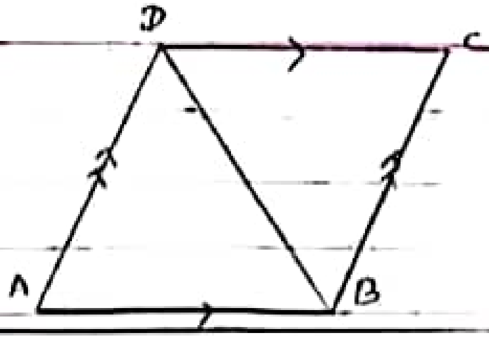
* Diagonal bisects the parm.



Given: □ABCD is a parm.

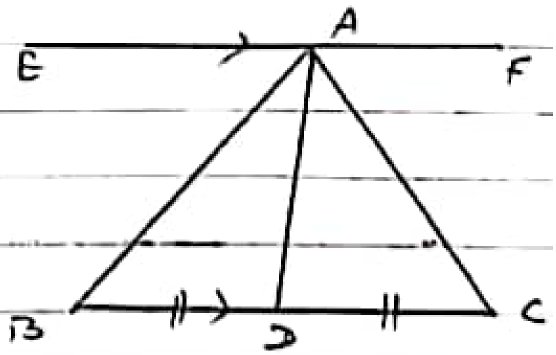
To Prove: △ABD = △BCD

Proof:

Statements	Reasons
(1) In △ABD and △BCD,	(1) From figure
(2) i) ∠ABD = ∠CDB	(2) i) Alternate angles
ii) BD = BD	ii) Common side
iii) ∠ADB = ∠CBD	iii) Alternate angle
(2) △ABD ≅ △BCD	(2) By ASA axiom
(3) △ABD = △BCD	(3) Congruents triangles are equal in area.

Proved.

* The medians bisects the triangle.



Given: In △ABC, BD = CD

To Prove: △ABD = △ACD

Construction: Produce a line EF through vertex A such that EF // BC.

Proof:

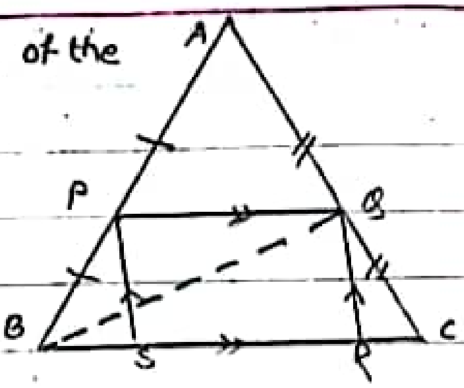
Statements	Reasons
(1) △ABD = △ACD	(1) Areas of triangles are equal standing on equal base and between same parallel lines.

Proved

10c) Given: P and Q are the mid-points of the sides AB and AC respectively,
SP // RQ

To Prove: $\Delta ABC = 2 \cdot \square PQRS$

Construction: Join BQ



Proof:

Statements	Reasons
① PQ // BC	① The line joining the mid-points of any two sides of a triangle is parallel and half of its third side.
② $\Delta BPQ = \frac{1}{2} \square PQRS$	② Area of triangle is half of area of parm standing on same base and betⁿ same parallels
③ $\Delta BPQ = \frac{1}{2} \Delta ABQ$	③ Medians bisects the triangle
④ $\Delta ABQ = \frac{1}{2} \Delta ABC$	④ Median bisects the triangle
⑤ $\Delta BPQ = \frac{1}{2} \times \frac{1}{2} \Delta ABC$	⑤ From ③ and ④
⑥ $\cancel{\frac{1}{2}} \square PQRS = \cancel{\frac{1}{2}} \times \frac{1}{2} \Delta ABC$	⑥ From ③ and ⑤
⑦ $\Delta ABC = 2 \cdot \square PQRS$	⑦ ~~Removing~~ From ⑥

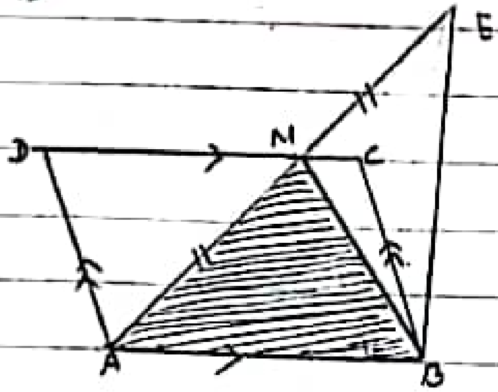
Proved.

10d)

Given: □ABCD is a parm and M is the mid-point of AE.

To Prove: $\Delta ABE = \square ABCD$

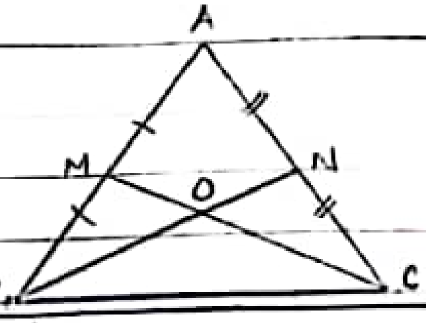
Construction: Join MB



Proof:

Statements	Reasons
① $\Delta AMB = \frac{1}{2} \Delta ABE$	① Median bisects the triangle
② $\Delta AMB = \frac{1}{2} \square ABCD$	② Area of triangle is half of parm standing on same base and betⁿ same parallels.
③ $\Delta ABE = \square ABCD$	③ From ① and ②

10A) Given: In ΔABC, medians BN and CM intersected at O.



To Prove: $\Delta BOC = \square AMON$

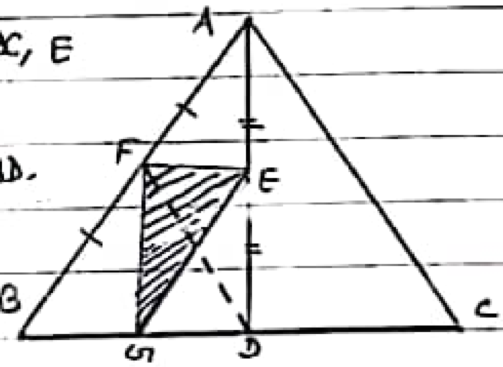
Proof:

Statements	Reasons
① $\Delta BCM = \Delta ACM = \frac{1}{2}\Delta ABC$	① Median bisects the triangle
② $\Delta ABN = \Delta BCN = \frac{1}{2}\Delta ABC$	② Median bisects the triangle
③ $\Delta BCM = \Delta ABN$	③ From ① and ②
④ $\Delta BCM - \Delta BOM = \Delta ABN - \Delta BOM$	④ Subtracting common triangle on both sides
⑤ $\Delta BOC = \square AMON$	⑤ Whole part axiom

Proved.

10B)

Given: D is the mid-point of side BC of ΔABC, E is the mid-point of AD, F is the mid-point of AB and G is any point on BD.



To Prove: $\Delta ABC = 8 \cdot \Delta EFG$

Construction: Join FD

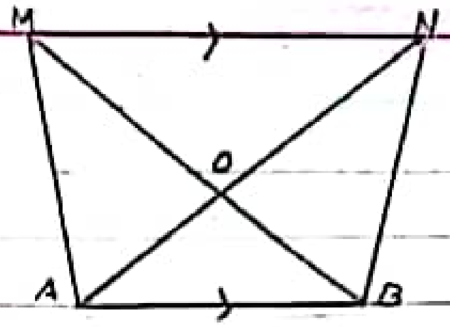
Proof:

Statements	Reasons
① EF // BD	① The line joining mid-points on any two sides of a triangle is parallel and half of third side.
② $\Delta DEF = \Delta EFG$	② Triangles standing on same and between same parallels are equal in area.
③ $\Delta DEF = \frac{1}{2}\Delta ADF$	③ Median bisects the triangle
④ $\Delta ADF = \frac{1}{2}\Delta ABD$	④ Median bisects the triangle
⑤ $\Delta ABD = \frac{1}{2}\Delta ABC$	⑤ Median bisects the triangle
⑥ $\Delta DEF = \frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\Delta ABC$	⑥ From ③, ④, ⑤
⑦ $\Delta EFG = \frac{1}{8}\Delta ABC$	⑦ From ② and ⑥
⑧ $\Delta ABC = 8 \cdot \Delta EFG$	⑧ From ⑦

Proved.

8B) Given: $\triangle AMB$ and $\triangle ANB$ are standing on the same base AB and betⁿ same parallels AB and MN.

To Prove: $\triangle AMB = \triangle ANB$ and $\triangle AOM = \triangle BON$



Proof:

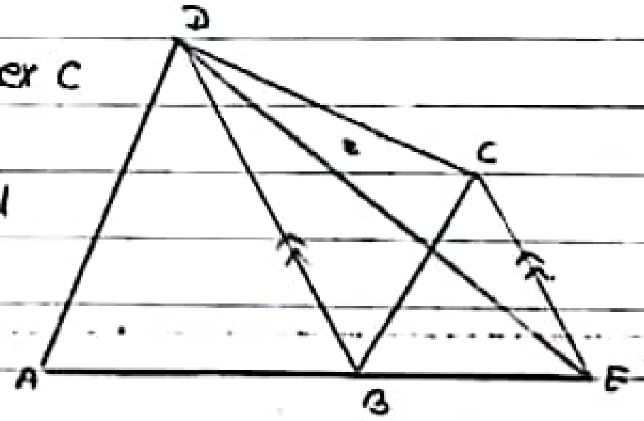
Statements	Reasons
① $\triangle AMB = \triangle ANB$	① Triangles standing on same base and betⁿ same parallels are equal in areas.
② $\triangle ANB - \triangle AOB = \triangle ANB - \triangle AOB$	② Subtracting common triangle on both sides
③ $\triangle AOM = \triangle BON$	③ Whole part axiom

Proved.

9A)

Given: The line drawn through the vertex C of the □ ABCD parallel to the diagonal BD meets AB produced at E.

To Prove: □ABCD = $\triangle DAE$

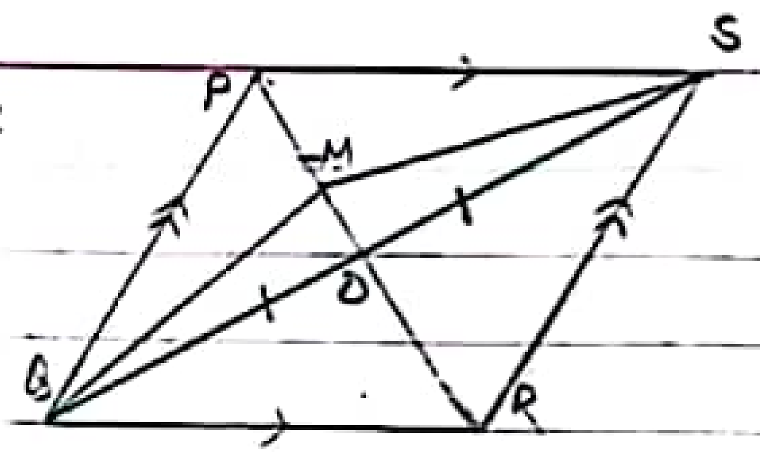


Proof:

Statements	Reasons
① $\triangle BCD = \triangle BED$	① Triangles standing on the same base and between same parallels are equal in areas.
② $\triangle ABD + \triangle BCD = \triangle ABD + \triangle BED$	② Adding common triangle on both sides,
③ □ ABCD = $\triangle DAE$	③ Whole part axiom.

Proved.

(11)(3) Given: PQRS is a parm, Q and S are joined to any point M on the diagonal PR of the parm.



To Prove: $\Delta PQM = \Delta PSM$

Construction: Join diagonial QS

Proof:

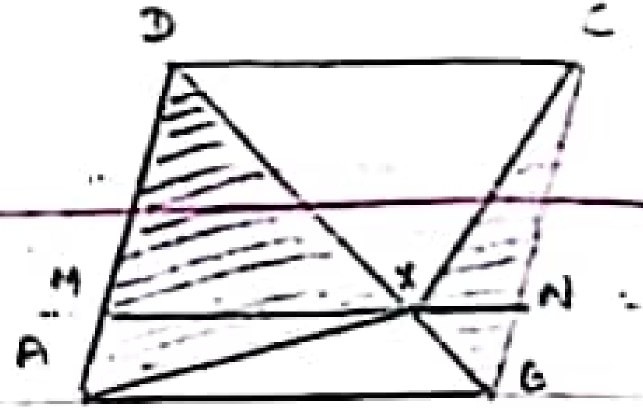
Statements	Reasons
① $OQ = OS$	① Diagonal of parm bisect each other
② $\Delta PQO = \Delta PSO$	② Median bisects the triangle
③ $\Delta MQO = \Delta MSO$	③ Median bisects the triangle
④ $\Delta PQO - \Delta MQO = \Delta PSO - \Delta MSO$	④ Subtracting ③ from ②
⑤ $\Delta PQM = \Delta PSM$	⑤ Whole part axiom

12A) Given: ABCD is a parm, X is any point within it.

To Prove: $\Delta XCD + \Delta XAB = \frac{1}{2} \square ABCD$

Construction: Draw $MN \parallel AB \parallel CD$

Proof:

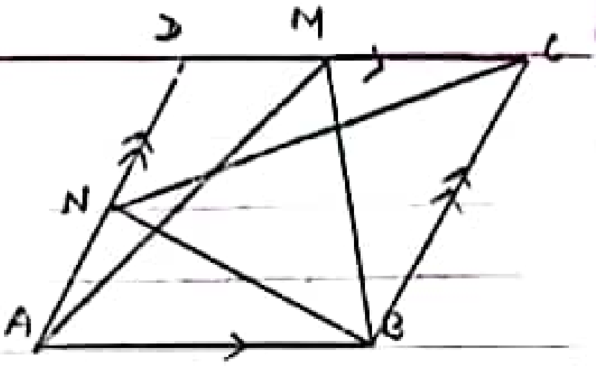


Statements	Reasons
① $\Delta XAB = \frac{1}{2} \square ABNM$	① Area of Δ is half of area of parm standing on same base and betn same parallels.
② $\Delta XCD = \frac{1}{2} \square NNCD$	② Same reason as ①
③ $\Delta XAB + \Delta XCD = \frac{1}{2}(\square ABNM + \square MNCD)$	③ Adding ① and ②
④ $\Delta XCD + \Delta XAB = \frac{1}{2} \square ABCD$	④ Whole part axiom and from ③

13) **Given:** ABCD is a parm, M and N are any points on CD and DA respectively.

To Prove: $\Delta AMB = \Delta CDN + \Delta ANB$

Proof:



Statements	Reasons
① $\Delta AMB = \frac{1}{2} \square ABCD$	① Area of Δ is half of $\square$ standing on same base and betn same parallels.
② $\Delta CNB = \frac{1}{2} \square ABCD$	② Same reason as ①
③ $\Delta ANB + \Delta CDN = \frac{1}{2} \square ABCD$	③ Whole part axiom and from ②
④ $\Delta AMB = \Delta CDN + \Delta ANB$	④ From ① and ③

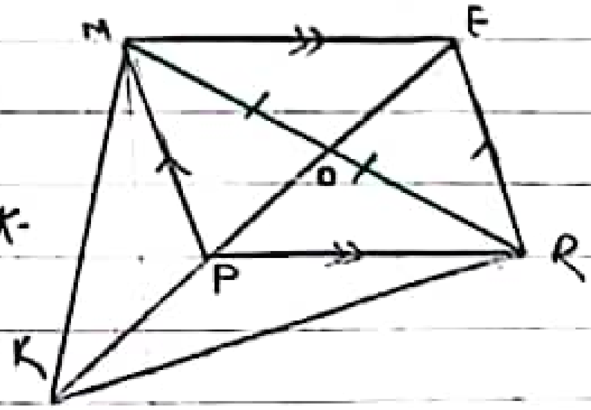
14) **Given:** PREM is a parm, ~~PM and ER are produced to meet at K~~

Diagonal EP is produced to point K.

To Prove: $\Delta KPM = \Delta KPR$

Construction: Join MR

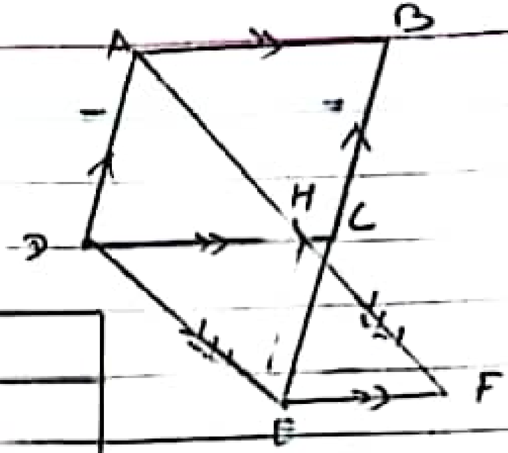
Proof:



Statements	Reasons
① OM = OR	① Diagonal of parm bisect each other
② $\Delta KOM = \Delta KOR$	② Median bisects each other
③ $\Delta POM = \Delta POR$	③ Median bisects each other
④ $\Delta KOM - \Delta POM = \Delta KOR - \Delta POR$	④ Subtracting ② from ③
⑤ $\Delta KPM = \Delta KPR$	⑤ from ④

1(B) Given: AB // DC // EF, AD // BE,

AF // DE



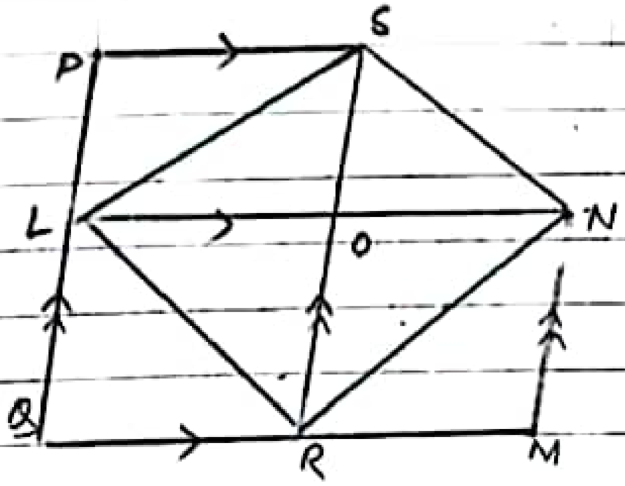
To Prove: ▱DEFH = ▱ABCD

Proof:

Statements	Reasons
(1) ▱ACED = ▱ABCD	(1) ▱ = ▱
(2) ▱ACED = ▱DEFH	(2) ▱ = ▱
(3) ▱DEFH = ▱ABCD	(3) From (1) and (2)

Proved

(1(C))



Given: PQRS and LQMN are two parms equal in area

To Prove: LR // SN

Construction: Join LS and RN.

Proof:

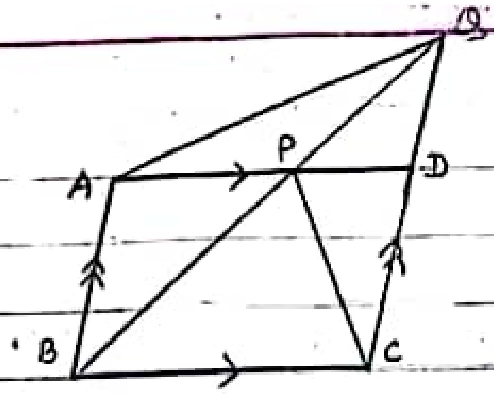
Statements	Reasons
(1) ΔLSR = $\frac{1}{2}$ ▱PQRS	(1) $\Delta = \frac{1}{2}$ ▱
(2) ΔLRN = $\frac{1}{2}$ ▱LQMN	(2) $\Delta = \frac{1}{2}$ ▱
(3) ▱PQRS = ▱LQMN	(3) Given
(4) ΔLSR = ΔLRN	(4) From (1), (2), (3)
(5) LR // SN	(5) Conversely, triangles standing on same base and bet^n same parallels are equal in area.

Proved

(15) B> Given: ABCD is a parm

To Prove: △APQ = △PDC

Proof:



Statements	Reasons
(1) △ABQ = $\frac{1}{2}$ ▱ABCD	(1) △ = $\frac{1}{2}$ ▱
(2) △BPC = $\frac{1}{2}$ ▱ABCD	(2) △ = $\frac{1}{2}$ ▱
(3) △ABP + △CDP = $\frac{1}{2}$ ▱ABCD	(3) WPA
(4) △ABQ = △ABP + △CDP or, △ABP + △APQ = △ABP + △CDP	(4) From (1) ad (3)
(5) △APQ = △PDC	(5) From (4)

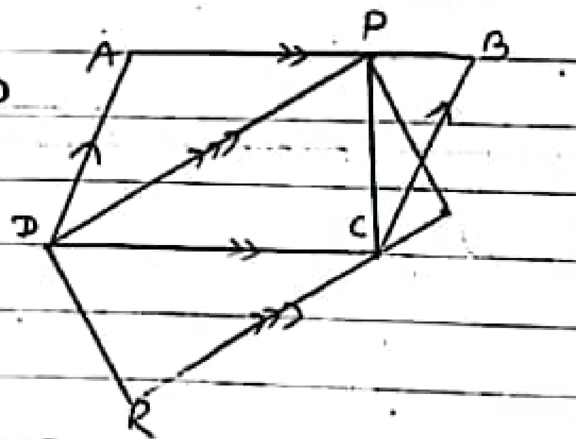
Proved

(16) A> Given: ABCD and PQRD are two parms

To Prove: ▱ABCD = ▱PQRD

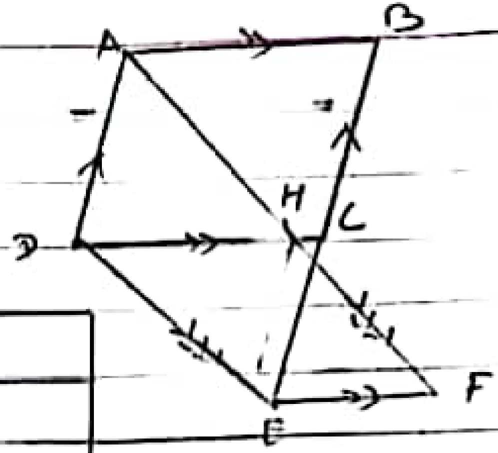
Construction: Join PC

Proof:



Statements	Reasons
(1) △PCD = $\frac{1}{2}$ ▱ABCD	(1) △ = $\frac{1}{2}$ ▱
(2) △PCD = $\frac{1}{2}$ ▱PQRD	(2) △ = $\frac{1}{2}$ ▱
(3) ▱ABCD = ▱PQRD	From (1) ad (2)

1(B) Given: AB // DC // EF, AD // BE, AF // DE



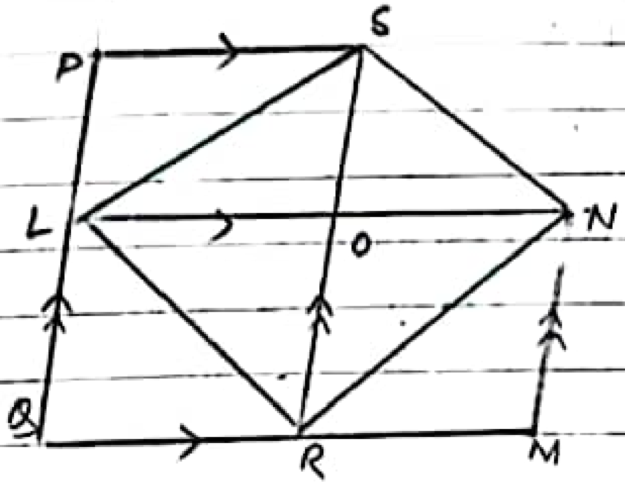
To Prove: ▱DEFH = ▱ABCD

Proof:

Statements	Reasons
① ▱ACED = ▱ABO	① ▱ = ▱
② ▱ACED = ▱DEFH	② ▱ = ▱
③ ▱DEFH = ▱ABCD	③ From ① and ②

Proved

1(C)



Given: PQRS and LQMN are two parallelograms equal in area

To Prove: LR // SN

Construction: Join LS and RN

Proof:

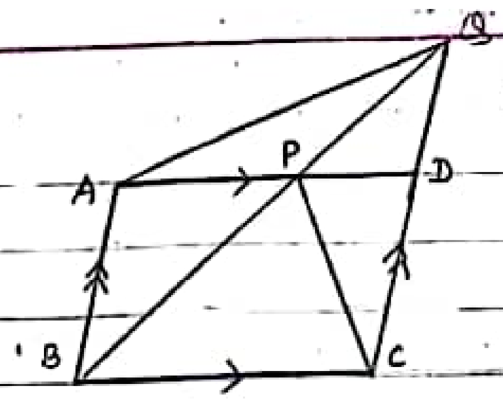
Statements	Reasons
① $\Delta LSR = \frac{1}{2}$ ▱PQRS	① $\Delta = \frac{1}{2}$ ▱
② $\Delta LRN = \frac{1}{2}$ ▱LQMN	② $\Delta = \frac{1}{2}$ ▱
③ ▱PQRS = ▱LQMN	③ Given
④ $\Delta LSR = \Delta LRN$	④ From ①, ②, ③
⑤ LR // SN	⑤ Conversely, triangles standing on same base and bet^n same parallels are equal in area.

Proved

15 A) Given: ABCD is a parm

To Prove: $\Delta APQ = \Delta PDC$

Proof:



Statements	Reasons
① $\Delta ABQ = \frac{1}{2} \square ABCD$	① $\Delta = \frac{1}{2} \square$
② $\Delta BPC = \frac{1}{2} \square ABCD$	② $\Delta = \frac{1}{2} \square$
③ $\Delta ABP + \Delta CDP = \frac{1}{2} \square ABCD$	③ WPA
④ $\Delta ABQ = \Delta ABP + \Delta CDP$	④ From ① and ②
or, $\Delta ABP + \Delta APQ = \Delta ABP + \Delta CDP$	
⑤ $\Delta APQ = \Delta PDC$	⑤ From ④

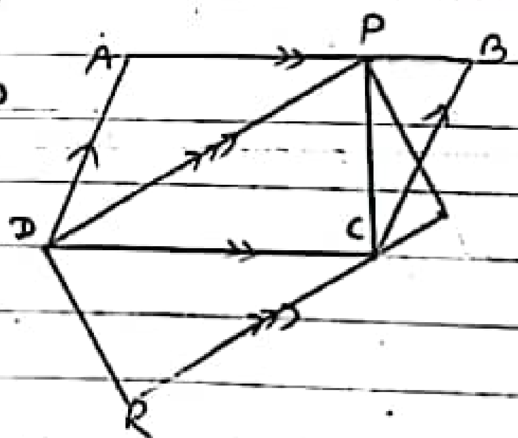
Proved

16 A) Given: ABCD and PQRD are two parms

To Prove: $\square ABCD = \square PQRD$

Construction: Join PC

Proof:

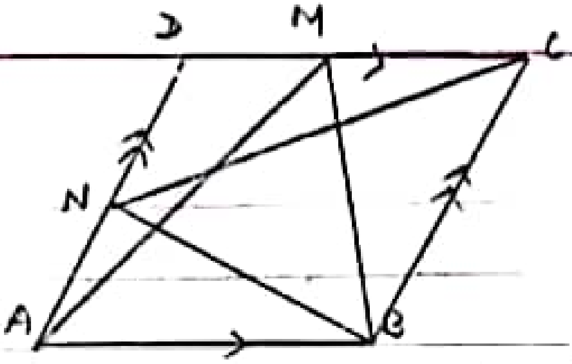


Statements	Reasons
① $\Delta PCD = \frac{1}{2} \square ABCD$	① $\Delta = \frac{1}{2} \square$
② $\Delta PCD = \frac{1}{2} \square PQRD$	② $\Delta = \frac{1}{2} \square$
③ $\square ABCD = \square PQRD$	From ① and ②

(13) Given: ABCD is a parm, M and N are any points on CD and DA respectively.

To Prove: $\Delta AMB = \Delta CDN + \Delta ANB$

Proof:



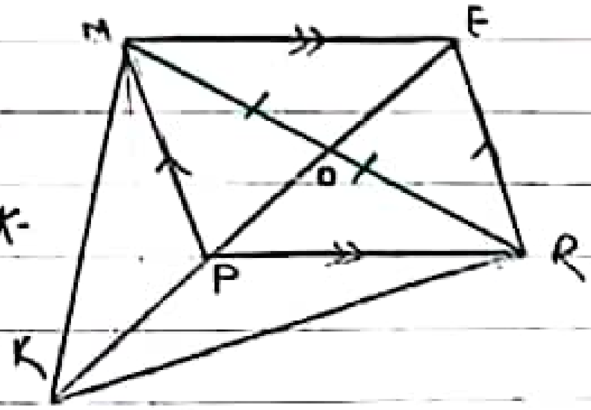
Statements	Reasons
① $\Delta AMB = \frac{1}{2} \square ABCD$	① Area of Δ is half of $\square$ standing on same base and between same parallels.
② $\Delta CNB = \frac{1}{2} \square ABCD$	② Same reason as ①
③ $\Delta ANB + \Delta CDN = \frac{1}{2} \square ABCD$	③ Whole part axiom and from ②
④ $\Delta AMB = \Delta CDN + \Delta ANB$	④ From ① and ③

(14) Given: PREM is a parm, ~~[illegible]~~ Diagonal EP is produced to point K.

To Prove: $\Delta KPM = \Delta KPR$

Construction: Join MR

Proof:

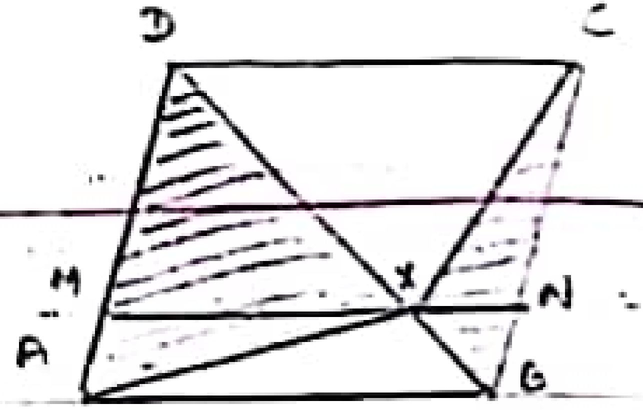


Statements	Reasons
① OM = OR	① Diagonal of parm bisect each other
② $\Delta KOM = \Delta KOR$	② Median bisects each other
③ $\Delta POM = \Delta POR$	③ Median bisects each other
④ $\Delta KOM - \Delta POM = \Delta KOR - \Delta POR$	④ Subtracting ② from ③
⑤ $\Delta KPM = \Delta KPR$	⑤ from ④

12A) Given: ABCD is a parm, X is any point within it.

To Prove: $\Delta XCD + \Delta XAB = \frac{1}{2} \square ABCD$

Construction: Draw MN // AB // CD



Proof:

Statements	Reasons
① $\Delta XAB = \frac{1}{2} \square ABNM$	① Area of Δ is half of area of parm standing on same base and betⁿ same parallels.
② $\Delta XCD = \frac{1}{2} \square MNCD$	② Same reason as ①
③ $\Delta XAB + \Delta XCD = \frac{1}{2}(\square ABNM + \square MNCD)$	③ Adding ① and ②
④ $\Delta XCD + \Delta XAB = \frac{1}{2} \square ABCD$	④ Whole part axiom and from ③

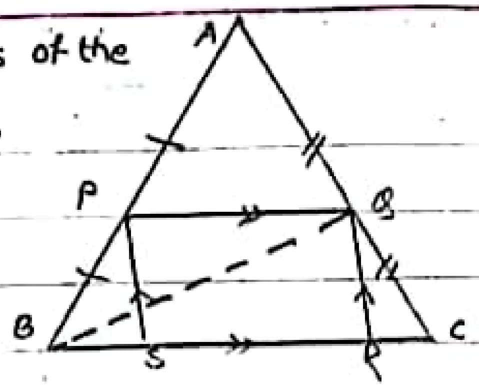
10c) Given: P and Q are the mid-points of the sides AB and AC respectively,

SP // RQ

To Prove: $\Delta ABC = 2 \cdot \square PQRS$

Construction: Join BQ

Proof:



Statements	Reasons
① PQ // BC	① The line joining the mid-points of any two sides of a triangle is parallel and half of its third side.
② $\Delta BPQ = \frac{1}{2} \square PQRS$	② Area of triangle is half of area of parm standing on same base and bet^n same parallels
③ $\Delta BPQ = \frac{1}{2} \Delta ABQ$	③ Medians bisects the triangle
④ $\Delta ABQ = \frac{1}{2} \Delta ABC$	④ Median bisects the triangle
⑤ $\Delta BPQ = \frac{1}{2} \times \frac{1}{2} \Delta ABC$	⑤ From ③ and ④
⑥ $\frac{1}{2} \square PQRS = \frac{1}{2} \times \frac{1}{2} \Delta ABC$	⑥ From ③ and ⑤
⑦ $\Delta ABC = 2 \cdot \square PQRS$	⑦ ~~Remaining~~ From ⑥

Proved.

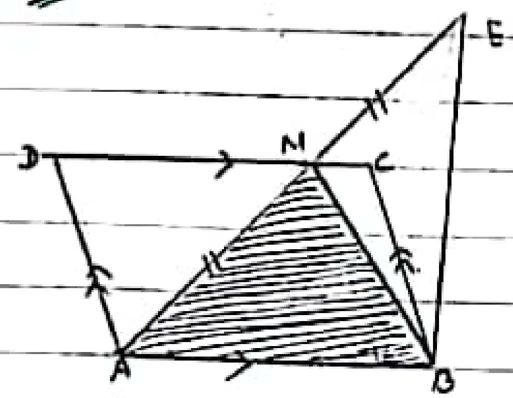
10d)

Given: □ABCD is a parm and M is the mid-point of AE.

To Prove: $\Delta ABE = \square ABCD$

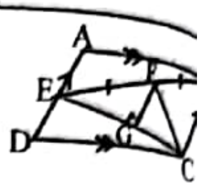
Construction: Join MB

Proof:



Statements	Reasons
① $\Delta AMB = \frac{1}{2} \Delta ABE$	① Median bisects the triangle
② $\Delta AMB = \frac{1}{2} \square ABCD$	② Area of triangle is half of parm standing on same base and bet^n same parallels.
③ $\Delta ABE = \square ABCD$	③ From ① and ②

22. In the given figure, ABCD is a parallelogram, F if the mid-point of EB and FG⊥EC. If EC = 10cm and FG = 6cm, find the area of parallelogram ABCD.



Ans: Given:– ABCD is a parallelogram, F if the mid-point of EB, FG⊥EC, EC = 10cm and FG = 6cm.

To find:– Area of parallelogram ABCD.

Here,

(i) Area of $\Delta EFC = \frac{1}{2}$ base × height

$= \frac{1}{2}$ EC × FG

$= \frac{1}{2} \times 10cm \times 6cm$

$= 30cm^2$

(ii) Area of $\Delta EFC = \frac{1}{2}$ area of ΔBEC [∵Median CF bisects ΔBEC]

or, $30cm^2 = \frac{1}{2}$ area of ΔBEC

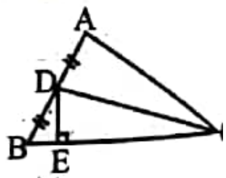
or, Area of $\Delta BEC = 60\ cm^2$

(iii) Area of parallelogram ABCD = 2 area of ΔBEC [∵Both are standing on the same base between the same parallel lines.]

or, Area of parallelogram ABCD $= 2 \times 60cm^2$

$= 120\ cm^2$ Ans.

23. In the adjoining figure, CD is the median of ΔABC and DE⊥BC. If area of $\Delta ABC = 24cm^2$ and BC = 8cm, find length of DE.



Ans: Given:– CD is the median of ΔABC, DE⊥BC, area of $\Delta ABC = 24cm^2$ and BC = 8cm.

To find:– Length of DE.

Here,

(i) Area of $\Delta BDC = \frac{1}{2}$ area of ΔABC [∵Median CD bisects ΔABC]

or, Area of $\Delta BDC = \frac{1}{2} \times 24cm^2$

$= 12cm^2$

(ii) Area of $\Delta BDC = \frac{1}{2}$ base × height

or, $12cm^2 = \frac{1}{2} \times BC \times DE$

or, $24cm^2 = 8cm \times DE$

or, $DE = \frac{24cm^2}{8cm}$

$= 3cm$

∴ The length of DE = 3cm Ans.

(ii) $\Delta ADC + \Delta ABC + \Delta BCE$ = Parallelogram ABED [$\because$ By whole-part axiom]

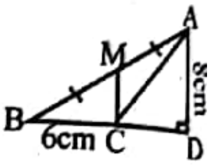
or, $\Delta ADC + 18cm^2 + \Delta BCE = 36cm^2$

or, $\Delta ADC + \Delta BCE = 36cm^2 - 18cm^2$

$= 18cm^2$

$\therefore$ The combined area of ΔADC and $\Delta BCE = 18cm^2$ Ans.

8. In the given figure, M is the mid-point of AB and AD⊥BD. If BC = 6cm and AD = 8cm, find the area of ΔAMC. (SLC 2072 E)



Ans: Given:– M is the mid-point of AB, AD⊥BD, BC = 6cm and AD = 8cm.

To find:– Area of ΔAMC

Here,

(i) Area of $\Delta ABC = \frac{1}{2} BC \times AD$ [$\because$ Area of a triangle $= \frac{1}{2}$ base × height]

$= \frac{1}{2} \times 6cm \times 8cm$

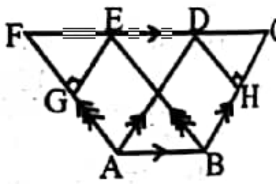
$= 24cm^2$

(ii) Area of $\Delta AMC = \frac{1}{2}$ area of ΔABC [$\because$ Median CM bisects ΔABC]

$= \frac{1}{2} \times 24cm^2$

$\therefore$ Area of ΔAMC = 12cm. Ans.

9. In the given figure, FC//AB, AD//BC, AF//BE, EG⊥AF and DH⊥BC. If EG = 5cm, AF = 12cm and BC = 6cm, find the measurement of HD. (SLC 2072 B)



Ans: Given:– FC//AB, AD//BC, AF//BE, EG⊥AF, DH ⊥BC, EG = 5cm, AF = 12cm and BC = 6cm.

To find:– The length of DH

Here,

(i) Area of parallelogram ABEF = AF×EG [$\because$ Area of a parallelogram = base × height]

$= 12cm \times 5cm$

$= 60cm^2$

(ii) Area of parallelogram ABCD = Area of parallelogram ABEF

[$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of parallelogram ABCD = $60cm^2$

(iii) Again, area of parallelogram ABCD = base × height

or, $60cm^2 = BC \times DH$

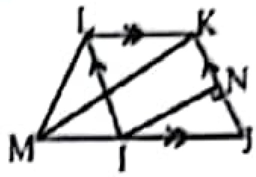
or, $60cm^2 = 6cm \times DH$

or, $DH = \frac{60cm^2}{6cm}$

or, DH = 10cm

$\therefore$ The length of DH = 10 cm Ans.

20. In the given figure, area of $\Delta LMK = 24cm^2$ and $IN = 8cm$, find the length of IL. **(SLC 2068 B)**



Ans: Given:– Area of $\Delta LMK = 24cm^2$ and $IN = 8cm$.

To find:– Length of IL.

Here,

(i) Area of parallelogram IJKL = 2 area of ΔLMK [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of parallelogram IJKL $= 2 \times 24cm^2$
$= 48cm^2$

(ii) Area of parallelogram IJKL = base × height

or, $48cm^2 = JK \times IN$

or, $48cm^2 = JK \times 8cm$

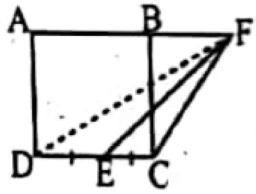
or, $JK = \dfrac{48cm^2}{8cm}$

or, $JK = 6cm$

(iii) $IL = JK$ [$\because$ Being the opposite sides of parallelogram IJKL]

or, $IL = 6cm$ Ans.

21. In the given figure, ABCD is a square whose perimeter is 40 cm and AB is produced to the point F. If E is the middle point of DC, find the area of the ΔEFC. **(SLC 2066 B)**



Ans: Given:– Perimeter of square ABCD = 40cm and E is the mid-point of DC.

To find:– Area of ΔEFC.

Construction:– DF is joined.

Here,

(i) Perimeter of square ABCD $= 4l$

or, $40cm = 4l$

or, $l = \dfrac{40cm}{4}$

or, $l = 10cm$

$\therefore$ Length of square ABCD $(l) = 10cm$

(ii) Area of a square ABCD $= l^2$
$= (10cm)^2$
$= 100cm^2$.

(iii) Area of $\Delta DFC = \dfrac{1}{2}$ area of square ABCD [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of $\Delta DFC = \dfrac{1}{2} \times 100cm^2 = 50cm^2$

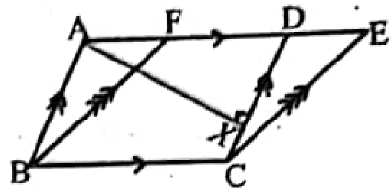
(iv) Area of $\Delta EFC = \dfrac{1}{2}$ area of ΔDFC[$\because$ Median EF bisects ΔDFC]

or, Area of $\Delta EFC = \dfrac{1}{2} \times 50cm^2$

Preparation of Q. No. 8(a)

In Q. No. 8(a), a question of 2 marks is asked from Triangle and Quadrilateral (from Geometry).

1. In the given figure, BC//AE, BA//CD, BF//CE and AX⊥CD. If AB = 12 cm and area of the quadrilateral BCEF = 84cm², find the length of AX. (SEE Model 1, 2074)



Ans: Given:– BC//AE, BA//CD, BF//CE, AX⊥CD, AB = 12cm and area of parallelogram BCEF = 84cm².

To find:– Length of AX

Here,

(i) Area of parallelogram ABCD = Area of parallelogram BCEF [∵ Both the parallelograms are standing on the same base BC and between the same parallels AE and BC.]

or, Area of parallelogram ABCD = 84 cm².

(ii) CD = AB = 12cm [∵ Being the opposite sides of parallelogram ABCD]

(iii) Area of parallelogram ABCD = CD × AX [∵ Area of a parallelogram = base × height]

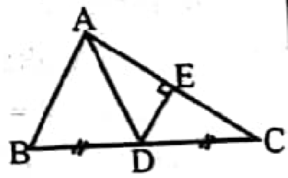
or, $84cm^2 = 12cm \times AX$

or, $\frac{84cm^2}{12cm} = AX$

or, AX = 7cm

∴ The length of AX = 7 cm Ans.

2. In the given figure, D is the mid-point of BC and DE⊥AC. If AC = 12cm and DE = 5cm, find the area of ΔABC. (SEE Model 2, 2074)



Ans: Given:– D is the mid-point of BC, DE⊥AC, AC = 12cm and DE = 5cm.

To find:– Area of ΔABC

Here,

(i) Area of $\Delta ADC = \frac{1}{2} AC \times DE$ [∵ Area of a triangle = $\frac{1}{2}$ base × height]

$= \frac{1}{2} \times 12cm \times 5\ cm$

$= 30cm^2$

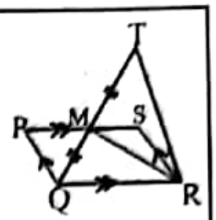
(ii) Area of ΔABC = 2 Area of ΔADC [∵ Median AD bisects ΔABC]

or, Area of $\Delta ABC = 2 \times 30cm^2$

$= 60cm^2$

∴ Area of $\Delta ABC = 60cm^2$ Ans.

14. In the given figure, PQRS is a parallelogram and QM = TM. If the area of parallelogram PQRS is 48 square cm, find the area of ΔQRT. (SLC 2070A)



Ans: Given:– QM = TM and area of parallelogram PQRS = $48cm^2$.

To find:– Area of ΔQRT

Here,

(i) Area of ΔQMR = $\frac{1}{2}$ area of parallelogram PQRS [$\because$ Both are standing on the same base and between the same parallel lines.]

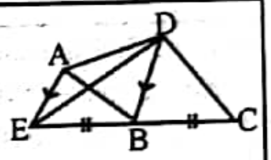
or, Area of ΔQMR = $\frac{1}{2} \times 48cm^2 = 24\ cm^2$

(ii) Area of ΔQMR = $\frac{1}{2}$ area of ΔQRT [$\because$ Median RM bisects ΔQRT]

or, $24cm^2 = \frac{1}{2}$ area of ΔQRT

or, Area of ΔQRT = $48cm^2$ Ans.

15. In the given figure, AE//DB and EB = CB. If the area of ΔABD is 25 square cm, what will be the area of ΔCDE. Find it. (SLC 2070 B)



Ans: Given:– AE//DB, EB = CB and area of ΔABD = $25cm^2$.

To find:– Area of ΔCDE

Here,

(i) Area of ΔEBD = area of ΔABD [$\because$ Both are standing on the same base and between the same parallel lines.]

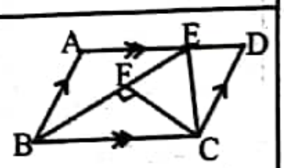
or, Area of ΔEBD = $25cm^2$

(ii) Area of ΔEBD = $\frac{1}{2}$ area of ΔCDE [$\because$ Median DB bisects ΔCDE]

or, $25cm^2 = \frac{1}{2}$ area of ΔCDE

or, Area of ΔCDE = $50\ cm^2$ Ans.

16. In the given figure, ABCD is a parallelogram and CF$\perp$BE. If BE = 2cm and CF = 8cm, find the area of the parallelogram ABCD. (SLC 2070 D)



Ans: Given:– ABCD is a parallelogram, CF$\perp$BE, BE = 12cm and CF = 8cm.

To find:– Area of the parallelogram ABCD.

Here,

(i) Area of ΔBEC = $\frac{1}{2}$ base $\times$ height

$= \frac{1}{2} \times BE \times CF$

$= \frac{1}{2} \times 12cm \times 8cm$

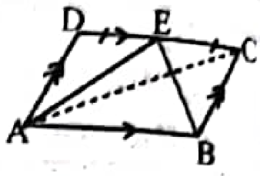
$= 48cm^2$

(ii) Area of parallelogram ABCD = 2 area of ΔBEC [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of parallelogram ABCD $= 2 \times 48cm^2$

$= 96cm^2$ Ans.

3. In the adjoining figure, E is the mid-point of DC. If the area of the parallelogram ABCD is 52 square cm, find the area of the quadrilateral ABCE. (SEE 2074 A)



Ans: Given:– E is the mid-point of DC and area of the parallelogram ABCD = $52cm^2$.

To find:– Area of the quadrilateral ABCE.

Construction:– AC is joined.

Here,

(i) Area of $\Delta ADC = \frac{1}{2}$ area of parallelogram ABCD [$\because$ Diagonal AC bisects parallelogram ABCD]

or, Area of $\Delta ADC = \frac{1}{2} \times 52cm^2$

$= 26cm^2$

(ii) Area of $\Delta ADE = \frac{1}{2}$ area of ΔADC [$\because$ Median AE bisects ΔADC]

or, Area of $\Delta ADE = \frac{1}{2} \times 26cm^2$

$= 13cm^2$

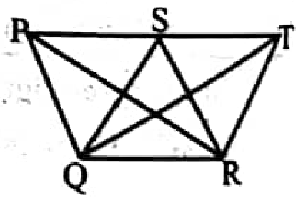
(iii) Area of quadrilateral ABCE = Area of parallelogram ABCD – area of ΔADE

[$\because$ By whole-part axiom]

or, Area of quadrilateral ABCE $= 52\ cm^2 - 13cm^2$

$= 39cm^2$ Ans.

4. In the adjoining figure, PQRS is a rhombus in which PS is produced to T. If PR= 10 cm and QS = 8cm, find the area of ΔQRT. (SEE 2074 B)



Ans: Given:– PQRS is a rhombus,

PR = 10cm and QS = 8cm.

To fiond:– Area of ΔQRT

Here,

(i) Area of rhombus PQRS $= \frac{1}{2}$ PR×QS [$\because$ Area of rhombus $= \frac{1}{2} d_1 \times d_2$]

or, Area of rhombus PQRS $= \frac{1}{2} \times 10cm \times 8cm$

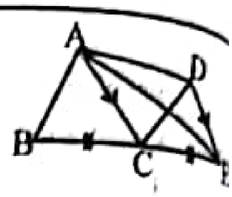
$= 40cm^2$

(ii) Area of $\Delta QRT = \frac{1}{2}$ Area of rhombus PQRS. [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of $\Delta QRT = \frac{1}{2} \times 40cm^2$

$= 20cm^2$ Ans.

17. In the given figure, AC//DE and BC = EC. If the area of ΔACE is 24 sq.cm, find the area of the quadrilateral ABCD. (SLC 2070 E)



Ans: Given:– AC//DE, BC = EC

and area of $\Delta ACE = 24cm^2$.

To find:– Area of quadrilateral ABCD.

Here,

(i) Area of ΔABC = area of ΔACE [$\because$ Median AC bisects ΔABE]

or, Area of $\Delta ABC = 24cm^2$

(ii) Area of ΔACD = area of ΔACE [$\because$ Both are standing on the same base and between the same parallel lines.]

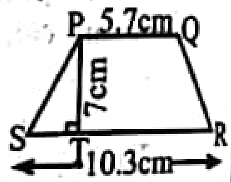
or, Area of $\Delta ACD = 24cm^2$

(iii) Area of quadrilateral ABCD = area of ΔABC + area of ΔACD [$\because$ By whole-part axiom]

or, Area of quadrilateral ABCD $= 24cm^2 + 24cm^2$

$= 48\ cm^2$ Ans.

18. Find the area of the trapezium PQRS.



Ans: Given:– In trapezium PQRS,

base $(b_1) = PQ = 5.7cm$

base $(b_2) = SR = 10.3cm$

height $(h) = PT = 7cm$

To find:– The area of the trapezium PQRS.

By formula,

$$\text{Area of the trapezium PQRS} = \frac{1}{2}h(b_1 + b_2)$$

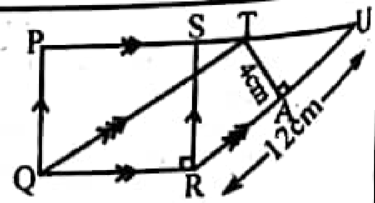
$$= \frac{1}{2} \times PT\ (PQ + SR)$$

$$= \frac{1}{2} \times 7cm\ (5.7cm + 10.3cm)$$

$$= \frac{1}{2} \times 7cm \times 16cm$$

$= 56cm^2$. Ans

19. In the given figure, if RU = 12cm and TA = 4cm, find the area of the rectangle PQRS. (SLC 2068 A)



Ans: Given:– RU = 12cm and TA = 4cm

To find:– Area of the rectangle PQRS.

Here,

(i) Area of the parallelogram TQRU = base × height

= RU × TA

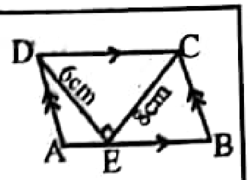
= 12cm × 4cm

$= 48cm^2$

(ii) Area of the rectangle PQRS = Area of the parallelogramTQRU [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of the rectangle PQRS $= 48cm^2$ Ans.

5. **In the figure, ABCD is a parallelogram. E is a point on AB. If DE = 6cm, CE = 8cm and $\angle DEC = 90°$, then find the area of parallelogram ABCD. (SEE2074 C)**



Ans: Given:– ABCD is a parallelogram,
DE = 6cm, CE = 8cm and $\angle DEC = 90°$.

To find:– Area of parallelogram ABCD.

Here,

(i) Area of $\Delta DEC = \frac{1}{2}$ CE×DE [$\because$ Area of a triangle $= \frac{1}{2}$ base × height]

$= \frac{1}{2} \times 8cm \times 6cm$

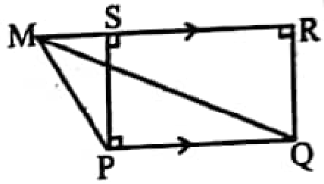
$= 24cm^2$

(ii) Area of parallelogram ABCD = 2 area of ΔDEC [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of parallelogram ABCD $= 2 \times 24cm^2$

$= 48cm^2$ Ans.

6. **In the figure, PQRS is a rectangle in which PQ = 3 PS = 12cm. RS is extended upto the point M. What is the area of ΔPQM? Find it. (SEE 2074 D)**



Ans: Given:– PQRS is a rectangle
and PQ = 3 PS = 12cm.

To find:– Area of ΔPQM

Here,

(i) 3PS = 12cm

or, $PS = \frac{12cm}{3} = 4cm$

(ii) Area of rectangle PQRS = PQ × PS [$\because$ Area of rectangle= length × breadth]

$= 12cm \times 4cm$

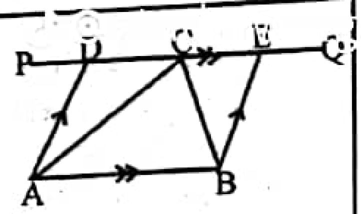
$= 48cm^2$

(iii) Area of $\Delta PQM = \frac{1}{2}$ Area of rectangle PQRS[$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of $\Delta PQM = \frac{1}{2} \times 48cm^2$

$= 24cm^2$ Ans.

7. **In the given figure, AB//PQ and AD//BE. If area of $\Delta ABC = 18\ cm^2$, find the combined area of ΔADC and ΔBCE. (SEE 2073 E)**



Ans: Given:– AB//PQ, AD//BE and area of $\Delta ABC = 18cm^2$

To find:– The combined area of ΔADC and ΔBCE.

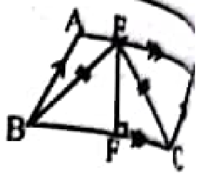
Here,

(i) Area of parallelogram ABED = 2 area of ΔABC [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of parallelogram ABED $= 2 \times 18cm^2$

$= 36cm^2$

12. **In the given figure, BE = EC, EF⊥BC, BE = 10 cm and AD = 16cm. Find the area of parallelogram ABCD.** (SLC 2071 C)



Ans: <u>Given</u>:- BE = EC, EF⊥BC, BE = 10cm and AD = 16cm.

<u>To find</u>:– Area of parallelogram ABCD.

Here,

(i) BC = AD = 16cm [∵ Being opposite sides of parallelogram ABCD]

(ii) $BF = \frac{1}{2}BC$ [∵ Perpendicular drawn from the vertex of an isosceles triangle bisects the base]

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

$= 8cm$

(iii) In right angled ΔEFB,

$EF^2 + BF^2 = BE^2$ [∵By Pythagoras theorem]

or, $EF^2 + (8cm)^2 = (10cm)^2$

or, $EF^2 + 64cm^2 = 100cm^2$

or, $EF^2 = 100cm^2 - 64cm^2$

or, $EF^2 = 36cm^2$

or, $EF^2 = (6cm)^2$

or, $EF = 6cm$

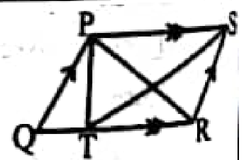
(iv) Area of parallelogram ABCD = base × height

$= BC \times EF$

$= 16cm \times 6cm$

$= 96cm^2$. Ans.

13. **In parallelogram PQRS, area of ΔPTS = 20cm² and area of ΔPTR = 18cm². Find the area of ΔPTQ.** (SLC 2071 D)



Ans: <u>Given</u>:– Area of ΔPTS= $20cm^2$ and area of ΔPTR = $18cm^2$.

<u>To find</u>:– Area of ΔPTQ

Here,

(i) Area of ΔPTS = $\frac{1}{2}$ area of parallelogram PQRS [∵Both are standing on the same base and between the same parallel lines.]

(ii) Area of ΔPQR= $\frac{1}{2}$ area of parallelogram PQRS[∵Diagonal PR bisects parallelogram PQRS]

(iii) Area of ΔPQR = area of ΔPTS [∵Both are halves of parallelogram PQRS]

or, Area of ΔPQR = $20cm^2$

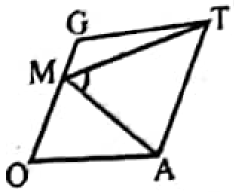
(iv) ΔPTQ + ΔPTR = Δ PQR [∵By whole-part axiom]

or, ΔPTQ + $18cm^2 = 20cm^2$

or, ΔPTQ = $20cm^2 - 18cm^2$

∴ Area of ΔPTQ = $2\ cm^2$ Ans.

24. In the given figure, GOAT is a parallelogram. If $\angle AMT = 90°$, MT = 16cm and the area of ▱GOAT is 160 sq.cm, find the length of MA. (SEE 2075 DP)



Ans: Given:– $\angle AMT = 90°$

MT = 16 cm

and area of parallelogram GOAT = 160 cm^2

To find:– The length of MA

Here,

Area of Δ AMT $= \frac{1}{2}$ area of //^{gm} GOAT [∵ Both are standing on the same base and between the same parallel lines.]

or, Area of Δ AMT $= \frac{1}{2} \times 160\ cm^2$

$= 80\ cm^2$

Now, by formula

Area of Δ AMT $= \frac{1}{2}$ base × height

or, $80\ cm^2 = \frac{1}{2}\ MA \times MT$

or, $80\ cm^2 = \frac{1}{2}\ MA \times 16\ cm$

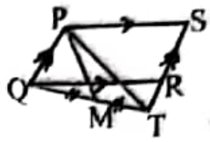
or, $80\ cm^2 = MA \times 8\ cm$

or, $\frac{80\ cm^2}{8\ cm} = MA$

or, $10\ cm = MA$

∴ The length of MA = 10 cm. Ans.

10. In given figure, PS//QR, PQ//ST and M is the mid-point of QT. If the area of parallelogram PQRS if 60 sq.cm, find the area of ΔPMT. (SLC 2072 C)



Ans: Given:– PS//QR, PQ//ST, M is the mid-point of QT and area of parallelogram PQRS = $60cm^2$.

To find:– Area of ΔPMT

Here,

(i) Area of $\Delta PQT = \frac{1}{2}$ area of PQRS [$\because$ Both are standing on the same base and between the same parallel lines.]

or, Area of $\Delta PQT = \frac{1}{2} \times 60\ cm^2$

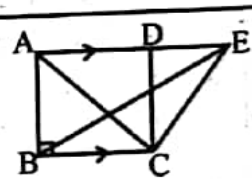
$= 30cm^2$

(ii) Area of $\Delta PMT = \frac{1}{2}$ area of ΔPQT [$\because$ Median PM bisects ΔPQT]

or, Area of $\Delta PMT = \frac{1}{2} \times 30cm^2$

$= 15cm^2$ Ans.

11. In the given figure, AE//BC. Square ABCD and ΔEBC are standing on the same base BC and between the same parallel lines. If AC = 6cm, find area of ΔEBC.



Ans: Given:– AE//BC, ABCD is a square and AC = 6cm.

To find:– Area of ΔEBC.

Here,

(i) Area of square ABCD $= \frac{1}{2} d^2$

$= \frac{1}{2} \times AC^2$

$= \frac{1}{2} \times (6cm)^2$

$= \frac{1}{2} \times 36cm^2$

$= 18cm^2$

(ii) Area of $\Delta EBC = \frac{1}{2}$ area of square ABCD [$\because$ Both are standing on the same base and between the same parallel lines]

or, Area of $\Delta EBC = \frac{1}{2} \times 18cm^2$

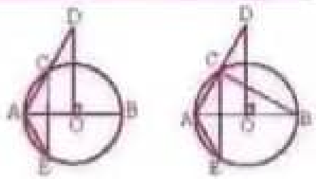
$= 9cm^2$ Ans.

HINTS & SOLUTION FOR QUESTIONS ON GEOMETRY

1. चित्रमा वृत्तको केन्द्र बिन्दु O, व्यास AB, र $DO \perp AB$ भए $\angle AEC = \angle ODA$ हुन्छ भनी सिद्ध गर्नुहोस् ।

In the figure, O is the centre of the circle. AB the diameter and $DO \perp AB$. Prove that $\angle AEC = \angle ODA$.

Construction: Join B and C



Statements	Reasons
1. In ΔACB and ΔADO,	1.
(i) $\angle ACB = \angle AOB$	(i) Both are right angles
(ii) $\angle BAC = \angle DAO$	(ii) Common angle
(iii) $\angle ODA = \angle ABC$	(iii) Remaining angles in a triangle
2. $\angle AEC = \angle ABC$	2. Angles standing on the same arcs
3. $\angle AEC = \angle ODA$	3. From statement 2 and 1 (iii)

2. चित्रमा ABCD एउटा चक्रीय चतुर्भुज हो । भुजा CD लाई लम्ब्याएर E सम्म पुर्‍याइएको छ । यदि AD ले $\angle BDE$ लाई आधा गरेको छ भने ΔABC एउटा समद्विबाहु त्रिभुज हो भनी प्रमाणित गर्नुहोस् ।

In the given figure, ABCD is a cyclic quadrilateral. The side CD is produced to E. If AD bisects $\angle BDE$, prove that ΔABC is an isosceles triangle.

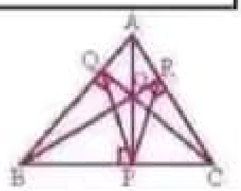
Proof:

	Statements		Reasons
1.	$\angle ADE = \angle ADB$	1.	Being AD bisector of $\angle BDE$
2.	$\angle ADE = \angle ABC$	2.	Being exterior angle and opposite interior angle of cyclic quad
3.	$\angle ADB = \angle ACB$	3.	Being inscribed angles on same arc
4.	$\angle ABC = \angle ACB$	4.	From (1), (2) and (3) with reason
5.	ΔABC is an isosceles triangle	5.	Base angles are equal in (4)

3. चित्रमा $AP \perp BC$, $BR \perp AC$ र $CQ \perp AB$ छन् भने, प्रमाणित गर्नुहोस् :

$\angle OPQ = \angle OPR$

In the given figure, $AP \perp BC$, $BR \perp AC$ and $CQ \perp AB$. Prove that: $\angle OPQ = \angle OPR$.



Proof:

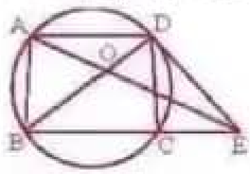
Statements	Reasons
1. Quad. PORC is a cyclic quad.	1. Being sum of opposite angles 180°
2. Quad. BPOQ is a cyclic quad.	2. Being sum of opposite angles 180°
3. B, C, R and Q are the cyclic points	3. Being inscribed angles on BC are equal
4. $\angle OPR = \angle OCR$, $\angle OPQ = \angle OBQ$	4. Being inscribed angles on same arcs
5. $\angle OBQ = \angle OCR$	5. Being inscribed angles on same arcs
6. $\angle OPQ = \angle OPR$	6. From (4) and (5)

4. एउटा वृत्तमा ABCD एउटा चक्रीय चतुर्भुज छ जहाँ $\overset{\frown}{AB} = \overset{\frown}{CD}$ छ । भुजा BC लाई बिन्दु E सम्म लम्ब्याइएको छ । BD र AE कुनै बिन्दु O मा प्रतिच्छेदित छन् र DE जोडिएको छ । प्रमाणित गर्नुहोस् :

In a circle, ABCD is a cyclic quadrilateral and $\overset{\frown}{AB} = \overset{\frown}{CD}$. Side BC is extended to a point E. BD and AE are intersected at any point O and DE is joined. Prove:

(a) क्षेत्रफल (Area) ΔABD = क्षेत्रफल (Area) ΔADE

(b) क्षेत्रफल (Area) ΔAOB = क्षेत्रफल (Area) ΔDOE



Proof:

	Statements		Reasons
1	AD // BE	1	Being $\overset{\frown}{AB} = \overset{\frown}{CD}$
2	Ar (ΔABD) = Ar (ΔADE)	2	Being both are on the same base and between the same parallels
3	Ar ($\Delta ABD - \Delta AOD$) = Ar ($\Delta ADE - \Delta AOD$)	3	Subtracting Ar (ΔAOD) from both the sides
4	Ar (ΔAOB) = Ar (ΔDOE)	4	From 3

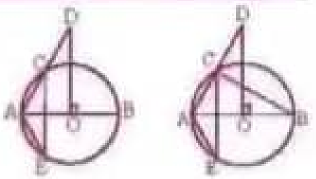
दिइएको QR Code स्क्यान गरी थप Hints and Solution पाउनुहोस् ।

HINTS & SOLUTION FOR QUESTIONS ON GEOMETRY

1. चित्रमा वृत्तको केन्द्र बिन्दु O, व्यास AB, र DO ⊥ AB भए ∡AEC = ∡ODA हुन्छ भनी सिद्ध गर्नुहोस् ।

In the figure, O is the centre of the circle. AB the diameter and DO ⊥ AB. Prove that ∡AEC = ∡ODA.

Construction: Join B and C



Statements	Reasons
1. In ΔACB and ΔADO,	1.
(i) ∡ACB = ∡AOB	(i) Both are right angles
(ii) ∡BAC = ∡DAO	(ii) Common angle
(iii) ∡ODA = ∡ABC	(iii) Remaining angles in a triangle
2. ∡AEC = ∡ABC	2. Angles standing on the same arcs
3. ∡AEC = ∡ODA	3. From statement 2 and 1 (iii)

2. चित्रमा ABCD एउटा चक्रीय चतुर्भुज हो । भुजा CD लाई लम्ब्याएर E सम्म पुर्‍याइएको छ । यदि AD ले ∡BDE लाई आधा गरेको छ भने ΔABC एउटा समद्विबाहु त्रिभुज हो भनी प्रमाणित गर्नुहोस् ।

In the given figure, ABCD is a cyclic quadrilateral. The side CD is produced to E. If AD bisects ∡BDE, prove that ΔABC is an isosceles triangle.

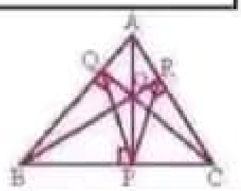
Proof:

	Statements		Reasons
1	∡ADE = ∡ADB	1	Being AD bisector of ∡BDE
2	∡ADE = ∡ABC	2	Being exterior angle and opposite interior angle of cyclic quad
3	∡ADB = ∡ACB	3	Being inscribed angles on same arc
4	∡ABC = ∡ACB	4	From (1), (2) and (3) with reason
5	ΔABC is an isosceles triangle	5	Base angles are equal in (4)

3. चित्रमा AP ⊥ BC, BR ⊥ AC र CQ ⊥ AB छन् भने, प्रमाणित गर्नुहोस् :

∡OPQ = ∡OPR

In the given figure, AP⊥BC, BR ⊥ AC and CQ ⊥ AB. Prove that: ∡OPQ = ∡OPR.



Proof:

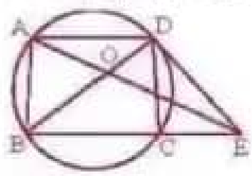
Statements	Reasons
1. Quad. PORC is a cyclic quad.	1. Being sum of opposite angles 180°
2. Quad. BPOQ is a cyclic quad.	2. Being sum of opposite angles 180°
3. B, C, R and Q are the cyclic points	3. Being inscribed angles on BC are equal
4. ∡OPR = ∡OCR, ∡OPQ = ∡OBQ	4. Being inscribed angles on same arcs
5. ∡OBQ = ∡OCR	5. Being inscribed angles on same arcs
6. ∡OPQ = ∡OPR	6. From (4) and (5)

4. एउटा वृत्तमा ABCD एउटा चक्रीय चतुर्भुज छ जहाँ $\overparen{AB} = \overparen{CD}$ छ । भुजा BC लाई बिन्दु E सम्म लम्ब्याइएको छ । BD र AE कुनै बिन्दु O मा प्रतिच्छेदित छन् र DE जोडिएको छ । प्रमाणित गर्नुहोस् :

In a circle, ABCD is a cyclic quadrilateral and $\overparen{AB} = \overparen{CD}$. Side BC is extended to a point E. BD and AE are intersected at any point O and DE is joined. Prove:

(a) क्षेत्रफल (Area) ΔABD = क्षेत्रफल (Area) ΔADE

(b) क्षेत्रफल (Area) ΔAOB = क्षेत्रफल (Area) ΔDOE



Proof:

	Statements		Reasons
1	AD // BE	1	Being $\overparen{AB} = \overparen{CD}$
2	Ar (ΔABD) = Ar (ΔADE)	2	Being both are on the same base and between the same parallels
3	Ar (ΔABD − ΔAOD) = Ar (ΔADE − ΔAOD)	3	Subtracting Ar (ΔAOD) from both the sides
4	Ar (ΔAOB) = Ar (ΔDOE)	4	From 3

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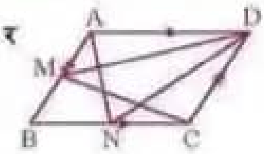
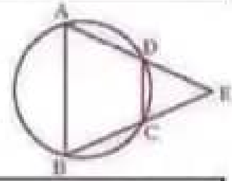
5. समानान्तर चतुर्भुज ABCD को भुजाहरू AB र BC मा क्रमशः बिन्दुहरू M र N छन् । ΔCMD र ΔAND को क्षेत्रफलहरू बराबर हुन्छन् भनी प्रमाणित गर्नुहोस् ।
The points M and N are on the sides AB and BC of a parallelogram ABCD respectively. Prove that the areas of ΔCMD and ΔAND are equal.



Proof:

	Statements		Reasons
1.	$Ar.(\Delta AND) = \frac{1}{2} \text{▱}ABCD$	1.	Being both are on same base & between the same parallels.
2.	$Ar.(\Delta CMD) = \frac{1}{2} \text{▱}ABCD$	2.	Same as reason 1.
3.	$Ar.(\Delta CMD) = Ar.(\Delta AND)$	3.	From 1 and 2.

6. ABCD एउटा चक्रीय चतुर्भुज छ, जसमा भुजाहरू AD र BC लाई बिन्दु E सम्म AE = BE हुने गरी लम्ब्याइएको छ । प्रमाणित गर्नुहोस् : AB // DC
ABCD is a cyclic quadrilateral, in which the sides AD and BC are produced to meet at the point E such that AE = BE. Proved that: AB // DC



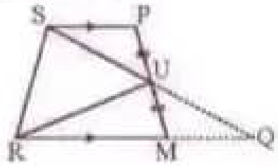
Proof:

	Statements		Reasons
1.	$\angle EAB = \angle EBA$	1.	Being AE = BE.
2.	$\angle EBA = \angle EDC$	2.	Exterior and opposite interior angle of a cyclic quadrilateral ABCD.
3.	$\angle EAB = \angle EDC$	3.	From 1 and 2.
4.	AB // CD	4.	Corresponding angles are equal in 3.

7. एउटा समलम्ब चतुर्भुज RMPS मा यदि RM // SP र MP को मध्यबिन्दु U भए प्रमाणित गर्नुहोस् :
In a trapezium RMPS, if RM // SP and U is the midpoint of MP, prove that:
ΔRUS को क्षेत्रफल (Area of ΔRUS) = $\frac{1}{2}$ समलम्ब चतुर्भुज RMPS को क्षेत्रफल (Area of trapezium RMPS)

METHOD - I:

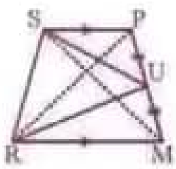
Construction: Produce SU and RM so that they will meet at Q.



Proof:

	Statements		Reasons
1.	In ΔSUP and ΔUQM (i) $\angle SPU = \angle UMQ$ (ii) PU = UM (iii) $\angle SUP = \angle MUQ$	1.	(i) Alternate angles (ii) Given (iii) Vertically opposite angles
2.	$\Delta SUP \cong \Delta UQM$	2.	By A.S.A axiom.
3.	$\Delta SUP = \Delta UMQ$	3.	From statement 2.
4.	SU = UQ	4.	Corresponding sides of $\cong \Delta$.
5.	$\Delta SUR = \Delta RUM + \Delta UMQ$	5.	From statement 4.
6.	$\Delta SUR = \Delta RUM + \Delta SUP$	6.	From statement 5 and 3.
7.	$\Delta SUR = \frac{1}{2}$ Trap . SRMP	7.	From statement 6.

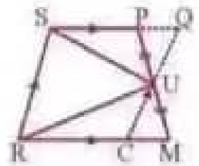
METHOD - II: **Construction:** Join SM and RP.



Proof:

	Statements		Reasons
1.	$\Delta SRM = \Delta PRM$	1.	They are standing on RM.
2.	$\Delta URM = \frac{1}{2}\Delta PRM$	2.	Median UR bisects ΔPRM.
3.	$\Delta URM = \frac{1}{2}\Delta SRM$	3.	From statement 1 and 2.
4.	$\Delta PSU = \frac{1}{2}\Delta PSM$	4.	Median US bisects ΔPSM.
5.	$\Delta URM + \Delta PSU = \frac{1}{2}(\Delta SRM + \Delta PSM)$	5.	Adding 3 and 4.
6.	$\Delta URM + \Delta PSU = \frac{1}{2}$ Trap . SRMP	6.	From statement 5.
7.	$\Delta SUR = \frac{1}{2}$ Trap . SRMP	7.	Subtracting the both sides of statement 6 from trapezium SRMP.

METHOD – III: Construction: Produce SP upto Q such that UC // SR.

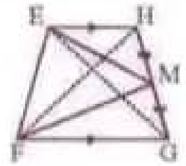


Proof:

	Statements		Reasons
1.	In ΔPUQ and ΔCUM (i) $\angle$QPU = $\angle$UMC (ii) PU = UM (iii) $\angle$PUQ = $\angle$CUM	1.	 (i) Alternate angles (ii) Given (iii) Vertically opposite angles
2.	ΔPUQ $\cong$ ΔCUM	2.	By A.S.A axiom.
3.	ΔPUQ = ΔCUM	3.	From statement 2.
4.	Trap . SRMP = Parm . SRCQ	4.	Adding pentagon SRCUP on both sides of 3.
5.	ΔSUR = $\frac{1}{2}$ Parm . SRCQ	5.	They are standing on SR and between SR // CQ.
6.	ΔSUR = $\frac{1}{2}$ Trap . SRMP	6.	From statement 4 and 5.

8. EFGH एउटा समलम्ब चतुर्भुज हो । यदि EH // FG र GH को मध्यबिन्दु M भए प्रमाणित गर्नुहोस् :

ΔEFM को क्षेत्रफल = $\frac{1}{2}$ समलम्ब चतुर्भुज EFGH को क्षेत्रफल



EFGH is a trapezium. If EH // FG and M is the midpoint of GH, prove that:

Area of ΔEFM = $\frac{1}{2}$ area of trapezium EFGH.

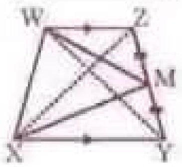
Construction: Join EG and FH.

Proof:

	Statements		Reasons
1.	ΔEFG = ΔHFG	1.	They are standing on FG.
2.	ΔMFG = $\frac{1}{2}$ ΔHFG	2.	Median MF bisects ΔHFG.
3.	ΔMFG = $\frac{1}{2}$ ΔEFG	3.	From statements 1 and 2.
4.	ΔHEM = $\frac{1}{2}$ ΔHEG	4.	Median ME bisects ΔHEG.
5.	ΔMFG + ΔHEM = $\frac{1}{2}$(ΔEFG + ΔHEG)	5.	Adding 3 and 4.
6.	ΔMFG + ΔHEM = $\frac{1}{2}$ Trap . EFGH	6.	From statement 5.
7.	ΔEMF = $\frac{1}{2}$ Trap . EFGH	7.	Subtracting the both sides of statement 6 from trapezium EFGH.

9. WXYZ एउटा समलम्ब चतुर्भुज हो । यदि WZ // XY र YZ को मध्यबिन्दु M छ भने, प्रमाणित गर्नुहोस् :

ΔWXM को क्षेत्रफल = $\frac{1}{2}$ समलम्ब चतुर्भुज WXYZ को क्षेत्रफल



WXYZ is a trapezium. If WZ // XY and M is the midpoint of YZ, then prove that:

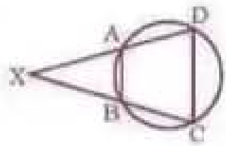
Area of ΔWXM = $\frac{1}{2}$ area of trapezium WXYZ.

Construction: Join WY and XZ.

Proof:

	Statements		Reasons
1.	ΔWXY = ΔZXY	1.	They are standing on XY.
2.	ΔMXY = $\frac{1}{2}$ ΔZXY	2.	Median MX bisects ΔZXY.
3.	ΔMXY = $\frac{1}{2}$ ΔWXY	3.	From statements 1 and 2.
4.	ΔZWM = $\frac{1}{2}$ ΔZWY	4.	Median MW bisects ΔZWY.
5.	ΔMXY + ΔZWM = $\frac{1}{2}$(ΔWXY + ΔZWY)	5.	Adding 3 and 4.
6.	ΔMXY + ΔZWM = $\frac{1}{2}$ Trap . WXYZ	6.	From statement 5.
7.	ΔWMX = $\frac{1}{2}$ Trap . WXYZ	7.	Subtracting the both sides of statement 6 from trapezium WXYZ.

10. दिइएको चित्रमा चक्रीय चतुर्भुज ABCD का भुजाहरू DA र CB लाई बाह्य बिन्दु X मा भेट्ने गरी लम्ब्याइएको छ। यदि XD = XC भए प्रमाणित गर्नुहोस्।
(i) AB // DC (ii) AX = BX

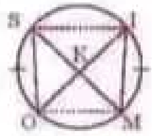


In the given figure, the sides DA and CB of a cyclic quadrilateral ABCD are produced to meet at an external point X. If XD = XC, prove that: (i) AB // DC (ii) AX = BX

Proof:

	Statements		Reasons
1.	∡ABX = ∡ADC	1.	Exterior angle of cyclic quad. ABCD and its opposite interior angles.
2.	∡ADC = ∡BCD	2.	Being XD = XC.
3.	∡ABX = ∡BCD	3.	From 1 and 2 equal quantities axiom.
4.	AB // CD	4.	Corresponding angles are equal in 3.
5.	∡BAX = ∡ADC	5.	Corresponding angles in AB // CD are equal.
6.	∡BAX = ∡ABX	6.	From 1 and 5 equal quantities axiom.
7.	AX = BX	7.	From statement 6.

11. बिन्दुहरू S, O, M र I चक्रीय छन्। जहाँ चाप SO = चाप IM छन्। यदि जीवाहरू SM र IO बिन्दु K मा प्रतिच्छेदन भएका छन् भने प्रमाणित गर्नुहोस्। (i) ΔSOK को क्षेत्रफल = ΔIMK को क्षेत्रफल (ii) SM = IO



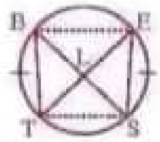
Points S, O, M and I are concyclic such that arc SO = arc IM. If the chords SM and IO are intersected at the point K, prove that: (i) Area of ΔSOK = Area of ΔIMK (ii) SM = IO

Construction: SI and OM are joined.

Proof:

Statements	Reasons
1. SI // OM	1. Being arc SO = arc IM
2. Ar. (ΔSOM) = Ar.(ΔIOM)	2. Being both are on the same base and between the same parallels.
3. ΔSOK = ΔIKM	3. Subtracting ΔOKM from both the sides of statement (2).
4. arc SOM = arc IMO	4. Adding arc OM on arc SO = arc IM (given).
5. SM = IO	5. Corresponding chords of equal arcs from (4).

12. बिन्दुहरू B, E, S, T चक्रीय छन्। जहाँ चाप BT = चाप SE छ। यदि जीवा BS र जीवा ET एकआपसमा बिन्दु L मा प्रतिच्छेदित भएका छन् भने प्रमाणित गर्नुहोस्।



Points B, E, S, T are concyclic such that arc BT = arc SE. If the chord BS and chord ET are intersected at the point L, prove that:
(i) क्षेत्रफल (ΔBLT) = क्षेत्रफल (ΔSEL) (Area of ΔBLT = Area of ΔSEL)
(ii) जीवा BS = जीवा ET (Chord BS = Chord ET)

Construction: BE and TS are joined.

Proof:

Statements	Reasons
1. BE // TS	1. Being arc BT = arc ES
2. Ar. (ΔBTS) = Ar.(ΔETS)	2. Being both are on the same base and between the same parallels.
3. ΔBTL = ΔELS	3. Subtracting ΔTLS from both the sides of statement (2).
4. arc BTS = arc EST	4. Adding arc TS on arc BT = arc ES (given).
5. BS = ET	5. Corresponding chords of equal arcs from (4).

13. बिन्दुहरू K, L, M र N चक्रीय छन्। जहाँ चाप KL = चाप NM छन्। यदि जीवाहरू KM र LN बिन्दु P मा प्रतिच्छेदन भएका छन् भने प्रमाणित गर्नुहोस्।

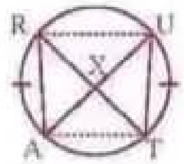
Points K, L, M and N are concyclic such that arc KL = arc NM. If the chords KM and LN are intersected at a point P, then prove that:
(i) ΔKPL को क्षेत्रफल = ΔNPM को क्षेत्रफल (Area of ΔKPL = Area of ΔNPM)
(ii) जीवा KM = जीवा LN (Chord KM = chord LN)

Construction: KN and LM are joined.

Proof:

Statements	Reasons
1. KN // LM	1. Being arc KL = arc NM
2. Ar. (ΔKLM) = Ar.(ΔNLM)	2. Being both are on the same base and between the same parallels.
3. ΔKLP = ΔNPM	3. Subtracting ΔLPM from both the sides of statement (2).
4. arc KLM = arc NML	4. Adding arc LM on arc KL = arc NM (given).
5. KM = NL	5. Corresponding chords of equal arcs from (4).

14. बिन्दुहरू R, A, T र U चक्रीय छन् । जहाँ चाप RA = चाप UT छन् । यदि जीवाहरू AU र RT बिन्दु X मा प्रतिच्छेदन भएका छन् भने प्रमाणित गर्नुहोस् ।
(i) ΔARX को क्षेत्रफल = ΔUXT को क्षेत्रफल
(ii) जीवा RT = जीवा AU



Points R, A, T and U are concyclic such that arc RA = arc UT. If the chords AU and RT are intersected at a point X, then prove that:
(i) Area of ΔARX = Area of ΔUXT
(ii) Chord RT = chord AU

Construction: RU and AT are joined.

Proof:

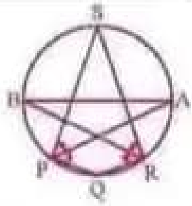
Statements	Reasons
1. RU // AT	1. Being arc RA = arc UT
2. Ar. (ΔRAT) = Ar.(ΔUAT)	2. Being both are on the same base and between the same parallels.
3. $\Delta RAX = \Delta UXT$	3. Subtracting ΔAXT from both the sides of statement (2).
4. arc RAT = arc UTA	4. Adding arc AT on arc RA = arc UT (given).
5. RT = UA	5. Corresponding chords of equal arcs from (4).

15. SONG एउटा चक्रीय चतुर्भुज हो । यदि $\measuredangle SON$ र $\measuredangle SGN$ का अर्धकहरूले वृत्तलाई क्रमशः बिन्दुहरू T र A मा भेट्छन् भने TA वृत्तको व्यास हो भनी प्रमाणित गर्नुहोस् ।
SONG is a cyclic quadrilateral. If the bisectors of $\measuredangle SON$ and $\measuredangle SGN$ meet the circle at the points T and A respectively then prove that TA is the diameter of the circle.

Proof:

Statements	Reasons
1. $\overset{\frown}{TGN} = \overset{\frown}{ST}$ and $\overset{\frown}{AON} = \overset{\frown}{SA}$	1. Opposite arcs of equal angles.
2. $\overset{\frown}{TGN} + \overset{\frown}{AON} = \overset{\frown}{ST} + \overset{\frown}{SA}$	2. Addition axiom in statement (1)
3. $\overset{\frown}{AONGT} = \overset{\frown}{TSA}$	3. Whole part axiom.
4. TA is a diameter.	4. From (3), arcs on both the sides of TA are equal.

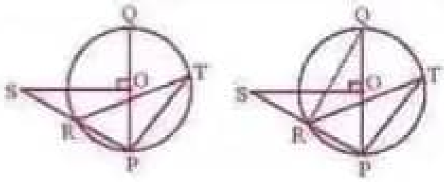
16. PQRS एउटा चक्रीय चतुर्भुज हो । यदि $\measuredangle QPS$ र $\measuredangle QRS$ का अर्धकहरूले वृत्तलाई क्रमशः बिन्दुहरू A र B मा भेट्छन् भने AB वृत्तको व्यास हो भनी प्रमाणित गर्नुहोस् ।
PQRS is a cyclic quadrilateral. If the bisectors of $\measuredangle QPS$ and $\measuredangle QRS$ meet the circle at the poinhts A and B respectively then prove that AB is the diameter of the circle.



Proof:

Statements	Reasons
1. $\overset{\frown}{QRA} = \overset{\frown}{AS}$	1. Opposite arcs of equal angles.
2. $\overset{\frown}{BPQ} = \overset{\frown}{BS}$	2. Same as reason 1.
3. $\overset{\frown}{QRA} + \overset{\frown}{BPQ} = \overset{\frown}{AS} + \overset{\frown}{BS}$	3. Addition axiom in (1) and (2).
4. $\overset{\frown}{BPQRA} = \overset{\frown}{BSA}$	4. Whole part axiom in (3).
5. AB is a diameter.	5. From (4), arcs on both sides of AB are equal.
4. MN is a diameter.	4. From (3) arcs on both the sides of MN are equal.

17. चित्रमा वृत्तको केन्द्र बिन्दु O, व्यास PQ, र SO $\perp$ PQ भए $\measuredangle PSO = \measuredangle PTR$ हुन्छ भनी सिद्ध गर्नुहोस् ।
In the figure, O is the centre of the circle. PQ the diameter and SO $\perp$ PB. Prove that $\measuredangle PSO = \measuredangle PTR$.



Construction: Join R and Q.

Proof:

Statements	Reasons
1. In ΔPRQ and ΔPSO,	1.
(i) $\measuredangle PRQ = \measuredangle POQ$	(i) Both are right angles.
(ii) $\measuredangle QPR = \measuredangle SPO$	(ii) Common angle.
(iii) $\measuredangle OSP = \measuredangle PQR$	(iii) Remaining angles in a triangle.
2. $\measuredangle PTR = \measuredangle PQR$	2. Angles standing on the same arcs.
3. $\measuredangle PTR = \measuredangle OSP$	3. From statement 2 and 1 (iii)

18. चित्रमा वृत्तको केन्द्र बिन्दु O, व्यास AB र $\measuredangle AEC = \measuredangle ODA$ भए $DO \perp AB$ हुन्छ भनी सिद्ध गर्नुहोस् ।

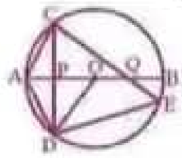
In the given figure, O is the centre of the circle. AB the diameter and $\measuredangle AEC = \measuredangle ODA$. Prove that: $DO \perp AB$

Construction: Join B and C.

Statements	Reasons
1. $\measuredangle AEC = \measuredangle ODA$	1. Given
2. $\measuredangle AEC = \measuredangle ABC$	2. Being both are on same arc.
3. $\measuredangle ODA = \measuredangle ABC$	3. From (1) and (2).
4. $\measuredangle BAC = \measuredangle DAO$	4. Common angle.
5. $\Delta ADO \sim \Delta ABC$	5. From (3) and (4) two equi-angular triangles are similar.
6. $\measuredangle ACB = \measuredangle AOD$	6. Corresponding angles of similar triangles.
7. $\measuredangle ACB = 90°$	7. Being angle at the circumference at the semi circle.
8. $\measuredangle AOD = 90°$	8. From statements (6) and (7).
9. $DO \perp AB$	9. From statement (8)

19. दिइएको चित्रमा, वृत्तको केन्द्रबिन्दु O हो । यदि QODE एउटा चक्रीय चतुर्भुज हो भने $\measuredangle ACP = \measuredangle ADP$ हुन्छ भनी प्रमाणित गर्नुहोस् ।

In the figure, O is the centre of the circle. If QODE is a cyclic quadrilateral, prove that : $\measuredangle ACP = \measuredangle ADP$.

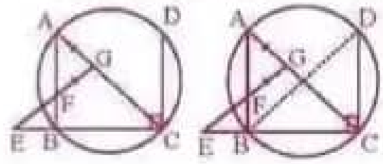


Proof:

	Statements		Reasons
1.	$\measuredangle AOD = \measuredangle CED$ or $\measuredangle QED$	1.	Exterior angle and opposite interior angle of a cyclic quadrilateral QODE.
2.	$\measuredangle AOD \equiv \overset{\frown}{AD}$ & $\measuredangle CED \equiv \frac{1}{2}\overset{\frown}{DAC}$	2.	From the relation between arc angle.
3.	$\overset{\frown}{AD} = \frac{1}{2}\overset{\frown}{DAC}$	3.	From (1) & (2)
4.	$\overset{\frown}{AD} = \overset{\frown}{AC}$	4.	From the statement (3)
5.	$AD = AC$	5.	From the statement (4)
6.	$\measuredangle ACP = \measuredangle ADP$	6.	From (5) the base angles of isosceles of ΔADC.

20. सँगैको चित्रमा $AG = FG$, $EG = CG$ र $DC \perp CE$ भए $AB = DC$ हुन्छ भनी प्रमाणित गर्नुहोस् ।

In the figure alongside $AG = FG$, $EG = CG$ and $DC \perp CE$. Prove that $AB = DC$.



Construction: Join BD.

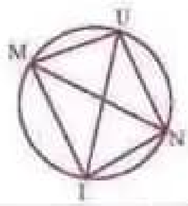
	Statements		Reasons
1.	$\measuredangle ABC = \measuredangle EFB + \measuredangle FEB$	1.	From the relation between exterior angle & opposite interior angles of ΔFEB.
2.	$\measuredangle A = \measuredangle AFG = \measuredangle EFB$	2.	Being $AG = FG$ and vertically opposite angles.
3.	$\measuredangle ACB = \measuredangle FEB$	3.	Being $EG = GC$.
4.	$\measuredangle ABC = \measuredangle A + \measuredangle ACB$	4.	From (1), (2) and (3)
5.	$\measuredangle ABC = 90°$	5.	From the sum of angles of ΔABC and from (4)
6.	$\Delta ABC \cong \Delta BCD$	6.	SAA fact
7.	$AB = CD$	7.	Corresponding sides of congruent triangles

21. दिइएको चित्रमा यदि $MN = IU$ भए, प्रमाणित गर्नुहोस् :

In the given figure if $MN = IU$, prove that :

(i) $MU = IN$ **and**

(ii) $MI \parallel UN$

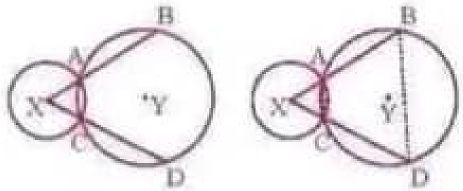


Proof:

	Statements		Reasons
1.	$\overset{\frown}{IMU} = \overset{\frown}{MIN}$	1.	The corresponding major arcs of equal chord.
2.	$\overset{\frown}{MU} = \overset{\frown}{IN}$	2.	Subtracting $\overset{\frown}{MU}$ from both the sides of (1).
3.	$MY = IN$	3.	The corresponding chord of equal arcs.
4.	$\measuredangle MIU = \measuredangle IUN$	4.	Being the corresponding angles of equal arcs from (2)
5.	$MI \parallel UN$	5.	Alternate angles are equal in (4).
6.	$Ar.(\Delta MIN) = Ar.(\Delta MUI)$	6.	Being both are on the same base and between same parallels $MI \parallel UN$.

22. चित्रमा X र Y केन्द्रबिन्दु भएका दुई वृत्तहरू A र C मा प्रतिच्छेदित भएका छन्। XA र XC लाई अर्को वृत्तको B र D सम्म लम्ब्याइएको छ। सिद्ध गर्नुहोस् : AB = CD.

In the figure, X and Y are the centres of the circles which intersect at A and C. XA and XC are produced to meet the other circle at B and D. Prove that: AB = CD.



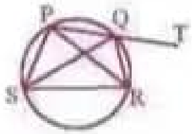
Construction: Join AC and BD.

Proof:

Statements	Reasons
1. ∠XAC = ∠CDB & ∠XCA = ∠ABD	1. Being ACDB is a cyclic quadrilateral.
2. ∠XAC = ∠XCA	2. Being XA = XC radii of same circle.
3. ∠CDB = ∠ABD	3. From (1) and (2)
4. XB = XD and AB = CD	4. Being the base angles of ΔXBD are equal in (3)

23. दिइएको चित्रमा ∠SQT को अर्धक QR हो र PQRS एउटा चक्रीय चतुर्भुज हो। ΔPRS एउटा समद्विबाहु त्रिभुज हो भनी प्रमाणित गर्नुहोस्।

In the figure, QR is the bisector of ∠SQT and PQRS is a cyclic quadrilateral. Prove that: ΔPSR is an isosceles triangle.

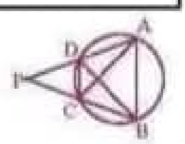


Proof:

Statements	Reasons
1. ∠SQR = ∠RQT	1. QR is bisector of ∠SQT
2. ∠SQR = ∠SPR	2. Angles at the circumference standing on the same arc.
3. ∠SPR = ∠RQT	3. From statements (1) and (2)
4. ∠PSR = ∠RQT	4. If one of the sides of a cyclic quad. is produced the exterior angle is equal to an interior angle opposite to its adjacent angle.
5. ∠SPR = ∠PSR	5. From the statements (3) and (4)
6. PR = SR	6. From statement (5)

24. चित्रमा ABCD एउटा चक्रीय चतुर्भुज र PD = PC भए BD = AC हुन्छ भनी प्रमाणित गर्नुहोस्।

In the figure, ABCD is a cyclic quadrilateral and PD = PC. Prove that: BD = AC

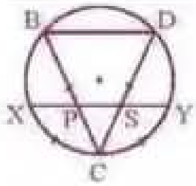


Proof:

	Statements		Reasons
1.	In ΔPAC and PDB	1.	
	(i) PC = PD (S) (ii) ∠PAC = ∠PBD (A) (iii)		(i) Given. (ii) Inscribed angles on same arc. (iii) Common angles in the both triangles.
2.	ΔPAC ≅ ΔPDB	2.	By SAA.
3.	AC = BD	3.	The corresponding sides of congruent triangles
4.	Ar.(DPAC) = Ar.(DPDB)	4.	Being ΔPAC ≅ ΔPDB

25. चित्रमा BCD एउटा समद्विबाहु त्रिभुज र चाप XC = चाप YC भए ΔPCS एउटा समद्विबाहु त्रिभुज हो भनी प्रमाणित गर्नुहोस्।

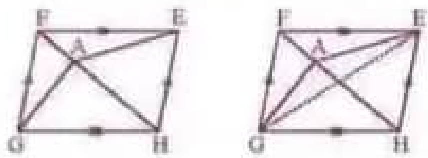
In the given figure, ΔBCD is an isosceles triangle and arc XC = arc YC then prove that: ΔPCS is an isosceles triangle.



Proof:

	Statements		Reasons
1.	BC = CD	1.	ΔBCD is an equilateral triangle.
2.	$\overset{\frown}{BXC} = \overset{\frown}{CYD}$	2.	Corresponding arcs of BC = CD
3.	$\overset{\frown}{BXC} - \overset{\frown}{CX} = \overset{\frown}{CYD} - \overset{\frown}{YC}$	3.	Subtracting $\overset{\frown}{CX} = \overset{\frown}{YC}$ from (2).
4.	$\overset{\frown}{BX} = \overset{\frown}{DY}$	4.	From (3)
5.	BD // XY	5.	From (4)
6.	∠B = ∠SPC and ∠D = ∠PSC	6.	From (5) co-interior angles in BD // XY
7.	∠SPC = ∠PSC	7.	Being ∠B = ∠D and from (6).

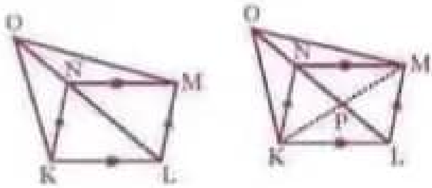
26. चित्रमा GHEF एउटा समानान्तर चतुर्भुज हो । यदि विकर्ण HF मा कुनै बिन्दु A छ भने ΔFAG र ΔFAE को क्षेत्रफल बराबर हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the figure, GHEF is a parallelogram. If A is any point on a diagonal HF, prove that ΔFAG and ΔFAE are equal in area.



CONSTRUCTION: Join EG so that EG and FH are intersected at O.

	Statements		Reasons
1.	O is the midpoint of GE.	1.	Diagonals of parallelogram bisect to each other.
2.	ΔGOF = ΔEOF & ΔGOA = ΔEOA	2.	Being FO & AO are the medians of ΔEFG & ΔEAG.
3.	ΔGOF – ΔGOA = ΔEOF – ΔEOA	3.	Subtraction axiom in (2).
4.	ΔFAG = ΔFAE (In area)	4.	From (3) comparision axiom.

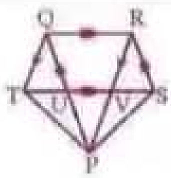
27. दिइएको चित्रमा KLMN एउटा समानान्तर चतुर्भुज हो । यदि विकर्ण LN लाई लम्ब्याएर O सम्म पुऱ्याइएको छ भने ΔKOL र ΔMOL को क्षेत्रफलहरू बराबर हुन्छन् भनी प्रमाणित गर्नुहोस् ।
In the given figure, KLMN is a parallelogram. Diagonal LN is produced to O. Then prove that ΔKOL and ΔMOL are equal in area.



CONSTRUCTION: Join KM.

	Statements		Reasons
1.	P is the mid-point of KM.	1.	Being the diagonals of parallelogram NKLM are intersected at P.
2.	ΔKPO = ΔMPO	2.	From (1), OP is the median of ΔOKM.
3.	ΔKPN = ΔMPN	3.	Being NP is the median of ΔNKM.
4.	ΔKPO – ΔKPN = ΔMPO – ΔMPN	4.	Subtracting the statement (3) from (2).
5.	ΔKON = ΔMON	5.	From the statement (4)
6.	ΔKLN = ΔMLN	6.	NL being the diagonal of //gm KLMN.
7.	ΔKON + ΔKLN = ΔMON + ΔMLN	7.	Adding statements (5) and (6)
8.	ΔKOL = ΔMOL	8.	Whole parts axiom

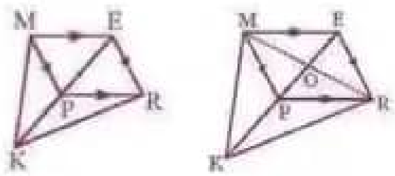
28. दिइएको चित्रमा QR // TS, QT // RP र RS // QP छन् भने प्रमाणित गर्नुहोस् ΔPQT को क्षेत्रफल = ΔPRS को क्षेत्रफल
In the given figure, QR // TS, QT // RP and RS // QP. Prove that: Area of ΔPQT = Area of ΔPRS



Proof:

	Statements		Reasons
1.	2ΔPQT = ▱QRVT	1.	Being both are on the same base and between the same parallels.
2.	2ΔPRS = ▱QRSU	2.	Being both are on the same base and between the same parallels.
3.	▱QRVT = ▱QRSU	3.	Being both are on the same base and between the same parallels.
4.	2ΔPQT = 2ΔPRS	4.	From the statement (1), (2) and (3)
5.	∴ ΔPQT = ΔPRS	5.	From the statement (4)

29. दिइएको चित्रमा PREM एउटा समानान्तर चतुर्भुज हो । विकर्ण EP लाई बिन्दु K सम्म लम्ब्याइएको छ । ΔKPM र ΔKPR को क्षेत्रफल बराबर हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the given figure, PREM is a parallelogram. Diagonal EP is produced to point K. Prove that ΔKPM and ΔKPR are equal in area.

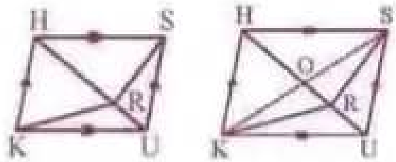


CONSTRUCTION: Join MR.

	Statements		Reasons
1.	O is the mid-point of MR.	1.	Being the diagonals of parallelogram PREM are intersected at O.
2.	ΔKMO = ΔKRO	2.	From (1), KO is the median of ΔKRM.
3.	ΔMOP = ΔROP	3.	Being OP is the median of ΔMPR.
4.	ΔKMO – ΔMOP = ΔKRO – ΔROP	4.	Subtracting the statement (3) from (2).
5.	ΔKPM = ΔKPR	5.	From the statement (4).

30. दिइएको चित्रमा KUSH एउटा समानान्तर चतुर्भुज हो । यदि UH को कुनै बिन्दु R भए ΔKHR र ΔSHR को क्षेत्रफल बराबर हुन्छ भनी प्रमाणित गर्नुहोस् ।

In the given figure, KUSH is a parallelogram. R is any point on diagonal UH. Then prove that ΔKHR and ΔSHR are equal in area.

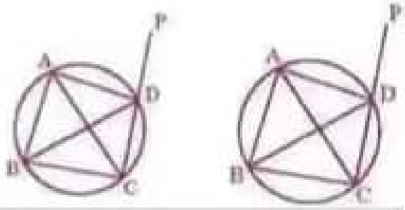


CONSTRUCTION: Join KS.

	Statements		Reasons
1.	O is the mid-point of KS.	1.	Being the diagonals of parallelogram KUSH are intersected at O.
2.	$\Delta SOR = \Delta KOR$	2.	From (1), OR is the median of ΔKSR.
3.	$\Delta HOS = \Delta HOK$	3.	Being OH is the median of ΔHKS.
4.	$\Delta SOR + \Delta HOS = \Delta KOR + \Delta HOK$	4.	Adding the statement (2) and (3).
5.	$\Delta SHR = \Delta KHR$	5.	From the statement (4).

31. दिइएको चित्रमा ABCD एउटा चक्रीय चतुर्भुज हो । भुजा CD लाई बिन्दु P सम्म लम्ब्याइएको छ । यदि AB = AC भए ∡BDP को अर्धक AD हुन्छ भनी प्रमाणित गर्नुहोस् ।

In the given figure, ABCD is a cyclic quadrilateral. A side CD is produced to the point P. If AB = AC, prove that AD is a bisector of $\angle BDP$.

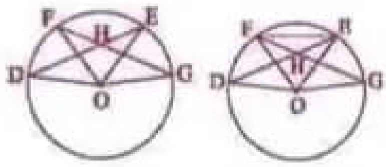


	Statements		Reasons
1.	$\angle ADP = \angle ABC$	1.	Exterior angle and opposite interior angle of a cyclic quadrilateral.
2.	$\angle ABC = \angle ACB$	2.	Being AB = AC.
3.	$\angle ACB = \angle ADB$	3.	Being both are inscribed angles on same arc.
4.	$\angle ADP = \angle ADB$	4.	From (1), (2) and (3).
5.	AD is a bisector of $\angle BDP$	5.	From the statement (4).

32. दिइएको चित्रमा, O वृत्तको केन्द्रबिन्दु हो । यदि जीवाहरू DE र FG बिन्दु H मा प्रतिच्छेदन भएका छन् भने, प्रमाणित गर्नुहोस्:

In the given figure, O is the centre of the circle. If two chords DE and FG intersect at the point H, prove that:

$\angle DOF + \angle EOG = 2\angle EHG$

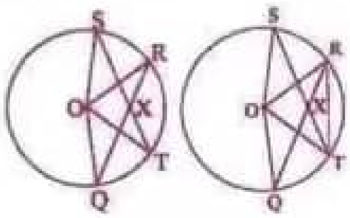


CONSTRUCTION: Join EF.

	Statements		Reasons
1.	$\angle DOF = 2\angle FEH$	1.	Being both are on same arc.
2.	$\angle EOG = 2\angle EFH$	2.	Being both are on same arc.
3.	$\angle DOF + \angle EOG = 2(\angle FEH + \angle EFH)$	3.	Addition axiom
4.	$\angle FEH + \angle EFH = 2\angle EHG$	4.	Being exterior angle and the sum of opposite interior angles.
5.	$\angle DOF + \angle EOG = 2\angle EHG$	5.	From (3) and (4).

33. चित्रमा, O वृत्तको केन्द्र हो । यदि जीवाहरू QR र ST बिन्दु X मा प्रतिच्छेदन भएका छन् भने, प्रमाणित गर्नुहोस् : $\angle QXT = \frac{1}{2}(\angle QOT + \angle ROS)$

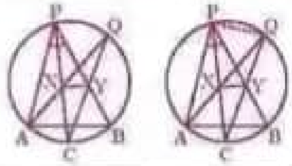
In the figure, O is the centre of the circle. If chords QR and ST intersect at the point X, prove that: $\angle QXT = \frac{1}{2}(\angle QOT + \angle ROS)$



CONSTRUCTION: Join RT.

	Statements		Reasons
1.	$\angle QRT = \frac{1}{2}\angle QOT$	1.	Being central angle and angle at the circumference standing on same arc.
2.	$\angle RTS = \frac{1}{2}\angle ROS$	2.	Same as reason (1).
3.	$\angle QRT + \angle RTS = \frac{1}{2}(\angle QOT + \angle ROS)$	3.	Adding statements (1) and (2).
4.	$\angle QRT + \angle RTS = \angle QXT$	4.	From the relation between exterior angle and opposite interior angles.
5.	$\angle QXT = \frac{1}{2}(\angle QOT + \angle ROS)$	5.	From (3) and (4).

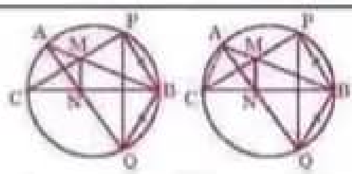
34. दिइएको चित्रमा $\angle APB$ अर्धक PC हो भने XY // AB हुन्छ भनी प्रमाणित गर्नुहोस् ।
If PC is the bisector of $\angle APB$ then prove that XY // AB.



Construction: Join P and Q.

	Statements		Reasons
1.	$\angle APC = \angle CPB = \angle AQC$	1.	From given and $\angle APC = \angle AQC$
2.	XYQP is a cyclic quad	2.	As $\angle XPY = \angle XQY$
3.	$\angle YPQ = \angle YXQ$	3.	Angles at arc YQ
4.	$\angle BPQ = \angle BAQ$	4.	Angles at arc BQ
5.	$\angle YXQ = \angle BAQ$	5.	From (3) and (4)
6.	XY // AB	6.	From (5)

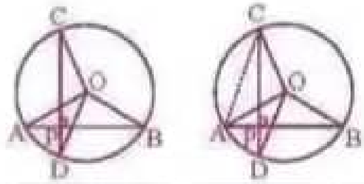
35. सँगैको वृत्तमा जीवा PB = जीवा BQ छ । MN // PQ हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the adjoining circle, chord PB = chord BQ. Prove that MN // PQ.



Proof: Construction: Join AC.

	Statements		Reasons
1.	$\angle MAN = \angle MCN$	1.	Both are on equal arcs.
2.	ACNM is a cyclic quadrilateral	2.	Being angles at the same segment of quad. ACNM are equal.
3.	$\angle ACM = \angle ANM$	3.	Both are on same segment of cyclic quad. ACNM.
4.	$\angle ACM = \angle AQP$	4.	Both are on same arc AP.
5.	$\angle ANM = \angle AQP$	5.	From (3) & (4)
6.	MN // PQ	6.	Corresponding angles are equal in (5).

36. चित्रमा O वृत्तको केन्द्रबिन्दु हो र CD ⊥ AB छ । कोणहरू $\angle AOC$ र $\angle BOD$ परिपूरक हुन्छन् भनी प्रमाणित गर्नुहोस् ।
In the given figure, O is the centre of a circle and CD ⊥ AB. Prove that $\angle AOD$ & $\angle BOC$ are supplementary.



Construction: Join AC.

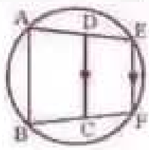
	Statements		Reasons
1.	$\angle ACP + \angle CAP = 90°$ $2\angle ACP + 2\angle CAP = 180°$	1.	From right angled $\triangle ACP$ the sum of acute angles
2.	$2\angle ACP = \angle AOD$ and $2\angle CAP = \angle BOC$	2.	From the relation between central angle and inscribed angle
3.	$\angle AOD + \angle BOC = 180°$	3.	From the statements 1 and 2

37. चित्रमा जीवाहरू AMX, BMY, र CMZ बिन्दु M मा प्रतिच्छेदन भएका छन् । $\angle BMC = \angle YXZ + \angle BAC$ हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the figure, the chords, AMX, BMY, and CMZ are intersected at M. Prove that $\angle BMC = \angle YXZ + \angle BAC$.

Proof:

	Statements		Reasons
1.	$\angle BMX = \angle MBA + \angle BAM$ $\angle CMX = \angle MAC + \angle MCA$	1.	Relation between exterior angle and opposite interior angles.
2.	$\angle BMX + \angle CMX = \angle MBA + \angle MCA + \angle BAM + \angle MAC$	2.	Addition axiom in (1).
3.	$\angle BMC = \angle MBA + \angle MCA + \angle BAC$	3.	Whole part axiom in (2).
4.	$\angle MBA + \angle MCA = \angle MXY + \angle MXZ = \angle YXZ$	4.	Angles in same arc and whole part axiom.
5.	$\angle BMC = \angle YXZ + \angle BAC$	5.	From (3) and (4).

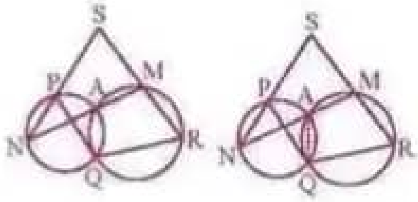
38. दिइएको चित्रमा DC // EF छन् भने ABCD एउटा चक्रीय चतुर्भुज हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the given figure, DC // EF. Prove that ABCD is a cyclic quadrilateral.



Proof:

	Statements		Reasons
1.	$\angle BAD + \angle BFE = 180°$	1.	Opposite angles of a cyclic quadrilateral.
2.	$\angle BCD = \angle BFE$	2.	Corresponding angles in parallel lines.
3.	$\angle BCD + \angle BAD = 180°$	3.	From the statements (1) and (2).
4.	ABCD is a cyclic quadrilateral.	4.	Being the sum of opposite angles is 180° in (3).

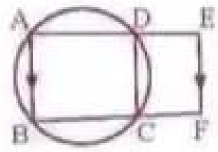
39. दिइएको चित्रमा NPS, MAN र RMS सरल रेखाहरू हुन् भने PQRS एउटा चक्रीय चतुर्भुज हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the given figure, NPS, MAN and RMS are straight lines. Prove that PQRS is a cyclic quadrilateral.



CONSTRUCTION: Join AQ.

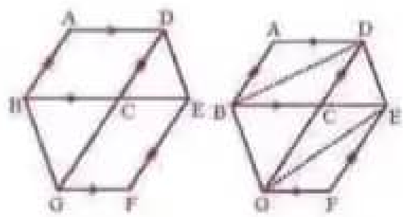
	Statements		Reasons
1.	$\angle NPQ = \angle NAQ$	1.	Being the inscribed angles on same arc.
2.	$\angle NAQ = \angle MRQ$	2.	Being exterior angle & opposite interior angle of a cyclic quadrilateral.
3.	$\angle NPQ = \angle MRQ$	3.	From the statements (1) and (2).
4.	PQRS is a cylic quadrilateral.	4.	Being exterior angle and opposite interior angle of a quad. PQRS are equal in (3).

40. दिइएको चित्रमा AB र EF एक आपसमा समानान्तर छन् भने CDEF एउटा चक्रीयचतुर्भुज हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the given figure AB and EF are parallel to each other. Prove that CDEF is a cyclic quadrilateral.



	Statements		Reasons
1.	$\angle BAD = \angle DCF$	1.	Being exterior angle and opposite interior angle of a quad. ABCD.
2.	$\angle BAD + \angle DEF = 180°$	2.	Being the sum of co-interior angles in parallel lines.
3.	$\angle DCF + \angle DEF = 180°$	3.	From the statements (1) and (2).
4.	CDEF is a cylic quadrilateral.	4.	Being the sum of opposite angles is 180° in (3).

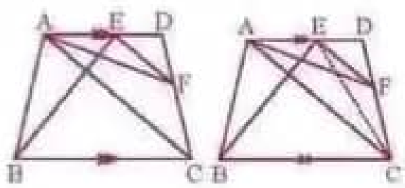
41. दिइएको चित्रमा AD // BE // GF र AB // DG // EF छन् । यदि समानान्तर चतुर्भुजहरू ABCD र CEFG का क्षेत्रफल बराबर भए DE || BG हुन्छन् भनी प्रमाणित गर्नुहोस् ।
In the given figure, there are AD // BE // GF and AB // DG // EF. If the areas of parallelograms ABCD and CEFG are equal, then prove that : DE // BG.



CONSTRUCTION: Join BD and GE.

	Statements		Reasons
1.	▱ABCD = 2ΔBCD	1.	Being BD is the diagonal of parm. ABCD.
2.	▱CEFG = 2ΔGCE	2.	Being GE is the diagonal of parm. ABCD.
3.	ΔBCD = ΔGCE	3.	▱ABCD = ▱CEFG (given) & from the (1) & (2).
4.	ΔBGD = ΔBGE	4.	Adding ΔBCG in statement (3).
5.	BG // DE	5.	Being triangles on the same base & between BG & DE are equal.

42. दिइएको चित्रमा AD // BC छन् । यदि ΔABE र ΔACF का क्षेत्रफलहरू बराबर छन् भने प्रमाणित गर्नुहोस् : EF // AC.
In the given figure, AD // BC. If the areas of ΔABE and ΔACF are equal, then prove that: EF // AC.



CONSTRUCTION: Join CE.

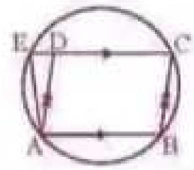
	Statements		Reasons
1.	Δ ABE = Δ ACF	1.	Given.
2.	Δ ABE = Δ AEC	2.	Being triangles on the same base & between the same parallels.
3.	Δ ACE = Δ ACF	3.	From the (1) & (2) equal quantities axiom.
4.	EF // AC	4.	Being triangles on the same base & between AC & EF are equal. in the statement (3).

43. दिइएको चित्रमा AD // BC छ भने ∡AYC = ∡BXD हुन्छ भनी प्रमाणित गर्नुहोस् ।
In the given figure, AD // BC. Prove that ∡AYC = ∡BXD.

Proof:

	Statements		Reasons
1.	$\overset{\frown}{AB} = \overset{\frown}{DC}$	1.	Corresponding arcs made by parallel lines.
2.	$\overset{\frown}{ABC} = \overset{\frown}{DCB}$	2.	Adding $\overset{\frown}{BC}$ on statement 1.
3.	$\measuredangle Y = \frac{1}{2}\overset{\frown}{ABC}$ & $\measuredangle X = \frac{1}{2}\overset{\frown}{DCB}$	3.	From the relation between inscribed angle & opposite arc.
4.	$\measuredangle Y = \measuredangle X$	4.	From (3) and (4) equal quantities axiom.

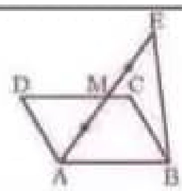
44. दिइएको चित्रमा ABCD एउटा समानान्तर चतुर्भुज हो र EABC चक्रीयचतुर्भुज हो । प्रमाणित गर्नुहोस्
In the figure, ABCD is a parallelogram and EABC is a cyclic quadrilateral, prove that : AE = AD

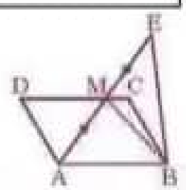


Proof:

	Statements		Reasons
1.	$\measuredangle E = 180° - \measuredangle B$	1.	From the relation betⁿ opposite angles of cyclic quadrilateral
2.	$\measuredangle B = \measuredangle ADC$	2.	Being the opposite angles of a parallelogram.
3.	$\measuredangle EDA = 180° - \measuredangle ADC$	3.	Being adjacent angles in a straight line.
4.	$\measuredangle EDA = 180° - \measuredangle B$	4.	From (2) and (3)
5.	$\measuredangle E = \measuredangle EDA$	5.	From (1) and (4)
6.	AE = AD	6.	From (5)

45. चित्रमा AE को मध्यबिन्दु M भए ΔABE को क्षेत्रफल र समानान्तर चतुर्भुज ABCD को क्षेत्रफल बराबर हुन्छन् भनी प्रमाणित गर्नुहोस् ।
In the figure, M is the mid-point of AE, then prove that area of ΔABE is equal to the area of parallelogram ABCD.

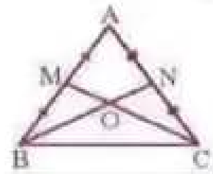




CONSTRUCTION: Join MB

	Statements		Reasons
1.	2ΔAMB = parm. ABCD	1.	Being both are on the same base and between the same parallels.
2.	2ΔAMB = ΔABE	2.	Being BM is the median of ΔEAB.
3.	ΔABE = parm. ABCD	3.	From (1) and (2)

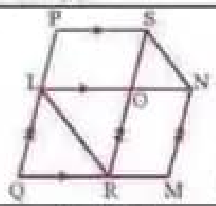
46. दिइएको ΔABC मा BN र CM दुई मध्यिकाहरू बिन्दु O मा प्रतिच्छेदन भए। सिद्ध गर्नुहोस् ΔBOC को क्षेत्रफल = चतुर्भुज AMON को क्षेत्रफल
In the given triangle ABC, medians BN and CM are intersected at O. Prove that area of ΔBOC = area of quadrilateral AMON.

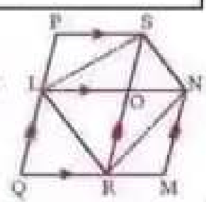


Proof:

	Statements		Reasons
1.	2ΔBNC = ΔABC	1.	Being BN is median.
2.	2ΔAMC = ΔABC	2.	Being CM is median.
3.	ΔBNC = ΔAMC	3.	From (1) & (2).
4.	ΔBNC – ΔCON = ΔAMC – ΔCON	4.	Subtracting ΔCON.
5.	ΔBOC = Quad. AMON	5.	From statements (4).

47. सँगैको चित्रमा PQRS र LQMN बराबर क्षेत्रफल भएका समानान्तर चतुर्भुजहरू हुन् । प्रमाणित गर्नुहोस् LR // SN छ ।
In the adjoining figure, PQRS and LQMN are two parallelograms equal in area. Prove that LR // SN.



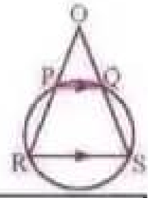


Construction: Join LS and RN.

	Statements		Reasons
1.	$\Delta RLS = \frac{1}{2}$ Parallelogram PQRS	1.	Being both are on the same base and between the same parallels
2.	$\Delta LRN = \frac{1}{2}$ Parallelogram LQMN	2.	Being both are on the same base and between the same parallels
3.	Δ RLS = ΔLRN	3.	From given and statements (1) and (2).
4.	LR // SN	4.	From (3) triangles on same base and between the same lines are equal in area.

48. दिइएको चित्रमा जीवाहरू RP र SQ बिन्दु O मा भेट्ने गरी लम्ब्याइएको छ। यदि PQ//RS भए, सिद्ध गर्नुहोस्: OP = OQ

In the given diagram, chords RP & SQ of the circle are produced to meet at O. If PQ//RS, prove that : OP = OQ

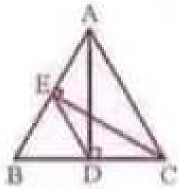


Proof:

	Statements		Reasons
1.	$\measuredangle PRS = \measuredangle OPQ$	1.	Corresponding angles in parallel lines.
2.	$\measuredangle PRS = \measuredangle OQP$	2.	Being exterior angle & opposite interior angle of a cyclic quad.
3.	$\measuredangle OPQ = \measuredangle OQP$	3.	From (1) and (2).
4.	OP = OQ	4.	Being $\measuredangle OPQ = \measuredangle OQP$ in Δ OPQ

49. दिइएको त्रिभुज ABC मा AD⊥BC र CE⊥AB छ भने सिद्ध गर्नुहोस्:
$\measuredangle BDE = \measuredangle BAC$.

In the given figure AD⊥BC and CE⊥AB are in ΔABC. Prove that:
$\measuredangle BDE = \measuredangle BAC$.

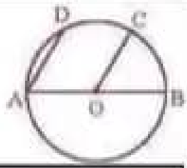


Proof:

	Statements		Reasons
1.	$\measuredangle AEC = \measuredangle ADC$	1.	Both are the right angles.
2.	A, E, D, C are the cyclic points.	2.	Being the angles on same segment AC are equal.
3.	AEDC is a cyclic quadrilateral.	3.	From the statement (2).
4.	$\measuredangle EAC = \measuredangle EDB$	4.	Being exterior angle and opposite interior angle of a quadrilateral AEDC.

50. सँगैको चित्रमा AOB व्यास हो। चाप DC = चाप BC भए प्रमाणित गर्नुहोस्। AD // OC

In the adjoining figure AOB is a diameter, Arc DC = Arc BC, then prove that:
AD // OC



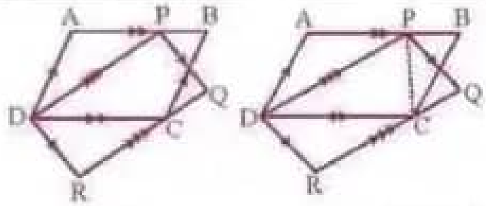
Proof:

	Statements		Reasons
1.	$\measuredangle BOC = \widehat{BC}$	1.	From the relation between central angle and opposite arc.
2.	$\measuredangle DAB = \frac{1}{2}\widehat{BD} = \widehat{BC}$	2.	From the relation between inscribed angle and opposite arc and being C is the midpoint of $\widehat{BD}$.
3.	$\measuredangle BOC = \measuredangle DAB$	3.	From the statements (1) and (2).
4.	AD // OC	4.	Being the corresponding angles are equal in (3).

51. दिइएको चित्रमा ABCD र PQRD दुई समानान्तर चतुर्भुजहरू हुन्। प्रमाणित गर्नुहोस्: ▱ABCD = ▱PQRD

In the given diagram, ABCD and PQRD are two parallelograms. Prove that: ▱ABCD = ▱PQRD

Construction: Join P and C.



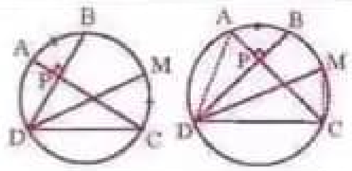
Proof:

	Statements		Reasons
1.	$\Delta PCD = \frac{1}{2}$ ▱ABCD	1.	Being both are on the same base and between the same parallels.
2.	$\Delta PCD = \frac{1}{2}$ ▱PQRD	2.	Being both are on the same base and between the same parallels.
3.	▱ABCD = ▱PQRD	3.	From the statements (1) and (2).

52. चित्रमा, $\widehat{AB} = \widehat{CM}$ र AC ⊥ BD भए DM व्यास हो भनी प्रमाणित गर्नुहोस्।

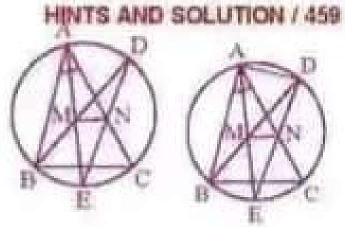
In the figure, $\widehat{AB} = \widehat{CM}$ and AC ⊥ BD. Prove that DM is the diameter of the circle.

Construction: Join AD and MC.



Statements		Reasons	
1.	$\Delta APD \sim \Delta MCD$	1.	Being $\measuredangle DAP = \measuredangle DMC$ & $\measuredangle ADP = \measuredangle MDC$ so by AA fact.
2.	$\measuredangle APD = \measuredangle MCD = 90°$	2.	Corresponding angles of similar triangles
3.	DM is a diameter.	3.	Being $\measuredangle MCD = 90°$.

53. दिइएको चित्रमा AE कोण ∡BAC को अर्धक भए प्रमाणित गर्नुहोस्:



In the figure if AE is the bisector of ∡BAC, prove that:

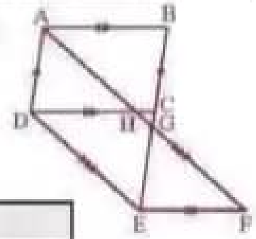
MN // BC

Construction: Join A and D.

Proof:

	Statements		Reasons
1.	∡BAE = ∡BDE = ∡EAN	1.	From given and inscribed angles on same arc.
2.	Points A, M, N and D are concyclic points.	2.	Being ∡MAN = ∡MDN from (1).
3.	∡DAN = ∡DMN, ∡DAN = ∡DBC	3.	Being the inscribed angles on same arc.
4.	∡DMN = ∡DBC	4.	From the statement (3)
5.	MN // BC	5.	Being the corresponding angles are equal in (3).

54. चित्रमा AB // DC // EF साथै AD // BE र AF // DE भए स.च. DEFH = स.च. ABCD हुन्छ भनी प्रमाणित गर्नुहोस्।

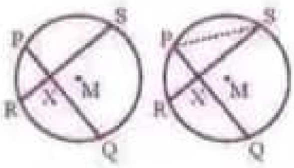


In the given figure, AB // DC // EF, AD // BE and AF // DE. Prove that parallelogram DEFH = parallelogram ABCD.

Proof:

	Statements		Reasons
1.	ADEG, ADCB, ADEG & DEFH are //gms	1.	Being the opposite sides are parallel.
2.	//gm ADEG = //gm DEFH (in area)	2.	Being both are on the same base and between the same parallels.
3.	//gm ADEG = //gm ABCD (in area)	3.	Same as reason (2).
4.	//gm DEFH = //gm ABCD (in area)	4.	From the statement (2) and (3)

55. दिइएको वृत्तमा जीवा PQ र जीवा RS वृत्तभित्र बिन्दु X मा काटिएका छन्। प्रमाणित गर्नुहोस् :

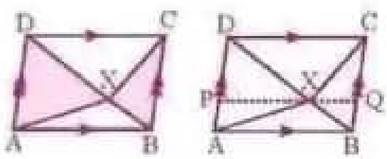


In the given circle, chords PQ and RS interest within the circle at point X. Prove that: $\angle PXR = \frac{1}{2}(\widehat{PR} + \widehat{QS})$

Construction: Join PS.

	Statements		Reasons
1.	∡PXR = ∡QPS + ∡PSR	1.	Relation between exterior angle and opposite interior angles of ΔPXS.
2.	$\angle QPS = \frac{1}{2}\widehat{QS}$ & $\angle PSR = \frac{1}{2}\widehat{PR}$	2.	Relation between inscribed angle and opposite arc.
3.	$\angle PXR = \frac{1}{2}\widehat{QS} + \frac{1}{2}\widehat{PR}$	3.	From (1) and (2).
4.	$\angle PXR = \frac{1}{2}(\widehat{PR} + \widehat{QS})$	4.	From (3).

56. दिइएको ▱ABCD भित्र X कुनै एउटा बिन्दु छ भने ΔXCD र ΔXAB का क्षेत्रफलको योगफल ▱ABCD को क्षेत्रफलको आधा हुन्छ भनी प्रमाणित गर्नुहोस्।



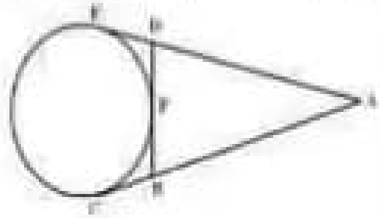
In given figure ABCD is a parallelogram. X is any point within it. Prove that the sum of area of ΔXCD and ΔXAB is equal to half of the area of ▱ABCD.

Construction: (A line PXQ is drawn through X parallel to AB or DC.)

	Statements		Reasons
1.	$\Delta XAB = \frac{1}{2}$ ▱ABQP, $\Delta XCD = \frac{1}{2}$ ▱PQCD	1.	Being both are on the same base and between the same parallels.
2.	$\Delta XAB + \Delta XCD = \frac{1}{2}$(▱ABQP + ▱PQCD)	2.	Addition axiom in (1)
3.	▱ABQP + ▱PQCD = ▱ABCD	3.	Whole part axiom
4.	$\Delta XAB + \Delta XCD = \frac{1}{2}$(▱ABCD)	4.	From (2) and (3)

3. $\angle BXY + \angle BCY = 180^0$	3. From statements 1 and 2
4. B, C, X and Y are concyclic	4. As opposite angles of quadrilateral are supplementary

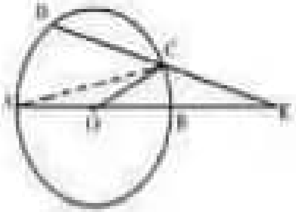
5. In the given figure O is the centre of the circle. If AE, AC and BE are tangents. Prove that
AE + AC = AB+BD+AD.
दिएको चित्रमा वृत्तको केन्द्र बिन्दु O हो । यदि AE, AC र BE स्पर्श रेखाहरू भए AE + AC = AB+BD+AD हुन्छ भनी प्रमाणित गर्नुहोस् ।



Given: O is the centre of the circle. AE, AC and BE are tangents.
To prove: AE + AC = AB+BD+AD
Proof:

Statements	Reasons
1. DE = DF	1. Tangents drawn from an external point are equal
2. BC = BF	2. Same as statement 1
3. AE+ AC = AD+DE+AB+BC	3. Being whole part axiom
4. AE+ AC = AD+AB+DF+BF	4. From statements 1, 2 and 3
5. AE + AC = AB+BD+AD	5. As DF+BF being whole part axiom

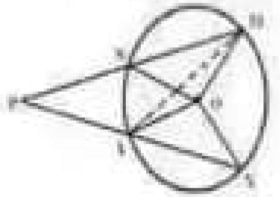
6. In the given figure O is the centre of the circle in which OCE is an isosceles triangle prove that arc AD is equal to the thrice of arc BC.
दिएको चित्रमा वृत्तको केन्द्र बिन्दु हो र एउटा समद्विबाहु त्रिभुज हो भने चाप



Given: O is the centre of circle and OCE is an isosceles triangle.
To prove: Arc AD = Thrice of Arc BC
Constructing: A and C are joined.
Proof:

Statements	Reasons
1. $\angle COE = \angle CEO$	1. As OC=CE, being base angles of isosceles
2. $\angle COB = 2\angle CAE$	2. Central angle is double of inscribed angle on same arc
3. $\angle ACD = \angle CAE + \angle CEA$	3. Ext. angle of triangle is equal to the sum of two non adjacent interior angles
4. $\angle ACD = 3\angle CAE$	4. From statements 1, 2 and 3
5. Arc AD = 3 Arc BC	5. From statement 4

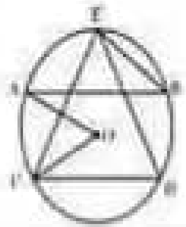
7. In the adjoining figure, O is the centre of the circle. Two chords XY and MN are produced to meet at P. Prove that
$\angle XOM - \angle YON = 2\angle XPM$.
दिएको चित्रमा वृत्तको केन्द्र बिन्दु O हो । दुईवटा जीवाहरू XY र MN बढाउँदा बिन्दु P मा भेटिन्छ । प्रमाणित गर्नुहोस् $\angle XOM - \angle YON = 2\angle XPM$



Given: O is the centre of the circle.
To prove: $\angle XOM - \angle YON = 2\angle XPM$
Constructing: M and Y are joined
Proof:

Statements	Reasons
1. $\angle MYX = \angle YMN + \angle XPM$ or, $\angle MYX - \angle YMN = \angle XPM$	1. Exterior angle of triangle is equal to the sum of two non adjacent interior angles
2. $\angle MYX = ½ \angle MOX$	2. Being central angle and inscribed angle of same arc
3. $\angle YMN = 1/2 \angle YON$	3. Same as statement 2
4. $\angle XOM - \angle YON = 2\angle XPM$	4. From statements 1, 2 and 3

8. In the given figure, O is the centre of the circle. If AB∥ CD, prove that $\angle AOC = 2\angle BED$.
दिएको चित्रमा वृत्तको केन्द्र बिन्दु O हो । यदि AB∥CD भए $\angle AOC = 2\angle BED$ हुन्छ भनी प्रमाणित गर्नुहोस् ।
Given: O is the centre of the circle and AB∥CD
To prove: $\angle AOC = 2\angle BED$
Proof:



Statements	Reasons
1. Arc AC = Arc BD	1. Arcs between parallel lines are equal
2. $\angle AOC$ = Arc AC	2. Being central angle and corresponding arc.
3. Arc BD = 2 $\angle BED$	3. Being inscribed angle and corresponding arc