

ANSWER MAZE



TRANSLATIONS IN THE COORDINATE PLANE

Translations: Which Way, Which Coordinate?

One page · 10–15 minutes · nothing to prepare

FREE

6

The rule is $(x, y) \rightarrow (x + 4, y - 3)$. Find the image of $(-6, 2)$.

$(10, -1) \rightarrow$ go to 4
 $(-2, -1) \rightarrow$ go to 3

Look at the sign of the starting x-coordinate before adding.

3

A point moves 5 units right and 2 units down. Find the image of $(6, -1)$.

$(11, -3) \rightarrow$ go to 8
 $(4, 4) \rightarrow$ go to 7

Look at which words move a point across and which move it up.

8

The rule is $(x, y) \rightarrow (x + 5, y - 2)$. The image is $(1, 3)$. Find the point it came from.

$(6, 1) \rightarrow$ go to 4
 $(-4, 5) \rightarrow$ go to 1

Look at which point the task gives: the original, or the image.

1

The rule is $(x, y) \rightarrow (x + 6, y - 1)$. Find the image of $(-2, 3)$.

$(4, 2) \rightarrow$ go to 5
 $(-3, 9) \rightarrow$ go to 7

Look at which slot of the rule each number stands in.

1. **Hand out page 3.** That is the whole preparation.
2. **Say this once:** *“Two questions every time: which number goes with x , and which way does it move it? Keep every minus sign with its number.”*
3. **Start at box 6.** Six boxes and you are out. **Write every box number in the row at the foot as you go.**

Student sheet	page 3, one per student. The rule and its arrow, with the run and the rise on its legs, are printed on it as pictures.
Answers	page 4.

The route is $6 \rightarrow 3 \rightarrow 8 \rightarrow 1 \rightarrow 5 \rightarrow 2 \rightarrow \text{out}$. Boxes 4 and 7 are not on it. **They look like every other box:** a question, two answers, two box numbers and a hint. Both answers in these two boxes lead back onto the route.

Every wrong answer is a common mistake. A student can make one of these mistakes and none of the others. They fall into two groups. Three boxes send a wrong answer to box 4. Those students move a part of the shift the wrong way. They drop the minus sign of a negative starting coordinate. They use the rule forward when they need to find the original point. They read a shift from the image back to the original. Three boxes send a wrong answer to box 7. Those students give a number to the wrong coordinate. They use “right” for y . They put the two numbers in the wrong places in the rule. They plot a point correctly but write its coordinates the wrong way round.

What the row at the foot tells you. A clean run is **six numbers**. A longer row shows where a student went wrong. The number just before 4 or 7 is the box they got wrong. Which of the two it is tells you which group of mistakes.



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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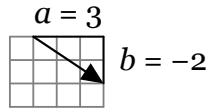
Answer Maze

Start at box 6 · which way, which coordinate

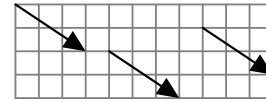
Name _____

Period _____

Date _____



$(x, y) \rightarrow (x + 3, y - 2)$
a is across: right +, left - · b is up: up +, down -



the same rule, drawn anywhere
every point of the plane moves by the same arrow

1

The rule is $(x, y) \rightarrow (x + 6, y - 1)$. Find the image of $(-2, 3)$.

(4, 2) → go to 5
(-3, 9) → go to 7

Look at which slot of the rule each number stands in.

2

The image of $(-3, 5)$ under $(x, y) \rightarrow (x + 7, y - 2)$ is plotted in the right place. Which pair names it?

(3, 4) → go to 7
(4, 3) → you are out

Look at which coordinate a pair writes first.

3

A point moves 5 units right and 2 units down. Find the image of $(6, -1)$.

(11, -3) → go to 8
(4, 4) → go to 7

Look at which words move a point across and which move it up.

4

Which rule undoes $(x, y) \rightarrow (x - 2, y + 6)$?

$(x, y) \rightarrow (x - 2, y - 6)$ → go to 6
 $(x, y) \rightarrow (x + 2, y - 6)$ → go to 3

Look at which way each part of the shift points.

5

A translation carries $(2, -3)$ to $(-1, 1)$. Where does it carry $(-6, 3)$?

(-9, 7) → go to 2
(-3, -1) → go to 4

Look at which point of the pair is the image, and which the original.

6

The rule is $(x, y) \rightarrow (x + 4, y - 3)$. Find the image of $(-6, 2)$.

(10, -1) → go to 4
(-2, -1) → go to 3

Look at the sign of the starting x-coordinate before adding.

7

A translation carries $(1, 2)$ to $(6, -1)$. Which rule is it?

$(x, y) \rightarrow (x + 5, y - 3)$ → go to 8
 $(x, y) \rightarrow (x - 3, y + 5)$ → go to 3

Look at what happens to x, and to y, one at a time.

8

The rule is $(x, y) \rightarrow (x + 5, y - 2)$. The image is $(1, 3)$. Find the point it came from.

(6, 1) → go to 4
(-4, 5) → go to 1

Look at which point the task gives: the original, or the image.

Write every box number here as you go. It shows you the way back if you lose your place. A clean run is six numbers.

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Answer Maze — answers

For the teacher

The route, in order, is below. Boxes 4 and 7 are not on the route. They are at the end of the table. A student reaches them only after a wrong answer.

6 → 3 → 8 → 1 → 5 → 2 → out

	Box	Answer	Wrong answer goes to	Right goes to
1	Box 6	(-2, -1)	(10, -1) → box 4. The minus sign of -6 is dropped (6 + 4).	box 3
2	Box 3	(11, -3)	(4, 4) → box 7. “Right” is used for y and “down” for x.	box 8
3	Box 8	(-4, 5)	(6, 1) → box 4. The rule is used forward on the image.	box 1
4	Box 1	(4, 2)	(-3, 9) → box 7. The two numbers are in the wrong places.	box 5
5	Box 5	(-9, 7)	(-3, -1) → box 4. The shift is read from the image to the original.	box 2
6	Box 2	(4, 3)	(3, 4) → box 7. The two coordinates are written the wrong way round.	out
	Box 4	(x, y) → (x + 2, y - 6)	(x, y) → (x - 2, y - 6) → box 6. The student thinks “undo” means subtract from both.	box 3
	Box 7	(x, y) → (x + 5, y - 3)	(x, y) → (x - 3, y + 5) → box 3. The two changes are in the wrong places.	box 8

Guessing does not get a student out. Every simple guessing rule, such as always taking the first answer, goes wrong within the first four boxes.

One shortcut does work. A student can find the route by reading the maze backward from “you are out”. That student has the right row of numbers but has answered nothing. Ask them to explain one box.