CONSTRUCTIONS - CIRCLES

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

Learning objective:

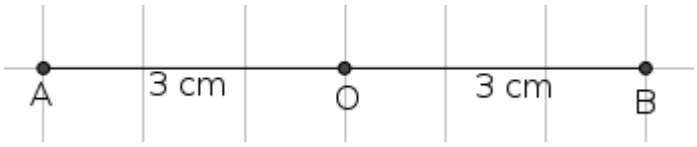
If we join the ends of a diameter of a circle to a point on the circle, we get a right angle.

ie,

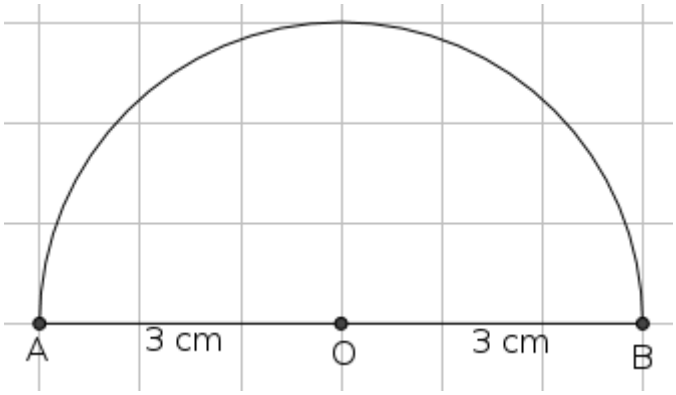
Angle in a semicircle is right.

- Draw a right angled triangle of hypotenuse 6 cm ?

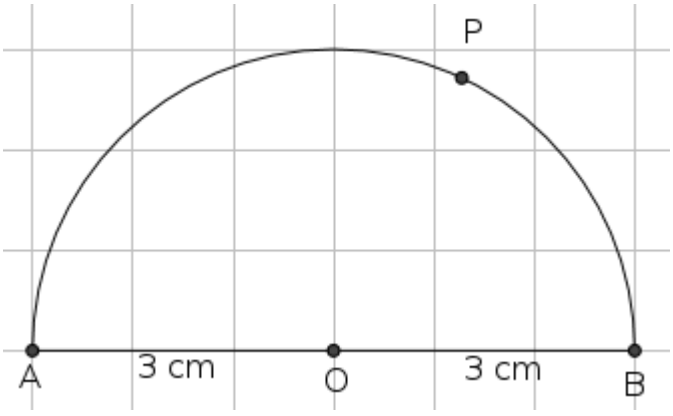
Step 1: Draw a line (AB) of length 6 cm .Find the midpoint (O) of AB.



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



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



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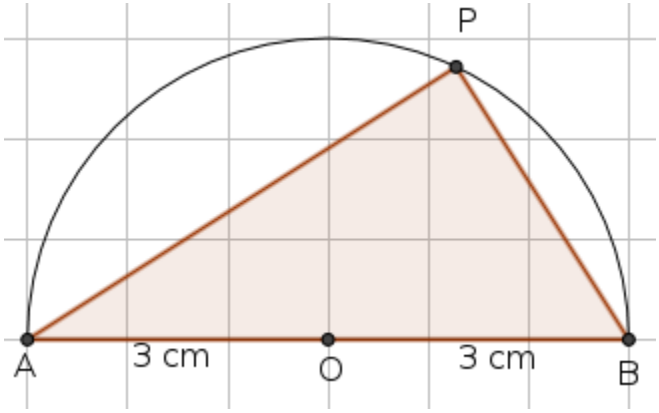
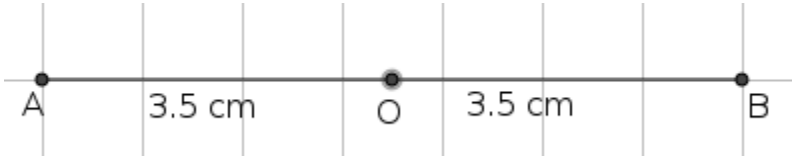
Step 4 : Draw the lines AP and BP .

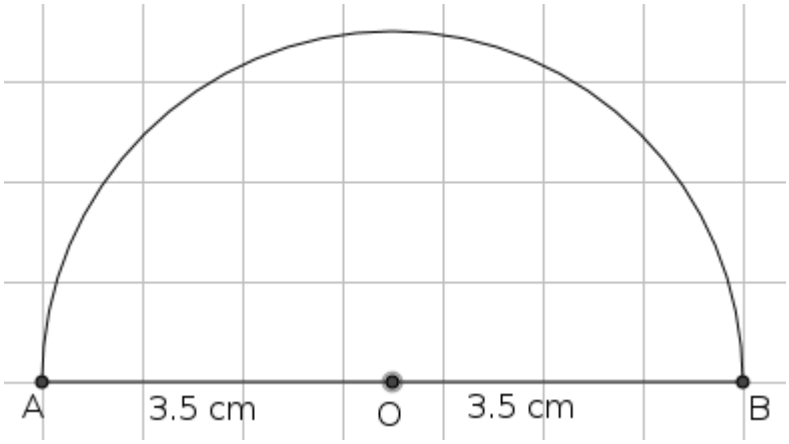


- Draw an isosceles right angled triangle of hypotenuse 7 cm ?

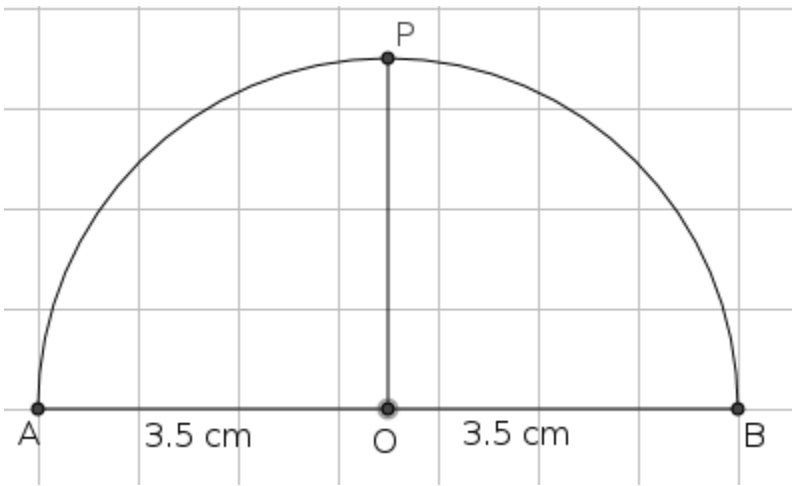
Step 1: Draw a line (AB) of length 7 cm .Find the midpoint (O) of AB.



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..



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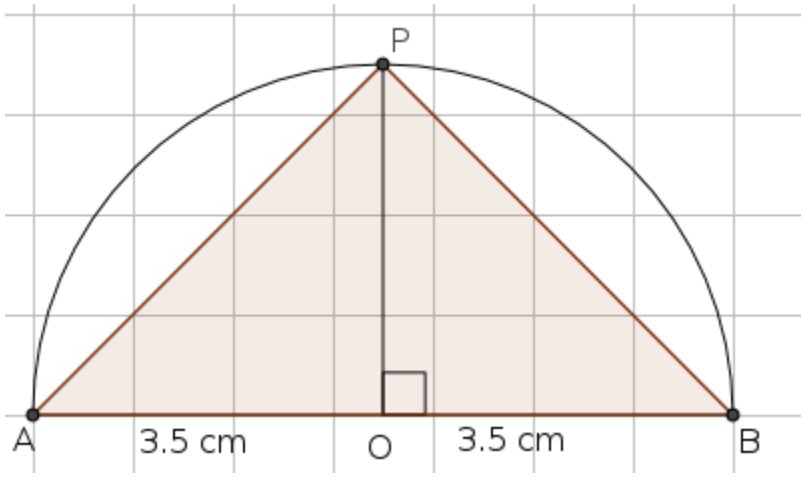
Step 4 : Draw the lines AP and BP.



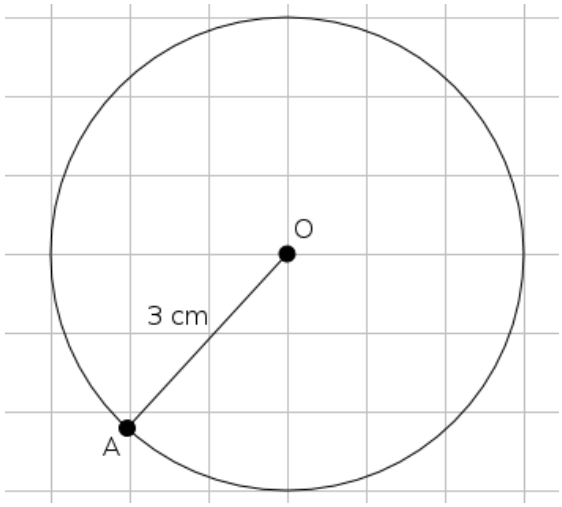
2.Construction of a triangle with given angles and circumradius .

Learning objective:

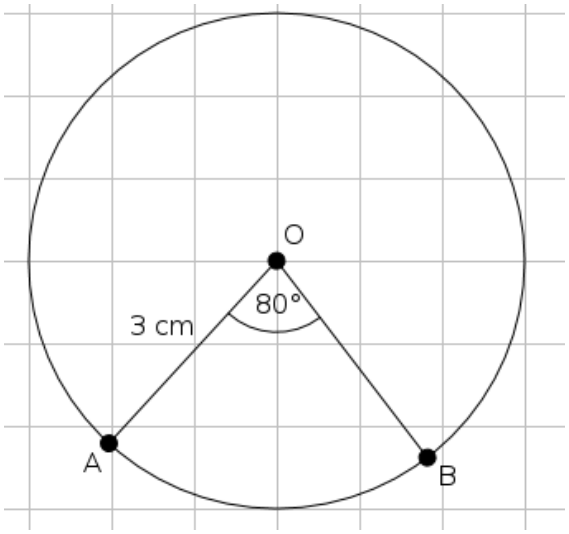
The angle made by any arc of a circle on the alternate arc is half the angle made at the centre.

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

Step 1:



Step 2:



Step 3:

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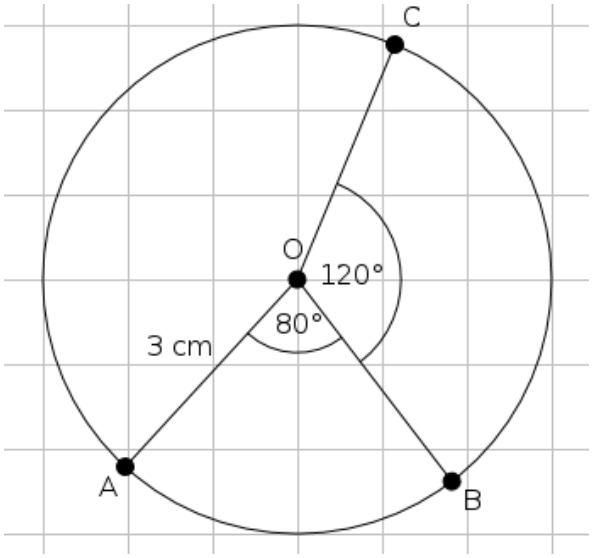
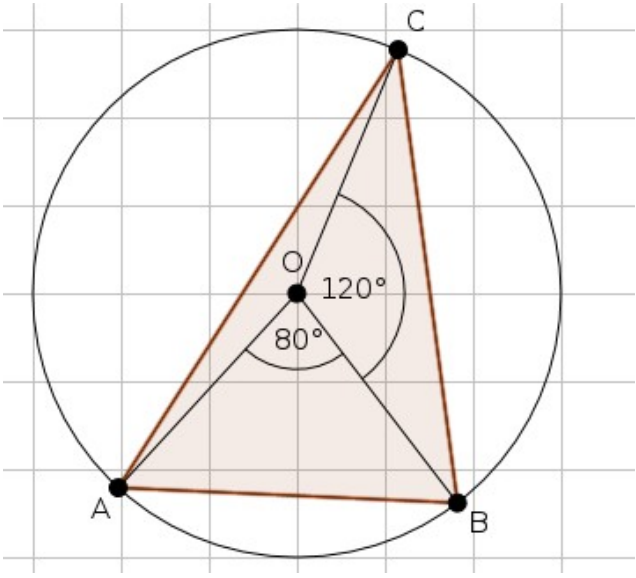


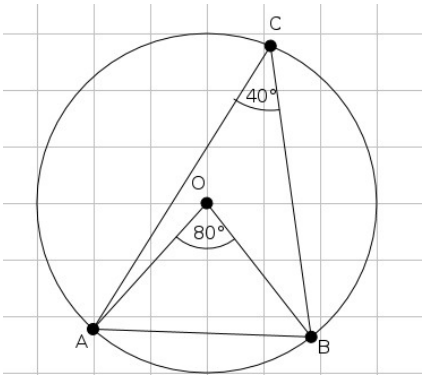
Step 4: Draw the lines AC and BC .



NB :

Draw a circle of given radius.

Take double the angles of the triangle at the centre consecutively.



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

Learning objective:

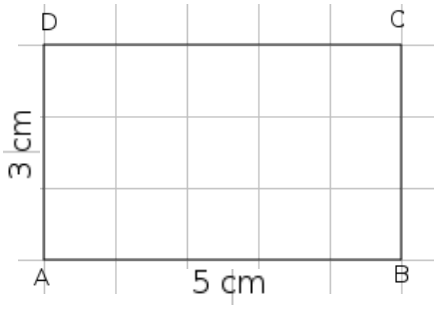
The product of the parts into which a diameter of a circle is cut by a perpendicular chord, is equal to the square of half the chord.

ie,

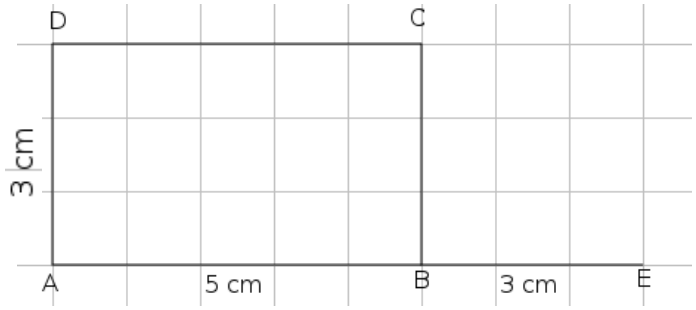
The area of the rectangle formed of parts into which a diameter of a circle is cut by a perpendicular chord is equal to the area of the square formed by half the chord.

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

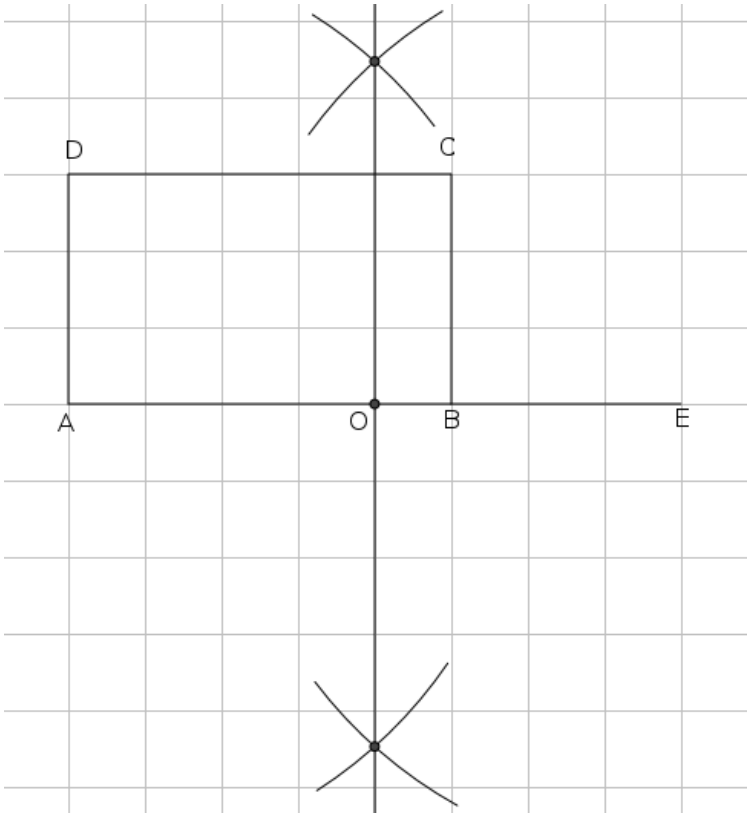
Step 1:



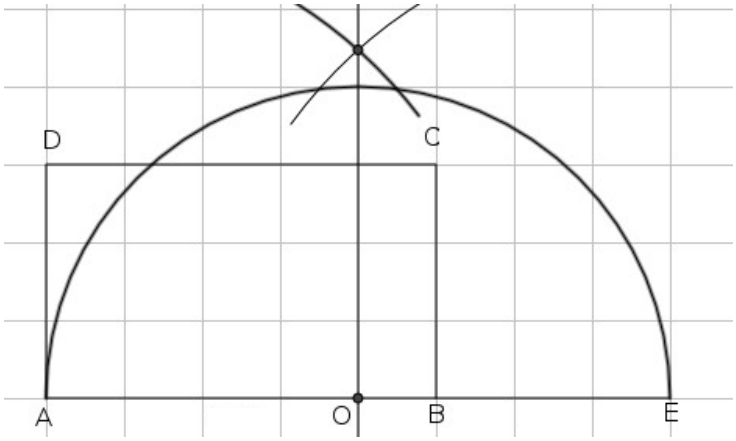
Step 2: Extend the line AB to outside by 3 cm.



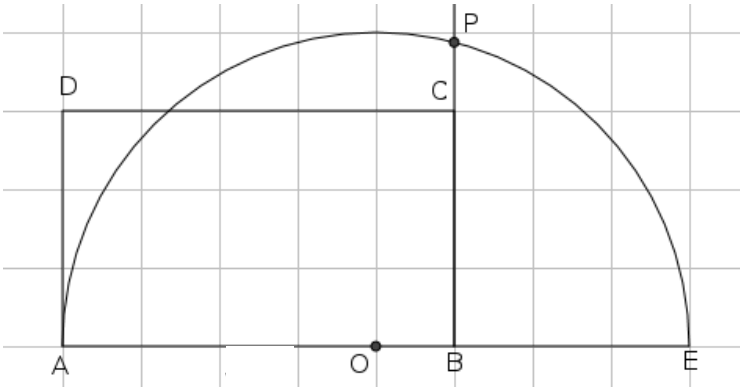
Step 3: Find the midpoint (O) of the line AE .



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 .



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Step 6 : Draw a semicircle with BP as side.

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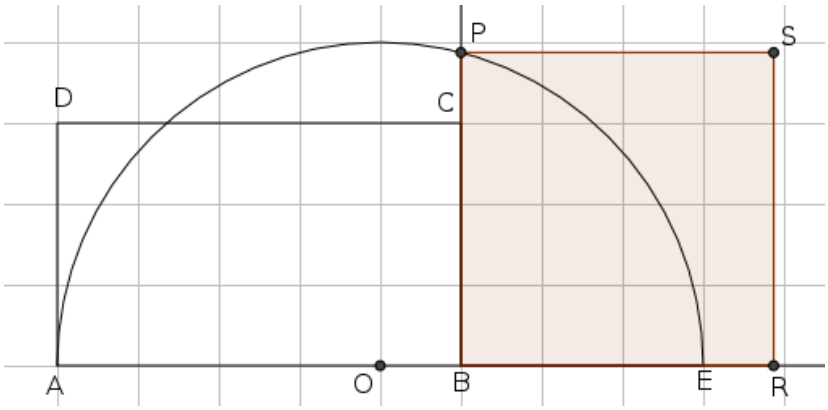


4. Construction of a rectangle of given area same as that of another rectangle. .

Learning objective:

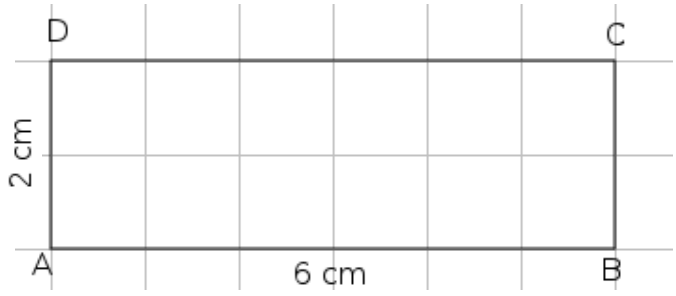
If two chords of a circle intersect within the circle, then the products of the parts of the two chords are equal.

ie,

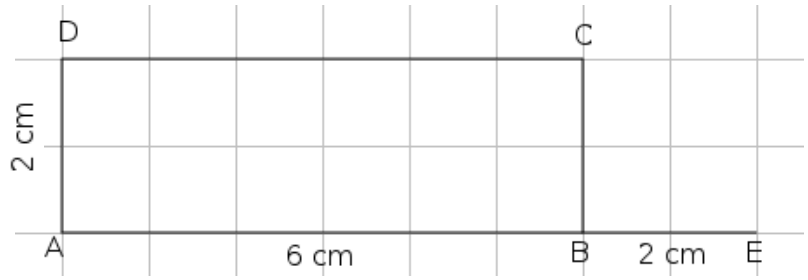
If two chords of a circle intersect within a circle, then the rectangles formed by the parts of the same chord have equal area.

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

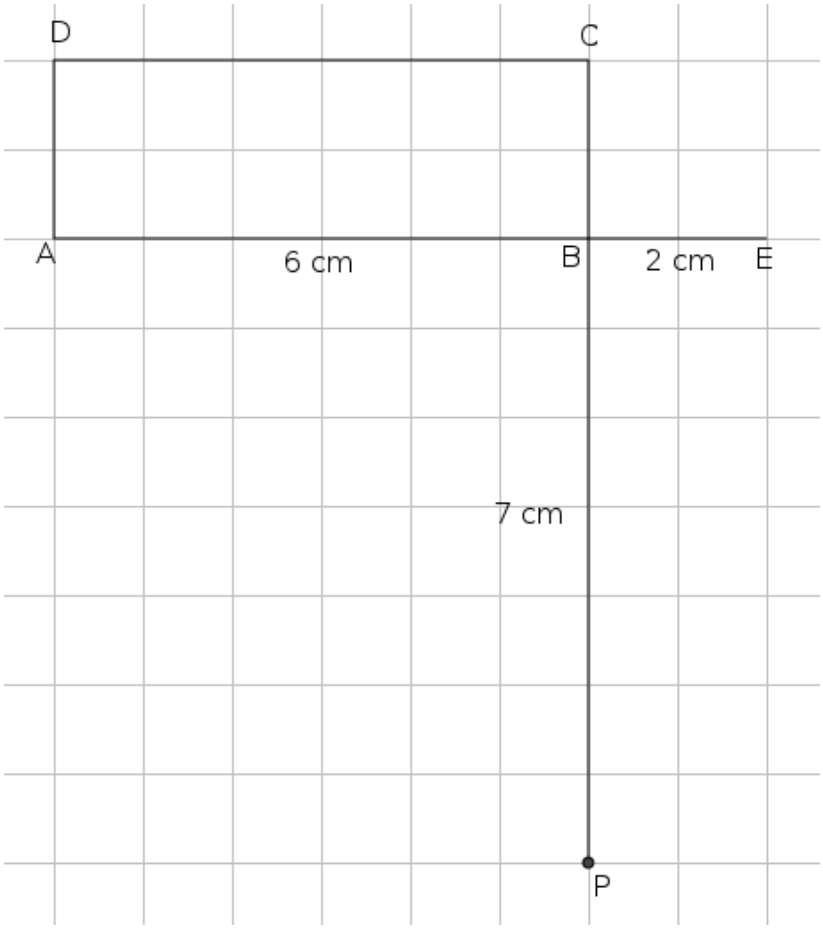
Step 1:



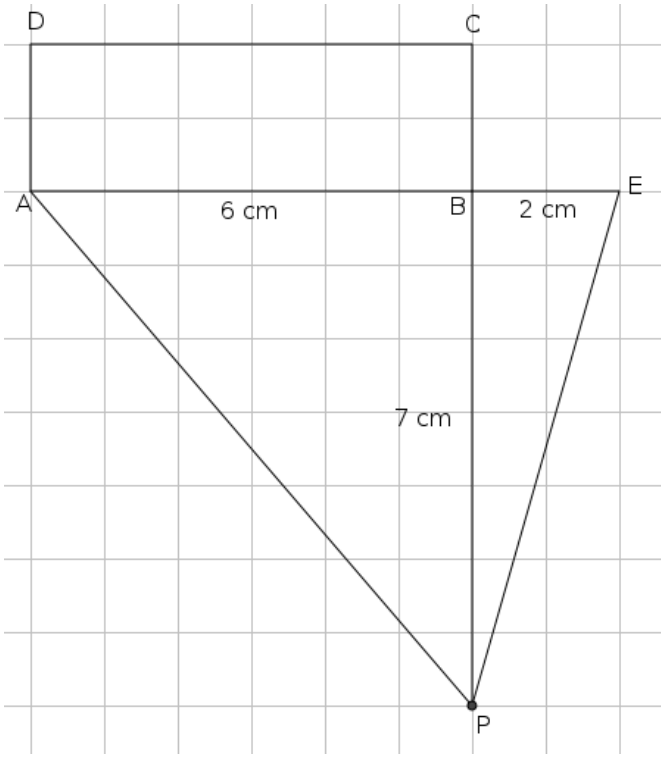
Step 2: Extend the line AB to outside by 2 cm.



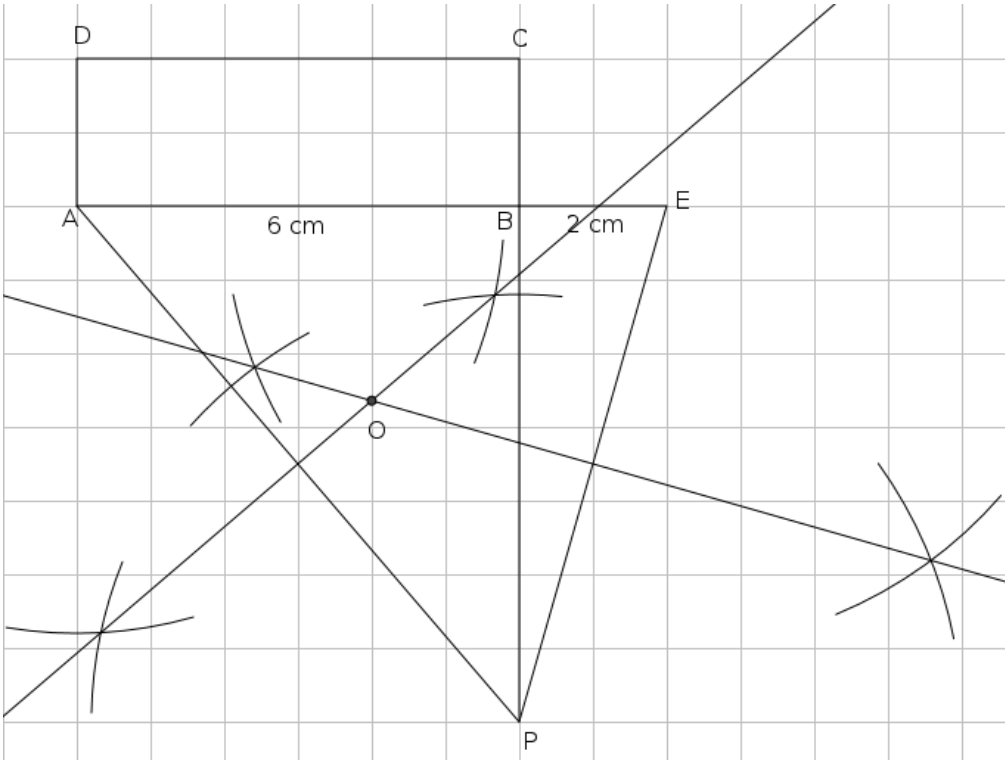
Step 3: Extend the line CB downwards by 7 cm. .



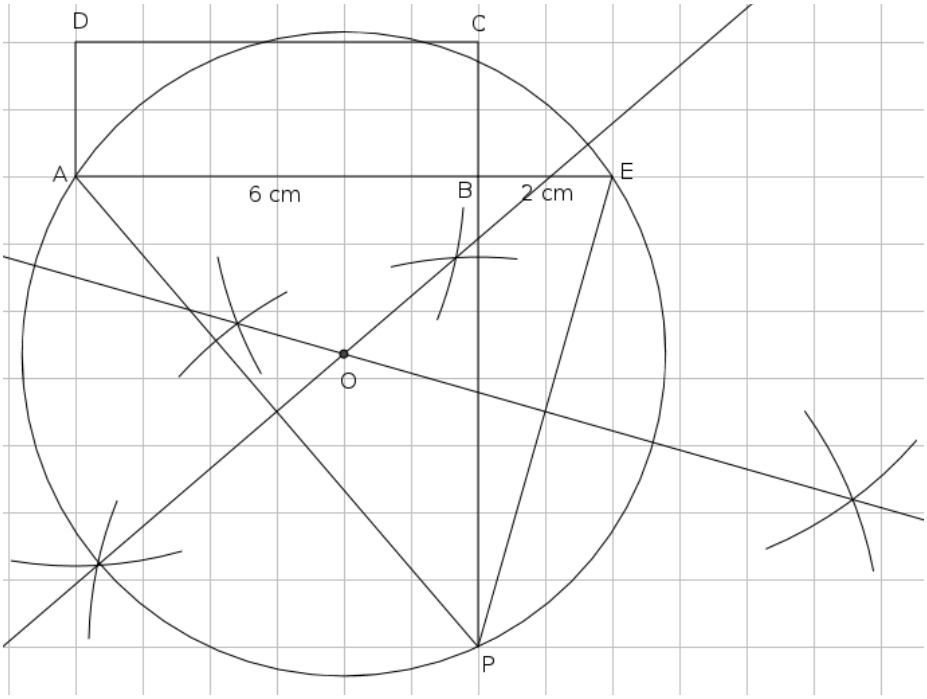
Step 4: Join the points A , E and P to form a triangle.



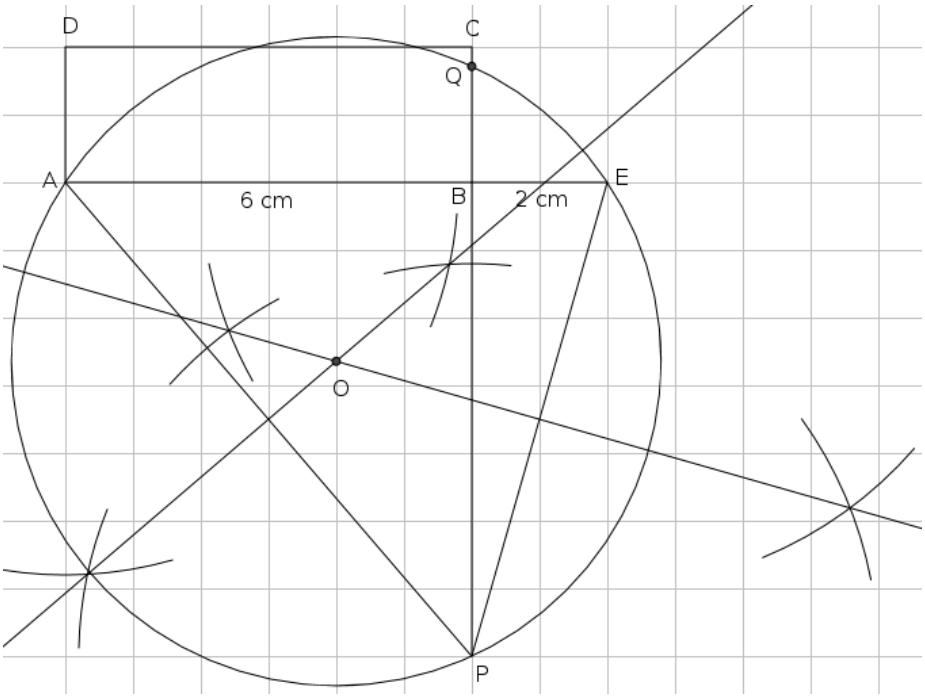
Step 5: Draw the perpendicular bisectors of the lines AP and DP . They intersect at O.



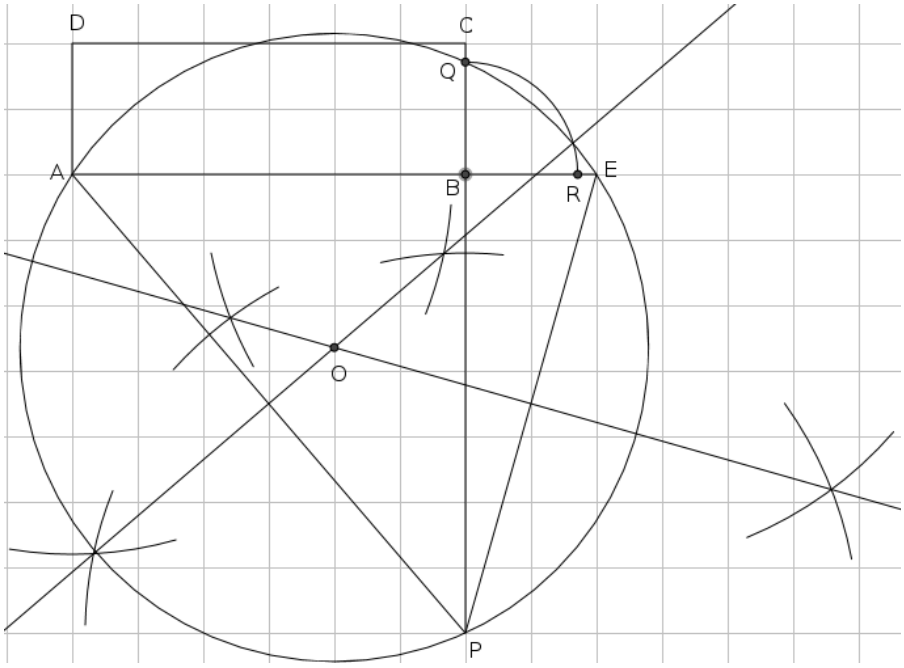
Step 6: Draw the circumcircle of the triangle AEP. The centre of the circumcircle is O.



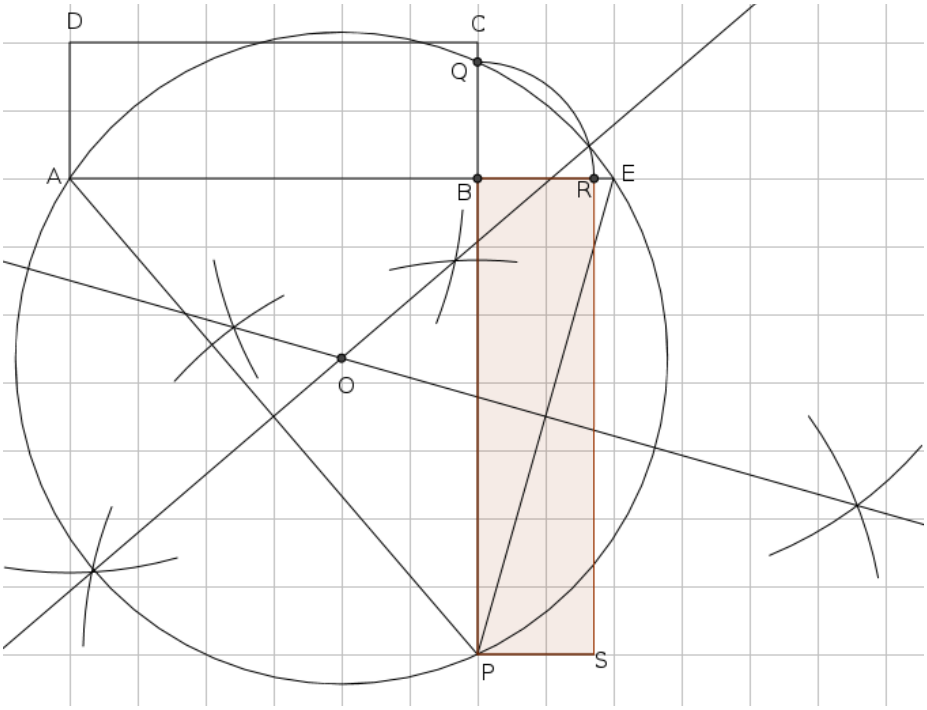
Step 7: The circumcircle meets the line BC at Q.



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.



(*for more reading / for more knowing)

5*. Construction of a square of given area same as that of a triangle.

Learning objective:

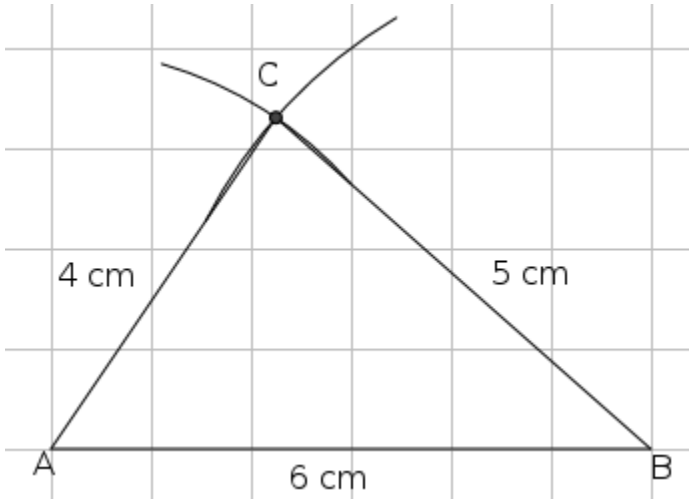
The product of the parts into which a diameter of a circle is cut by a perpendicular chord, is equal to the square of half the chord.

ie,

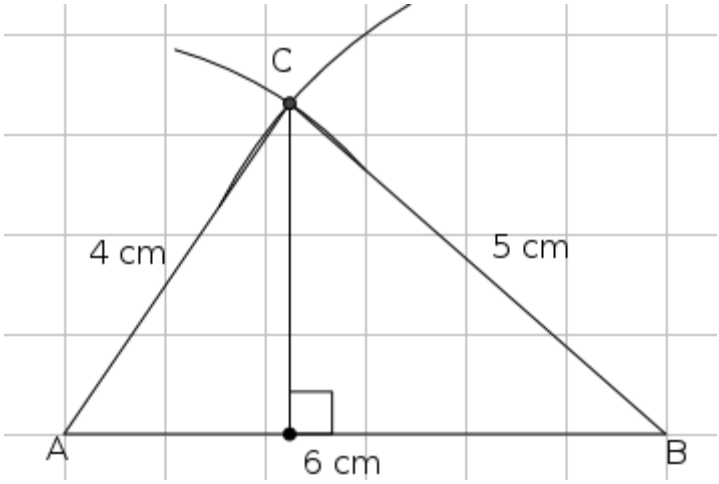
The area of the rectangle formed of parts into which a diameter of a circle is cut by a perpendicular chord is equal to the area of the square formed by half the chord.

Draw a triangle of sides 4, 5, 6 centimeters ? .Draw a square of the same area ?

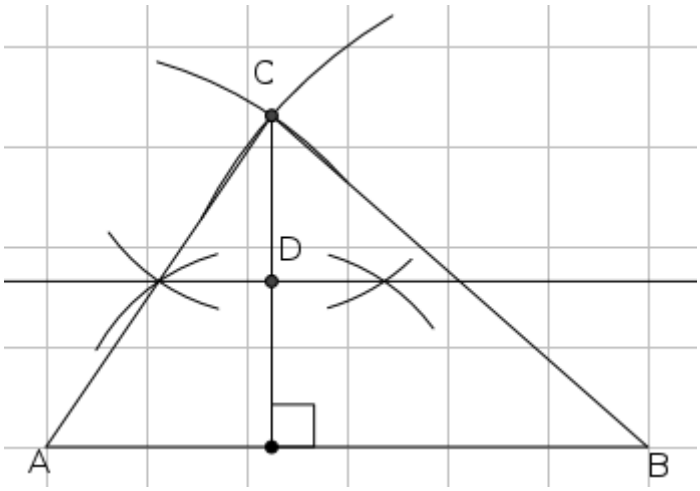
Step 1:



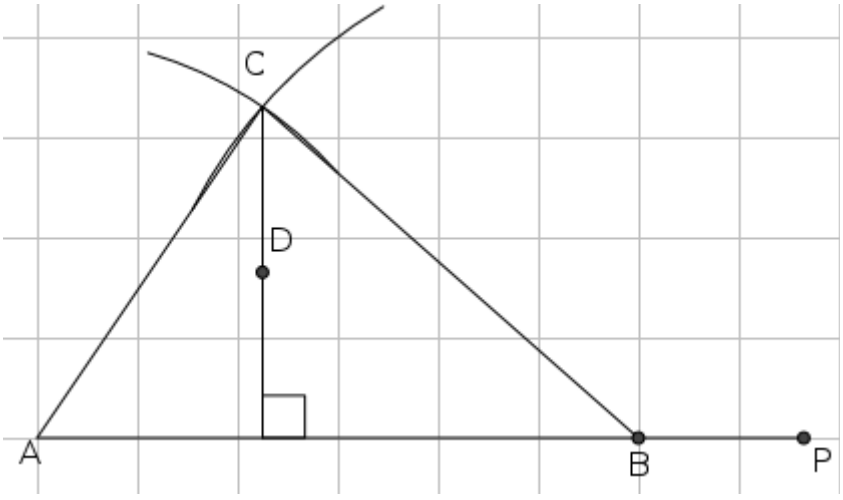
Step 2 : Draw a perpendicular from C to the side AB (altitude) .



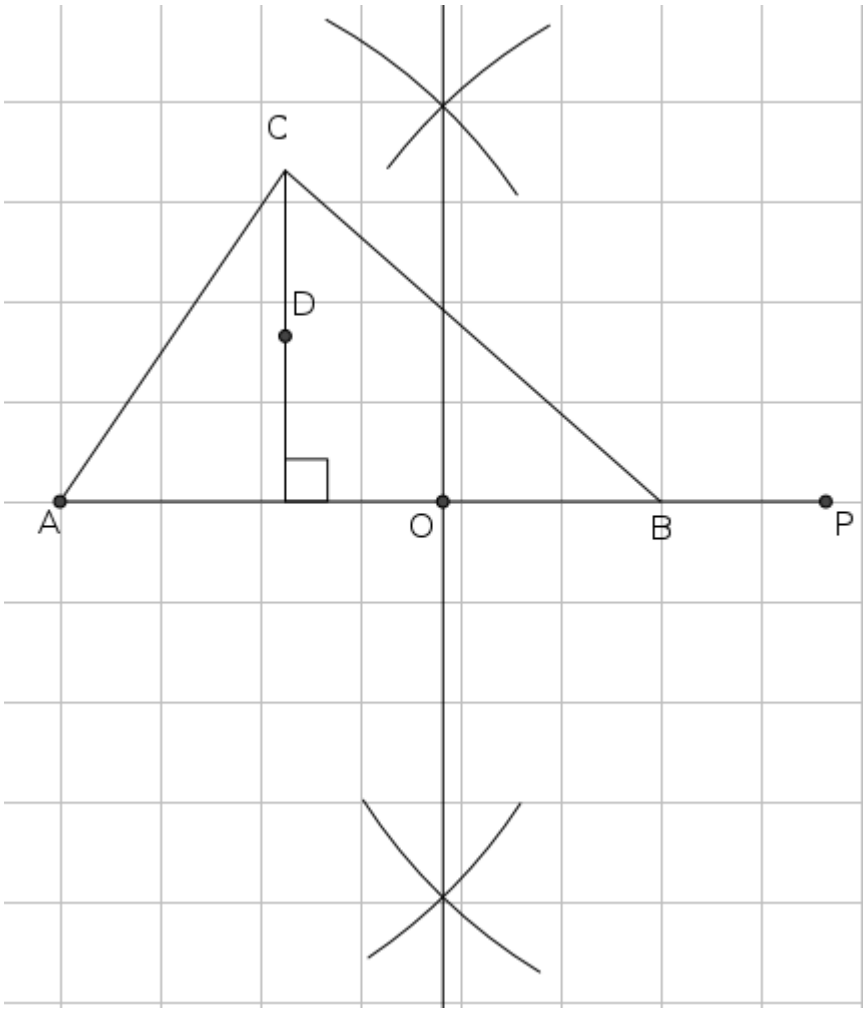
Step 3 : Find the midpoint (D) of the perpendicular (altitude).



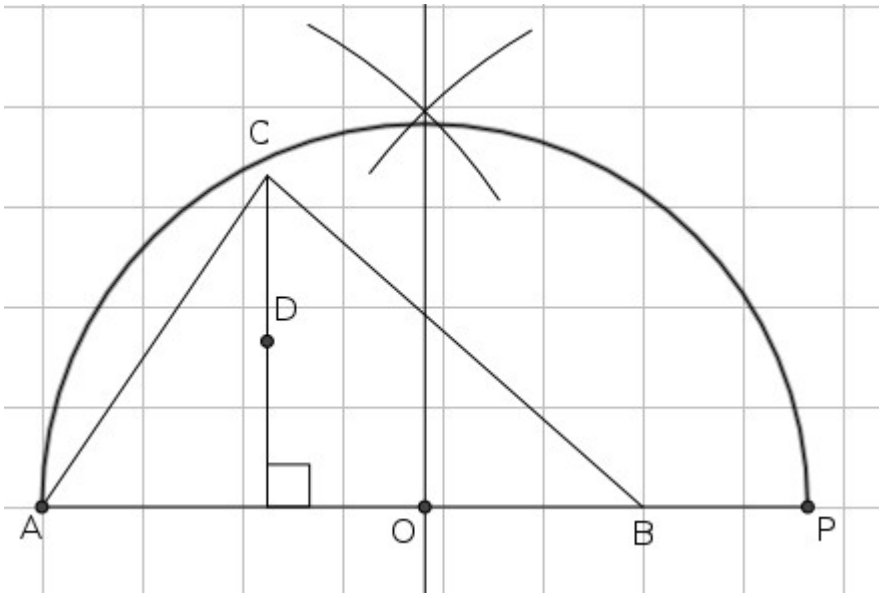
Step 4 : Extend the base (AB) by half the length of the altitude. (CD = BP)



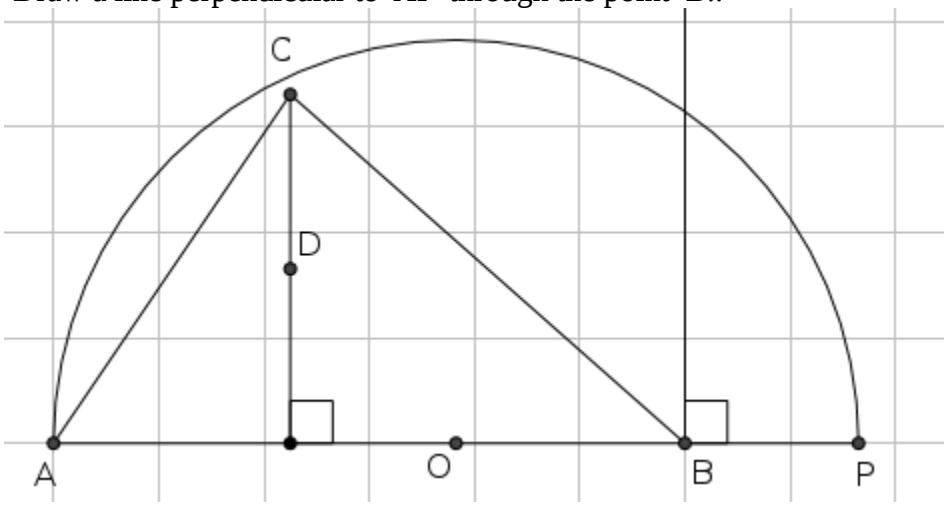
Step 5 : Find the midpoint (O) 0f the line AP.



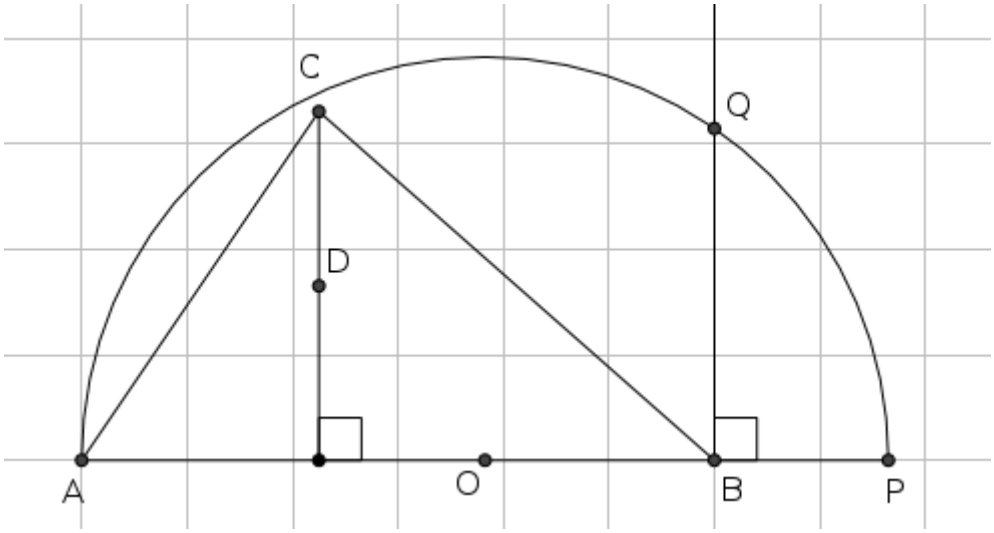
Step 6 : Draw a circle with O as centre and AP as diameter.



Step 7 : Draw a line perpendicular to AP through the point B..



Step 8 : The line perpendicular to AP through the point B meets the circle at Q .



Step 9 : Draw a square with BQ as side.