6. Circle

Extra Questions

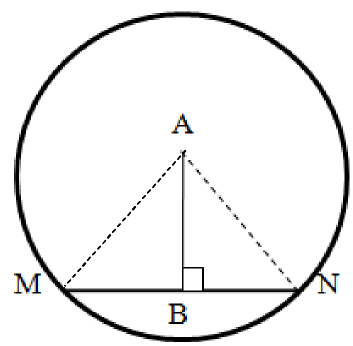
Q. 1) Radius of a circle is 13cm. The length of the chord is 10 cm. Find the distance of the chord from the centre (3M)

Solution: - In the fig,

length of the chord, MN = 10 cm and centre of the circle is A.

Seg AB ⊥ chord MN

Perpendicular drawn from the centre of the circle on its chord bisects the chord



∴ MB = BN = 5cm

Radius of the circle is 13 cm…….. (Given)

In right angled triangle ABN,

$AB^2 + BN^2 = AN^2$ --- (by phythagoras theorem)

$AB^2 + (5)^2 = (13)^2$

$AB^2 = (13)^2 - (5)^2$

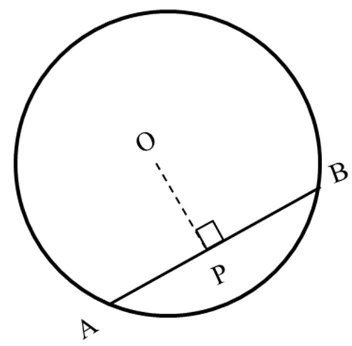
$AB^2 = 169 - 25$

$AB^2 = 144$

$AB = \sqrt{144} = 12$ cm

∴ Hence, the distance of the chord from the centre of the circle is 12 cm

Q.2) In the given figure, O is the centre of the circle. AB is chord of the circle which is of 10 cm, here $OP \perp AB$. So, what is the length of ?(2M)



Ans :- given $OP \perp AB$

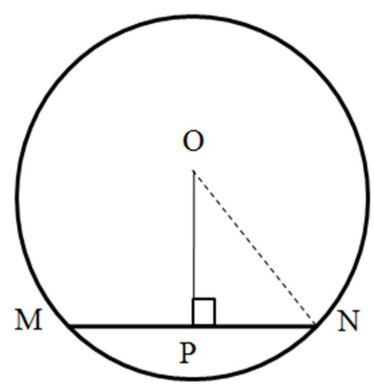
P is centre point of the AB

$\therefore AP = \frac{1}{2} AB$

$AP = \frac{1}{2} \times 10$ --- [$\because AB = 10$ cm given]

$AP = 5$ cm.

Q.3) Radius of the cirlce is 41 cm. If the distance of circle from centre to chord is 9 cm ,then what is length of the chord?(3M)



Ans :- O is the center of the circle

$\therefore$ Radius ON = 41 cm

$\therefore$ OP = 9 cm

$OP \perp MN$

MN = PN

$\Delta\ OPN$ is right angle triangle

$OP^2 + PN^2 = ON^2$ --- (by Pythagoras theorem)

$(9)^2 + PN^2 = (41)^2$

$PN^2 = (41)^2 - (9)^2$

$PN^2 = 1681 - 81 = 1600$

$PN = \sqrt{1600}$

$PN = 40$ cm

$\therefore MP = PN = 40$ cm

and $MN = MP + PN$ ---- (M - P - N)

MN = 40 + 40

MN = 80 cm

$\therefore$ length of chord is 80 cm.

Q.4) In the given figure, O is the centre of the circle. If AB = 8cm and OP = 3cm , then find radius of the circle (3M)

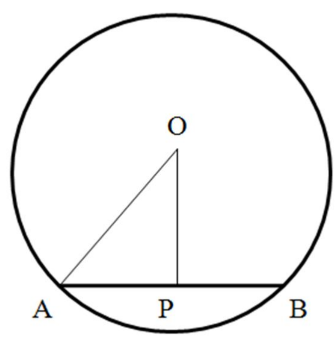
Solution : seg OP $\perp$ seg AB

P is the center point of the AB

$AP = \frac{1}{2} AB$

$= \frac{1}{2} \times 8$ ……[AB = 8cm given]

$= 4$ cm



In the Δ OPA, To find OA

$OA = \sqrt{OP^2 + AP^2}$

$= \sqrt{3^2 + 4^2}$

$= \sqrt{9 + 16}$

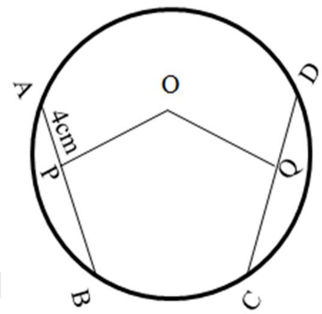
$= \sqrt{25}$

$= 5$ cm

$\therefore$ Seg OA = 5 cm

Radius of circle = 5 cm.

Q. 5) In the given figure, O is the center of the circle and OP = OQ. If AP = 4 cm, then find length of CD(3M)



Solution : OP = OQ

Chord AB and chord CD are at same distance from the center.

$\overline{AB} = \overline{CD}$

$\frac{1}{2}\overline{AB} = \frac{1}{2}\overline{CD}$

$\overline{AP} = \frac{1}{2}\overline{CD}$ ... (P is the center point of the AB·)

4 cm = $\frac{1}{2}\overline{CD}$

$\overline{CD} = 2 \times 4$cm

CD = 8 cm.

The length of the CD =8 cm

Q.6) The distance from the center O to the chord AB is 3cm. If the length of the chord AB is 8 cm. then find the diameter of circle. (3M)

Solution:

Given: chord AB = 8 cm

To find : Diameter of circle (d) = ?

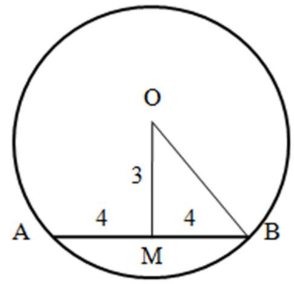
Distance from center point of circle to chord·

AB = AM + MB

= AM + AM ... (∵AM = MB)

∴ AB = 2AM

AM = MB = $\frac{8}{2}$ = 4 cm



In right angle Δ OMB] ∠OMB = 90^0

OM = 3 cm and MB = 4 cm

$OB^2 = OM^2 + MB^2$ ... (by Pythagoras theorem)

∴ $OB^2 = (3)^2 + (4)^2$

∴ $OB^2 = 9 + 16$

∴ $OB^2 = 25$

∴ OB = 5 cm

OB = Radius of circle = 5 cm

Diameter of circle = 2 × Radius

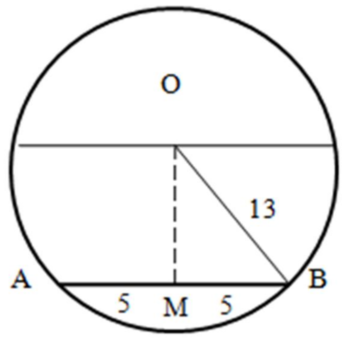
= 2 × 5

= 10 cm

∴ The diameter of circle is 10 cm.

Q. 7) Diameter of circle is 26 cm. Length of the chrod is 10 cm. Find the distance of the chord from the center. (3M)

Solution:



Radius of circle $= OB = \frac{26}{2} = 13$, chord $AB = 10$ cm

Length of the chord $AB = 10$ cm

$\therefore\ AM = MB = \frac{AB}{2} = \frac{10}{2} = 5$ cm.

In the right angle triangle OMB, $\angle OMB = 90^0$

$OB = 13$ cm, $MB = 5$ cm, $OM = 2$

$OB^2 = OM^2 + MB^2$ ... (Pythagoras Theorem)

$(13)^2 = OM^2 + (5)^2$

$OM^2 = (13)^2 - (5)^2$

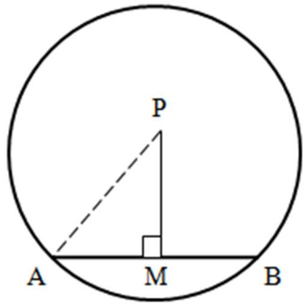
$OM^2 = 169 + 25$

$OM^2 = 144$

$OM = 12$ cm

$\therefore$ The distance of chord from the center is 12 cm.

Q.8) Radius of circle is 25 cm. length of the chord is 48 cm. find the distance from P(3M)



Solution:

Radius of the circle PA = 25 cm

PM ⊥ AB

PM bisect AB

AM ≅ MB

∴ AM = MB = $\frac{1}{2}$ AB = $\frac{1}{2}$ × 48 = 24 cm

In right angle, Δ PMA, ∠PMA = 90^0

According to Pythagoras Theorem ,

$PA^2 = PM^2 + AM^2$

$(25)^2 = PM^2 + (24)^2$

$PM^2 = (25)^2 - (24)^2$

$PM^2 = (25 + 24)(25 - 24)$

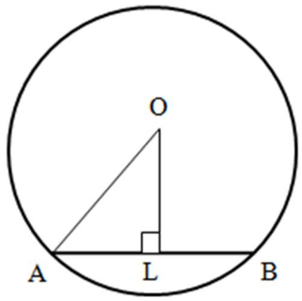
$PM^2 = (49) - (1)$

PM = 7 × 1

PM = 7 cm

∴ Distance of the chord from the center is 7 cm.

Q.9) Radius of circle is 13 cm , length of chord is 10 cm. Find the distance of the chord from the center. (3M)



Solution:

AB is the chord, Radius = 13 cm

OA = 13 cm

OL ⊥ AB

$AL = \frac{1}{2} AB = \frac{1}{2} \times 10 = 5$ cm

In right angle triangled. Δ OLA

$OA^2 = OL^2 + AL^2$

$OL^2 = OA^2 - AL^2$

$OL^2 = (13)^2 - (5)^2$

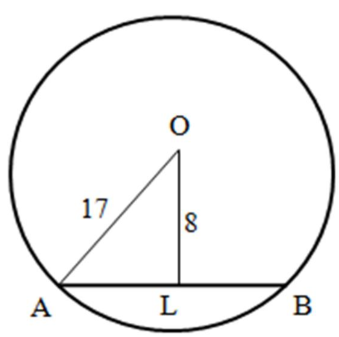
$OL^2 = 169 - 25$

$OL^2 = 144$

$\therefore OL = 12$ cm

$\therefore$ The distance of chord from the center is 12 cm

Q. 10) Find the length of the chord where distance of the chord from the center is 8 cm and radius 17 cm(3M)



Solution:

OL $\perp$ AB

Radius = 17 cm

If , OL $\perp$ AB then OL = 8 cm,

OA = 17 cm.

In right angle triangle, Δ OLA

By Pythagoras theorem

$OA^2 = OL^2 + AL^2$

$AL^2 = OA^2 - OL^2$

$= (17)^2 - (8)^2$

$= (17 + 18)(17 - 8)$

$= 225$

$\therefore$ AL = 15 cm

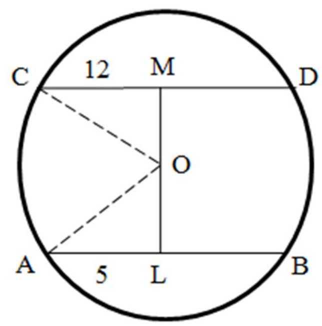
$\therefore$ seg OL bisect the chord AB

AB = 2 × AL

= 2 × 15

= 30 cm

Q. 11) Seg AB and seg CD are two parallel chord and present at opposite side of the center of circle. If AB = 10 cm, CD = 24 cm. find the distance between AB and CD and also find the radius of the circle. (3M)



Solution:

AB and CD are two chords

of the circle AB ∥ CD.

AB = 10 cm, and CD = 24 cm

OL ⊥ AB and OM ⊥ CD

Join the OA and OC

then OA = OC = r cm ... (radius of circle)

OL ⊥ AB and OM ⊥ CD and AB ∥ CD

∴ LM = 17 cm

OL = x OM = (17 - x) cm

$AL = \frac{1}{2}AB = \left(\frac{1}{2} \times 10\right)$ cm = 5 cm

and

$CM = \frac{1}{2}CD = \left(\frac{1}{2} \times 24\right)$ cm = 12 cm

In right angle triangle, $\Delta\, OLA$

$OA^2 = OL^2 + AL^2$

$OA^2 = x^2 + (5)^2$ ... (i)

In right angle triangle, Δ OMC

$OC^2 = OM^2 + CM^2$

$OC^2 = (17 - x)^2 + (12)^2$ ... (ii)

From (i) and (ii)

$x^2 + (5)^2 = (17 - x)^2 + (12)^2$

$x^2 + 25 = (x^2 - 34x + 289) + 144$

$x^2 + 25 = x^2 - 34x + 433$

$34x = 433 - 25$

$34x = 408$

$x = \frac{408}{34} = 12$ cm

$x = 12$

Put value of x in equation (i)

$OA^2 = (12)^2 + (5)^2$

$OA^2 = 144 + 25$

$OA^2 = 169$

OA = 13 cm

$\therefore$ Radius of circle is 13 cm.

Q.12) In the given figure. O is the center of the circle where AB = 16 cm. CD = 14cm and seg OM $\perp$ seg AB and seg ON $\perp$ seg CD, if OM = 6 cm then seg ON (3M)

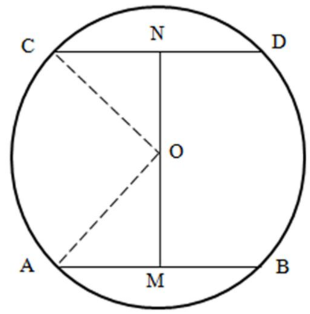
Solution:

Given : AB = 16 cm

seg OM ⊥ seg AB

Solution:

A - M - B



$\therefore AM = BM = \frac{1}{2}AB$

$= \frac{1}{2} \times 16 = 8$ cm

In right angle triangle, ΔOMA

$OA^2 = OM^2 + AM^2$ ... (Pythagoras theorem)

$OA^2 = 6^2 + 8^2$

$OA^2 = 36 + 64$

$OA^2 = 100$

$\therefore OA = 10$ cm

$\therefore OA = OC = 10$ cm

$CN = \frac{1}{2}CD$

$CN = \frac{1}{2} \times 14 = 7$ cm

In right angle triangle, ΔCON e/;]

$CO^2 = ON^2 + CN^2$ .. (Pythagoras theorem)

$10^2 = ON^2 + 7^2$

$100 = ON^2 + 49$

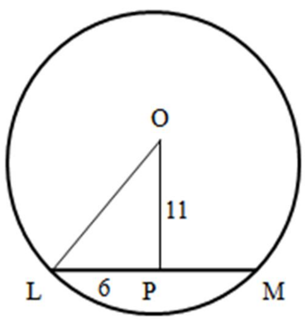
$ON^2 = 100 - 49$

$ON^2 = 51$

∴ ON = $\sqrt{51}$ cm

∴ length of seg ON = $\sqrt{51}$ cm

Q. 13) The length of the one chord in the circle is 12 cm and distance of chord from the center is 11 cm. Find the radius of the given circle. (3M)



Solution:

OP ⊥ LM

P is the center point of the LM.

∴ LP = $\frac{1}{2}$LM = $\frac{1}{2} \times 12 = 6$ cm

In Δ OPL,

Radius = $\sqrt{OP^2 + LP^2}$

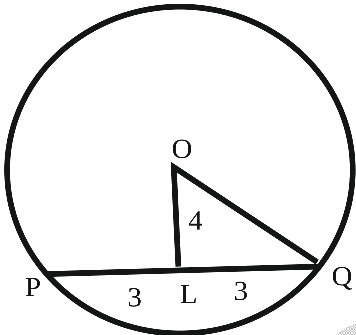
OL = $\sqrt{(11)^2 + (6)^2}$

= $\sqrt{121 + 36}$

= $\sqrt{157}$ cm

∴ Radius of the circle is $\sqrt{157}$ cm

Q. 14) The distance of the chord PQ from the center midpoint is 4 cm. The length of chord PQ is 6 cm , then find the diameter of the circle. (3M)



Solution:

Chord PQ = 6 cm

Diameter of circle (d) = ?

PQ = PL + LQ

PQ = PL + PL ... ($\because$ LQ = PL)

$\therefore$ PQ = 2PL

$\therefore$ PQ = QL = $\frac{6}{2}$ = 3 cm

In Δ OLQ, $\angle$ OLQ = 90^0

OL = 4 cm and LQ = 3 cm

$OQ^2 = OL^2 + LQ^2$

$OQ^2 = (4)^2 + (3)^2$

$OQ^2 = 16 + 9$

$OQ^2 = 25$

$\therefore$ OQ = 5 cm

$\therefore$ OQ = Radius of circle = 5 cm

$\therefore$ Diameter of circle = 2 × Radius

= 2 × 5

= 10 cm

$\therefore$ The diameter of the circle is 10 cm.

Q. 15) In the given figure the chord AB and chord CD are parallel to each other Radius of circle is 5cm AB = 8cm, CD = 6 cm If OP ⊥ AB OQ ⊥ CD find PQ (3M)

Solution:

$\therefore AP = \frac{1}{2}AB = \frac{1}{2} \times 8 = 4$ cm

$\therefore CQ = \frac{1}{2}CD = \frac{1}{2} \times 6 = 3$ cm

Join OA and OC

Then OA = OC = 5 cm ... (Given)

In Δ OPA

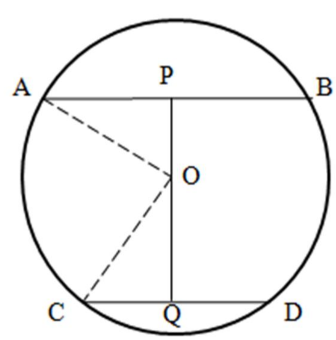
$OP^2 = OA^2 - AP^2$

$= (5)^2 - (4)^2$

$= 25 - 16$

$OP^2 = 9$

$OP = 3$ cm



In Δ OQC

$OQ^2 = OC^2 - CQ^2$

$= (5)^2 - (3)^2$

$= 25 - 9$

$OQ^2 = 16$

OQ = 4 cm

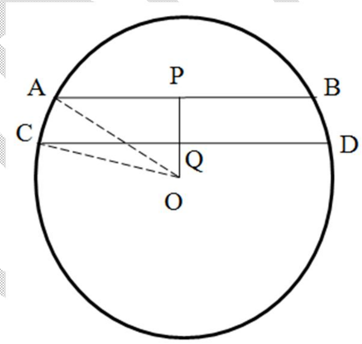
Now, OP ⊥ AB, OQ ⊥ CD and AB ⊥ CD, Point P, O, Q are congruent.

∴ PQ = OP + OQ = (3 + 4) = 7 cm

∴ Then length of PQ is 7 cm.

Q. 16 In the given fig. AB and CD are two chord are at equidistance radius is 5cm. AB = CM amd CD = 8 cm If OP ⊥ AB and OQ ⊥ CD Then find length of PQ (3M)

Solution :



OP ⊥ AB, OQ ⊥ CD and AB ∥ CD

Point O, Q, P are congruent

∴ $AP = \frac{1}{2}AB = \frac{1}{2} \times 6 = 3$ cm

∴ $CQ = \frac{1}{2}CD = \frac{1}{2} \times 8 = 4$ cm

Join OA and OC

In Δ OPA,

$OP^2 = OA^2 - AP^2$

$= (5)^2 - (3)^2$

$= 25 - 9$

$OP^2 = 16$

$OP = 4$ cm

In Δ OQC,

$OQ^2 = OC^2 - CQ^2$

$= (5)^2 - (4)^2$

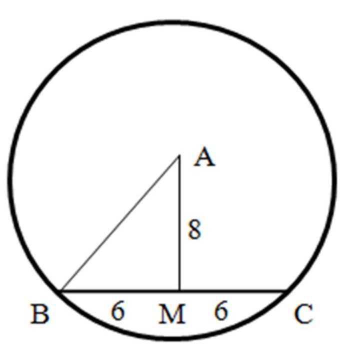
$= 25 - 16$

$OQ^2 = 9$

OQ = 3 cm

∴ PQ = OP - OQ = 4 - 3 = 1 cm

Q. 17) Length of chord for a given circle is 12 cm, distance from the center to midpoint point of chord is 8 cm, find the radius of the circle. (3M)



Solution : AM $\perp$ BC

A is the midpoint of BC

$BM = MC = \frac{1}{2} BC = \frac{1}{2} \times 12 = 6$ cm

In Δ AMB

Radius $AB = \sqrt{AM^2 + BM^2}$

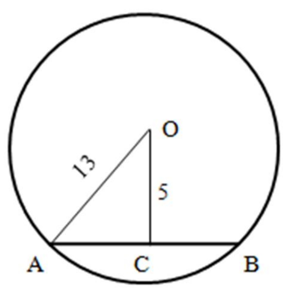
$= \sqrt{(8)^2 + (6)^2}$

$= \sqrt{64 + 36}$

$= \sqrt{100}$ cm

AB = 10 cm ·

Q. 18) The length of the the radius of a circle is 13 cm and distance between them is 5 cm. Then what is the length of the chord? (2M)



Solution : In right angled Δ OAC]

$AC = \sqrt{OA^2 - OC^2}$

$= \sqrt{(13)^2 - (5)^2}$

$= \sqrt{169 - 25}$

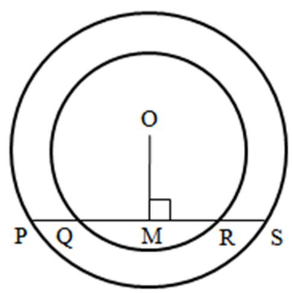
$= \sqrt{144}$ cm

$\therefore$ AC = 12 cm

AB = 2 × AC = 2 × 12 = 24 cm

$\therefore$ Length of the chord AB is 24 cm.

Q. 19) In the given figure , OM ⊥ PS If PS = 20 cm and QR = 15 cm then find PQ (3M)



Solution : OM ⊥ PS

QM = MR = $\frac{1}{2}$ QR = $\frac{15}{2}$ cm

PM = MS = $\frac{1}{2}$ PS = $\frac{20}{2}$ = 10 cm

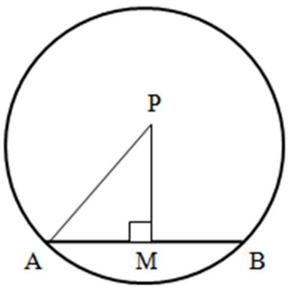
$\therefore$ PQ = QM − PM

$= \frac{10-15}{2}$

$= \frac{20-15}{2} = \frac{5}{2} = 2.5$

$\therefore$ PQ = 2.5 cm

Q.20) In a circular pond of water, a ship is at center P which is at distance of 10m from the bridge. The bridge across the pond is of length 40m. find the distance travelled by the ship to reach one end of the pond.(3M)



Solution :

From figure Distance of ship from center of pond bridge,

$\therefore$ AB = 40 m

PM $\perp$ AB

$\therefore$ AM = $\frac{1}{2}$AB ... (PM bisects chord AB)

$\therefore$ AM = $\frac{1}{2} \times 40$

$\therefore$ AM = 20 m

$\therefore$ PM = 10 m

In Δ PMA

$PA^2 = PM^2 + AM^2$............... (Pythagoras theorem)

$= 10^2 + 20^2$

$= 100 + 400$

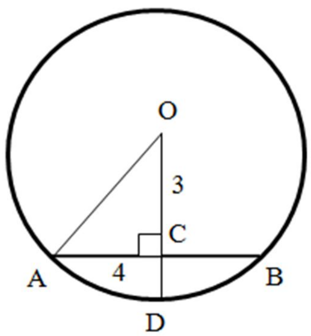
$PA^2 = 500$

$PA = 10\sqrt{5}$

$PA = 10\sqrt{5}$ = Radius of water pond

The ship has to travel $10\sqrt{5}$ m to reach the end point of the circular pond

Q.21) In the given fig. If OA = 5cm, AB = 8 cm OD ⊥ AB then find CD= ? (3M)



Solution : OD ⊥ AB [OD bisect AB]

$AC = CB = \frac{1}{2} AB = \frac{1}{2} \times 8 = 4$ cm

In Δ OCA

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

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

$= (4)^2 + (5)^2$

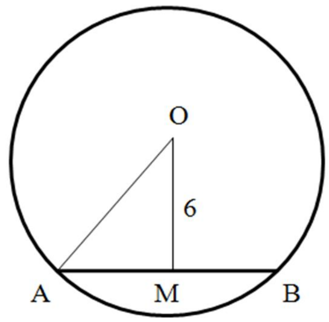
$= 16 - 25$

$= 9$

∴ OC = 3 cm

∴CD = OD - OC = 5 - 3 = 2 cm

Q. 22) A circle has centre O and chord AB. The distance form center to chord is 6 cm. The radius of the circle is 6 cm less than the length of chord AB. Find the length of the chord AB.(3M)



Solution :

O is the centre of the circle

seg OM ⊥ seg AB

OM = 6 cm

Radius OA = (Chord AB – 6)

Let AB = x

Radius OA = x – 6 (By given condition)

Also, AM = $\frac{1}{2}$ AB

$= \frac{1}{2}x$ (seg OM ⊥ seg AB)

$= \frac{x}{2}$

In Δ OMA , ∠OMA = 90^0

OA = $(x - 6)$ cm , OM = 6 cm

AM = $\frac{1}{2}$ x cm

By Pythagoras theorem

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

$(x - 6)^2 = \left(\frac{x}{2}\right)^2 + (6)^2$

$x^2 - 12x + 36 = \frac{x^2}{4} + 36$

$4(x^2 - 12x) = x^2$

$4x^2 - 48x = x^2$

$4x^2 - x^2 = 48x$

$4x^2 - x^2 = 48x$

$3x^2 = 48x$

$3x = 48x$

$x = \frac{48}{3}$

$x = 16$

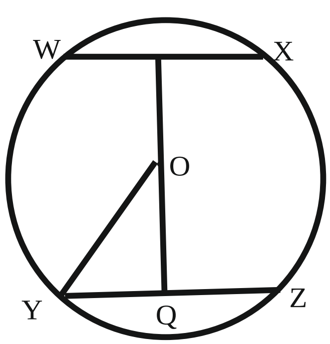
∴ Chord AB = x = 16 cm

∴ Radius of circle = x – 6

= 16 – 6

= 10 cm

Q. 23) The radius of the one circle is 13 cm. In the cirlce there are two chords each of length 24 cm, then find the distance of chords from the center point of the circle. (3M)



Solution : O is the center of the circle

Radius OY = 13 cm

seg OQ ⊥ chord YZ

Y - Q - Z and seg YQ ≅ seg ZQ

$\therefore$ YQ = ZQ = $\frac{1}{2}$ YZ = $\frac{1}{2} \times 24 = 12$ cm

$\therefore$ YQ = ZQ = 12 cm

In right angled triangle , Δ OYQ

$OY^2 = OQ^2 + YQ^2$ ... (Pythagoras theorem)

$13^2 = OQ^2 + 12^2$

$169 = OQ^2 + 144$

$OQ^2 = 169 - 144$

$OQ^2 = 25$

$\therefore$ OQ = 5 cm

In fig,

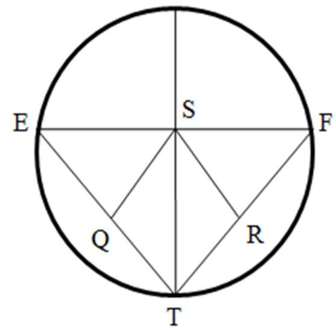
Chord YZ = Chord WX ….. [Given]

seg OP ⊥ chord WX

$\therefore$ seg OP ⊥ seg OQ …. [congruent side)

seg OP = 5 cm

Q.24) A circle with center S having two equidistance chord ET and chord FT then prove that ray TS is bisector of ∠ETF(4M)



Solution : A circle with center S

where,

Chord ET = chord FT

seg SQ ⊥ chord ET

seg SR ⊥ chord FT

To prove : Ray TS is bisector OF $\angle$ ETF

Here, chord ET = chord FT ……. Side (I)

seg SQ ⊥ chord ET ………….Side (II)

seg SR ⊥ chord FT …………..Side (III)

∴ SQ = SR …. [equidistance chord from the center of the circle)

TQ = QE = $\frac{1}{2}$ TE ….. (VI)

TR = RF = $\frac{1}{2}$ TF ... (V)

∴ TQ = QE = TR = RF ... (I), (V), (VI)

In Δ SQT and Δ SRT

SQ = SR ...from (IV)

TQ = TR ... from (IV)

ST = ST ... common side

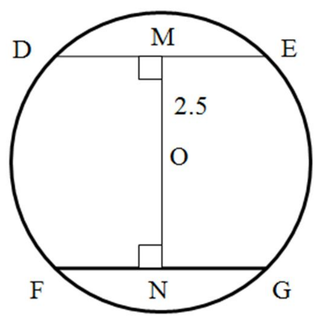
∴ Δ SQT ≅ Δ SRT ... [S-S-S test]

∴ ∠ SQT ≅ ∠ SRT ... (VIII)

∴ ∠ STE ≅ ∠ STF ... from (VIII)............ (IX)

∴ Ray TS is bisector of ∠ ETF

Q. 25) In the given figure, point O is the midpoint of the circle. DE = FG, If OM = 2.5 find the ON (2M)



Solution :

chord DE ≅ chord FG

OM ⊥ DE, ON ⊥ FG

Shown in the figure.

OM = 2.5 cm

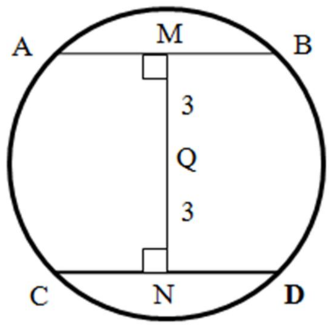
Means Distance of DE from O is 2.5 cm

ON = 2.5 cm

OM and ON (equidistance)

ON=2.5 cm

Q. 26) In the given figure, point Q is the midpoint of the circle · QM ⊥ AB, QN ⊥ CD. QM = QN = 3 cm. If AM= 2 cm, then find the length of CD (3M)



Solution :

QM ⊥ AB, QN ⊥ CD

QM = QN = 3 cm

∴ AB = CD ... (I) [equidistance chord]

$AM = \frac{1}{2}AB$ ... (II)

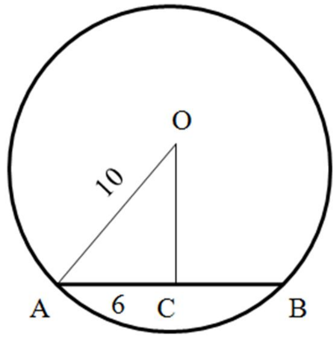
AM = 2

$\therefore AM = \frac{1}{2}AB = 2$ ... (II)

∴ AB = 4 cm ... (III)

∴ CD = 4 cm ...from (I) and (III)

Q. 27) In the given figure, O is the center of the circle, OA = 10 cm, chord AB ⊥ OC, OC = 8 cm, then find length of AB (3M)



Solution :

OC ⊥ AB

AC = CB

In Δ OAC,

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

... (by Pythagoras theorem)

$AC = \sqrt{OA^2 - OC^2}$

$= \sqrt{(10)^2 - (8)^2}$

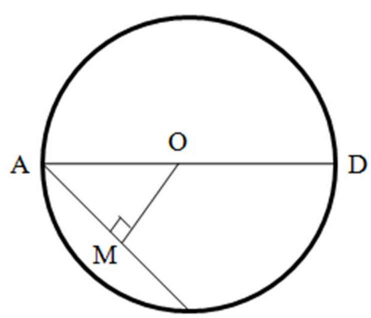
$= \sqrt{100 - 64}$

$= \sqrt{36}$

AC = 6 cm

∴ AB = 2 × AC = 2 × 6 = 12 cm

Q. 28) A circle has diameter AD and chord AB. If AD = 34 cm and AB = 30 cm ,then find the distance of AB from the center?(4M)



Solution :

Diameter of circle = AD = 34 cm

$\therefore AO = OD = \frac{1}{2} \times AD$

$= \frac{1}{2} \times 34$

$= 17$ cm

Chord AB = 30 cm

$AM = AB = \frac{1}{2} AB = \frac{1}{2} \times 30 = 15$ cm

In Δ OMA,

$OA^2 = OM^2 + AM^2$ ... (by Pythagoras theorem)

$(17)^2 = OM^2 + (15)^2$

$289 = OM^2 + 225$

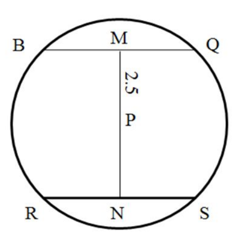
$OM^2 = 289 - 225$

$OM^2 = 64$

OM = 8 cm

$\therefore$ Distance of AB from the midpoint is 8 cm.

Q. 29) In the given figure. P is the midpoint of the circle. Chord BQ = 5 cm. chord BQ $\cong$ chord RS and PM $\perp$ BQ, PN $\perp$ RS , PM = 2.8 cm then find the length of PN.(4M)



Solution:

In the circle, P is the center of the circle.

chord BQ ≅ chord RD

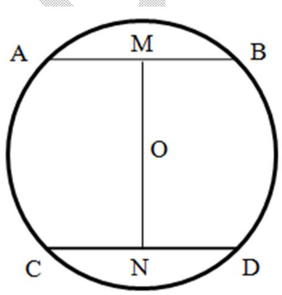
and PM ⊥ BQ, PN ⊥ RS

... (as shown in figure)

PM = 2.8 means distance of BQ from P is 2.8 cm

∴ PN = 2.8 cm … [congruent chord in a circle are equidistant from the center of circle]

Q. 30) In the circle, O is the center of circle OM ⊥ AB, ON ⊥ CD, OM = ON = 3.9 cm .If chord AB = 8.6 cm ,then find length of chord CD.(2M)



Solution:

OM ⊥ AB, ON ⊥ CD,

OM = ON = 3.9 cm

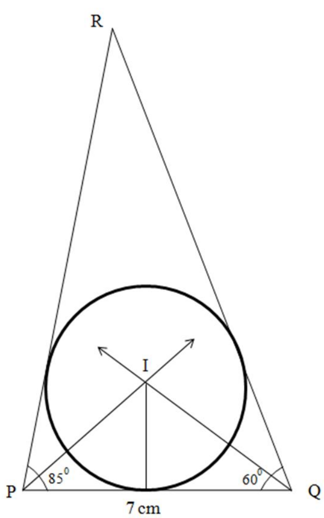
∴ AB = CD

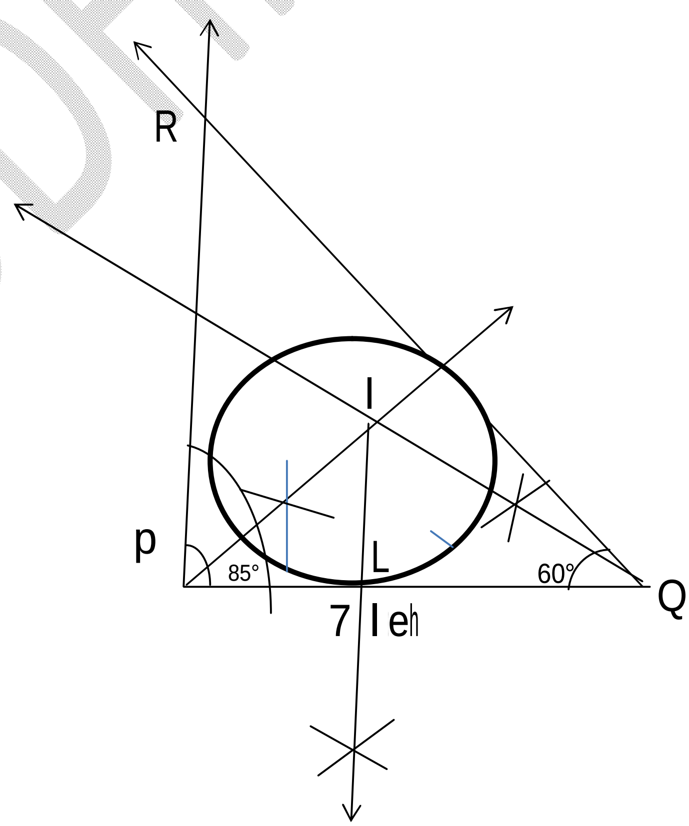
... (congruent chords in a circle are equidistant from the centre of the circle)

$\therefore$ AB = 8.6 cm

$\therefore$ CD = 8.6 cm

Q. 31) Construct ΔPQR such that $\angle P = 85^0$] PQ = 7 cm, $\angle Q = 60^0$. Draw in circle of ΔPQR. Draw a rough figure and show all measure on it





Solution:

i)Construct ΔPQR of given measure.

ii) Draw bisectors of any two angles of the triangle.

iii) Do note the point of inter section of angle bisectors as I

iv) Draw perpendicular IL from point I to the side PQ.

v) Draw a circle with center I and radius IM.

Q. 32) Distance of chord PQ from midpoint of the circle 1 cm. Length of chord is 4 cm, then find the radius of circle.

$PM = \frac{1}{2}\square$ ....(perpendicular drawn the center of the chord to chord bisects the chord)

$\therefore$ PM = $\square$

In $\Delta\, OMP$, $\angle OMP = 90^0$

$\therefore OP^2 = OM^2 + PM^2$ ... (by Pythagoras theorem)

$\therefore OP^2 = \square$

$\therefore$ OP = $\square$ ... (Take square root of both sides)

(3M)

Solution : $PM = \frac{1}{2}\boxed{PQ}$

....[perpendicular drawn the center of the circle to chord bisects the chord]

$\therefore$ PM = $\boxed{\frac{1}{2} \times 4 = 2cm}$

In $\Delta\, OMP$, $\angle OMP = 90^0$

$\therefore OP^2 = OM^2 + PM^2$ ... (by Pythagoras theorem)

$\therefore OP^2 = \boxed{(1)^2 + (2)^2}$

$= \boxed{1 + 4}$

$\therefore OP^2 = 5$ ... (Take square root of both sides)

$\therefore OP = \boxed{\sqrt{5}cm}$

Q. 33) Radius of circle is 61 cm from centre ‘O’, length of the chord AB is 120 unit. Find the distance of chord from center of circle. (3M)

$AP = \frac{1}{2}AB$ ...[perpendicular drawn on chord bisects chord]

$= \boxed{}$

In Δ OPA, $\angle OPA = 90^0$

$\therefore OA^2 = OP^2 + AP^2$ ... (by Pythagoras theorem)

$\therefore 61^2 = OP^2 + \boxed{}$

$OP^2 = (61 - 60)\boxed{}$

$\therefore OP = \boxed{}$

Solution :

$AP = \frac{1}{2}AB$

...[perpendicular drawn on chord bisects chord]

$= \boxed{\frac{1}{2} \times 120 = 60}$

AP = 60 unit

In Δ OPA , $\angle OPA = 90^0$

$\therefore OA^2 = OP^2 + AP^2$ ... (by Pythagoras theorem)

$\therefore 61^2 = OP^2 + \boxed{60^2}$

$OP^2 = (61 - 60)\ \boxed{(61 + 60)}$

$= \boxed{(1)(121)}$

$\boxed{OP^2 = 121}$

$\therefore$ OP = $\boxed{11}$ unit,

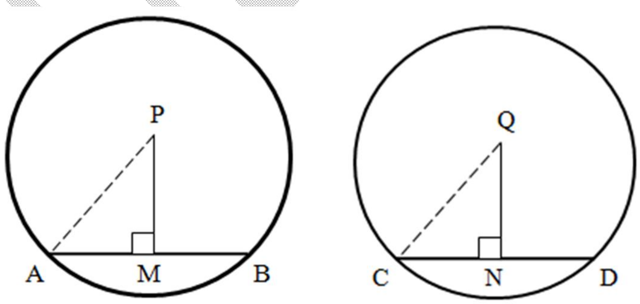
Q. 34) Chord of the circle are congruent and they are equidistance from the center

Side : point P and point q are centers of circles are congruent

seg PM ⊥ chord AB A - M - B

seg QN ⊥ chord CD C - N - D

PM = QN



To prove : chord AB ≅ chord CD

Construction : Draw seg PA and seg QC

Δ PMA and Δ QNC ,

☐ ≅ ∠ QNC ... (each 90^0)

seg PM ≅ seg QN ... (Given)

hypotenuse PA ≅ hypotenuse QC ... [congruent radii of circle)

Δ PMA ≅ Δ QNC

seg AM ≅ seg ☐

∴ AM = CN

∴ AM = $\frac{1}{2}$ × AB

CN = $\frac{1}{2}$ × CD

∴ AB = CD

∴ chord AB ≅ chord CD

(4M)

Ans : Δ PMA and Δ QNC

∠ PMA ≅ ∠ QNC ... (each 90^0)

seg PM ≅ seg QN ... (Given)

hypotenuse PA ≅ hypotenuse QC

…………….[congruent radii of circle)

Δ PMA ≅ Δ QNC

seg AM ≅ seg CN

∴ AM = CN

∴ AM = $\frac{1}{2}$ × AB

…... [perpendicular drawn from chord bisect chord]

$CN = \frac{1}{2} \times CD$

∴ AB = CD

∴ chord AB ≅ chord CD

Q. 35) In the given fig, P is the center of the circle ,chord AB and chord CD intersect in point E at the diameter. If ∠ AEP ≅ ∠ DEP, then prove AB = CD.

Side : P is the center of the circle ,chord AB and chord CD intersect in point E of diameter (4M)

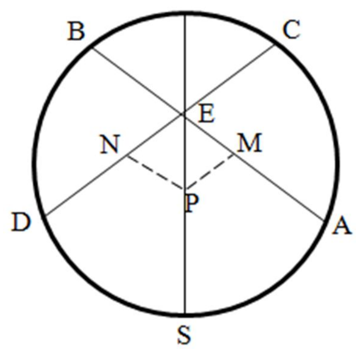
∠ AEP ≅ ∠ DEP

To prove : AB = CD

Construction : seg PM ⊥ chord AB

A - M - B

seg PN ⊥ chord CD , C - N - D



∠ AEP ≅ ∠ DEP ... (Given)

Bisector of seg ES [ ]

∴ [ ] = PN ... (bisector theorem)

chord AB ≅ chord CD ... [ ]

AB = CD ... (length of the congruent segment)

Solution :

$\angle$ AEP $\cong$ $\angle$ DEP ... (Given)

seg ES is the bisector of $\boxed{\angle AED}$

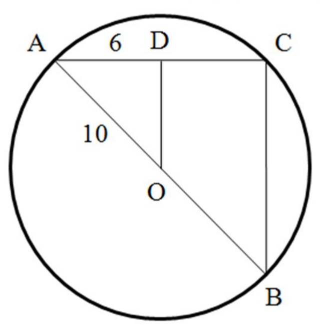
point P is the bisector of $\boxed{\angle AED}$

$\therefore$ $\boxed{PM}$ = PN ... (bisector theorem)

chord AB $\cong$ chord CD ... (congruent chords of a circle are equidistant from the center of the circle)

AB = CD ... (length of the congruent segment)

Q. 36) In the given figure, Diameter AB and chord AC has end point 'A' length of the AB is 20 cm and AC = 12 cm , find the distance of AC from midpoint of the circle? (4M)



Solution:

Given : Diameter AB and chord AC same end points

AB = 20 cm

and AC = 12 cm

To prove : To find OD

Proof : construct OD $\perp$ AC

$\therefore$ AD = DC = $\frac{1}{2}$ AC = $\frac{1}{2}$ $\times$ 12 = 6 cm

(perpendicular drawn from center of a circle to the chord bisects chord)

$\therefore$ OA = OB = $\frac{1}{2}$ AB = $\frac{1}{2} \times 20 = 10$ cm

In Δ ODA,

$\therefore OA^2 = OD^2 + AD^2$…(by Pythagoras theorem)

$(10)^2 = OD^2 + (6)^2$

$100 = OD^2 + 36$

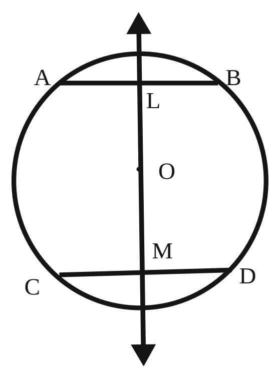
$OD^2 = 100 - 36$

$OD^2 = 64$

$\therefore OD = 8$ cm

The distance of AC from the midpoint of the circle is 8cm.

Q. 37) In the given figure. EF is a line passing through center O of circle. If EF bisects chord AB and CD of the circle. Prove that AB ∥ CD. (4M)



Solution : EF is the line passing

though the centre O of

a circle. EF bisects

chords AB and CD of the circle.

To prove : AB ∥ CD.

Proof : EF bisects chord AB

∴ ∠ OLB = ∠ OLA = 90^0 ... (1)

[The line drawn through the centre of circle to bisect a chord is perpendicular to the chord]

∴ EF bisects chord CD

∴ OM bisects chord CD

∴ ∠ OMC = ∠ OMD = 90^0 ... (2)

…..(The line drawn through the centre of circle to bisect a chord is perpendicular to the chord)

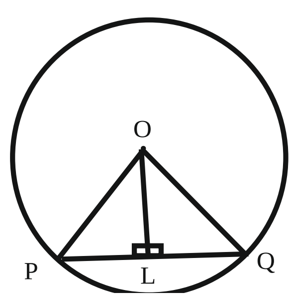
From (1) and (2)

∠ OLB = ∠ OMC = 90^0

But these angles form a pair of equal alternate interior angles.

∴ AB ∥ CD.

Q. 38) Prove that the perpendicular from the centre of a circle to a chord, bisects the chord. (4M)



Solution : A circle with centre O .

PQ is a chord of this circle.

OL is the perpendicular drawn to chord PQ from centre O.

Chord PQ from centre O

To prove : PL = QL

Construction : Join OP and OQ

Proof : In Δ OLP and Δ OLQ

OP = OQ ... (radii of the same circle)

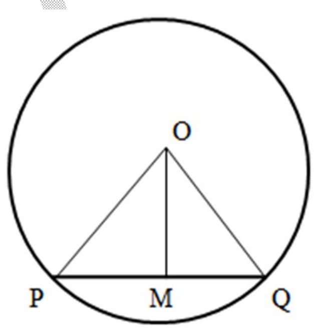
OL = OL ... (common side)

∠OLP = ∠OLQ ... (Each 90^0)

Δ OLP ≅ Δ OLQ ... (By A-S-A test of congruency)

∴ PL = QL.

Q. 39) Prove that the line drawn through the centre of circle to bisect a chord is perpendicular to the chord. (4M)



Given: A circle with centre O.

PQ is a chord of this circle

M is the mid point of the chord PQ

To prove : OM ⊥ PQ

Construction : Join OP and OQ

Proof : Δ OMP and Δ OMQ

OP = OQ ... (Radii of same circle)

OM = OM ... (common side)

MP = MQ ... (M is the midpoint of PQ)

∴ Δ OMP ≅ Δ OMQ ... (By S-S-S test)

∴ $\angle OMP = \angle OMQ$

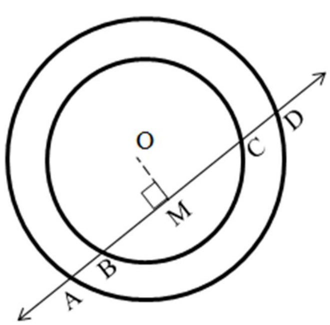
But,

$\angle OMP + \angle OMQ = 180^0$ ... (Linear pair axion)

∴ $\angle OMP = \angle OMQ = 90^0$

OM ⊥ PQ.

Q. 40) If a line intersects two concentric circles (Circles with same centre)with centre O at A, B, C and D, prove that AB = CD (4M)



Solution:

Given : A line intersects two concentric circles (circles with the same centre)

with centre O at A, B, C and D

To prove : AB = CD

Construction : Draw OM ⊥ BC

Proof : The perpendicular drawn from the centre of circle to a chord bisects the chord.

∴ AM = DM ... (1)

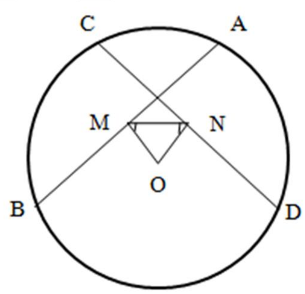
BM = CM ... (2)

Substracting (2) from (1) we get

AM - BM = DM - CM

AB = CD

Q. 41) In the given figure. Chord AB and chord CD are two congrucnet chord passing through center 'O' of the circle. IF OM ⊥ AB and ON ⊥ CD ,then prove that ∠ OMN = ∠ ONM-(4M)



Solution:

Given : In the given figure,

AB and CD are congruent

chord of same

length OM ⊥ AB and ON ⊥ CD

To prove: ∠ OMN = ∠ ONM

Proof : Chord AB = Chord CD

OM = ON ... (1) [perpendicular drawn from center of the circle to chord bisect are congruent)

In Δ OMN

OM = ON ... from (1)

∴ ∠ OMN = ∠ ONM ... (adjacent side of triangle having same angle)

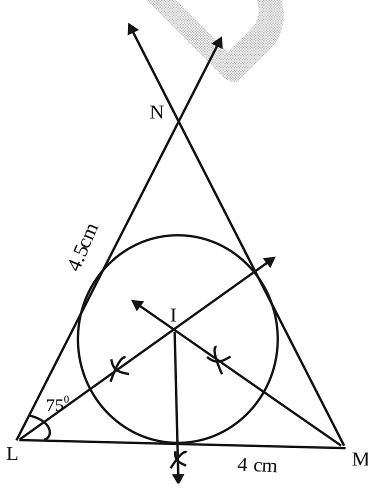
Q.42) Construct Δ LMN such that LM = 4cm] ∠ L = 70^0

LN = 4.5cm, Draw incircle of Δ LMN (4M)

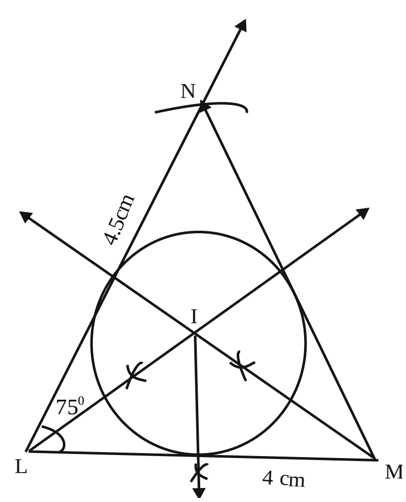
Ans : Draw a rough figure and show all measures init

1) Construct Δ LMN of given measures
2) Draw ∠ L and ∠ M as two bisectors of triangle
3) Denote the point of intersection of angle bisectors as I
4) Draw perpendicular LM from point I
5) Draw a circle with Centre I and radius IA.

Rough diagram



correct diagram



Q.43) Construct right angled triangle Δ ABC. Draw incircle of it. (3M)

Ans : Steps:

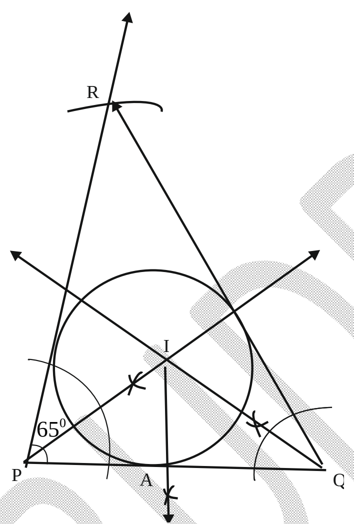
1) Construct Δ ABC (right angled triangle) of any measure.

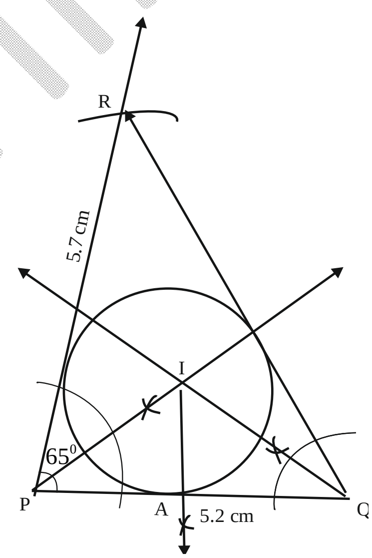
2) Draw bisectors of any two angles of of triangle.

3) Denote the point of intersection of angle bisectors as I

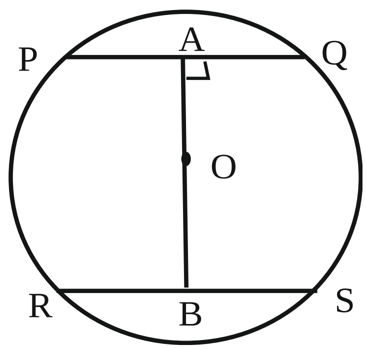
4) Draw perpendicular IM from the point I

Rough diagram   correct diagram





Q.44) Two chords PQ and RS of a circle are parallel to each other and AB is the perpendicular bisector of PQ. Without using any construction, prove that AB bisects RS(3M)



Given : Two chords PQ and RS of circle are parallel to each other and AB is perpendicular bisector of PQ

To prove : AB bisects RS

Proof : AB is the perpendicular bisector of PQ

∴ AB passes through the center O

∴ PQ ∥ RS

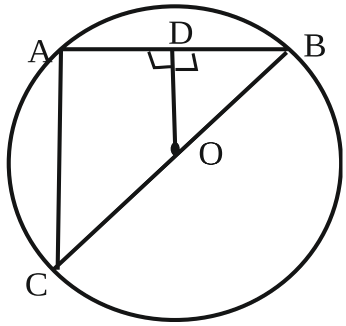
∴ AB ⊥ RS

∴ AB passed through the center

∴ AB bisects RS

[perpendicular drawn from the center of circle bisects the chord]

Q.45) OD is perpendicular to chord AB of circle whose centre is O. If BC is a diameter, prove that CA = 20D(4M)



Given : OD is perpendicular to chord AB of a circle where centre is O. BC is diameter of the circle.

To prove : CA = 2OD

Proof : D is the midpoint of AB

C the perpendicular drawn from the center of a circle to a chord bisects the chord.

In Δ BAC ,

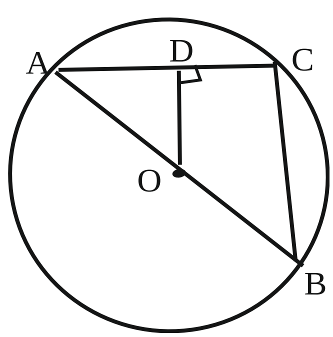
∴ D is the mid point of AB and O is the mid point of the BC.

OD ∥ AC …….. (By midpoint through)

And OD = $\frac{1}{2}$ AC

∴ CA = 2OD

Q.46) In the figure, diameter AB and chord AC have a common end point A. If the length of AB is 20 cm and AC is 12 cm, how for is AC from the center of the circle? (4M)



Given : Diameter AB and a chord AC have common end point A. AB = 20 and AC = 12 cm.

To determine : OD

Determination ∵ OD ⊥ AC

$AD = DC = \frac{1}{2} AC$

$= \frac{1}{2} \times 12$

= 6 cm [Perpendicular drawn from center of circle to a chord bisects the chord]

$OA = OB = \frac{1}{2} AB$

$= \frac{1}{2} \times 20$

= 10 cm

In right triangle ODA,

$\therefore OA^2 = OD^2 + AD^2$…(by Pythagoras theorem)

$(10)^2 = OD^2 + (6)^2$

$100 = OD^2 + 36$

$OD^2 = 100 - 36$

$OD^2 = 64$

$\therefore OD = 8$ cm

Hence, AC is 8 cm far from the centre of the circle.

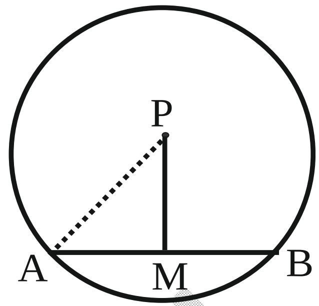
Q.47) P is the centre of circle with radius 25 cm length of the chord is 48 cm. Find the distance of P from center.

Solution : In fig.

Radius of circle , PA = 25cm

PM ⊥ AB (By construction)

PM bisect AB



∴ AM ≅ MB

∴ AM = MB = $\frac{1}{2}$ AB

= $\frac{1}{2} \times 48$

= 24 cm

In right ΔPMA , ∠PMA = 90^0

By Pythagoras theorem,

∴ $PA^2 = PM^2 + AM^2$

$(25)^2 = PM^2 + (24)^2$

$(25)^2 = (24)^2 + (PM)^2$

$(28 + 24)(25 - 24) = PM^2$

$(49 \times 1) = PM^2$

PM = 7 × 1

PM = 7 cm

∴ Distance from the centre of the circle is 7 cm.

Q.48) Diameter of a circle is 26 cm and length of a chord of the circle is 24 cm. Find the distance of the chord from the centre. (4M)

Solution:

Given : Radius of circle, OB = $\frac{26}{2}$ = 13 cm

Chord AB = 24 cm.

To find :-

Distance from centre, OM

Length of the chord, AB = 24 cm.

AM = MB = $\frac{AB}{2} = \frac{24}{2}$ = 12 cm

(perpendicular drawn from the centre bisects the chord)

In Δ OMB, ∠OMB = 90^0

OB = 13 cm, MB = 12 cm, OM =?

$\therefore OB^2 = OM^2 + MB^2$ ………. (by Pythagoras theorem)

$(OM)^2 = (13)^2 + (12)^2$

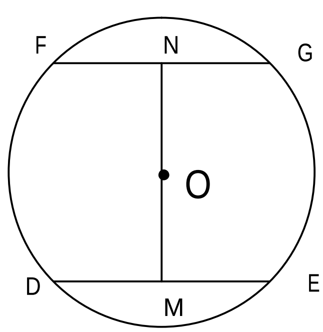
$(OM)^2 = 169 - 144$

$(OM)^2 = 25$

OM = 5 cm

∴ Distance of the chord from the centre is 5 cm.

Q.49) In the given figure O is the centre of the circle DE ≅ FG. If OM = 2.5 cm find ON (3M)



Solution : O is the centre of circle -

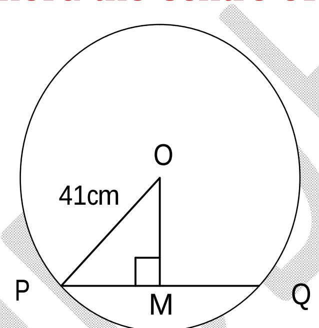
OM ⊥ DE, ON ⊥ FG and DE ≅ FG

∴ OM ≅ ON ….. (congruent chords are equidistant from centre.)

But, OM = 2.5 cm

∴ ON = 2.5 cm

Q.50) Radius of a circle with centre O is 41 units. Length of a chord PQ is 80 units, find the distance of the chord from the centre of the chord the centre of the circle. (4M)



Ans : Let seg OM ⊥ chord PQ such that P-M-Q ,

PQ = 80 units, OP = 41 units

∴ PM = $\frac{1}{2} \times 80$

∴ PM = 40 units.

In right angled Δ OMP,

By Pythagoras theorem,

$OP^2 = OM^2 + PM^2$

∴ $41^2 = OM^2 + 40^2$

∴ $OM^2 = 1681 - 1600$

∴ $OM^2 = 1681 – 1600$

∴ $OM^2 = 81$

∴ $OM = \sqrt{81}$

∴ OM = 9 units

∴ Distance of the chord from the centre is 9 units.

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