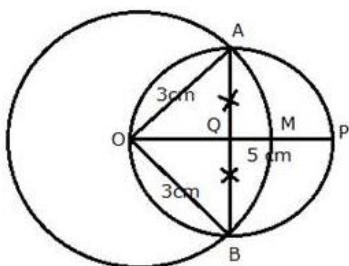


EXERCISE**Question 1:**

Draw a circle of radius 3 cm. Mark a point P at a distance of 5 cm from the centre of the circle drawn. Draw two tangents PA and PB to the given circle and measure the length of each tangent.

Solution 1:**Steps Of Construction:**

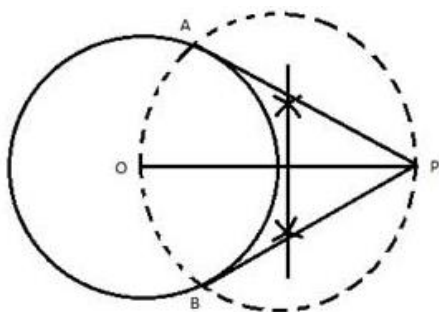
- Draw a circle with centre O and radius 3 cm.
- From O, take a point P such that $OP = 5$ cm
- Draw a bisector of OP which intersects OP at M.
- With centre M, and radius OM, draw a circle which intersects the given circle at A and B.
- Join AP and BP.

AP and BP are the required tangents.

On measuring $AP = BP = 4$ cm

Question 2:

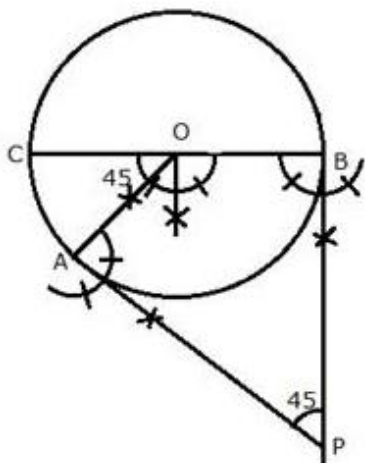
Draw a circle of diameter 9 cm. mark a point at a distance of 7.5 cm from the centre of the circle. Draw tangents to the given circle from this exterior point. Measure the length of each tangent.

Solution 2:

- Draw a circle of diameter 9 cm, taking O as the centre.
- Mark a point P outside the circle, such that $PO = 7.5$ cm.
- Taking OP as the diameter, draw a circle such that it cuts the earlier circle at A and B.
- Join PA and PB.

Question 3:

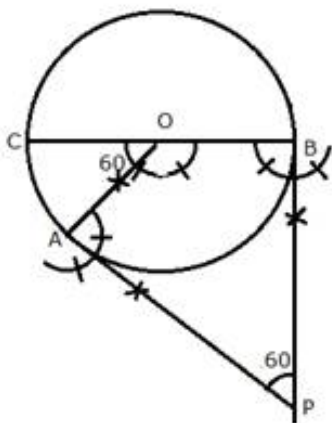
Draw a circle of radius 5 cm. draw two tangents to this circle so that the angle between the tangents is 45° .

Solution 3:**Steps of Construction:**

- Draw a circle with centre O and radius $BC = 5$ cm
- Draw arcs making an angle of $180^\circ - 45^\circ = 135^\circ$ at O such that $\angle AOB = 135^\circ$
- At A and B, draw two rays making an angle of 90° at each point which meet each other at point P, outside the circle.
- AP and BP are the required tangents which make an angle of 45° with each other at P.

Question 4:

Draw a circle of radius 4.5 cm. draw two tangents to this circle so that the angle between the tangents is 60° .

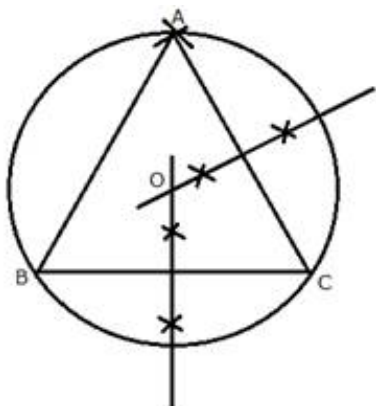
Solution 4:

Steps of Construction:

- i) Draw a circle with centre O and radius $BC = 4.5$ cm
- ii) Draw arcs making an angle of $180^\circ - 60^\circ = 120^\circ$ at O such that $\angle AOB = 120^\circ$
- iii) At A and B, draw two rays making an angle of 90° at each point which meet each other at point P, outside the circle.
- iv) AP and BP are the required tangents which make an angle of 60° with each other at P.

Question 5:

Using ruler and compasses only, draw an equilateral triangle of side 4.5 cm and draw its circumscribed circle. Measure the radius of the circle.

Solution 5:**Steps of construction:**

- i) Draw a line segment $BC = 4.5$ cm
- ii) With centers B and C, draw two arcs of radius 4.5 cm which intersect each other at A.
- iii) Join AC and AB.
- iv) Draw perpendicular bisectors of AC and BC intersecting each other at O.
- v) With centre O, and radius OA or OB or OC draw a circle which will pass through A, B and C.

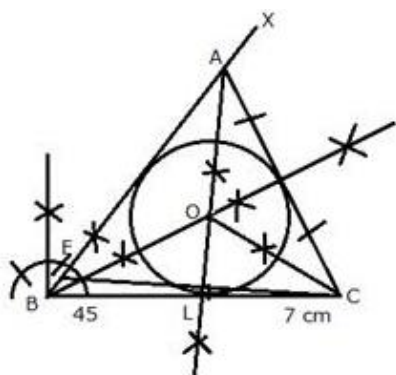
This is the required circumcircle of triangle ABC.

On measuring the radius $OA = 2.6$ cm

Question 6:

Using ruler and compasses only,

- (i) Construct triangle ABC, having given $BC = 7$ cm, $AB - AC = 1$ cm and $\angle ABC = 45^\circ$.
- (ii) Inscribe a circle in the $\triangle ABC$ constructed in (i) above. Measure its radius.

Solution 6:**Steps of Construction:**

i) Construction of triangle:

- a) Draw a line segment $BC = 7 \text{ cm}$
- b) At B, draw a ray BX making an angle of 45° and cut off $BE = AB - AC = 1 \text{ cm}$
- c) Join EC and draw the perpendicular bisector of EC intersecting BX at A .
- d) Join AC .

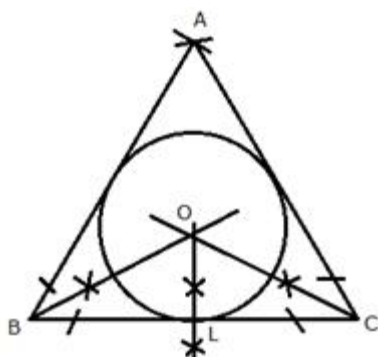
$\triangle ABC$ is the required triangle.

ii) Construction of incircle:

- e) Draw angle bisectors of $\angle ABC$ and $\angle ACB$ intersecting each other at O .
 - f) From O , draw perpendiculars OL to BC .
 - g) O as centre and OL as radius draw circle which touches the sides of the $\triangle ABC$. This is the required in-circle of $\triangle ABC$.
- On measuring, radius $OL = 1.8 \text{ cm}$

Question 7:

Using ruler and compasses only, draw an equilateral triangle of side 5 cm, draw its inscribed circle. Measure the radius of the circle.

Solution 7:

Steps of Construction:

- Draw a line segment $BC = 5$ cm
 - With centers B and C, draw two arcs of 5 cm radius each which intersect each other at A.
 - Join AB and AC.
 - Draw angle bisectors of $\angle B$ and $\angle C$ intersecting each other at O.
 - From O, draw $OL \perp BC$.
 - Now with centre O and radius OL, draw a circle which will touch the sides of $\triangle ABC$
- On measuring, $OL = 1.4$ cm

Question 8:

Using ruler and compasses only,

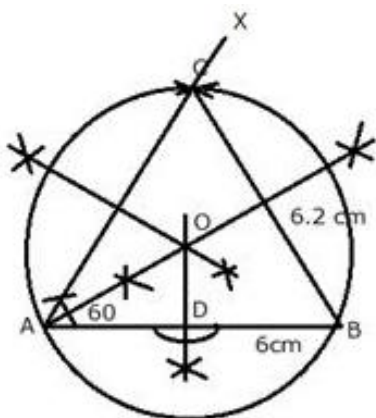
- (i) Construct a triangle ABC with the following data:

Base $AB = 6$ cm, $BC = 6.2$ cm and $\angle CAB = 60^\circ$

- (ii) In the same diagram, draw a circle which passes through the points A, B and C and mark its center O.

- (iii) draw a perpendicular from O to AB which meets AB in D.

- (iv) Prove that $AD = BD$

Solution 8:**Steps of construction:**

- Draw a line segment $AB = 6$ cm
- At A, draw a ray making an angle of 60° with BC.
- With B as centre and radius = 6.2 cm draw an arc which intersects AX ray at C.
- Join BC.
 $\triangle ABC$ is the required triangle.
- Draw the perpendicular bisectors of AB and AC intersecting each other at O.
- With centre O, and radius as OA or OB or OC, draw a circle which will pass through A, B and C.

vii) From O, draw $OD \perp AB$.

Proof: In right $\triangle OAD$ and $\triangle OBD$

$OA = OB$ (radii of same circle)

Side $OD = OD$ (common)

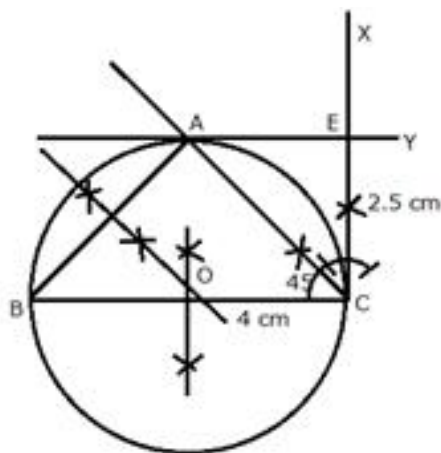
$\therefore \triangle OAD \cong \triangle OBD$ (RHS)

$\Rightarrow AD = BD$ (CPCT)

Question 9:

Using ruler and compasses only construct a triangle ABC in which $BC = 4\text{ cm}$, $\angle ACB = 45^\circ$ and perpendicular from A on BC is 2.5 cm. Draw a circle circumscribing the triangle ABC and measure its radius.

Solution 9:



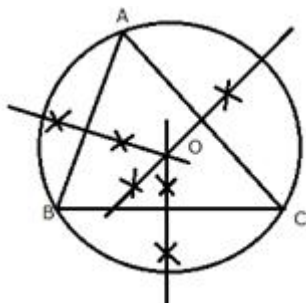
Steps of Construction:

- i) Draw a line segment $BC = 4\text{ cm}$.
 - ii) At C, draw a perpendicular line CX and from it, cut off $CE = 2.5\text{ cm}$.
 - iii) From E, draw another perpendicular line EY .
 - iv) From C, draw a ray making an angle of 45° with CB , which intersects EY at A.
 - v) Join AB.
 - vi) $\triangle ABC$ is the required triangle.
 - vii) Draw perpendicular bisectors of sides AB and BC intersecting each other at O.
 - viii) With centre O, and radius OB, draw a circle which will pass through A, B and C.
- Measuring the radius $OB = OC = OA = 2\text{ cm}$

Question 10:

Perpendicular bisectors of the sides AB and AC of a triangle ABC meet at O.

- (i) What do you call the point O?
- (ii) what is the relation between the distances OA, OB and OC?
- (iii) Does the perpendicular bisector of BC pass through O?

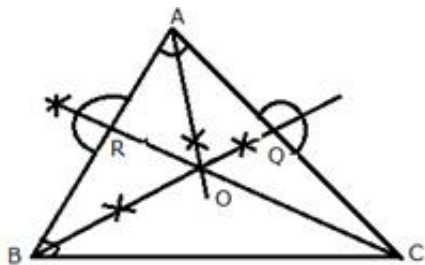
Solution 10:

- i) O is called the circumcentre of circumcircle of $\triangle ABC$.
- ii) OA, OB and OC are the radii of the circumcircle.
- iii) Yes, the perpendicular bisector of BC will pass through O.

Question 11:

The bisectors of angles A and B of a scalene triangle ABC meet at O.

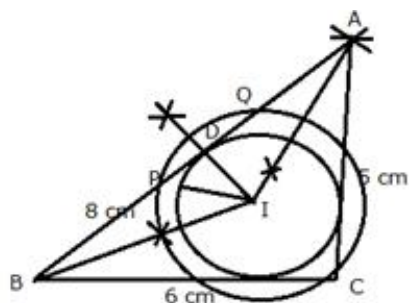
- (i) What is the point O called?
- (ii) OR and OQ are drawn perpendicular to AB and CA respectively. What is the relation between OR and OQ?
- (iii) What is the relation between angle ACO and angle BCO?

Solution 11:

- i) O is called the incentre of the incircle of $\triangle ABC$.
- ii) OR and OQ are the radii of the incircle and $OR = OQ$.
- iii) OC is the bisector of angle C
 $\therefore \angle ACO = \angle BCO$

Question 12:

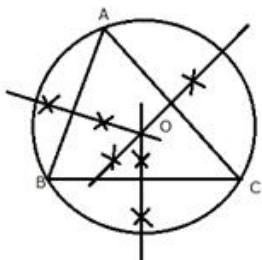
- (i) Using ruler and compasses only, construct a triangle ABC in which $AB = 8$ cm, $BC = 6$ cm and $CA = 5$ cm.
- (ii) Find its incentre and mark it I.
- (iii) With I as centre, draw a circle which will cut off 2 cm chords from each side of the triangle. What is the length of the radius of this circle.

Solution 12:**Steps of Construction:**

- Draw a line segment $BC = 6$ cm.
- With centre B and radius 8 cm draw an arc.
- With centre C and radius 5 cm draw another arc which intersects the first arc at A.
- Join AB and AC.
 $\triangle ABC$ is the required triangle.
- Draw the angle bisectors of $\angle B$ and $\angle A$ intersecting each other at I. Then I is the incentre of the triangle ABC
- Through I, draw $ID \perp AB$
- Now from D, cut off $DP = DQ = \frac{2}{2} = 1$ cm
- With centre I, and radius IP or IQ, draw a circle which will intersect each side of triangle ABC cutting chords of 2 cm each.

Question 13:

Construct an equilateral triangle ABC with side 6 cm. Draw a circle circumscribing the triangle ABC.

Solution 13:

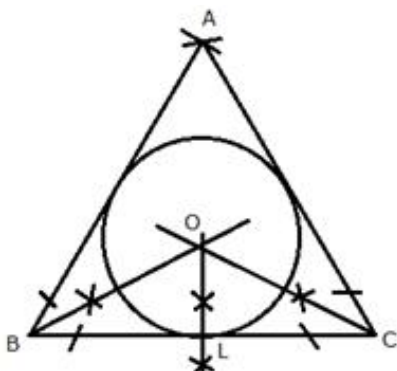
Steps of construction:

- i) Draw a line segment $BC = 6$ cm
- ii) With centers B and C, draw two arcs of radius 6 cm which intersect each other at A.
- iii) Join AC and AB.
- iv) Draw perpendicular bisectors of AC, AB and BC intersecting each other at O.
- v) With centre O, and radius OA or OB or OC draw a circle which will pass through A, B and C.

This is the required circumcircle of triangle ABC.

Question 14:

Construct a circle, inscribing an equilateral triangle with side 5.6 cm.

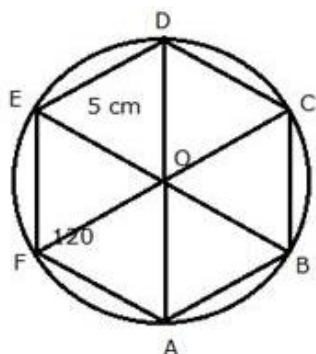
Solution 14:**Steps of Construction:**

- i) Draw a line segment $BC = 5.6$ cm
- ii) With centers B and C, draw two arcs of 5.6 cm radius each which intersect each other at A.
- iii) Join AB and AC.
- iv) Draw angle bisectors of $\angle B$ and $\angle C$ intersecting each other at O.
- v) From O, draw $OL \perp BC$.
- vi) Now with centre O and radius OL, draw a circle which will touch the sides of $\triangle ABC$.

This is the required circle.

Question 15:

Draw a circle circumscribing a regular hexagon with side 5 cm.

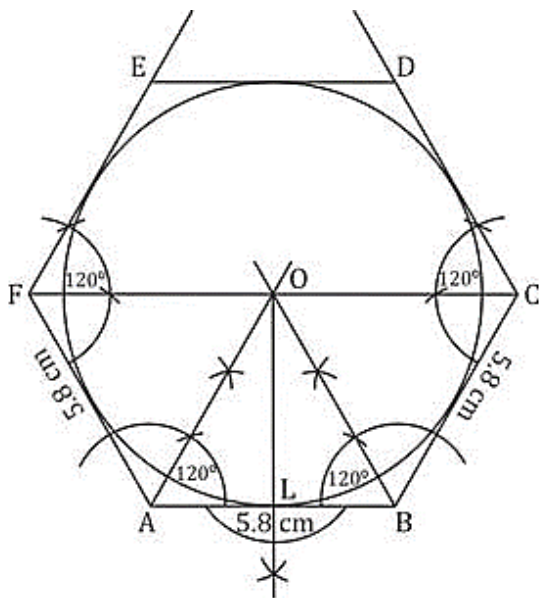
Solution 15:**Steps of Construction:**

- Draw a regular hexagon ABCDEF with each side equal to 5 cm and each interior angle 120° .
- Join its diagonals AD, BE and CF intersecting each other at O.
- With centre as O and radius OA, draw a circle which will pass through the vertices A, B, C, D, E and F.

This is the required circumcircle.

Question 16:

Draw an inscribing circle of a regular hexagon of side 5.8 cm.

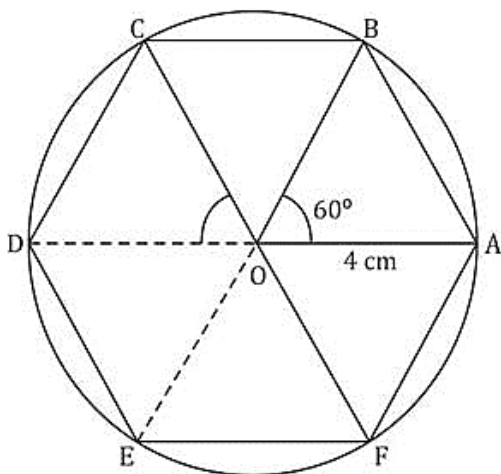
Solution 16:

Steps of Construction:

- i) Draw a line segment $AB = 5.8$ cm
- ii) At A and B, draw rays making an angle of 120° each and cut off $AF = BC = 5.8$ cm
- iii) Again F and C, draw rays making an angle of 120° each and cut off $FE = CD = 5.8$ cm.
- iv) Join DE. Then ABCDEF is the regular hexagon.
- v) Draw the bisectors of $\angle A$ and $\angle B$ intersecting each other at O.
- vi) From O, draw $OL \perp AB$
- vii) With centre O and radius OL, draw a circle which touches the sides of the hexagon.
This is the required in circle of the hexagon.

Question 17:

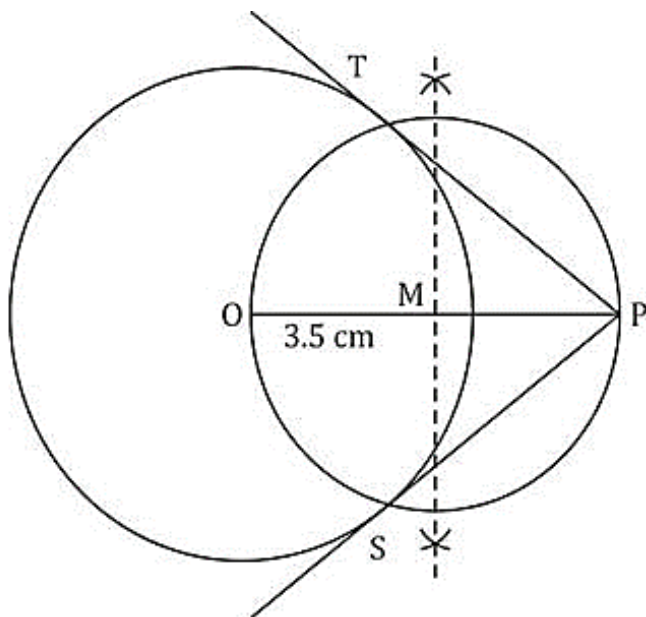
Construct a regular hexagon of side 4 cm. Construct a circle circumscribing the hexagon.

Solution 17:**Steps of Construction:**

- (i) Draw a circle of radius 4 cm with centre O
- (ii) Since the interior angle of regular hexagon is 60° , draw radii OA and OB such that $\angle AOB = 60^\circ$.
- (iii) Cut off arcs BC, CD, EF and each equal to arc AB on given circle
- (iv) Join AB, BC, CD, DE, EF, FA to get required regular hexagon ABCDEF in a given circle.
The circle is the required circum circle, circumscribing the hexagon.

Question 18:

Draw a circle of radius 3.5 cm. mark a point P outside the circle at a distance of 6 cm from the centre. Construct two tangents from P to the given circle. Measure and write down the length of one tangent.

Solution 18:**Steps of Construction:**

- i) Draw a line segment $OP = 6$ cm
- ii) With centre O and radius 3.5 cm, draw a circle
- iii) Draw the midpoint of OP
- iv) With centre M and diameter OP, draw a circle which intersect the circle at T and S
- v) Join PT and PS.

PT and PS are the required tangents. On measuring the length of $PT = PS = 4.8$ cm

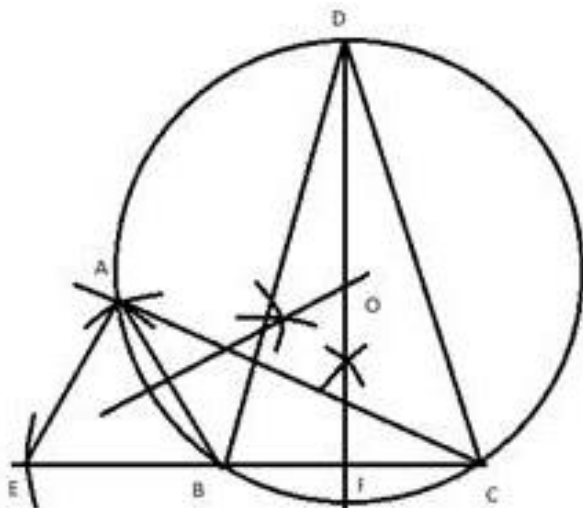
Question 19:

Construct a triangle ABC in which base $BC = 5.5$ cm, $AB = 6$ cm and $\angle ABC = 120^\circ$.

- (i) Construct a circle circumscribing the triangle ABC.
- (ii) draw a cyclic quadrilateral ABCD so that D is equidistant from B and C.

Solution 19:

i.



- a. Draw a line $BC = 5.4$ cm.
- b. Draw $AB = 6$ cm, such that $m\angle ABC = 120^\circ$.
- c. Construct the perpendicular bisectors of AB and BC , such that they intersect at O .
- d. Draw a circle with O as the radius.
- ii.
 - e. Extend the perpendicular bisector of BC , such that it intersects the circle at D .
 - f. Join BD and CD .
 - g. Here $BD = DC$.