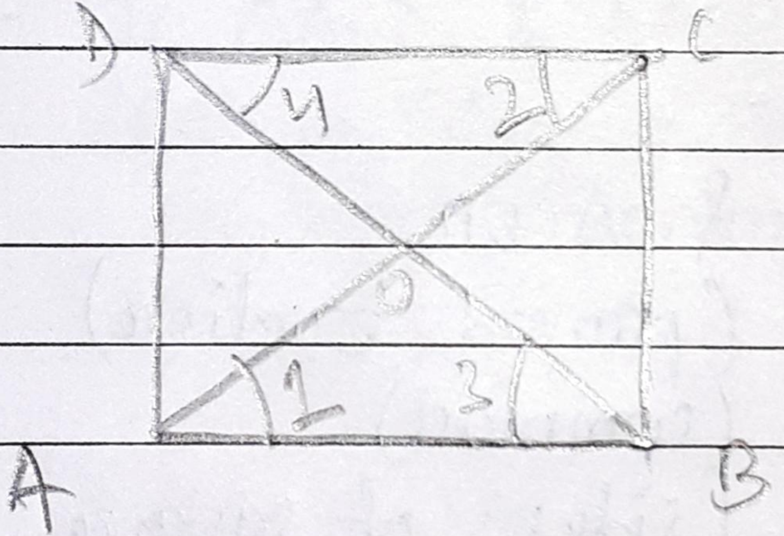
H.W
22.7.21

Ex. 8.1

4. Ans.



Given :- ABCD is a square
AC & DB are diagonals

To Prove :- i. $AC = BD$
ii. $OA = OC$
iii. $OB = OD$
iv. $\angle AOB = \angle BOC = \angle COD = \angle DOA = 90^\circ$

Proof :- In ΔDAB & ΔCBA
$\angle DAB = \angle CBA = 90^\circ$
$AD = BC$ (sides of square are equal)
$AB = AB$ (common)

$\therefore \Delta DAB \cong \Delta CBA$ (SAS)
i. $AC = BD$ (CPCT)

In ΔAOB & ΔCOD
$\angle 1 = \angle 2$
$\angle 3 = \angle 4$ {alternate angles}
$AB = CD$ (sides are equal)

$\therefore \Delta AOB \cong \Delta COD$ (ASA)
iii. $OA = OC$
iv. $OB = OD$ [CPCT]

In ΔAOB & ΔCOB
$OA = OC$ (proved earlier)
$OB = OB$ (common)
$AB = CB$ (sides of square are equal)

$\therefore \Delta AOB \cong \Delta COB$ (SSS)

~~In ΔAOB & ΔCOB~~

$\angle AOB = \angle BOC$ (CPCT)

$\angle AOB + \angle BOC = 180^\circ$ (Linear pair)

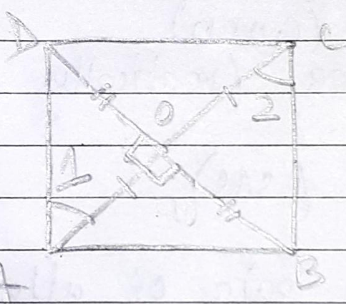
$\Rightarrow \angle AOB = \angle BOC = \frac{180^\circ}{2} = 90^\circ$ —— (i)

$\Rightarrow \angle COD = \angle DOA = 90^\circ$ (similarily) —— (ii)

From (i) & (ii)

$\therefore \angle AOB = \angle BOC = \angle COD = \angle DOA = 90^\circ$

5. Ans-



Given :- ABCD is quadrilaterals
AC & BD are diagonals, $AO = CO$, $OD = OB$

To prove :- ABCD is square

Proof :- In ΔAOD & ΔAOB

$\angle AOD = \angle AOB = 90^\circ$

$AO = AO$ (common)

$OD = OB$ (O is midpoint BD)

$\therefore \Delta AOD \cong \Delta AOB$ (SAS)

$AD = AB$ (CPCT) —— (i)

Similarily,
AB = BC —— (ii.)
BC = CD —— (iii.)
CD = DA —— (iv.)

From i., ii., iii., iv.
AB = BC = CD = DA
∴ Quadrilateral ABCD have all sides equal.

In ΔAOD & ΔCOB
AO = CO (Given)
OD = OB (Given)
$\angle AOD = \angle COB$ (vertically opposite angles)

∴ $\Delta AOD \cong \Delta COB$ (SAS)
$\angle 1 = \angle 2$ (CPCT)
But they form a pair of alternate angles.
∴ AD ∥ BC
similarily, AB ∥ DC
∴ ABCD is ∥gm.
∴ ∥gm having all its sides equal is a rhombus.
∴ ABCD is a rhombus.

In ΔABC & ΔBAD
AC = BD (Given)
BC = AD (proved)
AB = BA (common)

∴ $\Delta ABC \cong \Delta BAD$ (SSS)
$\angle ABC = \angle BAD$ (CPCT) —— (v.)

Since, AD || BC & AB is transversal

$\therefore \angle ABC + \angle BAD = 180^\circ$ —— (vi.) (cointerior angles)

$\Rightarrow \angle ABC = \angle BAD = \frac{180^\circ}{2} = 90^\circ$ (by v, vi.)

$\therefore$ Rhombus ABCD is having one angle 90°.

$\therefore$ ABCD is a square.