Constructions

I. Construction of tangent using the centre of the circle:

Example :

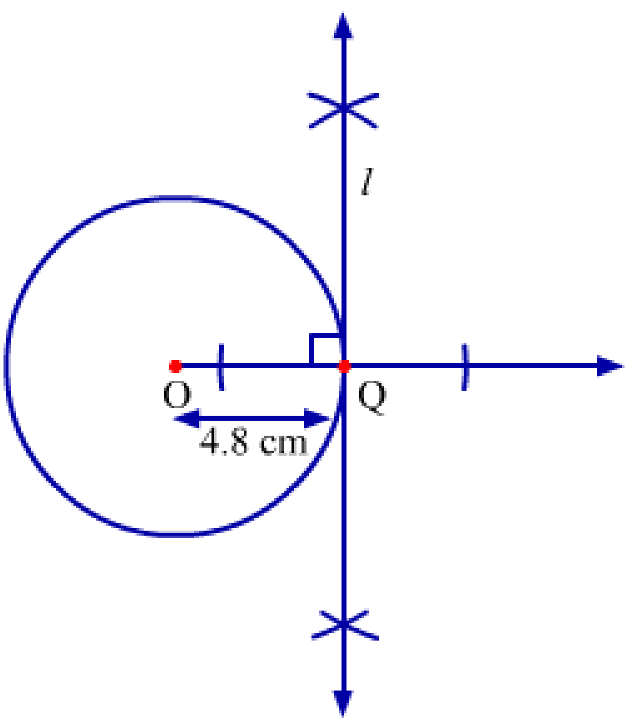
Draw a tangent to a circle of radius 4.8 cm by using the centre of the circle.

Solution:

Step 1: Draw a circle with centre O having radius 4.8 cm.

Step 2: Take a point Q on the circle and draw a ray OQ.

Step 3: Draw a line *l* perpendicular to OQ at point Q.



Line *l* is the required tangent.

II. Construction of tangent without using the centre of the circle:

Example:

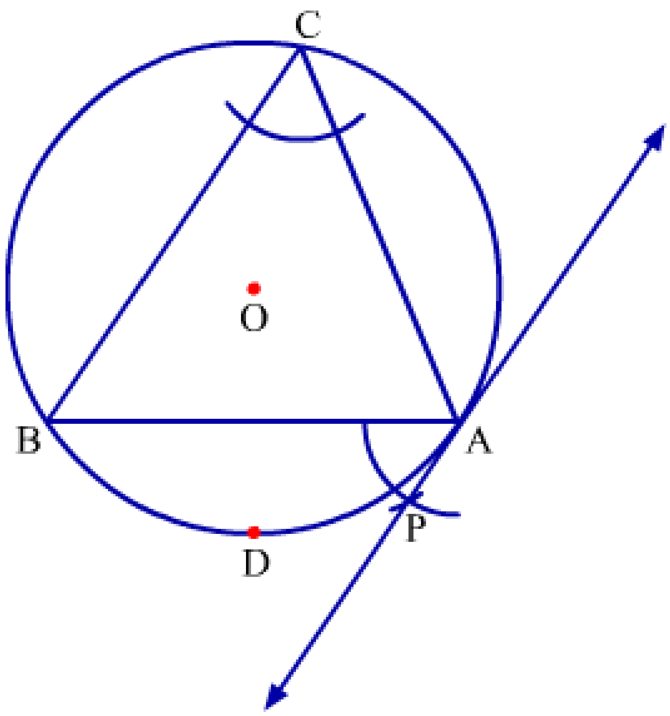
Draw a circle of radius 6.2 cm and take a point A on it. Draw a tangent through point A without using the centre.

Solution:

Step 1: Draw the circle of radius 6.2 cm, take point A anywhere on it and draw a chord AB of any length.

Step 2: Take a point C anywhere on the alternate arc of ADB and join C to A and B.

Step 3: Draw a ray AP such that ∠BAP = ∠BCA.



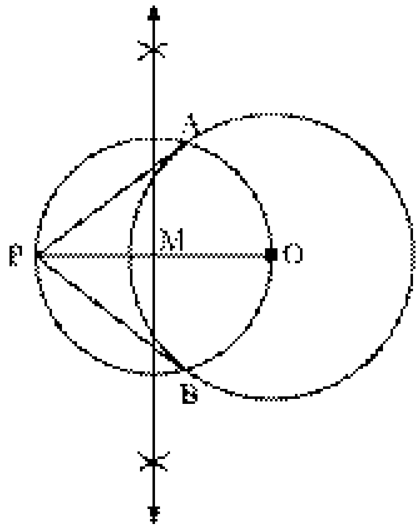
Line containing ray AP is the required tangent.

- **Construction of tangents to a circle**

Example:

Draw a circle of radius 3 cm. From a point 5 cm away from its centre, construct a pair of tangents to the circle and measure their lengths.

Solution:



Steps of construction:

1. Draw a circle with centre O and radius 3 cm. Take a point P such that OP = 5 cm, and then join OP.
2. Draw the perpendicular bisector of OP. Let M be the mid point of OP.
3. With M as the centre and OM as the radius, draw a circle. Let it intersect the previously drawn circle at A and B.
4. Joint PA and PB. Therefore, PA and PB are the required tangents. It can be observed that PA = PB = 4 cm.

- **Construction of circumcircle of given triangle:**

Example:

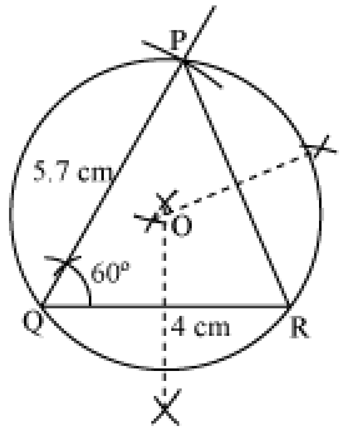
Construct the circumcircle of ΔPQR such that $\angle Q = 60°$, QR = 4 cm, and QP = 5.7 cm.

Solution:

Step 1: Draw a triangle PQR with $\angle Q = 60°$, QR = 4 cm, and QP = 5.7 cm

Step 2: Draw perpendicular bisector of any two sides, say QR and PR. Let these perpendicular bisectors meet at point O.

Step 3: With O as centre and radius equal to OP, draw a circle.



The circle so drawn passes through the points P, Q, and R, and is the required circumcircle of ΔPQR.

- **Construction of incircle of given triangle:**

  Example:

  Construct incircle of a right ΔPQR, right angled at Q, such that QR = 4 cm and PR = 6 cm.

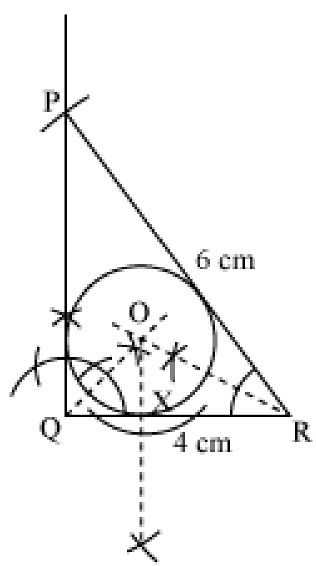
  Solution:

  Step 1: Draw a ΔPQR right-angled at Q with QR = 4 cm and PR = 6 cm.

  Step 2: Draw bisectors of ∠Q and ∠R. Let these bisectors meet at the point O.

  Step 3: From O, draw OX perpendicular to the side QR.

  Step 4: With O as centre and radius equal to OX, draw a circle.



The circle so drawn touches all the sides of ΔPQR and is the required incircle of ΔPQR.

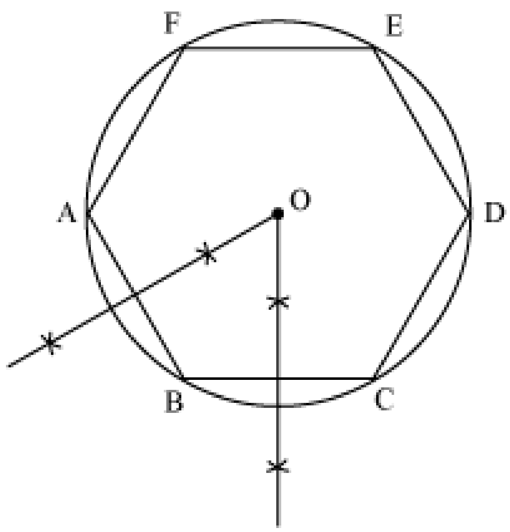
- **Construction of circumcircle of a regular hexagon:**

  Following are the steps of construction of circumcircle of a regular hexagon ABCDEF.

  Step 1: Construct a regular hexagon of side *x* unit.

  Step 2: Draw perpendicular bisectors of sides AB and BC. Let them intersect at a point O.

  Step 3: With O as centre and radius equal to OA, draw a circle.



  This circle touches all the vertices A, B, C, D, E, and F of the regular hexagon ABCDEF. Hence, it is the required circumcircle of the regular hexagon.

- **Construction of incircle of a regular hexagon:**

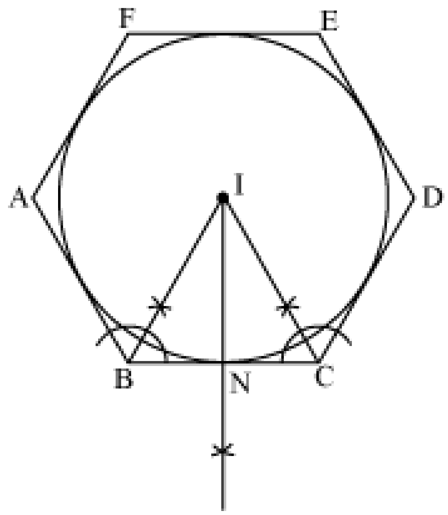
  Following are the steps of construction of incircle of a regular hexagon ABCDEF.

  Step 1: Construct a regular hexagon of side *x* unit.

  Step 1: Draw the bisectors of ∠B and ∠C. Let them meet at point I.

  Step 2: From I, draw IN perpendicular to BC.

  Step 3: Taking I as centre and radius equal to IN, draw a circle.



This circle touches each side of regular hexagon ABCDEF. Hence, it is the required incircle.