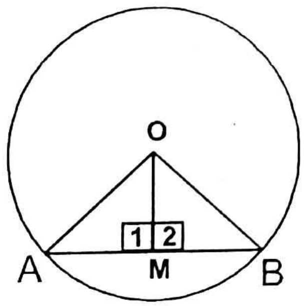
THEOREM 2

A straight line, drawn from the centre of a circle to bisect a chord (which is not a diameter) is perpendicular to the chord.



Given: M is the midpoint of any chord $\overline{AB}$ of a circle with centre at O.

Where chord $\overline{AB}$ is not the diameter of the circle.

To prove: $\overline{OM} \perp$ the chord $\overline{AB}$.

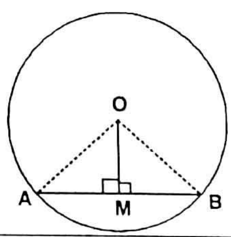
Construction: Join A and B with centre O. write $\angle 1$ and $\angle 2$ as shown in the figure.

Proof:

Statements	Reasons
In Δ OAM $\leftrightarrow \Delta$OBM	
$m\overline{OA} = m\overline{OB}$	Radii of the same circle
$m\overline{AM} = m\overline{BM}$	Given
$m\overline{OM} = m\overline{OM}$	Common
$\Delta OAM \cong \Delta OBM$	S.S.S $\cong$ S.S.S
$\Rightarrow$ $m\angle 1 = m\angle 2$.....................(i)	Corresponding angels of congruent Δ's
$i.e., m\angle 1 + m\angle 2 = m\angle AMB = 180^\circ$.....................$(ii)$	Adjacent supplementary angles
$m\angle 1 = m\angle 2 = 90^\circ$	From (i) and (ii)
i.e $\overline{OM} \perp \overline{AB}$	

THEOREM 3

Perpendicular from the centre of a circle on a chord bisects it.



Given: $\overline{AB}$ is the chord of a circle with centre at O so that $\overline{OM} \perp$ chord $\overline{AB}$.

To prove: M is the mid point of chord $\overline{AB}$ i.e. $m\overline{AM} = m\overline{BM}$

Construction: Join A and B with centre O.

Proof:

Statements	Reasons
In $\angle$rtΔ OAM $\leftrightarrow$ $\angle$rtΔ OBM	
$m\angle OMA = m\angle OMB = 90^\circ$	Given
hyp. $\overline{OA}$ = hyp. $\overline{OB}$	Radii of the same circle
$m\overline{OM} = m\overline{OM}$	Common
$\Delta OAM \cong \Delta OBM$	In $\angle$rt Δ^s H.S $\cong$ H.S
Hence, $m\overline{AM} = m\overline{BM}$	Corresponding sides of congruent triangles.
$\Rightarrow$ $\overline{OM}$ bisects the chord $\overline{AB}$.	