

Lesson 8-1

Example 1

Graph the image of parallelogram $ABCD$ with vertices $A(1, 7)$, $B(3, 5)$, $C(3, 0)$ and $D(1, 2)$ under each transformation from the original position.

a. 7 units down

b. reflected across the y -axis

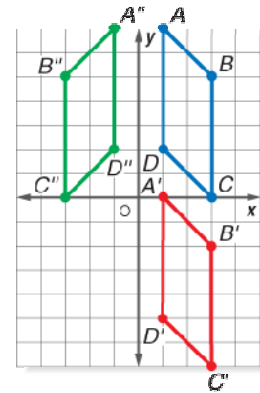
Solution

a. To move the image 7 units down, subtract 7 from the y -coordinates of each vertex.

$$\begin{aligned} A(1, 7) &\square A'(1, 7 - 7) \square A'(1, 0) \\ B(3, 5) &\square B'(3, 5 - 7) \square B'(3, -2) \\ C(3, 0) &\square C'(3, 0 - 7) \square C'(3, -7) \\ D(1, 2) &\square D'(1, 2 - 7) \square D'(1, -5) \end{aligned}$$

b. The reflection of the point (x, y) across the y -axis is the point $(-x, y)$.

$$\begin{aligned} A(1, 7) &\square A'(-1, 7) \\ B(3, 5) &\square B'(-3, 5) \\ C(3, 0) &\square C'(-3, 0) \\ D(1, 2) &\square D'(-1, 2) \end{aligned}$$



Example 2

Compare the slopes of corresponding non-horizontal sides for the preimage and each transformation in Example 1.

Solution

For the first transformation, compare the slopes of \overline{AB} and $\overline{A'B'}$, as well as the slopes of \overline{CD} and $\overline{C'D'}$. For the second transformation, compare the slopes of \overline{AB} and $\overline{A''B''}$, as well as the slopes of \overline{CD} and $\overline{C''D''}$.

Side	\overline{AB}	$\overline{A'B'}$	\overline{CD}	$\overline{C'D'}$	$\overline{A''B''}$	$\overline{C''D''}$
Slope	-1	$-\frac{1}{3}$	-1	-1	$\frac{1}{3}$	1

For the translation in part **a**, corresponding sides have equal slopes. For the reflection in part **b** corresponding sides have opposite slopes.

Example 3

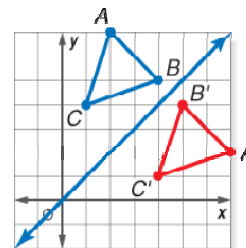
RECREATION At a miniature course a hole is designed so that the ball must travel along a line of reflection between two congruent triangular blocks.

Graph the image of $\triangle ABC$ with vertices $A(2, 7)$, $B(4, 5)$ and $C(1, 4)$ under a reflection across the line whose equation is $y = x$. Compare the slopes of the corresponding sides of $\triangle ABC$ and $\triangle A'B'C'$.

Solution

Graph the image and reflection as directed. Graph the line $y = x$. Use the rule $(x, y) \rightarrow (y, x)$. Make a table to compare the slopes of corresponding sides. The slopes of corresponding sides are reciprocals of each other.

Side	\overline{AB}	\overline{BC}	\overline{AC}	$\overline{A'B'}$	$\overline{B'C'}$	$\overline{A'C'}$
Slope	-1	-1	3	-1	1	$\frac{1}{3}$



Example 4

ART The figure shown at the right is half of a symmetrical design. Complete the figure.

Solution

Draw a reflection across the line of symmetry for the half of the figure shown.

