

# 10.1 Properties of Dilations

Common Core Standards:

## **8.G.4**

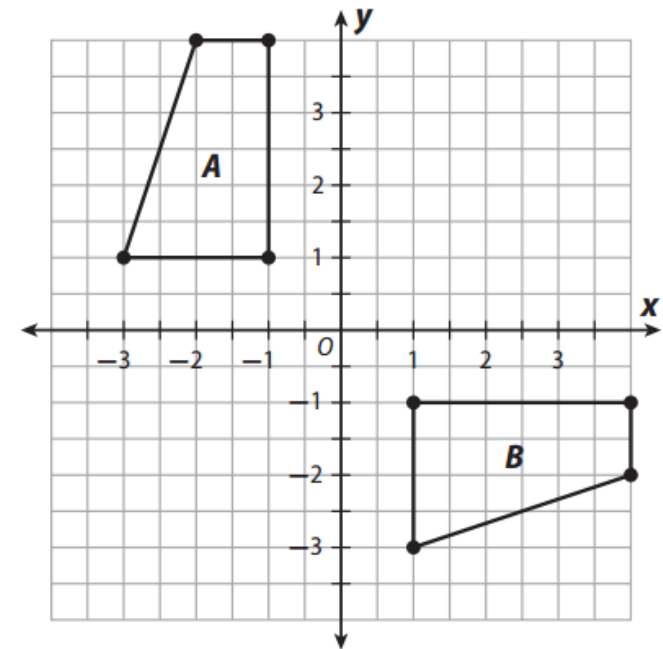
Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

## **8.G.3**

Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates

## Bellringer

- On a coordinate grid, graph a triangle with its vertices at  $(-2, 1)$ ,  $(-4, 1)$ , and  $(-1, 4)$ . Then apply the indicated series of transformations to the triangle. Each transformation is applied to the image of the previous transformation. Label each image with the letter of the transformation applied.
  - Rotation  $90^\circ$  clockwise around the origin
  - $(x, y) \rightarrow (x, y - 3)$
  - $(x, y) \rightarrow (x - 3, y - 2)$
- Identify a sequence of transformations that will transform figure A into figure B.



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## **8.G.3**

Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates

## Vocabulary

- Dilation - change in the size of a figure
- Center of Dilation - a fixed point of a dilation where the lines connecting corresponding parts of figures intersect
- Similar - has the same shape, but different sizes
  - ↳ similar shapes have proportional corresponding sides and congruent corresponding angles

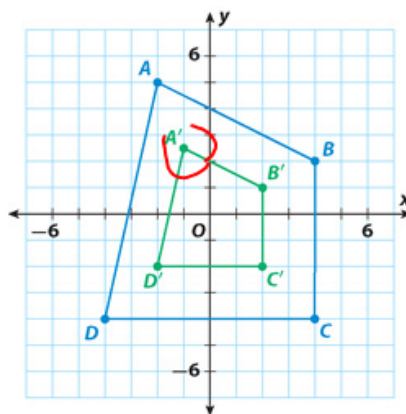
**EXPLORE ACTIVITY 2**

COMMON CORE 8.G.3

**Exploring Dilations on a Coordinate Plane**

In this activity you will explore how the coordinates of a figure on a coordinate plane are affected by a dilation.

- A** Complete the table. Record the  $x$ - and  $y$ -coordinates of the points in the two figures and the ratios of the  $x$ -coordinates and the  $y$ -coordinates.



$$\frac{-1}{-2} = .5$$

Vertex	$x$	$y$	Vertex	$x$	$y$	Ratio of $x$ -coordinates ( $A'B'C'D' \div ABCD$ )	Ratio of $y$ -coordinates ( $A'B'C'D' \div ABCD$ )
$A'$	-1	2.5	$A$	-2	5	$-1 \div -2 = .5$	$2.5 \div 5 = .5$
$B'$	2	1	$B$	4	2	$2 \div 4 = .5$	$1 \div 2 = .5$
$C'$	2	-2	$C$	4	-4	$2 \div 4 = .5$	$-2 \div -4 = .5$
$D'$	-2	-2	$D$	-4	-4	$-2 \div -4 = .5$	$-2 \div -4 = .5$

- B** Write a conjecture about the ratios of the coordinates of a dilation image to the coordinates of the original figure.

Ratios all = .5

proportional

## Vocabulary

- Scale Factor - describes how much the figure is enlarged or reduced
- enlargement - when dilation produces a larger figure  
↳ Scale factor will be greater than 1
- reduction - when dilation produces a smaller figure  
↳ Scale factor will be less than 1

**EXAMPLE 1**

An art supply store sells several sizes of drawing triangles. All are dilations of a single basic triangle. The basic triangle and one of its dilations are shown on the grid. Find the scale factor of the dilation.

$$\begin{array}{l} \overline{AC} = 2 \\ \overline{CB} = 3 \end{array} \quad \begin{array}{l} \overline{A'C'} = 4 \\ \overline{C'B'} = 6 \end{array} \quad \begin{array}{l} \frac{4}{2} = 2 \\ \frac{6}{3} = 2 \end{array}$$

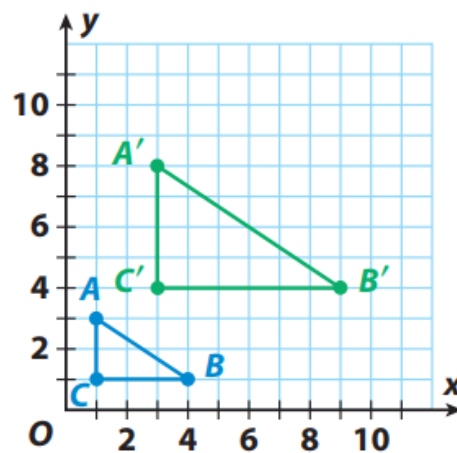


Image  
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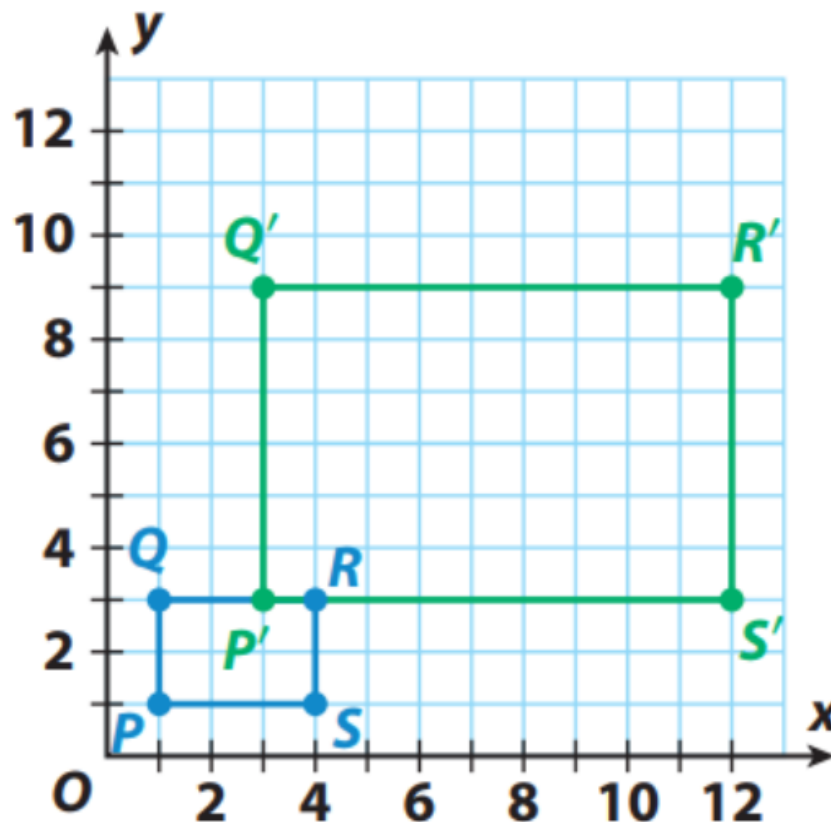
Scale factor  
of 2

## ADDITIONAL EXAMPLE 1

An office supply store sells index cards in two different sizes. The large size is a dilation of the small size. Both sizes are shown. Find the scale factor of the dilation.

$$\begin{array}{lll} \overline{QR} = 3 & \overline{Q'R'} = 9 & \frac{9}{3} = 3 \\ \overline{PS} = 3 & \overline{P'S'} = 9 & \frac{9}{3} = 3 \\ \overline{QP} = 2 & \overline{Q'P'} = 6 & \frac{6}{2} = 3 \\ \overline{RS} = 2 & \overline{R'S'} = 6 & \frac{6}{2} = 3 \\ & & \frac{6}{2} = 3 \end{array}$$

S.F. = 3





## YOUR TURN

5. Find the scale factor of the dilation.

.5

$$\overline{DE} = 6$$

$$\overline{D'E'} = 3$$

$$\frac{3}{6} = .5$$

$$\overline{GF} = 6$$

$$\overline{G'F'} = 3$$

$$\frac{3}{6} = .5$$

$$\overline{DG} = 4$$

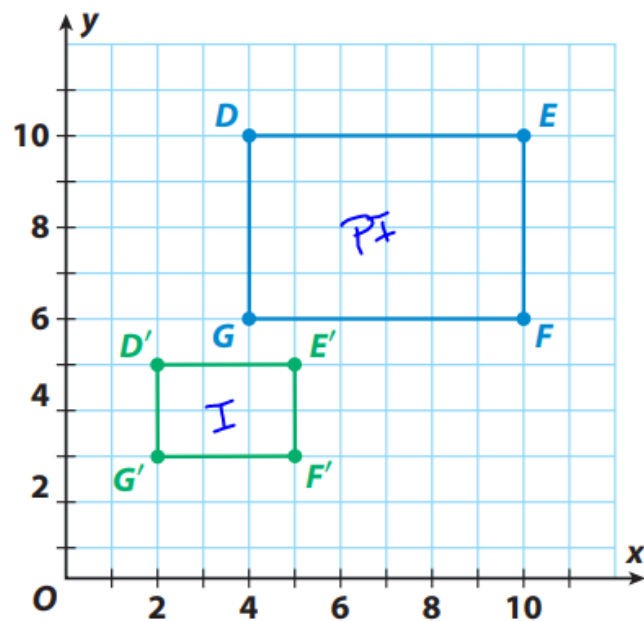
$$\overline{D'G'} = 2$$

$$\frac{2}{4} = .5$$

$$\overline{EF} = 4$$

$$\overline{E'F'} = 2$$

$$\frac{2}{4} = .5$$



## Guided Practice

Use triangles  $ABC$  and  $A'B'C'$  for 1–5. (Explore Activities 1 and 2, Example 1)

- For each pair of corresponding vertices, find the ratio of the x-coordinates and the ratio of the y-coordinates.

ratio of x-coordinates = \_\_\_\_\_

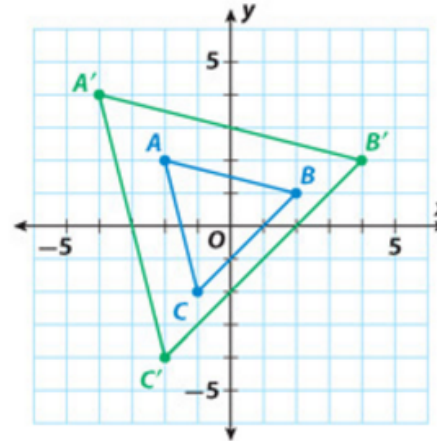
ratio of y-coordinates = \_\_\_\_\_

- I know that triangle  $A'B'C'$  is a dilation of triangle  $ABC$  because the ratios of the corresponding x-coordinates are \_\_\_\_\_ and the ratios of the corresponding y-coordinates are \_\_\_\_\_.

- The ratio of the lengths of the corresponding sides of triangle  $A'B'C'$  and triangle  $ABC$  equals \_\_\_\_\_.

- The corresponding angles of triangle  $ABC$  and triangle  $A'B'C'$  are \_\_\_\_\_.

- The scale factor of the dilation is \_\_\_\_\_.



P 318 (All)  
P 319 - 320  
(7-18)