Transformations

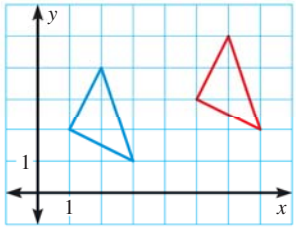
TEKS 8.6.A, 8.6.B

A **transformation** is a change made to the location, size, or shape of a figure. The new figure formed by a transformation is called an **image**. In this book, original figures are shown in blue and images in red.

A **translation** is a transformation in which each point of a figure moves the same distance in the same direction. A figure and its translated image are identical in size and shape.

EXAMPLE **Translate the triangle 4 units to the right and 1 unit up.**

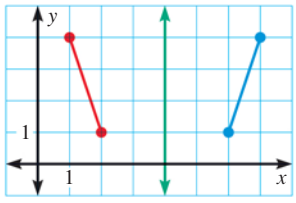
From each vertex of the triangle, move 4 units to the right and 1 unit up to plot the image of the vertex. Draw segments connecting the images of the vertices.



A **reflection** is a transformation in which a figure is reflected, or flipped, in a line, called the *line of reflection*. A figure and its reflected image are identical in size and shape.

EXAMPLE **Reflect the line segment in the given line.**

For each endpoint, find the distance from the endpoint to the line of reflection. Move the same distance on the opposite side of the line of reflection and plot the image point. Draw a segment connecting the image points.



A **dilation** is a transformation in which a figure stretches or shrinks with respect to a fixed point called the *center of dilation*. (The examples and exercises below all have the origin as the center of dilation.) A figure and its dilated image have the same shape.

The **scale factor** of a dilation is the ratio of a side length of the image to the corresponding side length of the original figure. A figure *stretches* if its scale factor is greater than 1. A figure *shrinks* if its scale factor is between 0 and 1.

EXAMPLE **Dilate the rectangle using a scale factor of 3.**

Multiply each coordinate of each vertex by 3 to find the coordinates of the image. Plot the image of each vertex. Connect the image points to form a rectangle.

$(1, 1) \rightarrow (3, 3)$ $(1, 2) \rightarrow (3, 6)$

$(3, 2) \rightarrow (9, 6)$ $(3, 1) \rightarrow (9, 3)$