Lesson Context

BIG PICTURE of this UNIT:	• mastery with algebraic skills to be used in our work with co-ordinate geometry (midpoint, length, slope) • understanding various geometric properties of quadrilaterals & triangles • how do you really prove that something is "true"?		
CONTEXT of this LESSON:	Where we've been You know how to find a midpoint, a length & slope and how to work with GeoGebra	Where we are Using length, slope & midpoint in classifying geometric figures	Where we are heading How can I prove various geometric properties of quadrilaterals and triangles?

Lesson Objectives:

a. Review the properties of quadrilaterals through GeoGebra
b. Use algebraic methods to classify triangles

Warm-up:

Distance/Length: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$ Midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

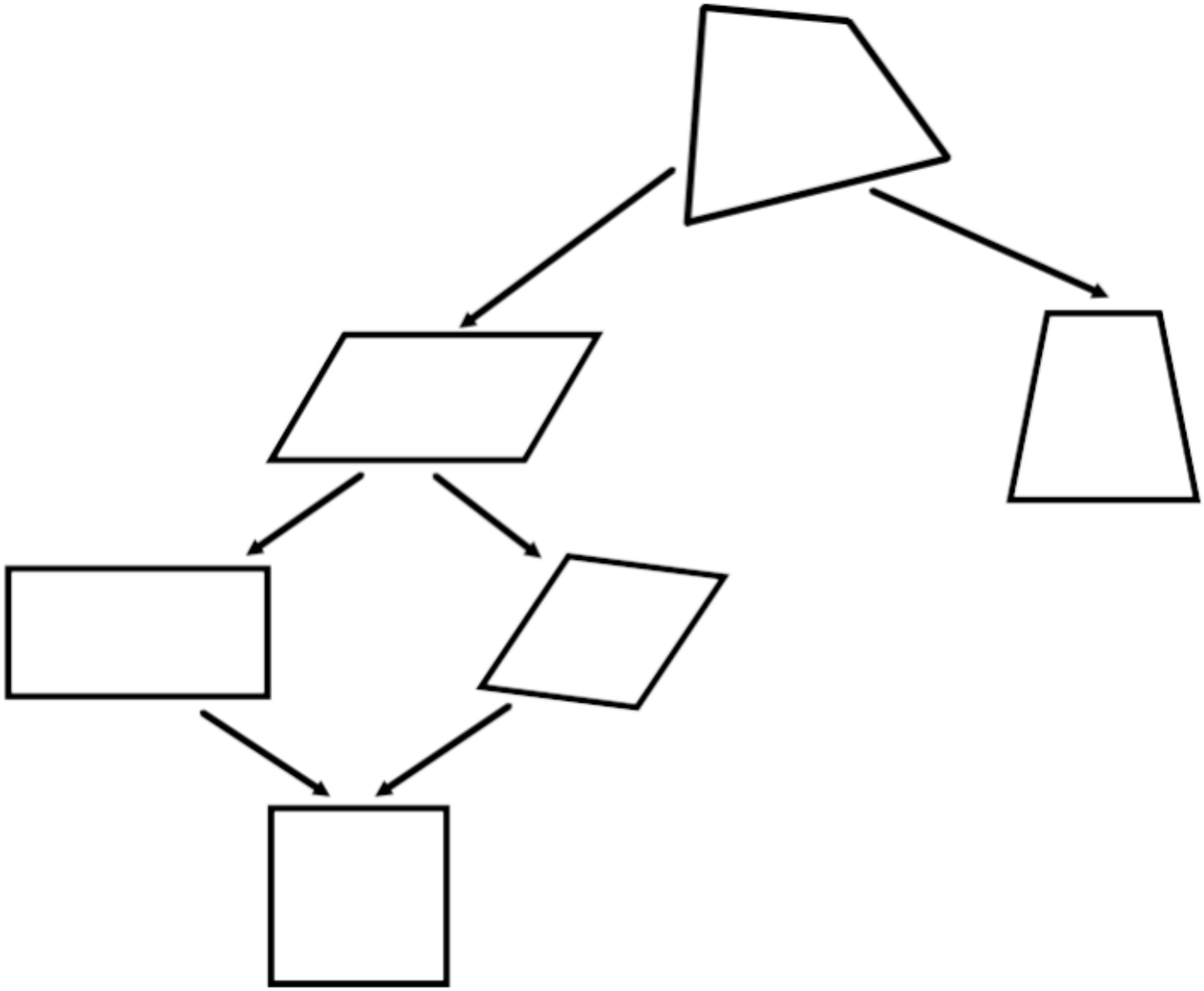
Given the two points **S(10,-3)** and **T(-7,-5)**. Find the:

a. distance b. slope c. midpoint

A: Exploring Quadrilaterals – through dynamic geometry software: GeoGebra

Quadrilateral Type:	**Use these points to construct each shape on GeoGebra:**	**Properties:**	**DESCRIBE how you would confirm each property ALGEBRAICALLY:**
Square	A(-1, -2) B(5, 2) C(1, 8) D(-5,4)		
Rhombus	A(-4, 4) B(1, 6) C(-1, 1) D(-6, -1)		
Rectangle	A(-6, 1) B(-3, -2) C(2, 3) D(-1,6)		
Parallelogram	A(-3, 2) B(4, 4) C(2, -1) D(-5, -3)		
Trapezoid	A(-3, 4) B(3, 2) C(2, -1) D(-5, -2)		
Quadrilateral	A(-3, 5) B(2, 2) C(4, -3) D(-5, -1)		

B: Quadrilateral Flow Chart:



C: Classifying Quadrilaterals given slopes and lengths of each side:

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

Slope of $\overline{BE} = \frac{1}{3}$
Slope of $\overline{EA} = -3$
Slope of $\overline{AR} = \frac{1}{3}$
Slope of $\overline{BR} = -3$

Length of $\overline{BE} = \sqrt{10}$
Length of $\overline{EA} = \sqrt{10}$
Length of $\overline{AR} = \sqrt{10}$
Length of $\overline{BR} = \sqrt{10}$

BEAR is a _____.

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

Slope of $\overline{OH} = -\frac{1}{3}$
Slope of $\overline{HM} = -3$
Slope of $\overline{MY} = -\frac{1}{3}$
Slope of $\overline{OY} = -3$

Length of $\overline{OH} = \sqrt{10}$
Length of $\overline{HM} = 2\sqrt{10}$
Length of $\overline{MY} = \sqrt{10}$
Length of $\overline{OY} = 2\sqrt{10}$

OHMY is a _____.

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

Slope of $\overline{WZ} = 0$
Slope of $\overline{ZR} = -\frac{4}{3}$
Slope of $\overline{RD} = 0$
Slope of $\overline{WD} = -\frac{4}{3}$

Length of $\overline{WZ} = 5$
Length of $\overline{ZR} = 5$
Length of $\overline{RD} = 5$
Length of $\overline{WD} = 5$

WZRD is a _____.

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

Slope of $\overline{AH} = \frac{1}{4}$
Slope of $\overline{SZ} = \frac{6}{7}$
Slope of $\overline{HS} = -4$
Slope of $\overline{ZA} = \frac{9}{2}$

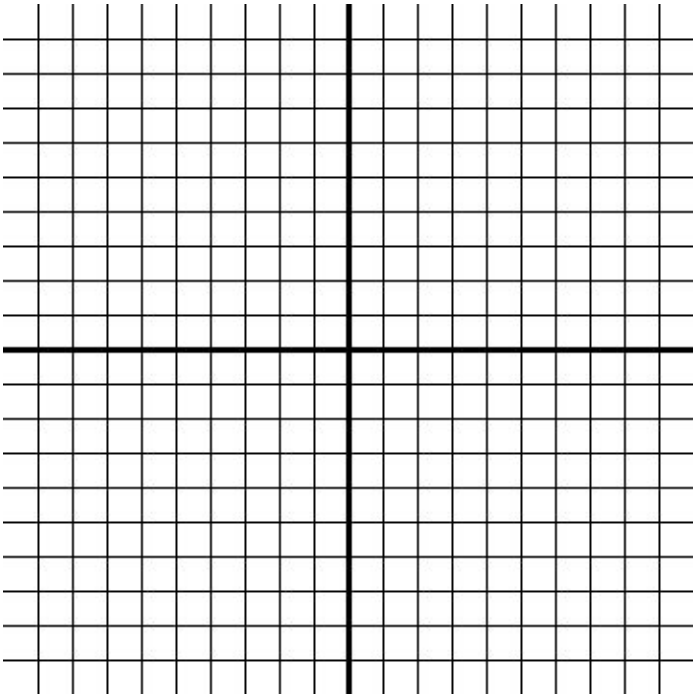
Length of $\overline{AH} = \sqrt{17}$
Length of $\overline{SZ} = \sqrt{85}$
Length of $\overline{HS} = \sqrt{17}$
Length of $\overline{ZA} = \sqrt{85}$

AHSZ is a _____.

D: Classifying Quadrilaterals in the coordinate plane:

Classify quadrilateral ABCD with vertices at A(4,7), B(9,7), C(6,3), D(1,3).

Step 1: Plot the points in the coordinate plane.



Step 2: Use the distance formula to find the length of each side:

AB =

BC =

CD =

DA =

Step 3: Check for parallel lines and right angles by checking the slopes of each side.

The slope of $\overline{AB}$ =

The slope of $\overline{BC}$ =

The slope of $\overline{CD}$ =

The slope of $\overline{DA}$ =

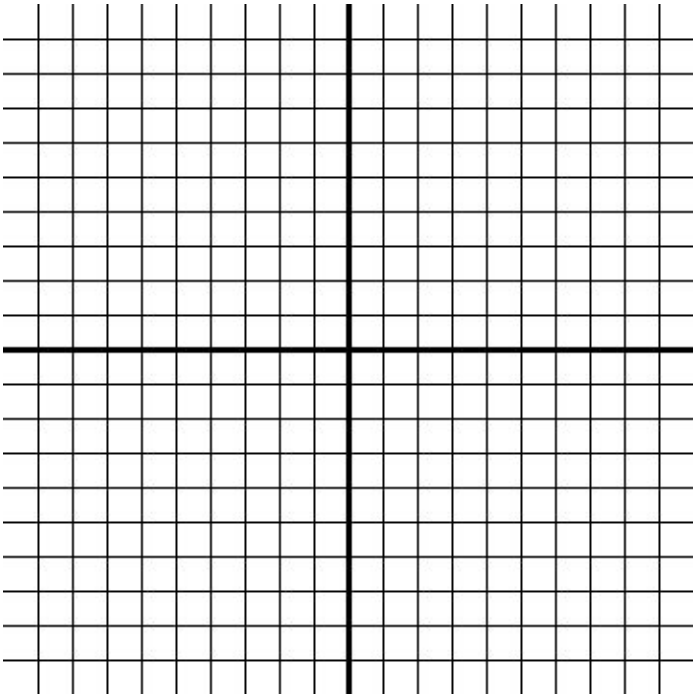
Step 4: Classify ABCD.

Therefore ABCD is a _____.

E: Classifying Quadrilaterals in the coordinate plane:

Classify quadrilateral ABCD with vertices at A(-2,5), B(1,8), C(4,5), D(1,2).

Step 1: Plot the points in the coordinate plane.



Step 2: Use the distance formula to find the length of each side:

AB =

BC =

CD =

DA =

Step 3: Check for parallel lines and right angles by checking the slopes of each side.

The slope of $\overline{AB}$ =

The slope of $\overline{BC}$ =

The slope of $\overline{CD}$ =

The slope of $\overline{DA}$ =

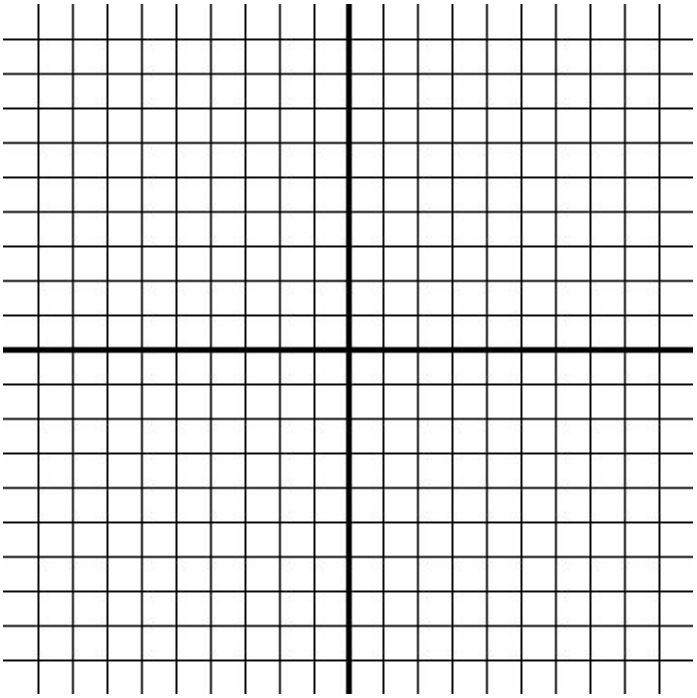
Step 4: Classify ABCD.

Therefore ABCD is a _____.

F: Classifying Quadrilaterals in the coordinate plane:

Classify quadrilateral ABCD with vertices at A(3,6), B(9,-2), C(5,-8), D(-5,-6).

Step 1: Plot the points in the coordinate plane.



Step 2: Use the distance formula to find the length of each side:

AB =

BC =

CD =

DA =

Step 3: Check for parallel lines and right angles by checking the slopes of each side.

The slope of $\overline{AB}$ =

The slope of $\overline{BC}$ =

The slope of $\overline{CD}$ =

The slope of $\overline{DA}$ =

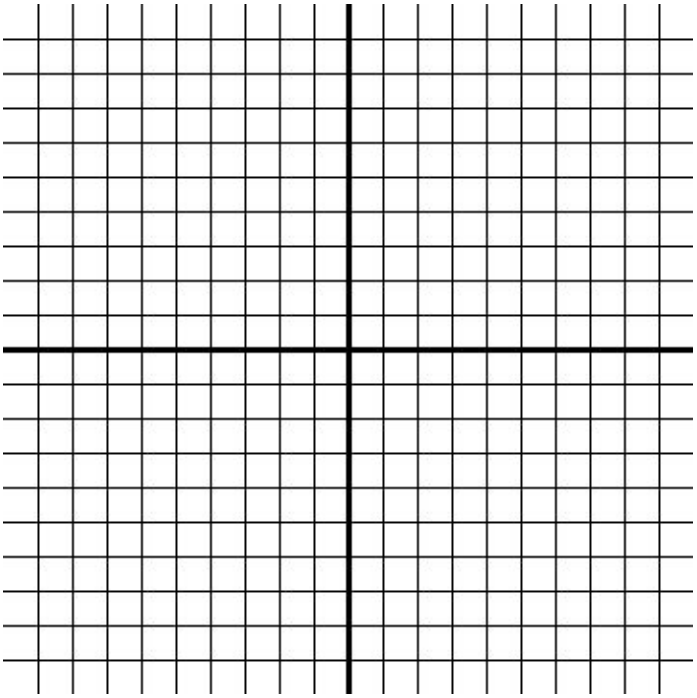
Step 4: Classify ABCD.

Therefore ABCD is a _____.

G: Classifying Quadrilaterals in the coordinate plane:

Classify quadrilateral ABCD with vertices at A(-5,4), B(5,4), C(5,-5), D(-5,-5).

Step 1: Plot the points in the coordinate plane.



Step 2: Use the distance formula to find the length of each side:

AB =

BC =

CD =

DA =

Step 3: Check for parallel lines and right angles by checking the slopes of each side.

The slope of $\overline{AB}$ =

The slope of $\overline{BC}$ =

The slope of $\overline{CD}$ =

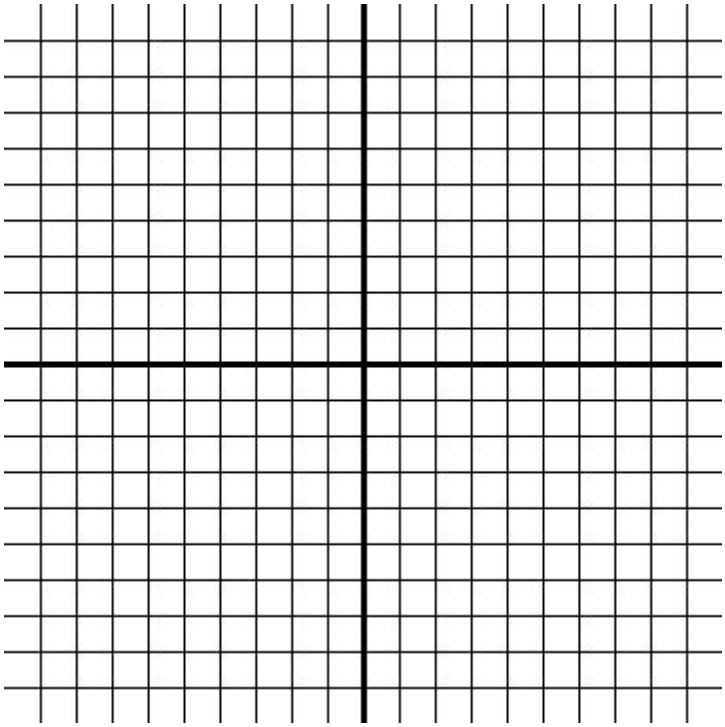
The slope of $\overline{DA}$ =

Step 4: Classify ABCD.

Therefore ABCD is a _____.

H: Classifying Quadrilaterals in the coordinate plane:

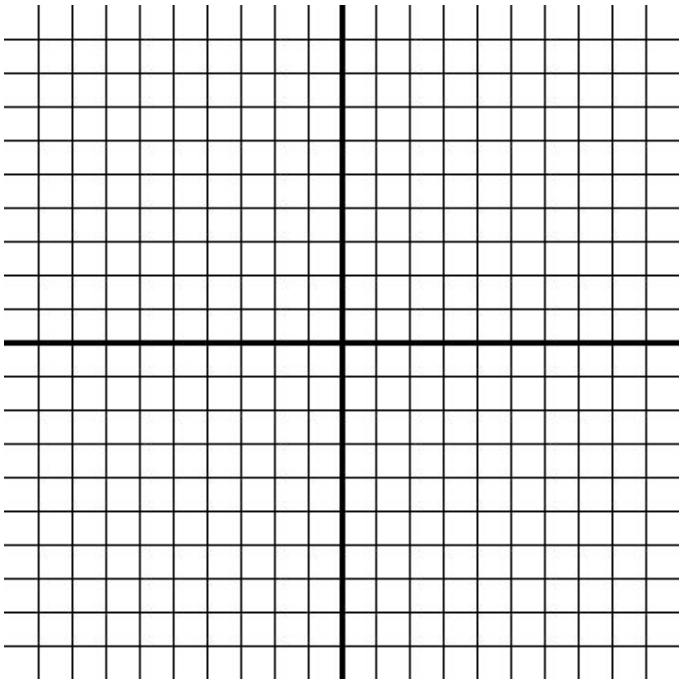
Graph quadrilateral ABCD which has coordinates:
A(-2,-3)
B(0,4)
C(6,4)
D(4,-3)



Classify quadrilateral ABCD.

I: Classifying Quadrilaterals in the coordinate plane:

Graph quadrilateral ABCD which has coordinates
A(-5,3)
B(-1,5)
C(1,-4)
D(-3,-5)



Classify quadrilateral ABCD.