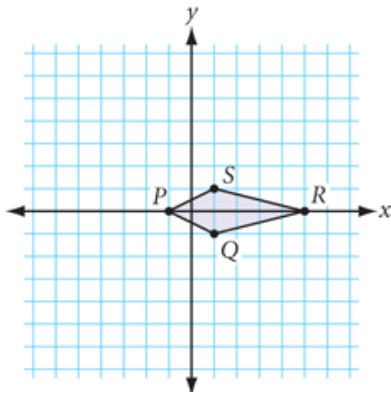
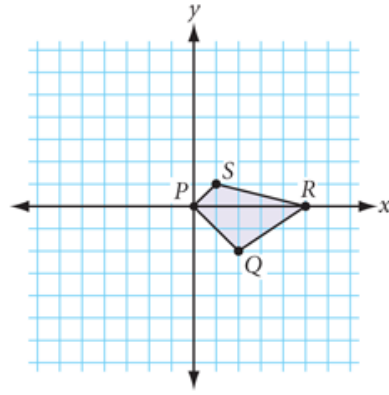


For exercises 1-2, translate each quadrilateral by the given vector.

1.  $\langle -4, 3 \rangle$

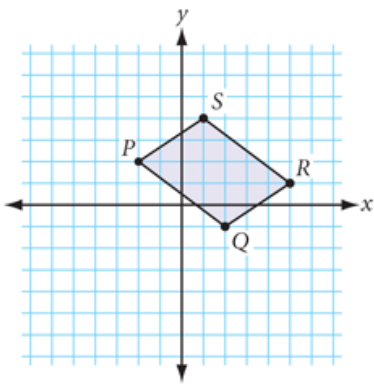


2.  $\langle 0, 4 \rangle$

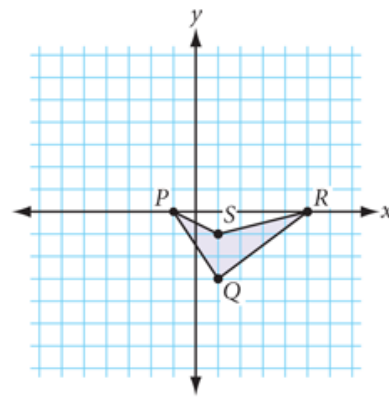


For exercises 3-4, reflect each quadrilateral by the given ordered rule. Identify the line of reflection.

3.  $(x, y) \rightarrow (y, x)$

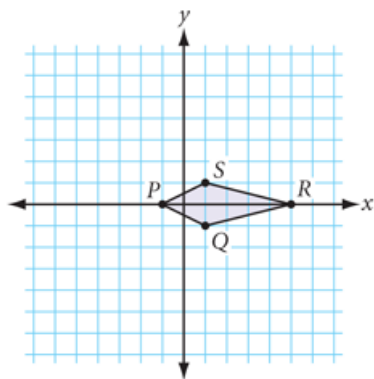


4.  $(x, y) \rightarrow (x, -y)$  (h)

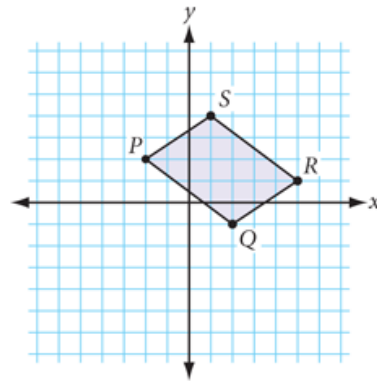


For exercises 5-6, transform each quadrilateral by the given ordered pair rule. Identify either the line of reflection or the center of rotation.

5.  $(x, y) \rightarrow (y, -x)$  (h)

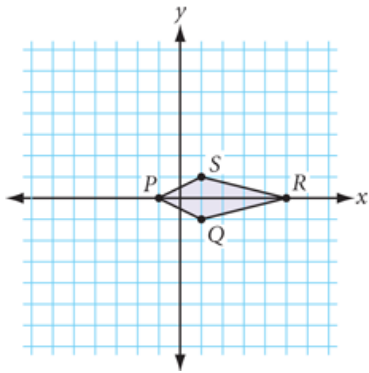


6.  $(x, y) \rightarrow (-y, -x)$

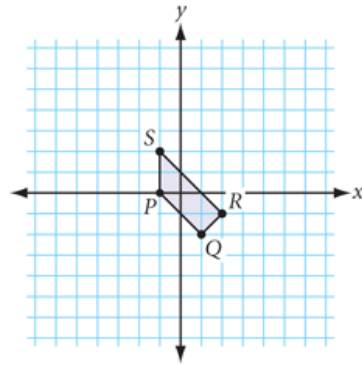


For exercises 7-8, transform each quadrilateral by the given ordered pair rule. Explain how these transformations are different than the previous transformations.

7.  $(x, y) \rightarrow (x, 3y)$  **(h)**

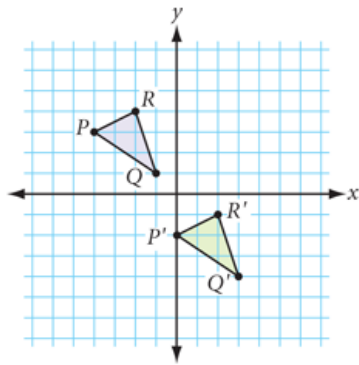


8.  $(x, y) \rightarrow (3x, 3y)$

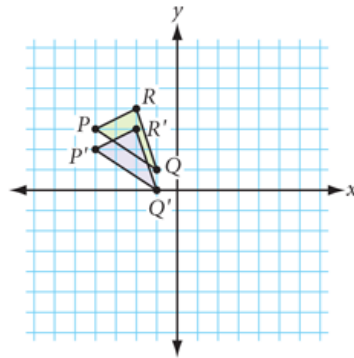


For exercises 9-14, describe the type of transformation. Then find the ordered pair that transformed the triangle PQR to the triangle P'Q'R'.

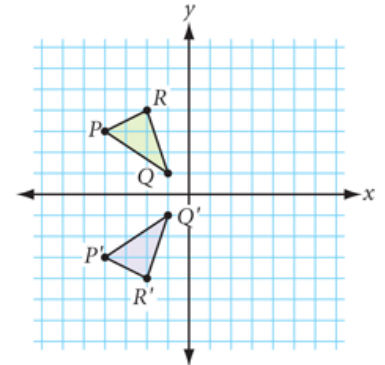
9.  $(x, y) \rightarrow (?, ?)$  **(h)**



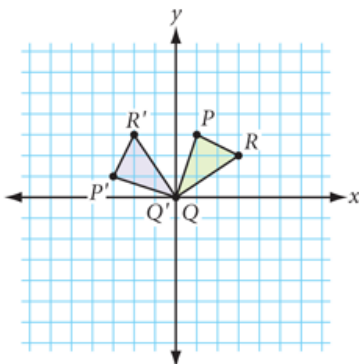
10.  $(x, y) \rightarrow (?, ?)$



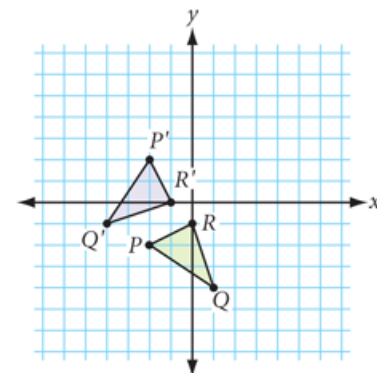
11.  $(x, y) \rightarrow (?, ?)$



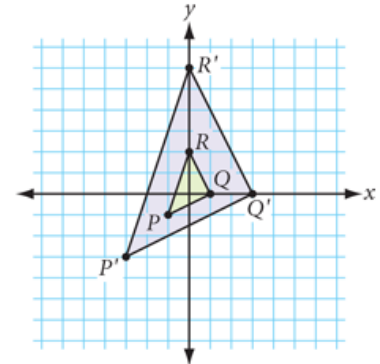
12.  $(x, y) \rightarrow (?, ?)$  **(h)**



13.  $(x, y) \rightarrow (?, ?)$



14.  $(x, y) \rightarrow (?, ?)$  **(h)**



For exercises 15-22, match the composition of transformations with the ordered pair rule.

- |   |   |
|---|---|
| 15. $(x, y) \rightarrow (x + h, y + k)$ | a. $90^\circ$ clockwise rotation about the origin.        |
| 16. $(x, y) \rightarrow (x, -y)$        | b. reflection across the $x$ -axis.                       |
| 17. $(x, y) \rightarrow (y, -x)$        | c. $90^\circ$ counterclockwise rotation about the origin. |
| 18. $(x, y) \rightarrow (-x, y)$        | d. reflection across the $y$ -axis.                       |
| 19. $(x, y) \rightarrow (-x, -y)$       | e. translation by the vector $\langle h, k \rangle$ .     |
| 20. $(x, y) \rightarrow (y, x)$         | f. reflection across the line $y = x$ .                   |
| 21. $(x, y) \rightarrow (-y, x)$        | g. reflection across the line $y = -x$ .                  |
| 22. $(x, y) \rightarrow (-y, -x)$       | h. $180^\circ$ rotation about the origin.                 |

23. Given  $\triangle ABC$  with vertices:  $A(-6, -2)$ ,  $B(1, 1)$ ,  $C(-5, 2)$

- Translate  $\triangle ABC$  by the translation rule  $(x, y) \rightarrow (x, y + 4)$  to create  $\triangle A'B'C'$ .
- What are the coordinates of the vertices of  $\triangle A'B'C'$ ?
- Translate  $\triangle A'B'C'$  by the translation rule  $(x, y) \rightarrow (x + 6, y - 7)$  to create  $\triangle A''B''C''$ .
- What are the coordinates of the vertices of  $\triangle A''B''C''$ ?
- What is the single transformation rule that takes  $\triangle ABC$  onto  $\triangle A''B''C''$ ?
- What is the single transformation rule that takes  $\triangle A''B''C''$  back onto  $\triangle ABC$ ?

