

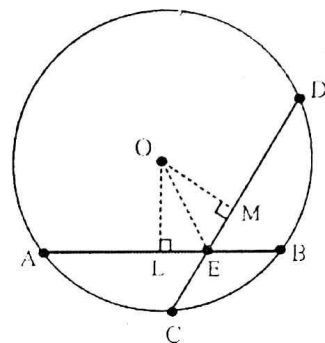
EXERCISE 9.2

Q.1 Two equal chords of a circle intersect, show that the segments of the one are equal corresponding to the segments of the other.

Given: A circle with centre "O". Two equal chords $\overline{AB}$ and $\overline{CD}$ (i.e. $m\overline{AB} = m\overline{CD}$) intersect each other at point E.

To prove: $m\overline{AE} = m\overline{ED}$ and $m\overline{EB} = m\overline{EC}$

Construction: Draw perpendiculars $\overline{OL}$ and $\overline{OM}$ from the centre "O" to the chords $\overline{AB}$ and $\overline{CD}$ respectively. L and M are midpoints of $\overline{AB}$ and $\overline{CD}$ respectively.



Proof:

Statement	Reasons
In $\triangle OLE \leftrightarrow \triangle OME$ $\overline{OL} \cong \overline{OM}$ $m\angle OLE = m\angle OME = 90^\circ$	Two equal chords of a circle are equidistant from the centre. $\overline{OL} \perp \overline{AB}$ and $\overline{OM} \perp \overline{CD}$
$m\overline{OE} \cong m\overline{OE}$	Common side
$\therefore \triangle OLE \cong \triangle OME$	$H.S \cong H.S$
$\overline{LE} \cong \overline{ME}$ (i)	Corresponding sides of congruent triangles.
$m\overline{AL} = \frac{1}{2} m\overline{AB}$	
$m\overline{DM} = \frac{1}{2} m\overline{CD}$	
$m\overline{AL} = m\overline{DM}$ (ii)	Both are half of equal chords.
$m\overline{AL} + m\overline{LE} = m\overline{DM} + m\overline{ME}$	Adding (i) and (ii).
$m\overline{AE} = m\overline{DE}$ (iii)	
Now, $m\overline{AB} = m\overline{CD}$	Given
$m\overline{AE} + m\overline{EB} = m\overline{DE} + m\overline{EC}$	From (iii)
$m\overline{EB} = m\overline{EC}$	By cancellation property.

Q.2 AB is the chord of a circle and diameter CD is perpendicular

bisector of $\overline{AB}$. Prove that $m\overline{AC} = m\overline{BC}$

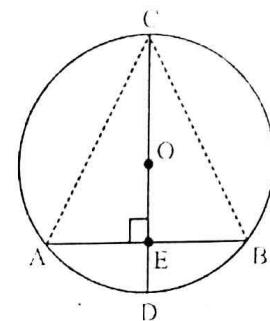
Given: A circle with centre "O" diameter $\overline{CD} \perp$ chord $\overline{AB}$ i.e

$m\angle CEA = m\angle CEB = 90^\circ$ and $\overline{AE} \cong \overline{EB}$

To prove: $m\overline{AC} = m\overline{BC}$

Construction: Join C to A and B.

Proof:



Statements	Reasons
In $\triangle ACE \leftrightarrow \triangle BCE$	
$\overline{AE} \cong \overline{EB}$	A diameter $\overline{CD} \perp$ on chord AB bisect it.
$m\angle CEA = m\angle CEB$	Given
$\overline{CE} \cong \overline{CE}$	Common side
$\triangle ACE \cong \triangle BCE$	S.A.S $\cong$ S.A.S
$\overline{AC} \cong \overline{BC}$	Corresponding sides of congruent triangles.
$m\overline{AC} = m\overline{BC}$	

Q.3 As shown in fig. find the distance between two parallel chords $\overline{AB}$ and $\overline{CD}$.

Given: A fig. as shown.

To find: Distance between two parallel chords $\overline{AB}$ and $\overline{CD}$ i.e $m\overline{EF} = ?$

Construction: Join O to A.

Calculations:

$$m\overline{AE} = \frac{1}{2} m\overline{AB} = \frac{1}{2} (6cm) = 3cm$$

$$m\overline{CF} = \frac{1}{2} m\overline{CD} = \frac{1}{2} (8cm) = 4cm$$

$$m\overline{OA} = m\overline{OC} = 5cm$$

In right triangle AOE, by Pythagoras theorem

$$(m\overline{OA})^2 = (m\overline{OE})^2 + (m\overline{AE})^2$$

$$(5cm)^2 = (m\overline{OE})^2 + (3cm)^2$$

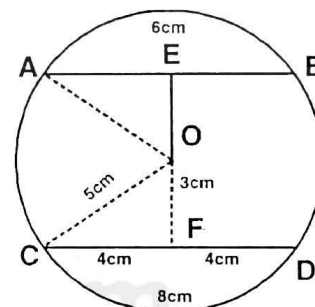
$$25cm^2 = (m\overline{OE})^2 + (9cm^2)$$

$$m25cm^2 - 9cm^2 = (m\overline{OE})^2$$

$$16cm^2 = (m\overline{OE})^2$$

$$\sqrt{(m\overline{OE})^2} = \sqrt{16cm^2}$$

$$m\overline{OE} = 4cm$$



In right triangle COF, by Pythagoras theorem

$$(m\overline{OC})^2 = (m\overline{CF})^2 + (m\overline{OF})^2$$

$$(5cm)^2 = (4cm)^2 + (m\overline{OF})^2$$

$$25cm^2 - 16cm^2 = (m\overline{OF})^2$$

$$9cm^2 = (m\overline{OF})^2$$

$$\sqrt{(m\overline{OF})^2} = \sqrt{9cm^2}$$

$$m\overline{OF} = 3cm$$

Now,

$$m\overline{EF} = m\overline{OE} + m\overline{OF}$$

$$m\overline{EF} = 4cm + 3cm$$

$$m\overline{EF} = 7cm$$