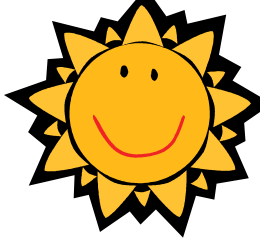
Unit 1 Day 3

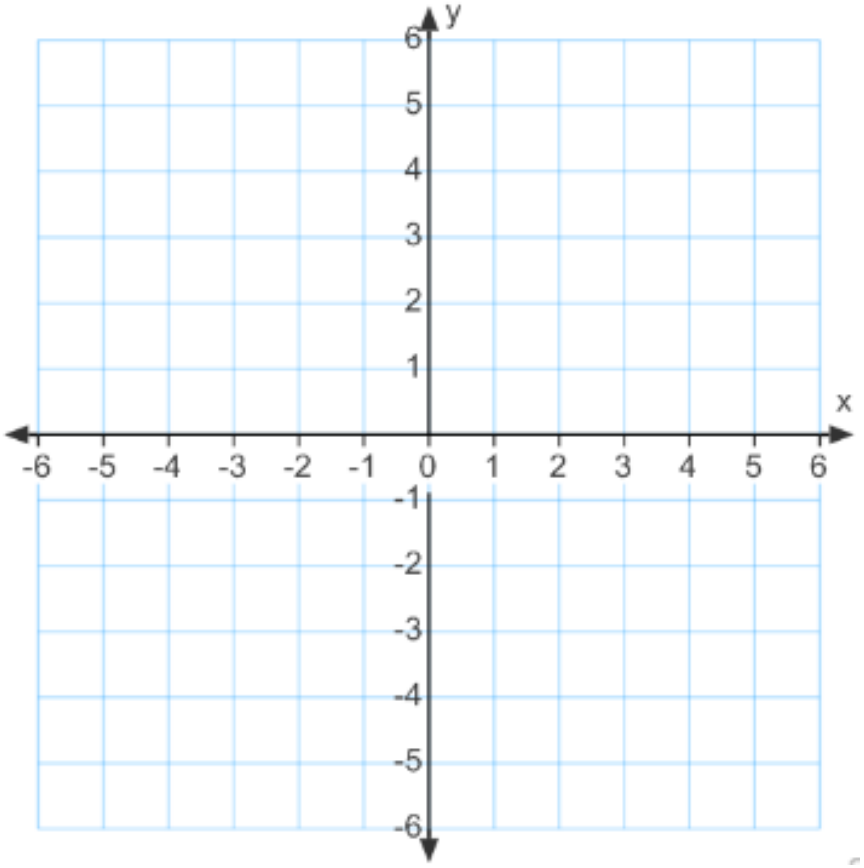
Rotations

Warm Up



Given triangle ABC with A(-1, 4), B(4, 3) and C(1, -5), graph the image points after the following transformations, identify the coordinates of the image, and write the Algebraic Rule for each.

1) Translate left 3, up 2
   A'(–4, 6), B'(1, 5), C'(–2, –3)
   (x, y) → (x–3, y+2)
2) Translate right 2, down 1
   A'(1, 3), B'(6, 2), C'(3, -6)
   (x, y) → (x+2, y–1)
3) Reflect over the x-axis
   A'(–1, –4), B'(4, –3), C'(1, 5)
   (x, y) → (x, −y)
4) Reflect over the y-axis
   A'(1, 4), B'(–4, 3), C'(–1, –5)
   (x, y) → (−x, y)

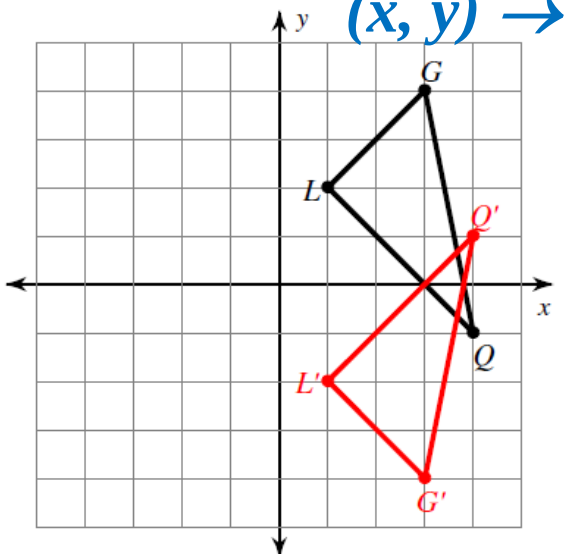


5) **Solve the following system:** $4m + 18n = 80$, $12m + 34n = 160$ *(2, 4)*

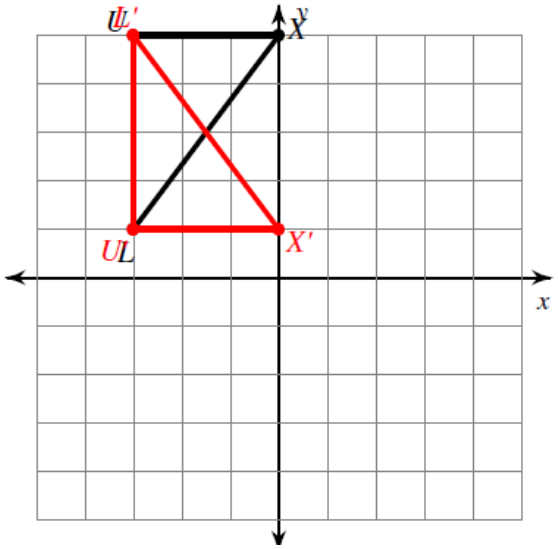
Day 2 Homework Answers

1) reflection across the x-axis

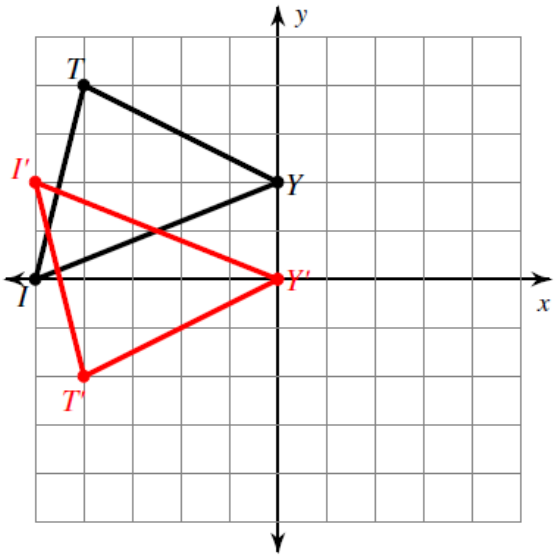
$(x, y) \rightarrow (x, -y)$



2) reflection across $y = 3$

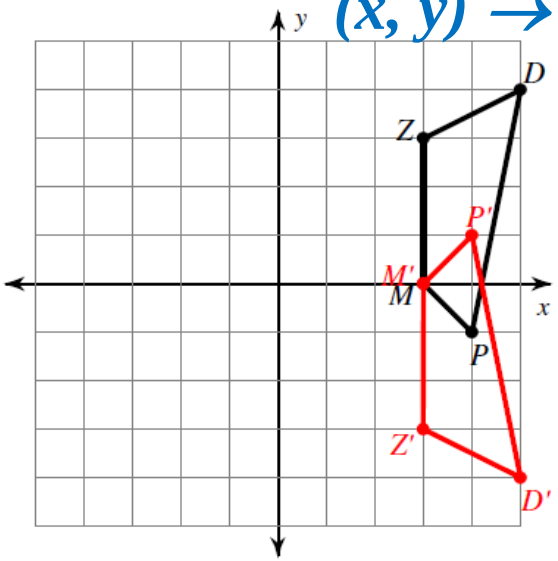


3) reflection across $y = 1$



4) reflection across the x-axis

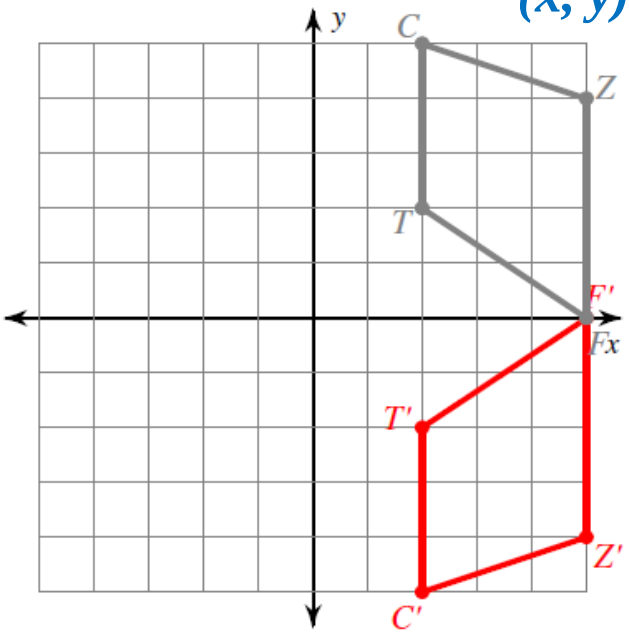
$(x, y) \rightarrow (x, -y)$



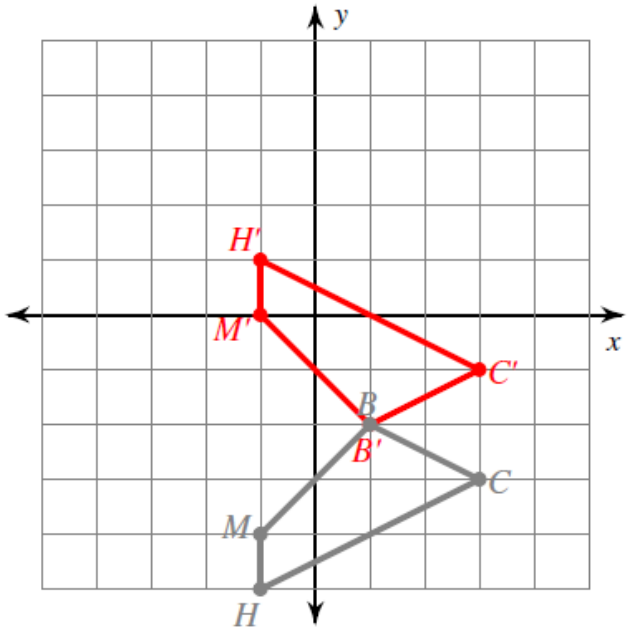
Day 2 Homework Answers

5) reflection across the x-axis
$T(2, 2), C(2, 5), Z(5, 4), F(5, 0)$

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



6) reflection across $y = -2$
$H(-1, -5), M(-1, -4), B(1, -2), C(3, -3)$



7) reflection across the x-axis
$K(1, -1), N(4, 0), Q(4, -4)$ $(x, y) \rightarrow (x, -y)$
$N'(4, 0), Q'(4, 4), K'(1, 1)$

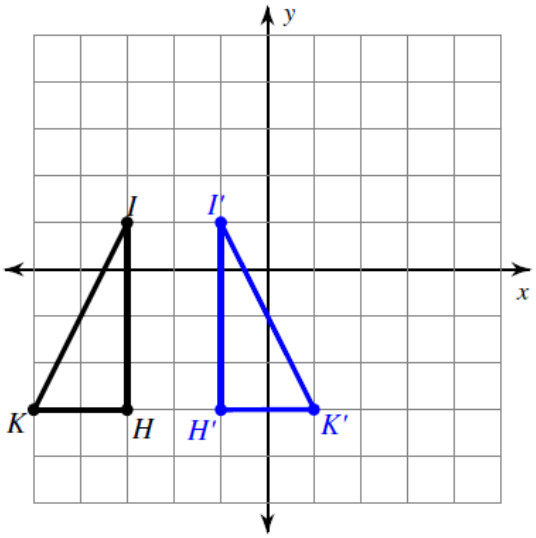
8) reflection across $y = -1$
$R(-3, -5), N(-4, 0), V(-2, -1), E(0, -4)$
$N'(-4, -2), V'(-2, -1), E'(0, 2), R'(-3, 3)$

9) reflection across $x = 3$
$F(2, 2), W(2, 5), K(3, 2)$
$W'(4, 5), K'(3, 2), F'(4, 2)$

10) reflection across $x = -1$
$V(-3, -1), Z(-3, 2), G(-1, 3), M(1, 1)$
$Z'(1, 2), G'(-1, 3), M'(-3, 1), V'(1, -1)$

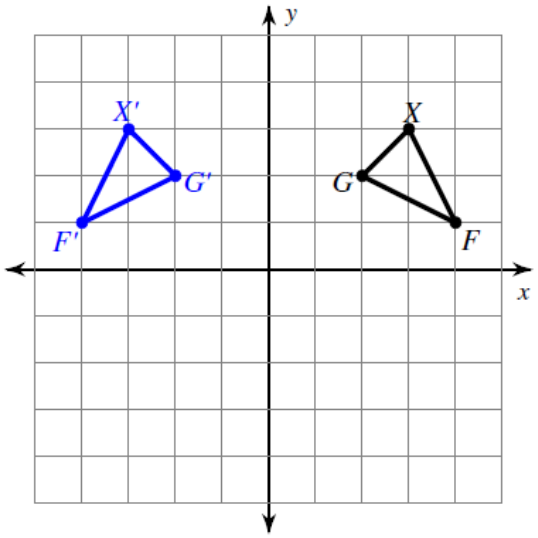
Day 2 Homework Answers

11)



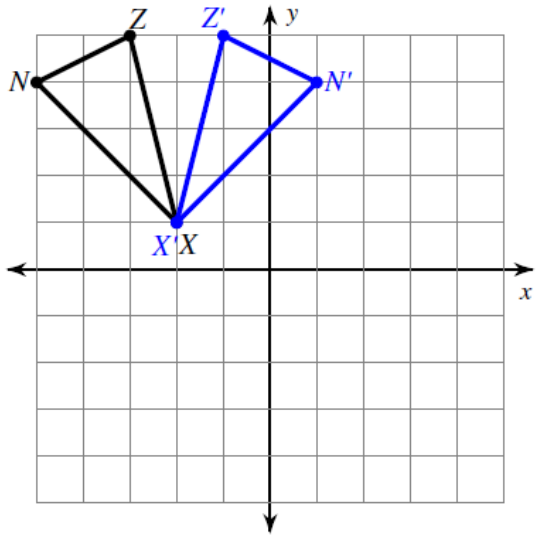
reflection across $x = -2$

12)



reflection across the y-axis

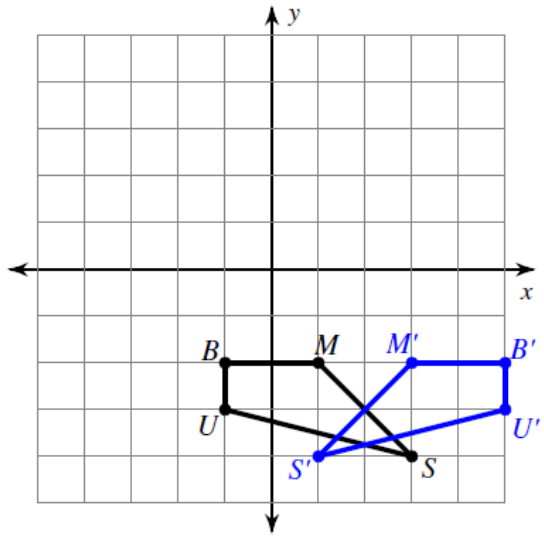
13)



reflection across $x = -2$

14)

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



reflection across $x = 2$

Day 2 HW Answers

(x, y)

1. (3, 9) $5x+(3x)=24$ $8x=24$ $x=3$ $y=3(3)$

4. (9, 22) $3x+2(4+2x)=71$ $7x+8=71$ $x=9$ $y=4+2(9)$

7. (1, 6) change to $2x+4=y$ then $8x+3(2x+4)=26$

$14x+12=26$ $x=1$ $2(1)=y-4$

10. (4, 0) add then $8x=32$ $x=4$ $5(4)-y=20$

22. (3, -1) multiply top by 3 and bottom by -4 then add

$-31y=31$ $y=-1$ $3x+4(-1)=5$

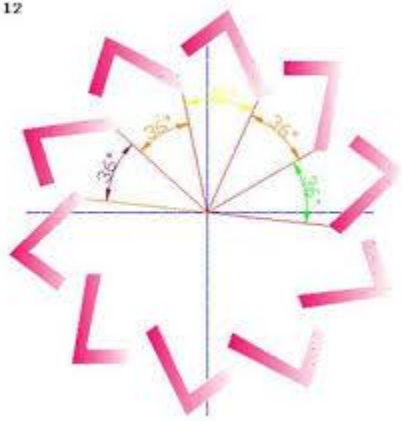
Homework

- Packet Page 8 & 9
- Packet Page 11-12 **multiples of 3**

- Have you found the HW Packet Day 5-7 on the website? Remember that you need to print it before class Tuesday! honorsmath2greenhope.weebly.com

- Start reviewing the material we have learned thus far. The first quiz is coming up on Wednesday!

- Suggestion for learning algebraic rules, notations, and vocabulary: Notecards ☺



Rotations Discovery

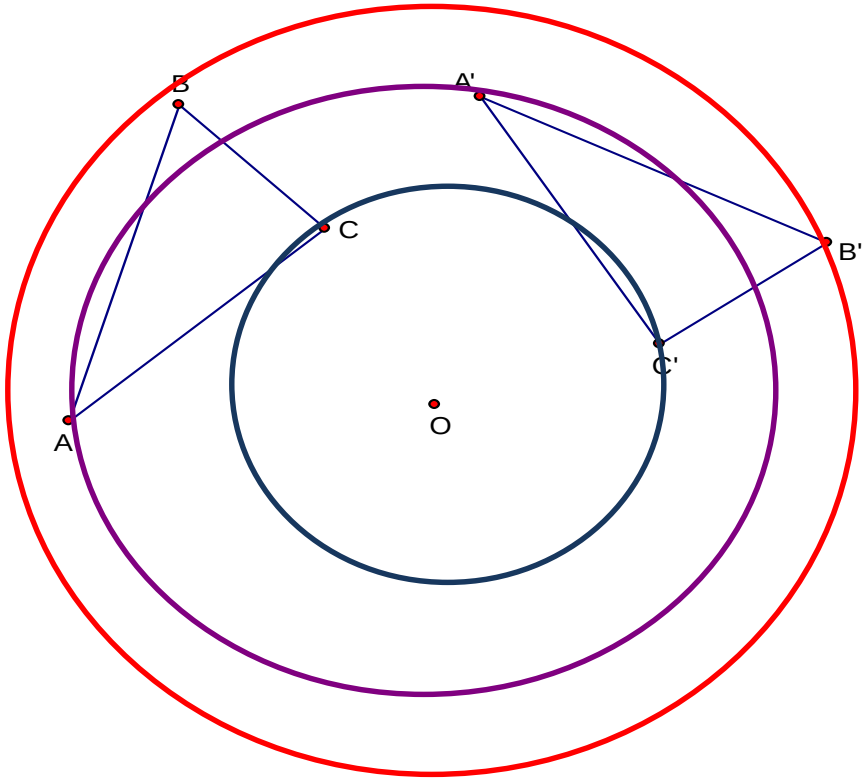
Clear your desk of everything except:

Notes, Pencil, Patty Paper, Compass

Do the Rotations Discovery Activity

Notes p.8 -9 Top

Rotations Exploration p. 8

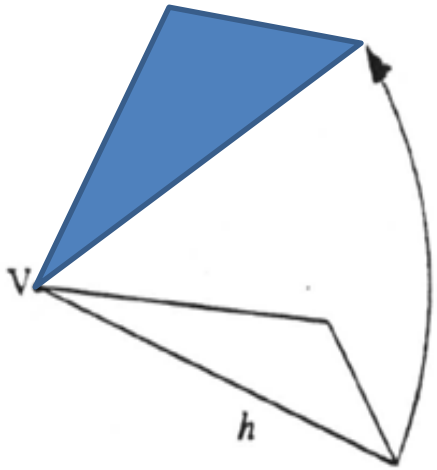


What do you notice about the triangle as it rotates around in either direction?

The preimage and corresponding image points lie on the same circle as you rotate the triangle

∴ The preimage and corresponding image points are equidistant from the center of rotation. (Ex: A and A' are equidistant from O.)

Rotations Exploration p. 9



- What method did you use?

  Patty paper rotation with pencil on center of rotation, V.

- What does the arrow tell you?

  The angle of rotation AND
  The direction of rotation

- What is point V? What happens to point V after the motion is performed?

  V is the center of rotation.
  V stays fixed even after the motion is performed.

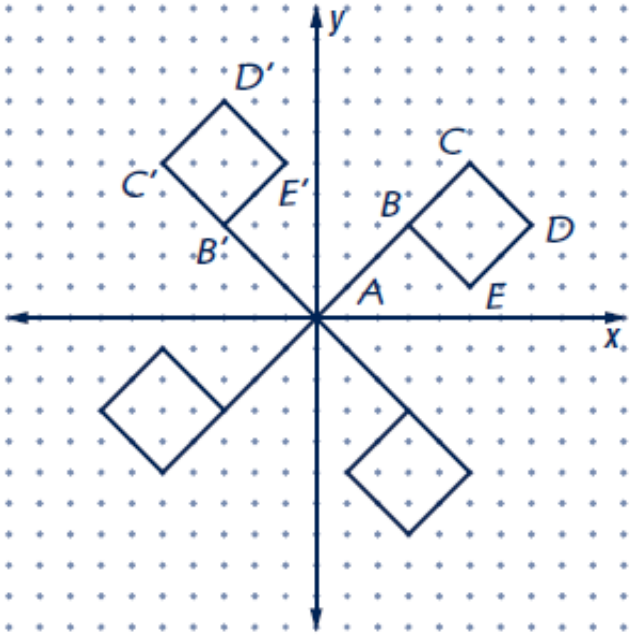
Summary

This type of transformation is called a **rotation**. To rotate an object, you must specify the **angle** of rotation, the **point** around which the rotation is to occur, and the **direction**.

***Note:** the standard for rotations, if not otherwise noted, is **counterclockwise**

Visualizing Rotations Centered About the Origin

The flag shown below is rotated about the origin 90°, 180°, and 270°. Flag ABCDE is the preimage. Flag A'B'C'D'E' is a 90° counterclockwise rotation of ABCDE.

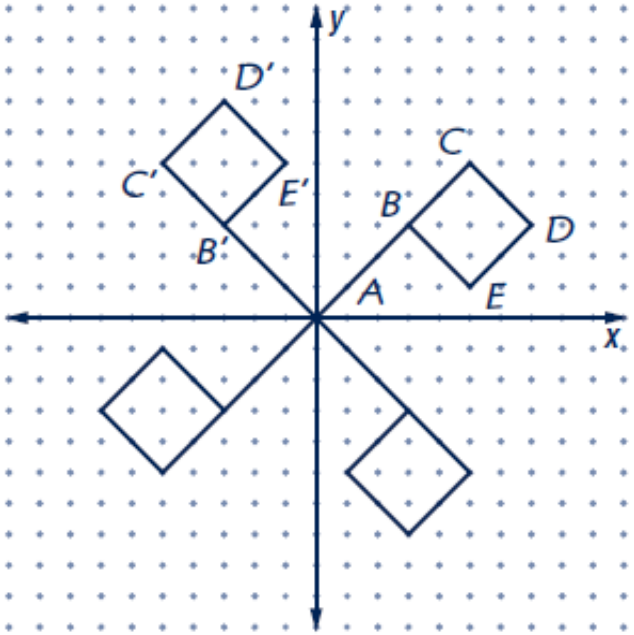


Counter-Clockwise	Clockwise
Positive Degrees!	Negative Degrees!

NOTE: Unless otherwise specified, the standard for rotations is **counterclockwise**!

Notation for Rotations

The flag shown below is rotated about the origin 90°, 180°, and 270°. Flag ABCDE is the preimage. Flag A'B'C'D'E' is a 90° counterclockwise rotation of ABCDE.



Rotation Notation:

$R_{O,\ 90}$

Center of Rotation is O, the Origin

Angle of Rotation is 90°

You Try!

Bottom of Notes p. 9 - 10

After the checkpoint, remember to check in with your Teacher or a Neighbor!

Exploration Answers p. 10

2. Rotate Triangle ABC 90°

A’(0, 2), B’(-4, 3), C’(-4, 6)

3. Rotate Triangle ABC 270°

A’(0, -2), B’(4, -3), C’(4, -6)

4. Rotate Triangle ABC 180°

A’(-2, 0), B’(-3, -4), C’(-6, -4)

Checkpoint Answers p. 10

1. A 90° counter-clockwise rotation maps (x, y) → **(- y, x)** $R_{0,90}$

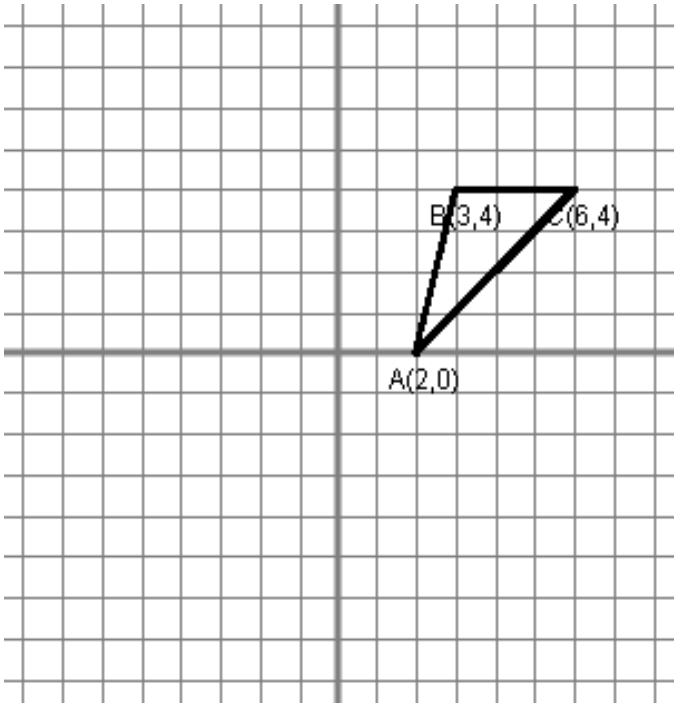
2. A 270° counter-clockwise rotation maps (x, y) → **(y, -x)** $R_{0,270}$

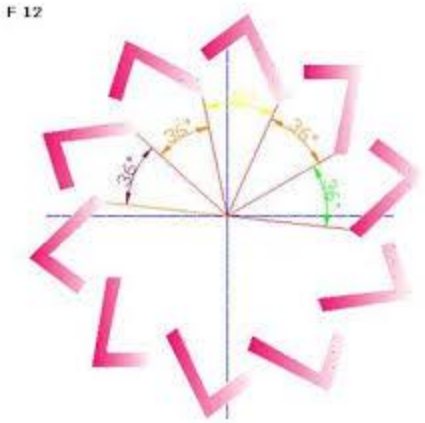
3. A 180° rotation maps (x, y) → **(-x, -y)** $R_{0,180}$

4. A rotation of 270° clockwise is equivalent to a rotation of
   90 ° counterclockwise.

5. A rotation of 270° counterclockwise is equivalent to a rotation of
   90 ° clockwise.

Practice: Rotations with Polygons and on the Coordinate Plane Notes p.11 & 12





Summarize With Algebraic Rules

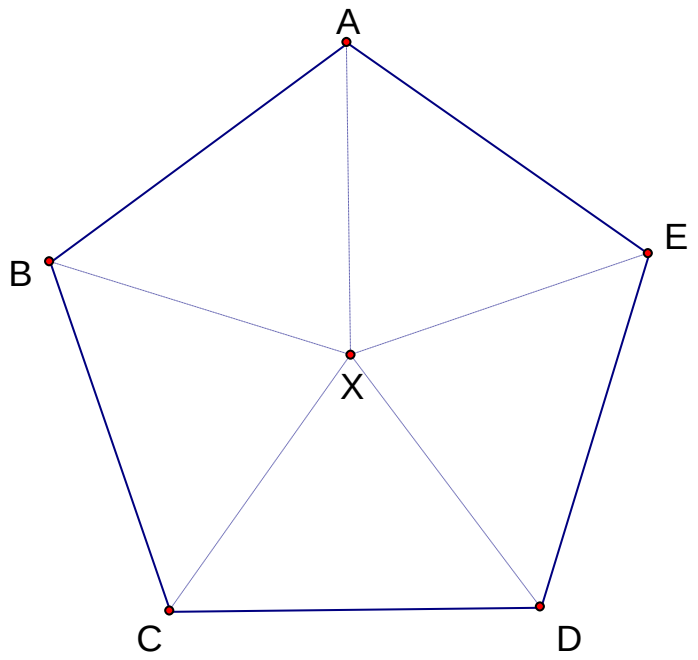
What type of transformation does each of the following algebraic rules produce?

(x, y) → (-y, x) **Rotate 90° Counterclockwise**	(x, y) → (-x, -y) **Rotate 180°**
(x, y) → (y, -x) **Rotate 270° Counterclockwise (or Rotate 90° clockwise)**	
Can you figure out this one on your own? Describe the rotation the results from the following algebraic rule (x, y) → (x, y) **Rotate 360° or 0°**	
The rotation from the algebraic rule (x, y) → (x, y) is the same as another transformation. Describe that transformation. **Double reflection over one axis**	

Practice p. 11

ABCDE is a regular pentagon. A regular polygon has all congruent angles and all congruent side lengths.

$$\frac{360}{5} = 72^\circ$$



Name the image of point E for a counterclockwise 72° rotation about X.

A

Name the image of point A for a clockwise 216° rotation about X.

C

Describe 2 transformations with a preimage of point D and image of B.

Ex. 144° clockwise rotation from D with a center of X.
Ex. 216° rotation from D with a center of X

Practice p. 12

1) The coordinates of ABC are A(3, 1), B(6, 5) and C(2, 4). The coordinates of A'B'C' are A'(-1, 3), B'(-5, 6), and C'(-4, 2).

90° rotation (x, y) →(-y, x)

2) The coordinates of ABC are A(3, 1), B(6, 5) and C(2, 4). The coordinates of A'B'C' are A'(1, -3), B'(5, -6), and C'(4, -2).

270° rotation (x, y) →(y, -x)
(or 90° clockwise rotation)

3) The coordinates of ABC are A(3, 1), B(6, 5) and C(2, 4). The coordinates of A'B'C' are A'(-3, -1), B'(-6, -5), and C'(-2, -4).

180° rotation (x, y) →(-x, -y)
or reflection over x & y axis

4) The coordinates of ABC are A(2, -1), B(6, 4) and C(-3, 2). The coordinates of A'B'C' are A'(-1, -2), B'(4, -6), and C'(2, 3).

270° rotation (x, y) →(y, -x)
(or 90° clockwise rotation)

Transformation Rules Summary

Let's fill it out!

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