Assignment

LESSON 5: Half Turns and Quarter Turns

Write

In your own words, explain how each rotation about the origin affects the coordinate points of a figure.

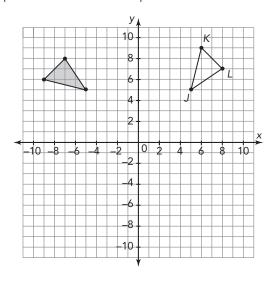
- a. a counterclockwise rotation of 90°
- b. a clockwise rotation of 90°
- c. a rotation of 180°

Remember

A rotation "turns" a figure about a point. A rotation is a rigid motion that preserves the size and shape of figures.

Practice

1. Use $\triangle JKL$ and the coordinate plane to answer each question.

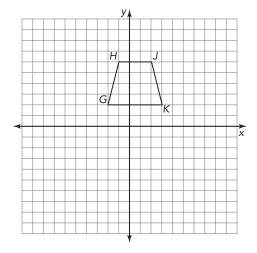




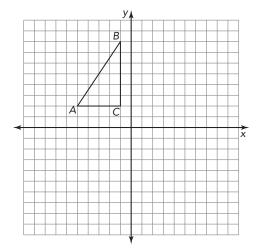
- a. List the coordinates of each vertex of $\triangle JKL$.
- b. Describe the rotation that you can use to move $\triangle JKL$ onto the shaded area on the coordinate plane. Use the origin as the point of rotation.
- c. Determine what the coordinates of the vertices of the rotated $\triangle J'K'L'$ will be if you perform the rotation you described in your answer to part (b). Explain how you determined your answers.
- d. Verify your answers by graphing $\triangle J'K'L'$ on the coordinate plane.
- 2. Determine the coordinates of each triangle's image after the given transformation.
 - a. Triangle ABC with coordinates A (3, 4), B (7, 7), and C (8, 1) is translated 6 units left and 7 units down.
 - b. Triangle *DEF* with coordinates D(-2, 2), E(1, 5), and F(4, -1) is rotated 90° counterclockwise about the origin.
 - c. Triangle GHJ with coordinates G(2, -9), H(3, 8), and J(1, 6) is reflected across the x-axis.
 - d. Triangle *KLM* with coordinates K(-4, 2), L(-8, 7), and M(3, -3) is translated 4 units right and 9 units up.
 - e. Triangle NPQ with coordinates N (12, -3), P (1, 2), and Q (9, 0) is rotated 180° about the origin.

Stretch

1. Rotate Trapezoid *GHJK* 90° clockwise around point *G*.



2. Rotate $\triangle ABC$ 135° clockwise around point C.



Review

Given a triangle with the vertices A (1, 3), B (4, 8), and C (5, 2). Determine the vertices of each described transformation.

- 1. A reflection across the *x*-axis.
- 2. A reflection across the y-axis.
- 3. A translation 5 units horizontally.
- 4. A translation -4 units vertically.

Rewrite each expression using properties.

5.
$$2(x + 4) - 3(x - 5)$$

6.
$$10 - 8(2x - 7)$$