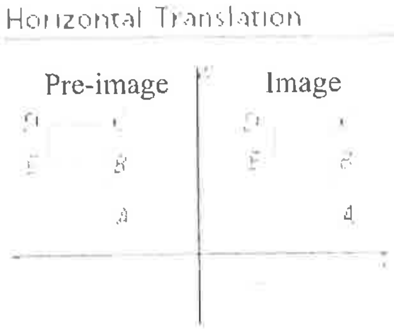
Key

Math 1 Name KEY

[redacted] Transformation Investigation
5-5

1. Define **translation:** sliding motion (determined by distance and direction)



Fill in the table below:

Pre-Image	Translation Image
A(-5, 2)	A'(7, 2)
B(-5, 5)	B'(7, 5)
C(-5, 7)	C'(7, 7)
D(-8, 7)	D'(4, 7)
E(-8, 5)	E'(4, 5)

2a. Describe the *horizontal translation* of the flag as precisely as you can.

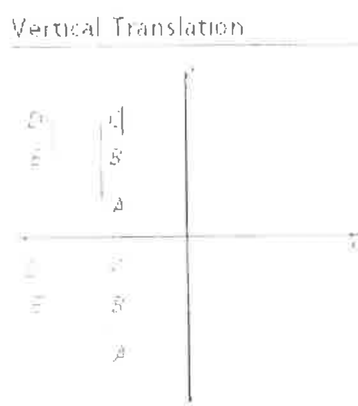
Translated 12 units to the right

2b. The rule is $(x, y) \rightarrow (x+12, y)$

2c. Given the following points, what would their image be under the same translation?

$(0, 0) \rightarrow (12, 0)$ $(1, -5) \rightarrow (13, -5)$

$(-5, -4) \rightarrow (7, -4)$ $(a, b) \rightarrow (a+12, b)$

3a. 

Fill in the table below:

Pre-Image	Translation Image
A(-5, 2)	A'(-5, -7)
B(-5, 5)	B'(-5, -4)
C(-5, 7)	C'(-5, -2)
D(-8, 7)	D'(-8, -2)
E(-8, 5)	E'(-8, -4)

3b. Describe the *vertical translation* of the flag as precisely as you can.

Translated 9 units down

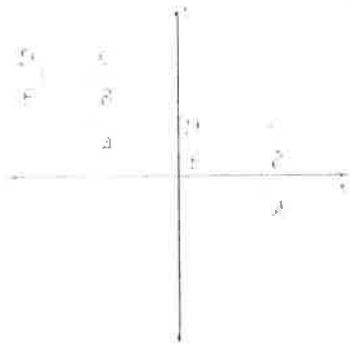
3c. The rule is $(x, y) \rightarrow (x, y-9)$

3d. Given the following points, what would their image be under the same translation?

$(0, 0) \rightarrow (0, -9)$ $(2, 5) \rightarrow (2, -4)$

$(4.1, -2) \rightarrow (4.1, -11)$ $(a, b) \rightarrow (a, b-9)$

4a. Oblique Translation (diagonal)



Fill in the table below:

Pre-Image	Translation Image
A(−5 , 2)	A'(5 , −2)
B(−5 , 5)	B'(5 , 1)
C(−5 , 7)	C'(5 , 3)
D(−8 , 7)	D'(2 , 3)
E(−8 , 5)	E'(2 , 1)

4b. Describe the *oblique translation* of the flag as precisely as you can.
Translated 10 units right, and 4 units down

4c. The rule is $(x, y) \rightarrow (x+10 , y-4)$

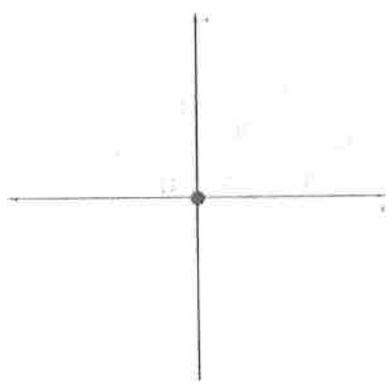
4d. Given the following points, what would their image be under the same translation?

$(0, 0) \rightarrow (10 , -4)$ $(2, 5) \rightarrow (12 , 1)$

$(4.1 , -2) \rightarrow (14.1 , -6)$ $(a, b) \rightarrow (a+10, b-4)$

In general, when **translating** a pre-image h units horizontally and k units vertically, the translation rule will be $(x, y) \rightarrow (x+h , y+k)$

5a. Rotations About the Origin



Fill in the table below:

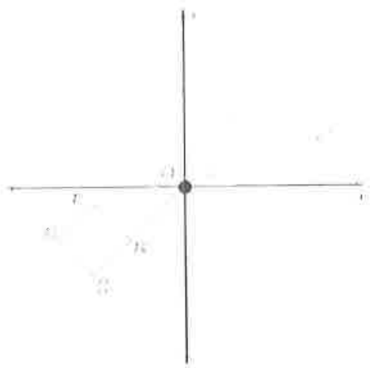
Pre-Image	90° Counterclockwise Rotation Image
A(0, 0)	A'(0 , 0)
B(3, 3)	B'(−3 , 3)
C(5, 5)	C'(−5 , 5)
D(7, 3)	D'(−3 , 7)
E(5, 1)	E'(−1 , 5)

5b. The rule for a **90° rotation** is $(x, y) \rightarrow (-y , x)$

5c. Notice the angles that were formed through this rotation. For example, look at the measures of $\angle COC'$ and $\angle EOE'$. How are the two angles related? They are both 90°
Angle measures are preserved!

5d. The slope of the line through a pre-image point and the origin should be the opposite reciprocal of the slope of a line through the image point and the origin.
(perpendicular!)

6a. Rotations About the Origin



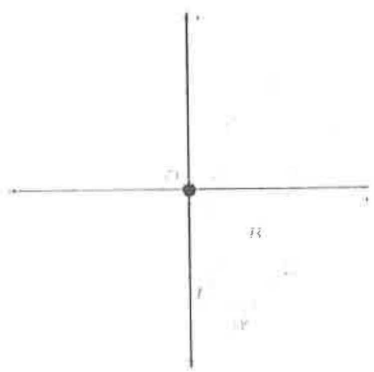
Fill in the table below:

Pre-Image	180° Counterclockwise Rotation Image
A(0, 0)	A'(0 , 0)
B(3, 3)	B'(-3 , -3)
C(5, 5)	C'(-5 , -5)
D(7, 3)	D'(-7 , -3)
E(5, 1)	E'(-5 , -1)

6b. The rule for a **180° rotation** is $(x, y) \rightarrow ($ $-x$, $-y$ $)$

6c. Notice the angles that were formed through this rotation. For example, look at the measures of $\angle COC'$ and $\angle EOE'$. How are the two angles related? They are both 180° Angle measures are preserved and slopes are the same because lines are parallel.

7a. Rotations About the Origin



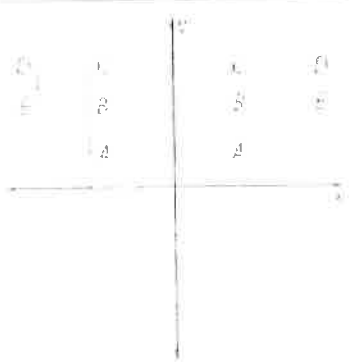
Fill in the table below:

Pre-Image	270° Counterclockwise Rotation Image
A(0, 0)	A'(0 , 0)
B(3, 3)	B'(3 , -3)
C(5, 5)	C'(5 , -5)
D(7, 3)	D'(3 , -7)
E(5, 1)	E'(1 , -5)

7b. The rule for a **270° rotation** is $(x, y) \rightarrow ($ y , $-x$ $)$

7c. Notice the angles that were formed through this rotation. For example, look at the measures of $\angle COC'$ and $\angle EOE'$. How are the two angles related? Through the rotation, angles are 270°. When going clockwise, the angles are 90°.

8a. Reflected Across the y-axis



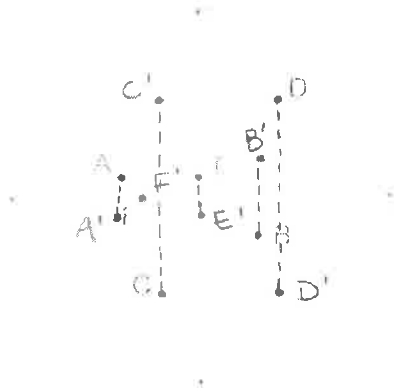
Fill in the table below:

Pre-Image	Reflection Image over *y-axis*
A(-5, 2)	A'(5 , 2)
B(-5, 5)	B'(5 , 5)
C(-5, 7)	C'(5 , 7)
D(-8, 7)	D'(8 , 7)
E(-8, 5)	E'(8 , 5)

8b. Describe the *y-axis reflection* of the flag as precisely as you can.
The flag flipped over the y-axis, looks like a mirror image.

8c. The rule for a **y-axis reflection** is $(x, y) \rightarrow (-x\ ,\ y\ )$

9. **Reflected Across the *x* – axis**



Read #9a below then fill in the table:

Pre-Image	Reflection Points over *x-axis*
A(-4, 1)	A'(−4 , −1)
B(3, -2)	B'(3 , 2)
C(-2, -5)	C'(−2 , 5)
D(4, 5)	D'(4 , −5)
E(0, 1)	E'(0 , −1)
F(-3, 0)	F'(−3 , 0)

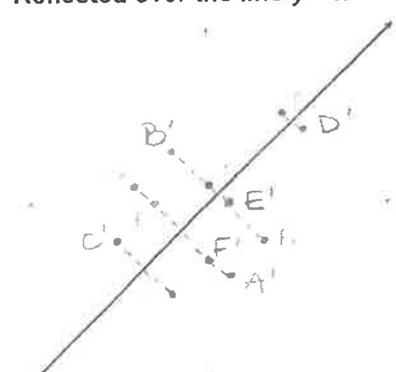
9a. Reflect the above points *over the x-axis* on the graph. *Label* your points and write the coordinates in the table. *Draw a dotted line* connecting the pre-image points to the reflection points.

9b. What changed about the *x*-coordinates? The *y*-coordinates?
x-coordinates stayed the same, and the y-coordinates are the opposite.

9c. Compare the x-axis to the line segments connecting your points. What does the x-axis act as?
perpendicular bisector

9d. The rule for a **x-axis reflection** is $(x, y) \rightarrow (\ x\ ,\ -y\ )$

10. **Reflected over the line *y* = *x***



Read #10a below then fill in the table:

Pre-Image	Reflection Points over ~~x-axis~~ Y=X
A(-4, 1)	A'(1 , −4)
B(3, -2)	B'(−2 , 3)
C(-2, -5)	C'(−5 , −2)
D(4, 5)	D'(5 , 4)
E(0, 1)	E'(1 , 0)
F(-3, 0)	F'(0 , −3)

10a. Reflect the above points *over the line y = x*. *Label* your points and write the coordinates in the table. *Draw a dotted line* connecting the pre-image points to the reflection points.

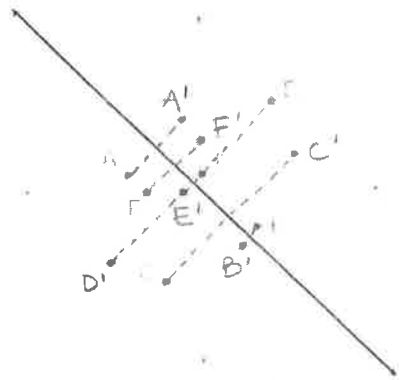
10b. What changed about the coordinates?
The x- and y-coordinates are switched

10c. Compare the line $y = x$ to the line segments connecting your points. What does $y = x$ act as?

perpendicular bisector

10d. | The rule for a **reflection over** $y = x$ is $(x, y) \rightarrow ($ y , x $)$ |

11. **Reflected over the line y = -x**



Read #11a below then fill in the table:

Pre-Image	Reflection Points over ~~x-axis~~ y = -x
A(-4, 1)	A'(-1 , 4)
B(3, -2)	B'(2 , -3)
C(-2, -5)	C'(5 , 2)
D(4, 5)	D'(-5 , -4)
E(0, 1)	E'(-1 , 0)
F(-3, 0)	F'(0 , 3)

11a. Reflect the above points *over the line* $y = -x$. *Label* your points and write the coordinates in the table. *Draw a dotted line* connecting the pre-image points to the reflection points.

11b. What changed about the coordinates? *Be specific!*

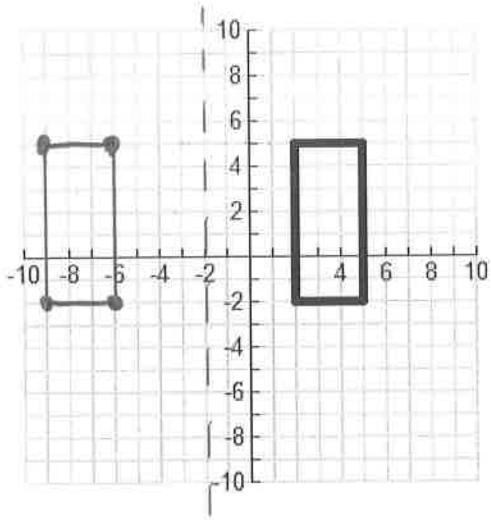
The x- and y-coordinates are switched and the signs are opposite.

11c. Compare the line $y = -x$ to the lines connecting your points. What does $y = -x$ act as?

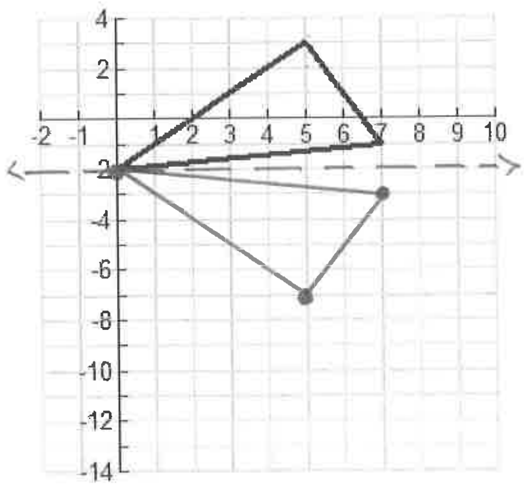
perpendicular bisector

11d. | The rule for a **reflection over** $y = -x$ is $(x, y) \rightarrow ($ -y , -x $)$ |

12. Reflect the following figure over the line $x = -2$.



13. Reflect the following figure over the line $y = -2$.



14. Triangle ABC has vertices at $A(-1, 2)$, $B(3, 4)$, and $C(6, 0)$ in the coordinate plane. The triangle will be reflected over the y-axis and then shifted 5 units left and 2 units down. What are the new coordinates of $\Delta A'B'C'$?