# 8.1

① $3x + 5x + 9x + 13x = 360°$ (ASP of Quadrilateral)

$\Rightarrow 30x = 360°$

$\Rightarrow x = \frac{360}{30}$ 12

$\Rightarrow x = 12$

$3x = 3 \times 12 = 36°$

$5x = 5 \times 12 = 60°$

$9x = 9 \times 12 = 108°$

$13x = 13 \times 12 = 156$

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Quadrilateral 8.1

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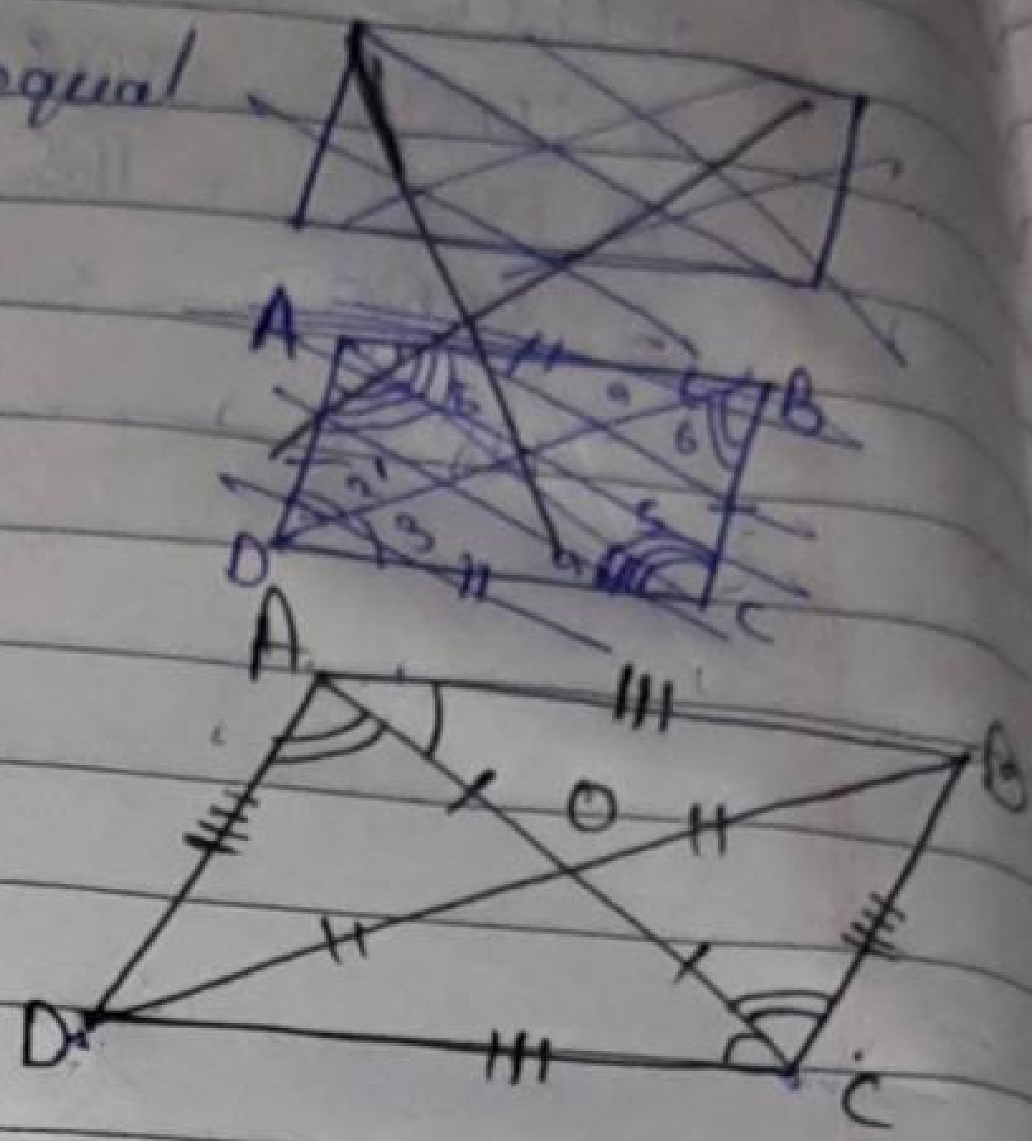
(2) Given:- Diagonals of llgm are equal

To prove:- AC = BD

Proof:- ABCD is a llgm,
∠DAC = ∠ACB (AIA)
∠CAB = ∠ACD (AIA)




In △ADC and △BCD,
DC = DC (Common side)
AD = BC (Given)
∴ △ADC ≅ △BDC (By SSS Congruence)

So, ∠ADC = ∠BCD (cpct) — (1)

Similarly,
In △ADB and △ABC,
AB = AB (Common side)
AD = BC (Given)
DB = AC (Diagonals are equal, Given)
∴ △ADB ≅ △ACB (By SSS congruence)

So, ∠DAB = ∠ABC (cpct) — (2)

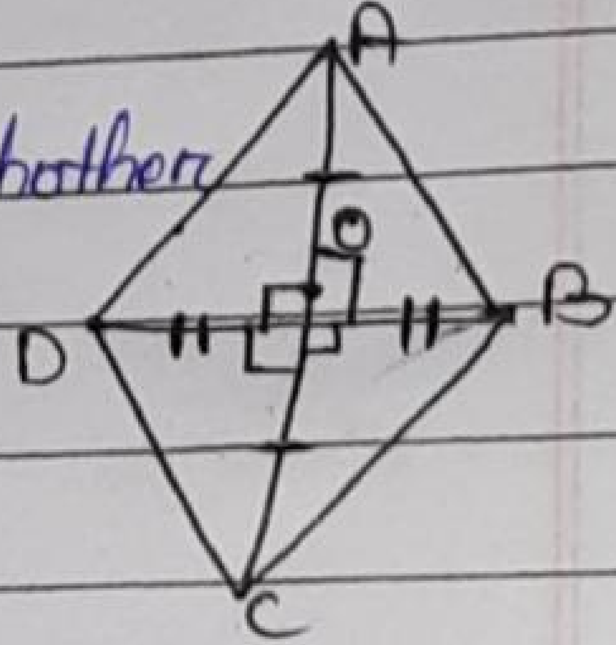
From (1) and (2),
∠ADC + ∠BCD = 180° [adjacent angles are supplementary in llgm]
~~∠DAB + ∠ABC = 180°~~
⇒ ∠ADC + ∠ADC = 180°
⇒ 2∠ADC = 180°
⇒ ∠ADC = 90°      ∴ ∠ADC = ∠BCD = 90°

(3)

From ②,
$\angle DAB + \angle ABC = 180°$
$\Rightarrow \angle DAB + \angle DAB = 180°$
$\Rightarrow 2\angle DAB = 180°$
$\Rightarrow \angle DAB = \frac{180°}{2}$

$\Rightarrow \angle DAB = 90°$
$\therefore \angle DAB = \angle ABC = 90°$
$\because$ So, ~~All angles~~ $\angle DAB = \angle ABC = \angle ADC = \angle BCD = 90°$
$\because$ Hence proved

③ Given:- ~~A quadrilateral~~ AC and DB bisect each other at 90°




To prove:- AB = BC = CD = DA

Proof:- In $\Delta$ AOB and $\Delta$ AOD,
AO = AO (Common side)
$\angle AOD = \angle AOB$ (90° each)
DO = OB (Given)
$\therefore \Delta AOB \cong \Delta AOD$ (by SAS Congruence)
AD = AB (cpct) — ①

In $\Delta$ AOD and $\Delta$ DOC,
AO = OC (Given)
$\angle AOD = \angle DOC$ (90° each)
OD = OD (Common side)
$\therefore \Delta AOD \cong COD$ (by SAS Congruence)
AD = DC (cpct) — ②
~~In $\Delta$ COB~~ In $\Delta$ AOB and BOC,
AO = OC (Given)
$\angle AOB = \angle COB$ (90° each)
OB = OB (Common side)
$\therefore \Delta AOB \cong \Delta$ ~~BOC~~ COB (by SAS Congruence)

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AB = BC (cpct) — (3)

From (1), (2) and (3)

AD = AB = BC = DC

So, ABCD is a Rhombus.

∴ Hence proved

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