

WANDOOR GANITHAM – S.S.L.C STUDY MATERIAL 2021

CONSTRUCTIONS

CONSTRUCTIONS - CIRCLES

1. Construction of a right angled triangle with given hypotenuse.

Learning objective :

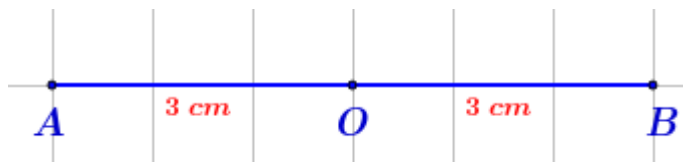
If we join the ends of a diameter of a circle to a point on the circle, we get a right angle.

ie,

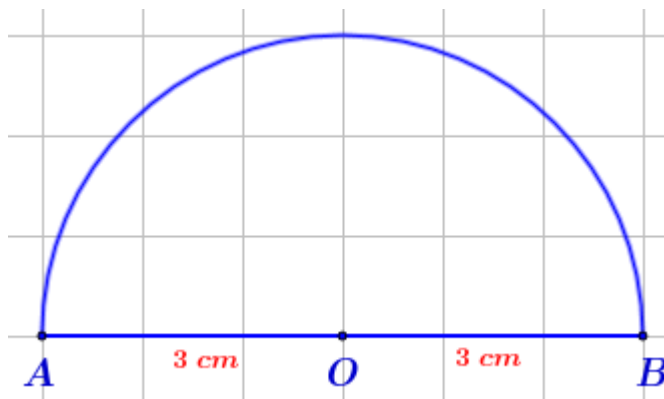
Angle in a semicircle is right.

- Draw a right angled triangle of hypotenuse 6 cm ?

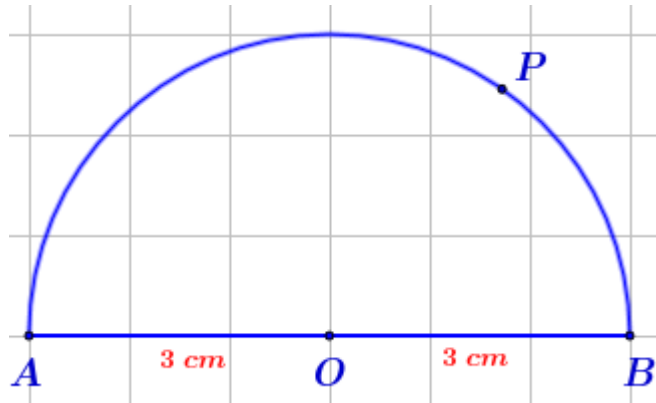
Step 1 : Draw a line (AB) of length 6 cm .Find the midpoint (O) of AB.



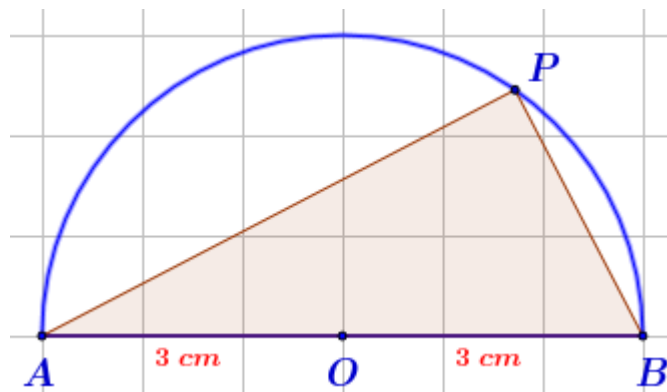
Step 2 : Draw a semicircle with O as centre and AB as diameter.



Step 3 : Mark a point (P) on the semicircle.

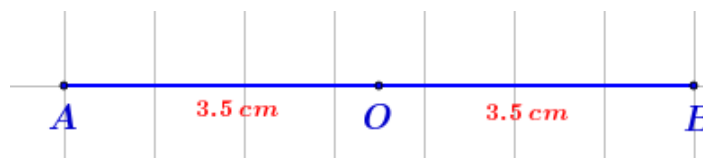


Step 4 : Draw the lines AP and BP .

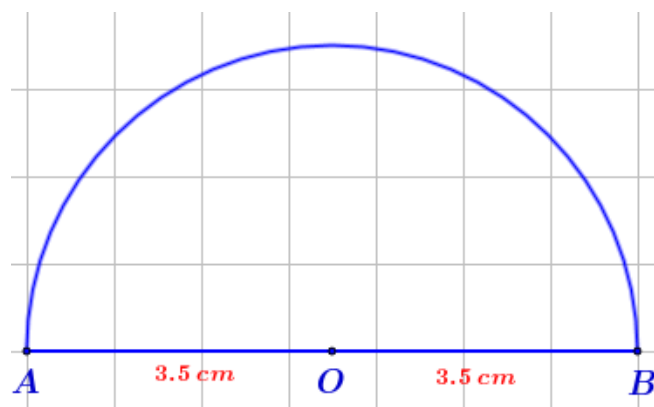


● Draw an isosceles right angled triangle of hypotenuse 7 cm ?

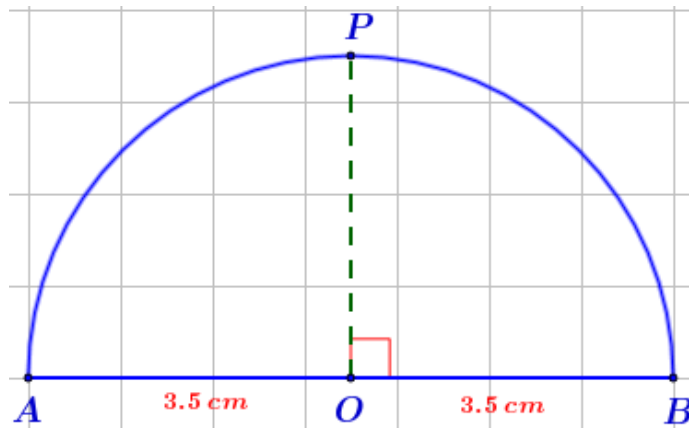
Step 1 : Draw a line (AB) of length 7 cm .Find the midpoint (O) of AB.



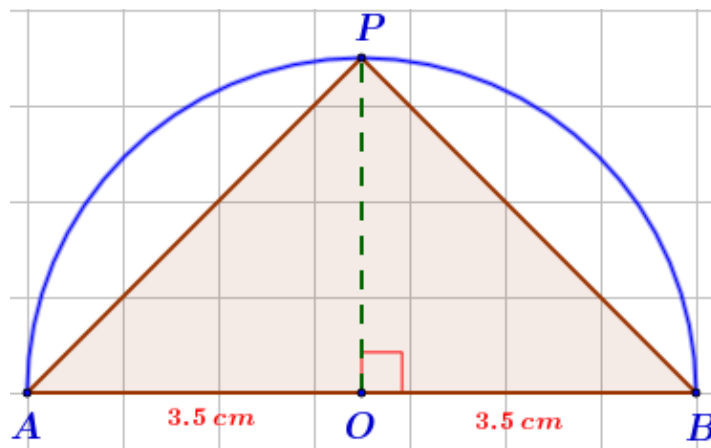
Step 2 : Draw a semicircle with O as centre and AB as diameter.



Step 3 : The perpendicular drawn through O to the line AB meets the semicircle at P .



Step 4 : Draw the lines AP and BP .



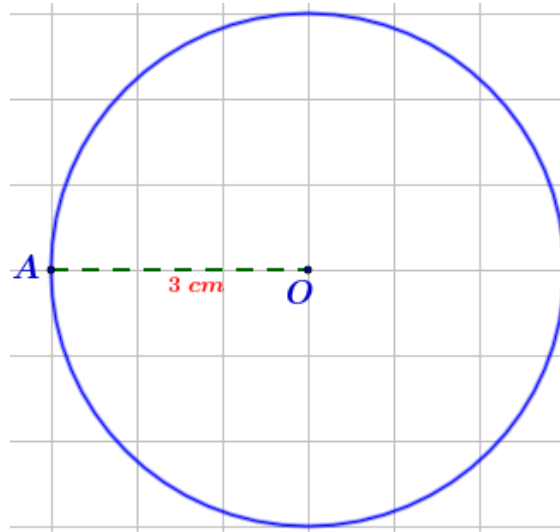
2. Construction of a triangle with given angles and circumradius .

Learning objective :

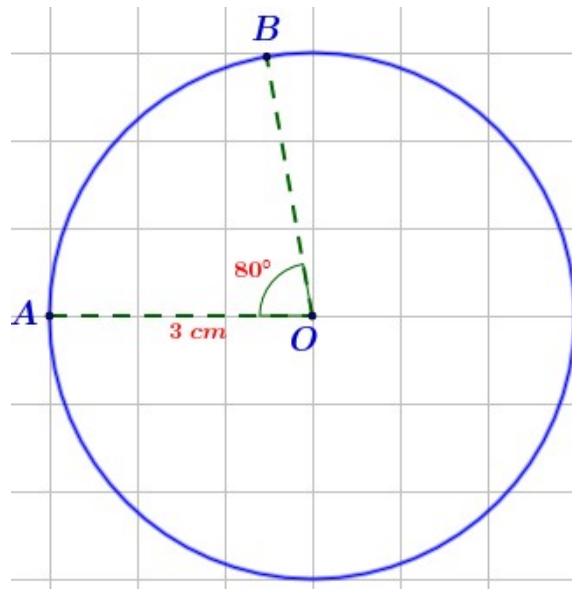
The angle made by any arc of a circle on the alternate arc is half the angle made at the centre.

- Draw a triangle of circumradius 3 cm and two of the angles 40° and 60° ?

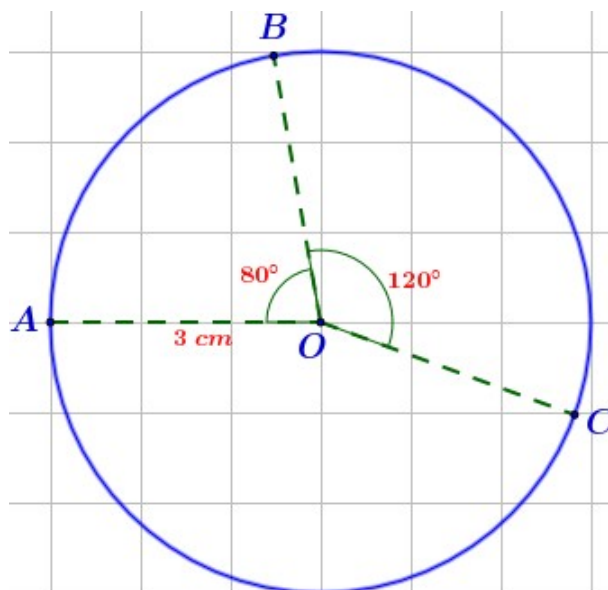
Step 1 :



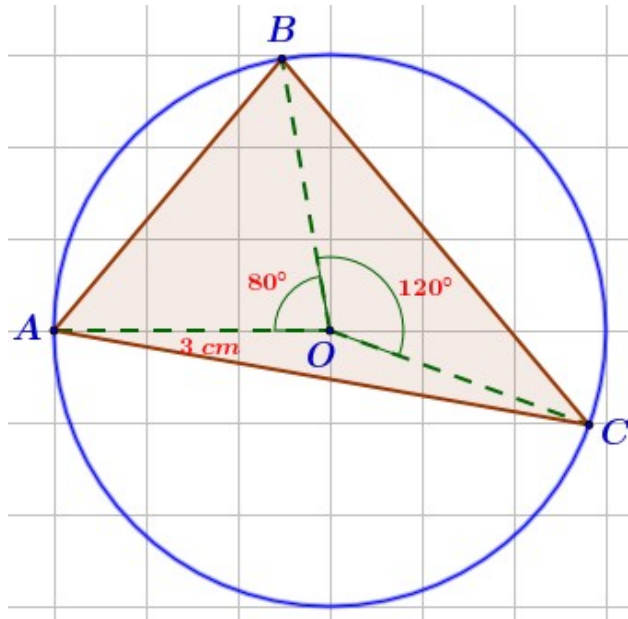
Step 2 :



Step 3 :



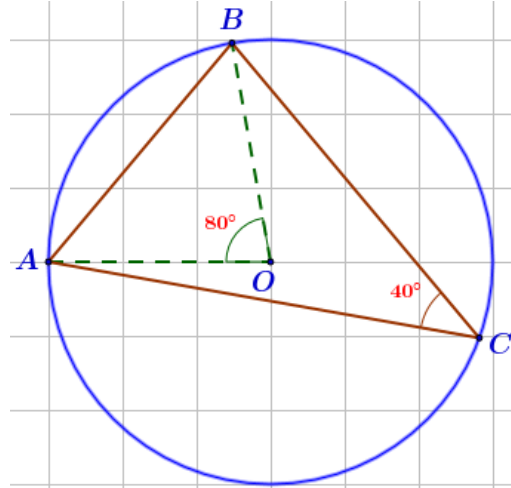
Step 4 : Draw the lines AB , AC and BC .



NB :

Draw a circle of given radius.

Take double the angles of the triangle at the centre within three consecutive radii.



3. Construction of a rectangle of given area same as that of another rectangle..

Learning objective :

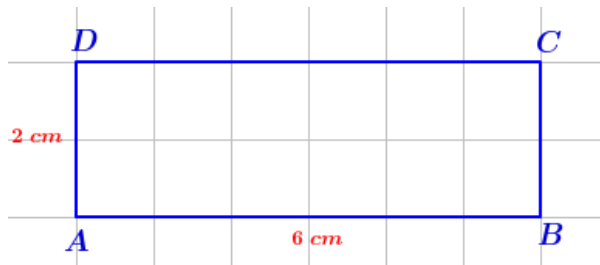
If two chords of a circle intersect within the circle, then the products of the parts of the two chords are equal.

ie,

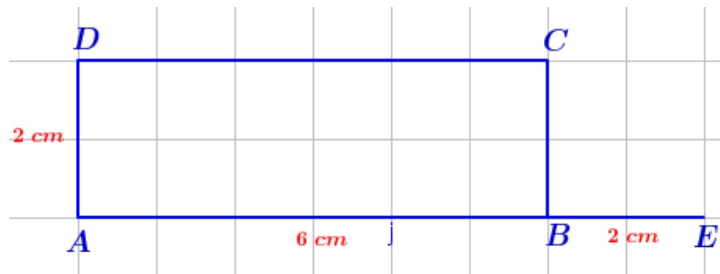
If two chords of a circle intersect within a circle, then the rectangles formed by the parts of the same chord have equal area.

● Draw a rectangle of width 6 cm and height 2 cm. Draw a rectangle of the same area with width 7 cm ?

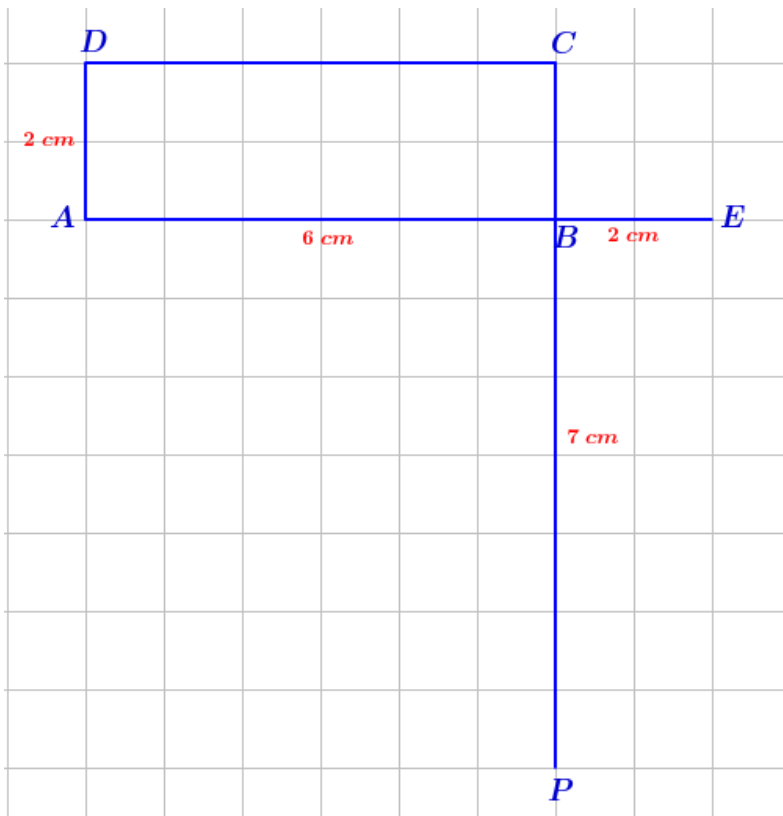
Step 1 : Draw a rectangle of width 6 cm and height 2 cm.



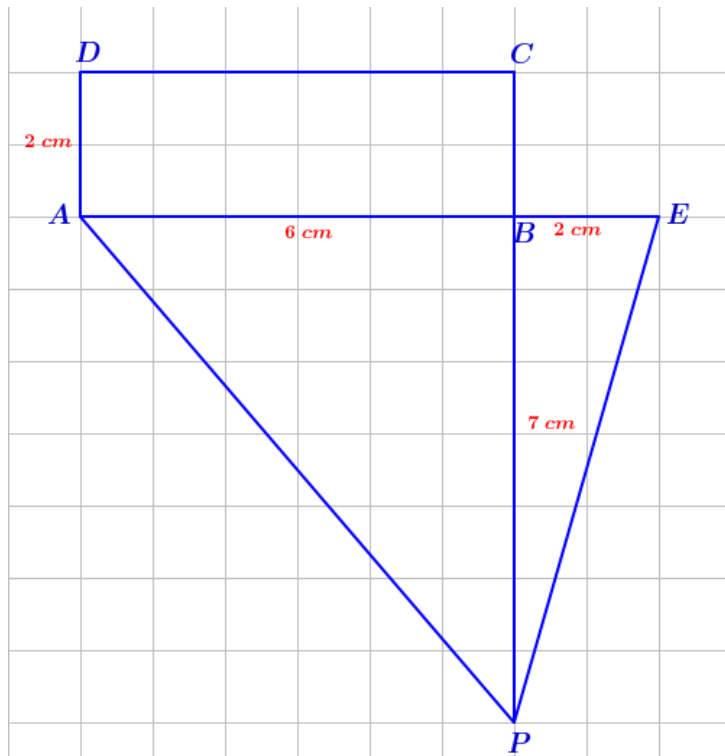
Step 2 : Extend the line AB by 2 cm.



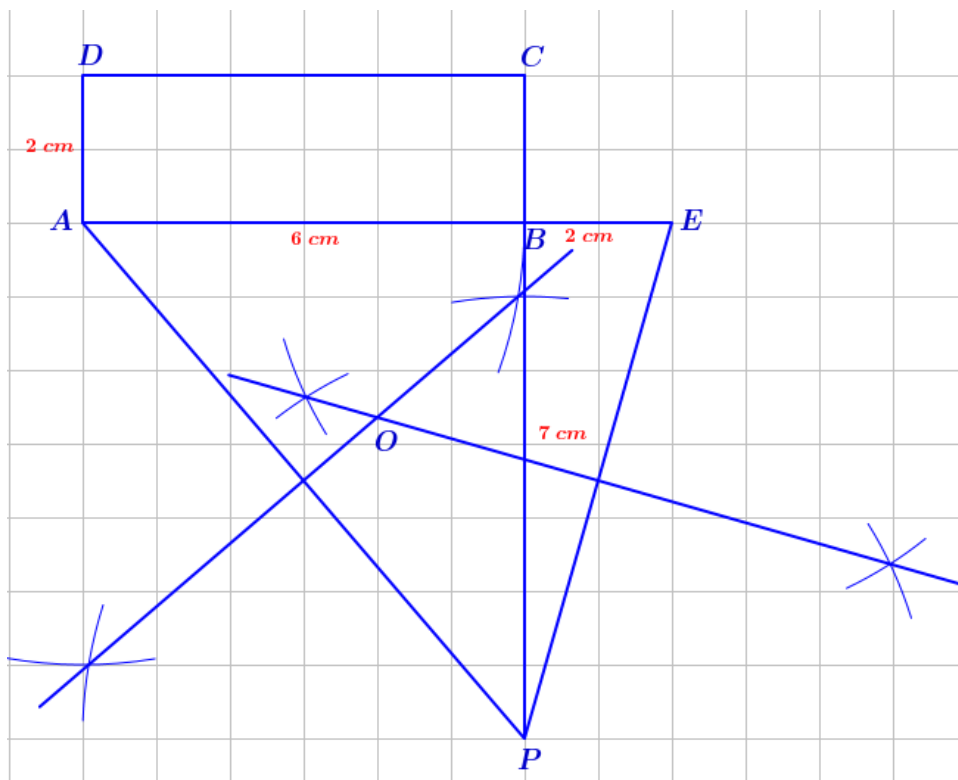
Step 3 : Extend the line CB downwards by 7 cm and mark a point P.



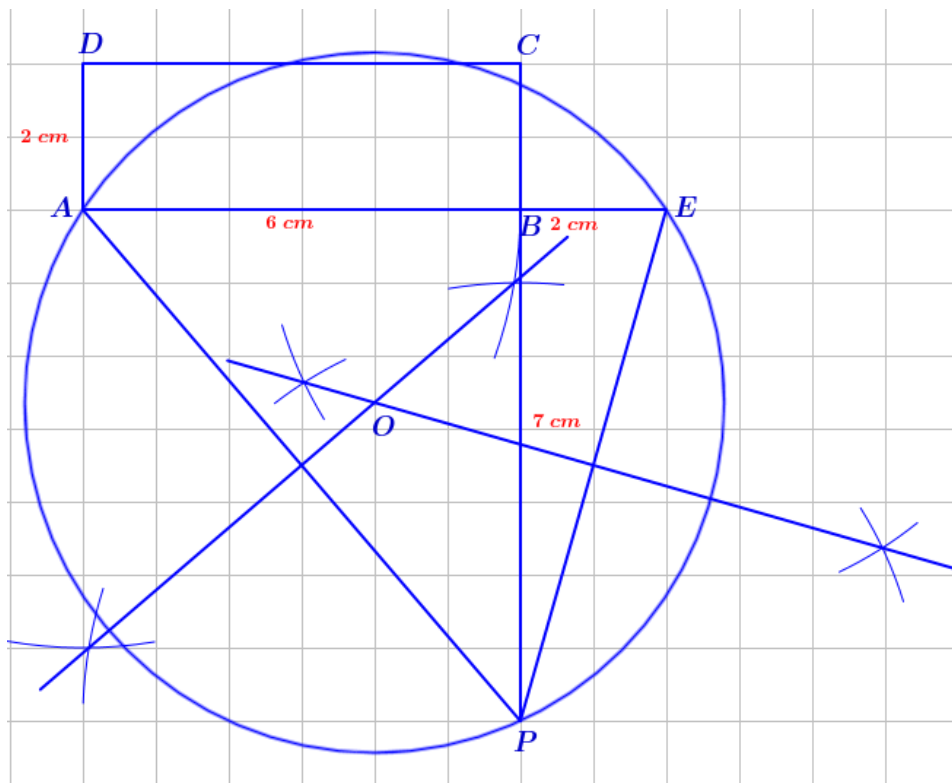
Step 4 : Join the points A , E and P to form a triangle.



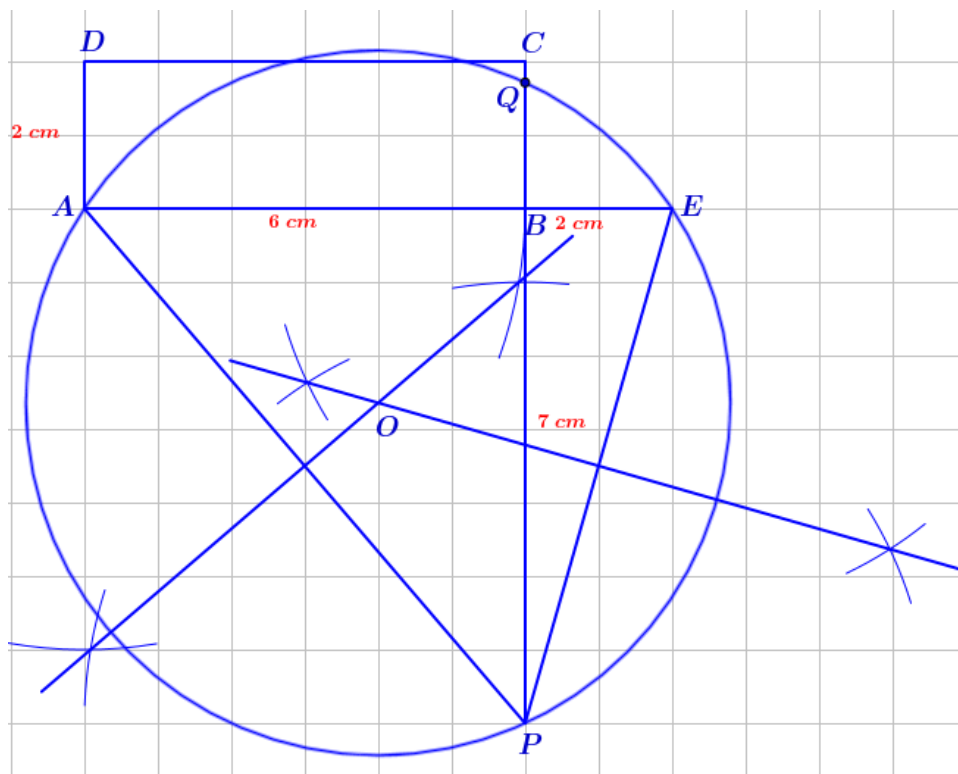
Step 5 : Draw the perpendicular bisectors of the lines AP and EP . They intersect at O .



Step 6 : Draw the circumcircle of the triangle AEP. The centre of the circumcircle is O.

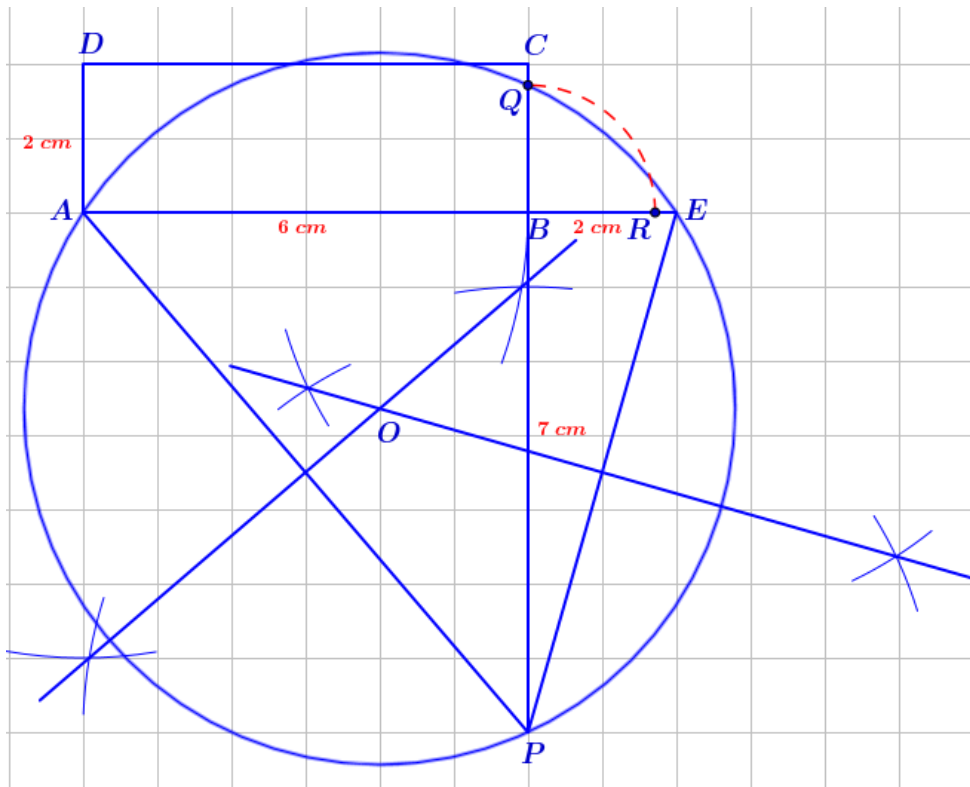


Step 7 : The circumcircle meets the line BC at Q.

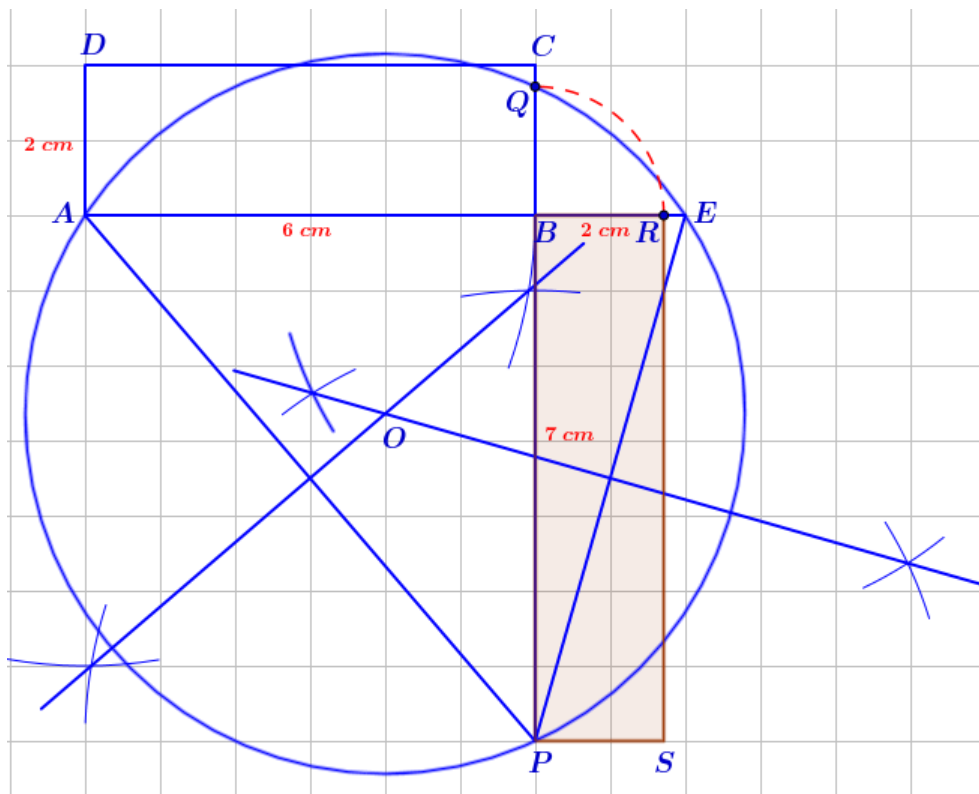


Step 8 : Draw an arc with centre B and radius BQ . The arc meets the line BE at R .

(ie, $BQ = BR$)



Step 9 : Draw a rectangle with width BP and height BR .



4. Construction of a square of given area same as that of a rectangle.

Learning objective :

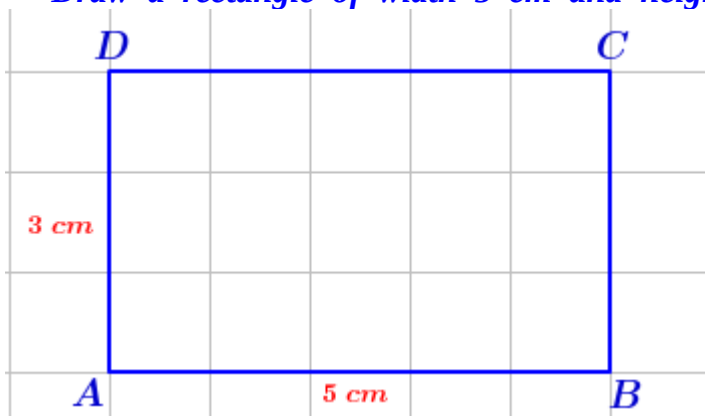
The product of the parts into which a diameter of a circle is cut by a perpendicular chord, is equal to the square of half the chord.

ie,

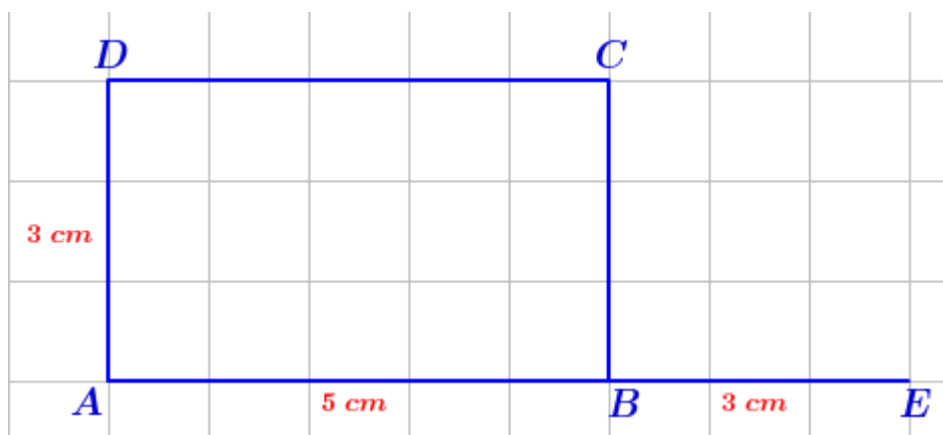
The area of the rectangle formed of parts into which a diameter of a circle is cut by a perpendicular chord is equal to the area of the square formed by half the chord.

● Draw a rectangle of width 5 cm and height 3 cm. Draw a square of the same area .

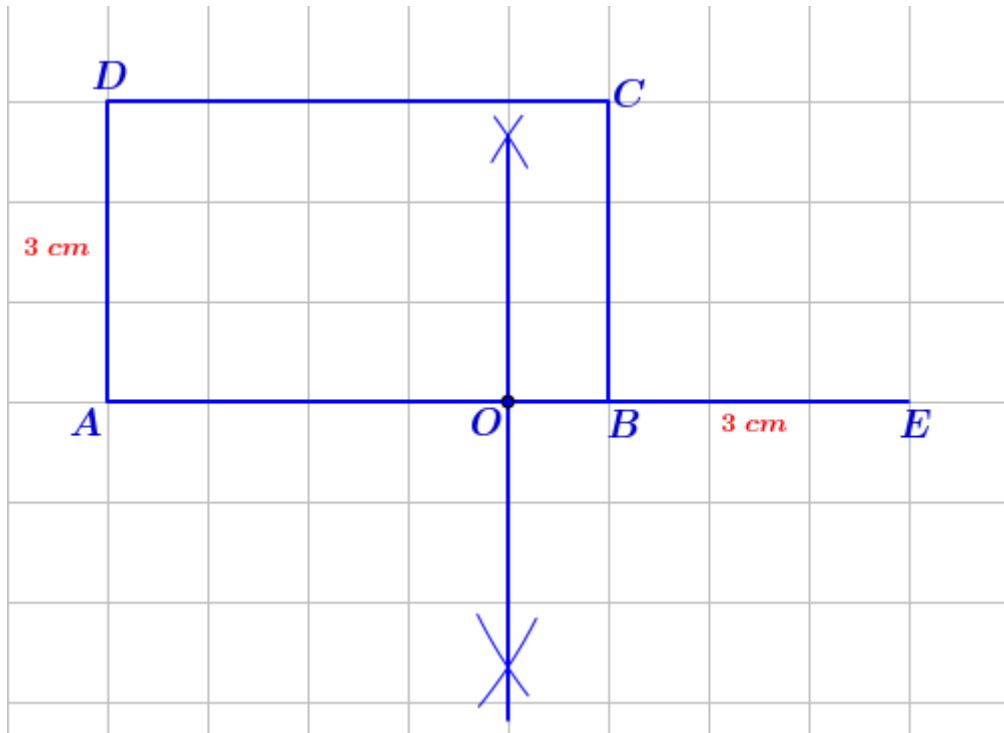
Step 1 : Draw a rectangle of width 5 cm and height 3 cm.



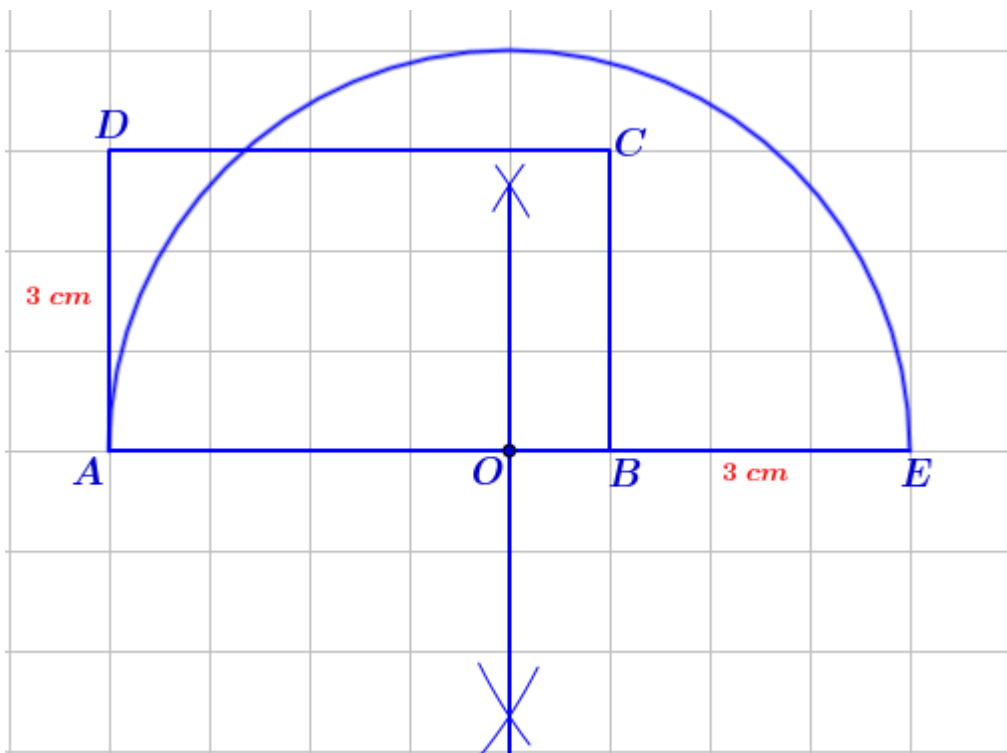
Step 2 : Extend the line AB by 3 cm.



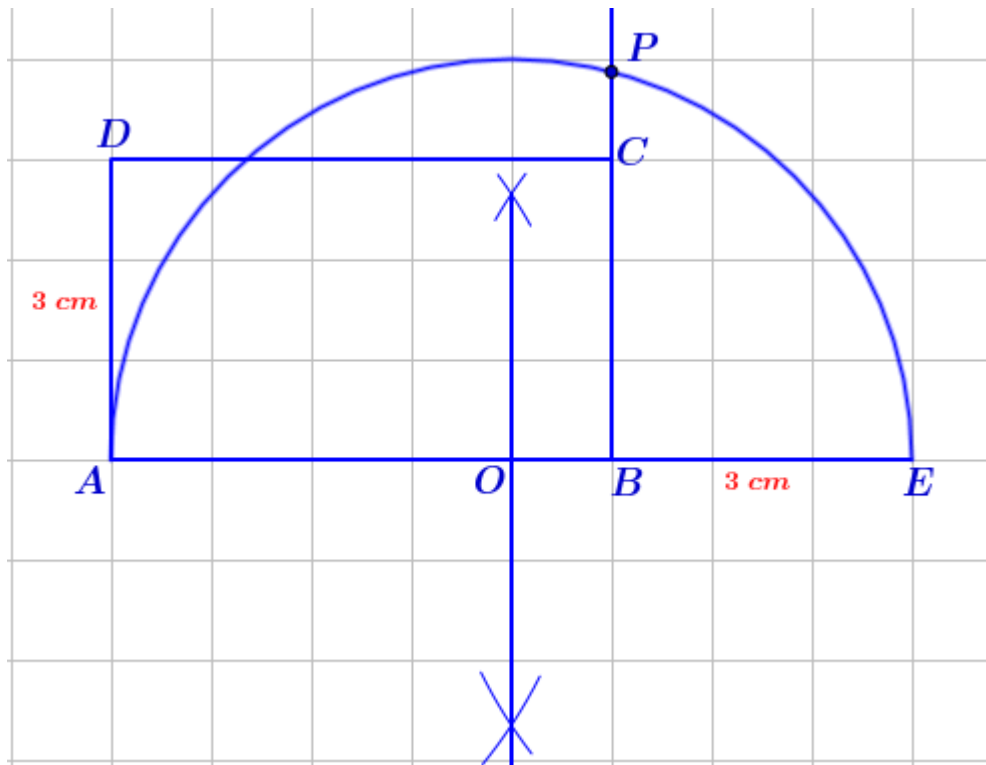
Step 3 : Find the midpoint (O) of the line AE .



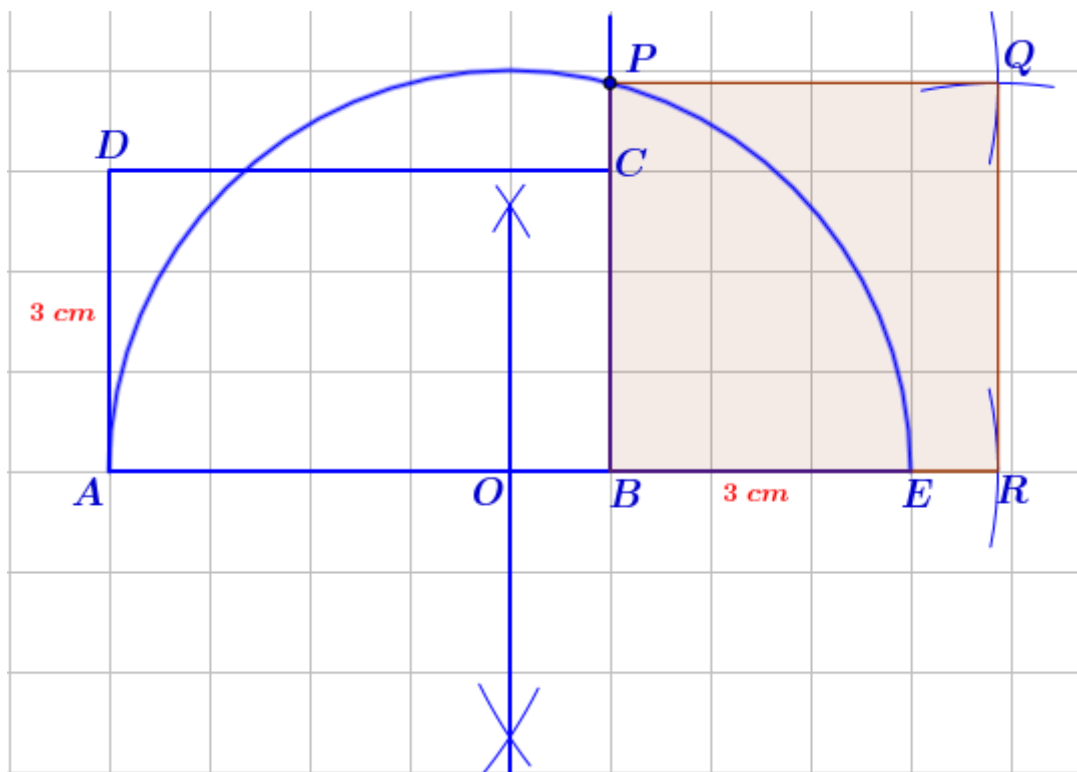
Step 4 : Draw a semicircle with O as centre and AE as diameter.



Step 5 : Extend the line BC and it meets the semicircle at P .

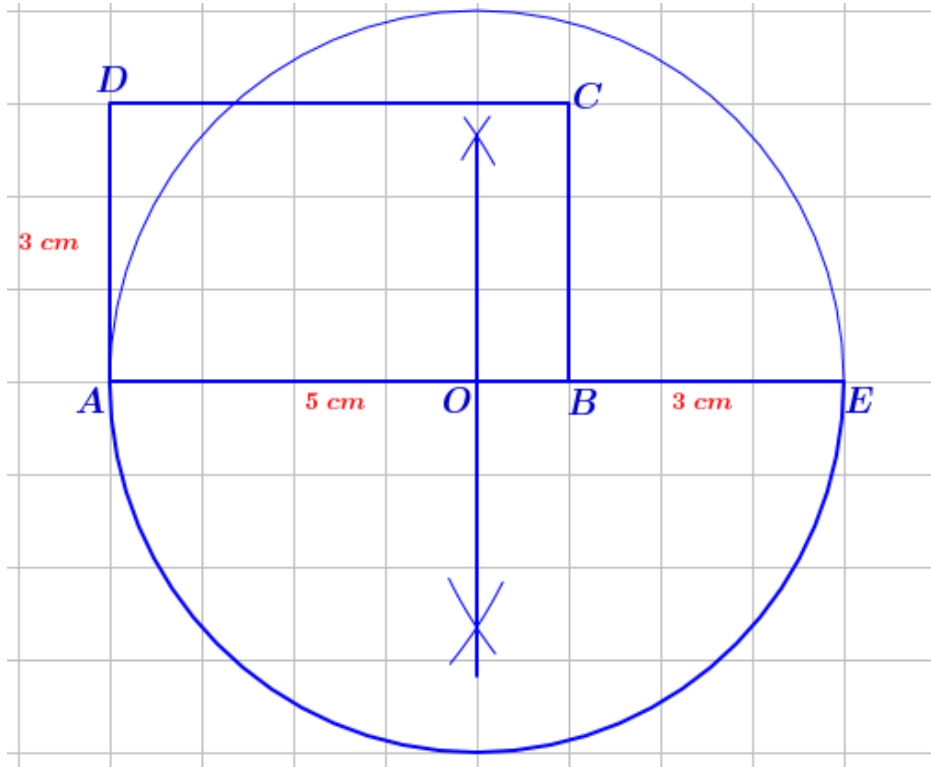


Step 6 : Draw a square with BP as side.

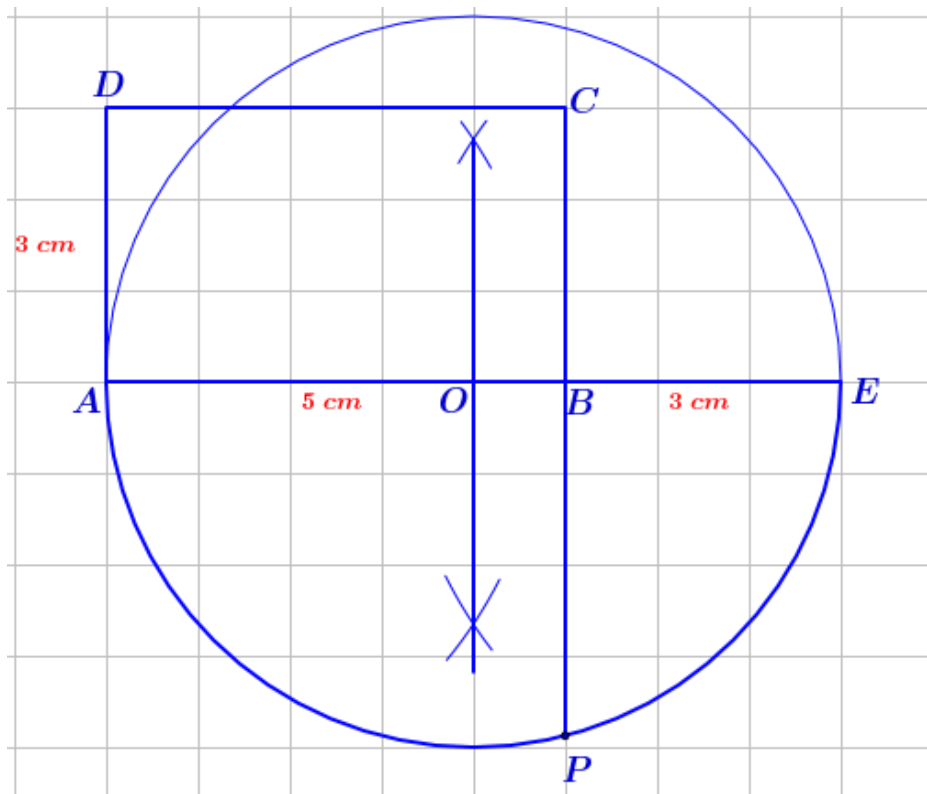


NOTE : We can complete this construction in another way also , instead of the steps 4 , 5 and 6

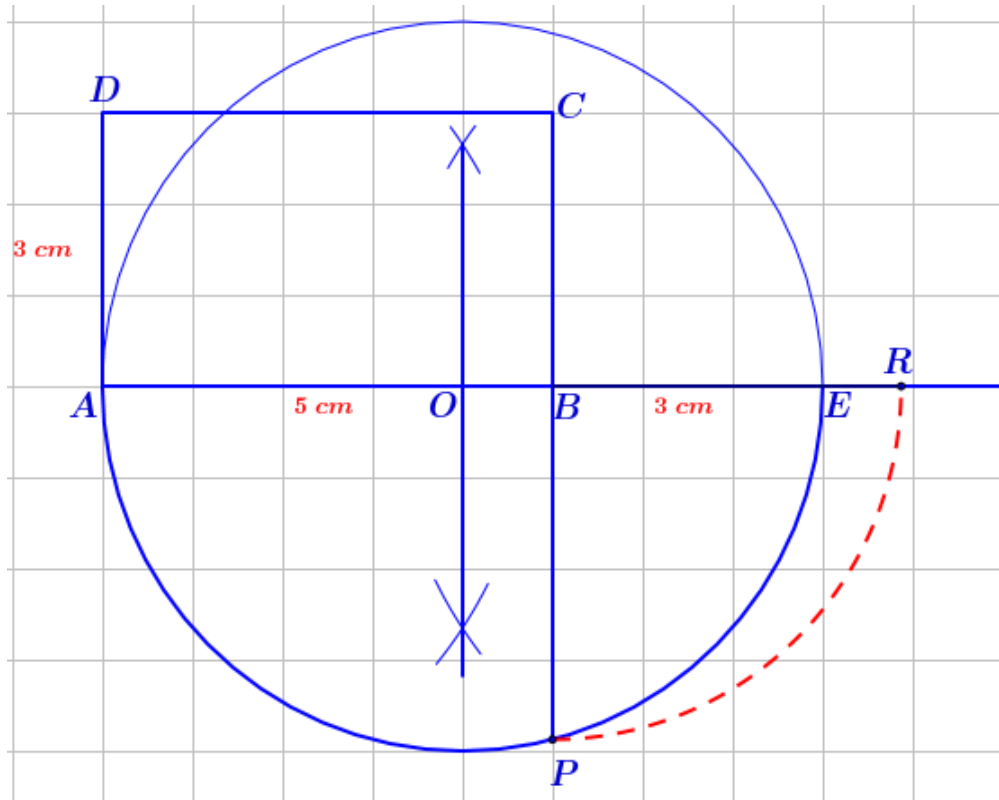
Step 4 : Draw a circle with O as centre and AE as diameter.



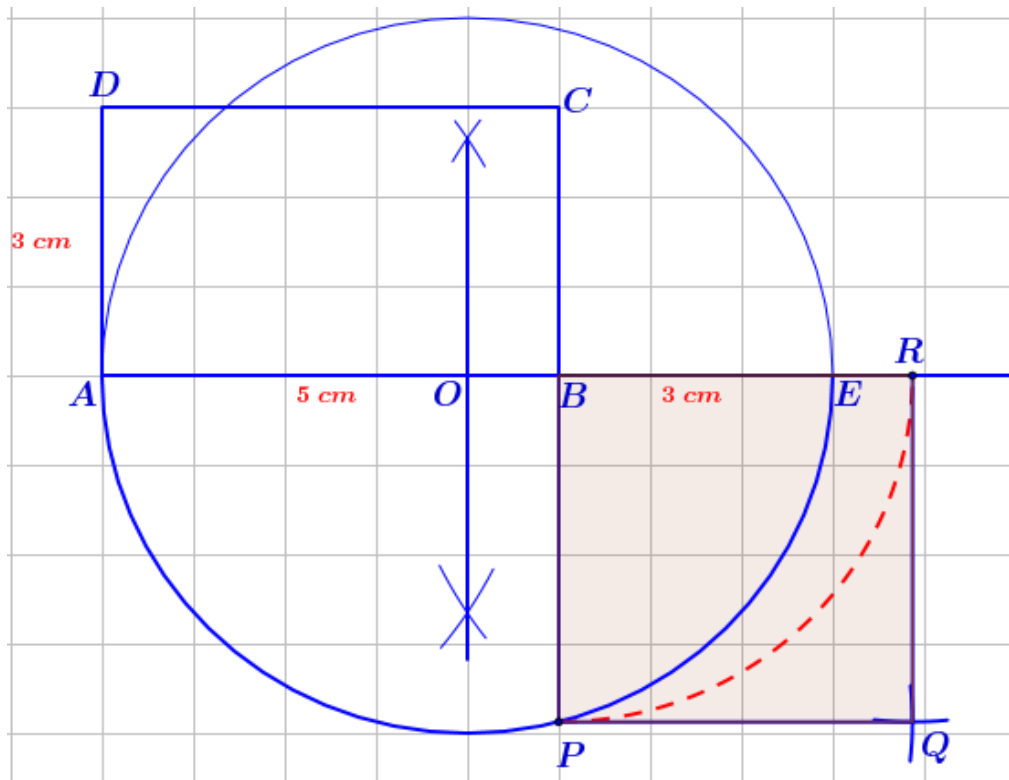
Step 5 : Extend the line CB and it meets the circle at P .



Step 6 : Extend the line BE . Draw an arc with centre B and radius BP. This arc meets the extended line at R. (ie, $BP = BR$)



Step 6 : Draw a square with BP as side.



CONSTRUCTIONS - TANGENTS

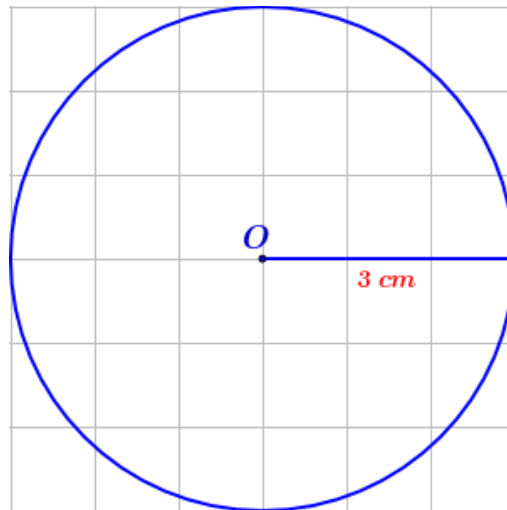
1. Tangent through a point on a circle

Learning objective :

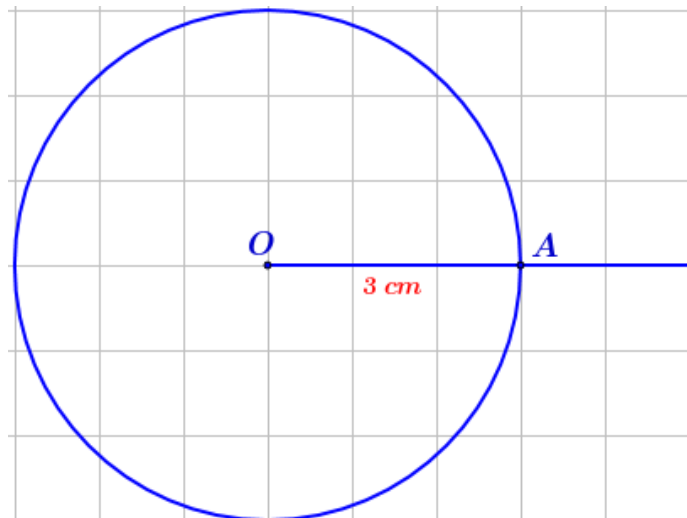
The tangent at a point on a circle is perpendicular to the diameter through that point.

- Draw a circle of radius 3 cm and mark a point on it . Draw a tangent through that point ?

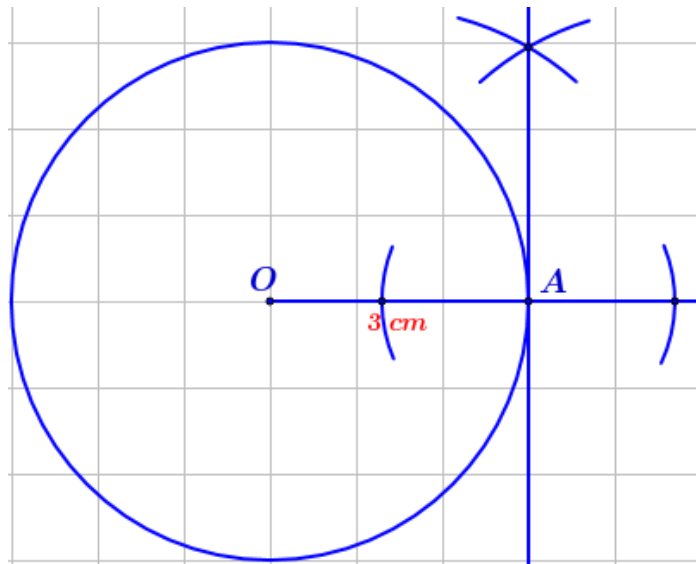
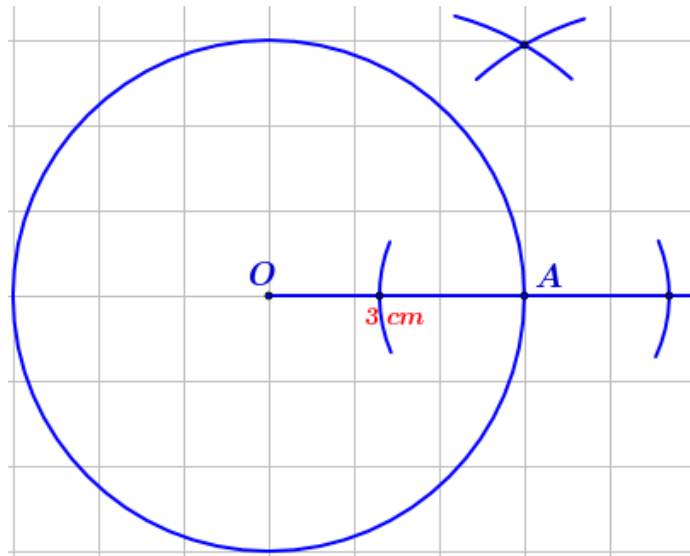
Step 1 : Draw a circle of radius 3 cm



Step 2 : Extend the line OA to outside the circle .



Step 3 : Draw a line perpendicular to OA through the point A .



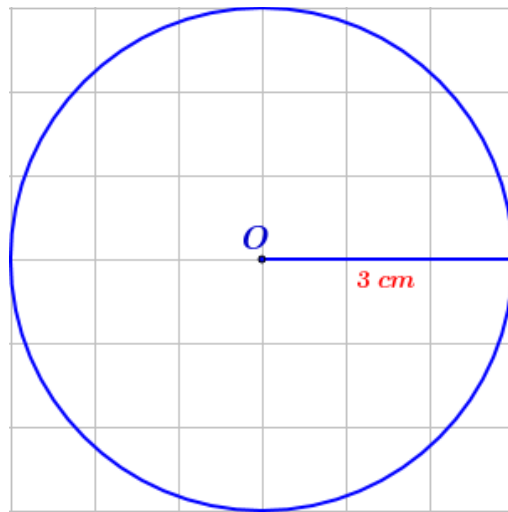
2. Tangents from a point outside the circle

Learning objective :

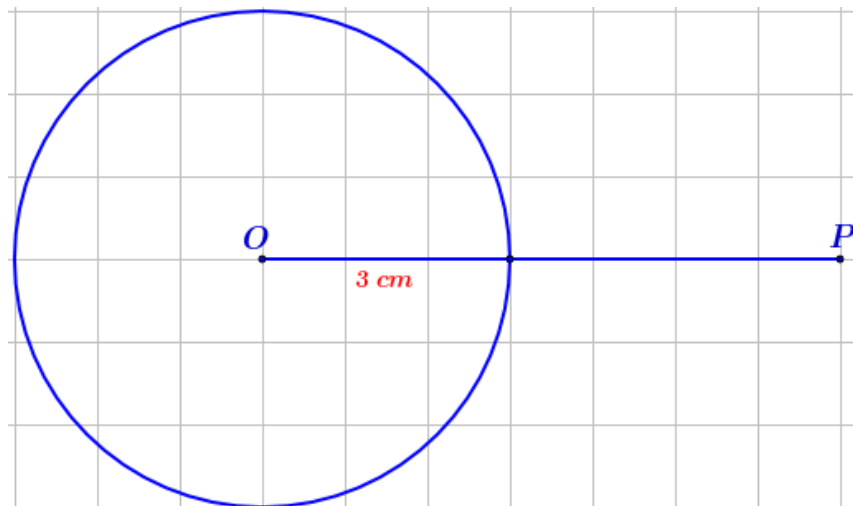
From a point outside a circle, two tangents can be drawn.

- *Draw a circle of radius 3 cm and mark a point 7 cm away from its centre. Draw the tangents to the circle from this point ?*

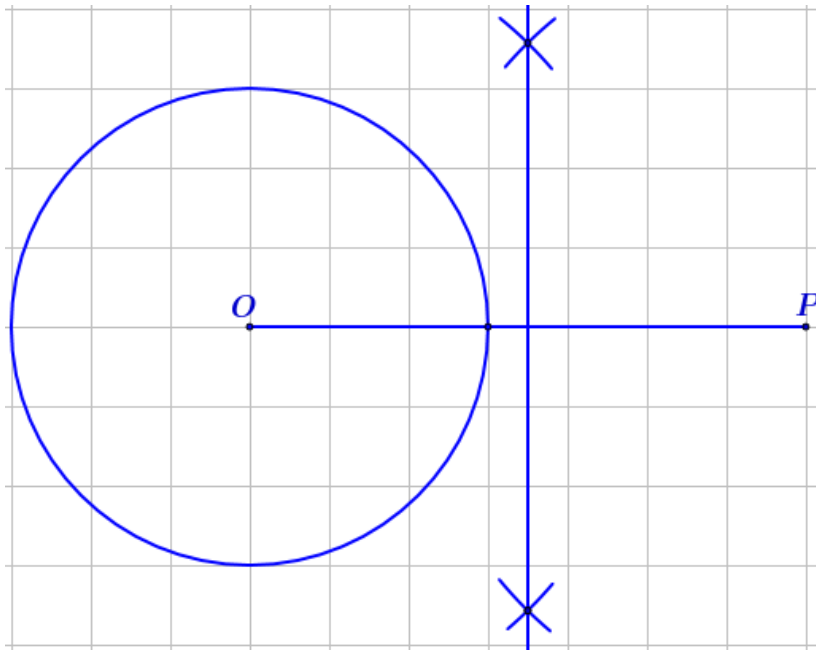
Step 1 : *Draw a circle of radius 3 cm .*



Step 2 : *Mark a point P, 7 cm away from the centre of the circle .*

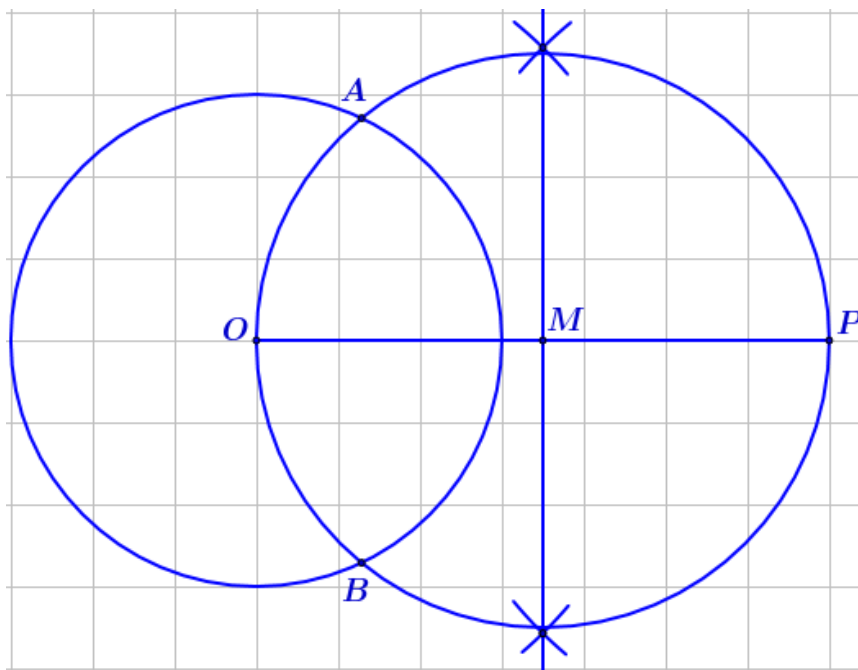


Step 3 : Draw the perpendicular bisector of the line OP .

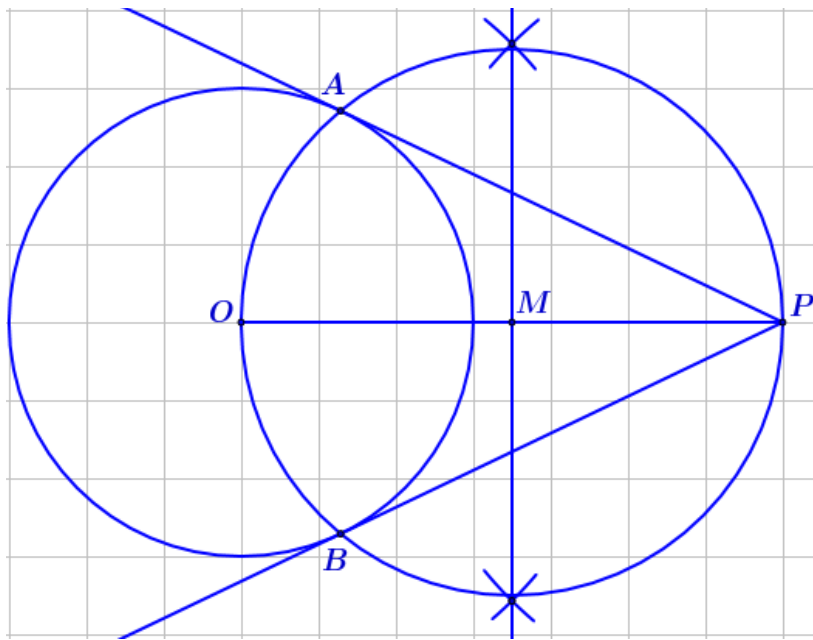


Step 4 : M is the midpoint of OP . Draw a circle with centre M and radius MO .

The circles intersect at A and B .



Step 5 : Draw lines from the point P to A and B .



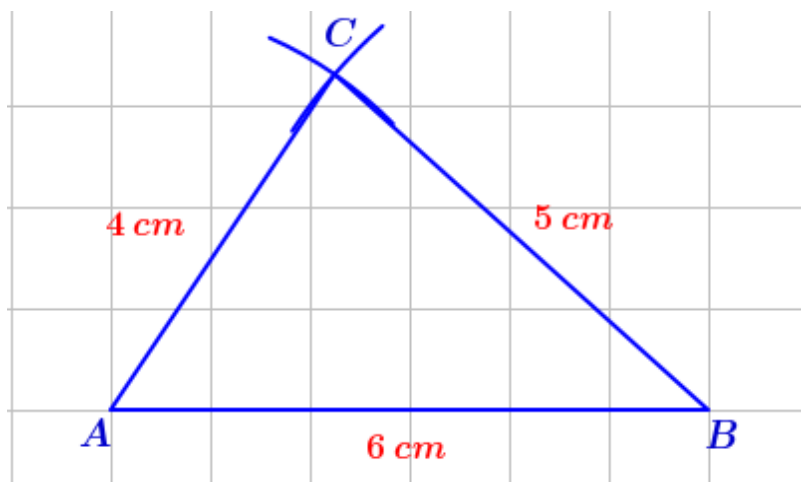
4. Incircle of a triangle .

Learning objective :

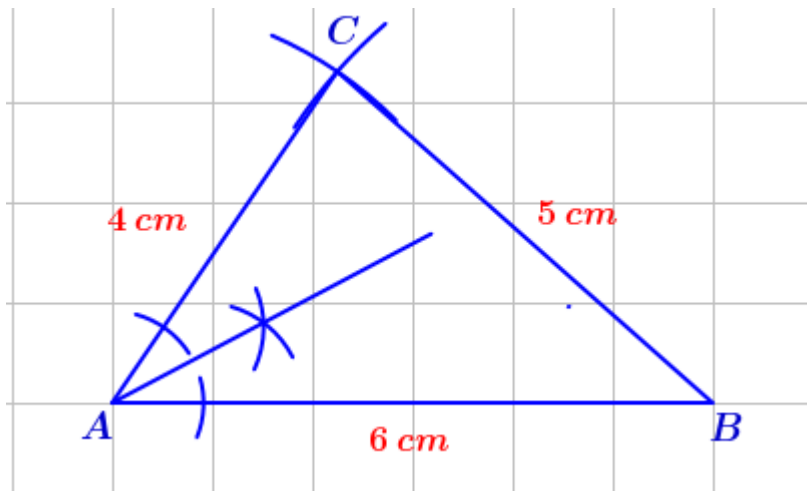
The bisectors of all three angles of a triangle meet at a point.

● Draw a triangle of sides 4 cm , 5 cm , 6 cm and draw its incircle .

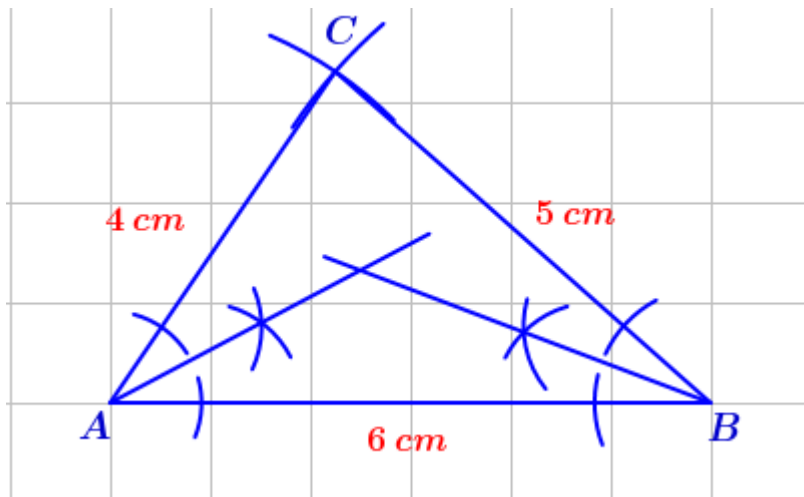
Step 1 : Draw a triangle of sides 4 cm , 5cm , 6cm .



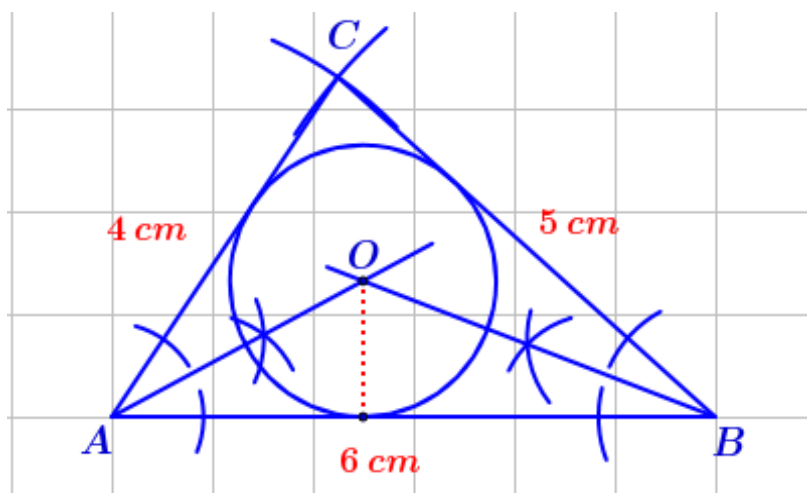
Step 2 : Draw the bisector of $\angle A$.



Step 3 : Draw the bisector of $\angle B$.



Step 4 : The bisectors of $\angle A$ and $\angle B$ intersect at O . Draw a circle with O as centre and the distance from O to the side AB as radius.



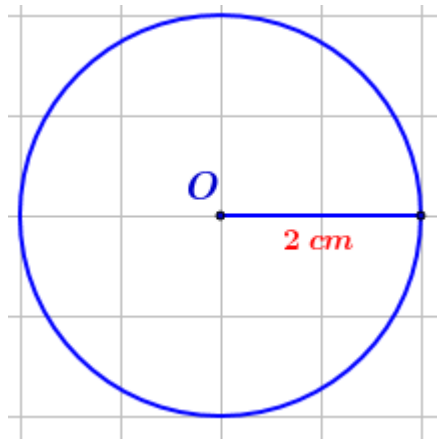
5. Triangle with all its sides touching a circle.

Learning objective :

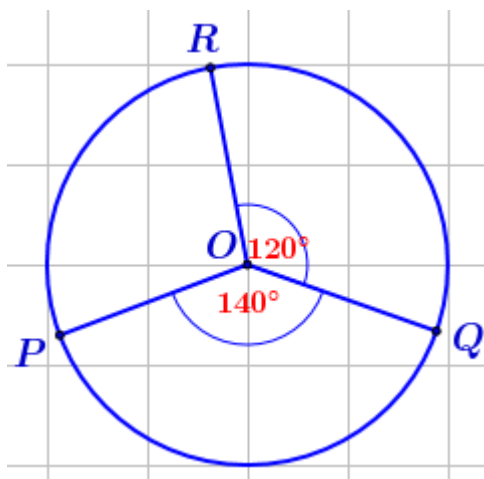
In a circle, the angles between the radii through two points and the angle between the tangents at these points are supplementary.

- Draw a circle of radius 2 cm . Draw a triangle of angles 40° , 60° , 80° with all its sides touching the circle.

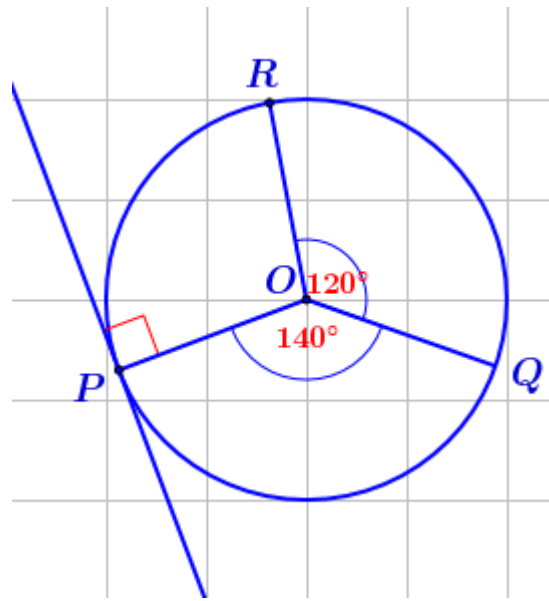
Step 1 : Draw a circle of radius 2 cm .



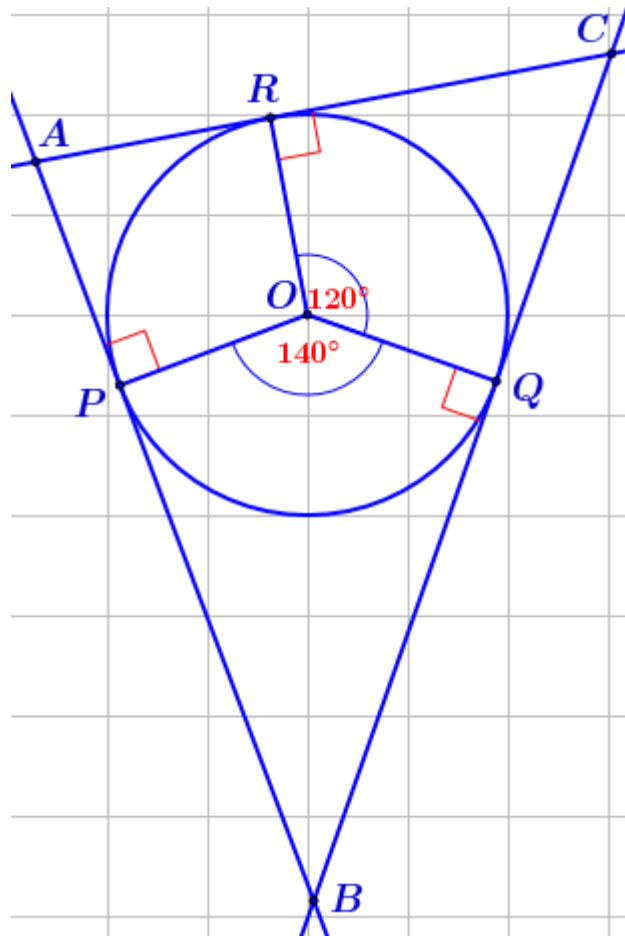
Step 2 : Draw angles of measure 140° , 120° and 100° among three consecutive radii.



Step 3 : Draw a line perpendicular to the radius OP through the point P .



Step 4 : The perpendiculars through the points P , Q and R intersect at A , B and C .



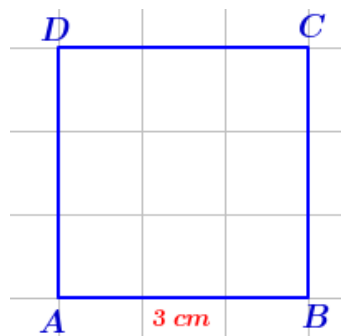
6 . Construction of a rectangle having same area as that of a square.

Learning objective :

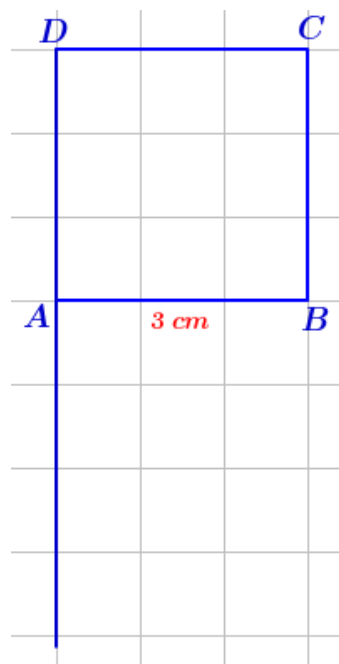
The product of an intersecting line and the part of it outside the circle is equal to the square of the tangent.

- **Draw a square of side 3 cm . Draw a rectangle whose area equal to the area of the square and one of the is 7 cm ?**

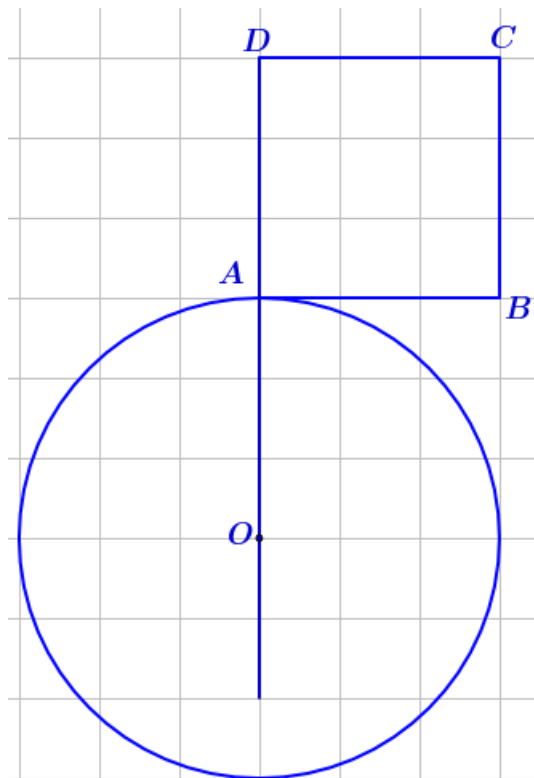
Step 1 : Draw a square of side 3 cm .



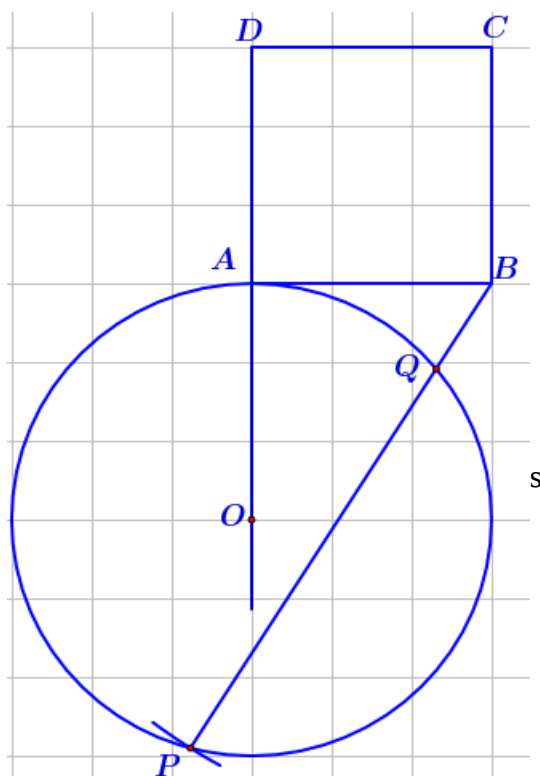
Step 2 : Extend the side DA downwards .



Step 3 : Mark a point O on this extended line . Draw a circle with O as centre and OA as radius.

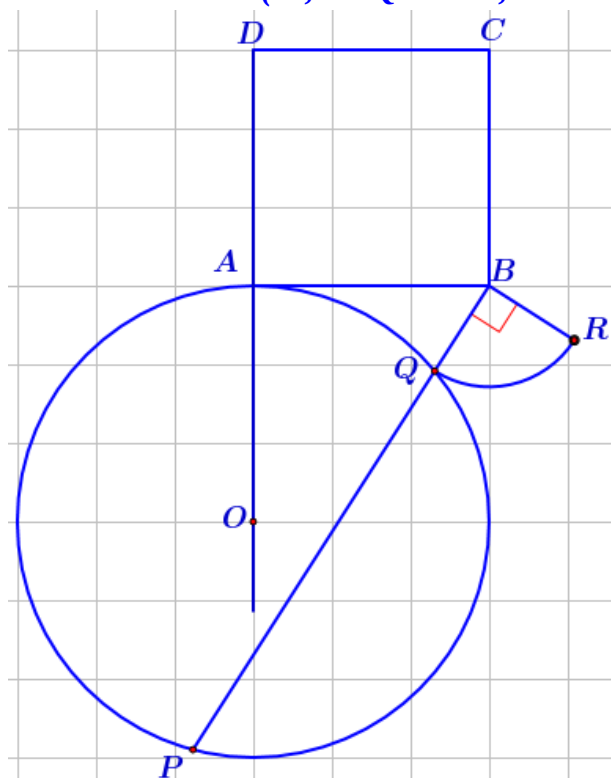


Step 4 : Draw a line of length 7 cm from B and this line meets the circle at the points P and Q .



Step 5 : Draw an arc with centre B and radius BQ . Draw a perpendicular through B

which meets the arc at R . (ie, $BQ = BR$, $\angle B = 90^\circ$)



Step 6 : Draw a rectangle with BP as width and BR as height.

