ONLINE MATHS CLASS- X - 15 (23 / 07 /2021)

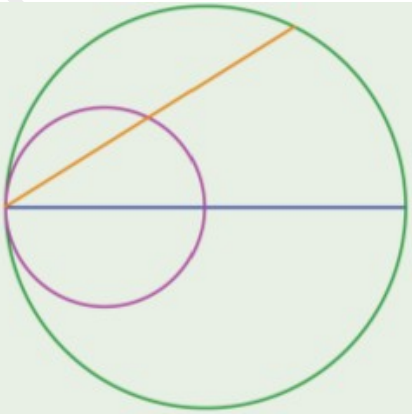
2 . CIRCLES – CLASS - 3

What did we study in the last class ?

- **If we join the ends of a diameter of a circle to a point on the circle , we get a right angle .**
- **Angle in a semicircle is right**
- **If a pair of lines drawn from the ends of a diameter of a circle are perpendicular to each other , then they meet on the circle .**

Activity 1

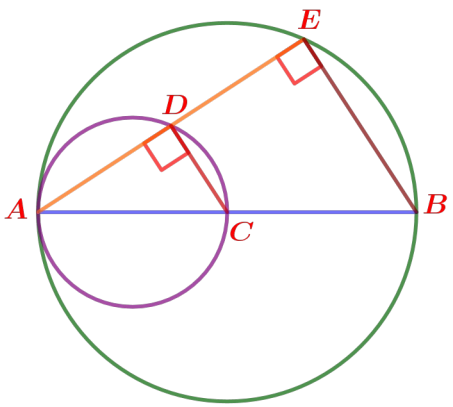
In the picture, a circle is drawn with a line as diameter and a smaller circle with half the line as diameter. Prove that any chord of the larger circle through the point where the circles meet is bisected by the small circle.



Answer.

In the figure C is the centre of the larger circle .

AC is the diameter of the smaller circle and AB is the diameter of the larger circle .The chord AE of the larger circle cuts the smaller circle at D



∠ ADC = ∠ AEB = 90º

(Angle in a semicircle is right)

==> The line CD is perpendicular to the chord AE .

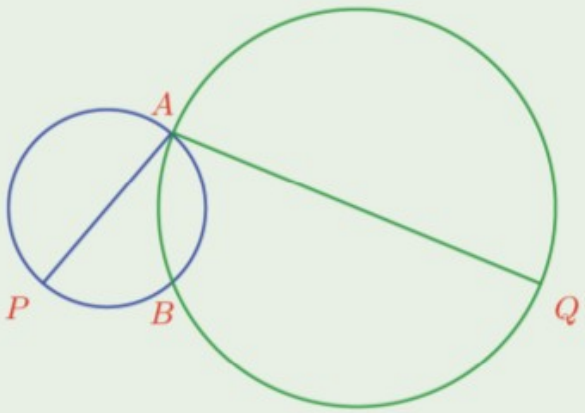
Therefore AD = DE (The perpendicular from the centre of a circle to a chord bisects the chord)

Points to be remember :

C is the centre of the larger circle and AE is a chord on it

Activity 2

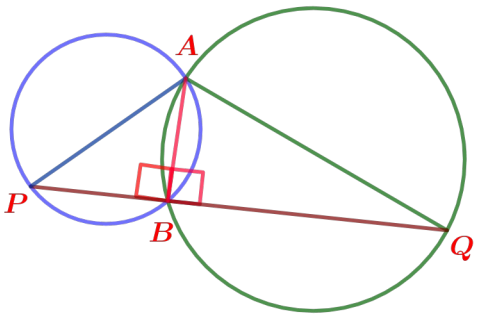
The two circles in the picture cross each other at A and B. The points P and Q are the other ends of the diameters through A.



i) Prove that P, B, Q lie on a line.

ii) Prove that PQ is parallel to the line joining the centres of the circles and is twice as long as this line.

Answer.



In the figure AP is the diameter of the smaller circle and AQ is the diameter of the larger circle .

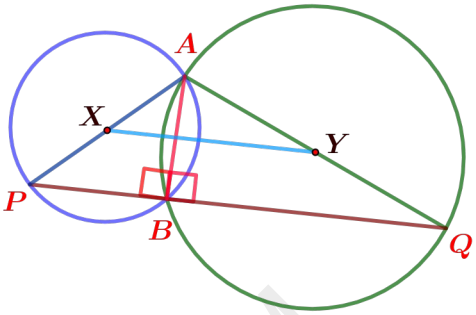
i) Join AB

∠ ABP = 90º (Angle in a semicircle of diameter AP)

Also ∠ ABQ = 90 º (Angle in a semicircle of diameter AQ)

P , B ,Q line on a line . (∠ ABP + ∠ ABQ = 90º + 90º = 180º , linear pair)

ii) If we take the centre of the smaller circle as X and that of the larger circle is Y , we have



AX = PX

AY = QY (Radii of a circle are equal)

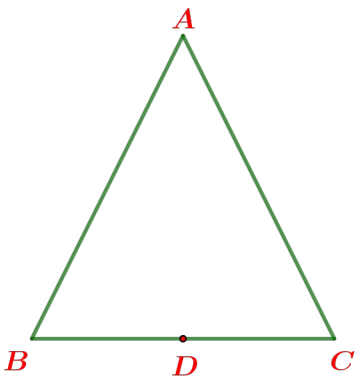
==> The line PQ is parallel to the side XY .

Also PQ = 2 x XY (The line joining the midpoints of any two sides of a triangle is parallel to its third side and the length of this line is half the length of the third side)

Activity 3

Prove that the two circles drawn on the two equal sides of an isosceles triangle as diameters pass through the mid point of the third side.

Answer .



In the figure AB = AC

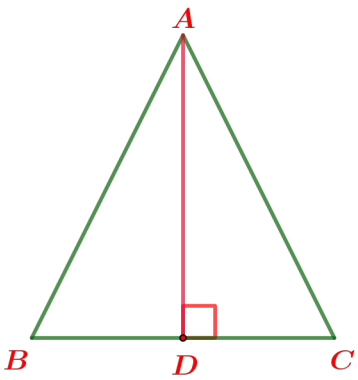
D is the midpoint of BC .

BD = CD

Join AD .

The triangles ABD and ACD are equal

(Since AB = AC , BD = CD , AD = AD)



== > ∠ ADB = ∠ ADC

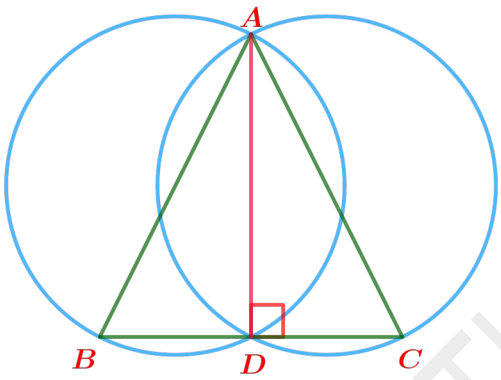
Also ∠ ADB + ∠ ADC = 180° (linear pair)

Therefore ∠ ADB = ∠ ADC = 90 °

==> So the circle with diameter AB passes through D .

(∠ ADB = 90 º , If a pair of lines drawn from the ends of a diameter of a circle are perpendicular to each other , then they meet on the circle)

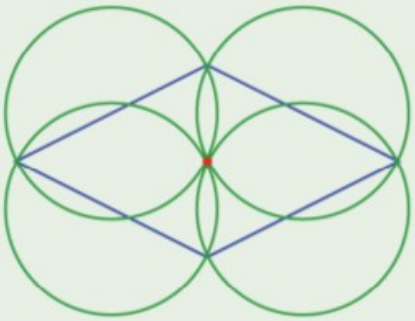
Similarly , the circle with diameter AC passes through D . (∠ ADC = 90 º)



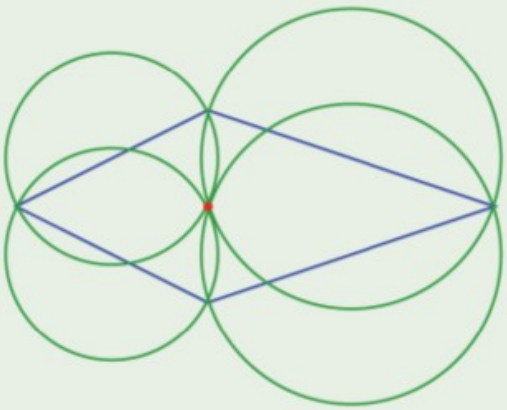
More activities (Text book page 43 , 44)

(3) If circles are drawn with each side of a triangle of sides 5 centimetres, 12 centimetres and 13 centimetres, as diameters, then with respect to each circle, where would be the third vertex?

(8) Prove that all four circles drawn with the sides of a rhombus as diameters pass through a common point.



Prove that this is true for any quadrilateral with adjacent sides equal, as in the picture.



(9) A triangle is drawn by joining a point on a semicircle to the ends of the diameter. Then semicircles are drawn with the other two sides as diameter.

Prove that the sum of the areas of the blue and red crescents in the second picture is equal to the area of the triangle.