## Sec 2.10 Geometry – Quadrilateral Properties

**Name all of the properties of a parallelogram and its diagonals.**

1. Opposite Sides are parallel
2. Opposite Sides are congruent
3. Opposite Angles are congruent
4. Consecutive Angles are supplementary
5. Diagonals bisect each other

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**The properties of a rectangle and its diagonals:**

1. All angles are right
2. Opposite Sides are parallel
3. Opposite Sides are congruent
4. Diagonals bisect each other
5. Diagonals are congruent

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**The properties of a rhombus and its diagonals:**

1. Opposite angles are congruent
2. Opposite Sides are parallel
3. All Sides are congruent
4. Consecutive angles are supplementary
5. Diagonals are perpendicular
6. Diagonals bisect interior angles.

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**The properties of a square and its diagonals:**

1. All angles are right
2. Opposite Sides are parallel
3. All Sides are congruent
4. Diagonals bisect each other
5. Diagonals are perpendicular
6. Diagonals bisect angles
7. Diagonals are congruent
Find the value of \( x \) in each diagram below using properties of quadrilaterals.

1. \( x = \)

2. \( x = \)

3. \( x = \)

4. \( x = \)

5. \( x = \)

6. \( x = \)
Plot points A(3, -1), B(-1, 2), C(4, 2), and D(2, -1).
1. What specialized geometric figure is quadrilateral ABCD? Support your answer mathematically.

2. Draw the diagonals of ABCD. Find the coordinates of the midpoint of each diagonal. What do you notice?

3. Find the slopes of the diagonals of ABCD. What do you notice?

4. The diagonals of ABCD create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?

Plot points E(1, 2), F(2, 5), G(4, 3) and H(5, 6).
5. What specialized geometric figure is quadrilateral EFHG? Support your answer mathematically using two different methods.

6. Draw the diagonals of EFHG. Find the coordinates of the midpoint of each diagonal. What do you notice?

7. Find the slopes of the diagonals of EFHG. What do you notice?

8. The diagonals of EFHG create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?
Plot points $P(4, 1)$, $W(-2, 3)$, $M(2, -5)$, and $K(-6, -4)$.

9. What specialized geometric figure is quadrilateral $PWKM$? Support your answer mathematically.

10. Draw the diagonals of $PWKM$. Find the coordinates of the midpoint of each diagonal. What do you notice?

11. Find the lengths of the diagonals of $PWKM$. What do you notice?

12. Find the slopes of the diagonals of $PWKM$. What do you notice?

13. The diagonals of $ABCD$ create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?

Plot points $A(1, 0)$, $B(-1, 2)$, and $C(2, 5)$.

14. Find the coordinates of a fourth point $D$ that would make $ABCD$ a rectangle. Justify that $ABCD$ is a rectangle.

15. Find the coordinates of a fourth point $D$ that would make $ABCD$ a parallelogram that is not also a rectangle. Justify that $ABCD$ is a parallelogram but is not a rectangle.