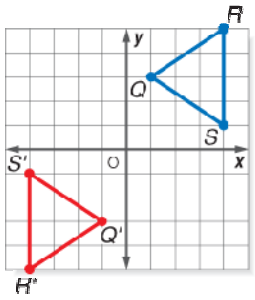
Lesson 8-2

Example 1

Graph $\triangle QRS$ and its image after 180° clockwise rotation about the origin. Then compare the slopes of $\overline{QR}$, $\overline{Q'R'}$, $\overline{QS}$, and $\overline{Q'S'}$.

Solution

Use the rule $(x, y) \rightarrow (-x, -y)$.



$Q(1, 3) \rightarrow Q'(-1, -3)$
$R(4, 5) \rightarrow R'(-4, -5)$
$S(4, 1) \rightarrow S'(-4, -1)$

Side	$\overline{QR}$	$\overline{Q'R'}$	$\overline{QS}$	$\overline{Q'S'}$
Slope	$-\frac{2}{3}$	$-\frac{2}{3}$	$-\frac{2}{3}$	$-\frac{2}{3}$

The slopes of corresponding sides are the same.

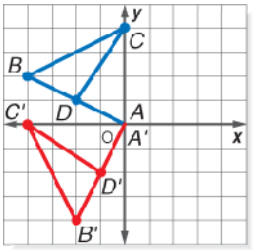
Example 2

RIDE MANAGEMENT Computers are used to signal ride operators when it is safe to begin a new ride cycle. The ride can start with the screen shows a raised flag. A lowered flag tells the operator to wait. On the computer screen, the raised flag contains the points. $A(0, 0)$, $B(-4, 2)$, $C(0, 4)$, and $D(-2, 1)$ Graph the flag and its image after a 90º counterclockwise rotation about the origin. Label the points of the image A', B', C', and D'. Then compare the slope of $\overline{BC}$ with the slope of $\overline{B'C'}$.

Solution

Use the rule $(x, y) \rightarrow (-y, x)$.

$A(0, 0) \rightarrow A'(0, 0)$
$B(-4, 2) \rightarrow B'(-2, -4)$
$C(0, 4) \rightarrow C'(-4, 0)$
$D(-2, 1) \rightarrow D'(-1, -2)$



slope of $\overline{BC} = \frac{4 - 2}{0 - (-4)}$
$= \frac{1}{2}$

slope of $\overline{B'C'} = \frac{0 - (-4)}{-4 - (-2)}$
$= \frac{4}{-2}$ or -2

The product of the slopes is -1. The lines are perpendicular.

Example 3

Triangle *XYZ* is rotated twice around the origin. Compare the slopes and determine the angle of rotation first for rotation 1 and then for rotation 2.

Original Position		After rotation 1		After rotation 2	
Side	Slope	Side	Slope	Side	Slope
$\overline{XZ}$	3	$\overline{X'Z'}$	$-\frac{1}{3}$	$\overline{X''Z''}$	$-\frac{1}{3}$
$\overline{YZ}$	$\frac{1}{4}$	$\overline{Y'Z'}$	-4	$\overline{Y''Z''}$	-4
$\overline{XY}$	$-\frac{2}{3}$	$\overline{X'Y'}$	$\frac{3}{2}$	$\overline{X''Y''}$	$\frac{3}{2}$

Solution

The first rotation is 90º, because the slopes are negative reciprocals of the original position slopes. That is, the product of the slopes is -1.

The second rotation is 180º or 360º, because the slopes are equal to the slopes after the first rotation.