WANDOOR GANITHAM – S.S.L.C STUDY MATERIAL 2022

CONSTRUCTIONS

CONSTRUCTIONS - CIRCLES

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

Learning objective :

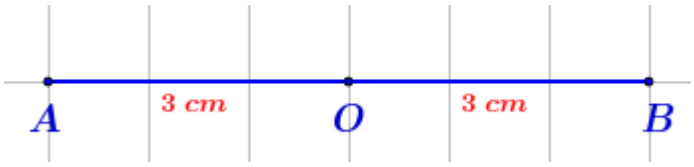
If we join the ends of a diameter of a circle to a point on the circle, we get a right angle.

ie,

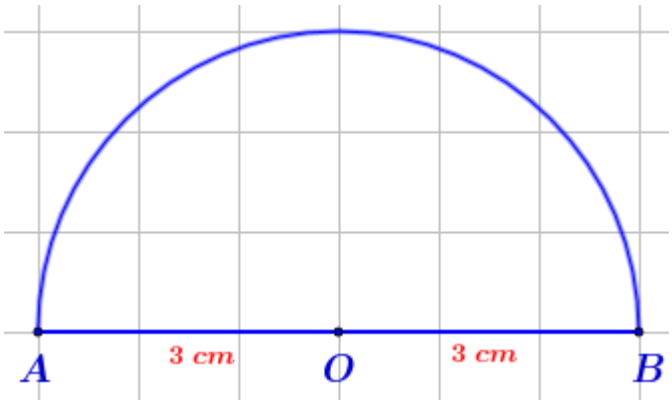
Angle in a semicircle is right.

- ***Draw a right angled triangle of hypotenuse 6 cm ?***

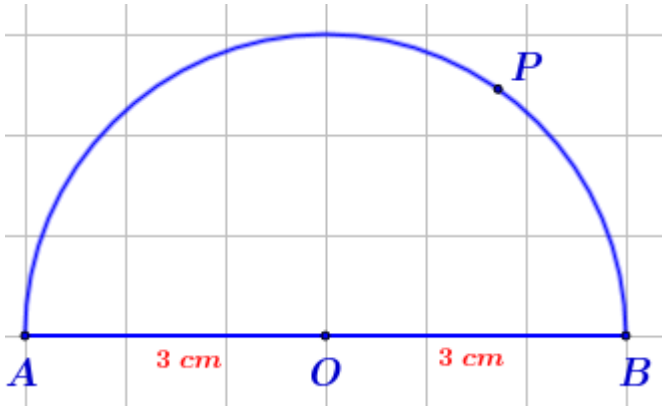
Step 1 : ***Draw a line (AB) of length 6 cm .Find the midpoint (O) of AB.***



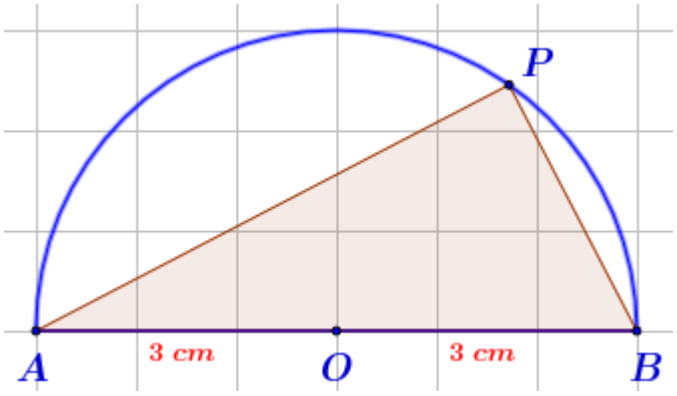
Step 2 : ***Draw a semicircle with O as centre and AB as diameter.***



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

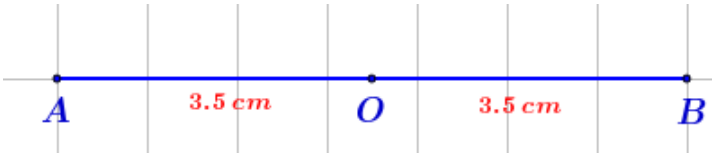


Step 4 : ***Draw the lines AP and BP .***

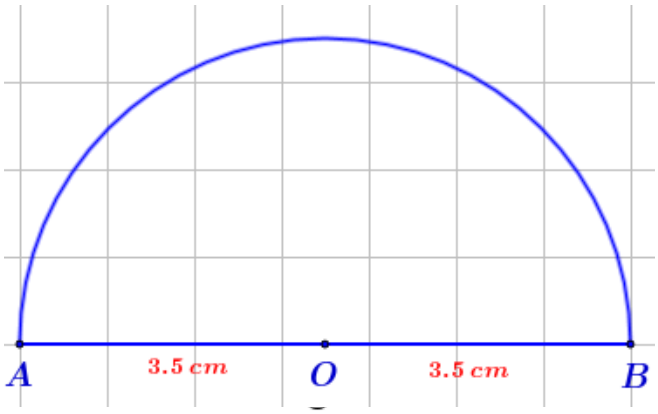


- ***Draw an isosceles right angled triangle of hypotenuse 7 cm ?***

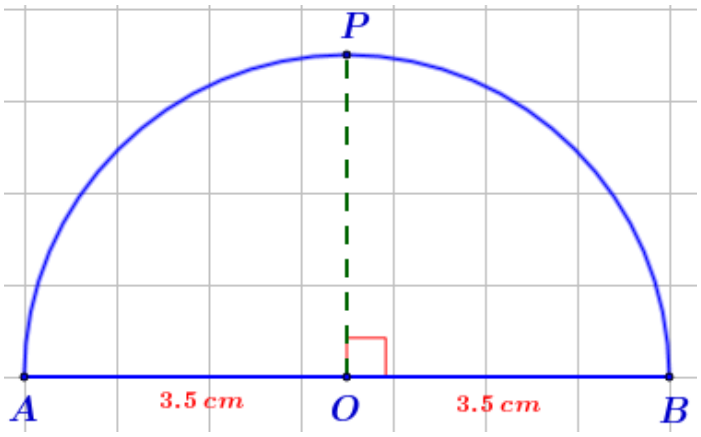
Step 1 : ***Draw a line (AB) of length 7 cm .Find the midpoint (O) of AB.***



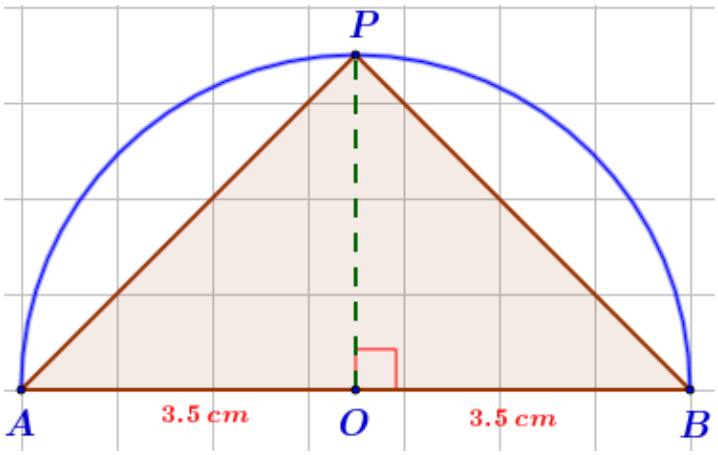
Step 2 : ***Draw a semicircle with O as centre and AB as diameter.***



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



Step 4 : ***Draw the lines AP and BP.***



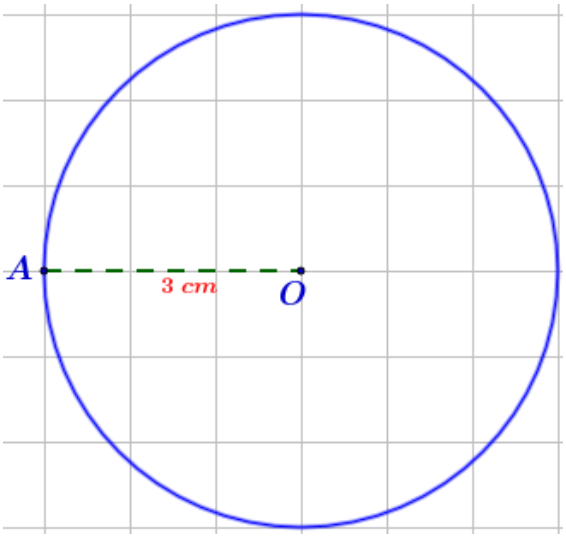
2. *Construction of a triangle with given angles and circumradius .*

Learning objective :

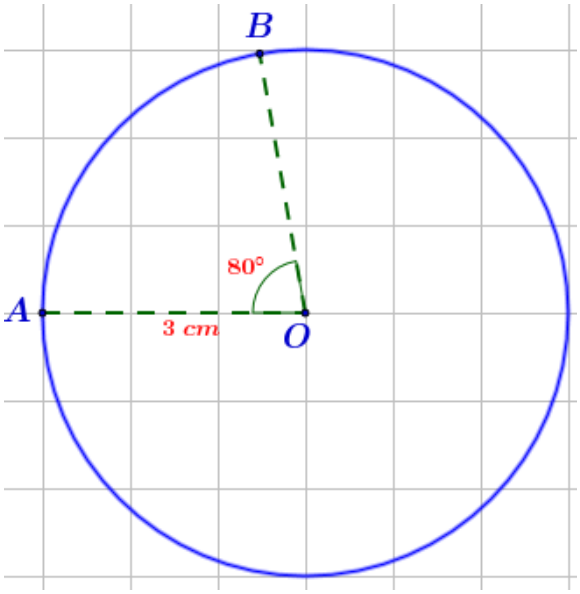
The angle made by any arc of a circle on the alternate arc is half the angle made at the centre.

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

***Step* 1 :**



***Step* 2 :**



***Step* 3 :**

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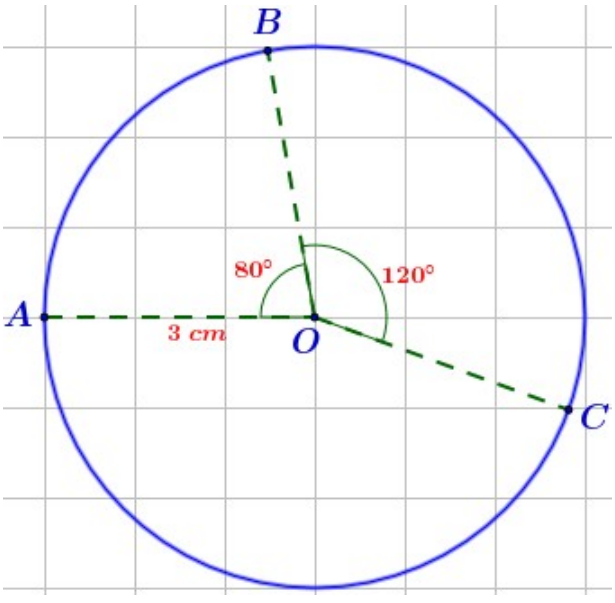
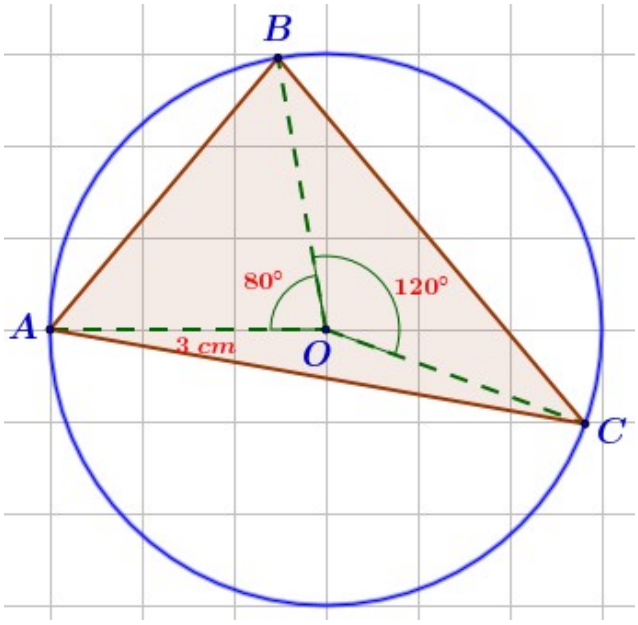


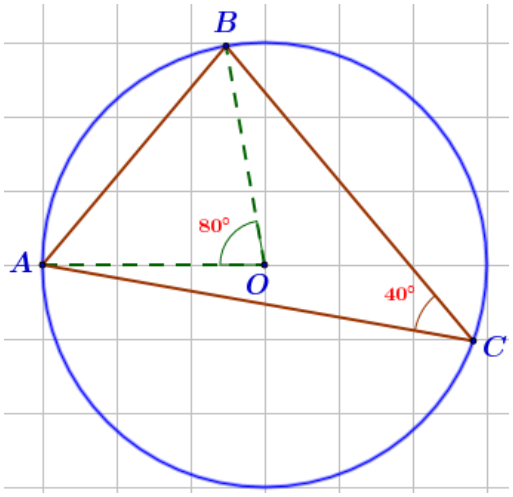
Step 4 : ***Draw the lines AB , AC and BC .***



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 :

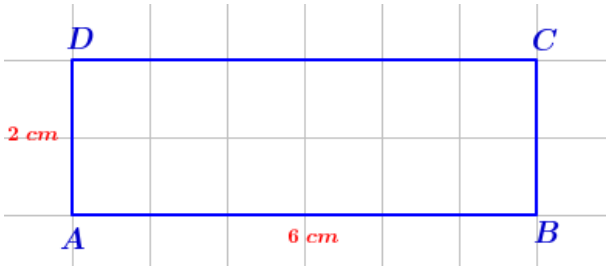
If two chords of a circle intersect within the circle, then the products of the parts of the two chords are equal.

ie,

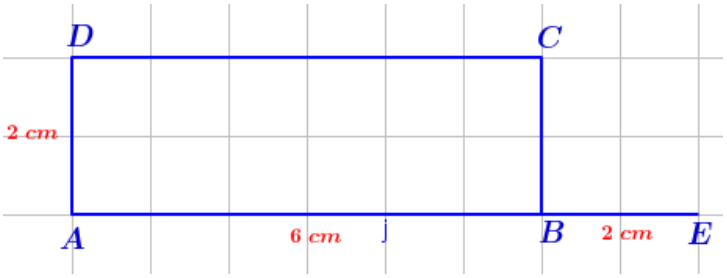
If two chords of a circle intersect within a circle, then the rectangles formed by the parts of the same chord have equal area.

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

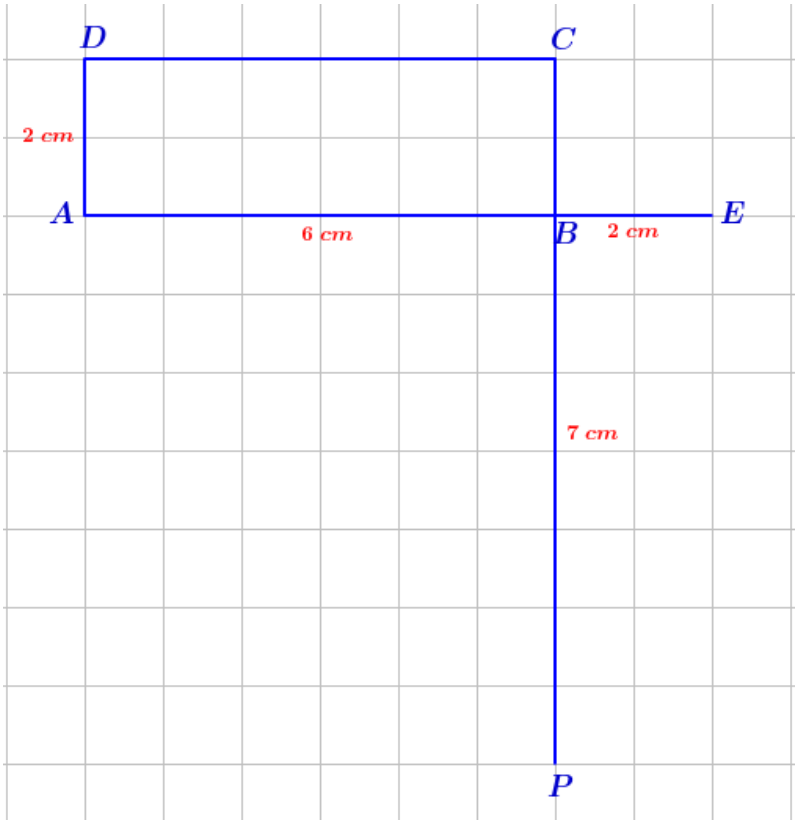
Step 1 : Draw a rectangle of width 6 cm and height 2 cm.



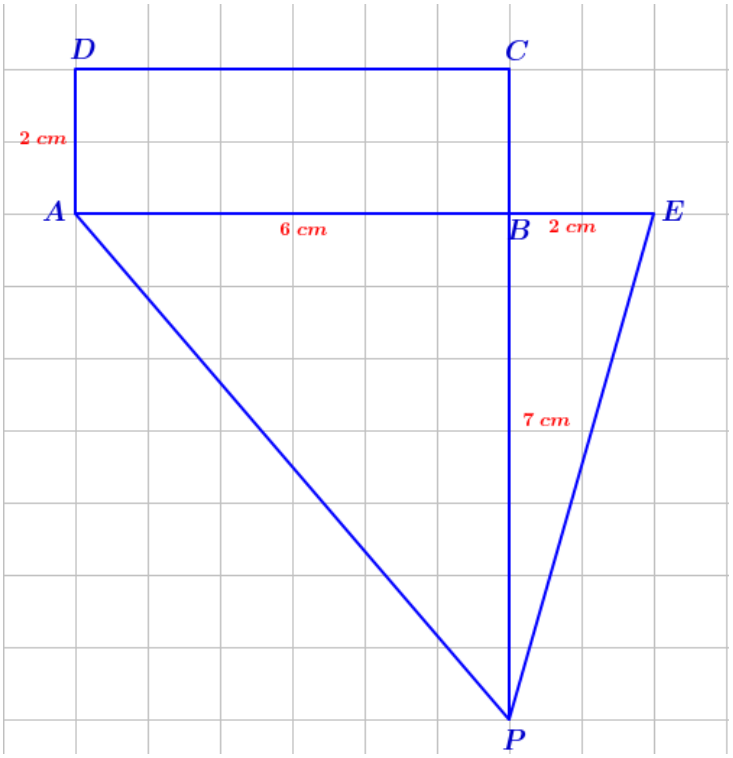
Step 2 : Extend the line AB by 2 cm.



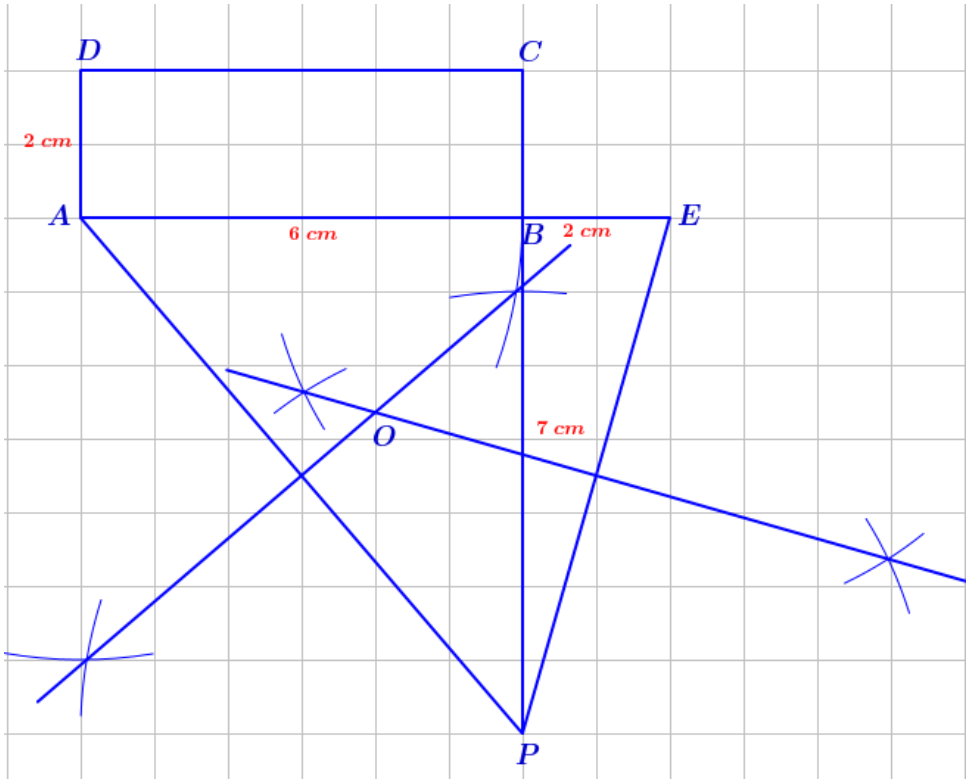
Step 3 : Extend the line CB downwards by 7 cm and mark a point P .



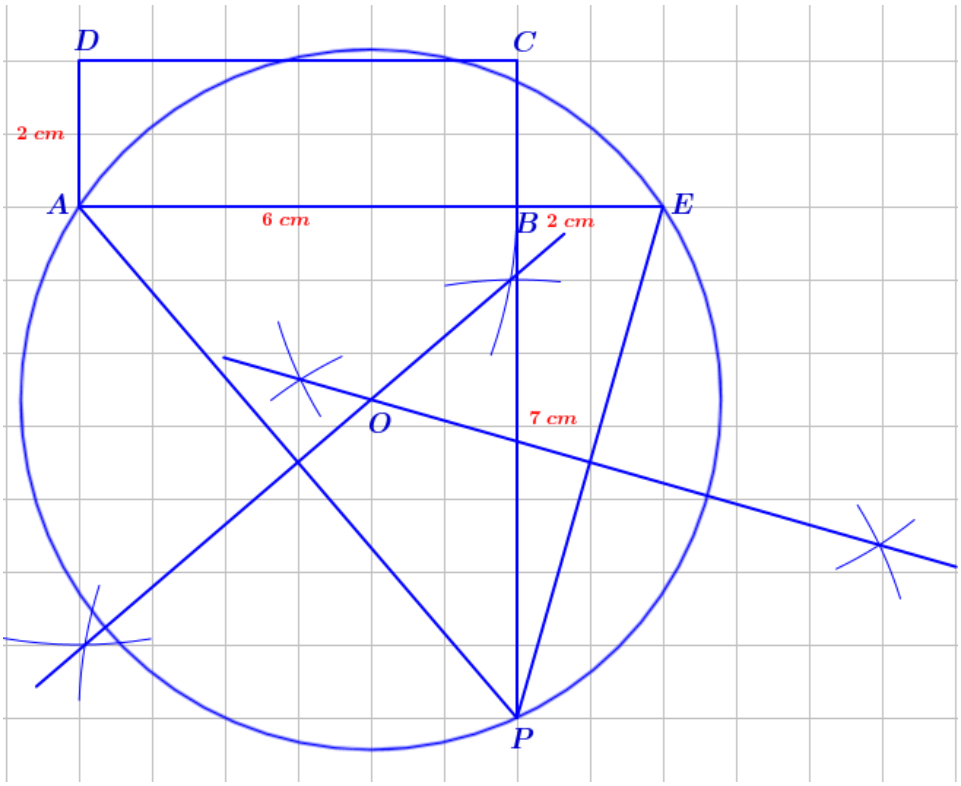
Step 4 : *Join the points A , E and P to form a triangle.*



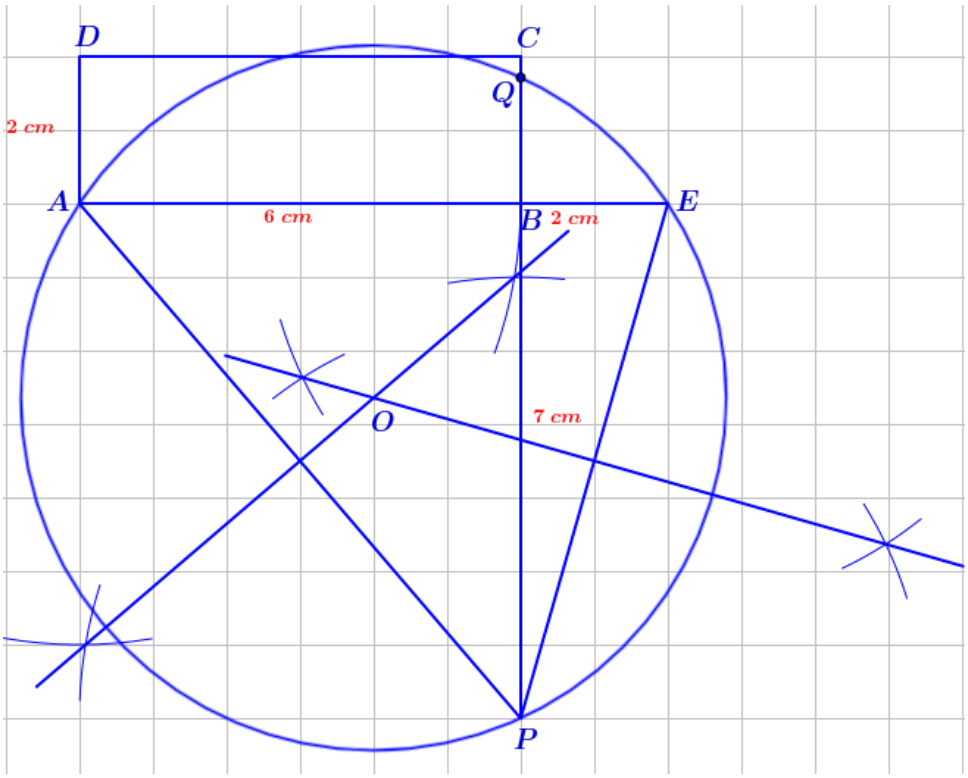
Step 5 : *Draw the perpendicular bisectors of the lines AP and EP . They intersect at O.*



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

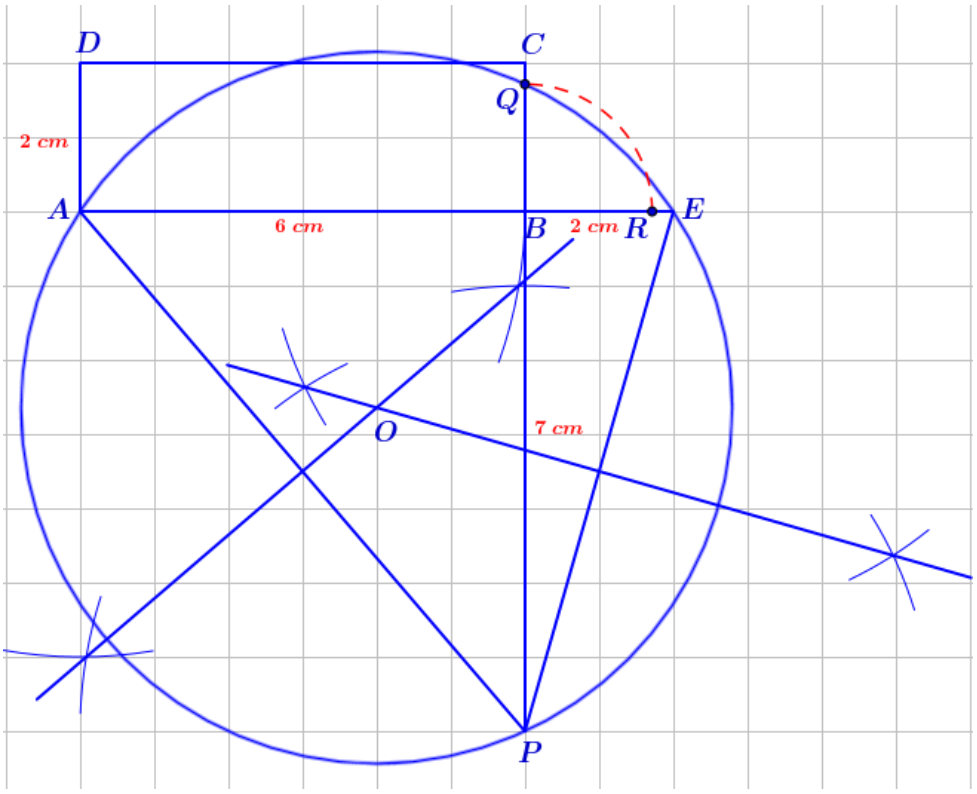


Step 7 : The circumcircle meets the line BC at Q.

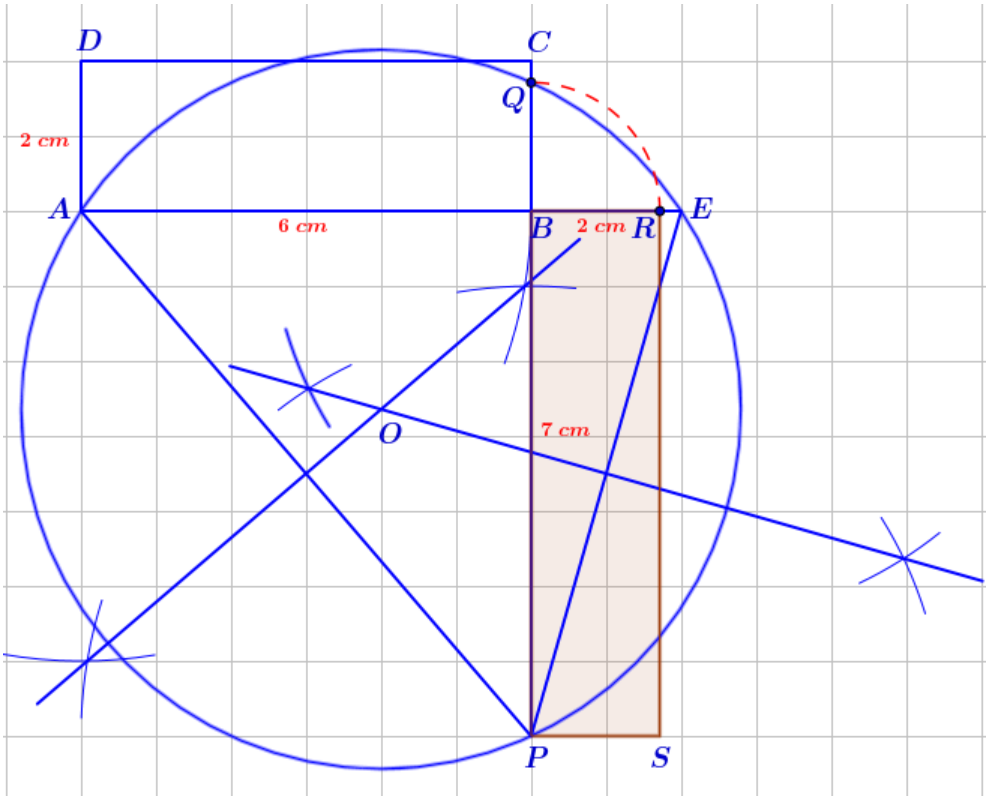


Step 8 : Draw an arc with centre B and radius BQ. The arc meets the line BE at R.

(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.*

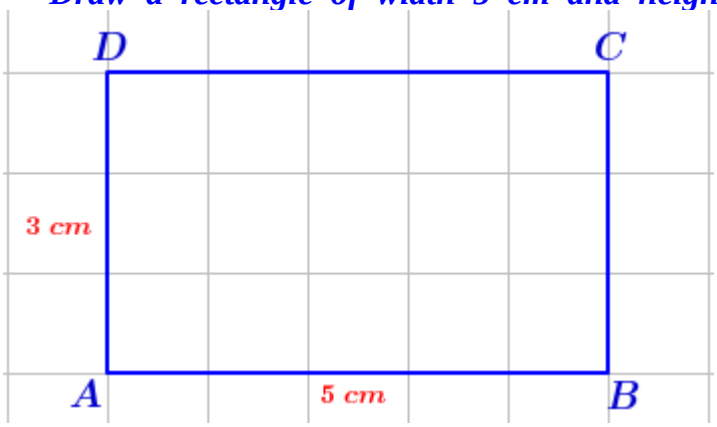
Learning objective :

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.

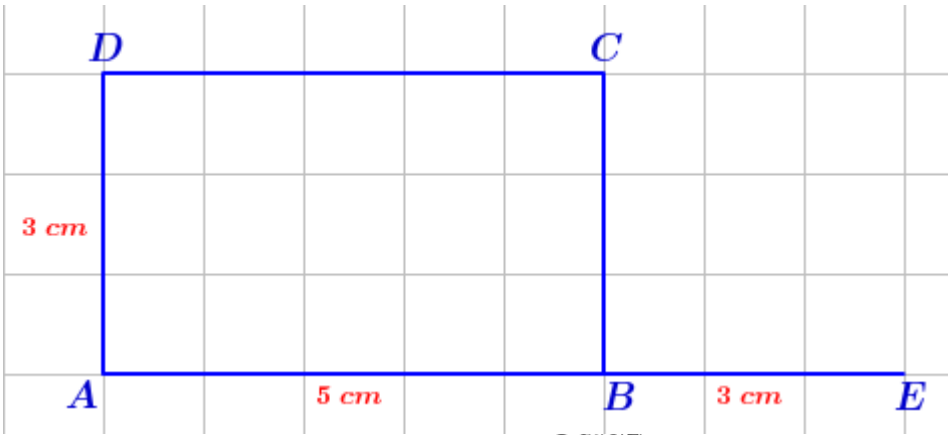
ie, **The area of the rectangle formed of parts into which a diameter of a circle is cut by a perpendicular chord is equal to the area of the square formed by half the chord.**

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

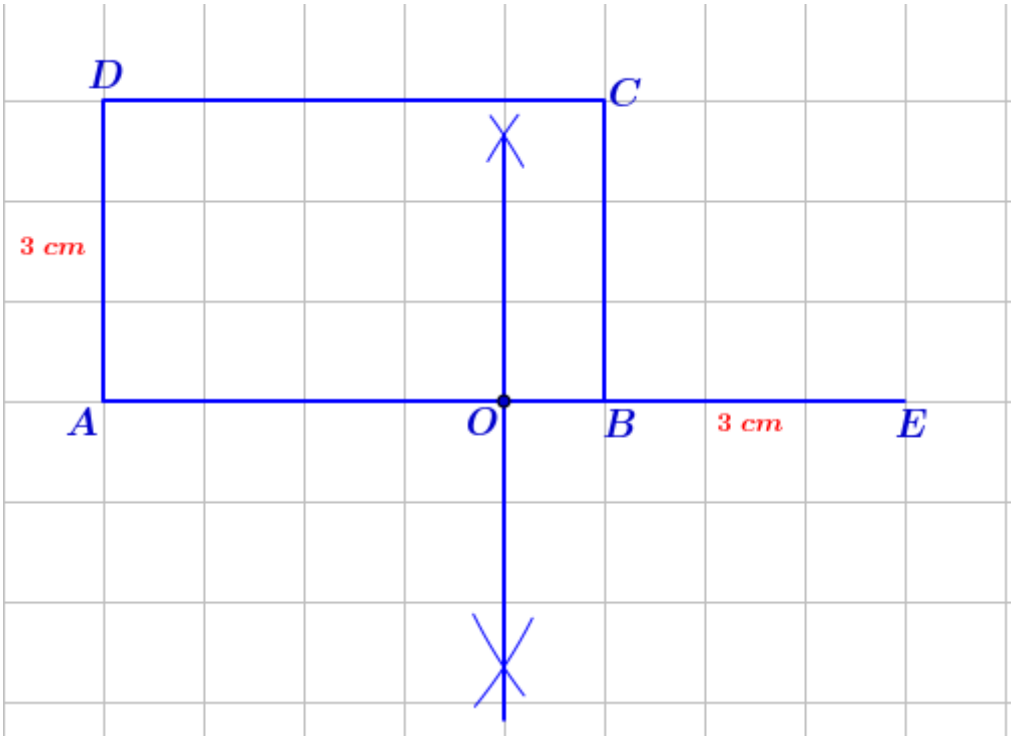
Step 1 : ***Draw a rectangle of width 5 cm and height 3 cm.***



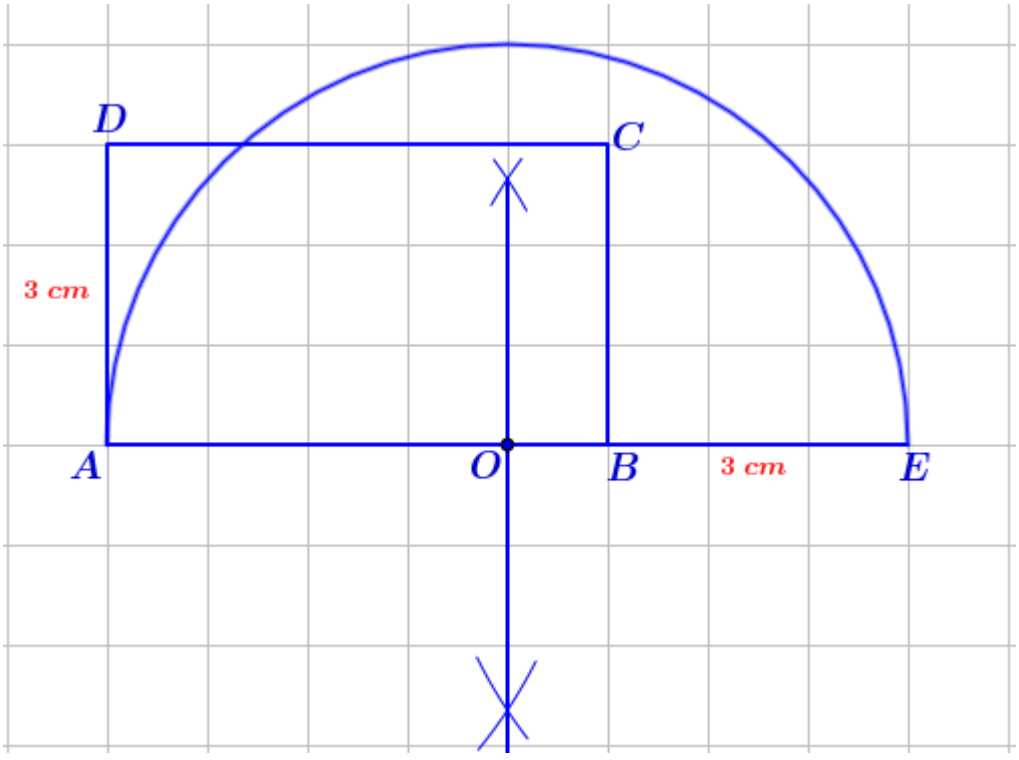
Step 2 : ***Extend the line AB by 3 cm.***



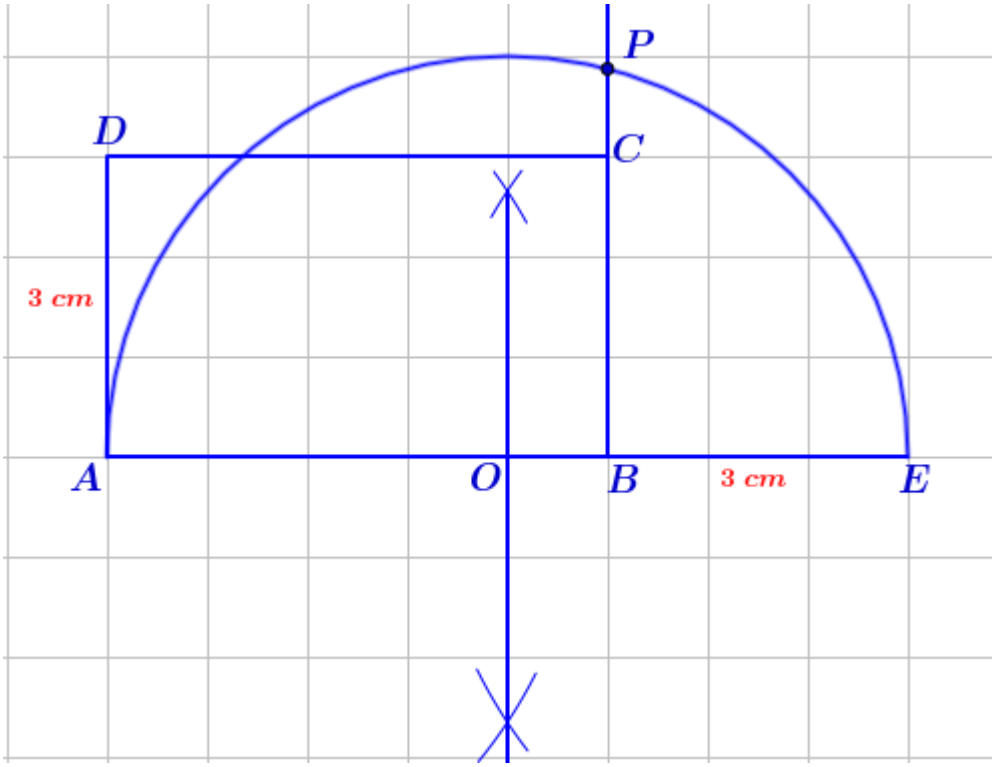
Step 3 : ***Find the midpoint (O) of the line AE .***



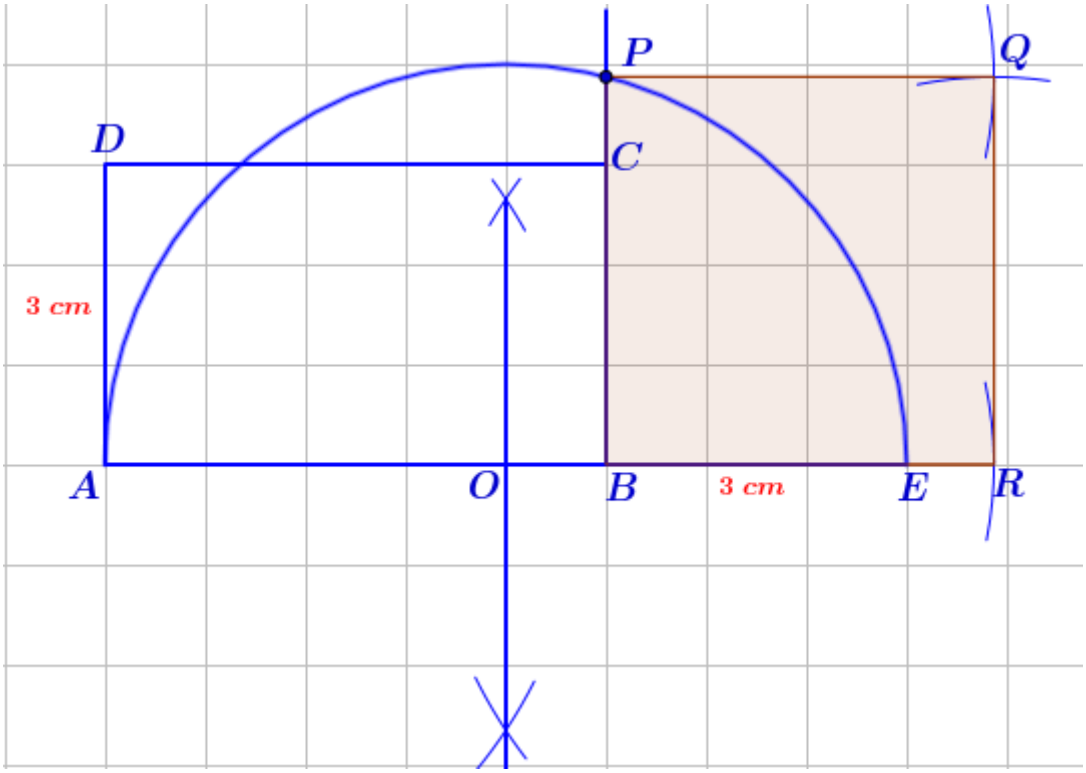
Step 4 : ***Draw a semicircle with O as centre and AE as diameter.***



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

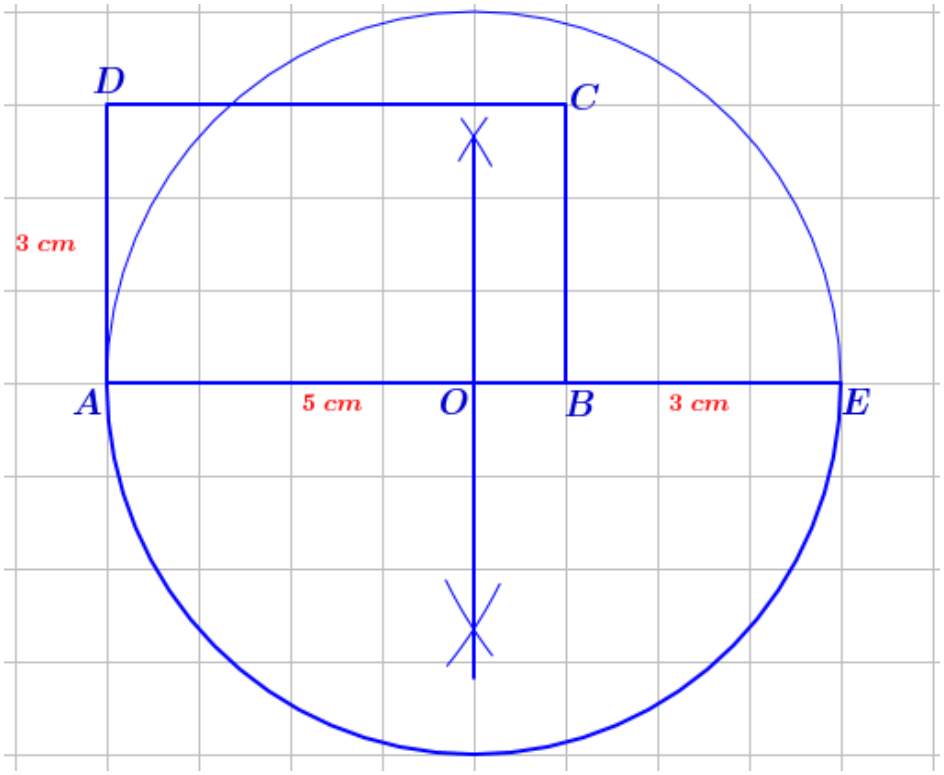


Step 6 : *Draw a square with BP as side.*

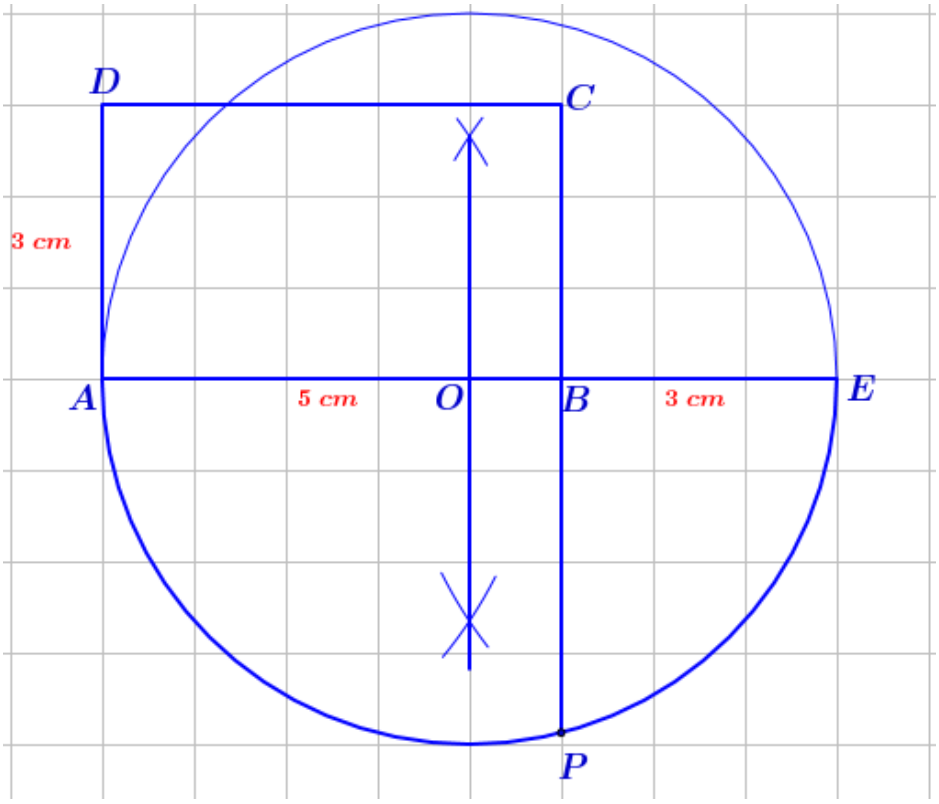


NOTE : ***We can complete this construction in another way also , instead of the steps*** **4 , 5 and 6**

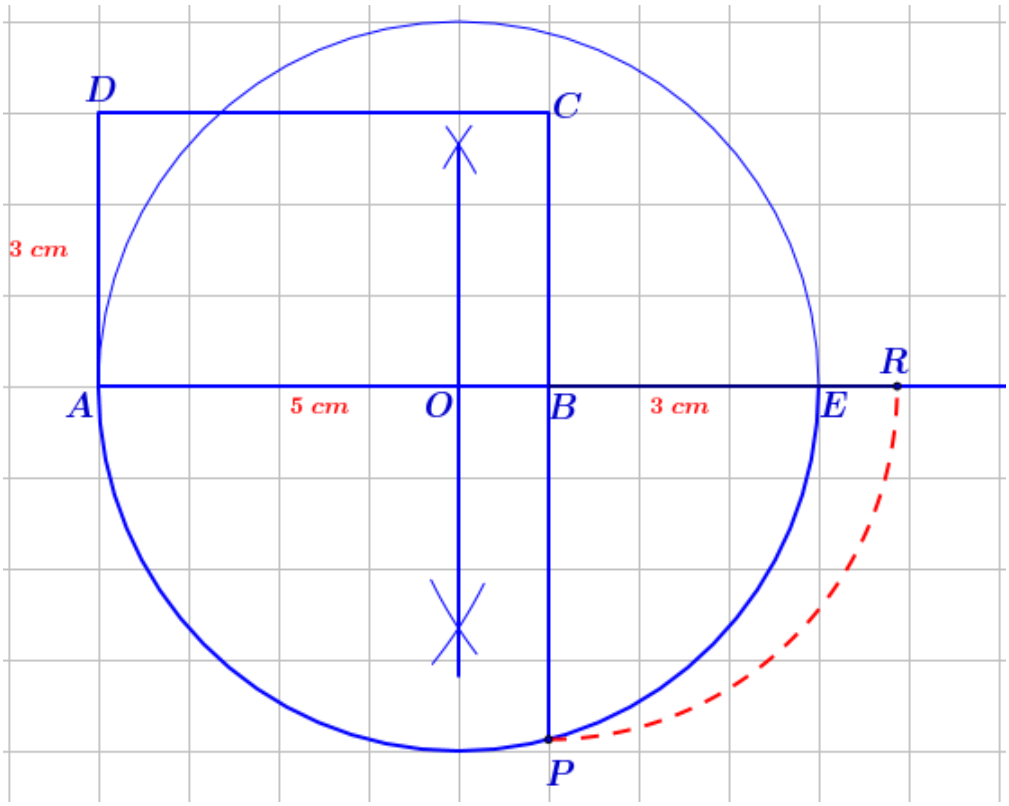
Step **4 :** ***Draw a circle with O as centre and AE as diameter.***



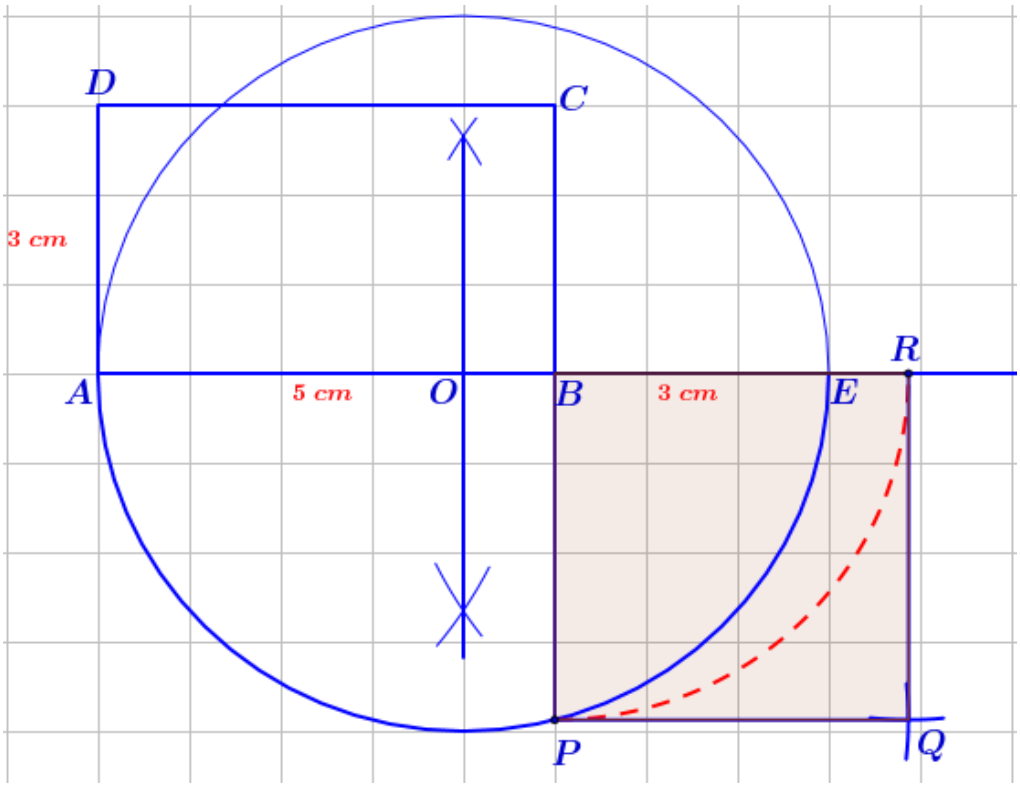
Step **5 :** ***Extend the line CB and it meets the circle at P .***



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

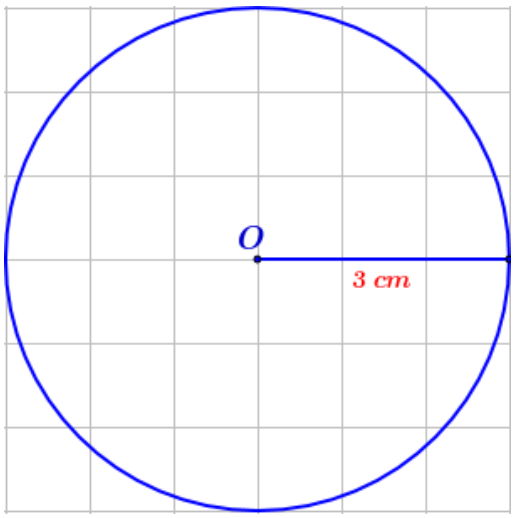
1. *Tangent through a point on a circle*

Learning objective :

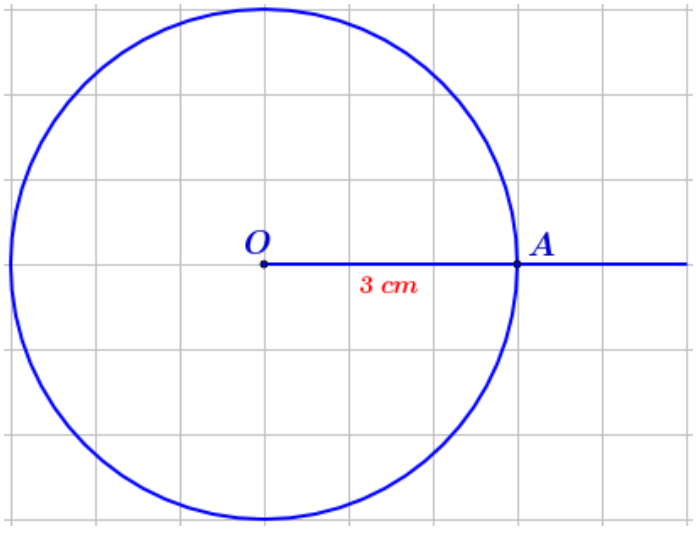
The tangent at a point on a circle is perpendicular to the diameter through that point.

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

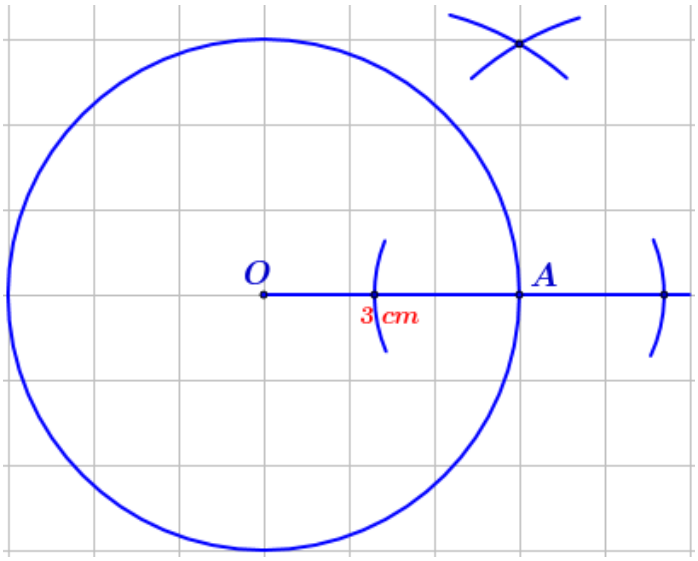
Step 1 : Draw a circle of radius 3 cm

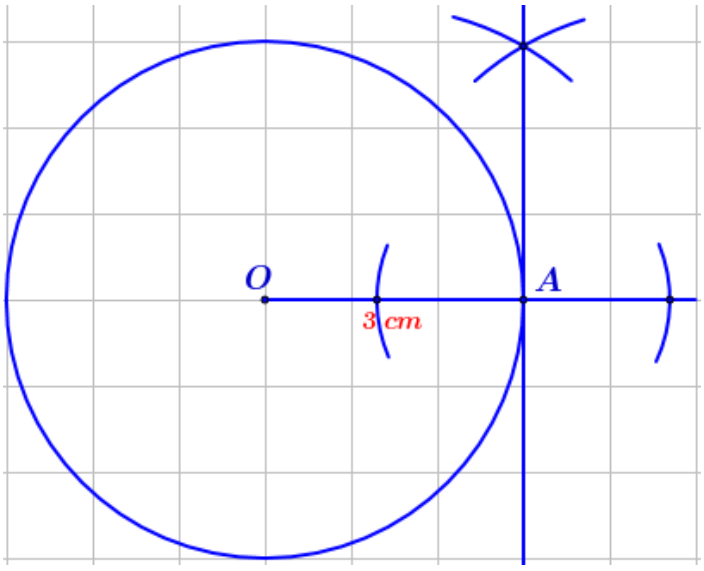


Step 2 : Extend the line OA to outside the circle .



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 .

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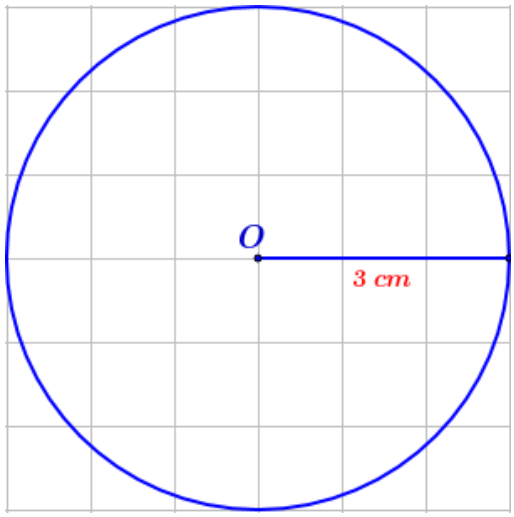
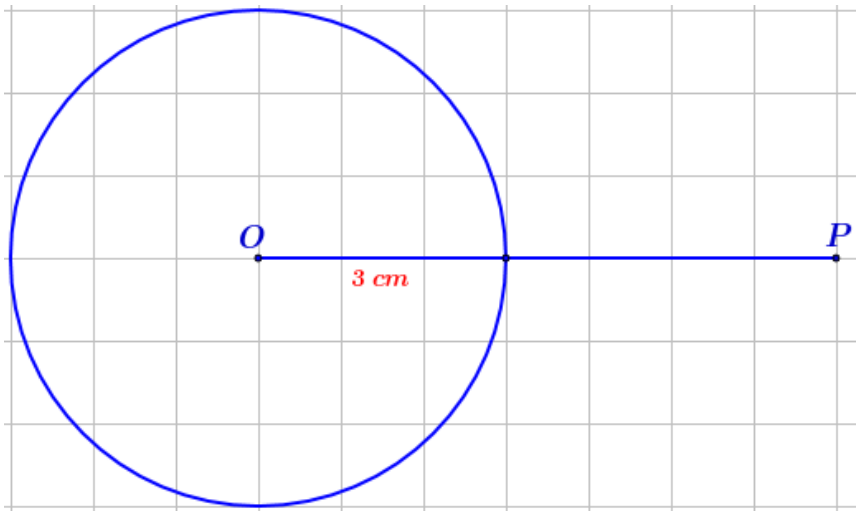
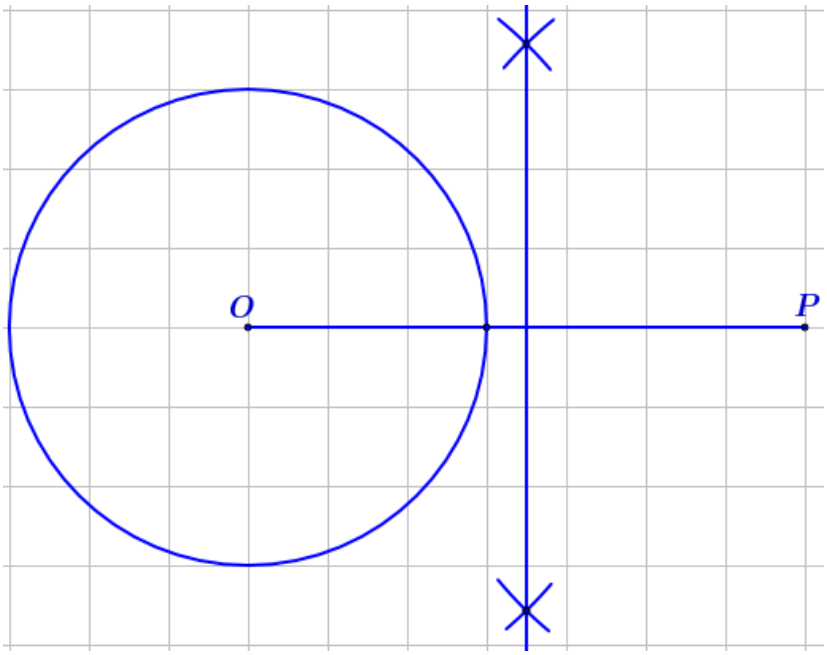


Step 2 : Mark a point P , 7 cm away from the centre of the circle .

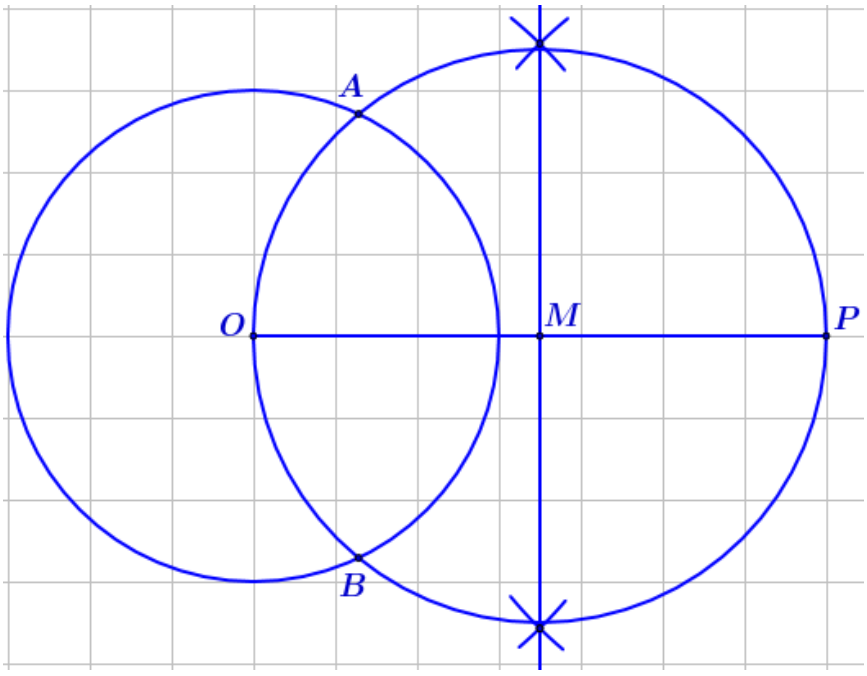


Step 3 : ***Draw the perpendicular bisector of the line OP .***

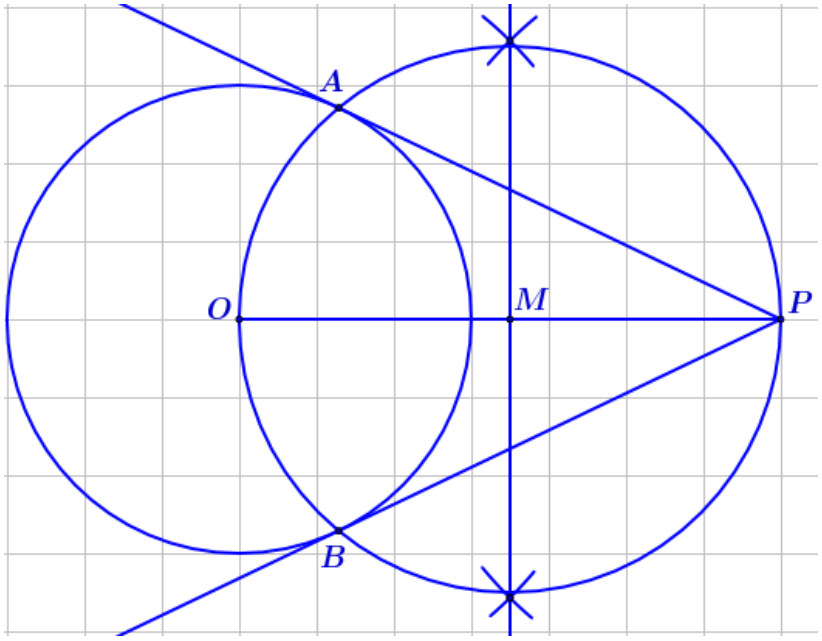


Step 4 : ***M is the midpoint of OP . Draw a circle with centre M and radius MO.***

The circles intersect at A and B .



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



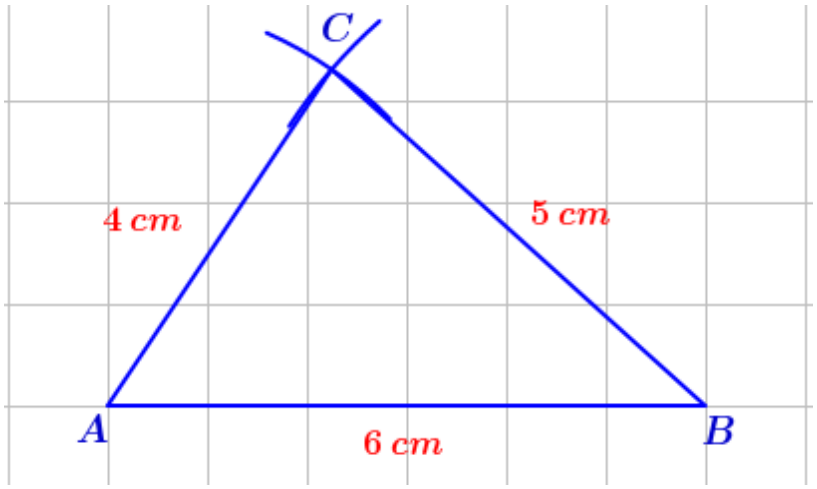
4 . *Incircle of a triangle* .

Learning objective :

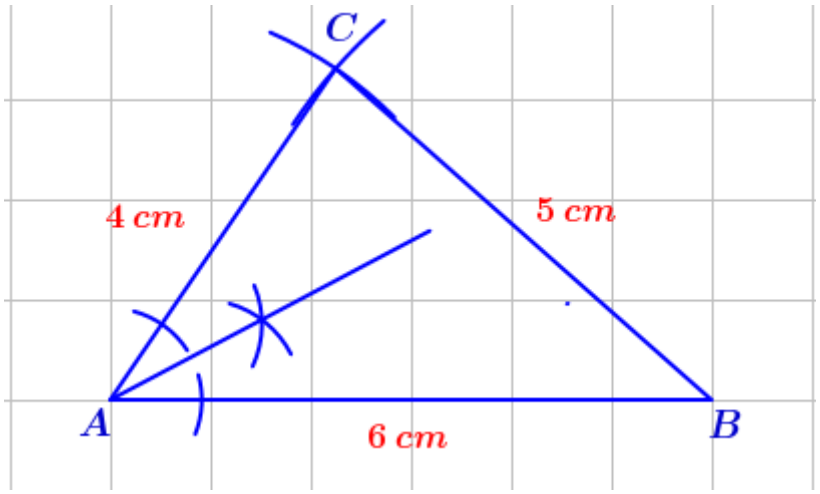
The bisectors of all three angles of a triangle meet at a point.

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

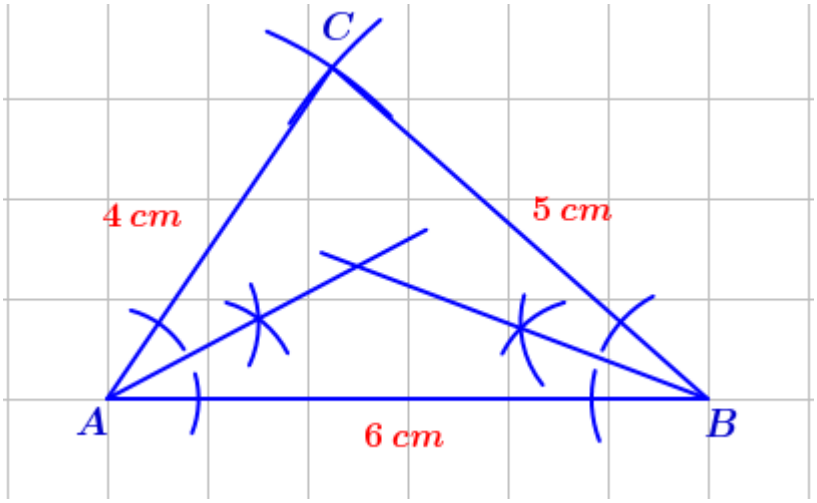
Step 1 : ***Draw a triangle of sides 4 cm , 5cm , 6cm .***



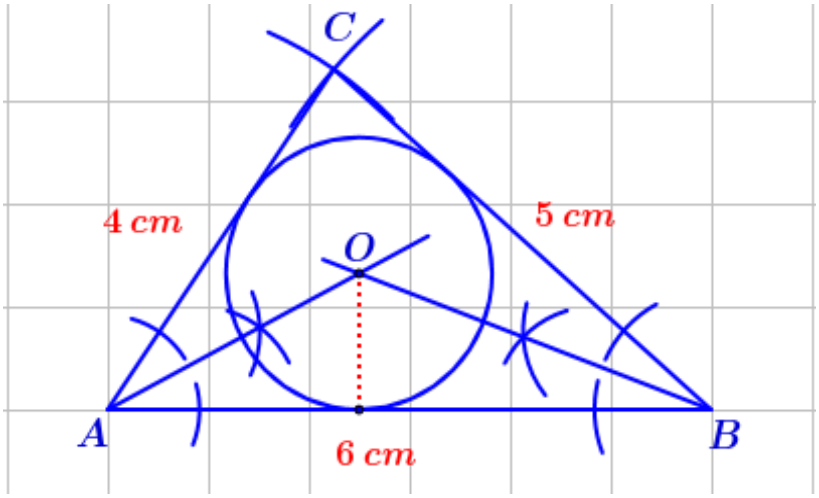
Step 2 : ***Draw the bisector of $< A$.***



Step 3 : ***Draw the bisector of $< B$.***



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



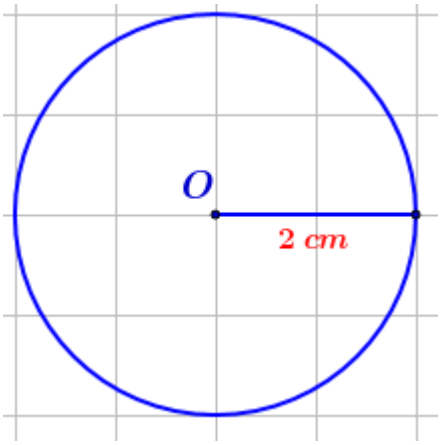
5. *Triangle with all its sides touching a circle.*

Learning objective :

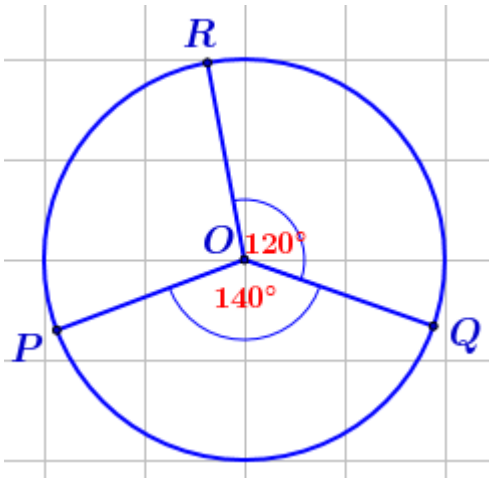
In a circle, the angles between the radii through two points and the angle between the tangents at these points are supplementary.

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

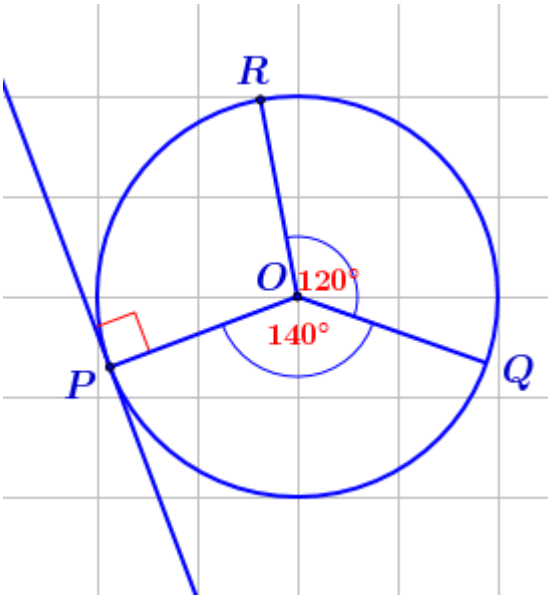
Step 1 : Draw a circle of radius 2 cm .



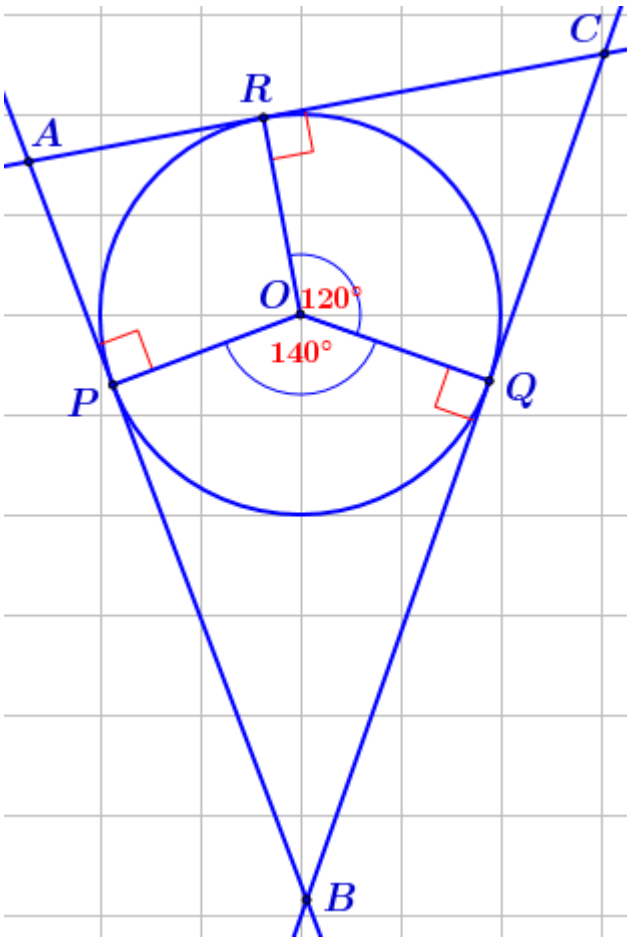
Step 2 : Draw angles of measure 140º , 120º and 100º among three consecutive radii.



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.



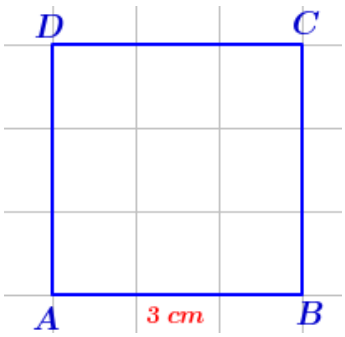
6 . *Construction of a rectangle having same area as that of a square.*

Learning objective :

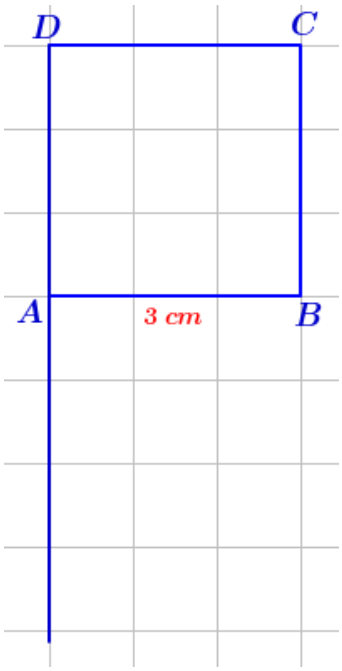
The product of an intersecting line and the part of it outside the circle is equal to the square of the tangent.

- ***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 ?***

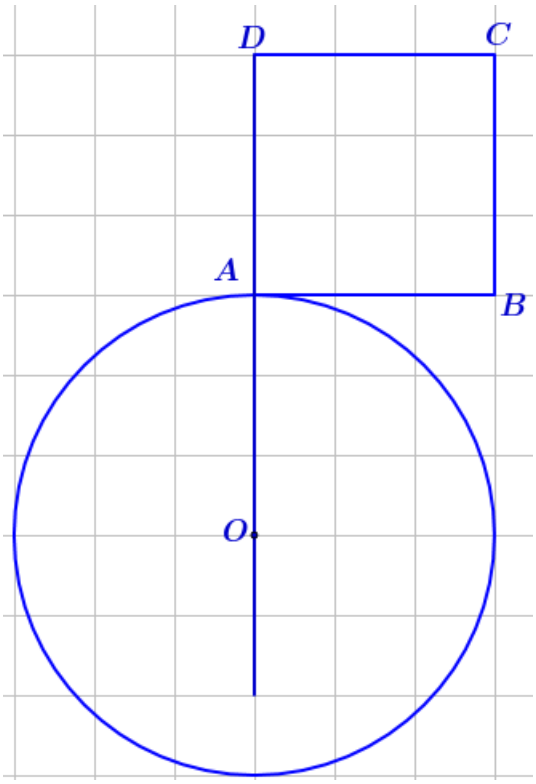
Step 1 : Draw a square of side 3 cm .



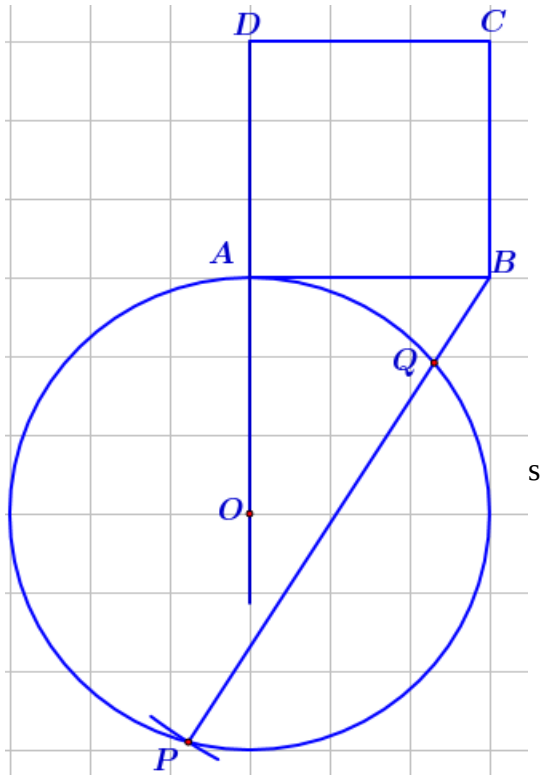
Step 2 : Extend the side DA downwards .



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

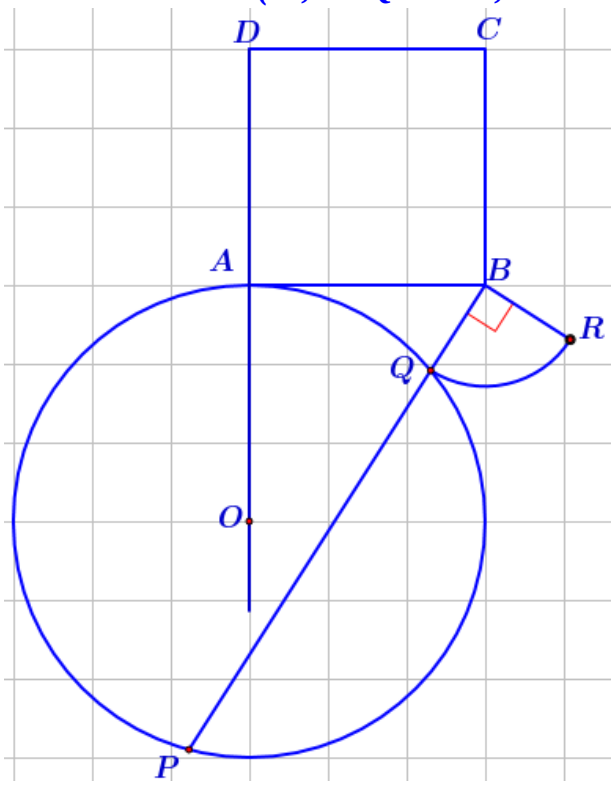


Step 4 : ***Draw a line of length 7 cm from B and this line meets the circle at the point the points P and Q .***



S

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 , < B = 90°)*



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