Justifying with Coordinate Geometry

~~#5~~ 5

Name: Key

Date: _____ Period: ____

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

Given coordinate points for quadrilateral ABCD, calculate side lengths and slopes and use them to justify what type of quadrilateral it is.

Coordinates: A (-4, 5) B (-1 , 5) C (2 , -1) D (-4 , 2)

Side Coords.	Side Length Work (d):	Side Slope Work (m):
AB (-4, 5) (-1, 5)	$d = \sqrt{(-4--1)^2+(5-5)^2}$ $d = \sqrt{(-3)^2+(0)^2}$ $d = \sqrt{9}$ $= 3$ units 3 units	$m = \frac{5-5}{-1--4} = \frac{0}{3} = 0$ 0
BC (-1, 5) (2, -1)	$d = \sqrt{(-1-2)^2+(5--1)^2}$ $d = \sqrt{(-3)^2+(6)^2}$ $d = \sqrt{9+36}$ $d = \sqrt{45} \approx 6.71$ units ≈ 6.71 units	$m = \frac{-1-5}{2--1} = \frac{-6}{3} = -2$ -2
CD (2, -1) (-4, 2)	$d = \sqrt{(2--4)^2+(-1-2)^2}$ $d = \sqrt{(6)^2+(-3)^2}$ $d = \sqrt{36+9}$ $d = \sqrt{45} \approx 6.71$ units ≈ 6.71 units	$m = \frac{2--1}{-4-2} = \frac{3}{-6} = -\frac{1}{2}$ $-\frac{1}{2}$
AD (-4, 5) (-4, 2)	$d = \sqrt{(-4--4)^2+(5-2)^2}$ $d = \sqrt{0^2+3^2}$ $d = \sqrt{9}$ $= 3$ units 3 units	$m = \frac{2-5}{-4--4} = \frac{-3}{0} = \emptyset$ undefined

Diagonal Coords.	Diagonal Lengths	Diagonal Slopes	Diagonal Midpoints
AC (-4, 5) (2, -1)	$d = \sqrt{(2--4)^2+(-1-5)^2}$ $d = \sqrt{6^2+(-6)^2}$ $d = \sqrt{36+36}$ $= \sqrt{72} \approx 8.49$ units ≈ 8.49 units	$m = \frac{-1-5}{2--4} = \frac{-6}{6}$ -1	$\left(\frac{-4+2}{2}, \frac{5+-1}{2}\right)$ $\left(\frac{-6}{2}, \frac{+4}{2}\right)$ (-3, +2)
BD (-1, 5) (-4, 2)	$d = \sqrt{(-4--1)^2+(2-5)^2}$ $d = \sqrt{(-3)^2+(-3)^2}$ $d = \sqrt{9+9}$ $d = \sqrt{18} \approx 4.24$ un ≈ 4.24 units	$m = \frac{2-5}{-4--1} = \frac{-3}{-3}$ 1	$\left(\frac{-1+-4}{2}, \frac{5+2}{2}\right)$ $\left(\frac{-5}{2}, \frac{7}{2}\right)$ (-2.5, 3.5)

Summarize your calculations (from the front) in the table below. Then, use the table to help you brainstorm and write your justification.

Sides	Side Length	Side Slope
AB	3 units	0
BC	≈ 6.71 units	−2
CD	≈ 6.71 units	$-\frac{1}{2}$
AD	3 units	∅

Diagonals	Diagonal Lengths	Diagonal Slopes	Diagonal Midpoints
AC	≈ 8.49 un	−1	(−3, +2)
BD	≈ 4.24 un	1	(−2.5, 3.5)

Type of quadrilateral: _____

JUSTIFICATION #1 (Just side information):

- No pairs of parallel sides (Not in the parallelogram / trap family)
  - ↳ Kite or plain quad
- 2 pairs of consecutive sides ≅ (kite)
- 1 pair of ⊥ sides - 1 90° angles

Kite - with one right angle

JUSTIFICATION #2 (Diagonal & Side information):

- Diagonals not ≅ (para, [redacted], rhom, kite, plain quad)
- Diagonals are ⊥ - opposite reciprocal slopes (rhom, kite, plain quad)
- Diagonals do not bisect each other ([redacted] kite, plain quad)
- 2 pairs of consecutive sides ≅ (kite)

Kite