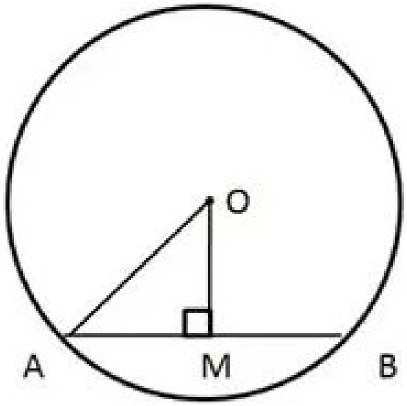
**Solution 1:** **Exercise 17(D)**




To find : OM

Given that AB = 24 cm

Since $OM \perp AB$

$\Rightarrow$ OM bisects AB

So, AM = 12 cm

In right $\Delta OMA$,

$OA^2 = OM^2 + AM^2$

$\Rightarrow OM^2 = OA^2 - AM^2$

$\Rightarrow OM^2 = 13^2 - 12^2$

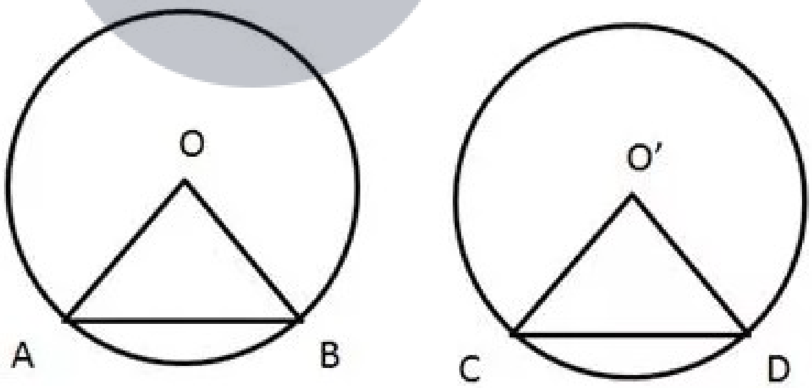
$\Rightarrow OM^2 = 25$

$\Rightarrow OM = 5$ cm

Hence, the distance of the chord from the centre is 5 cm.



**Solution 2:**




Given: AB and CD are two equal chords of congruent circles with centres O and O' respectively.

To prove: $\angle AOB = \angle CO'D$

Proof: In $\Delta OAB$ and $\Delta O'CD$,

$OA = O'C$ ($\because$ Radii of congruent circles)

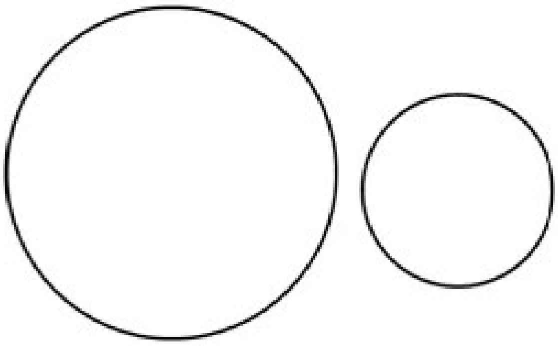
$OB = O'D$ ($\because$ Radii of congruent circles)

$AB = CD$ (Given)

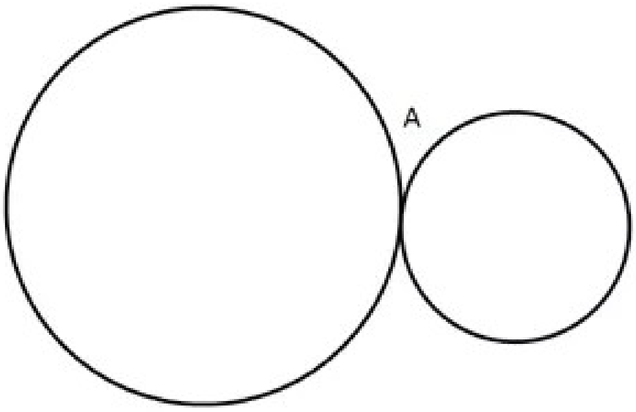
$\Delta OAB \cong \Delta O'CD$ (By SSS congruence criterion)

$\angle AOB = \angle CO'D$ (cpct)

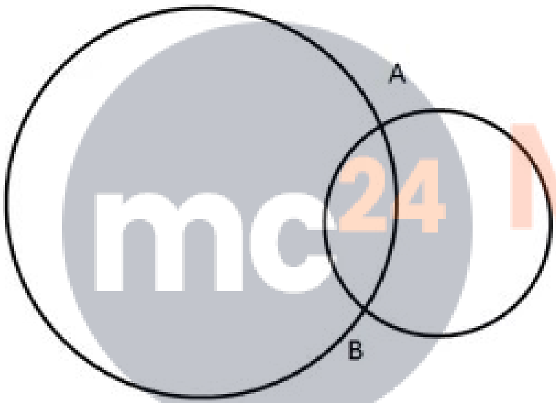
**Solution 3:**



No point of intersection




One point of intersection



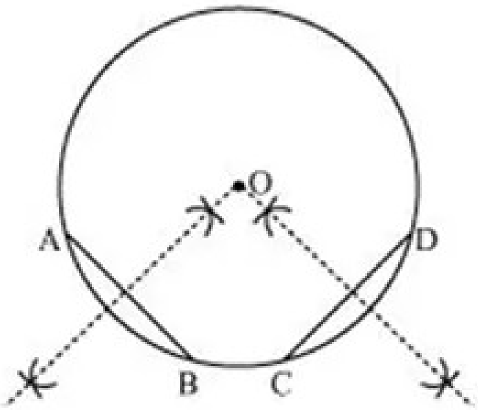

Two points of intersection



So, the circle can have 0, 1 or 2 points in common.

The maximum number of common points is 2.

**Solution 4:**

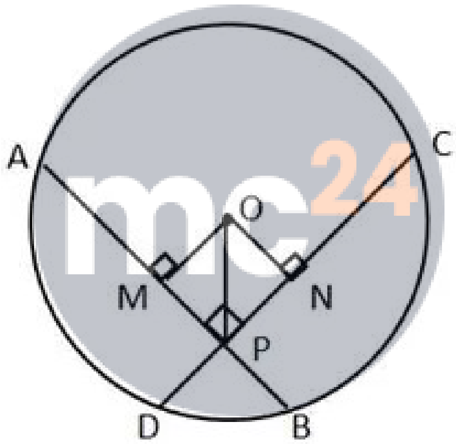



To draw the centre of a given circle:

1. Draw the circle.
2. Take any two different chords AB and CD of this circle and draw perpendicular bisectors of these chords.
3. Let these perpendicular bisectors meet at point O.

So, O will be the centre of the given circle.

**Solution 5:**






In $\Delta OMP$ and $\Delta ONP$,

$OP = OP$ (common side)

$\angle OMP = \angle ONP$ (both are right angles)

$OM = OM$ (side both the chords are equal, so the distance of the chords from the centre are also equal)

$\Delta OMP \cong \Delta ONP$ (RHS congruence criterion)

$\Rightarrow MP = PN$ (cpct)

....(a)

(i) Since $AB = CD$ (given)

$\Rightarrow AM = CN$ ($\perp$ drawn from the centre to the chord bisects the chord)

$\Rightarrow AM + MP = CN + NP$ (from (a))

$\Rightarrow AP = CP$...(b)

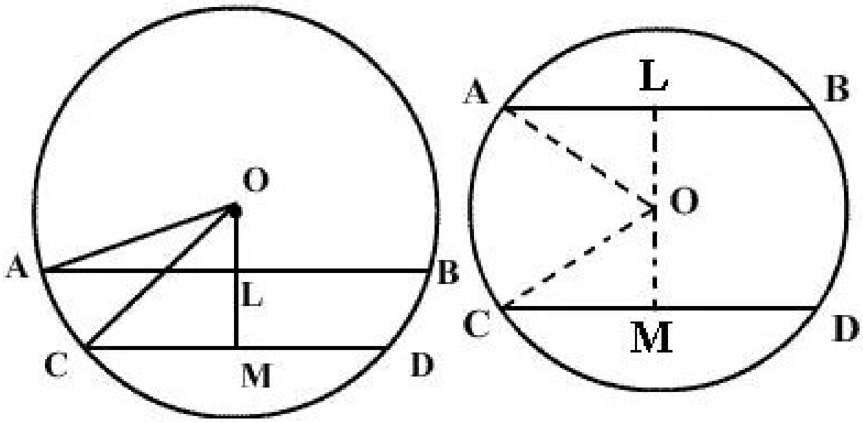
(ii) Since $AB = CD$

$\Rightarrow AP + BP = CP + DP$

$\Rightarrow BP = DP$ (from (b))

Hence proved.

**Solution 6:**




Given that $AB = 16$ cm and $CD = 12$ cm

So, $AL = 8$ cm and $CM = 6$ cm ($\perp$ from the centre to the chord bisects the chord)

In right triangles OLA and OMC,

By Pythagoras theorem,

$OA^2 = OL^2 + AL^2$ and $OC^2 = OM^2 + CM^2$

$\Rightarrow 10^2 = OL^2 + 8^2$ and $10^2 = OM^2 + 6^2$

$\Rightarrow OL^2 = 100 - 64$ and $OM^2 = 100 - 36$

$\Rightarrow OL^2 = 36$ and $OM^2 = 64$

$\Rightarrow OL = 6$ cm and $OM = 8$ cm

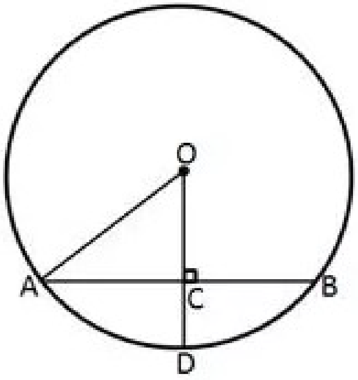
(i) In the first case, distance between AB and CD is

$LM = OM - OL = 8 - 6 = 2$ cm

(ii) In the second case, distance between AB and CD is

$LM = OM + OL = 8 + 6 = 14$ cm

**Solution 7:**




To find : CD

Given AB = 32 cm

$\Rightarrow$ AC = 16 cm (Since $\perp$ drawn from the centre to the chord, bisects the chord)

In right $\Delta$OCA,

$OA^2 = OC^2 + AC^2$ (By Pythagoras theorem)

$\Rightarrow OC^2 = OA^2 - AC^2$

$\Rightarrow OC^2 = 20^2 - 16^2$

$\Rightarrow OC^2 = 144$

$\Rightarrow OC = 12$ cm

Since OD = 20 cm and OC = 12 cm

$\Rightarrow CD = OD - OC = 20 - 12 = 8$ cm

## Solution 8:

It is given in the question that point P is the midpoint of the chord AB and and point Q is the midpoint of the chord CD .

$\Rightarrow \angle APO = 90^\circ$ $\left(\begin{array}{l}\text{as the straight line drawn from the centre of a circle} \\ \text{to bisect a chord, which is not a diameter, is at the} \\ \text{right angle to the chord}\end{array}\right)$

As chords AB and CD are equal therefore they are equidistant from the centre i.e. PO = OQ ($\because$ Equal chords of a circle are equidistant from the centre)

Now the $\Delta POQ$ is an isosceles triangle with OP = OQ as its two equal sides

Therefore $\angle OPQ = \angle PQO$ , as they are opposite angles to the equal sides of an isosceles triangle.

Sum of all the angles of a triangle is $180^0$

$\Rightarrow \angle POQ + \angle OPQ + \angle PQO = 180^\circ$

$\Rightarrow \angle OPQ + \angle POQ + 150^\circ = 180^\circ$ $[\text{Given: } \angle POQ = 150^\circ]$

$\Rightarrow 2\angle OPQ = 180^\circ - 150^\circ$ $[\text{As, } \angle OPQ = \angle PQO]$

$\Rightarrow 2\angle OPQ = 30^\circ$

$\Rightarrow \angle OPQ = 15^\circ$

As $\angle APO = 90^\circ$

$\Rightarrow \angle APQ + \angle OPQ = 90^\circ$

$\Rightarrow \angle APQ = 90^\circ - 15^\circ$ $[\text{As, } \angle OPQ = 15^\circ]$

$\Rightarrow \angle APQ = 75^\circ$



## Solution 9:

Given :

1. AOC is the diameter

2. Arc AXB = $\frac{1}{2}$ Arc BYC

From Arc AXB = $\frac{1}{2}$ Arc BYC we can see that

Arc AXB : Arc BYC = 1:2

$\Rightarrow \angle BOA : \angle BOC = 1:2$

Since AOC is the diameter of the circle hence,

$\angle AOC = 180^\circ$

Now,

Assume that $\angle BOA = x^\circ$ and $\angle BOC = 2x^\circ$

$\angle AOC = \angle BOA + \angle BOC = 180^\circ$

$\Rightarrow x + 2x = 180$

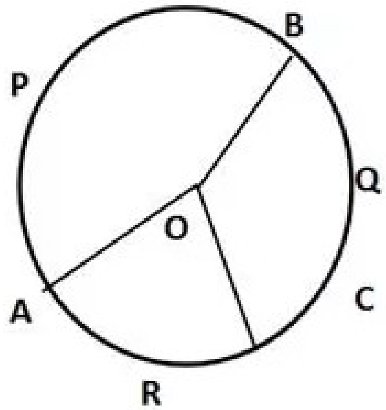
$\Rightarrow 3x = 180$

$\Rightarrow x = 60$

Hence $\angle BOA = 60^\circ$ and $\angle BOC = 120^\circ$

**Solution 10:**

From the given conditions given in the question
we can draw the circle with arc APB, arc BQC and arc CRA




The given equation is

$$\frac{\text{Arc APB}}{2} = \frac{\text{Arc BQC}}{3} = \frac{\text{Arc CRA}}{4}$$

let

$$\frac{\text{Arc APB}}{2} = \frac{\text{Arc BQC}}{3} = \frac{\text{Arc CRA}}{4} = k(\text{Say})$$

then Arc APB $= 2k$, Arc BQC $= 3k$, Arc CRA $= 4k$

or

Arc APB : Arc BQC : Arc CRA = 2 : 3 : 4

$\Rightarrow \angle AOB : \angle BOC : \angle AOC = 2 : 3 : 4$

and therefore

and $\angle AOB = (2k)^\circ$ , $\angle BOC = (3k)^\circ$ and $\angle AOC = (4k)^\circ$

Now,

Angle in a circle is $360^\circ$

So, $2k + 3k + 4k = 360$

$\Rightarrow 9k = 360$

$\Rightarrow k = 40$

Hence

$\angle BOC = 3 \times 40 = 120^\circ$