NAME _____ DATE _____ PERIOD _____

2-7 Study Guide and Intervention

Translations and Reflections on the Coordinate Plane

Transformations A **transformation** is an operation that maps an original geometric figure onto a new figure called the **image.** A **translation** and a **reflection** are two types of transformations on the coordinate plane.

Translation

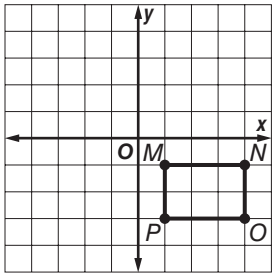
- called a "slide"
- image is the same shape and the same size as original figure
- orientation is the same as the original figure

Reflection

- called a "flip"
- figures are mirror images of each other
- image is the same shape and same size as original figure
- orientation is *different* from the original figure

An ordered pair (a, b) can be used to describe a translation, where every point $P(x, y)$ is moved to an image $P'(x + a, y + b)$.

Example **Rectangle *MNOP* is shown at the right. If it is translated 4 units to the left and 5 units up, find the coordinates of the vertices of the image.**

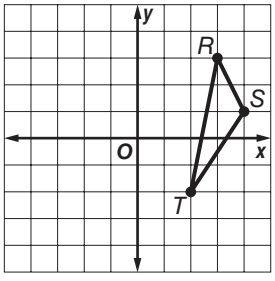


This translation can be written as $(-4, 5)$. To find the coordinates of the translated image, add -4 to each x-coordinate and add 5 to each y-coordinate.

vertex		translation		Image
$M(1, -1)$	+	$(-4, 5)$	→	$M'(-3, 4)$
$N(4, -1)$	+	$(-4, 5)$	→	$N'(0, 4)$
$O(4, -3)$	+	$(-4, 5)$	→	$O'(0, 2)$
$P(1, -3)$	+	$(-4, 5)$	→	$P'(-3, 2)$

Exercises

1. Triangle *RST* is shown on the coordinate plane. Find the coordinates of the vertices of the image if triangle *RST* is translated 6 units to the left and 3 units down.

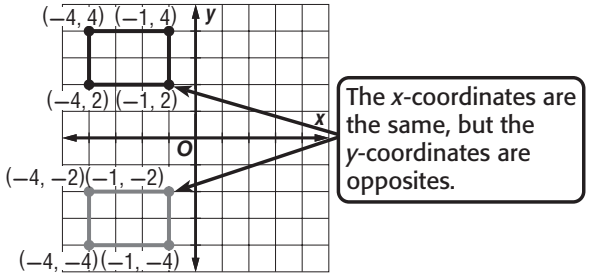


2-7 Study Guide and Intervention *(continued)*

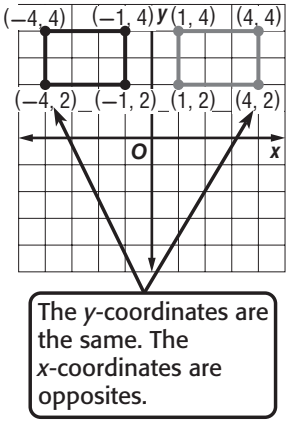
Translations and Reflections on the Coordinate Plane

Graph Transformations When reflecting a figure, every point of the original figure has a corresponding point on the other side of the **line of symmetry.** Corresponding points are the same distance from the line of symmetry.

Reflection over the *x*-axis

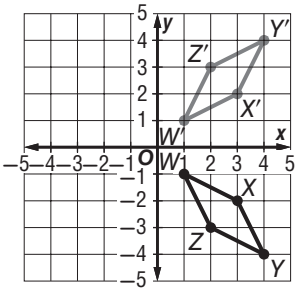


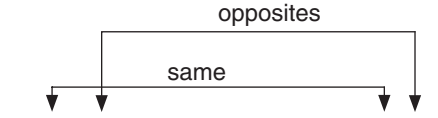
Reflection over the *y*-axis



Example **The vertices of figure *WXYZ* are *W*(1, –1), *X*(3, –2), *Y*(4, –4), and *Z*(2, –3). Graph the figure and its image after a reflection over the *x*-axis.**

To find the coordinates of the vertices of the image after a reflection over the *x*-axis, use the same *x*-coordinate. Replace the *y*-coordinate with its opposite.





$W(1, -1) \rightarrow W'(1, 1)$
$X(3, -2) \rightarrow X'(3, 2)$
$Y(4, -4) \rightarrow Y'(4, 4)$
$Z(2, -3) \rightarrow Z'(2, 3)$

Exercises

1. The vertices of figure *JKLM* are *J*(–4, –2), *K*(–2, –2), *L*(–1, –4), and *M*(–5, –4). Graph the figure and its image after a reflection over the *y*-axis.