

Activity 1: Reflection Across the  $x$  and  $y$  axes and the Line  $y = x$   
and the Line  $y = -x$

1. On quarter inch grid paper, plot these points to create the vertices of a quadrilateral:

A (-1, 2), B (-1, 5), C (2, 7), D (2, 3)

- a. Reflect the quadrilateral across both  $x$ -axis and  $y$ -axis. You should have a total of three quadrilaterals drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on quadrilateral	Original Image	Original Image (reflected across $x$ -axis)	Original Image (reflected across $y$ -axis)
A			
B			
C			
D			
any	$(x, y)$		

- b. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $x$ -axis)	Original Image (reflected across $y$ -axis)
slope AB			
slope BC			
slope CD			
slope AD			
any	$m$		

2. On quarter inch grid paper, plot these points to create the vertices of a triangle: A (-2, 4), B (-2, 7), C (-6, 7)
- a. Reflect the triangle across both  $y = x$  and  $y = -x$ . You should have a total of three triangles drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on Triangle	Original Image	Original Image (reflected across $y = x$ )	Original Image (reflected across $y = -x$ )
A			
B			
C			
any	$(x, y)$		

- b. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $y = x$ )	Original Image (reflected across $y = -x$ )
slope AB			
slope BC			
slope AC			
any	m		

3. On quarter inch grid paper, plot these points to create the vertices of a triangle: A (-2, -4), B (-6, -6), C (-5, -1)
- a. Reflect the triangle across both  $y = x$  and  $y = -x$ . You should have a total of three triangles drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on Triangle	Original Image	Original Image (reflected across $y = x$ )	Original Image (reflected across $y = -x$ )
A			
B			
C			
any	$(x, y)$		

- b. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $y = x$ )	Original Image (reflected across $y = -x$ )
slope AB			
slope BC			
slope AC			
any	m		

4. Describe any relationships you have noticed about the slopes of the original images, the reflected images, and the line of reflection.

### Activity 2: Reflection Across Multiple Lines of Reflection

1. On quarter inch grid paper, plot these points to create the vertices of a quadrilateral: A (1, 2), B (1, 4), C (5, 6), D (3, 2)
  - a. Reflect the quadrilateral across the  $x$ -axis. Reflect the new image across  $y = x$ . You should have a total of three quadrilaterals drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on Quadrilateral	Original Image	Original Image (reflected across $x$ -axis)	New Image (reflected across $y = x$ )
A			
B			
C			
D			
any	$(x, y)$		

- b. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $x$ -axis)	New Image (reflected across $y = x$ )
slope AB			
slope BC			
slope CD			
slope AD			
any	$m$		

- c. Reflect the original quadrilateral across the  $y$ -axis. Reflect the new image across  $y = x$ . You should have a total of three quadrilaterals drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on Quadrilateral	Original Image	Original Image (reflected across $y$ -axis)	New Image (reflected across $y = x$ )
A			
B			
C			
D			
any	$(x, y)$		

- d. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $y$ -axis)	New Image (reflected across $y = x$ )
slope AB			
slope BC			
slope CD			
slope AD			
Any	$m$		

2. On quarter inch grid paper, plot these points to create the vertices of a quadrilateral: A (1, 2), B (1, 4), C (5, 6), D (3, 2)
- a. Reflect the quadrilateral across  $y = -x$ . Reflect the new image across  $y = x$ . You should have a total of three quadrilaterals drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on Quadrilateral	Original Image	Original Image (reflected across $y = -x$ )	New Image (reflected across $y = x$ )
A			
B			
C			
D			
any	$(x, y)$		

- b. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $y = -x$ )	New Image (reflected across $y = x$ )
Slope AB			
Slope BC			
Slope CD			
Slope AD			
any	$m$		

- c. Reflect the original quadrilateral across  $y = x$ . Reflect the new image across  $y = -x$ . You should have a total of three quadrilaterals drawn. Record the vertices of the reflected images in the table. Look for a possible pattern and record that in the last row of the table.

Point on Quadrilateral	Original Image	Original Image (reflected across $y = x$ )	New Image (reflected across $y = -x$ )
A			
B			
C			
D			
any	$(x, y)$		

- d. Find the slope of the original image and the slope of the reflected images. Record the slopes in the table.

	Original Image	Original Image (reflected across $y = x$ )	New Image (reflected across $y = -x$ )
slope AB			
slope BC			
slope CD			
slope AD			
any	m		

3. Describe any relationships you have noticed about the slopes of the original images, the reflected images, and the line of reflection.

4. Using the patterns you have found and given one slope, fill in the table with the slopes of images reflected over the various lines of reflection.

### Single lines of reflection

All reflections performed on original figure

Slope of Original image	Reflected across x-axis	Reflected across y-axis	Reflected across $y = x$	Reflected across $y = -x$
-2				
$\frac{2}{3}$				
-1				
$\frac{1}{4}$				
Undefined				
0				

### Multiple lines of reflection

Reflection performed on original image then on reflected image

Slope of Original image	Reflected across $y = x$ then $y = -x$	Reflected across $y = -x$ then $y = x$	Reflected across x-axis then $y = x$	Reflected across y-axis then $y = x$	Reflected across y-axis then x-axis then y-axis
-2					
$\frac{2}{3}$					
-1					
$\frac{1}{4}$					
Undefined					
0					

5. Describe a reflection process that could explain the following.
- a.  $(2, -7)$  reflected across \_\_\_\_\_ is  $(2, 7)$
  - b.  $(2, -7)$  reflected across \_\_\_\_\_ is  $(-7, 2)$
  - c.  $(2, -7)$  reflected across \_\_\_\_\_ is  $(-2, -7)$
  - d.  $(2, -7)$  reflected across \_\_\_\_\_ is  $(-2, 7)$
  - e.  $(2, -7)$  reflected across \_\_\_\_\_ is  $(7, -2)$
  - f.  $(2, -7)$  reflected across \_\_\_\_\_ is  $(2, -7)$