Name: Answer Key Per: _____ Date: _____
Serafino • Geometry

10A–1 Transformations

Translations & Reflections

When you move a figure around, change its orientation, or grow/shrink it, you are performing a **transformation**. This unit (I'm calling it 10A) is about transforming figures on the coordinate plane.

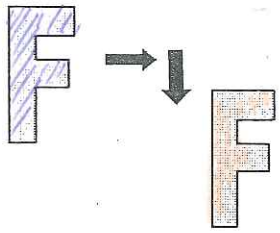
To do this, we need words to describe the "before" and the "after" figures.

preimage — image

F "F" — F' "F prime"

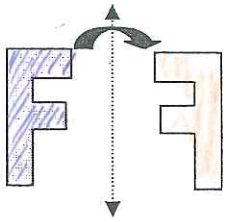
Congruence Transformations: shape stays same image ≅ preimage

"Rigid" $F \cong F'$



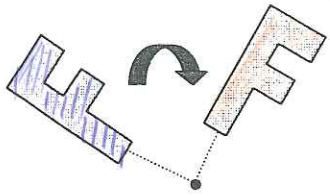
Translation

slide up/down/left/right



Reflection

mirror image over a line

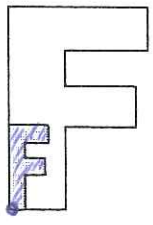


Rotation

turn about a point

Similarity Transformation: shape grows/shrinks image ~ preimage

$F \sim F'$



Dilation

grow/shrink from a point

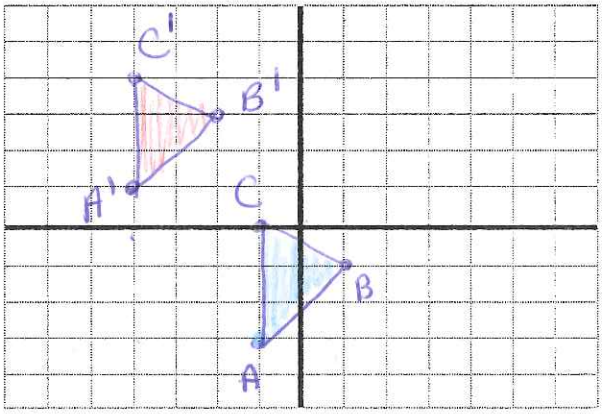
TRANSLATIONS

Translation notation: $(x, y) \rightarrow (x \pm a, y \pm b)$

a is the # of units you move left (–) or right (+), **b** is the # of units you move up (+) or down (–)

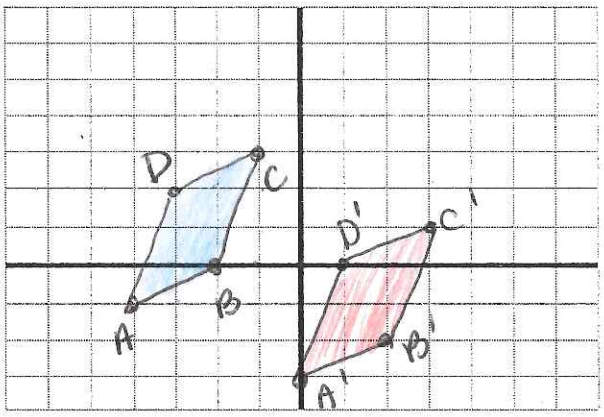
1. A (-1, -3), B (1, -1), and C (-1, 0). Pperform $(x, y) \rightarrow (x - 3, y + 4)$.
   Label your image points and give the coordinates.

-3 left
+4 up



A'(-4, 1)
B'(-2, 3)
C'(-4, 4)

2. A (-4, -1), B (-2,0), C (-1,3), and D (-3,2). Perform $(x, y) \rightarrow (x + 4, y - 2)$.
   Label your image points and give the coordinates.



3. Write the described transformation in coordinate translation notation:
   a. 6 units to the left and 2 units up $(x, y) \rightarrow (x - 6, y + 2)$
   b. 2 units down: $(x, y) \rightarrow (x, y - 2)$
   c. 8 units right: $(x, y) \rightarrow (x + 8, y)$

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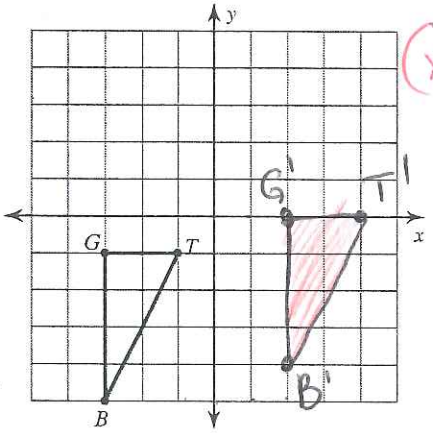
Name_____

Translations

Date_____ Period____

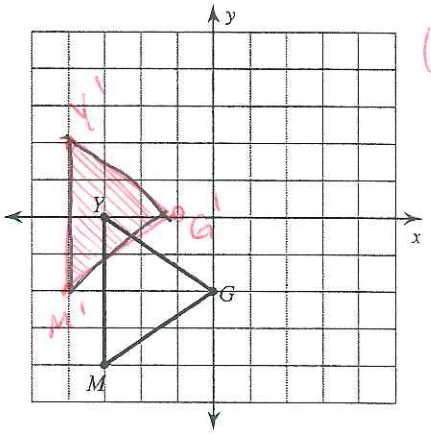
Graph the image of the figure using the transformation given. (label image points)

1) translation: 5 units right and 1 unit up



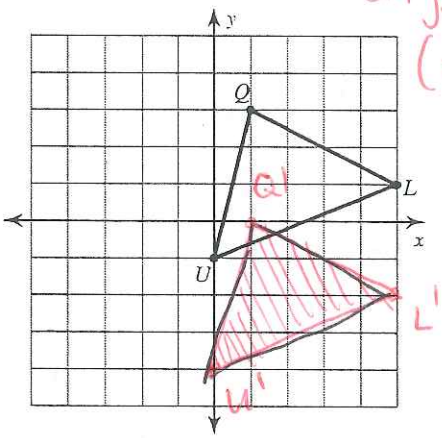
$(x,y) \rightarrow (x+5, y+1)$

2) translation: 1 unit left and 2 units up



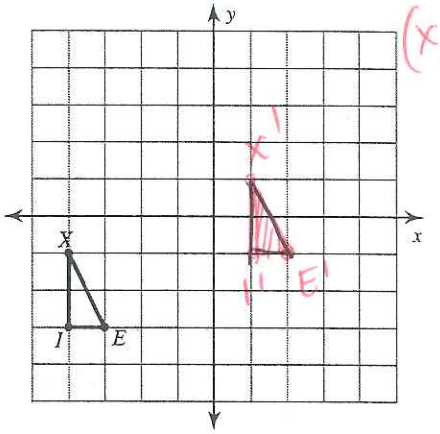
$(x,y) \rightarrow (x-1, y+2)$

3) translation: 3 units down



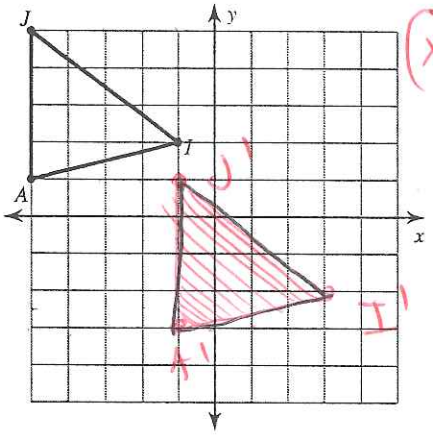
$(x,y) \rightarrow (x, y-3)$

4) translation: 5 units right and 2 units up



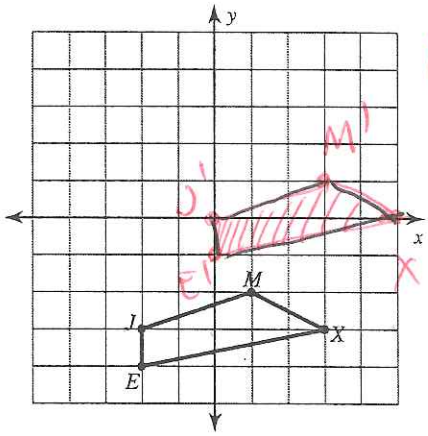
$(x,y) \rightarrow (x+5, y+2)$

5) translation: 4 units right and 4 units down



$(x+4, y-4)$

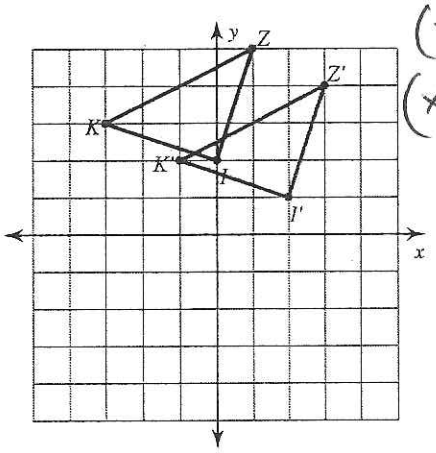
6) translation: 2 units right and 3 units up



$(x+2, y+3)$

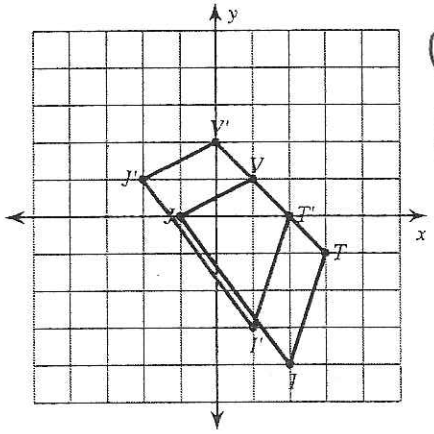
Write a rule to describe each transformation. (in translation notation)

7)



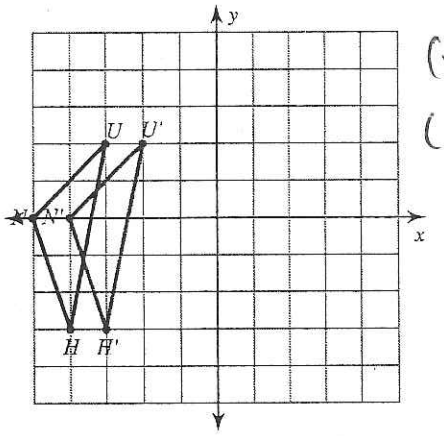
$(x, y) \rightarrow (x+2, y-1)$

8)



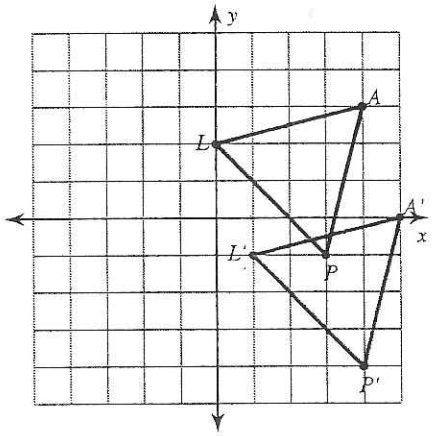
$(x, y) \rightarrow (x-1, y+1)$

9)



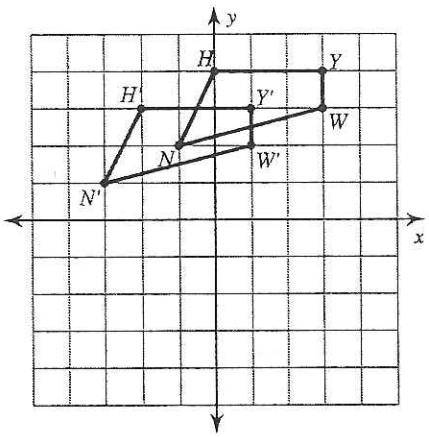
$(x, y) \rightarrow (x+1, y)$

10)



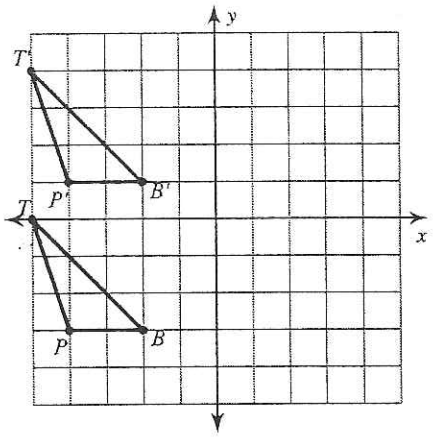
$(x, y) \rightarrow (x+1, y-3)$

11)



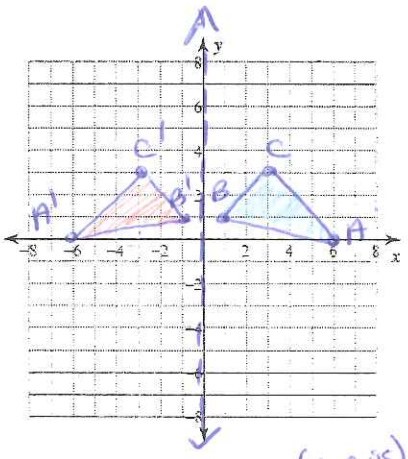
$(x, y) \rightarrow (x-2, y-1)$

12)

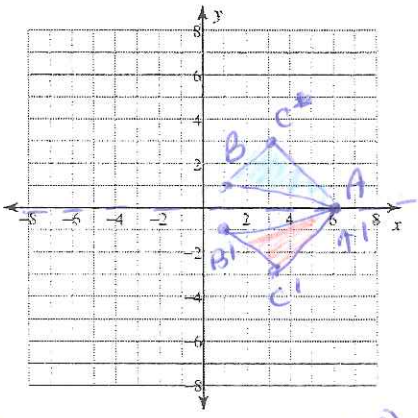


$(x, y) \rightarrow (x, y-4)$

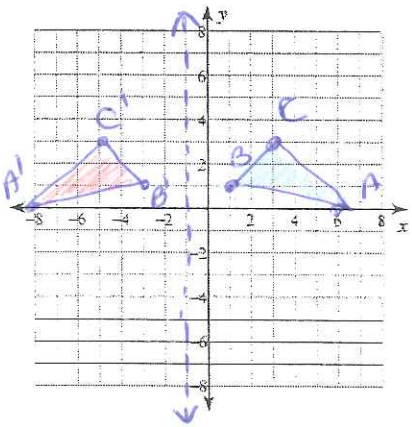
4. A(6, 0) B(1, 1) C(3, 3). Perform the reflection and label your image points. △ABC △A'B'C'



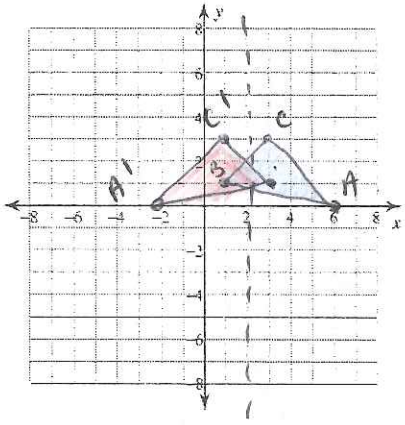
a. reflect over x = 0 (y-axis)



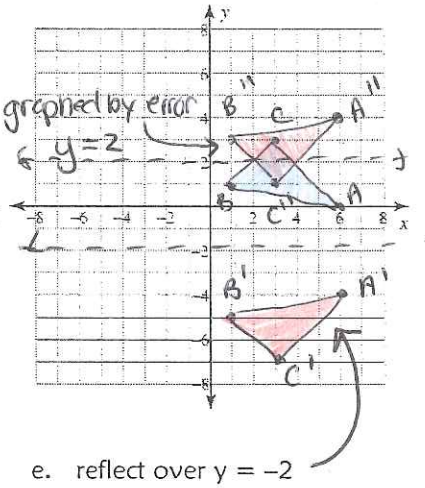
b. reflect over y = 0 (x-axis)



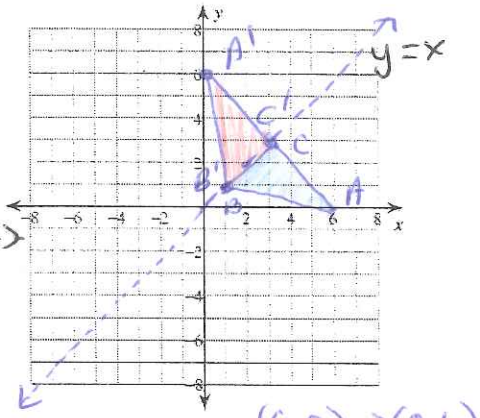
c. reflect over x = –1



d. reflect over x = 2



e. reflect over y = –2



f. reflect over y = x

x stays same, y changes sign

y stays same, x changes sign

5. a. Reflect (5, 3) over the x-axis (5,-3)

b. Reflect (–2, 7) over the y-axis (2,7)

c. Reflect (5, 3) over y = x (3,5)

x and y swap

d. Reflect (–2, 7) over y = –x (-7,2)

x and y swap, change signs.

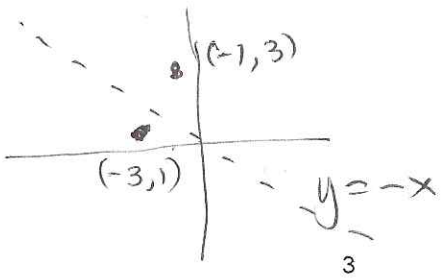
6. Identify if the given reflection is in the x-axis or the y-axis.

a. (4, 5) → (4, -5) is a reflection in the X - axis

b. (-6, 2) → (6, 2) is a reflection in the y - axis

c. (7, -3) → (-7, -3) is a reflection in the y - axis

d. (1, -3) → (1, 3) is a reflection in the X - axis



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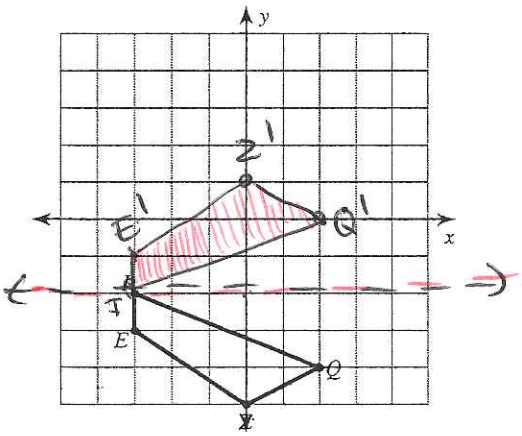
Reflections

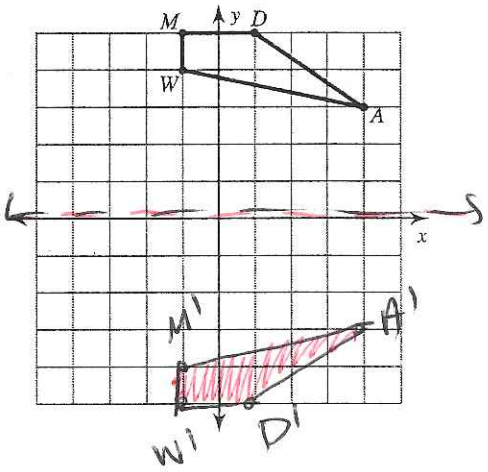
Date_____ Period____

Graph the image of the figure using the transformation given. (label 'image points')

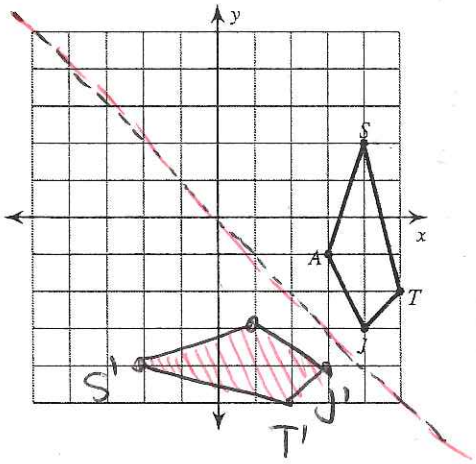
1) reflection across $y = -2$



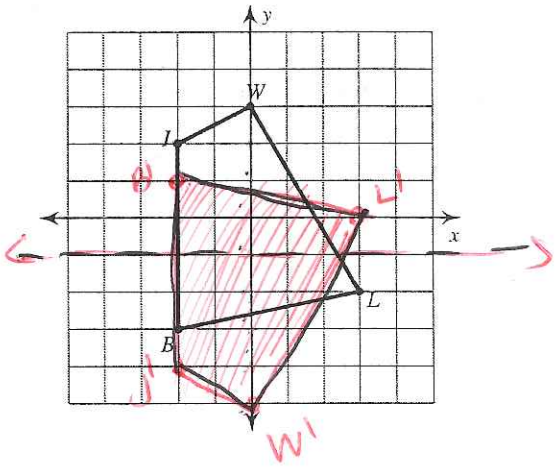
2) reflection across the x-axis



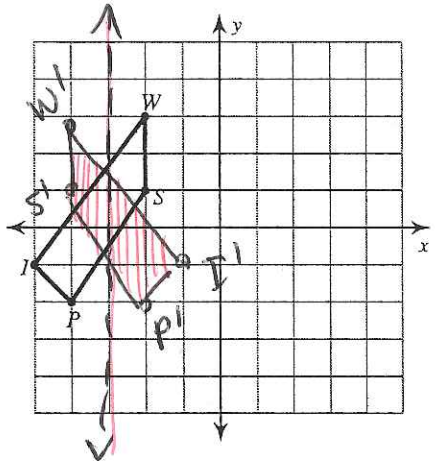
3) reflection across $y = -x$



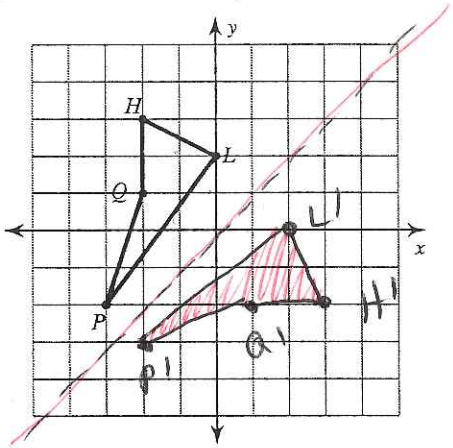
4) reflection across $y = -1$



5) reflection across $x = -3$

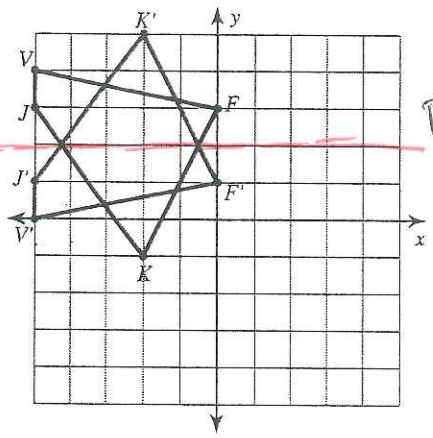


6) reflection across $y = x$



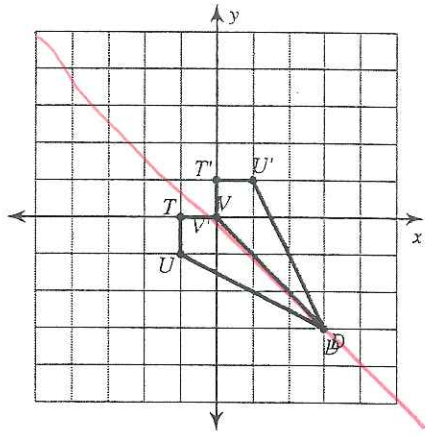
Write a rule to describe each transformation.

7)



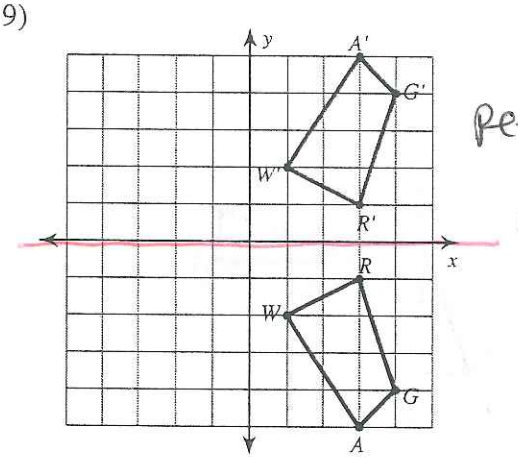
Reflect over $y=2$

8)



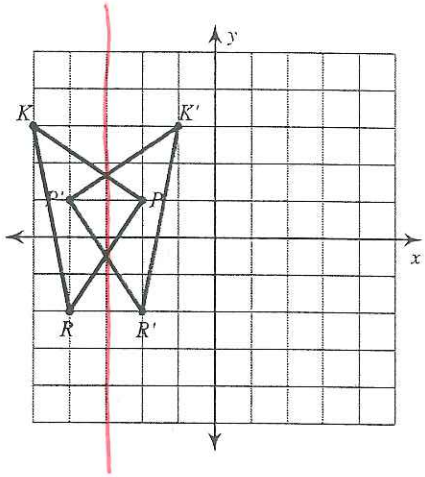
Reflect over $y=-x$

9)



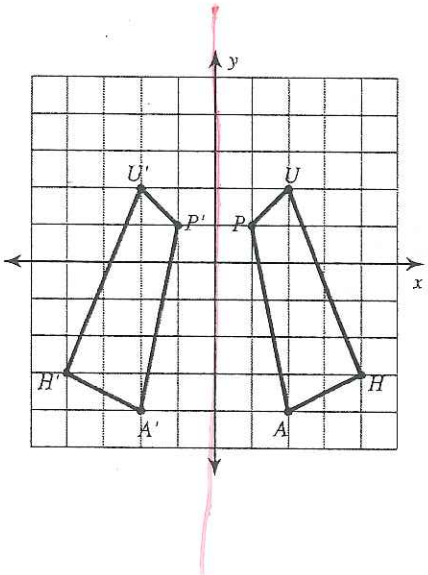
Reflect over $y=0$

10)



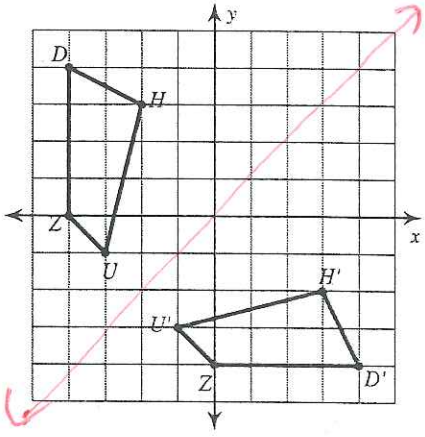
Reflect over $x=-3$

11)



Reflect over $x=0$

12)



Reflect over $y=x$

7. A(5, 0) B(2, 1) C(3, 5). Perform the transformations and label your image points.

   a. Reflect over x = 1

   b. Translate 4 units down

   c. Reflect over y = 0

   d. Translate 2 units to the right

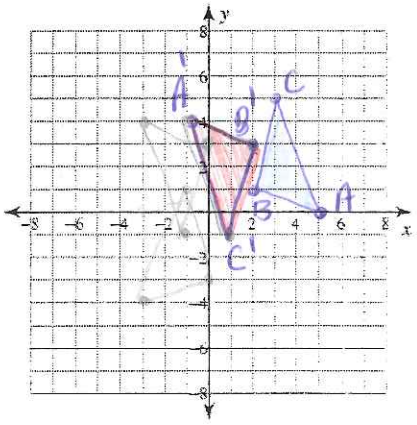


Image Points:

A'(-1,4) B'(2,3) C'(1,-1)

8. A(8, 1) B(2, 1) C(8, 3). Perform the transformations and label your image points.

   a. Reflect over y– axis

   b. Reflect over x – axis

   c. Translate 4 units to right.

   d. Reflect over y = x

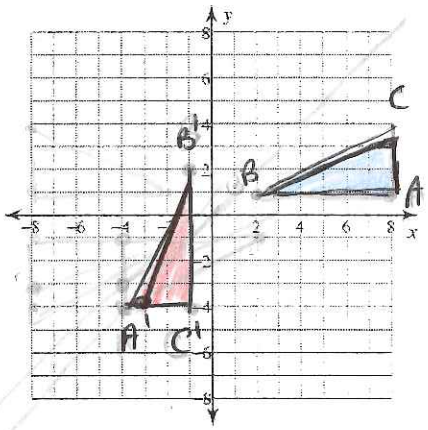


Image Points:

A'(-4,-8) B(-1,2) C'(-1,-4)

9. A(–4, –2) B(0, 0) C(–1, 2). Perform the transformations and label your image points.

   a. Reflect over y–axis

   b. (x, y) → (x – 5, y – 2)

   c. Reflect over the x–axis.

   d. Translate 2 units to the right

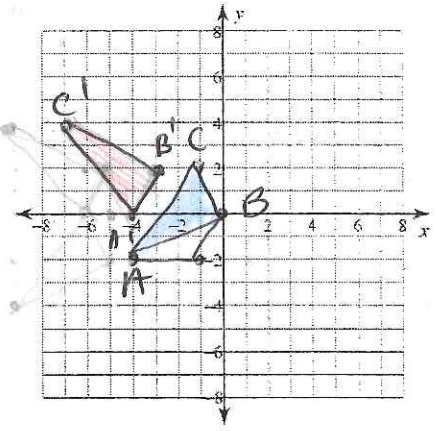


Image Points:

A'(-4,0) B'(-3,2) C'(-7,4)