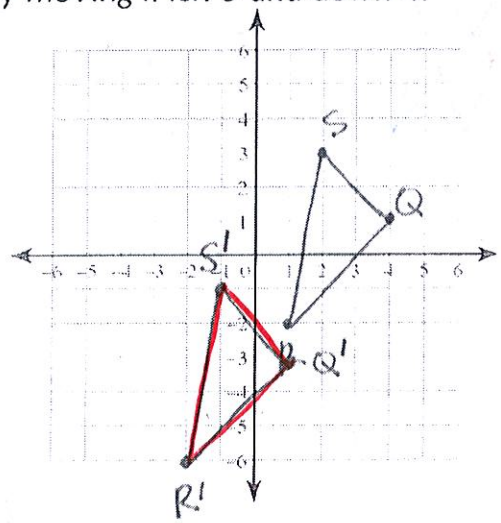
Geometry – Multiple Transformations Name: key

You should already know how to do the following:

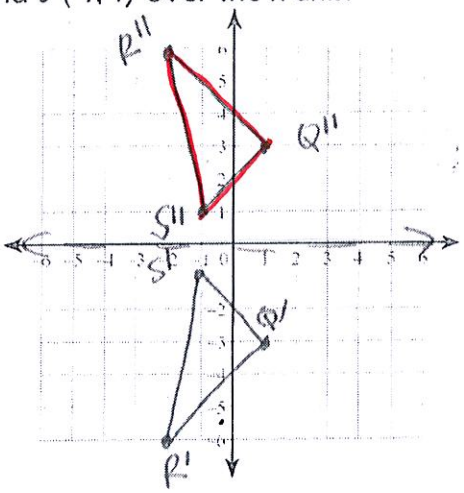
- Translations (slides)
- Reflections (flips, like with a mirror)
- Rotations (spins or turns)
- Dilations (stretches or shrinks)

Let's review to get "warmed-up".

1) Translate ΔQRS if Q(4,1), R(1,-2), S(2,3) by moving it left 3 and down 4.



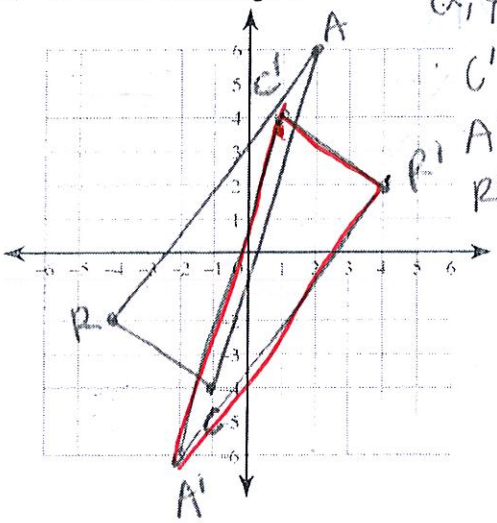
2)Reflect ΔQ'R'S' if Q'(1,-3), R'(-2,-6), and S'(-1,-1) over the x-axis.



3) Rotate ΔCAR if C(-1,-4), A(2,6), R(-4,-2) 180° around the origin.

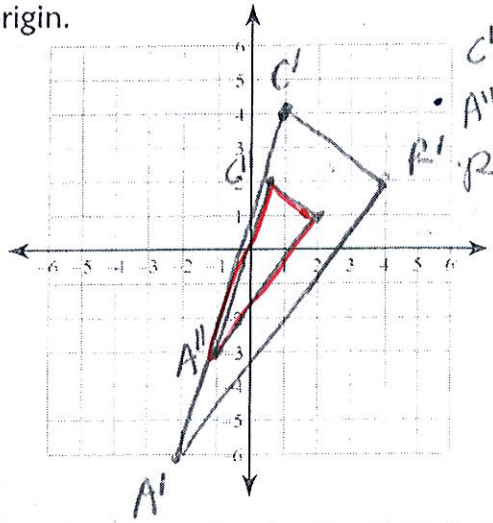
$(x,y) \rightarrow (-x,-y)$

C'(1,4)
A'(-2,-6)
R'(4,2)



4) Dilate ΔC'A'R' if C'(1,4), A'(-2,-6), and R'(4,2) by a scale factor of ½ from the origin.

C''(0.5,2)
A''(-1,-3)
R''(2,1)



5) What did you notice in problems 1&2 and problems 3&4? How were the shapes related? Explain how you could transform ΔQRS by translating it left 3 and down 4 and then reflecting the image over the x-axis. Where does the final image end up?

$A \rightarrow A' \rightarrow A''$

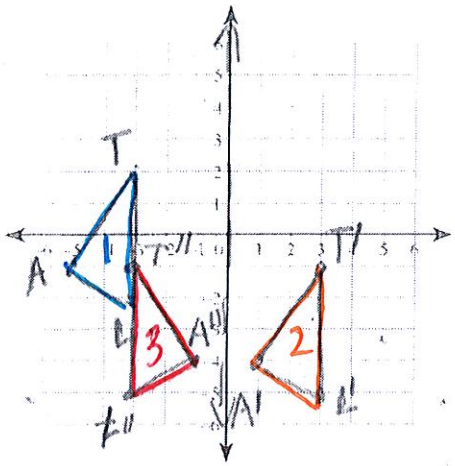
Translation $(x,y) \rightarrow (x-3, y-4)$ Reflection over x-axis

6) How would you rotate ΔCAR 180° about the origin and then dilate it by a scale factor of ½?

$A \rightarrow A' \rightarrow A''$

7. Now you are going to try some multiple transformations: ORDER MATTERS! So do the first transformation written and then the next one.

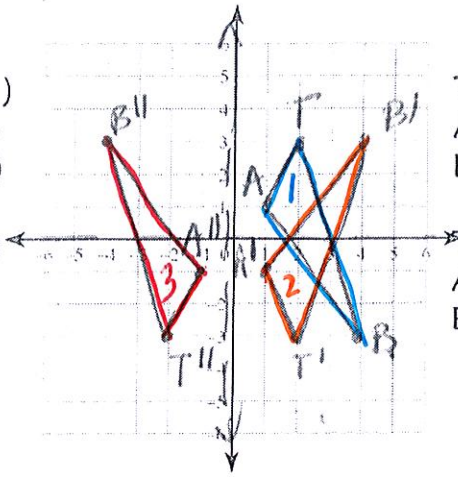
a) Translate ΔALT if A(-5,-1), L(-3,-2), T(-3,2) by moving it right 6 and down 3, then reflect the image over the y-axis.



A'(1 , -4)
L'(3 , -5)
T'(3 , -1)

A"(-1 , -4)
L"(-3 , -5)
T"(-3 , -1)

b) Reflect ΔTAB if T(2,3), A(1,1), and B(4,-3) over the x-axis, then reflect the image over the y-axis.

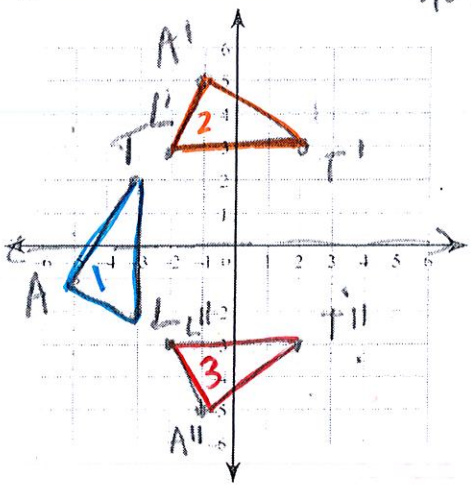


T'(2 , -3)
A'(1 , -1)
B'(4 , 3)

T"(-2 , -3)
A"(-1 , -1)
B"(-4 , 3)

c) Rotate ΔALT if A(-5,-1), L(-3,-2), T(-3,2) 90° clockwise around the origin, then reflect the image over the x-axis.

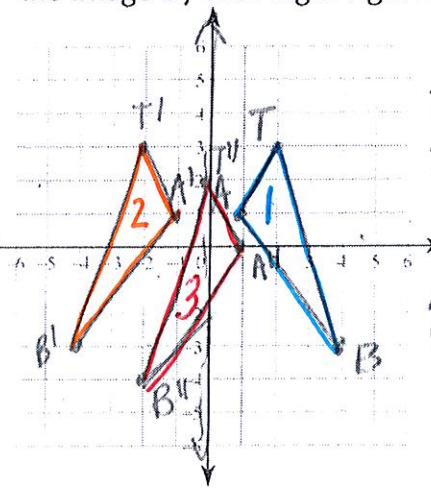
90°CW (y, -x)



A'(-1 , 5)
L'(-2 , 3)
T'(2 , 3)

A"(-1 , -5)
L"(-2 , -3)
T"(2 , -3)

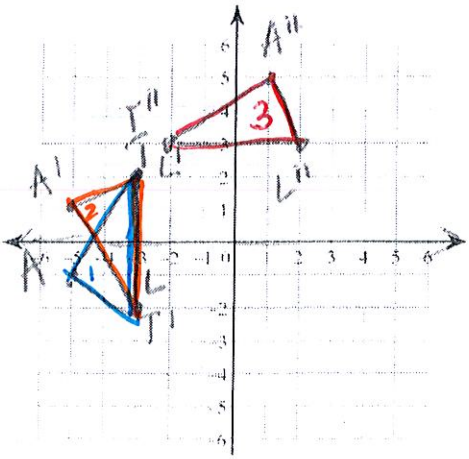
d) Reflect ΔTAB if T(2,3), A(1,1), and B(4,-3) over the y-axis, then translate the image by moving it right 2 and down 1.



T'(-2 , 3)
A'(-1 , 1)
B'(-4 , -3)

T"(0 , 2)
A"(1 , 0)
B"(-2 , -4)

e) Why does order matter? Try letter C again but reverse the order of transformations. Does your image match the one in C?



A'(-5 , 1)
L'(-3 , 2)
T'(-3 , -2)

x-axis reflection

A"(1 , 5)
L"(2 , 3)
T"(-2 , 3)

90° cw
(y, -x)