

3-3 Rotations

PINWHEELS Find the angle of rotation to the nearest tenth of a degree that maps P onto P' . Explain your reasoning.

14. Refer to page 243.

ANSWER:

90° ; $360^\circ \div 8 \text{ petals} = 45^\circ$ per petal. Two petal turns is $2 \cdot 45^\circ$ or 90° .

15. Refer to page 243.

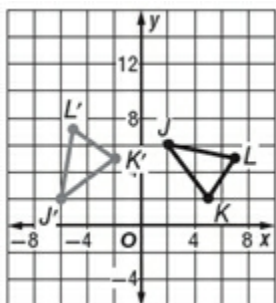
ANSWER:

154.2° ; $360^\circ \div 7 \text{ petals} = 51.4^\circ$ per petal. Three petal turns is $3 \cdot 51.4^\circ$ or 154.2° .

Graph each figure and its image after the specified rotation.

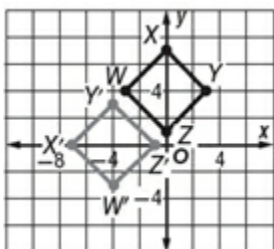
16. $\triangle JKL$ has vertices $J(2, 6)$, $K(5, 2)$, and $L(7, 5)$; 90° about the origin

ANSWER:



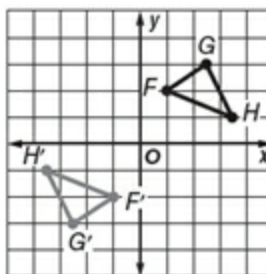
17. rhombus $WXYZ$ has vertices $W(-3, 4)$, $X(0, 7)$, $Y(3, 4)$, and $Z(0, 1)$; 90° about the origin

ANSWER:



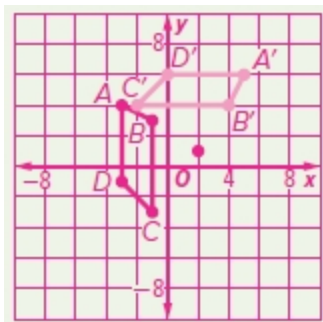
18. $\triangle FGH$ has vertices $F(2, 4)$, $G(5, 6)$, and $H(7, 2)$; 180° about the origin

ANSWER:

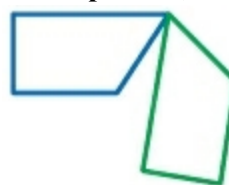


20. trapezoid $ABCD$ has vertices $A(-3, 4)$, $B(-1, 3)$, $C(-1, 0)$, and $D(-3, -1)$; 270° about the point $(2, 1)$

ANSWER:

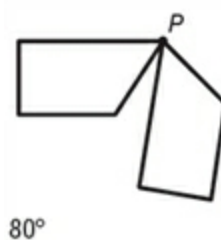


Each figure shows a preimage and its image after a rotation about point P . Copy each figure, locate point P , and find the angle of rotation.



24.

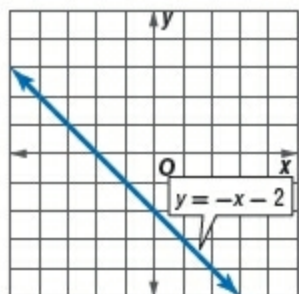
ANSWER:



80°

3-3 Rotations

ALGEBRA Give the equation of the line $y = -x - 2$ after a rotation about the origin through the given angle. Then describe the relationship between the equations of the image and preimage.



26. 90°

ANSWER:

$y = x - 2$; perpendicular

27. 180°

ANSWER:

$y = -x + 2$; parallel

39. **CONSTRUCT ARGUMENTS** Is the reflection of a figure in the x -axis equivalent to the rotation of that same figure 180° about the origin? Explain.

ANSWER:

No; sample answer: When a figure is reflected about the x -axis, the x -coordinates of the transformed figure remain the same, and the y -coordinates are negated. When a figure is rotated 180° about the origin, both the x - and y -coordinates are negated. Therefore, the transformations are not equivalent.

40. **WRITING IN MATH** Do invariant points *sometimes*, *always*, or *never* occur in a rotation? Explain your reasoning.

ANSWER:

Sometimes; sample answer: When a figure is rotated about a point on the figure, then the point of rotation is invariant. If a figure is rotated about a point not on the figure, then there are no invariant points in the rotation.

41. Triangle GHJ has vertices $G(1, 3)$, $H(4, 3)$, and $J(2, 0)$. Triangle $G'H'J'$ is the image of triangle GHJ under the rotation $(x, y) \rightarrow (-y, x)$. Which of the following is a true statement about triangle $G'H'J'$?

- A Triangle $G'H'J'$ lies entirely in Quadrant III.
- B Triangle $G'H'J'$ intersects the positive y -axis.
- C Triangle $G'H'J'$ intersects the x -axis.
- D Triangle $G'H'J'$ overlaps triangle GHJ .

ANSWER:

B

44. Milo graphs the line $x = 3$. Then he graphs the image of the line using the rotation $(x, y) \rightarrow (-y, x)$. Which of the following points lies on the image of the line?

- A $(-3, 2)$
- B $(4, 3)$
- C $(-1, -3)$
- D $(2, -3)$

ANSWER:

B