Vertices, Sides, Angles and Diagonals of a Quadrilateral

A quadrilateral is a polygon with 4 sides, 4 vertices, and 4 angles. It is a closed figure made of four line segments.

Key Terms:

1. **Vertices:** The corners or points where two sides meet.

   Example: In quadrilateral ABCD, the vertices are A, B, C, and D.

2. **Sides:** The line segments that form the boundary of the quadrilateral.

   Example: AB, BC, CD, and DA are the sides of quadrilateral ABCD.

3. **Angles:** The angle formed between two sides at a vertex.

   Example: ∠A, ∠B, ∠C, ∠D.

4. **Diagonals:** A line segment that joins non-adjacent vertices of a quadrilateral.

   Example: In quadrilateral ABCD, AC and BD are diagonals.

Properties of a Quadrilateral:

- A quadrilateral has 4 sides, 4 vertices, and 4 angles.
- The sum of all interior angles of a quadrilateral is always 360°.
- It has 2 diagonals.
- The diagonals may or may not be equal depending on the type of quadrilateral.
- The diagonals may or may not bisect each other.

Formula:

Sum of Interior Angles = $(n - 2) \times 180°$

Here, $n = 4$

So, $(4 - 2) \times 180° = 360°$

Example 1

In a quadrilateral PQRS, the angles $\angle P = 90°$, $\angle Q = 85°$, $\angle R = 95°$. Find $\angle S$.

Solution:

Sum of angles in a quadrilateral = 360°

$\angle P + \angle Q + \angle R + \angle S = 360°$

$90° + 85° + 95° + \angle S = 360°$

$\Rightarrow 270° + \angle S = 360°$

$\Rightarrow \angle S = 360° - 270° = 90°$

Answer: $\angle S = 90°$

Example 2

How many diagonals can a quadrilateral have? Name them in quadrilateral ABCD.

Solution:

A quadrilateral has 2 diagonals.

In quadrilateral ABCD, the diagonals are:

AC (joins vertex A to C)

BD (joins vertex B to D)

Answer: 2 diagonals → AC and BD

Summary Points

- A quadrilateral has 4 sides, 4 vertices, 4 angles, and 2 diagonals.
- The sum of interior angles is always 360°.
- Diagonals connect opposite (non-adjacent) vertices.
- The number of diagonals in any n-sided polygon = $\frac{n(n-3)}{2}$

For quadrilateral: $\frac{4(4-3)}{2}$ = 2 diagonals