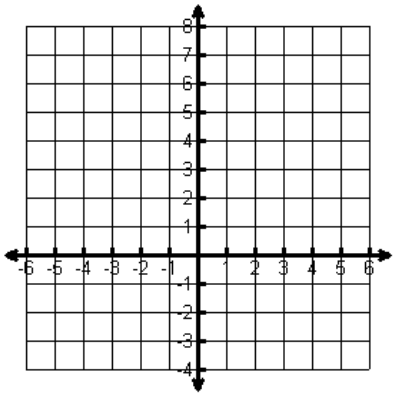
Connecting Algebra & Geometry Through Coordinates WS 1

Name: _____ Date: _____

The goal of this assignment is to use the distance and slope formulas to prove statements about geometric figures on the coordinate plane. Since the purpose is to prove a statement, you **must show work.**

1. **Quadrilateral 1**: Plot and label each point. **A(-5, 6), B(3, 7), C(4, -1),** and **D(-4, -2).**
2. *Definition: A parallelogram is a quadrilateral with two pairs of opposite sides that are parallel.* Using the definition of parallelogram, prove that Quadrilateral 1 is a parallelogram. **(Hint: Find the slope of all the sides)**



AB:_____

BC:_____

CD:_____

AD: _____

3. *Theorem: A parallelogram with four right angles is a rectangle.* Using the theorem, prove that Quadrilateral 1 is a rectangle. **(Hint: What do you notice about the slopes of adjacent sides?)**

4. *Definition: A rhombus is a parallelogram with all sides congruent.* Using the definition, prove that Quadrilateral 1 is a rhombus. **(Hint: Find the length or distance of each side)**

AB:_____

BC:_____

CD:_____

AD: _____

5. *Definition: A square is a rectangle and a rhombus.* Using the definition, is Quadrilateral 1 a square? Why?

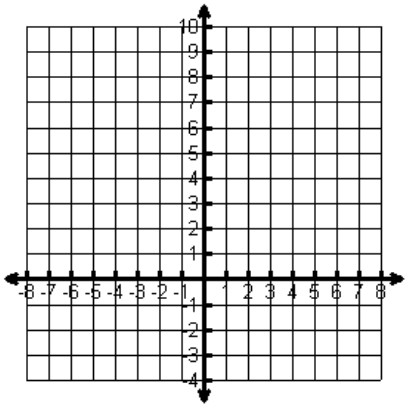
6. *Theorem: The diagonals in a rhombus are perpendicular.* Prove that the theorem is true for Quadrilateral 1. **(Hint: Find the slope of each diagonal and compare them)**

AC:_____

DB:_____

7. **Quadrilateral 2**: Plot and label each point. **A(-5, -3), B(7, 9), C(6, 3),** and **D(1, -2).**

8. *Definition: A trapezoid is a quadrilateral with one pair of opposite sides that are parallel.* Using the definition of trapezoid, prove that Quadrilateral 2 is a trapezoid. **(Hint: Find the slope of all the sides.)**



AB:_____

BC:_____

CD:_____

AD:_____

9. *Definition: An isosceles trapezoid is a quadrilateral with one pair of opposite sides congruent.* Using the definition of trapezoid, prove that Quadrilateral 2 is an isosceles trapezoid. **(Hint: Find the length of the two sides you think are congruent.)**

Side 1: _____

Side 2: _____

10. *Theorem: The diagonals in an isosceles trapezoid are congruent.* Prove that the theorem is true for Quadrilateral 2. **(Hint: Find the length of the diagonals)**

AC: _____

BD:_____