Constructions
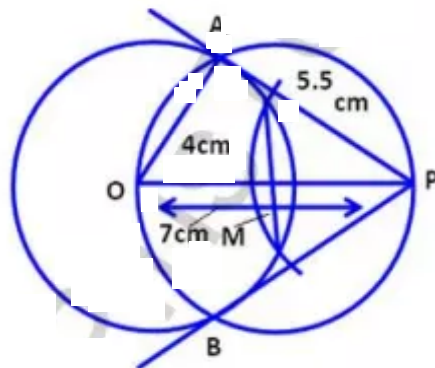
EXERCISE- 16.1

Q1. Use a ruler and compass only in this question.
(i) Draw a Circle, Centre O and radius 4cm.
(ii) Mark a point P Such that OP = 7cm
Construct two tangents to the Circle from P.
Measure and record the length of one of the
tangents.

Sd.

steps of construction:

(i) Draw a Circle with O and radius 4cm.
(ii) take a point P Such that OP = 7cm.
(iii) Bisect OB at M.
(iv) With Centre M and diameter OP, draw
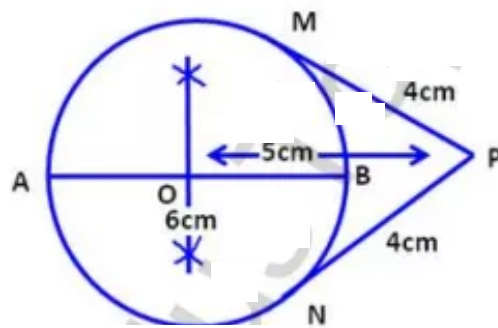another Circle intersecting the given Circle
at A and B.

(v) join PA and PB.

PA and PB is a pair of tangents to the circle
on measuring PA, it is equal to 5.8cm.

Q2. Draw a Line AB = 6cm. Construct a circle with
AB as diameter. Mark a point p at a distance
of 5cm from the mid point of AB.
construct two tangents from p to the circle
with AB as diameter. Measure the length of
each tangent.

Sd.

Steps of Construction:

(i) Draw a Line Segment AB = 6cm

(ii) Draw a perpendicular bisector on AB which
cut AB at O. which is the Centre of the
Circle.

(iii) Take O as Centre and draw a circle
with radius $\frac{6}{2} = 3cm$.

(iv) From the point O, Take a point P at a distance of
5cm.

(v) Draw two tangents from which cut the circle
at M and N.

(vi) Measure PM = PN = 4cm.

Q3. Draw an equilateral triangle of side 4cm. Draw its circumcircle.

Sol.
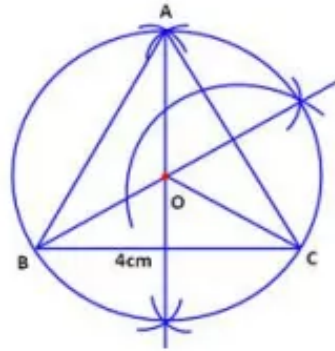
steps of construction :

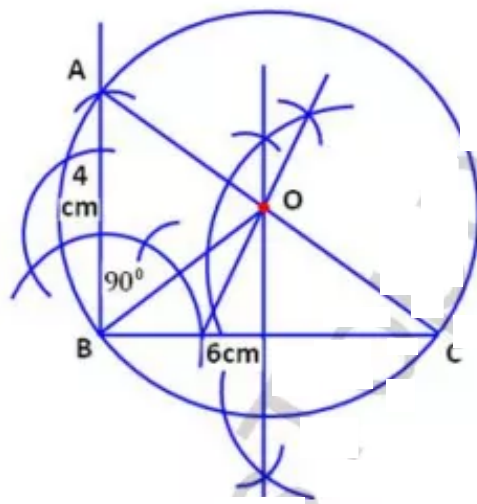(i) Draw a Line Segment BC = 4cm.

(ii) with centers B and C, draw two arcs of radius 4cm which intersect each other at A.

(iii) Join AB and AC. △ABC is equilateral triangle.

(iv) Draw the right bisector of BC and AC intersecting each other at O.

(v) Join OA, OB and OC.

(vi) with Centre O, and radius equal to OB or OC or OA draw a circle which will pass through A, B and C.

This is the required circumcircle of △ABC.

Q4. Using a ruler and pair of compasses only, construct :

   (i) An $\triangle ABC$, given $AB = 4cm$, $BC = 6cm$ and $\angle ABC = 90°$.

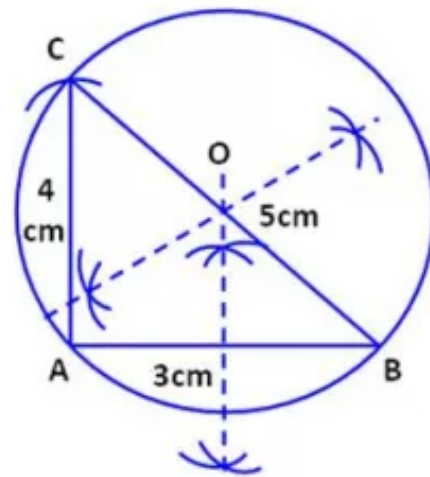   (ii) A circle which passes through the points A, B and C and mark its centre as O.

sol.

steps of construction :

(i) Draw a Line Segment $BC = 6cm$.

(ii) At B draw an angle of $90°$ and cut off $BA = 4cm$.

(iii) Join AC.

(iv) Draw the right bisectors of sides BC and AC intersecting each other at O.

(V) Join OB.

(vi) With centre O and and radius OA or OC, draw a circle which will pass through A, B and C.

This is the required circumcircle whose radius is equal to $3.6cm$.

Q5. Construct a triangle with Sides 3cm, 4cm and 5cm. Draw its circumcircle and measure its radius.

Sol.
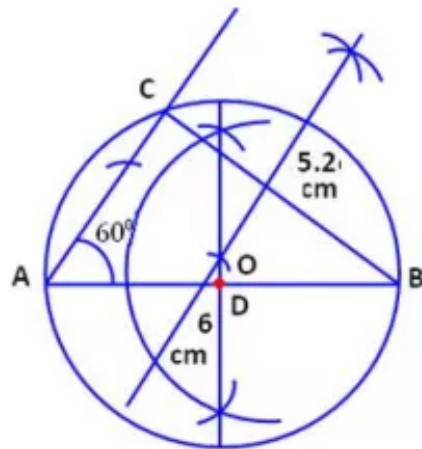

Steps of Construction :

(i) Draw $\triangle ABC$ with the given data.

(ii) Draw perpendicular bisector of AB and BC.

(iii) with O as Centre and radius $OA = OB = OC$, draw a circle. The Circle drawn passes through the points A, B and C and it is the required circumcircle of $\triangle ABC$.

(iv) Measure its radius $OA = OB = OC = 2.5$ cm.

Q6. Using ruler and Compasses only :

(i) Construct a triangle ABC with the data :
  $AB = 6$ cm, $BC = 5.2$ cm and $\angle CAB = 60°$.

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

Sol.

steps of Construction :

(i) Draw on Line Segment AB = 6cm.

(ii) At A, draw a ray making an angle of 60°

(iii) with Centre B and radius 5·2cm. Draw an arc which intersecting each other say @ C.

(iv) Join BC.

(v) Draw the perpendicular bisector of AB and BC intersecting each other at O.

(vi) Draw OD ⊥ AB which meets AB at D.

∴ O lies on the perpendicular bisector of AB.

∴ AD = DB.

Q7. Using ruler and compasses only, draw an equilateral triangle of Side 5cm and draw its inscribed circle. Measure the radius of the circle.
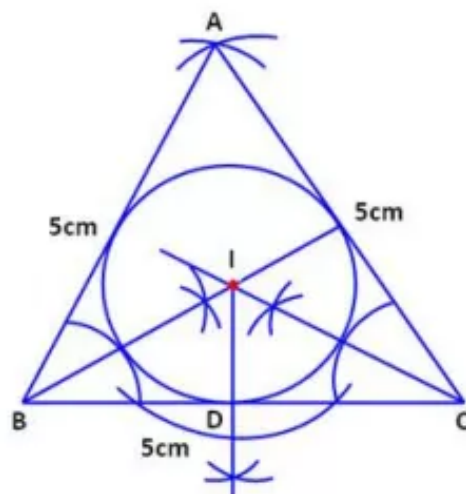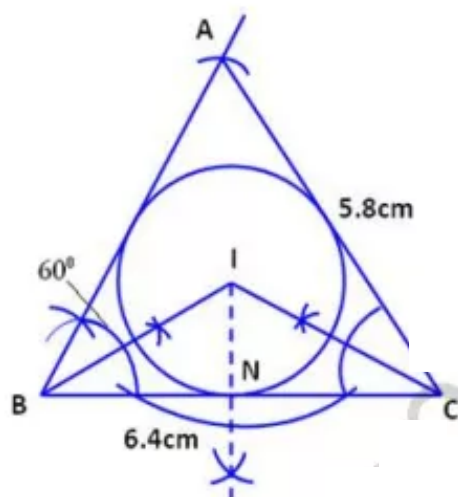
steps of Construction :

(i) Draw a Line Segment BC = 5cm.

(ii) With Centre B and C and radius 5cm, draw two arcs intersecting each other at A.

(iii) Join AB and AC.

(iv) Draw the angle bisectors of ∠B and ∠C intersecting each other at I.

(v) From I, draw a perpendicular ID on BC.

(vi) With Centre I and radius ID, draw a Circle which touches the Sides of the triangle internally.

on measuring radius of Circle = 0.3cm.

Q8. Construct a triangle ABC with BC = 6.4cm, CA = 5.8cm and ∠ABC = 60°. Draw its incircle. Measure and record the radius of incircle.

sol.

steps of Construction:

(i) Construct △ABC with given data.

(ii) Draw the (internal) bisectors of ∠B and ∠C. let these bisectors meet at the point I.

(iii) From I draw IN perpendicular to the side BC.

(iv) With I as centre and radius equal to IN draw a circle. so drawn touches all the sides of the OABC is incircle of △ABC.
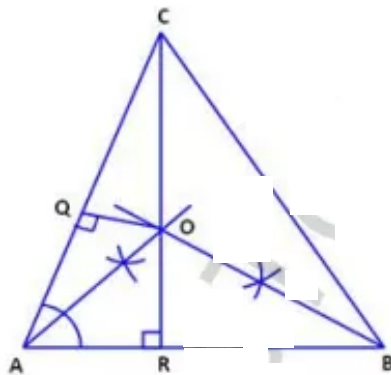
on measuring radius of circle = 1.6cm.

Q9. 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 $\angle BCO$?

Sol.

(i) The point O where the angle bisectors of meet is called the incentre of the ~~Circle~~ triangle.
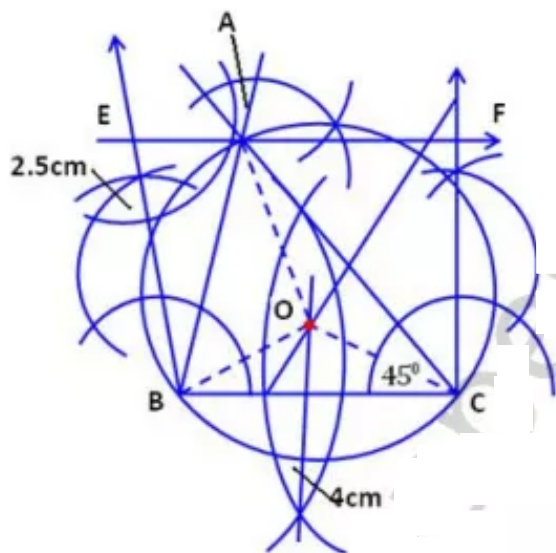
(ii) The perpendiculars drawn from O to AB and CA are equal i.e, OR and OQ

(iii) $\angle ACO = \angle BCO$

$\therefore$ OC will bisect the $\angle C$

Q.10. Using ruler and compasses only, construct a triangle ABC in which BC = 4cm, $\angle$ACB = 45° and the perpendicular from A on BC is 2.5cm. Draw the circumcircle of triangle ABC and measure its radius.

Sol.

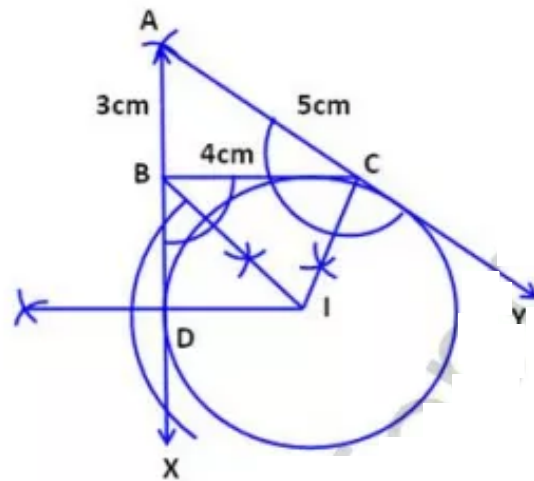steps of Construction :

(i) Draw a Line Segment BC = 4cm.

(ii) At B, draw a perpendicular and cut BE = 2.5cm

(iii) From E, draw a Line EF parallel to BC.

(iv) from C, draw a ray making an angle of 45° which intersects EF at A.

(v) Join AB.

(vi) Draw the perpendicular bisectors of sides BC and AC intersecting each other at O.

(vii) Join OB, OC and OA.

(viii) With Centre O and radius OB or OC or OA draw a Circle which will pass through A, B and C. The circle is Circumcircle of $\triangle$ABC. on measuring its radius OB = 2cm.

Q11. Using ruler and compasses only:

(i) Construct a △ABC from the data AB = 3cm. AC = 5cm and BC = 4cm.

(ii) Draw the inscribed circle to the triangle ABC drawn in part (i) so that the circle touches the side BC. Measure the radius of the circle.

sol.

steps of construction:

(i) Draw a line segment BC = 4cm.

(ii) from B, drawn an arc with radius of 3cm and from C, radius of 5cm which intersect each other at A.

(iii) Join AB and AC.

(iv) produce AB and AC to x and y respectively.

(v) Draw the angle bisectors of Exterior ∠B and ∠C intersecting each other at I.

(vi) from I, draw a perpendicular ID to BX.

(vii) with centre I and radius ID, draw a circle which will touch B.C and AB, AC on producing. length of ID = 6.5cm.

Q12. Construct a $\triangle ABC$, given that $AB = 4.5\,cm$, $BC = 7\,cm$ and median $AD = 4\,cm$. Construct inscribed circle of $\triangle ABC$ and measure its radius.

sol.
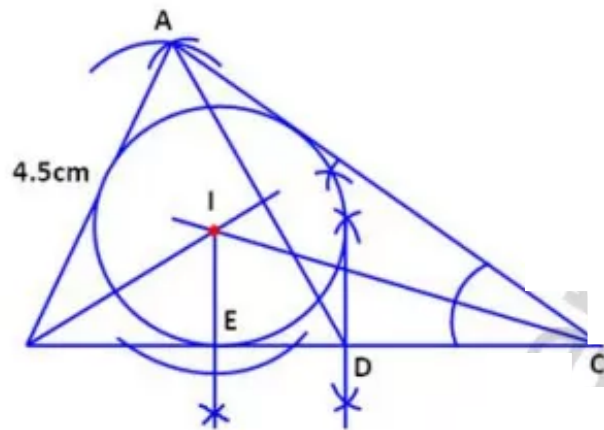
Steps of Construction:

(i) Draw a Line Segment $BC = 7\,cm$ and bisect it at D.

(ii) With Centre B and radius $4.5\,cm$ draw an arc.

(iii) With centre D and radius $4\,cm$ draw another arc which intersects the first arc at A.

(iv) Join AB, AD and AC.

(v) Draw the angle bisector of $\angle B$ and $\angle C$ intersecting each other at I.

(vi) From I, draw a perpendicular IE at BC.

(vii) With Centre I and radius IE, draw a Circle which will touch the Sides of the triangle ABC. This is the required incircle of $\triangle ABC$ and on measuring its radius. $IE = 1.6\,cm$.

**Q13.** Draw a regular hexagon of side 3.5cm. Construct its circumcircle. measure and record its radius.

Sol.
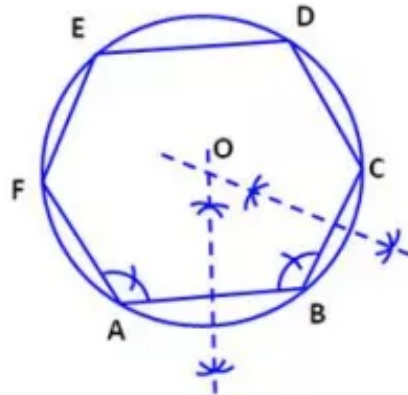
Steps of Construction :

(i) Draw a hexagon with Side AB = 3.5cm.

(ii) Draw a perpendicular bisector of two sides AB and BC which cut at O which is the Centre of the Circum Circle.

(iii) Now the O as Centre and OA = OB as radius draw a Circle which cut the hexagon at points A, B, C, D, E, F and it is the required hexagon.

(iv) Measure the radius OA = OB = OC = OD = OE = OF = 3.5cm.

Q14. Draw a regular hexagon of side 4cm and construct its incircle.

sol.
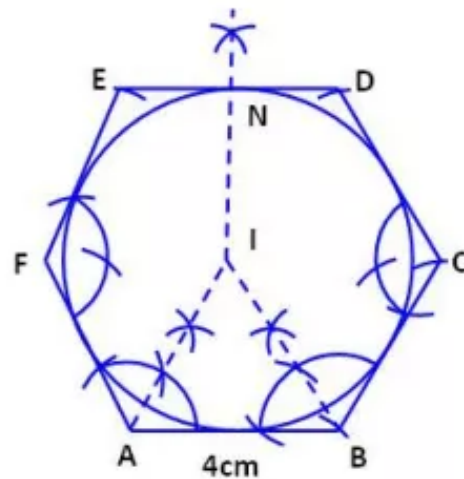
steps of Construction:

(i) Construct a regular hexagon ABCDEF with side 4cm.

(ii) Draw bisectors of $\angle A$ & $\angle B$ let these bisectors meet at the point I.

(iii) From I draw IN perpendicular to ED.

(iv) with I as Centre and radius equal to IN draw a Circle. This Circle touches all the sides of the hexagon ABCDEF and is the required Circle in the regular hexagon.