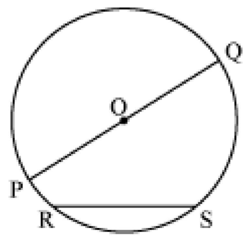
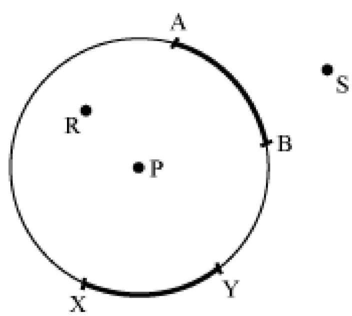
17. Circle - Chord and Arc

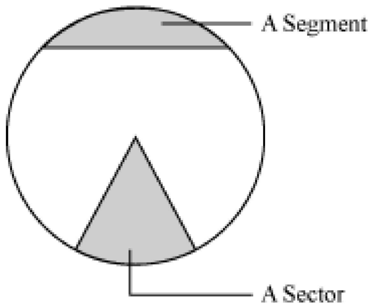
- **Circle:** Circle is a simple closed curve.



1. The fixed point O is the centre of the circle.
2. The fixed distance OP = OQ is the **radius** of the circle.
3. The distance around the circle is its **circumference**.
4. A line joining any two points on a circle is known as **chord**. In the given figure, RS and PQ are the chords.
5. The chord passing through the centre of a circle is called **diameter**. The diameter of a circle divides it into two semicircles.
6. The diameter of a circle is the longest chord of the circle and it is twice the radius.
7. The portions on a circle are known as arcs. In the figure, XY and AB are arcs.

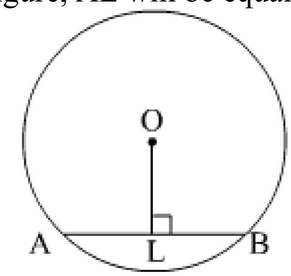


8. The region in the interior of a circle enclosed by a chord and an arc is known as **segment.**
9. The region in the interior of a circle enclosed by an arc on one side and a pair of radii on the other side is called **sector.**



- Perpendicular drawn from the centre of a circle to a chord bisects the chord.

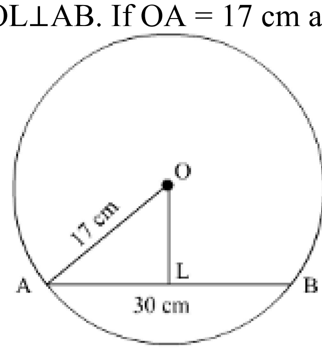
  In the given figure, AL will be equal to LB if OL ⊥ AB, where O is the centre of the circle.



  Converse of this property also holds true, which states that the line joining the centre of the circle to the mid-point of a chord is perpendicular to the chord.

Example:

In the given figure, OL⊥AB. If OA = 17 cm and AB = 30 cm then find the length of OL.

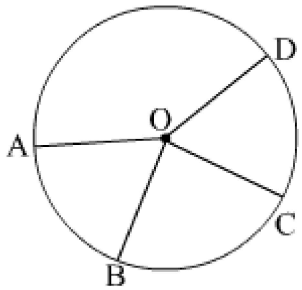


Solution:

We know that the perpendicular drawn from the centre of a circle to a chord bisects the chord.
∴ AL = BL = 15 cm
Now in right-angled triangle OLA, using Pythagoras theorem
$(OA)^2 = (OL)^2 + (AL)^2$
$\Rightarrow (17)^2 = (OL)^2 + (15)^2$
$\Rightarrow (OL)^2 = (17)^2 - (15)^2$
$\Rightarrow (OL)^2 = 289 - 225$
$\Rightarrow OL = \sqrt{64}$
∴ OL = 8 cm

- Congruent arcs subtend equal angles at the centre of the circle.

  In the given figure, ∠AOB will be equal to ∠COD if arcs AB and CD are congruent.



Converse of the property is also true, which states that two arcs subtending equal angles at the centre of the circle are congruent.