## 9-1 Study Guide and Intervention *(continued)*

Draw Reflections In The Coordinate Plane Reflections can be performed in the coordinate plane. Each point of the image and its corresponding point on the preimage must be the same distance from the line of reflection.

- To reflect a point in the x-axis, multiply its y-coordinate by -1.

- To reflect a point in the y-axis, multiply its x-coordinate by -1.

- To reflect a point in the line $y = x$, interchange the x-and y-coordinates.

Example Quadrilateral *DEFG* has vertices D(−2, 3), E(4, 4), F(3, −2), and G(−3, −1). Find the image under reflection in the x-axis.
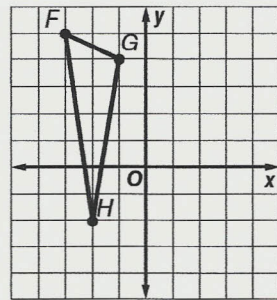
To find an image for a reflection in the x-axis, use the same x-coordinate and multiply the y-coordinate by -1. In symbols, $(a, b) \rightarrow (a, -b)$. The new coordinates are $D'(-2, -3)$, $E'(4, -4)$, $F'(3, 2)$, and $G'(-3, 1)$. The image is $D'E'F'G'$.
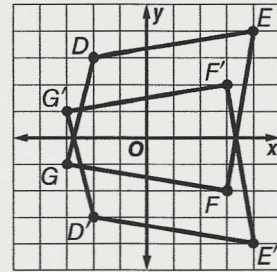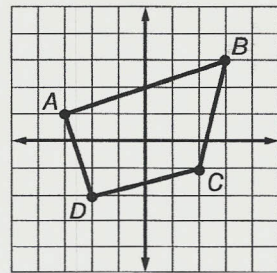
Exercises

Graph △*FGH* and its image in the given line.
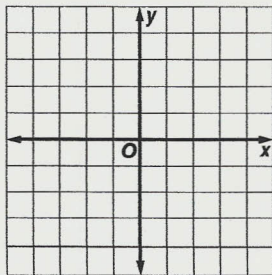
1. $x = -1$

2. $y = 1$

Graph quadrilateral *ABCD* and its image in the given line.
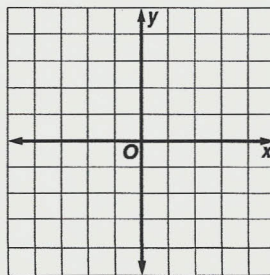
3. $y = 0$

4. $x = 1$

Graph each figure and its image under the given reflection.

5. △*DEF* with D(−2, −1), E(−1, 3), F(3, −1) in the x-axis

**6.** *ABCD* with A(1, 4), B(3, 2), C(2, −2), D(−3, 1) in the y-axis

9-2 Study Guide and Intervention (continued)

Translations

Translations In The Coordinate Plane A vector can be used to translate a figure on the coordinate plane when written in the form $\langle a, b \rangle$ where a represents the horizontal change and b represents the vertical change from the vector's tip to its tail.

Example Rectangle *RECT* has vertices $R(-2, -1)$, $E(-2, 2)$, $C(3, 2)$, and $T(3, -1)$. Graph the figure and its image along the vector $\langle 2, -1 \rangle$.
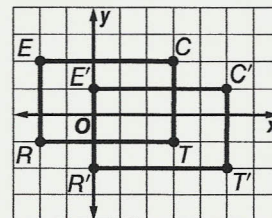
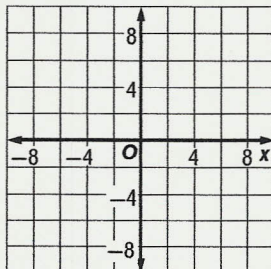The vector indicates a translation 2 units right and 1 unit down.

$$
\begin{array}{lcl}
(x, y) & \rightarrow & (x + 2, y - 1) \\
R(-2, -1) & \rightarrow & R'(0, -2) \\
E(-2, 2) & \rightarrow & E'(0, 1) \\
C(3, 2) & \rightarrow & C'(5, 1) \\
T(3, -1) & \rightarrow & T'(5, -2)
\end{array}
$$
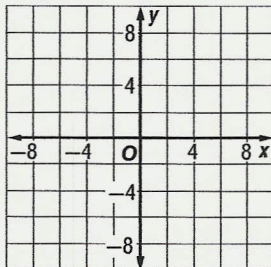
Graph *RECT* and its image $R'E'C'T'$.

Exercises

Graph each figure and its image along the given vector.

1. quadrilateral *TUVW* with vertices $T(-3, -8)$, $U(-6, 3)$, $V(3, 0)$, and $W(0, 3)$; $\langle 4, 5 \rangle$

2. $\triangle QRS$ with vertices $Q(2, 5)$, $R(7, 1)$, and $S(-1, 2)$; $\langle -1, -2 \rangle$

3. parallelogram *ABCD* with vertices $A(1, 6)$, $B(4, 5)$, $C(1, -1)$, and $D(-2, 0)$; $\langle 3, -2 \rangle$