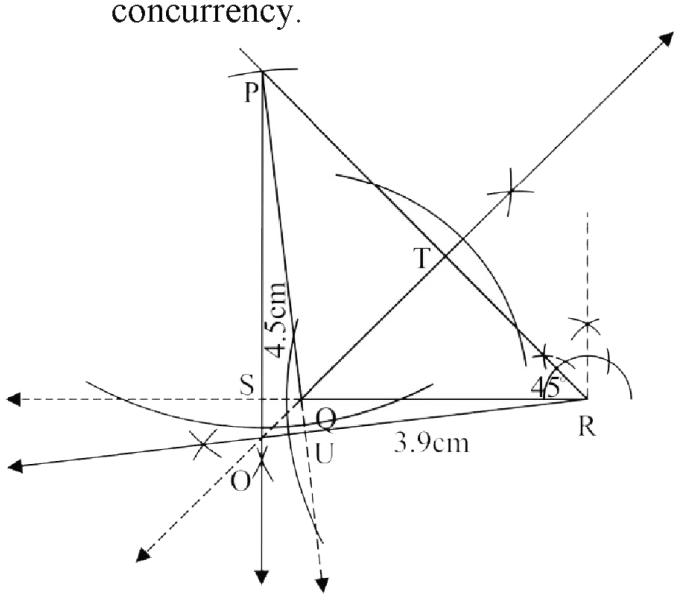
viii. We observe that third altitude also passes through the point of intersection O of the first two.
Hence three altitudes of ΔPQR are concurrent at O.

(ii) $m\overline{PQ} = 4.5cm$ $m\overline{QR} = 3.9cm$ $m\angle R = 45^\circ$

Required:

i. To construct ΔPQR.

ii. To draw altitudes and verify their concurrency.



Construction:

i. Draw a line segment $m\overline{QR} = 3.9cm$.

ii. Taking R as centre draw an angle of 45°.

iii. Taking Q as centre draw an arc of radius $4.5cm$ which intersects the terminal side of angle at P.

iv. Join P to Q to complete the ΔPQR.

v. From vertex P drop $\overline{PS} \perp \overline{RQ}$ produced.

vi. From vertex Q drop $\overline{QT} \perp \overline{PR}$.

vii. Form vertex R drop $\overline{RU} \perp \overline{PQ}$ produced.
Hence the three altitudes of ΔPQR are concurrent at point O.

(iii) $m\overline{RP}=3.6cm \quad m\angle Q=30° \quad m\angle P=105°$

Sum of three angles in a triangle is 180° so,

$\angle P+\angle Q+\angle R=180°$

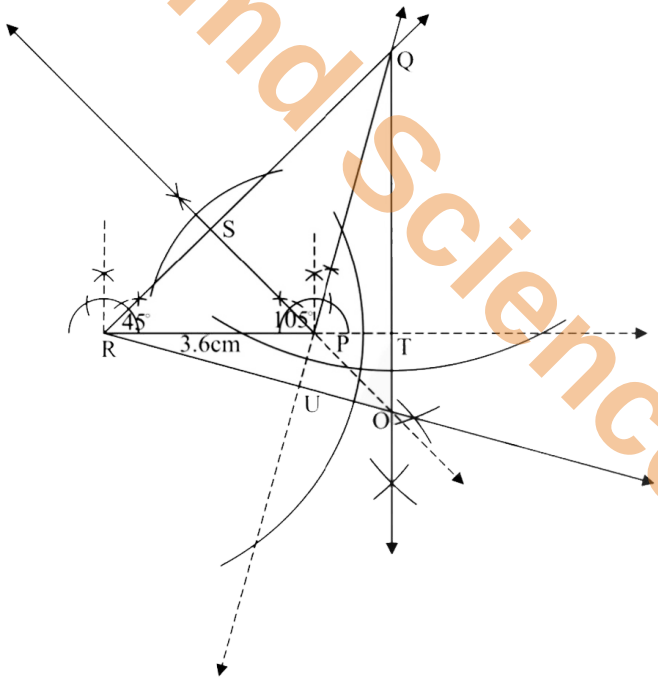
$105+30+\angle R=180°$

$135+\angle R=180°$

$\angle R=180°-135°$

$\angle R=45°$

So



Construction:

i. Draw a line segment $m\overline{RP}=3.6cm$.

ii. Taking R as centre, construct an angle of $45°$.

iii. Taking P as centre draw an angle of 105°.

iv. Terminal arms of both angles meet in point Q forming ΔPQR .

v. From vertex P drop $\overline{PS}\perp\overline{RQ}$.

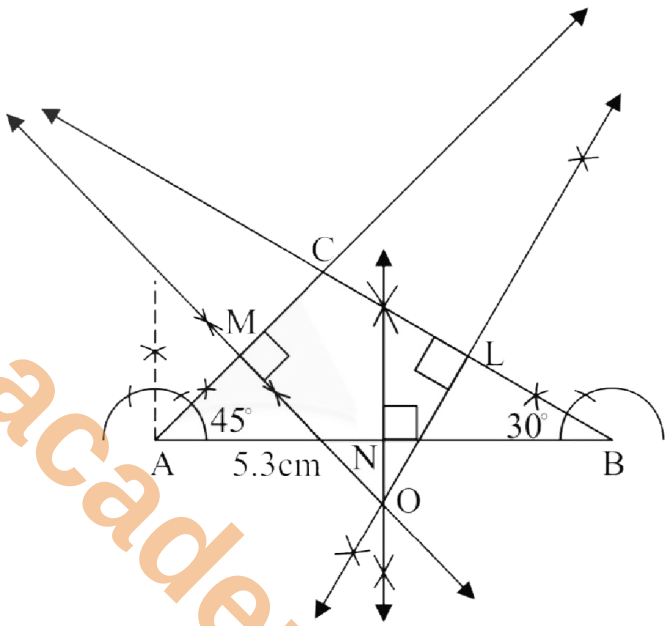
vi. From vertex Q drop $\overline{QT}\perp\overline{RP}$ produced.

vii. Form vertex R drop $\overline{RU}\perp\overline{QP}$ produced.

Hence the three altitudes of ΔPQR are concurrent at point O.

Q.3 Contract the following triangles ABC draw the perpendicular bisector of three sides and verify their concurrency. Do they meet inside the triangle?

(i) $\overline{AB}=5.3cm \quad m\angle A=45° \quad m\angle B=30°$



Construction:

i. Draw a line segment $m\overline{AB}=5.3cm$.

ii. At the end point A of $\overline{AB}$ make $m\angle A=45°$.

iii. At the end point B of $\overline{AB}$ make $m\angle B=30°$.

iv. Terminal sides of two angles meet at C. The ABC is requiredΔ.

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 outside the triangle.

(ii) $m\overline{BC} = 2.9cm \quad m\angle A = 30° \quad m\angle B = 60°$

The sum of three angles in a triangle is 180° then

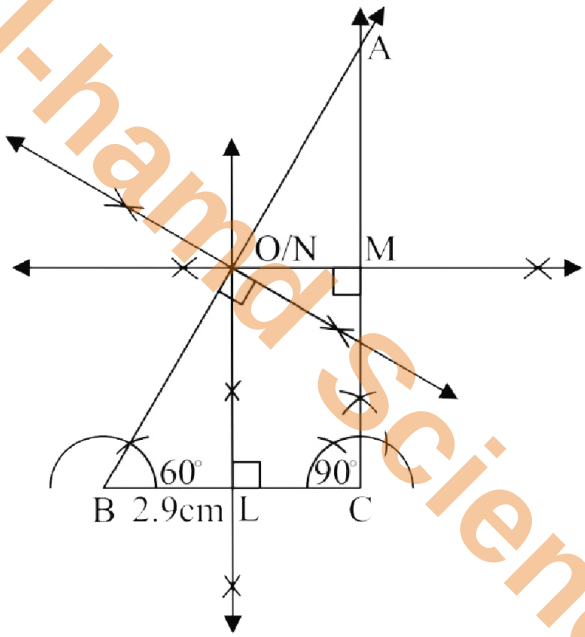
$\angle A + \angle B + \angle C = 180°$

$30 + 60 + \angle C = 180°$

$90 + \angle C = 180°$

$\angle C = 180° - 90°$

$\angle C = 90°$



Construction:

i. Draw a line segment $m\overline{BC} = 2.9cm$.

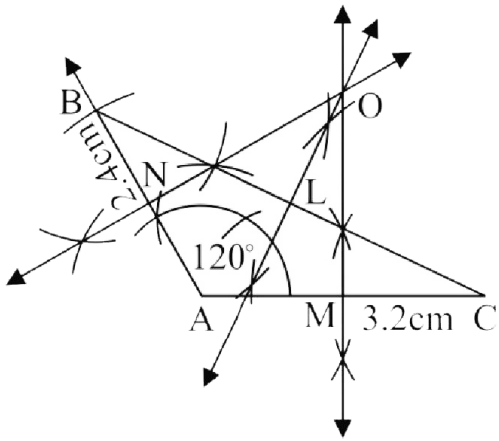
ii. At the end point B of $\overline{BC}$ make $m\angle B = 60°$.

iii. At the end point C of $\overline{BC}$ make $m\angle C = 90°$.

iv. Terminal sides of two angles meet at A. The ABC is requiredΔ.

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 ΔABC are concurrent at O, at the mid point of hypotenuse.

(iii) $m\overline{AB} = 2.4cm \quad m\overline{AC} = 3.2cm \quad m\angle A = 120°$



Construction:

i. Take $\overline{AC} = 3.2cm$.

ii. At A draw an angle of 120°.

iii. Taking centre A draw an arc of radius 2.4cm which cuts the terminal side of angle A at point B.

iv. Join C to B, ΔABC is the triangle.

v. Draw perpendicular bisectors of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ meeting each other at the point O outside the triangle.
Hence all the three perpendicular bisectors are concurrent.

Q.4 **Construct the following Δs XYZ . Draw their three medians and show that they are concurrent.**

(i) $m\overline{YZ} = 4.1cm \quad m\angle Y = 60° \quad m\angle X = 75°$

Sum of three angles in a triangle is 180° then

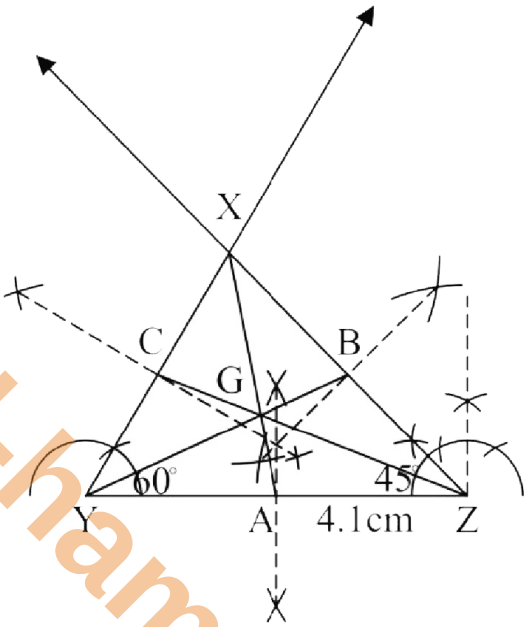
$m\angle X + m\angle Y + m\angle Z = 180°$

$75 + 60 + m\angle Z = 180°$

$135 + m\angle Z = 180°$

$m\angle Z = 180° - 135°$

$m\angle Z = 45°$



Construction:

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

ii. Taking Z as centre draw an angle of 45°.

iii. Taking Y as centre draw an angle of 60°.

iv. The terminal sides of these angles meet at X.
Then XYZ is requiredΔ.

v. Draw perpendicular bisectors of the sides $\overline{XZ}, \overline{XY}$ and $\overline{YZ}$ of ΔXYZ and make their midpoints B,C and A respectively.

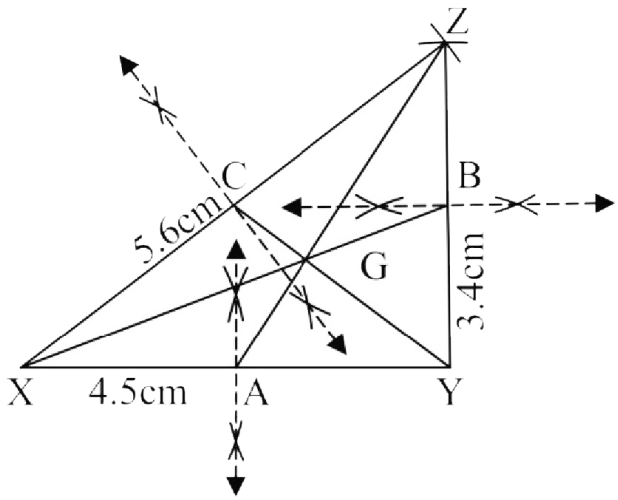
vi. Join Y to B, midpoint of XZ to get $\overline{YB}$ as median.

vii. Join Z to C midpoint of XY to get $\overline{ZC}$ as median.

viii. Join X to A midpoint of YZ to get $\overline{XA}$ as median.

All median intersect at point G. Hence the median are concurrent at G.

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



Construction:

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

ii. Taking Y as centre draw an arc of radius 3.4cm.

iii. Taking X as center draw another arc of radius 6.5cm to cut at point Z.

iv. Join X to Z and Y to Z.

v. Draw perpendicular bisectors of the sides $\overline{XY}, \overline{YZ}$ and $\overline{XZ}$ of ΔXYZ and make their mid point A, B and C.

vi. Join Y to mid point C to get median $\overline{YC}$.

vii. Join Y to mid point B to get median $\overline{XB}$.

viii. Join Z to mid point A to get median $\overline{ZA}$.

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

(iii) $m\overline{ZX} = 4.3cm$ $m\angle X = 75°$ and $m\angle Y = 45°$

Sum of three angles in a triangle is 180° then

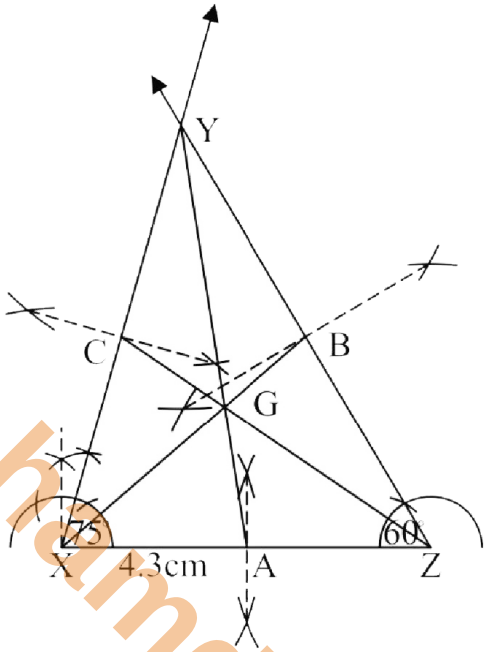
$m\angle X + m\angle Y + m\angle Z = 180°$

$75 + 45 + m\angle Z = 180°$

$120° + m\angle Z = 180°$

$m\angle Z = 180° - 120°$

$m\angle Z = 60°$



Construction:

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

ii. Taking Z as centre draw an angle of 60°.

iii. Taking X as centre draw an angle of 75°.

iv. The terminal sides of these angles meet at Y.
Then XYZ is requiredΔ.

v. Draw perpendicular bisectors of the sides $\overline{XZ}, \overline{YZ}$ and $\overline{XY}$ of ΔXYZ and make their midpoints A,B and C respectively.

vi. Join X to midpoint B to get $\overline{XB}$ as median.

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

viii. Join Y to midpoint A to get $\overline{YA}$ as median.
All median intersect at point G.
Hence the median are concurrent at G.