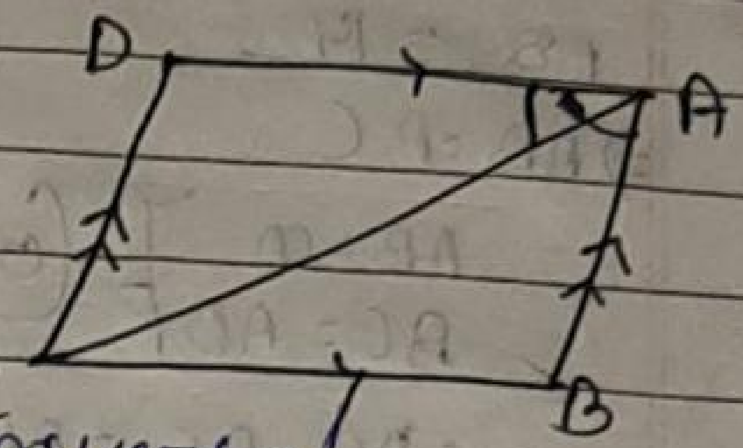
⑥ i) Given - AC bisect $\angle A$

To prove - AC bisects $\angle C$
$\angle DCA = \angle ACB$



In ABCD ∥gm,
DA ∥ CB and AC is the transversal.
$\angle DAC = \angle ACB$ (AIA)
$\angle BAC = \angle DCA$ (AIA)

$\angle DAC + \angle BAC = \angle DCA + \angle ACB$
$\Rightarrow \angle A = \angle C$

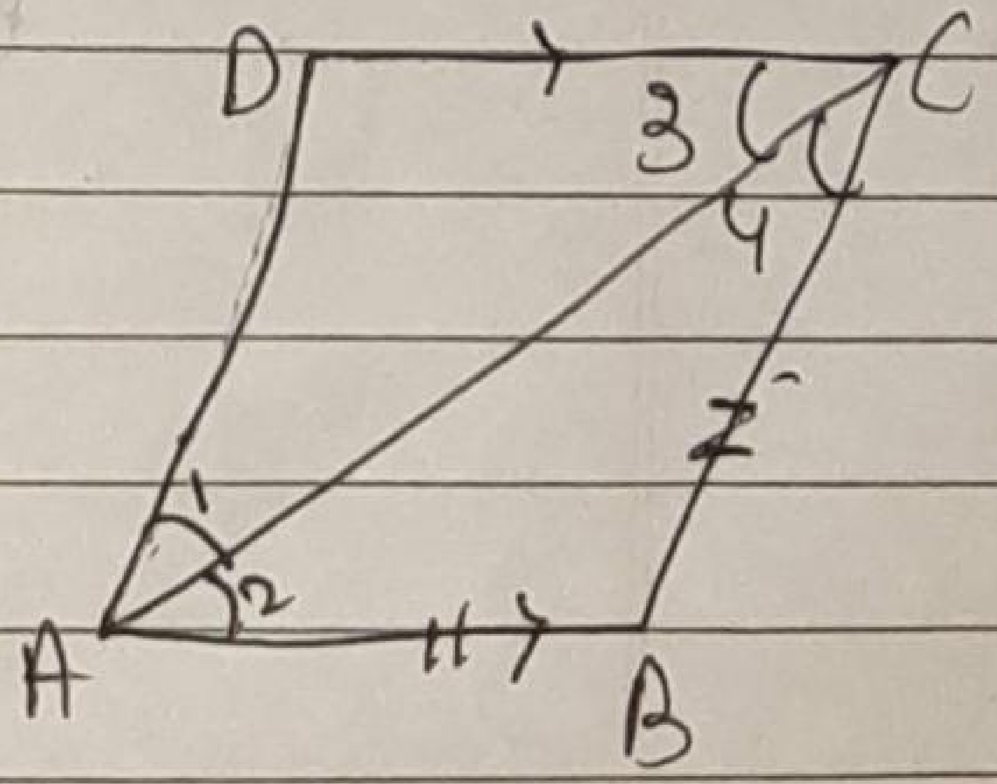
∴ ~~When~~ If $\angle DAC + \angle BAC = \angle DCA + \angle ACB$ and they form $\angle A = \angle C$, then AC bisects $\angle A$ into $\angle DAC$ and $\angle BAC$ & $\angle C$ into $\angle DCA + \angle ACB$

∴ Hence proved.

ii) Given:- AC bisects $\angle A$

To prove:- ABCD is a rhombus

Proof:- $\angle A = \angle C$ (opp. $\angle$s of a ∥gm are =)
$\angle 1 = \angle 2$ —① (AC Bisect $\angle A$)



$\left.\begin{array}{l}\angle 1 = \angle 4 \\ \angle 2 = \angle 3\end{array}\right]$ (alt int. $\angle$s are =)

$\angle 3 = \angle 4$

So AC bisects $\angle C$
$\angle 1 = \angle 2 = \angle 3 = \angle 4$

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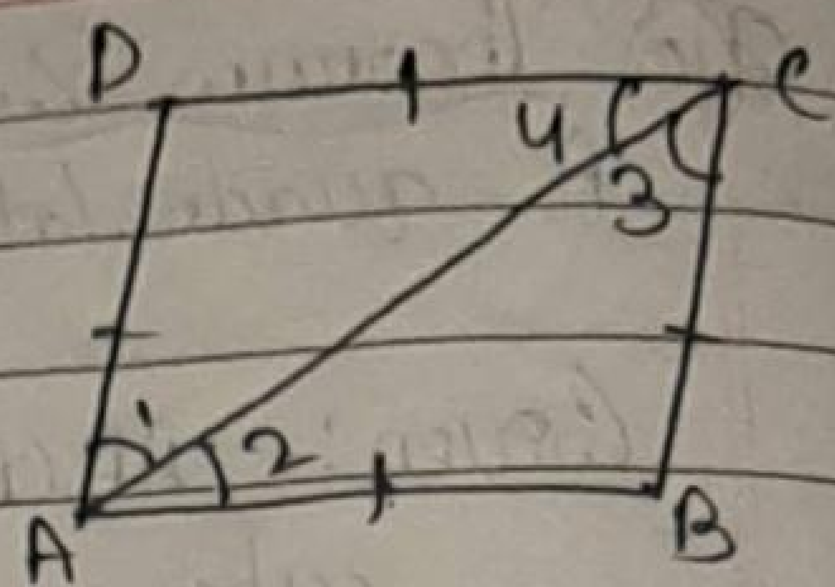
8.1



(7) Given :- ABCD is a Rhombus

To prove :- AC Bisects $\angle A$ and $\angle C$

Prove :- In $\triangle ABC$,

AB = BC. (Sides of Rhombus equal)

$\Rightarrow \angle 2 = \angle 3$ — (i)

Similarly, In $\triangle ADC$,

AD = DC

$\angle 1 = \angle 4$ — (ii)

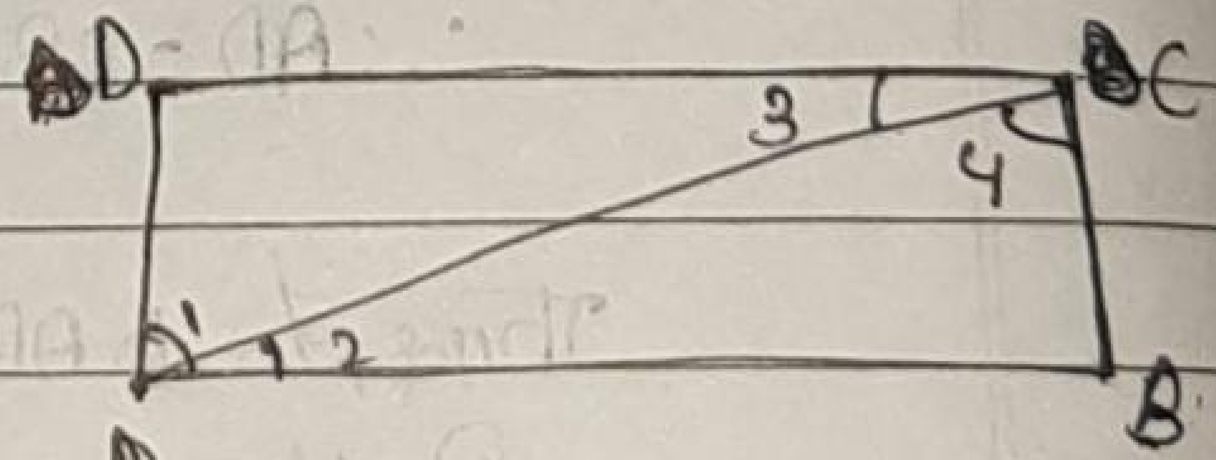
AB ∥ DC,

$\angle 2 = \angle 4$ and $\angle 1 = \angle 3$ — (alt int angles)

$\angle 1 = \angle 2 = \angle 3 = \angle 4$

$\therefore \angle 1 = \angle 2$ (AC bisects $\angle A$)

$\angle 3 = \angle 4$ (AC bisects $\angle C$)



(8) Given - ABCD is a ▭

To prove - ABCD is a sq.

Proof :- $\angle A = \angle C = 90°$

$\Rightarrow \frac{\angle A}{2} = \frac{\angle C}{2} = 45°$

$\Rightarrow \angle 1 = \angle 2 = \angle 3 = \angle 4 = 45°$

In $\triangle ABC$

$\angle 2 = \angle 4$

$\Rightarrow$ AB = BC (opp sides of equal $\angle$s of a $\triangle$ are =)

AB = CD] (opp sides of rect. are equal)
BC = AD]

So, ABCD is a sq &

(8) (ii) Diagonals of a sq bisect the opp angles.

So, BD bisects ∠B as well as ∠D.