8.Quadrilaterals

Ex-8.1(solved exercise) Part-1

By:- Ashish Jha

Q1.The angles of quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral.

Solution: Let the angles of the quadrilateral be 3x, 5x, 9x and 13x.

∴ 3x + 5x + 9x + 13x = 360°

[Angle sum property of a quadrilateral]

⇒ 30x = 360°

⇒ x =360/30

= 12°

∴ 3x = 3 x 12° = 36°

5x = 5 x 12° = 60°

9x = 9 x 12° = 108°

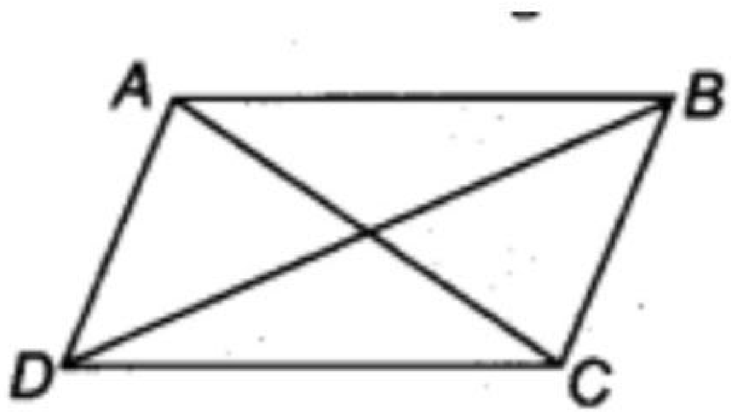
13a = 13 x 12° = 156°

⇒ The required angles of the quadrilateral are 36°, 60°, 108° and 156°.

Q 2.If the diagonals of a parallelogram are equal, then show that it is a rectangle.

Solution:

Let ABCD is a parallelogram such that AC = BD.



In ∆ABC and ∆DCB,

AC = DB [Given]

AB = DC [Opposite sides of a parallelogram]

BC = CB [Common]

∴ ∆ABC ≅ ∆DCB [By SSS congruency]

⇒ ∠ABC = ∠DCB [By C.P.C.T.] …(1)

Now, AB || DC and BC is a transversal. [∵ ABCD is a parallelogram]

∴ ∠ABC + ∠DCB = 180° … (2) [Co-interior angles]

From (1) and (2), we have

∠ABC = ∠DCB = 90°

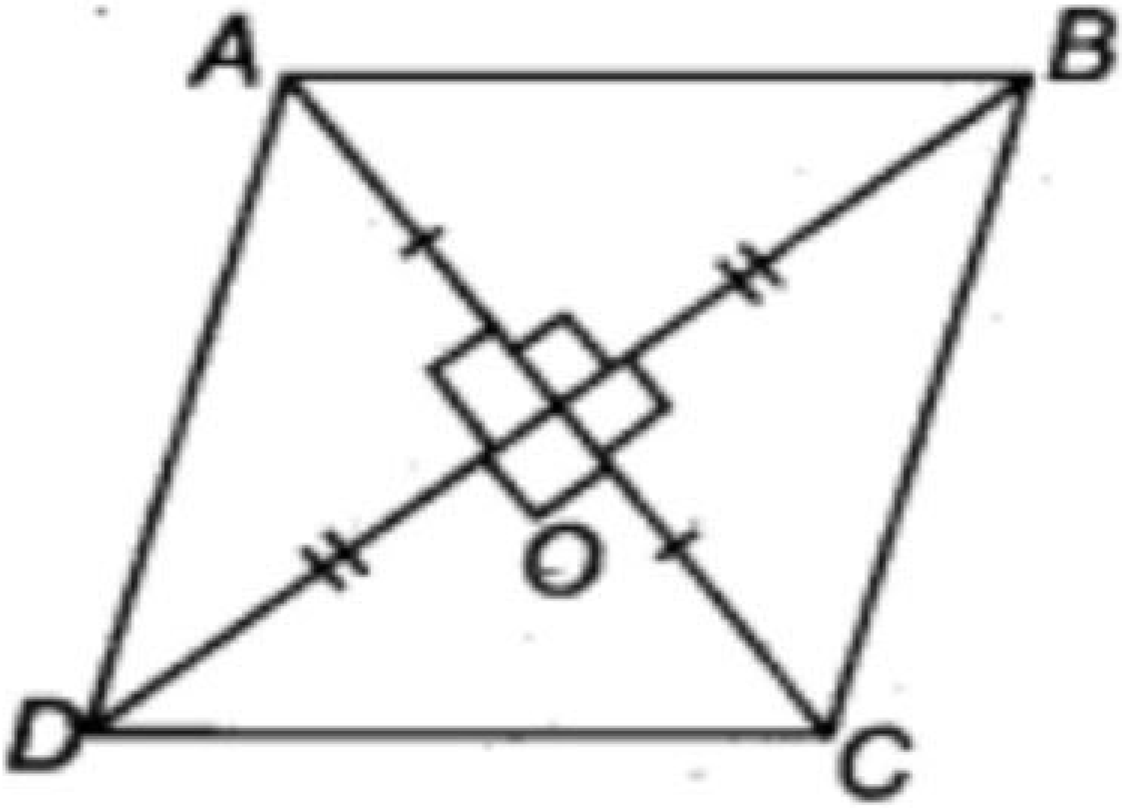
i.e., ABCD is a parallelogram having an angle equal to 90°.

∴ ABCD is a rectangle.

Q3.Show that if the diagonals of a quadrilateral bisect each other at right angles, then it is a rhombus.

Solution:

Let ABCD be a quadrilateral such that the diagonals AC and BD bisect each other at right angles at O.



∴ In △AOB and △AOD, we have

AO = AO [Common]

OB = OD [O is the mid-point of BD]

∠AOB = ∠AOD [Each 90]

∴ △AQB ≅ △AOD [By,SAS congruency

∴ AB = AD [By C.P.C.T.] ……..(1)

Similarly, AB = BC .. .(2)

BC = CD …..(3)

CD = DA ……(4)

∴ From (1), (2), (3) and (4), we have

AB = BC = CD = DA

Thus, the quadrilateral ABCD is a rhombus.

Alternatively : ABCD can be proved first a parallelogram then proving one pair of adjacent sides equal will result in rhombus.