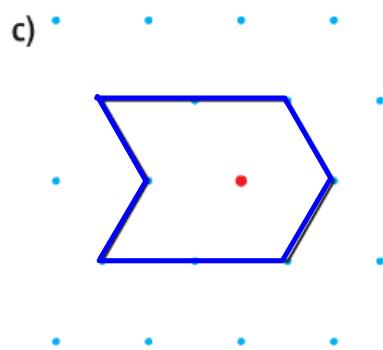
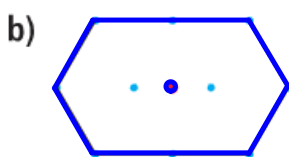
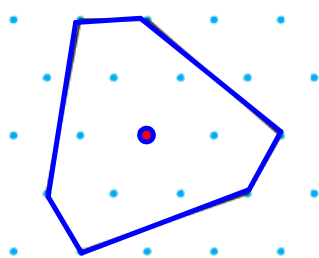


## Section 7.6: Rotations and Rotational Symmetry

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- A shape is said to have rotational symmetry when it coincides with itself after a rotation of less than  $360^\circ$  about its center.
- The # of times a shape coincides with itself during a rotation of  $360^\circ$ , is called the order of rotation.
- Angle of Rotation Symmetry =  $\frac{360^\circ}{\text{order}}$

Example: Determine which hexagons below have rotational symmetry. State the order of rotation and the angle of rotation symmetry.



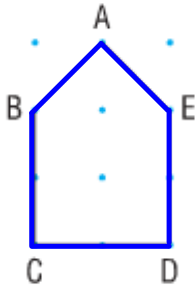
(A) Hexagon A has rotational symmetry.  
 Order of Rotation = 3  
 $\therefore$  Angle of Rotation =  $\frac{360}{3} = 120^\circ$

(B) Hexagon B has rotational symmetry  
 Order of Rotation = 2  
 Angle of Rotation =  $\frac{360}{2} = 180^\circ$

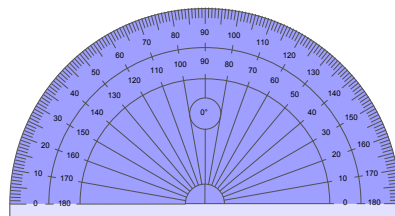
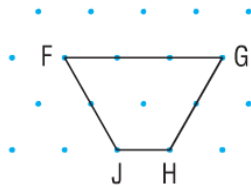
(C) Hexagon C does not have rotational symmetry since it does not coincide with itself until we turn it  $360^\circ$ .

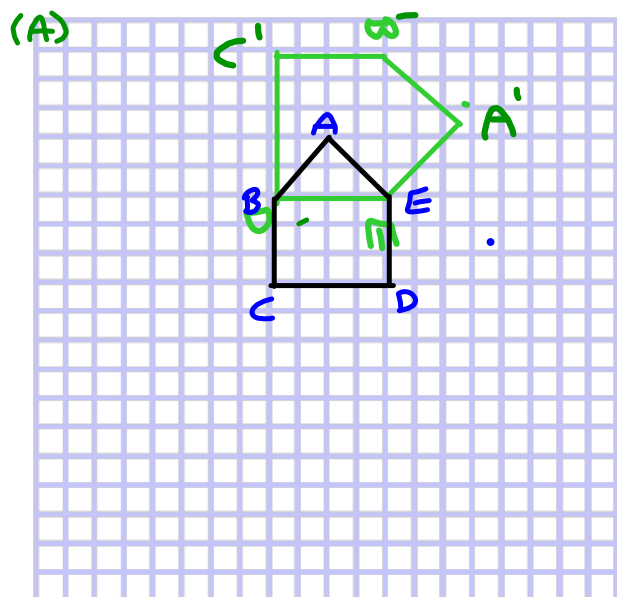
Example #2: Drawing Rotation Images:

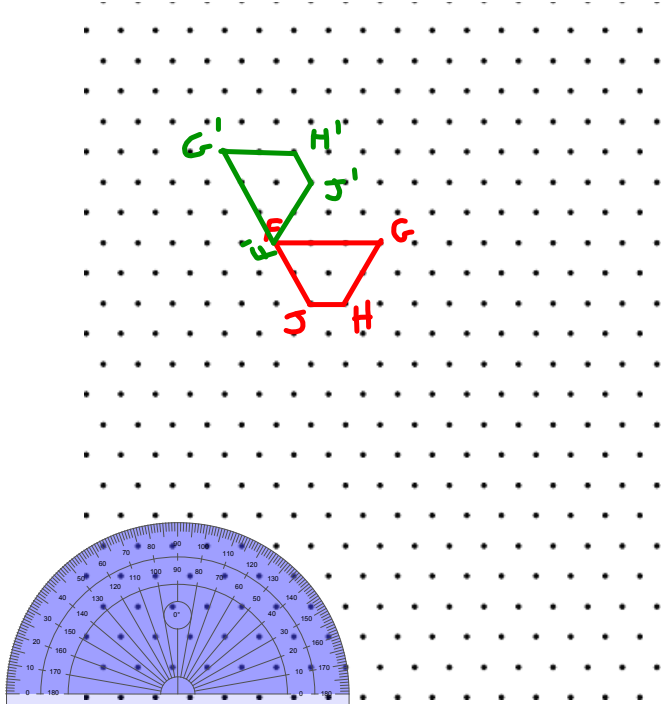
(a) Rotate pentagon ABCDE  $90^\circ$  clockwise about vertex E. Draw the rotation image.



(b) Rotate Trapezoid FGHIJ  $120^\circ$  counter-clockwise about vertex F.

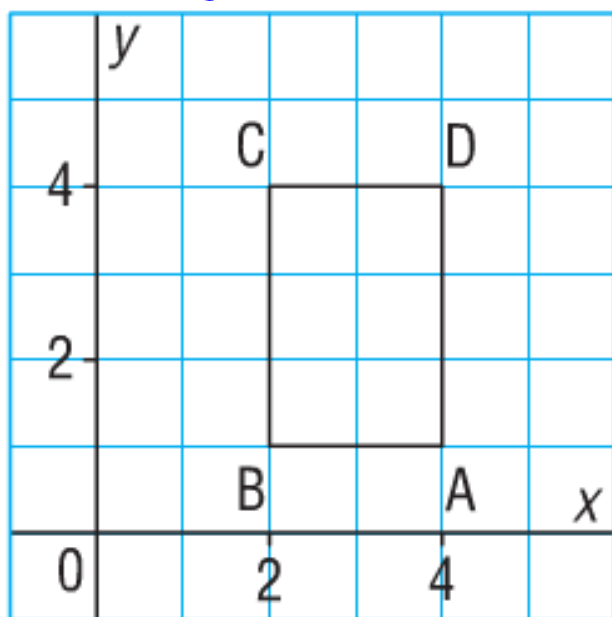


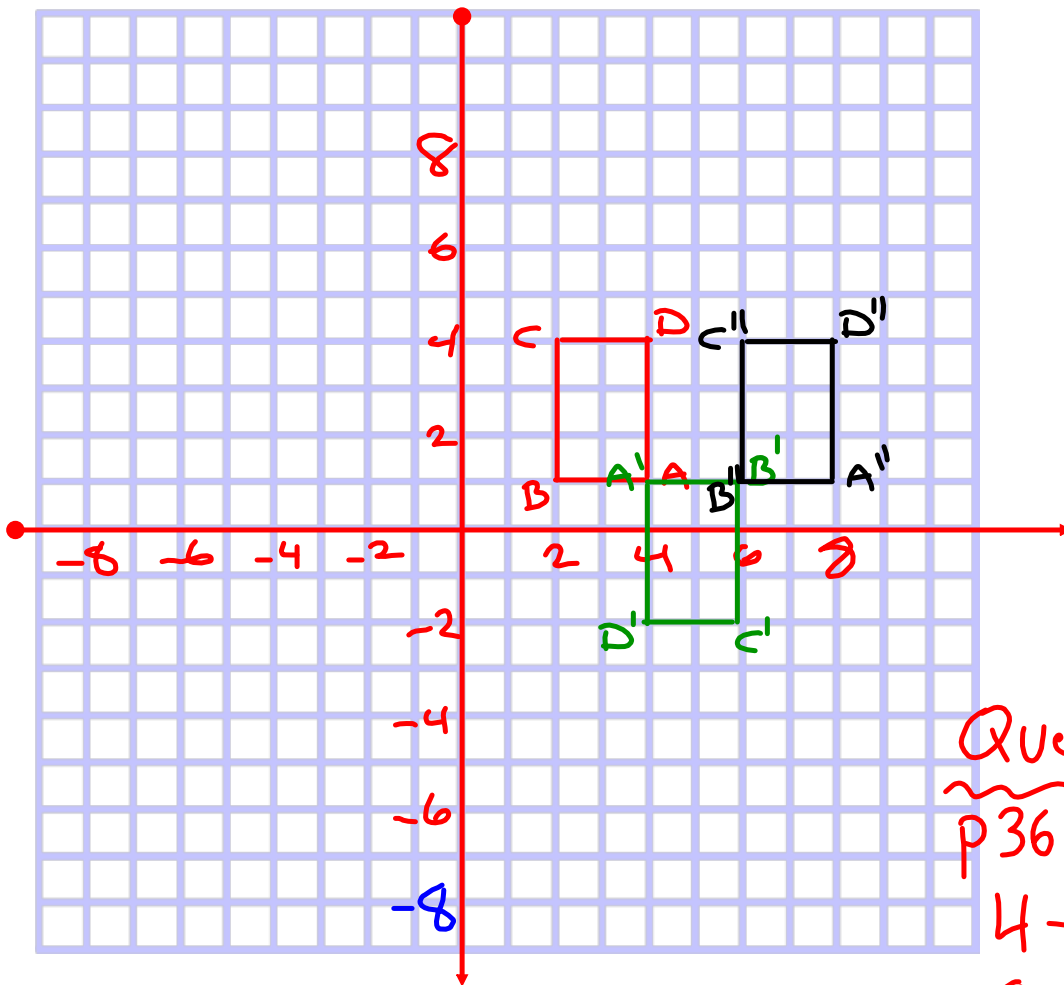




Example #3: Rotate as follows:

- (A) Rectangle ABCD  $180^\circ$  CW about A
- (B) Rectangle A'B'C'D'  $180^\circ$  CCW about B'  
(See Sheet)

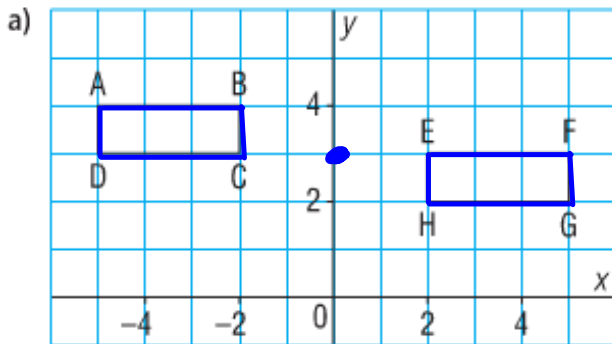




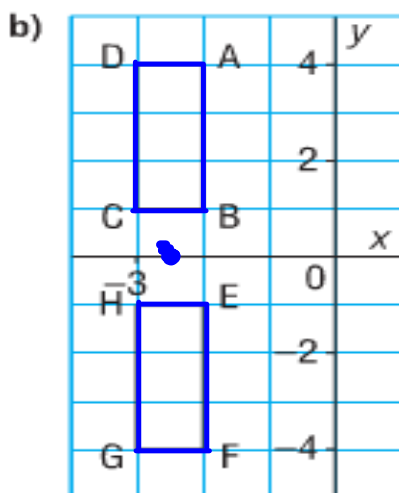
Questions  
p365-366  
4-6  
8-10

## Section 7.7: Identifying Types of Symmetry on the Cartesian Plane

Example: For each pair of rectangles ABCD and EFGH, determine if they are related by symmetry.



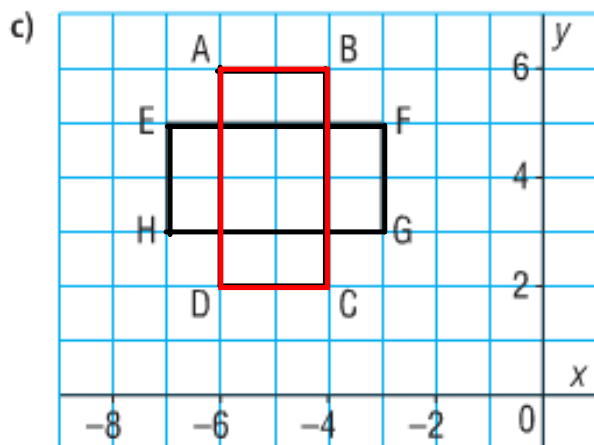
Ans) Rectangle ABCD is rotated  $180^\circ$  about the point  $(0, 3)$



Ans) Rectangle ABCD is rotated  $180^\circ$  about the point  $(-2.5, 0)$



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Ans) Rectangle ABCD  
is rotated about  
the point  $(-5, 4)$  either

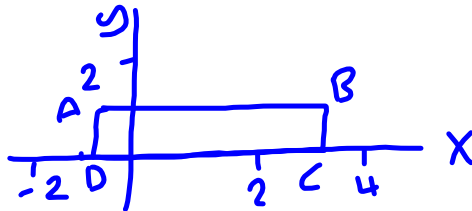
- $90^\circ$  CCW
- $90^\circ$  CW
- $270^\circ$  CCW
- $270^\circ$  CW

Example #2: Draw the image of rectangle ABCD after each transformation:

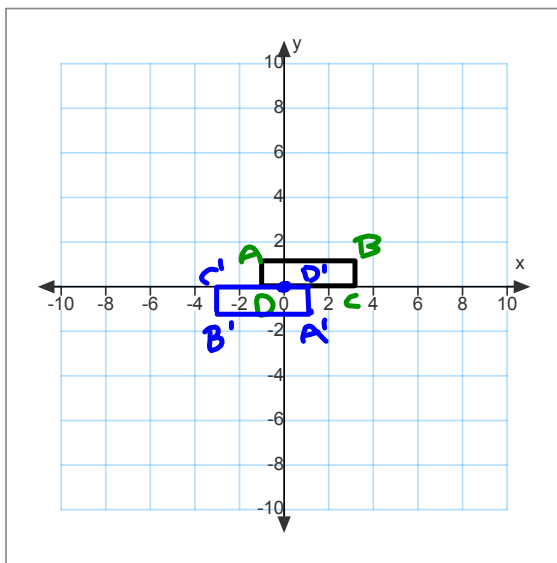
- (a) a rotation  $180^\circ$  about the origin.
- (b) a reflection in the x-axis.
- (c) a translation 4 units right + 1 down.

\* Write the coordinates of rectangle ABCD + its image coordinates.

\* Describe any symmetry that results



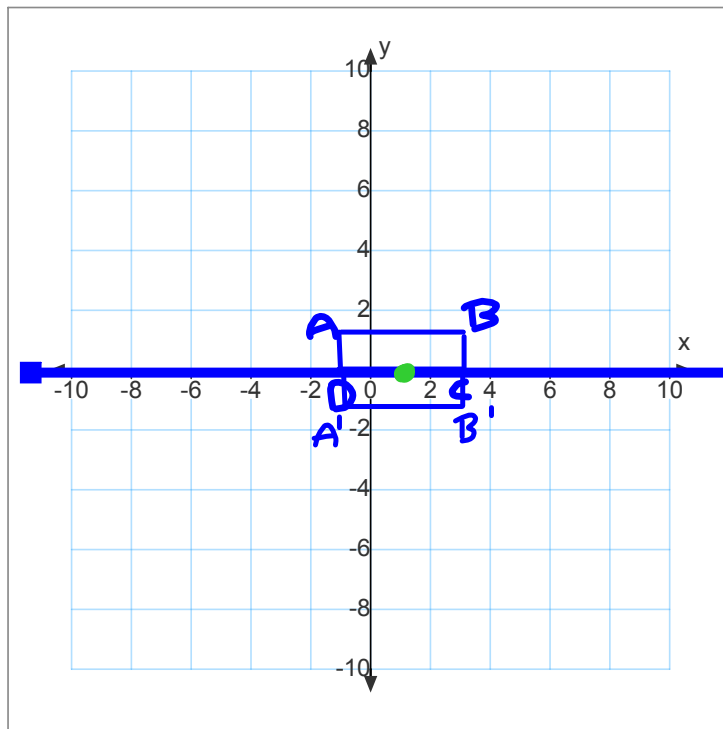
(a) a rotation  $180^\circ$  about the origin.



Original	Image
$A(-1, 1)$	$A'(-1, -1)$
$B(3, 1)$	$B'(-3, -1)$
$C(3, 0)$	$C'(-3, 0)$
$D(-1, 0)$	$D'(-1, 0)$

\* This rotation can also be done by translating Rectangle ABCD 2 units left and 1 unit down.

b) a reflection in the x-axis.

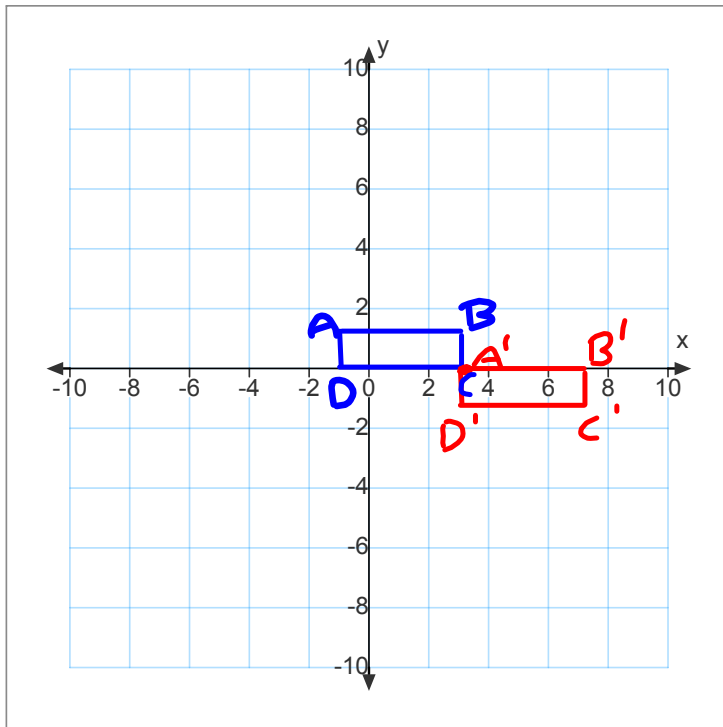


Original	Image
$A(-1, 1)$	$A'(-1, -1)$
$B(3, 1)$	$B'(3, -1)$
$C(3, 0)$	$C'(3, 0)$
$D(-1, 0)$	$D'(-1, 0)$

\* This reflection can also be a rotation  $180^\circ$  about the point  $(1, 0)$ .

OR  
 Translate 1 unit down.

(c) a translation 4 units right + 1 down.



Original	Image
$A(-1, 1)$	$A'(3, 0)$
$B(3, 1)$	$B'(7, 0)$
$C(3, 0)$	$C'(7, -1)$
$D(-1, 0)$	$D'(3, -1)$

\* In addition to translating Rectangle ABCD, we could also rotate it  $180^\circ$  at vertex  $(3, 0)$

Homework:

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