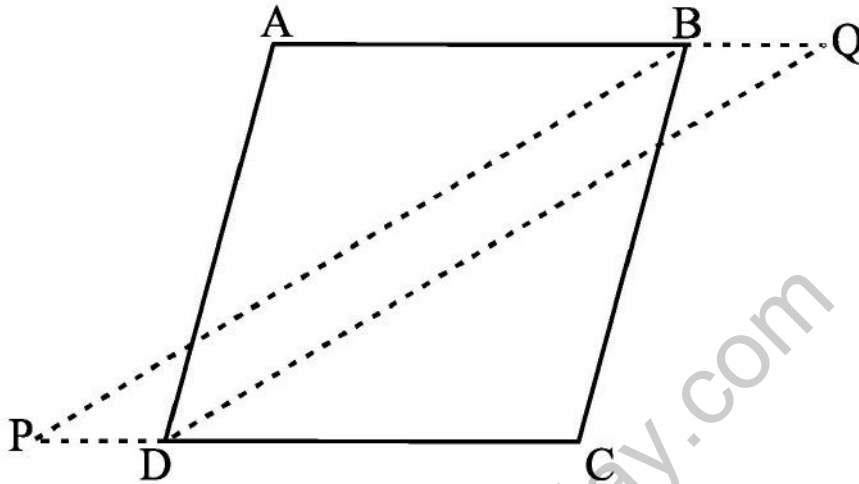


PRACTICE QUESTIONS

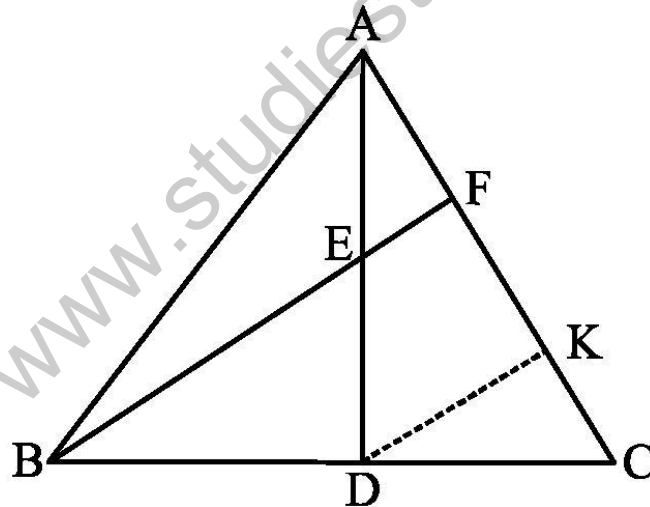
CLASS IX: CHAPTER – 8

QUADRILATERALS

1. In the below figure, bisectors of $\angle B$ and $\angle D$ of quadrilateral ABCD meet CD and AB, produced at P and Q respectively. Prove that $\angle P + \angle Q = \frac{1}{2} (\angle ABC + \angle ADC)$

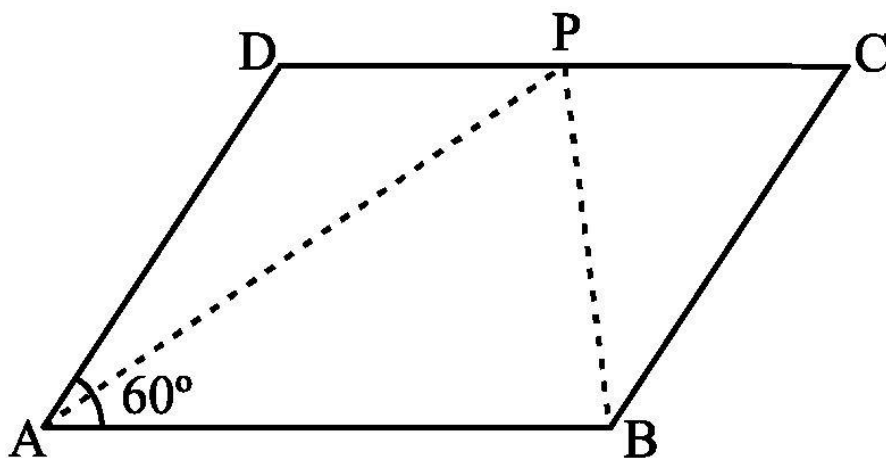


2. In $\triangle ABC$, AD is the median through A and E is the midpoint of AD. BE produced meets AC in F such that $BF \parallel DK$. Prove that $AF = \frac{1}{3} AC$

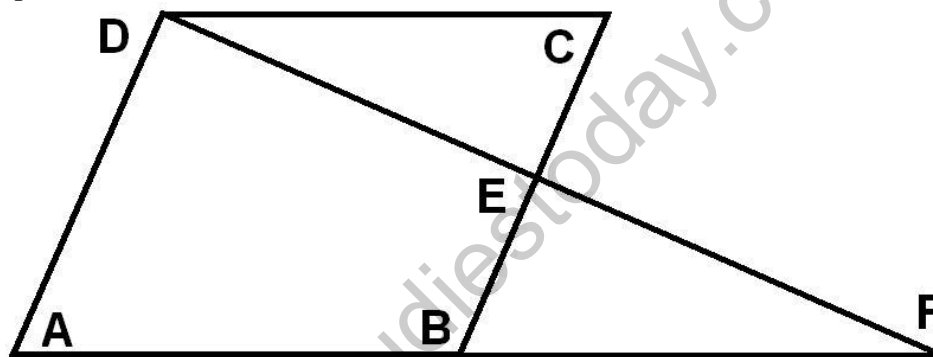


3. In a parallelogram, the bisectors of any two consecutive angles intersect at right angle. Prove it.
4. In a quadrilateral ABCD, AO and BO are the bisectors of $\angle A$ and $\angle B$ respectively. Prove that $\angle AOB = \frac{1}{2} (\angle C + \angle D)$
5. ABCD is a square E, F, G, H are points on AB, BC, CD and DA respectively such that $AE = BF = CG = DH$. Prove that EFGH is a square.
6. ABCD is a parallelogram. If its diagonals are equal, then find the value of $\angle ABC$.

7. In the below figure, ABCD is a parallelogram and $\angle DAB = 60^\circ$. If the bisector AP and BP of angles A and B respectively meet P on CD. Prove that P is the midpoint of CD.

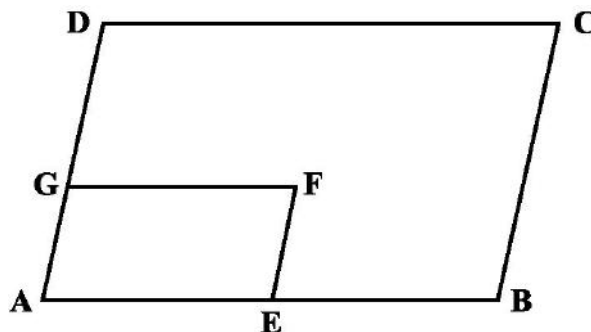
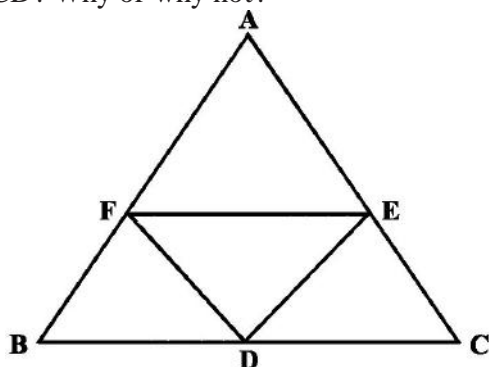


8. In the below given figure, ABCD is a parallelogram and E is the midpoint of side BC, DE and AB when produced meet at F. Prove that $AF = 2AB$.

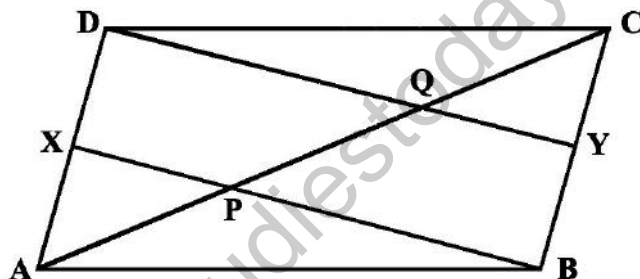


9. $\triangle ABC$ is right angle at B and P is the midpoint of AC and Q is any point on AB. Prove that (i) $PQ \perp AB$ (ii) Q is the midpoint of AB (iii) $PA = \frac{1}{2} AC$
10. The diagonals of a parallelogram ABCD intersect at O. A line through O intersects AB at X and DC at Y. Prove that $OX = OY$.
11. ABCD is a parallelogram. AB is produced to E so that $BE = AB$. Prove that ED bisects BC.
12. If ABCD is a quadrilateral in which $AB \parallel CD$ and $AD = BC$, prove that $\angle A = \angle B$.
13. Diagonals AC and BD of a parallelogram ABCD intersect each other at O. If $OA = 3$ cm and $OD = 2$ cm, determine the lengths of AC and BD.
14. In quadrilateral ABCD, $\angle A + \angle D = 180^\circ$. What special name can be given to this quadrilateral?
15. All the angles of a quadrilateral are equal. What special name is given to this quadrilateral?
16. In $\triangle ABC$, $AB = 5$ cm, $BC = 8$ cm and $CA = 7$ cm. If D and E are respectively the mid-points of AB and BC, determine the length of DE.
17. Diagonals of a quadrilateral ABCD bisect each other. If $\angle A = 35^\circ$, determine $\angle B$.

18. Opposite angles of a quadrilateral ABCD are equal. If $AB = 4$ cm, determine CD.
19. In the below figure, it is given that BDEF and FDCE are parallelograms. Can you say that $BD = CD$? Why or why not?



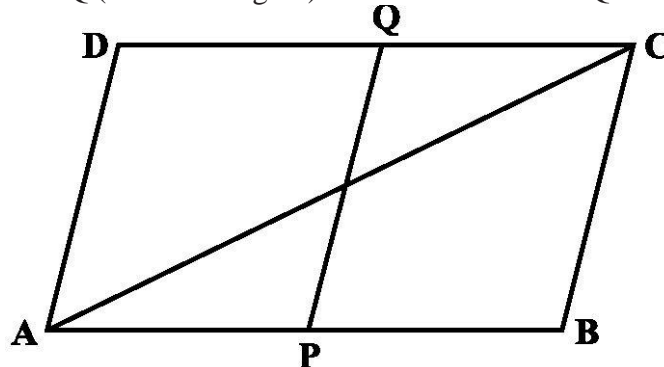
20. In the above right sided figure, ABCD and AEFG are two parallelograms. If $\angle C = 55^\circ$, determine $\angle F$.
21. Angles of a quadrilateral are in the ratio $3 : 4 : 4 : 7$. Find all the angles of the quadrilateral.
22. In the below figure, X and Y are respectively the mid-points of the opposite sides AD and BC of a parallelogram ABCD. Also, BX and DY intersect AC at P and Q, respectively. Show that $AP = PQ = QC$.



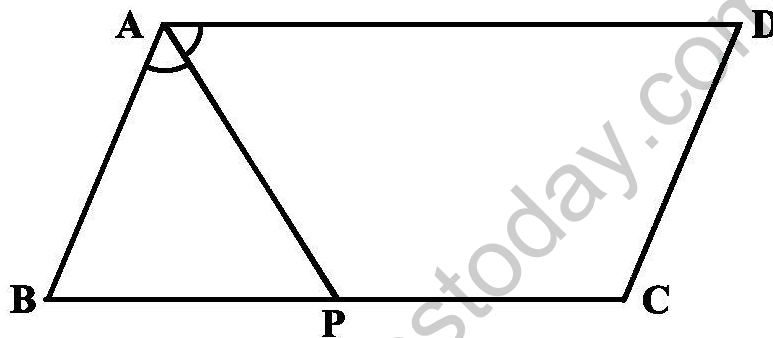
23. One angle of a quadrilateral is of 108° and the remaining three angles are equal. Find each of the three equal angles.
24. ABCD is a trapezium in which $AB \parallel DC$ and $\angle A = \angle B = 45^\circ$. Find angles C and D of the trapezium.
25. The angle between two altitudes of a parallelogram through the vertex of an obtuse angle of the parallelogram is 60° . Find the angles of the parallelogram.
26. ABCD is a rhombus in which altitude from D to side AB bisects AB. Find the angles of the rhombus.
27. E and F are points on diagonal AC of a parallelogram ABCD such that $AE = CF$. Show that BFDE is a parallelogram.
28. ABCD is a parallelogram and $\angle DAB = 60^\circ$. If the bisectors AP and BP of angles A and B respectively, meet at P on CD, prove that P is the midpoint of CD.
29. ABCD is a parallelogram. AM and BN are respectively, the perpendiculars from A and B to DC and CD produced. Prove that $AM = BN$.

30. ABCD is a parallelogram. L and M are points on AB and DC respectively and $AL = CM$. Prove that LM and BD bisect each other.

31. Points P and Q have been taken on opposite sides AB and CD, respectively of a parallelogram ABCD such that $AP = CQ$ (see below figure). Show that AC and PQ bisect each other.



32. In the below figure, P is the mid-point of side BC of a parallelogram ABCD such that $\angle BAP = \angle DAP$. Prove that $AD = 2CD$.



33. D, E and F are the mid-points of the sides BC, CA and AB, respectively of an equilateral triangle ABC. Show that $\triangle DEF$ is also an equilateral triangle.

34. E is the mid-point of the side AD of the trapezium ABCD with $AB \parallel DC$. A line through E drawn parallel to AB intersect BC at F. Show that F is the mid-point of BC.

35. PQ and RS are two equal and parallel line-segments. Any point M not lying on PQ or RS is joined to Q and S and lines through P parallel to QM and through R parallel to SM meet at N. Prove that line segments MN and PQ are equal and parallel to each other.

36. Prove that “If the diagonals of a quadrilateral bisect each other, then it is a parallelogram”.

37. Prove that “A quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel”.

38. Prove that “A quadrilateral is a parallelogram if its opposite angles are equal”.

39. Show that the diagonals of a rhombus are perpendicular to each other.

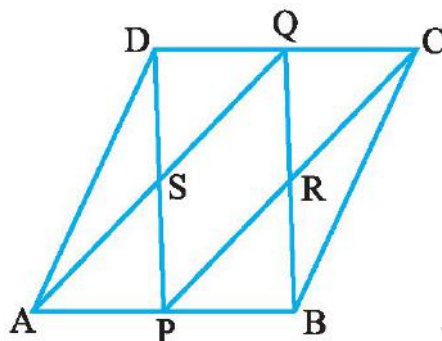
40. Two parallel lines l and m are intersected by a transversal p . Show that the quadrilateral formed by the bisectors of interior angles is a rectangle.

41. Show that the bisectors of angles of a parallelogram form a rectangle.

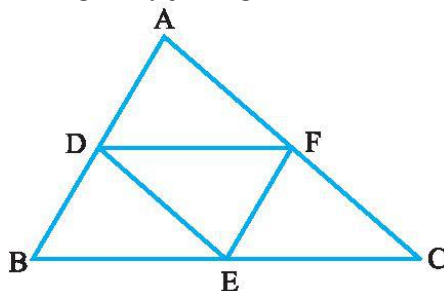
42. If the diagonals of a parallelogram are equal, then show that it is a rectangle.

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

44. Show that the diagonals of a square are equal and bisect each other at right angles.
45. Show that if the diagonals of a quadrilateral are equal and bisect each other at right angles, then it is a square.
46. In the adjoining figure, 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 CP at R, show that:
- APCQ is a parallelogram.
 - DPBQ is a parallelogram.
 - PSQR is a parallelogram.

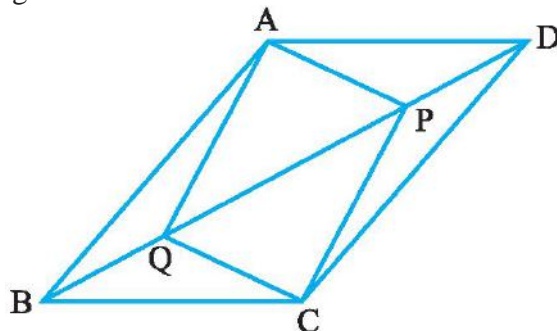


47. The angles of quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral.
48. Prove that “The line segment joining the mid-points of two sides of a triangle is parallel to the third side and half of it”.
49. Prove that “The line drawn through the mid-point of one side of a triangle, parallel to another side bisects the third side”.
50. Show that if the diagonals of a quadrilateral are equal and bisect each other at right angles, then it is a square.
51. 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.
52. ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Show that
- D is the mid-point of AC
 - $MD \perp AC$
 - $CM = MA = \frac{1}{2} AB$
53. In $\triangle ABC$, D, E and F are respectively the mid-points of sides AB, BC and CA. Show that $\triangle ABC$ is divided into four congruent triangles by joining D, E and F.

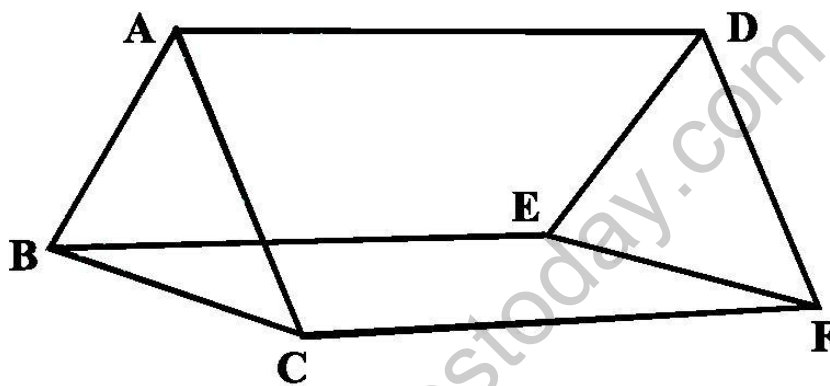


54. Prove that the quadrilateral formed by joining the mid-points of the sides of a quadrilateral, in order, is a parallelogram.

55. l , m and n are three parallel lines intersected by transversals 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 .
56. In parallelogram $ABCD$, two points P and Q are taken on diagonal BD such that $DP = BQ$. Show that: $APCQ$ is a parallelogram



57. In the below figure, $AB \parallel DE$, $AB = DE$, $AC \parallel DF$ and $AC = DF$. Prove that $BC \parallel EF$ and $BC = EF$.



58. A square is inscribed in an isosceles right triangle so that the square and the triangle have one angle common. Show that the vertex of the square opposite the vertex of the common angle bisects the hypotenuse.
59. $ABCD$ 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.
60. Show that the line segments joining the mid-points of the opposite sides of a quadrilateral bisect each other.
61. E and F are respectively the mid-points of the non-parallel sides AD and BC of a trapezium $ABCD$. Prove that $EF \parallel AB$ and $EF = \frac{1}{2}(AB + CD)$
62. Prove that the quadrilateral formed by the bisectors of the angles of a parallelogram is a rectangle.
63. P and Q are points on opposite sides AD and BC of a parallelogram $ABCD$ such that PQ passes through the point of intersection O of its diagonals AC and BD . Show that PQ is bisected at O .
64. $ABCD$ is a rectangle in which diagonal BD bisects $\angle B$. Show that $ABCD$ is a square.
65. D , E and F are respectively the mid-points of the sides AB , BC and CA of a triangle ABC . Prove that by joining these mid-points D , E and F , the triangle ABC is divided into four congruent triangles.

66. Prove that the line joining the mid-points of the diagonals of a trapezium is parallel to the parallel sides of the trapezium.
67. P is the mid-point of the side CD of a parallelogram ABCD. A line through C parallel to PA intersects AB at Q and DA produced at R. Prove that DA = AR and CQ = QR.
68. E is the mid-point of a median AD of $\triangle ABC$ and BE is produced to meet AC at F. Show that $AF = \frac{1}{3} AC$
69. Show that the quadrilateral formed by joining the mid-points of the consecutive sides of a square is also a square.
70. In a parallelogram ABCD, AB = 10 cm and AD = 6 cm. The bisector of $\angle A$ meets DC in E. AE and BC produced meet at F. Find the length of CF.
71. P, Q, R and S are respectively the mid-points of the sides AB, BC, CD and DA of a quadrilateral ABCD in which AC = BD. Prove that PQRS is a rhombus.
72. P, Q, R and S are respectively the mid-points of the sides AB, BC, CD and DA of a quadrilateral ABCD such that $AC \perp BD$. Prove that PQRS is a rectangle.
73. P, Q, R and S are respectively the mid-points of sides AB, BC, CD and DA of quadrilateral ABCD in which AC = BD and $AC \perp BD$. Prove that PQRS is a square.
74. A diagonal of a parallelogram bisects one of its angles. Show that it is a rhombus. P and Q are the mid-points of the opposite sides AB and CD of a parallelogram
75. In quadrilateral ABCD. AQ intersects DP at S and BQ intersects CP at R. Show that PRQS is a parallelogram.
76. ABCD is a quadrilateral in which $AB \parallel DC$ and $AD = BC$. Prove that $\angle A = \angle B$ and $\angle C = \angle D$.
77. ABC is a triangle. D is a point on AB such that $AD = \frac{1}{4} AB$ and E is a point on AC such that $AE = \frac{1}{4} AC$. Prove that $DE = \frac{1}{4} BC$.
78. Let ABC be an isosceles triangle in which $AB = AC$. If D, E, F be the midpoints of the sides BC, CA and AB respectively, show that the segment AD and EF bisect each other at right angles.
79. Prove that the line segment joining the mid-points of the diagonals of a trapezium is parallel to each of the parallel sides and is equal to half the difference of these sides.
80. P is the midpoint of side AB of a parallelogram ABCD. A line through B parallel to PD meets DC at Q and AD produced at R. Prove that (i) $AR = 2BC$ (ii) $BR = 2BQ$.
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