

Shape Shift

Use transformations to identify congruence and similarity.

HIGH SCHOOL • MA.912.GR.2

MA.912.GR.2 "Apply properties of transformations to describe congruence or similarity."

NAME _____

DATE _____

TRANSFORMATION RULES

Translations, rotations, and reflections preserve side lengths and angles, so the image is congruent to the original. A dilation preserves angles and scales all lengths by the same factor, so the image is similar when the scale factor is not 1.

WORKED EXAMPLE

Dilate $Q(11, -8)$ by a scale factor of 3 centered at the origin.

1. Multiply the x-coordinate by 3: $11 \times 3 = 33$.
2. Multiply the y-coordinate by 3: $-8 \times 3 = -24$.
3. Write the image coordinates.

Answer: $Q'(33, -24)$; the figures are similar.

PRACTICE 5 problems

- 1** Translate $A(5, -2)$ left 7 units and up 4 units. Find A' and name the relationship.

ANSWER _____

- 2** Dilate $B(-10, 14)$ by a scale factor of $1/2$ centered at the origin. Find B' and name the relationship.

ANSWER _____

- 3** Reflect $C(-9, 6)$ across the y-axis. Find C' and name the relationship.

ANSWER _____

- 4** A triangle has side lengths 24, 30, and 42. It is dilated by a scale factor of $5/6$. Find the image side lengths.

ANSWER _____

- 5** A figure is rotated 90 degrees about the origin. Is the image congruent or similar to the original?

ANSWER _____

APPLY IT Show your work

- 1** A design app enlarges a club logo that is 35 mm wide and 45 mm tall by a scale factor of $\frac{4}{5}$. What are the new dimensions, and are the logos congruent or similar?

WORK SPACE

ANSWER _____

- 2** In a video game, a triangular badge is moved 14 units left and 12 units up. One vertex starts at (9, -5). What is its new location, and is the badge congruent or similar to the original?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Triangle ABC has A(4, 7), B(10, 7), and C(4, 15). Dilate it by $\frac{1}{2}$ centered at the origin, then translate it left 6 units and up 4 units. Find A', B', and C'. Explain whether the final image is congruent or similar to ABC.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Translate A(5, -2) left 7 units and up 4 units. Find A' and name the relationship.	A'(-2, 2); congruent.
2	Dilate B(-10, 14) by a scale factor of $\frac{1}{2}$ centered at the origin. Find B' and name the relationship.	B'(-5, 7); similar.
3	Reflect C(-9, 6) across the y-axis. Find C' and name the relationship.	C'(9, 6); congruent.
4	A triangle has side lengths 24, 30, and 42. It is dilated by a scale factor of $\frac{5}{6}$. Find the image side lengths.	20, 25, and 35.
5	A figure is rotated 90 degrees about the origin. Is the image congruent or similar to the original?	Congruent.

PART 2 • APPLY IT

- 28 mm wide and 36 mm tall; similar.** Multiply each dimension by $\frac{4}{5}$. A dilation with a scale factor other than 1 creates similar figures.
- (-5, 7); congruent.** Subtract 14 from the x-coordinate and add 12 to the y-coordinate. A translation preserves size and shape.

CHALLENGE

A'(-4, $\frac{15}{2}$), B'(-1, $\frac{15}{2}$), C'(-4, $\frac{23}{2}$); similar. The dilation has scale factor $\frac{1}{2}$, so side lengths change.

Accept equivalent coordinate notation and equivalent fractions. For relationship questions, accept only congruent after translations, rotations, or reflections, and similar after a dilation with scale factor not equal to 1.