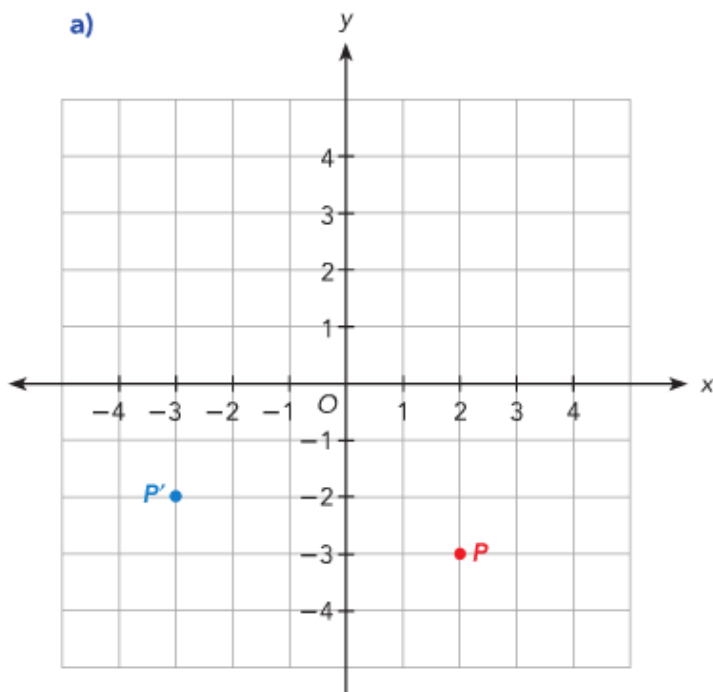


Practice 8.3

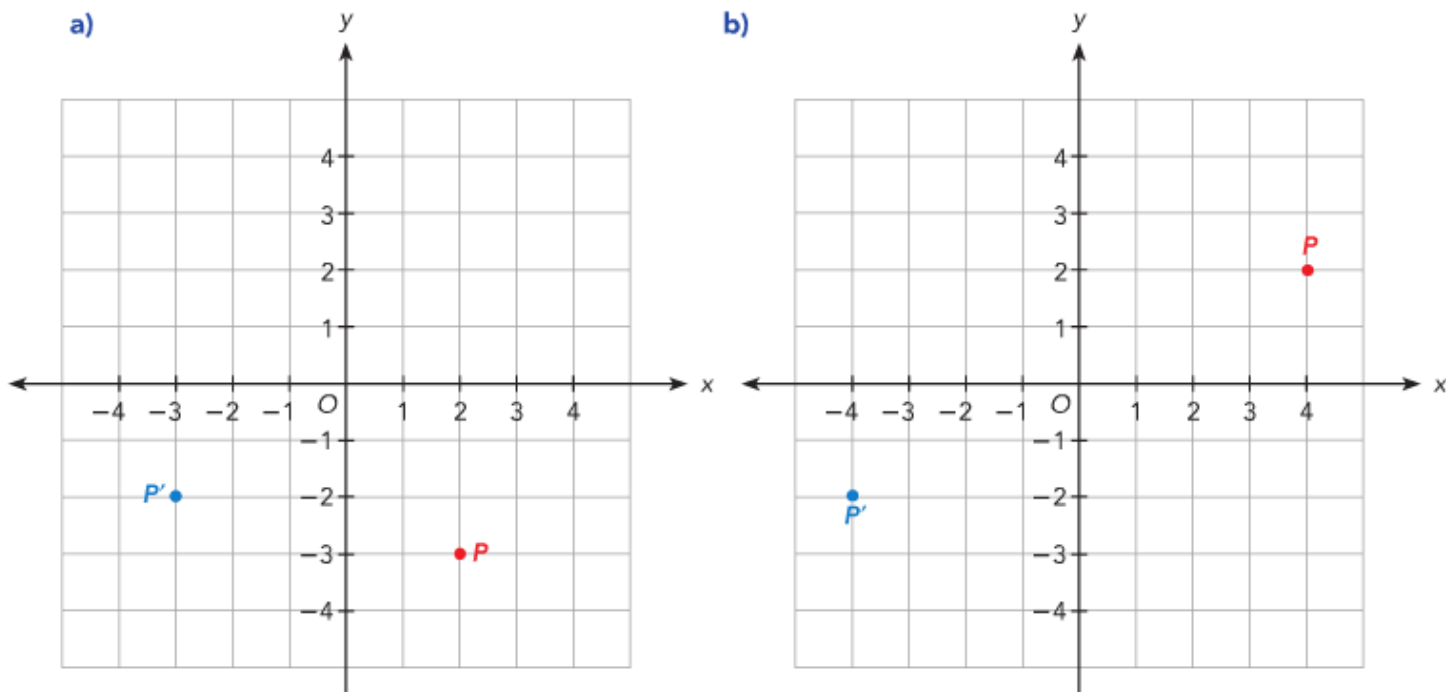
Solve. Show your work.

- 1 A rotation of point P clockwise about O maps onto P' . State the angle of rotation.

a)

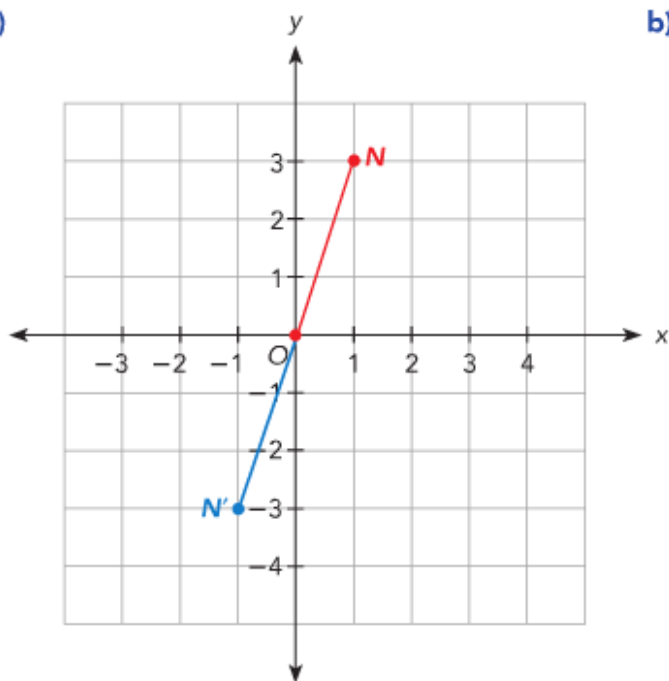


b)

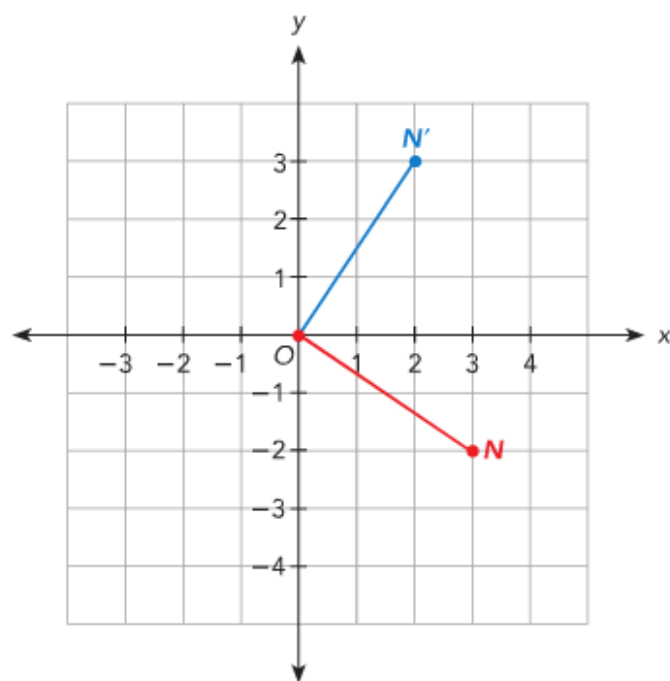


- 2 \overline{ON} is rotated about the origin, O , to form the image $\overline{ON'}$. State the angle and direction of each rotation.

a)



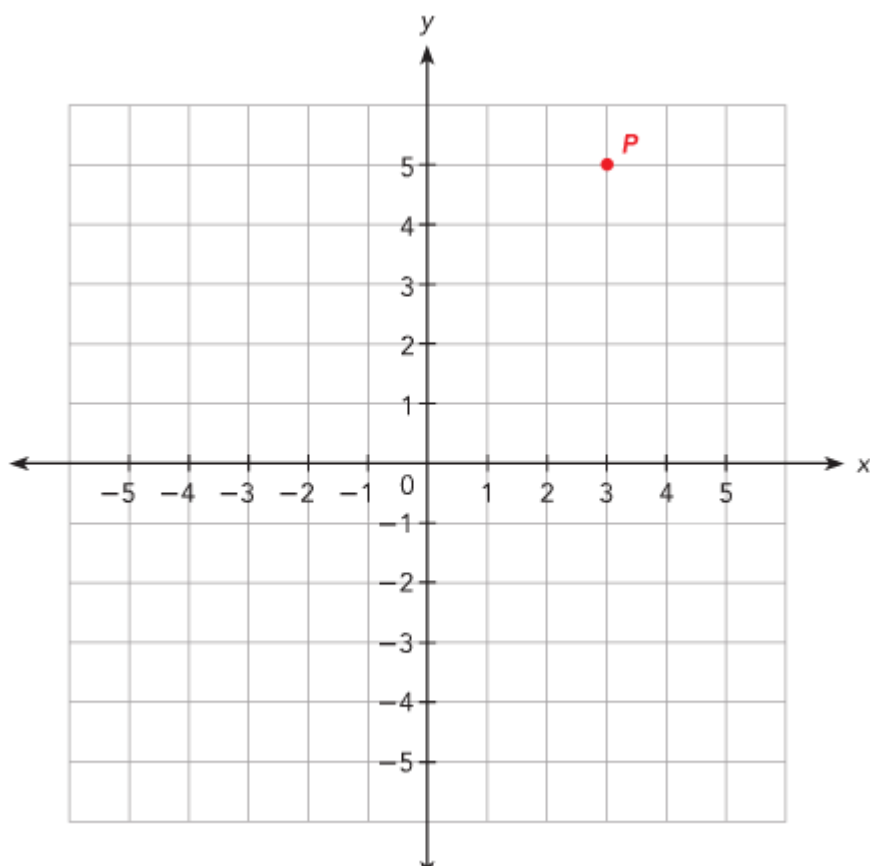
b)



Solve. Show your work.

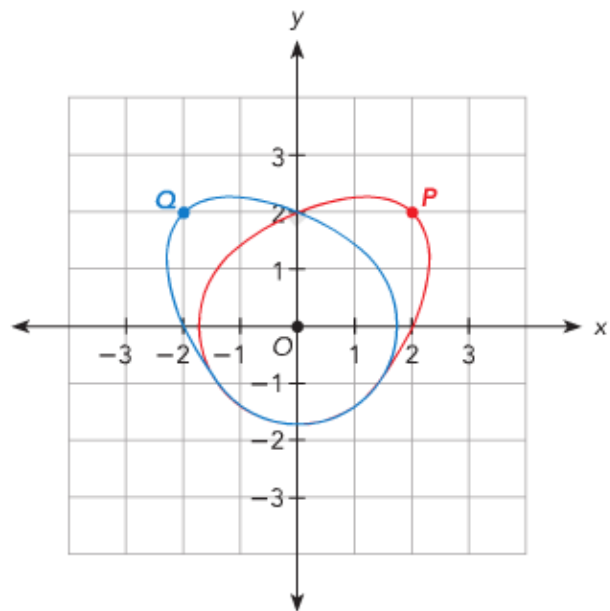
3 At an amusement park, Olivia is riding the carousel at point P . She is rotated from P by each of the following rotations. Mark and label her position after each rotation from P on a copy of the graph.

- a) A: 90° counterclockwise about the origin
- b) B: 90° clockwise about the origin
- c) C: 270° counterclockwise about the origin
- d) D: Half turn about the origin



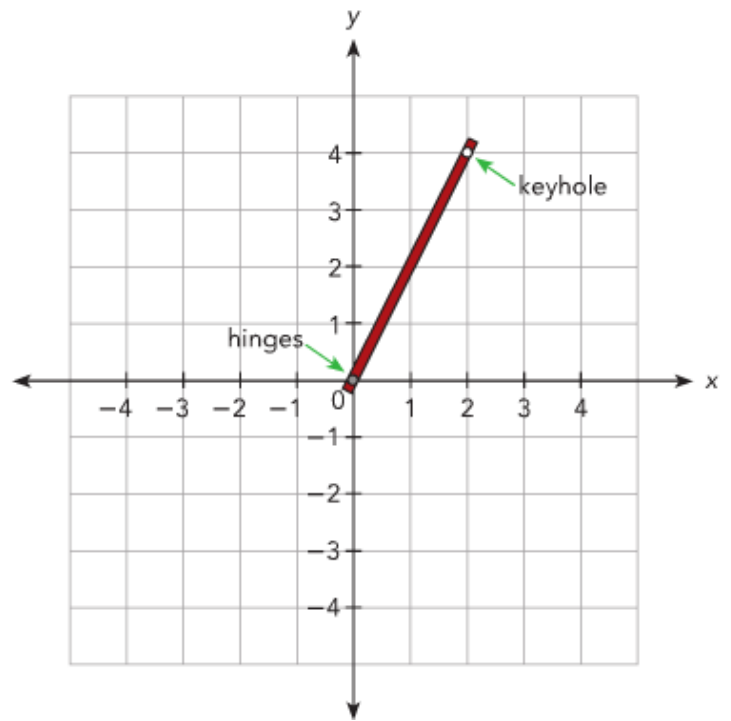
4 A cam of an automobile rotates about a shaft at the origin, O . Point P on the cam rotates to point Q .

- a) Describe the rotation.
- b) A point $(-5, 4)$ undergoes the same rotation. Find the coordinates of the image.



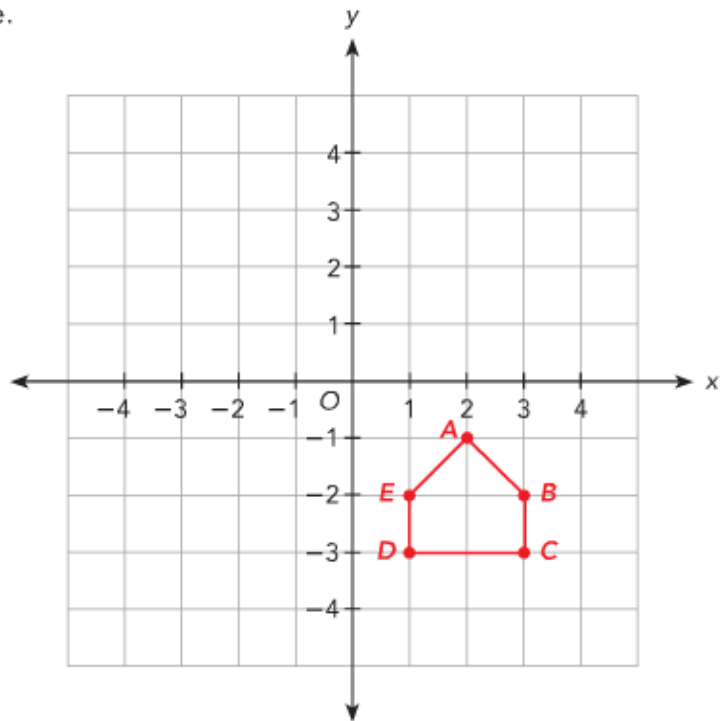
5 The hinges on a door are at $(0, 0)$, looking down from above. Its keyhole is at position $(2, 4)$ when the door is closed. The door swings open. Find the position of the keyhole under each rotation below.

- a) 90° clockwise
- b) 90° counterclockwise
- c) 180°

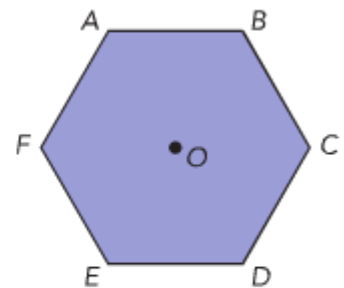



6 Pentagon $ABCDE$ is drawn on the coordinate plane.

- a) $ABCDE$ is rotated 90° clockwise about the origin, O . Draw and label the image $A'B'C'D'E'$.
- b) State the coordinates of A' , B' , C' , D' , and E' .
See below.
- c) $ABCDE$ is rotated 90° counterclockwise about the origin, O . Draw the image $A''B''C''D''E''$. State the coordinates for $A''B''C''D''E''$.
- d) How are $A'B'C'D'E'$ and $A''B''C''D''E''$ related?



7 A regular hexagon $ABCDEF$ is rotated about its center, O , so that its appearance stays the same, but the vertices are rotated to different positions. For example in one rotation, A moves to B , B to C , and so on. Which clockwise rotations will cause this effect?



8  *Math Journal* Which points are invariant under a rotation? Explain.