

ANSWER MAZE



DILATIONS IN THE COORDINATE PLANE

Dilations: Where Is the Center?

One page · 10–15 minutes · nothing to prepare

FREE

5

Dilate $P(1, -2)$ using center $C(-2, 1)$ and scale factor 2. Where does P land?

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

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

Look at where the center is before any multiplying.

2

Dilate $P(-2, 3)$ using center the origin and scale factor 3. Where does P land?

$(-6, 9) \rightarrow$ go to 7

$(1, 6) \rightarrow$ go to 6

Look at what a dilation does to each number of the point.

Answer Maze — how to run it

10–15 minutes

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 5. Find the center first. It is not always the origin. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet at a glance.** A clean run is **5 2 7 1 8 4**: six boxes, then out.

Student sheet page 3, one per student. The three steps are printed at the top in one line.
Answers page 4.

The two boxes off the route catch two kinds of mistake. Box 3 catches mistakes about where the center is. A student lands there after multiplying a point by the scale factor when the center is not the origin, after taking the center away and never adding it back, or after taking the origin as the center. Box 6 catches mistakes about the scale factor. A student lands there after adding the scale factor instead of multiplying, after doing a dilation forward when it has to be undone, or after multiplying the slope of a line. Both answers in those two boxes lead back to the route, and neither lets a student skip ahead.

Two boxes ask for the image of a line. A dilation never changes the slope of a line. When the center is on the line, the image is the same line. When the center is not on the line, the image is a parallel line with a new y -intercept.

The row of box numbers at the bottom is your check. A clean run is six numbers. Each wrong answer adds one or more. The hint in each box says what to look at. It never says which answer is right.

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.



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 5 · find the center first

Name _____

Period _____

Date _____

Choose an answer in each box and go where it says. **A dilation in three steps:** take the center away, multiply by the scale factor, then add the center back.

1

The line $y = 2x + 1$ is dilated with center $(0, 1)$ and scale factor 3. What is the image line?

$y = 2x + 1 \rightarrow$ go to 8

$y = 6x + 3 \rightarrow$ go to 6

Look at whether the center is on the line, and at the slope of each answer.

2

Dilate $P(-2, 3)$ using center the origin and scale factor 3. Where does P land?

$(-6, 9) \rightarrow$ go to 7

$(1, 6) \rightarrow$ go to 6

Look at what a dilation does to each number of the point.

3

A dilation has center $K(2, -1)$ and scale factor 3. Which point does it leave where it is?

$(2, -1) \rightarrow$ go to 2

$(0, 0) \rightarrow$ go to 5

Look at the one point that a dilation never moves.

4

A dilation with center the origin and scale factor 2 sends V to $V'(-6, 4)$. Find V .

$(-3, 2) \rightarrow$ you are out

$(-12, 8) \rightarrow$ go to 6

Look at which point is the start and which is the image.

5

Dilate $P(1, -2)$ using center $C(-2, 1)$ and scale factor 2. Where does P land?

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

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

Look at where the center is before any multiplying.

6

The line $y = x + 2$ is dilated with center the origin and scale factor 3. What is the image line?

$y = x + 2 \rightarrow$ go to 2

$y = x + 6 \rightarrow$ go to 7

Look at one point of the line, such as where it crosses the y -axis. Where does it go?

7

Dilate $P(6, 5)$ using center $C(2, 3)$ and scale factor $1/2$. Where does P land?

$(2, 1) \rightarrow$ go to 3

$(4, 4) \rightarrow$ go to 1

Look at the last of the three steps, and at whether the image sits near the center.

8

A dilation sends $A(2, 1)$ to $A'(4, 3)$ and $B(3, 3)$ to $B'(7, 9)$. Where is its center?

$(0, 0) \rightarrow$ go to 3

$(1, 0) \rightarrow$ go to 4

Look at the line through A and A' and the line through B and B' . Where do they cross?

Write each box number as you reach it:

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The route, in order. Boxes 3 and 6 are off it and lead back to it.

5 → 2 → 7 → 1 → 8 → 4 → out

	Box	Answer	Why it is right	Wrong answer, the mistake behind it, and where it goes
1	Box 5	(4, -5)	From C to P is $(3, -3)$. Multiplied by 2, that is $(6, -6)$. Add it to C : $(-2, 1) + (6, -6) = (4, -5)$.	$(2, -4)$: P multiplied by the scale factor, as if the center were the origin. Goes to box 3.
2	Box 2	(-6, 9)	The center is the origin, so multiply both numbers of P by 3: $(-2, 3)$ becomes $(-6, 9)$.	$(1, 6)$: the scale factor added to each number instead of multiplied. Goes to box 6.
3	Box 7	(4, 4)	From C to P is $(4, 2)$. Multiplied by $1/2$, that is $(2, 1)$. Add it to C : $(2, 3) + (2, 1) = (4, 4)$.	$(2, 1)$: the center taken away, but never added back. Goes to box 3.
4	Box 1	$y = 2x + 1$	The center $(0, 1)$ is on the line, because $2 \times 0 + 1 = 1$. A dilation with its center on a line gives back that same line.	$y = 6x + 3$: the slope and the y -intercept multiplied too. Goes to box 6.
5	Box 8	(1, 0)	From $(1, 0)$, A is $(1, 1)$ away and A' is $(3, 3)$ away. B is $(2, 3)$ away and B' is $(6, 9)$ away. Both images are 3 times as far in the same direction, so $(1, 0)$ is the center.	$(0, 0)$: the origin taken as the center of every dilation. Goes to box 3.
6	Box 4	(-3, 2)	V' is the image, not the start. To undo the dilation, divide both numbers of V' by 2: $(-6, 4)$ becomes $(-3, 2)$.	$(-12, 8)$: V' multiplied by the scale factor instead of divided by it. Goes to box 6.
	Box 3	(2, -1)	A dilation never moves its center, and the center here is $K(2, -1)$. The origin moves, because it is not the center.	$(0, 0)$: the origin taken as the point that never moves. Goes to box 5.
	Box 6	$y = x + 6$	The center is not on the line, so the image is a parallel line with the same slope, 1. The point $(0, 2)$ goes to $(0, 6)$, so the image is $y = x + 6$.	$y = x + 2$: the line taken to stay where it is. Goes to box 2.

How to dilate a point. Take the center away, multiply by the scale factor, then add the center back. When the center is the origin, the first and last steps change nothing. That is why $(x, y) \rightarrow (kx, ky)$ works only when the center is the origin.

How to find the center. Draw the line through a point and its image. Draw the line through a second point and its image. The center is where the two lines cross. It is the one point the dilation does not move.