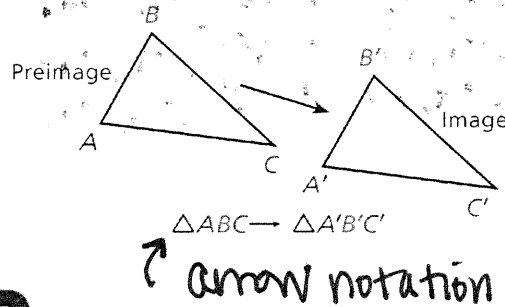


A **transformation** is a change in the position, size, or shape of a figure. The original figure is called the **preimage**. The resulting figure is called the **image**. A transformation *maps* the preimage to the image. Arrow notation (\rightarrow) is used to describe a transformation, and primes (') are used to label the image.



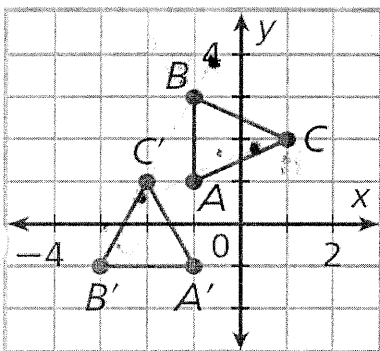
Transformations	REFLECTION	ROTATION	TRANSLATION
	<p>A reflection (or <i>flip</i>) is a transformation across a line, called the line of reflection. Each point and its image are the same distance from the line of reflection.</p>	<p>A rotation (or <i>turn</i>) is a transformation about a point P, called the center of rotation. Each point and its image are the same distance from P.</p>	<p>A translation (or <i>slide</i>) is a transformation in which all the points of a figure move the same distance in the same direction.</p>

Translation

- To find coordinates for the image of a figure in a translation, add a to the **x-coordinates** of the preimage and add b to the **y-coordinates** of the preimage.
- $(x, y) \rightarrow (x + a, y + b)$

RULE

Example 1: Identify the transformation. Then use arrow notation to describe the transformation.



Rotation

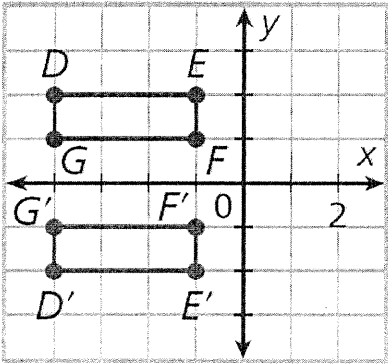
$$\Delta ABC \rightarrow \Delta A'B'C'$$

$$A(-1, 1) \rightarrow A'(-1, -1)$$

$$B(-1, 3) \rightarrow B'(-3, -1)$$

$$C(1, 2) \rightarrow C'(-2, 1)$$

Example 2: Identify the transformation. Then use arrow notation to describe the transformation.



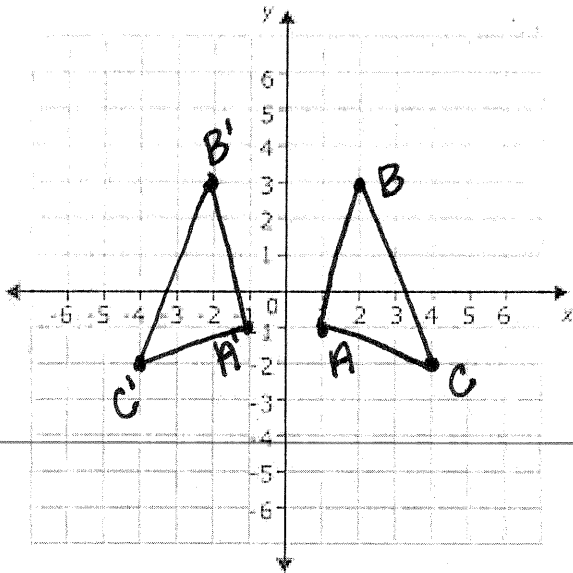
Reflection (over the x-axis)

Rectangle DEFG \rightarrow Rectangle D'E'F'G'

$$\left. \begin{aligned} D(-4, 2) &\rightarrow D'(-4, -2) \\ E(-1, 2) &\rightarrow E'(-1, -2) \\ F(-1, 1) &\rightarrow F'(-1, -1) \\ G(-4, 1) &\rightarrow G'(-4, -1) \end{aligned} \right\}$$

Example 3: A figure has vertices at $A(1, -1)$, $B(2, 3)$, and $C(4, -2)$. After a transformation, the image of the figure has vertices at $A'(-1, -1)$, $B'(-2, 3)$, and $C'(-4, -2)$.

Draw the preimage and image. Then identify the transformation.



Reflection
(over the y-axis)

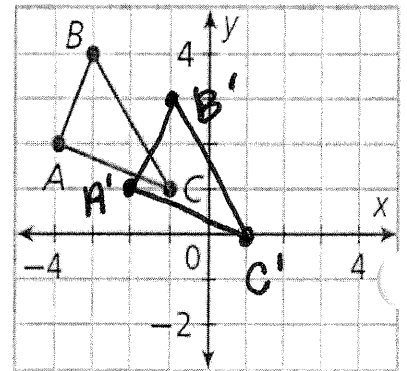
- To find coordinates for the image of a figure in a translation, add a to the x -coordinates of the preimage and add b to the y -coordinates of the preimage. Translations can also be described by a rule such as $(x, y) \rightarrow (x + a, y + b)$.

Example 4: Find the coordinates for the image of $\triangle ABC$ after the translation $(x, y) \rightarrow (x + 2, y - 1)$. Draw the image.

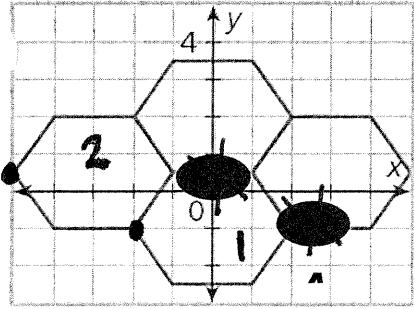
$$A(-4, 2) \rightarrow A'(-2, 1)$$

$$B(-3, 4) \rightarrow B'(-1, 3)$$

$$C(-1, 1) \rightarrow C'(1, 0)$$



Example 5: The figure shows part of a tile floor. Write a rule for the translation of hexagon 1 to hexagon 2.



$$(x, y) \rightarrow (x - 3, y + 1.5)$$
$$(-2, 1) \rightarrow (-5, 0.5)$$

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