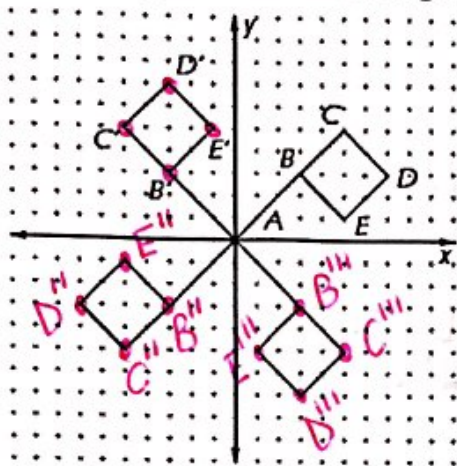


1. Consider flag $ABCDE$ and its image under a 90° counterclockwise rotation about the origin.



Prelmage	90° Counterclockwise Rotated Image
$A(0, 0)$	$A' (0, 0)$
$B(3, 3)$	$B' (-3, 3)$
$C(5, 5)$	$C' (-5, 5)$
$D(7, 3)$	$D' (-3, 7)$
$E(5, 1)$	$E' (-1, 5)$

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

a) Record the coordinates of the images of the five points on the flag under a 90° counterclockwise rotation about the origin.

b) Use any patterns you see above to plot the image of point $(-2, -5)$ under a 90° counterclockwise rotation about the origin.
 $(x, y) \rightarrow (-y, x)$

c) Plot the image of point $(-4, 1)$ under a 90° counterclockwise rotation about the origin.
 $(x, y) \rightarrow (-y, x)$

d) Plot the image of point $(5, -3)$ under a 90° counterclockwise rotation about the origin.
 $(x, y) \rightarrow (-y, x)$

e) For problems b – d, draw a dashed segment connecting the preimage to the origin. Then draw another dashed line connecting the image point to the origin.

f) Connect each preimage segment to its image segment with a "turn" arrow that shows the direction of the rotation.

g) Write a rule you could use to rotate any point (x, y) under a 90° CCW rotation about the origin. State the rule in **words** and in **symbolic form**.

90° CCW $(x, y) \rightarrow (-y, x)$
 "switch x & y and negate y "

2. Counterclockwise rotations of 180° and 270° about the origin also have predictable coordinate patterns.

<p>a) Using the diagram of flag <i>ABCDE</i> in problem 1, investigate the patterns in the coordinates of the preimage and image pairs when rotated 180° CCW about the origin.</p>	<table border="1"> <thead> <tr> <th>Preimage</th> <th>180° Counterclockwise Rotated Image</th> </tr> </thead> <tbody> <tr> <td>A(0,0)</td> <td>A''(0,0)</td> </tr> <tr> <td>B(3,3)</td> <td>B''(-3,-3)</td> </tr> <tr> <td>C(5,5)</td> <td>C''(-5,-5)</td> </tr> <tr> <td>D(7,3)</td> <td>D''(-7,-3)</td> </tr> <tr> <td>E(5,1)</td> <td>E''(-5,-1)</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Preimage	180° Counterclockwise Rotated Image	A(0,0)	A''(0,0)	B(3,3)	B''(-3,-3)	C(5,5)	C''(-5,-5)	D(7,3)	D''(-7,-3)	E(5,1)	E''(-5,-1)						
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<p>b) Write a rule you could use to rotate any point (x, y) under a 180° CCW rotation about the origin. State the rule in words and in symbolic form</p>	<p>180° CCW $(x, y) \rightarrow (-x, -y)$ "negate x and y"</p>																		
<p>c) Similarly, investigate the patterns in the coordinates of the preimage and image pairs when rotated 270° CCW about the origin.</p>	<table border="1"> <thead> <tr> <th>Preimage</th> <th>270° Counterclockwise Rotated Image</th> </tr> </thead> <tbody> <tr> <td>A(0,0)</td> <td>A'''(0,0)</td> </tr> <tr> <td>B(3,3)</td> <td>B'''(3,-3)</td> </tr> <tr> <td>C(5,5)</td> <td>C'''(5,-5)</td> </tr> <tr> <td>D(7,3)</td> <td>D'''(3,-7)</td> </tr> <tr> <td>E(5,1)</td> <td>E'''(1,-5)</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Preimage	270° Counterclockwise Rotated Image	A(0,0)	A'''(0,0)	B(3,3)	B'''(3,-3)	C(5,5)	C'''(5,-5)	D(7,3)	D'''(3,-7)	E(5,1)	E'''(1,-5)						
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