

Name: _____

Date: _____

Period: _____

Chapter 11: Coordinate Geometry Proofs

Topic 4: Parallelogram Proofs

Do Now:

Given points A (-3, 16) and B (6, -4), find the midpoint, length & slope of $\overline{AB}$.

Recall: A **parallelogram** is a quadrilateral in which both pairs of opposite sides are parallel and congruent.

Properties of Parallelograms:

- Opposite sides are _____ and _____.
- Opposite angles are _____.
- Consecutive angles are _____.
- **Diagonals** _____.

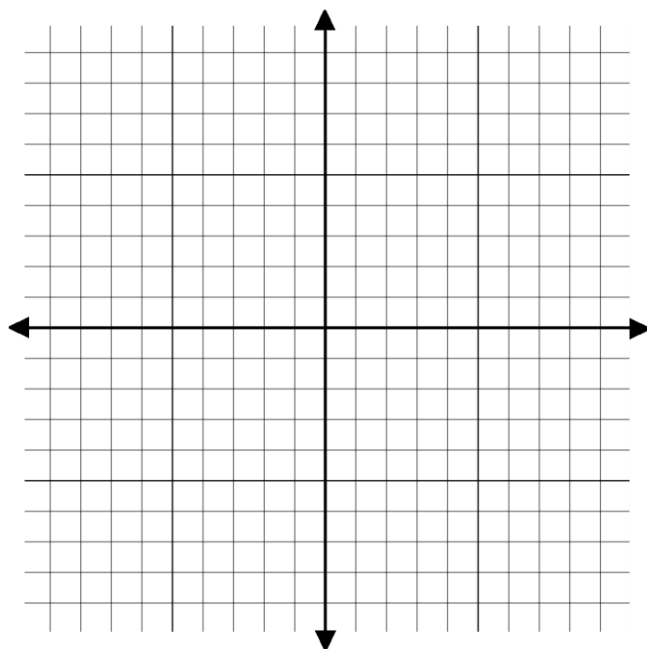
To prove that a Quadrilateral is a Parallelogram, we must prove that

_____ (midpoint twice).

Examples:

1. Prove that quadrilateral A(-4, 3), B(2, 7), C(5, 1), and D(-1, -3) is a parallelogram.

- *Plot and label the graph*
- *Midpoint & Work*

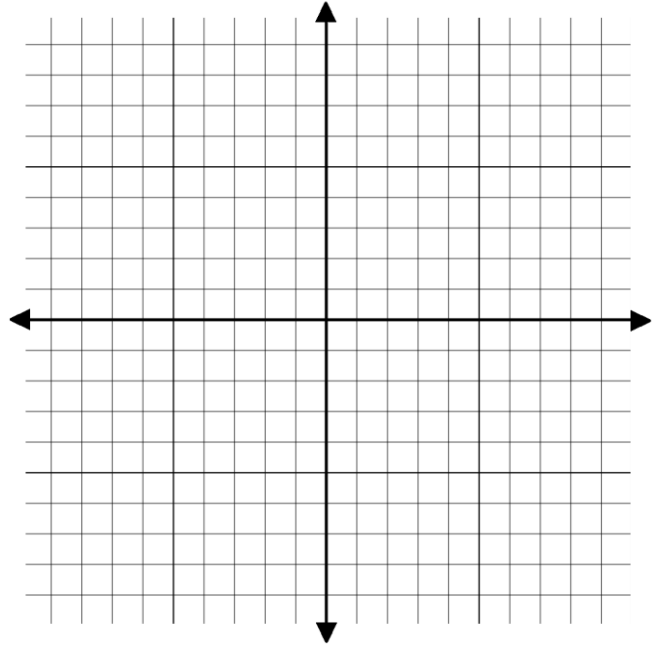


Conclusions

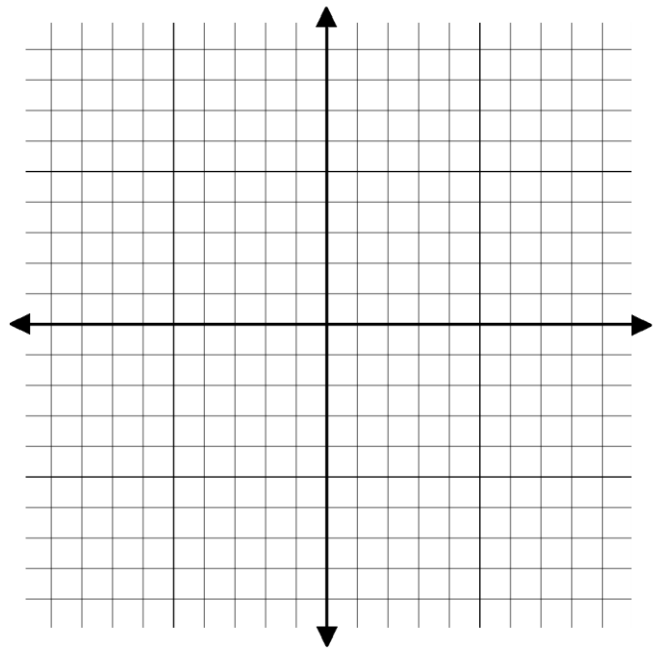
$\therefore \overline{AC}$ bisects $\overline{BD}$ because _____

$\therefore$ Quadrilateral ABCD is _____

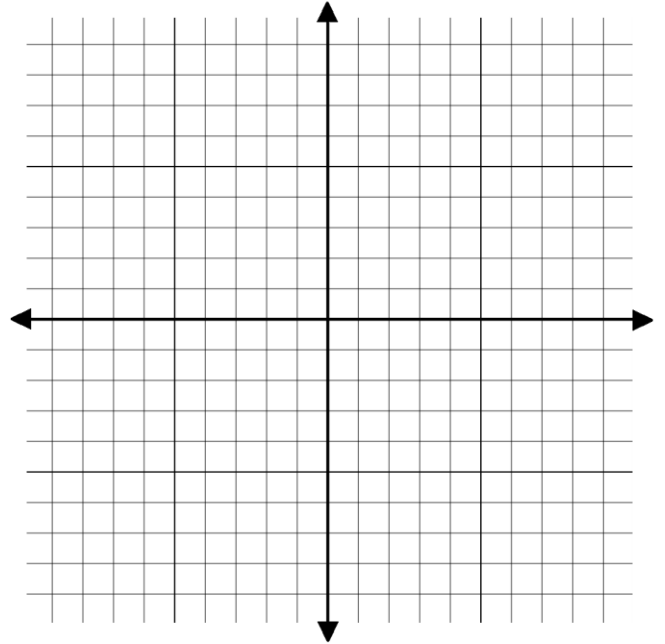
2. Prove that $E(-9, 4)$, $F(-2, 7)$, $G(4, -2)$ and $H(-3, -5)$ is a parallelogram.



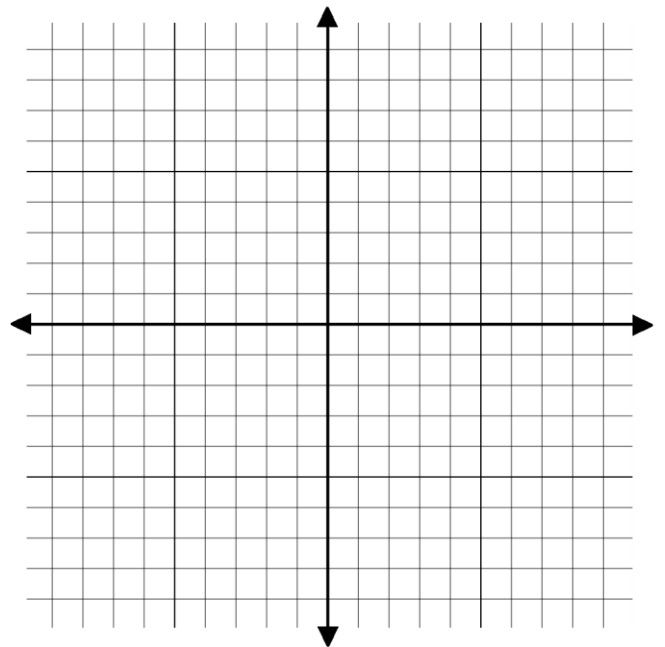
3. Determine if the quadrilateral $J(-2, 3)$, $K(1, 5)$, $L(2, 9)$, and $M(-1, 9)$ is a parallelogram.



4. Quadrilateral PQRS has vertices $P(4,4)$, $Q(6,1)$, $R(0,-3)$, and $S(-2,0)$. Show that PQRS is a parallelogram.



5. **Given:** $A(1,4)$, $B(5,4)$, $C(5,6)$, $D(1,6)$
Prove: This quadrilateral is a parallelogram.



What other shape does this look like?
What other information do we need to know for sure?

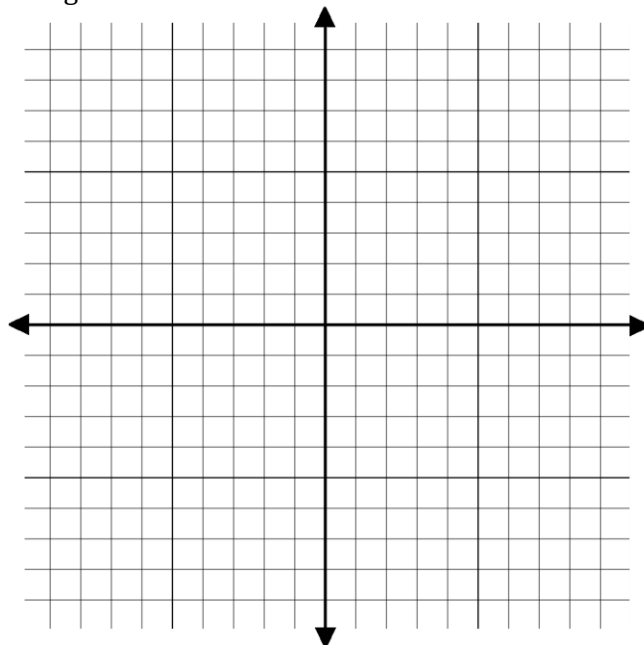
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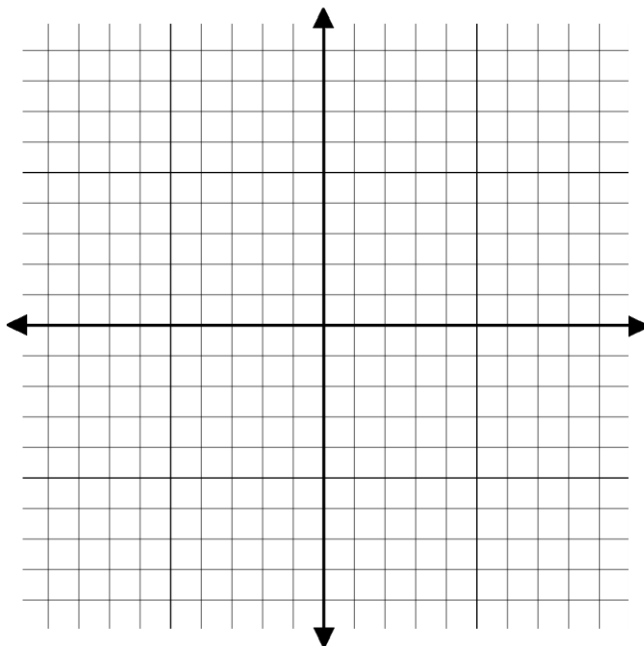
Parallelogram Proofs Homework

1. Prove that $A(-3,2)$, $B(-2,6)$, $C(2,7)$ and $D(1,3)$ is a parallelogram.



2. **Given:** Quadrilateral ABCD has vertices $A(-5, 6)$, $B(6, 6)$, $C(8, -3)$, and $D(-3, -3)$.

Prove: Quadrilateral ABCD is a parallelogram



3. Parallelogram ABCD has coordinates $A(1, 5)$, $B(6, 3)$, $C(3, -1)$, and $D(-2, 1)$. What are the coordinates of E, the intersection of diagonals AC and BD?

(a) $(2, 2)$

(b) $(4.5, 1)$

(c) $(3.5, 2)$

(d) $(-1, 3)$

Review Questions:

4. What is an equation of the line that is perpendicular to the line whose equation is $y = \frac{3}{5}x - 2$ and that passes through the point $(3, -6)$?
5. Given the equations $y = x^2 - 6x + 10$ and $y + x = 4$, what is the solution to the given system of equations?
6. True or False:
- (a) All trapezoids are quadrilaterals. _____
 - (b) All parallelograms are trapezoids. _____
 - (c) All rectangles are parallelograms. _____
 - (d) All quadrilaterals are squares. _____
 - (e) All squares are rhombuses. _____
 - (f) All isosceles trapezoids are quadrilaterals. _____
 - (g) All rhombuses are rectangles. _____
 - (h) All quadrilaterals are rhombuses. _____