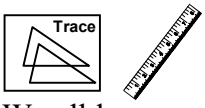
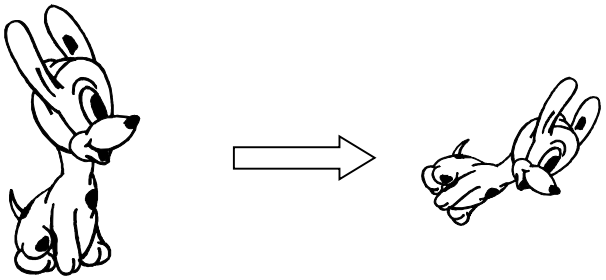
Name: _____ Date: _____



TRANSFORMATIONS
COMMON CORE GEOMETRY

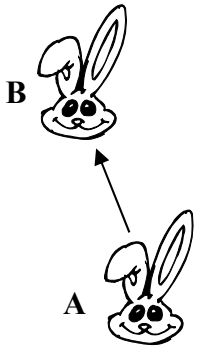
We all have a sense for what it means to **transform an image**. We see this every day with the pictures we take on our phones and the photo filters we apply to the images.

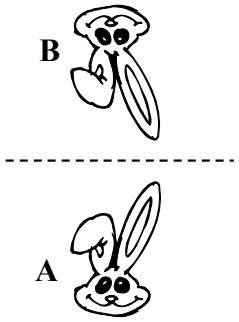
***Exercise* #1:** The picture of the dog in A below has been transformed into the image in B. Describe all of the different transformations that have occurred to A in order to produce image B. You don't need to use technical terminology, yet, but may do so if you remember.

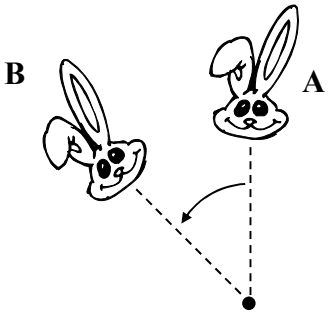


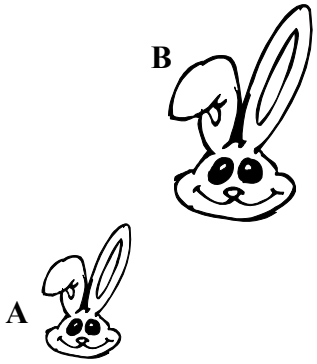
There are many types of transformations that you've seen in previous courses. Let's review four basic types in the next exercise.

***Exercise* #2:** The image of the rabbit face, A, has been transformed each time into image B. Match the transformation with its proper name.









Reflection **Dilation** **Translation** **Rotation**

Transformations have a technical mathematical definition that you were not ready for in previous courses. But, with your extensive study of **functions** in **Common Core Algebra I**, we can now introduce this definition.

TRANSFORMATIONS IN THE PLANE

A **transformation**, F, is a **function** (or rule) that for every point, P, in the plane as its input gives or assigns another, single point in the plane, $F(P)$, as its output.

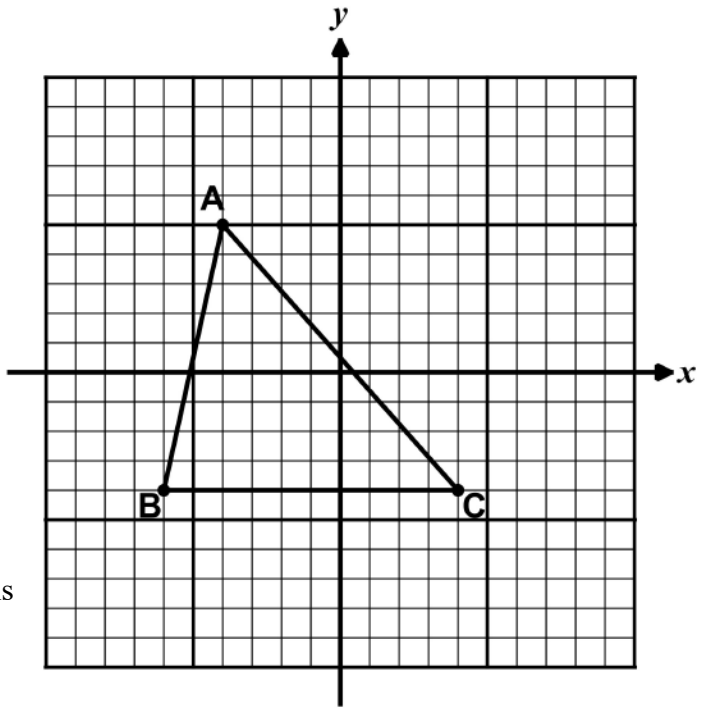
Transformation rules apply whether we are doing geometry in the Euclidean plane (no coordinates) or in the Cartesian plane (with coordinates). They are easy to give in algebraic form if the coordinate plane is being used.

***Exercise* #3:** Triangle ABC is graphed below with vertices at $A(-4,5), B(-6,-4)$ and $C(4,-4)$. Use the following two rules to produce triangles $A'B'C'$ and $A''B''C''$ using ΔABC as the original image both times.

(a) $F(x,y) \rightarrow (x+2,-y)$ to produce $\Delta A'B'C'$

(b) $G(x,y) = \left(\frac{x}{2}, y+5\right)$ to produce $\Delta A''B''C''$

(c) Using tracing paper, which of these two transformations maintained the size and shape of the original image?

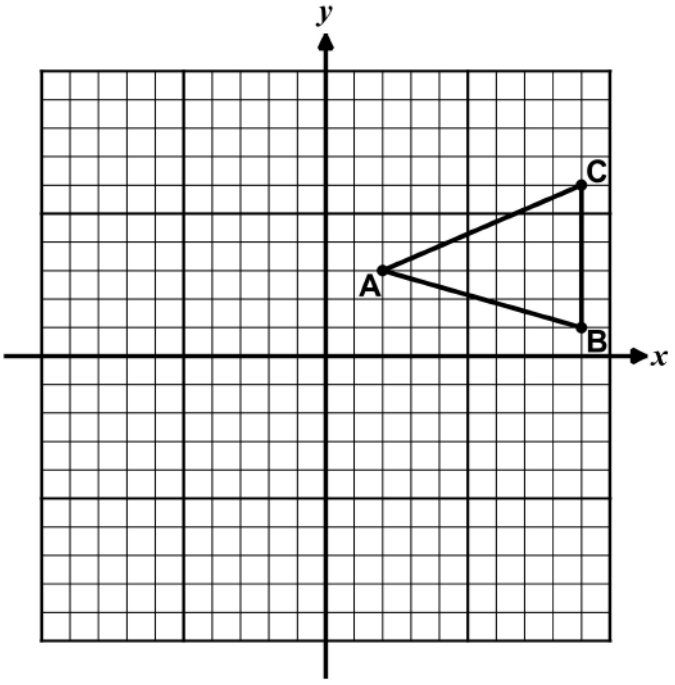


***Exercise* #4:** Using the transformation rule F ,given below, create the image of ΔABC on the same grid. Label it $\Delta A'B'C'$.

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

What transformation does this rule represent?

Did it preserve the size and shape of the triangle?



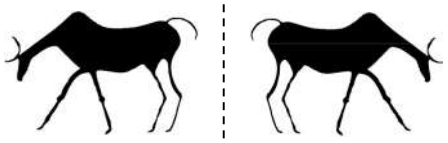
Name: _____ Date: _____

TRANSFORMATIONS
COMMON CORE GEOMETRY HOMEWORK

MEASUREMENT AND CONSTRUCTION

For each of the following transformations on image A, resulting in image B, label it as a rotation, a reflection, a translation, or a dilation.

1.

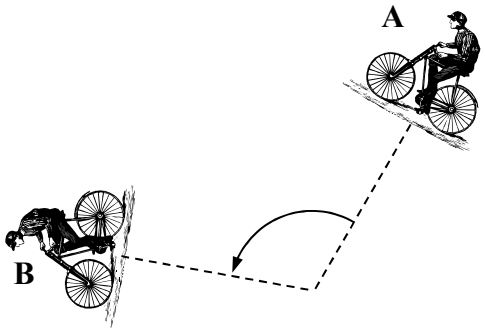


_____

2.

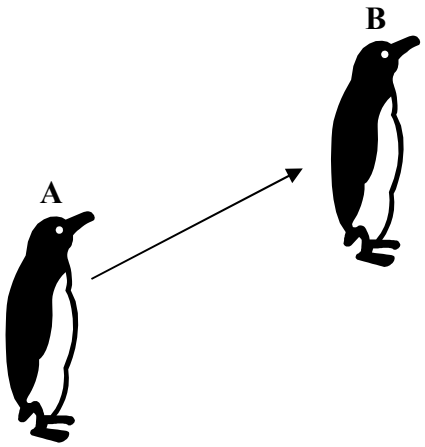
_____

3.



_____

4.



_____

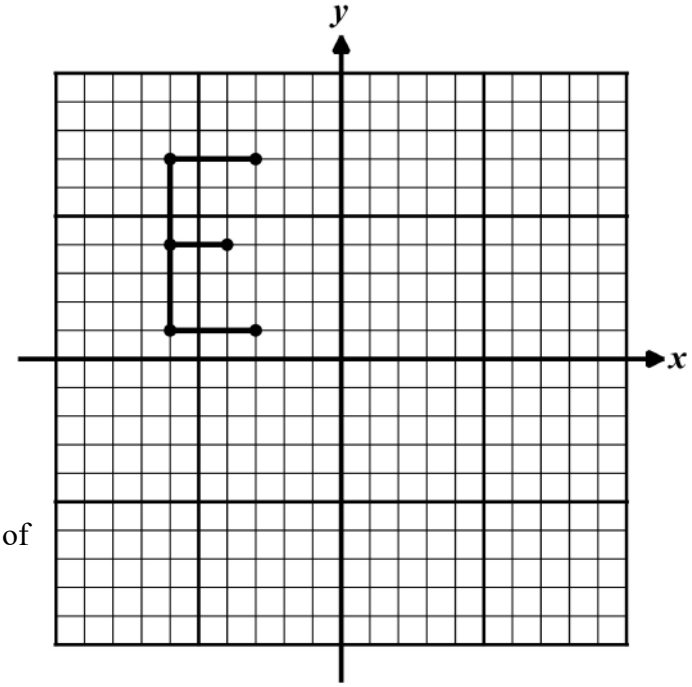
5. Which of the transformations above preserved the size and shape of the original image? Use tracing paper if you need to check.

6. One of the transformations above was a dilation by a **scale factor** of ***k***. The scale factor is the **multiplicative amount** that the picture has been enlarged. To calculate it, divide any length on B by the corresponding length on A. Use your ruler to make these measurements and then calculate the **scale factor** of the dilation. Round to the nearest tenth.

PROBLEM SOLVING

7. The letter E is shown on the graph grid below. Transform the image using the function F shown below.

$$F(x, y) = (y, x)$$



Did this transformation preserve the size and shape of the image? Use tracing paper if necessary.

Can you determine which of the four major types of transformations *F* represents? Explain how you determined your answer. Use tracing paper to experiment with different transformations.

REASONING

8. Transformations that **preserve shape and size** are called **rigid motions**. Find a definition of *just* the word **rigid** using the internet and write it below.

rigid (adj): _____

_____

9. If a rigid motion was used to transform Image A into Image B and then a rigid motion was used to transform Image B into Image C, would Image C have to be the same size and shape as Image A? Explain.