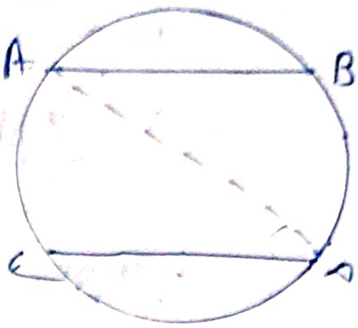
Class 9th Sub-Mathematics Writer-Agarwal

chapter=14 Arc properties of circles

<u>Ans 1</u> given that

Arc AC = Arc BD



To prove = $AB \parallel CD$

Now,

proof = Arc AC = Arc BD

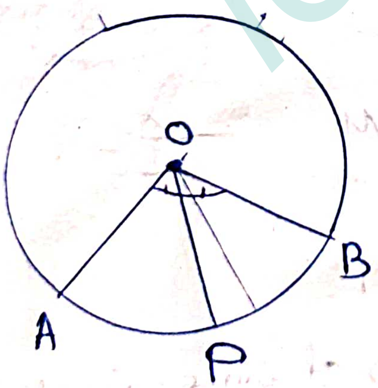
$\Rightarrow \angle ADC = \angle BAD$ (Arc are equal so its angle also will equal)

But, these are alternate angle

Therefore $AB \parallel CD$

proved.

<u>Ans 2.</u> given that an arc AB which subtends $\angle AOB$ at centre O is the mid point of AB.



Join OP

To prove = $\angle AOP = \angle BOP$.

Proof! AC = BC (P is the mid point of Arc AB)

these subtends $\angle AOP$ and $\angle BOP$

$\therefore \angle AOP = \angle BOP$ (OP is bisector)

Hence proved.

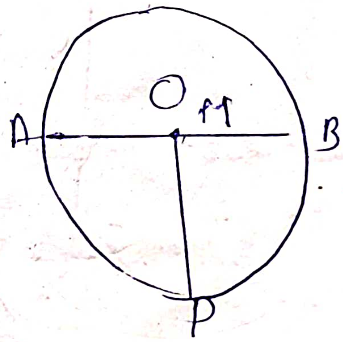
3 Answer given that

P is mid point of arc APB
M is mid point of chord AB

Now,

Join AO and BO and produce PM at Q.

(i) $PM \perp AB$



Proof:- Arc AP = BP

Therefore = $\angle AOP = \angle POB$

$\angle AOM = \angle BOM$

Now, $\triangle OAM$ and OBM

OB = OA (radius of same circle)

OM = OM (common)

$\angle AOM = \angle BOM$ (prove already

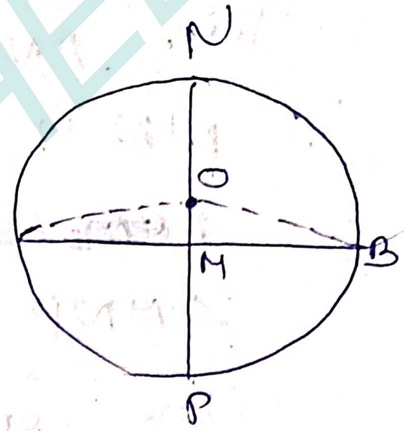
Therefore $\angle BMO = \angle AMO$

As,

$\angle AMO + \angle BMO = 180°$

$\angle AMO = \angle BMO = 90°$

Hence $MP \perp AB$ or OM



(ii) $\angle AMP + \angle OMA = 90° + 90°$

$\Rightarrow 180°$

PMO is a straight line. passes through O

(iii) since POQ is diameter of circle

arc PAQ = arc PBQ

arc PAQ − arc AP = arc PBQ − arc PB

(AP = PB)

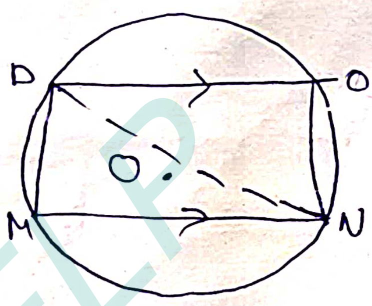
arc AN = BN

N is the bisector of AB

Proved

4 Answer Given that MNOP is a cyclic trapezium

MN ∥ OP



To prove = MP = NO

Proof = Join PN

∵ MN ∥ OP (given)

$\angle$ ~~[illegible]~~ $= \angle 1$

$\angle MNP = \angle OPN$ (alternate angles)

these angle subtends by the Arcs MP and NO

arc MP = arc NO

Chord MP = chord NO

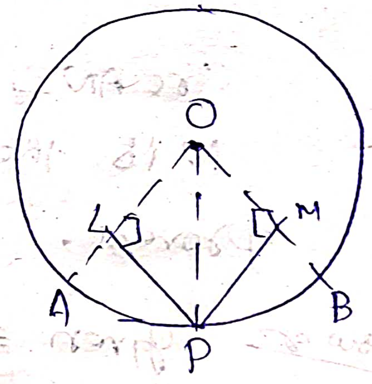
[equal arc = equal chords]

Hence MP = NO

proved.

5 A circle has O centre and P is point.

radii is OA and OB



To prove = arc AP = arc PB

Now Join OP

Proof :- in right angled $\triangle OMP$ and $\triangle OLP$

OP = OP (common)

PL = PM (given)

∠LOP = ∠MOP (given by CPCT)

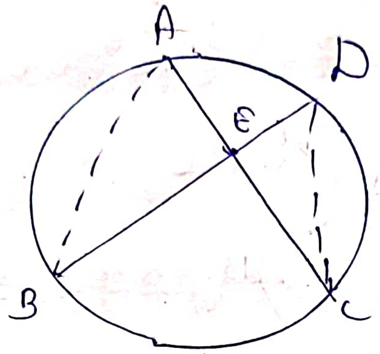
or △OLP ≅ △OMP (RHS)

or ∠AOP = ∠BOP

arc AP = Arc BP (Because angle are equal so Arc will also)

Proved.

6 Answer



given that

in a figure, there is two chords AC and BD Both intersect to each other at a point E.

Arc AB = Arc CD

To proof:- AE = ED

BE = EC

construction = Join CD and AD

proof! Chord AB = chord CD (given)

Arc AB = Arc CD (given)

Now in △CED and BEA

$CD = AB$ (proved)

$\angle EAB = \angle EDC$ (angle in same segment)

$\angle EBA = \angle DCE$ (angle in same segment)

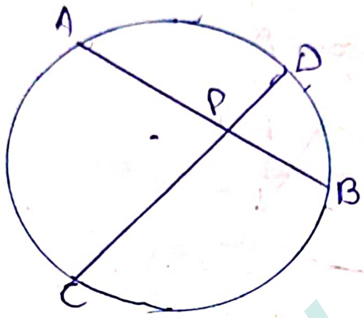
$\therefore \triangle BEA \cong \triangle CED$ (A.S.A)

$BE = EC$ (c.p.c.t)

$AE = DE$ (c.p.c.t)

Answer

7th



given that two chords AB and CD intersect each other at point P

so,

$\therefore AB = CD$

To proof = Arc AD = Arc CB

Proof = $AB = CD$ (given)

Arc AB = Arc CD

Subtract arc BD from both sides,

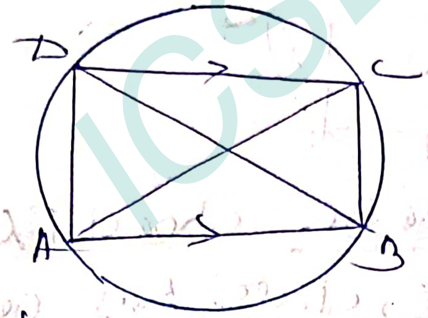
arc AB − arc BD = arc CD − arc BD

$\Rightarrow$ arc AD = arc CB

proved

Answer 8 given that a cyclic quadrilateral ABCD in it AC and BD are diagonal

AB || DC



To prove :- (i) AD = BC

(ii) AC = BD

Proof = in ABCD quadrilateral

AB || DC (given)

∴ ∠BAC = ∠ACD (alternate angle)

arc BC = arc AD

(Because of equal angle)

AD = BC

(equal arc have equal chord)

Now

in △ABC and △ADB

AB = AB (common)

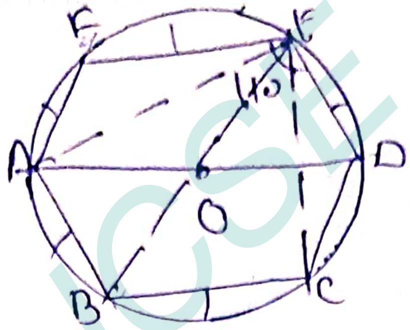
BC = AD (proved)

∠ACB = ∠ADB (angle in same)

△ABC ≅ △ADB (by SAS)

AC = BD (by c.p.c.t)

Answer 9(i)



chord AB = chord BC = chord CD (given)

AD is diameter, circle has centre 'O' (given)

$\angle DEF = 110°$ (given)

(i) AEF = ? , (ii) $\angle FAB$ = ?

construction: Joining CE, BE and AE

proof: -

AB = CD = BC

arc AB = arc CD = arc BC

$\angle AEB = \angle CED = \angle BEC$

(equal arc subtends equal angles)

and $\angle AED = 90°$ (angle in semi circle)

(i) $\therefore \angle AEF = \angle DEF - \angle AED$

$= 110° - 90°$

$= 20°$

(ii) since ABEF is a cyclic quadrilateral

$\angle FAB + \angle BEF = 180°$

$\angle FAB + 50 = 180°$ ($\angle BEF = 30 + 20 = 50°$)

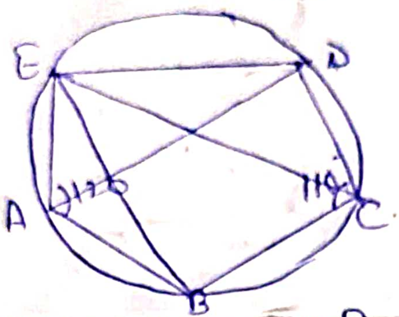
$\angle FAB = 180° - 150°$
$= 30°$ Ans

Answer 10 ABCDEA is a pentagon which is inscribed in a circle

$AB = BC = CD$ (given)

$\angle BCD = 110°$ (given)

$\angle BAE = 120°$ (given)



Construction = join BE, AD and CE

(i) in cyclic quadrilateral EBCD

$\angle BCD = 110°$

$\angle BED = 180° - 110°$

$\Rightarrow 70°$

$BC = AB = CD$

$\therefore$ arc BC = arc AB = arc CD

$\angle CED = \angle BEC$

$= \frac{70°}{2} = 35$

and $\angle AEB = 35°$ (Bcoz $AB = CD = BC$)

(ii) in quadrilateral AECB

$\angle ABC + \angle AEC = 180°$

$\angle ABC + 70° = 180°$

$\angle ABC = 180 - 70$

$\Rightarrow 110°$

in $\triangle ABE$

$\angle EAB + \angle ABE + \angle AEB = 180°$

$120 + \angle ABE + 35° = 180°$

$ABE + 155 = 180°$

$\angle ABE = 180 - 155$

$= 25$

$\therefore \angle EBC = \angle ABC - \angle ABE$

$= 110° - 25°$

$= 85°$

Now, in quadrilateral EBCD

$\angle CDE + \angle EBC = 180°$

$\angle CDE + 85° = 180°$

$\angle CDE = 180 - 85$

$= 95°$

(iii) $\angle AED = 35° + 35° + 35°$

$= 105$

(iv) in ABCD quadrilateral

$\angle BCD + \angle DAB = 180^\circ$

$110^\circ + \angle DAB = 180^\circ$

$\angle DAB = 180 - 110$

$= 70^\circ$

But

$\angle EAB = 120^\circ$

$\angle EAD = 120 - 70$

$= 50^\circ$