

Justifying with Coordinate Geometry

#4

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 (-2, 2) B (-2, -3) C (1, -5) D (1, 4)**

Side Coords.	Side Length Work (d):	Side Slope Work (m):
AB (-2, 2) (-2, -3)	$d = \sqrt{(-2 - -2)^2 + (-3 - 2)^2}$ $d = \sqrt{(0)^2 + (-5)^2}$ $d = \sqrt{25}$ $d = 5 \text{ units}$	$m = \frac{-3 - 2}{-2 - -2} = \frac{-5}{0} = \emptyset$ undefined
BC (-2, -3) (1, -5)	$d = \sqrt{(-2 - 1)^2 + (-3 - -5)^2}$ $d = \sqrt{(-3)^2 + (2)^2}$ $d = \sqrt{9 + 4}$ $d = \sqrt{13} \approx 3.61 \text{ units}$	$m = \frac{-5 - -3}{1 - -2} = \frac{-2}{3}$ $\frac{-2}{3}$
CD (1, -5) (1, 4)	$d = \sqrt{(1 - 1)^2 + (-5 - 4)^2}$ $d = \sqrt{0^2 + (-9)^2}$ $d = \sqrt{81}$ $d = 9 \text{ units}$	$m = \frac{4 - -5}{1 - 1} = \frac{9}{0} = \emptyset$ undefined
AD (-2, 2) (1, 4)	$d = \sqrt{(-2 - 1)^2 + (2 - 4)^2}$ $d = \sqrt{(-3)^2 + (-2)^2}$ $d = \sqrt{9 + 4}$ $d = \sqrt{13} \approx 3.61 \text{ units}$	$m = \frac{4 - 2}{1 - -2} = \frac{2}{3}$ $\frac{2}{3}$

Diagonal Coords.	Diagonal Lengths	Diagonal Slopes	Diagonal Midpoints
AC (-2, 2) (1, -5)	$d = \sqrt{(-2 - 1)^2 + (2 - -5)^2}$ $d = \sqrt{(-3)^2 + 7^2}$ $d = \sqrt{9 + 49}$ $d = \sqrt{58} \approx 7.62 \text{ units}$	$m = \frac{-5 - 2}{1 - -2} = \frac{-7}{3}$ $\frac{-7}{3}$	$(\frac{-2+1}{2}, \frac{2+-5}{2})$ $(-\frac{1}{2}, -\frac{3}{2})$
BD (-2, -3) (1, 4)	$d = \sqrt{(-2 - 1)^2 + (-3 - 4)^2}$ $d = \sqrt{(-3)^2 + (-7)^2}$ $d = \sqrt{9 + 49}$ $d = \sqrt{58} \approx 7.62 \text{ units}$	$m = \frac{4 - -3}{1 - -2} = \frac{7}{3}$ $\frac{7}{3}$	$(\frac{1+-2}{2}, \frac{-3+4}{2})$ $(-\frac{1}{2}, \frac{1}{2})$

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	5 un	\emptyset
BC	≈ 3.61 un	$-\frac{2}{3}$
CD	9 un	\emptyset
AD	≈ 3.61 un	$\frac{2}{3}$

Diagonals	Diagonal Lengths	Diagonal Slopes	Diagonal Midpoints
AC	≈ 7.62 un	$-\frac{7}{3}$	$(-\frac{1}{2}, -\frac{3}{2})$
BD	≈ 7.62 un	$\frac{7}{3}$	$(-\frac{1}{2}, \frac{1}{2})$

Type of quadrilateral: Isosceles Trapezoid

JUSTIFICATION #1 (Side Information ONLY):

- 1 pair of parallel sides (Not in the parallelogram family / Kite)
↳ trapezoid
- 2 \cong non-consecutive sides (isosceles trap)
- 0 slopes are \perp (not a right trapezoid)

isosceles trapezoid

JUSTIFICATION #2 (Diagonal & Side information):

- Diagonals \cong (rec, sq, isos trap, plain quad)
- Diagonal slopes are not \perp (rec, isos trap, plain quad)
- Diagonals do not bisect each other - do not share a midpoint (isos trap, plain quad).
- 1 pair of parallel sides (isos trap)

isosceles trapezoid