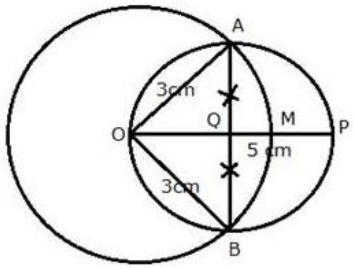
Book Name: Selina Concise

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:

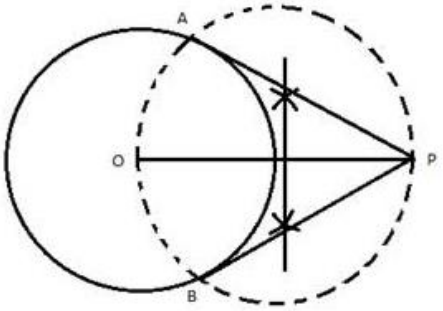
i) Draw a circle with centre O and radius 3 cm.
ii) From O, take a point P such that OP = 5 cm
iii) Draw a bisector of OP which intersects OP at M.
iv) With centre M, and radius OM, draw a circle which intersects the given circle at A and B.
v) Join AP and BP.

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:

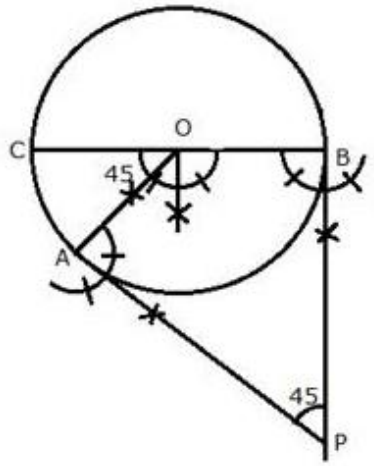


i. Draw a circle of diameter 9 cm, taking O as the centre.
ii. Mark a point P outside the circle, such that PO = 7.5 cm.
iii. Taking OP as the diameter, draw a circle such that it cuts the earlier circle at A and B.
iv. Join PA and PB.

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:

i) Draw a circle with centre O and radius BC = 5 cm

ii) Draw arcs making an angle of 180º - 45º = 135º at O such that ∠AOB = 135º

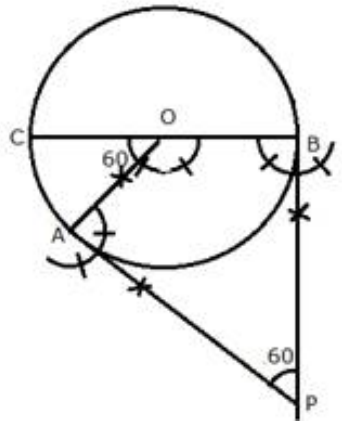
iii) AT A and B, draw two rays making an angle of 90º at each point which meet each other at point P, outside the circle.

iv) AP and BP are the required tangents which make an angle of 45º 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 180º - 60º = 120º at O such that ∠AOB = 120º

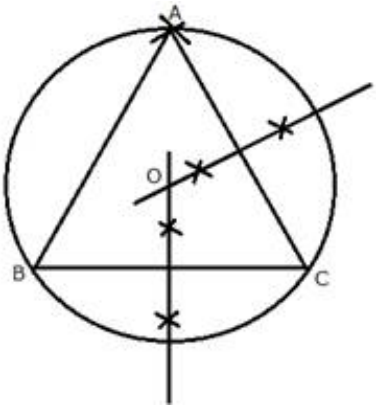
iii) AT A and B, draw two rays making an angle of 90º at each point which meet each other at point P, outside the circle.

iv) AP and BP are the required tangents which make an angle of 60º 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

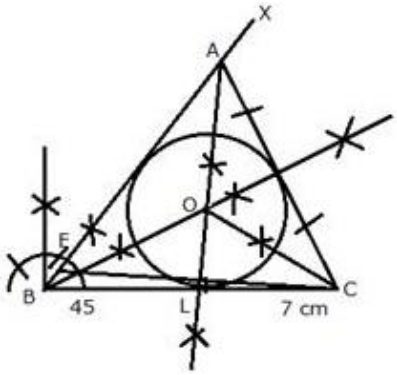
Question 6:

Using ruler and compasses only,

(i) Construct triangle ABC, having given BC = 7cm, AB – AC = 1cm and ∠ABC = 45°.

(ii) Inscribe a circle in the ΔABC constructed in (i) above. Measure its radius.

Solution 6:



Steps of Construction:

i) Construction of triangle:

a) Draw a line segment BC = 7 cm

b) At B, draw a ray BX making an angle of 45° and cut off BE = AB − AC = 1cm

c) Join EC and draw the perpendicular bisector of EC intersecting BX at A.

d) Join AC.

ΔABC is the required triangle.

ii) Construction of incircle:

e) Draw angle bisectors of ∠ ABC and ∠ ACB intersecting each other at O.

f) From O, draw perpendiculars OL to BC.

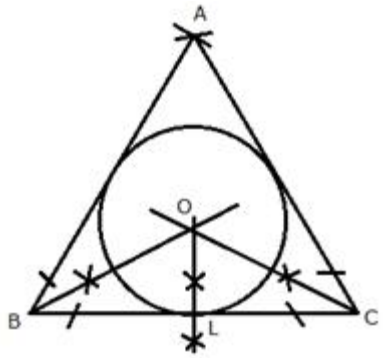
g) O as centre and OL as radius draw circle which touches the sides of the ΔABC. This is the required in-circle of ΔABC.

On measuring, radius OL = 1.8 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:

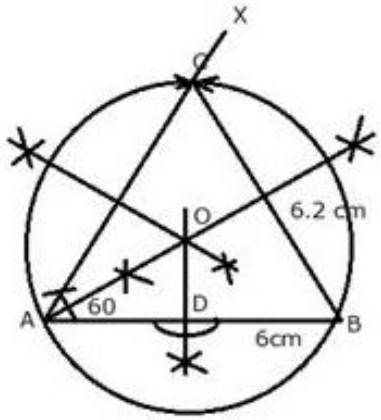
i) Draw a line segment BC = 5 cm
ii) With centers B and C, draw two arcs of 5 cm radius each which intersect each other at A.
iii) Join AB and AC.
iv) Draw angle bisectors of ∠B and ∠C intersecting each other at O.
v) From O, draw OL ⊥ BC.
vi) Now with centre O and radius OL, draw a circle which will touch the sides of ΔABC

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 ∠CAB = 60°
(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:

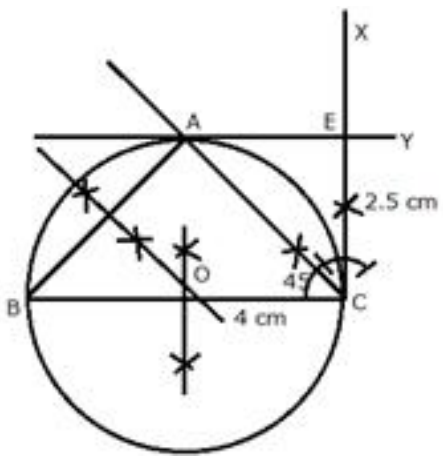
i) Draw a line segment AB = 6 cm
ii) At A, draw a ray making an angle of 60° with BC.
iii) With B as centre and radius = 6.2 cm draw an arc which intersects AX ray at C.
iv) Join BC.
ΔABC is the required triangle.
v) Draw the perpendicular bisectors of AB and AC intersecting each other at O.
vi) With 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 ⊥ AB.
Proof: In right ΔOAD and ΔOBD
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 = 4cm, ∠ACB = 45° 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 cm.
ii) At C, draw a perpendicular line CX and from it, cut off CE = 2.5 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) ΔABC 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 cm

Question 10:

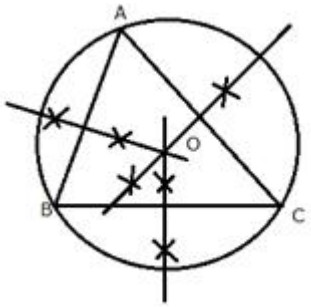
Perpendicular bisectors of the sides AB and AC of a triangle ABC meet at O.

(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 ΔABC.

ii) OA, OB and OC are the radii of the circumcircle.

iii) Yes, the perpendicular bisector of BC will pass through O.

Question 11:

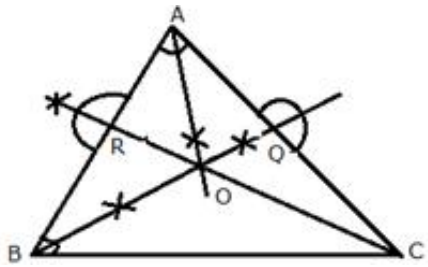
The bisectors of angles A and B of a scalene triangle ABC meet at O.

(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 ΔABC.

ii) OR and OQ are the radii of the incircle and OR = OQ.

iii) OC is the bisector of angle C

$\therefore \angle ACO = \angle BCO$

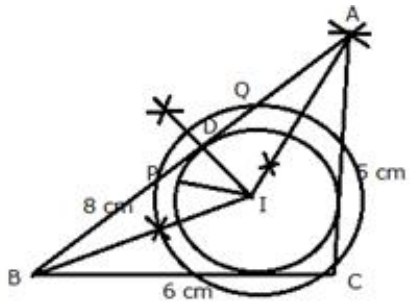
Question 12:

(i) Using ruler and compasses only, construct a triangle ABC in which AB = 8 cm, BC = 6 cm and CA = 5cm.

(ii) Find its in centre 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:

i) Draw a line segment BC = 6 cm.

ii) With centre B and radius 8 cm draw an arc.

iii) With centre C and radius 5 cm draw another arc which intersects the first arc at A.

iv) Join AB and AC.
ΔABC is the required triangle.

v) Draw the angle bisectors of $\angle B$ and $\angle A$ intersecting each other at I. Then I is the incentre of the triangle ABC

vi) Through I, draw $ID \perp AB$

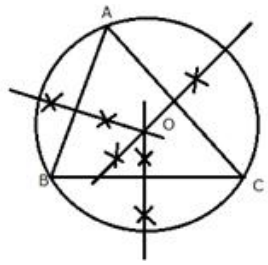
vii) Now from D, cut off $DP = DQ = \frac{2}{2} = 1$ cm

viii) 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:

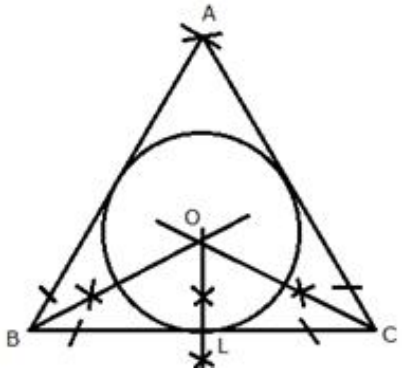
i) Draw a line segment BC = 6 cm
ii) With centers B and C, draw two arcs of radius 6 cm which intersect each other at A.
iii) Join AC and AB.
iv) Draw perpendicular bisectors of AC, AB and BC intersecting each other at O.
v) With centre O, and radius OA or OB or OC draw a circle which will pass through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

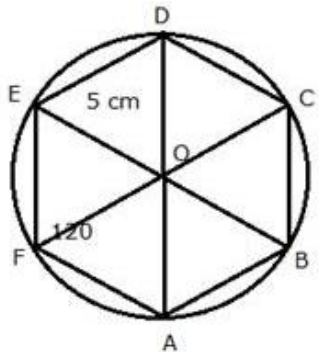
i) Draw a line segment BC = 5.6 cm
ii) With centers B and C, draw two arcs of 5.6 cm radius each which intersect each other at A.
iii) Join AB and AC.
iv) Draw angle bisectors of ∠B and ∠C intersecting each other at O.
v) From O, draw $OL \perp BC$.
vi) Now with centre O and radius OL, draw a circle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

This is the required circle.

Question 15:

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

Solution 15:



Steps of Construction:

i) Draw a regular hexagon ABCDEF with each side equal to 5 cm and each interior angle 120º.

ii) Join its diagonals AD, BE and CF intersecting each other at O.

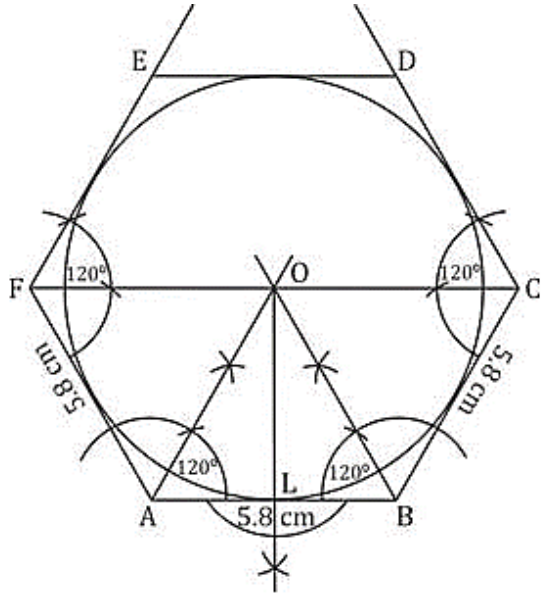
iii) With centre as O and radius OA, draw a circle which will pass through the vertices A, B, C, D, E and F.

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 ∠A and ∠B intersecting each other at O.

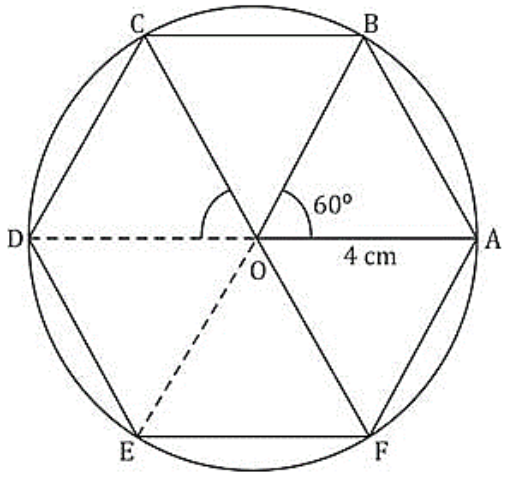
vi) From O, draw $OL \perp AB$

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 $\angle AOB = 60^\circ$.

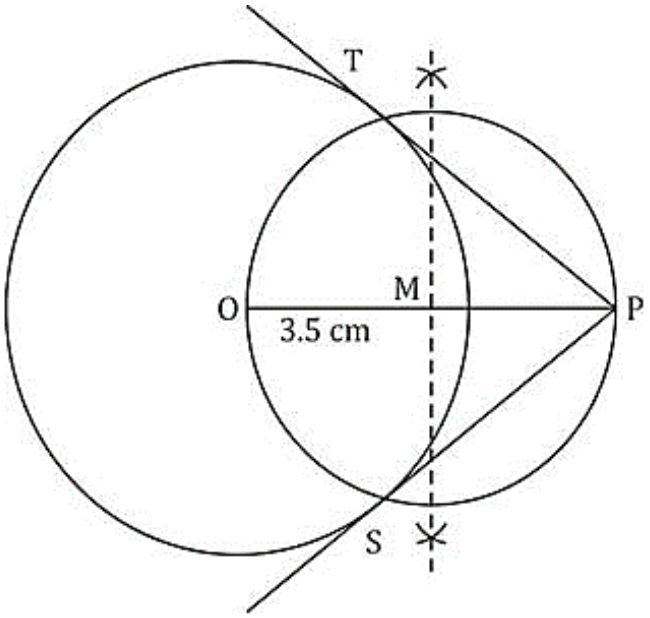
(iii) Cut off arcs BC, CD, EF and each equal to arc AB on given circle

(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.

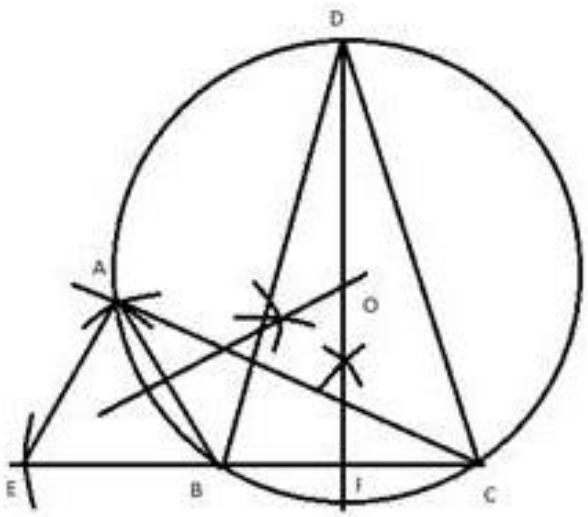
PT and PS are the required tangents. On measuring the length of PT = PS = 4.8 cm

Question 19:

Construct a triangle ABC in which base BC = 5.5 cm, AB = 6cm and ∠ABC = 120°.
(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∠ABC = 120°.
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.