9.4: Compositions of Transformations

Target 9.4: Identify and draw compositions of transformations.

A **Composition of transformations** is one transformation followed by another.

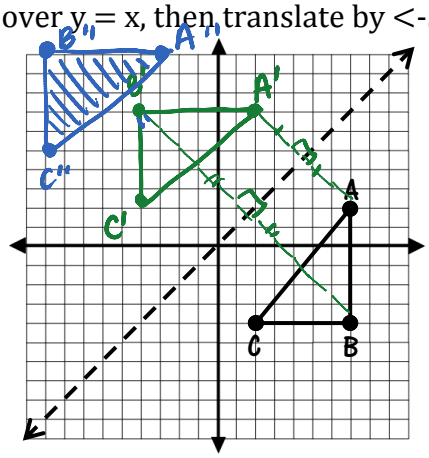
Example 1: Given △ABC, A (7, 2), B (7,-4) and C (2, -4), Reflect over y = x, then translate by <-5, 3>

Step 1: Reflect over y=x

△A'B'C'

Step 2: Translate by vector <-5, 3>

△A"B"C"



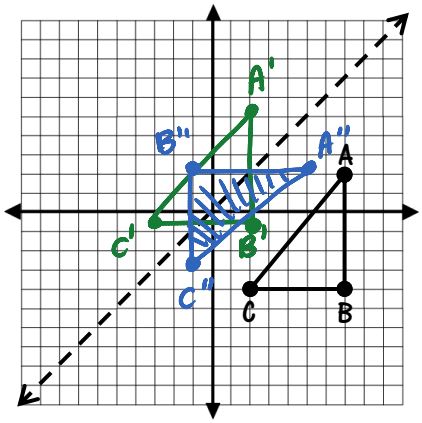
Example 2: Given △ABC, A (7, 2), B (7,-4) and C (2, -4), Translate by <-5, 3>, then reflect over y = x.

Step 1: Translate by vector <-5, 3>

△A'B'C'

Step 2: Reflect over the y = x

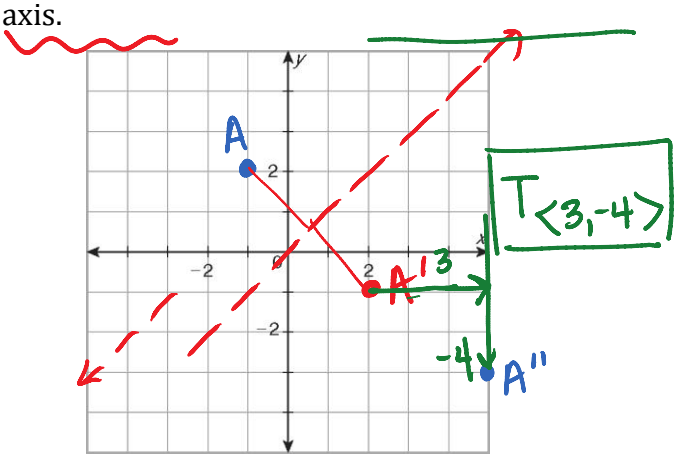
△A"B"C"



Think-About-It then Write-About-It! Example 1 and 2 began with the same image. Both required you to perform the same transformations, but in a different order. What did you observe?

The final image (△A"B"C") from Example 1 and 2 are ≅; however, they did not end up in the same location. The order in which you transform the △'s matters ☺ so be careful...

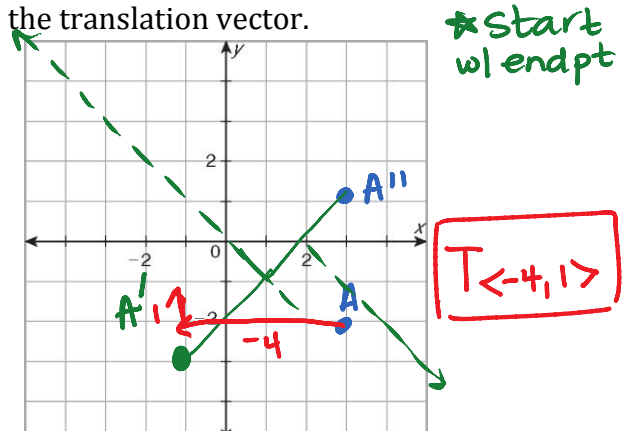
Example 3: Point A (-1, 2) was mapped to point A" (5, -5) first by a reflection across the line y = x, and then by what translation vector?



Example 4: Point A (3, -4) was mapped to point A" (3, 1) first by an unknown vector?!? and then by a reflection across the y = -x axis.

Find the translation vector.

*Start w/ endpt



Part 1: Plot the points A(-6, 6), B(-4, 4), and C(0, 4).

1st: Reflect over y = 3. Label this figure ΔA'B'C'.

2nd: Reflect ΔA'B'C' over y = -1. Label this figure ΔA"B"C".

3rd: Write as a composition of isometries.

$R_{y=-1} \circ R_{y=3}$

4th: What single isometry would get us from the preimage (ΔABC) to the final image (ΔA"B"C")?

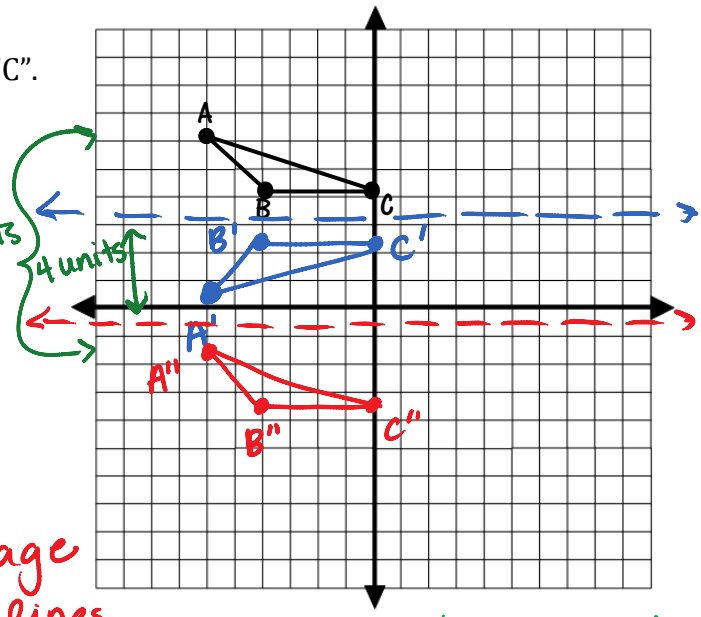
a translation 8 units down

5th: Fill in the Blanks: A double reflection over ||

lines is a translation.

Notice anything else special?

The distance from preimage to image is twice the distance between the || lines



Part 2: Plot the points A(1, 0), B(7, 0), and C(3, -5)

1st: Reflect over x-axis. Label this figure ΔA'B'C'.

2nd: Reflect ΔA'B'C' over y-axis. Label this figure ΔA"B"C".

3rd: Write as a composition of isometries.

$R_{y\text{-axis}} \circ R_{x\text{-axis}}$

4th: What single isometry would get us from the preimage (ΔABC) to the final image (ΔA"B"C")?

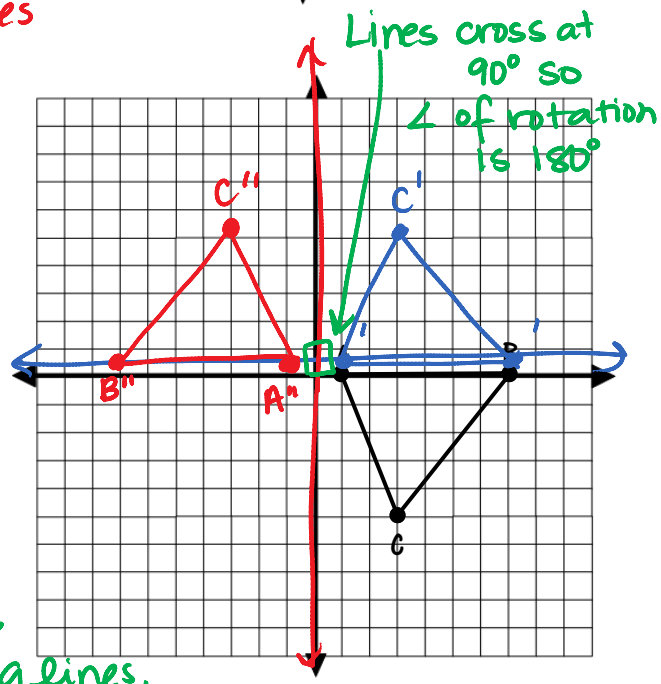
a 180° rotation

5th: Fill in the Blanks: A double reflection over ⊥

lines is a rotation.

Notice anything else special?

The angle of rotation is double the ∡ measure created by the intersecting lines.



Example 5: Which transformation(s) would take Quadrilateral ABDC to Quadrilateral A' B'D'C'? For every choice you choose, provide the translation vector, line of reflection, and/or center of rotation.

~~a)~~ Translation only

~~b)~~ Reflection only

c) Rotation only If so... about what pt?

d) Translation and Reflection Left 6 units, Reflect over x-axis

(ε-'1),0