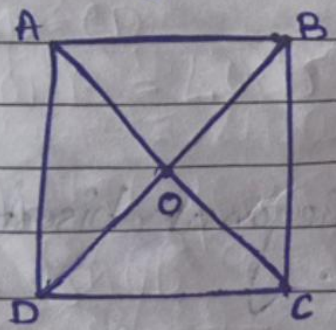
(4) Show that the diagonals of a squared are equal and bisect each other at right angles.

→



Let ABCD be a square.

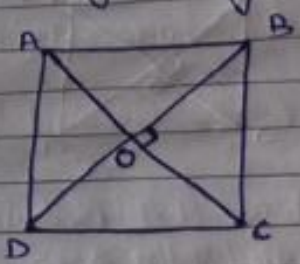
It Diagonals AC and BD intersects each other at O.

AC = BD
AO = OC
∠AOB = 90°

In ΔABC and ΔBAD,
AB = BA
∠ABC = ∠BAD = 90°
given,
BC = AD
ΔABC is not equal to ΔBAD
Thus,
AC = BD
Diagonals are equal.
In ΔAOB and ΔCOD,
∠BAO = ∠DCO
∠AOB = ∠COD
AB = CD
ΔAOB is not equal to ΔCOD
AO = CO
In ΔAOB and ΔCOB,
OB = OB (given)
AO = CO
AB = CB (sides of square)
∠AOB = ∠COB
Linear pair,
∠AOB + ∠COB = 180°
∠AOB = ∠COB = 90°

So, Diagonals bisect each other at right angles.

(5) Show that if the diagonals of a quadrilateral are equal and bisect each other at right angles, then it is a square.



Let ABCD ~~was a~~ is a quadrilateral and it's diagonals biesects each other at right angle at O.

To prove, The quadrilateral ABCD is a square.

proof,

In ΔAOB and ΔCOD,

$AO = CO$

$\angle AOB = \angle COD$

$OB = OD$

ΔAOB is not equal to ΔCOD

(i) $AB = CD$

$\angle OAB = \angle OCD$

AB is parallel to CD $\Rightarrow$ $AB \parallel CD$

In ΔAOD and ΔCOD

$AO = CO$

$\angle AOD = \angle COD$ (vertically opposite)

$OD = OD$

$\Delta AOD \cong \Delta COD$

$\therefore AD = CD$

$AD = BC$ and $AD = CD$

$AD = BC = CD = AB$

$\angle ADC = \angle BCD$

$\angle ADC + \angle BCD = 180°$

$\angle ADC = 90°$

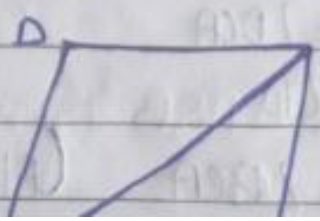
one of the interior angles is right angle.

ABCD quadrilateral is a square. (Hence proved.)

(6) Diagonal AC of a parallelogram ABCD bisects $\angle A$ (see fig. 8.19) show that:

(i) it bisects $\angle C$ also,

(ii) ABCD is a rhombus.



(Fig. 8.19)