Practice Exercise

Understanding Quadrilaterals

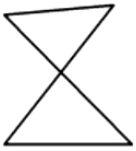
Basic

1. Which of the following quadrilaterals is convex, concave or complex?

(i)

(ii)

(iii)



2. How many diagonals do these quadrilaterals have?

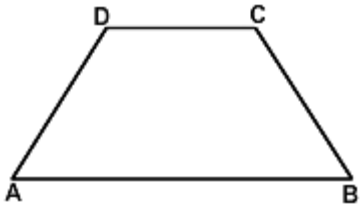
(i) Hexagon
(ii) Pentagon
(iii) Triangle

3. Define a regular polygon.

4. In the figure below, ABCD is a quadrilateral

(i) How many pairs of adjacent sides are there? Name them.

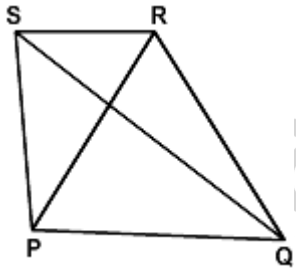
(ii) How many pairs of opposite sides are there? Name them.



5. In the following quadrilateral PQRS:

(i) How many pairs of opposite angles are there? Name them.

(ii) How many diagonals are there? Name them.



6. Fill in the blanks:

(i) A quadrilateral has ___ sides.

(ii) A quadrilateral has ___ angles.

(iii) The sum of the angles of a quadrilateral is ___ .

7. Three angles of a quadrilateral are 54°, 80° and 116°. Find the measure of the fourth angle.

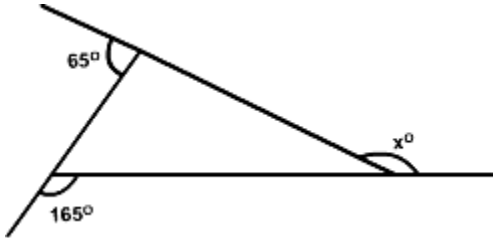
8. A quadrilateral has three acute angles, each measuring 75°. Find the measure of the fourth angle.

9. State the name of a regular polygon of

(i) 4 sides and

(ii) 5 sides.

10. Find x in the following figure.



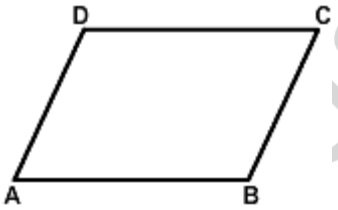
11. Name each of the following parallelograms:
(i) The diagonals are equal and the adjacent sides are unequal.
(ii) All sides are equal and one angle is 60°.

12. Which of the following statements are true or false?
(i) The diagonals of a parallelogram are equal.
(ii) The diagonals of a rhombus are equal.

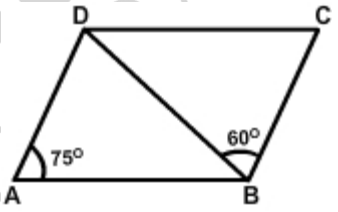
13. State true or false:
(i) Every rhombus is a parallelogram.
(ii) Every rectangle is a square.

14. In what parallelogram, two diagonals are not necessarily equal?

15. In the given figure, ABCD is a parallelogram in which $\angle A = 75°$. Find the measure of each of the angles $\angle B$, $\angle C$, $\angle D$.



16. In the given figure, ABCD is a parallelogram in which $\angle BAD = 75°$ and $\angle DBC = 60°$. Calculate
(i) $\angle$ CDB and
(ii) $\angle ADB$.



17. The sum of two opposite angles of a parallelogram is 130°. Find the measure of each of its angles.

18. Define the following types of quadrilaterals: Parallelogram, Rectangle, Trapezium, and Square.

19. In a square ABCD, AB = (2x + 3) cm and BC = (3x − 5) cm. Then, what is the value of x?

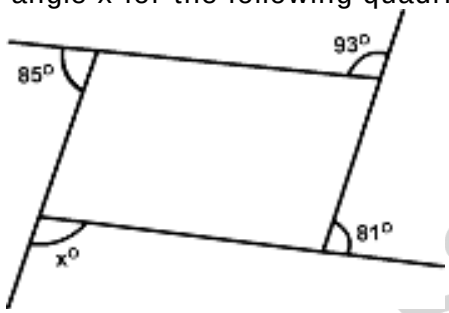
20. The length of a rectangle is 8 cm and each of its diagonals measures 10 cm. Find its breadth.

Advance

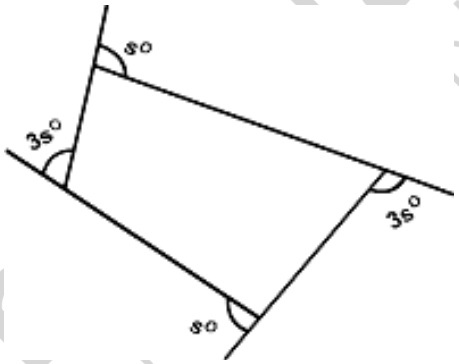
21. Prove that the sum of the angles of a quadrilateral is 360°.

22. The four angles of a quadrilateral are in the ratio 2:3:5:8. Find the angles.

23. Find the measure of angle x for the following quadrilateral.



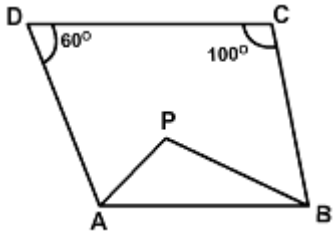
24. Find the measure of s.



25. Prove that the sum of exterior angles of a quadrilateral is 360°.

26. Three angles of a quadrilateral are equal and the measure of the fourth angle is 120°. Find the measure of each of the equal angles.

27. In the given figure, the bisectors of ∠A and ∠B meet in a point P. If ∠C = 100° and ∠D = 60°, find the measure of ∠APB.

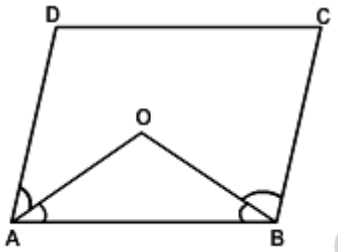


28. Prove that in a parallelogram, the opposite sides are equal and the opposite angles are equal.

29. Prove that diagonals of a rhombus bisect each other at right angles.

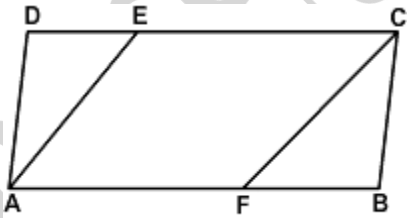
30. Two adjacent angles of a parallelogram are as 2:3. Find the measure of each of its angles.

31. In the given figure, ABCD is a parallelogram; AO and BO are the bisectors of $\angle A$ and $\angle B$ respectively. Prove that $\angle AOB = 90°$



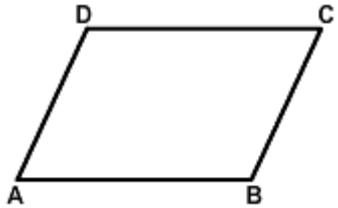
32. Two adjacent angles of a parallelogram are $(3x - 4)°$ and $(3x + 16)°$. Find the value of x and hence find the measure of each of its angles.

33. In the given figure, ABCD is a parallelogram and line segments AE and CF bisect the angles A and C respectively. Show that AE ∥ CF.

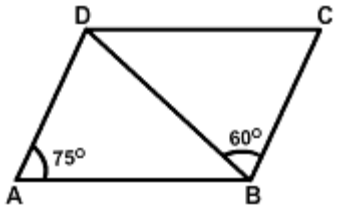


34. Prove that the diagonals of a square are equal and bisect each other at right angles.

35. If an angle of a parallelogram is two-third of its adjacent angle, then what is the smallest angle of the parallelogram?



36. The length of diagonals of a rhombus are 16 cm and 12 cm. Find the length of each side of the rhombus.



37. The length and breadth of a rectangle are in the ratio 4:3. If the diagonals measures 25 cm, then what is the perimeter of the rectangle?

38. If one angle of a parallelogram is 24° less than twice the smallest angle, then what is the largest angle of the parallelogram?

39. Prove that any two adjacent angles of a parallelogram are supplementary.

40. The sides of a rectangle are in the ratio 5:4 and its perimeter is 90 cm. Find its length and breadth.

Answers

1.
(i) concave
(ii) convex
(iii) complex

2.
(i) 9
(ii) 5
(iii) 0

3. A polygon with equal sides and equal angles.

4.
(i) 4; AB and BC, BC and CD, CD and DA, DA and AB
(ii) 2; AB and CD ; AD and BC

5.
(i) 2; ∠S and ∠Q, ∠P and ∠R
(ii) 2; PR and QS

6.
(i) four
(ii) four
(iii) 360°

7. 110°

8. 135°

9.
(i) Square
(ii) Regular pentagon

10. 130°

11. (i) Rectangle
(ii) Rhombus

12. (i) False
(ii) False

13. (i) True
(ii) False

14. Rhombus

15. $\angle B = 105°$, $\angle C = 75°$, and $\angle D = 105°$

16. (i) 45°
(ii) 60°

17. 65°, 115°, 65°, 115°

18. Parallelogram is a quadrilateral with each pair of opposite sides parallel. Rectangle is a parallelogram with a right angle. Trapezium is a quadrilateral with a pair of parallel sides. Square is a rectangle with sides of equal length.

19. 8

20. 6 cm

21. Hint: Divide it into 2 triangles and add the angles.

22. 40°, 60°, 100°, 160°

23. 101

24. 45°

25. Hint: Show that interior and exterior angle form a supplementary pair.

26. 80°

27. 80°

28. Hint: Draw a diagonal and use properties of transversal cutting the two parallel lines.

29. Hint: Draw both diagonals and in the triangles so formed, prove SSS congruence.

30. 72°, 108°, 72°, 108°

31. Hint: The sum of two adjacent angles of a parallelogram is 180°. Therefore, take $\angle A + \angle B = 180°$, $\angle OAB = \frac{1}{2}\angle A$ and $\angle ABO = \frac{1}{2}\angle B$. Then, consider ΔOAB, and use the angle sum property of a triangle.

32. X = 28; 80°, 100°, 80°, 100°

33. Hint: Show congruency of ΔADE and ΔCBF. Thus prove that AECF is a parallelogram.

34. Hint: Use the result that every square is a rectangle and here use the diagonal properties of rectangles. Then consider that every square is a rhombus and consider the diagonal properties of the rhombus.

35. 72°

36. 10 cm

37. 70 cm

38. 112°

39. Hint: Use the property of parallel lines: sum of interior angles on the same side of the transversal which is cutting two parallel lines is 180°

40. 25 cm, 20 cm