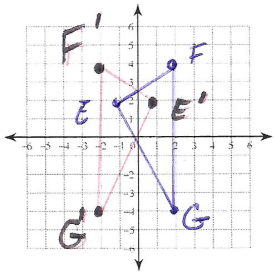
Geometry
Reflections

Name _____
Period _____ Date _____

1. Graph each figure and its image under the given **reflection**. Find the coordinates of the vertices of each image. ***Label all points.***

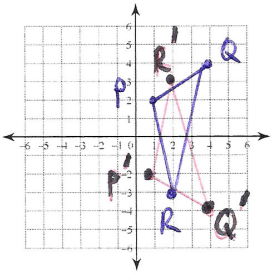
a. ΔEFG if E(-1, 2), F(2, 4) and G(2, -4) reflected over the y-axis.

E' (1, 2)
F' (-2, 4)
G' (-2, -4)



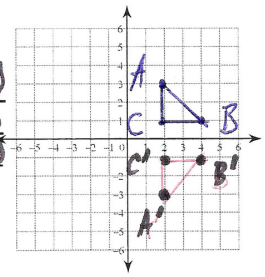
b. ΔPQR if P(1, 2), Q(4, 4) and R(2, -3) reflected over the x-axis.

P' (1, -2)
Q' (4, -4)
R' (2, 3)



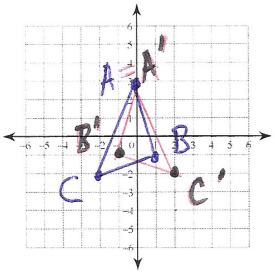
c. ΔABC with vertices A(2,3), B(4, 1), and C(2, 1) reflected over the x-axis.

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



d. ΔABC if A(0, 3), B(1, -1), and C(-2, -2) reflected over the line y-axis.

A' (0, 3)
B' (-1, -1)
C' (2, -2)



For problems a-d, examine how the coordinates for each point changed after the reflection? Which were the same? Which were different? What pattern did you see?

Reflect over y-axis changes x to its opposite

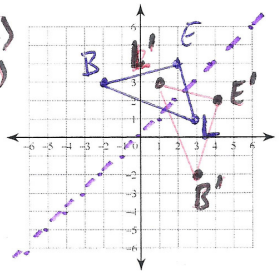
Reflet over x-axis changes y to its opposite

Write a rule for a reflection over the x-axis and one for over the y-axis:

Over x-axis: (x,y) → (X , -Y) Over y-axis: (x,y)→ (-X , Y)

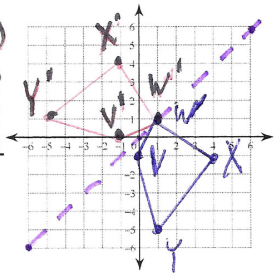
e) ΔBEL if B(-2, 3), E(2, 4), and L(3, 1) reflected over the line $y = x$.

B' (3, -2)
E' (4, 2)
L' (1, 3)



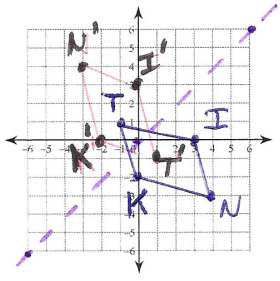
f) Quadrilateral VWXY if V(0, -1), W(1, 1), X(4, -1), and Y(1, -5) reflected over the line $y = x$.

V' (-1, 0)
W' (1, 1)
X' (-1, 4)
Y' (-5, 1)



g) Parallelogram TINK if T(-1, 1), I(3, 0), N(4, -3) and K(0,-2) reflected over $y = x$.

T' (1, -1)
I' (0, 3)
N' (-3, 4)
K' (-2, 0)



What pattern did you see from problems e - g? How did the coordinates change in this case?

The x and y coordinates switch

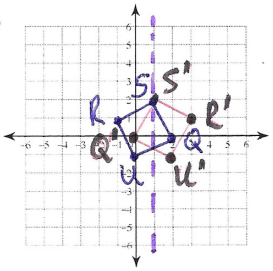
Using words, write a rule for how to find the coordinates of the image of a reflection over the line $y = x$.

(x,y) → (Y , X)

Some of these graphs may leave the graph paper. Estimate the points, but list the coordinates exact.

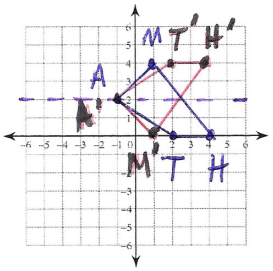
h. Square SQUR if S(1, 2), Q(2, 0), U(0, -1), R(-1, 1) reflected over the line $x = 1$.

S' (1, 2)
Q' (0, 0)
U' (2, -1)
R' (3, 1)



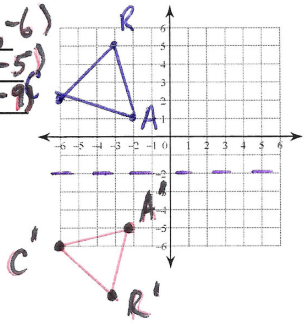
i. Quadrilateral MATH if M(1, 4), A(-1, 2), T(2, 0) and H(4, 0) reflected over $y = 2$.

M' (1, 0)
A' (-1, 2)
T' (2, 4)
H' (4, 4)



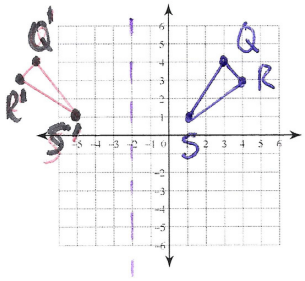
j. Triangle CAR if C(-6,2), A(-2,1), and R (-3,5) reflected over the line $y = -2$

C' (-6, -6)
A' (-2, -5)
R' (-3, -9)



k. Triangle QRS if Q(3,4), R(4,3), and S(1,1) reflected over the line $x = -2$.

Q' (-7, 4)
R' (-8, 3)
S' (-5, 1)



What did you notice from the previous three problems? Could you find a pattern? How did the coordinates change? Could you have written any of them as a reflection over the x or y axis and then a translation? How would that look?

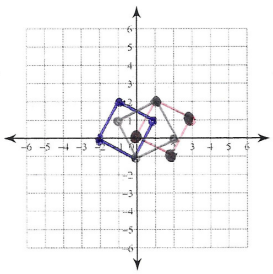
If reflecting over $x = h$, first reflect over the y axis and then translate $(x, y) \rightarrow (x+2h, y)$

If reflecting over $y = k$, first reflect over the x-axis and then translate $(x, y) \rightarrow (x, y+2k)$

For l. and m. show the pre-image and both images. You do not have to label the points this time. (Lack of space.)

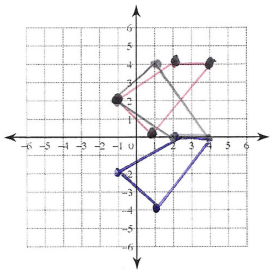
l. Square SQUR if S(1, 2), Q(2, 0), U(0, -1), R(-1, 1) reflected over the y-axis and translated by the rule(x,y) → (x+2, y).

S'' (1, 2)
Q '' (0, 0)
U'' (2, -1)
R'' (3, 1)



m. Quadrilateral MATH if M(1, 4), A(-1, 2), T(2, 0) and H(4, 0) reflected over the x-axis and . translated by the rule (x,y) → (x,y+4)

M'' (1, 0)
A'' (-1, 2)
T'' (2, 4)
H'' (4, 4)



Examine the transformation from l & m. How do they relate to the image from h & i? Write a rule for how a reflection over a line like x=a or y=b could be written as a reflection over the x or y axis and then a translation.