ODM EDUCATIONAL GROUP
Changing your Tomorrow

PERIOD 5

MATHEMATICS

CHAPTER NUMBER :~ 8
CHAPTER NAME :~QUADRILATERALS

PREVIOUS KNOWLEDGE TEST

1. In a parallelogram show that the angle bisectors of two adjacent angles intersect at right angle.

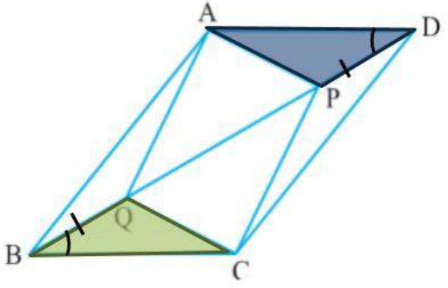
LEARNING OUTCOME:~

1.Students will be able to develop expertise on application on properties of parallelogram.

Ex 8.1, 9

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ Show that:

(i) Δ APD ≅ Δ CQB



Given: ABCD is a parallelogram

where DP = BQ

To prove: Δ APD ≅ Δ CQB

Proof:

Now, AD ∥ BC (Opposite sides of parallelogram are parallel)

and transversal BD.

∠ADP = ∠CBQ (Alternate angles) .....(1)

In ΔAPD and ΔCQB,

AD = CB (Opposite sides of parallelogram are equal)

∠ADP = ∠CBQ (From (1))

DP = BQ (Given)

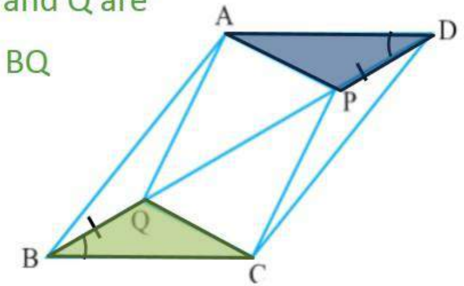
∴ ΔAPD ≅ ΔCQB (SAS congruency)

Ex 8.1, 9

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ

Show that:

(ii) AP = CQ



In previous part,

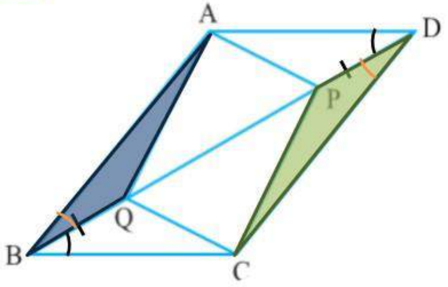
we proved that ΔAPD ≅ ΔCQB,

∴ AP = CQ (CPCT)

Ex 8.1, 9

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ Show that:

(iii) Δ AQB $\cong$ Δ CPD



Since,

AB || DC (Opposite sides of parallelogram are parallel)

and transversal BD.

$\angle ABQ = \angle CDP$ (Alternate angles) .....(1)

In ΔAQB and ΔCPD,

AB = CD (Opposite sides of parallelogram are equal)

$\angle ABQ = \angle CDP$ (From (1))

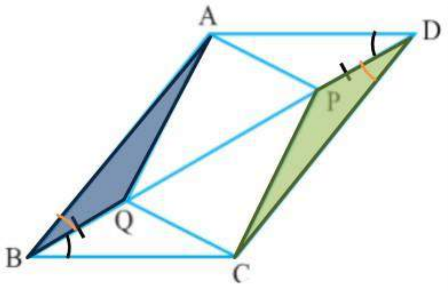
BQ = DP (Given)

$\therefore \Delta AQB \cong \Delta CPD$ (SAS congruency)

Ex 8.1, 9

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ. Show that:

(iv) AQ = CP



In previous part,

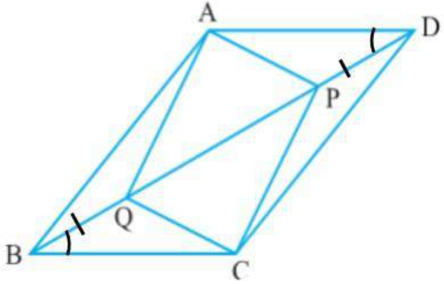
we proved that ΔAQB ≅ ΔCPD,

∴ AQ = CP (CPCT)

Ex 8.1, 9

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ. Show that:

(v) APCQ is a parallelogram



In part (ii) & (iv) we proved that

AP = CQ

and

AQ = CP

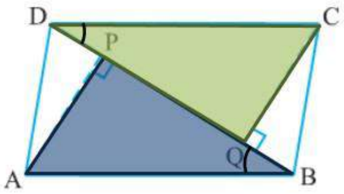
Since both pairs of opposite sides in APCQ are equal,

APCQ is a parallelogram.

Ex 8.1, 10

ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD. Show that

(i) $\Delta APB \cong \Delta CQD$



Given: ABCD is a parallelogram

with $AP \perp BD$ & $CQ \perp BD$

To prove: $\Delta APB \cong \Delta CQD$

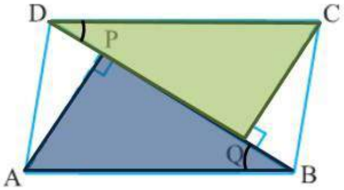
Proof:

Now,

AB || DC *(Opposite sides of parallelogram are parallel)*

and transversal BD.

$\angle ABP = \angle CDQ$, (Alternate angles) ...(1)



In ΔAPB and ΔCQD,

∠APB = ∠CQD (Both are 90°)

∠ABP = ∠CDQ (From (1))

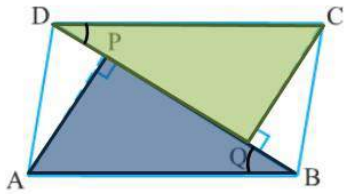
AB = CD (Opposite sides of parallelogram are equal)

∴ ΔAPB ≅ ΔCQD (AAS congruence rule)

Ex 8.1, 10

ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD. Show that

(ii) AP = CQ



In previous part,

we proved that ΔAPB ≅ ΔCQD,

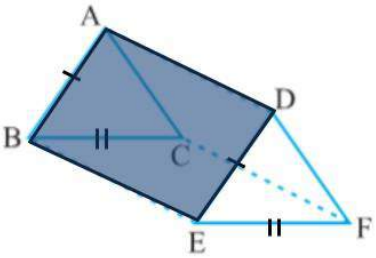
∴ AP = CQ (CPCT)

Hence proved

Ex 8.1, 11

In Δ ABC and Δ DEF, AB = DE, AB ∥ DE, BC = EF and BC ∥ EF. Vertices A, B and C are joined to vertices D, E and F respectively .Show that

(i) quadrilateral ABED is a parallelogram



Given: Δ ABC and Δ DEF,

AB = DE, AB ∥ DE, BC = EF and BC ∥ EF

To prove: ABED is a parallelogram

Proof:

Given that AB = DE and AB ∥ DE.

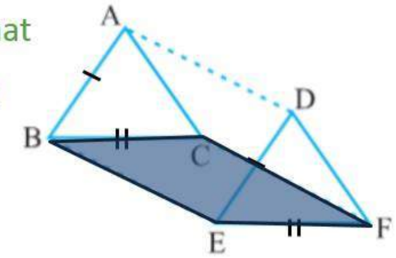
⇒ One pair of opposite sides are equal and parallel to each other

∴ ABED is a parallelogram

Hence proved

Ex 8.1, 11

In Δ ABC and Δ DEF, AB = DE, AB ∥ DE, BC = EF and BC ∥ EF.
Vertices A, B and C are joined to
vertices D, E and F respectively. Show that
(ii) quadrilateral BEFC is a parallelogram



Given that BC = EF and BC ∥ EF.

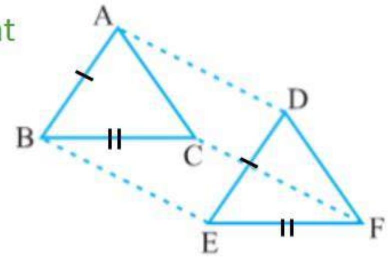
⇒One pair of opposite sides are equal and parallel to each other

∴ BEFC is a parallelogram

Hence proved

Ex 8.1, 11

In Δ ABC and Δ DEF, AB = DE, AB ∥ DE, BC = EF and BC ∥ EF.
Vertices A, B and C are joined to
vertices D, E and F respectively. Show that
(iii) AD ∥ CF and AD = CF



From part(i), *we proved that*

ABED is a parallelogram

So, AD = BE and AD ∥ BE (Opposite sides of parallelogram are equal and parallel) ...(1)

From part(ii) , *we proved that*

BEFC is a parallelogram

So, BE = CF and BE ∥ CF (Opposite sides of parallelogram are equal and parallel) ...(2)

Hence From (1) & (2)

∴ AD = CF and AD ∥ CF

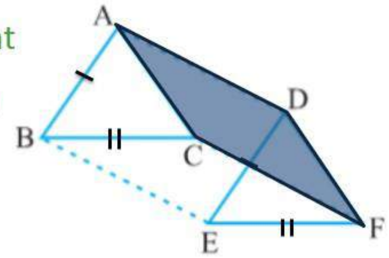
Ex 8.1, 11

In Δ ABC and Δ DEF, AB = DE, AB ∥ DE, BC = EF and BC ∥ EF.

Vertices A, B and C are joined to

vertices D, E and F respectively. Show that

(iv) quadrilateral ACFD is a parallelogram



In part (iii) we proved that

AD = CF and AD ∥ CF

⇒One pair of opposite sides are equal and parallel to each other

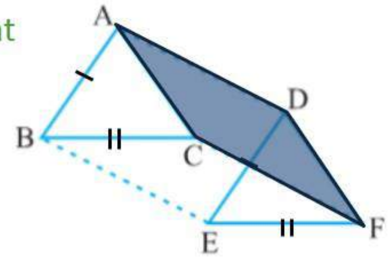
∴ ACFD is a parallelogram

Therefore, quadrilateral ACFD is a parallelogram.

Ex 8.1, 11

In Δ ABC and Δ DEF, AB = DE, AB || DE, BC = EF and BC || EF. Vertices A, B and C are joined to vertices D, E and F respectively. Show that

(v) AC = DF



From part(iv), ACFD is a parallelogram

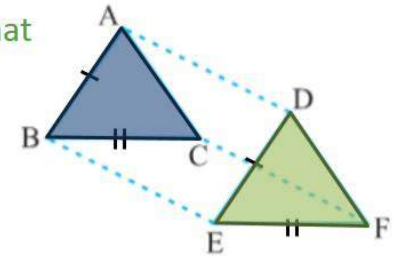
So, AC = DF (Opposite sides of parallelogram are equal)

Hence proved

Ex 8.1, 11

In Δ ABC and Δ DEF, AB = DE, AB ∥ DE, BC = EF and BC ∥ EF. Vertices A, B and C are joined to vertices D, E and F respectively .Show that

(vi) Δ ABC ≅ Δ DEF.



In ΔABC and ΔDEF,

AB = DE (Given)

BC = EF (Given)

AC = DF (Proved in part(v))

∴ ΔABC ≅ ΔDEF (SSS congruence rule)

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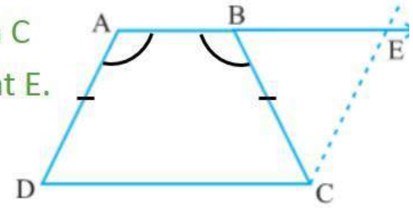
Ex 8.1, 12

ABCD is a trapezium in which AB ∥ CD and AD = BC . Show that

(i) ∠ A = ∠ B

[**Hint**: Extend AB and draw a line through C parallel to DA intersecting AB produced at E.



Given: ABCD is a trapezium where

AB ∥ CD and AD = BC

To prove: ∠A = ∠B

Construction: Extend AB and draw a line through C parallel to DA intersecting AB produced at E

Proof:

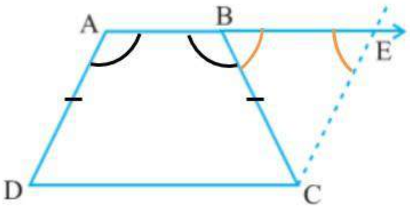
AD ∥ CE (From construction)

& AE ∥ DC (As AB ∥ DC, & AB is extended)

In AECD, both pair of opposite sides are parallel,

AECD is a parallelogram

∴ AD = CE (Opposite sides of parallelogram are equal)



But AD = BC (Given)

⇒ BC = CE

So, ∠CEB = ∠CBE (In Δ BCE, Angles opposite to equal sides are equal) ...(1)

For AD ∥ CE,

& AE is the transversal

∠A + ∠CEB = 180 ° *(Interior angle on same side of transversal is supplementary)*

∠A = 180° – ∠CEB ...(2)

Also AE is a line,

So, ∠B + ∠CBE = 180 ° *(Linear pair)*

∠B + ∠CEB = 180 ° *(From (1))*

∠B = 180° – ∠CEB ...(3)

From (2) & (3)

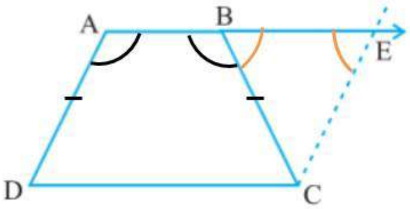
∠A = ∠B

Hence proved

Ex 8.1, 12

ABCD is a trapezium in which AB ∥ CD and AD = BC . Show that

(ii) $\angle C = \angle D$



For AB ∥ CD,

& AD is the transversal

$\angle A + \angle D = 180°$ *(Interior angle on same side of transversal is supplementary)*

$\angle D = 180° - \angle A$ ...(1)

For AB ∥ CD,

& BC is the transversal

$\angle B + \angle C = 180°$ *(Interior angle on same side of transversal is supplementary)*

$\angle C = 180° - \angle B$

$\angle C = 180° - \angle A$ (As $\angle A = \angle B$ proved in (i)) ...(2)

From (1) & (2)

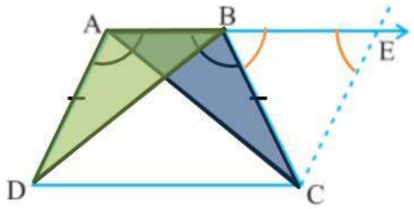
$\angle D = \angle C$

Hence proved

Ex 8.1, 12

ABCD is a trapezium in which AB || CD and AD = BC . Show that

(iii) Δ ABC $\cong$ Δ BAD



In ΔABC and ΔBAD,

AB = BA (Common)

∠B = ∠A (Proved in part(i))

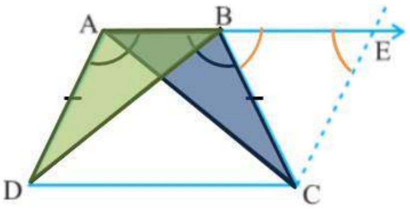
BC = AD (Given)

∴ ΔABC ≅ ΔBAD (SAS congruence rule)

Ex 8.1, 12

ABCD is a trapezium in which AB || CD and AD = BC . Show that

(iv) diagonal AC = diagonal BD



In the last part we proved

that ΔABC ≅ ΔBAD

∴ AC = BD (CPCT)

HOMEWORK ASSIGNMENT

Exercise 8.1

Question number 8,9,10

AHA

1.P is the midpoint of the side CD of a parallelogram ABCD .A line through C parallel to PA intersects AB at Q and DA produced at R .Prove that DA=AR and CQ=QR.

THANKING YOU

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