8-6 Transformations and Similarity

CONTENT STANDARDS
8.G.4

What You'll Learn

To describe a sequence of transformations that maps one figure onto a figure that is similar; to determine whether two figures are similar by using a sequence of transformations

Why Learn This?

Smartphones and tablets have a "zoom" feature that makes a figure larger or smaller. A "swipe" feature lets you slide the figure around on the screen. When you use these two features together, the final figure is similar to the original figure.

If two figures are similar, but not congruent, then a dilation, or a dilation and a sequence of transformations, will map one figure onto the other.

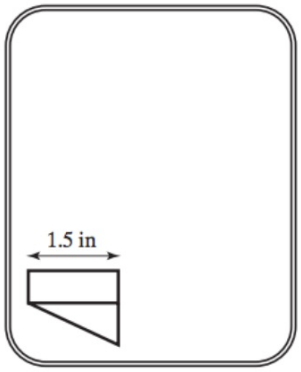
EXAMPLE 1 Determining Similarity using Transformations

You use the zoom and swipe features on your smartphone to enlarge and then move an image of a bee on the screen. Describe the sequence of transformations that maps the original image of the bee onto an image that is similar.

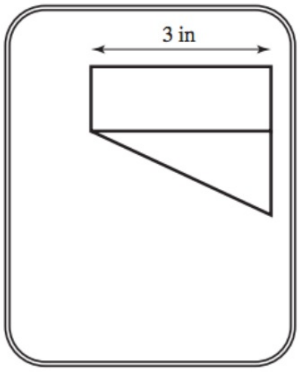
A dilation with a scale factor of 3.5 maps the original image of the bee onto the first zoomed-in image. A translation to the left maps the zoomed-in image onto the final image similar to the original image.

Example

1 Recognizing a Series of Transformations You use the zoom and swipe features on a tablet computer to enlarge and then move a geometric image. The original and final images are shown below. Describe the sequence of transformations that maps the original image onto the final image



Original Image



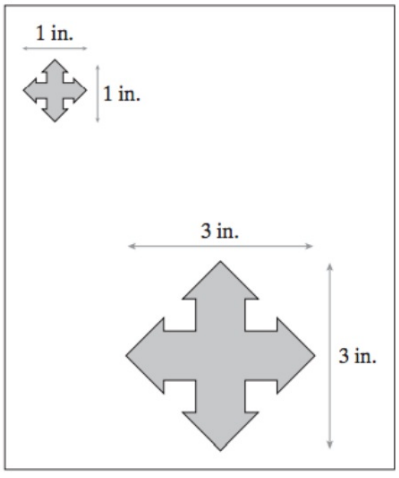
Final Image

The zoom was a [dilation] with a scale factor of [2].

Swiping the image mapped the original image in the direction [right] and then [up] onto the final zoomed-in image.

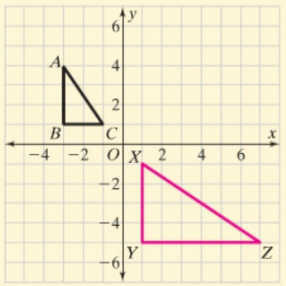
Quick Check

1. Using a computer, a graphic designer moves a company logo from the top left of a page to the bottom center of the page and then enlarges the logo, as shown below. Describe the sequence of transformations that maps the original logo onto the final logo.



More Than One Way

Determine whether $\triangle ABC$ is similar to $\triangle ZYX$. Explain your reasoning.



Tina's Method

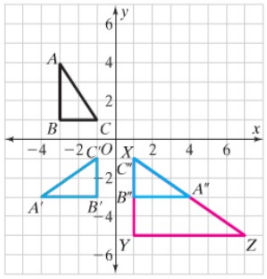
I can use a sequence of transformations to prove that $\triangle ABC$ is similar to $\triangle ZYX$.

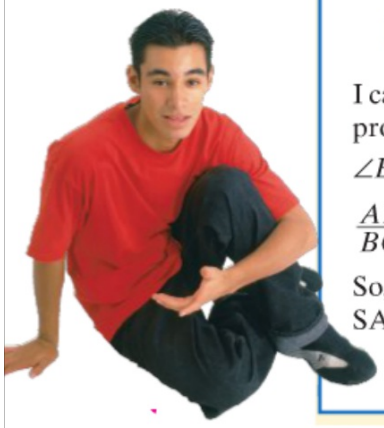
Rotate $\triangle ABC$ 90° about the origin to get $\triangle A'B'C'$.

Reflect $\triangle A'B'C'$ over the y-axis to get $\triangle A''B''C''$.

Dilate $\triangle A''B''C''$ by the scale factor 2 with center C'' to get $\triangle ZYX$.

I can map $\triangle ABC$ onto $\triangle ZYX$ using transformations with a dilation, so the triangles are similar.





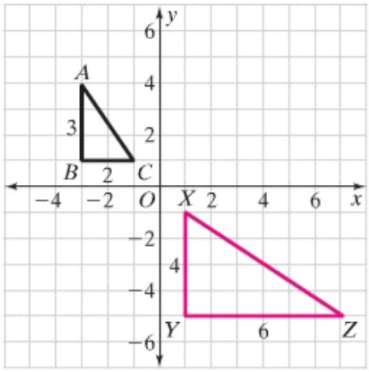
Roberto's Method

I can use the SAS Similarity Theorem to prove that the two triangles are similar.

$\angle B \cong \angle Y$ because they are right angles.

$\frac{AB}{BC} = \frac{3}{2}$ and $\frac{ZY}{YX} = \frac{6}{4} = \frac{3}{2}$.

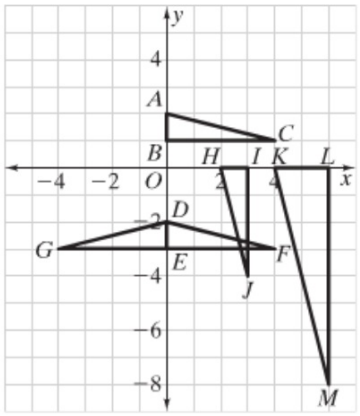
So, $\triangle ABC$ is similar to $\triangle ZYX$ by the SAS Similarity Theorem.



Check Your Understanding

1. **Reasoning** What type of transformation can change the size of a figure? Explain your reasoning.

Use the graph at the right. Identify each mapping as a translation, reflection, rotation, or dilation.



2. $\triangle ABC \rightarrow \triangle DEF$
3. $\triangle DEF \rightarrow \triangle DEG$
4. $\triangle DEG \rightarrow \triangle HIJ$
5. $\triangle HIJ \rightarrow \triangle KLM$
6. What sequence of transformations maps $\triangle ABC$ onto $\triangle KLM$?

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