

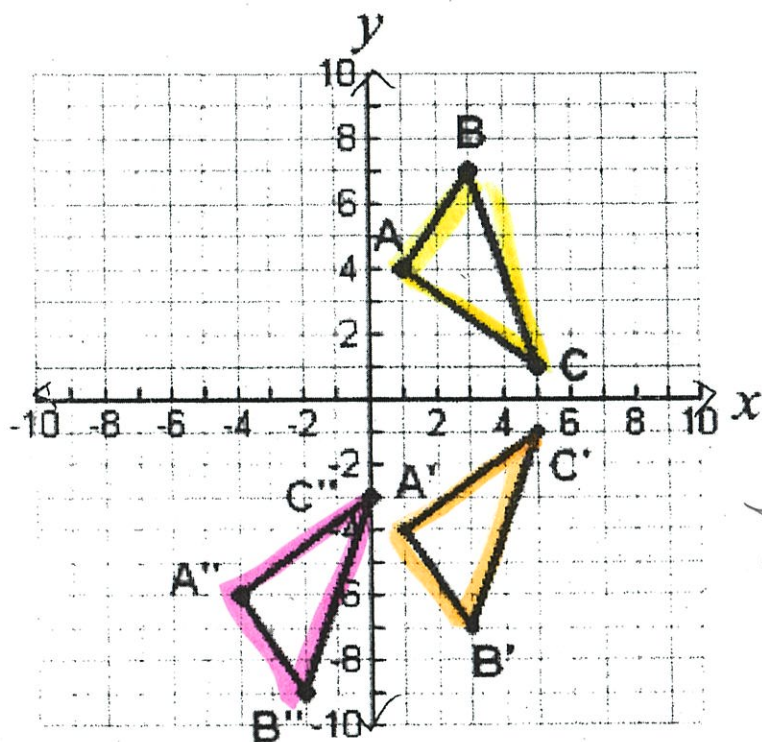
NAME Key

DATE _____

Composition of Transformations

When **two or more transformations** are combined to form a new transformation, the result is called a **composition of transformations**. In a composition, the first transformation produces an image upon which the second transformation is then performed.

Example: Given triangle ABC : $A(1,4)$, $B(3,7)$, $C(5,1)$ Graph the image that is a reflection in the x -axis followed by a translation five units to the left and two units down.



Triangle $A'B'C'$ is the reflection in the x -axis.

Then triangle $A''B''C''$ is the translation of $T(-5, -2)$.

left 5 down 2

$A''(-4, -6)$, $B''(-2, -9)$, $C''(0, -3)$

★ Is $\triangle A''B''C''$ congruent or similar to $\triangle ABC$?

Congruent
★ same size and same shape.

*Translations, reflections, and rotations are called **rigid transformations**, because they do not change the size or shape of a figure. These transformations produce **congruent** figures. Characteristics such as the length of line segments, angle measures, and parallel lines are unchanged by these types of transformations.

* **Dilations** are transformations that **change the size**, but not the shape of a figure. After a dilation, the image is **similar** to the original figure. Therefore dilations produce **non-rigid** transformations. In a dilation only the lengths of the line segments change. The angle measures remain the same.

★ Same shape

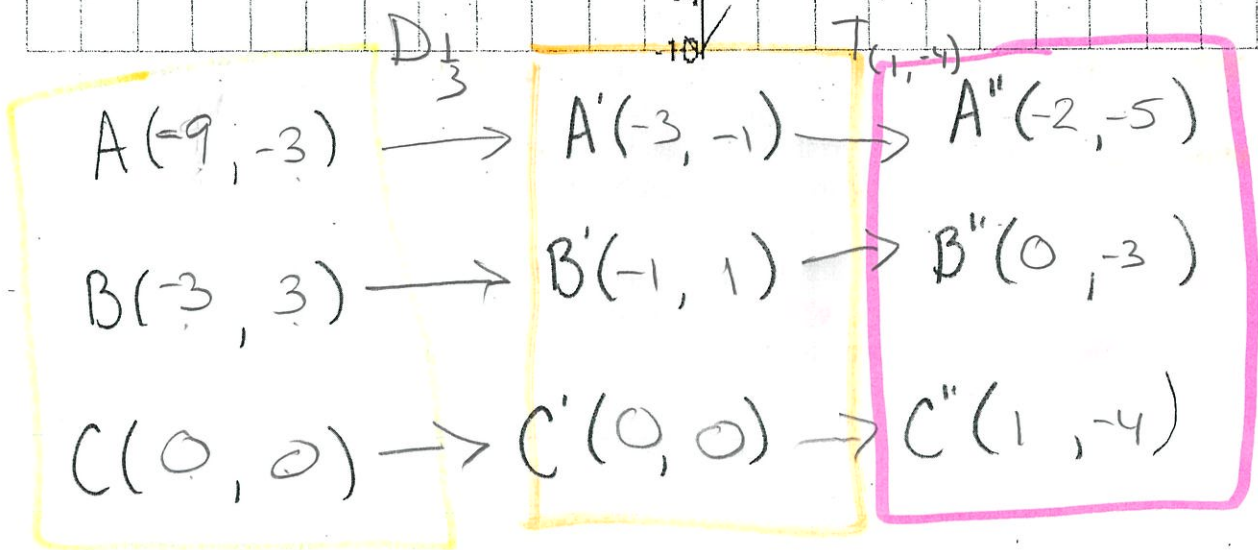
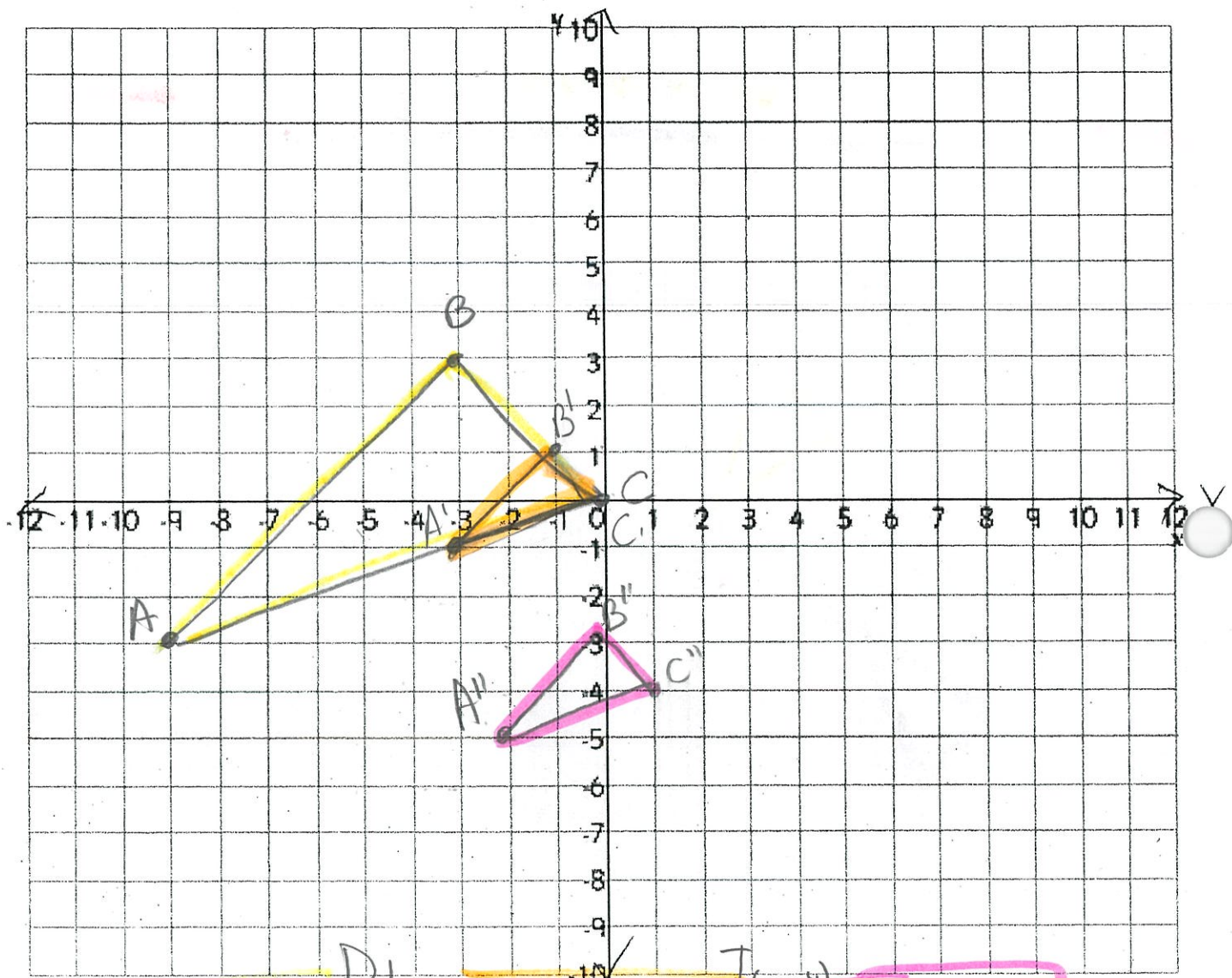
★ different rotation

INDY 100 The coordinates by 3

1. a) Given triangle $A(-9,-3)$, $B(-3,3)$, $C(0,0)$, draw the image formed by a dilation with scale factor $\frac{1}{3}$ to form triangle $A'B'C'$. Translate triangle $A'B'C'$ 1 unit to the right and 4 units down to form $\Delta A''B''C''$.

b) Is $\Delta A''B''C''$ congruent or similar to ΔABC ?

Similar (Non-rigid)



→ change the sign of the x-coordinate

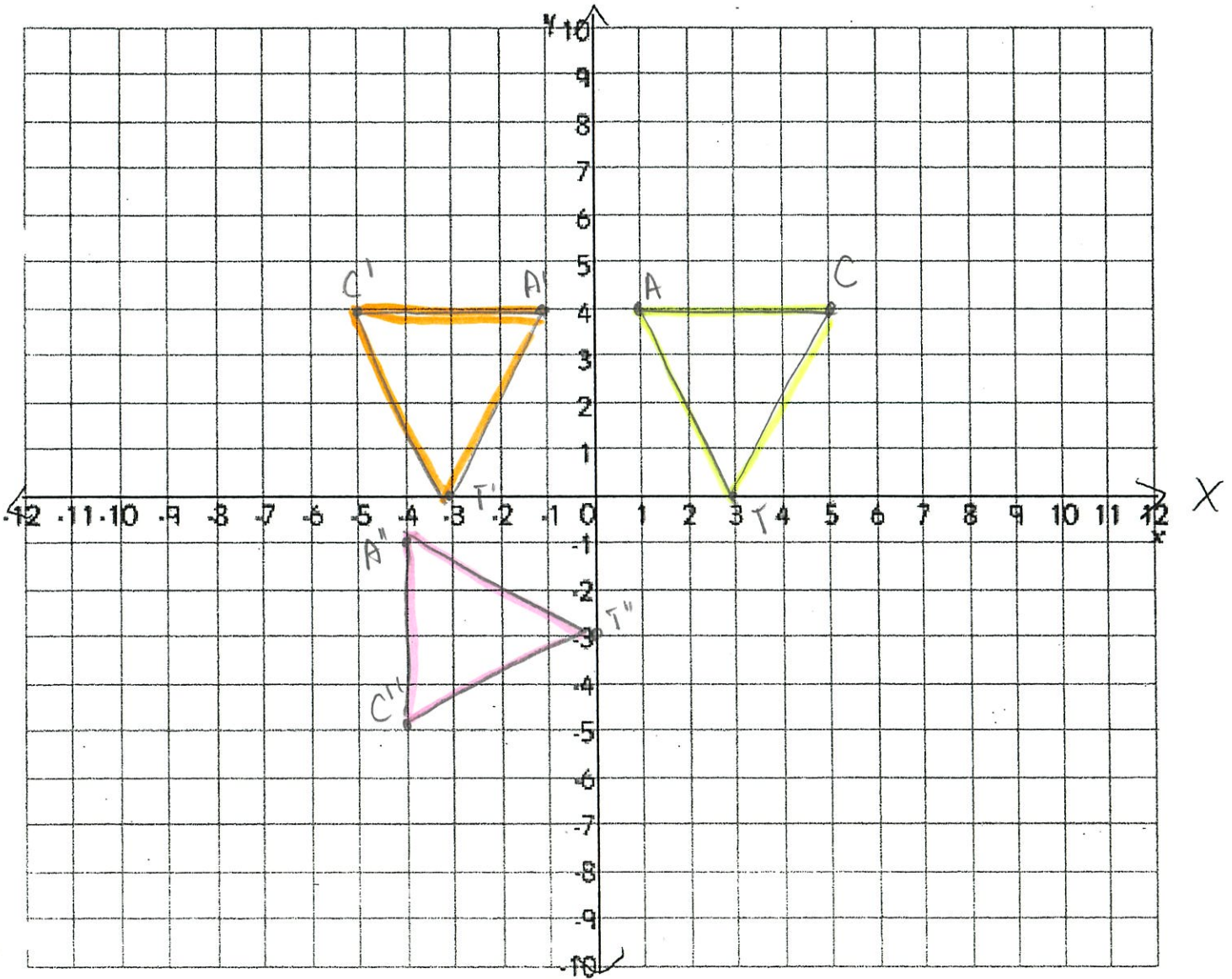
2. a) Given triangle $C(5,4)$, $A(1,4)$, $T(3,0)$, draw the image formed by a reflection in the y-axis, and then a rotation of 90° counterclockwise about the origin.

b) Write the coordinates of $\Delta C'A'T'$ and $\Delta C''A''T''$

$C(5,4) \rightarrow C'(-5,4) \rightarrow C''(-4,-5)$
 $A(1,4) \rightarrow A'(-1,4) \rightarrow A''(-4,-1)$
 $T(3,0) \rightarrow T'(-3,0) \rightarrow T''(0,-3)$

Rotation: $(-y, x)$

c) Is $\Delta C''A''T''$ congruent or similar to ΔCAT ? Congruent (rigid)



3. a) Given triangle $Q(-5,-1)$, $R(-3,3)$, $S(0,-1)$ draw the image formed by a dilation with

scale factor 2 followed by a translation of $T(x+1, y+4)$.

multiply all the coordinates by a scale factor of 2
 ↓
 1 unit right → 4 units up

Complete the chart to help you graph.

| | | |
|------------|--------------|--------------|
| $Q(-5,-1)$ | $Q'(-10,-2)$ | $Q''(-9,2)$ |
| $R(-3,3)$ | $R'(-6,6)$ | $R''(-5,10)$ |
| $S(0,-1)$ | $S'(0,-2)$ | $S''(1,2)$ |

b) Is $\Delta Q''R''S''$ congruent or similar to ΔQRS ?

Similar (NON-rigid)

