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Roll no. 27 IX/A

Assignment I

1) Find the value of $\sin^2 45^\circ + \sin^2 30^\circ + \sin^2 60^\circ$

Ans

$\sin^2 45^\circ = \left(\frac{1}{\sqrt{2}}\right)^2$, $\sin^2 30^\circ = \left(\frac{1}{2}\right)^2$, $\sin^2 60^\circ = \left(\frac{\sqrt{3}}{2}\right)^2$

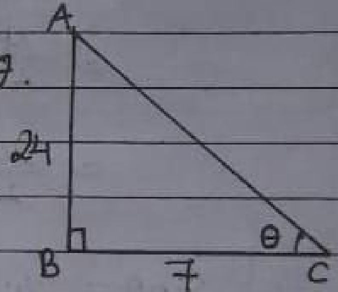
$= \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2$

$= \frac{1}{2} + \frac{1}{4} + \frac{3}{2}$

$= \frac{2+1+6}{4}$

$= \frac{9}{4}$

2) If $\tan\theta = \frac{24}{7}$, find $\sin\theta$ and $\cos\theta$.



Ans ΔABC, is a rightangled triangle
let $\angle C$ be θ

$\therefore \tan\theta = \frac{\text{Opposite Side of } \theta}{\text{Adjacent Side of } \theta} = \frac{24}{7} = \frac{AB}{BC}$

$\boxed{\therefore AB = 24}$
$\boxed{\therefore BC = 7}$

$\therefore$ We have to find the side AC to get the values of $\sin\theta$ and $\cos\theta$.

$\therefore$ In ΔABC, $m\angle B = 90^\circ$,

$\therefore$ by pythagoraes theorem

$AC^2 = BC^2 + AB^2$

$AC^2 = 7^2 + 24^2$

$AC^2 = 49 + 576$

$AC^2 = 625$

$\boxed{\therefore AC = 25}$ $\because$ Taking Square roots on both Sides.

$\therefore$ Now we can find the values of $\sin\theta$ and $\cos\theta$

$\sin\theta = \dfrac{\text{Opposite Side of } \theta}{\cancel{\text{Adjacent Side of } \theta} \text{ Hypotenuse}}$

$= \dfrac{AB}{AC}$

$= \dfrac{24}{25}$

$\boxed{\therefore \sin\theta = 24:25}$

$\cos\theta = \dfrac{\text{Adjacent Side of } \theta}{\text{Hypotenuse}}$

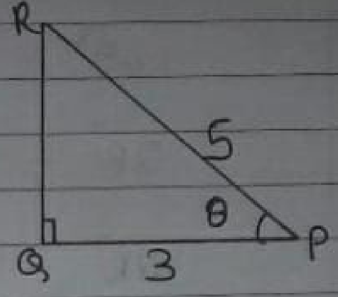
$= \dfrac{BC}{AC}$

$= \dfrac{7}{25}$

$\boxed{\therefore \cos\theta = 7:25}$

$\therefore$ We sucessfully found the values of $\sin\theta$ and $\cos\theta$ as 24:25 and 7:25 respectively.

3) In a right angled triangle PQR, $\angle Q = 90°$, $\angle P = \theta$ and $\cos\theta = \frac{3}{5}$, find $\sin\theta$ and $\tan\theta$, Similarly find $\sin^2\theta$ and $\tan^2\theta$



Ans Given- in ΔPQR,

$m\angle Q = 90°$

$\angle P = \theta$

$\cos\theta = 3/5$

To find - $\sin\theta$, $\tan\theta$, $\sin^2\theta$, $\tan^2\theta$

Solution-

So first-of-all lets find the values of $l(PQ)$, $l(QR)$, $l(PR)$.

$$\cos\theta = \frac{\text{Adjacent side of } \theta}{\text{Hypotenuse}} = \frac{QP}{RP} = \frac{3}{5}$$

$\boxed{\therefore l(QP) = 3}$

$\boxed{\therefore l(RP) = 5}$

Now lets find $l(RQ)$

$\therefore$ in ΔPQR, $m\angle Q = 90°$

$\therefore$ by pythagoraes theorem

$$PR^2 = RQ^2 + QP^2$$

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$5^2 = 3^2 + QR^2$

$25 = 9 + QR^2$

$QR^2 = 25 - 9$

$QR^2 = 16$

$\boxed{\therefore QR = 4}$ Taking Square roots on both sides.

Now let us find the values of $\sin\theta$, $\tan\theta$, $\sin^2\theta$, $\tan^2\theta$

$\sin\theta = \frac{\text{Opposite Side of } \theta}{\text{Hypotenuse}}$

$= \frac{RQ}{RP}$

$= \frac{4}{5}$

$\boxed{\therefore \sin\theta = 4:5}$

$\tan\theta = \frac{\text{Opposite side of } \theta}{\text{Adjacent Side of } \theta}$

$= \frac{RQ}{QP}$

$= \frac{4}{3}$

$\boxed{\therefore \tan\theta = 4:3}$

$$\sin^2\theta = \left(\frac{\text{opposite side of }\theta}{\text{Hypotenuse}}\right)^2$$

$$= \left(\frac{RQ}{RP}\right)^2$$

$$= \left(\frac{4}{5}\right)^2$$

$$= \frac{16}{25}$$

$$\boxed{\therefore \sin^2\theta = 16:25}$$

$$\tan^2\theta = \left(\frac{\text{Opposite side of }\theta}{\text{Adjacent Side of }\theta}\right)^2$$

$$= \left(\frac{RQ}{QP}\right)^2$$

$$= \left(\frac{4}{3}\right)^2$$

$$= \frac{16}{9}$$

$$\boxed{\therefore \tan^2\theta = 16:9}$$

$\therefore$ We successfully found the values of the following as following.

$\sin\theta = 4:5$
$\tan\theta = 4:3$
$\sin^2\theta = 16:25$
$\tan^2\theta = 16:9$

4] find the value of $\frac{\cos 56^\circ}{\sin 34^\circ}$

Ans

We Know that, $\cos\theta = \sin(90-\theta)$ So using this property.

$\cos 56^\circ = \sin(90-56)$

$\cos 56^\circ = \sin 34^\circ$ ... (I)

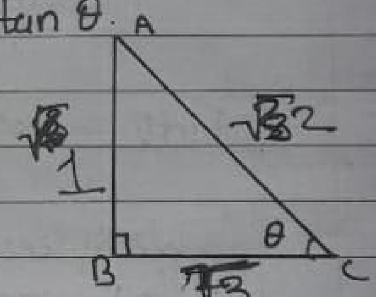
$\therefore = \frac{\cos 56^\circ}{\sin 34^\circ}$

$= \frac{\sin 34^\circ}{\sin 34^\circ}$ from I

$= 1$

$\boxed{\therefore \frac{\cos 56^\circ}{\sin 34^\circ} = 1}$

5) If $\cos\theta = \frac{\sqrt{3}}{2}$, find $\sin\theta$ and $\tan\theta$.



Ans ΔABC is a right angled triangle and let $\angle C$ be θ

$\cos\theta = \frac{\text{Adjacent Side of } \theta}{\text{Hypotenuse}} = \frac{ABC}{AC} = \frac{\sqrt{3}}{2}$

$\boxed{\therefore ABC = \sqrt{3}}$

$\boxed{\therefore AC = 2}$

Now let us find $l(BC)$

$\therefore$ in ΔABC, $m\angle B = 90^\circ$

$\therefore$ by pythagoraes Theorem.

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$$AC^2 = BC^2 + AB^2$$

$$\cancel{4}\,2^2 = (\sqrt{3})^2 + AB^2$$

$$4 = 3 + AB^2$$

$$4-3 = AB^2$$

$$AB^2 = 1$$

$\boxed{AB = 1}$ ∵ Taking square root on both the sides

$$\sin\theta = \frac{\text{Opposite side of } \theta}{\text{Hypotenuse}}$$

$$= \frac{AB}{A\cancel{C}}$$

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

$\boxed{\therefore \sin\theta = 1:2}$

$$\tan\theta = \frac{\text{Opposite side of } \theta}{\text{Adjacent side of } \theta}$$

$$= \frac{AB}{BC}$$

$$= \frac{1}{\sqrt{3}}$$

$\boxed{\therefore \tan\theta = 1:\sqrt{3}}$

∴ We sucessfully found the value of $\sin\theta$ and $\cos\theta$ as $1:2$ and $1:\sqrt{3}$

Adjustment details

Q.2, Q.4 and Q.5 are Solved first and

Q.1 and Q.3 (Graphs) are Solved at the end of Assignment 2

Assignment 2

Q.2 Complete the following table in order to get the graph of equation $2x+y=5$

x	0	2.5	2
y	5	0	1
(x,y)	$(0,5)$	$(2.5,0)$	$(2,1)$

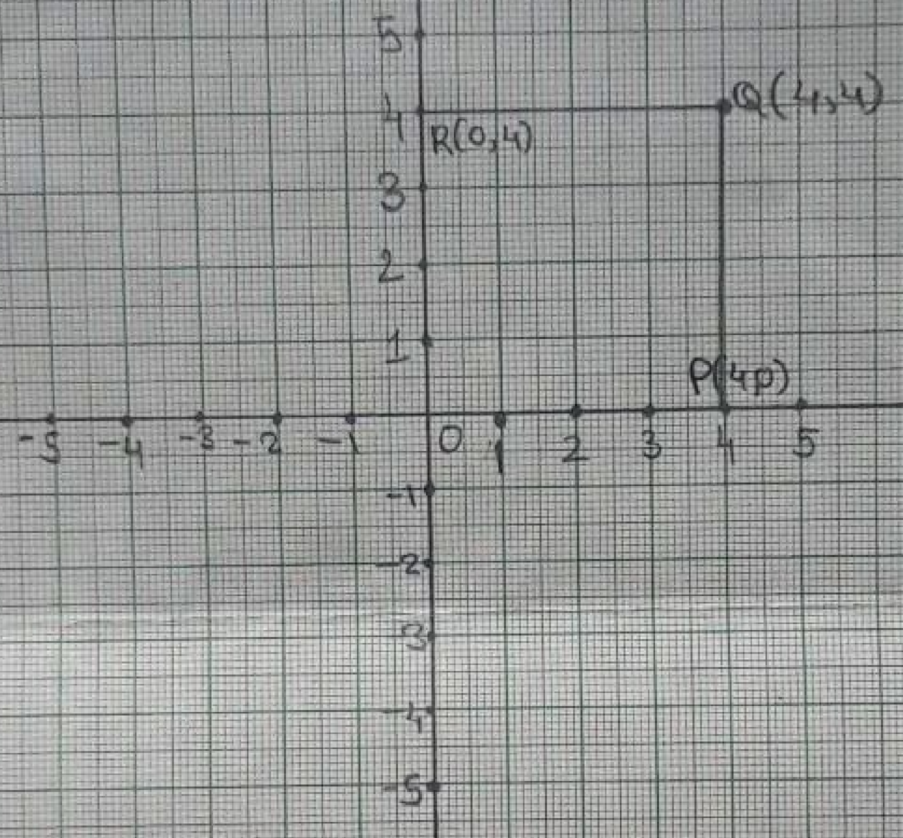
Q.4 Match the following

1] Both ~~a~~ coordinates are positive - First Quadrant
2] Both Coordinates are negative - Third Quadrant
3] x-coordinate is 0 and y-Coordinate is positive - ~~Fourth Quadrant~~ y-axis
4] x-Coordinate is positive and y-Coordinate is negative - Fourth Quadrant

Q.5 1] Equation of x-axis is $y=0$

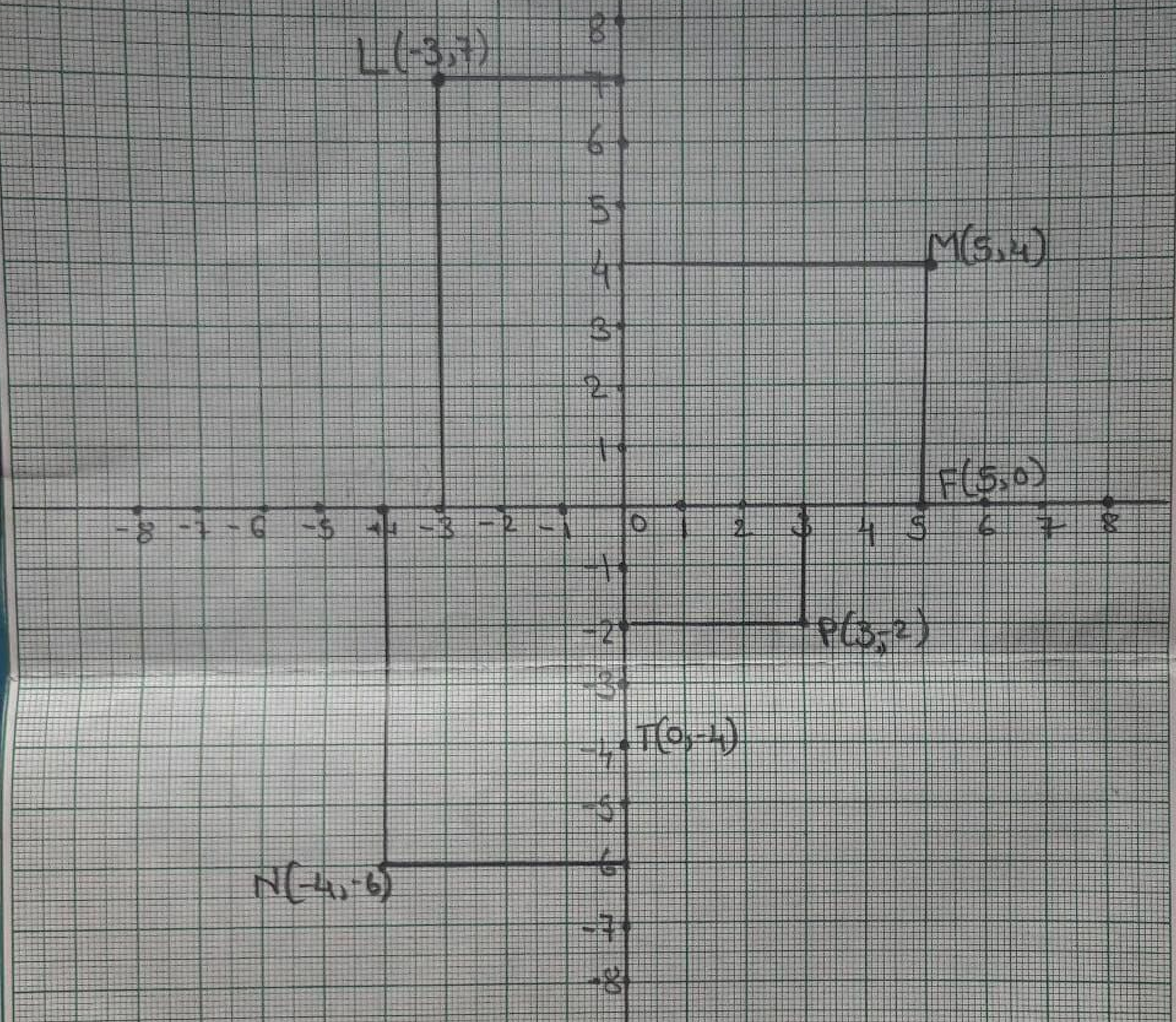
2] Equation of y-axis is $x=0$

Plot points P(4,0), Q(4,4) R(0,4) on a graph Paper and see which figure is formed.



As seen in the graph we can see that a Square is formed.

Plot the following points on a graph paper, L(-3,7) M(5,4) N(-4,-6), P(3,-2), T(0,-4), F(5,0)



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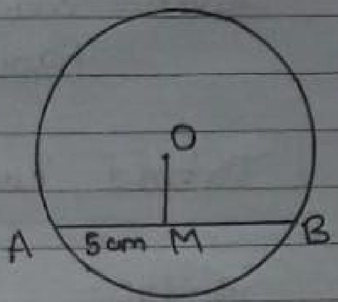
Assignment 3

Q.1 In the given figure Seg AB is the chord of the Circle with center O seg OM ⊥ Chord AB If AM = 5cm, find AB



Ans Given- Seg AB is chord of circle
center is O
OM⊥ Chor AB
AM=5cm

To find- l(AB)

Solution

We all are well known to the theorem that a perpendicular drawn from the center of circle to the chord, bisects the chord. So here seg OM is bisecting the chord ∴ AM+BM = AB --- I
∴ AM ≅ BM --- II

AB = AM + BM --I
AB = 2AM --II
AB = 2(5)
AB = 10 cm

∴ If the value of AM = 5cm then the valee of AB will be 10cm

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2] If the radius of circumcircle of an equilateral triangle is 5cm, then find the radius of incircle.

Given- Triangle is an equilateral triangle.
Radius of circumcircle = 5cm

To find- Radius of incircle.

Solution-

We know that, Ratio of radius of circumcircle to radius of incircle of an equilateral triangle is 2:1

Let the radius of incircle be x

$$\frac{5}{x} = \frac{2}{1}$$

$$\frac{1}{x} = \frac{2}{5}$$

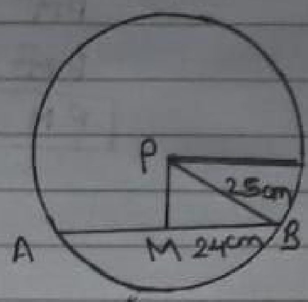
$$\frac{1}{x} = \frac{1}{2.5}$$

$$\boxed{\therefore x = 2.5cm}$$

$\therefore$ Radius of incircle is 2.5cm.

Q.3 Radius of a circle ~~P~~ is with center P is 25 cm the length of the chord of the same circle is 48 cm. find the distance of the chord from the center of the circle.

Ans Given- Radius of circle = 25cm
Center of circle = P
Chord of circle = 48cm



To find - Distance of chord from center P

Construction - Let chord be AB
Let PM Be the distance of the Chord from ~~cent~~ Center
PB is the radius of the circle.

Solution -

$PM \perp AB,$

$\therefore AM + BM = AB$ $\because$ Perpendicular drawn from the center of circle to the chord bisects the chord.

$\therefore Am \cong BM$ --I

$\therefore AM + BM = AB$ from I

$BM + BM = 48$

$2BM = 48$

$BM = \frac{48}{2}$

$\boxed{BM = 24cm}$

$\therefore$ in $\triangle PMB$, $m\angle M = 90^\circ$,

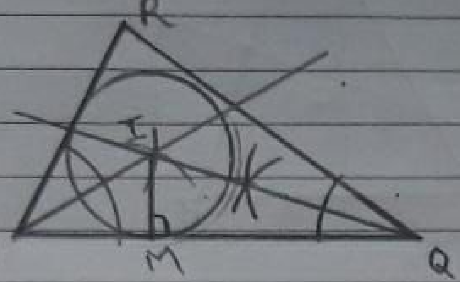
$\therefore$ by pythagoras theorem.

$PB^2 = PM^2 + MB^2$

$$25^2 = 24^2 + PM^2$$
$$625 = 576 + PM^2$$
$$PM^2 = 625 - 576$$
$$PM^2 = 49$$
$$\boxed{PM = 7}$$ ∵ Taking square roots on booth the sides

∴ We found thath the distance between chord and center of circle (PM) is 7cm

Q.4



1) letus draw seg PQ of 6 cm

2] Make an angle of 35° for Q and draw a seg of 5.5 cm

3] Then join the points R and P, we have made the required triangle now.

4] Draw bisectors of any 2 angles of triangle (here ∠P and ∠Q)

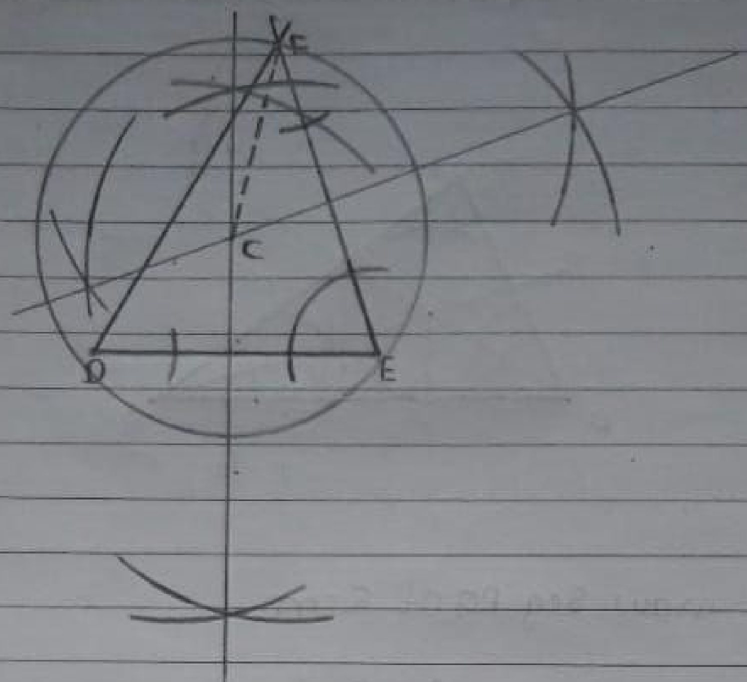
5] Mark the point of intersection as I

6] Draw the perpendicular from point I to PQ.

7] Draw circle ~~II~~ with center I and radius IM.

8] Your incircle of triangle is ready.

Q.B



1] Draw DEF of required measurments

2] Draw perpendicular bisectors of any two sides of triangle

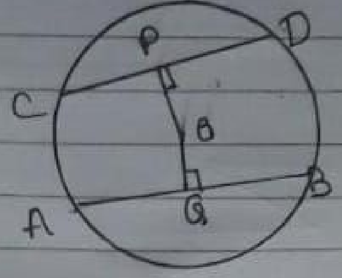
3] Name the point of intersection as C

4] Join seg CF

5] Draw circle with center C and radius CF.

Q.6 In The given figure, O is the center of the Circle and AB = CD. If OP = 4cm, then find the length of OQ

Given - Chord AB ≅ Chord CD
l(OP) = 4 cm



To find - l(OQ)

Solution -

We have heard about the property that the congruent chords of a circle are equidistant from the center of circle.

if Same applied here, we will get the Solution

~~OP~~ Seg OP and Seg OQ are the distance from the center of circle.

$\therefore$ OP = OQ $\because$ The congruent chords of a circle are equidistant from the center of circle.
4cm = OQ
$\therefore$ OQ = 4cm

$\therefore$ by appling the property we found the distantce of OQ as 4cm.

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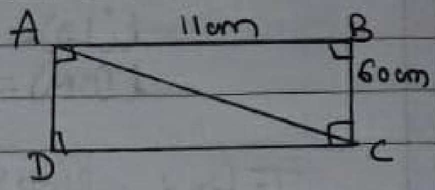
Assignment 4

Q.1 □ABCD is a rectangle, AB=11cm, BC=60cm, then find AC



Given - l(AB)=11cm
l(BC)=60cm

To find - l(AC)

Solution -

All angles of a rectang measure 90°

∴ in △ABC, There's a right angle
∴ △ABC is a right angled triangle.

∴ by pythagoras theorem

$AC^2 = AB^2 + BC^2$
$AC^2 = 11^2 + 60^2$
$AC^2 = 121 + 3600$
$AC^2 = 3721$
$\boxed{AC = 61 \text{ cm}}$ ∵ Taking square roots on both sides.

∴ We found the l(AC) as 61cm

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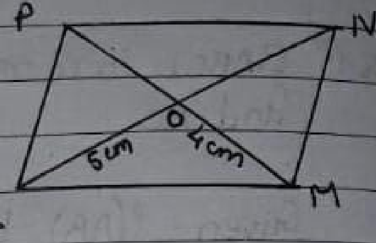
Q.2 In the figure, □LMNP is a paralleogram, LO = 5cm OM = 4cm, find OP and LN.



Given - □LMNP is a llogram
$l(LO) = 5cm$
$l(OM) = 4cm$

To find - $l(OP)$, $l(LN)$

Solution.

Seg PM and seg LN are the diagonals of □LMNP

$LO = \frac{1}{2} \times LN$ ∵ diagonals of paralleogram bisect each other.

$OM = \frac{1}{2} \times PM$ ∵ diagonals of paralleogram bisect each other.

∴ $LN = LO \times 2$
$LN = 5 \times 2$
$\boxed{\therefore LN = 10cm}$

∴ $PM = OM \times 2$
$PM = 4 \times 2$
$\boxed{\therefore PM = 8cm}$

∴ We found the lengths of seg LN and seg PM as 10 cm and 8cm respectively.

Q.3 Measures of angles of □ABCD are in the ratio 4:5:7:8. Show that □ABCD is a trapezium.

Let the measures of $\angle A, \angle B, \angle C, \angle D$ be $(4x)^\circ$, $(5x)^\circ$, $(7x)^\circ$ and $(8x)^\circ$ respectively

Sum of all angles of quadrilateral is 360°

$$4x + 5x + 7x + 8x = 360$$
$$24x = 360$$
$$\boxed{\therefore x = 15}$$

$\angle A = 4 \times 15 = 60^\circ$
$\angle B = 5 \times 15 = 75^\circ$
$\angle C = 7 \times 15 = 105^\circ$
$\angle D = 8 \times 15 = 120^\circ$

Now $\angle B + \angle C = 75^\circ + 105^\circ = 180^\circ$ I
Now $\angle A + \angle B = 75^\circ + 60^\circ = 135^\circ \neq 180$ II
$\therefore$ Side BC and AD are not parallel [from I and II]

$\therefore$ □ABCD is a trapezium.

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Q4 Proove that Every rhombus is a ~~square~~ Paralleogram

~~Given~~
To Prove - Every rhombus is a paralleogram

Proof -

Opposite sides of paralleogram are parallel - I

Opposite sides of rhombus are parallel - II

Diagonals of paralleogram bisect each other - III

Diagonals of rhombus bisect each other - IV

$\therefore$ Prooved, Every rhombus is a paralleogram [from I, II, III, IV]

Q.5 The length of diagonal of a square is $13\sqrt{2}$ cm find the length of its each side

Given - Diagonal's length = $13\sqrt{2}$

To find - Side length

Solution -

$$\text{diagonal of square} = \text{side} \times \sqrt{2}$$
$$13\sqrt{2} = \text{side} \times \sqrt{2}$$
$$\text{side} = \frac{13\sqrt{2}}{\sqrt{2}}$$
$$\boxed{\therefore \text{Side} = 13\text{cm}}$$

$\therefore$ Each side of square = 13cm