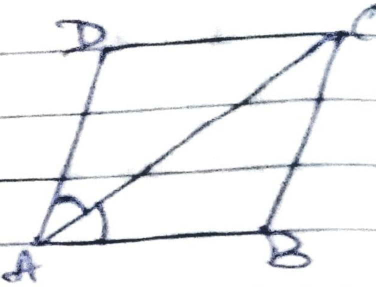
26.07.21 L-8 Quadrilateral

8.1



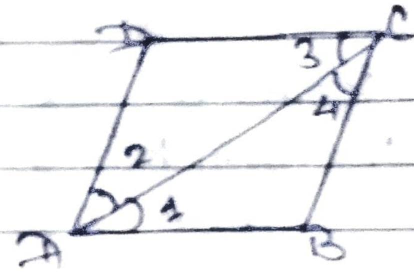

Given,

ABCD is a ||gm.
Diagonals AC bisects ∠A

⇒ ∠DAC = ∠BAC

Prove :- (i) it bisects ∠C also,
(ii) ABCD is a rhombus.

Construction :- →




Proof → (i) Since, ABCD is a ||gm

∵ AB || DC and AC is a transversal
∴ ∠1 = ∠3 ... ① [Alt. int. ∠s are equal]

∵ BC || AD and AC is a transversal
∴ ∠2 = ∠4 ... ② [Alt. int. ∠s are equal]

∠1 = ∠2 ... ③ [AC bisects ∠A]

From ①, ② & ③, we have

∠3 = ∠4

⇒ AC bisect ∠C.

(iii) In $\Delta ABC$, we have

$\angle 1 = \angle 4$ [from (2) and (3)]

$\Rightarrow BC = AB$ .... (4)

[$\because$ Sides opp. to equal ~~sides~~ $\angle s$ of a $\Delta$ are equal].

Similarly,

$AD = DC$ .... (5)

But, ABCD is a ||gm [given].

$\therefore AB = DC$ = (6)

From (4), (5) and (6) we have

$AB = BC = CD = DA$

Thus,

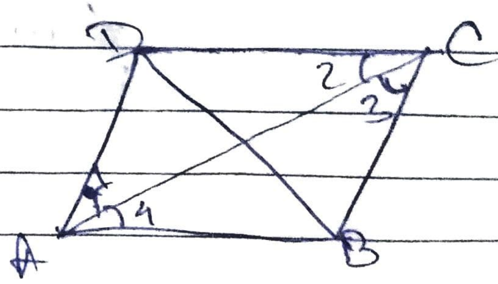
ABCD is a rhombus.

Ans Given,

ABCD is a rhombus.

$\Rightarrow AB = BC = CD = DA$

$AB \parallel CD$ & $AD \parallel BC$




Prove :- (i) The diagonal AC bisects $\angle A$ and $\angle C$

(ii) The diagonal BD bisects $\angle B$ and $\angle D$

Proof :- (i) $CD = AD \Rightarrow \angle 1 = \angle 2$ ... (1)

[Angles opp. to equal sides of a triangle are equal].

$AD \parallel BC$ and $AC$ is the transversal.

[$\because$ Every rhombus is a ||gm]

$\Rightarrow \angle 1 = \angle 3$ — (2) [Alt. int. $\angle$s are equal].

From (1) and (2), we have,

$\angle 2 = \angle 3$ ... (3)

$\because$ Since, $AB \parallel DC$ and $AC$ is transversal

$\therefore \angle 2 = \angle 4$ ... (4)

[$\because$ Alt int $\angle$s are equal] (2)

From (1) and (4), we have.

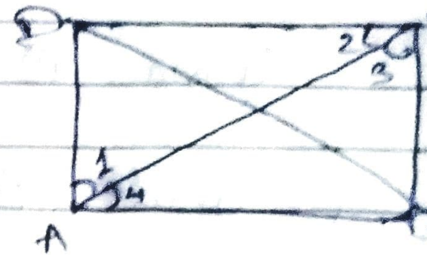
$\angle 1 = \angle 4$

$\therefore AC$ bisects $\angle C$ as well as $\angle A$.

Similarly, we can prove that BD bisects $\angle B$ as well as $\angle D$.

Ans. Given,

ABCD is a rectangle.
AC bisects ∠A and ∠C.




Prove :- (i) ABCD is a Square
(ii) diagonal BD bisects ∠B as well as ∠D

Proof :- We have a rectangle ABCD
such that AC bisects ∠A & ∠C.
i.e ∠1 = ∠4 and ∠2 = ∠3 — ①

(i) Since, every rectangle is a ||gm.
∴ ABCD is a ||gm.

⇒ AB || CD and AC is a transversal.
∴ ~~∠2 and~~ ∠2 = ∠4 — ②
[Alt. int ∠s are equal]

From ① and ②, we have
∠3 and ∠4.

In △ABC, ∠3 = ∠4
⇒ AB = BC [∵ sides opp. to equal angles of △ are equal].

Similarly, CD = DA.
So, ABCD is a rectangle having adjacent sides equal. ⇒ ABCD is a Square

(ii) Since, ABCD is a Square and diagonals of a square bisect the opp. ∠s. ∴ So, BD bisects ∠B as well as ∠D.