

ANSWER MAZE



TRANSLATIONS

Translations: What the Arrow Says

One page · 10–15 minutes · nothing to prepare

FREE

3

Is the translation by the arrow from B to A the same as the one by the arrow from A to B?

Yes — one segment, one length → go to 7

No — they go opposite ways → go to 8

Look at the order of the letters, and at the head of each arrow.

8

The arrow from A to B is drawn in a corner of the page, far from flag F. What does its translation do to F?

Moves it by AB, the arrow's way → go to 1

Nothing — the arrow misses F → go to 5

Which points of the plane does a translation move?

1

The arrow from A to B lies on line m . Flag F stands beside line m . What is F' , the image of F?

F slid along m , same way round → go to 6

F flipped over m , a mirror image → go to 7

Follow one corner of F: does it move by the arrow?

6

Arrows AB and CD are equal in length, parallel and point the same way, in two places. Where do their translations send a point P?

To two different points → go to 5

To one and the same point → go to 4

Follow P under each arrow: how far, and which way?

1. **Hand out page 3.** That is the whole preparation.
2. **Say this once:** *“The arrow is the translation. Its length says how far. Its head says which way. It tells every point of the plane the same thing, wherever the arrow is drawn.”*
3. **Start at box 3.** 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 arrow and a flag with its image are printed on it as pictures.
Answers page 4.

The route is 3 → 8 → 1 → 6 → 4 → 2 → out. Boxes 5 and 7 are not on it. **They look like every other box:** a question, two answers, two box numbers and a hint. No box has a drawing. Both answers in these two boxes lead back onto the route.

Every wrong answer comes from one belief: that the arrow is only a mark on the page, not the translation itself. This belief shows up in two ways. Three boxes send a wrong answer to box 5. Those students think that where the arrow is drawn decides what moves. They say a flag the arrow does not touch does not move. They say two equal, parallel arrows send P to two places. They say the corner far from the arrow moves less. Three boxes send a wrong answer to box 7. Those students read only part of the arrow. They say the arrow from B to A is the same as the arrow from A to B. They flip the flag over the arrow's line, which is the most serious mistake in this lesson. They say a segment with no arrowhead still names one translation.

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 5 or 7 is the box they got wrong. Which of the two it is tells you which way of thinking caused it.



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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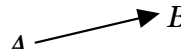
Answer Maze

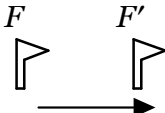
Start at box 3 · what the arrow says

Name _____

Period _____

Date _____


the arrow from A to B
how far: its length · which way: its head


F' is the image of F
every point moved by the arrow. Same size, same way round

1

The arrow from A to B lies on line m . Flag F stands beside line m . What is F', the image of F?
F slid along m , same way round → go to 6
F flipped over m , a mirror image → go to 7

Follow one corner of F: does it move by the arrow?

2

The arrow from A to B starts at corner A of flag F. Q is the corner farthest from A. How far does Q move?
Exactly as far as A → you are out
Less far — Q is far from the arrow → go to 5

Compare the step Q takes with the step A takes.

3

Is the translation by the arrow from B to A the same as the one by the arrow from A to B?
Yes — one segment, one length → go to 7
No — they go opposite ways → go to 8

Look at the order of the letters, and at the head of each arrow.

4

The head of the arrow from A to B is erased. Does the plain segment still name exactly one translation?
Yes — its length and line remain → go to 7
No — it could go either way → go to 2

Check each part of the arrow: what did the head tell a point?

5

Under the translation by the arrow from A to B, what is the image of A itself?
A — the arrow's tail stays put → go to 8
B — A moves along the arrow → go to 1

Treat A as any other point of the plane.

6

Arrows AB and CD are equal in length, parallel and point the same way, in two places. Where do their translations send a point P?
To two different points → go to 5
To one and the same point → go to 4

Follow P under each arrow: how far, and which way?

7

Under the translation by the arrow from A to B, flag F moves 5 cm. How long is AB?
5 cm — its length says how far → go to 8
Cannot tell — it gives only a direction → go to 3

Think what each part of an arrow tells a point.

8

The arrow from A to B is drawn in a corner of the page, far from flag F. What does its translation do to F?
Moves it by AB, the arrow's way → go to 1
Nothing — the arrow misses F → go to 5

Which points of the plane does a translation move?

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 5 and 7 are not on the route. They are at the end of the table. A student reaches them only after a wrong answer.

3 → 8 → 1 → 6 → 4 → 2 → out

	Box	Answer	Wrong answer goes to	Right goes to
1	Box 3	No — they go opposite ways	Yes — one segment, one length → box 7	box 8
2	Box 8	Moves it by AB, the arrow's way	Nothing — the arrow misses F → box 5	box 1
3	Box 1	F slid along <i>m</i>, same way round	F flipped over <i>m</i> , a mirror image → box 7	box 6
4	Box 6	To one and the same point	To two different points → box 5	box 4
5	Box 4	No — it could go either way	Yes — its length and line remain → box 7	box 2
6	Box 2	Exactly as far as A	Less far — Q is far from the arrow → box 5	out
	Box 5	B — A moves along the arrow	A — the arrow's tail stays put → box 8	box 1
	Box 7	5 cm — its length says how far	Cannot tell — it gives only a direction → box 3	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.