LESSON MAKER PRO

# Origin Zoom Studio

*Multiply each vertex to make a dilation centered at the origin.*

**GRADE 7 · 7.MG.4.b**

**7.MG.4.b** "Sketch the image of a dilation of a polygon limited to a scale factor of 14, 12, 2, 3, or 4. The center of the dilation will be the origin."

NAME _____ DATE _____

## DILATION RULE

When the center is the origin, multiply both coordinates of every vertex by the scale factor. A scale factor greater than 1 makes the figure larger, and a scale factor between 0 and 1 makes it smaller.

## WORKED EXAMPLE

Triangle EFG has vertices E(-5, 7), F(5, 7), and G(0, -2). Dilate it by a scale factor of 3 about the origin.

1. Use the rule (x, y) -> (3x, 3y).
2. E(-5, 7) -> E'(-15, 21).
3. F(5, 7) -> F'(15, 21).
4. G(0, -2) -> G'(0, -6).

**Answer: E'(-15, 21), F'(15, 21), G'(0, -6)**

## PRACTICE 6 problems

**1** Triangle ABC has vertices A(-2, 1), B(2, 1), and C(0, 4). Dilate the triangle by a scale factor of 2 about the origin. List the image vertices, then sketch the image.

**ANSWER** _____

**2** Rectangle DEFG has vertices D(-6, -2), E(4, -2), F(4, 6), and G(-6, 6). Dilate the rectangle by a scale factor of 1/2 about the origin. List the image vertices, then sketch the image.

**ANSWER** _____

**3** Square HIJK has vertices H(8, -4), I(16, -4), J(16, 8), and K(8, 8). Dilate the square by a scale factor of 1/4 about the origin. List the image vertices, then sketch the image.

**ANSWER** _____

**4** Triangle LMN has vertices L(-1, 3), M(2, 1), and N(3, 4). Dilate the triangle by a scale factor of 3 about the origin. List the image vertices, then sketch the image.

**ANSWER** _____

**5** Square PQRS has vertices P(-2, -1), Q(1, -1), R(1, 2), and S(-2, 2). Dilate the square by a scale factor of 4 about the origin. List the image vertices, then sketch the image.

**ANSWER** _____

**6** Kite UVWX has vertices U(-7, 1), V(-1, 5), W(3, 1), and X(-1, -3). Dilate the kite by a scale factor of 1/2 about the origin. List the image vertices, then sketch the image.

**ANSWER** _____

## APPLY IT Show your work

**1** A student designs a triangular profile icon on a coordinate grid. Its vertices are G(-8, 12), H(4, 12), and J(0, -4). To make a smaller icon, the design is dilated by a scale factor of 1/4 about the origin. What are the vertices of the smaller icon?

WORK SPACE

**ANSWER** _____

**2** A gaming club has a rectangular pixel-art banner with corners K(-3, -2), L(3, -2), M(3, 2), and N(-3, 2). They project the banner at twice its size, using the origin as the center. What are the coordinates of the projected banner?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

**CHALLENGE**

Triangle ABC is dilated by a scale factor of 1/2 about the origin. The image has vertices A'(-3, 2), B'(1, 4), and C'(5, -2). Find the original vertices. Explain how you know.

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# Origin Zoom Studio



## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Triangle ABC has vertices A(-2, 1), B(2, 1), and C(0, 4). Dilate the triangle by a scale factor of 2 about the origin. List the image vertices, then sketch the image. | **A'(-4, 2), B'(4, 2), C'(0, 8)** |
| 2 | Rectangle DEFG has vertices D(-6, -2), E(4, -2), F(4, 6), and G(-6, 6). Dilate the rectangle by a scale factor of 1/2 about the origin. List the image vertices, then sketch the image. | **D'(-3, -1), E'(2, -1), F'(2, 3), G'(-3, 3)** |
| 3 | Square HIJK has vertices H(8, -4), I(16, -4), J(16, 8), and K(8, 8). Dilate the square by a scale factor of 1/4 about the origin. List the image vertices, then sketch the image. | **H'(2, -1), I'(4, -1), J'(4, 2), K'(2, 2)** |
| 4 | Triangle LMN has vertices L(-1, 3), M(2, 1), and N(3, 4). Dilate the triangle by a scale factor of 3 about the origin. List the image vertices, then sketch the image. | **L'(-3, 9), M'(6, 3), N'(9, 12)** |
| 5 | Square PQRS has vertices P(-2, -1), Q(1, -1), R(1, 2), and S(-2, 2). Dilate the square by a scale factor of 4 about the origin. List the image vertices, then sketch the image. | **P'(-8, -4), Q'(4, -4), R'(4, 8), S'(-8, 8)** |
| 6 | Kite UVWX has vertices U(-7, 1), V(-1, 5), W(3, 1), and X(-1, -3). Dilate the kite by a scale factor of 1/2 about the origin. List the image vertices, then sketch the image. | **U'(-7/2, 1/2), V'(-1/2, 5/2), W'(3/2, 1/2), X'(-1/2, -3/2)** |

## PART 2 · APPLY IT

1. **G'(-2, 3), H'(1, 3), J'(0, -1)** Multiply each coordinate by 1/4. For example, G(-8, 12) becomes G'(-2, 3).
2. **K'(-6, -4), L'(6, -4), M'(6, 4), N'(-6, 4)** A scale factor of 2 doubles both coordinates of each corner. Multiply every x-coordinate and y-coordinate by 2.

## CHALLENGE

**A(-6, 4), B(2, 8), C(10, -4). Because the image is half the size of the original, multiply each image coordinate by 2 to find each original coordinate.**

Accept correctly labeled ordered pairs in any vertex-list order. For sketches, accept any graph that places the image vertices correctly, including fractional coordinates in problem 6.