

ANSWER MAZE



CLASSIFYING QUADRILATERALS ON THE COORDINATE PLANE

The Most Specific Name: Quadrilaterals from Their Corners

Classifying quadrilaterals on the coordinate plane · one page · 10–15 minutes · nothing to prepare

FREE

4 $A(-3, 1)$, $B(1, -1)$, $C(2, 1)$ and $D(-2, 3)$

parallelogram → **go to box 2**

rectangle → **go to box 7**

Hint: After the opposite sides, check one corner. Multiply the slopes of AB and BC.

7 $A(-3, -2)$, $B(1, -1)$, $C(2, 3)$ and $D(-2, 2)$

square → **go to box 5**

rhombus → **go to box 1**

Hint: Matching sides do not settle the corners. Multiply the slopes of two sides that meet.

1. **Hand out page 3**, one per student, and scrap paper. No calculator is needed.
2. **Say this once:** *“Start at box 4. Each box gives the four corners of ABCD in order. Use slopes, side lengths and midpoints to find the most specific name. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **4 7 1 6 3 8**: six boxes, then out.

Student sheet	page 3, one per student. A box at the top shows the six names, what this sheet means by each, and which tool shows what.
Answers	page 4.

Every box gives a quadrilateral by its four corners, in order. Slopes show parallel sides and right angles. The squares of the side lengths, $(\text{across})^2 + (\text{up})^2$, show equal sides. The midpoints of the diagonals show whether the diagonals bisect each other. The answer is the most specific true name.

Each wrong name is one step off. A name that is true but not specific enough sends the student to box 2. It comes from stopping early: finding both pairs of sides parallel and writing “parallelogram” when the figure is a rectangle or a rhombus, or never checking the sides or the corners of a square. A name that is too strong sends the student to box 5. It comes from four equal sides called a square, one right angle called a rectangle, diagonals that bisect each other taken to be the same length, or one pair of parallel sides taken for two. Boxes 2 and 5 ask the same kind of question again, and both of their answers lead back to the route.

The row at the bottom is the check. A clean run is six numbers. Each wrong answer adds at least one more, and the extra box number tells you which way the name went wrong. Guessing does not get a student out: every simple guessing rule, such as always taking the more specific name, goes wrong within the first four boxes.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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Answer Maze — the most specific name

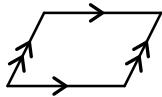
Start at box 4

Name _____

Period _____

Date _____

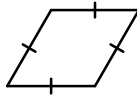
Start at box 4. **Each box gives the four corners of ABCD, in order. Write its most specific name.** The sides of ABCD are AB, BC, CD and DA. The diagonals are AC and BD. Pick one answer and go to the box it names. Write each box number in the row at the bottom as you go.



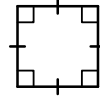
parallelogram
both pairs of opposite
sides parallel



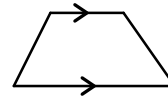
rectangle
a parallelogram with
four right angles



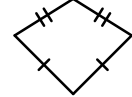
rhombus
four equal sides



square
four equal sides and four
right angles



trapezoid
at least one pair of
parallel sides



kite
two pairs of equal sides
next to each other

Give the most specific name. A square is also a rectangle and a rhombus. A rectangle and a rhombus are also parallelograms. A rhombus is also a kite. A trapezoid has *at least* one pair of parallel sides, so a parallelogram is also a trapezoid.

Slopes show parallel sides (equal slopes) and right angles (slopes that multiply to -1). Two vertical sides are parallel. A vertical side and a horizontal side are perpendicular.

Distances show equal lengths: compare the squares, (across)² + (up)². **Midpoints** show that the diagonals bisect each other: the two midpoints must match in *both* coordinates.

1 A(-2, -3), B(1, -2), C(2, 1) and D(-1, 0)

parallelogram → **go to box 2**

rhombus → **go to box 6**

Hint: After the slopes, compare the squares of two sides that meet, like AB^2 and BC^2 .

2 A(-1, -4), B(3, -3), C(2, 1) and D(-2, 0)

rhombus → **go to box 4**

square → **go to box 7**

Hint: Sides alone do not settle the corners. Multiply the slopes of AB and BC.

3 A(-2, -1), B(1, -3), C(3, 0) and D(0, 2)

rectangle → **go to box 2**

square → **go to box 8**

Hint: Check the corners, and also compare AB^2 and BC^2 .

4 A(-3, 1), B(1, -1), C(2, 1) and D(-2, 3)

parallelogram → **go to box 2**

rectangle → **go to box 7**

Hint: After the opposite sides, check one corner. Multiply the slopes of AB and BC.

5 A(-4, 0), B(0, -2), C(1, 2) and D(-1, 3)

trapezoid → **go to box 1**

parallelogram → **go to box 7**

Hint: A name needs every pair of opposite sides. Compare the slopes of BC and DA too.

6 A(-3, -2), B(3, -2), C(1, 2) and D(-3, 2)

trapezoid → **go to box 3**

rectangle → **go to box 5**

Hint: One corner tells little. Compare the slopes of BC and DA as well as AB and CD.

7 A(-3, -2), B(1, -1), C(2, 3) and D(-2, 2)

square → **go to box 5**

rhombus → **go to box 1**

Hint: Matching sides do not settle the corners. Multiply the slopes of two sides that meet.

8 A(-4, -1), B(1, -2), C(3, 2) and D(-2, 3)

parallelogram → **you are out**

rectangle → **go to box 5**

Hint: A shared midpoint is not a length. Compare AC^2 and BD^2 .

Write every box number here, in order.

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The route, in order. Boxes 2 and 5 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table. This sheet counts a square as a rectangle and a rhombus, a rhombus as a kite, and a parallelogram as a trapezoid (a trapezoid has at least one pair of parallel sides). Some textbooks use other definitions, so tell the class which ones this sheet uses.

4 → 7 → 1 → 6 → 3 → 8 → out

	The box's question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 4 ABCD has corners A(-3, 1), B(1, -1), C(2, 1) and D(-2, 3). Write the most specific name.	rectangle. Slopes: AB $-1/2$, BC 2, CD $-1/2$, DA 2. Opposite sides are parallel, and the slopes of AB and BC multiply to -1 . $AB^2 = 20$ and $BC^2 = 5$ differ, so it is not a square.	"parallelogram" goes to box 2. A student who finds both pairs of opposite sides parallel and stops writes "parallelogram". It is true, but rectangle is more specific.
2	Box 7 ABCD has corners A(-3, -2), B(1, -1), C(2, 3) and D(-2, 2). Write the most specific name.	rhombus. $AB^2 = 17$, $BC^2 = 17$, $CD^2 = 17$, $DA^2 = 17$. All four sides are the same length. The slope of AB is $1/4$ and the slope of BC is 4. They do not multiply to -1 , so it is not a square.	"square" goes to box 5. Four equal sides make a rhombus. A square also needs a right angle, and this one has none.
3	Box 1 ABCD has corners A(-2, -3), B(1, -2), C(2, 1) and D(-1, 0). Write the most specific name.	rhombus. $AB^2 = 10$, $BC^2 = 10$, $CD^2 = 10$, $DA^2 = 10$. All four sides are the same length. The slope of AB is $1/3$ and the slope of BC is 3. They do not multiply to -1 , so it is not a square.	"parallelogram" goes to box 2. A student who finds both pairs of opposite sides parallel and stops writes "parallelogram". It is true, but rhombus is more specific.
4	Box 6 ABCD has corners A(-3, -2), B(3, -2), C(1, 2) and D(-3, 2). Write the most specific name.	trapezoid. Slopes: AB 0, BC -2 , CD 0, DA no slope (vertical). Only one pair of opposite sides is parallel, so it is a trapezoid and not a parallelogram.	"rectangle" goes to box 5. Right angles at A and D do not make a rectangle. BC and DA are not parallel, so the corners at B and C are not right angles.
5	Box 3 ABCD has corners A(-2, -1), B(1, -3), C(3, 0) and D(0, 2). Write the most specific name.	square. $AB^2 = 13$, $BC^2 = 13$, $CD^2 = 13$, $DA^2 = 13$. All four sides are the same length. The slope of AB is $-2/3$ and the slope of BC is $3/2$. They multiply to -1 , so the corners are right angles.	"rectangle" goes to box 2. A student who checks the corners but never compares two sides that meet stops at "rectangle". The sides are all the same length too.
6	Box 8 ABCD has corners A(-4, -1), B(1, -2), C(3, 2) and D(-2, 3). Write the most specific name.	parallelogram. Slopes: AB $-1/5$, BC 2, CD $-1/5$, DA 2. Both pairs of opposite sides are parallel. The midpoints of AC and BD are both $(-0.5, 0.5)$. $AC^2 = 58$ and $BD^2 = 34$ differ, so it is not a rectangle. $AB^2 = 26$ and $BC^2 = 20$ differ, so it is not a rhombus.	"rectangle" goes to box 5. Diagonals that share a midpoint bisect each other. That shows a parallelogram, not equal diagonals, so it is not a rectangle.
	Box 2 ABCD has corners A(-1, -4), B(3, -3), C(2, 1) and D(-2, 0). Write the most specific name.	square. $AB^2 = 17$, $BC^2 = 17$, $CD^2 = 17$, $DA^2 = 17$. All four sides are the same length. The slope of AB is $1/4$ and the slope of BC is -4 . They multiply to -1 , so the corners are right angles.	"rhombus" goes to box 4. A student who finds four equal sides and never checks a corner stops at "rhombus". The corners are right angles too.
	Box 5 ABCD has corners A(-4, 0), B(0, -2), C(1, 2) and D(-1, 3). Write the most specific name.	trapezoid. Slopes: AB $-1/2$, BC 4, CD $-1/2$, DA 1. Only one pair of opposite sides is parallel, so it is a trapezoid and not a parallelogram.	"parallelogram" goes to box 7. One pair of parallel sides makes a trapezoid. A parallelogram needs both pairs.

How to check any box. Compare the slopes of opposite sides. Then compare the squares of two sides that meet, and multiply the slopes at one corner. A square needs equal sides and a right angle.

A student can find the last four boxes of the route by following the arrows backward from "you are out." So ask a student with a clean row to explain one box.