

# Chapter 8 § 4

## Rectangles

### Theorems :

**(8-13) – If a parallelogram is a rectangle, then its diagonals are congruent.**

**(8-14) – If the diagonals of a parallelogram are congruent, then the parallelogram is a rectangle.**

### Properties of a Rectangle:

- 1. Opposite sides are congruent and parallel.**
- 2. Opposite angles are congruent.**
- 3. Consecutive angles are supplementary.**
- 4. Diagonals are congruent and bisect each other.**
- 5. All four angles are right angles.**

Determine whether parallelogram ABCD is a rectangle, given A (-6,9), B (5,10), C (6,-1), and D (-5,-2).

**Method 1: Using Slopes**

$$\text{Slope of AB} = \frac{10 - 9}{5 - (-6)} = \frac{1}{11}$$

$$\text{Slope of CD} = \frac{-1 - (-2)}{6 - (-5)} = \frac{1}{11}$$

$$\text{Slope of AD} = \frac{9 - (-2)}{-6 - (-5)} = -11$$

$$\text{Slope of BC} = \frac{10 - (-1)}{5 - 6} = -11$$

**Method 2: Using Diagonals**

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$AC = \sqrt{(-6 - 6)^2 + (9 - (-1))^2} = \sqrt{244}$$

$$BD = \sqrt{(5 - (-5))^2 + (10 - (-2))^2} = \sqrt{244}$$