Topic: Quadrilaterals

Lesson Objectives

By the end of this lesson, students should be able to:

- Define and **identify quadrilaterals**

- Describe the **properties of different quadrilaterals**

- **Construct quadrilaterals** accurately using technical drawing tools

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1. What is a Quadrilateral?

A **quadrilateral** is a **four-sided polygon**. It has:

- **4 sides**

- **4 angles**

- **4 vertices (corners)**

Sum of Angles in a Quadrilateral:

The sum of the interior angles of any quadrilateral is always **360°**.

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2. Types of Quadrilaterals and Their Properties

Quadrilateral	Description	Properties
Square	A four-sided figure with **all sides equal** and **all angles 90°**	- 4 equal sides - 4 right angles - Opposite sides parallel
Rectangle	A four-sided figure with **opposite sides equal** and **all angles 90°**	- Opposite sides equal and parallel - 4 right angles
Rhombus	A **parallelogram** with **all sides equal**, but angles **not necessarily 90°**	- All sides equal - Opposite angles equal

Quadrilateral	Description	Properties
		- Diagonals bisect each other at 90°
Parallelogram	Opposite sides are **equal and parallel**, but angles are **not 90°**	- Opposite sides equal - Opposite angles equal - Diagonals bisect each other
Trapezium (Trapezoid)	Only **one pair of opposite sides is parallel**	- One pair of parallel sides - No sides necessarily equal
Kite	A quadrilateral with **two pairs of adjacent sides equal**	- Diagonals are perpendicular - One pair of opposite angles equal

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3. Construction of Quadrilaterals

Tools Required:

- **Compass**

- **Ruler**

- **Protractor**

- **Set square**

- **Pencil (2H or HB)**

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a) Construction of a Square

Steps:

1. Draw a **base line (AB)** using the ruler.

2. At point **A**, use a **set square** or **protractor** to construct a **90° angle** and mark point **D**.

3. From **A** and **B**, use a **compass** to mark sides **AD** and **BC** equal to **AB**.

4. Connect points **C** and **D** to complete the square.

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b) Construction of a Rectangle

Steps:

1. Draw the **base (AB)**.

2. At points **A** and **B**, construct **90° angles** using a set square or protractor.

3. From **A** and **B**, measure the **height (AD and BC)**.

4. Join **C to D** to complete the rectangle.

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c) Construction of a Rhombus

Steps (Using Diagonals):

1. Draw both **diagonals**, which cross at **90°** and **bisect each other**.

2. Using a compass, measure from the **center to a corner**, and draw arcs to locate the four vertices.

3. Join the points to form the **rhombus**.

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d) Construction of a Parallelogram

Steps:

1. Draw one side (AB).

2. Use the compass to measure the adjacent side (AD).

3. At points **A** and **B**, use the **set square** to draw **parallel lines** for the other sides.

4. Mark points **C** and **D** where the sides intersect.

5. Join **C to D** and **B to C**.

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e) Construction of a Trapezium

Steps:

1. Draw the **parallel sides** (top and base).

2. Connect the two parallel sides using the **non-parallel sides** (legs).

3. Use a **protractor** to ensure the angles are correct if specified.

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f) Construction of a Kite

Steps:

1. Draw the **main diagonal (longer one)**.

2. At the midpoint, draw the **shorter diagonal** perpendicular to the longer diagonal.

3. Use a compass to mark the sides of the kite.

4. Join the points to complete the kite.

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4. Uses of Quadrilaterals in Real Life

Quadrilateral	Real-Life Example
Square	Tiles, chessboard squares
Rectangle	Books, windows, doors
Rhombus	Diamond shapes, playing cards
Parallelogram	Slanted tiles, ramps
Trapezium	Bridges, road signs
Kite	Actual kites, decorations

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5. Importance of Quadrilaterals in Technical Drawing

- **Architecture:** Walls, windows, roofs

- **Engineering:** Machine parts, design components

- **Construction:** Floor plans, tile designs

- **Graphic Design:** Patterns, logos, decorations

6. Summary of Key Points

Concept	Details
Quadrilateral	A polygon with 4 sides and 4 angles
Types	Square, Rectangle, Rhombus, Parallelogram, Trapezium, Kite
Properties	Sides, angles, diagonals
Construction	Use compass, ruler, protractor, set square
Applications	Architecture, design, daily objects