Name _____ Date _____

10-9 Study Guide

Integration: Geometry Rotations

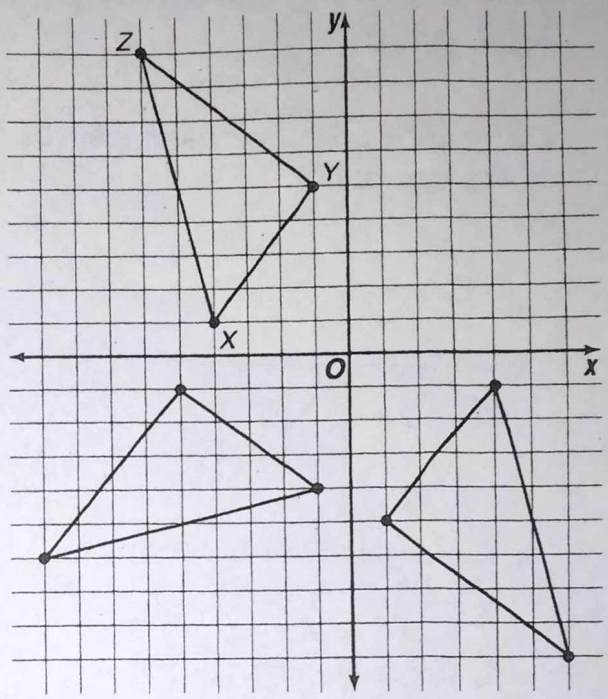
Triangle XYZ has vertices $X(-4, 1)$, $Y(-1, 5)$, and $Z(-6, 9)$.

To **rotate** $\triangle XYZ$ 180°, multiply each coordinate by -1.

$(-4, 1) \rightarrow (4, -1)$
$(-1, 5) \rightarrow (1, -5)$
$(-6, 9) \rightarrow (6, -9)$

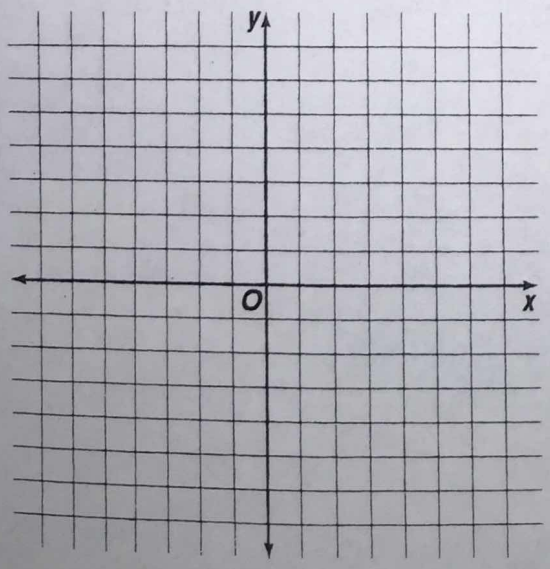
To rotate $\triangle XYZ$ 90° counterclockwise, switch the coordinates and multiply the first by -1.

$(-4, 1) \rightarrow (-1, -4)$
$(-1, 5) \rightarrow (-5, -1)$
$(-6, 9) \rightarrow (-9, -6)$



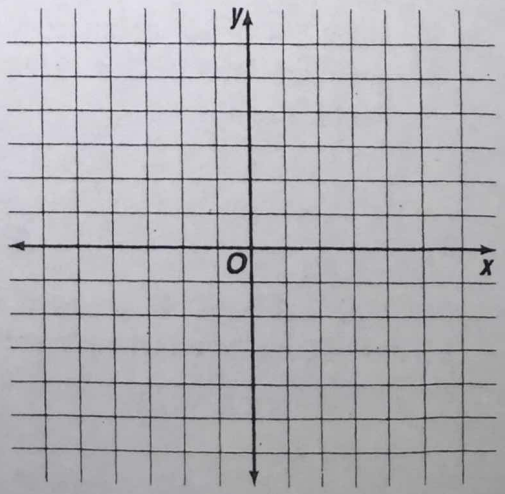
Triangle RST has vertices R(−2, −1), S(0, −4), and Y(−4, −7).

1. Graph $\triangle RST$.
2. Find the coordinates of the vertices after a 90° counterclockwise rotation. Graph the rotation.
3. Find the coordinates of the vertices after a 180° rotation. Graph the rotation.



Rectangle TWIN has vertices T(2, 1), W(6, 3), I(5, 5), and N(1, 3).

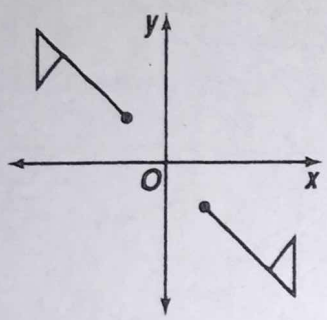
4. Graph rectangle $TWIN$.
5. Find the coordinates of the vertices after a 90° counterclockwise rotation. Graph the rotation.
6. Find the coordinates of the vertices after a 180° rotation. Graph the rotation.

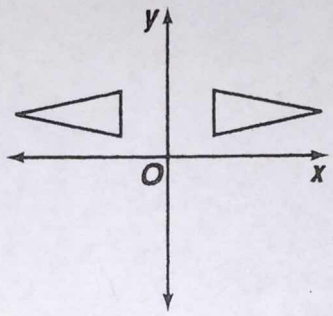


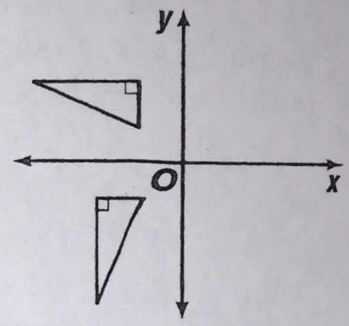
10-9 Practice

Integration: Geometry
Rotations

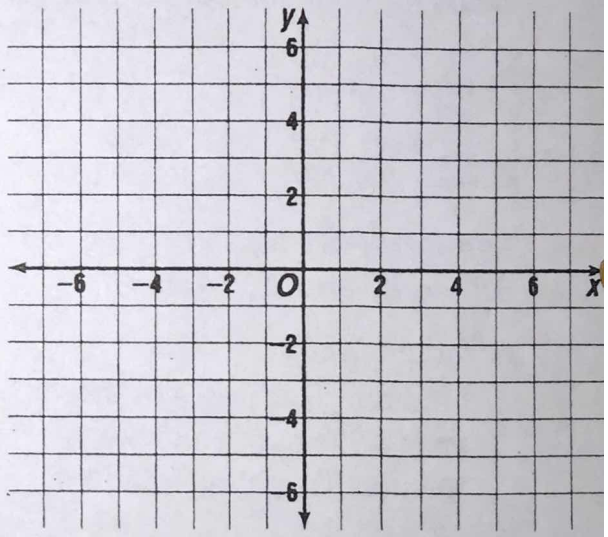
Determine whether each pair of figures represents a rotation. Write yes or no.

1. 

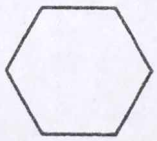
2. 

3. 

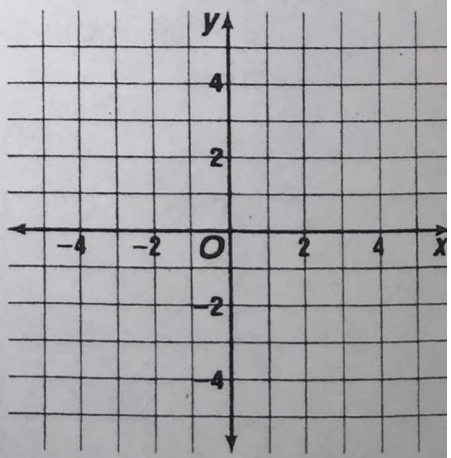
4. Rectangle *WORK* has vertices $W(1, 3)$, $O(4, 6)$, $R(6, 4)$, and $K(3, 1)$.
   a. Graph *WORK*.
   b. Rotate the rectangle 90° counterclockwise, and graph $W'O'R'K'$.
   c. Rotate the rectangle 180°, and graph $W''O''R''K''$.



5. Examine the figure at the right.
   a. Does the figure have rotational symmetry?
   b. If so, find the degree turns that show this symmetry.



6. Quadrilateral *NEAL* has vertices $N(3, 5)$, $E(4, 4)$, $A(3, 2)$ and $L(1, 3)$.
   a. Graph quadrilateral *NEAL* and its 90° counterclockwise rotation $N'E'A'L'$.
   b. Rotate $N'E'A'L'$ 90° counterclockwise.
   c. Rotate quadrilateral *NEAL* 180°. Explain the result.



7. A triangle is rotated 90° counterclockwise. The coordinates of the vertices of the rotated triangle are (3, 2), (−1, 3), and (2, −3). What are the coordinates of the original triangle?