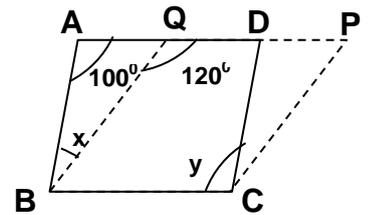


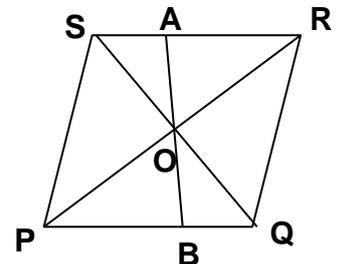
CLASS IX
QUADRILATERALS

1. In the given fig, BCPQ and BCDA are parallelograms on the same base BC. Find the value of $(x + y)$.



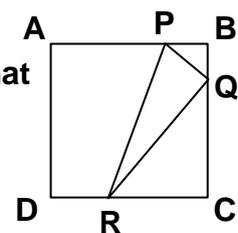
2. ABCD is a parallelogram in which $\angle DAC = 40^\circ$, $\angle BAC = 30^\circ$, $\angle DOC = 105^\circ$, then find the measure of $\angle CDO$.
3. ABCD is a rectangle in which diagonal AC bisects angle A and angle C. Show that ABCD is a square.
4. The angles of a quadrilateral are in the ratio 2:3:6:7. Show that this a trapezium.

5. In fig, PQRS is a parallelogram whose diagonals intersect each other at O. Through O, AB is drawn. Prove that : $OA = OB$.



6. If the diagonals of a parallelogram are equal, then show that it is a rectangle.
7. Show that the diagonals of a rhombus are perpendicular to each other.
8. ABCD is a parallelogram. L and M are points on AB and DC respectively such that $AL = MC$. Prove that LM and BD bisect each other.
9. Prove that, in a parallelogram, the bisectors of any two consecutive angles intersect at right angle.

10. in fig, ABCD is a square. If $\angle PQR = 90^\circ$ and $PB = QC = DR$, prove that $QB = RC$ and $PQ = QR$.



11. PQRS is a square and T and U are respectively the mid- points of PS and QR. Find the area of $\triangle OTS$ if $PQ = 8$ cm.
12. Prove that the diagonals of a parallelogram divides it into two equal parts.
13. Prove that opposite sides of a parallelogram are equal.

14. ABCD is a parallelogram and $\angle DAB = 60^\circ$. If the bisectors AM and BM of $\angle A$ and $\angle B$ meets CD at M, prove that M is the mid- point of CD.
15. ABCD is a trapezium in which $AB \parallel DC$, BD is a diagonal and ZE is the mid- point of AD. A line is drawn through E parallel to AB intersecting BC at F. Show that F is the mid- point of BC.

16. ABCD is a trapezium with $AB \parallel DC$. LM is the line joining the mid- points of AD and BC respectively. N is the mid- point of DB. Prove that : $LM = \frac{1}{2} (AB + DC)$.
17. ABCD is a parallelogram and E is the mid- point of side BC. DE and AB on producing meet at F. Prove that : $AF = 2 AB$.
18. ABCD is a parallelogram and X and Y are points on the diagonals BD such that $DX = BY$. Prove that AXCY is a parallelogram.
19. l, m and n are three parallel lines intersected by transversal p and q such that l, m and n cut off equal intercepts AB and BC on p. Show that l, m and n cut off equal intercepts DE and EF on q also.
20. ABC is an isosceles triangle in which $AB = AC$, $CD \parallel AB$ and AD is the bisector of exterior $\angle CAE$ of $\triangle ABC$. Prove that $\angle CAD = \angle BCA$ and ABCD is a parallelogram.
21. In a quadrilateral ABCD, AO and BO are the bisectors of $\angle A$ and $\angle B$ respectively. Prove that $\angle AOB = \frac{1}{2} (\angle C + \angle D)$.
22. PQRS is a parallelogram in which PQ is produced to T such that $QT = PQ$. Prove that ST bisects RQ.
23. The angles of a quadrilateral are $5(y + 1)$, $3(2y + 5)$, $9y$ and $10(y + 4)$. Find the value of y and assign the name of the quadrilateral ABCD.
24. PQRS is a rhombus with $\angle QPS = 50^\circ$. Find $\angle PRS$ and $\angle RQS$.
25. PQRS is a parallelogram. M is a point on PS such that $PM = \frac{1}{3} PS$ and N is a point on QR such that $RN = \frac{1}{3} QR$. Prove that the quadrilateral PNRM is a parallelogram.
26. In a parallelogram, E and F are the mid- points of sides of AB and CD respectively. Show that the line segments AF and EC trisect the diagonal BD.
27. Show that if the diagonals of a quadrilateral are equal and bisect each other at right angle, then it is a square.
28. ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD. Show that: (i) $\triangle APB = \triangle CQD$ (ii) $AP = CQ$
29. ABC is a triangle, AD is a median and E is the mid- point of AD. BE is joined and produced to intersect AC in a point F. Prove that $AF = \frac{1}{3} AC$.
30. ABCD is a parallelogram in which P and Q are mid- points of opposite sides AB and CD. If AQ intersects DP at S and BQ intersects CR at R, show that:
(i) APCQ is a parallelogram. (ii) DPBQ is a parallelogram. (iii) PSQR is a parallelogram.
31. ABCD is a parallelogram and X and Y are the mid- points of the sides AB and DC respectively. Show that AXCY is a parallelogram.

32. Bisectors of $\angle B$ and $\angle D$ of quadrilateral ABCD meet CD and AB produced at P and Q respectively. Prove that $\angle P + \angle Q = \frac{1}{2} (\angle ABC + \angle ADC)$
33. ABCD is a rhombus and P, Q, R and S are the mid- points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rectangle.
34. Two segments AC and BD bisect each other at O. Show that the ABCD is a parallelogram.
35. ABCD is a rectangle in which diagonal AC bisects $\angle A$ as well as $\angle C$. Show that
 (i) ABCD is a square (ii) diagonal BD bisects $\angle B$ as well as $\angle D$
36. ABCD is a rectangle and P, Q, R and S are mid- points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rhombus.
37. In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ. Show that: (i) $\triangle APD = \triangle CQB$ (ii) AP = CQ (iii) $\triangle AQB = \triangle CPD$ (iv) AQ = CP
38. ABCD is a trapezium in which AB \parallel CD and AD = BC. Show that:
 (i) $\angle A = \angle B$ (ii) $\angle C = \angle D$ (iii) $\triangle ABC = \triangle BAD$ (iv) AC = BD
39. Two parallel lines l and m are intersected by a transversal line p. Show that the quadrilateral formed by the bisectors of interior angles is a rectangle.
40. Show that the line segment joining the mid- points of two sides of a triangle is parallel to third side and half of third side.
41. Show that the bisectors of angles of a parallelogram form a rectangle.
42. In quadrilateral ABCD, $\angle B = 130^\circ$, $\angle C = 60^\circ$, angle bisectors of $\angle A$ and $\angle D$ meet at P. Find $\angle APD$.
43. Prove that the quadrilateral obtained by joining the mid- points of consecutive sides of a quadrilateral is a parallelogram.
44. ABC is an isosceles triangle in which AB = AC. AD bisects exterior angle PAC and CD \parallel AB. Show that (i) $\angle DAC = \angle BCA$ (ii) ABCD is a parallelogram.
45. ABCD is a square and on the side DC, an equilateral triangle is constructed. Prove that AE = BE and $\angle DAE = 15^\circ$.
46. P, Q, R and S are respectively the mid- points of the sides AB, BC, CD and DA of a quadrilateral ABCD such that AC is perpendicular to BD. Prove that PQRS is a square.
47. In $\triangle ABC$, D, E and F are respectively the mid- points of the sides AB, BC and CA. Show that $\triangle ABC$ is divided into four congruent triangles by joining D, E and F.
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