

Origin Zoom

Use scale factors to resize polygons on a coordinate plane.

GRADE 7 • 7.MG.4

7.MG.4 "The student will apply dilations of polygons in the coordinate plane. Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been dilated. Scale factors are limited to 14, 12, 2, 3, or 4..."

NAME _____

DATE _____

DILATE FROM ZERO

When the center of dilation is the origin, multiply both coordinates of every vertex by the scale factor. A factor greater than 1 makes the image larger, while a factor between 0 and 1 makes the image smaller. Keep each vertex label with its matching image label.

WORKED EXAMPLE

Triangle TUV has vertices T(2, -4), U(-3, 1), and V(0, 5). Dilate it by a scale factor of 3 centered at the origin.

1. Multiply each x-coordinate by 3.
2. Multiply each y-coordinate by 3.
3. T'(6, -12), U'(-9, 3), and V'(0, 15).

Answer: T'(6, -12), U'(-9, 3), V'(0, 15)

PRACTICE 6 problems

- 1** PRACTICE 1. Point A(-6, 8) is dilated by a scale factor of $\frac{1}{2}$ centered at the origin. What are the coordinates of A'?

ANSWER _____

- 2** PRACTICE 2. Triangle BCD has vertices B(-4, 6), C(8, -2), and D(0, 4). Dilate the triangle by a scale factor of $\frac{1}{2}$ centered at the origin. List the image vertices.

ANSWER _____

- 3** PRACTICE 3. Rectangle PQRS has vertices P(-3, -5), Q(2, -5), R(2, 1), and S(-3, 1). Dilate the rectangle by a scale factor of 2 centered at the origin. List the image vertices.

ANSWER _____

- 4** PRACTICE 4. Sketch triangle EFG after a dilation of $\frac{1}{4}$ centered at the origin. The vertices are E(8, -12), F(-4, -8), and G(0, -16). Then list the image vertices.

ANSWER _____

- 5** PRACTICE 5. Triangle MNO has vertices M(-2, 3), N(1, 4), and O(3, -1). Dilate the triangle by a scale factor of 3 centered at the origin. List the image vertices.

ANSWER _____

- 6** PRACTICE 6. Point A(3, -1) maps to A'(12, -4) in a dilation centered at the origin. What is the scale factor? Describe what happened to the point.

ANSWER _____

APPLY IT Show your work

- 1** APPLY 1. A video game map shows a triangular team zone with vertices $(-8, 4)$, $(-4, 10)$, and $(0, 4)$. The game shrinks the zone by a scale factor of $\frac{1}{2}$ centered at the origin for a mini-map. What are the image coordinates? Describe the dilation.

WORK SPACE

ANSWER _____

- 2** APPLY 2. A student makes a poster from a small skateboarding logo shaped like a triangle with vertices $(3, -2)$, $(5, -2)$, and $(4, 1)$. The logo is enlarged by a scale factor of 3 centered at the origin. What are the poster coordinates? Describe the dilation.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

CHALLENGE. A triangle was dilated by a scale factor of $\frac{1}{2}$ centered at the origin. Its image has vertices $A'(4, -3)$, $B'(0, 5)$, and $C'(-6, 2)$. Find the preimage vertices A , B , and C . Explain how you know.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	PRACTICE 1. Point A(-6, 8) is dilated by a scale factor of $\frac{1}{2}$ centered at the origin. What are the coordinates of A'?	A'(-3, 4)
2	PRACTICE 2. Triangle BCD has vertices B(-4, 6), C(8, -2), and D(0, 4). Dilate the triangle by a scale factor of $\frac{1}{2}$ centered at the origin. List the image vertices.	B'(-2, 3), C'(4, -1), D'(0, 2)
3	PRACTICE 3. Rectangle PQRS has vertices P(-3, -5), Q(2, -5), R(2, 1), and S(-3, 1). Dilate the rectangle by a scale factor of 2 centered at the origin. List the image vertices.	P'(-6, -10), Q'(4, -10), R'(4, 2), S'(-6, 2)
4	PRACTICE 4. Sketch triangle EFG after a dilation of $\frac{1}{4}$ centered at the origin. The vertices are E(8, -12), F(-4, -8), and G(0, -16). Then list the image vertices.	E'(2, -3), F'(-1, -2), G'(0, -4)
5	PRACTICE 5. Triangle MNO has vertices M(-2, 3), N(1, 4), and O(3, -1). Dilate the triangle by a scale factor of 3 centered at the origin. List the image vertices.	M'(-6, 9), N'(3, 12), O'(9, -3)
6	PRACTICE 6. Point A(3, -1) maps to A'(12, -4) in a dilation centered at the origin. What is the scale factor? Describe what happened to the point.	Scale factor 4. Each coordinate was multiplied by 4, so A' is four times as far from the origin as A.

PART 2 • APPLY IT

- (-4, 2), (-2, 5), and (0, 2). The mini-map zone is half the size and each vertex is half as far from the origin.** Multiply both coordinates of each vertex by $\frac{1}{2}$. The image has the same shape but is smaller because the scale factor is less than 1.
- (9, -6), (15, -6), and (12, 3). The poster logo is three times the size, and each vertex is three times as far from the origin.** Multiply each x-coordinate and y-coordinate by 3. A scale factor of 3 creates a larger similar image.

CHALLENGE

A(8, -6), B(0, 10), and C(-12, 4). Because the image was made by multiplying by $\frac{1}{2}$, multiply each image coordinate by 2 to find the preimage.

Accept correctly labeled vertices in any order. For the sketch, accept an image with the listed coordinates and the same shape in the correct position relative to the origin.