Some special Parallelograms

A parallelogram is a quadrilateral with opposite sides parallel and equal.

Some parallelograms have extra special properties and are called special parallelograms.

These include:

- Rectangle
- Rhombus
- Square

1. Rectangle

A rectangle is a parallelogram with all angles equal to 90°.

Properties:

- Opposite sides are equal and parallel
- All angles = 90°
- Diagonals are equal and bisect each other

2. Rhombus

A rhombus is a parallelogram with all sides equal.

Properties:

- All sides are equal
- Opposite angles are equal
- Diagonals bisect each other at 90°
- Diagonals are not equal

3. Square

A square is a parallelogram with all sides equal and all angles = 90°.

Properties:

- All sides equal
- All angles = 90°
- Diagonals are equal and bisect each other at 90°

• Square = Rectangle + Rhombus

Comparison Table:

Property	Rectangle	Rhombus	Square
Opposite sides equal	\checkmark	\checkmark	\checkmark
All sides equal	×	Ø	\checkmark
All angles 90°	\checkmark	×	\checkmark
Diagonals equal	\checkmark	×	\checkmark
Diagonals bisect at 90°	×	Ø	

Example 1:

The sides of a quadrilateral are all equal, and the diagonals bisect each other at 90°, but the diagonals are not equal. What is the name of the figure?

Solution:

If all sides are equal and diagonals bisect at 90°, but diagonals are not equal, it is a rhombus.

Answer: Rhombus

Example 2:

In a rectangle, the length is 10 cm and the breadth is 6 cm. Find the length of its diagonal.

Solution:

In a rectangle, diagonals are equal and form a right triangle.

Use the Pythagoras theorem:

 $Diagonal^2 = Length^2 + Breadth^2$

 $= 10^2 + 6^2 = 100 + 36 = 136$

Diagonal = $\sqrt{136}$ = 11.66 cm (approx)

Answer: Diagonal = 11.66 cm (approx)

Summary Points:

- **Rectangle:** All angles 90°, opposite sides equal, diagonals equal.
- **Rhombus:** All sides equal, diagonals bisect at 90°, diagonals not equal.
- Square: All sides equal, all angles 90°, diagonals equal and bisect at 90°.
- All are special types of parallelograms with extra features.