

# Exercises

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## GUIDED PRACTICE

1. **Vocabulary** A ? creates a mirror image of a set of points. (*reflection matrix* or *translation matrix*)

LE 1 Translate the polygon with coordinates  $P(-2, 4)$ ,  $Q(3, 1)$ ,  $R(1, -4)$ , and  $S(-2, -2)$  as indicated. Find the coordinates of the vertices of the image, and graph.

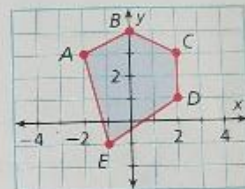
- 2 units left and 1 unit up
- 1 unit right and 0 units down

LE 2 Use a matrix to reduce or enlarge the polygon with coordinates  $P(-2, 4)$ ,  $Q(3, 1)$ ,  $R(1, -4)$ , and  $S(-2, -2)$  by the given factor. Find the coordinates of the vertices of the image, and graph.

- Reduce polygon  $PQRS$  by a factor of 0.5.
- Enlarge polygon  $PQRS$  by a factor of 2.

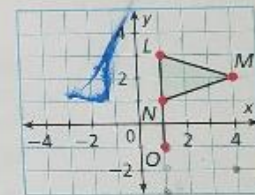
LE 3 Reflect the figure with coordinates  $A(-2, 3)$ ,  $B(0, 4)$ ,  $C(2, 3)$ ,  $D(2, 1)$ , and  $E(-1, -1)$  across the given line. Find the coordinates of the vertices of the image, and graph.

- Reflect  $ABCDE$  across the  $y$ -axis.
- Use  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$  to reflect  $ABCDE$  across the line  $y = x$ .



LE 4 Use each matrix to rotate the figure with coordinates  $L(1, 3)$ ,  $M(4, 2)$ ,  $N(1, 1)$ , and  $O(1, -1)$  about the origin. Graph and describe the image.

- $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$
- $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$



## PRACTICE AND PROBLEM SOLVING

10. Translate the polygon with coordinates  $D(0, 4)$ ,  $E(-3, -1)$ ,  $F(1, -5)$ , and  $G(1, 0)$  3 units right and 3 units up. Find the coordinates of the vertices of the image, and graph.

11. Dilate the polygon with coordinates  $W(1, 2)$ ,  $X(-2, 3)$ ,  $Y(-3, 4)$ , and  $Z(-4, 1)$  by a factor of  $\frac{3}{2}$ . Find the coordinates of the vertices of the image, and graph.

12. Reflect the figure with coordinates  $A(-2, 3)$ ,  $B(0, 4)$ ,  $C(2, 3)$ ,  $D(2, 1)$ , and  $E(-1, -1)$  across the  $x$ -axis. Graph and describe the image.

13. Use each matrix to rotate the figure  $PQRST$  with coordinates  $P(-3, 2)$ ,  $Q(0, 0)$ ,  $R(-4, 1)$ ,  $S(-4, 4)$ , and  $T(-1, 4)$ . Graph and describe the image.

- $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$
- $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$

