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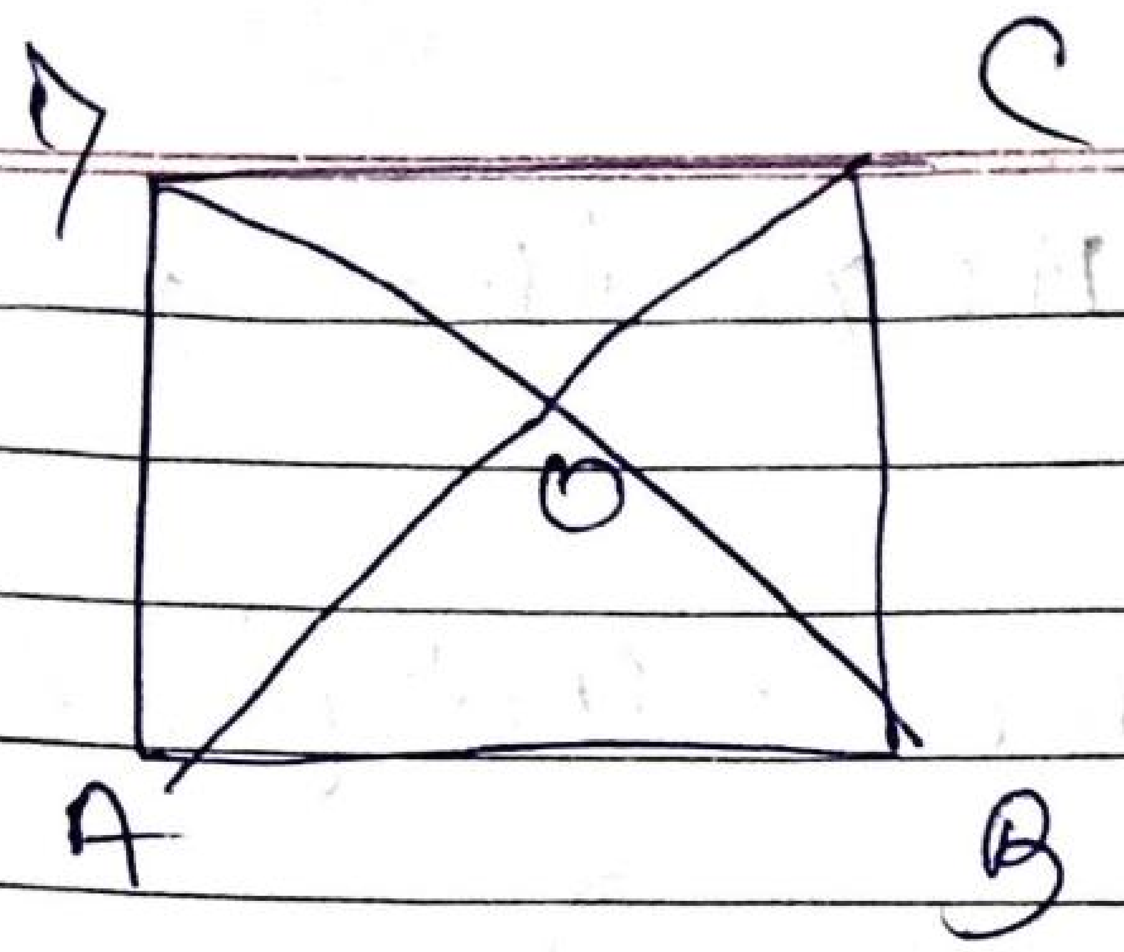
(4) 

Ans) ABCD is a square in which AC & BD are diagonals.

To prove AC = BD & AC bisects BD at right angle AC⊥BD, AO = OC & OB = OD

AB = AB (common)
BC = AD [Side of a square]
∠ABC = ∠BAD [angles of a square]

ΔABC ≅ ΔBAD (SAS)

AC = BD (C.P.C.T)

Now In ΔAOB & ΔCOD

∠AOB = ∠COD (V.O.A)
AB = CD (Side)
∠OAB = ∠OCD (Alternate angles)

ΔAOB ≅ ΔCOD : (ASA)

∠AO = ∠OC

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Similarly by taking ΔAOD & ΔBOC we can show that $OB = OD$

In ΔABC, $\angle BAC + \angle BAC = 90^\circ$ [$\because \angle B = 90^\circ$

$\Rightarrow 2\angle BAC = 90^\circ$ ($\angle BAC = \angle BCA$)

$\Rightarrow \angle BAC = \frac{\cancel{90}\ 45^\circ}{\cancel{2}}$

$\Rightarrow \angle BCA = 45^\circ$ or $\angle BCO = 45^\circ$

Similarly $\angle CBO = 45^\circ$

In ΔBCO

$\Rightarrow \angle BCO + \angle CBO + \angle BOC = 180^\circ$

$\Rightarrow 90^\circ + \angle BOC = 180^\circ$

$\Rightarrow \angle BOC = 90^\circ$

$\Rightarrow BO \perp OC \Rightarrow BO \perp AC$

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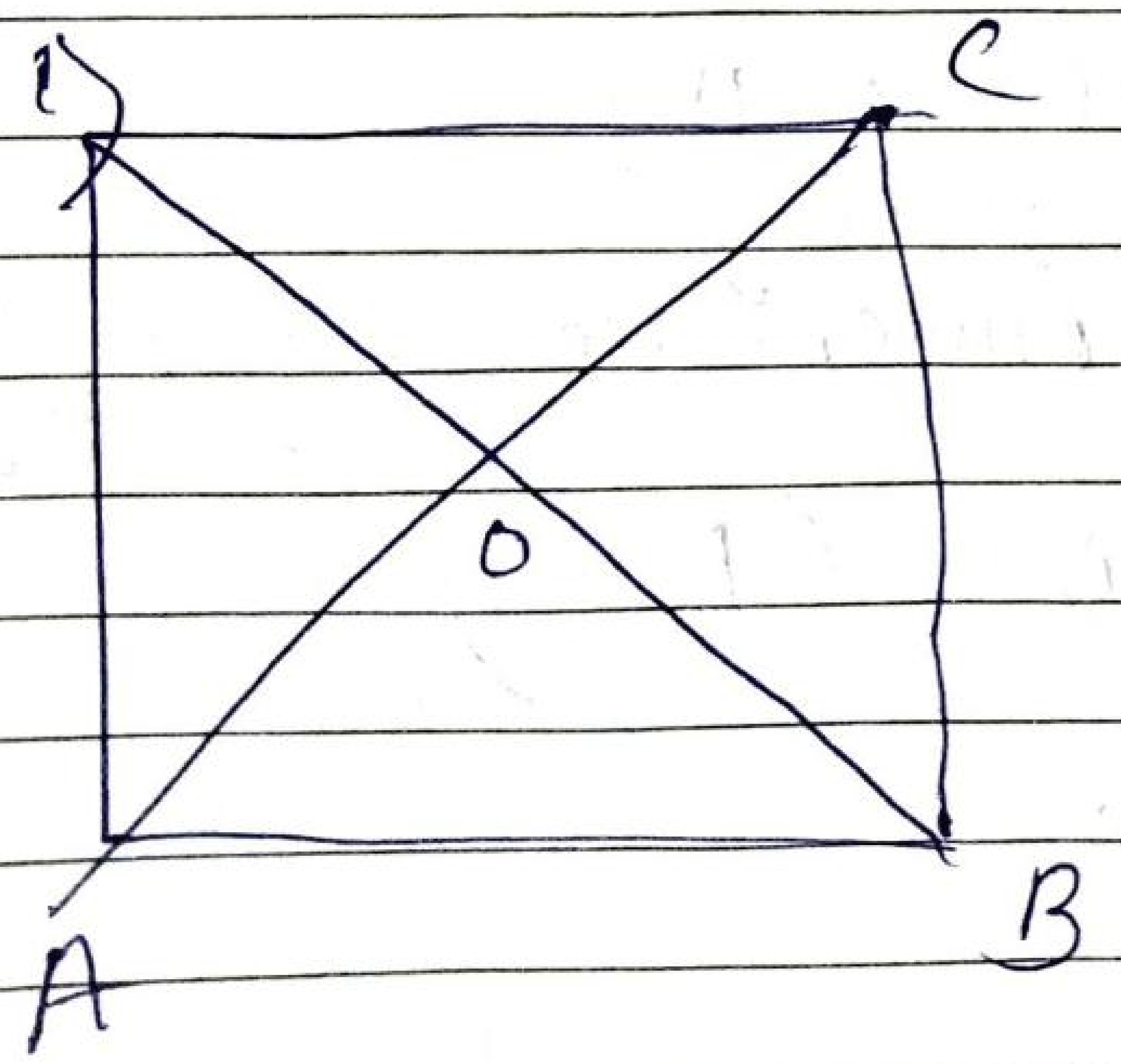

Since ABCD is a quadrilateral whose diagonals bisect each other, so it is a parallelogram

$AB = BC = CD = DA$ [sides of a rhombus]

In ΔABC & ΔBAD, we have

$AB = AB$ (common)

$BC = AD$ (sides of a rhombus]

$AC = BD$ [Given)

$\Delta ABC \cong \Delta BAD$ [S.S.S]

$\angle ABC = \angle BAD$ [C.P.C.T]

But, $\angle ABC + \angle BAD = 180^\circ$

$\angle ABC = \angle BAD = 90^\circ$

$\angle A = \angle B = \angle C = \angle D = 90^\circ$ (opposite angles)

$\therefore$ ABCD is a rhombus & square (proved)