Math 8 – Exploring Reflections Part 2

On Friday, you explored some of the properties of a reflection such as
- the preimage and image are congruent figures,
- the lines connecting each preimage to its image intersect the line of reflection at right angles, and
- the preimage and image are equal distances from the line of reflection.

Today you will be exploring reflections over specific lines ($y - axis,\ x - axis,\ y = x,\ and\ y = -x$) and looking for patterns between the preimage coordinates (x,y) and the image coordinates (x',y'). Then you will write a generalization/rule for a reflection over each of the specific lines and use your rule to complete reflections without actually graphing them.

Getting Started
- Person 1: Log on to a netbook and access this document in your Google Drive.
    - Google Username: lastnamefirstinitial@bronsonschools.org
    - Password: Viking2016
  - **Make a copy** of the document (File, make a copy).
  - Rename the document **Last Name Person 1, Last Name Person 2 - Hour - Reflections Part 2**.
  - You will use this document to guide your work and you will **record your answers this document by typing them in. Do NOT use black font.** Pick a different color of font color so your answers are easy to see and read.

- Person 2: Log on to a netbook
  - Go to Geogebra.org.
  - **Login as blemasts using the password Viking2016.**
  - Open **Part 2 - Exploring Reflections**
  - You will use the Geogebra document to explore the patterns in the coordinates when reflecting over specific lines ($y - axis,\ x - axis,\ y = x,\ and\ y = -x$)

Part 2 - Exploring Reflections
1. Unclick distances
2. Name the preimage:

> ABCDE

3. Name the image:

> A'B'C'D'E'

Reflections over the y-axis

1. Grab point F and move it so the line of reflection is the y-axis.
2. Click the coordinates box
3. Record the coordinates of each point.

Preimage   Image

    A (2 ,8)   A' (-2 ,8)
    B (0,2)   B' (0 , 2)
    C (2, 0)   C' (-2 , 0)
    D (6 , 0)   D' (-6 ,0)
    E (10 ,6)   E' (-10 ,6)

4. Change the shape of the preimage. Make sure you move each of the points. Be sure that at least one of the preimage points is below the x-axis and that another is on the left side of the y-axis. Record the coordinates of each point.

Preimage   Image

    A (-2 ,6)   A' (2 , 6)
    B (2 , 2)   B' (-2 ,2)
    C (4 ,-2)   C' (-4 , -2)
    D (10 ,-2)   D' (-10 ,-2)
    E (10 ,6)   E' (-10 ,6)

5. Look back at your answers from 3 and 4. Explain the pattern you notice between each preimage coordinate and its image coordinate.

The preimage and image have the same y coordinate. The x coordinate in the image is the opposite of the x coordinate in the preimage.

6. WIthout graphing, use the pattern to complete each coordinate for a reflection over the y-axis.

Preimage   Image

    A (0 , 4)   A' (0 ,4)

B (-4 , -4)   B' (4 ,-4)
C (0 , -8)   C' (0 ,-8)
D (6 , -6)   D' (-6 , 6)
E (8 , 0)   E' (-8 ,0)

7. Check your answers from question 6. Move the points to create the Quadrilateral ABCDE from question 6. Are your predictions for A', B', C', D', and E' correct? If not, fix them.

8. Use the pattern to complete the rule for reflecting a point over the y-axis.

Reflection over the y-axis: Preimage (x,y) → Image (-x , y   )

Reflections over the x-axis
1. Hit the refresh button in the upper right hand corner.
2. Unclick distances and click coordinates
3. Grab point F and move it so the line of reflection is the x-axis.
4. Record the coordinates of each point.

Preimage	Image
A (2 ,8)	A' (2 , -8)
B (0 , 2)	B' (0 ,-2)
C (2 ,0)	C' (2 ,0)
D (6 ,0)	D' (6 ,0)
E (10 , 6)	E' (10 ,-6)

5. Change the shape of the preimage. Make sure you move each of the points. Be sure that at least one of the preimage points is below the x-axis and that another is on the left side of the y-axis. Record the coordinates of each point.

Preimage	Image
A (2 ,-6)	A' (2 ,6)
B (-8 ,4)	B' (-8 ,-4)
C (2 ,0)	C' (2 , 0)

D (6 , 0)   D' (6 , 0)
E (14 ,4)   E' (14 , -4)

6. Look back at your answers from 4 and 5. Explain the pattern you notice between each preimage coordinate and its image coordinate.

The preimage and image have the same x coordinates. The y coordinate in the image is the opposite of the y coordinate in the preimage.

7. WIthout graphing, use the pattern to complete each coordinate for a reflection over the x-axis.

Preimage   Image
    A (0 , 4)   A' (0 ,-4)
    B (-4 , -4)   B' (-4 , 4)
    C (0, -8)   C' (0 , 8)
    D (6 , -6)   D' (6 , 6)
    E (8 , 0)   E' (8 , 0)

8. Check your answers from question 7. Move the points to create the Quadrilateral ABCDE from question 6. Are your predictions for A', B', C', D', and E' correct? If not, fix them.

9. Use the pattern to complete the rule for reflecting a point over the x-axis.

Reflection over the x-axis: Preimage (x,y) → Image (x   , -y   )

Reflections over y = x

1. Hit the refresh button in the upper right hand corner.
2. Unclick distances and click coordinates
3. Grab point F and move it so the line of reflection is the line y = x
4. Record the coordinates of each point.

Preimage	Image
A (2 ,8)	A' (8 ,2)
B (0 ,2)	B' (2 ,0)
C (2 , 0)	C' (0 , 2)
D (6 , 0)	D' (0 , 6)
E (10 , 6)	E' (6 , 10)

5. Change the shape of the preimage. Make sure you move each of the points. Be sure that at least one of the preimage points is below the x-axis and that another is on the left side of the y-axis. Keep all the preimage points below the line of reflection. Record the coordinates of each point.

Preimage	Image
A (-4 ,8)	A' (8 , -4)
B (0 , 0)	B' (0 , 0)
C (2 , -2)	C' (-2 ,2)
D (10 , -6)	D' (-6 , 10)
E (10 , 6)	E' (6 , 10)

6. Look back at your answers from 4 and 5. Explain the pattern you notice between each preimage coordinate and its image coordinate.

The x coordinate in the preimage becomes the y coordinate in the image, and the y coordinate in the preimage becomes the x coordinate in the image.

7. WIthout graphing, use the pattern to complete each coordinate for a reflection over the line y = x.

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Preimage                          Image
    A ( 0 , 4 )                       A' ( 4 , 0 )
    B ( -4 , -4 )                     B' ( -4 ,-4 )
    C ( 0 , -8 )                      C' ( -8 , 0 )
    D ( 6 , -6 )                      D' ( -6 ,6 )
    E ( 8 , 0 )                       E' ( 0 , 8 )
```

8. Check your answers from question 7. Move the points to create the Quadrilateral ABCDE from question 6. Are your predictions for A', B', C', D', and E' correct? If not, fix them.

9. Use the pattern to complete the rule for reflecting a point over the line y = x.

Reflection over the y = x: Preimage (x,y) → Image (y   , x   )

Reflections over y = - x
1. Hit the refresh button in the upper right hand corner.
2. Unclick distances and click coordinates
3. Grab point F and move it so the line of reflection is the line y = - x
4. Record the coordinates of each point.

```
Preimage                          Image
    A (2 , 8 )                        A' (-8 ,-2 )
    B ( 0 , 2 )                       B' ( -2 ,0 )
    C ( 2 ,0 )                        C' ( 0 ,-2 )
    D ( 6 , 0 )                       D' ( 0 , -6 )
    E ( 10 , 6 )                      E' ( -6 ,-10 )
```

5. Change the shape of the preimage. Make sure you move each of the points. Be sure that at least one of the preimage points is below the x-axis and that another is on the left side of the y-axis. Keep all the preimage points above the line of reflection. Record the coordinates of each point.

```
Preimage                          Image
    A (-2 ,8 )                        A' ( -8 , 2 )
    B ( 0 , 2 )                       B' ( -2 ,0 )
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C (2 , 0)   C' (0 , -2)

D (6 ,-2)   D' (2 , -6)

E (10 , 6)   E' (-6 , -10on)

6. Look back at your answers from 4 and 5. Explain the pattern you notice between each preimage coordinate and its image coordinate.

The x coordinate in the image is the opposite of the y coordinate in the preimage and the y coordinate in the image is the opposite of the x coordinate in the preimage.

7. WIthout graphing, use the pattern to complete each coordinate for a reflection over the line y = - x.

Preimage   Image

A (0 , 4)   A' (-4 ,0)

B (-4 , -4)   B' (4 , 4)

C (0 , -8)   C' (8 ,0)

D (6 , -6)   D' (6 ,-6)

E (8 , 0)   E' (0 , -8)

8. Check your answers from question 7. Move the points to create the Quadrilateral ABCDE from question 6. Are your predictions for A', B', C', D', and E' correct? If not, fix them.

9. Use the pattern to complete the rule for reflecting a point over the line y = - x.

Reflection over the y = - x: Preimage (x,y) → Image (-y , -x)

Summary:
1. Record each of the reflection rules on the backside of your pink formula sheet.