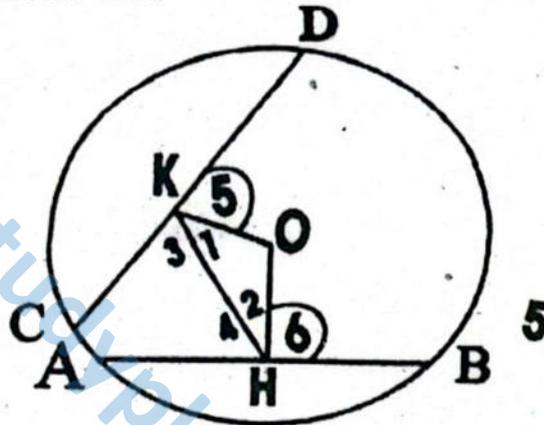




Exercise 10.2



Q.1 \overline{AB} and \overline{CD} are two equal chords in a circle with centre O . H and K are respectively the mid points of the chords. Prove that \overline{HK} makes equal angles with \overline{AB} and \overline{CD} .



Given: (i) A circle with centre at O



$$(ii) \quad m\overline{AB} = m\overline{CD}$$

(iii) H is joined with K .

To prove:

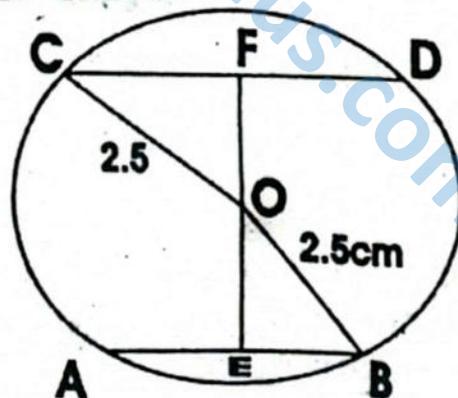
$$(i) \quad m\angle AHK = m\angle CKH$$

$$(ii) \quad m\angle BHK = m\angle DKH$$

Proof:

Statements	Reasons
In ΔHOK	
$m\overline{OH} = m\overline{OK}$	Theorem
$\therefore m\angle 1 = m\angle 2$ (i)	
And $m\angle 5 = m\angle 6$ (ii)	Each 90°
$m\angle 1 + m\angle 5 = m\angle 2 + m\angle 6$	From (i) + (ii)
Thus, $m\angle BHK = m\angle DKH$	Proved
$m\angle AHO = m\angle CKO$ (iii)	Each 90°
$m\angle 2 = m\angle 1$ (iv)	
$m\angle AHO - m\angle 2$	
$= m\angle CKO$	from (iii) - (iv)
$- m\angle 1$	
$m\angle AHK = m\angle CKH$	Proved

Q.2 The radius of a circle is 2.5 cm. \overline{AB} and \overline{CD} are two chords 3.9 cm apart. If $m\overline{AB} = 1.4$ cm, then measure the other chord.



Given:

O is the centre of a circle.

$$(i) \quad m\overline{OB} = m\overline{OC} = 2.5\text{cm}$$

$$m\overline{AB} = 1.4\text{ cm}$$

$$m\overline{EF} = 3.9\text{ cm}$$

Required:

To measure \overline{CD} .

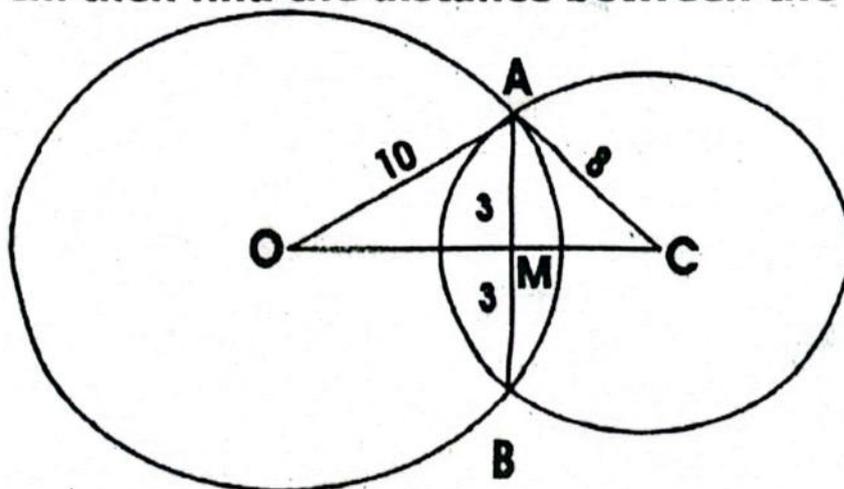
Construction:

Join O with B and C .

Proof:

Statements	Reasons
<p>In $\triangle OEB$ (a right angled \triangle) $m\overline{OB} = 2.5$ cm $m\overline{EB} = \frac{1}{2}m\overline{AB} = \frac{1}{2}(1.4)$ $= .7$ cm $(m\overline{OE})^2 = (m\overline{OB})^2 - (m\overline{EB})^2$ $= (2.5)^2 - (.7)^2$ $= 6.25 - .49$ $(m\overline{OE})^2 = 5.76$ $m\overline{OE} = \sqrt{5.76}$ $= 2.4$ cm Now $m\overline{OF} = m\overline{EF} - m\overline{OE}$. $= 3.9 - 2.4$ $= 1.5$ cm</p>	<p>Given</p> <p>(i)</p>
<p>In right angled triangle OCF $(m\overline{CF})^2 = m(\overline{OC})^2 - (m\overline{OF})^2$ $= (2.5)^2 - (1.5)^2$ $6.25 - 2.25$ $(m\overline{CF})^2 = 4$ $\therefore m\overline{CF} = 2$ $m\overline{CD} = 2(m\overline{CF})$ $= 2 \times 2$ $= 4$ cm</p>	<p>From (i)</p> <p>(ii)</p> <p>From (ii)</p>

Q.3 The radii of two intersecting circles are 10 cm and 8 cm. If the length of their common chord is 6 cm then find the distance between the centres.



Calculations:

$\overline{AB} \perp \overline{OC}$ and M is their point of intersection.

In $\triangle OMA$

$$m\overline{OA} = 10 \text{ cm}$$

$$m\overline{AM} = 3 \text{ cm.} \quad \text{as } m\overline{AB} = 6 \text{ cm}$$

By pythagorus theorem

$$\begin{aligned} m\overline{OM} &= \sqrt{(m\overline{OA})^2 - (m\overline{AM})^2} \\ &= \sqrt{(10)^2 - (3)^2} \\ &= \sqrt{100 - 9} \\ &= 9.54 \text{ cm} \end{aligned}$$

In $\triangle AMC$

$$m\overline{CA} = 8 \text{ cm}$$

$$m\overline{AM} = 3 \text{ cm}$$

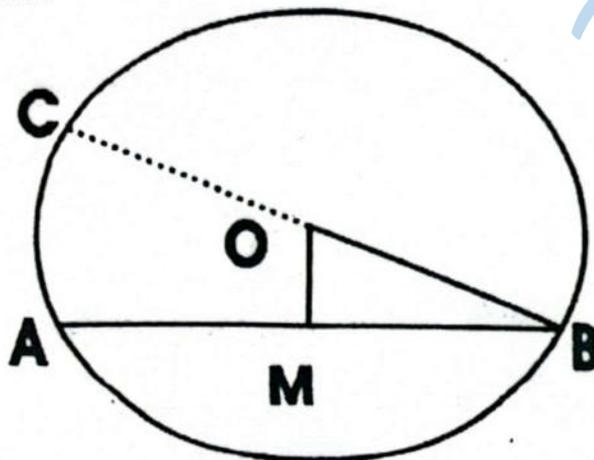
By Pythagorus theorem

$$\begin{aligned} m\overline{MC} &= \sqrt{(m\overline{CA})^2 - (m\overline{AM})^2} \\ &= \sqrt{(8)^2 - (3)^2} \\ &= \sqrt{64 - 9} \\ &= \sqrt{55} \\ &= 7.42 \end{aligned}$$

$$\begin{aligned} \text{Thus, } m\overline{OC} &= m\overline{OM} + m\overline{MC} \\ &= 9.54 + 7.42 \\ &= 16.96 \text{ cm} \end{aligned}$$

Distance between the centres = 16.69 cm

Q.4 Show that greatest chord in a circle is its diameter.



Given:

Let O be the centre of the circle.
 \overline{COB} is any diameter.

Let \overline{AB} be any chord of the circle.

To Prove:

$$m\overline{CB} > m\overline{AB}$$

Calculation:

Draw $\overline{OM} \perp \overline{AB}$

In right angled triangle OMB .

By pythagorean theorem.

$$(m\overline{OB})^2 = (m\overline{OM})^2 + (m\overline{MB})^2$$

This means $m\overline{OB} > m\overline{MB}$

$$\therefore 2(m\overline{OB}) > 2(m\overline{MB})$$

As $2(m\overline{OB})$ is length of the diameter and $2(m\overline{MB})$ is length of the chord \overline{AB}

Thus, $m\overline{CB} > m\overline{AB}$

Similarly it can be proved that diameter of a circle is its greatest chord.

