**Transformations: Dilation Notes**

**Dilations: to create an image that is similar to the original figure on a coordinate plane; larger or smaller**

**Find the coordinates of the vertices of △*CAT* with coordinates *C*(1, 4),   
*A*(2, 2), and *T*(5, 5) after a dilation with a scale factor of 2. Then graph the original image and the dilation.**



The dilation is (*x*, *y*) → (2*x*, 2*y*). Multiply the coordinates of each vertex by 2. Then graph both figures.

*C*(1, 4) → (2 ∙ 1, 2 ∙ 4) → (2, 8)

*A*(2, 2) → (2 ∙ 2, 2 ∙ 2) → (4, 4)

*T*(5, 5) → (2 ∙ 5, 2 ∙ 5) → (10, 10)



So, the coordinates of the figure after the dilation are *C´*(2, 8), *A´*(4, 4), and   
*T´*(10, 10).

** A triangle has vertices *A*(−2, 3), *B*(0, 0) and *C*(1, 1).**

**a. Find the coordinates of the triangle if it is reflected over the *x*-axis, then dilated by a scale factor of 3.**

Find the coordinates after the reflection over the *x*-axis by multiplying the   
*y*-coordinates of each vertex by –1.

*A*(−2, 3) → (−2, −3)

*B*(0, 0) → (0, 0)

*C*(1, 1) → (1, −1)

To dilate Δ*A*′*B*′*C*′ by a scale factor of 3, multiply the coordinates of each vertex by 3.

*A*′(−2, −3) → (−6, −9)

*B*′(0, 0) → (0, 0)

*C*′(1, −1) → (3, −3)

The coordinates of Δ*A*″*B*″*C*″ are *A*″(–6, –9), *B*″(0, 0), and *C*″(3, –3).

**b. Find the coordinates if the original triangle is dilated by a scale factor of 3, then reflected over the *x*-axis.**

To dilate Δ*ABC* by a scale factor of 3, multiply the coordinates of each vertex by 3.

*A*(−2, 3) → (−6, 9)

*B*(0, 0) → (0, 0)

*C*(1, 1) → (3, 3)

The coordinates of Δ*A*′*B*′*C*′ after the dilation are *A*′(–6, 9), *B*′(0, 0), and   
*C*′(3, 3). To find the coordinates after the reflection over the *x*-axis multiply the *y*-coordinates of each vertex by –1.

*A*′(−6, 9) → (−6, −9)

*B*′(0, 0) → (0, 0)

*C*′(3, 3) → (3, −3)

The coordinates of Δ*A*″*B*″*C*″ are *A*″(–6, –9), *B*″(0, 0), and *C*″(3, –3).

**c. Are the two transformations commutative? Explain.**

Yes; Sample answer: since the coordinates of the answers to Exercises **a** and **b** are the same, the order in which you perform them does not matter.