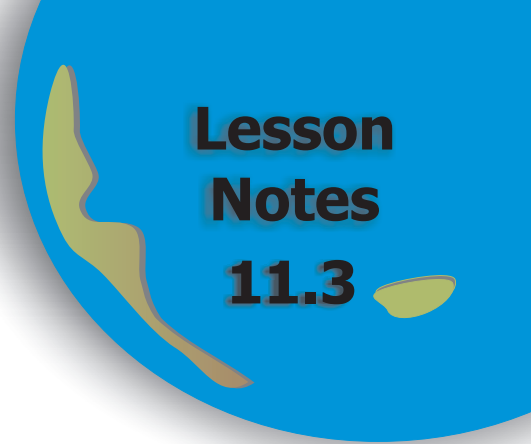


NAME \_\_\_\_\_

Module 11 Transformations of Shapes  
Lesson 3 Dilations



### Lesson Objectives

- Draw and describe dilations (enlargements and reductions) of two-dimensional figures.
- Graph dilations on a coordinate plane.

### Subtopic 1 Dilations

Dilation

- Figure changes size but not shape.
- Figure and its image are similar.
- An enlargement if the image is larger than the original figure
- A reduction if the image is smaller than the original figure

Scale factor

- A number that indicates how much larger—or smaller—the image is from the original
- Describes the size of the change from the original figure to its image

Enlargement

- A dilation with scale factor > 1
- The image is larger than the figure.

Reduction

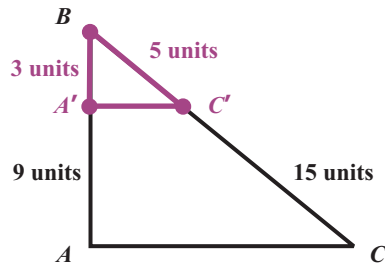
- A dilation with  $0 < \text{scale factor} < 1$
- The image is smaller than the figure.

In a dilation with scale factor = 1, the figure and its image have the same points.

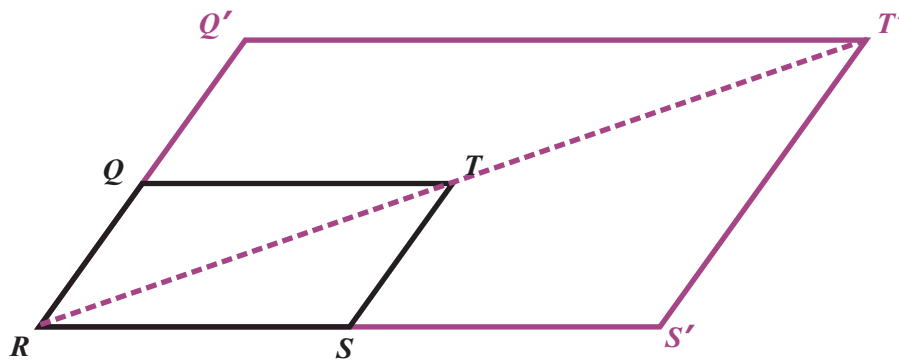
The center of dilation is a fixed point from which all points contract or expand to make the similar image.



Construct a dilation on  $\triangle ABC$  with scale factor  $\frac{1}{3}$  and center  $B$ .



Construct a dilation of quadrilateral  $QRST$  with scale factor two and center  $R$ .



### Subtopic 2

### Dilations on the Coordinate Plane



$\triangle FGH$  has vertices  $F(2, 8)$ ,  $G(0, -4)$ , and  $H(-3, 5)$ . What are the vertices of an image with a  $(0,0)$  center and a scale factor of 5?

$$\begin{aligned} F(2, 8) &\rightarrow F'(2 \times 5, 8 \times 5) \rightarrow F'(10, 40) \\ G(0, -4) &\rightarrow G'(0 \times 5, -4 \times 5) \rightarrow G'(0, -20) \\ H(-3, 5) &\rightarrow H'(-3 \times 5, 5 \times 5) \rightarrow H'(-15, 25) \end{aligned}$$

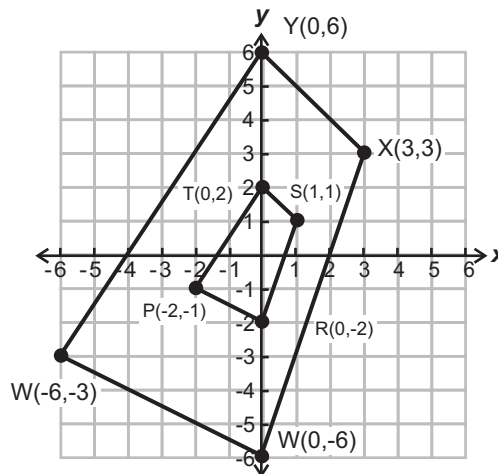
NAME \_\_\_\_\_

**Module 11 Transformations of Shapes**  
**Lesson 3 Dilations**

**4** Quadrilateral  $PRST$  is the image of quadrilateral  $VWXY$  under a dilation with center  $(0, 0)$ . What is the scale factor of the dilation?

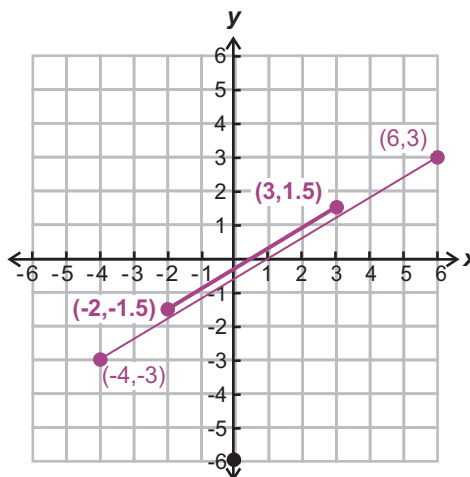
$$\begin{aligned} V(-6, -3) &\rightarrow P(-2, -1) \\ W(0, -6) &\rightarrow R(0, -2) \\ X(3, 3) &\rightarrow S(1, 1) \\ Y(0, 6) &\rightarrow T(0, 2) \end{aligned}$$

Scale factor:  $\frac{1}{3}$



**5** Graph the image of a line segment with endpoints at  $(-4, -3)$  and  $(6, 3)$  under a dilation with scale factor  $\frac{1}{2}$ .

$$\begin{aligned} \left(6 \times \frac{1}{2}, 3 \times \frac{1}{2}\right) &\rightarrow \left(3, 1\frac{1}{2}\right) = (3, 1.5) \\ \left(-4 \times \frac{1}{2}, -3 \times \frac{1}{2}\right) &\rightarrow \left(-2, -1\frac{1}{2}\right) = (-2, -1.5) \end{aligned}$$



**6** Graph the image of  $\triangle BCD$  under a dilation with scale factor 2.

$$\begin{aligned} B'(0 \times 2, 2 \times 2) &\rightarrow (0, 4) \\ C'(2 \times 2, -3 \times 2) &\rightarrow (4, -6) \\ D'(-2 \times 2, -1 \times 2) &\rightarrow (-4, -2) \end{aligned}$$

