

ANSWER MAZE



WRITING COORDINATE PROOFS

Write the Last Sentence of a Coordinate Proof

Writing coordinate proofs · one page · 10–15 minutes · nothing to prepare

FREE

4 Last sentence: _____, so ABCD is a parallelogram.

$$AB = \sqrt{26}, BC = \sqrt{20}, CD = \sqrt{26}, DA = \sqrt{20}$$

AB is parallel to CD and BC is parallel to DA → **go to box 2**

Both pairs of opposite sides are congruent → **go to box 7**

Hint: Name the tool that made these numbers. Read what it shows.

7 Last sentence: _____, so ABCD is a rectangle.

slope of AB = $-1/3$, slope of BC = 3, slope of CD = $-1/3$,
slope of DA = 3

Both pairs of opposite sides are parallel and AB is perpendicular to BC → **go to box 1**

Both pairs of opposite sides are parallel → **go to box 5**

Hint: Find this figure in the box of rules. Check every part.

1. **Hand out page 3**, one per student. Nothing is calculated: every number is already on the sheet.
2. **Say this once:** *“Start at box 4. Every number in a box is correct. Pick the words for the gap in the last sentence. They must name the rule the numbers show, and every part of that rule. 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 which tool proves which kind of claim, and the rules for each figure.
Answers	page 4.

Every box is a proof with its numbers done. Only the last sentence is missing, and that is where most marks are lost on a coordinate proof. Distances show congruent segments. Slopes show parallel or perpendicular segments. Midpoints show segments that bisect each other.

Each wrong sentence makes one of two mistakes. A sentence that names a rule the numbers did not show sends the student to box 2, for example a sentence about parallel sides after four lengths. Everything it says is true, which is why students miss it. A sentence that names only part of a rule sends the student to box 5: both pairs of sides parallel, so a rectangle, with no right angle. 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. The extra box number tells you which mistake was made. Guessing does not get a student out: every simple guessing rule, such as always taking the longer sentence, goes wrong within the first five 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 last sentence

Start at box 4

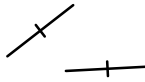
Name _____

Period _____

Date _____

Start at box 4. **Every number in a box is correct. Pick the words for the gap. They must name the rule the numbers show, and every part of it.** Go to the box your choice names. Write each box number in the row at the bottom.

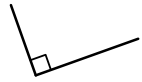
Which tool proves which kind of claim



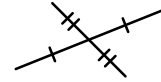
Distance: equal lengths → **congruent**



Slope: equal slopes → **parallel**



Slope: slopes multiply to -1 → **perpendicular**



Midpoint: same midpoint → **bisect each other**

Parallelogram: both pairs of opposite sides parallel, or both pairs congruent, or diagonals that bisect each other, or one pair of opposite sides parallel and congruent.

Rectangle: a parallelogram with a right angle. **Rhombus:** four congruent sides, or a parallelogram whose diagonals are perpendicular.

Square: a rhombus with a right angle.

Right triangle: two sides are perpendicular. **Isosceles triangle:** two sides are congruent.

Numbers for one figure prove a claim about that figure only. A claim about *every* figure needs letters, like p and q , in the coordinates.

1 Last sentence: _____, so ABCD is a parallelogram.

midpoint of AC = (1, 2), midpoint of BD = (1, 2)

The diagonals bisect each other → **go to box 6**

Both pairs of opposite sides are parallel → **go to box 2**

Hint: Check what these numbers measure.

2 Last sentence: _____, so ABCD is a parallelogram.

midpoint of AC = (0, 1), midpoint of BD = (0, 1)

Both pairs of opposite sides are parallel → **go to box 4**

The diagonals bisect each other → **go to box 7**

Hint: Match the tool of these numbers to the drawings at the top.

3 Last sentence: _____, so ABCD is a parallelogram.

slope of AB = $2/3$, slope of BC = 4, slope of CD = $2/3$,

slope of DA = 4

Both pairs of opposite sides are congruent → **go to box 2**

Both pairs of opposite sides are parallel → **go to box 8**

Hint: Which tool made these numbers? What does it show?

4 Last sentence: _____, so ABCD is a parallelogram.

$AB = \sqrt{26}$, $BC = \sqrt{20}$, $CD = \sqrt{26}$, $DA = \sqrt{20}$

AB is parallel to CD and BC is parallel to DA → **go to box 2**

Both pairs of opposite sides are congruent → **go to box 7**

Hint: Name the tool that made these numbers. Read what it shows.

5 Last sentence: _____, so ABCD is a rhombus.

$AB = 5$, $BC = 5$, $CD = 5$, $DA = 5$

All four sides are congruent → **go to box 1**

Both pairs of opposite sides are congruent → **go to box 7**

Hint: Check which sides the rule for this figure talks about.

6 Last sentence: _____, so ABCD is a square.

$AB = \sqrt{10}$, $BC = \sqrt{10}$, $CD = \sqrt{10}$, $DA = \sqrt{10}$, slope of AB = $1/3$,

slope of BC = -3

All four sides are congruent and AB is perpendicular to BC → **go to box 3**

All four sides are congruent → **go to box 5**

Hint: Count the parts the rule for this figure asks for.

7 Last sentence: _____, so ABCD is a rectangle.

slope of AB = $-1/3$, slope of BC = 3, slope of CD = $-1/3$,

slope of DA = 3

Both pairs of opposite sides are parallel and AB is perpendicular to BC → **go to box 1**

Both pairs of opposite sides are parallel → **go to box 5**

Hint: Find this figure in the box of rules. Check every part.

8 Last sentence: _____, so ABCD is a rhombus.

midpoint of AC = (2, 2), midpoint of BD = (2, 2), slope of AC = 1,

slope of BD = -1

The diagonals bisect each other → **go to box 5**

The diagonals bisect each other and AC is perpendicular to BD → **you are out**

Hint: Read the rule for this figure. Check each part of it.

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 uses these rules. Parallelogram: both pairs of opposite sides parallel, or both pairs congruent, or diagonals that bisect each other, or one pair of opposite sides parallel and congruent. Rectangle: a parallelogram with a right angle. Rhombus: four congruent sides, or a parallelogram whose diagonals are perpendicular. Square: a rhombus with a right angle. Right triangle: two sides are perpendicular. Isosceles triangle: two sides are congruent. 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. Prove: ABCD is a parallelogram. $AB = \sqrt{26}$, $BC = \sqrt{20}$, $CD = \sqrt{26}$, $DA = \sqrt{20}$.	Both pairs of opposite sides are congruent, so ABCD is a parallelogram. The lengths show that both pairs of opposite sides are congruent. That is the rule for a parallelogram.	"AB is parallel to CD and BC is parallel to DA, so ABCD is a parallelogram." goes to box 2. It says both pairs of opposite sides are parallel. That is true of the figure, but lengths cannot show it.
2	Box 7. Prove: ABCD is a rectangle. slope of AB = $-1/3$, slope of BC = 3, slope of CD = $-1/3$, slope of DA = 3.	Both pairs of opposite sides are parallel and AB is perpendicular to BC, so ABCD is a rectangle. The slopes show that both pairs of opposite sides are parallel and AB is perpendicular to BC. That is the rule for a rectangle, with every part named.	"Both pairs of opposite sides are parallel, so ABCD is a rectangle." goes to box 5. It says only that both pairs of opposite sides are parallel. That is true, but it is not enough for a rectangle.
3	Box 1. Prove: ABCD is a parallelogram. midpoint of AC = (1, 2), midpoint of BD = (1, 2).	The diagonals bisect each other, so ABCD is a parallelogram. The midpoints show that the diagonals bisect each other. That is the rule for a parallelogram.	"Both pairs of opposite sides are parallel, so ABCD is a parallelogram." goes to box 2. It says both pairs of opposite sides are parallel. That is true of the figure, but midpoints cannot show it.
4	Box 6. Prove: ABCD is a square. $AB = \sqrt{10}$, $BC = \sqrt{10}$, $CD = \sqrt{10}$, $DA = \sqrt{10}$, slope of AB = $1/3$, slope of BC = -3 .	All four sides are congruent and AB is perpendicular to BC, so ABCD is a square. The lengths and slopes show that all four sides are congruent and AB is perpendicular to BC. That is the rule for a square, with every part named.	"All four sides are congruent, so ABCD is a square." goes to box 5. It says only that all four sides are congruent. That is true, but it is not enough for a square.
5	Box 3. Prove: ABCD is a parallelogram. slope of AB = $2/3$, slope of BC = 4, slope of CD = $2/3$, slope of DA = 4.	Both pairs of opposite sides are parallel, so ABCD is a parallelogram. The slopes show that both pairs of opposite sides are parallel. That is the rule for a parallelogram.	"Both pairs of opposite sides are congruent, so ABCD is a parallelogram." goes to box 2. It says both pairs of opposite sides are congruent. That is true of the figure, but slopes cannot show it.
6	Box 8. Prove: ABCD is a rhombus. midpoint of AC = (2, 2), midpoint of BD = (2, 2), slope of AC = 1, slope of BD = -1 .	The diagonals bisect each other and AC is perpendicular to BD, so ABCD is a rhombus. The midpoints and slopes show that the diagonals bisect each other and AC is perpendicular to BD. That is the rule for a rhombus, with every part named.	"The diagonals bisect each other, so ABCD is a rhombus." goes to box 5. It says only that the diagonals bisect each other. That is true, but it is not enough for a rhombus.
	Box 2. Prove: ABCD is a parallelogram. midpoint of AC = (0, 1), midpoint of BD = (0, 1).	The diagonals bisect each other, so ABCD is a parallelogram. The midpoints show that the diagonals bisect each other. That is the rule for a parallelogram.	"Both pairs of opposite sides are parallel, so ABCD is a parallelogram." goes to box 4. It says both pairs of opposite sides are parallel. That is true of the figure, but midpoints cannot show it.
	Box 5. Prove: ABCD is a rhombus. $AB = 5$, $BC = 5$, $CD = 5$, $DA = 5$.	All four sides are congruent, so ABCD is a rhombus. The lengths show that all four sides are congruent. That is the rule for a rhombus, with every part named.	"Both pairs of opposite sides are congruent, so ABCD is a rhombus." goes to box 7. It says only that both pairs of opposite sides are congruent. That is true, but it is not enough for a rhombus.

How to check any box. Ask which tool made the numbers. Then ask which rule for the figure those numbers complete. The right sentence names that rule, all of it.

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.