Go to page 2 for the SOLUTIONS to the practice.

For questions 1-5, use the following transformations with each question:

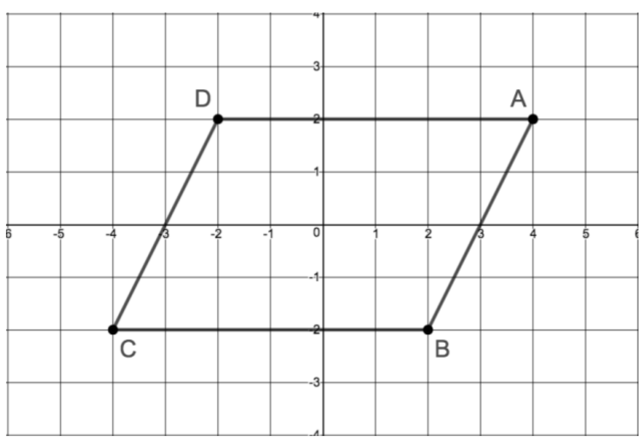
- 90 degree rotation
- 180 degree rotation
- 270 degree rotation

1. What is the image of A(1,-3)?
2. What is the image of A′?
3. What is the preimage of D′(-12,-7)?
4. What is the image of B(a, b)?
5. What is the image of F(x + 2, y)?

The vertices of △ABC are A(6,−3),B(−3,−1) and C(5,2). Find the vertices of △A′B′C′, given the translation rules below and describe what type of transformation occurred.

6. (x,y)→(-x, -y)
7. (x,y)→(-y, x)
8. (x,y)→(y, -x)

Use the figure below to answer each question.



9. Rotate ABCD 90 degrees clockwise. What counterclockwise rotation would yield the same result?

10. Rotate ABCD 180 degrees. What do you notice about the pre-image and image after this rotation? Which segments can you confirm are equal in length after this rotation and why?

11. Rotational symmetry is when a figure looks the same after a rotation. What are the rotational symmetries of ABCD?

12. Given that the area of a parallelogram can be found using the formula A = bh, where b is the length of the base and h is the height of the parallelogram, what is the area of ABCD?

13. What is the area of A'B'C'D' after a 270 degree rotation? What can you say about ABCD and A'B'C'D' after this rotation? Will this be true for all rotations?

Answer Key

For questions 1-5, use the following transformations with each question:

Rules

- 90 degree rotation $(x,y) \rightarrow (-y,x)$
- 180 degree rotation $(x,y) \rightarrow (-x,-y)$
- 270 degree rotation $(x,y) \rightarrow (y,-x)$

} counterclockwise

1. What is the image of A(1,-3)?
   a. 90 degree rotation A'(3, 1)

switch x & y and change the sign of y, A'(3,1)

   b. 180 degree rotation A'(-1, 3)

change the sign of x & y, A'(-1,3)

   c. 270 degree rotation A'(-3, -1)

switch x & y and change the sign of x, A'(-3,-1)

2. What is the image of A'?
   a. 90 degree rotation A''(-1, 3)

A'(3,1) → A''(-1,3)

   b. 180 degree rotation A''(1,-3)

A'(-1,3) → A''(1,-3)

   d. 270 degree rotation A''(-1, 3)

A'(-3,-1) → A''(-1,3)

3. What is the preimage of D'(-12,-7)? $(x,y) \rightarrow (-y,x)$ 90° rotation rule
   a. 90 degree rotation D(-7, 12)

D'(-12,-7) → D(-7,12)

   b. 180 degree rotation D(12, 7) $(x,y) \rightarrow (-x,-y)$ 180° rotation rule

D'(-12,-7) → D(12,7)

   c. 270 degree rotation D(7, -12) $(x,y) \rightarrow (y,-x)$ 270° rotation rule

D'(-12,-7) → D(7,-12)

4. What is the image of B(a, b)?
   a. 90 degree rotation B'(-b, a)

$(x,y) \rightarrow (-y,x)$ B(a,b) → B'(-b,a)

   b. 180 degree rotation B'(-a, -b)

$(x,y) \rightarrow (-x,-y)$ B(a,b) → B'(-a,-b)

c. 270 degree rotation B’(b, -a)

$(x,y) \to (y,-x)$ $B(a,b) \to B'(b,-a)$

5. What is the image of F(x + 2, y)?

a. 90 degree rotation F’(-y, x + 2)

$(x,y) \to (-y,x)$ $F(x+2,y) \to F'(-y, x+2)$

b. 180 degree rotation F’(-x - 2, -y)

$(x,y) \to (-x,-y)$ $F(x+2,y) \to F'(-(x+2),-y)$
$\to F'(-x-2,-y)$

c. 270 degree rotation F’(y, -x - 2)

$(x,y) \to (y,-x)$ $F(x+2,y) \to F'(y,-(x+2)) \to F'(y,-x-2)$

The vertices of △ABC are A(6,−3),B(−3,−1) and C(5,2). Find the vertices of △A′B′C′, given the translation rules below and describe what type of transformation occurred.

6. (x,y)→(-x, -y) A(-6,3),B(3,1) and C(-5,-2)   180 degree rotation

180° rule counterclockwise

7. (x,y)→(-y, x) A(3,6),B(1,−3) and C(-2,5)   90 degree rotation (270 degree clockwise rotation)

90° rule counterclockwise

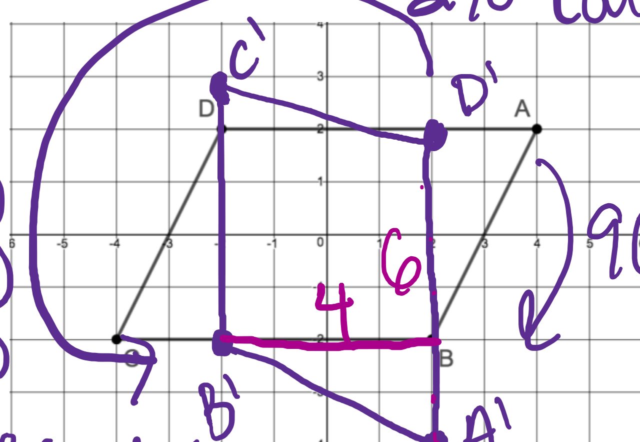
8. (x,y)→(y, -x) A(-3,-6),B(-1,3) and C(2,-5)   270 degree rotation (90 degree clockwise rotation)

270° rule counterclockwise

Use the figure below to answer each question.

270° counterclockwise

$(x,y) \to (y,-x)$
$A(4,2) \to A'(2,-4)$
$B(2,-2) \to B'(-2,-2)$
$C(-4,-2) \to C'(-2,4)$
$D(-2,2) \to D'(2,2)$

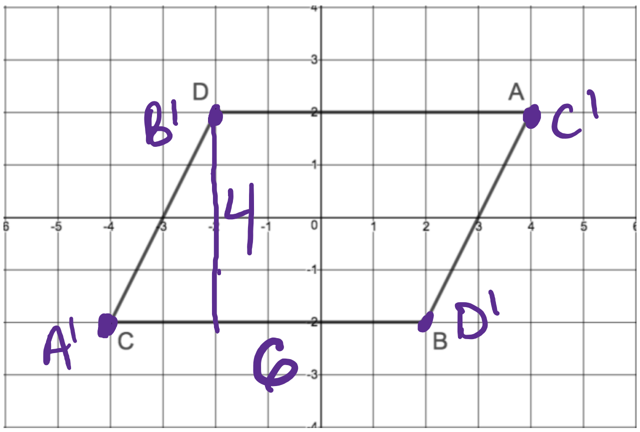


90° clockwise

270° counter

9. Rotate ABCD 90 degrees clockwise. What counterclockwise rotation would yield the same result? 270 degree rotation counterclockwise

10. Rotate ABCD 180 degrees. What do you notice about the pre-image and image after this rotation? Which segments can you confirm are equal in length after this rotation and why?



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

$A(4,2) \to A'(-4,-2)$

$B(2,-2) \to B'(-2,2)$

$C(-4,-2) \to C'(4,2)$

$D(-2,2) \to D'(2,-2)$

The image and preimage look the same. Opposite sides are equal in length because they are in the same location after a 180 degree rotation.

11. Rotational symmetry is when a figure looks the same after a rotation. What are the rotational symmetries of ABCD?

180 degree rotation

12. Given that the area of a parallelogram can be found using the formula A = bh, where b is the length of the base and h is the height of the parallelogram, what is the area of ABCD?

24 units squared $A = 6 \cdot 4 = 24$

13. What is the area of A'B'C'D' after a 270 degree rotation? What can you say about ABCD and A'B'C'D' after this rotation? Will this be true for all rotations?

24 units squared

ABCD and A'B'C'D' are congruent (the same size and shape). This would be true for all rotations because a rotation is a **rigid transformation** that preserves shape and size.

use the image in #9

$A = 6 \cdot 4 = 24$

Rotations and Translations are examples of rigid transformations.