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CLASS – 9

MATHEMATICS

Chapter – 8

Quadrilaterals

Part - 8

Exercise 8.1 (Question 3 - 4)

Vikas Saini

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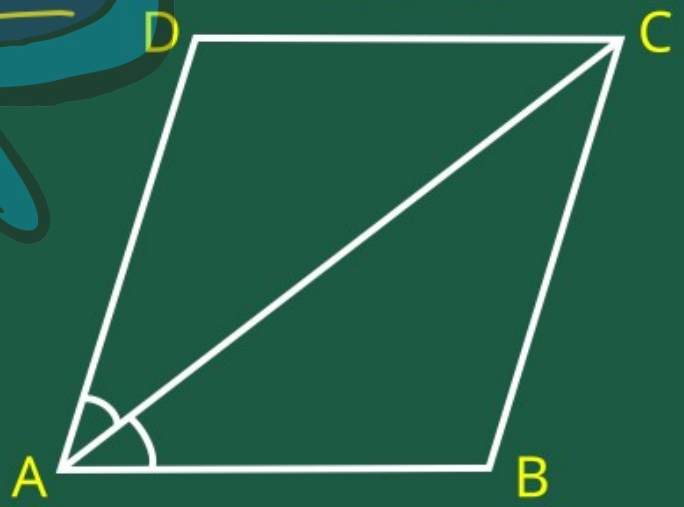
3. Diagonal AC of a parallelogram ABCD bisects ∠A (see Fig). Show that

(i) AC bisects ∠C also,

(ii) ABCD is a rhombus.



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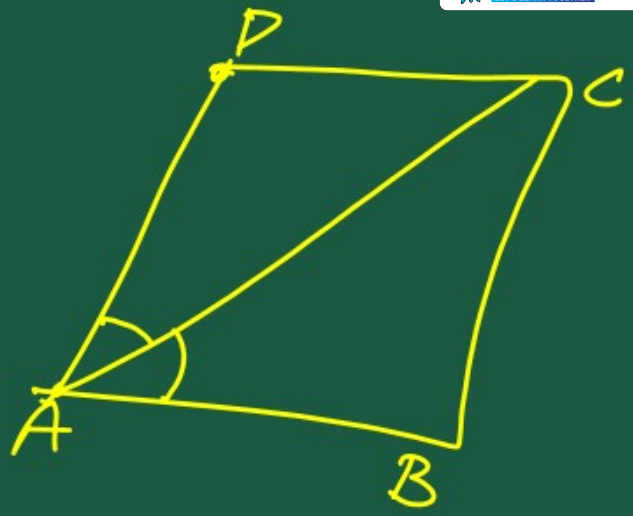
Given :→ ABCD is ||gm

where AC is dragonal

which bisects ∠A.

$\angle DAC = \angle BAC = \frac{\angle A}{2}$



To prove :→ AC bisects ∠C also

ABCD is Rhombus

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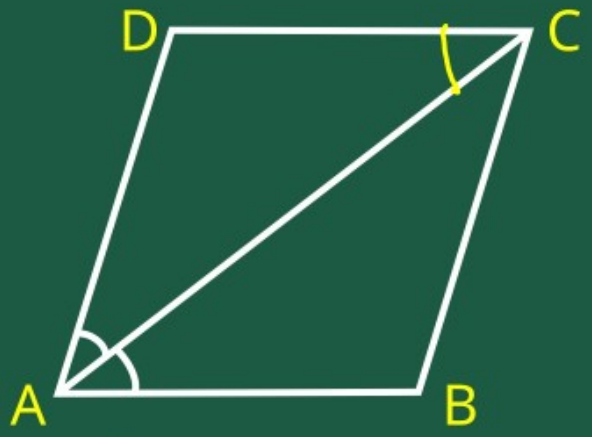
Soln's:

(i) AC bisects $\angle C$

Since $AB \parallel CD$ [$\because$ ABCD is llgm (Given)]

AC is transversal

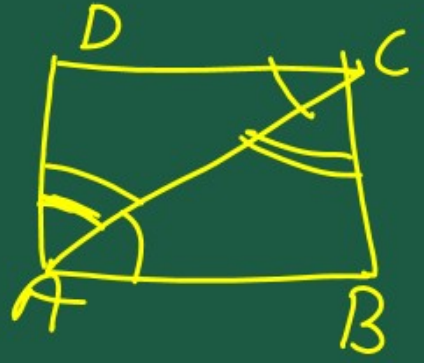
$\angle DCA = \angle BAC$ [A.I.A] — (a)



llly $AD \parallel BC$

AC is transversal

$\angle DAC = \angle BCA$ [A.I.A] — (b)



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Since,

$\angle DAC = \angle BAC = \frac{\angle A}{2}$

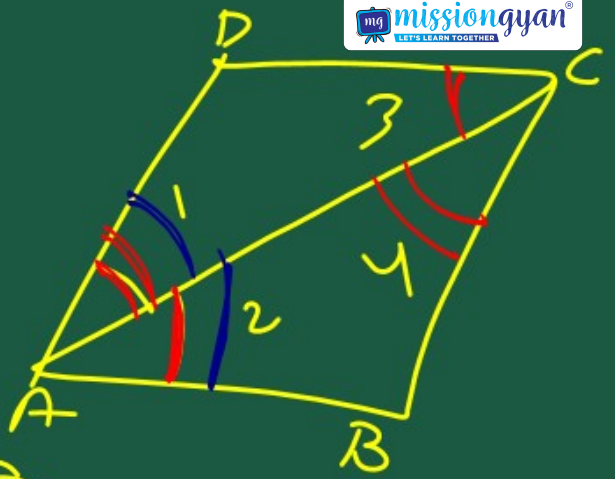
[Given].

from eq (a) & (b) & (c) — (c)

$\angle DCA = \angle BAC = \angle DAC = \angle BCA$

$\therefore \angle DCA = \angle BCA$

AC bisects $\angle C$ as well



$\angle DCA = \angle BAC$

$\angle DAC = \angle BCA$

$\angle 1 = \angle 2$

$\angle 1 = \angle 4$

$\angle 2 = 3$

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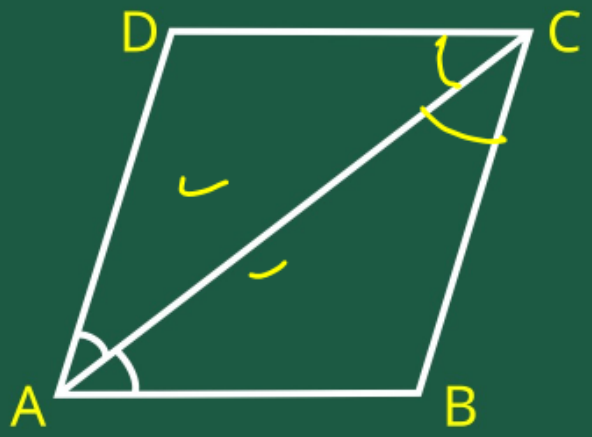
(ii) ABCD is a rhombus.

Since we know that
if in a parallelogram
All sides are equal
then it is Rhombus.



Now,
In $\triangle ABC$
$\angle BAC = \angle BCA$ [Proved above]

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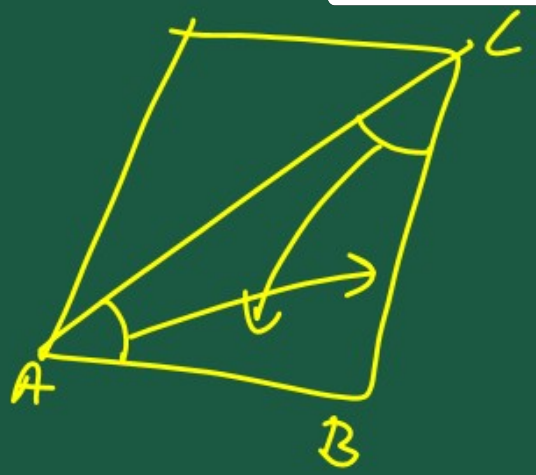
Since, In ΔABC

$\angle BAC = \angle BCA$

[Opp sides are also equal if opp. angles are equal in Δ.]

$BC = AB$ ——— eq (a)



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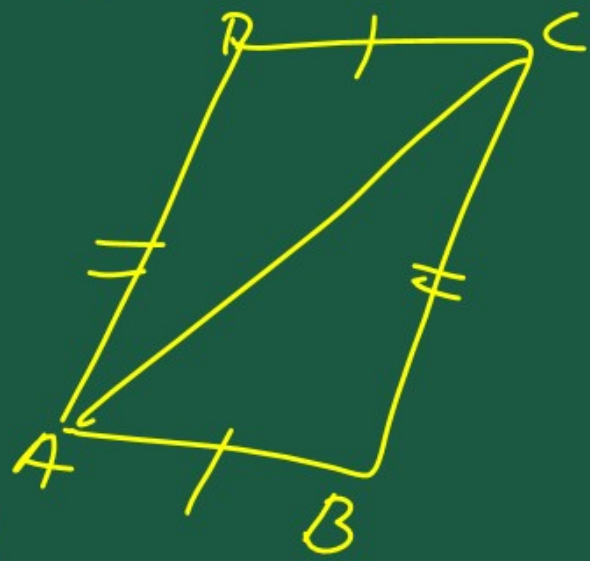
Since ABCD is ||gm [Given]

$\therefore$ $AB = CD$

$AD = BC$

& from eq (i)

$AD = BC = AB = CD$



Since All sides of ||gm are equal

$\therefore$ ABCD is Rhombus.

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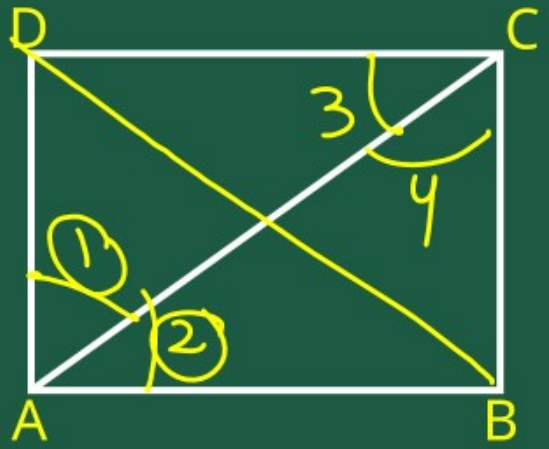
4. ABCD is a rectangle in which diagonal AC bisects ∠A as well as ∠C. Show that:

(i) ABCD is a square

(ii) diagonal BD bisects ∠B as well as ∠D.

∠1 = ∠2

∠3 = ∠4



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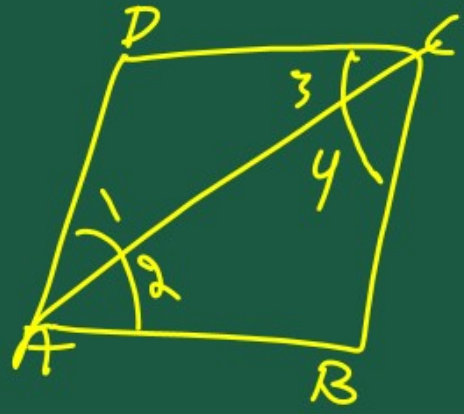
Given :- ABCD is Rectangle



$AB = CD$

$AD = BC$

$\angle A = \angle B = \angle C = \angle D = 90^\circ$

∴ AC is diagonal of Rect. ABCD which bisects $\angle A$ as well as $\angle C$

$\angle 1 = \angle 2$

$\angle 3 = \angle 4$

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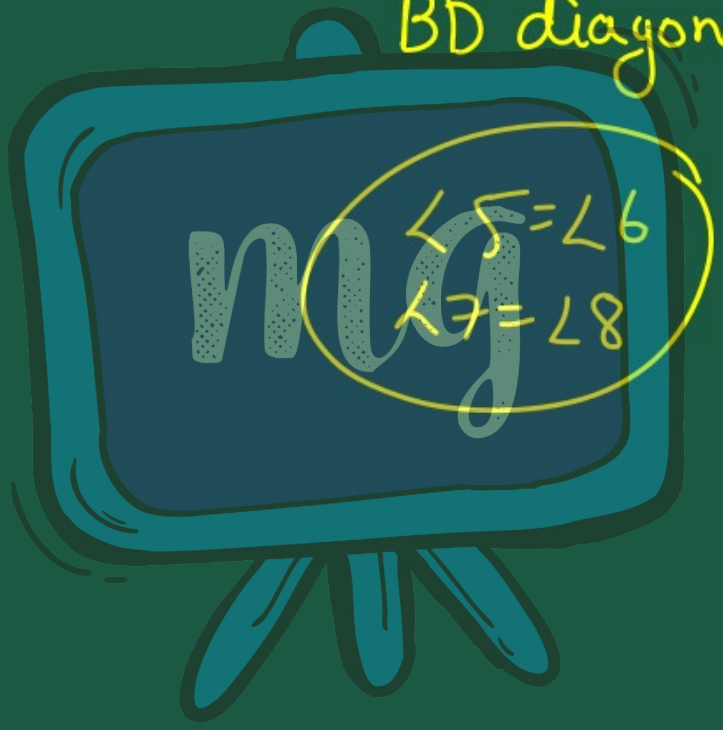
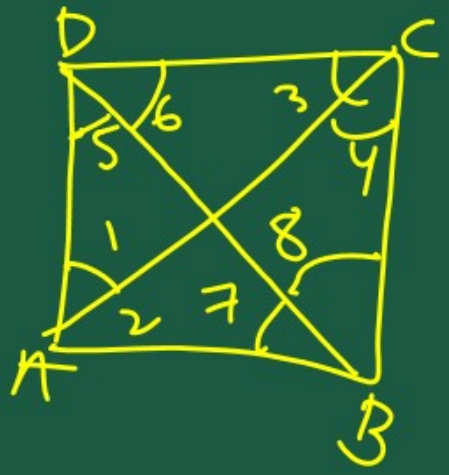
To prove :→ ABCD is Square

BD diagonal also bisects ∠B as well as ∠D





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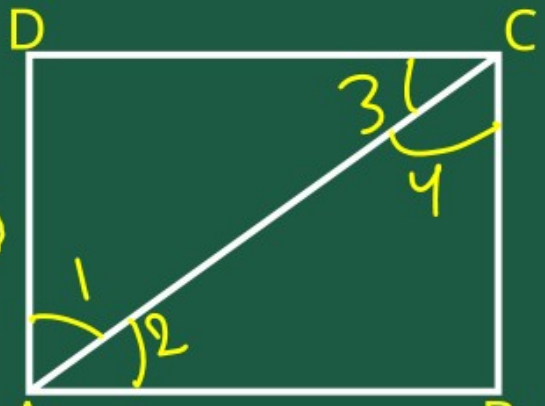
(i) ABCD is a square

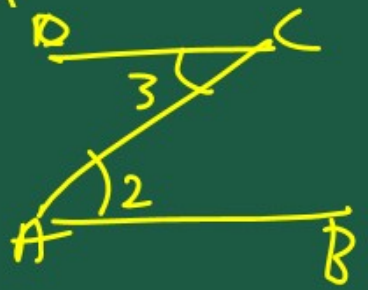
So, ABCD is Rectangle [Given]

& AB || CD

AC is transversal

$\angle 2 = \angle 3$ [A-I-A]





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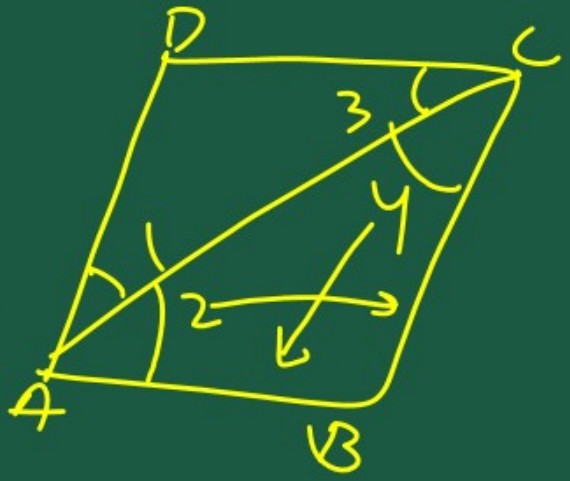
Since $\angle 1 = \angle 2$ $\angle 3 = \angle 4$ [Given]



& $\angle 2 = \angle 3$ [Proved above]

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

Now In $\triangle ABC$

$\angle 2 = \angle 4$ [Proved above]

$BC = AB$ [Opp angles are equal then sides opp to them are also equal]

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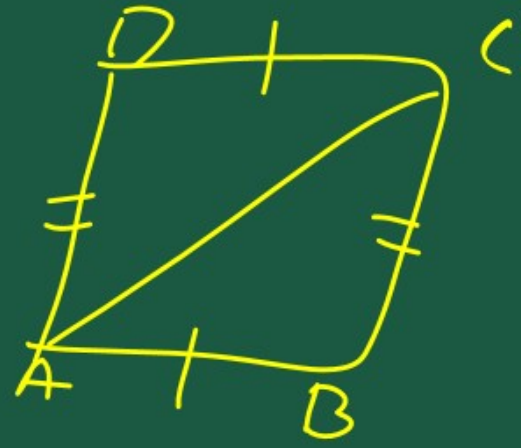
Now ABLD is Rect

$AB = CD$

$AD = BC$



& $AB = BC$ [Proved above]

$AD = BC = AB = CD$

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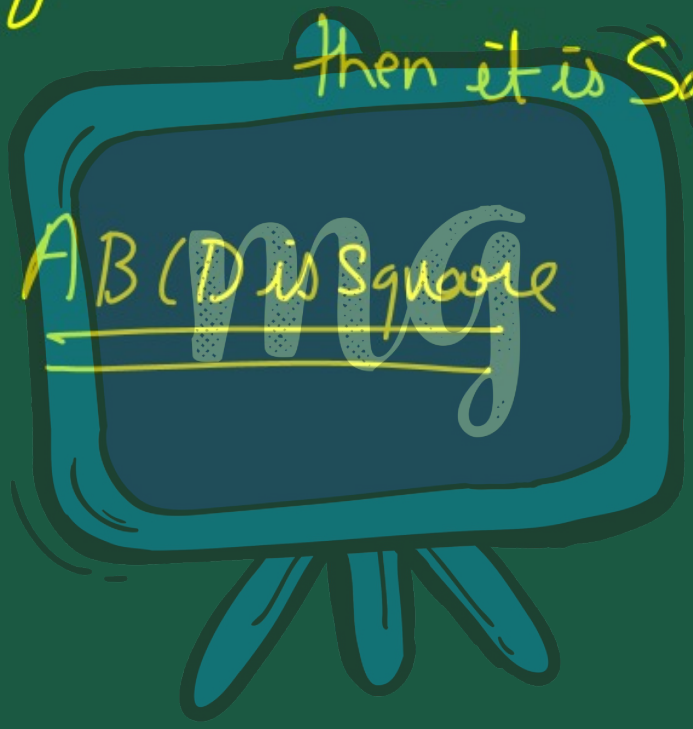
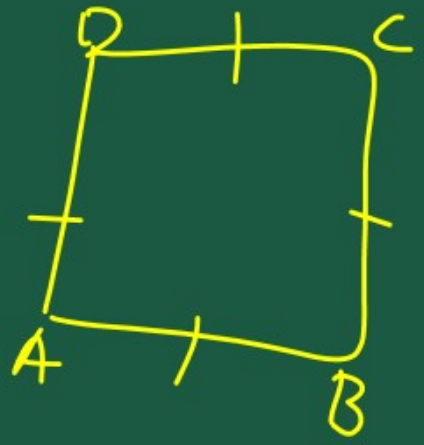
if all sides of a Rectangle equal

then it is Square





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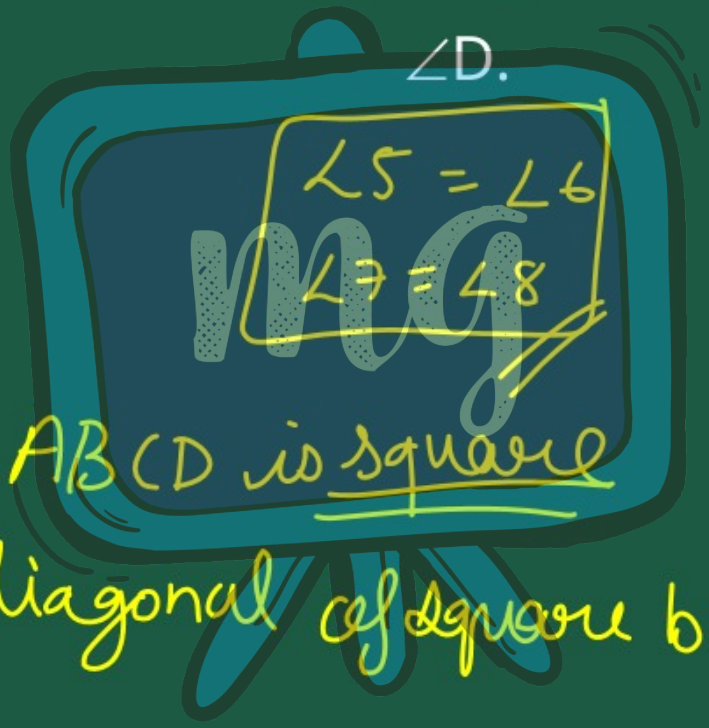
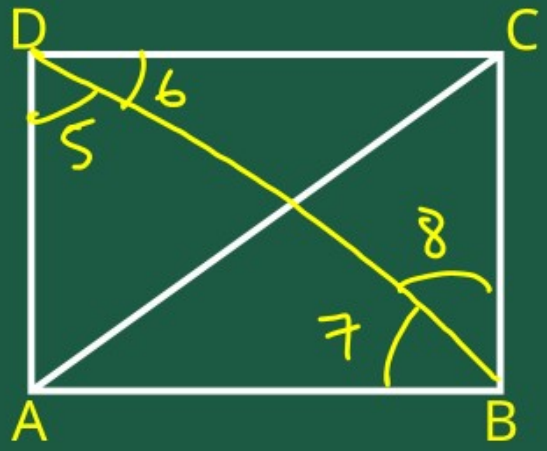
(ii) diagonal BD bisects ∠B as well as ∠D.





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