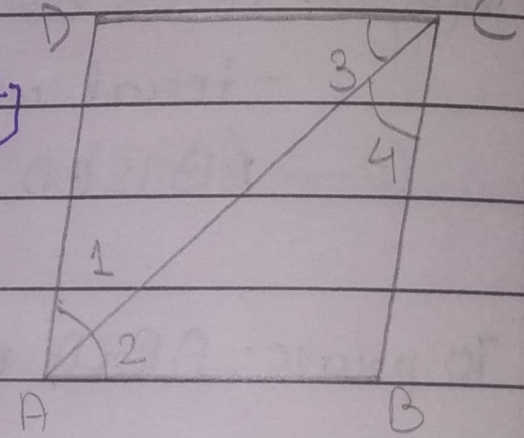
Exercise 8.1

6. Given: Parallelogram ABCD where $\angle 1 = \angle 2$ —(1)



To prove: AC bisects $\angle C$

i.e. $\angle 3 = \angle 4$

Proof: $\angle 1 = \angle 2$ (Given)

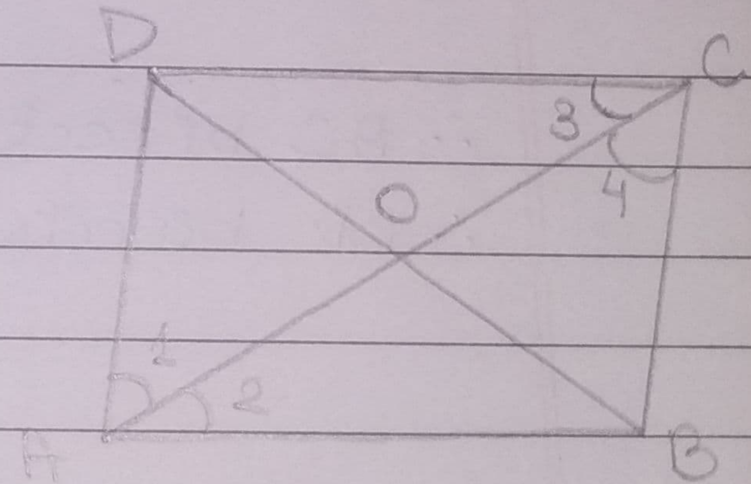
$\angle 1 = \angle 4$ (Alternate exterior angles)

$\angle 2 = \angle 3$ (Alternate interior angles)

$\angle 4 = \angle 3$

$\therefore$ AD bisects $\angle C$.

7. Geven : Rhombus ABCD



To prove: i) AC besects $\angle A$,

i.e. $\angle 1 = \angle 2$ &

$\angle 3 = \angle 4$

ii) BD besects $\angle B$

as well as $\angle D$

Proof: $AB = BC = CD = DA$ [ABCD is a rhombus]

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

$CD = AD \Rightarrow \angle 1 = \angle 2$ — (1) [Angles opposite to equal sides of a triangle are equal]

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

$\Rightarrow \angle 1 = \angle 3$ — (2) [Alternate interior angles are equal]

From (1) & (2), we have

$\angle 2 = \angle 3$ — (3)

$\angle 2 = \angle 4$ — (4) [Alternate interior angles are equal]

From $\angle 1$ & $\angle 4$, we have

$\angle 1 = \angle 4$

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

$\therefore$ BD bisects $\angle B$ as well as $\angle D$

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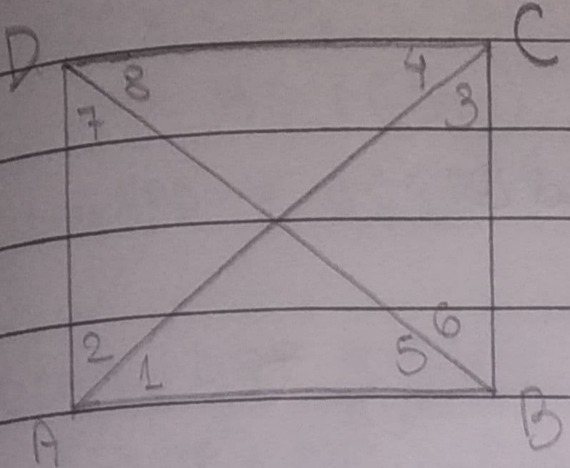

Given :- ABCD is a rectangle such that AC bisects $\angle A$ and $\angle C$.

To prove: (i) ABCD is a square

(ii) Diagonal BD bisects $\angle B$ as well as $\angle D$

Proof: In Δ ABC and ΔADC, we have

$\angle 1 = \angle 2$ (given)

$AC = AC$ (common)

$\angle 3 = \angle 4$ (given)

$\therefore ABC \cong \Delta ADC$ (ASA congruency)

$\therefore AB = AD$ and $BC = DC$ (CPCT)

In rectangle ABCD,

$AB = BC = CD = DA$

$\therefore$ ABCD is a square

In ΔABD and ΔCBD

$AB = CB$

$AD = CD$

$BD = BD$

$\therefore \Delta ABD \cong \Delta CBD$ (SSS Congruency)

$\angle 5 = \angle 6$ (CPCT)

$\angle 7 = \angle 8$

$\Rightarrow$ BD bisects $\angle B$ and $\angle D$