

# Geometry

NAME: \_\_\_\_\_

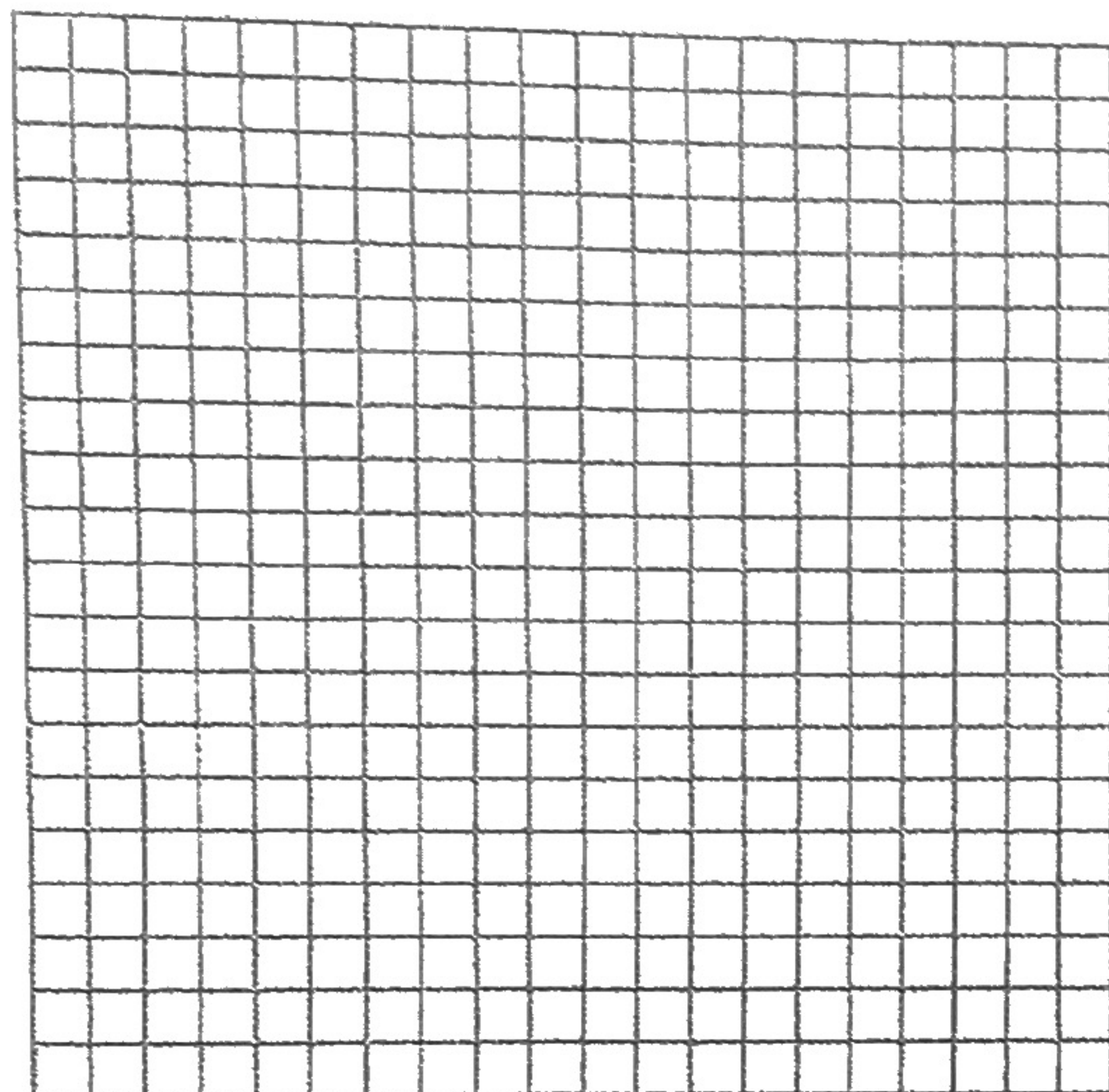
WORKSHEET: *Quadrilaterals in the Plane*

PERIOD: \_\_\_\_\_ DATE: \_\_\_\_\_

## Quadrilaterals in the Coordinate Plane

- A) Given the vertices of a quadrilateral, it can be classified by characterizing its sides. You start by calculating the length and slope of each side.

Classify quadrilateral LION with vertices L(-5, -2), I(1, 2), O(3, -1), N(-3, -5)

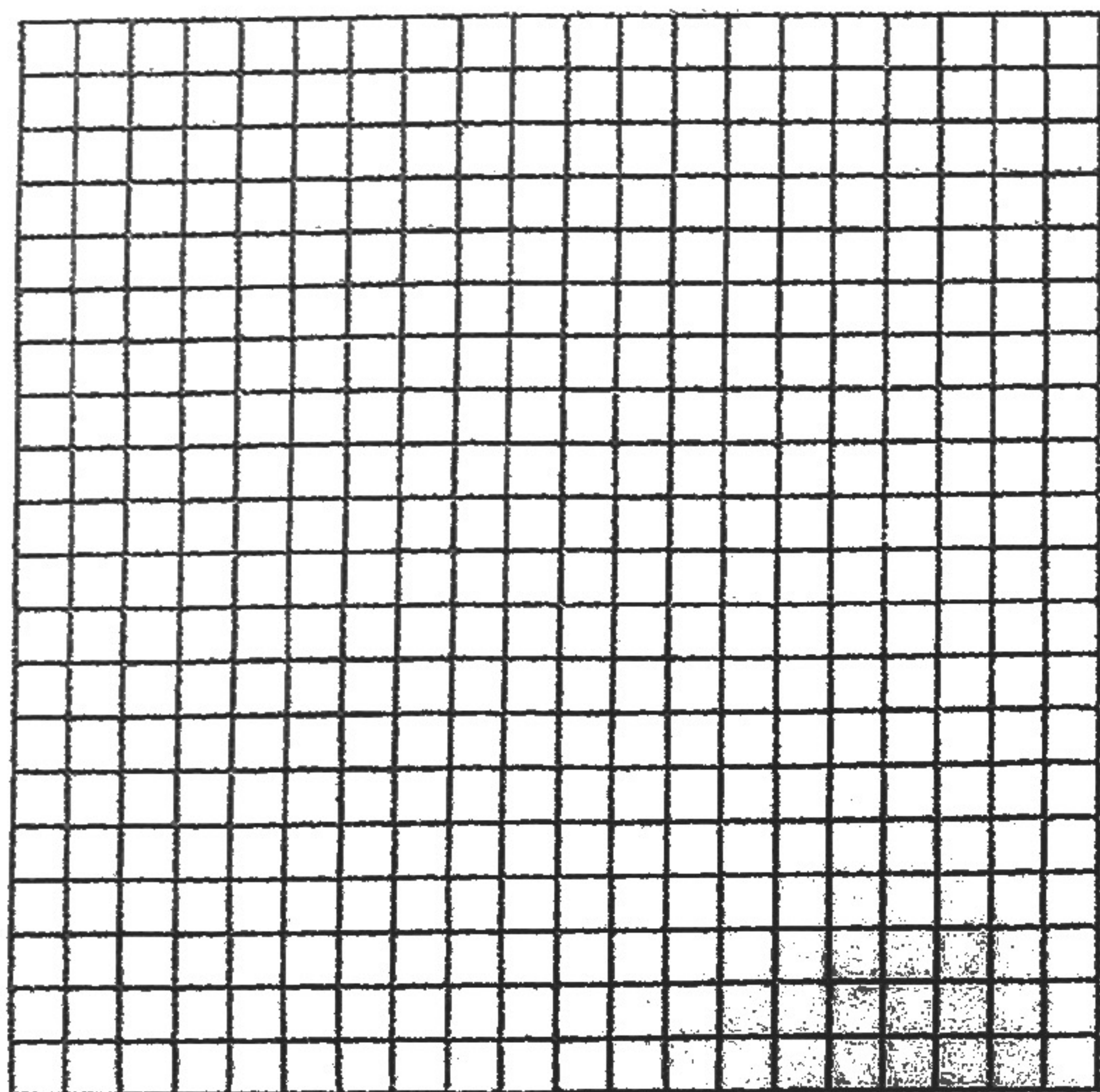


	Length	Slope
LI	$2\sqrt{13}$	$\frac{-2-2}{-5-1} = \frac{-4}{-6} = \frac{2}{3}$
IO	$\sqrt{13}$	$\frac{2+1}{1-3} = \frac{3}{-2} = -\frac{3}{2}$
ON	$2\sqrt{13}$	$\frac{-1+5}{3+3} = \frac{4}{6} = \frac{2}{3}$
NL	$\sqrt{13}$	$\frac{-5-2}{-3-(-5)} = \frac{-7}{-2} = \frac{7}{2}$

[Rectangle]

- B) A quadrilateral can also be classified by characterizing its diagonals. You start by calculating the length, slope, and midpoints of each diagonal.

Classify quadrilateral TIGR, with vertices T(-3, 4), I(-1, 5), G(2, -1), R(0, -2)



Length

TG  $\sqrt{(-3-2)^2 + (4-(-1))^2} = 5\sqrt{2}$

IR  $\sqrt{(-1-0)^2 + (5-(-2))^2} = 5\sqrt{2}$

} rectangle or square

Slope

TG  $\frac{4-(-1)}{-3-2} = \frac{5}{-5} = -1$

IR  $\frac{5+2}{-1-0} = \frac{7}{-1} = -7$

} rectangle (not square)

Midpoint

TG  $\frac{-3+2}{2}, \frac{4+(-1)}{2} = \frac{-1}{2}, \frac{3}{2}$

IR  $\frac{-1+0}{2}, \frac{5+(-2)}{2} = \frac{-1}{2}, \frac{3}{2}$

[Rectangle]



Quadrilaterals in the Coordinate Plane

A) Classify these quadrilaterals by calculating the length and slope *of the sides* and determining the shape *based on these calculations only*.

*Problem 1:* Classify quadrilateral BEAR, where B(-1, 4), E(2, 5), A(3, 2), R(0, 1)

	<u>Length</u>	<u>Slope</u>	
BE	$\sqrt{10}$	$\frac{1}{3}$	[square]
EA	$\sqrt{10}$	-3	
AR	$\sqrt{10}$	$\frac{1}{3}$	
BR or RB	$\sqrt{10}$	-3	

*Problem 2:* Classify quadrilateral OHMY, where O(-1, 4), H(2, 3), M(4, -3), Y(1, -2)

	<u>Length</u>	<u>Slope</u>	
OH	$\sqrt{10}$	$-\frac{1}{3}$	[parallelogram]
HM	<del><math>\sqrt{10}</math></del> $2\sqrt{10}$	-3	
MY	$\sqrt{10}$	$-\frac{1}{3}$	
OY (or YO)	<del><math>\sqrt{10}</math></del> $2\sqrt{10}$	-3	



B) Classify these quadrilaterals by calculating the length, slope, and midpoints of the diagonals and determining the shape based on these calculations only.

Problem 3: Classify quadrilateral WZRD, where  $W(0, 3)$ ,  $Z(5, 3)$ ,  $R(8, -1)$ ,  $D(3, -1)$

	<u>Length</u>	<u>Slope</u>	<u>midpoint</u>
WR	$4\sqrt{5}$	$-\frac{1}{2}$	$(4, 1)$
ZD	$2\sqrt{5}$	$2$	$(4, 1)$
	$\checkmark$ parallelogram or rhombus	$\checkmark$ rhombus	

Problem 4: Classify quadrilateral AHSZ, where  $A(-2, 1)$ ,  $H(2, 2)$ ,  $S(5, -4)$ ,  $Z(1, -5)$

	<u>Length</u>	<u>Slope</u>	<u>midpoint</u>
<del>AS</del>	$\sqrt{74}$	<del> </del> $-\frac{5}{7}$	$(\frac{3}{2}, -\frac{3}{2})$
<del>HS</del>	$5\sqrt{2}$	$7$	$(\frac{3}{2}, -\frac{3}{2})$
<del>AS</del>	$\checkmark$ parallelogram rhombus	parallelogram	



# Geometry

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PERIOD: \_\_\_\_\_ DATE: \_\_\_\_\_

ALL OF THE FOLLOWING INFORMATION WAS FOUND USING THE COORDINATES OF THE VERTICES OF A QUADRILATERAL. USE THIS INFORMATION TO CLASSIFY EACH QUADRILATERAL AS A:

SQUARE...RECTANGLE...RHOMBUS...TRAPEZOID...ISOSCELES TRAPEZOID...KITE... OR JUST A GENERIC PARALLELOGRAM OR A GENERIC QUADRILATERAL

1) Classify quadrilateral **BEAR**, where:

$$\text{Slope of } \overline{BE} = \frac{1}{3}$$

$$\text{Slope of } \overline{EA} = -3$$

$$\text{Slope of } \overline{AR} = \frac{1}{3}$$

$$\text{Slope of } \overline{BR} = -3$$

$$\text{Length of } \overline{BE} = \sqrt{10}$$

$$\text{Length of } \overline{EA} = \sqrt{10}$$

$$\text{Length of } \overline{AR} = \sqrt{10}$$

$$\text{Length of } \overline{BR} = \sqrt{10}$$

**BEAR** is a square

2) Classify quadrilateral **OHMY**, where:

$$\text{Slope of } \overline{OH} = -\frac{1}{3}$$

$$\text{Slope of } \overline{HM} = -3$$

$$\text{Slope of } \overline{MY} = -\frac{1}{3}$$

$$\text{Slope of } \overline{OY} = -3$$

$$\text{Length of } \overline{OH} = \sqrt{10}$$

$$\text{Length of } \overline{HM} = 2\sqrt{10}$$

$$\text{Length of } \overline{MY} = \sqrt{10}$$

$$\text{Length of } \overline{OY} = 2\sqrt{10}$$

**OHMY** is a parallelogram

(not a rectangle b/c slopes are not perp)

not perp. b/c not opposite signs

3) Classify quadrilateral **WZRD**, where:

$$\text{Slope of } \overline{WZ} = 0$$

$$\text{Slope of } \overline{ZR} = -\frac{4}{3}$$

$$\text{Slope of } \overline{RD} = 0$$

$$\text{Slope of } \overline{WD} = -\frac{4}{3}$$

$$\text{Length of } \overline{WZ} = 5$$

$$\text{Length of } \overline{ZR} = 5$$

$$\text{Length of } \overline{RD} = 5$$

$$\text{Length of } \overline{WD} = 5$$

**WZRD** is a rhombus

4) Classify quadrilateral **AHSZ**, where:

$$\text{Slope of } \overline{AH} = \frac{1}{4}$$

$$\text{Slope of } \overline{SZ} = \frac{6}{7}$$

$$\text{Slope of } \overline{HS} = -4$$

$$\text{Slope of } \overline{ZA} = \frac{9}{2}$$

$$\text{Length of } \overline{AH} = \sqrt{17}$$

$$\text{Length of } \overline{SZ} = \sqrt{85}$$

$$\text{Length of } \overline{HS} = \sqrt{17}$$

$$\text{Length of } \overline{ZA} = \sqrt{85}$$

**AHSZ** is a none

opp sides are not parallel



## USING DIAGONALS TO CLASSIFY QUADRILATERALS

If this is true...	Then the quadrilateral is possibly a... (list all)	How would you use coordinates to confirm this?
(A) Diagonals bisect each other.	parallelogram rectangle rhombus square	midpoint formula
(B) Diagonals are perpendicular.	rhombus square	Slope formula
(C) Diagonals are congruent.	rectangle square	distance formula

SQUARE...RECTANGLE...RHOMBUS...TRAPEZOID...ISOSCELES TRAPEZOID...KITE...  
OR JUST A GENERIC PARALLELOGRAM OR A GENERIC QUADRILATERAL

Name all possible quadrilaterals that have the combinations of properties listed below:

- 1) Both (A) and (B) are true. Possibilities: rhombus, square
- 2) Both (B) and (C) are true. Possibilities: square
- 3) (A), (B), and (C) are all true. Possibilities: square
- 4) Both (A) and (B) are true, (C) is false. Possibilities: rhombus, parallelogram
- 5) Both (A) and (C) are true, (B) is false. Possibilities: parallelogram, rectangle
- 6) Both (B) and (C) are true, (A) is false. Possibilities: none
- 7) (A) is true, (B) and (C) are false. Possibilities: parallelogram
- 8) (B) is true, (A) and (C) are false. Possibilities: none
- 9) (A), (B), and (C) are all false. Possibilities: none