LESSON MAKER PRO

Lines That Move

Track lines through dilations.

HIGH SCHOOL · GDA.GM.F.26.a

GDA.GM.F.26.a "Verify that a dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged."

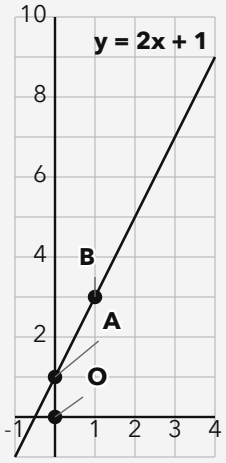
NAME _____ DATE _____

WHAT CHANGES?

A dilation centered at O=(0,0) with scale factor k sends each point (x,y) to (kx,ky). For k greater than 0, a line y=mx+b moves to y=mx+kb, so its slope does not change. A line through O stays in place, while a line that misses O becomes a distinct parallel line unless k=1. When k=1, every line stays in place.

WORKED EXAMPLE

Dilate the graphed line by a factor of 3 about O. Find the image line and compare it with the original.

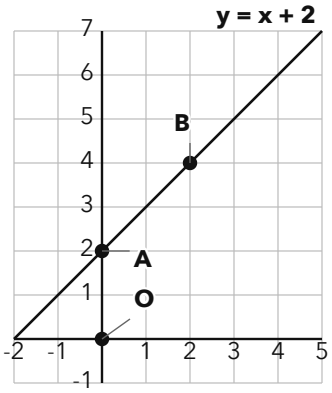


1. Read A=(0,1) and B=(1,3) from the grid.
2. Multiply each coordinate by 3: A'=(0,3) and B'=(3,9).
3. The image slope is (9-3)/(3-0)=2, so its equation is y=2x+3.

Answer: The image is y=2x+3. The lines are distinct and parallel because they have the same slope.

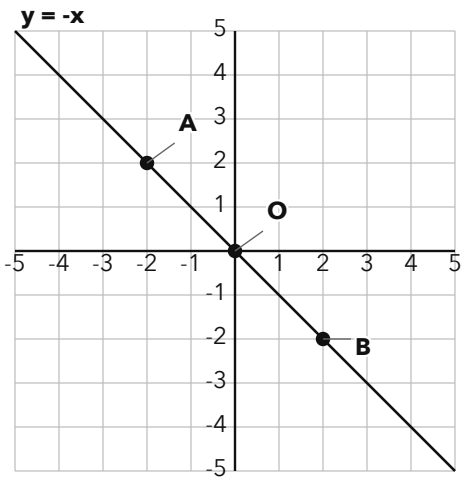
PRACTICE 6 problems

1 Dilate the graphed line by a factor of 2 about O. Give the image equation. Are the lines distinct and parallel, or unchanged?



ANSWER _____

2 Dilate the graphed line by a factor of 1/2 about O. Give the image equation. Are the lines distinct and parallel, or unchanged?



ANSWER _____

3 A dilation centered at O has scale factor 2. Find the image equation of y=-2x+3.

ANSWER _____

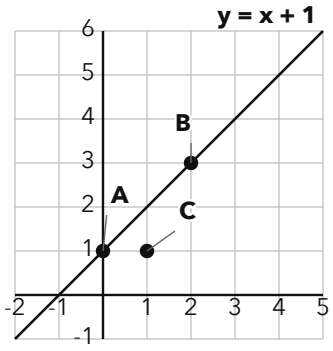
4 A dilation centered at O has scale factor 1. Find the image equation of y=3x-2. Is the line unchanged?

ANSWER _____

5 A dilation centered at O has scale factor 1/2. Find the image equation of y=1/2x-4. Are the lines distinct and parallel, or unchanged?

ANSWER _____

6 Dilate the graphed line by a factor of 2 about C. Use the plotted points to find the image equation. Are the lines distinct and parallel, or unchanged?



ANSWER _____

APPLY IT Show your work

1 A designer enlarges a concert poster layout by a factor of 2 about O=(0,0). One border follows y=-x+5. Find the enlarged border's equation and explain how it compares with the original.

WORK SPACE

ANSWER _____

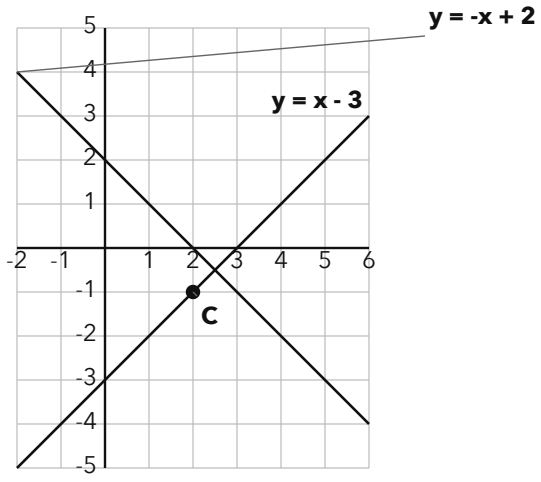
2 A video game map is resized by a factor of 1/2 about C=(1,0). A path follows y=2x-2. Find the resized path's equation and explain why it stays in place or moves.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Dilate both graphed lines by a factor of 2 about C. Find each image equation. Which line stays in place, and why?



WORK SPACE AND ANSWER

Lines That Move

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Dilate the graphed line by a factor of 2 about O. Give the image equation. Are the lines distinct and parallel, or unchanged?	**y=x+4; the lines are distinct and parallel.**
2	Dilate the graphed line by a factor of 1/2 about O. Give the image equation. Are the lines distinct and parallel, or unchanged?	**y=-x; the line is unchanged.**
3	A dilation centered at O has scale factor 2. Find the image equation of y=-2x+3.	**y=-2x+6**
4	A dilation centered at O has scale factor 1. Find the image equation of y=3x-2. Is the line unchanged?	**y=3x-2; yes, the line is unchanged.**
5	A dilation centered at O has scale factor 1/2. Find the image equation of y=1/2x-4. Are the lines distinct and parallel, or unchanged?	**y=1/2x-2; the lines are distinct and parallel.**
6	Dilate the graphed line by a factor of 2 about C. Use the plotted points to find the image equation. Are the lines distinct and parallel, or unchanged?	**A'=(-1,1) and B'=(3,5), so the image is y=x+2. The lines are distinct and parallel.**

PART 2 · APPLY IT

1. **y=-x+10; the borders are distinct and parallel.** Double the y-intercept from 5 to 10. The slope remains -1, so the borders are parallel and distinct.
2. **y=2x-2; the path stays in place.** C lies on the path because 0=2(1)-2. A dilation leaves any line through its center unchanged.

CHALLENGE

The image of y=x-3 is y=x-3. The image of y=-x+2 is y=-x+3. The first line stays in place because it passes through C=(2,-1).

Accept equations with spaces or equivalent forms. For the challenge, a point-based explanation is also valid: points on the first line and their images remain on that line.