Practice 1.10.1: Proving Properties of Parallelograms

Use slope to determine whether the given vertices form a parallelogram.

1. A (–2, –1), B (–1, 3), C (4, 3), and D (3, –1)

2. F (–1, 1), G (1, 3), H (4, –2), and I (2, –4)

Use the distance formula to determine whether the given vertices form a parallelogram.

3. J (0, 0), K (1, 5), L (4, 6), and M (3, 0)

4. M (0, 8), N (–1, 2), O (5, 6), and P (6, 12)

Use the midpoint formula to determine whether the given vertices form a parallelogram.

5. P (–2, 2), Q (1, 8), R (4, 5), and S (3, –2)

6. D (2, 2), E (4, 5), F (10, 6), and G (8, 3)

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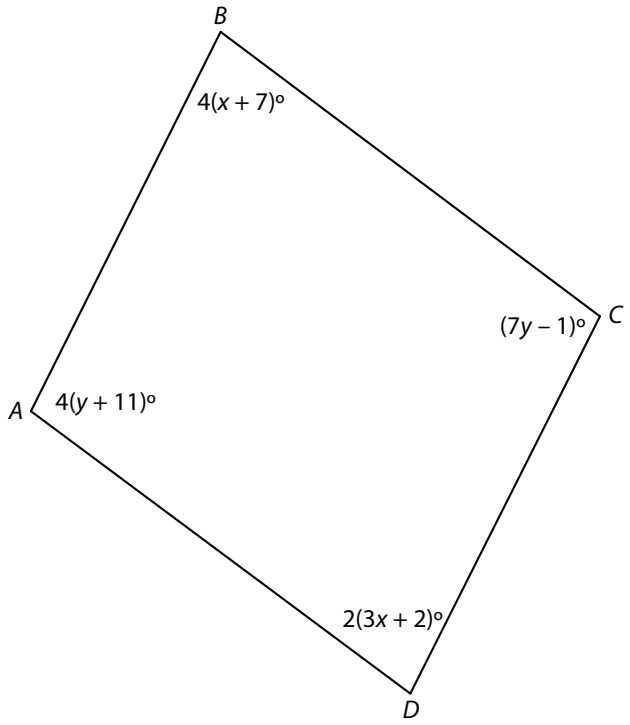
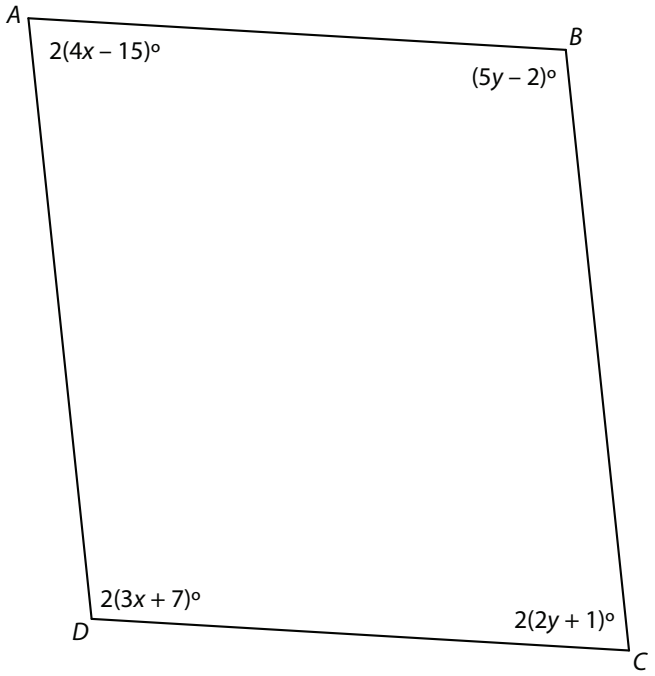
Determine the unknown angle measures and the values of x and y that make quadrilateral $ABCD$ a parallelogram.

7.



8.



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Lesson 1.10.2: Proving Properties of Special Quadrilaterals

Warm-Up 1.10.2

You are taking a road trip from Carrollton, Georgia, to Campton, Georgia, traveling through Atlanta. Your best efforts to avoid traffic will take you around the city of Atlanta, but you want to know how far it is "as the crow flies" (moving in a straight line) between Carrollton and Campton.

1. When looking at a map with a grid, if Carrollton lies at (2, 2) and Campton lies at (10, 4.5), calculate the distance between those two cities if 1 unit on the grid is approximately 10 miles.

2. If Atlanta is the midpoint between the two cities, where does Atlanta lie on the grid?

3. What is the distance between Atlanta and each of the cities?

4. What is the slope of the line that passes through these three cities?

5. What is the slope of a line perpendicular to the line through the cities?

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Practice 1.10.2: Proving Properties of Special Quadrilaterals

For problems 1–8, use the given coordinates as well as slope, distance, midpoints, and/or diagonals to classify each quadrilateral in as many ways as possible (parallelogram, rectangle, rhombus, square, kite, trapezoid, or isosceles trapezoid). Justify your answers.

1. A (–5, 6), B (3, –3), C (0, –6), D (–9, 3)

2. E (0, 2), F (4, 2), G (4, –2), H (–1, –3)

3. I (–6, 7), J (–3, 4), K (–6, 1), L (–9, 4)

4. M (–3, 8), N (2, 5), O (–1, 0), P (–6, 3)

5. P (1, 5), Q (5, 2), R (3, –1), S (–1, 2)

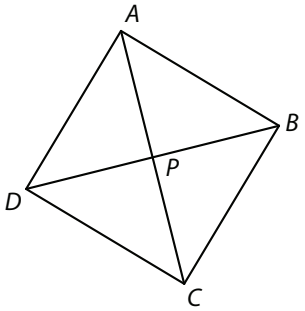
6. T (–6, –4), U (6, –4) V (3, –8), W (–3, –8)

7. W (3, 3), X (8, 1), Y (4, –9), Z (–1, –7)

8. A (2, –2), B (9, –2), C (9, –9), D (2, –9)

Use the information given in each problem that follows to write proofs.

9. Given that quadrilateral $ABCD$ below is a rhombus, prove that the diagonals form four congruent triangles.



10. Given the vertices of a rhombus, A (0, 0), B (b, c), $C\left(b+\sqrt{b^2+c^2}, c\right)$, and $D\left(\sqrt{b^2+c^2}, 0\right)$, prove that the diagonals form four right angles. (*Hint*: Think about the product of the slopes of perpendicular lines.)

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