

CHAPTER 13

Practical Geometry Circle

Exercise 13.1

Q1. Construct a triangle with sides 2cm, 2.5cm and 3cm. Also draw its circum circle?

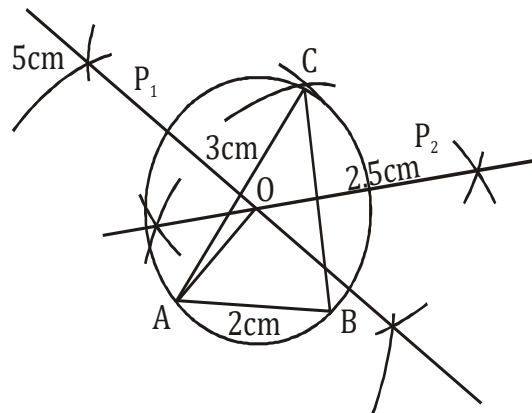
Given:

$$\overline{AB} = 2\text{cm}, \overline{BC} = 2.5\text{cm}, \overline{CA} = 3\text{cm}$$

Required:

Construct a triangle and also draw its circum circle?

Procedure:



Draw

- I draw a circle which sides are $\overline{AB} = 2\text{cm}$, $\overline{BC} = 2.5\text{cm}$ and $\overline{AC} = 3\text{cm}$

- ii. Then I draw perpendicular bisector l_1 of side AC and l_2 of side BC which intersect each other on point O.
- iii. Then draw a circle of center O and radius $\overline{OA}$ or $\overline{OC}$ which is required circum circle.

Q2. Construct a triangle ABC such that $\overline{AB} = 3''$, $\overline{AC} = 4''$ and $\angle A = 60^\circ$. Draw circum circle to this triangle.

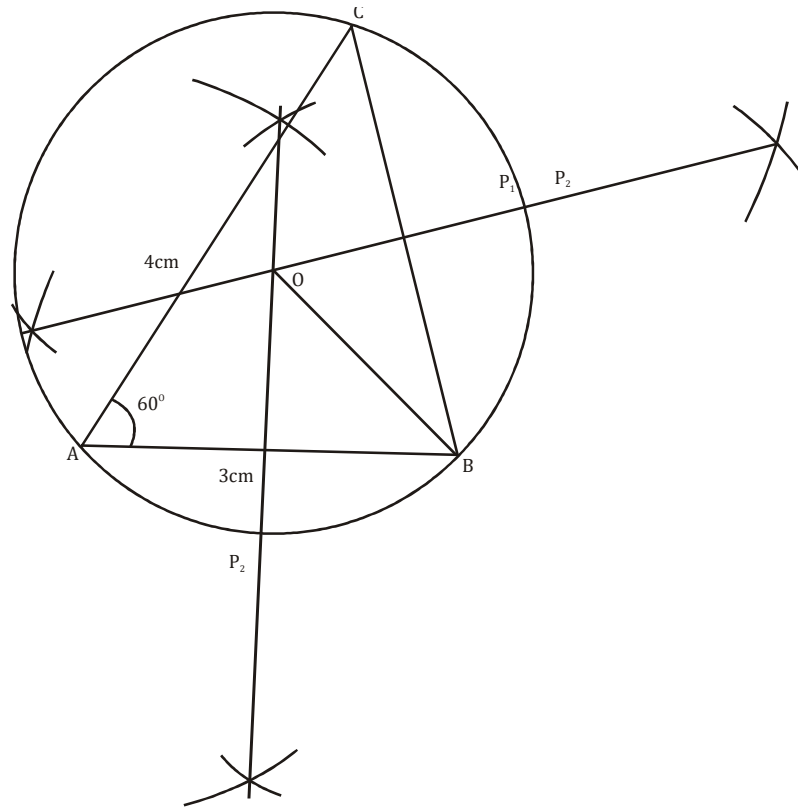
Given:

$$\overline{AB} = 3'', \overline{AC} = 4'' \text{ and } \angle A = 60^\circ$$

Required:

Drawing a triangle and also drawing its circumscribe?

Procedure:

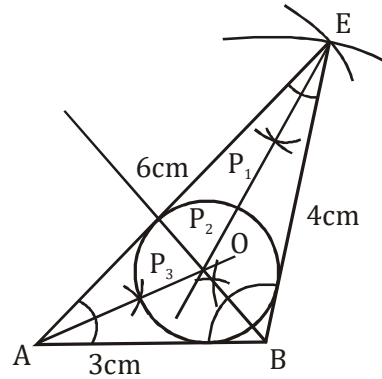


- i. I draw a Δ of $m\overline{AB}=3''$, $m\overline{AC}=4''$ and $\angle A=60^\circ$
- ii. I draw a perpendicular bisector l_1 of side BC and l_2 of side AB which intersect each other on point O.
- iii. I draw a circle of centre O and of radius $m\overline{OA}$ OR $m\overline{OB}$ or $m\overline{OC}$. Which is the required circum circle

Q3. Suppose we have a triangle whose sides are 3 cm, 4 cm and 6 cm respectively. Draw its inscribed circle.

Given:

A triangle of side
 $\overline{AB}=3\text{cm}$, $\overline{BC}=4\text{cm}$ and $\overline{CA}=6\text{cm}$



Procedure:

- i. I draw a triangle of sides
 $\overline{AB}=3\text{cm}$, $\overline{BC}=4\text{cm}$ and $\overline{CA}=6\text{cm}$
- ii. I draw a bisector l_3 of $\angle A$, l_2 of $\angle B$ and l_1 of $\angle C$ which intersect each other on point O.
- iii. Point O is the centre of the circle
- iv. Then I draw a circle of centre O and of radius $\overline{OB}$ or $\overline{OA}$ or $\overline{OC}$ and this is the required inscribe circle

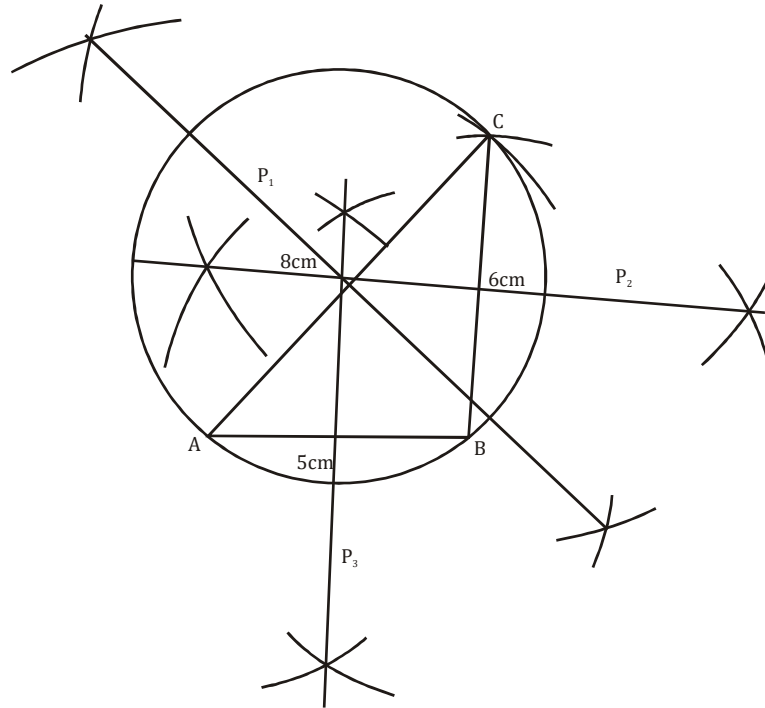
Q4. Construct a triangle ABC with sides $\overline{AB}=5\text{cm}$, $\overline{BC}=6\text{cm}$ and $\overline{CA}=8\text{cm}$. Draw perpendicular bisectors of its sides and then circumscribe a circle.

Given:

A triangle of side
 $\overline{AB}=5\text{cm}$, $\overline{BC}=6\text{cm}$ and $\overline{CA}=8\text{cm}$

Required:

Draw a triangle and perpendicular bisector of each side and then a circumscribe a circle?



Procedure:

- i. I draw a triangle of sides $\overline{AB} = 5\text{cm}$, $\overline{BC} = 6\text{cm}$ and $\overline{CA} = 8\text{cm}$
- ii. I draw a perpendicular bisector of l_1 of side AC, l_2 of side BC and l_3 of side AB which intersect each other on point O.
- iii. Then I draw a circle of centre O and a radius of equal to $\overline{OB}$ or $\overline{OA}$ or $\overline{OC}$ and this is the required inscribe circle.

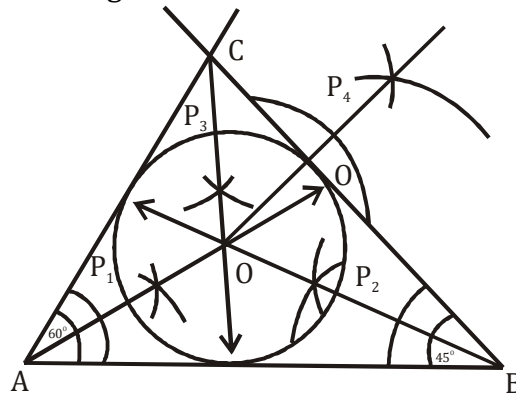
Q5. Draw a triangle ABC with $m\angle A = 60^\circ$ and $m\angle B = 45^\circ$. Draw three angle bisectors and then inscribe a circle in it.

Given:

$$m\angle A = 60^\circ \text{ and } m\angle B = 45^\circ$$

Required:

Draw three angle bisector and then an inscribe circle?



Procedure:

- i. I draw 2 line $\overline{AB}$ and the $m\angle A = 60^\circ$ and $m\angle B = 45^\circ$ make a triangle.
- ii. Then I draw bisector of $\angle A$ is l_1 and l_2 of $\angle B$ and l_3 of $\angle C$ which intersect each other on point "O"
- iii. Then I draw a perpendicular bisector l_n of $\overline{BC}$ side which cross BC on point D
- iv. Then draw a circle of center "O" and of radius $\overline{OD}$.
- v. This is the required inscribed circle.

Q6. An equilateral triangle is inscribed in a circle. Find the altitude of the triangle if the radius of the circle varies. As under. $r=3$ units, $r=4$ units, $r=10$ units

Solution:

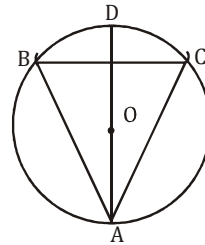
Given: A circle of center O,
With radius $r=3$, 4 , 6 and 10 units.

Required: An equilateral triangle is inscribed in a circle.
Also altitude of the triangle.

Step of construction:

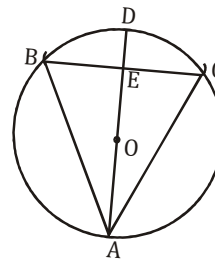
For $r=3$ units:

- (i) Take O is a center and draw a circle of radius 3 units.
- (ii) Draw diameter $\overline{AD}$ of the given circle.
- (iii) With center D and radius $\overline{OD}=3$ units, draw two arcs which cut the given circle at B and C.
- (iv) Join A, B and C.
- (v) Thus $\triangle ABC$ is required triangle.
- (vi) E is a point to intersect $\overline{AD}$
- (vii) Thus $\overline{AE}$ is the altitude of triangle ABC of measures 4 units



For $r=4$ units

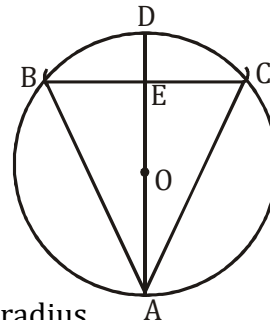
- (i) Take O is center and draw a circle of radius 4 units.



- (ii) Draw diameter $\overline{AD}$ of the given circle.
- (iii) With center D and radius $\overline{OD}=4$ units, draw two arcs which cut the given circle at B and C.
- (iv) Join A , B and C.
- (v) Thus $\triangle ABC$ is required triangle.
- (vi) E is a point to intersect $\overline{AD}$.
- (vii) Thus $\overline{AE}$ is the altitude of triangle ABC of measures 6 units.

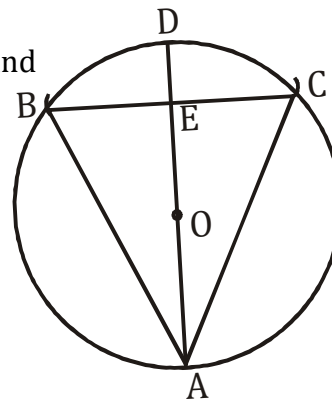
For r=6 units

- (i) Take O is a center and draw a circle of radius 6 units.
- (ii) Draw diameter $\overline{AD}$ of the given circle at B and D.
- (iii) With center D and radius $\overline{OD}=6$ units, draw two arcs which cut the given circle at B and C.
- (iv) Join A , B and C.
- (v) Thus $\triangle ABC$ is required triangle.
- (vi) E is a point to intersect $\overline{AD}$
- (vii) Thus $\overline{AE}$ is the altitude of triangle ABC of measures 9 units.



For r=12 units.

- (i) Take O is a center and draw a circle of radius 12 units.



- (ii) Draw diameter $\overline{AD}$ of the given circle.
- (iii) With center D and radius $\overline{OD}=12$ units, draw two arcs which cut the given circle at B and D.
- (iv) Join A , B and C
- (v) Thus $\triangle ABC$ is required triangle.
- (vi) E is a point to intersect $\overline{AD}$.
- (vii) Thus $\overline{AE}$ is the altitude of triangle ABC of measures 18 units.

From this we deduce that E divides diameter $\overline{AD}$ of the circle in the ratios of 3:1.

Q7: An equilateral triangle is circumscribed about a circle. Find the altitude of the triangle if the radius r of the circle varies as $r=2$ units, $r=5$ units, $r=10$ units.

Slution:

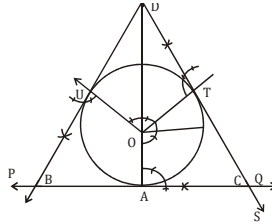
Given: A circle of center O and radius of $r=2$ units, $r=5$ units and $r=10$ units.

Required: Circumscribed an equilateral triangle about the circle.

Also find altitude of triangle.

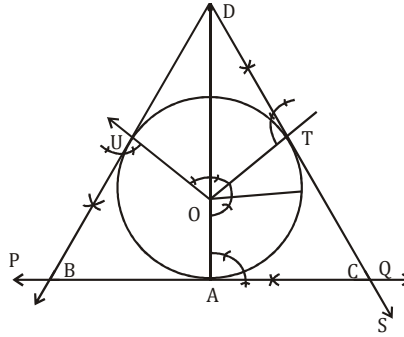
Steps of construction:

For $r=2$ units:



- (i) Take O is a centre and draw a circle of radius 2 units.
- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.
- (iii) Construct an angle $\angle AOT$ of measure 120°
- (iv) Construct another angle $\angle TOU$ measuring 120°
- (v) The three points A, T, U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs.
 $\widehat{AT}$, $\widehat{TU}$ and $\widehat{UA}$
- (vi) Draw perpendiculars to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A, T and U respectively. These perpendicular lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$
- (vii) These lines intersect each other at B, C and D forming a triangle BCD.
- (viii) Thus BCD is required triangle of length 6 units.

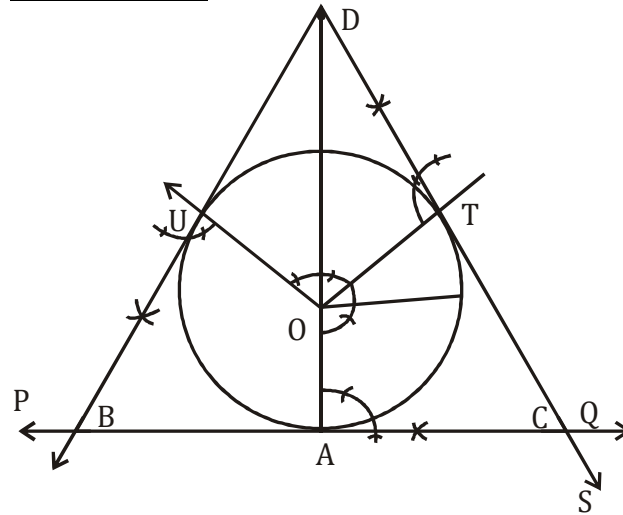
For $r=5$ units:



- (i) Take O is a center and draw a circle of radius 5 units.
- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.
- (iii) Construct an angle $\angle AOT$ of measure 120° .
- (iv) Construct another angle $\angle TOU$ measuring 120° .
- (v) The three points A, T, U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs.
 $\widehat{AT}$, $\widehat{TU}$ and $\widehat{UA}$
- (vi) Draw perpendiculars to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A, T and U respectively. These perpendicular lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$
- (vii) These lines intersect each other at B, C and D forming a triangle BCD.
- (viii) Thus BCD is required triangle.
- (ix) Join A and D.

- (x) Thus $\overline{AD}$ is the altitude of the given triangle of length 7.5 units.

For $r=10$ units



- (i) Take O is a center and draw a circle of radius 10 units.
- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.
- (iii) Construct an angle $\angle AOT$ of measure 120° .
- (iv) Construct another angle $\angle TOU$ measuring 120° .
- (v) The three points A, T, U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs $\widehat{AT}$, $\widehat{TU}$ and $\widehat{UA}$

- (vi) Draw perpendiculars to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A, T and U respectively. These perpendiculars lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$.
- (vii) These lines intersect each other at B, C and D forming a triangle BCD.
- (viii) Thus BCD is required triangle.
- (ix) Join A and D.
- (x) Thus $\overline{AD}$ is the altitude of the given triangle of length 15 units.

From this we can deduce that a point on the circumference which intersects $\overline{AD}$ in the ratio of 2:1.

Q8: Circumscribe an equilateral triangle about a circle of radius 2, 3 and 1.

Solution:

Given: Circumscribe an equilateral triangle about a circle of radius 2, 3 and 1.

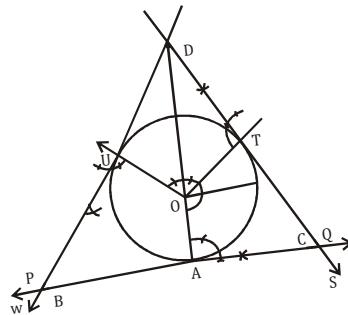
Required: Circumscribe an equilateral triangle about the circle.

Also find altitude of triangle.

- (i) Take O as a center and draw a circle of radius 2 units.
- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.
- (iii) Construct an angle $\angle AOT$ of measure 120° .
- (iv) Construct another angle $\angle TOU$ measuring 120° .

- (v) The three points A , T , U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs.
 $\widehat{AT}$, $\widehat{TU}$ and $\widehat{UA}$
- (vi) Draw perpendiculars to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A,T and U respectively. These perpendiculars lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$.
- (vii) These lines intersects each other at B , C and D forming a triangle BCD.
- (viii) Thus BCD required triangle.

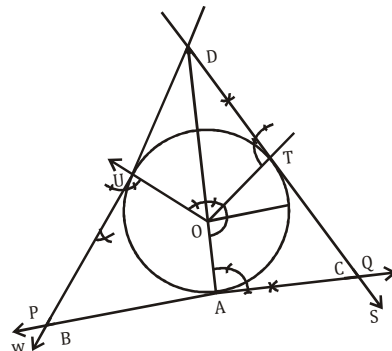
For r=2:



- (i) Take O is a center and draw a circle of radius 3 units.

- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.
- (iii) Construct an angle $\angle AOT$ of measure 120°
- (iv) Construct an angle $\angle TOU$ of measure 120°
- (v) The three points A, T, U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs.
AT, TU and UA
- (vi) Draw perpendicular to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A, T and U respectively. These perpendicular lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$
- (vii) These lines intersect each other at B, C and D forming a triangle BCD.
- (viii) Thus BCD is required triangle.

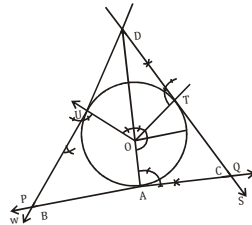
For $r = 3$



- (i) Take O as a center and draw a circle of radius 3 units.

- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.
- (iii) Construct an angle $\angle AOT$ of measure 120° .
- (iv) Construct another angle of $\angle TOU$ measure 120° .
- (v) The three point A, T, U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs. AT, TU and UA
- (vi) Draw perpendicular to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A, T and U respectively. These perpendicular lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$.
- (vii) These lines intersect each other at B, C and D forming a triangle BCD.

For $r = 1$



- (i) Take O is a center and draw a circle of radius 3 units.
- (ii) Take any point A on the circumference of the circle and join O to A. $\overline{OA}$ is radial segment.

- (iii) Construct an angle $\angle AOT$ of measure 120° .
- (iv) Construct another angle of $\angle TOU$ measure 120° .
- (v) The three point A, T, U which are lying on the circumference of the given circle are such that they divided the boundary of the circle into three equal arcs. AT, TU and UA
- (vi) Draw perpendicular to $\overline{OA}$, $\overline{OT}$ and $\overline{OU}$ at A, T and U respectively. These perpendicular lines are $\overline{PQ}$, $\overline{RS}$ and $\overline{VW}$.
- (vii) These lines intersects each other at B, C and D forming a triangle BCD.
- (viii) Thus BCD is required triangle.

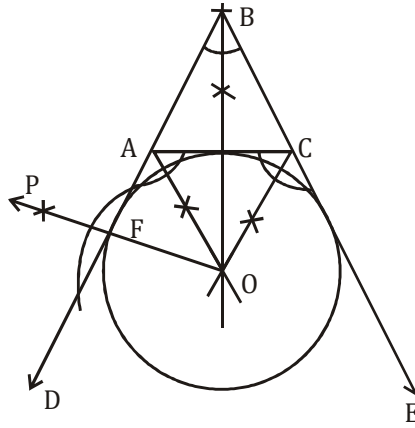
Q9. Draw a triangle with sides 2.5cm, 3.5cm and 4.5cm long. Draw an escribed circle to the triangle touching the longest side of the triangle.

Solution:

Given: A triangle ABC, $m\overline{AB} = 2.5$, $m\overline{BC} = 3.5$ and $m\overline{AC} = 4.5$

Required: Draw a triangle and escribed circle to the triangle touching the side $\overline{AC}$.

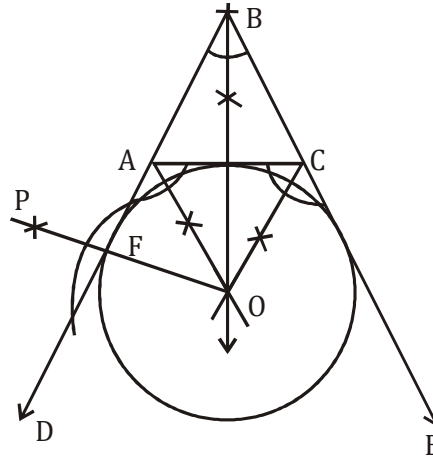
Steps of Construction:



- i. Draw $\overline{AC} = 4.5\text{cm}$
- ii. Take A as a center and draw an arc of length 2.5cm.
- iii. Take C as a center and draw an arc of length 3.5cm.
- iv. Which cut each other at point B. Join B with A and C.
- v. Thus triangle ABC is formed.
- vi. Produce $\overline{AB}$ and $\overline{BC}$ to form two exterior angles $\angle ACE$ and $\angle CAD$.
- vii. Draw bisector of $\angle ABC$, $\angle ACE$ and $\angle CAD$ which intersect each other at point O.
- viii. O is the center of the required circle.
- ix. Draw $\overline{OF} \perp \overline{AC}$.
- x. Take O as the center and draw a circle of radius $\overline{OF}$ which touches $\overline{AC}$, $\overline{AD}$ and $\overline{CE}$.
- xi. This is the required circle.

Q10. For the problem in Q.9 draw an escribed circle to the triangle touching the smallest side.

Solution:



Give: A triangle ABC, $m\overline{AB} = 2.5$, $m\overline{BC} = 3.5$ and $m\overline{AC} = 4.5$

Required: Draw a triangle and escribed circle to the triangle touching the side $\overline{AB}$.

Steps of Construction:

- i. Draw $m\overline{AB} = 2.5\text{cm}$.
- ii. Take A as a center and draw an arc of length 4.5cm.
- iii. Take B as a center and draw an arc of length of 3.5cm.
- iv. Which cut each other at point C. Join C with A and B.
- v. Thus triangle ABC is formed.
- vi. Produce $\overline{AC}$ and $\overline{BC}$ to form two exterior angles $\angle ABE$ and $\angle BAD$
- vii. Draw bisector of $\angle ACB$, $\angle ABE$ and $\angle BAD$ which intersect each other at point O.
- viii. O is the center of required circle.
- ix. Draw $OF \perp AC$.
- x. Take O as the center and draw a circle of radius mOF which touches $\overline{AB}$, $\overline{AD}$ and $\overline{BE}$.

xi. This the required circle.

Exercise 13.2

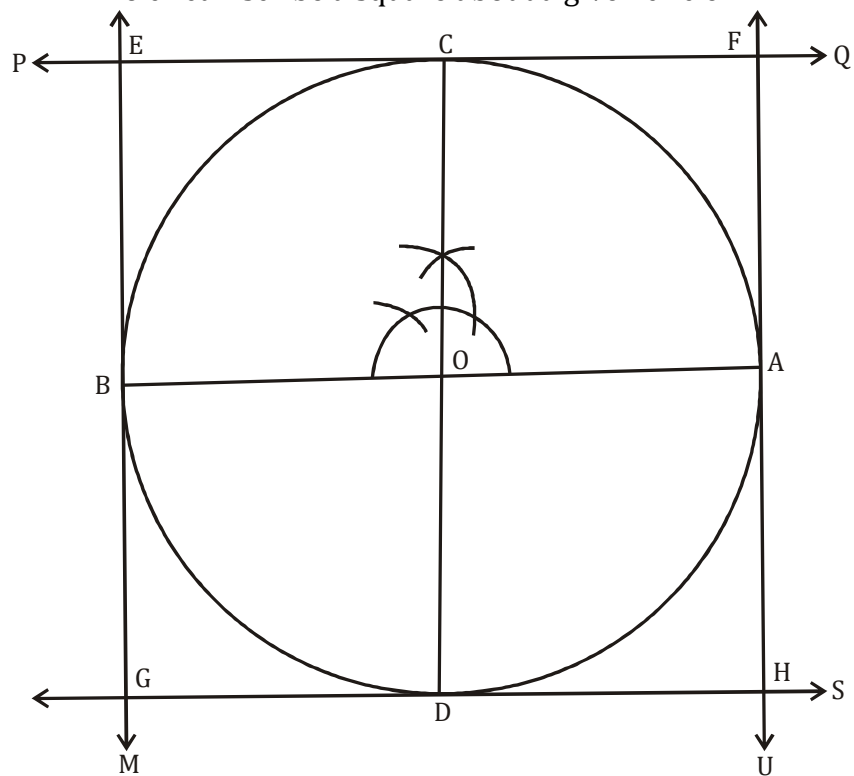
Q1. Circumscribe a square about a circle of radius 5cm.

Given:

A circle of radius equal to 5cm

Required:

To circumscribe a square about a given circle



Procedure:

- i. I draw a circle of radius equal to 5cm
- ii. Then I draw a diameter $\overline{AB}$

iii. Then $\overline{DC} \perp \overline{AB}$

iv. Then draw perpendiculars $\overline{TU}$, $\overline{VW}$, $\overline{PQ}$, $\overline{RS}$ on extreme A, B, C, D

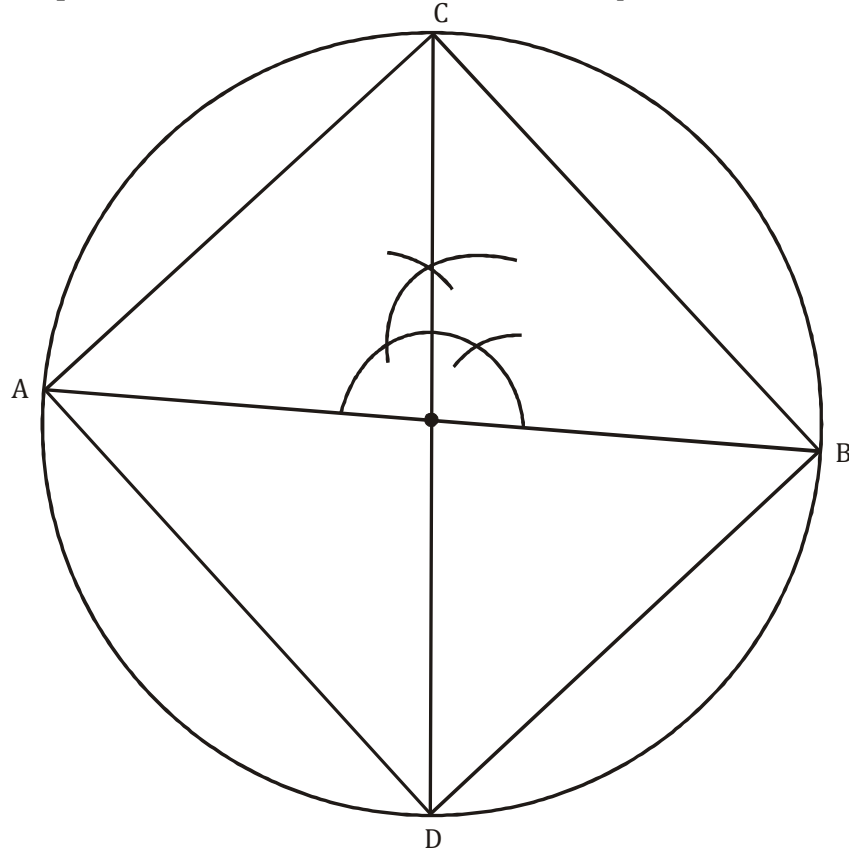
v. These line touch each other on points E, F, G, H

vi. E, F, G, H is the required circumscribed square.

Q2. Inscribe a square in a circle of radius 6 cm.

Given: A circle of radius = 6cm

Required: To draw an inscribed square



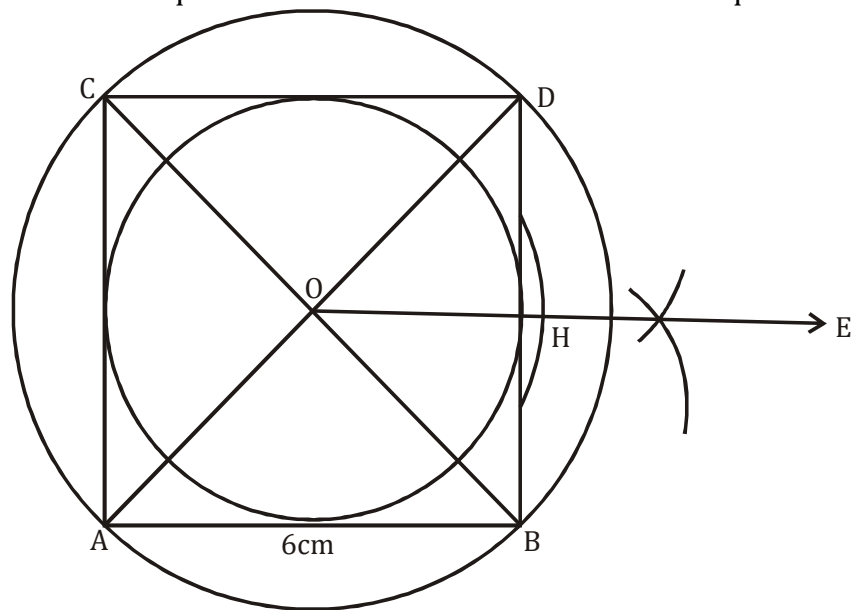
Procedure:

i. I draw a circle of radius 6cm and a diameter $\overline{AB}$

- ii. Then I draw another diameter $\overline{DC} \perp \overline{AB}$
 - iii. Then draw $\overline{AC}$, $\overline{BC}$, $\overline{AD}$ and $\overline{BD}$
 - iv. ABCD is the inscribed square
- Q3. Draw a square of side 6cm. Circumscribe a circle about that square and then inscribe a circle in the same square. Measure the radii of these two circles.**

Given: Length of one side is 6cm

Required: Draw a square and then circumscribe this about this square and then inscribed a circle in this square?



Procedure:

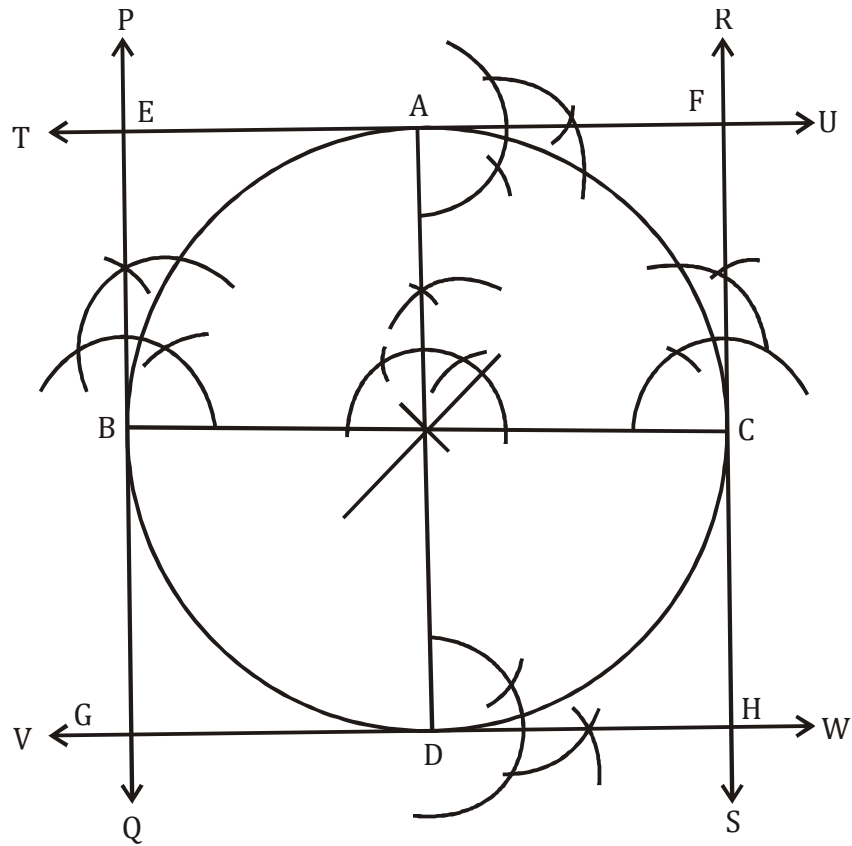
- i. I draw a square ABCD of sides 6cm
- ii. Then I draw $\overline{BC}$ and $\overline{AD}$ which cross each other on point O.

- iii. Then I draw a circle of center O and of radius equal to $\overline{OA}$ or $\overline{OB}$ or $\overline{OD}$ which cross $\overline{BD}$ on point H
- iv. Then I draw a second circle of radius equal to OH which is required inscribed circle
- v. The radius of the 1st circle is 5.4cm and the second is 3cm

Q4. First draw a circle of suitable radius, so that the square circumscribed about that circle has sides of length 8 units.

Given: Side of ABCD = 8 units

Required: Draw a circle and a square?



Procedure:

- i. First I draw a circle of radius of 4cm
- ii. Then draw diameter $\overline{BC}$
- iii. Then $\overline{AD} \perp \overline{BC}$
- iv. Then draw perpendicular $\overline{TU}$, $\overline{PQ}$, $\overline{PS}$ and $\overline{VW}$ on vertex ABCD which touch each other on points E, F, G, H
- v. E, F, G, H is the required circumscribed square about the given circle which side is 8units of radius.

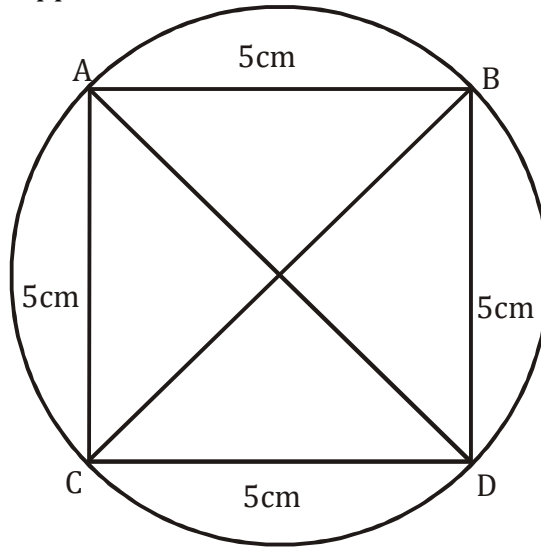
Q5. Inscribe a square of side 10 cm in a circle. What will be the size of the radius?

Given: Square of side 10cm

Required: Inscribe the square

Solution:

Let suppose $2\text{cm} = 1\text{cm}$ then $10\text{cm} = 5\text{cm}$



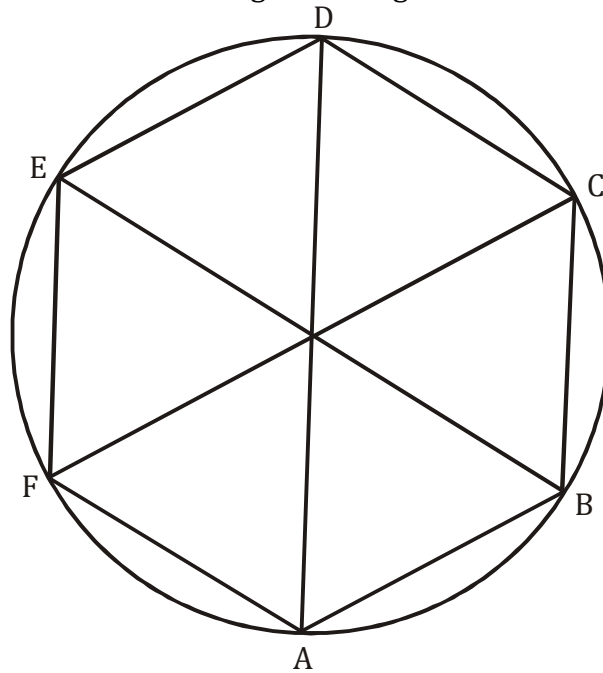
Procedure:

- i. I draw ABCD of side 5cm.
- ii. Then draw $\overline{BC}$ and $\overline{AD}$ which intersect each other on point O
- iii. Then draw a circle of center O and of radius equal to $m\overline{OA}$ or $m\overline{OB}$ or $m\overline{OC}$ or $m\overline{OD}$
- iv. ABCD is the required inscribed circle
- v. The length of the circle radius is 2.5cm

Q6. Inscribe a regular hexagon in a circle of radius 4 cm.

Given: A circle of radius 4cm

Required: Inscribe a regular hexagonal?



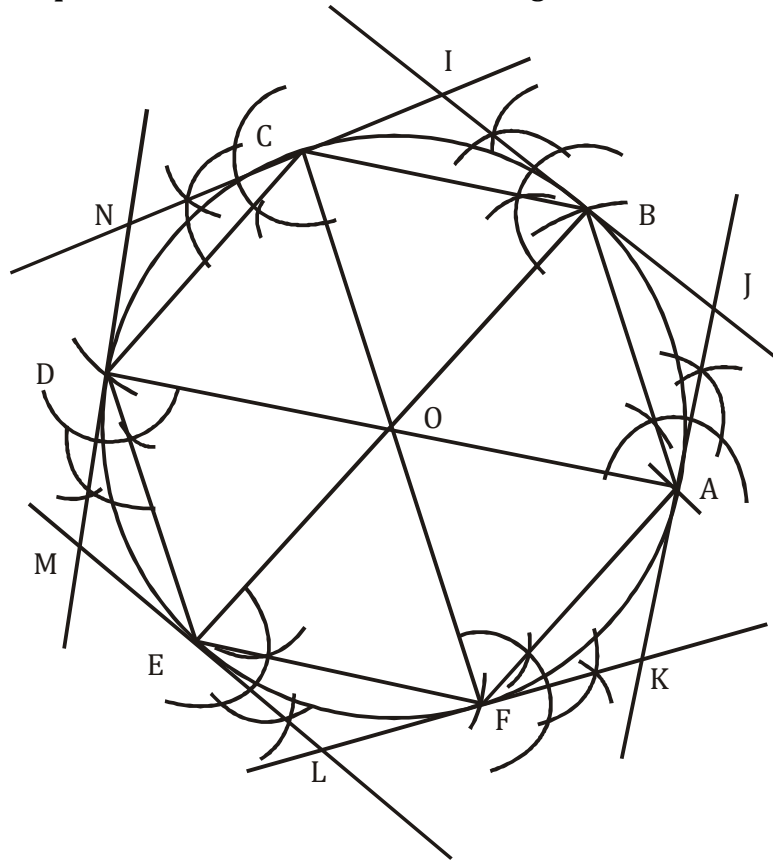
Procedure:

- i. I draw a circle of radius 4cm
- ii. Then take a point A on circumference
- iii. Then cut the circumference in equal successive point B, C, D, E, F
- iv. Then I draw $\overline{BC}$, $\overline{CD}$, $\overline{DE}$, $\overline{EF}$ and $\overline{AB}$
- v. ABCDEF is required inscribed hexagonal

Q7. Construct a circle of radius 4cm and draw a regular hexagon about the circle.

Given: Magnitude of radius of circle = $r = 4\text{cm}$

Required: Draw a circle and a hexagonal about the circle



Procedure:

- i. I take a circle of radius 4cm
- ii. I take a point on circumference and other points B, C, D, E, F
- iii. Then I draw perpendicular at the extreme point A, B, C, D, E, F of diameter $\overline{BE}$, $\overline{FC}$ and $\overline{AD}$

- iv. These line cut each other at point I, J, K, L, M, N
- v. I, J, K, L, M, N is the required circumscribed hexagonal

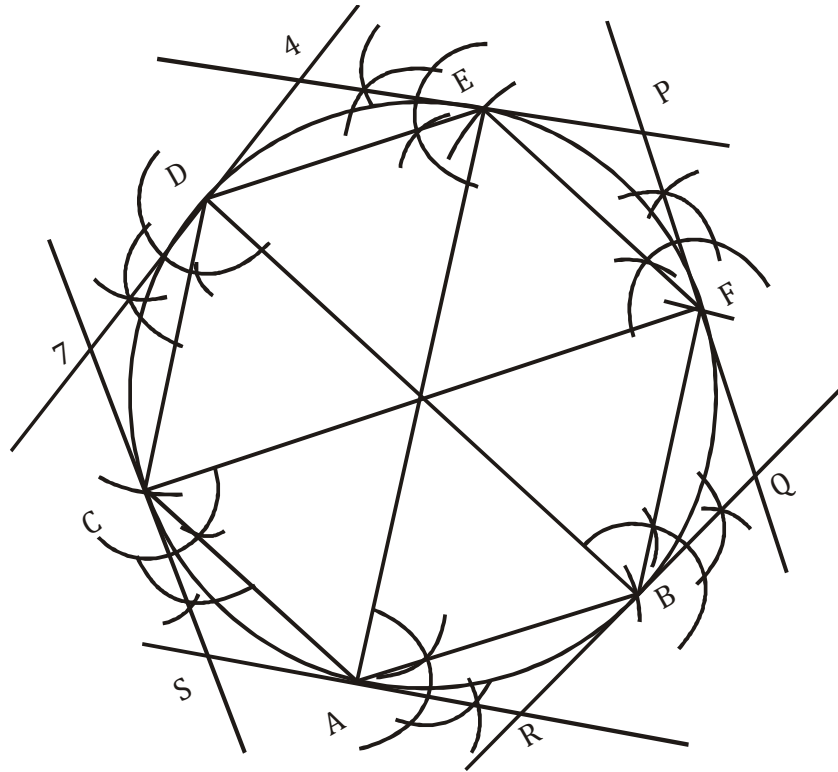
Q8. Draw a circle of radius 8cm. circumscribe a regular hexagon about that circle and also inscribe a regular hexagon in the same circle. Find the areas of these geometrical figures. Comment on the values of these ares.

Given: A circle of radius 8cm

Required: Circumscribed a regular hexagonal and inscribe and find the area?

Solution:

Let suppose $2\text{cm} = 1\text{cm}$ then



Procedure:

- i. I draw a circle of radius equal to 4cm
- ii. Then I take a point A on circumference
- iii. Then take 2 points B and C and through center draw diameter $\overline{AE}$, $\overline{BD}$ and $\overline{CF}$
- iv. Then I draw perpendicular on each extreme A, B, C, D and E which cut each other on point P, Q, R, S, T, U which is required hexagonal

- v. Then draw $\overline{FE}$, $\overline{ED}$, $\overline{DE}$, $\overline{CA}$ and $\overline{AB}$ which is second required hexagonal and

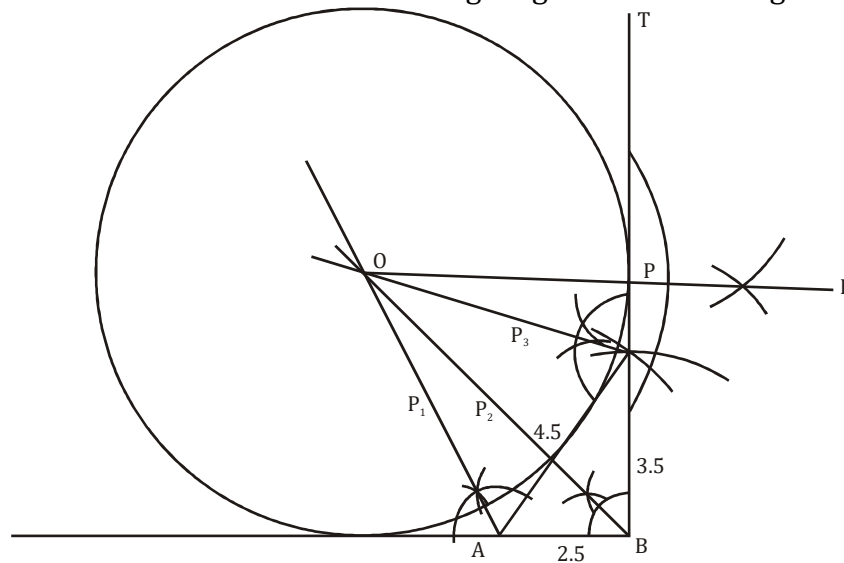
$$Area = \pi r^2 = \frac{22}{7} \times (4)^2 = 50.2 cm^2$$

Q9. Draw two regular hexagons of perimeters 6 cm and 30 cm respectively. Determine their centers. From their center draw perpendicular to any of their sides. What is the relation of these two perpendicular?

Given: $m\overline{AB} = 2.5cm$, $m\overline{BC} = 3.5cm$ and $m\overline{CA} = 4.5cm$

Required:

- Draw a triangle
- Draw an inscribed touching long side of the triangle?



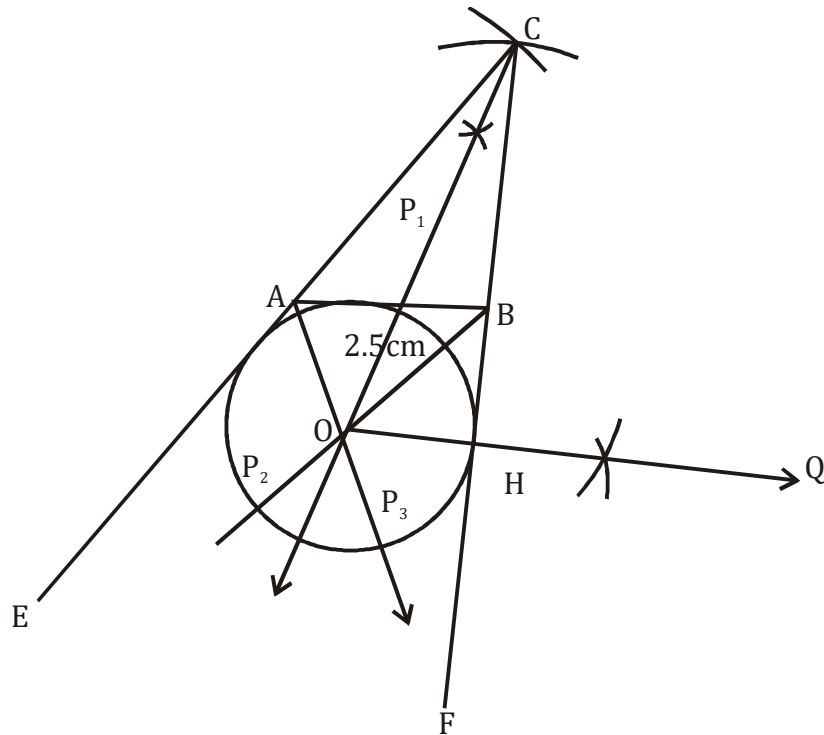
Procedure:

- i. First I draw a triangle of sides
 $m\overline{AB} = 2.5\text{cm}$, $m\overline{BC} = 3.5\text{cm}$ and $m\overline{CA} = 4.5\text{cm}$
- ii. Then I draw l_1 bisector of $\angle SAT$, l_2 of $\angle ABQ$ and l_3 of $\angle ACT$ which intersect each other on point O
- iii. Then I draw of $\perp \overline{BT}$ which cross $\overline{BT}$ on point P
- iv. Then I draw a circle of center O and of radius equal to $m\overline{OP}$
- v. This the required circle which touch side $\overline{AC}$ which is the longest side.

Q10. Can you construct a square whose area equals the areas of a given circle? Discuss in details.

Given: $m\overline{AB} = 2.5\text{cm}$, $m\overline{BC} = 3.5\text{cm}$ and $m\overline{CA} = 4.5\text{cm}$

Required: Draw a triangle and inscribed circle which touch the smallest side of the triangle?



Procedure:

- i. First I draw a triangle of sides $m\overline{AB} = 2.5\text{cm}$, $m\overline{BC} = 3.5\text{cm}$ and $m\overline{CA} = 4.5\text{cm}$
- ii. Then I draw l_1 bisector of $\angle FCE$ or $\angle ACB$, l_2 of $\angle ABH$ and l_3 of $\angle BAE$ which intersect each other on point O
- iii. Then I draw of $\overline{OQ} \perp \overline{FC}$ which cross FC on point H
- iv. Then I draw a circle of center O and of radius equal to $\overline{OQ}$ which is the required circle.

Exercise 13.3

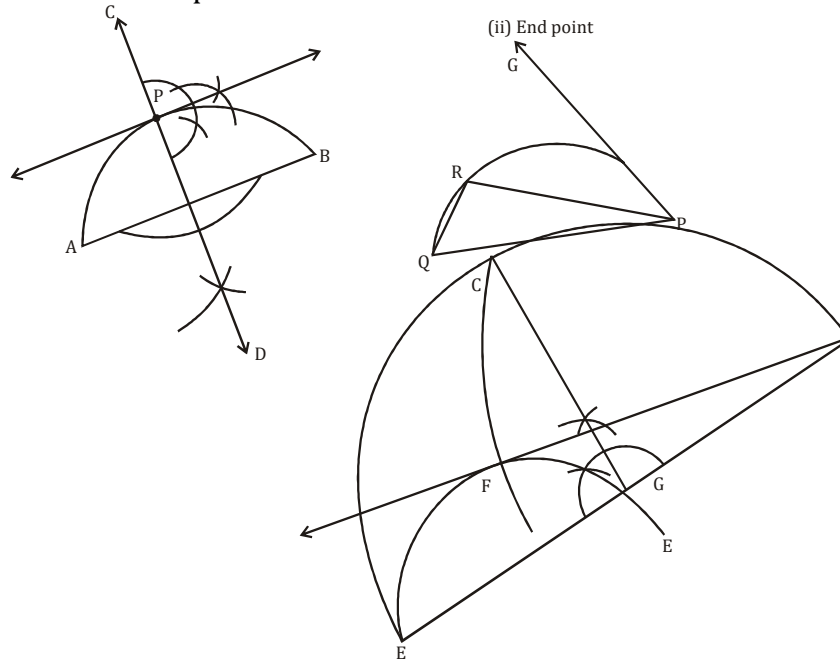
Q1. Draw an arc of length 7cm. Without using the centre draws a tangent through a given point A when A is

- i. The middle point of the arc.
- ii. End point of the arc.
- iii. Outside the arc.

Given: length of Arc=7cm

Required: Draw a tangent through a given point

i. When point at the middle



Procedure: for 1:

- i. I draw an arc of 7cm

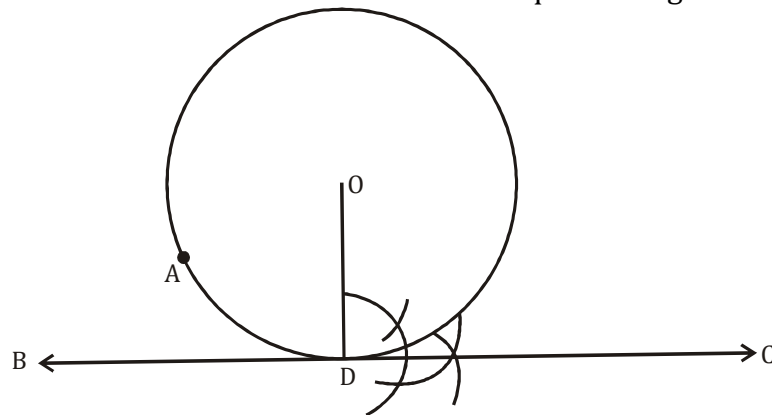
- ii. Then draw $\overline{AB}$
- iii. Then $\overline{CD} \perp \overline{AB}$ which cut arc on P.
- iv. Then $\perp$ on extream P which is required tangent.

For 2.

- i. I take a point R on QP and draw card QR and RP .
- ii. Then join Q and R.
- iii. Then construct $\angle RQP \cong \angle RPG$
- iv. PG is the required tangent

For 3.

- i. I join E and P. which cuts the arc G.
- ii. Then bisect EP at G.
- iii. G is centre and radius m $\overline{GP}$ I draw a semi circle .
- iv. G is centre and radius in $\overline{GP}$. I draw a semicircle.
- v. $\overline{GC} \perp \overline{ED}$ which cuts the simecircle at C.
- vi. I draw than an arc $\overline{CF}$.
- vii. Then I draw PF which is required tangent.



Q2. Draw a circle passing through a point A and touching a given line $\overline{BC}$ at point D.

Given: A line $\overleftrightarrow{BC}$

Required: Draw a circle which pass through a point A and touch line at point D.

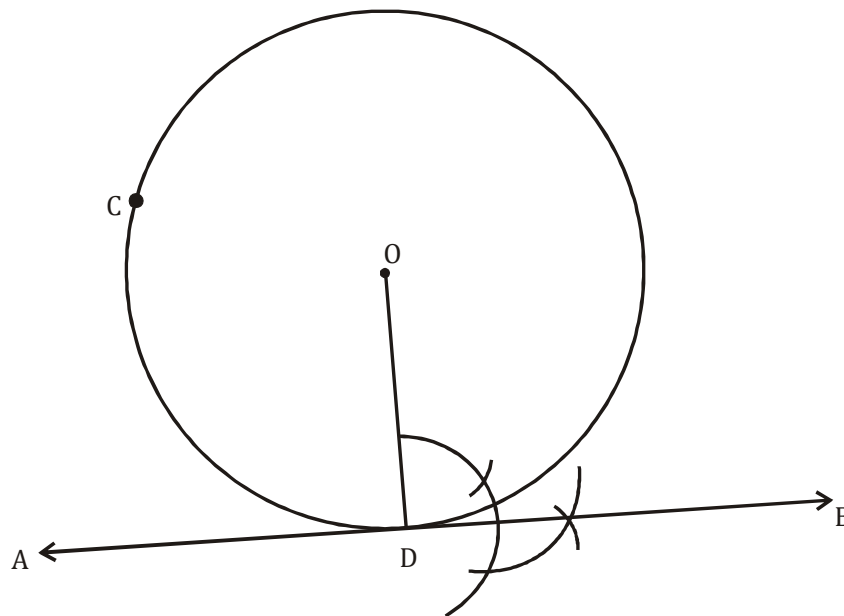
Procedure:

I draw a circle which passes through a point A. (ii) Then draw a line $\overleftrightarrow{BC}$ which perpendicular to $\overleftrightarrow{OD}$, (iii) This is the required circle.

Q3. Describe a circle of radius 4cm, passing through a given point C and touching a given straight line $\overleftrightarrow{AB}$

Given: Circle of radius 4cm

Required: The line circle which passing through a pint C and touch straight line $\overleftrightarrow{AB}$.



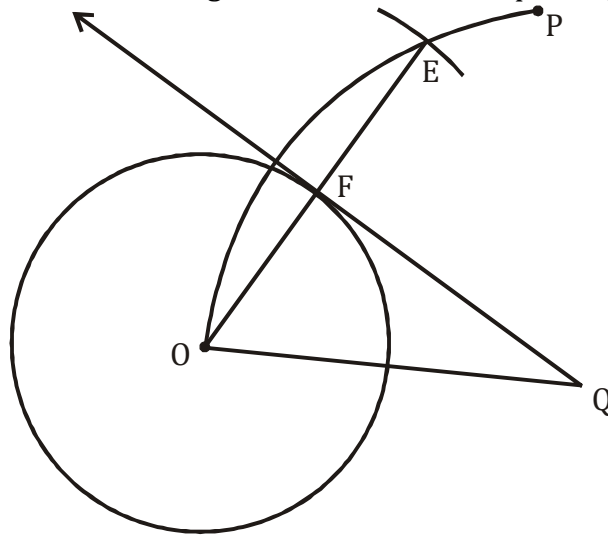
Procedure:

- i. I draw a circle of radius 4cm.
- ii. This circle pass through point C.
- iii. Then I draw a perpendicular $\overline{AB}$ to the radius $\overline{OD}$.

Q4. Radius of circle is 2.5 cm. A point Q is at a distance of 5cm from the center. Draw tangent to the circle from the point Q.

Given: Radius of circle equal to 2.5cm and point Q at 5cm from centre.

Required: Draw tangent to the circle from point Q.



Procedure:

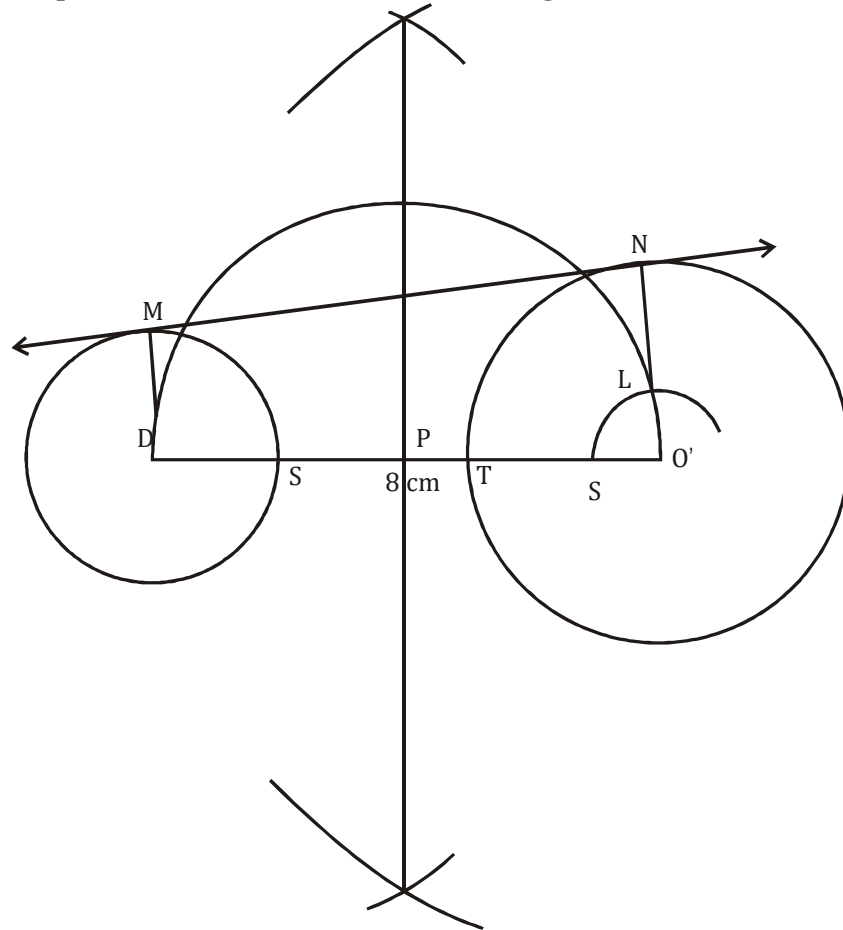
- i. I draw a circle of radius equal to 2.5cm.
- ii. Then I take a point at 5cm from center.
- iii. As Q is center $\overline{OQ}$ is radius I draw an arc OP.
- iv. As O is center and diameter is length I draw another arc at E.

- v. Then I draw a line OE which touch circle at point F.
- vi. Then I draw $\overline{QF}$ which is required tangent.

Q5. Radii of two circles are 2cm and 3cm and their center are 8cm apart. Draw direct common tangents to the circles.

Given: Radius of the circle is 2cm and 4cm, distance between 8cm.

Required: Draw direct common tangent.



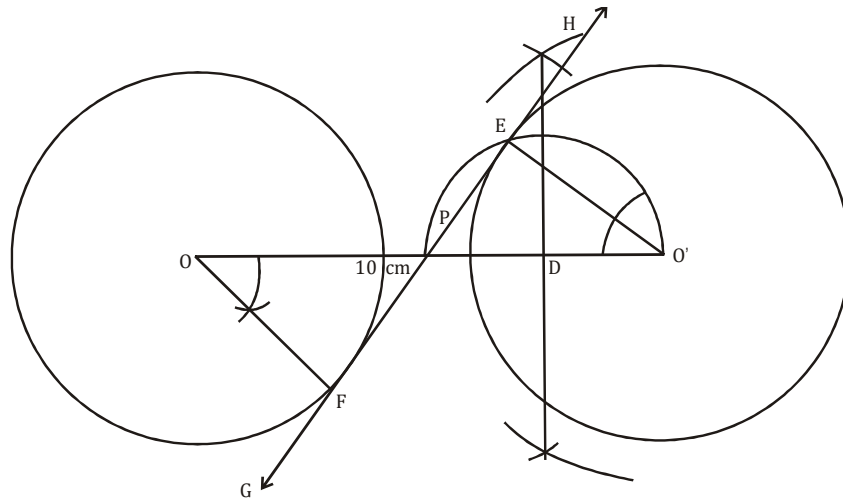
Procedure:

- i. I draw two circle of radii 2cm and 3cm.
- ii. Then I join O and O' which cuts the circle at T and S.
- iii. The bisect $\overline{OO'}$ on point P and then P center and $\overline{PO'}$ or $\overline{PO}$ radius draw a semi circle.
- iv. With center O' and m $\overline{SO'}$ I draw an arc which intersect semicircle at point L.
- v. Then draw ML' which cross the bigger circle and take $O'N$.
- vi. Then take $\overline{OM} \perp \overline{MO'}$.
- vii. Join MN which is the required tangent.

Q6. Two congruent circles are of radius 4cm each. Their centers are 10cm apart. Draw transverse common tangent of these circles.

Given: Congruent circles of radii 4cm $MOO' = 10\text{cm}$.

Required: Draw transverse tangent to the circle.



Procedure:

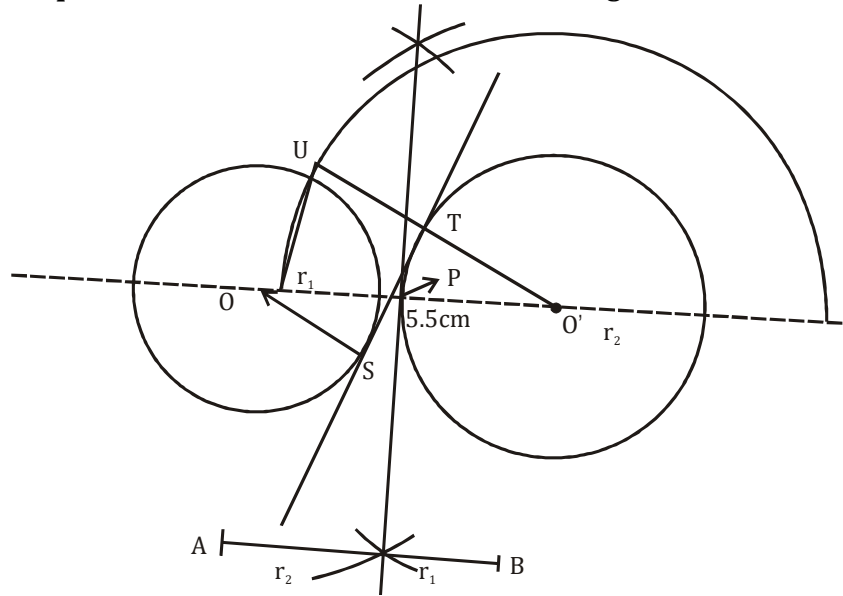
- i. First I draw two circles of radius equal to 4cm and their center for approximately 10cm from each other.
- ii. I bisect $\overline{OO'}$ at Q
- iii. Then bisect $\overline{PO'}$ at D.
- iv. Center D and radius DP draw a semi-circle which cuts first circle at point E.
- v. Then join $\overline{EO'}$.
- vi. Then draw $\overline{OF} \perp \overline{EO'}$ and join $\overline{FE}$.
- vii. When $\overline{FE}$ expands then $\overline{GH}$ is the required tangent.

Q7. Radius of two circles are 2cm and 2.5cm respectively. Distance between their centers is 5.5 cm. Draw transverse common tangents to the circles.

Given: Radius of two circles are 2cm and 2.5cm.

distance between them is 5.5cm.

Required: Draw transverse common tangent.



Procedure:

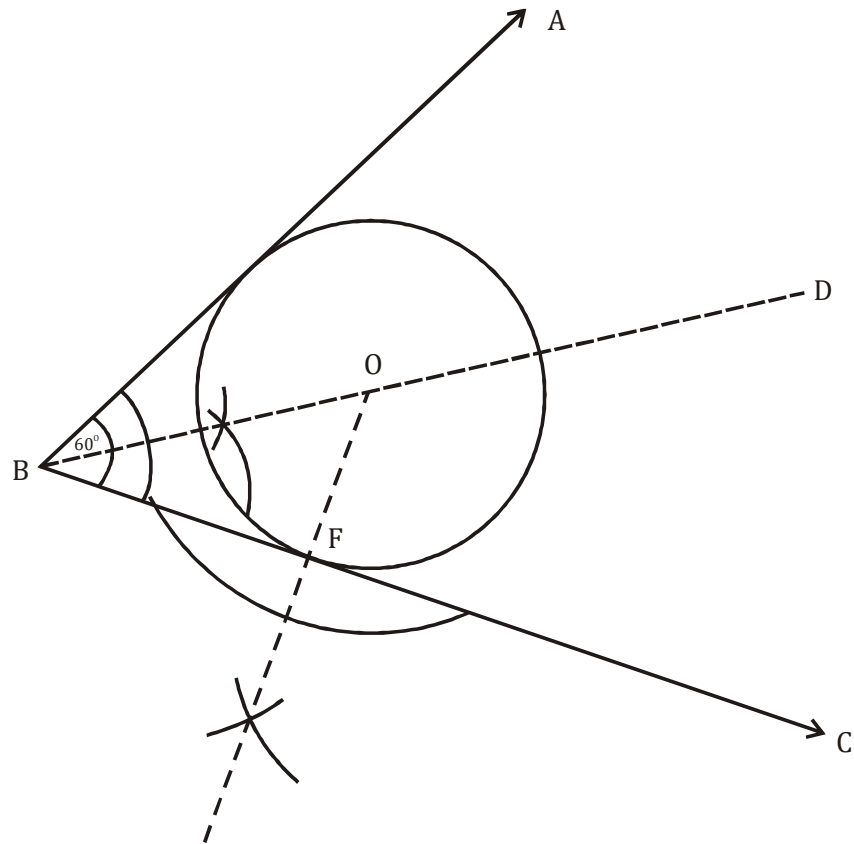
- i. I draw two circles of radius 2cm and 2.5cm and the distance between them is 5.5cm.
- ii. Then bisect $\overline{OO'}$ at point P.
- iii. Then produce the line $\overline{OO'}$ and take $m\overline{AB} = r_1 + r_2$.
- iv. Center O' and radius $m\overline{AB}$ I draw a semi-circle.
- v. Then take P and radius $m\overline{PO'}$ I draw an arc which cross semi-circle at point U.

- vi. Then join $\overline{UO'}$. (vii) Draw $\overline{OS} \perp \overline{UO'}$ (viii) Then join S with T and produce and that is the required transverse common tangent.

Q8. Draw $\angle ABC$ of measures of measure 60° . Construct a circle having radius 2.5cm and touching the arms of the angle.

Given: $\angle ABC = 60^\circ$

Required: Construct a circle having radius 2.5cm and touch the arms.



Procedure:

- i. First I draw $\angle DABC = 60^\circ$.
- ii. Then I bisect $\overline{BD}$ of $\triangle DABC$.
- iii. Then I take a point O on $\overline{BD}$.
- iv. I draw perpendicular OF on $\overline{BC}$.
- v. Then taking O as center and $\overline{OF}$ as radius and draw a circle. Which is the required circle.