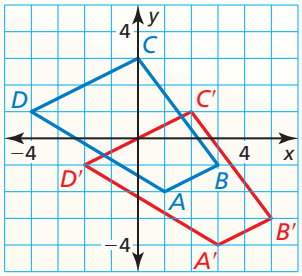
4 Chapter Review

Dynamic Solutions available at *BigIdeasMath.com*

4.1 Translations *(pp. 173–180)*

Graph quadrilateral $ABCD$ with vertices $A(1, -2)$, $B(3, -1)$, $C(0, 3)$, and $D(-4, 1)$ and its image after the translation $(x, y) \rightarrow (x + 2, y - 2)$.

Graph quadrilateral $ABCD$. To find the coordinates of the vertices of the image, add 2 to the x-coordinates and subtract 2 from the y-coordinates of the vertices of the preimage. Then graph the image.



$$(x, y) \rightarrow (x + 2, y - 2)$$

$A(1, -2) \rightarrow A'(3, -4)$

$B(3, -1) \rightarrow B'(5, -3)$

$C(0, 3) \rightarrow C'(2, 1)$

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

Graph $\triangle XYZ$ with vertices $X(2, 3)$, $Y(-3, 2)$, and $Z(-4, -3)$ and its image after the translation.

1. $(x, y) \rightarrow (x, y + 2)$

2. $(x, y) \rightarrow (x - 3, y)$

3. $(x, y) \rightarrow (x + 3, y - 1)$

4. $(x, y) \rightarrow (x + 4, y + 1)$

Graph $\triangle PQR$ with vertices $P(0, -4)$, $Q(1, 3)$, and $R(2, -5)$ and its image after the composition.

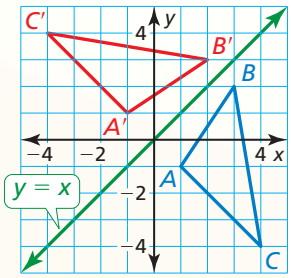
5. **Translation:** $(x, y) \rightarrow (x + 1, y + 2)$
Translation: $(x, y) \rightarrow (x - 4, y + 1)$

6. **Translation:** $(x, y) \rightarrow (x, y + 3)$
Translation: $(x, y) \rightarrow (x - 1, y + 1)$

4.2 Reflections *(pp. 181–188)*

Graph $\triangle ABC$ with vertices $A(1, -1)$, $B(3, 2)$, and $C(4, -4)$ and its image after a reflection in the line $y = x$.

Graph $\triangle ABC$ and the line $y = x$. Then use the coordinate rule for reflecting in the line $y = x$ to find the coordinates of the vertices of the image.



$$(a, b) \rightarrow (b, a)$$

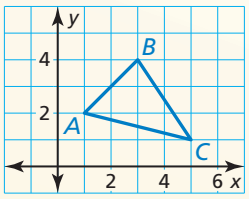
$A(1, -1) \rightarrow A'(-1, 1)$

$B(3, 2) \rightarrow B'(2, 3)$

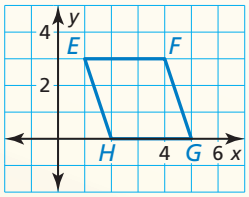
$C(4, -4) \rightarrow C'(-4, 4)$

Graph the polygon and its image after a reflection in the given line.

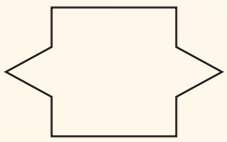
7. $x = 4$



8. $y = 3$



9. How many lines of symmetry does the figure have?

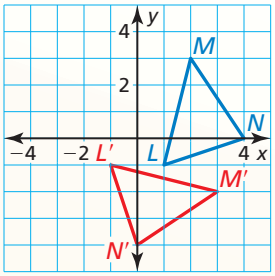


4.3 Rotations *(pp. 189–196)*

Graph $\triangle LMN$ with vertices $L(1, -1)$, $M(2, 3)$, and $N(4, 0)$ and its image after a 270° rotation about the origin.

Use the coordinate rule for a 270° rotation to find the coordinates of the vertices of the image. Then graph $\triangle LMN$ and its image.

$$(a, b) \rightarrow (b, -a)$$
$$L(1, -1) \rightarrow L'(-1, -1)$$
$$M(2, 3) \rightarrow M'(3, -2)$$
$$N(4, 0) \rightarrow N'(0, -4)$$



Graph the polygon with the given vertices and its image after a rotation of the given number of degrees about the origin.

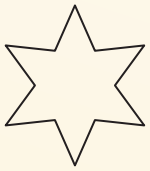
10. $A(-3, -1)$, $B(2, 2)$, $C(3, -3)$; 90°

11. $W(-2, -1)$, $X(-1, 3)$, $Y(3, 3)$, $Z(3, -3)$; 180°

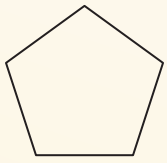
12. Graph $\overline{XY}$ with endpoints $X(5, -2)$ and $Y(3, -3)$ and its image after a reflection in the x-axis and then a rotation of 270° about the origin.

Determine whether the figure has rotational symmetry. If so, describe any rotations that map the figure onto itself.

13.

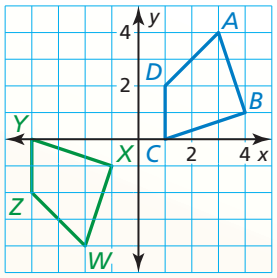


14.



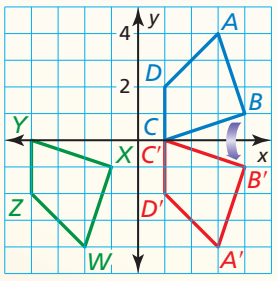
4.4 Congruence and Transformations *(pp. 199–206)*

Describe a congruence transformation that maps quadrilateral *ABCD* to quadrilateral *WXYZ*, as shown at the right.



$\overline{AB}$ falls from left to right, and $\overline{WX}$ rises from left to right. If you reflect quadrilateral $ABCD$ in the x-axis as shown at the bottom right, then the image, quadrilateral $A'B'C'D'$, will have the same orientation as quadrilateral $WXYZ$. Then you can map quadrilateral $A'B'C'D'$ to quadrilateral $WXYZ$ using a translation of 5 units left.

▶ So, a congruence transformation that maps quadrilateral $ABCD$ to quadrilateral $WXYZ$ is a reflection in the x-axis followed by a translation of 5 units left.



Describe a congruence transformation that maps $\triangle DEF$ to $\triangle JKL$.

15. $D(2, -1)$, $E(4, 1)$, $F(1, 2)$ and $J(-2, -4)$, $K(-4, -2)$, $L(-1, -1)$

16. $D(-3, -4)$, $E(-5, -1)$, $F(-1, 1)$ and $J(1, 4)$, $K(-1, 1)$, $L(3, -1)$

17. Which transformation is the same as reflecting an object in two parallel lines? in two intersecting lines?