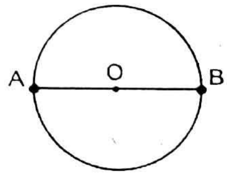
**Diameter**

The Chord passing through the centre of the circle is called diameter of the circle. Evidently diameter bisects a circle.




In figure $\overline{AB}$ is diameter of the circle.

**Segment of the Circle**

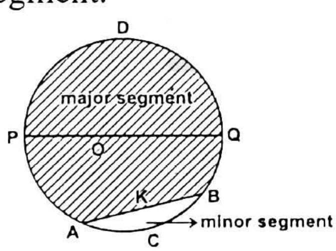
The circular region bounded by an arc and a corresponding chord is called segment of the circle. Evidently any chord divides a circle into two segments. There are two types of segments.

**i. Major Segment**

The circular region bounded by a major arc and a corresponding chord is called major segment.

**ii. Minor Segment**

The circular region bounded by a minor arc and a corresponding chord is called minor segment.




In figure the bigger area shown by slanting line segments is the major segment whereas the smaller area shown by shading is the minor segment.

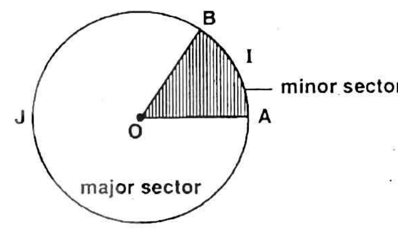
**Sector of a Circle**

A sector of a circle is the plane figure founded by two radii and the arc intercepted between them. Any pair of radii divides a circle into two sectors.

i. Major Sector

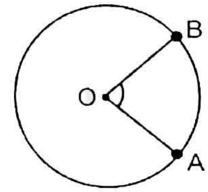
ii. Minor Sector

In the figure OAIB is the minor sector, whereas OAJB is the major sector of the circle.




**Central Angle**

An angle whose vertex is at the centre of the circle and its arms meet at the end points of an arc is called central angle.




In figure $\angle AOB$ is the central angle of a circle.

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## THEOREM 1

**One and only one circle can pass through three non-collinear points.**

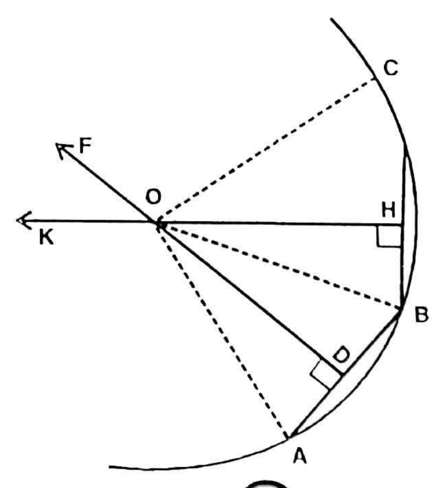
**Given:** A, B and C are three non collinear points in a plane.

**To prove:** One and only one circle can pass through three non-collinear points A, B and C.

**Construction:** Join A with B and B with C.

Draw $\overline{DF} \perp$ bisector to $\overline{AB}$ and $\overline{HK}$ $\perp$ bisector to $\overline{BC}$.

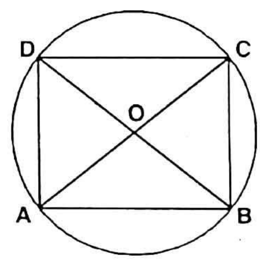
So, $\overline{DF}$ and $\overline{HK}$ are not parallel and they intersect each other at point O. Also join A, B and C with point O.



**Proof:**

| Statements | Reasons |
|---|---|
| Every point on $\overline{DF}$ is equidistant from A and B. | $\overline{DF}$ is ⊥ bisector to $\overline{AB}$ (construction) |
| In particular $m\overline{OA} = m\overline{OB}$ ...............(i) | |
| Similarly every point on $\overline{HK}$ is equidistant from B and C. | $\overline{HK}$ is ⊥ bisector to $\overline{BC}$ (construction) |
| In particular $m\overline{OB} = m\overline{OC}$ ...............(ii) | |
| Now O is the only point common to $\overline{DF}$ and $\overline{HK}$ which is equidistant from A, B and C. | |
| i.e., $m\overline{OA}=m\overline{OB}=m\overline{OC}$ | Using (i) and (ii). |
| However there is no such other point except O. | |
| Hence a circle with centre O and radius OA will pass through A, B and C. | |
| Ultimately there is only one circle which passes through three given points A, B and C. | |

**Example:** **Show that only one circle can be drawn to pass through the vertices of any rectangle.**




**Given:** ABCD is a rectangle.

**To Prove:** Only one circle can be drawn through the vertices of the rectangle ABCD.

**Construction:** Diagonals $\overline{AC}$ and $\overline{BD}$ of the rectangle meet each other at point O.

| Statements | Reasons |
|---|---|
| ABCD is a rectangle. | Given |
| ∴ $m\overline{AC}=m\overline{BD}$ ...............................(i) | Diagonals of a rectangle are equal. |
| ∵ $\overline{AC}$ and $\overline{BD}$ meet each other at O | Construction |
| ∴ $m\overline{OA} = m\overline{OC}$ and $m\overline{OB} = m\overline{OD}$ ..........(ii) | Diagonals of rectangle bisect each other |
| ⇒ $m\overline{OA} = m\overline{OB} = m\overline{OC} = m\overline{OD}$ .............. (iii) | Using (i) and (ii) |
| i.e., point O is equidistant from all vertices of the rectangle ABCD. | |
| Hence $\overline{OA}$, $\overline{OB}$, $\overline{OC}$ and $\overline{OD}$ are the radii of the circle which is passing through the vertices of the rectangle having centre O. | |