

Unit 1 Lesson 7

Composition of Transformations

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A **composition** is a sequence of transformations.

An example of a composition is a glide reflection since it is the composition of a translation and a reflection.

➤ Composition of Motions with Algebraic Rules

Using your algebraic rules, write a new rule after both transformations have taken place.

1) Translate a triangle 4 units right and 2 units up, and then reflect the triangle over the line $y = x$.

$$(x, y) \rightarrow (x+4, y+2) \rightarrow (y+2, x+4)$$

2) Rotate a triangle 90 degrees counterclockwise, and then dilate the figure by a scale factor of 3.

$$(x, y) \rightarrow (-y, x) \rightarrow (-3y, 3x)$$

3) Translate a triangle 4 units left and 2 units down, and then reflect the triangle over the y -axis.

$$(x, y) \rightarrow (x-4, y-2) \rightarrow (-(x-4), y-2) \rightarrow (-x+4, y-2)$$

4) Rotate a triangle 90 degrees clockwise, and then dilate the figure by a scale factor of $\frac{1}{3}$.

$$(x, y) \rightarrow (y, -x) \rightarrow (\frac{1}{3}y, -\frac{1}{3}x)$$

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$$x-4 \quad x=1 \quad 1-4 = -3$$

$$4-x \quad 4-1 = 3$$

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5) Translate a triangle 4 units right and 2 units down, and then reflect the triangle over the x -axis.

$$(x, y) \rightarrow (x+4, y-2) \rightarrow (x+4, -(y-2)) \rightarrow (x+4, -y+2)$$

6) Rotate a triangle 180 degrees counterclockwise, and then dilate the figure by a scale factor of 2.

$$(x, y) \rightarrow (-x, -y) \rightarrow (-2x, -2y)$$

7) Translate a triangle 4 units left and 2 units up, and then reflect the triangle over the line $y = x$.

$$(x, y) \rightarrow (x-4, y+2) \rightarrow (y+2, x-4)$$

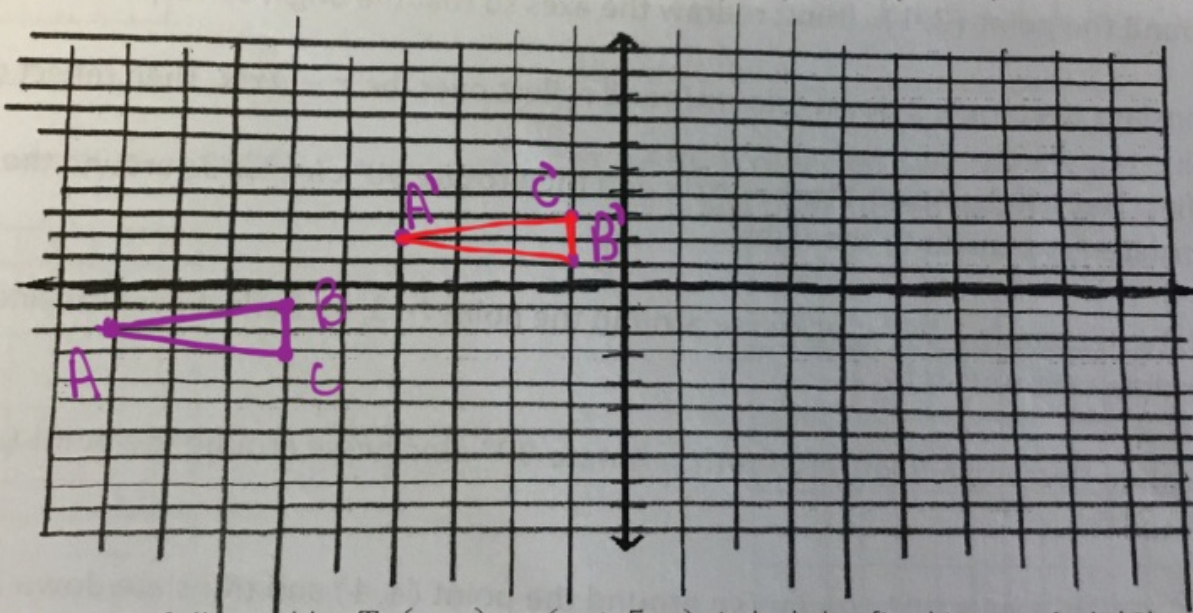
8) Rotate a triangle 180 degrees clockwise, and then dilate the figure by a scale factor of $\frac{1}{2}$.

$$(x, y) \rightarrow (-x, -y) \rightarrow (-\frac{1}{2}x, -\frac{1}{2}y)$$

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9) a. On a coordinate grid, draw a triangle using $A(-9, -2)$, $B(-6, -1)$, $C(-6, -3)$ to represent a duck foot.



$$\begin{array}{r} 180 \\ 2 \overline{) 360} \\ \underline{20} \\ 16 \end{array}$$

Transform ΔABC using $R_{x\text{-axis}}$, followed by $T: (x, y) \rightarrow (x + 5, y)$. Label the final image $\Delta A'B'C'$.

Write a coordinate rule for this composite transformation.

$(x, y) \rightarrow (x, -y) \rightarrow (x + 5, -y)$ $(-6, -3) \rightarrow (-1, 3)$

Now apply the coordinate rule you gave in part c two more times to $\Delta A'B'C'$.



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