

EXERCISE 15C

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1. Construct a $\triangle ABC$ such that:

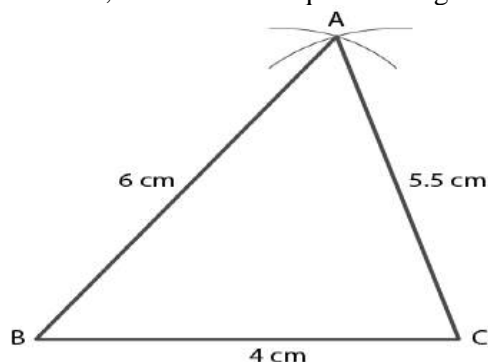
- (i) $AB = 6$ cm, $BC = 4$ cm and $CA = 5.5$ cm
- (ii) $CB = 6.5$ cm, $CA = 4.2$ cm and $BA = 5.1$ cm
- (iii) $BC = 4$ cm, $AC = 5$ cm and $AB = 3.5$ cm

Solution:

(i) Steps of Construction

1. Construct a line segment $BC = 4$ cm.
2. Taking B as centre and 6 cm as radius construct an arc.
3. Taking C as centre and 5.5 cm as radius construct another arc which intersects the first arc at the point A.
4. Now join AB and AC.

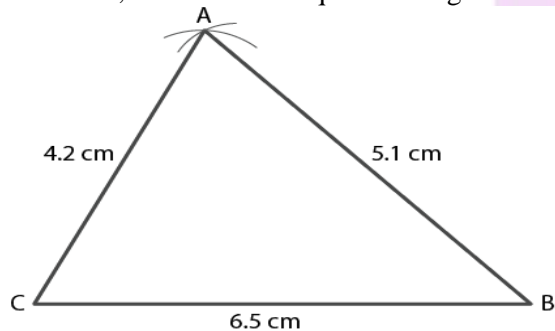
Therefore, $\triangle ABC$ is the required triangle.



(ii) Steps of Construction

1. Construct a line segment $CB = 6.5$ cm
2. Taking C as centre and 4.2 cm as radius construct an arc.
3. Taking B as centre and 5.1 cm as radius construct another arc which intersects the first arc at the point A.
4. Now join AC and AB.

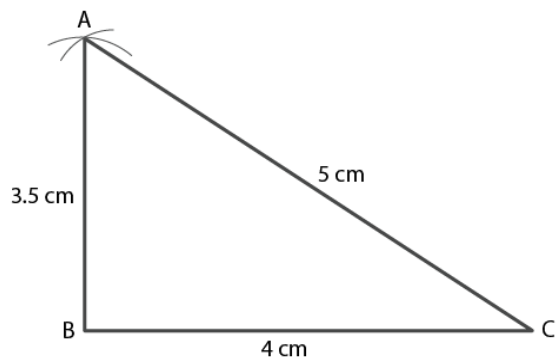
Therefore, $\triangle ABC$ is the required triangle.



(iii) Steps of Construction

1. Construct a line segment $BC = 4$ cm
2. Taking B as centre and 3.5 cm as radius construct an arc.
3. Taking C as centre and 5 cm as radius construct another arc which intersects the first arc at the point A.
4. Now join AB and AC.

Therefore, $\triangle ABC$ is the required triangle.



2. Construct a $\triangle ABC$ such that:

(i) $AB = 7$ cm, $BC = 5$ cm and $\angle ABC = 60^\circ$

(ii) $BC = 6$ cm, $AC = 5.7$ cm and $\angle ACB = 75^\circ$

(iii) $AB = 6.5$ cm, $AC = 5.8$ cm and $\angle A = 45^\circ$

Solution:

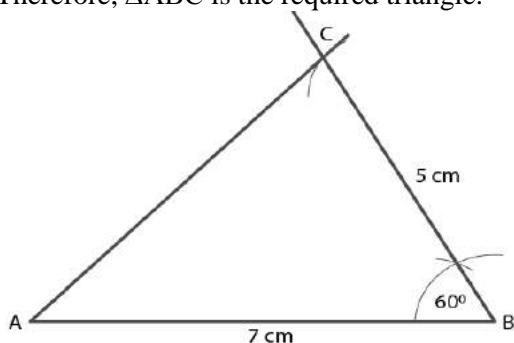
(i) Steps of Construction

1. Construct a line segment $AB = 7$ cm.

2. At the point B construct a ray which makes an angle 60° and cut off $BC = 5$ cm.

3. Now join AC.

Therefore, $\triangle ABC$ is the required triangle.



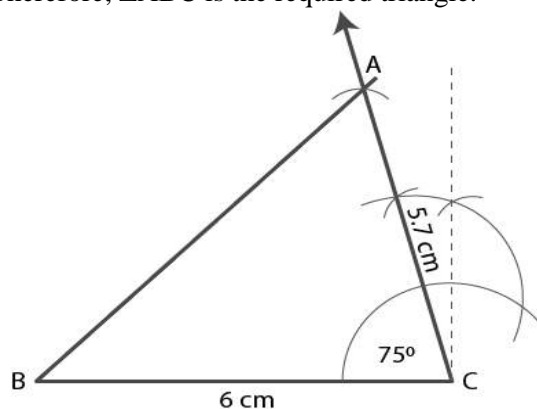
(ii) Steps of Construction

1. Construct a line segment $BC = 7$ cm.

2. At the point C construct a ray which makes an angle 75° and cut off $CA = 5.7$ cm.

3. Now join AB.

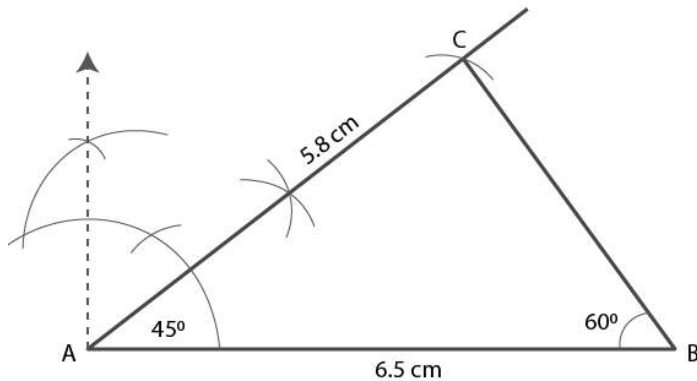
Therefore, $\triangle ABC$ is the required triangle.



(iii) Steps of Construction

1. Construct a line segment $AB = 6.5$ cm.
2. At the point A construct a ray which makes an angle 45° and cut off $AC = 5.8$ cm.
3. Now join CB.

Therefore, $\triangle ABC$ is the required triangle.



3. Construct a $\triangle PQR$ such that :

- (i) $PQ = 6$ cm, $\angle Q = 60^\circ$ and $\angle P = 45^\circ$. Measure $\angle R$.
- (ii) $QR = 4.4$ cm, $\angle R = 30^\circ$ and $\angle Q = 75^\circ$. Measure PQ and PR .
- (iii) $PR = 5.8$ cm, $\angle P = 60^\circ$ and $\angle R = 45^\circ$.

Measure $\angle Q$ and verify it by calculations

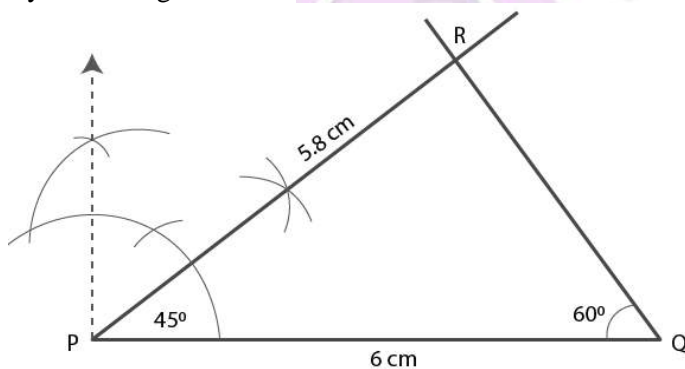
Solution:

(i) Steps of Construction

1. Construct a line segment $PQ = 6$ cm.
2. At point P construct a ray which makes an angle 45° .
3. At point Q construct another ray which makes an angle 60° which intersect the first ray at point R.

Therefore, $\triangle PQR$ is the required triangle.

By measuring $\angle R = 75^\circ$.

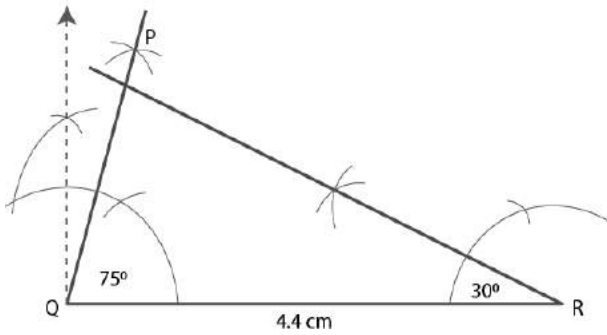


(ii) Steps of Construction

1. Construct a line segment $QR = 4.4$ cm.
2. At point Q construct a ray which makes an angle 75° .
3. At point R construct another ray which makes an angle 30° which intersect the first ray at point R.

Therefore, $\triangle PQR$ is the required triangle.

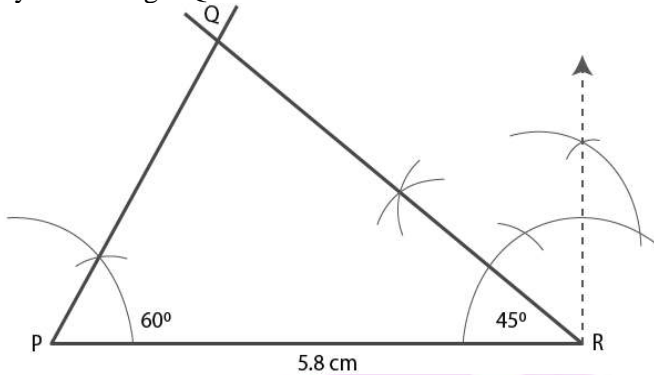
By measuring the length, $PQ = 2.3$ cm and $PR = 4.4$ cm.



(iii) Steps of Construction

1. Construct a line segment $PR = 5.8$ cm.
 2. At point P construct a ray which makes an angle 60° .
 3. At point R construct another ray which makes an angle 45° which intersect the first ray at point Q.
- Therefore, ΔPQR is the required triangle.

By measuring $\angle Q = 75^\circ$.



Verification –

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

Substituting the values

$$60^\circ + \angle Q + 45^\circ = 180^\circ$$

By further calculation

$$\angle Q = 180 - 105 = 75^\circ$$

4. Construct an isosceles ΔABC such that:

- (i) base $BC = 4$ cm and base angle $= 30^\circ$
- (ii) base $AB = 6.2$ cm and base angle $= 45^\circ$
- (iii) base $AC = 5$ cm and base angle $= 75^\circ$.

Measure the other two sides of the triangle.

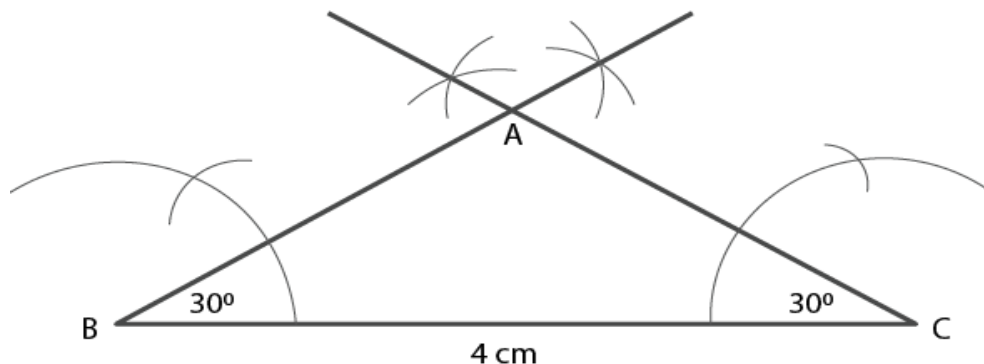
Solution:

(i) Steps of Construction

In an isosceles triangle the base angles are equal

1. Construct a line segment $BC = 4$ cm.
 2. At the points B and C construct rays which makes an angle 30° intersecting each other at the point A.
- Therefore, ΔABC is the required triangle.

By measuring the equal sides is 2.5 cm in length approximately.

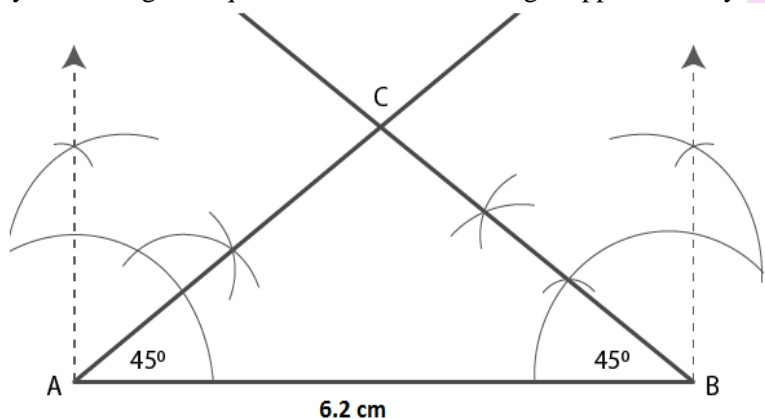


(ii) Steps of Construction

In an isosceles triangle the base angles are equal

1. Construct a line segment $AB = 6.2$ cm.
 2. At the points A and B construct rays which makes an angle 45° intersecting each other at the point C.
- Therefore, $\triangle ABC$ is the required triangle.

By measuring the equal sides is 4.3 cm in length approximately.

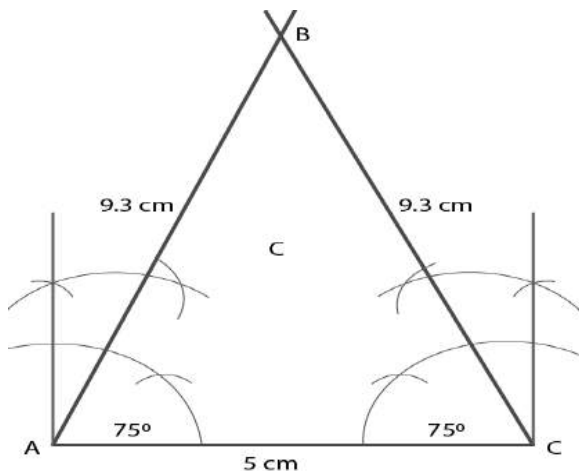


(iii) Steps of Construction

In an isosceles triangle the base angles are equal

1. Construct a line segment $AC = 5$ cm.
 2. At the points A and C construct rays which makes an angle 75° intersecting each other at the point B.
- Therefore, $\triangle ABC$ is the required triangle.

By measuring the equal sides is 9.6 cm in length approximately.



5. Construct an isosceles $\triangle ABC$ such that:

(i) $AB = AC = 6.5$ cm and $\angle A = 60^\circ$

(ii) One of the equal sides = 6 cm and vertex angle = 45° . Measure the base angles.

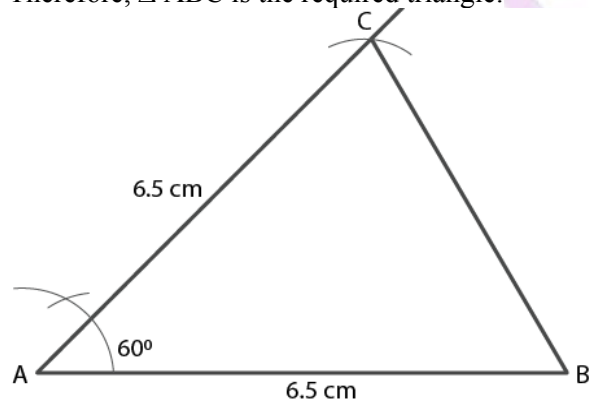
(iii) $BC = AB = 5.8$ cm and $\angle B = 30^\circ$. Measure $\angle A$ and $\angle C$.

Solution:

(i) Steps of Construction

1. Construct a line segment $AB = 6.5$ cm.
2. At point A construct a ray which makes an angle 60° .
3. Now cut off $AC = 6.5$ cm
4. Join BC.

Therefore, $\triangle ABC$ is the required triangle.

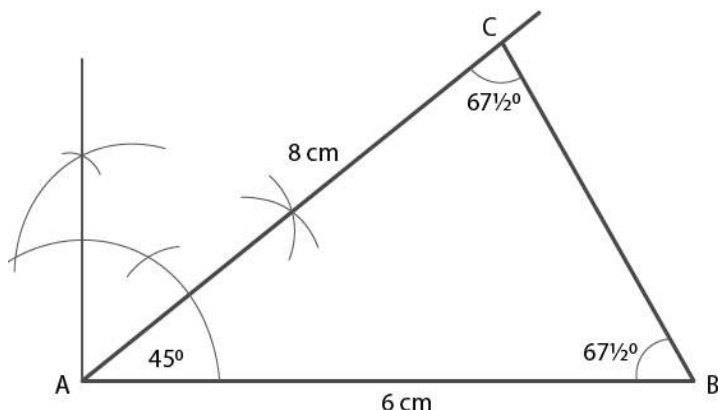


(ii) Steps of Construction

1. Construct a line segment $AB = 6$ cm.
2. At point A construct a ray which makes an angle 45° .
3. Now cut off $AC = 6$ cm
4. Join BC.

Therefore, $\triangle ABC$ is the required triangle.

By measuring $\angle B$ and $\angle C$ is equal to 1° and $67\frac{1}{2}^\circ$.

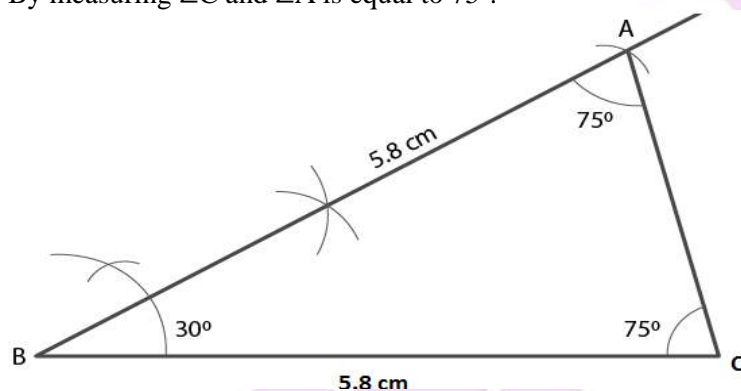


(iii) Steps of Construction

1. Construct a line segment $BC = 5.8$ cm.
2. At point B construct a ray which makes an angle 30° .
3. Now cut off $BA = 5.8$ cm
4. Join AC.

Therefore, $\triangle ABC$ is the required triangle.

By measuring $\angle C$ and $\angle A$ is equal to 75° .



6. Construct an equilateral $\triangle ABC$ such that:

(i) $AB = 5$ cm. Draw the perpendicular bisectors of BC and AC. Let P be the point of intersection of these two bisectors. Measure PA, PB and PC.

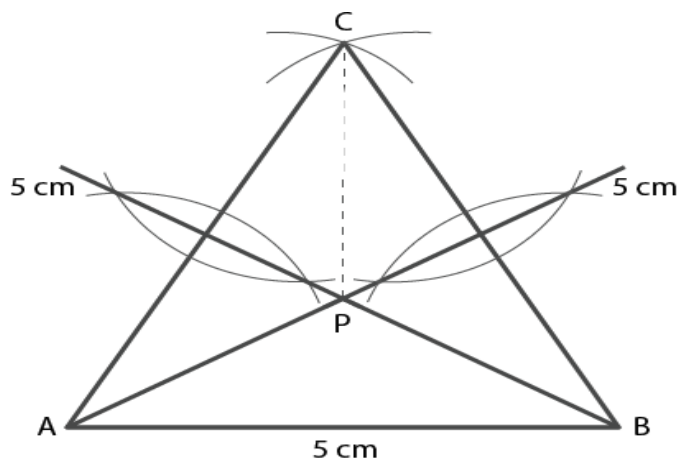
(ii) Each side is 6 cm.

Solution:

(i) Steps of Construction

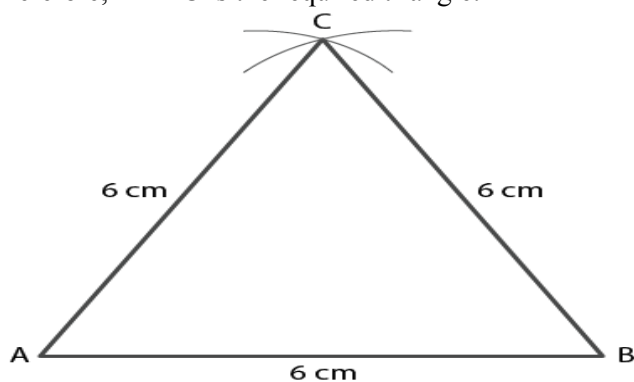
1. Construct a line segment $AB = 5$ cm.
2. Taking A and B as centres and 5 cm radius, construct two arcs which intersect each other at the point C.
3. Now join AC and BC where $\triangle ABC$ is the required triangle.
4. Construct perpendicular bisectors of sides AC and BC which intersect each other at the point p.
5. Join PA, PB and PC.

By measuring each is 2.9 cm.



(ii) Steps of Construction

1. Construct a line segment $AB = 6\text{ cm}$.
 2. Taking A and B as centres and 6 cm radius, construct two arcs which intersect each other at the point C.
 3. Now join AC and BC
- Therefore, ΔABC is the required triangle.



7. (i) Construct a ΔABC such that $AB = 6\text{ cm}$, $BC = 4.5\text{ cm}$ and $AC = 5.5\text{ cm}$. Construct a circumcircle of this triangle.

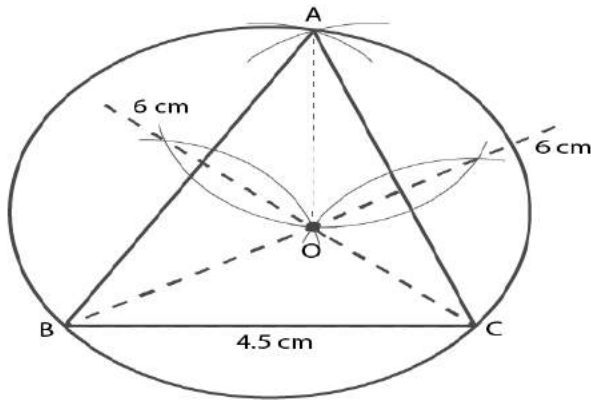
(ii) Construct an isosceles ΔPQR such that $PQ = PR = 6.5\text{ cm}$ and $\angle PQR = 75^\circ$. Using ruler and compasses only construct a circumcircle to this triangle.

(iii) Construct an equilateral triangle ABC such that its one side = 5.5 cm . Construct a circumcircle to this triangle.

Solution:

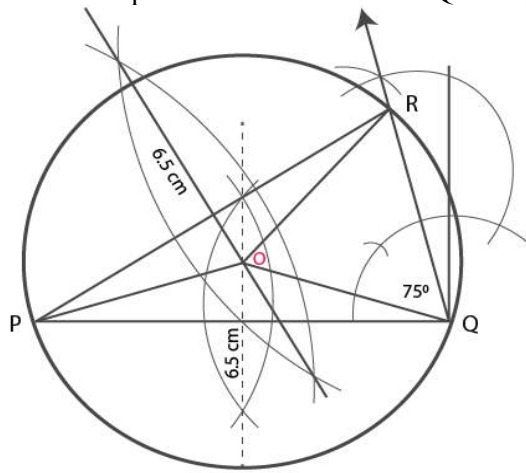
(i) Steps of Construction

1. Construct a line segment $BC = 4.5\text{ cm}$.
 2. Taking B as centre and 6 cm radius construct an arc.
 3. Taking C as centre and 5.5 cm radius construct another arc which intersects the first arc at point A.
 4. Now join AB and AC
- Therefore, ΔABC is the required triangle.
5. Construct a perpendicular bisector of AB and AC which intersect each other at the point O.
 6. Now join OB, OC and OA.
 7. Taking O as centre and radius OA construct a circle which passes through the points A, B and C.
- This is the required circumcircle of ΔABC .



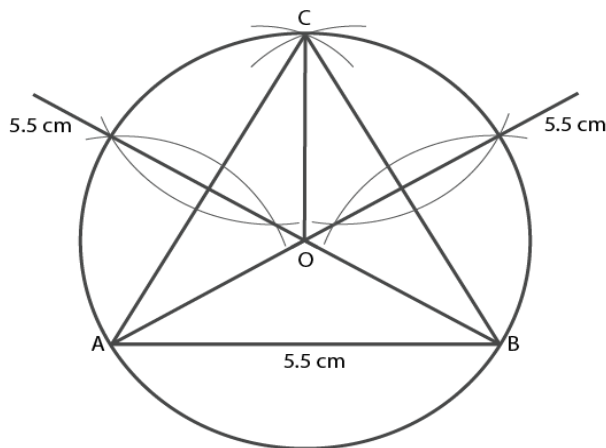
(ii) Steps of Construction

1. Construct a line segment $PQ = 6.5$ cm.
 2. At point Q, construct an arc which makes an angle 75° .
 3. Taking P as centre and radius 6.5 cm construct an arc which intersects the angle at point R.
 4. Join PR.
- $\triangle PQR$ is the required triangle.
4. Construct the perpendicular bisector of sides PQ and PR which intersect each other at the point O.
 5. Join OP, OQ and OR.
 6. Taking O as centre and radius equal to OP or OQ or OR construct a circle which passes through P, Q and R.
- This is the required circumcircle of $\triangle PQR$.



(iii) Steps of Construction

1. Construct a line segment $AB = 5.5$ cm.
 2. Taking A and B as centres and radius 5.5 cm construct two arcs which intersect each other at point C.
 3. Now join AC and BC.
- $\triangle ABC$ is the required triangle.
4. Construct perpendicular bisectors of sides AC and BC which intersect each other at the point O.
 5. Now join OA, OB and OC.
 6. Taking O as centre and OA or OB or OC as radius construct a circle which passes through A, B and C.
- This is the required circumcircle.



8. (i) Construct a $\triangle ABC$ such that $AB = 6$ cm, $BC = 5.6$ cm and $CA = 6.5$ cm. Inscribe a circle to this triangle and measure its radius.

(ii) Construct an isosceles $\triangle MNP$ such that base $MN = 5.8$ cm, base angle $MNP = 30^\circ$. Construct an incircle to this triangle and measure its radius.

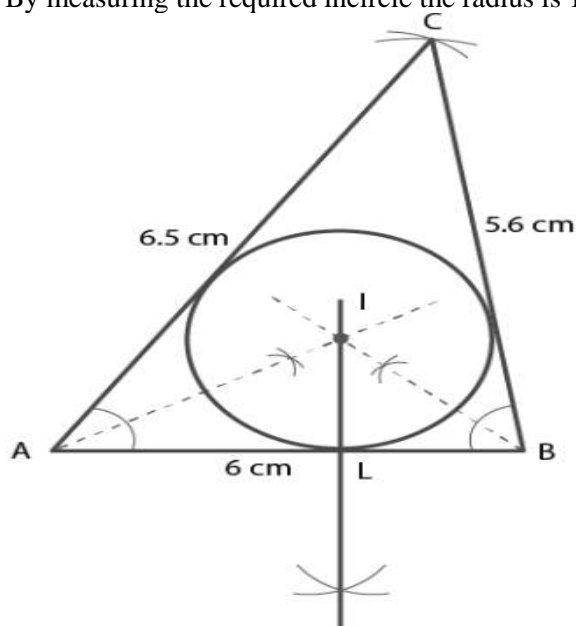
(iii) Construct an equilateral $\triangle DEF$ whose one side is 5.5 cm. Construct an incircle to this triangle.

(iv) Construct a $\triangle PQR$ such that $PQ = 6$ cm, $\angle QPR = 45^\circ$ and angle $PQR = 60^\circ$. Locate its incentre and then draw its incircle.

Solution:

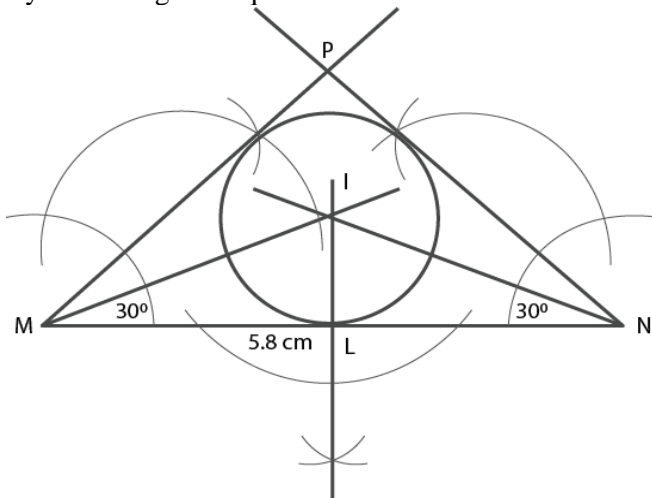
(i) Steps of Construction

1. Construct a line segment $AB = 6$ cm.
 2. Taking A as centre and 6.5 cm as radius and B as centre and 5.6 cm as radius construct arcs which intersect each other at point C.
 3. Now join AC and BC.
 4. Construct the angle bisector of $\angle A$ and $\angle B$ which intersect each other at point I.
 5. From the point I construct IL which is perpendicular to AB .
 6. Taking I as centre and IL as radius construct a circle which touches the sides of $\triangle ABC$ internally.
- By measuring the required incircle the radius is 1.6 cm.



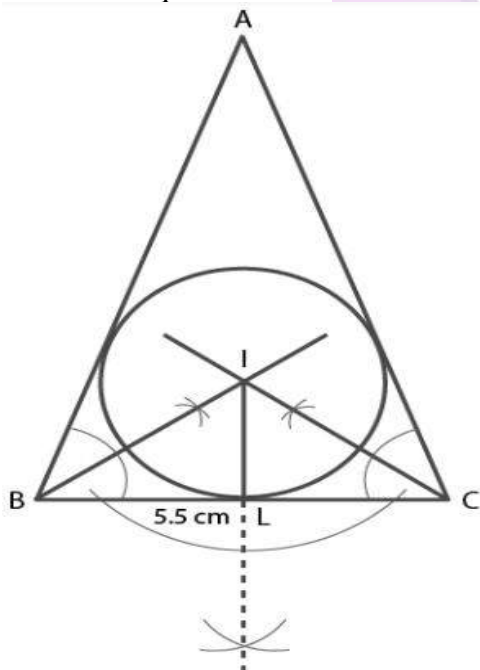
(ii) Steps of Construction

1. Construct a line segment $MN = 5.8$ cm.
 2. At points M and N construct two rays which make an angle 30° each which intersect each other at point P.
 3. Construct the angle bisectors of $\angle M$ and $\angle N$ which intersect each other at point I.
 4. From the point I draw perpendicular IL on MN.
 5. Taking I as centre and IL as radius construct a circle which touches the sides of $\triangle PMB$ internally.
- By measuring the required incircle the radius is 0.6 cm.



(iii) Steps of Construction

1. Construct a line segment $BC = 5.5$ cm.
 2. Taking B and C as centres and 5.5 cm radius construct two arcs which intersect each other at point A.
 3. Now join AB and AC.
 4. Construct the perpendicular bisectors of $\angle B$ and $\angle C$ which intersect each other at the point I.
 5. From the point I construct IL which is perpendicular to BC.
 6. Taking I as centre and IL as radius construct a circle which touches the sides of $\triangle ABC$ internally.
- This is the required incircle.



(iv) Steps of Construction

1. Construct a line segment $PQ = 6$ cm.
 2. At the point P construct rays which make an angle of 45° and at point Q which makes an angle 60° which intersects each other at point R.
 3. Construct the bisectors of $\angle P$ and $\angle Q$ which intersect each other at point I.
 4. From the point I construct IL which is perpendicular to PQ .
 5. Taking I as centre and IL as radius construct a circle which touches the sides of $\triangle PQR$ internally.
- This is the required incircle where the point I is incentre.

