

Name: \_\_\_\_\_

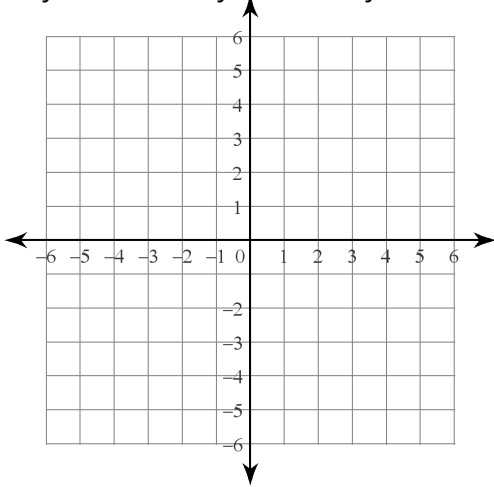
## Geometry – Multiple Transformations

The following worksheet is for you to discover how to do MULTIPLE TRANSFORMATIONS!  
Work with a partner or group of 3 – but make sure you are WORKING THE WHOLE PERIOD!!!  
You should already know how to do the following:

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

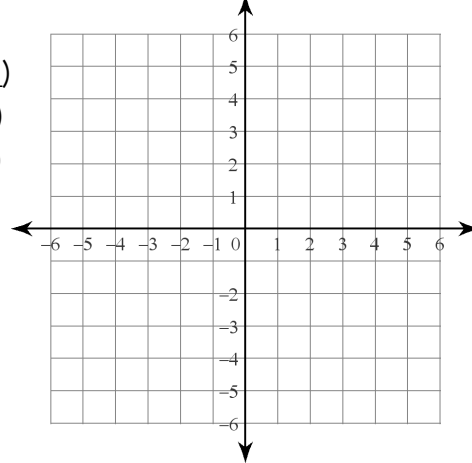
Let's start out with some easier single-transformations to get "warmed-up".

1) Translate  $\triangle QRS$  if  $Q(4,1)$ ,  $R(1,-2)$ ,  $S(2,3)$   
by the rule  $(x,y) \rightarrow (x - 3, y - 4)$



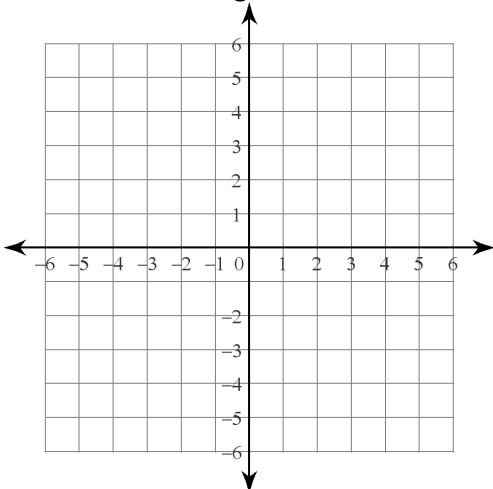
$Q'$  (\_\_\_\_,\_\_\_\_)  
 $R'$  (\_\_\_\_,\_\_\_\_)  
 $S'$  (\_\_\_\_,\_\_\_\_)

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



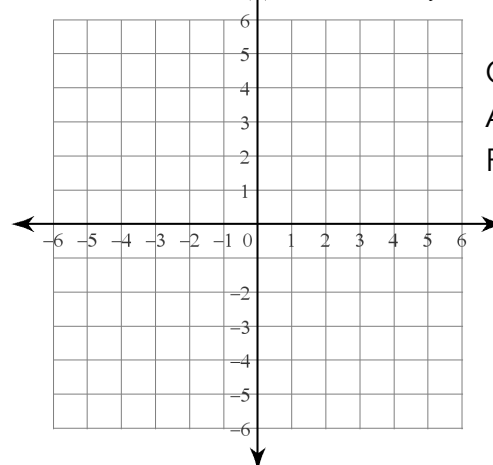
$Q''$  (\_\_\_\_,\_\_\_\_)  
 $R''$  (\_\_\_\_,\_\_\_\_)  
 $S''$  (\_\_\_\_,\_\_\_\_)

3) Rotate  $\triangle CAR$  if  $C(-1,-4)$ ,  $A(2,3)$ ,  $R(-3,-2)$   
 $180^\circ$  about the origin.



$C'$  (\_\_\_\_,\_\_\_\_)  
 $A'$  (\_\_\_\_,\_\_\_\_)  
 $R'$  (\_\_\_\_,\_\_\_\_)

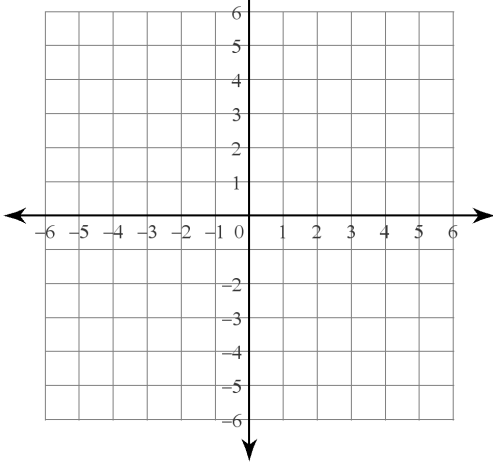
4) Reflect  $\triangle C'A'R'$  if  $C'(1,4)$ ,  $A'(-2,-3)$ ,  
and  $R'(3,2)$  over the line  $y = x$



$C''$  (\_\_\_\_,\_\_\_\_)  
 $A''$  (\_\_\_\_,\_\_\_\_)  
 $R''$  (\_\_\_\_,\_\_\_\_)

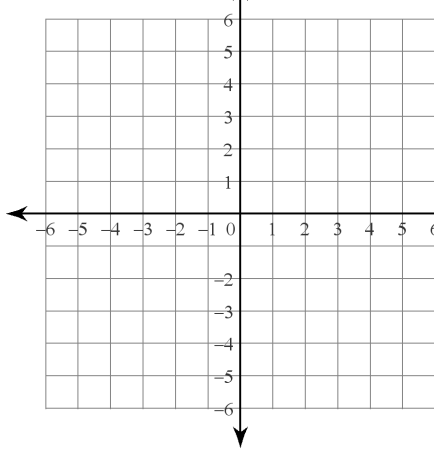
5) Now you are going to try some multiple transformations:

a) Translate  $\triangle ALT$  if  $A(-5,-1)$ ,  $L(-3,-2)$ ,  $T(-3,2)$  by the rule  $(x,y) \rightarrow (x+6, y-3)$ , then reflect the image over the  $y$ -axis



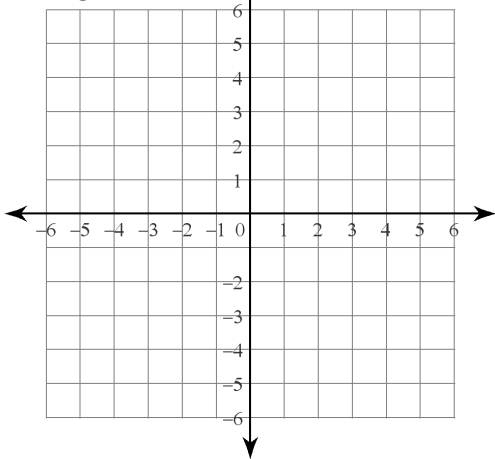
$A'$  (\_\_\_\_,\_\_\_\_)  
 $L'$  (\_\_\_\_,\_\_\_\_)  
 $T'$  (\_\_\_\_,\_\_\_\_)  
  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $L''$ (\_\_\_\_,\_\_\_\_)  
 $T''$ (\_\_\_\_,\_\_\_\_)

b) Reflect  $\triangle TAB$  if  $T(2,3)$ ,  $A(1,1)$ , and  $B(4,-3)$  over the  $x$ -axis, then reflect the image over the  $y$ -axis



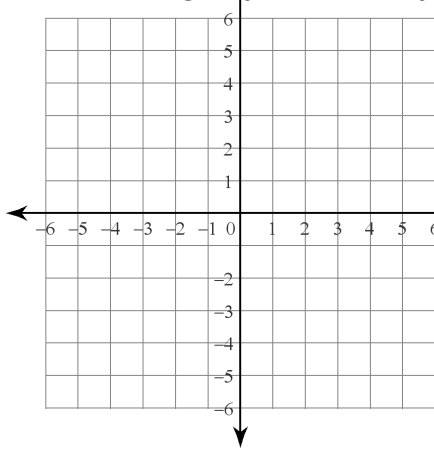
$T'$ (\_\_\_\_,\_\_\_\_)  
 $A'$ (\_\_\_\_,\_\_\_\_)  
 $B'$ (\_\_\_\_,\_\_\_\_)  
  
 $T''$ (\_\_\_\_,\_\_\_\_)  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $B''$ (\_\_\_\_,\_\_\_\_)

c) Rotate  $\triangle ALT$  if  $A(-5,-1)$ ,  $L(-3,-2)$ ,  $T(-3,2)$   $90^\circ$  clockwise about the origin, then reflect the image over the line  $y = x$



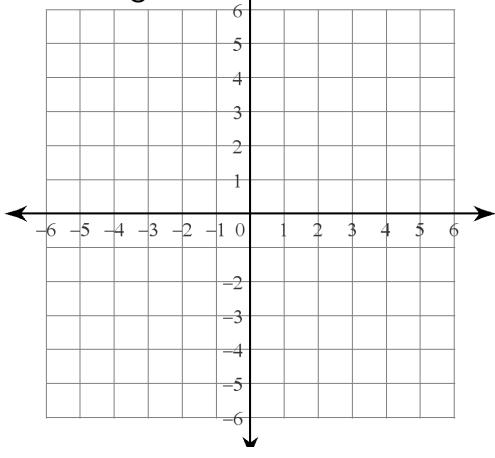
$A'$  (\_\_\_\_,\_\_\_\_)  
 $L'$  (\_\_\_\_,\_\_\_\_)  
 $T'$  (\_\_\_\_,\_\_\_\_)  
  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $L''$ (\_\_\_\_,\_\_\_\_)  
 $T''$ (\_\_\_\_,\_\_\_\_)

d) Reflect  $\triangle TAB$  if  $T(2,3)$ ,  $A(1,1)$ , and  $B(4,-3)$  over the  $y$ -axis, then translate the image by the rule  $(x,y) \rightarrow (x+2, y-1)$



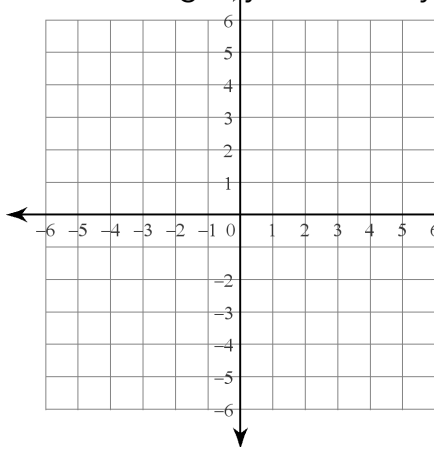
$T'$ (\_\_\_\_,\_\_\_\_)  
 $A'$ (\_\_\_\_,\_\_\_\_)  
 $B'$ (\_\_\_\_,\_\_\_\_)  
  
 $T''$ (\_\_\_\_,\_\_\_\_)  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $B''$ (\_\_\_\_,\_\_\_\_)

e) Rotate  $\triangle ALT$  if  $A(-5,-1)$ ,  $L(-3,-2)$ ,  $T(-3,2)$   $180^\circ$  clockwise about the point  $(-1,-1)$ , then reflect the image over the line  $x = 1$



$A'$  (\_\_\_\_,\_\_\_\_)  
 $L'$  (\_\_\_\_,\_\_\_\_)  
 $T'$  (\_\_\_\_,\_\_\_\_)  
  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $L''$ (\_\_\_\_,\_\_\_\_)  
 $T''$ (\_\_\_\_,\_\_\_\_)

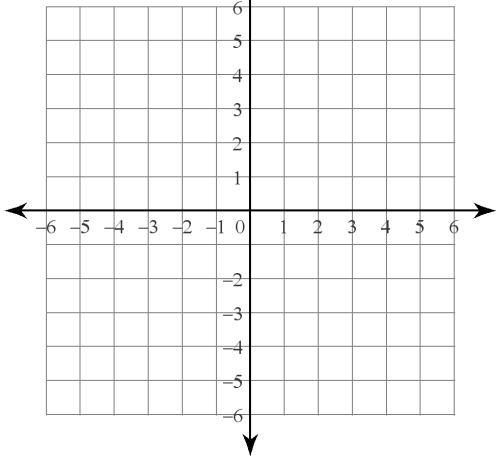
f) Reflect  $\triangle TAB$  if  $T(2,3)$ ,  $A(1,1)$ , and  $B(4,-3)$  over the line  $y = 2$ , then translate the image by the rule  $(x,y) \rightarrow (x-5, y-4)$



$T'$ (\_\_\_\_,\_\_\_\_)  
 $A'$ (\_\_\_\_,\_\_\_\_)  
 $B'$ (\_\_\_\_,\_\_\_\_)  
  
 $T''$ (\_\_\_\_,\_\_\_\_)  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $B''$ (\_\_\_\_,\_\_\_\_)

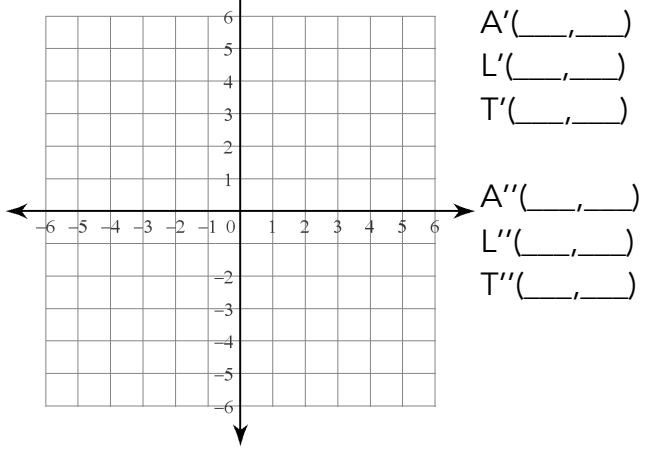
8) Now we are going to explore if the order in which you do multiple transformations matters.

a) Translate  $\triangle ALT$  if  $A(-5,-1)$ ,  $L(-3,-2)$ ,  $T(-3,2)$  by the rule  $(x,y) \rightarrow (x + 3, y + 2)$ , then reflect the image over the y-axis



$A'$  (\_\_\_\_,\_\_\_\_)  
 $L'$  (\_\_\_\_,\_\_\_\_)  
 $T'$  (\_\_\_\_,\_\_\_\_)  
  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $L''$ (\_\_\_\_,\_\_\_\_)  
 $T''$ (\_\_\_\_,\_\_\_\_)

b) Reflect  $\triangle ALT$  if  $A(-5,-1)$ ,  $L(-3,-2)$ ,  $T(-3,2)$  over the y-axis, then translate the image by the rule  $(x,y) \rightarrow (x + 3, y + 2)$ ,



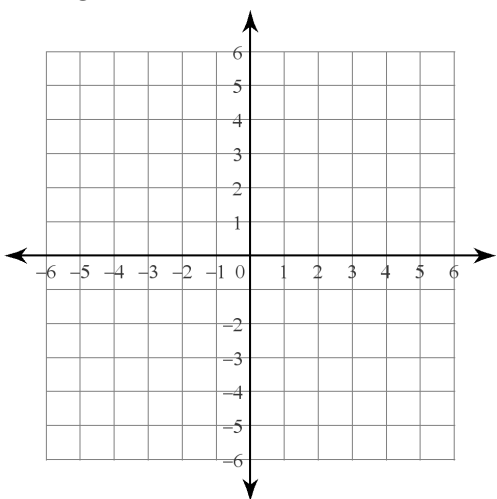
$A'$ (\_\_\_\_,\_\_\_\_)  
 $L'$ (\_\_\_\_,\_\_\_\_)  
 $T'$ (\_\_\_\_,\_\_\_\_)  
  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $L''$ (\_\_\_\_,\_\_\_\_)  
 $T''$ (\_\_\_\_,\_\_\_\_)

Did the order you did the transformations change the final image?

So, does order matter?

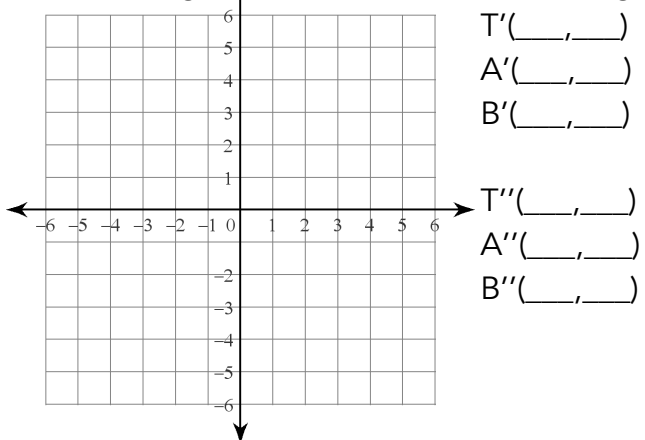
What about with rotations and reflections?

c) Rotate  $\triangle TAB$  if  $T(2,3)$ ,  $A(1,1)$ ,  $B(4,-3)$   $90^\circ$  clockwise about the origin, then reflect the image over the line x-axis.



$T'$  (\_\_\_\_,\_\_\_\_)  
 $A'$  (\_\_\_\_,\_\_\_\_)  
 $B'$  (\_\_\_\_,\_\_\_\_)  
  
 $T''$ (\_\_\_\_,\_\_\_\_)  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $B''$ (\_\_\_\_,\_\_\_\_)

d) Reflect  $\triangle TAB$  if  $T(2,3)$ ,  $A(1,1)$ , and  $B(4,-3)$  over the x-axis, then rotate the image  $90^\circ$  clockwise about the origin,



$T'$ (\_\_\_\_,\_\_\_\_)  
 $A'$ (\_\_\_\_,\_\_\_\_)  
 $B'$ (\_\_\_\_,\_\_\_\_)  
  
 $T''$ (\_\_\_\_,\_\_\_\_)  
 $A''$ (\_\_\_\_,\_\_\_\_)  
 $B''$ (\_\_\_\_,\_\_\_\_)

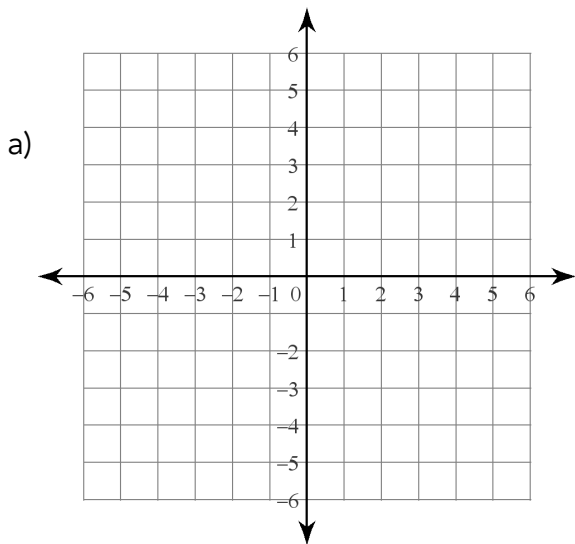
Did the order you did the transformations change the final image?

So, does order matter?

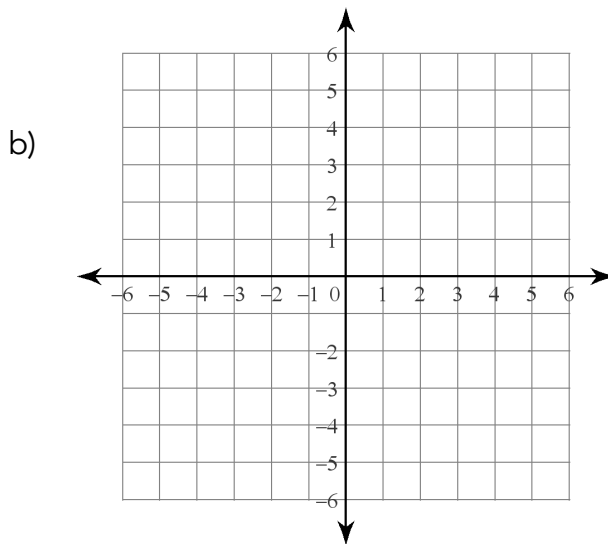
So, if you want to get the correct answer, should you do the transformations in the order given?

For this page you are going to try to discover what transformation(s) have taken place.

For each problem, write the name of the transformation, and any information needed to perform the transformation.



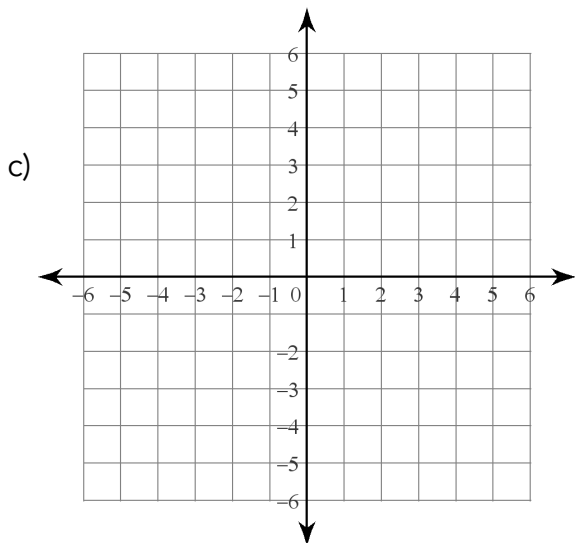
Transformation? \_\_\_\_\_



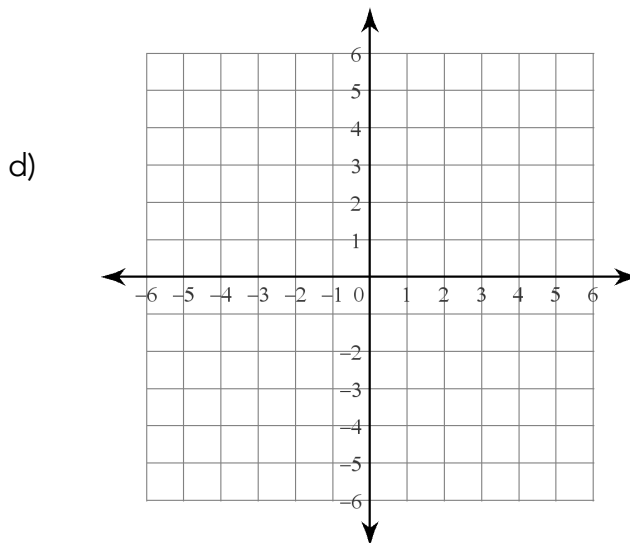
Transformation? \_\_\_\_\_

What do you need to know to do the transformation?

What do you need to know to do the transformation?



Transformation? \_\_\_\_\_



Transformation? \_\_\_\_\_